

**PREVENTION OF SIGNIFICANT DETERIORATION
PRECONSTRUCTION REVIEW AND FINAL DETERMINATION
FOR ADIENT US LLC
POLYURETHANE FOAM MANUFACTURING FACILITY
IN GILES COUNTY, TENNESSEE**

**This review was performed by the Tennessee Air
Pollution Control Division in accordance with the
Rules for Prevention of Significant Deterioration
(PSD).**

September 22, 2022

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I. Rule Background

On June 3, 1981, the State of Tennessee adopted Tennessee Air Pollution Control Regulations (TAPCR) 1200-03-09-.01(4), Prevention of Significant Air Quality Deterioration. This Rule has been subsequently amended, with the latest amendments effective April 4, 2018. Under these regulations, a new major stationary source that is included in one of 28 source categories and has the potential or increased potential to emit 100 tons per year or more of any air pollutant regulated in the Clean Air Act must be reviewed with regard to significant deterioration prior to construction. In addition, any source having the potential or increased potential to emit 250 tons per year or more of any of these air pollutants must be reviewed with the same regard.

To comply with the amended PSD regulations, a source with potential emissions greater than significant amounts of a regulated pollutant must meet several criteria. The first criterion is that Best Available Control Technology (BACT) must be applied to all emission points for the applicable PSD pollutant. The second criterion is that the proposed source or modification must not cause or contribute to any violation of the National Ambient Air Quality Standards (NAAQS – see **Table 1**). Finally, increases in ambient concentrations of sulfur dioxide, nitrogen dioxide and particulate matter resulting from emissions discharged by the proposed source must not exceed the increments specified by the PSD regulations (**Table 2**).

Table 1: National Ambient Air Quality Standards			
Pollutant		Averaging Period	Standard
Particulate Matter	(PM ₁₀)	24-hour	150 µg/m³
	(PM _{2.5})	Annual	12.0 µg/m³ (primary)
			15.0 µg/m³ (secondary)
		24-hour	35 µg/m³
Nitrogen Dioxide (NO ₂)		Annual (primary and secondary)	53 ppb
		1-hour (primary)	100 ppb
Carbon Monoxide (CO)		8-hour	9 ppm
		1-hour	35 ppm
Sulfur Dioxide (SO ₂)		1-hour (primary)	75 ppb
		3-hour (secondary)	0.5 ppm
Lead		3-month (primary and secondary)	0.15 µg/m³
Ozone		8-hour (primary and secondary)	0.070 ppm

Table 2: Maximum Allowable Increases (µg/m³) for Class II Areas	
Pollutant	µg/m³
PM10, annual arithmetic mean	17
PM10, 24-hour maximum	30
PM2.5, annual arithmetic mean	4
PM2.5, 24-hour maximum	9
Sulfur dioxide: Annual arithmetic mean	20
Sulfur dioxide: 24-hour maximum	91
Sulfur dioxide: 3-hour maximum	512
Nitrogen dioxide: Annual arithmetic mean	25

II. Project Background and Description

On March 30, 2022, Adient US LLC (Adient or Adient Pulaski) submitted an application for a construction permit to increase its emission limits for the production operations at the polyurethane foam manufacturing facility located at 1890 Mines Road, Pulaski, Giles County, Tennessee. This change will increase the Volatile Organic Compound (VOC) allowable emission limit from 308.0 tons per year (tpy) in Title V Operating Permit 569269 to 491.4 tpy.

Adient operates three moisture curing, urethane foam injection lines at its Pulaski, Tennessee facility. The foam lines produce automotive seat cushions and other foam products in clamshell molds. The three molding lines each operate using racetrack-type conveyors, whereby the molds are presented to the various production stations for the foam process to produce a part in its final form. An open mold is presented to the mold release - spray application station where an operator sprays the mold with the mold release agent. The mold release agent is comprised of a wax in a solvent carrier which contains VOC. The mold advances to the pour station where a robot equipped with a urethane component mix head injects the mixed foam components into the open mold. The mold is automatically closed, and the foam reaction occurs in the mold cavity. As the mold advances through the production line, the foam expands, cures and is opened and presented to the extraction station. A worker team removes the molded part, cleans and prepares the mold for another cycle, and the process repeats.

On April 29, 2004, the Technical Secretary issued Title V permit 556316 to the previous owner, Johnson Controls, Inc (Johnson Controls). Condition E4-2 limited VOC emissions from the source to 248.0 tons during all intervals of 12 consecutive months. On May 8, 2006, the Division of Air Pollution Control issued a minor modification to that permit to increase the allowable VOC emissions to 258.0 tons during all intervals of 12 consecutive months.

On February 18, 2010, the Division received an application from Johnson Controls dated February 16, 2010, for a minor modification to Title V permit 556316 to increase the allowable VOC emission limit in

condition E4-2 to 276.7 tons during all intervals of 12 consecutive months. On March 4, 2010, the Division received a letter from Johnson Controls indicating that the baseline emissions used in the February 16, 2010, application were incorrect. The letter stated that “Johnson Controls is requesting an increase in the VOC allowable for the Foam Production Line from 258.0 tons per year to 285.9 tons per year during all intervals of 12 consecutive months.” On June 4, 2010, the Division issued Title V renewal permit 562120 which contained condition E4-2 that increased the VOC emission limit for the source to 285.9 tons during all intervals of 12 consecutive months.

On January 15, 2016, the Technical Secretary issued Title V renewal permit 569269. On May 26, 2016, the Division issued an Administrative Amendment to Title V permit 569269 changing the permittee to Adient US LLC (Adient). Adient submitted an application dated July 15, 2016, requesting a Minor Modification for permit 560269 “to increase the VOC limit from 285.9 to 320 tons per year”. Adient submitted a revised application dated October 12, 2016, requesting a change to the VOC emission limit to 308 tons per year. On November 21, 2016, the Division issued Minor Modification #1 to Title V permit 569249 which changed the VOC emission limit in condition E4-2 to 308.0 tons during all intervals of 12 consecutive months.

On June 15, 2020, the Division received a revised Title V permit renewal application dated June 11, 2020, from Adient. The application states “During this renewal application process, Adient Pulaski is targeting an increase in Allowable AAP Emissions VOC’s from the current 308 tons per AAP to 346 AAP.” In June 2021, Adient contacted the Division regarding increasing VOC emissions from the mold release operations to 491.4 tpy¹.

In accordance with 40 CFR 52.21(r)(4), and Division Rule 1200-03-09-.01(4)(a)6. states:

If a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements of this paragraph shall apply to the source or modification as though construction had not yet commenced on the source or modification.

The Division determined that the VOC emission limit increase from 248.0 to 258.0 tons during all intervals of 12 consecutive months in 2006 was not the result of a modification to the source, and the facility became a major stationary source solely by relaxation of an enforceable limitation. The Division determined that the VOC emission limit increases to 276.7 tons (during all intervals of 12 consecutive months) in 2010 and to 308.0 tons (during all intervals of 12 consecutive months) in 2016 further relaxed the enforceable emission limitation that kept the facility from being a major stationary source. Therefore, the 2006, 2010, and 2016 emissions increases should have been issued in accordance with paragraph 1200-03-09-.01(4), Prevention of Significant Air Quality Deterioration (PSD).

The proposed modification will result in a significant emission increase for VOC. The project is therefore subject to review under the regulations governing the Prevention of Significant Air Quality Deterioration (PSD).

¹ Projected maximum emissions facility-wide are 502.85 tpy, but Adient will voluntarily accept a limit on facility-wide emissions of 491.40 tpy.

III. Information Used in Analysis

The applicant provided the following information in their March 30, 2022, permit application (Appendix C).

The proposed modification will affect the emission source listed in **Table 3**.

Table 3: Source Description					
Emission Source	Stack (Process Vent) ID	Description	Stack Height (ft)	Stack Exit Flowrate (scfm)	Stack Diameter (ft)
Facility ID (ESRN): 28-0076-01 All stacks emit at ambient conditions of 70°F, with 1% moisture from round discharge points unobstructed in the upward direction	1	Polyurethane Foam Manufacturing Foam line No. 2	80	15,900	3'2"
	2		90	18,200	3'6"
	3		96	23,800	3'10"
	4		61	7,100	2'1"
	5		58	5,000	2'
	6	Polyurethane Foam Manufacturing Foam Line No. 1	10'6"	25,000	5'6"
	7		10'6"	25,000	5'6"
	8		10'6"	25,000	5'6"
	9		10'6"	25,000	5'6"
	10	Polyurethane Foam Manufacturing Foam Line No. 3	10'6"	25,000	5'6"
	11		10'6"	25,000	5'6"
	12		10'6"	25,000	5'6"
	13		10'6"	25,000	5'6"

Notes: ESRN is the Emission Source Reference Number for the source point on the permit.
Stack parameters from **Figure 3** in application dated 2022-03-30

IV. Emissions Analysis

Projected emissions increase from the proposed modification (**Table 4**) were obtained from the information and assumptions given in the March 30, 2022, permit application.

Table 4: Projected Emissions Increases and Permit Emission Limits				
Pollutant	Project Emissions Increase (tons/year)	New Permit Allowable Emission Limits (tons/year)	PSD Significance Threshold (tons/year)	Subject to PSD Review?
PM/PM ₁₀ /PM _{2.5}	9.45	9.90	25/15/10	No
VOC	502.85	491.40	40	Yes

The company's calculated VOC PTE is 502.85 tpy (see calcs in Appendix B of Adient's application dated March 30, 2022), but they chose to request a limit of 491.4 tpy. The facility-wide VOC emission rate is primarily generated by the use and operations associated with the mold release agent, and the balance of the VOC emissions are from other related foam manufacturing and cleaning operations. The VOC emissions from other related foam manufacturing and cleaning operations are relatively low enough that Adient is able to accept a VOC emissions cap of 491.4 tpy. The company provided a letter stating this agreement to the VOC limit of 491.4 tpy.

Since the PSD application submitted by Adient is the result of the 2006 permit modification that made the Adient facility become a major stationary source (by virtue of a relaxation of an enforceable VOC limit), all three foam seating lines are considered new emission units for the purpose of determining baseline actual emissions. Therefore, baseline actual emissions for this source are zero, as required by TAPCR 1200-03-09-.01(4)(a)6.

V. Control Technology Review

V.1 National Emission Standards for Hazardous Air Pollutants (NESHAP)

EPA has promulgated National Emission Standards for Hazardous Air Pollutants (NESHAPs) for various industrial categories. Adient is an area source of hazardous air pollutants (HAPs), which emits less than 10 tons per year of any single HAP and less than 25 tons per year of total HAPs. The application was evaluated to determine the applicability of 40 CFR Part 63 Subpart OOOOOO (National Emission Standards for Hazardous Air Pollutants for Flexible Polyurethane Foam Production and Fabrication Area Sources).

The Adient polyurethane foam operations is an area source of HAPs and an existing source pursuant to 40 CFR §63.11414(c). Accordingly, the operations are subject to 40 CFR Part 63, Subpart OOOOOO: National Emission Standards for Hazardous Air Pollutants for Flexible Polyurethane Foam Production and Fabrication Area Sources. Being subject to 40 CFR Part 63 Subpart OOOOOO, the facility shall not use a material containing methylene chloride as an equipment cleaner to flush the mixhead, use a material containing methylene chloride elsewhere as an equipment cleaner, or use a mold release agent containing methylene chloride in the molded flexible polyurethane foam process.

V.2 New Source Performance Standards (NSPS)

Not Applicable

V.3 Other Federal Regulations

The Adient Pulaski facility operates processes which utilize toluene diisocyanate (TDI), Chemical Abstract System no. 26471-62-5. TDI is a regulated hazardous substance under Section 112(r) of the Clean Air Act, Accidental Release Prevention/Risk Management Plan Rule. Adient Pulaski is subject to Program 1 of the rule, which requires preparation and submittal of a Risk Management Plan (RMP) in accordance with 40 CFR §68.12(a) and (b), updated every five years. Program 1 also requires a hazard assessment, which consists of a worst-case release scenario analysis as provided in §68.25 and a five-year accident history as provided in §68.42.

V.4 Best Available Control Technology (BACT) Analysis

Pursuant to TAPCR 1200-03-09-.01(4)(j), this proposed source is required to apply best available control technology for VOC since significant net emission increases are expected from the project as a whole.

Best Available Control Technology means an emission limitation (including a visible emission standard) based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification which the Technical Secretary, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.

In no event shall application of Best Available Control Technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR part 60 or 61. If the Technical Secretary determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to require the application of Best Available Control Technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

The EPA policy memorandum dated December 1, 1987, directs applicants and permit reviewers to consider all technically feasible alternatives, including those more stringent than the BACT selection. This is referred to as the "top-down BACT analysis approach." EPA's 1990 New Source Review manual summarizes the top-down BACT analysis in the following steps:

1. Identify all control technologies.
2. Eliminate technically infeasible options.
3. Rank remaining control technologies by control effectiveness.

Table 5: Summary of BACT Analysis			
Emission Source	Pollutant	Emission Limit	Control Technology
Three Polyurethane Foam Production lines	VOC	491.40 tons of VOC per 12 consecutive months	Utilize good work practice standards to reduce VOC emissions

4. Evaluate most effective controls and document results.
5. Select BACT.

The results of the BACT analysis are summarized in **Table 5**. Top-down BACT analysis provides that all available control technologies be ranked in descending order of control effectiveness. The most effective control technology is established as BACT unless the applicant demonstrates, and the permitting authority agrees, that technical considerations, or energy, environmental, or economic impacts indicate that the most effective technology is not achievable. If the most stringent technology is eliminated in this fashion, then the next most stringent alternative is considered until a BACT option is selected.

V.4.1 Volatile Organic Compounds (VOC) Emissions – Three Polyurethane Foam Production Lines

BACT applies to each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification, and BACT analyses are generally performed on each emissions

unit subject to PSD review. Where appropriate, BACT analyses may be performed on groupings of emission units on a case-by-case basis.

Step One: Identify all control technologies: Available control options are those air pollution control technologies or techniques with a practical potential for application to the emissions unit and the regulated pollutant under evaluation. Air pollution control technologies and techniques include the application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the affected pollutant. This includes technologies employed outside of the United States. In some circumstances inherently lower-polluting processes are appropriate for consideration as available control alternatives. The control alternatives should include not only existing controls for the source category in question, but also (through technology transfer) controls applied to similar source categories and gas streams, and innovative control technologies. Technologies required under lowest achievable emission rate (LAER) determinations are available for BACT purposes, must also be included as control alternatives, and usually represent the top alternative.

Adient provided the following information in their March 30, 2022, permit application (Appendix C). The application identified the following options to control VOC emissions from the three polyurethane foam production lines:

- Chemical adsorption (carbon and synthetic)
- Recuperative thermal oxidizers coupled with a carbon absorber
- Thermal oxidizer using flare technology
- Scrubber technology
- Refrigeration/condensing VOC control units
- Recuperative thermal oxidizer
- Regenerative thermal oxidizer
- Catalytic thermal oxidizer

The Division reviewed EPA's RACT-BACT-LAER Clearinghouse (RBLC) categories 63.013 and 99.016; guidance documents and found no additional technologies. After further review, the Division proposes to add good work practice standards to the list of control options under consideration to reduce VOC emissions.

Step Two: Eliminate technically infeasible options: In the second step, the technical feasibility of the control options identified in step one is evaluated with respect to the source-specific (or emissions unit-specific) factors. A demonstration of technical infeasibility should be clearly documented and should show, based on physical, chemical, and engineering principles, that technical difficulties would preclude the successful use of the control option on the emissions unit under review. Technically infeasible control options are then eliminated from further consideration in the BACT analysis.

Adient provided the following information in their March 30, 2022, permit application (Appendix C). The application states that the following selected control technologies were rejected as technically infeasible.

Chemical adsorption/Recuperative thermal oxidizers coupled with a carbon adsorber: For this application, large volumes of air are used to collect and transport the mold release solvents and wax overspray to the atmosphere. The wax content in the air will bind on chemically active media surfaces used in adsorber technologies, which makes carbon adsorption and synthetic adsorption incompatible and technically infeasible. For cost projection purposes, a hybrid control system using a carbon concentrator coupled with a [smaller volume] thermal oxidizer was evaluated but is not presented for cost analysis purposes since the concentrator technology is not compatible with the wax materials and thus is not feasible.

Flare technology: Thermal treatment using open or closed flares are typically deployed to control process gases where the exhaust gas has a suitable combustible content and flammability ranges capable of sustaining an open or closed flame. Since the volatile to air ratio for this application are significantly below the lower flammable limit, flare technology is not suitable and has been determined to be technically infeasible.

Scrubber: The VOCs in this process are not water-soluble. Typical wet and dry scrubbing systems are not capable of collecting and treating VOC airstreams and as a result those technologies are usually reserved or utilized as VOC pretreatment components in a VOC treatment system. Since these technologies do not [substantially] remove or treat VOC laden air, those technologies will not be further evaluated.

Refrigeration/condensing technology: Condensing or refrigeration systems are typically used in low air flow, high VOC content air streams for condensation and collection of the VOC liquid components. For this application, the high-volume air stream and dilute VOC concentration are not compatible or technically feasible control options and are not considered further.

Step Three: Rank remaining technologies by control effectiveness:

Adient provided the following information in their March 30, 2022, permit application (Appendix C).

Since the technologies remaining [not eliminated] are all based on the principle of thermal oxidation (TO), each category will be further evaluated for the economic benefit and cost/control determination. With the desire for a high level of VOC control, those technologies that involve TO have been ranked accordingly by their efficacy and ability to reduce VOCs in relatively dilute airstreams. **Table 6** ranks the remaining control technologies.

Table 6: Ranked Control Options		
Rank	Control Option	VOC Control Efficiency
Equal	Recuperative TO	95%
Equal	Regenerative TO	95%
Equal	Catalytic TO	95%
4	Good Work Practice Standards	N/A

Recuperative Thermal Oxidation: A recuperative TO is a large air-heating device that uses the exhaust temperature to preheat the incoming air using an air-to-air heat exchanger. Relatively low thermal efficiency of the recuperative design results in large fuel gas volume projections, and the relatively short heat of combustion contact time with the process gases (and the targeted VOC compounds) also requires higher treatment (combustion) temperatures to attain the targeted 95% VOC destruction performance.

Regenerative Thermal Oxidation: The regenerative thermal oxidization technology provides operational advantages over recuperative and catalytic technologies in that the thermal efficiency is greatly improved, thereby reducing the quantity of fuel gas needed to attain a specific treatment temperature. The thermal improvement is typically attained using ceramic media and the heat of combustion from the combustion chamber (in this case supplemental fuel burning) is conducted in multiple and sequencing beds in a series of cycles between pre-heat and heat recovery of the treatment beds on a regularly cyclical and

frequent basis. The result of this design is fuel gas savings and reduced combustion gas emissions, when compared to other TO technologies.

Catalytic Incineration: This technology allows a reactive catalyst to bring the air stream up to the target VOC oxidation temperature. For the catalyst to work properly, the process gas must be heated to approximately 800°F. Final VOC treatment (destruction) is attained as the reaction of the VOC compounds on the catalytic surface heats the VOC compounds which are then oxidized, and the targeted VOC destruction is complete without the need for additional fuel beyond the preheater section. Catalysts have finite life spans and are subject to catalyst poisoning from compounds in the airstream. Not included in this evaluation are the likely needs for special pretreatment filtration to isolate overspray wax from blinding or contaminating the reactive catalyst surface. Adient is concerned this technology may not be fully compatible with the wax overspray but has presented the US EPA values for comparative and full BACT treatment consideration.

Good Work Practice Standards: A work practice standard is any design, equipment, work practice, operational standard, or combination thereof to reduce air emissions. Good work practice standards may be implemented to satisfy the requirement for the application of BACT when control technology is infeasible or economic limitations exist.

Step Four: Evaluate most effective controls and document results: EPA's 1990 NSR workshop manual states that after technically feasible control options are identified, the energy, environmental, and economic impacts are considered to arrive at the final level of control. If the applicant accepts the highest-ranked control option as BACT, the applicant proceeds to consider whether impacts of unregulated air pollutants or impacts in other media would justify selection of an alternative control option. If there are no outstanding issues regarding collateral environmental impacts, the analysis is ended, and the highest-ranked option is proposed as BACT.

Adient provided the following information in their March 30, 2022, permit application (Appendix C).

The production lines are equipped with existing process ventilation exhaust systems that total approximately 270,000 scfm to meet OSHA spray application requirements. The process exhaust is at room temperature and is comprised of (dilute) VOC concentrations with very low fuel value. The BACT demonstration indicates the VOC concentrations are considered very low for VOC – BACT control treatment considerations. Typical TO systems, treating low concentration VOC streams, require large volumes of fuel gas to maintain proper oxidation temperatures in the combustion chamber of the unit.

The thermal and destruction efficiencies have been summarized and are presented in **Table 7**. The values presented have been calculated using US EPA Cost Control Manual factors. Other factors used in the BACT demonstration are also tabulated for relative comparison of features and benefits. For this BACT demonstration, the three selected TO technologies are believed to be the appropriate types of control for this application.

Table 7: Operating Parameters for VOC Control Equipment					
Control Technology	Gas Preheat of Treatment Temperature	Thermal Efficiency	Destruction Efficiency	Fuel Flow	Estimated Heat Input
Recuperative TO	1, 450 F	70%	95%	3,553 scfm	217.4 MMBtu/hr
Regenerative TO	1,600 F	95%	95%	431.4 scfm	26.4 MMBtu/hr
Catalytic Incinerator	800 F	70%	95%	1,251.6 scfm	76.6 MMBtu/hr
Heat inputs are estimated from a conversion factor of 1,020 Btu/scf					

EPA's 1990 New Source Review manual addresses cost effectiveness as follows:

Cost effectiveness (dollars per ton of pollutant reduced) values above the levels experienced by other sources of the same type and pollutant, are taken as an indication that unusual and persuasive differences exist with respect to the source under review. In addition, where the cost of a control alternative for the specific source reviewed is within the range of normal costs for that control alternative, the alternative, in certain limited circumstances, may still be eligible for elimination. To justify elimination of an alternative on these grounds, the applicant should demonstrate to the satisfaction of the permitting agency that costs of pollutant removal for the control alternative are disproportionately high; when compared to the cost of control for that particular pollutant and source in recent BACT determinations. If the circumstances of the differences are adequately documented and explained in the application, and are acceptable to the reviewing agency, they may provide a basis for eliminating the control alternative.

Capital costs include the purchase and installation of equipment items, foundations and supports, piping, insulation, structural steel, and instrumentation. Annual operating costs include utilities, operating labor, and maintenance. The application submitted by Adient on March 30, 2022, states that costs for various control approaches was completed using current costs associated with fuel and electrical utility fees, labor rates, and methods and costs from US EPA's Vatauvuk Air Pollution Control Cost Indexes - updated using the U.S Department of Labor Statistics Inflation Calculator. **Table 8** includes the cost per ton of VOC treated for the technically feasible options identified.

Table 8: Cost per Ton of VOC Treated		
Thermal Control Option	Dollars per Ton of VOC Treated	
	2006 Dollars	CPI-Adjusted to 2022 Dollars
Recuperative Thermal Oxidizer	\$42,261	\$71,032
Regenerative Thermal Oxidizer	\$10,734	\$18,042
Catalytic Incinerator	\$19,308	\$32,453

The application submitted by Adient on March 30, 2022, states that the high projected VOC treatment estimates summarized in **Table 8** result from a variety of factors listed below:

- 1) The process discharges large volumes of air which are needed to provide a safe working environment for workers in the foam operation area for each of the three foam seating lines.
- 2) The spray mold release agent and solvent release rates result in low VOC concentrations in the exhaust stream.
- 3) The high air volumes require extensive and high costs for VOC abatement equipment capable of handling 270,000 scfm and also achieving the needed 95 percent destruction efficiency of the VOC compounds at relatively low concentration.
- 4) The VOC abatement equipment will require large volumes of fuel in the form of natural gas to heat the large volume, low VOC content, ambient temperature exhaust stream to the target treatment temperatures for each of the targeted and respective TO devices evaluated.
- 5) The COVID pandemic situation has raised the costs for TO manufacturers and components found in TO equipment. Delays in materials and operating system components have been experienced, along with fabrication and transportation delays.
- 6) Inflation is at a 40-year high level.

Step Five: Select BACT: The application submitted by Adient on March 30, 2022, concludes that the projected costs per ton of VOC treated are in excess of what would be considered cost effective for VOC

controls. On that basis, Adient concluded the current configuration without VOC abatement is BACT for this project and for the existing process.

TDEC-APC Review of Proposed BACT: The Division compared Adient proposed BACT with other control technology reviews for VOC. **Table 9** includes cost information for PSD permits issued in Tennessee in the previous five years. Adient's rejection of add-on controls is consistent with prior determinations issued in Tennessee.

Table 9: Previous BACT Determinations for VOC with Cost Information				
Facility	Permit Number	BACT Option	Cost Effectiveness (\$/ton)	Selected as BACT?
Granges Americas Inc.	973712	Thermal Oxidation	\$29,963	No
Hankook Tire Manufacturing Tennessee, LP	971720	Regenerative Thermal Oxidation	\$19,936	No
		Thermal Oxidation	\$61,017	No
TVA Gleason	975023	Catalytic Oxidation	\$157,000	No
Domtar Paper	978656	Thermal and Catalytic Oxidation	\$10,174	No
			\$21,483	

Table 10: RBLC Search Results – VOC Controls for Polyurethane Foam Manufacturing (Molds)					
RBLC ID	Facility Name	Date	Process Name	Control Method Description	Efficiency
IN-0208	NHK Seating of America, Inc.	3/7/2019	Seat Foam Production Line	Regenerative Thermal Oxidizer	95%
MI-0095	Johnson Controls, Inc.	12/18/2001	MFG Process, Polyurethane Foam	Airless spray gun for mold release/Emission limit	NA
IN-0137	Foamex Innovations, Inc.	10/12/2012	Polyurethane Foam Coating Line	Best Management Practices/Emission limit	NA
IN-0137	Foamex Innovations, Inc.	10/12/2012	Polyurethane Foam Production Line	Best Management Practices/Emission limit	NA
MI-0313	Woodbridge Corporation	11/18/2002	Mold release application	HVLP is used to yield good transfer efficiency. RTO costing \$6500 per ton was not required. (Costs were not verified) / Emission limit	NA
MI-0163	Steelcase, Inc.	10/9/2002	Mold Release Polyurethane Foam	Water Base Mold Release	100%
MI-0176	International Foam and Trim	3/25/1994	IN-Mold coating of polyurethane parts.	HVLP coating application equipment used. Dry filters/Emission limit	NA

The RACT-BACT-LAER Clearinghouse (RBLC) was reviewed to identify comparable processes (**Table 10**). The Division identified seven processes for comparison with Adient's proposed BACT.

NHK Seating of America, Inc. (RBLC ID: IN-0208) uses a regenerative thermal oxidizer for VOC emissions control. After review of the permit in the RBLC, this facility has one automobile seat foam production line, with a capacity of 56 seats per hour, that exhausts through ventilation hoods equipped with dry filters. This line has the capability to use water-based or solvent-based mold release. If solvent-based mold release is used, the VOC emissions are controlled by a regenerative thermal oxidizer. The BACT Analysis (Appendix C of the permit) provided no details for the volume of exhaust air or VOC concentration in the exhaust air stream. An economic impact analysis was not performed as part of BACT. Since no direct comparison of the exhaust stream from the RBLC listing can be made to the Pulaski operation, the control options identified in this BACT demonstration will be used to determine the best available control for this application.

Steelcase, Inc. (RBLC ID: MI-0163) uses water-based mold release agent. There are no details for the polyurethane process in the RBLC for Steelcase, Inc. Adient's attempts to use low emitting alternatives such as co-solvent and water-based mold release agents have failed, resulting in high levels of damaged parts, requiring re-manufacturing and wasted raw materials. Specifically, the use of lower emitting mold release agents does not allow a clean release of the newly formed foam part and frequently causes the foam to stick to the mold, causing damage to the part upon extraction. Therefore, water-based mold release agents cannot be used in Adient's polyurethane foam process.

Pursuant to TAPCR 1200-03-09-.01(4), the following requirements are established as BACT for VOC from source 01, polyurethane foam manufacturing:

- Utilize good work practice standards to reduce VOC emissions

Compliance with this requirement shall be assured by conducting the following daily work practice activities to ensure VOC emissions are minimized and reduced. These activities are outlined in Adient's ISO 14001 Environmental Management System (EMS) Policies as well as internal Standard Work Guidelines:

- All VOC containing mold release containers shall be kept in closed and sealed containers and piping systems at all times until end point usage.
 - Inventory storage of all mold release containers shall consist of a fully enclosed locked storage structure complete with self-contained spill containment.
 - Mold release material shall be transferred from the tank storage area to the end point discharge via a fully contained and closed loop piping conveyance system.
 - In the event of an inadvertent failure of the closed loop conveyance system, flow sensors shall continuously monitor abrupt or out of calibration flow rates to ensure mold release material spillage is kept at a minimum. Spilled material is mitigated immediately by an internal quick reactionary team to ensure VOC containing mold release is contained quickly to not increase potential VOC emissions.
 - End point usage of VOC containing mold release material shall continuously be monitored by Line Operators and Line Technicians to ensure proper application at all times.
 - Utilizing the ISO14001 EMS Environmental Objectives Form, plant personnel shall participate in monthly mold release usage reduction activities with progress continuously tracked and compared with prior months records.
- Limit of 491.40 tons of VOC per 12 consecutive months.

Compliance with this limit shall be demonstrated by calculating VOC emissions during each calendar month and each period of 12-consecutive months.

VI. Ambient Air Quality Impact Analysis

VI.1 Introduction

On March 30, 2022, Adient submitted an application to expand its operations at 1890 Mines Road in Pulaski, TN by increasing VOC emissions from its currently permitted 308 TPY to 491.4 TPY. The increase in emissions will be due to an increase in the facility's usage of its mold release agent at its three urethane foam injection lines. **Figure 1** shows an aerial photo of the plant and its immediate surroundings which is about 5 km NW of the center of Pulaski. **Figure 2** also shows the near-field within 1 km surrounding the facility.

**Figure 1 – Adient US, LLC – Pulaski Tennessee Facility
in relationship to Pulaski, TN (Google Maps image)**

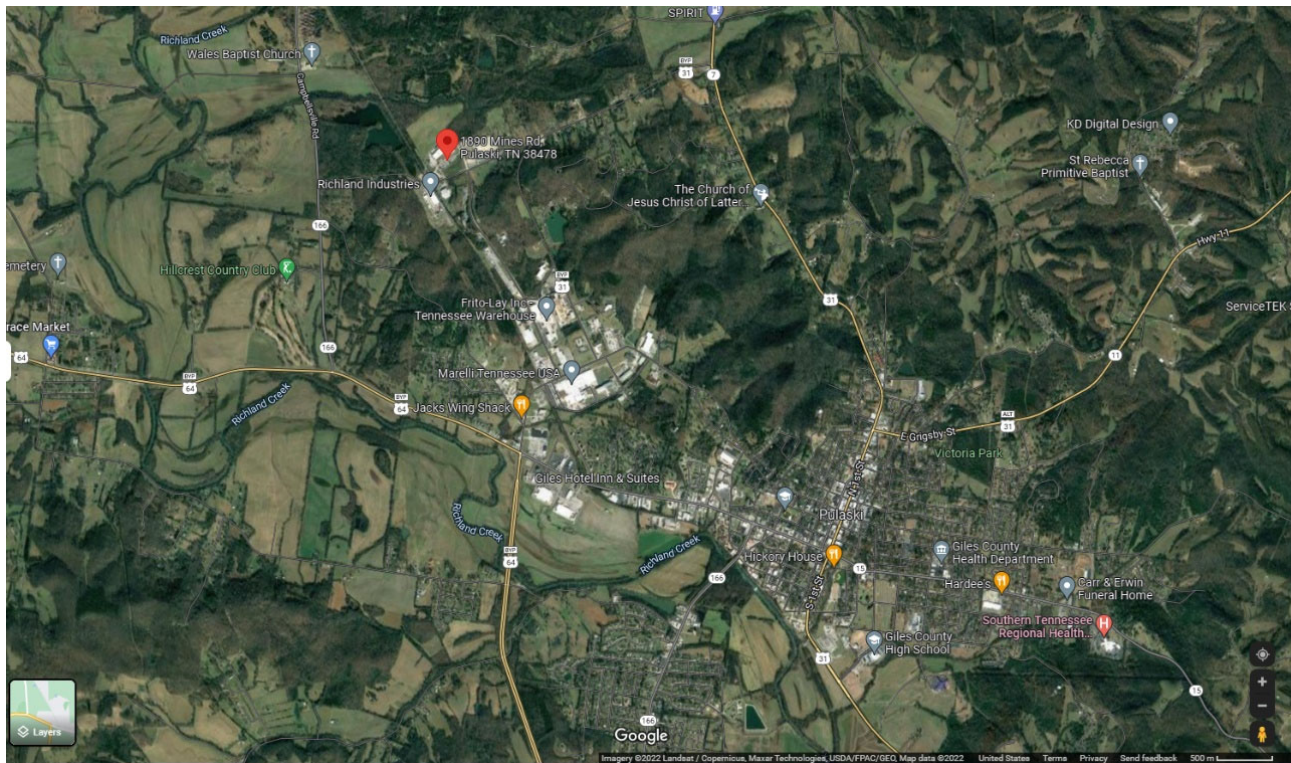


Figure 2 – Adient US, LLC – Pulaski Tennessee Facility
Near field with 1 km UTM Grid overlay (Google Earth image)



VI.2 Project Overview

Adient designs, engineers, and manufactures seats for the automotive industry. The manufacturing process includes the production of automotive cushions, backrests, head restraints and other automotive components formulated with polyurethane foam. As part of an overall program to reduce its environmental footprint, Adient has developed a lightweight seating foam and has pioneered the creation of low-emission foams using renewable resources and natural oil polyols. These advancements not only have a direct positive impact on the local community, but also serve to support the automotive industry in lowering the weight of cars, which has a direct effect on improved gas mileage.

Adient - Pulaski operates under Tennessee Division of Air Pollution Control (TDAPC) Title V Permit Number 569269. Federally enforceable emission limits make Adient a major source under Prevention of Significant Deterioration (PSD) regulations [40 CFR 52.21(b)(1)(i)(b)]. Adient proposes to increase annual emissions such that the facility emits more than the PSD Significant Emission Rate (SER) thresholds for the New Source Review (NSR) pollutant category of VOCs. Therefore, increasing the annual emission limitations for this facility will be subject to PSD review (including modeled impact assessment and review) under TAPCR rule 1200-03-09-.01(4)(a)(6).

This section of the PSD Analysis describes the assessment of ambient impacts resulting from the increase in emissions from the proposed permitting action and existing equipment. Section V above discusses the required best available control technology (BACT) analysis. Sections in Volume VI below provide the air quality analysis and analysis of other impacts, respectively. The permit application forms, emission

calculations, BACT survey results, and modeling output and plots are contained in the application appendices. With this application, TDAPC proposes to approve Adient's requests for issuance of a PSD Permit for the new operating scenario at their Pulaski facility.

The facility, in Giles County, is located at 1890 Mines Rd in Pulaski, TN 38478, which is about 66 miles south-southwest of downtown Nashville, TN. The area is considered a rural Class II area. The closest Class I areas are: The Sipsey Wilderness Area in north central Alabama (60 mi or 97 km SSW) and Cohutta Wilderness Area in southeastern Tennessee and northern GA (135 mi or 218 km East),

The application describes the process as follows in Section 1.2.2:

*"The three molding lines each operate using racetrack-type conveyors, whereby the molds are presented to the various production stations for the foam process to produce a part in its final form. An open mold is presented to the mold release - spray application station where an operator sprays the mold with the mold release agent. The mold advances to the pour station where a robot equipped with a urethane component mix head injects the mixed foam components into the open mold. The mold automatically closes and the foam reaction occurs in the mold cavity. As the mold advances through the production line, the foam expands, cures and is opened and presented to the extraction station. A worker team removes the molded part, cleans and prepares the mold for another cycle, and the process repeats. A process flow diagram is attached in **Figure 2** of the appendix.*

Prior to injecting the foam components into the mold, the molds are sprayed with a wax mold release agent to allow removal of the cured foam. The mold release wax is suspended in an aliphatic (non-halogenated) solvent, which contains VOC.

The two-part foam components are moisture-cured producing a polyurethane automotive seat cushion. Halogenated compounds are not used as blowing agents. The foam components are mixed at the gun head, injected/poured into the clamshell molds, the molds are closed and the foam reaction occurs in the mold cavity."

Listed below are the potential emissions from the project compared to the PSD applicability levels for those pollutants emitted at the facility, which require an initial modeling analysis of the facility's projected emissions. Emissions greater than the applicability level necessitate preliminary modeling analyses for those pollutants.

Table 11: Potential Emissions (Tons/Year) Subject to PSD Modeling

Pollutant	Existing Emissions (tpy) ^[1]	Project Emissions Increases (tpy) ^[2]	PSD Significant Emission Rate (tpy)	PSD Triggered? (Yes/No)
Filterable Particulate Matter (PM)	113.9 ³	0.0 (9.9 total)	25	No
Total PM ≤ 10 microns (PM10)	113.9 ³	0.0 (9.9 total)	15	No
Total PM ≤ 2.5 microns (PM2.5)	113.9 ³	0.0 (9.9 total)	10	No
Sulfur Dioxide (SO ₂)	0.0	0.0	40	No
Nitrogen Oxides (NO _x)	0.0	0.0	40	No
Volatile Organic Compounds (VOC)	308.0	183.4 (491.4 total)	40	Yes
Carbon Monoxide (CO)	0.0	0.0	100	No

Notes:

1. From existing Title V Operating Permit 569269, Condition E1.
2. Total VOC and PM is from **Table 2** in **Section 3.1.4** of the permit application.

3. PM existing emissions previously based on the allowable regulatory limit of 0.02 gr/dscf

As required by the PSD regulations, after it is determined that a facility has significant impacts, a typical air quality impact assessment may include some or all of the following steps:

1. Determination of the Significant Impact Area (SIA) if any for each pollutant with a Class II SIL &
2. monitoring *de minimis* analysis for the proposed emission increase.

Also when proposed new impacts are significant:

3. a comprehensive PSD increment consumption analysis for the surrounding Class II area, *and any Class I areas close enough to have significant impacts*,
4. a comprehensive Ambient Air Quality Standards impact analysis, and
5. an additional airshed impact assessment of the effects on Visibility, Soils, Vegetation, Associated Growth, and Nonattainment Areas, as well as Class I area Air Quality Related Values (AQRV's) if applicable.

The emission rate of PM₁₀ is below the significant emission rate (SER) of 15 tpy for PSD applicability, and it is also below the SER threshold for PM (25 tpy) and PM_{2.5} (10 tpy). Also, since the facility process is not heated in a separate curing oven, PM_{2.5} is not an anticipated air pollutant. Hence, all forms of PM maybe considered below the SERs for PM, which makes further PM analysis unnecessary for this permit application.

Since **Table 11** above indicates that this facility is only a major PSD source for VOC, many of the typical ambient PSD analysis steps involving refined modeling with the latest version (v21112) of the refined AERMOD dispersion model were unnecessary for this analysis. For this case only an analysis using Modeled Emission Rates for Precursors (MERPs) was necessary to evaluate the facility's impact on ozone creation from the sources existing VOC emissions.

As a result, VOC emissions were assessed using MERPs and comparing the screening level impact to that of the significant impact level (SIL) associated with the National Ambient Air Quality Standards (NAAQS) for Ozone. Additionally, a breakout of individual source emissions and discharge parameters is unnecessary since MERPs analyses are based on total facility emissions in tons per year.

Finally, representative ozone background data for the MERPs analysis was found, so the preconstruction monitoring requirement was waived based on the availability of representative data from the regional ozone monitor at Fairview Middle School (FMS) in Fairview, Tennessee. Specifically, the regional ozone monitor located at FMS in Fairview, Tennessee was found to be representative of the project site. TDAPC staff agrees with this assessment. The application also describes the monitor as follows:

“The FMS monitor is located approximately 80 kilometers (km) north of Adient's Pulaski facility. Fairview and Pulaski have similar populations of approximately 8,700 and 7,600, respectively. For ozone, a large component of background concentration can be attributed to vehicle use. With similar sized populations, vehicle use can be expected to occur at a similar rate. The two areas also have similar terrain and land use.”

Design value data for the FMS monitor is available for the previous ten years (2011 – 2020). FMS monitor information and data for 2020 is provided below.

Table 12: Representative Ozone Monitor

Monitor Location	Monitor ID	2020 Design Value (ppb)
Fairview Middle School, Crow Cut Road, Fairview, TN 37062	471870106	60

Since VOC is regulated from the facility versus emissions of other pollutants from individual processes and emission points, a summary of the facility-wide emissions for each pollutant and for each modeled scenario, each process and each emission point were unnecessary. Hence **Table 11** emissions above will suffice instead of a detailed description of emission sources and locations which would be pertinent to many other PSD analyses for criterial pollutants.

Similarly, consideration of stack parameters and emissions (based on unit expected maximum capacity) is only pertinent regarding the general release height and annual facility tonnage when comparing them with the general release heights and annual facility tonnages used in EPA's MERPs analysis work. **Table 11** above indicates that the facility's total VOC emissions of 491 TPY is best comparable to the 500 TPY level in EPA's MERPs analyses. Also above, **Table 3: Source Description** indicates that the facility's general emissions release height is less than 100 feet which is most comparable to lower release height of 10 meters, used in EPA's MERPs analyses.

VI.3 CLASS II MODELING: SINGLE-SOURCE IMPACT ANALYSIS

The following sections summarize the methodology used to evaluate the facility's air quality impacts in Class II areas. The dispersion modeling described was performed in accordance with the EPA "Guideline on Air Quality Models" (GAQM, contained in 40 CFR Part 51, Appendix W) (EPA, 2017a), the New Source Review (NSR) Workshop Manual (EPA, 1990), all applicable EPA clarification memorandums and guidance documents, and direction and regulatory guidance provided by the Tennessee Department of Environment and Conservation (TDEC) and EPA Region IV. The modeling analysis focused on demonstrating that the ambient impact of proposed emissions from the Adient project will be in compliance with all applicable NAAQS and PSD Class II increments.

VI.3.1 Dispersion Modeling Methodology

Since VOC emissions are the target of this analysis, EPA's work to define a screening methodology to evaluate precursor emission impacts on ozone formation using EPA's work with photochemical grid modeling (PGM) methods was relied on for this analysis, instead of using the American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) gaussian dispersion model, which is typically used to determine predicted impacts in the Class II area surrounding the facility.

In December 2016, the EPA developed a simple screening methodology to estimate single source impacts on secondary pollutants which they described as: Modeled Emission Rates for Precursors and debuted using the acronym "MERPs". MERPs reflect levels of increased precursor emissions that are not expected to cause a significant contribution to O₃ for PSD applications. A MERP can relate:

- ☐ VOC emissions to O₃; and
- ☐ NO_x emissions to O₃.

MERPs modeling methods are intended to conservatively estimate secondary pollutant impacts in what is also termed a Tier 1 screening analysis to demonstrate ambient compliance, before a more refined and resource intensive Tier 2 analysis using detailed photochemical grid modeling is necessary.

VI.3.2 Assessment of Secondary Pollutant Impacts

The SIL for ozone (O₃) which EPA recommended in their April 2018, guidance on SIL's, was used to demonstrate that the proposed potential impacts from Adient do not cause or contribute to a violation of the NAAQS for ozone. The recommended SIL for O₃ was used to assess potential impacts from secondary pollutants emitted from Adient.

The EPA December 2016, guidance memorandum provided a framework on how to develop source-specific or site-specific MERPs. The guidance document did not endorse a specific MERP value, though it did provide illustrative MERPs from the EPA's modeling of two hypothetical sources in various locations across the United States.

EPA's initial 2016 MERPs guidance memorandum was finalized by EPA in April of 2019. Tennessee has also provided more customized MERPs guidance for sources in Tennessee since the 2019 memorandum. According to EPA and Tennessee guidance, sources are required to estimate both the impacts of primarily emitted and secondarily formed pollutants as part of the PSD program. This is normally done using a Tier 1 MERPs analysis first, and if a Tier 1 analysis fails to demonstrate ambient compliance, a Tier 2 analysis using PGM techniques may be used if necessary.

Tennessee's guidance regarding MERPs was used to assess potential impact of secondarily formed O₃ which could be expected from the chemical interaction of Adient's potential emissions of VOCs with nitrogen oxides emitted from off-site combustion sources in the vicinity.

The precursors to ground-level ozone formation are VOC and NO_x. However, since this project only exceeded the SER for VOC and not NO_x, Adient only needed to consider VOC contributions to ozone as a part of this assessment.

VI.3.2.1 Ozone Assessment

TDEC documentation titled "*Tennessee Guidance on the Use of EPA's MERPs to Account for Secondary Ozone and Fine Particulate Formation in Tennessee Under the New Source Review (NSR) Prevention of Significant Deterioration Program (PSD)*" was customized for sources in Tennessee by the Division of Air Pollution Control using the PGM results EPA used in their MERPs guidance. The secondary ozone analysis in this report specifically relied upon the Tennessee Guidance document to conservatively predict impacts resulting from VOC emissions at the Adient- Pulaski facility. Below is a quote from the pertinent part of Tennessee's latest MERPs guidance on page 4.

"The significant Impact Level (SIL) for ozone is 1 ppb The units for the Maximum Model Impact are parts per billion (ppb) for ozone The most conservative (lowest) MERP values from the six (6) nearby hypothetical sources (in or near Tennessee) by precursor and pollutant are contained in table. . . . These default MERP values can be used for Tier 1 demonstrations in Tennessee without further justification."

The abbreviated **Table 13** from the Tennessee guidance contains the following default MERP values for 8-hour ozone impacts resulting from NO_x and VOC emissions.

Table 13: "Default MERP values (TPY) for Tennessee PSD applications"

<i>Precursor</i>	<i>8-hour Ozone</i>
<i>NO_x</i>	<i>156</i>

VOC	1,542
-----	-------

Note: The default values are the lowest (conservative) MERP values for hypothetical sources in and near Tennessee.”

In the Tennessee MERPs Guidance on pages 12 and 13 it states:

SILs Analysis

MERPs can be used to determine if a facility’s proposed emission increases will result in secondary impacts that are above the SILs. Once either one of the precursor pollutants triggers this analysis because their emissions are above the PSD Significant Emission Rates (SERs), then emissions of the other precursor pollutant must be included in the analysis to determine the synergistic impact that both pollutants have together, even though the other pollutant’s emissions may fall below the SER. The analysis is unnecessary only when emissions of both precursor pollutants are below the respective SERs.

For ozone, the following equation should be used:

$$\frac{EMIS_NOx}{MERP_NOx} + \frac{EMIS_VOC}{MERP_VOC} < 1$$

EMIS_NOx and EMIS_VOC are the proposed emission increases for NOx and VOC (tpy). MERP_NOx and MEPR_VOC are the MERPs for NOx and VOC (tpy). If the sum of the ratios is less than 1, then the secondary ozone impacts are below the ozone SIL and the applicant does not need to perform a cumulative analysis for ozone. If the sum of the ratios is equal to or greater than 1, the applicant must perform a cumulative analysis for ozone.

VI.3.2.2 Single-Source Impact Modeling Results

Summary results for each significantly emitted pollutant and avg time.

O₃ – The NAAQS for Ozone (O₃) is 70 ppb, which equates to 140 µg/m³, for an 8-hour average. The SIL for Ozone is 1 ppb. Since O₃ is a secondary pollutant formed in the atmosphere by precursor VOC and NOx pollutants, the source was evaluated using single source MERPs methodology below in this section to demonstrate that the source will not cause or contribute to a violation of the NAAQS for O₃.

Resultant details for secondary Ozone resulting from VOC emissions.

The secondary O₃ impact assessment is compared to the established SIL for Ozone of 1 part per billion (ppb). As outlined in **Table 7** of the TDEC November 2019 guidance (seen above), the default MERP values (tpy) for Tennessee PSD applications are 156 tpy of NO_x and 1542 tpy of VOC. Per equations provided above from page 13 of the TDEC guidance

(https://www.tn.gov/content/dam/tn/environment/air/documents/apc-modeling-page/apc_TN%20Guidance%20on%20the%20Use%20of%20EPAs%20MERPs%20to%20Account%20for%20Secondary%20Formation%20in%20Tennessee_11222019.pdf), the SIL analysis demonstration for the proposed project at Adient is as follows:

For the Class II significant impact modeling analysis, the maximum predicted impact was compared to the only pertinent PSD Class II SIL, which was the SIL for ozone. The modeled impacts for the Tier 1 secondary pollutant analysis scenario are summarized below.

Since the source does not emit primary ozone and only emits one precursor to secondary ozone formation, the analysis centers around the single precursor VOC. In the Tennessee MERPs equation above, the value for *EMIS_VOC* is 491.4 TPY, while the value for *EMIS_NOx* is zero. The MERP value for VOC related to 8-hour ozone is 1,542 TPY from the MERPs table, so the computed ratio for NOx is zero while the computed ratio for VOC is less than one as seen below.

$$\frac{EMIS_NOx}{MERP_NOx} + \frac{EMIS_VOC}{MERP_VOC} = \frac{0\ TPY\ of\ NOx}{156\ NOx\ MERP} + \frac{491.4\ TPY\ of\ VOC}{1542\ VOC\ MERP} = 0.32\ which\ is\ < 1$$

Hence, an evaluation of the equation indicates that the sum of the computed ratios of emissions to MERPs is also less than 1. Therefore, the 491.4 TPY of VOC emitted by the Adient facility would be expected to have an impact less than the SIL of 1 ppb for ozone. As a result, any further cumulative analysis for VOC is unnecessary to approve the company's ambient assessment for VOC.

Additionally, since the predicted ozone value is less than the threshold value of 1, a cumulative analysis for ozone was unnecessary, and it is not necessary to include the background ozone concentration in a more refined cumulative evaluation for ozone described on page 13 of the Tennessee MERPs guidance.

VI.4 CLASS I AREA AMBIENT AIR QUALITY IMPACT ASSESSMENT

Class I areas are federally protected areas for which more stringent air quality standards apply to protect unique natural, cultural, recreational, and/or historic values. Air quality dispersion modeling analyses to support the PSD application for the Adient-Pulaski Class I analysis include the following assessments:

1. Determination of the facility potential pollutant emission quantities relative to PSD significant emission rates (SER) as defined in PSD rules (40 CFR 52.21).
2. Determination of the source location and distance within 300 km of any Class I area. Facility impacts at Class I areas located beyond 300 km from the PSD source are considered insignificant.
3. Determination of compliance with the Federal Land Managers (FLMs) Air Quality Related Values (AQRVs) in addressing regional haze visibility and acidic deposition.
4. Determination of whether facility impacts at Class I areas located within 300 km from the PSD source are considered significant. If so, a determination of compliance with the EPA's NAAQS and PSD increments for those triggered criteria pollutants that have Class I area increments.

The Adient facility submitted separate analyses to assess impacts on AQRVs and on the Class I SILs for the NAAQS and PSD increments.

VI.4.1 Initial Screening Criteria for AQRVS

The Federal Land Managers (FLM) have the authority & responsibility to protect air quality related values (AQRVs) in Class I areas, and to consider in consultation with the permitting authority whether a proposed major emitting facility will have an adverse impact on such values. Class I AQRVs for which PSD modeling is typically conducted include visibility impairment, ozone (O₃) effects on vegetation, and effects of sulfur and nitrogen deposition on soils and surface waters.

The FLMs developed an Initial Screening Criteria, Q/D, to determine if sources greater than 50 km away from a Class I area need to perform any further Class I AQRV impact analyses. The Q/D ratio is calculated by summing the annual VOC, SO₂, NO_x, PM, and H₂SO₄ emissions (in tons per year, based on 24-hour maximum allowable emissions and adjusted as if it were operated for 8,760 hours per year then dividing by the distance (in kilometers) to the nearest Class I area. If the Q/D value is less than or equal to 10, the source is considered to have negligible impacts on AQRVs in the Class I area and no further analyses are needed.

The Initial Screening Criteria for Adient emissions were calculated for the five Class I areas within 300 km of the Adient facility below (with the approximate distance to the facility listed):

- Sipsey National Wilderness Area (~ 97 km)
- Cohotta Wilderness Area (~218 km)
- Mammoth Cave National Park (~ 226 km)
- Joyce Kilmer-Slickrock Wilderness Area (~278 km)
- Great Smoky Mountain National Park (~281 km)

All other Class I areas are located at distances greater than 300 km from the facility.

A Class I area analysis includes a Class I PSD increment assessment for pollutants subject to PSD review (increasing above the SER) and an AQRV analysis for visibility, ozone, and deposition that could impact a Class I area's resources.

Class I AQRV Analysis

The Class I AQRV analysis was prepared in accordance with the FLM's Air Quality Related Values Work Group (FLAG) *Phase I Report – Revised (2010)*. The FLMs developed a screening-level criteria involving facility emissions and distance to the Class I area (Q/D ratio) for sources greater than 50 km from a Class I area to determine whether adverse impacts could occur to AQRV from a pollutant. The equation used is provided below:

$$\text{Q/D ratio} = \frac{\text{Facility Emissions (Q)}}{\text{Distance to Class I Area (D)}}$$

If the Q/D ratio is below 10, it is presumed that no adverse impact will occur, and no further AQRV analysis is required. An AQRV analysis for the Class I Areas of concern can be found below.

Table 14: Q/D ratios for Class I Areas within 300 km of Adient-Pulaski
(From Table 7: Class I AQRV Analysis in permit application)

Class I Area	Pollutant	Q (tpy)	D (km)	Q/D	Q/D sum
Sipsey Wilderness Area	PM	9.90	97	0.10	5.17
	VOC	491.4		5.07	
	PM	9.90	218	0.05	2.30

Cohotta Wilderness Area	VOC	491.4		2.25	
Mammoth Cave National Park	PM	9.90	226	0.04	2.21
	VOC	491.4		2.17	
Joyce Kilmer-Slickrock Wilderness Area	PM	9.90	278	0.04	1.81
	VOC	491.4		1.77	
Great Smoky Mountain National Park	PM	9.90	281	0.04	1.79
	VOC	491.4		1.75	

The Q/D ratios for PM and VOC and their sums for each of the Class I Areas are well below the threshold of 10; therefore, it is presumed there are no adverse impacts from Adient, and no further analysis is required.

Class I Increment Analysis

Adient does not have a significant increase of PM/PM₁₀/PM_{2.5}, above the corresponding SERs, so an analysis of significant PM impacts vs. PM increments or PM NAAQS was not necessary. Additionally, since there is no Class I PSD increment established for VOC, any other increment analysis for this project would not be applicable.

Class I NAAQS Analysis

Finally, since the computed MERP ratio in the Class II area for NO_x is zero and the corresponding ratio for VOC is much less than one, then the combined MERP ratio at the much increased distances to the Class I areas is assumed to be even less, making anticipated Class I ozone impacts insignificant as well.

VII. ADDITIONAL IMPACTS ANALYSIS

PSD applies to new major sources or major modifications at existing sources for pollutants where the area the source is located is in attainment or unclassifiable with the NAAQS. Adient is a major source of VOCs, a precursor to ozone. Adient is located in the City of Pulaski, County of Giles in the State of Tennessee, which is designated attainment for ozone.

A PSD major source subject to PSD review is required to conduct an air quality analysis and an additional impacts analysis, among other requirements. Pursuant to 40 CFR §52.21(o), the additional impacts analysis consists of three parts: Growth Analysis, Soils and Vegetation Impacts Analysis and Visibility Impairment Analysis. Each of these analyses is addressed below.

VII.1 GROWTH ANALYSIS

The Adient plant is located in an industrial park setting on the north side of Pulaski, Tennessee. Pulaski is located in the south central portion of the state nearly equidistant between Memphis and Chattanooga. The

general vicinity outside of the industrial development is mainly agricultural pastureland and woodland with some residential development east of the plant (**Figure 1**). The workforce consists of 305 employees living within commuting distance of the plant. The size of the workforce has resulted in little impact on population growth in Giles County, which has a population of 29,503 as of 2018. A review of historical aerial photos dating back to 1998, indicate that there has been little industrial or commercial development in the immediate vicinity of the Adient plant, and no substantive residential growth in the general area.

VII.2 SOIL AND VEGETATION ANALYSIS

Particulate Matter and Volatile Organic Compounds

The criteria for evaluating impacts on soils and vegetation is taken from EPA's, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*, EPA, 1980. According to US EPA, "...sources more than 10 km from any Class I areas, exemptions provide that no analysis of impairment need be done if emission increases are below specified limits." Specified limits are de minimis values found at 40 CFR 52.21(b)(23)(i).

The Adient operations are located more than 10 km from any Class I areas in the region. The criteria air pollutants emitted by the Adient Pulaski operations include PM and PM₁₀. Emissions of PM and PM₁₀ are below the significance levels (de minimis values) found at 40 CFR 52.21(b)(23)(i).

The Adient operations generating particulate matter emissions are not the direct result of combustion or combustion byproducts and therefore, Adient assumes there are no emissions of PM_{2.5}, but in any event, all PM emitted by the source is less than the respective thresholds, including the threshold for PM_{2.5}.

Adient emits VOC at an annual rate above the de minimis value of 40 tpy, but screening concentrations are not available for VOC. VOC is a precursor to ozone and while ozone is identified as a "Regulated Pollutant", EPA indicates that a screening concentration [for O₃ is] available, and now a simple procedure for estimating the ozone impact of a single source is currently available through the use of MERPs.

Additionally, the secondary NAAQS were established at concentration levels below which no harmful effects to either soil or vegetation is expected (per US EPA, Office of Air Quality Planning and Standards, *New Source Review Workshop Manual (Draft)*, U.S. EPA, Research Triangle Park, NC, October, 1990).⁶ As discussed above, EPA has developed a two-tiered evaluation for secondary ozone formation from VOC. As demonstrated by this application, the VOC emissions from Adient's facility are below the default TDEC MERPs value, indicating that no adverse impact to compliance with the ozone NAAQS is expected. As such, VOC emissions from the facility will not negatively affect soil and vegetation in the surrounding area.

Other than VOC, Adient does not emit any criteria air pollutants above their respective significance thresholds.

VII.3 VISIBILITY IMPAIRMENT ANALYSIS

US EPA prescribes the use of its *Workbook for Plume Visual Screening and Analysis (Revised)*, October 1992 (EPA-454/R92-023), methodologies for purposes of conducting a visibility impairment analysis. A

visibility impairment analysis is generally required to determine the impact on sensitive areas such as state parks, wilderness areas, airports, scenic sites, and overlooks. Three levels of screening procedures are outlined by US EPA. If the criteria for the first screening level, the most conservative level, are met, no further analysis is needed.

The VISCREEN model is recommended for the Level 1 screen. The VISCREEN model primarily considers NO₂ and particulate emission increases associated with a project. VISCREEN does not consider or calculate visibility impacts from ozone.

Level 1 Screen Analysis

Level 1 analysis incorporates conservative parameters to determine plume impacts. Default values for particle size and density, and a default of worst-case meteorological condition of F stability and 1.0 meters per second (m/s) wind speed are used for the analysis, while all emissions are assumed to exit the plant from one point. The worst-case meteorological condition is expected to persist for 12 hours with a wind direction that would transport the plume directly to the sensitive area being analyzed.

A maximum particulate matter emission rate of 2.64 lb/hour, based on a maximum emission rate of 9.9 tpy assuming an operating schedule of 7,488 hours/year (6 days per week, 24 hours per day, 52 weeks/year), was input to the model. It was assumed that there were no emissions of NO_x, soot, primary nitrogen dioxide and primary sulfate. A background visual range of 25 kilometers was used. All other inputs relied on the default parameters.

While the Pulaski facility is greater than 10 km from any Class I area, a distance of 10 km was assumed in order to run the most conservative analysis of visibility impairment.

Level 1 modeling results indicate that the Adient operations do not adversely impact visibility within or beyond a 10 km radius.

OVERALL RESULTS OF PLUME VISIBILITY SCREENING

SOURCE: Adient US LLC, Pulaski,
CLASS I AREA: NA

INSIDE class I area --

Plume delta E DOES NOT EXCEED screening criterion for SKY background
Plume delta E DOES NOT EXCEED screening criterion for TERRAIN background
Plume contrast DOES NOT EXCEED screening criterion for SKY background
Plume contrast DOES NOT EXCEED screening criterion for TERRAIN background

OUTSIDE class I area --

Plume delta E DOES NOT EXCEED screening criterion for SKY background
Plume delta E DOES NOT EXCEED screening criterion for TERRAIN background
Plume contrast DOES NOT EXCEED screening criterion for SKY background
Plume contrast DOES NOT EXCEED screening criterion for TERRAIN background

SCREENING CRITERIA: DELTA E = 2.0
GREEN CONTRAST = 0.050

VIII CONCLUSIONS AND CONDITIONS OF APPROVAL FOR AMBIENT AIR QUALITY IMPACT ANALYSIS

Projected emissions of VOC from the proposed modification exceed the PSD significance levels at maximum operating rate and maximum hours of operation. This major modification is subject to review under the regulations for the Prevention of Significant Deterioration contained in 1200-03-09-.01(4). The proposed control technology satisfies the requirement to install BACT, as required by the PSD regulations. The BACT requirements are incorporated into the permit to be issued for the proposed modification. The proposed changes will not result in ambient impacts that would exceed any National Ambient Air Quality Standards or PSD Increments and will not cause or contribute to adverse impacts on Air Quality Related Values in nearby Class I areas.

After review of the information submitted with the PSD application, it is concluded that the proposed modification qualifies for approval, subject to the terms and conditions of the PSD construction permit (Appendix A).

Appendix A –PSD Construction Permit 980244



**STATE OF TENNESSEE
AIR POLLUTION CONTROL BOARD
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE**

PSD PERMIT TO CONSTRUCT / MODIFY AIR CONTAMINANT SOURCE(S)

Permit Number: 980244
Facility (Permittee): Adient US LLC
Facility ID: 28-0076
Facility Address: 1890 Mines Road, Pulaski
Giles County
Facility Classification: Title V
Federal Requirements: PSD (VOC): 40 CFR 63 Subpart OOOOOO
Facility Description: Polyurethane Foam Production Facility

Permit 980244, consisting of 27 pages is hereby issued September 22, 2022, pursuant to the Tennessee Air Quality Act and by the Technical Secretary, Tennessee Air Pollution Control Board, Department of Environment and Conservation. This permit expires on September 21, 2023. The holder of this permit shall comply with the conditions contained in this permit as well as all applicable provisions of the Tennessee Air Pollution Control Regulations (TAPCR).

Michelle W. Owenby
Technical Secretary
Tennessee Air Pollution Control Board

No Authority is Granted by this Permit to Operate, Construct, or Maintain any Installation in Violation of any Law, Statute, Code, Ordinance, Rule, or Regulation of the State of Tennessee or any of its Political Subdivisions.

Section I – Sources Included in this Construction Permit

FACILITY DESCRIPTION			
Source Number	Source Description	Status	Control Device/Equipment
01	Polyurethane Foam Production (automotive seats)	Modified	None

Section II – Permit Record

Permit Type	Description of Permit Action	Issue Date
Initial	Initial PSD construction permit issuance	September 22, 2022

Section III - General Permit Conditions

G1. Responsible Person

The application that was utilized in the preparation of this construction permit is dated March 30, 2022, and is signed by Ryan Speck, Plant Manager, the Responsible Person for the permittee. The Responsible Person may be the owner, president, vice-president, general partner, plant manager, environmental/health/safety coordinator, or other person that is able to represent and bind the facility in environmental permitting affairs. If this Responsible Person terminates their employment or is assigned different duties and is no longer the person to represent and bind the permittee in environmental permitting affairs, the new Responsible Person for the permittee shall notify the Technical Secretary of the change in writing. The Notification shall include the name and title of the new Responsible Person assigned by the permittee to represent and bind the permittee in environmental permitting affairs, and the date the new Responsible Person was assigned these duties.

Should a change in the Responsible Person occur, the new Responsible Person must submit the Notification provided in Appendix 1 of this permit no later than 30 days after the change. A separate notification shall be submitted for each subsequent change in Responsible Person.

TAPCR 1200-03-09-.03(8)

G2. Application and Agreement Letters

This source shall operate in accordance with the terms of this permit, the information submitted in the approved permit application referenced in **Condition G1**, and any documented agreements made with the Technical Secretary.

TAPCR 1200-03-09-.01(1)(d)

G3. Submittals

Unless otherwise specified within this permit, the permittee shall submit, preferably via email and in Adobe Portable Document format (PDF), all applicable plans, checklists, certifications, notifications, test protocols, reports, and applications to the attention of the following Division Programs at the email addresses indicated in the table below:

Permitting Program	Compliance Validation Program	Field Services Program
<ul style="list-style-type: none"> • Notifications • Startup certifications • Applications • NSPS reports • MACT/GACT/NESHAP reports • Emission statements • Construction permit extension requests 	<ul style="list-style-type: none"> • Test protocols • Emission test reports • Visible emission evaluation reports 	<ul style="list-style-type: none"> • Semiannual reports • Annual compliance certifications/status reports
Division of Air Pollution Control William R. Snodgrass TN Tower, 15 th Floor 312 Rosa L. Parks Avenue Nashville, TN 37243 Air.Pollution.Control@tn.gov		Columbia Environmental Field Office Division of Air Pollution Control 1421 Hampshire Pike Columbia, TN 38401 APC.ColuEFO@tn.gov

The permittee shall submit the information identified above as requested in this permit. In lieu of submitting this information to the email addresses above, the permittee may submit the information to the attention of the respective Division Programs at the mailing addresses listed above.

TAPCR 1200-03-09-.03(8)

G4. Notification of Changes

The permittee shall notify the Technical Secretary for any of the following changes to a permitted air contaminant source which would not be a modification requiring a new construction permit:

- change in air pollution control equipment that does not result in an increase or otherwise meet the definition of a modification
- change in stack height or diameter
- change in exit velocity of more than 25 percent or exit temperature of more than 15 percent based on absolute temperature.

The permittee must submit the Notification provided in Appendix 2 of this permit 30 days before the change is commenced.

TAPCR 1200-03-09-.02(7)

G5. Permit Transference

- This permit is not transferable from one air contaminant source to another air contaminant source or from one location to another location. The permittee must submit a construction permit application for a new source to the Permitting Program not less than 90 days prior to the estimated starting date of these events. If the new source will be subject to major New Source Review, the application must be submitted not less than 120 days in advance of the estimated starting date of these events.

TAPCR 1200-03-09-.03(6)(b) and 1200-03-09-.01(1)(b)

- B. In the event an ownership change occurs at this facility, the new owner must submit the notification provided in Appendix 3 of this permit. The written notification must be submitted by the new owner to the Permitting Program no later than 30 days after the ownership change occurs. If the change in ownership results in a change in Responsible Person for the facility, notification of the change in Responsible Person must also be submitted, as specified in **Condition G1**.

TAPCR 1200-03-09-.03(6)(a) and (b)

G6. Operating Permit Application Submittal

The permittee shall submit a revised application for the Title V renewal permit number 578338 not less than 180 days prior to this permit's expiration date.

TAPCR 1200-03-09-.02(11)(d)1(i)(II)

G7. Temporary Operating Permit

This construction permit shall serve as a temporary operating permit from the date of issuance, until the Technical Secretary issues a new Title V operating permit, provided the permittee submits a revised Title V renewal application, within the timeframe specified in **Condition G6**.

TAPCR 1200-03-09-.02(1), 1200-03-09-.02(2), and 1200-03-09-.02(11)(d)1(i)(V)

G8. Startup Certification for New or Modified Source(s)

Not Applicable

G9. Fees

The air contaminant source(s) identified in this permit shall comply with the requirements for payment of applicable annual emission fees to the Tennessee Division of Air Pollution Control.

TAPCR 1200-03-26-.02

G10. General Recordkeeping Requirements

- A. All recordkeeping requirements for all data required to be recorded shall follow the following schedules:

For Daily Recordkeeping	For Weekly Recordkeeping	For Monthly Recordkeeping
No later than seven days from the end of the day for which the data is required.	No later than seven days from the end of the week for which the data is required.	No later than 30 days from the end of the month for which the data is required.

- B. The information contained in logs, records, and submittals required by this permit shall be kept at the facility's address, unless otherwise noted, and provided to the Technical Secretary or a Division representative upon request. Computer-generated logs are acceptable. Compliance is assured by retaining the logs, records, and submittals specified in this permit for a period of not less than five years at the facility's address.

TAPCR 1200-03-10-.02(2)(a)

G11. Routine Maintenance Requirements

The permittee shall maintain and repair the emission source, associated air pollution control device(s), and compliance assurance monitoring equipment as required to maintain and assure compliance with the specified emission limits.

TAPCR 1200-03-09-.03(8)

Compliance Method: Records of all repair and maintenance activities required above shall be recorded in a suitable permanent form and kept available for inspection by the Division. These records must be retained for a period of not less than five years. The date each maintenance and repair activity began shall be entered in the log no later than seven days following the start of the repair or maintenance activity, and the completion date shall be entered in the log no later than seven days after activity completion.

G12. Visible and Fugitive Emissions

- A. Unless otherwise specified, visible emissions from this facility shall not exhibit greater than 20% opacity, except for one six-minute period in any one-hour period, and for no more than four six-minute periods in any 24-hour period. A stack is defined as any chimney, flue, conduit, exhaust, vent, or opening of any kind whatsoever, capable of, or used for, the emission of air contaminants.

TAPCR 1200-03-05-.01(1) and 1200-03-05-.03(6)

Compliance Method: When required to demonstrate compliance, visible emissions shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).

- B. The permittee shall not cause, suffer, allow, or permit any materials to be handled, transported, or stored; or a building, its appurtenances, or a road to be used, constructed, altered, repaired, or demolished without taking reasonable precautions to prevent particulate matter from becoming airborne. Reasonable precautions shall include, but are not limited to, the following:
- (a) Use, where possible, of water or chemicals for control of dust in demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land;
 - (b) Application of asphalt, water, or suitable chemicals on dirt roads, material stockpiles, and other surfaces which can create airborne dusts;
 - (c) Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods shall be employed during sandblasting or other similar operations.

The permittee shall not cause, suffer, allow, or permit fugitive dust to be emitted in such manner to exceed five minutes per hour or 20 minutes per day as to produce a visible emission beyond the property line of the property on which the emission originates, excluding malfunction of equipment as provided in TAPCR 1200-03-20. A malfunction is defined as, any sudden and unavoidable failure of process equipment or for a process to operate in an abnormal and unusual manner. Failures that are caused by poor maintenance, careless operation, or any other preventable upset condition or preventable equipment breakdown shall not be considered malfunctions.

TAPCR 1200-03-08-.01(1) and 1200-03-08-.01(2)

Compliance Method: When required to demonstrate compliance, fugitive emissions shall be determined by Tennessee Visible Emissions Evaluation Method 4 as adopted by the Tennessee Air Pollution Control Board on April 16, 1986.

C. Fugitive emissions from roads and parking areas shall not exhibit greater than 10% opacity.

TAPCR 1200-03-08-.03

Compliance Method: When required to demonstrate compliance, fugitive emissions from roads and parking areas shall be determined by utilizing Tennessee Visible Emissions Evaluation (TVEE) Method 1, as adopted by the Tennessee Air Pollution Control Board on April 29, 1982, as amended on September 15, 1982 and August 24, 1984.

G13. Facility-wide Requirements/Limitations

The as-supplied VOC and HAP content of all VOC and HAP-containing materials (Including but not limited to coatings, inks, adhesives, thinners, and solvents) to be used by this source shall be determined from Safety Data Sheets (SDS) or manufacturer or vendor formulation data which explicitly list the VOC and HAP content by weight. If new materials are used, or if material formulation is changed, logs used to calculate emissions of VOC and HAP shall be updated within 30 days from the initial date of usage of the new or altered material.

TAPCR 1200-03-09-.03(8) and TAPCR 1200-03-10-.02(2)(a)

Compliance Method: Purchase orders and/or invoices for all VOC- and HAP-containing materials, along with current SDS, must be maintained and kept available for inspection by the Technical Secretary or a Division representative. The SDS must explicitly list the VOC and HAP content by weight for all VOC- and HAP-containing materials. If SDS are not available with this information, vendor formulation data containing the required information for those materials must also be maintained. These records must be retained in accordance with **Condition G10**. In lieu of paper documents, scanned documents (maintained electronically) may be used to fulfill this requirement.

TAPCR 1200-03-10-.02(2)(a)

G14. NSPS/NESHAP/MACT/GACT Standards

The following source(s) are subject to and shall comply with all applicable requirements of each NSPS/NESHAP/MACT/GACT standard as indicated in the table below, including the General Provisions identified in Appendix 9. The applicable requirements of each standard are incorporated into this permit pursuant to TAPCR 1200-03-09-.03(8).

Source	NESHAP/MACT/GACT	NSPS
01	40 CFR 63 Part OOOOOO	Not Applicable

TAPCR 1200-03-09-.03(8)

Compliance Method: Compliance methods are provided in the conditions in **Section IV** of this permit.

G15. VOC and NO_x Emission Statement

Not applicable

G16. Permit Supersedes Statement

This permit supersedes the conditions (E4-1, E4-2, and E4-3) for Source 01 in Title V Permit 569269 upon issuance of this permit.

TAPCR 1200-03-09-.03(8)

G17. Source Testing Requirements

Not Applicable

Section IV – Federal and/or State Only Requirements

F1-1. Prevention of Significant Deterioration of Air Quality

- A This permit allows the modification of source 28-0076-01 (three polyurethane foam production lines) subject to the Prevention of Significant Deterioration (PSD) review provisions of TAPCR 1200-03-09-.01(4) for significant emissions increases of volatile organic compounds (VOC) associated with the proposed project. This facility shall modify and operate this emission source in accordance with the terms of this permit and the information submitted in the approved permit application. Approval to construct shall not relieve any owner or operator of the responsibility to comply fully with the applicable provisions under Division 1200-03, Division 0400-30, and any other requirements under local, State, or Federal law.
- B The permittee shall apply best available control technology (Table F1-1) for each regulated NSR pollutant that has the potential to emit in significant amounts.

Table F1-1: Best Available Control Technology (BACT)			
Emission Source Reference Number	Description	Pollutant(s)	Best Available Control Technology
28-0076-01	Three polyurethane foam production lines	VOC	Utilize good work practice standards to reduce VOC emissions
			VOC emission limit of 491.40 ton per 12 consecutive months

TAPCR 1200-03-09-.01(4)

F2-1. 40 CFR Part 63 Subpart OOOOOO - National Emission Standards for Hazardous Air Pollutants for Flexible Polyurethane Foam Production and Fabrication Area Sources

This source is subject to all applicable requirements of 40 CFR Part 63, Subpart OOOOOO, National Emission Standards for Hazardous Air Pollutants for Flexible Polyurethane Foam Production and Fabrication Area Sources. The following standards will apply to this source:

- (1) The permittee must not use a material containing methylene chloride as an equipment cleaner to flush the mixhead or use a material containing methylene chloride elsewhere as an equipment cleaner in a molded flexible polyurethane foam process.
- (2) The permittee must not use a mold release agent containing methylene chloride in a molded flexible polyurethane foam process.

40 CFR §63.11416(c) and TAPCR 1200-03-09-.03(8)

Compliance Method:

- (1) Compliance may be demonstrated using VOC containing material usage records, Safety Data Sheets (SDS), manufacturer's formulation data, and engineering calculations. The permittee shall maintain documentation used to demonstrate compliance in accordance with **Condition G10**.
- (2) The permittee shall keep a certification on file at the plant site that contains the following statements, and must be signed by a responsible official:
 - (i) "This facility does not use any equipment cleaner to flush the mixhead which contains methylene chloride, or any other equipment cleaner containing methylene chloride in a molded flexible polyurethane foam process in accordance with § 63.11416(c)(1)."
 - (ii) "This facility does not use any mold release agent containing methylene chloride in a molded flexible polyurethane foam process in accordance with § 63.11416(c)(2)."

40 CFR §63.11416(f), 40 CFR §63.11417(c), and TAPCR 1200-03-09-.03(8)

Section V - Source Specific Permit Conditions

Source Number	Source Description
01	Polyurethane Foam Production - Source consists of three foam production lines where various mixtures of Polyol, Toluene Diisocyanate (TDI), and Diethanolamine (DEOA), are injected into molds to produce polyurethane foam for automotive seat cushions. Minor repairs are performed using Methylene Diphenyl Diisocyanate (MDI) as the foaming agent (Area Source: NESHAP-Subpart OOOOOO, PSD/BACT)

S1-1. Input Limitation(s) or Statement(s) of Design

Not Applicable

S1-2. Production Limitation(s)

Not Applicable

S1-3. Operating Hour Limitation(s)

Not Applicable

S1-4. Emission Limitation(s)

- A. Particulate matter (PM) emitted from this source shall not exceed 3.00 lb/hr on a daily average basis and 9.90 tons during any period of 12-consecutive months.

TAPCR 1200-03-07-.01(5) and the agreement letter dated July 18, 2022, from the permittee (Appendix 7)

Compliance Method:

- (1) The permittee shall demonstrate compliance with the hourly PM emission limitation by calculating the actual PM emitted each hour, on a daily average basis, and maintain records of the emissions in the format in log 3 of Appendix 8, or an alternative format, which readily provides the same information. These logs shall be retained in accordance with **Condition G10**.
 - (2) The permittee shall demonstrate compliance with the annual PM emission limitation by calculating the actual PM emitted during each calendar month and each period of 12-consecutive months and maintain records of the emissions in the format in logs 4 and 5 of Appendix 8, or in an alternative format which readily provides the same information. These logs shall be retained in accordance with **Condition G10**.
- B. Volatile organic compounds (VOC) emitted from this source shall not exceed 491.40 tons during any period of 12-consecutive months and shall utilize good work practice standards. This shall represent Best Available Control Technology (BACT) for this source.

TAPCR 1200-03-09-.01(4), TAPCR 1200-03-07-.07(2) and the agreement letter dated July 18, 2022, from the permittee (Appendix 7)

Compliance Method:

- (1) The permittee shall demonstrate compliance with the annual VOC limit by calculating actual emissions of VOCs and HAPs (using the emission factors below) emitted during each calendar month and each period of 12-consecutive months and maintain records of the emissions in the format found in logs 1 and 2 of Appendix 8, or in an alternative format which readily provides the same information. These logs shall be retained in accordance with **Condition G10**.
 - Toluene Diisocyanate (TDI) emissions shall be calculated using the emission factor of 3.29×10^{-5} lb TDI emitted per lb of TDI used. This emission factor is based on a source test performed on October 1, 1997.
 - Diethanolamine (DEOA) emissions shall be calculated using the emission factor of 7.94×10^{-6} lb DEOA emitted per lb of DEOA used. This emission factor is based on a source test performed on October 1, 1997.
 - Methylene Diphenyl Diisocyanate (MDI) emissions shall be calculated using the emission factor of 9.39×10^{-6} lb MDI emitted per lb of MDI used. This emission factor is based on a source test performed on October 1, 1997.
- (2) The permittee shall assure compliance with good work practice standards by conducting and recording the following work practice activities to ensure VOC emissions are minimized and reduced. These records shall be retained in accordance with **Condition G10**. These activities are outlined in Adient's ISO 14001 Environmental Management System (EMS) Policies as well as internal Standard Work Guidelines:
 - All VOC containing mold release containers shall remain closed until such time the container is in process of preparation for and ready for use.
 - Inventory storage of VOC containing mold release containers shall consist of a controlled access area complete with spill containment.
 - Mold release material shall be transferred from tank storage to end point discharge via a fully contained and closed loop piping conveyance system.
 - In the event of an inadvertent failure of the closed loop conveyance system resulting in the incidental release of mold release material, as referenced within Adient Pulaski's internal Plant Emergency Operations Plan, the onsite Spill Response Team shall be notified immediately and shall mitigate the spill in a manner which reduces potential fugitive VOC emissions.

- End point usage of VOC containing mold release material shall be monitored regularly as outlined within Adient Pulaski's internal work instructions and standard operating procedures.
- Utilizing the ISO14001 EMS Environmental Objectives Form, or the Adient continuous improvement platform, plant personnel shall participate in regular mold release tracking activities. These records shall be retained in accordance with **Condition G10**.

The above measures are instituted by way of the internal ISO program for continuous improvement and are collectively considered good management practices at the time of permit issuance. Improvements and the ongoing potential for continuous improvement may require updates of these procedures and environmental objectives. If Adient Pulaski revises the above measures, the permittee shall provide written notification to the Division at least 30 days prior to the change.

S1-5. Source-Specific Visible Emissions Limitation(s)

Not Applicable

(end of conditions)

The permit application gives the location of this source as 36°13'46.41" N Latitude and 87°04'14.41" W Longitude.

Appendix 1: Notification of Change in Responsible Person

Facility (Permittee): _____ Adient US LLC _____

Facility ID: _____ 28-0076 _____

Former Responsible Person: _____
Name Title

New Responsible Person: _____
Name Title

Email

Date New Responsible Person was assigned this duty: _____

As the Responsible Person of the above mentioned facility (permittee), I certify that the information contained in this Notification is accurate and true to the best of my knowledge. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Signature		Date
Signer's name (print)	Title	Phone (with area code)

Appendix 2: Notification of Changes

Facility (Permittee): Adient US LLC

Facility ID: 28-0076

Source Number: _____

	Control Equipment	Stack Height (Feet)	Stack Diameter (Feet)	Exit Velocity (Feet/Second)	Exit Temperature (°F)
Current					
Proposed					
Current					
Proposed					
Current					
Proposed					

Comments:

As the Responsible Person of the above mentioned facility (permittee), I certify that the information contained in this Notification is accurate and true to the best of my knowledge. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Signature		Date
Signer's name (print)	Title	Phone (with area code)

Appendix 3: Notification of Ownership Change

Facility (Permittee): Adient US LLC (Previous Owner)

Facility ID: 28-0076

Facility (Permittee): _____ (New Owner)

Email Address: _____

Secretary of State Control Number: _____ [as registered with the TN Secretary of State]

Date of Ownership Change: _____

Comments:

As the responsible person for the new owner or operator of the above mentioned facility (permittee):

- I agree to not make any changes to the stationary source(s) that meet the definition of modification as defined in Division 1200-03 or Division 0400-30¹, and
- I agree to comply with the conditions contained in **the permits listed below**, Division 1200-03 and Division 0400-30 of the Tennessee Air Pollution Control Regulations, the Tennessee Air Quality Act, and any documented agreements made by the previous owner to the Technical Secretary.

List all active permits issued to the facility for which the owner wishes to assume ownership:

As the Responsible Person of the above mentioned facility (permittee), I certify that the information contained in this Notification is accurate and true to the best of my knowledge. As specified in Tennessee Code Annotated Section 39-16-702(a)(4), this declaration is made under penalty of perjury.

Signature		Date
Signer's name (print)	Title	Phone (with area code)

¹ Appropriate application forms must be submitted prior to modification of the stationary source(s).

Appendix 4: Startup Certification

Not Applicable

Appendix 5: Fees

Not Applicable

Appendix 6: Emission Statement for VOC and NO_x

Not Applicable

Appendix 7: Agreement Letter

1890 Mines Road
Pulaski, Tennessee 38478
Tel 931.363.5666 Fax 931.424-6722



July 18, 2022

Michelle B. Owenby, Technical Secretary
Attn: West Tennessee Permit Program
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN. 37243

Facility Owner/Company Name:	Adient US LLC Pulaski
Facility Address:	1890 Mines Road, Pulaski, TN.
Emission Source Reference Number:	28-0076
Title V Permit Number:	569269 including Minor Modification #1

Ms. Owenby,

This letter is being submitted at the request of the Tennessee Department of Environment and Conservation (TDEC) and serves as an agreement by Adient US LLC Pulaski (Adient) to establish volatile organic (VOC) and particulate matter (PM₁₀) emission limits from the foam molding operations as represented in whole or part in the construction permit application dated March 30, 2022. Notwithstanding this agreement, Adient retains the right and opportunity to review and comment on all draft construction permit terms and conditions available ahead of the public comment period and during the public comment period and to utilize any appeal right it may have with respect to any terms or conditions it does not believe are appropriate.

As a part of this major PSD air permit request, Adient seeks to increase its production rates. The agreed upon emission rates are summarized in Table 1.

Table 1. Maximum Air Contaminant Emission Rates

Air Contaminant	Maximum Emission Rate
VOC	491.4 tons per year as calculated across a consecutive rolling 12-month basis
PM ₁₀	9.9 tons per year and 3.0 pounds per hour

The annual VOC and PM₁₀ emission rates are based on the maximum potential emission rates generated by the foam molding operations excluding insignificant sources and exempt sources at the facility. The annual VOC and PM₁₀ emission rates are calculated for an entire year and are considered the mass emissions as averaged over a period of 12 consecutive months.

The Significant Emissions Rate (SER) for PM₁₀ is 15 tons per year (tpy). Adient is proposing a maximum PM₁₀ emission rate of 9.9 tpy. Consequently, the SER will not be exceeded. In regard to the requirement to impose shorter term limits on PM₁₀ emissions, Adient proposes a limit on PM₁₀ emissions at a rate of 3.0 pounds per hour (lb/hour) to allow for operational flexibility and production variability routinely experienced during certain periods of time in any given month or year. Adient recognizes that at a maximum PM₁₀ emission rate of 3.0 lb/hour,

Adient – PUBLIC

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the annual PM₁₀ emission rate would otherwise be greater than 9.9 tpy. A maximum emission rate of, or potential to emit (PTE) PM₁₀ at 3.0 lb/hr based upon sustained emissions over 8,760 hours would equate to 13.14 tpy, which remains below the SER of 15 tons per year for PM₁₀. However, Adient is voluntarily accepting an annual restriction/limit on PM₁₀ emissions of 9.9 tpy. The combination of the longer-term annual PM₁₀ emissions rate with the projected and slightly higher hourly equivalent PM₁₀ emissions rate will:

- 1) Provide for a significant decrease in currently allowed particulate matter emissions from the process;
- 2) Cap annual emission at slightly less than two-thirds of the SER for PM₁₀; and
- 3) Provide necessary production flexibility while also allowing for seasonality and business/production variations.

Adient will demonstrate compliance with the above-referenced VOC and PM10 emission limits by the following methods already in place and required by the facility's current Title V operating permit no. 569269 including Minor Modification #1.

Table 2. Compliance Demonstration (Abbreviated)

Permit Condition No.	Compliance Demonstration	Regulatory Reference
E3-1	Visible emissions at this facility shall not exhibit greater than twenty percent (20%) opacity, except for one (1) six-minute period in any one (1) hour period, and for no more than four (4) six-minute periods in any twenty-four (24) hour period. Visible emissions from this source shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average).	TAPCR 1200-03-05-.01(1) and 1200-03-05-03(6), EPA Test Method 9
E3-2 and E-3	Maintenance of Safety Data Sheets (SDSs) and Material Safety Data Sheets (MSDSs) as well as other documentation (e.g. manufacturer/supplier formulation data, technical data sheets, environmental data sheets) for purposes of a mass balance calculation of emissions.	TAPCR 1200-03-10-.02(2)(a)
E3-13	Regarding recordkeeping of logs, the following is applicable: a) For monthly recordkeeping, all data, including the results of all calculations, must be entered into the log no later than 30 days from the end of the month for which the data is required. b) For weekly recordkeeping, all data, including the results of all calculations, must be entered into the log no later than 7 days from the end of the week for which the data is required. c) For daily recordkeeping, all data, including the results of all calculations, must be entered into the log no later than 7 days from the end of the day for which the data is required.	TAPCR 1200-03-10-.02(2)(a)
E3-15	For purposes of compliance with Volatile Organic Compound (VOC) and Hazardous Air Pollutants (HAPs) emissions limits in this permit, the following logs	TAPCR 1200-03-10-.02(2)(a)

Adient – PUBLIC

Permit Condition No.	Compliance Demonstration	Regulatory Reference
	(LOG 1 and LOG 2) shall be used. These logs shall contain all volatile emissions excluding water and/or exempt compounds and also shall contain all HAPs. Logs in an alternate format providing the same information may be used. Records shall also be retained to verify the HAP content of each material. This may include MSDS, formulation data, or other documentation to establish the HAP content. These logs and records must be retained for a period of not less than five years and shall be reported in accordance with Condition E2 of this permit. Also, these logs shall include records of VOC or HAP emissions from any source which is considered to be insignificant or exempt under the provisions of TAPCR 1200-03-09-.04.	
E4-2	<p>Volatile organic compounds (VOC) emitted from this source shall not exceed 491.4 tons during all intervals of twelve (12) (MM1) consecutive months.</p> <p>Compliance Method: The permittee shall calculate the actual quantities of VOC and HAPs emitted from this facility during each calendar month and during each twelve consecutive (12) month period. The permittee shall maintain records of these emissions in a form that readily shows compliance with this condition. (See Logs 1 and 2 of Condition E3-15 for an example) These logs must be maintained at the source location and kept available for inspection by the Technical Secretary or representative thereof. These logs must also be reported in accordance with Condition E2 of this permit and be retained for a period of not less than five (5) years.</p> <ul style="list-style-type: none"> Toluene Diisocyanate (TDI) emissions shall be calculated using the emission factor of 3.29 x 10⁻⁵ lb TDI emitted per lb of TDI used. This emission factor is based on a source test performed on October 1, 1997. Diethanolamine (DEOA) emissions shall be calculated using the emission factor of 7.94 x 10⁻⁶ lb DEOA emitted per lb of DEOA used. This emission factor is based on a source test performed on October 1, 1997. Methylene Diphenyl Diisocyanate (MDI) emissions shall be calculated using the emission factor of 9.39 x 10⁻⁶ lb MDI emitted per lb of MDI used. This emission factor is based on a source test performed on October 1, 1997. 	TAPCR 1200-03-07-.07(2)
New permit condition	The permittee shall calculate the actual quantities of PM ₁₀ emitted from this facility on a daily basis, and based on the daily data, calculate hourly emissions for each day. The permittee shall calculate the actual quantities of PM ₁₀ emitted from this facility during	TBD

Page 4 of 4

Permit Condition No.	Compliance Demonstration	Regulatory Reference
	each calendar month and during each twelve consecutive (12) month period.	

I, the undersigned, am the responsible official as defined in TAPCR 1200-3-9-.02(11)(d)4 of the Title V source for which this document is being submitted. I hereby certify, based on the information and belief formed after reasonable inquiry, that the statements made, and data contained in this document are true, accurate, and complete.

Sincerely,



Ryan Speck
Plant Manager

Cc: Kris Patrick Foster, Adient; Ricki Palmer, Adient Ann O'Brien; SCS Engineers; Jeffrey M. Pfost, Environmental Partners, Inc.; Stephanie Taylor, SCS Engineers

Adient – PUBLIC

Appendix 8: Example Logs

LOG 1 MONTHLY LOG FOR {28-0076-01} MONTH: _____ YEAR: _____

MATERIAL NAME	MATERIAL DENSITY (lb/gal)	USAGE (gal/month)	VOC CONTENT (lbs VOC/gal)	VOC EMITTED (tons/month)	TDI EMISSION FACTOR (3.29x10 ⁻⁵ lb/lb)	TDI EMITTED (tons/month)	DEOA EMISSION FACTOR (7.94x10 ⁻⁶ lb/lb)	DEOA EMITTED (tons/month)	MDI EMISSION FACTOR (9.39x10 ⁻⁶ lb/lb)	MDI EMITTED (tons/month)	TOTAL HAPs EMITTED (tons/month)
TOTALS											

LOG 2 12-MONTH -LOG FOR {28-0076-01}

MONTH/YEAR	VOC EMISSIONS (TONS per MONTH)	(*) VOC EMISSIONS (TONS per 12 MONTHS)	HAP-1 EMISSIONS (TONS per MONTH)	(*) HAP-1 EMISSIONS (TONS per 12 MONTHS)	HAP-2 EMISSIONS (TONS per MONTH)	(*) HAP-2 EMISSIONS (TONS per 12 MONTHS)	HAP-3 EMISSIONS (TONS per MONTH)	(*) HAP-3 EMISSIONS (TONS per 12 MONTHS)	TOTAL HAP EMISSIONS (TONS per MONTH)	(*) TOTAL HAP EMISSIONS (TONS per 12 MONTHS)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

(*) The Tons per 12 Month value is the sum of the VOC (or HAP) emissions in the 11 months preceding the month just completed + the VOC (or HAP) emissions in the month just completed. If data is not available for the 11 months preceding the initial use of this Table, this value will be equal to the value for tons per month. For the second month it will be the sum of the first month and the second month. Indicate in parentheses the number of months summed [i.e., 6 (2) represents 6 tons emitted in 2 months].

LOG 3 DAILY PM LOG FOR {28-0076-01} Month: _____ Year: _____

DAY	MATERIAL USAGE (lbs.)	PARTICULATE CONTENT (wt %)	TRANSFER EFFICIENCY (55%)	HOURS OF OPERATION	*DAILY AVERAGE PM EMITTED (lbs./hr.)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					

*Daily average PM emitted (lb/hr) = material usage (lbs) x particulate content (wt %) x (1- transfer efficiency (55%)) / hours of operation

LOG 4 MONTHLY PM LOG FOR {28-0076-01} MONTH: _____ YEAR: _____

MATERIAL NAME	USAGE (lb/month)	PARTICULATE CONTENT (wt %)	TRANSFER EFFICIENCY (55%)	*PM EMITTED (tons/month)
TOTALS				

* *PM emitted (ton/month) = material usage (lbs/month) x particulate content (wt %) x (1- transfer efficiency (55%))*

LOG 5 12-MONTH -PM LOG FOR {28-0076-01}

MONTH/YEAR	PM EMISSIONS (TONS per MONTH)	*TOTAL PM EMISSIONS (TONS per 12 CONSECUTIVE MONTHS)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

(*) The Tons per 12-consecutive Month value is the sum of the PM emissions in the 11 months preceding the month just completed + the PM emissions in the month just completed. If data is not available for the 11 months preceding the initial use of this Table, this value will be equal to the value for tons per month. For the second month it will be the sum of the first month and the second month. Indicate in parentheses the number of months summed [i.e., 6 (2) represents 6 tons emitted in 2 months].

Appendix 9: General Provisions for 40 CFR Part 63, Subpart OOOOOO

You are required to comply with the following General Provisions of the federal National Emission Standards for Hazardous Air Pollutants (NESHAP):

General Provisions Citation 40 CFR	Subject of Citation	Applies to Subpart	Explanation
§63.1	Applicability	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.2	Definitions	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Definitions are modified and supplemented by §63.11419.
§63.3	Units and Abbreviations	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.4	Prohibited Activities and Circumvention	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.5	Preconstruction Review and Notification Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.6(a), (b), (c), (d)	Compliance with Standards and Maintenance Requirements—Applicability Compliance Dates	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.6(e)(1)-(2)	Operation and Maintenance Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.6(e)(3)	Operation and Maintenance Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Owners and operators of subpart OOOOOO affected sources are not required to develop and implement a startup, shutdown, and malfunction plan.
§63.6(f)-(g)	Compliance with Non-opacity Emission Standards	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.6(h)	Compliance with Non-opacity Emission Standards	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Subpart OOOOOO does not require opacity and visible emissions standards.
§63.6(i)-(j)	Compliance with Non-opacity Emission Standards	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.7	Performance Testing Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Performance tests not required by subpart OOOOOO
§63.8	Monitoring Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Continuous monitoring, as defined in subpart A, is not required by subpart OOOOOO
§63.9(a)-(d)	Notification Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.9(e)-(g)	Notification Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

§63.9(h)	Notification Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Subpart OOOOOO specifies Notification of Compliance Status requirements.
§63.9(i)-(j)	Notification Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.10(a)-(b)	Recordkeeping and Reporting Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Subpart OOOOOO specifies Recordkeeping and Reporting requirements.
§63.10(c)	Recordkeeping and Reporting Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.10(d)(1)	Recordkeeping and Reporting Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.10(d)(2)-(3)	Recordkeeping and Reporting Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.10(d)(4)	Recordkeeping and Reporting Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.10(d)(5)	Recordkeeping and Reporting Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.10(e)	Recordkeeping and Reporting Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.10(f)	Recordkeeping and Reporting Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.11	Control Device Requirements	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.12	State Authorities and Delegations	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.13	Addresses	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.14	Incorporations by Reference	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.15	Availability of Information and Confidentiality	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
§63.16	Performance Track Provisions	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

TAPCR 1200-03-09-.03(8)

Appendix B – Emission Summary for PSD Permit 980244

Emission Summary

Source 01

Permit Number: 980244

Source Status: New ☐ Modification ☒ Expansion ☐ Relocation ☐ **Permit Status:** New ☒ Renewal ☐

PSD ☒ NSPS ☐ NESHAPs ☒ **Previous Permit Number:** Construction _____ Operating 569269

Pollutant	Pounds/Hour			Tons/Year			Date of Data	Applicable Standard TAPCR 1200-03-
	Actual	Uncontrolled Potential	Allowable/ Permitted Potential	Actual	Uncontrolled Potential	Allowable/ Permitted Potential		
VOC ^[1]					502.85	491.4	3/30/2022	09-.01(4) 07-.07(2)
PM ^[2]	2.16	2.16	3.00	6.22	9.46	9.90	3/30/2022	07-.01(5)

1. VOC emissions are uncontrolled and are based on the data in Page 36 of the application (3/30/22). The facility has agreed to limit (through recordkeeping and good work practice standards) VOC emissions to 491.4 tons per any period of 12-consecutive months. The emission limit is based on an agreement letter dated July 18, 2022, from the permittee.

2. PM emissions are uncontrolled and are based on the data in Page 37 of the application (3/30/22). The regulatory allowable limit (TAPCR 1200-03-07-.03(1)) for PM is 46.29 lb/hr. The facility has agreed to limit (through recordkeeping) PM emissions to 3.00 lb/hr and 9.90 tons per year based on an agreement letter dated July 18, 2022, from the permittee.

The actual TPY is based on the facility's operating hours of 5,760 hr/yr from APC 10 form in the application (3/30/22).

Appendix C – Application for PSD Permit 980244

Aemilia Hamel

From: Air.Pollution Control
Sent: Wednesday, 30 March, 2022 20:43
To: APC Permitting
Subject: FW: Email 1 of 2 - Construction Permit Application_Source ID 28-0076 Adient US, LLC
Attachments: Adient_Air Quality Construction Permit Application_March 2022_final_PART 1 OF 2.pdf

From: O'Brien, Ann <AOBrien@scsengineers.com>
Sent: Wednesday, March 30, 2022 5:02 PM
To: Air.Pollution Control <Air.Pollution.Control@tn.gov>
Cc: Kris Patrick Foster <kris.patrick.foster@adient.com>
Subject: [EXTERNAL] Email 1 of 2 - Construction Permit Application_Source ID 28-0076 Adient US, LLC

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****

To Whom It May Concern, on behalf of Adient US, LLC, Source ID No. 28-0076, attached please find a construction permit application, which includes all sections except for the Safety Data Sheets. Given the size of the application, which exceeds 25 MB, we are sending it in two separate emails. Please let me know if you have any questions. Or, you can contact Kris P. Foster, EHS Analyst with Adient US, LLC. He can be reached at kris.patrick.foster@adient.com.

Attached to this email are all application documents EXCEPT the Safety Data Sheets. They will be sent as an attachment to a second email (Email 2 of 2 – Construction Permit Application_Source ID 28-0076 Adient US, LLC).

An original application is being sent to the Department by way of certified mail. Best regards, Ann O'Brien

Ann P. O'Brien
Project Manager
SCS Engineers
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Chicago, IL 60646 USA
773-775-6362 (W)
773-540-5199 (C)
aobrien@scsengineers.com

Driven by Client Success
www.scsengineers.com

1890 Mines Road
Pulaski, Tennessee 38478
Tel 931.363.5666 Fax 931.424-6722



March 30, 2022

Michelle Owenby, Technical Secretary
State of Tennessee, Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

SUBJECT: Air Construction Permit Application, Prevention of Significant Deterioration
Adient US, LLC
1890 Mines Road, Pulaski, TN 38478

To Whom It May Concern,

Enclosed please find an air construction permit application for Adient US, LLC (Adient) located at 1890 Mines Road, Pulaski (Giles County), Tennessee. Adient designs, engineers and manufactures seats for the automotive industry. The manufacturing process includes the production of automotive cushions, backrests, head restraints and other automotive components formulated with polyurethane foam. This air quality construction permit application has been prepared in accordance with the requirements of the Tennessee Department of Environment & Conservation (TDEC), Air Pollution Control Regulations, Tennessee Code: Title 68: Chapter 201. Adient US, LLC (Adient) is a major source of air pollution, specifically as to volatile organic compounds (VOC) and is seeking authority to expand its foam manufacturing operations located in Pulaski, Tennessee.

By way of background, in June 2021, Adient approached TDEC regarding increasing VOC emissions from the facility to 491.4 tpy. Discussions regarding this increase continued during the remainder of 2021 and into the spring of 2022. In October 2021, TDEC alleged that Adient had not met certain permit requirements. Adient denied these allegations and discussions between the parties ensued. As a result of these discussions, the parties entered into a Consent Order on February 24, 2022. Pursuant to the discussions, Adient is submitting this PSD permit application.

Should you have any questions or need additional information, please contact Mr. Kris Patrick Foster, EHS Analyst at (931) 363 – 5666 or kris.patrick.foster@adient.com. You can also contact Ms. Stephanie Taylor, Project Professional with SCS Engineers. Stephanie can be reached at (913) 749 – 0733 or staylor@scsengineers.com.

Thank you for your assistance in processing this permit application. We look forward to meeting and working with you on this project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Ryan Speck".

Ryan Speck
Plant Manager

Ms. Michelle Owenby, Technical Secretary
March 30, 2022

Encl: Air Construction Permit Application, Prevention of Significant Deterioration

Cc: Mr. Kris Patrick Foster, EHS Analyst
Mr. Rick H. Palmer, Regional EHS Manager
Ms. Stephanie Taylor, SCS Engineers
Mr. Jeff Pfof, Environmental Partners, Inc.

Air Quality Construction Permit Application

Prevention of Significant Deterioration

Adient US, LLC
1890 Mines Road
Pulaski, Tennessee 38478

March 30, 2022



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1.0 INTRODUCTION

This air quality construction permit application has been prepared in accordance with the requirements of the Tennessee Department of Environment & Conservation (TDEC), Air Pollution Control Regulations, Tennessee Code: Title 68: Chapter 201. Adient US, LLC (Adient) is a major source of air pollution, specifically as to volatile organic compounds (VOC) and is seeking authority to expand its operations located in Pulaski, Tennessee (**Figure 1**).

1.1 SITE LOCATION AND CONTACTS

Company name: Adient US, LLC
Street address: 1890 Mines Road
City, State, Zip Code: Pulaski, Tennessee 38478
Telephone number: (931) 363 - 5666
Website: <https://www.adient.com>

Responsible official: Mr. Ryan Speck
Job title: Plant Manager
Electronic mailing address: Ryan.speck@adient.com

Environmental contact: Mr. Kris Patrick Foster
Job title: EHS Analyst
Electronic mailing address: kris.patrick.foster@adient.com

Corporate environmental contact: Mr. Rick H. Palmer
Job title: Regional EHS Manager
Electronic mailing address: ricki.h.palmer@adient.com

1.2 PROCESS OVERVIEW

Adient designs, engineers and manufactures seats for the automotive industry. The manufacturing process includes the production of automotive cushions, backrests, head restraints and other automotive components formulated with polyurethane foam. As part of an overall program to reduce its environmental footprint, Adient has developed a lightweight seating foam and has pioneered the creation of low-emission foams using renewable resources and natural oil polyols. These advancements not only have a direct positive impact on the local community, but also serve to support the automotive industry in lowering the weight of cars, which has a direct effect on improved gas mileage.

Standard Industrial Classification:	2821: Plastics Materials, Synthetic Resins and Nonvulcanizable Elastomers
North American Industrial Classification System:	326150: Urethane and Other Foam Product (except Polystyrene) Manufacturing
Establishments primarily engaged in manufacturing synthetic resins, plastics materials, and nonvulcanizable elastomers. Important products of this industry include: cellulose plastics materials; phenolic and other tar acid resins; urea and melamine resins; vinyl resins; styrene resins; alkyd resins; acrylic resins; polyethylene resins; polypropylene resins; rosin modified resins; coumarone-indene and petroleum polymer resins; miscellaneous resins, including polyamide resins, silicones, polyisobutylenes, polyesters, polycarbonate resins, acetal resins, and fluorohydrocarbon resins; and casein plastics.	

1.2.1 Process Description, Pulaski Operations

Adient operates three moisture curing, urethane foam injection lines at its Pulaski, Tennessee facility. The foam lines produce automotive seat cushions and other foam products in clamshell molds.

The three molding lines each operate using racetrack-type conveyors, whereby the molds are presented to the various production stations for the foam process to produce a part in its final form. An open mold is presented to the mold release - spray application station where an operator sprays the mold with the mold release agent. The mold advances to the pour station where a robot equipped with a urethane component mix head injects the mixed foam components into the open mold. The mold is automatically closed and the foam reaction occurs in the mold cavity. As the mold advances through the production line, the foam expands, cures and is opened and presented to the extraction station. A worker team removes the molded part, cleans and prepares the mold for another cycle, and the process repeats. A process flow diagram is attached (**Figure 2**).

Prior to injecting the foam components into the mold, the molds are sprayed with a wax mold release agent to allow removal of the cured foam. The mold release wax is suspended in an aliphatic (non-halogenated) solvent, which contains VOC.

The two-part foam components are moisture-cured producing a polyurethane automotive seat cushion. Halogenated compounds **are not used** as blowing agents. The foam components are mixed at the gun head, injected/poured into the clamshell molds, the molds are closed and the foam reaction occurs in the mold cavity.

Copies of the Safety Data Sheets (SDSs) for the wax mold release agent and other raw materials containing regulated air pollutants (**Appendix A**) are attached.

2.0 AIR PERMIT HISTORY

April 29, 2004: TDEC issued Title V operating permit number 556316 ("Permit 556316"), to Johnson Controls, Inc. (28-0076) for a polyurethane foam manufacturing operation. Condition E4-2 of Permit 556316 limited the VOC emissions to 248.0 tons during any 12-consecutive months.

May 8, 2006: TDEC issued Minor Modification #2 to Permit 556316, to Johnson Controls, Inc. to increase the allowable VOC emissions from 248.0 to 258.0 tons during any 12-consecutive months. According to TDEC, documentation attached to Minor Modification #2 indicated that the increase was based on a letter dated January 23, 2006 from Kathy Arnold. The Division has no copy of the January 23, 2006 letter.

February 18, 2010: TDEC received an application from Johnson Controls, Inc. dated February 16, 2010, for a minor modification to Permit 556316, to increase the allowable VOC emissions from 258.0 to 276.7 tons per 12-consecutive months.

March 4, 2010: According to TDEC, it received a letter from Johnson Controls, Inc. that indicated the baseline emissions used in the February 16, 2010 application was incorrect. The letter stated, "Johnson Controls is requesting an increase in the VOC allowable for the Foam Production."

June 4, 2010: TDEC issued renewal Title V operating permit number 562120 to Johnson Controls, Inc. which contained condition E4-2 that increased the VOC emission limit to 285.9 tons during any 12-consecutive months.

January 15, 2016: TDEC issued renewal Title V operating permit number 569269 ("Permit 569269"), to Johnson Controls, Inc. for the polyurethane foam manufacturing operation.

May 26, 2016: TDEC issued Administrative Amendment #1 to Permit 569269, for the ownership change of the polyurethane foam manufacturing operation from Johnson Controls, Inc. to Adient US, LLC, which occurred on May 1, 2016.

November 21, 2016: TDEC issued Minor Modification #1 to Permit 569269, to Adient US, LLC, to increase the VOC emissions from 285.9 tons during all intervals of 12-consecutive months to 308 tpy during all intervals of 12-consecutive months.

June 15, 2020: TDEC received a revised Title V permit renewal application dated June 11, 2020 from Adient US, LLC. The application stated, “During this renewal application process, Adient Pulaski is targeting an increase in Allowable AAP Emissions VOC’s from the current 308 tpy per AAP to 346 AAP.”

In June 2021, Adient approached TDEC regarding increasing VOC emissions from the mold release operations to 491.4 tpy¹. Discussions regarding this increase continued during the remainder of 2021 and into the spring of 2022. In October 2021, TDEC alleged that Adient had not met certain permit requirements. Adient denied these allegations and discussions between the parties ensued. As a result of these discussions, the parties entered into a Consent Order on February 24, 2022. Pursuant to the discussions, Adient is submitting this PSD permit application.

3.0 CONSTRUCTION PERMIT APPLICATION

As a result of increased business related to a new automotive program, Adient is seeking a construction air permit for the existing Pulaski foam operations. Adient is a major source of VOC and accordingly, this permit application is being submitted under the Prevention of Significant Deterioration (PSD) permitting program. Pursuant to 1200-03-09-.01(4), Prevention of Significant Air Quality Deterioration (PSD), the following elements are addressed:

1. Emission calculations for applicable regulated air pollutants, namely criteria air pollutants and hazardous air pollutants (HAPs);
2. Applicable federal and state air pollution control regulations and rules and standards;
3. Top-down Best Available Control Technology (BACT) analysis;
4. Air quality assessment;
5. Additional impact analysis including potential growth impacts, soil and water impacts and visibility impacts;
6. Additional information and data provided on TDEC permit application forms.

Adient understands that this construction permit application is subject to public participation pursuant to 1200-03-09-.01(4). Adient further understands that the Department accomplishes the requirement associated with public participation by electronic notice on the Department’s website on a monthly basis including applicants seeking authority to construct, modify and/or operate air pollution emission sources.

3.1 FACILITY-WIDE EMISSION RATES

3.1.1 Volatile Organic Compounds (VOCs)

As described above, projected VOC emissions are the result of in-mold release agents used to produce polyurethane foam seating systems for the automotive industry. The mold release agents may be sprayed or

¹ Projected maximum emissions facility-wide are 502 tpy, but Adient will voluntarily accept a limit on facility-wide emissions of 491.4 tpy.

manually applied to the mold surface, prior to foam component application. The mold release agent is comprised of wax in a solvent carrier.

Attempts to use low emitting alternatives such as co-solvent mold release agents have failed, resulting in high levels of damaged parts, requiring re-manufacturing and wasted raw materials. Specifically, the use of lower emitting mold release agents does not allow a clean release of the newly formed foam part and frequently causes the foam to stick to the mold, causing damage to the part upon extraction.

Adient is proposing to increase the allowable facility-wide VOC emission rate to 491.4 tons per year (tpy). The facility-wide VOC emission rate is primarily generated by the use and operations associated with the mold release agent, and the balance of the VOC emissions are from other related foam manufacturing and cleaning operations. The VOC emissions from other related foam manufacturing and cleaning operations are relatively low enough that Adient is able to accept a VOC emissions cap of 491.4 tpy.

The project net emissions increases and decreases are summarized below. Pursuant to TDEC’s request, baseline emissions in this application are 0.0 tpy.

Table 1. Contemporaneous VOC Emission Decreases and Increases

VOC Emissions - Netting Exercise	
Baseline VOC emissions:	0.0 tpy (past actual)
Proposed VOC emission increases:	491.4 tpy
Contemporaneous VOC emission decreases:	0.0 tpy
Net VOC emission increases:	491.4 tpy

Detailed VOC emissions calculations are included with this application (**Appendix B**). Because the existing operation is considered a PSD major source of VOC emissions (greater than 250 tons), the requested VOC increases (the project) are greater than 250 tpy, and the emissions increases and net emissions increases are also greater than the PSD significance level of 40 tons, this request requires a major source PSD review.

3.1.2 Particulate Matter Emissions

The wax mold release agents (subject of the VOC increases) contain wax solids suspended in a solvent carrier. The solids portion of the mold release agents are sprayed or manually applied.

Particulate emissions result from overspray of the mold release agent. The purpose of the mold release application is to apply the release wax to the mold which prevents the foam from sticking to the mold surface. The process uses high volume, low pressure (HVLP) spray applicators for improved transfer efficiency. Overspray in the form of total suspended particulate (TSP) has been equated to particulate matter 10 microns and smaller (PM₁₀ filterable) particulates. The spray wax particles are highly cohesive such that they stick to the mold surface as larger agglomerated overspray particles. Since the process is not heated in a separate curing oven and does not involve combustion or by-products of incomplete combustion, it is assumed PM_{2.5} is negligible, if emitted at all.

HVLP applicators are typically equated to a transfer efficiency of 65 percent. For purposes of determining worst case/highest particle emissions, a transfer efficiency of 55 percent has been assumed in the calculation of particle emissions.

Adient has calculated a maximum PM/PM₁₀ (and PM_{2.5}) emission rate of 9.455 tpy, but is seeking authority to emit up to 9.90 tpy of particulate matter emissions for which emission calculations are attached (**Appendix B**).²

The emission rate of PM₁₀ is below the significant emission rate (SER) of 15 tpy for PSD applicability, and it is also below the SER threshold for PM (25 tpy) and PM_{2.5} (10 tpy). Reference is made to PM_{2.5} although as mentioned above, the process is not heated in a separate curing oven and accordingly, PM_{2.5} is not an anticipated air pollutant.

No other criteria pollutants are associated with the process so potential emissions for criteria pollutants other than VOC and PM and PM₁₀ are considered negligible. Detailed criteria air pollutant emission calculations, including emission rates for all processed raw materials are included in **Appendix B**.

3.1.3 Hazardous Air Pollutant (HAP) Emissions

Some raw materials contain low concentrations of federal hazardous air pollutants (HAPs) and consequently, Adient is an area source of HAPs. The calculation of HAP emission rates is included in **Appendix B**.

3.1.4 Criteria Air Pollutant and HAP Emissions – Summary

Total facility-wide criteria air pollutant and HAP emission rates are summarized below.

Table 2. Facility-wide Emissions Summary

Criteria Air Pollutant and HAP Emissions					
Regulated Air Pollutant ³	Baseline Emissions	Emission Increases (Decreases)	Proposed Allowable Emissions	PSD Significance Threshold	Comments
	Tons per Year				
SO ₂	NA	0.00	0.00	40	<SER
NO _x	NA	0.00	0.00	40	<SER
CO	NA	0.00	0.00	100	<SER
PM _{total}	0.00	0.00	9.90	25	<SER
PM ₁₀	NA	0.00	9.90	15	<SER
PM _{2.5}	NA	0.00	9.90	10	<SER
VOC ⁴	0.00	0.00	491.4	40	>SER
Pb	NA	0.00	0.00	0.6	<SER

² The current maximum allowed particulate matter (TSP) for the mold release operation is 113.9 tpy. However, this particulate emission rate is much higher than currently sought as part of this permit application on the belief that at the time the existing PM emissions were established, a different PM estimating method and/assumptions of emissions factors were used. Careful reconsideration of the materials using mass balance with inclusion of EPA established spray gun transfer efficiency guidelines results in much lower worst-case maximum potential particulate emissions projections. Further, equating total particulate matter to PM₁₀ is believed to also present worst case PM₁₀ projected/potential emissions.

³ The Pulaski foam manufacturing facility is currently permitted to emit 113.90 tpy of PM (total) and 308.00 tpy of VOC.

⁴ Projected maximum VOC emission rates are estimated to be 502 tpy, but Adient will accept a voluntary limit on emissions of 491.40.

Criteria Air Pollutant and HAP Emissions					
Regulated Air Pollutant ³	Baseline Emissions	Emission Increases (Decreases)	Proposed Allowable Emissions	PSD Significance Threshold	Comments
	Tons per Year				
CO ₂ e	NA	0.00	0.00	75,000	<SER
HF	NA	0.00	0.00	3	<SER
H ₂ SO ₄	NA	0.00	0.00	7	<SER
H ₂ S	NA	0.00	0.00	10	<SER
Highest single HAP	NA	NA	<10 tpy	NA	NA
Total HAPs	NA	NA	<25 tpy	NA	NA

4.0 REGULATORY APPLICABILITY

The Pulaski foam manufacturing facility is a major source of VOC emissions and an area source of HAPs. The following federal and state regulatory programs are applicable to these operations.

4.1 NEW SOURCE PERFORMANCE STANDARDS

There are no New Source Performance Standards (NSPS) pursuant to 40 CFR Part 60 that are applicable to the molded foam operations conducted at the Adient Pulaski facility.

Adient does not operate any fuel combustion equipment except small air makeup units that provide space heating by way of natural gas combustion and consequently, 40 CFR 60 subpart Dc is not applicable.

Adient Pulaski does not operate any new stationary compression ignition (CI) internal combustion engines (ICE), as defined (40 CFR 60 subpart IIII).

Adient Pulaski does not operate any new stationary spark ignition (SI) internal combustion engines (ICE), as defined (40 CFR 60 subpart JJJJ).

4.2 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

The Adient Pulaski foam operations are an area source of HAPs and an existing source pursuant to 40 CFR §63.11414(c) accordingly, the operations are subject to 40 CFR 63 subpart 000000 National Emission Standards for Hazardous Air Pollutants for Flexible Polyurethane Foam Production and Fabrication Area Sources. The following standards will apply to this source:

- The permittee must not use a material containing methylene chloride as an equipment cleaner to flush the mix head or use a material containing methylene chloride elsewhere as an equipment cleaner in a molded flexible polyurethane foam process.
- The permittee must not use a mold release agent containing methylene chloride in a molded flexible polyurethane foam process.

Reference: 40 CFR 63.11416(c) and 1200-03-09-.03(8) TAPCR

- The permittee shall keep a certification on file at the plant site that contains the following statements, and must be signed by a responsible official:
 - This facility does not use any equipment cleaner to flush the mix head which contains methylene chloride, or any other equipment cleaner containing methylene chloride in a molded flexible polyurethane foam process in accordance with § 63.11416(c)(1).
 - This facility does not use any mold release agent containing methylene chloride in a molded flexible polyurethane foam process in accordance with § 63.11416(c)(2).

Reference: 40 CFR 63.11417(c)

The Adient Pulaski operations are an area source of HAPs and accordingly, are not subject to the boiler MACT (40 CFR 63 DDDDD).

The Adient Pulaski facility does not operate any stationary reciprocating internal combustion engines (RICE) and accordingly, is not subject to 40 CFR 63 subpart ZZZZ.

4.3 OTHER FEDERAL REGULATIONS

The Adient Pulaski operates processes which utilize toluene diisocyanate (TDI), Chemical Abstract System no. 26471-62-5. TDI is a regulated hazardous substance under Section 112(r) of the Clean Air Act, Accidental Release Prevention/Risk Management Plan Rule.

Adient Pulaski is subject to Program 1 of the rule, which requires preparation and submittal of a Risk Management Plan (RMP) in accordance with 40 CFR §68.12(a) and (b), updated every 5 years. Program 1 also requires a hazard assessment, which consists of a worst-case release scenario analysis as provided in §68.25 and a five-year accident history as provided in §68.42.

Reference: 40 CFR 68

4.4 FEDERAL AND STATE RECORDKEEPING, REPORTING AND MONITORING REQUIREMENTS AND EMISSION STANDARDS

Regulatory Reference	Requirement	Comments
Recordkeeping, Reporting and Monitoring Requirements		
40 CFR 82	Operation, maintenance and disposal of regulated refrigerants	
1200-03-09-.02(11)(e)1(iii)	Monitoring and associated recordkeeping requirements	
1200-03-09.02(11)(e)1(iii)(II)II	Records retention	
1200-03-09-.02(11)(e)1(iii)	Monitoring and records reporting	
200-03-09-.02(11)(e)3(v)(IV)	Annual compliance certifications	Submittal to both EPA Region 4 and TDEC
1200-03-05-.01(1)	Visible emissions standards	
1200-03-05-.03(6)		
1200-03-05-.02(1)		
1200-03-08	Fugitive dust prohibition and control standards	

Regulatory Reference	Requirement	Comments
Recordkeeping, Reporting and Monitoring Requirements		
1200-03-26-.02(2)(i)	Annual Accounting Period and Associated Reporting	Annual emissions reporting and payment of emission fees
1200-03-09-.02(11)(e)1.(iii)	Semi-annual reporting	Monitoring and recordkeeping reporting
1200-03-10-.02(2)(a)	Documentation of all VOC and HAP-containing materials	Maintain SDSs, records of VOC and HAP content and maintain these records for five years
1200-03-32-.03(3)	Accidental release plan	Maintain the plan and on an annual basis, submit a certification of compliance with the plan
1200-03-10-.02(2)(a)	Recordkeeping of logs	Mandates time schedule for routine, ongoing records entries
1200-03-09-.04.	VOC and HAP records	Maintain records of VOC and HAP usages and emissions
Emission Standards		
1200-03-07-.04(1).	Particulate matter (PM) emitted from this source shall not exceed 0.02 gr/dscf) of exhaust gases	
1200-03-07-.07(2)	VOC emissions limit	Currently 308 tpy; proposed 491.4 tpy

5.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT) ANALYSIS

PSD regulations require that a PSD major modification incorporate and use the best available control technology (BACT). This application includes a top-down BACT demonstration for VOC emissions using the 5-step top-down BACT demonstration methods as follows:

- Step 1 – Identify all control technologies
- Step 2 – Eliminate technically infeasible options
- Step 3 – Rank remaining control technologies by control effectiveness
- Step 4 – Evaluate most effective controls and document results
- Step 5 – Findings and Conclusions

5.1 IDENTIFICATION OF ALL CONTROL TECHNOLOGIES

The feasibility of various VOC control options are first determined based upon conventional pollutant specific control technologies. For this application, the control of volatile organic compounds (VOCs) results from the use of mold release agent on the three foam molding lines. The mold release agents are comprised of mold release wax consisting of approximately 4.1 percent, by weight, solids suspended in a VOC solvent. The evaporation of the mold release solvent (VOC carrier) results in VOC emissions which is the subject of the BACT control demonstration.

The considerations have focused on air treatment systems and technologies capable of treating relatively dilute VOC containing air that also contains wax overspray. Water scrubbing devices and dry filtration methods would be considered highly effective at removing the wax solids from the airstream but limited or

ineffective at removing VOC compounds. The technologies capable of reducing VOC content in air have been identified as follows:

- Chemical adsorption (carbon or synthetic)
- Recuperative thermal oxidizers coupled with a carbon absorber.
- Thermal oxidizer using flare technology
- Scrubber technology
- Refrigeration/condensing VOC control units
- Recuperative thermal oxidizers
- Regenerative thermal oxidizers
- Catalytic thermal oxidizers

5.2 ELIMINATION OF TECHNICALLY INFEASIBLE OPTIONS

Chemical adsorption: For this application, large volumes of air are used to collect and transport the mold release solvents and wax overspray to the atmosphere. The wax content in the air will bind on chemically active media surfaces used in adsorber technologies, which makes carbon adsorption and synthetic adsorption incompatible and technically infeasible. For cost projection purposes, a hybrid control system using a carbon concentrator coupled with a [smaller volume] thermal oxidizer was evaluated but is not presented for cost analysis purposes since the concentrator technology is not compatible with the wax materials and thus is not feasible. For this reason, oxidation of the entire air stream (without concentration) is technically the most viable VOC control strategy for the BACT demonstration.

Flare technology: Thermal treatment using open or closed flares are typically deployed to control process gases where the exhaust gas has a suitable combustible content and flammability ranges capable of sustaining an open or closed flame. Since the volatile to air ratio for this application are significantly below the lower flammable limit, flare technology is not suitable and has been determined to be technically infeasible.

Scrubber: Typical wet and dry scrubbing system are not capable of collecting and treating VOC airstreams and as a result those technologies are usually reserved or utilized as VOC pretreatment components in a VOC treatment system. Since these technologies do not [substantially] remove or treat VOC laden air, those technologies will not be further evaluated.

Refrigeration/condensing technology: Condensing or refrigeration systems are typically used in low air flow, high VOC content air streams for condensation and collection of the VOC liquid components. For this application, the high-volume air stream and dilute VOC concentration are not compatible or technically feasible control options and are not considered further.

5.3 RANKING OF REMAINING CONTROL TECHNOLOGIES

Oxidation by way of heating air streams above the thermal destruction temperature are highly effective at treating VOC air streams of varying concentrations. Wax particles from overspray and accompanying VOC-laden exhaust is compatible with high temperatures found in most oxidizing equipment, although wax solids build up on heat exchangers and solid catalysts may present operational and maintenance issues. Regardless of the wax content concerns, the remaining oxidizer base treatment technologies may be feasible and are further evaluated in the BACT demonstration.

Ranking of the remaining control technologies has been compiled based on the anticipated effectiveness of the control equipment (thermal oxidization). All of the remaining technologies (not eliminated) are oxidizers that are highly effective in treating (reducing) VOCs from the foam line mold release agent. While carbon

monoxide and oxides of nitrogen are also components of thermal oxidization by-products, the benefits of VOC controls typically outweigh the relatively small adverse impacts from the by-product gases produced.

Since the technologies remaining [not eliminated] are all based on the principle of thermal oxidation (TO), each category will be further evaluated for the economic benefit and cost/control determination. With the desire for high level of VOC control, those technologies that involve TO have been ranked accordingly by their efficacy and ability to reduce VOCs in relatively dilute airstreams.

The identification and ranking of TO technologies include:

- Recuperative thermal oxidation
- Regenerative thermal oxidation
- Catalytic thermal oxidation.

The production lines are currently equipped with existing process ventilation exhaust systems that total approximately 270,000 scfm (**Figure 3**). The process exhaust is at room temperature and is comprised of (dilute) VOC concentrations with very low fuel value. The concentration of VOC in the exhaust stream at the proposed (full potential) concentration rates is calculated at 6.93×10^{-6} pounds of VOC per cfm of exhaust or the equivalent of 0.0069 pounds of VOC per 1,000 scfm. Roughly and on average, the concentration of the targeted VOC is slightly less than 96 parts per million (ppm) by weight. Typical lower flammable limits (LFL) concentrations for VOC compounds are measured in percentages and to be combustible would require VOC concentrations that are several orders of magnitude higher than this process air to sustain combustion or even to have measurable fuel value. This is the reason the BACT demonstration indicates the VOC concentrations are not only low, but are considered very low for VOC – BACT control treatment considerations. Typically TO systems treating low concentration VOC streams require large volumes of fuel gas to maintain proper oxidation temperatures in the combustion chamber of the unit.

The three molding lines each operate using racetrack-type conveyors, whereby the molds are presented to the various production stations for the foam process to produce a part in its final form. The nature and positioning of the personnel working on the respective molding line places the de-mold, mold cleaning, and spray wax stations in close proximity. Hooded spray exhaust is provided for a relatively large area of the human occupied stations. For worker safety and health reasons, and to meet OSHA spray application requirements, the exhaust rate from each of the lines is high. At the same time, the spray rate of VOC's in the spray wax material is relatively low compared to other types of industrial VOC sources, resulting in very high air flow rates with relatively low VOC concentrations.

Spray application areas are also regulated by [safe] building code requirements under the guidance and restrictions of the National Fire Protection Association (NFPA). These regulations are intended to minimize fire hazards and provide a safe working environment for workers using flammable and combustible materials. The mold release agent is comprised of solvent carriers that are considered flammable agents. NFPA requires solvent concentrations be maintained well below their respective flammable limits. Safe limits are maintained in the process air system as a result of adequate ventilation rates and proper system design components and elements. The exhaust volumes presented in the BACT analysis are the accumulation of measured process exhaust volumes. They are considered necessary for personnel safety reasons and believed accurate to the BACT demonstration.

Because the VOC laden airstream is dilute and is also at room temperature, it has little or no heat value, requiring thermal oxidation (TO) treatment to bring the gases to their final and desired treatment temperature, for example to 1,600° F. With little or no fuel value, the TO control unit will be required to supplement the exhaust gas with large quantities of fuel. The large volume of process exhaust also requires very large volumes of fuel gas, whereby the amount of fuel gas is directly proportional to the thermal

efficiency of the TO technology option evaluated. For example, the greater the thermal efficiency, the less fuel is required to attain and maintain proper treatment temperature; and as a result, lower operating costs are realized and lower combustion emissions are also possible with higher thermal efficiency TO units/technologies.

Those VOC treatment systems identified in the BACT analysis capable of high thermal efficiency reduce the quantity (and cost) of supplemental fuel which reduces the overall (annual) operating cost of the treatment system. Of the systems ranked above, the regenerative thermal oxidizer has the highest thermal efficiency while maintaining a high degree of VOC removal/treatment efficacy. Catalytic systems require lower air pre-heat temperatures and appropriately sized catalytic exchanger sections. Catalytic costs and size limitations may restrict the viability of this treatment technology, however catalytic oxidation is further evaluated for cost/benefit determination.

The thermal and destruction efficiencies have been summarized and are presented in **Table 3**. The values presented have been calculated using US EPA Cost Control Manual factors. Other factors used in the BACT demonstration are also tabulated for relative comparison of features and benefits. For this BACT demonstration, the three selected TO technologies are believed to be the appropriate types of control for this application and each TO type is discussed further.

Table 3. Operating Parameters for VOC Control Equipment

Control Technology	Gas Preheat of Treatment Temperature	Thermal Efficiency	Destruction Efficiency	Fuel Flow	Estimated Heat Input
Recuperative TO	1,450° F	70%	95%	3,553 scfm	217.4 MMBtu/hr
Regenerative TO	1,600° F	95%	95%	431.4 scfm	26.4 MMBtu/hr
Catalytic TO	800° F	70%	95%	1251.6 scfm	76.6 MMBtu/hr
Heat inputs are estimated from a conversion factor of 1,020 Btu/scf					

Recuperative TO technology has a low thermal efficiency and as a result very high fuel operating cost as evidenced in **Table 3** above. This TO technology is further evaluated for cost/benefit determination. As set forth above, all three TO technologies have equivalent destruction efficiencies and are therefore ranked equally from a VOC control and viability perspective.

5.4 EVALUATE MOST EFFECTIVE CONTROLS AND DOCUMENT RESULTS

Adient completed evaluations of various VOC treatment and control options identified above (treatment and control type as well as configuration options). Costs for various control approaches was completed using current costs associated with fuel and electrical utility fees, labor rates, and methods and costs from US EPA's *Vatavuk Air Pollution Control Cost Indexes* - updated using the U.S Department of Labor Statistics Inflation Calculator. TDEC has directed Adient to perform the BACT cost/benefit exercise without adding retrofit costs, and as a result retrofit costs are not considered in the analysis, as Adient believes they should be.

5.4.1 Recuperative Thermal Oxidation

A recuperative TO is a large air-heating device that uses the exhaust temperature to preheat the incoming air using an air-to-air heat exchanger. This technology recovers and recuperates a portion of the spent (combusted) gas energy, providing the technology name. Air-to-air heat exchangers have limited efficiencies and a value of 70% thermal efficiency was used by the EPA Cost Control demonstration tool. Relatively low thermal efficiency of the recuperative design results in large fuel gas volume projections, and the relatively

short heat of combustion contact time with the process gases (and the targeted VOC compounds) also requires higher treatment (combustion) temperatures to attain the targeted 95% VOC destruction performance. These factors combine to yield the EPA Cost Control projected fuel gas rates that are the highest for the three TO technologies evaluated.

5.4.2 Regenerative Thermal Oxidization

The regenerative thermal oxidization technology provides operational advantages over recuperative and catalytic technologies, in that the thermal efficiency is greatly improved, thereby reducing the quantity of fuel gas needed to attain a specific treatment temperature. The thermal improvement is typically attained using ceramic media and the heat of combustion from the combustion chamber (in this case supplemental fuel burning) is conducted in multiple and sequencing beds in a series of cycles between pre-heat and heat-recovery of the treatment beds on a regularly cyclical and frequent basis; for example, every couple of minutes. The cycle times are field adjusted for actual conditions and loadings to minimize the output VOC concentrations to the extent possible.

Because of the long contact time with the heat transfer media, the targeted VOC compound destruction is increased, allowing the combustion temperature to be lower than that of the recuperative or catalytic TO counterparts. For example, the 95% destruction can be achieved at a temperature of 1,450°F and with a higher thermal efficiency (typically 95% thermal recovery). The result of this design is fuel gas savings and reduced combustion gas emissions, when compared to other TO technologies. As stated, the fuel needs and typical thermal efficiency are as calculated using the US EPA BACT Cost Control Manual and are also typical of field observations for this technology.

5.4.3 Catalytic Incineration

This technology allows a reactive catalyst to bring the air stream up to the target VOC oxidation temperature. For the catalyst to work properly, the process gas must first be raised to approximately 800°F. Final VOC treatment (destruction) is attained as the reaction of the VOC compounds on the catalytic surface heats the VOC compounds which are then oxidized and the targeted VOC destruction is complete without the need for additional fuel beyond the preheater section. Catalytic TO technologies are evaluated in the US EPA Cost Control tool at 70% thermal efficiency. Not included in this evaluation are the likely needs for special pretreatment filtration to isolate overspray wax from blinding or contaminating the reactive catalyst surface.

Since lower temperatures needed on the front end of the control unit are realized with this technology, fuel gas consumption for this technology are less than that of comparable recuperative TO technologies. To their detriment, catalyst have finite life spans, are subject to catalyst poisoning from compounds in the airstream, and require periodic replacement and additional maintenance, adding to their higher initial and operating/maintenance costs. The US EPA BACT Cost Control tool accounts for these factors including the initial costs, maintenance costs, catalyst replacement costs and fuel costs for comparative purposes in the BACT demonstration, but does not account for special pre-filtration equipment costs. The Company is concerned this technology may not be fully compatible with the wax overspray but has presented the US EPA values for comparative and full BACT treatment consideration.

5.5 COST/BENEFIT EVALUATION

The specific details of the cost/benefit evaluations conducted are included in **Appendix C**. The lowest cost/benefit VOC control options were tabulated for regenerative thermal oxidizer technology, due to the high thermal efficiency and high rate of VOC treatment efficacy. As described in above, three treatment types were evaluated for cost/benefit determination.

Table 4. BACT Cost/Benefit Evaluation

Thermal Control Option	Dollars per Ton of VOC Treated	
	2006 Dollars	CPI-Adjusted to 2022 Dollars
Recuperative Thermal Oxidizer	\$42,261	\$71,032
Regenerative Thermal Oxidizer	\$10,734	\$18,042
Catalytic Incinerator	\$19,308	\$32,453

Even absent any escalation using 2006 costs, the overall treatment costs results in treatment costs that are excessively high and not economically feasible. The high projected VOC treatment estimates summarized in **Table 4** result from a variety of factors listed below.

- 1) The process discharges large volumes of air which are needed to provide a safe working environment for workers in the foam operation area for each of the three foam seating lines.
- 2) The spray mold release agent and solvent release rates result in low VOC concentrations in the exhaust stream.
- 3) The high air volumes require extensive and high costs for VOC abatement equipment capable of handling 270,000 scfm and also achieving the needed 95 percent destruction efficiency of the VOC compounds at relatively low concentration.
- 4) The VOC abatement equipment will require large volumes of fuel in the form of natural gas to heat the large volume, low VOC content, ambient temperature exhaust stream to the target treatment temperatures for each of the targeted and respective TO devices evaluated.
- 5) The COVID pandemic situation has raised the costs for TO manufacturers and components found in TO equipment. Delays in materials and operating system components have been experienced, along with fabrication and transportation delays.
- 6) Inflation is at a 40-year high level.

The impact and effect of some of the factors listed above have not been included in the BACT evaluation provided, but will result in higher costs than the evaluation presented in the economic portion of the BACT. Since as directed by TDEC, a baseline of zero emissions was used, the costs would be even higher if actual emissions were considered.

5.6 OTHER CONSIDERATIONS

The Pulaski site is located in an area that is designated as attainment for ozone, and VOC is a precursor to ozone. This should reduce the sensitivity or perceived need for VOC abatement which typically raises the “reasonable range” used by the permitting authority to require the use of controls for new VOC projects. It appears the cost/benefit consideration remains higher than reasonable for each of the technologies at each of the adjusted or escalated values used in this demonstration.

The cost projections do not include special retrofit costs since the air permit application seeks the allowed rate of 491 tons per year with a baseline of zero. As a result, actual costs incurred would be higher than projected in the BACT demonstration if the baseline were higher.

The US EPA tools were stretched beyond the reasonable maximum flow rates of 100,000 scfm as if the costs projections and escalations were linear. Experience with large demand systems dictate that replicate and multiple units are needed for such applications due to unit engineering, production, and transportation limitations for the air pollution control unit manufacturer/supplier.

Because the regenerative TO has the lowest cost benefit ratio, a regenerative TO manufacturer was contacted for verification of commercial availability, size and maximum design flow rates. For a system capable of processing 270,000 scfm would require the deployment of four of their largest units which have the individual capability of 70,000 scfm each. This replicated installation would require the costs be calculated on a ¼ basis (one for each regenerative TO unit) and as a result of the replicated fabrication and construction costs, would result in a much higher cost/benefit factor.

The environmental impact of burning natural gas is not put forth in the US EPA tool or into the evaluation and discussion. Oxides of nitrogen, carbon monoxide, and large volumes of carbon dioxide (among other products of combustion) would result if a regenerative TO was required. Adient is very sensitive to its greenhouse gas (GHG) impacts and such a system would increase both the consumption of fossil fuel (in the form of natural gas), increase the release of other air pollutants that are products of combustion, and result in the release of large quantities of GHGs.

5.7 FINDINGS AND CONCLUSIONS

A query from the RACT/BACT/LAER Clearinghouse (RBLC) was conducted for flexible foam production and only one record was returned for a facility in Indiana (see **Appendix D**), which used regenerative thermal oxidization controls. No details were provided in the RBLC listing for the volume of air, the number of lines or for the dollars per ton of treatment. Adient was able to confirm from the RBLC listing that the technology used for the Indiana site is the same technology (regenerative thermal oxidation) that yielded the lowest treatment costs summarized in Table 3 above. Since no direct comparison of process specific details from the RBLC listing could be made to the Pulaski operation, Adient is relying on the control options identified in its BACT demonstration to determine the best available control for this application.

Typically, VOC control strategies considered BACT have a cost/benefit in the range of \$5,000 to \$6,000 per ton of treatment. The best available control demonstrations for this application yield costs that are far in excess of this range, with the lowest cost technology being the regenerative thermal oxidizer. Projected costs and processing equipment yields annual operating and control benefits far in excess of what would otherwise be considered cost effective for VOC controls. Further, these figures also do not include retrofitting costs which would make the costs per ton of treatment even higher. On that basis, Adient concludes and asserts the current configuration without VOC abatement is BACT for this project and for the existing process.

6.0 AIR QUALITY ANALYSIS

An air quality analysis for VOC is required for the proposed project because the net emission increase exceeds the PSD SER for VOC (40 tpy). The air quality analysis involves demonstrating compliance with National Ambient Air Quality Standards (NAAQS) and PSD increment standards, as well as a Class I Area impact analysis. There are no established National Ambient Air Quality Standards (NAAQS) or PSD increment standards for VOC; however, VOC is considered a precursor emission to ozone. As such, a secondary impact analysis is required for VOC emissions in relation to secondary ozone formation.

6.1 OZONE ANALYSIS

6.1.1 Preconstruction Monitoring

Since the project's net emission increase is greater than 100 tpy for VOC, preconstruction monitoring must be addressed for ozone. Per US EPA's *Ambient Monitoring Guidelines for PSD*, data from an existing monitor may be used if it is considered representative of the facility location. When determining if data is representative of the site, location, quality of data, and the currentness of the data must be considered.

Ozone is considered a regional pollutant; therefore, possible chemical reactions that could influence ambient concentrations must also be considered.

Adient believes that the regional ozone monitor located at the Fairview Middle School (FMS) in Fairview, Tennessee is representative of the project site. The FMS monitor is located approximately 80 kilometers (km) north of Adient's Pulaski facility. Fairview and Pulaski have similar populations of approximately 8,700 and 7,600, respectively. For ozone, a large component of background concentration can be attributed to vehicle use. With similar sized populations, vehicle use can be expected to occur at a similar rate. The two areas also have similar terrain and land use.

Design value data for the FMS monitor is available for the previous ten years (2011 – 2020). FMS monitor information and data for 2020 is provided below. Adient is requesting that TDEC waive the preconstruction monitoring requirement based on the availability of representative data from the FMS ozone monitor.

Table 5. Representative Ozone Monitor

Monitor Location	Monitor ID	2020 Design Value (ppb)
Fairview Middle School, Crow Cut Road, Fairview, TN 37062	471870106	60

6.1.2 Secondary Impact Analysis

There is no established NAAQS for VOC; however, VOC is a precursor to ozone, which does have an established NAAQS. US EPA has developed a two-tiered evaluation for secondary ozone formation. The Tier I analysis allows for a qualitative assessment based on existing modeling studies performed by US EPA. The Tier I approach involves comparison of facility emissions to a Modeled Emission Rate for Precursors (MERPs) developed by US EPA. TDEC's guidance document, *Tennessee Guidance on the Use of EPA's MERPs to Account for Secondary Ozone and Fine Particulate in Tennessee Under the New Source Review PSD Program (TDEC MERPs Guidance)*, was utilized to assess if further analysis is required for precursor emissions.

To evaluate compliance, a Tier 1 demonstration using the *TDEC MERPs Guidance* and suggested default values was completed. A comparison of Adient's VOC emissions to TDEC's default MERPs for VOC is shown in the table below.

Table 6. MERPs Analysis

Pollutant	Facility Emissions ⁵ (tpy)	TDEC Default MERPs Value (tpy)	Emissions Below MERPs?
VOC	491.4	1,542	Yes

In accordance with the *TDEC MERPs Guidance*, a Tier I demonstration is successful if the facility emissions are less than the default MERPs value. As demonstrated above, Adient's emissions are below the TDEC

⁵ Adient has voluntarily agreed to limit facility-wide VOC emissions to 491.4 tpy.

default MERPs value for ozone; therefore, no further analysis is required, and no adverse secondary impacts for ozone are expected to occur.

6.2 CLASS I AREA ANALYSIS

Class I areas are provided the most protection under the PSD program, ensuring protection to natural, scenic, recreational, and/or historical areas. TDEC requires sources to evaluate impacts to Class I areas located within 300 km of the project site. There are five Class I areas within 300km of Adient – Sipsey National Wilderness Area (~ 97 km), Cohotta Wilderness Area (~218 km), Mammoth Cave National Park (~ 226 km), Joyce Kilmer-Slickrock Wilderness Area (~278 km), and Great Smoky Mountain National Park (~281 km).

A Class I area analysis includes a Class I PSD increment assessment for pollutants subject to PSD review (increasing above the SER) and an Air Quality Related Values (AQRV) analysis for visibility, ozone, and deposition that could impact a Class I area's resources.

6.2.1 Class I Increment Analysis

Adient does not have a significant increase of PM/PM₁₀/PM_{2.5}, and there is no Class I PSD increment established for VOC. As such, a Class I increment analysis is not required.

6.2.2 Class I AQRV Analysis

The Class I AQRV analysis was prepared in accordance with the Federal Land Manager's (FLM's) Air Quality Related Values Work Group (FLAG) *Phase I Report – Revised (2010)*. The FLMs developed a screening criteria involving facility emissions and distance to the Class I area (Q/D ratio) for sources greater than 50 km from a Class I area to determine whether adverse impacts could occur to AQRV from a pollutant. The equation used is provided below:

$$\frac{\text{Facility Emissions (Q)}}{\text{Distance to Class I Area (D)}}$$

If the Q/D ratio is below 10, it is presumed that no adverse impact will occur, and no further AQRV analysis is required. An AQRV analysis for the Class I Areas of concern can be found below.

Table 7. Class I AQRV Analysis

Class I Area	Pollutant	Q (tpy)	D (km)	Q/D
Sipsey Wilderness Area	PM	9.90	97	0.10
	VOC	491.4		5.07
Cohotta Wilderness Area	PM	9.90	218	0.05
	VOC	491.4		2.25
Mammoth Cave National Park	PM	9.90	226	0.04
	VOC	491.4		2.17
Joyce Kilmer-Slickrock Wilderness Area	PM	9.90	278	0.04
	VOC	491.4		1.77
Great Smoky Mountain National Park	PM	9.90	281	0.04
	VOC	491.4		1.75

The Q/D ratio for PM and VOC in each of the Class I Areas are below the threshold of 10; therefore, it is presumed there are no adverse impacts from Adient, and no further analysis is required. .

7.0 ADDITIONAL IMPACTS ANALYSIS

PSD applies to new major sources or major modifications at existing sources for pollutants where the area the source is located is in attainment or unclassifiable with the NAAQS. Adient is a major source of VOCs, a precursor to ozone. Adient is located in the City of Pulaski, County of Giles in the State of Tennessee, which is designated attainment for ozone.

A PSD major source subject to PSD review is required to conduct an air quality analysis and an additional impacts analysis, among other requirements. Pursuant to 40 CFR §52.21(o), the additional impacts analysis consists of three parts: Growth Analysis, Soils and Vegetation Impacts Analysis and Visibility Impairment Analysis. Each of these analyses is addressed below.

7.1 GROWTH ANALYSIS

The Adient plant is located in an industrial park setting on the north side of Pulaski, Tennessee. Pulaski is located in the south central portion of the state nearly equidistant between Memphis and Chattanooga. The general vicinity outside of the industrial development is mainly agricultural pastureland and woodland with some residential development east of the plant (**Figure 4**). The workforce consists of 305 employees living within commuting distance of the plant. The size of the workforce has resulted in little impact on population growth in Giles County, which has a population of 29,503 as of 2018. A review of historical aerial photos dating back to 1998, indicate that there has been little industrial or commercial development in the immediate vicinity of the Adient plant, and no substantive residential growth in the general area. .

7.2 SOIL AND VEGETATION ANALYSIS

7.2.1 Particulate Matter and Volatile Organic Compounds

The criteria for evaluating impacts on soils and vegetation is taken from EPA's, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*, EPA, 1980. According to US EPA, "...sources more than 10 km from any Class I areas, exemptions provide that no analysis of impairment need be done if emission increases are below specified limits." Specified limits are de minimis values found at 40 CFR 52.21(b)(23)(i).

The Adient operations are located more than 10 km from any Class I areas in the region. The criteria air pollutants emitted by the Adient Pulaski operations include particulate matter (PM) and PM₁₀. Emissions of PM and PM₁₀ are below the significance levels (de minimis values) found at 40 CFR 52.21(b)(23)(i). The Adient operations generating particulate matter emissions are not the direct result of combustion or combustion byproducts and therefore, Adient assumes there are no emissions of PM_{2.5}, but in any event, all PM emitted by the source is less than the respective thresholds, including the threshold for PM_{2.5}.

Adient emits VOC at an annual rate above the de minimis value of 40 tpy, but screening concentrations are not available for VOC. VOC is a precursor to ozone and while ozone is identified in Table 2.1 as a "Regulated Pollutant", the EPA screening guide indicates that "a screening concentration [for O₃ is] available, but no simple procedure for estimating the ozone impact of a single source is currently available." Additionally, the secondary NAAQS were established at concentration levels below which no harmful effects to either soil or vegetation is expected.⁶ As discussed in Section 6.1.2, EPA has developed a two-tiered evaluation for

⁶ US EPA, Office of Air Quality Planning and Standards, *New Source Review Workshop Manual (Draft)*, U.S. EPA, Research Triangle Park, NC, October, 1990.

secondary ozone formation from VOC. As demonstrated by this application, the VOC emissions from Adient's facility are below the default TDEC MERPs value, indicating that no adverse impact to compliance with the ozone NAAQS is expected. As such, VOC emissions from the facility will not negatively affect soil and vegetation in the surrounding area.

Other than VOC, Adient does not emit any criteria air pollutants above their respective significance thresholds.

7.3 VISIBILITY IMPAIRMENT ANALYSIS

US EPA prescribes the use of its *Workbook for Plume Visual Screening and Analysis (Revised)*, October 1992 (EPA-454/R92-023), methodologies for purposes of conducting a visibility impairment analysis. A visibility impairment analysis is generally required to determine the impact on sensitive areas such as state parks, wilderness areas, airports, scenic sites and overlooks. Three levels of screening procedures are outlined by US EPA. If the criteria for the first screening level, the most conservative level, are met, no further analysis is needed.

The VISCREEN model is recommended for the Level 1 screen. The VISCREEN model primarily considers NO₂ and particulate emission increases associated with a project. VISCREEN does not consider or calculate visibility impacts from ozone.

7.3.1 Level 1 Screen Analysis

Level 1 analysis incorporates conservative parameters to determine plume impacts. Default values for particle size and density, and a default of worst-case meteorological condition of F stability and 1.0 meters per second (m/s) wind speed are used for the analysis, while all emissions are assumed to exit the plant from one point. The worst-case meteorological condition is expected to persist for 12 hours with a wind direction that would transport the plume directly to the sensitive area being analyzed.

A maximum particulate matter emission rate of 2.64 lb/hour, based on a maximum emission rate of 9.9 tpy assuming an operating schedule of 7,488 hours/year (6 days per week, 24 hours per day, 52 weeks/year), was input to the model. It was assumed that there were no emissions of NO_x, soot, primary nitrogen dioxide and primary sulfate. A background visual range of 25 kilometers was used. All other inputs relied on the default parameters.

While the Pulaski facility is greater than 10 km from any Class I area (**Figure 5**), a distance of 10 km was assumed in order to run the most conservative analysis of visibility impairment.

Level 1 modeling results indicate that the Adient operations do not adversely impact visibility within or beyond a 10 km radius.

```
OVERALL RESULTS OF PLUME VISIBILITY SCREENING

SOURCE:  Adient US LLC, Pulaski,
CLASS I AREA:  NA

  INSIDE class I area --
Plume delta E DOES NOT EXCEED screening criterion for SKY background
Plume delta E DOES NOT EXCEED screening criterion for TERRAIN background
Plume contrast DOES NOT EXCEED screening criterion for SKY background
Plume contrast DOES NOT EXCEED screening criterion for TERRAIN background

  OUTSIDE class I area --
Plume delta E DOES NOT EXCEED screening criterion for SKY background
Plume delta E DOES NOT EXCEED screening criterion for TERRAIN background
Plume contrast DOES NOT EXCEED screening criterion for SKY background
Plume contrast DOES NOT EXCEED screening criterion for TERRAIN background

SCREENING CRITERIA:      DELTA E = 2.0
                        GREEN CONTRAST = 0.050
```

8.0 TDEC CONSTRUCTION PERMIT APPLICATION FORMS

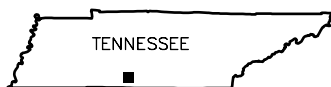
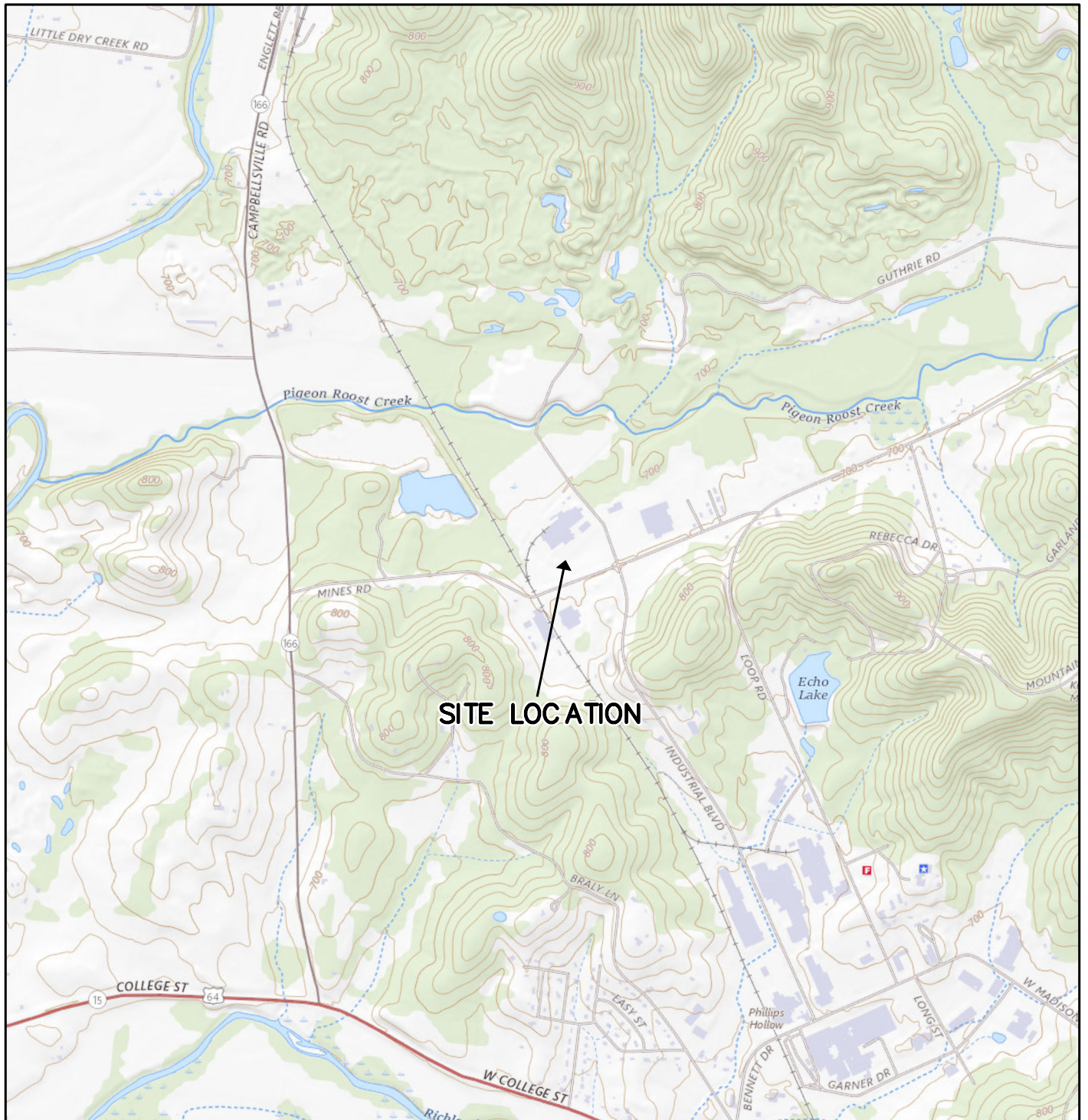
TDEC construction permit application forms are included in **Appendix E**.

APC 1	Identification
APC 2	Operations and Flow Diagrams
APC 3	Stack Identification
APC 10	Miscellaneous Processes
APC 19	Compliance Certification – Monitoring and Reporting
APC 22	Compliance Demonstration by Monitoring Control System Parameters or Operating Parameters of a Process
APC 26	Compliance Demonstration by Recordkeeping
APC 29	Emission Summary for the Facility
APC 30	Current Emissions Requirements and Status
APC 31	Compliance Plan and Compliance Certification

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Figures

- 1 Site Location Map
- 2 Process Flow Diagram
- 3 Stack Exhaust Flow Rates
- 4 Aerial View
- 5 Map – Visibility Impairment Analysis



USGS THE NATIONAL MAP
AUGUST 2021

2,000 0 2,000'



SCALE: 1" = 2,000'




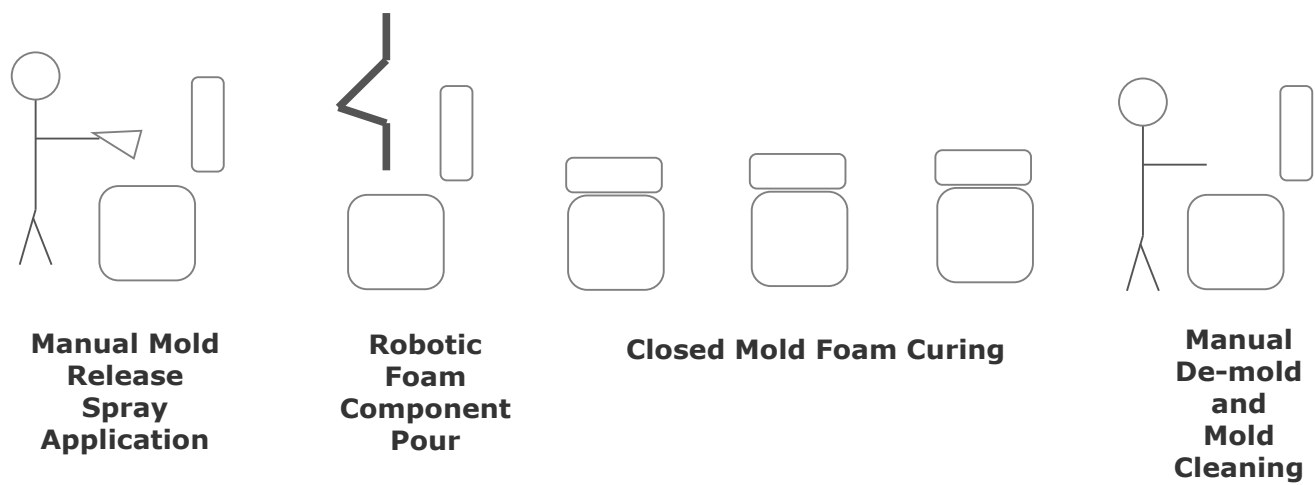
CLIENT  ADIENT US LLC 1890 MINES ROAD PULASKI, TN 38478	SITE ADIENT US LLC 1890 MINES ROAD PULASKI, TN 38478	SITE LOCATION	
PROJECT NO. 27221443.00	DRAWN BY: AA	SCS ENGINEERS 2830 DAIRY DRIVE, MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN: 03/17/2022	CHECKED BY: APO		1
REVISED: 03/17/2022	APPROVED BY:		

Figure 2. Process Flow Diagram



Foam Line Processing Step Diagram

Figure 3. Stack Exhaust Flow Rates

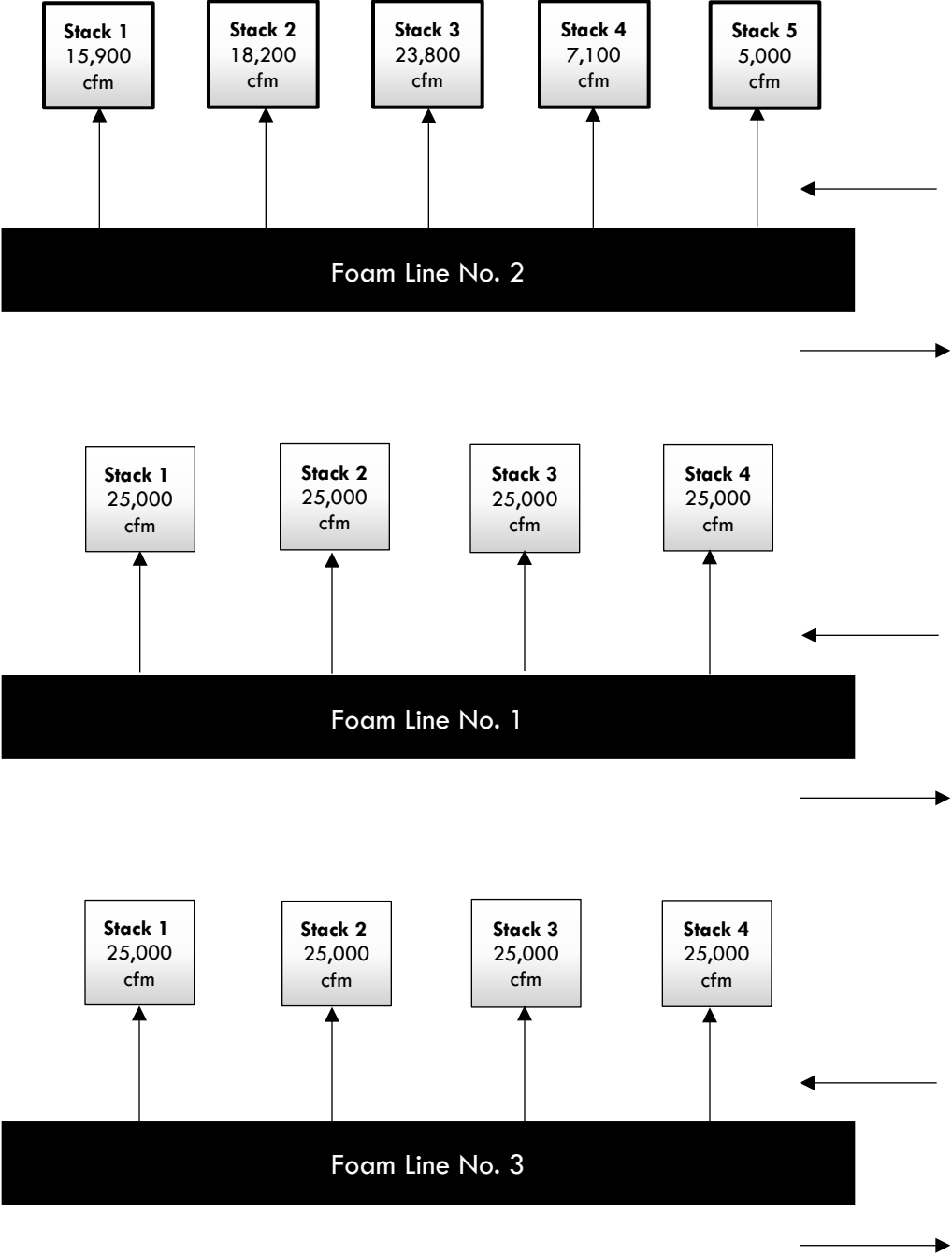
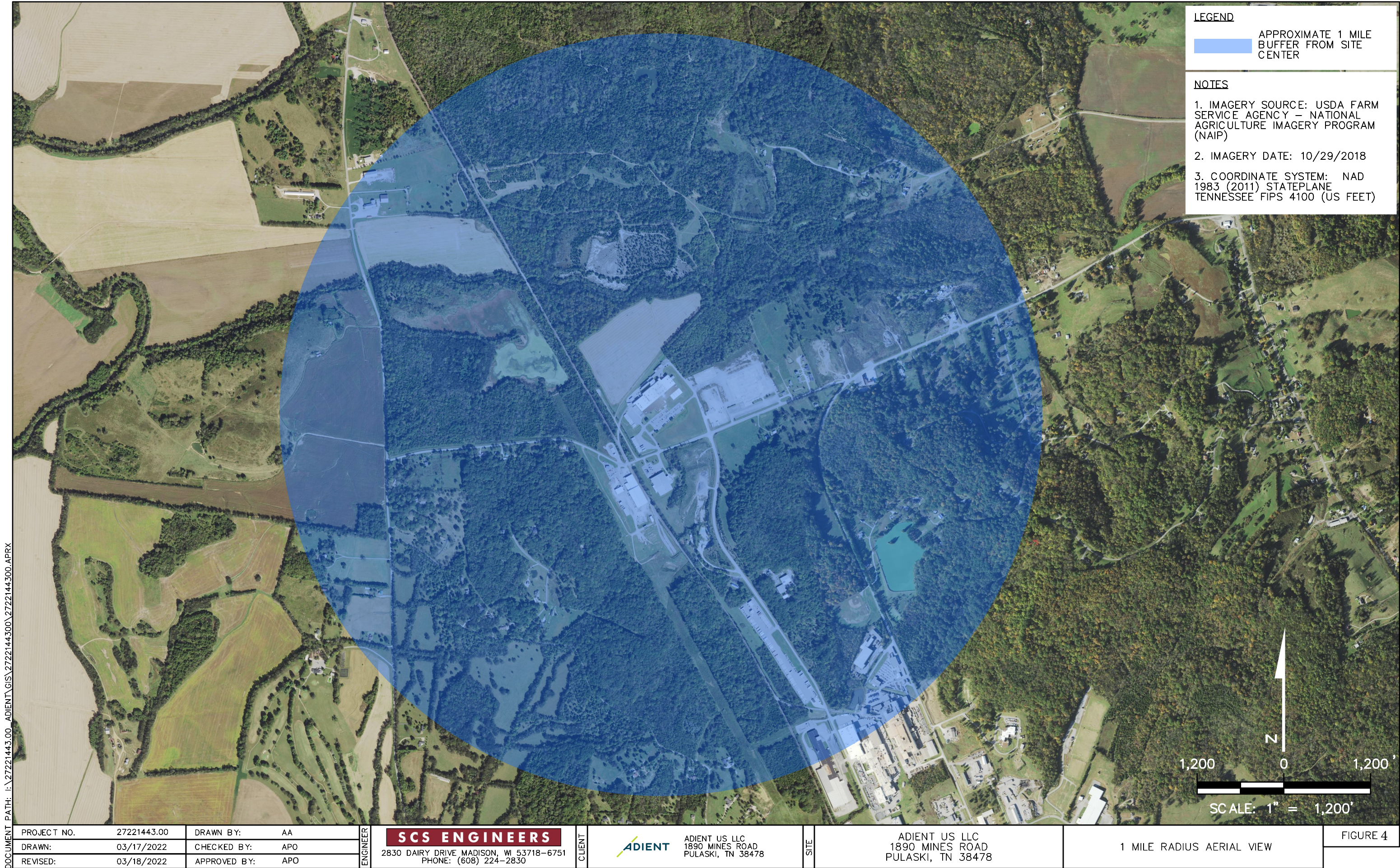


Figure 3. Stack Parameters (Cont'd)

	Exhaust Flow Rate	Height¹	Diameter	Temperature	Moisture Content	Configuration	Direction
Stack ID No.	scfm	ft	ft	° F	%	Round, Rectangular	Up, Down, Horizontal
1	15,900	80'	3' 2"	70	<1%	Round	Up
2	18,200	90'	3' 6"	70	<1%	Round	Up
3	23,800	96'	3' 10"	70	<1%	Round	Up
4	7,100	61'	2' 1"	70	<1%	Round	Up
5	5,000	58'	2'	70	<1%	Round	Up
6	25,000	10' 6"	5' 6"	70	<1%	Round	Up
7	25,000	10' 6"	5' 6"	70	<1%	Round	Up
8	25,000	10' 6"	5' 6"	70	<1%	Round	Up
9	25,000	10' 6"	5' 6"	70	<1%	Round	Up
10	25,000	10' 6"	5' 6"	70	<1%	Round	Up
11	25,000	10' 6"	5' 6"	70	<1%	Round	Up
12	25,000	10' 6"	5' 6"	70	<1%	Round	Up
13	25,000	10' 6"	5' 6"	70	<1%	Round	Up

¹ Height above roof; roof height is 35'.

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LEGEND

APPROXIMATE 1 MILE
BUFFER FROM SITE
CENTER

NOTES

1. IMAGERY SOURCE: USDA FARM
SERVICE AGENCY – NATIONAL
AGRICULTURE IMAGERY PROGRAM
(NAIP)

2. IMAGERY DATE: 10/29/2018

3. COORDINATE SYSTEM: NAD
1983 (2011) STATEPLANE
TENNESSEE FIPS 4100 (US FEET)

PROJECT NO.	27221443.00	DRAWN BY:	AA
DRAWN:	03/17/2022	CHECKED BY:	APO
REVISED:	03/18/2022	APPROVED BY:	APO

SCS ENGINEERS
2830 DAIRY DRIVE, MADISON, WI 53718-6751
PHONE: (608) 224-2830

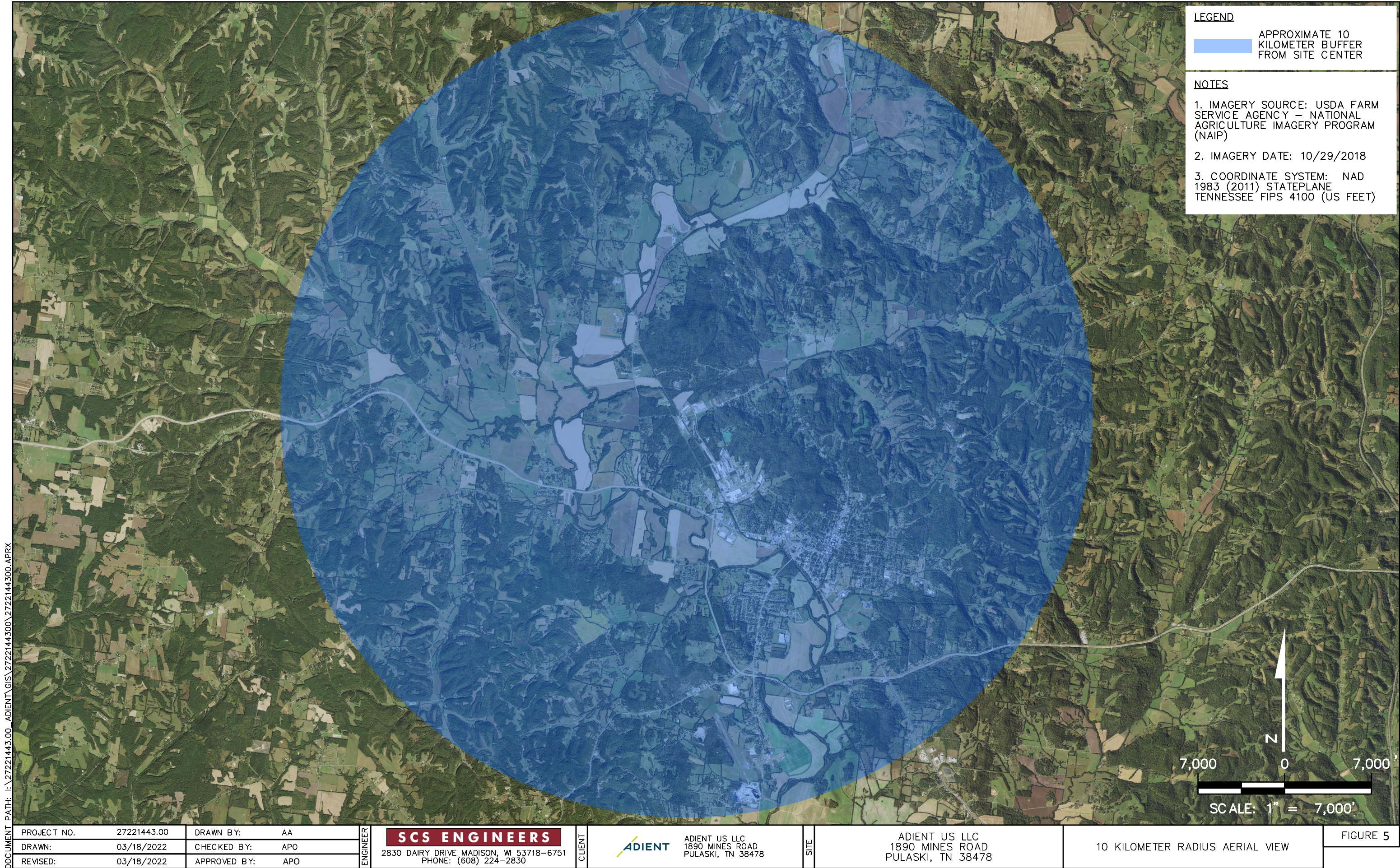
**ADIENT**
ADIENT US LLC
1890 MINES ROAD
PULASKI, TN 38478

SITE
ADIENT US LLC
1890 MINES ROAD
PULASKI, TN 38478

1 MILE RADIUS AERIAL VIEW

FIGURE 4

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PROJECT NO.	27221443.00	DRAWN BY:	AA
DRAWN:	03/18/2022	CHECKED BY:	APO
REVISED:	03/18/2022	APPROVED BY:	APO

ENGINEER

SCS ENGINEERS

2830 DAIRY DRIVE, MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT

ADIENT

ADIENT US LLC
1890 MINES ROAD
PULASKI, TN 38478

SITE

ADIENT US LLC
1890 MINES ROAD
PULASKI, TN 38478

10 KILOMETER RADIUS AERIAL VIEW

Appendix A

Safety Data Sheets

Appendix B

Emission Calculations

Table 1. Potential to Emit - Volatile Organic Compounds (VOC) Emissions

Adient US LLC
FID 28-0076-01

Source: Foam Production - General Process
SCC: 30801005

Raw Material	Average Raw Material Usage Rate ¹		Potential to Emit ²									
			Maximum Raw Material Usage Rate ³					Volatile Organic Compounds (VOC)				
			Density	Usage	mo/yr	Usage	Content	Emission Factor	Unit	Emissions		
	gal/mo	gal/yr	lb/gal	gal/mo		gal/yr	lb VOC/gal			lb/hr	lb/yr	tpy
Mold Release Agent ⁴	8,389	100,668	6.30	13,295	12	159,540	6.15	6.16	lb VOC/gal	112	982,766	491.38
Paste Wax	65	780	6.84	104	12	1,248	5.15	5.15	lb VOC/gal	0.73	6,427	3.21
Tegostab B 8737 LF (Silicon)	603	7,236	8.16	965	12	11,578	-	1.5%	% by wt	0.16	1,417	0.71
Tegostab B 8724 LF2 (Surfactant)	1,206	14,472	7.90	1,930	12	23,155	0.00	0.00	lb VOC/gal	0	0	0.00
Glycerine	1,541	18,492	10.52	2,466	12	29,587	0.50	0.50	lb VOC/gal	1.69	14,794	7.40
DL-02596 Black	563	6,756	9.82	901	12	10,810	0.00	0.00	lb VOC/gal	0	0	0.00
Jeffcat -2F20	240	2,880	7.09	384	12	4,608	0.00	0.00	lb VOC/gal	0	0	0.00
Dabco 33 LX	506	6,072	9.31	810	12	9,715	0.00	0.00	lb VOC/gal	0	0	0.00
YUKOL - 8331	505	6,060	8.72	808	12	9,696	0.00	0.00	lb VOC/gal	0	0	0.00
BIOH 2828	3,053	36,636	8.40	4,885	12	58,618	0.00	0.00	lb VOC/gal	0	0	0.00
Multranol 3901	9,605	115,260	8.42	15,368	12	184,416	0.00	0.00	lb VOC/gal	0	0	0.00
Polyol (E833)	73,188	878,256	8.55	117,101	12	1,405,210	0.00	0.00	lb VOC/gal	0	0	0.00
Polyol (E855)	89,843	1,078,116	8.84	143,749	12	1,724,986	0.00	0.00	lb VOC/gal	0	0	0.00
Voranol 360 Polyol DA	7,038	84,456	9.04	11,261	12	135,130	0.00	0.00	lb VOC/gal	0	0	0.00
Voranate TDI T-80 (TDI)	45,385	544,620	10.17	72,616	12	871,392	10.09	3.29E-05	lb/lb ⁵	0.0333	291.70	0.1458
Diphenylmethane diisocyanate (MDI)	4,080	48,960	10.09	6,528	12	78,336	10.00	9.39E-06	lb/lb ^{5,6}	0.0008	7.42	0.0037
Diethanolamine (DEOA)	1,232	14,784	9.09	1,971	12	23,654	7.78	7.94E-06	lb/lb ⁷	0.0002	1.71	0.0009
Total	247,042	2,964,504		395,140		4,741,678				114.81	1,005,705	502.85

8,760 hr/yr

Footnotes

1. Average raw material usage rates are based on recent semi-annual emissions reporting data (October 2020 through September 2021).
2. Potential to emit is based on worst-case conservative assumptions; Adient will voluntarily accept a facility-wide VOC limit of 491.4 tpy.
3. With the exception of the mold release agent, maximum usage rates are based on highest monthly usage rate of each respective raw material for the period of October 2020 through September 2021 multiplied by a factor of 1.60 (491 tpy proposed VOC emission rate/308 tpy current allowable VOC emission rate).
4. Maximum usage rate of mold release agent is based on a worst-case conservative assumption allowing for potential growth in production rates from customer requirements.
5. TDI and MDI emission factors are based on a source test conducted on October 1, 1997 (see Title V permit renewal application, 2014).
6. All diphenylmethane diisocyanate is assumed to be methylene diphenyl diisocyanate (MDI); historically assumed.
7. Emission factors are based on emission factors used in the 2014 Title V permit renewal application, and semi-annual/12-month emission reports.

Source

Safety Data Sheets

Table 2. Particulate Matter Emissions

Adient US LLC

FID 28-0076-01

Source: Foam Production - General Process

SCC: 30801005

Process	Potential to Emit							
	Maximum Product Usage Rate			Particulate Matter Emissions ¹				
	lb/mo	mo/yr	lb/yr	Content ²	Transfer Efficiency ³	Emissions		
				wt %	%	lb/hr	lb/yr	tpy
Mold release	85,400	12	1,024,800	4.10%	55.00%	2.16	18,908	9.45

Operation **8,760** hr/yr**Footnotes**

1. Assume PM is equivalent to PM10; PM2.5 is not an anticipated air pollutant emission, but assumed under conservative worst-case PTE calculations.

2. Safety Data Sheet: Mold Release Agent_Chem Trend_PU-11434

3. Transfer efficiency is a conservative assumption; industry standards for spray gun efficiency is 65%.

Table 3. Potential to Emit - Hazardous Air Pollutant (HAP) Emissions

Adient US LLC

FID 28-0076-01

Source: Foam Production - General Process

SCC: 30801005

Raw Material	Potential to Emit									
	Maximum Product Usage Rate				Hazardous Air Pollutants (HAPs)					
	Density	Usage	mo/yr	Usage	Content ²	Emission Factor	Unit	Emissions		
	lb/gal	gal/mo		gal/yr	lb VOC/gal			lb/hr	lb/yr	tpy
TD-80 (TDI)	10.17	72,616	12	871,392	10.09	3.29E-05	lb/lb ¹	0.0333	291.70	0.1458
Diphenylmethane diisocyanate (MDI)	10.09	6,528	12	78,336	10.00	9.39E-06	lb/lb ^{1,2}	0.0008	7.42	0.0037
Diethanolamine (DEOA)	9.09	1,971	12	23,654	7.78	7.94E-06	lb/lb ³	0.0002	1.71	0.0009
Total								0.03	301	0.15

8,760 hr/yr**Footnotes**

1. TDI and MDI emission factors are based on a source test conducted on October 1, 1997 (see Title V permit renewal application, 2014).
2. All diphenylmethane diisocyanate is assumed to be methylene diphenyl diisocyanate (MDI); historically assumed.
3. Emission factors are based on emission factors used in the 2014 Title V permit renewal application, and semi-annual/12-month emission reports.

Source

Safety Data Sheets

Appendix C

BACT Analysis – Backup Calculations

BACT Cost-Benefit Evaluation

3/28/2022

DATA INPUTS

Company Name	Adient
Location	Pulaski, TN
Process Name	Spray Mold Release 3 Foam Lines
Annual Hours of Operation	8,760 hrs/yr
Process Exhaust Flow Rate	270,000 scfm
VOC Capture Efficiency	80 %
VOC Control Efficiency	95 %
Annual VOC Emissions (before controls)	491.4 tons/yr
Natural Gas Rate	7.80 \$/1000ft ³
Electricity Rate	0.083 \$/kwh
VOC Heating Value	21,095 BTU/lb
Process Exhaust Temperature	80 °F
2006 Dollars CPI Recuperative Oxidizer	146.4
2006 Dollars CPI Regenerative Oxidizer	139.0
2006 Dollar CPI Catalytic Oxidizer	217.4
Date of Vatavek Cost Index	3rd Quarter 2006
Operating Labor Rate	75 \$/hr
Annual Interest Rate	7 %
Control System Life	20 years
Cost of Permanent Total Enclosure (\$)	0

DATA OUTPUTS

Process Exhaust Gas Heat Content	0.146 BTU/scf
Annual VOC Emissions Controlled	373.464 tons

Annual Costs of Control Device	2006 dollars		CPI adjusted to 2022 dollars
Recuperative \$	42,261	\$/ton VOC Controlled	\$ 71,032
Regenerative \$	10,734	\$/ton VOC Controlled	\$ 18,042
Catalytic \$	19,308	\$/ton VOC Controlled	\$ 32,453
Minimum \$	10,734	\$/ton VOC Controlled	\$ 18,042

3/28/2022

Recuperative

BACT Cost-Benefit Evaluation

3/28/2022

CAPITAL COSTS

Equipment Costs (\$):

-- Incinerator:

@ 0 % heat recovery:	0
@ 35 % heat recovery:	0
@ 50 % heat recovery:	0
@ 70 % heat recovery:	488,088

PTE Containment or other capital costs

Total Equipment Cost--base:	488,088
' ' ' --escalated:	893,766
Instrumentation:	0
Sales Tax:	26,813
Freight:	44,688
	<hr/>

Purchased Equipment Cost (\$): 1,054,644

Direct Installation Costs:

Foundations & Supports:	84,372
Handling & Erection:	147,650
Electrical:	42,186
Piping:	21,093
Ductwork and Insulation:	10,546
Painting:	10,546
	<hr/>

Direct Installation Cost: 316,393

Site Preparation:	0
Buildings or PTE:	0
	<hr/>

Total Direct Cost: 1,371,038

BACT Cost-Benefit Evaluation

3/28/2022

Indirect Installation Costs:

Engineering:	105,464
Field Expenses:	52,732
Contractor Fees:	105,464
Start-Up:	21,093
Performance Test:	10,546
Contingencies:	31,639

Total Indirect Cost: 326,940

Total Capital Investment (\$): 1,697,977

=====

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760
Operating labor rate (\$/hr):	75.00
Maintenance labor rate (\$/hr):	82.50
Operating labor factor (hr/sh):	0.5
Maintenance labor factor (hr/sh):	0.5
Electricity price (\$/kwh):	0.083
Natural gas price (\$/mscf):	7.80
Annual interest rate (fraction):	0.070
Control system life (years):	20
Capital recovery factor:	0.0944
Taxes, insurance, admin. factor:	0.04
Pressure drop (in. w.c.):	19.0

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F. (cond.)
Operating labor	41,063	0.003	----
Supervisory labor	6,159	0.000	----
Maintenance labor	45,169	0.003	----
Maintenance materials	45,169	0.003	----
Natural gas	14,597,540	0.925	----
Electricity	736,981	0.047	----
Overhead	82,536	0.005	0.014
Taxes, insurance, administrative	67,919	0.004	----
Capital recovery	160,277	0.010	0.014
Total Annual Cost	15,782,811	1.000	1.000

BACT Cost-Benefit Evaluation

3/28/2022

[1] Original equipment costs reflect this date.
 [2] VAPCCI = Vataavuk Air Pollution Control Cost Index (for thermal incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this data via the VAPCCI and control equipment vendor data. Latest indexes included herein.

2006 Costs for
270000

U.S. Bureau of Labor
Statistics Correction
Factor - 2006 to 2022
CPI Inflation Calculator

1.6808

RACT Cost Summary Table

scfm system

2022 dollars

1 Purchased Equipment Cost (PEC)	1,054,644	1,772,646
2 Total Direct Cost (includes PEC)	1,371,038	2,304,440
3 Total Indirect Cost	<u>326,940</u>	<u>549,520</u>
4 Total Capital Investment (= 2+3)	1,697,977	2,853,960
5 Annual Direct Operating Costs	15,472,080	26,005,471
6 Annual Indirect Operating Costs	150,455	252,884
7 Annual Capital Recovery Costs	<u>160,277</u>	<u>269,394</u>
8 Total Annual Costs (= 5+6+7)	15,782,811	26,527,749

2006 dollars

Oxidizer VOC Control Efficiency	95 %
Annual VOC Input to the Control Device	393.12 tons
Annual VOC Emissions Controlled	373.464
Annual VOC Emissions after Controls	19.656
Annual Cost of Control Device	\$ 42,261 \$/ton Controlle

2022 dolars
71,031.61

BACT Cost-Benefit Evaluation

3/28/2022

Company Name: Adient
Location: Pulaski, TN
Process: Spray Mold Release 3 Foam Lines

TOTAL ANNUAL COST SPREADSHEET PROGRAM--REGENERATIVE THERMAL OXIDIZER (RTO)

Describes the annual operating costs for purchasing, installing and operating a regenerative thermal oxidizer to control the above process.

COST BASE DATE: December 1988 [1]

VAPCCI [2] 3rd Quarter 2006 139.0

INPUT PARAMETERS

-- Gas flowrate (scfm):	270000
-- Reference temperature (oF):	77
-- Inlet gas temperature (oF):	80
-- Inlet gas density (lb/scf):	0.0739
-- Primary heat recovery (fraction):	0.95
-- Waste gas heat content (BTU/scf):	0.146
-- Waste gas heat content (BTU/lb):	1.98
-- Gas heat capacity (BTU/lb-oF):	0.255
-- Combustion temperature (oF):	1450
-- Heat loss (fraction):	0.01
-- Exit temperature (oF):	149
-- Fuel heat of combustion (BTU/lb):	21502
-- Fuel density (lb/ft3):	0.0408

DESIGN PARAMETERS

Auxiliary Fuel Requirement (lb/min):	17.642
(scfm):	432.4
Total Gas Flowrate (scfm):	270432

BACT Cost-Benefit Evaluation

3/28/2022

TOTAL CAPITAL INVESTMENT (\$) [3]

(Cost correlations range: 5000 to 500,000 scfm)

PTE Containment or other capital costs	0
@ 85 % heat recovery--base:	0
' ' ' --escalated:	0
@ 95 % heat recovery--base:	6,755,111
' ' ' --escalated:	10,269,247

=====

ANNUAL COST INPUTS

Operating factor (hr/yr):	8760
Operating labor rate (\$/hr):	75.00
Maintenance labor rate (\$/hr):	82.50
Operating labor factor (hr/sh):	0.50
Maintenance labor factor (hr/wk):	1.00
Electricity price (\$/kwh):	0.083
Natural gas price (\$/mscf):	7.80
Annual interest rate (fraction):	0.070
Control system life (years):	20
Capital recovery factor:	0.0944
Taxes, insurance, admin. factor:	0.04
Pressure drop (in. w.c.):	20.0

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F.(cond.)
Operating labor	41,063	0.010	----
Supervisory labor	6,159	0.002	----
Maintenance labor	4,290	0.001	----
Maintenance materials	4,290	0.001	----
Natural gas	1,772,684	0.442	----
Electricity	766,841	0.191	----
Overhead	33,481	0.008	0.022
Taxes, insurance, administrative	410,770	0.102	----
Capital recovery	969,344	0.242	0.344
Total Annual Cost	4,008,922	1.000	1.000

[1] Base total capital investment reflects this date.

[2] VAPCCI = Vatavuk Air Pollution Control Cost Index (for regenerative thermal oxidizers) corresponding to year and quarter shown. Base total capital investment has been escalated to this date via VAPCCI and control equipment vendor data. Latest indexes included herein.

[3] Source: Vatavuk, William M. ESTIMATING COSTS OF AIR POLLUTION CONTROL. Boca Raton, FL: Lewis Publishers, 1990.

COMPARISON OF REECO/DUPONT, CO\$T-AIR, AND MANUAL RTO COSTS: (1st Qtr. '91 \$)

Flow (scfm)	REECo (\$)	Manual (\$) [a]	Manual/REECo	CO\$T-AIR (\$) [b]	C-A/REECo
2,000	340,000	371,061	1.09	640,305	1.88
5,000	425,000	423,946	1.00	713,363	1.68
10,000	500,000	512,087	1.02	835,125	1.67
25,000	850,000	776,511	0.91	1,200,413	1.41
50,000	1,500,000	1,217,217	0.81	1,809,225	1.21
100,000	2,850,000	2,098,629	0.74	3,026,850	1.06

[a] Escalated from April. '88 to 1st quarter '91 and multiplied by installation factor of 1.416 (1.2*1.18).
Range of correlation: 10,000 to 100,000 scfm.

[b] Escalated from Dec. '88 to 1st quarter '91. Costs pertain to 95% heat recovery units.
Range of correlation: 5,000 to 500,000 scfm.

BACT Cost-Benefit Evaluation

3/28/2022

U.S. Bureau of Labor Statistics Correction Factor - 2006 to 2022 CPI Inflation Calculator 1.6808

	Costs for 270000	
RACT Cost Summary Table for RTO	<u>scfm system</u>	<u>2022 Costs</u>
1 Total Capital Investment	#####	17,260,550
2 Annual Direct Operating Costs	2,595,327	4,362,226
3 Annual Indirect Operating Costs	444,251	746,697
4 Annual Capital Recovery Costs	<u>969,344</u>	<u>1,629,274</u>
5 Total Annual Costs (= 2+3+4)	4,008,922	6,738,197

Oxidizer VOC Control Efficiency	95 %	
Annual VOC Input to the Control Device	393.12 tons	
Annual VOC Emissions Controlled	373.464	
Annual VOC Emissions after Controls	19.656	
Cost of Control Device	\$ 10,734	
	\$/ton Controlled	\$18,042

Company Name: Adient
 Location: Pulaski, TN
 Process: Spray Mold Release 3 Foam Lines

TOTAL ANNUAL COST SPREADSHEET PROGRAM--CATALYTIC INCINERATORS (FIXED)

Describes the annual operating costs for purchasing, installing and operating a Catalytic Oxidizer to control the above process.

COST REFERENCE DATE: April 1988 [1]

VAPCCI [2] 3rd Quarter 2006 217.4

INPUT PARAMETERS

-- Gas flowrate (scfm):	270000
-- Reference temperature (oF):	77
-- Inlet gas temperature (oF):	80
-- Inlet gas density (lb/scf):	0.0739
-- Primary heat recovery (fraction):	0.70
-- Waste gas heat content (BTU/scf):	0.146
-- Waste gas heat content (BTU/lb):	1.98
-- Gas heat capacity (BTU/lb-oF):	0.248
-- Combustion temperature (oF):	650
-- Preheat temperature (oF):	479
-- Fuel heat of combustion (BTU/lb):	21502
-- Fuel density (lb/ft3):	0.0408

DESIGN PARAMETERS

-- Auxiliary Fuel Reqrmnt (lb/min):	51.173
(scfm):	1254.3
-- Total Gas Flowrate (scfm):	271254
-- Catalyst Volume (ft3):	525.3

CAPITAL COSTS

Equipment Costs (\$):

-- Incinerator:	
@ 0 % heat recovery:	0

BACT Cost-Benefit Evaluation

3/28/2022

@ 35 % heat recovery:	0
@ 50 % heat recovery:	0
@ 70 % heat recovery:	1,453,093
-- Other (auxiliary equipment, etc.):	0
Total Equipment Cost--base:	1,453,093
' ' ' --escalated:	3,414,836

Instrumentation	341,484
Sales Tax	102,445
Freight	170,742

Purchased Equipment Cost (\$): 4,029,506

Direct Installation Costs:

Foundation & Supports	322,361
Handling & Erection	564,131
Electrical	161,180
Piping	80,590
Ductwork & Insulation	40,295
Painting	40,295
Buildings or PTE:	0

Total Direct Cost: 5,238,358

Indirect Installation Costs:

Engineering	402,951
Field Expenses	201,475
Contractor Fees	402,951
Start-Up	80,590
Performance Test	40,295
Contingencies	120,885

Total Indirect Costs: 1,249,147

Total Capital Investment (\$): 6,487,505

=====

ANNUAL COST INPUTS

Operating factor (hr/yr): 8760

BACT Cost-Benefit Evaluation

3/28/2022

Operating labor rate (\$/hr):	75.00
Maintenance labor rate (\$/hr):	82.50
Operating labor factor (hr/sh):	0.5
Maintenance labor factor (hr/sh):	0.5
Electricity price (\$/kwh):	0.083
Catalyst price (\$/ft3):	650
Natural gas price (\$/mscf):	7.80
Annual interest rate (fraction):	0.07
Control system life (years):	20
Catalyst life (years):	2
Capital recovery factor (system):	0.0944
Capital recovery factor (catalyst):	0.5531
Taxes, insurance, admin. factor:	0.04
Pressure drop (in. w.c.):	21.0

ANNUAL COSTS

Item	Cost (\$/yr)	Wt. Factor	W.F.(cond.)
Operating labor	41,063	0.006	----
Supervisory labor	6,159	0.001	----
Maintenance labor	45,169	0.006	----
Maintenance materials	45,169	0.006	----
Natural gas	5,142,028	0.713	----
Electricity	807,684	0.112	----
Catalyst replacement	203,972	0.028	----
Overhead	82,536	0.011	0.031
Taxes, insurance, administrative	259,500	0.036	----
Capital recovery	577,564	0.080	0.116
Total Annual Cost	7,210,843	1.000	1.000

[1] Original equipment costs reflect this date.

[2] VAPCCI = Vatauvuk Air Pollution Control Cost Index (for catalytic incinerators) corresponding to year and quarter shown. Original equipment cost, purchased equipment cost, and total capital investment have been escalated to this date via the VAPCCI and control equipment vendor data.

BACT Cost-Benefit Evaluation

3/28/2022

RACT Cost Summary Table

	2006 dollars	2022 dollars
1 Purchased Equipment Cost (PEC)	4,029,506	6,772,794
2 Total Direct Cost (includes PEC)	5,238,358	8,804,632
3 Total Indirect Cost	1,249,147	2,099,566
4 Total Capital Investment (= 2+3)	<u>6,487,505</u>	<u>10,904,199</u>
5 Annual Direct Operating Costs	6,291,244	10,574,322
6 Annual Indirect Operating Costs	342,036	574,894
7 Annual Capital Recovery Costs	577,564	970,769
8 Total Annual Costs (= 5+6+7)	<u>7,210,843</u>	<u>12,119,985</u>

U.S. Bureau of Labor Statistics Correction Factor - 2006 to 2022 CPI Inflation Calculator 1.6808

Oxidizer VOC Control Efficiency (%)	95 %	
Annual VOC Input to the Control Device	393.12 tons	
Annual VOC Emissions Controlled	373.464 tons	
Annual VOC Emissions after Controls	19.656 tons	
Annual Cost of Control Device	\$ 19,308 per ton controlled	\$32,453

CPI

				U.S. Bureau of Labor Statistics Correction Factor - 2006 to 2022 CPI Inflation Calculator	
			3rd Qtr. 2006	2022	1.6808
		Regen	139.0	233.6	
		Recup	146.4	246.1	
		CatOX	217.4	365.4	

Appendix D

RACT/BACT/LAER Clearinghouse Search Results

COMPREHENSIVE REPORT Report Date: 11/18/2021

Facility Information

RBLC ID:	IN-0208 (final)	Date Determination	
		Last Updated:	03/07/2019
Corporate/Company Name:	NHK SEATING OF AMERICA, INC.	Permit Number:	023-34689-00035
Facility Name:	NHK SEATING OF AMERICA, INC.	Permit Date:	11/25/2014 (actual)
Facility Contact:	DEAN HILL 7656597824 DHILL@NHKSEATING.COM	FRS Number:	110055569718
Facility Description:	AUTOMOBILE SEAT MANUFACTURING OPERATION	SIC Code:	2531
Permit Type:	D: Both B (Add new process to existing facility) & C (Modify process at existing facility)	NAICS Code:	336360
Permit URL:	HTTP://PERMITS.AIR.IDEM.IN.GOV/34689F.PDF		
EPA Region:	5	COUNTRY:	USA
Facility County:	CLINTON		
Facility State:	IN		
Facility ZIP Code:	46041		
Permit Issued By:	INDIANA DEPT OF ENV MGMT, OFC OF AIR (Agency Name) MR. MATT STUCKEY (Agency Contact) (317) 233-0203 mstuckey@idem.in.gov		
Other Agency Contact Info:	PERMIT WRITER: BRIAN WRIGHT BWRIGHT1@IDEM.IN.GOV 317-234-6544 SECTION CHIEF: NATHAN BELL 317-233-5670		
Permit Notes:			

Process/Pollutant Information

PROCESS NAME: SEAT FOAM PRODUCTION LINE

Process Type: 63.013 (Flexible Polyurethane Foam Production)

Primary Fuel:

Throughput: 56.00 SEATS

Process Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Test Method: Unspecified

Pollutant Group(s): (Volatile Organic Compounds (VOC))

Emission Limit 1: 95.0000 % OVERALL CONTROL EF 3 HOURS

Emission Limit 2: 10.0000 PPMV 3 HOURS

Standard Emission:

Did factors, other than air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: OTHER CASE-BY-CASE

Other Applicable Requirements:

Control Method: (A) REGENERATIVE THERMAL OXIDIZER

Est. % Efficiency: 95.000

Cost Effectiveness: 0 \$/ton

Incremental Cost Effectiveness: 0 \$/ton

Compliance Verified: No

Pollutant/Compliance Notes: STATE BACT

Appendix E

TDEC Construction Permit Application Forms



TITLE V PERMIT APPLICATION INDEX OF AIR POLLUTION PERMIT APPLICATION FORMS


Section 1: Identification and Diagrams		
This application contains the following forms:	APC Form 1, Facility Identification	1
	APC Form 2, Operations and Flow Diagrams	1

Section 2: Emission Source Description Forms		
		Total number of this form
This application contains the following forms (one form for each incinerator, printing operation, fuel burning installation, etc.):	APC Form 3, Stack Identification	1
	APC Form 4, Fuel Burning Non-Process Equipment	
	APC Form 5, Stationary Gas Turbines or Internal Combustion Engines	
	APC Form 6, Storage Tanks	
	APC Form 7, Incinerators	
	APC Form 8, Printing Operations	
	APC Form 9, Painting and Coating Operations	
	APC Form 10, Miscellaneous Processes	1
	APC Form 33, Stage I and Stage II Vapor Recovery Equipment	
	APC Form 34, Open Burning	

Section 3: Air Pollution Control System Forms		
		Total number of this form
This application contains the following forms (one form for each control system in use at the facility):	APC Form 11, Control Equipment - Miscellaneous	
	APC Form 13, Adsorbers	
	APC Form 14, Catalytic or Thermal Oxidation Equipment	
	APC Form 15, Cyclones/Settling Chambers	
	APC Form 17, Wet Collection Systems	
	APC Form 18, Baghouse/Fabric Filters	

(OVER)

Section 4: Compliance Demonstration Forms		
		Total number of this form
This application contains the following forms (one form for each incinerator, printing operation, fuel burning installation, etc.):	APC Form 19, Compliance Certification - Monitoring and Reporting - Description of Methods for Determining Compliance	1
	APC Form 20, Continuous Emissions Monitoring	
	APC Form 21, Portable Monitors	
	APC Form 22, Control System Parameters or Operating Parameters of a Process	1
	APC Form 23, Monitoring Maintenance Procedures	
	APC Form 24, Stack Testing	
	APC Form 25, Fuel Sampling and Analysis	
	APC Form 26, Record Keeping	1
	APC Form 27, Other Methods	
	APC Form 28, Emissions from Process Emissions Sources / Fuel Burning Installations / Incinerators	
	APC Form 29, Emissions Summary for the Facility or for the Source Contained in This Application	1
	APC Form 30, Current Emissions Requirements and Status	1
	APC Form 31, Compliance Plan and Compliance Certification	1
APC Form 32, Air Monitoring Network		

Section 5: Statement of Completeness and Certification of Compliance	
<p>I have reviewed this application in its entirety and to the best of my knowledge, and based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete. I have provided all the information that is necessary for compliance purposes and this application consists of <u>11</u> pages and they are numbered from page <u>1</u> to <u>11</u>. The status of this facility's compliance with all applicable air pollution control requirements, including the enhanced monitoring and compliance certification requirements of the Federal Clean Air Act, is reported in this application along with the methods to be used for compliance demonstration.</p>	
Name and Title of Responsible Official	Telephone Number with Area Code
Ryan Speck, Plant Manager	931-363-5666
Signature of Responsible Official	Date of Application
	3/30/22
(For definition of responsible official, see instructions for APC Form 1)	



TITLE V PERMIT APPLICATION FACILITY IDENTIFICATION

SITE INFORMATION				
1. Organization's legal name Adient US, LLC			For APC Use Only	APC company point no.
2. Site name (if different from legal name)				APC Log/Permit no.
3. Site address (St./Rd./Hwy.) 1890 Mines Road			NAICS or SIC Code 326150	
City or distance to nearest town Pulaski		Zip code 38478	County name Giles	
4. Site location (in Lat./Long)	Latitude 36 13' 46.41" N		Longitude 87 04' 14.41" W	
CONTACT INFORMATION (RESPONSIBLE OFFICIAL)				
5. Responsible official contact Ryan Speck			Phone number with area code 931-363-5666	
6. Mailing address (St./Rd./Hwy.) 1890 Mines Road			Fax number with area code 931-363-5787	
City Pulaski	State TN	Zip code 38478	Email address ryan.speck@adient.com	
CONTACT INFORMATION (TECHNICAL)				
7. Principal technical contact Kris P. Foster			Phone number with area code 931-363-5666	
8. Mailing address (St./Rd./Hwy.) 1890 Mines Road			Fax number with area code 931-363-5787	
City Pulaski	State TN	Zip code 38478	Email address kris.patrick.foster@adient.com	
CONTACT INFORMATION (BILLING)				
11. Billing contact Rhonda Gardner			Phone number with area code 931-363-5666	
12. Mailing address (St./Rd./Hwy.) 1890 Mines Road			Fax number with area code 931-363-5787	
City Pulaski	State TN	Zip code 38478	Email address rhonda.b.garner@adient.com	
TYPE OF PERMIT REQUESTED				
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>13. Permit requested for:</p> <p style="margin-left: 40px;">Initial application to operate : <input type="checkbox"/></p> <p style="margin-left: 40px;">Permit renewal to operate : <input type="checkbox"/></p> <p style="margin-left: 40px;">Administrative permit amendment : <input type="checkbox"/></p> </div> <div style="width: 45%;"> <p style="margin-left: 40px;">Minor permit modification : <input type="checkbox"/></p> <p style="margin-left: 40px;">Significant modification : <input type="checkbox"/></p> <p style="margin-left: 40px;">Construction permit : <input checked="" type="checkbox"/></p> </div> </div>				

(OVER)

HAZARDOUS AIR POLLUTANTS, DESIGNATIONS, AND OTHER PERMITS ASSOCIATED WITH FACILITY

14. Is this facility subject to the provisions governing prevention of accidental releases of hazardous air contaminants contained in Chapter 1200-03-32 of the Tennessee Air Pollution Control regulations?

☒

Yes

☐

No

If the answer is Yes, are you in compliance with the provisions of Chapter 1200-03-32 of the Tennessee Air Pollution Control regulations?

☒

Yes

☐

No

15. If facility is located in an area designated as "Non-Attainment" or "Additional Control", indicate the pollutant(s) for the designation.

Attainment for all pollutants.

16. List all valid Air Pollution permits issued to the sources contained in this application [identify all permits with most recent permit numbers and emission source reference numbers listed on the permit(s)].

569269 Title V Operating Permit (28-0076)

17. Page number :

Revision number:

Date of revision:

2



TITLE V PERMIT APPLICATION OPERATIONS AND FLOW DIAGRAMS

1. Please list, identify, and describe briefly process emission sources, fuel burning installations, and incinerators that are contained in this application. Please attach a flow diagram for this application.

8-0076-01 Polyurethane Foam Manufacturing - production of polyurethane foam automotive seat cushions. Foam cushions or buns are produced on one of three production lines. Molds are sprayed with mold release, and/or with hand applied application techniques to prevent the foam from sticking to the mold. VOC emissions from the process are mostly from the use of solvent and water based mold release agents. Wax in the mold release materials may be emitted as total suspended particulates via process vents.

Liquid foam components are added (poured) into the open mold, the mold is closed, the foam expands to fill the cavity of the mold and the foam cures in the closed mold. Once cured, the foam part is extracted, the mold is cleaned and the cycle is repeated.

2. List all insignificant activities which are exempted because of size or production rate and cite the applicable regulations.

Tank Farm (Closed Loop System)	1200-03-09-.04(5)(a)4(i)
Foam Crushing	1200-03-09-.04(5)(a)4(i)
Mold Cleaning	1200-03-09-.04(5)(a)4(i)
Parts Cleaning (Maintenance)	1200-03-09-.04(5)(f)76

3. Are there any storage piles?

YES _____ NO X

4. List the states that are within 50 miles of your facility.

Alabama

5. Page number:

Revision Number:

Date of Revision:

3



TITLE V PERMIT APPLICATION STACK IDENTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION	
1. Facility name: Adient US, LLC	
2. Emission source (identify): 28-0076-01 Polyurethane Foam Manufacturing	
STACK DESCRIPTION	
3. Stack ID (or flow diagram point identification): F1 through F13 (please see Figure 3 for stack parameters)	
4. Stack height above grade in feet: 	
5. Velocity (data at exit conditions): _____ (Actual feet per second)	6. Inside dimensions at outlet in feet:
7. Exhaust flowrate at exit conditions (ACFM): 	8. Flow rate at standard conditions (DSCFM):
9. Exhaust temperature: _____ Degrees Fahrenheit (°F)	10. Moisture content (data at exit conditions): <div style="text-align: right; font-size: small;">Grains per dry standard cubic foot (gr./dscf.)</div> _____ Percent
11. Exhaust temperature that is equaled or exceeded during ninety (90) percent or more of the operating time (<u>for stacks subject to diffusion equation only</u>): <div style="text-align: center;">NA _____ (°F)</div>	
12. If this stack is equipped with continuous pollutant monitoring equipment required for compliance, what pollutant(s) does this equipment monitor (e.g., Opacity, SO₂, NO_x, etc.)? NA	
Complete the appropriate APC form(s) 4, 5, 7, 8, 9, or 10 for each source exhausting through this stack.	
BYPASS STACK DESCRIPTION	
13. Do you have a bypass stack? <div style="text-align: center;"> _____ Yes <input checked="" type="checkbox"/> No </div> If yes, describe the conditions which require its use & complete APC form 4 for the bypass stack. Please identify the stack number(s) of flow diagram point number(s) exhausting through this bypass stack.	
14. Page number: Revision Number: Date of Revision: 4	



TITLE V PERMIT APPLICATION MISCELLANEOUS PROCESSES

GENERAL IDENTIFICATION AND DESCRIPTION			
1. Facility name: Adient US, LLC			
2. Process emission source (identify): 28-0076-01 Polyurethane Foam Manufacturing			
3. Stack ID or flow diagram point identification(s): F1 through F13		4. Year of construction or last modification: Last Modification was in 2010	
If the emissions are controlled for compliance, attach an appropriate Air Pollution Control system form.			
5. Normal operating schedule: 24 Hrs./Day 5 Days/Wk. 240 Days/Yr.			
6. Location of this process emission source in UTM coordinates: UTM Vertical : 3898.504 UTMHorizontal: 493.569			
7. Describe this process (Please attach a flow diagram of this process) and check one of the following: <div style="display: flex; align-items: center; margin-top: 5px;"> <input type="checkbox"/> Batch <input checked="" type="checkbox"/> Continuous A detailed description of the process is included in the narrative portion of the application. </div>			
PROCESS MATERIAL INPUT AND OUTPUT			
8. List the types and amounts of raw materials input to this process:			
Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Foam chemicals	Chemical storage/delivered directly to process	2,965,000 gal/yr	4,742,000 gal/yr
		See attached emission calculations for average usage by raw material	See attached emission calculations for maximum usage by raw material
9. List the types and amounts of primary products produced by this process:			
Material	Storage/Material handling process	Average usage (units)	Maximum usage (units)
Auto foam products	Foam manufacturing	3,178,091 FBE	9,833,712 FBE
		Full Bench Equivalent	Full Bench Equivalent
10. Process fuel usage:			
Type of fuel	Max heat input (10 ⁶ BTU/Hr.)	Average usage (units)	Maximum usage (units)
NA			
11. List any solvents, cleaners, etc., associated with this process: Mold maintenance and cleaning materials.			
If the emissions and/or operations of this process are monitored for compliance, please attach the appropriate Compliance Demonstration form.			
12. Describe any fugitive emissions associated with this process, such as outdoor storage piles, open conveyors, open air sand blasting, material handling operations, etc. (please attach a separate sheet if necessary). All emissions assumed to be a point source.			
13. Page number: 5 Revision Number: Date of Revision:			



TITLE V PERMIT APPLICATION
COMPLIANCE CERTIFICATION - MONITORING AND REPORTING
DESCRIPTION OF METHODS USED FOR DETERMINING COMPLIANCE

All sources that are subject to 1200-03-09-.02(11) of the Tennessee Air Pollution Control Regulations are required to certify compliance with all applicable requirements by including a statement within the permit application of the methods used for determining compliance. This statement must include a description of the monitoring, recordkeeping, and reporting requirements and test methods. In addition, the application must include a schedule for compliance certification submittals during the permit term. These submittals must be no less frequent than annually and may need to be more frequent if specified by the underlying applicable requirement or the Technical Secretary.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Adient US, LLC
2. Process emission source, fuel burning installation, or incinerator (identify): 28-0076-01 Polyurethane Foam Manufacturing
3. Stack ID or flow diagram point identification(s): Figure 2 Process Flow Diagram and Figure 3 Stack Parameters

METHODS OF DETERMINING COMPLIANCE

4. This source as described under Item #2 of this application will use the following method(s) for determining compliance with applicable requirements (and special operating conditions from an existing permit). Check all that apply and attach the appropriate form(s)

☐ Continuous Emission Monitoring (CEM) - APC 20
 Pollutant(s): _____

☐ Emission Monitoring Using Portable Monitors - APC 21
 Pollutant(s): _____

☒ Monitoring Control System Parameters or Operating Parameters of a Process - APC 22
 Pollutant(s): Opacity - Visual Observation

☐ Monitoring Maintenance Procedures - APC 23
 Pollutant(s): _____

☐ Stack Testing - APC 24
 Pollutant(s): _____

☐ Fuel Sampling & Analysis (FSA) - APC 25
 Pollutant(s): _____

☒ Recordkeeping - APC 26
 Pollutant(s): PM and VOC

☐ Other (please describe) - APC 27
 Pollutant(s): _____

5. Compliance certification reports will be submitted to the Division according to the following schedule:
 Start date: Per Title V Permit Requirements
 And every 365 days thereafter.

6. Compliance monitoring reports will be submitted to the Division according to the following schedule:
 Start date: Per Title V Permit Requirements
 And every 365 days thereafter.

7. Page number: 6 Revision number: _____ Date of revision: _____

State of Tennessee
Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243
Telephone: (615) 532-0554



APC 22

**TITLE V PERMIT APPLICATION - COMPLIANCE DEMONSTRATION BY
MONITORING CONTROL SYSTEM PARAMETERS OR OPERATING PARAMETERS OF A PROCESS**

The monitoring of a control system parameter or a process parameter shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value and the emission rate of a particular pollutant is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Adient US, LLC	2. Stack ID or flow diagram point identification(s) F1 through F13
-------------------------------------	---

3. Emission source:
28-0076-01 Polyurethane Foam Manufacturing

MONITORING DESCRIPTION

4. Pollutant(s) being monitored:
Opacity

5. Description of the method of monitoring and establishment of correlation between the parameter value and the emission rate of a particular pollutant:
Visible emissions reading pursuant to EPA Method 9.

6. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated):
Annually per the Opacity Decision Tree dated June 18, 1996, amended September 11, 2013.

7. Page number: 7	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION COMPLIANCE DEMONSTRATION BY RECORDKEEPING

Recordkeeping shall be acceptable as a compliance demonstration method provided that a correlation between the parameter value recorded and the applicable requirement is established.

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Adient US, LLC	2. Stack ID or flow diagram point identification(s): F1 through F13
-------------------------------------	--

3. Emission source (identify): 28-0076-01 Polyurethane Foam Manufacturing
--

MONITORING AND RECORDKEEPING DESCRIPTION

4. Pollutant(s) or parameter being monitored: PM and VOC

5. Material or parameter being monitored and recorded: Material Usage and Material Formulation Data
--

6. Method of monitoring and recording: Monthly record of the actual usage of Polyurethane Foam Manufacturing materials. Emissions are estimated as follows: 1. PM - (Material Usage) x (PM content) x (1-55% Transfer Efficiency) 2. VOC - (Material Usage) x (VOC content) 3. TDI, MDI, DEOA - (Material Usage) x (HAP content) x (Emissions Factor) Note: TDI and MDI are reactants in the foam materials and are largely consumed or locked into the matrix of the foam. The compound emission factors are from testing performed on October 1, 1997.
--

7. Compliance demonstration frequency (specify the frequency with which compliance will be demonstrated): Monthly Calculation
--

8. Page number: 8	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION EMISSION SUMMARY FOR THE FACILITY OR FOR THE SOURCES CONTAINED IN THIS APPLICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: **Adient US, LLC**

EMISSIONS SUMMARY TABLE – CRITERIA AND SELECTED POLLUTANTS

2. Complete the following emissions summary for regulated air pollutants at this facility or for the sources contained in this application.

Air Pollutant	Summary of Maximum Allowable Emissions		Summary of Actual Emissions	
	Tons per Year	Reserved for State use (Pounds per Hour- Item 4, APC 28)	Tons per Year	Reserved for State use (Pounds per Hour- Item 4, APC 28)
Particulate Matter (TSP)	9.9	NA	<9.9	NA
Sulfur Dioxide				
Volatile Organic Compounds	491.4	NA	305	NA
Carbon Monoxide				
Lead				
Nitrogen Oxides				
Total Reduced Sulfur				
Mercury				
Asbestos				
Beryllium				
Vinyl Chlorides				
Fluorides				
Gaseous Fluorides				
Greenhouse Gases in CO ₂ Equivalents				

(Continued on next page)

3. Complete the following emissions summary for regulated air pollutants that are hazardous air pollutant(s) at this facility or for the sources contained in this application.

4. Page number: Revision number: Date of revision:

RDA 1298



TITLE V PERMIT APPLICATION CURRENT EMISSIONS REQUIREMENTS AND STATUS

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name: Adient US, LLC	2. Emission source number 28-0076-01
--	--

3. Describe the process emission source / fuel burning installation / incinerator.

Polyurethane Foam Manufacturing

EMISSIONS AND REQUIREMENTS

4. Identify if only a part of the source is subject to this requirement	5. Pollutant	6. Applicable requirement(s): TN Air Pollution Control Regulations, 40 CFR, permit restrictions, air quality based standards	7. Limitation	8. Maximum actual emissions	9. Compliance status (In/Out)
Please refer to the application narrative for a list of applicable requirements. Adient requests that this action under the PSD permitting process be rolled into the Title V permit renewal process and accordingly, the PSD application includes the most current regulatory requirements including allowable emission rates. Regarding compliance status associated with applicable requirements, please refer to TDEC application form APC 31 below, Note 5.					

10. Other applicable requirements (new requirements that apply to this source during the term of this permit)

11. Page number: 10	Revision number:	Date of revision:
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TITLE V PERMIT APPLICATION COMPLIANCE PLAN AND COMPLIANCE CERTIFICATION

GENERAL IDENTIFICATION AND DESCRIPTION

1. Facility name:

Adient US LLC Pulaski

2. List all the process emission source(s) or fuel burning installation(s) or incinerator(s) that are part of this application.

28-0076-01 Polyurethane Foam Manufacturing

COMPLIANCE PLAN AND CERTIFICATION

3. Indicate that source(s) which are contained in this application are presently in compliance with all applicable requirements, by checking the following:

☒

A. Attached is a statement of identification of the source(s) currently in compliance. We will continue to operate and maintain the source(s) to assure compliance with all the applicable requirements for the duration of the permit.

☐

B. APC 30 form(s) includes new requirements that apply or will apply to the source(s) during the term of the permit. We will meet such requirements on a timely basis.

4. Indicate that there are source(s) that are contained in this application which are not presently in full compliance, by checking both of the following:

☐

A. Attached is a statement of identification of the source(s) not in compliance, non-complying requirement(s), brief description of the problem, and the proposed solution.

☐

B. We will achieve compliance according to the following schedule:

Action

Deadline

Progress reports will be submitted:

Start date: _____ and every 180 days thereafter until compliance is achieved.

5. State the compliance status with any applicable compliance assurance monitoring and compliance certification requirements that have been promulgated under section 114(a)(3) of the Clean Air Act as of the date of submittal of this APC 31.

NOTE: As set forth is the attached Permit Narrative, TDEC alleged non-compliance with some permit requirements and Adient disputed those allegations. On February 24, 2022, Adient and TDEC entered into a Consent Order to resolve those concerns.

6. Page number:

Revision number:

Date of revision:

11

SAFETY DATA SHEET

Chem-Trend® PU-11434



Section 1. Identification

Product name : Chem-Trend® PU-11434

Relevant identified uses of the substance or mixture and uses advised against
Not available.

Supplier's details : Chem-Trend LP
1445 W McPherson Park Dr
PO Box 860, Howell MI 48844-0860
517-546-4520

Emergency telephone number and Telephone number : +1 517 546 4520

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 3
ACUTE TOXICITY (inhalation) - Category 4
SKIN IRRITATION - Category 2
EYE IRRITATION - Category 2A
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
ASPIRATION HAZARD - Category 1

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : Flammable liquid and vapor.
Harmful if inhaled.
Causes serious eye irritation.
Causes skin irritation.
May be fatal if swallowed and enters airways.
May cause drowsiness or dizziness.

Precautionary statements

Prevention : Wear protective gloves. Wear eye or face protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid breathing vapor. Wash hands thoroughly after handling.

Section 2. Hazards identification

Response	: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.
Storage	: Store locked up. Store in a well-ventilated place. Keep cool.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
Hazards not otherwise classified	: None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
nonane	≥50 - ≤75	111-84-2
Hydrocarbon naphthas	≥25 - ≤50	-

Section 4. First aid measures

Description of necessary first aid measures

Eye contact	: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	: Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Section 4. First aid measures

- Inhalation** : Harmful if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.
- Skin contact** : Causes skin irritation.
- Ingestion** : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering
redness
- Inhalation** : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
- Skin contact** : Adverse symptoms may include the following:
irritation
redness
- Ingestion** : Adverse symptoms may include the following:
nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

- Specific hazards arising from the chemical** : Flammable liquid and vapor. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Section 5. Fire-fighting measures

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not swallow. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Section 7. Handling and storage

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
nonane	ACGIH TLV (United States, 3/2017). TWA: 200 ppm 8 hours. TWA: 1050 mg/m ³ 8 hours.
Hydrocarbon naphthas	ACGIH TLV (United States, 3/2017). Absorbed through skin. TWA: 200 mg/m ³ , (as total hydrocarbon vapor) 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 8. Exposure controls/personal protection

Section 9. Physical and chemical properties

Physical state	Liquid.	Color	Off-white.
Odor	Hydrocarbon.	Odor threshold	Not available.
pH	Not applicable.	Melting point	Not available.
Boiling point	154.4°C (309.9°F)	Flash point	Closed cup: 39.4°C (102.9°F) [Setaflash.]
Burning time	Not applicable.	Burning rate	Not applicable.
Evaporation rate	<1 (butyl acetate = 1)	Flammability (solid, gas)	Not available.
Lower and upper explosive (flammable) limits	Not available.	Vapor pressure	Not available.
Vapor density	>1 [Air = 1]	Relative density	0.784
Solubility	Insoluble in the following materials: cold water.	Solubility in water	Not available.
Partition coefficient: n-octanol/water	Not available.	Auto-ignition temperature	Not available.
Decomposition temperature	Not available.	SADT	Not available.
Viscosity	Kinematic (40°C (104°F)): <0.2 cm ² /s (<20 cSt)	Volatility	95.9

Lower and upper explosive (flammable) limits

Distillates (petroleum), hydrotreated light nonane

Lower: 0.6% Upper: 5.5%
Lower: 0.8% Upper: 2.9%

Aerosol product

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Section 10. Stability and reactivity

- Conditions to avoid** : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
- Incompatible materials** : Reactive or incompatible with the following materials: oxidizing materials
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
nonane	LC50 Inhalation Gas.	Rat	3200 ppm	4 hours
	LC50 Inhalation Vapor	Rat	17000 mg/m ³	4 hours

Irritation/Corrosion : Causes serious eye irritation. Causes skin irritation.

Sensitization : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Reproductive toxicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Name	Target organs
Hydrocarbon naphthas	Narcotic effects

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Name	Result
Chem-Trend® PU-11434	ASPIRATION HAZARD - Category 1
nonane	ASPIRATION HAZARD - Category 1
Hydrocarbon naphthas	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Harmful if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.

Skin contact : Causes skin irritation.

Ingestion : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Section 11. Toxicological information

Eye contact Adverse symptoms may include the following: pain or irritation watering redness Inhalation Adverse symptoms may include the following: nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness	Skin contact Adverse symptoms may include the following: irritation redness Ingestion Adverse symptoms may include the following: nausea or vomiting
--	--

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Inhalation (gases)	5679.4 ppm
Inhalation (vapors)	14.48 mg/l

Section 12. Ecological information

No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 13. Disposal considerations

RCRA classification : D001 Because of its ignitability if the product is disposed of in its original form.

Section 14. Transport information

	DOT Classification	Bulk	TDG Classification	IATA	IMDG
UN number	Not regulated.	NA1993	UN1993	UN1993	UN1993
UN proper shipping name	-	Combustible liquid, n.o.s.(nonane, Hydrocarbon naphthas)	FLAMMABLE LIQUID, N.O.S. (nonane, Hydrocarbon naphthas)	Flammable liquid, n.o.s. (nonane, Hydrocarbon naphthas)	FLAMMABLE LIQUID, N.O.S. (nonane, Hydrocarbon naphthas)
Transport hazard class(es)	-		3	3	3
Packing group	-	III	III	III	III
Environmental hazards	No.	Yes.	No.	No.	Yes.

Emergency Response Guidebook (ERG): 128

Additional information

DOT Classification : -

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.18-2.19 (Class 3).

Explosive Limit and Limited Quantity Index 5

Passenger Carrying Road or Rail Index 60

Special provisions 16

IMDG : The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.

Emergency schedules F-E, _S-E_

Special provisions 223, 274, 955

IATA : The environmentally hazardous substance mark may appear if required by other transportation regulations.

Quantity limitation Passenger and Cargo Aircraft: 60 L. Packaging instructions: 355.

Cargo Aircraft Only: 220 L. Packaging instructions: 366. Limited Quantities - Passenger Aircraft: 10 L. Packaging instructions: Y344.

Special provisions A3

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Section 15. Regulatory information

Inventory list

Australia	: All components are listed or exempted.
Canada	: At least one component is not listed in DSL but all such components are listed in NDSL.
China	: All components are listed or exempted.
Europe	: Contact local supplier or distributor.
Japan	: Japan inventory (ENCS) : At least one component is not listed. Japan inventory (ISHL) : At least one component is not listed.
New Zealand	: All components are listed or exempted.
Philippines	: All components are listed or exempted.
Republic of Korea	: All components are listed or exempted.
Taiwan	: All components are listed or exempted.
United States	: All components are listed or exempted.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

Not applicable.

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : FLAMMABLE LIQUIDS - Category 3
ACUTE TOXICITY (inhalation) - Category 4
SKIN IRRITATION - Category 2
EYE IRRITATION - Category 2A
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
ASPIRATION HAZARD - Category 1

State regulations

Massachusetts	: The following components are listed: NONANE; Waxy solid1
New York	: None of the components are listed.
New Jersey	: The following components are listed: NONANE; Waxy solid1
Pennsylvania	: The following components are listed: NONANE; Waxy solid1

California Prop. 65

⚠ WARNING: This product can expose you to benzene, which is known to the State of California to cause cancer and birth defects or other reproductive harm. This product can expose you to chemicals including naphthalene, ethylbenzene, cumene, which are known to the State of California to cause cancer, and Toluene, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

U.S. Federal regulations : **TSCA 12(b) one-time export:** nonane

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health : 3 / Flammability : 2 Physical hazards : 0 Personal protection Code : H

National Fire Protection Association (U.S.A.)

Health : 1 Flammability : 2 Instability/Reactivity : 0 Special : -

History

Date of issue/Date of revision : 4/22/2018
Date of previous issue : 6/27/2017
Version : 1.1
Prepared by : Chem-Trend Regulatory Affairs Department.
Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973
as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

▣ Indicates information that has changed from previously issued version.

Notice to reader

Information presented herein has been compiled from information provided to us by our suppliers and other sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief but is not guaranteed to be so. Nothing herein is to be construed as recommending any practice or the use of any product in violation of any patent or in violation of any law or regulation. It is the users' responsibility to determine the suitability of any material for a specific purpose and to adopt such safety precautions as may be necessary. We make no warranty as to the results to be obtained in using any material and, since conditions of use are not under our control, we must necessarily disclaim all liability with respect to the use of any material supplied by us.



SAFETY DATA SHEET

Product Name: Rikeizai H-179K-7

SECTION 1) CHEMICAL PRODUCT AND SUPPLIER'S IDENTIFICATION

Product Name: Rikeizai H-179K-7
SDS Number: CRSH-179K-7
Revision Date: Jan 08, 2019 Date Printed: Sep 09, 2019
Version: 2.2 Supersedes Date: Jan 30, 2018
Manufacturer's Name: Cytech Products
Address: 906 Peterson Drive Elizabethtown, KY, US, 42701
Emergency Phone: 1-800-424-9300 (CHEMTREC)
Information Phone Number: 1-270-769-1046
Fax:
Product/Recommended Uses: Mold Release Prep and Touchup Paste Wax for Polyurethane Molding

SECTION 2) HAZARDS IDENTIFICATION

Classification

Acute toxicity Inhalation - Category 4
Aspiration Hazard - Category 1
Eye Irritation - Category 2B
Flammable Liquids - Category 3
Skin Irritation - Category 2
Specific Target Organ Toxicity -Single Exposure (Narcotic Effects) - Category 3

Pictograms



Signal Word

Danger

Hazardous Statements - Health

H332 - Harmful if inhaled
H304 - May be fatal if swallowed and enters airways
H320 - Causes eye irritation
H315 - Causes skin irritation
H336 - May cause drowsiness or dizziness

Hazardous Statements - Physical

H226 - Flammable liquid and vapor

Precautionary Statements - General

P101 - If medical advice is needed, have product container or label at hand.
P102 - Keep out of reach of children.

P103 - Read label before use.

Precautionary Statements - Prevention

P261 - Avoid breathing dust/fume/gas/mist/vapors/spray.

P271 - Use only outdoors or in a well-ventilated area.

P264 - Wash thoroughly/ hands thoroughly after handling.

P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

P233 - Keep container tightly closed.

P240 - Ground/bond container and receiving equipment.

P241 - Use explosion-proof electrical, ventilating, lighting equipment.

P242 - Use only non-sparking tools.

P243 - Take action to prevent static discharges.

P280 - Wear protective gloves/protective clothing/eye protection/face protection.

Precautionary Statements - Response

P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P312 - Call a POISON CENTER or doctor, if you feel unwell.

P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor.

P331 - Do NOT induce vomiting.

P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337 + P313 - If eye irritation persists: Get medical advice/attention.

P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

P370 + P378 - In case of fire: Use carbon-dioxide, alcohol foam, water spray or dry chemical to extinguish.

P302 + P352 - IF ON SKIN: Wash with plenty of water.

P321 - Specific treatment (see first-aid on this label).

P332 + P313 - If skin irritation occurs: Get medical advice/attention.

P362 + P364 - Take off contaminated clothing. And wash it before reuse.

Precautionary Statements - Storage

P405 - Store locked up.

P403 + P235 - Store in a well-ventilated place. Keep cool.

P403 + P405 - Store in a well-ventilated place. Store locked up.

Precautionary Statements - Disposal

P501 - Dispose of contents/container in accordance with local/national/international regulation. Under RCRA it is the responsibility of the user of the products to determine at the time of disposal whether the product meets RCRA criteria for hazardous waste. Waste management should be in full compliance with federal, state and local laws.

Hazards Not Otherwise Classified (HNOC)

None.

Acute toxicity of less than one percent of the mixture is unknown

SECTION 3) COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Chemical Name	% By Weight
0064742-47-8	ISOPARAFFINIC PETROLEUM DISTILLATE	72% - 76%

Specific chemical identity and/or exact percentage (concentration) of the composition has been withheld to protect confidentiality.

SECTION 4) FIRST-AID MEASURES

Inhalation

Remove source of exposure or move person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER/doctor. If breathing is difficult, trained personnel should administer emergency oxygen if advised to do so by the POISON CENTER/doctor. If exposed/If you feel unwell/If concerned: Call a POISON CENTER/doctor.

Skin Contact

Take off contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Wash with plenty of lukewarm, gently flowing water for a duration of 15-20 minutes or until medical aid is available. IF exposed or concerned: Get medical advice/attention. Wash contaminated clothing before re-use.

Eye Contact

If irritation occurs, cautiously rinse eyes with lukewarm, gently flowing water for 5 minutes, while holding the eyelids open. If eye irritation persists: Get medical advice/attention.

Ingestion

Rinse mouth. Drink 2-3 glasses of water. Immediately call a POISON CENTER/doctor. Do NOT induce vomiting. If vomiting occurs naturally, lie on your side, in the recovery position.

Most Important Symptoms/Effects, Acute and Delayed

Skin Contact: Prolonged skin contact may cause irritation or dermatitis.

Inhalation: Vapor concentrations above the TLV may cause nasal and respiratory irritation, dizziness, weakness, fatigue, nausea, headache, and, at extreme levels, asphyxiation.

Indication of Immediate Medical Attention and Special Treatment Needed

No data available.

SECTION 5) FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Small Fire : Dry chemical, carbon dioxide, water-spray or alcohol-resistant foam.

Large Fire : Water spray, fog or alcohol-resistant foam.

Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

Unsuitable Extinguishing Media

Do not use straight stream of water.

Specific Hazards in Case of Fire

Fire will produce irritating gases.

Containers may explode in fire.

Runoff from fire control may cause pollution.

Fire-Fighting Procedures

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Cool containers with flooding quantities of water until well after fire is out. Caution should be exercised when using water or foam as frothing may occur, especially if sprayed into containers of hot, burning liquid. Dispose of fire debris and contaminated extinguishing water in accordance with official regulations. Do not allow contaminated extinguishing water to enter the soil, ground-water or surface waters.

Large Fire: Dike fire-control water for later disposal; do not scatter the material.

Special Protective Actions

Wear positive pressure self-contained breathing apparatus (SCBA).

Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

SECTION 6) ACCIDENTAL RELEASE MEASURES

Emergency Procedure

Evacuate and isolate hazard area and keep unauthorized personnel away. Stay uphill and/or upstream. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. A vapor-suppressing foam may be used to reduce vapors.

Recommended Equipment

Wear liquid tight chemical protective clothing in combination with positive pressure self-contained breathing apparatus (SCBA).

Personal Precautions

DO NOT breathe vapor or mist.

DO NOT get on skin, eyes or clothing.

Environmental Precautions

Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems and natural waterways by using sand, earth, or other appropriate barriers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and Materials for Containment and Cleaning up

Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Ventilate area after clean-up is complete.

SECTION 7) HANDLING AND STORAGE

General

Wash hands after use.

Do not get in eyes, on skin or on clothing.

Do not breathe vapors or mists.

Use good personal hygiene practices.

Eating, drinking and smoking in work areas is prohibited.

This product is not intended for human or animal consumption.

Remove contaminated clothing and protective equipment before entering eating areas.

All containers must be properly labelled.

Eyewash stations and showers should be available in areas where this material is used and stored.

Ventilation Requirements

Use only with adequate ventilation to control air contaminants to their exposure limits. The use of local ventilation is recommended to control emissions near the source. Report ventilation failures immediately.

Storage Room Requirements

Segregate from other hazard classes and store in a cool, dry, well ventilated area, away from sources of ignition and incompatibilities.

Protect containers against banging or other physical damage when storing, transferring, or using them.

Provide secondary containment for toxic materials.

Keep containers securely sealed when not in use.

Keep the smallest amount of material in work areas.

Procedures must be conducted in a fume hood, glove box, or other suitable containment device.

Empty container can retain residue and may be dangerous.

Label cabinets with "TOXIC CHEMICALS" or similar warning.

Store between 40-100°F.

SECTION 8) EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye protection

Wear indirect-vent, impact and splash resistant goggles when working with liquids.

Skin protection

Use of gloves approved from relevant standards that meet or are equivalent to OSHA 29 CFR 1910.132. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Use of an apron and over-boots of chemically impervious materials such as neoprene or nitrile rubber. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker, a respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 should be followed. Check with respiratory protective equipment suppliers.

Appropriate Engineering Controls

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Chemical Name	OSHA STEL (mg/m3)	OSHA STEL (ppm)	OSHA TWA (mg/m3)	OSHA TWA (ppm)	OSHA Carcinogen	OSHA Skin designation	OSHA Tables (Z1, Z2, Z3)	NIOSH STEL (mg/m3)
ISOPARAFFINIC PETROLEUM DISTILLATE			2000	500			1	

Chemical Name	NIOSH TWA (mg/m3)	NIOSH STEL (ppm)	NIOSH TWA (ppm)	NIOSH Carcinogen	ACGIH STEL (mg/m3)	ACGIH STEL (ppm)	ACGIH TWA (mg/m3)	ACGIH TWA (ppm)
ISOPARAFFINIC PETROLEUM DISTILLATE							[(L)[N159](L)[N800]]; [5 (I)[N159]5 (I)[N800]];	(L)[N159](L)[N800]

Chemical Name	ACGIH TLV Basis	ACGIH Carcinogen	ACGIH Notations
ISOPARAFFINIC PETROLEUM DISTILLATE	URT irr [N159]URT irr [N800]	[A2[N159]A2 [N800]]; [A4 [N159]A4 [N800]];	[A2[N159]A2 [N800]]; [A4 [N159]A4 [N800]];

URT - Upper respiratory tract

SECTION 9) PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Non-Volatiles wt%	25 +/- 5
Density	6.84000 lb/gal
Density VOC	5.15000 lb/gal
Specific Gravity	0.82000
Appearance	White Paste
Odor Threshold	N/A
Odor Description	Slight hydrocarbon solvent odor
pH	N/A
Water Solubility	Negligible
Flammability	Flash point at or above 100°F/38°C and less than 200°F/93°C
Flash Point Symbol	N/A
Flash Point	42 °C
Viscosity (cps @ 77°F)	Less than 1000
Lower Explosion Level	0.6
Upper Explosion Level	6
Vapor Pressure	0.37
Vapor Density	5.300000000000
Freezing Point	N/A
Melting Point	N/A
Low Boiling Point	318 °F
High Boiling Point	400 °F
Auto Ignition Temp	230 °C
Decomposition Pt	N/A

Evaporation Rate
Coefficient Water/Oil

0.13
N/A

SECTION 10) STABILITY AND REACTIVITY

Stability

Stable under normal conditions.

Conditions to Avoid

Avoid heat, spark, flame, direct sunlight and incompatible materials.

Hazardous Reactions/Polymerization

Will not occur.

Incompatible Materials

Avoid materials incompatible with water.

Hazardous Decomposition Products

No data available.

SECTION 11) TOXICOLOGICAL INFORMATION

Likely Route of Exposure

Inhalation, ingestion, skin absorption, eye contact.

Aspiration Hazard

May be fatal if swallowed and enters airways

Carcinogenicity

No data available.

Germ Cell Mutagenicity

No data available.

Reproductive Toxicity

No data available.

Respiratory/Skin Sensitization

0064742-47-8 ISOPARAFFINIC PETROLEUM DISTILLATE

The substance defats the skin, which may cause dryness or cracking.

Serious Eye Damage/Irritation

Causes eye irritation

0064742-47-8 ISOPARAFFINIC PETROLEUM DISTILLATE

The vapour is mildly irritating to the eyes.

Skin Corrosion/Irritation

Causes skin irritation

Specific Target Organ Toxicity - Repeated Exposure

No data available.

Specific Target Organ Toxicity - Single Exposure

May cause drowsiness or dizziness

0064742-47-8 ISOPARAFFINIC PETROLEUM DISTILLATE

May cause effects on the central nervous system.

Acute Toxicity

Harmful if inhaled

0064742-47-8 ISOPARAFFINIC PETROLEUM DISTILLATE

If swallowed, can easily enter the airways and could result in aspiration pneumonitis.

If swallowed, can easily enter the airways and could result in aspiration pneumonitis. Inhalation of high concentrations may cause dizziness, anesthesia, unconsciousness.

Likely Routes of Exposure

0064742-47-8 ISOPARAFFINIC PETROLEUM DISTILLATE

The substance can be absorbed into the body by inhalation of its vapour and by ingestion.

SECTION 12) ECOLOGICAL INFORMATION

Toxicity

No data available.

Other Adverse Effects

No data available.

Persistence and Degradability

0064742-47-8 ISOPARAFFINIC PETROLEUM DISTILLATE

Expected to be inherently biodegradable. The volatile constituents will oxidize rapidly by photochemical reactions in air.

Mobility in Soil

0064742-47-8 ISOPARAFFINIC PETROLEUM DISTILLATE

Floats on water. Contains volatile constituents. Evaporates within a day from water or soil surfaces. Large volumes may penetrate soil and could contaminate groundwater.

SECTION 13) DISPOSAL CONSIDERATIONS

Waste Disposal

It is the responsibility of the user of the product to determine at the time of disposal whether the product meets local criteria for hazardous waste. Waste management should be in full compliance with national, state and local laws.

Empty Containers retain product residue which may exhibit hazards of material, therefore do not pressurize, cut, glaze, weld or use for any other purposes. Return drums to reclamation centers for proper cleaning and reuse.

SECTION 14) TRANSPORT INFORMATION

U.S. DOT Information

UN number: UN 1268

Proper shipping name: Petroleum Distillates, N.O.S. (ISOPARAFFINIC PETROLEUM DISTILLATE)

Hazard class: Combustible liquid

Packaging group: III

Hazardous substance (RQ): No Data Available

Toxic-Inhalation Hazard: No Data Available

Marine Pollutant: No Data Available

Note / Special Provision: No Data Available

IMDG Information

UN number: UN 1268

Proper shipping name: Petroleum Distillates, N.O.S. (ISOPARAFFINIC PETROLEUM DISTILLATE)

Hazard class: 3

Packaging group: III

Marine Pollutant: No Data Available

Note / Special Provision: No Data Available

IATA Information

UN number: UN 1268

Proper shipping name: Petroleum Distillates, N.O.S. (ISOPARAFFINIC PETROLEUM DISTILLATE)

Hazard class: 3

Packaging group: III

Marine Pollutant: No Data Available

Note / Special Provision: No Data Available

SECTION 15) REGULATORY INFORMATION

CAS	Chemical Name	% By Weight	Regulation List
0064742-47-8	ISOPARAFFINIC PETROLEUM DISTILLATE	72% - 76%	SARA312,VOC,IARCCarcinogen,TS CA,TSCA_UVCB - CHEMICAL SUBSTANCES OF UNKNOWN OR VARIABLE COMPOSITION, COMPLEX REACTION PRODUCTS AND BIOLOGICAL MATERIALS
0009002-88-4	POLYETHYLENE	20% - 22%	SARA312,IARCCarcinogen,TSCA
0009010-79-1	Polypropylene	1.5% - 4%	SARA312,TSCA

SECTION 16) OTHER INFORMATION INCLUDING INFORMATION ON PREPARATION AND REVISION OF THE SDS

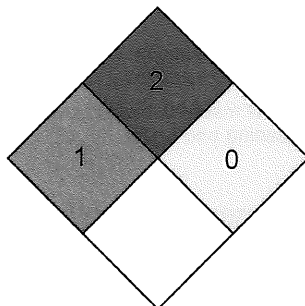
Glossary

ACGIH- American Conference of Governmental Industrial Hygienists; ANSI- American National Standards Institute; Canadian TDG Canadian Transportation of Dangerous Goods; CAS- Chemical Abstract Service; Chemtrec- Chemical Transportation Emergency Center (US); CHIP- Chemical Hazard Information and Packaging; DSL- Domestic Substances List; EC- Equivalent Concentration; EH40 (UK)- HSE Guidance Note EH40 Occupational Exposure Limits; EPCRA- emergency Planning and Community Right-To-Know Act; SLEffects screening levels; HMIS- Hazardous Material Information Service; LC- Lethal Concentration; LD- Lethal Dose; NFPA- National Fire Protection Association; OEL- Occupational Exposure Limits; OSHA- Occupational Safety and Health Administration, US Department of Labor; PEL- Permissible Exposure Limit; ARA (Title III)- Superfund Amendments and eauthorization Act; SARA 313- Superfund Amendments and Reauthorization Act, Section 313; SCBA- Self-Contained Breathing Apparatus; STEL- Short Term Exposure Limit; TCEQ - Texas Commission on Environmental Quality; TLV- Threshold Limit Value; TSCA- Toxic Substances Control Act Public Law 94- 469; TWA - Time Weighted Value; US DOT- US Department of Transportation; WHMIS- Workplace Hazardous Materials Information System.

HMIS

Health	/ 1
FLAMMABILITY	2
Physical Hazard	0
Personal Protection	B

NFPA



(*) - Chronic effects

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks

Version 2.1:

Revision Date: Jan 08, 2019

DISCLAIMER

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.



Cytech Products Inc.

906 Peterson Drive
Elizabethtown, KY 42701

Rikeizai H-179K-7

Release Agent

Acoustical / Carpet / High Resilience Foam

The composition given below is the composition of the Product as Formulated. Slight variation may occur in individual batches.

Weight/Gallon	6.8221 Lbs/Gal
Non-Volatiles (% by weight)	24.51%
Non-Volatiles (% by volume)	21.31%
Volatiles (% by weight)	75.49%
Volatiles (% by volume)	78.69%
Density of Blend (kg/liter)	0.8179
Volatile Organic Compounds Minus Exempt Solvents.	75.49% by wt.; 5.150 lbs/gal; 617.11 grams/liter

For Environmental Reporting and Permitting use Actual Batch Data and Processing Information. For Further Assistance, Contact Your Sales Representative.

Density Of Solvent Blend
6.5202 Pounds/Gallon

This product is **not** photochemically reactive as per SCAQMD rule 102.

Volatile Composition:

Percent of Volatile

<u>CAS#</u>	<u>Composition</u>	<u>Weight</u>	<u>Volume</u>
64742-47-8	Hydrocarbon Naphtha	75.49%	78.69%

Solvent Blend NFPA Hazard Rating

H = 1 F = 2 R = 0

Hazardous and Safety Information

This product is in solvent base form. The product should always be kept away from excessive heat or open flames. Gloves should be worn when handling the product. If spills occur, dispose of them in accordance with local, federal, state or international regulations. Hands and arms should be washed thoroughly with soap and water after contact. The Safety Data Sheet (SDS) for this product contains detailed information regarding all hazardous and safety information. Always read the SDS that accompanies this product before use.

The information, statements, and data contained herein are to the best of Cytech Products' knowledge and belief, accurate and reliable as of the date issued. Cytech Products does not warrant or guarantee their accuracy or reliability, and Cytech Products shall not be liable for any loss or damage arising out of the use thereof. This information is provided as a guide, with the understanding that it is the customer's responsibility to safely and correctly use our products based on the customer's actual conditions. Therefore, Cytech Products Inc. assumes no warranty, expressed or implied, regarding the actual use, storage, handling or merchantability of this product for a particular purpose. The information provided herein should not be assumed as recommendations to infringe on any patents or licenses.

AQD H-179K-7 1.0 05/09/17

Phone: 270-769-1046 Fax: 270-769-1048 Email: sales@cytechproducts.com

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SAFETY DATA SHEET

Classified in accordance 29 CFR 1910.1200

1. Identification

Product identifier: TEGOSTAB B 8737 LF 2

Chemical name:

Preparation of organomodified polysiloxanes

Other means of identification

Recommended restrictions

Recommended use: Industrial Use

Restrictions on use: None known.

Manufacturer/Importer/Distributor Information

Company Name : Evonik Corporation
Nutrition & Care
PO Box 34628
Richmond, VA 23234
USA

Telephone : +1 804 727 0700

Fax : +1 804 727 0845

E-mail : us-productsafety-cs@evonik.com

Emergency telephone number:

24-Hour Health : +1 800 424 9300 (CHEMTREC - US & CANADA)

Emergency : +1 800 681 9531 (CHEMTREC MEXICO)

+1 703 527 3887 (CHEMTREC WORLD)

2. Hazard(s) identification

Hazard Classification

Physical Hazards

Flammable liquids

Category 4

Health Hazards

Toxic to reproduction

Category 2

Label Elements

Hazard Symbol:



Signal Word: Warning

Hazard Statement: Combustible liquid.
Suspected of damaging fertility or the unborn child.

Precautionary Statements

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Wear protective gloves/eye protection/face protection.

Response: IF exposed or concerned: Get medical advice/attention.

Storage: Store in a well-ventilated place. Keep cool.

Hazard(s) not otherwise classified (HNOC): None.

3. Composition/information on ingredients

Chemical name:

Preparation of organomodified polysiloxanes

Mixtures

Chemical Identity	CAS number	Content in percent (%) [*]
Hexamethyl disiloxane	107-46-0	0.5 - 1%
propane-1,2-diol	57-55-6	<0.5%
2-Propanol, 1,1',1''-nitrilotris-	122-20-3	<0.005%
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	128-37-0	<0.001%

^{*} All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

The exact concentration has been withheld as a trade secret.

4. First-aid measures

Description of necessary first-aid measures

General information: Remove soiled or soaked clothing immediately

Inhalation: Ensure supply of fresh air. In the event of symptoms seek medical advice.

Skin Contact: In case of contact with skin wash off with soap and water. In the event of symptoms seek medical advice.

Eye contact: In case of contact with eyes rinse thoroughly with water. In the event of symptoms seek medical advice.

Ingestion: Thoroughly clean the mouth with water In the event of symptoms seek medical advice.

Personal Protection for First-aid Responders: Do not inhale explosion and/or combustion gases, Self-contained breathing apparatus.

Most important symptoms/effects, acute and delayed

Symptoms: No special hints.

Hazards: No data available.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically.

5. Fire-fighting measures

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: foam, carbon dioxide, dry powder, water spray.

Unsuitable extinguishing media: Full water jet

Specific hazards arising from the chemical: In the event of fire the following can be released: - Carbon monoxide, carbon dioxide, silicon dioxide Under certain conditions of combustion traces of other toxic substances cannot be excluded

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Take action to prevent static discharges. Keep away from sources of ignition - no smoking. Vapours may form explosive mixtures with air Cool endangered containers by water spray

Special protective equipment for fire-fighters: Do not inhale explosion and/or combustion gases Self-contained breathing apparatus.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Ensure adequate ventilation. Keep away sources of ignition.

Methods and material for containment and cleaning up: Take up with absorbent material (eg sand, kieselguhr, universal binder) Dispose of absorbed material in accordance with the regulations.

Environmental Precautions: Do not allow to enter drains or waterways Do not discharge into the subsoil/soil.

7. Handling and storage

Handling

Technical measures (e.g. Local and general ventilation): No data available.

Safe handling advice: Avoid contact with skin and eyes. Do not inhale gases/vapours/aerosols.No special measures necessary if stored and handled as prescribed.

Hygiene measures: Do not eat, drink or smoke when working. Wash hands before breaks and immediately after handling the product. Remove soiled or soaked clothing immediately.

Storage

Safe storage conditions: Keep container tightly closed and in a well-ventilated place.

Safe packaging materials: No data available.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

None of the components have assigned exposure limits.
 Hazardous components without workplace control parameters

Appropriate Engineering Controls No data available.

Individual protection measures, such as personal protective equipment

Eye/face protection: This product is not classified as a hazardous substance. Any necessity for eye protection must be determined within the scope of a risk assessment.

Skin Protection

Hand Protection:

Material: gloves made of nitril (NBR)
 Break-through time: > 480 min
 Material: gloves made of chloroprene (CR, e.g. Neoprene)
 Break-through time: > 480 min
 Material: protective gloves made of fluorinated rubber (FKM, e.g. Viton)
 Break-through time: > 480 min

Skin and Body Protection:

protective clothing

Respiratory Protection: in case of formation of vapours/aerosols: Short term: filter apparatus, combination filter A-P2

Hygiene measures: Do not eat, drink or smoke when working. Wash hands before breaks and immediately after handling the product. Remove soiled or soaked clothing immediately.

9. Physical and chemical properties

Appearance

Physical state:	liquid
Form:	liquid
Color:	colourless to yellowish
Odor:	Characteristic
Odor Threshold:	not measured
pH:	not determined
Freezing point:	not measured
Boiling Point:	not measured
Flash Point:	147.20 °F (DIN EN ISO 2719)
Evaporation Rate:	not measured

Explosive limit - upper (%):	not measured
Explosive limit - lower (%):	not measured
Vapor pressure:	not measured
Vapor density (air=1):	not measured
Density:	0.958 - 0.978 g/cm ³ (25 °C) (DIN 51757)
Relative density:	No data available.
Solubility(ies)	
Solubility in Water:	Insoluble
Solubility (other):	not measured
Partition coefficient (n-octanol/water):	not measured
Self Ignition Temperature:	not measured
Decomposition Temperature:	not measured
Kinematic viscosity:	No data available.
Dynamic viscosity:	20 - 40 mPa.s (25 °C, DIN 53019)
Other information	
Explosive properties:	not measured
Oxidizing properties:	not measured
Minimum ignition temperature:	not measured
Metal Corrosion:	not measured

10. Stability and reactivity

Reactivity:	see section "Possibility of hazardous reactions"
Chemical Stability:	The product is stable under normal conditions.
Possibility of hazardous reactions:	Reactions with acids. Reactions with alkalies.
Conditions to avoid:	Unknown
Incompatible Materials:	Unknown
Hazardous Decomposition Products:	None with proper storage and handling.

11. Toxicological information

Information on likely routes of exposure

Inhalation:	If handled correctly, not a relevant route of exposure. Information on effects are given below.
Skin Contact:	Relevant route of exposure. Information on effects are given below.
Eye contact:	Relevant route of exposure. Information on effects are given below.
Ingestion:	If handled correctly, not a relevant route of exposure. Information on effects are given below.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation:	No data available.
-------------	--------------------

Eye contact: No data available.

Ingestion: No data available.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: no data available

Dermal
Product: no data available

Inhalation
Product: no data available

Repeated dose toxicity
Product: no data available

Skin Corrosion/Irritation
Product: no data available

Serious Eye Damage/Eye Irritation
Product: no data available

Respiratory or Skin Sensitization
Product: no data available

Carcinogenicity
Product: No data available.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogens present or none present in regulated quantities

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogens present or none present in regulated quantities

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogens present or none present in regulated quantities

Germ Cell Mutagenicity

In vitro
Product: No data available.

Components:
Hexamethyl disiloxane Ames test (OECD 471): negative

In vivo
Product: No data available.

Components:
Hexamethyl disiloxane Chromosomal aberration (OECD 475): negative

Reproductive toxicity
Product: No data available.

Specific Target Organ Toxicity - Repeated Exposure**Product:** no data available**Aspiration Hazard****Product:** Not classified**Other effects:**

Proper use provided, no adverse health effects have been observed or have been come to our knowledge.

12. Ecological information**Ecotoxicity:****Acute hazards to the aquatic environment:****Fish****Product:** No data available.**Aquatic Invertebrates****Product:** No data available.**Chronic hazards to the aquatic environment:****Fish****Product:** No data available.**Aquatic Invertebrates****Product:** No data available.**Toxicity to Aquatic Plants****Product:** No data available.**Persistence and Degradability****Biodegradation****Product:** No data available.**BOD/COD Ratio****Product:** No data available.**Bioaccumulative potential****Bioconcentration Factor (BCF)****Product:** No data available.**Partition Coefficient n-octanol / water (log Kow)****Product:** Log Kow: not measured**Mobility in soil:**

No data available.

Components:

Hexamethyl disiloxane	No data available.
propane-1,2-diol	No data available.
2-Propanol, 1,1',1"-nitrilotris-	No data available.
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	No data available.

Other adverse effects: Do not allow to enter soil, waterways or waste water canal.

13. Disposal considerations

Disposal methods: In accordance with local authority regulations, take to special waste incineration plant

Contaminated Packaging: If empty contaminated containers are recycled or disposed of, the receiver must be informed about possible hazards.

14. Transport information

Domestic regulation

49 CFR

Not regulated as a dangerous good

International Regulations

UNRTDG

Not regulated as a dangerous good

IATA-DGR

Not regulated as a dangerous good

IMDG-Code

Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

15. Regulatory information

US Federal Regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

None present or none present in regulated quantities.

US. Toxic Substances Control Act (TSCA) Section 5(a)(2) Final Significant New Use Rules (SNURs) (40 CFR 721, Subpt E)

None present or none present in regulated quantities.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

None present or none present in regulated quantities.

Superfund Amendments and Reauthorization Act of 1986 (SARA)**Hazard categories**

Flammable (gases, aerosols, liquids, or solids), Reproductive toxicity

SARA 302 Extremely Hazardous Substance

None present or none present in regulated quantities.

US. EPCRA (SARA Title III) Section 304 Extremely Hazardous Substances Reporting Quantities and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Hazardous Substances**SARA 311/312 Hazardous Chemical****Chemical Identity****Threshold Planning Quantity****SARA 313 (TRI Reporting)**

None present or none present in regulated quantities.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

None present or none present in regulated quantities.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

None present or none present in regulated quantities.

US State Regulations**US. California Proposition 65**

No ingredient requiring a warning under CA Prop 65.

US. New Jersey Worker and Community Right-to-Know Act

No ingredient regulated by NJ Right-to-Know Law present.

US. Massachusetts RTK - Substance List

No ingredient regulated by MA Right-to-Know Law present.

US. Pennsylvania RTK - Hazardous Substances

No ingredient regulated by PA Right-to-Know Law present.

US. Rhode Island RTK

No ingredient regulated by RI Right-to-Know Law present.

Inventory Status:

US TSCA Inventory:	Included on Inventory.
Canada DSL Inventory List:	Included on Inventory.

16. Other information, including date of preparation or last revision
HMIS Hazard ID

Health	<input type="text" value="1"/>
Flammability	<input type="text" value="2"/>
Physical Hazards	<input type="text" value="0"/>
PERSONAL PROTECTION	<input checked="" type="checkbox"/>

Ask supervisor or safety specialist for handling instructions

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe; RNP - Rating not possible; *Chronic health effect

Issue Date: 03/15/2019

Version #: 1.0

Further Information: none

Revision Information: Changes since the last version are highlighted in the margin. This version replaces all previous versions.

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SAFETY DATA SHEET

Classified in accordance 29 CFR 1910.1200

1. Identification

Product identifier: TEGOSTAB B 8724 LF 2

Chemical name:

Preparation of organomodified polysiloxanes

Other means of identification

Recommended restrictions

Recommended use: Industrial Use

Restrictions on use: None known.

Manufacturer/Importer/Distributor Information

Company Name : Evonik Corporation
Nutrition & Care
PO Box 34628
Richmond, VA 23234
USA

Telephone : +1 804 727 0700

Fax : +1 804 727 0845

E-mail : us-productsafety-cs@evonik.com

Emergency telephone number:

24-Hour Health : +1 800 424 9300 (CHEMTREC - US & CANADA)

Emergency : +1 800 681 9531 (CHEMTREC MEXICO)

+1 703 527 3887 (CHEMTREC WORLD)

2. Hazard(s) identification

Hazard Classification

Label Elements

Hazard Symbol: No symbol

Signal Word: No signal word.

Hazard Statement: Not applicable

Precautionary Statements Not a hazardous substance or mixture according to 29 CFR 1910.1200.

Hazard(s) not otherwise classified (HNOC): None.

3. Composition/information on ingredients**Chemical name:**

Preparation of organomodified polysiloxanes

Mixtures**Composition Comments:** No hazardous ingredients.**4. First-aid measures****Description of necessary first-aid measures****General information:** Remove soiled or soaked clothing immediately**Inhalation:** Ensure supply of fresh air.**Skin Contact:** In case of contact with skin wash off with soap and water. Consult a doctor if skin irritation persists.**Eye contact:** In case of contact with eyes rinse thoroughly with plenty of water. If symptoms persist, seek medical advice.**Ingestion:** Medical treatment**Personal Protection for First-aid Responders:** Do not inhale explosion and/or combustion gases, Use self-contained breathing apparatus and wear full protective suit.**Most important symptoms/effects, acute and delayed****Symptoms:** No information is on file to date regarding acute and/or delayed post-exposure symptoms and effects.**Hazards:** No data available.**Indication of immediate medical attention and special treatment needed****Treatment:** Treat symptomatically.**5. Fire-fighting measures****Suitable (and unsuitable) extinguishing media****Suitable extinguishing media:** foam, carbon dioxide, dry powder, water spray.**Unsuitable extinguishing media:** Full water jet**Specific hazards arising from the chemical:** In the event of fire the following can be released: - Carbon monoxide, carbon dioxide, silicon dioxide Under certain conditions of combustion traces of other toxic substances cannot be excluded**Special protective equipment and precautions for firefighters****Special fire fighting procedures:** No specific precautions.**Special protective equipment for fire-fighters:** Do not inhale explosion and/or combustion gases Use self-contained breathing apparatus and wear full protective suit.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	Use personal protective equipment.
Methods and material for containment and cleaning up:	Take up with absorbent material (eg sand, kieselguhr, universal binder) Dispose of absorbed material in accordance with the regulations.
Environmental Precautions:	Do not allow to enter drains or waterways Do not discharge into the subsoil/soil.

7. Handling and storage

Handling

Technical measures (e.g. Local and general ventilation):	No data available.
Safe handling advice:	Avoid contact with skin and eyes.Ensure adequate ventilation.
Contact avoidance measures:	No data available.
Hygiene measures:	Do not eat, drink or smoke when working. Wash hands before breaks and immediately after handling the product. Remove soiled or soaked clothing immediately.

Storage

Safe storage conditions:	Keep container tightly closed and in a well-ventilated place.
Safe packaging materials:	No data available.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

None of the components have assigned exposure limits.

Appropriate Engineering Controls	No data available.
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Individual protection measures, such as personal protective equipment

Eye/face protection:	goggles with side pieces
Skin Protection	
Hand Protection:	Additional Information: gloves made of nitril (NBR)
Skin and Body Protection:	light protective clothing
Respiratory Protection:	in case of formation of vapours/aerosols: Short term: filter apparatus, Filter A-P2
Hygiene measures:	Do not eat, drink or smoke when working. Wash hands before breaks and immediately after handling the product. Remove soiled or soaked clothing immediately.

9. Physical and chemical properties

Appearance	
Physical state:	liquid
Form:	liquid
Color:	colourless to yellowish
Odor:	Characteristic
Odor Threshold:	not measured
pH:	not determined
Freezing point:	not measured
Boiling Point:	not measured
Flash Point:	363.20 °F (DIN EN ISO 2719)
Evaporation Rate:	not measured
Flammability (solid, gas):	no data available
Explosive limit - upper (%):	not measured
Explosive limit - lower (%):	not measured
Vapor pressure:	not measured
Vapor density (air=1):	not measured
Density:	0.959 - 0.979 g/cm ³ (25 °C) (DIN 51757)
Relative density:	No data available.
Solubility(ies)	
Solubility in Water:	Insoluble
Solubility (other):	not measured
Partition coefficient (n-octanol/water):	not measured
Self Ignition Temperature:	not measured
Decomposition Temperature:	not measured
Kinematic viscosity:	No data available.
Dynamic viscosity:	20 - 40 mPa.s (25 °C, DIN 53019)
Other information	
Explosive properties:	not measured
Oxidizing properties:	not measured
Minimum ignition temperature:	not measured
Metal Corrosion:	not measured

10. Stability and reactivity

Reactivity:	see section "Possibility of hazardous reactions"
Chemical Stability:	The product is stable under normal conditions.
Possibility of hazardous reactions:	Reactions with acids. Reactions with alkalies.
Conditions to avoid:	Unknown
Incompatible Materials:	Unknown
Hazardous Decomposition Products:	None with proper storage and handling.

11. Toxicological information

Information on likely routes of exposure

Inhalation:	If handled correctly, not a relevant route of exposure. Information on effects are given below.
Skin Contact:	Relevant route of exposure. Information on effects are given below.
Eye contact:	Relevant route of exposure. Information on effects are given below.
Ingestion:	If handled correctly, not a relevant route of exposure. Information on effects are given below.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation:	No data available.
Skin Contact:	No data available.
Eye contact:	No data available.
Ingestion:	No data available.

Information on toxicological effects**Acute toxicity (list all possible routes of exposure)**

Oral Product:	no data available
Dermal Product:	no data available
Inhalation Product:	no data available

Repeated dose toxicity Product:	no data available
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Skin Corrosion/Irritation Product:	no data available
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Serious Eye Damage/Eye Irritation Product:	no data available
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Respiratory or Skin Sensitization Product:	no data available
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Carcinogenicity Product:	No data available.
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IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogens present or none present in regulated quantities

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogens present or none present in regulated quantities

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogens present or none present in regulated quantities

Germ Cell Mutagenicity

In vitro
Product: No data available.

In vivo
Product: No data available.

Reproductive toxicity
Product: No data available.

Specific Target Organ Toxicity - Single Exposure
Product: no data available

Specific Target Organ Toxicity - Repeated Exposure
Product: no data available

Aspiration Hazard
Product: Not classified

Other effects: Proper use provided, no adverse health effects have been observed or have been come to our knowledge. Due to the composition of the product it cannot be excluded: Irritates eyes and skin

12. Ecological information**Ecotoxicity:****Acute hazards to the aquatic environment:**

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and Degradability

Biodegradation
Product: No data available.

BOD/COD Ratio
Product: No data available.

Bioaccumulative potential

Bioconcentration Factor (BCF)**Product:** No data available.**Partition Coefficient n-octanol / water (log Kow)****Product:** Log Kow: not measured**Mobility in soil:** No data available.**Other adverse effects:** Do not allow to enter soil, waterways or waste water canal.**13. Disposal considerations****Disposal methods:** In accordance with local authority regulations, take to special waste incineration plant**Contaminated Packaging:** If empty contaminated containers are recycled or disposed of, the receiver must be informed about possible hazards.**14. Transport information****Domestic regulation****49 CFR**

Not regulated as a dangerous good

International Regulations**UNRTDG**

Not regulated as a dangerous good

IATA-DGR

Not regulated as a dangerous good

IMDG-Code

Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

15. Regulatory information**US Federal Regulations****TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**

None present or none present in regulated quantities.

US. Toxic Substances Control Act (TSCA) Section 5(a)(2) Final Significant New Use Rules (SNURs) (40 CFR 721, Subpt E)

None present or none present in regulated quantities.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

None present or none present in regulated quantities.

Superfund Amendments and Reauthorization Act of 1986 (SARA)**Hazard categories**

Not classified

SARA 302 Extremely Hazardous Substance

None present or none present in regulated quantities.

US. EPCRA (SARA Title III) Section 304 Extremely Hazardous Substances Reporting Quantities and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Hazardous Substances**SARA 311/312 Hazardous Chemical**

None present or none present in regulated quantities.

SARA 313 (TRI Reporting)

None present or none present in regulated quantities.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

None present or none present in regulated quantities.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

None present or none present in regulated quantities.

US State Regulations**US. California Proposition 65**

No ingredient requiring a warning under CA Prop 65.

US. New Jersey Worker and Community Right-to-Know Act

No ingredient regulated by NJ Right-to-Know Law present.

US. Massachusetts RTK - Substance List

No ingredient regulated by MA Right-to-Know Law present.

US. Pennsylvania RTK - Hazardous Substances

No ingredient regulated by PA Right-to-Know Law present.

US. Rhode Island RTK

No ingredient regulated by RI Right-to-Know Law present.

Inventory Status:

US TSCA Inventory:	Included on Inventory.
Canada DSL Inventory List:	Included on Inventory.

16. Other information, including date of preparation or last revision
HMIS Hazard ID

Health	<input type="text" value="1"/>
Flammability	<input type="text" value="1"/>
Physical Hazards	<input type="text" value="0"/>
PERSONAL PROTECTION	<input checked="" type="checkbox"/>

Ask supervisor or safety specialist for handling instructions

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe; RNP - Rating not possible; *Chronic health effect

Issue Date: 04/30/2019

Version #: 1.1

Further Information: none

Revision Information: Changes since the last version are highlighted in the margin. This version replaces all previous versions.

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Glycerine 99.7% USP Kosher

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Revision Date: 12/3/2018

Supersedes: 10/21/2013

Version: 2.0

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY

1.1. Product Identifier

Product Form: Substance

Product Name: Glycerine 99.7% USP Kosher

CAS No: 56-81-5

Formula: C₃H₈O₃/C₃H₅(OH)₃

Synonyms: 1,2,3-Propanetriol; Glycerol; Glycerin

1.2. Intended Use of the Product

Use of the substance/mixture: NF Excipient

1.3. Name, Address, and Telephone of the Responsible Party

Company

Acme-Hardesty Co.

450 Sentry Parkway

Blue Bell, PA 19422

T 866-226-3834 T 215-591-3610

www.acme-hardesty.com

1.4. Emergency Telephone Number

Emergency Number : 800-424-9300

For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident, call CHEMTREC – Day or Night

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the Substance or Mixture

Classification (GHS-US)

Not classified

2.2. Label Elements

GHS-US Labeling

Not applicable

2.3. Other Hazards

No additional information available

2.4. Unknown Acute Toxicity (GHS-US):

No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Name	Product Identifier	%	Classification (GHS-US)
Glycerin	(CAS No) 56-81-5	99.7	Not classified

Full text of H-phrases: see section 16

3.2. Mixtures

Not applicable

Full text of H-phrases: see section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of First Aid Measures

First-aid Measures General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

First-aid Measures After Inhalation: When symptoms occur: go into open air and ventilate suspected area.

First-aid Measures After Skin Contact: Remove contaminated clothing. Drench affected area with water for at least 15 minutes.

First-aid Measures After Eye Contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Glycerine 99.7% USP Kosher

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according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

First-aid Measures After Ingestion: Rinse mouth. Do NOT induce vomiting.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/Injuries: None expected under normal conditions of use.

Symptoms/Injuries After Inhalation: Not expected to present a significant inhalation hazard under anticipated conditions of normal use.

Symptoms/Injuries After Skin Contact: None under normal conditions.

Symptoms/Injuries After Eye Contact: Direct contact with the eyes is likely irritating.

Symptoms/Injuries After Ingestion: If a large quantity has been ingested: May cause nausea, vomiting, and diarrhea.

4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

If medical advice is needed, have product container or label at hand.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing Media

Suitable Extinguishing Media: Use extinguishing media appropriate for surrounding fire. Water spray or fog, dry chemical powder, alcohol-resistant foam, carbon dioxide (CO₂).

Unsuitable Extinguishing Media: None known.

5.2. Special Hazards Arising From the Substance or Mixture

Fire Hazard: Not flammable.

Explosion Hazard: Product is not explosive.

Reactivity: Stable at ambient temperature and under normal conditions of use.

5.3. Advice for Firefighters

Firefighting Instructions: Exercise caution when fighting any chemical fire.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Handle in accordance with good industrial hygiene and safety practice.

6.1.1. For Non-emergency Personnel

Protective Equipment: Use appropriate personal protection equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

6.1.2. For Emergency Responders

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Ventilate area.

6.2. Environmental Precautions

Prevent entry to sewers and public waters.

6.3. Methods and Material for Containment and Cleaning Up

For Containment: Absorb and/or contain spill with inert material, then place in suitable container.

Methods for Cleaning Up: Clear up spills immediately and dispose of waste safely.

6.4. Reference to Other Sections

See heading 8, Exposure Controls and Personal Protection.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for Safe Handling

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking, or smoking and again when leaving work. Do not eat, drink or smoke when using this product.

7.2. Conditions for Safe Storage, Including Any Incompatibilities

Storage Conditions: Store in a dry, cool and well-ventilated place. Keep container closed when not in use.

Incompatible Products: Strong acids. Strong bases. Strong oxidizers.

7.3. Specific End Use(s) NF Excipient

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control Parameters

Glycerine 99.7% USP Kosher

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Glycerin (56-81-5)		
USA OSHA	OSHA PEL (TWA) (mg/m3)	5 mg/m ³

8.2. Exposure Controls

Personal Protective Equipment

: Gloves. Safety glasses.



Hand Protection

: Wear chemically resistant protective gloves. The breakthrough time of the selected gloves must be greater than the intended use period.

Eye Protection

: Chemical goggles or safety glasses.

Respiratory Protection

: In case of inadequate ventilation wear respiratory protection.

Other Information

: When using, do not eat, drink or smoke.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on Basic Physical and Chemical Properties

Physical State	: Liquid
Appearance	: Colorless. Viscous.
Odor	: Characteristic.
Odor Threshold	: No data available
pH	: No data available
Relative Evaporation Rate (butylacetate=1)	: No data available
Melting Point	: 18 °C (64.4°C)
Freezing Point	: No data available
Boiling Point	: 290 °C (554°F) (decomposition)
Flash Point	: 177 °C (350.6°F) Cleveland Open Cup
Auto-ignition Temperature	: 400 °C (752°F)
Decomposition Temperature	: No data available
Flammability (solid, gas)	: No data available
Vapor Pressure	: < 0.01 hPa
Relative Vapor Density at 20 °C	: No data available
Relative Density	: No data available
Specific Gravity	: 1.26 g/cm ³
Solubility	: Fully miscible.
Log Pow	: No data available
Log Kow	: -1.76
Viscosity, Kinematic	: 1300 mPas @ 20 °C
Viscosity, Dynamic	: No data available
Explosive Properties	: No data available
Oxidizing Properties	: No data available
Explosive Limits	: Not applicable

9.2. Other Information

VOC content : ≤ 0.5 %

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity: Stable at ambient temperature and under normal conditions of use.

10.2 Chemical Stability: Product is stable.

10.3 Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Glycerine 99.7% USP Kosher

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10.4 Conditions to Avoid: Direct sunlight. Extremely high or low temperatures.

10.5 Incompatible Materials: Strong acids. Strong bases. Strong oxidizers.

10.6 Hazardous Decomposition Products: Under fire conditions this material may produce hazardous carbon dioxide (CO₂), carbon monoxide (CO), various low molecular weight hydrocarbons, and smoke.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information On Toxicological Effects

Acute Toxicity : Not classified

Glycerin (56-81-5)	
LD50 Dermal Rabbit	> 10 g/kg
LC50 Inhalation Rat (mg/l)	> 570 mg/m ³ (Exposure time: 1 h)
ATE (Oral)	12600.000 mg/kg

Skin Corrosion/Irritation: Not classified

Serious Eye Damage/Irritation: Not classified

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Carcinogenicity: Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Injuries After Inhalation: Not expected to present a significant inhalation hazard under anticipated conditions of normal use.

Symptoms/Injuries After Skin Contact: None under normal conditions.

Symptoms/Injuries After Eye Contact: Direct contact with the eyes is likely irritating.

Symptoms/Injuries After Ingestion: If a large quantity has been ingested: May cause nausea, vomiting, and diarrhea.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Glycerin (56-81-5)	
LC50 Fish 1	51 (51 - 57) ml/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [static])
EC50 Daphnia 1	> 500 mg/l (Exposure time: 24 h - Species: Daphnia magna)

12.2. Persistence and Degradability

Glycerine 99.7% USP Kosher	
Persistence and Degradability	The substance is biodegradable. Unlikely to persist.

12.3. Bioaccumulative Potential

Glycerine 99.7% USP Kosher	
Log Pow	-1.76
Bioaccumulative Potential	Based on the n-octanol/water partition coefficient accumulation in organisms is not expected.

Glycerin (56-81-5)	
BCF fish 1	(no bioaccumulation)
Log Pow	-1.76

12.4. Mobility in Soil No additional information available

12.5. Other Adverse Effects

Other Information : Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, and international regulations.

Glycerine 99.7% USP Kosher

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

SECTION 14: TRANSPORT INFORMATION

In Accordance With ICAO/IATA/DOT/TDG

14.1. UN Number Not applicable

14.2. UN Proper Shipping Name Not regulated for transport.

14.3. Additional Information

Other information : No supplementary information available.

Transport by Sea Not regulated for transport.

Air Transport Not regulated for transport.

SECTION 15: REGULATORY INFORMATION

15.1 US Federal Regulations

Glycerin (56-81-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
EPA TSCA Regulatory Flag	Y2 - Y2 - indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

15.2 US State Regulations

Glycerin (56-81-5)
U.S. - Connecticut - Hazardous Air Pollutants - HLVs (30 min) U.S. - Connecticut - Hazardous Air Pollutants - HLVs (8 hr) U.S. - Idaho - Occupational Exposure Limits - TWAs U.S. - Massachusetts - Right To Know List U.S. - Michigan - Occupational Exposure Limits - TWAs U.S. - Minnesota - Hazardous Substance List U.S. - Minnesota - Permissible Exposure Limits - TWAs U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - 24-Hour U.S. - New Hampshire - Regulated Toxic Air Pollutants - Ambient Air Levels (AALs) - Annual U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - North Dakota - Air Pollutants - Guideline Concentrations - 8-Hour U.S. - Oregon - Permissible Exposure Limits - TWAs U.S. - Pennsylvania - RTK (Right to Know) List U.S. - Tennessee - Occupational Exposure Limits - TWAs U.S. - Texas - Effects Screening Levels - Long Term U.S. - Texas - Effects Screening Levels - Short Term U.S. - Vermont - Permissible Exposure Limits - TWAs U.S. - Washington - Permissible Exposure Limits - STELs U.S. - Washington - Permissible Exposure Limits - TWAs

Global Inventories

TSCA	Listed - CAS # 56-81-5
DSL/NDSL	Listed.
EINECS/ELINCS	Listed. - EINECS 200-289-5
ENCS	Listed. Nikkaji Number - J1.916J
KECL	Listed. KE-29297
PICCS	Listed.
AICS	Listed.

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

ENCS - Japan Existing and New Chemical Substances

Glycerine 99.7% USP Kosher

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

KECL - Korean Existing and Evaluated Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances

AICS - Australian Inventory of Chemical Substances

SECTION 16: OTHER INFORMATION

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

The data herein are based on our current knowledge and believed to be reliable. Acme-Hardesty Co., provides this information without any representation or warranty, expressed or implied, regarding its accuracy or correctness.

Users must make their own determination that handling, storage, use and disposal of the product in the anticipated manner is safe and appropriate. Because these actions of the user are out of our control, and may be beyond our knowledge, we do not assume responsibility and expressly disclaim liability for loss, damage, expense or any other claim arising out of or in any way connected with the handling, storage, use or disposal of the product or container.

SDS US (GHS HazCom) - US Only

SAFETY DATA SHEET

DL-02596 Black LV

Specification: 000000038190

Version Number: 02

Revision Date: 08-21-2015

**1. Identification****Product Identifier** DL-02596 Black LV**Other means of identification****SAP Specification** 000000038190**Recommended use** Not available.**Recommended restrictions** None known.**Manufacturer/Importer/Supplier/Distributor information****Manufacturer****Company** Chromaflo Technologies Corporation
2600 Michigan Avenue
Ashtabula, OH 44005-0816
USA**Telephone** 440-997-5137**Telefax** 440-992-3613**NA: EMERGENCY
NUMBER** 866-519-4752**GLOBAL: EMERGENCY
NUMBER** (+1) 760-476-3962**CANADA: CANUTEC
EMERGENCY NUMBER** 613-996-6666**Product Regulatory
Services** ehs_americas@chromaflo.com**2. Hazard(s) identification****Physical hazards** Not classified.**Health hazards** Not classified.**OSHA defined hazards** Not classified.**Label elements****Hazard symbol** None.**Signal word** None.**Hazard statement** The mixture does not meet the criteria for classification.**Precautionary statement****Prevention** Observe good industrial hygiene practices.**Response** Wash hands after handling.**Storage** Store away from incompatible materials.**Disposal** Dispose of waste and residues in accordance with local authority requirements.**Hazard(s) not otherwise
classified (HNOC)** None known.**Supplemental information** If product is in liquid or paste form, physical or health hazards listed related to dust are not considered significant. However, product may contain substances that could be potential hazards if caused to become airborne due to grinding, sanding or other abrasive processes.**3. Composition/information on ingredients****Mixtures**

Chemical name	Common name and synonyms	CAS number	%
Carbon Black		1333-86-4	20 - 40
Oligomeric Hydrocarbons*		Proprietary*	2.5 - 10
Other components below reportable levels			60 - 80

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

Material name: DL-02596 Black LV

000000038190 Version #: 02 Revision date: 08-21-2015 Issue date: 04-23-2015

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4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Wash off with soap and water. Get medical attention if irritation develops and persists.
Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep out of low areas. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Use water spray to reduce vapors or divert vapor cloud drift. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Avoid prolonged exposure. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Carbon Black (CAS 1333-86-4)	PEL	3.5 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Carbon Black (CAS 1333-86-4)	TWA	3 mg/m3	Inhalable fraction.

US. NIOSH: Pocket Guide to Chemical Hazards
Components
Type
Value

 Carbon Black (CAS
1333-86-4)

TWA

0.1 mg/m3

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment
Eye/face protection

If contact is likely, safety glasses with side shields are recommended.

Skin protection
Hand protection

For prolonged or repeated skin contact use suitable protective gloves.

Other

Wear suitable protective clothing.

Respiratory protection

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to vapor/mist at levels exceeding the exposure limits.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties
Appearance
Physical state

Liquid.

Form

Liquid. Viscous Liquid

Color

Black.

Odor

slight to none

Odor threshold

Not available.

pH

Not available.

Melting point/freezing point

Not available.

Initial boiling point and boiling range

7592 °F (4200 °C) estimated

Flash point

333.7 °F (167.6 °C) estimated

Evaporation rate

Not available.

Flammability (solid, gas)

Not available.

Upper/lower flammability or explosive limits
Flammability limit - lower (%)

Not available.

Flammability limit - upper (%)

Not available.

Explosive limit - lower (%)

Not available.

Explosive limit - upper (%)

Not available.

Vapor pressure

Not available.

Vapor density

Not available.

Relative density

Not available.

Solubility(ies)
Solubility (water)

Not available.

Partition coefficient (n-octanol/water)

Not available.

Auto-ignition temperature

Not available.

Decomposition temperature

Not available.

Viscosity

Not available.

Other information

Density 9.821 lb/gal
Flammability class Combustible III B estimated

10. Stability and reactivity

Reactivity The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability Material is stable under normal conditions.
Possibility of hazardous reactions No dangerous reaction known under conditions of normal use.
Conditions to avoid Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials Strong oxidizing agents.
Hazardous decomposition products No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation Prolonged inhalation may be harmful.
Skin contact No adverse effects due to skin contact are expected.
Eye contact Direct contact with eyes may cause temporary irritation.
Ingestion Expected to be a low ingestion hazard.

Symptoms related to the physical, chemical and toxicological characteristics Direct contact with eyes may cause temporary irritation.

Information on toxicological effects

Acute toxicity

Product	Species	Test Results
DL-02596 Black LV		
<u>Acute</u>		
Dermal		
LD50	Rabbit	1373.1575 ml/kg estimated
Oral		
LD50	Rat	22929.7773 mg/kg estimated
Components	Species	Test Results

Carbon Black (CAS 1333-86-4)

Acute

Oral

LD50

Rat

> 8000 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation Prolonged skin contact may cause temporary irritation.

Serious eye damage/eye irritation Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization Not available.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

IARC Monographs. Overall Evaluation of Carcinogenicity

Carbon Black (CAS 1333-86-4)

2B Possibly carcinogenic to humans.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not available.
Chronic effects	Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulative potential	No data available.
Mobility in soil	No data available.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT	Not regulated as dangerous goods.
IATA	Not regulated as dangerous goods.
IMDG	Not regulated as dangerous goods.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not available.

15. Regulatory information

US federal regulations	All components are on the U.S. EPA TSCA Inventory List.
TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)	Not regulated.
CERCLA Hazardous Substance List (40 CFR 302.4)	Not listed.
SARA 304 Emergency release notification	Not regulated.
US, OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)	Not listed.
Superfund Amendments and Reauthorization Act of 1986 (SARA)	
Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
SARA 302 Extremely hazardous substance	Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)
Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US - New Jersey RTK - Substances: Listed substance

Carbon Black (CAS 1333-86-4)

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Carbon Black (CAS 1333-86-4)

US. Massachusetts RTK - Substance List

Carbon Black (CAS 1333-86-4)

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania RTK - Hazardous Substances

Carbon Black (CAS 1333-86-4)

US. Pennsylvania Worker and Community Right-to-Know Law

Carbon Black (CAS 1333-86-4)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

Carbon Black (CAS 1333-86-4)

Listed: February 21, 2003

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes
Taiwan	Taiwan Toxic Chemicals Substances Control Act	No

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 04-23-2015

Material name: DL-02596 Black LV

000000038190 Version #: 02 Revision date: 08-21-2015 Issue date: 04-23-2015

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Revision date

08-21-2015

Version #

02

Disclaimer

The information contained herein is based on data believed to be reliable and the manufacturer disclaims any liability incurred from the use or reliance upon the same. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. This safety information is not a license to use this material as claimed by any patents of third parties. The user alone must finally determine whether a contemplated use of this material will infringe any such patents, and for obtaining any required licenses. The information in the sheet was written based on the best knowledge and experience currently available.

Revision Information

Physical & Chemical Properties: Multiple Properties

SAFETY DATA SHEET

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JEFFCAT® ZF-20Version
1.3Revision Date:
02/26/2019SDS Number:
400001000079Date of last issue: 06/27/2017
Date of first issue: 03/14/2016**SECTION 1. IDENTIFICATION**

Product name : JEFFCAT® ZF-20

Manufacturer or supplier's detailsCompany name of supplier : Huntsman International LLC
Address : P.O. Box 4980
The Woodlands,
TX 77387
United States of America (USA)
Telephone : TechInfo: (281) 719-7780

E-mail address of person responsible for the SDS : SDS@huntsman.com

Emergency telephone number : Chemtrec: (800) 424-9300 or (703) 527-3887

Recommended use of the chemical and restrictions on use

Recommended use : Component of a Polyurethane System.

Restrictions on use : For industrial use only.

SECTION 2. HAZARDS IDENTIFICATION**GHS classification in accordance with 29 CFR 1910.1200**Flammable liquids : Category 4
Acute toxicity (Oral) : Category 4
Acute toxicity (Inhalation) : Category 4
Acute toxicity (Dermal) : Category 3
Skin corrosion : Category 1B
Serious eye damage : Category 1
Short-term (acute) aquatic hazard : Category 3**GHS label elements**

Hazard pictograms :



Signal word : Danger

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Hazard statements : H227 Combustible liquid.
H302 + H332 Harmful if swallowed or if inhaled.
H311 Toxic in contact with skin.
H314 Causes severe skin burns and eye damage.
H402 Harmful to aquatic life.

Precautionary statements : **Prevention:**
P210 Keep away from heat/sparks/open flames/hot surfaces.
No smoking.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P301 + P312 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P362 Take off contaminated clothing and wash before reuse.
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
Storage:
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
Disposal:
P501 Dispose of contents/container to an approved facility in accordance with local, regional, national and international regulations.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Chemical nature : Amines

Hazardous components

Chemical name	CAS-No.	Concentration (% w/w)
N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine)	3033-62-3	90 - 100

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The specific chemical identity and/or exact percentage (concentration) of composition may be withheld as a trade secret.

SECTION 4. FIRST AID MEASURES

- General advice : Move out of dangerous area.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
Symptoms of poisoning may appear several hours later.
Treat symptomatically.
Get medical attention if symptoms occur.
- If inhaled : If inhaled, remove to fresh air.
Get medical attention if symptoms occur.
- In case of skin contact : Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.
Take victim immediately to hospital.
If on skin, rinse well with water.
If on clothes, remove clothes.
- In case of eye contact : Small amounts splashed into eyes can cause irreversible tissue damage and blindness.
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Continue rinsing eyes during transport to hospital.
Remove contact lenses.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.
- If swallowed : Clean mouth with water and drink afterwards plenty of water.
Keep respiratory tract clear.
Do NOT induce vomiting.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.
Take victim immediately to hospital.
- Most important symptoms and effects, both acute and delayed : Blurred vision
- Notes to physician : Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

- Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Carbon dioxide (CO₂)

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- Unsuitable extinguishing media : High volume water jet
- Specific hazards during firefighting : Do not allow run-off from fire fighting to enter drains or water courses.
- Hazardous combustion products : No hazardous combustion products are known
- Specific extinguishing methods : No data is available on the product itself.
- Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
For safety reasons in case of fire, cans should be stored separately in closed containments.
Use a water spray to cool fully closed containers.
- Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.
Refer to protective measures listed in sections 7 and 8.
- Environmental precautions : Prevent product from entering drains.
Prevent further leakage or spillage if safe to do so.
If the product contaminates rivers and lakes or drains inform respective authorities.
- Methods and materials for containment and cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).
Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

- Advice on protection against fire and explosion : Do not spray on a naked flame or any incandescent material.
Keep away from open flames, hot surfaces and sources of ignition.
- Advice on safe handling : Avoid formation of aerosol.
Do not breathe vapours/dust.
Avoid contact with skin and eyes.
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.
Provide sufficient air exchange and/or exhaust in work rooms.

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To avoid spills during handling keep bottle on a metal tray.
Dispose of rinse water in accordance with local and national regulations.

Conditions for safe storage : Prevent unauthorized access.
No smoking.
Keep in a well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Observe label precautions.
Keep in properly labelled containers.

Materials to avoid : For incompatible materials please refer to Section 10 of this SDS.

Further information on storage stability : Stable under normal conditions.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**Components with workplace control parameters**

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine)	3033-62-3	TWA	0.05 ppm	ACGIH
		STEL	0.15 ppm	ACGIH

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection

Remarks : The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Eye protection : Eye wash bottle with pure water
Tightly fitting safety goggles
Wear face-shield and protective suit for abnormal processing problems.

Skin and body protection : Impervious clothing

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Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures : Avoid contact with skin, eyes and clothing.
When using do not eat or drink.
When using do not smoke.
Wash hands before breaks and immediately after handling the product.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : light yellow

Odour : ammoniacal

Odour Threshold : No data is available on the product itself.

pH : 11.6

Melting point : < -4 °F / < -20 °C

Boiling point : 373.8 °F / 189.9 °C
(1,013 hPa)

Flash point : 154 °F / 68 °C
Method: closed cup

Evaporation rate : No data is available on the product itself.

Flammability (solid, gas) : No data is available on the product itself.

Flammability (liquids) : No data is available on the product itself.

Upper explosion limit / Upper flammability limit : No data is available on the product itself.

Lower explosion limit / Lower flammability limit : No data is available on the product itself.

Vapour pressure : 0.49 hPa (68 °F / 20 °C)

Relative vapour density : 1

Relative density : 0.85 (68 °F / 20 °C)

Density : 0.85 g/cm3 (68 °F / 20 °C)

Solubility(ies)
Water solubility : 1,000 g/l completely miscible (68 °F / 20 °C)

Solubility in other solvents : Solvent: Methanol
Description: soluble

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Partition coefficient: n-octanol/water : log Pow: -0.34 (68 °F / 20 °C)
Auto-ignition temperature : 316 °F / 158 °C
Thermal decomposition : No data is available on the product itself.
Self-Accelerating decomposition temperature (SADT) : No data is available on the product itself.
Viscosity :
Viscosity, dynamic : < 20 mPa.s (68 °F / 20 °C)
Explosive properties : No data is available on the product itself.
Oxidizing properties : No data is available on the product itself.
Molecular weight : 160.3 g/mol
Metal corrosion rate : Not corrosive to metals
Particle size : No data is available on the product itself.

SECTION 10. STABILITY AND REACTIVITY

Reactivity : No dangerous reaction known under conditions of normal use.
Chemical stability : Stable under normal conditions.
Possibility of hazardous reactions : Vapours may form explosive mixture with air.
Conditions to avoid : Heat, flames and sparks.
Incompatible materials : Strong acids and oxidizing agents
Hazardous decomposition products : No hazardous decomposition products are known.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure : No data is available on the product itself.
Acute toxicity
Acute oral toxicity - Product : Acute toxicity estimate : 681.09 mg/kg
Method: Calculation method
Acute inhalation toxicity - Product : Acute toxicity estimate: 4.02 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: Calculation method

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Acute dermal toxicity - : Acute toxicity estimate : 442.66 mg/kg
Product Method: Calculation method

Acute toxicity (other routes of : No data available
administration)

Skin corrosion/irritation**Components:**

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):
Species: Rabbit
Method: OECD Test Guideline 404
Result: Causes burns

Serious eye damage/eye irritation**Components:**

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):
Species: Rabbit
Result: Risk of serious damage to eyes.
Method: OECD Test Guideline 405

Respiratory or skin sensitisation**Components:**

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):
Exposure routes: Skin
Species: Guinea pig
Method: OECD Test Guideline 406
Result: Does not cause skin sensitisation.

Assessment: No data available

Germ cell mutagenicity**Components:**

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):
Genotoxicity in vitro : Concentration: .08 - .18 mg/ml
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 479
Result: Not classified due to inconclusive data.

Metabolic activation: negative
Method: OECD Test Guideline 482
Result: negative

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Components:

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Genotoxicity in vivo : Application Route: Intraperitoneal injection
Dose: 45 - 145 mg/kg
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity

No data available

Carcinogenicity - : No data available
Assessment

IARC

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

OSHA

No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Effects on fertility : No data available

Components:

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Effects on foetal : Species: Rabbit
development : Application Route: Dermal
General Toxicity Maternal: No observed adverse effect level:
2.5 mg/kg body weight
Embryo-foetal toxicity: No observed adverse effect level: 12
mg/kg body weight
Method: OECD Test Guideline 414
Result: Embryotoxic effects and adverse effects on the
offspring were detected only at high maternally toxic doses

Reproductive toxicity - : No data available
Assessment

STOT - single exposure

No data available

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No data available

Repeated dose toxicity**Components:**

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Species: Rat, male and female

: 8.2 mg/m3

Application Route: Ingestion

Test atmosphere: vapour

Exposure time: 336 h

Number of exposures: 6 h

Method: Subacute toxicity

Repeated dose toxicity - : No data available
Assessment**Aspiration toxicity**

No data available

Experience with human exposure

General Information: No data available

Inhalation: No data available

Skin contact: No data available

Components:

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Eye contact : Symptoms: Blurred vision

Ingestion: No data available

Toxicology, Metabolism, Distribution

No data available

Neurological effects

No data available

Further information

Ingestion: No data available

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SECTION 12. ECOLOGICAL INFORMATION**Ecotoxicity****Components:**

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Toxicity to fish : LC50 (Brachydanio rerio (zebrafish)): ca. 131.2 mg/l
Exposure time: 96 h
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 203

Components:

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Toxicity to daphnia and other : EC50 (Daphnia magna (Water flea)): 102 mg/l
aquatic invertebrates
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 202

Components:

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Toxicity to algae/aquatic : ErC50 (Selenastrum capricornutum (green algae)): 24 mg/l
plants
Exposure time: 72 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 201

M-Factor (Acute aquatic : No data available
toxicity)

Toxicity to fish (Chronic : No data available
toxicity)

Toxicity to daphnia and other : No data available
aquatic invertebrates
(Chronic toxicity)

M-Factor (Chronic aquatic : No data available
toxicity)

Toxicity to microorganisms : No data available

Toxicity to soil dwelling : No data available
organisms

Plant toxicity : No data available

Sediment toxicity : No data available

Toxicity to terrestrial : No data available
organisms

Ecotoxicology Assessment

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Acute aquatic toxicity : No data available

Components:

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Chronic aquatic toxicity : This product has no known ecotoxicological effects.

Toxicity Data on Soil : No data available

Other organisms relevant to the environment : No data available

Persistence and degradability**Components:**

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Biodegradability : Inoculum: activated sludge
Result: Inherently biodegradable.
Biodegradation: < 10 %
Exposure time: 28 d
Method: OECD Test Guideline 302B

Inoculum: activated sludge
Result: Not readily biodegradable.
Biodegradation: 2 %
Exposure time: 28 d
Method: OECD Test Guideline 301F

Biochemical Oxygen Demand (BOD) : No data available

Chemical Oxygen Demand (COD) : No data available

BOD/COD : No data available

ThOD : No data available

BOD/ThOD : No data available

Dissolved organic carbon (DOC) : No data available

Physico-chemical removability : No data available

Stability in water : No data available

Photodegradation : No data available

Impact on Sewage Treatment : No data available

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Bioaccumulative potential**Components:**

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine):

Bioaccumulation : Remarks: Bioaccumulation is unlikely.

Partition coefficient: n-octanol/water - Product : log Pow: -0.34 (68 °F / 20 °C)

Mobility in soil

Mobility : No data available

Distribution among environmental compartments : No data available

Stability in soil : No data available

Other adverse effects

Environmental fate and pathways : No data available

Results of PBT and vPvB assessment : No data available

Endocrine disrupting potential : No data available

Adsorbed organic bound halogens (AOX) : No data available

Hazardous to the ozone layerOzone-Depletion Potential : Regulation: 40 CFR Protection of Environment; Part 82
Protection of Stratospheric Ozone - CAA Section 602 Class I Substances
Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).Additional ecological information - Product : An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

Global warming potential (GWP) : No data available

SECTION 13. DISPOSAL CONSIDERATIONS**Disposal methods**Waste from residues : The product should not be allowed to enter drains, water courses or the soil.
Do not contaminate ponds, waterways or ditches with

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chemical or used container.
Send to a licensed waste management company.
Dispose of as hazardous waste in compliance with local and national regulations.
Dispose of contents/ container to an approved waste disposal plant.

Contaminated packaging : Empty remaining contents.
Dispose of as unused product.
Do not re-use empty containers.
Do not burn, or use a cutting torch on, the empty drum.

SECTION 14. TRANSPORT INFORMATION**IATA**

UN/ID No.	: UN 2922
Proper shipping name	: Corrosive liquid, toxic, n.o.s. (BIS(DIMETHYLAMINOETHYL)ETHER)
Class	: 8
Subsidiary risk	: 6.1
Packing group	: II
Labels	: Corrosive, Toxic
Packing instruction (cargo aircraft)	: 855
Packing instruction (passenger aircraft)	: 851

IMDG

UN number	: UN 2922
Proper shipping name	: CORROSIVE LIQUID, TOXIC, N.O.S. (BIS(DIMETHYLAMINOETHYL)ETHER)
Class	: 8
Subsidiary risk	: 6.1
Packing group	: II
Labels	: 8 (6.1)
EmS Code	: F-A, S-B
Marine pollutant	: no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

National Regulations**DOT Classification**

UN/ID/NA number	: UN 2922
Proper shipping name	: CORROSIVE LIQUIDS, TOXIC, N.O.S. (BIS(DIMETHYLAMINOETHYL)ETHER)
Class	: 8
Subsidiary risk	: 6.1

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Packing group	: II
Labels	: CORROSIVE, POISON
ERG Code	: 154
Marine pollutant	: no

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION**EPCRA - Emergency Planning and Community Right-to-Know Act****CERCLA Reportable Quantity**

This material does not contain any components with a CERCLA RQ.

SARA 311/312 Hazards	: Flammable (gases, aerosols, liquids, or solids) Acute toxicity (any route of exposure) Skin corrosion or irritation Serious eye damage or eye irritation
-----------------------------	---

SARA 313	: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
-----------------	---

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

California Prop. 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

CH INV	: On the inventory, or in compliance with the inventory
DSL	: All components of this product are on the Canadian DSL
AICS	: On the inventory, or in compliance with the inventory
NZIoC	: On the inventory, or in compliance with the inventory
ENCS	: On the inventory, or in compliance with the inventory
KECI	: On the inventory, or in compliance with the inventory
PICCS	: On the inventory, or in compliance with the inventory
IECSC	: On the inventory, or in compliance with the inventory
TCSI	: On the inventory, or in compliance with the inventory
TSCA	: On the inventory, or in compliance with the inventory

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Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

TSCA - 5(a) Significant New Use Rule List of Chemicals

No substances are subject to a Significant New Use Rule.

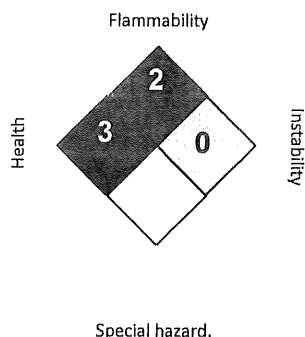
US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Further information

NFPA 704:



HMIS® IV:

HEALTH	3
FLAMMABILITY	2
PHYSICAL HAZARD	0

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard

Revision Date : 02/26/2019

ACGIH : USA. ACGIH Threshold Limit Values (TLV)
ACGIH / TWA : 8-hour, time-weighted average
ACGIH / STEL : Short-term exposure limit

The information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PURPOSE.

THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

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Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.

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NO PERSON OR ORGANIZATION EXCEPT A DULY AUTHORIZED HUNTSMAN EMPLOYEE IS AUTHORIZED TO PROVIDE OR MAKE AVAILABLE DATA SHEETS FOR HUNTSMAN PRODUCTS. DATA SHEETS FROM UNAUTHORIZED SOURCES MAY CONTAIN INFORMATION THAT IS NO LONGER CURRENT OR ACCURATE.

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1. Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : DABCO 33 LX

1.2. Recommended use of the chemical and restrictions on use

Recommended use : Polyurethane Foam Catalyst

Non-recommended use(s) : None known.

1.3. Details of the supplier of the safety data sheet

Company : Evonik Corporation
Nutrition & Care
PO Box 34628
Richmond VA 23234
USA

Telephone : +1 (0)804-727-0700

Telefax : +1 (0)804-727-0845

E-mail : us-productsafety-cs@evonik.com

Contact Canada

Company : Evonik Canada Inc.
3380 South Service
Burlington ON L7N 3J5
Canada

Telephone : +1 (0)905-336-3423-

Telefax : +1 (0)905-332-5632

E-mail : us-productsafety-cs@evonik.com

1.4. Emergency telephone number

Emergency information : Non-Emergency Phone Number : (800) 732-5616

24 HOUR EMERGENCY TELEPHONE NUMBERS:

CHEMTREC - US & CANADA toll free: +1-800-424-9300

CHEMTREC - MEXICO toll free: 01-800-681-9531

CHEMTREC GLOBAL - Collect calls accepted: +1-703-527-3887

2. Hazards identification

2.1. Classification of the substance or mixture

GHS classification in accordance with 29 CFR 1910.1200

Skin irritation

Category 2

H315

Eye irritation

Category 2A

H319

2.2. Label elements

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GHS classification in accordance with 29 CFR 1910.1200

Symbol(s)



Signal word

: Warning

hazard statement

: H315 - Causes skin irritation.
H319 - Causes serious eye irritation.

Precautionary
Statement
(Prevention)

: P264 - Wash skin thoroughly after handling.
P280 - Wear protective gloves/ eye protection/ face protection.

Precautionary
Statement
(Response)

: P302 + P352 - IF ON SKIN: Wash with plenty of water/ soap.
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes.
Remove contact lenses, if present and easy to do. Continue rinsing.
P332 + P313 - If skin irritation occurs: Get medical advice/ attention.
P337 + P313 - If eye irritation persists: Get medical advice/ attention.
P362 + P364 - Take off contaminated clothing and wash it before reuse.

2.3. Other hazards

None known.

3. Composition/information on ingredients

3.1. Substances

-

3.2. Mixtures

Hazardous components

Chemical Name	NJ Trade secrets CAS-No.	Concentration	Classification
1,4-Diazabicyclooctane	- 280-57-9	Ø 33%	H228, 1, Flam. Sol. H302, 4, Acute Tox., Oral H315, 2, Skin Irrit. H318, 1, Eye Dam.

Texts of H phrases, see in Chapter 16

4. First aid measures

4.1. Description of first aid measures

General advice

: Seek medical advice.
If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately.

Inhalation

: Move to fresh air.

Skin contact

: Wash off immediately with soap and plenty of water. Wash off immediately with plenty of water for at least 15 minutes.
Immediately remove contaminated clothing, and any extraneous chemical, if possible to do so without delay.

Eye contact

: Rinse immediately with plenty of water for at least 15 minutes. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Remove contact lenses.

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Ingestion : Prevent aspiration of vomit. Turn victim's head to the side. Never give anything by mouth to an unconscious person.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms : Up to now no symptoms are known.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

Suitable extinguishing media : Carbon dioxide (CO₂)
Dry chemical
Dry sand
Limestone powder
Alcohol-resistant foam

Unsuitable extinguishing media : no data available

5.2. Special hazards arising from the substance or mixture

Incomplete combustion may form carbon monoxide.
May generate ammonia gas.
May generate toxic nitrogen oxide gases.
Burning produces noxious and toxic fumes.
Downwind personnel must be evacuated.

5.3. Advice for firefighters

Use personal protective equipment.
Wear self-contained breathing apparatus for firefighting if necessary.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate personnel to safe areas. Wear suitable protective clothing, gloves and eye/face protection.
Use self-contained breathing apparatus and chemically protective clothing.

6.2. Environmental precautions

Construct a dike to prevent spreading.

6.3. Methods and material for containment and cleaning up

Place in appropriate chemical waste container. Call Emergency Response number for advice.
Approach suspected leak areas with caution.
If possible, stop flow of product.

7. Handling and storage

7.1. Precautions for safe handling

Advice on safe handling : Use personal protective equipment.

Emergency showers and eye wash stations should be readily accessible.
Adhere to work practice rules established by government regulations.
Avoid contact with eyes.

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- Hygiene measures : Provide readily accessible eye wash stations and safety showers.
- General protective measures : Discard contaminated leather articles.
Wash hands at the end of each workshift and before eating, smoking or using the toilet.

7.2. Conditions for safe storage, including any incompatibilities

Prevention of fire and explosion

- Information : No special measures required.

Storage

- Information : Do not store near acids.
Keep containers tightly closed in a dry, cool and well-ventilated place.
- Advice on common storage : Do not store in reactive metal containers.

8. Exposure controls/personal protection

8.1. Control parameters

Exposure limit(s)

Ingredients	CAS-No.	Statutory basis/list (Update)	Value type (Form of exposure; Expressed as)	Value	Short-term
-------------	---------	-------------------------------	---	-------	------------

Contains no substances with occupational exposure limit values.
Hazardous components without workplace control parameters

8.2. Exposure controls

Engineering controls

- Appropriate engineering controls : Provide readily accessible eye wash stations and safety showers.
Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits.

Personal protective equipment

- Eye protection : Chemical resistant goggles must be worn.
- Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
butyl-rubber
Nitrile rubber
Neoprene gloves
Impervious gloves
- Body Protection : No specific recommendation. Long sleeve shirts and trousers without cuffs.
- Respiratory protection : Not required for properly ventilated areas. No personal respiratory protective equipment normally required.

9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

- Physical state : liquid
- Form : liquid
- Colour : colourless

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EVONIK

POWER TO CREATE

Odour : ammoniacal

Odour Threshold : no data available

pH : 10.7

Melting point : no data available

Boiling point : Boiling point/range
218 °C

Flash point : > 110 °C

Evaporation rate : no data available

Flammability : no data available

Upper Explosion/Ignition Limit : no data available

Lower explosion limit : no data available

Vapour pressure : 4.799 hPa
(21 °C)

Relative vapour density : no data available

Relative density : 1.019
(21 °C)

Solubility(ies) : no data available

Water solubility : completely soluble

Partition coefficient: n-octanol/water : no data available

Autoignition temperature : no data available

Thermal decomposition : no data available

Viscosity, kinematic : no data available

Viscosity, dynamic : 305 mPa.s
(21.1 °C)
223 mPa.s
(25 °C)
43.8 mPa.s
(54.4 °C)

Explosive properties : no data available

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Oxidising properties : no data available

9.2. Other information

Density : no data available

Metal corrosion : no data available

Ignition temperature : no data available

volatile organic compounds : This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCM Intermediate or Final VOC's (40 CFR 60.489).

This product does not contain any VOC exemptions listed under the U.S. Clean Air Act Section 450.

10. Stability and reactivity

10.1. Reactivity

see section "Possibility of hazardous reactions"

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

no data available

10.4. Conditions to avoid

no data available

10.5. Incompatible materials

Reactive metals (e.g. sodium, calcium, zinc etc.).

Materials reactive with hydroxyl compounds.

Dehydrating Agents.

Organic acids (i.e. acetic acid, citric acid etc.).

Mineral acids.

sodium hypochlorite

Product slowly corrodes copper, aluminum, zinc and galvanized surfaces.

Reaction with peroxides may result in violent decomposition of peroxide possibly creating an explosion.

Oxidizing agents

10.6. Hazardous decomposition products

Nitric acid

Ammonia

Nitrogen oxides (NO_x)

Nitrogen oxide can react with water vapors to form corrosive nitric acid.

Carbon monoxide

Carbon dioxide (CO₂)

Aldehydes

Flammable hydrocarbon fragments.

Heating above 65 °C in the presence of strong base can liberate flammable hydrocarbon fragments.

Carbon oxides

11. Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral) : LD50
Species: Rat
Dose: 3,200 mg/kg
Method: estimated

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Acute toxicity (inhalation) : No data is available on the product itself.

Acute toxicity (dermal) : No data is available on the product itself.

Acute toxicity estimate
Dose: > 5,000 mg/kg
Method: Calculation method

Irritation/corrosion of the skin : Method: see user defined free text
Remarks: Mild skin irritation
The data are derived from the evaluations or test results achieved with similar products (conclusion by analogy).

Serious eye damage/ eye irritation : Result: Irritating to eyes.
Remarks: Moderate eye irritation
Data from a comparable product:
Product vapor can cause glaucoma (corneal edema) when absorbed into the tissue of the eye from the atmosphere.
Corneal edema may give rise to a perception of "blue haze" or "fog" around lights.
This effect is temporary and has no known residual effect.

Respiratory/skin sensitization : no data available

Repeated dose toxicity : no data available

CMR assessment

Carcinogenicity : no data available

Mutagenicity : No data is available on the product itself.

Teratogenicity : No data is available on the product itself.

Toxicity to reproduction : No data is available on the product itself.

US. National Toxicology Program (NTP) Report on Carcinogens

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

US. IARC Monographs on Occupational Exposures to Chemical Agents

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Specific Target Organ Toxicity - Single exposure : no data available

Specific Target Organ Toxicity - Repeated exposure : no data available

Aspiration hazard : no data available

12. Ecological information

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Ecotoxicology Assessment

Acute aquatic toxicity : no data available

Chronic aquatic toxicity : no data available

12.1. Toxicity

Aquatic toxicity, fish : No data is available on the product itself.

Aquatic toxicity, invertebrates : No data is available on the product itself.

Aquatic toxicity, algae / aquatic plants : No data is available on the product itself.

Toxicity in microorganisms : no data available

chronic toxicity in fish : no data available

Chronic toxicity in aquatic invertebrates : no data available

12.2. Persistence and degradability

Photodegradation : no data available

Biological degradability : no data available

12.3. Bioaccumulative potential

Bioaccumulation : no data available

12.4. Mobility in soil

Environmental distribution : no data available

12.5. Results of PBT and vPvB assessment

PBT and vPvB assessment : No data available

12.6. Other adverse effects

General Information : Do not allow to enter soil, waterways or waste water canal.
The product is classified as slightly hazardous to waters (according to the German Regulation on the Classification of Substances Hazardous to Waters (WwSV).

13. Disposal considerations

13.1. Waste treatment methods

Product : Contact supplier if guidance is required.

Contaminated : Dispose of container and unused contents in accordance with federal, state, and local

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packaging

requirements.

14. Transport information

Not dangerous according to transport regulations.

- 14.1. UN number: --
 - 14.2. UN proper shipping name: --
 - 14.3. Transport hazard class(es): --
 - 14.4. Packing group: --
 - 14.5. Environmental hazards: --
 - 14.6. Special precautions for user: Yes
- II Not dangerous according to transport regulations.

15. Regulatory information

US Federal Regulations

SARA Title III Section 311/312 Hazard Categories

- Acute Health Hazard

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A)

- This material does not contain any components with a SARA 302 RQ.

SARA 304 - Emergency Release Notification

- This material does not contain any components with a section 304 EHS RQ.

US. EPA CERCLA Hazardous Substances (40 CFR 302)

- This material does not contain any components with a CERCLA RQ.

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

- This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A)

- No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

US. Clean Air Act - Hazardous Air Pollutants (HAP)

- This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

US. Clean Air Act Section 112(r); Regulated toxic and flammable substances for Accidental Release Prevention - 40 CFR 68.130 (subpart F)

- This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

USA. Clean Water Act - Section 311: Designation of Hazardous Substances. CFR Title 40, Part 116

- This product does not contain any Hazardous Substances listed under the U.S. Clean Water Act, Section 311, Table 116.4A.

USA. Clean Water Act - Section 311, Determination of Reportable Quantities for Hazardous Chemicals. CFR Title 40, Part 117

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- This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.

USA. Clean Water Act - Section 307: Toxic Pollutants

- This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307

State Regulations

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

HMIS Ratings

Health:	2
Flammability:	1
Reactivity:	0

Notification status

USA (TSCA)	: listed/registered or exempted
Canada (DSL)	: listed/registered or exempted

16. Other information

List of references

Revision date : 06/07/2018

Relevant H phrases from chapter 3

H228	: Flammable solid.
H302	: Harmful if swallowed.
H315	: Causes skin irritation.
H318	: Causes serious eye damage.

Changes since the last version are highlighted in the margin. This version replaces all previous versions. This information and any recommendations, technical or otherwise, are presented in good faith and believed to be correct as of the date prepared. Recipients of this information and recommendations must make their own determination as to its suitability for their purposes. In no event shall Evonik assume liability for damages or losses of any kind or nature that result from the use of or reliance upon this information and recommendations. EVONIK EXPRESSLY DISCLAIMS ANY REPRESENTATIONS AND WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, AS TO THE ACCURACY, COMPLETENESS, NON-INFRINGEMENT, MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE (EVEN IF EVONIK IS AWARE OF SUCH PURPOSE) WITH RESPECT TO ANY INFORMATION AND RECOMMENDATIONS PROVIDED. Reference to any trade names used by other companies is neither a recommendation nor an endorsement of the corresponding product, and does not imply that similar products could not be used. Evonik reserves the right to make any changes to the information and/or recommendations at any time, without prior or subsequent notice.

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**Legend**

ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADNR	European agreement concerning the international carriage of dangerous goods by inland waterways (ADN)
ASTM	American Society for Testing and Materials
ATP	Adaptation to Technical Progress
BCF	Bioconcentration factor
BetrSichV	German Ordinance on Industrial Safety and Health
c.c.	closed cup
CAS	Chemical Abstract Services
CESIO	European Committee of Organic Surfactants and their Intermediates
ChemG	German Chemicals Act
CMR	carcinogenic-mutagenic-toxic for reproduction
DIN	German Institute for Standardization
DMEL	Derived minimum effect level
DNEL	Derived no effect level
EINECS	European Inventory of Existing Commercial Chemical Substances
EC50	half maximal effective concentration
GefStoffV	German Ordinance on Hazardous Substances
GGVSEB	German ordinance for road, rail and inland waterway transportation of dangerous goods
GGVSee	German ordinance for sea transportation of dangerous goods
GLP	Good Laboratory Practice
GMO	Genetic Modified Organism
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods
ISO	International Organization For Standardization
LOAEL	Lowest observed adverse effect level
LOEL	Lowest observed effect level
NOAEL	No observed adverse effect level
NOEC	no observed effect concentration
NOEL	no observed effect level
o. c.	open cup
OECD	Organisation for Economic Cooperation and Development
OEL	Occupational Exposure Limit
PBT	Persistent, bioaccumulative, toxic
PEC	Predicted effect concentration
PNEC	Predicted no effect concentration
REACH	REACH registration
RID	Convention concerning International Carriage by Rail
STOT	Specific Target Organ Toxicity
SVHC	Substances of Very High Concern
TA	Technical Instructions
TPR	Third Party Representative (Art. 4)
TRGS	Technical Rules for Hazardous Substances
VCI	German chemical industry association
vPvB	very persistent, very bioaccumulative
VOC	volatile organic compounds
VwVwS	German Administrative Regulation on the Classification of Substances Hazardous to Waters into Water Hazard Classes
WGK	Water Hazard Class
WHO	World Health Organization



SAFETY DATA SHEET

Y-8331

Date of issue: 2017-03-08

Revision date: Not applicable

Version: R0001.0001

1. IDENTIFICATION

A. Product name

- Y-8331 [US-P-181]

B. Recommended use and restriction on use

- General use : Polyol Components for the production of polyurethane
- Restriction on use : Not available

C. Manufacturer / Supplier / Distributor information

- Company name : Mitsui Chemicals & SKC Polyurethanes Inc.
- Address : 255, Yongjam-ro, Nam-gu, Ulsan, 44782, Korea
- Telephone number : +82-52-278-5242
- Emergency telephone number : +82-52-278-5242

2. HAZARD IDENTIFICATION

A. GHS Classification

- Not applicable

B. GHS label elements

- o Hazard symbols
 - Not applicable
- o Signal words
 - Not applicable
- o Hazard statements
 - Not applicable
- o Precautionary statements
 - 1) Prevention
 - Not applicable
 - 2) Response
 - Not applicable
 - 3) Storage
 - Not applicable
 - 4) Disposal
 - Not applicable

C. Other hazards which do not result in classification : (NFPA Classification)

- o NFPA grade (0 ~ 4 level)
 - Health : 1 , Flammability : 1, Reactivity : 0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Trade names and Synonyms	CAS No.	Content(%)
Polyether Polyol Resin	-	9082-00-2	100

4. FIRST AID MEASURES

A. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.

B. Skin contact

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Laundering enough contaminated clothing before reuse.

C. Inhalation contact

- When exposed to large amounts of steam and mist, move to fresh air.
- Take specific treatment if needed.

D. Ingestion contact

- About whether I should induce vomiting Take the advice of a doctor.
- Rinse your mouth with water immediately.

E. Delayed and immediate effects and also chronic effects from short and long term exposure

- Not available

F. Notes to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.

5. FIREFIGHTING MEASURES

A. Suitable (Unsuitable) extinguishing media

- Dry chemical, carbon dioxide, regular foam extinguishing agent, spray
- Avoid use of water jet for extinguishing

B. Specific hazards arising from the chemical

- Not available

C. Special protective actions for firefighters

- Cool containers with water until well after fire is out.
- Avoid inhalation of materials or combustion by-products.
- Use appropriate extinguishing measure suitable for surrounding fire.
- Wear appropriate protective equipment.
- Keep containers cool with water spray.
- Vapor or gas is burned at distant ignition sources can be spread quickly.

6. ACCIDENTAL RELEASE MEASURES

A. Personal precautions, protective equipment and emergency procedures

- Ventilate closed spaces before entering.
- Must work against the wind, let the upwind people to evacuate.
- Move container to safe area from the leak area.
- Remove all sources of ignition.
- Do not direct water at spill or source of leak.

B. Environmental precautions

- Prevent runoff and contact with waterways, drains or sewers.
- If large amounts have been spilled, inform the relevant authorities.

C. Methods and materials for containment and cleaning up

- Large spill : Stay upwind and keep out of low areas. Dike for later disposal.
- Notification to central government, local government. When emissions at least of the standard amount

- Dispose of waste in accordance with local regulation.
- Appropriate container for disposal of spilled material collected.
- Small leak: sand or other non-combustible material, please let use absorption.
- Wipe off the solvent.
- Dike for later disposal.

7. HANDLING AND STORAGE

A. Precautions for safe handling

- Comply with all applicable laws and regulations for handling
- Get the manual before use.
- Dealing only with a well-ventilated place.
- Do not inhale the steam prolonged or repeated.

B. Conditions for safe storage, including any incompatibilities

- Do not apply direct heat.
- Save applicable laws and regulations.
- Keep in the original container.
- Keep sealed when not in use.
- Prevent static electricity and keep away from combustible materials or heat sources.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

A. Exposure limits

- o ACGIH TLV
 - Not available
- o OSHA PEL
 - Not available

B. Engineering controls

- A system of local and/or general exhaust is recommended to keep employee exposures above the Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. The use of local exhaust ventilation is recommended to control emissions near the source.

C. Individual protection measures, such as personal protective equipment

- o Respiratory protection
 - Under conditions of frequent use or heavy exposure, Respiratory protection may be needed.
 - Respiratory protection is ranked in order from minimum to maximum.
 - Consider warning properties before use.
 - Any chemical cartridge respirator with organic vapor cartridge(s).
 - Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).
 - Any air-purifying respirator with a full facepiece and an organic vapor canister.
 - For Unknown Concentration or Immediately Dangerous to Life or Health : Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. Any self-contained breathing apparatus with a full facepiece.
- o Eye protection
 - Wear primary eye protection such as splash resistant safety goggles with a secondary protection face shield.
 - Provide an emergency eye wash station and quick drench shower in the immediate work area.
- o Hand protection
 - Wear appropriate glove.
- o Skin protection
 - Wear appropriate clothing.
- o Others
 - Not available

9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance

- Appearance	Liquid(Viscous liquid)
- Color	Colorless
B. Odor	Almost Odorless
C. Odor threshold	Not available
D. pH	5.5~7.5
E. Melting point/Freezing point	-30~-50℃
F. Initial Boiling Point/Boiling Ranges	Not available
G. Flash point	225 ℃ ~ 235 ℃
H. Evaporation rate	Not available
I. Flammability(solid, gas)	Not available
J. Upper/Lower Flammability or explosive limits	Not available
K. Vapour pressure	Not available
L. Solubility	Not available
M. Vapour density	Not available
N. Specific gravity(Relative density)	Not available
O. Partition coefficient of n-octanol/water	Not available
P. Autoignition temperature	Not available
Q. Decomposition temperature	Not available
R. Viscosity	Not available
S. Molecular weight	Not available

10. STABILITY AND REACTIVITY

A. Chemical Stability

- This material is stable under recommended storage and handling conditions.

B. Possibility of hazardous reactions

- Hazardous Polymerization will not occur.

C. Conditions to avoid

- Avoid contact with incompatible materials and condition.
- Avoid : Accumulation of electrostatic charges, Heating, Flames and hot surfaces

D. Incompatible materials

- Not available

E. Hazardous decomposition products

- May emit flammable vapour if involved in fire.

11. TOXICOLOGICAL INFORMATION

A. Information on the likely routes of exposure

- (Respiratory tracts)
 - Not available
- (Oral)
 - Not available
- (Eye-Skin)
 - Not available

B. Delayed and immediate effects and also chronic effects from short and long term exposure

- Acute toxicity
 - * Oral
 - [Polyether Polyol Resin] : LD50 > 10000 mg/kg Rat
 - * Dermal
 - [Polyether Polyol Resin] : LD50 > 5000 mg/kg Rabbit
 - * Inhalation
 - Not available
- Skin corrosion/irritation

- Not available
- Serious eye damage/irritation
 - Not available
- Respiratory sensitization
 - Not available
- Skin sensitization
 - Not available
- Carcinogenicity
 - * IARC
 - Not available
 - * OSHA
 - Not available
 - * ACGIH
 - Not available
 - * NTP
 - Not available
 - * EU CLP
 - Not available
- Germ cell mutagenicity
 - Not available
- Reproductive toxicity
 - Not available
- STOT-single exposure
 - Not available
- STOT-repeated exposure
 - Not available
- Aspiration hazard
 - Not available

12. ECOLOGICAL INFORMATION

A. Ecotoxicity

- Fish
 - Not available
- Crustaceans
 - Not available
- Algae
 - Not available

B. Persistence and degradability

- Persistence
 - Not available
- Degradability
 - Not available

C. Bioaccumulative potential

- Bioaccumulative potential
 - Not available
- Biodegradation
 - Not available

D. Mobility in soil

- Not available

E. Other adverse effects

- Not available

13. DISPOSAL CONSIDERATIONS

A. Disposal methods

- Since more than two kinds of designaed waste is mixed, it is difficult to treat sepearatly, then can be reduction or stabilization by incineration or similar process.
- If water separation is possible, pre-process with Water separation process.
- Dispose by incineration.

B. Special precautions for disposal

- The user of this product must disposal by oneself or entrust to waste disposer or person who other's waste recycle and dispose, person who establish and operate waste disposal facilities.
- Dispose of waste in accordance with all applicable laws and regulations.

14. TRANSPORT INFORMATION**A. UN No. (IMDG)**

- Not applicable

B. Proper shipping name

- Not applicable

C. Hazard Class

- Not applicable

D. IMDG Packing group

- Not applicable

E. Marine pollutant

- Not applicable

F. Special precautions for user related to transport or transportation measures

- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
- Air transport(IATA): Not subject to IATA regulations.
- EmS FIRE SCHEDULE : Not available
- EmS SPILLAGE SCHEDULE : Not available

15. REGULATORY INFORMATION**A. National and/or international regulatory information**

- o POPs Management Law
 - Not applicable
- o Information of EU Classification
 - * Classification
 - Not applicable
 - * Risk Phrases
 - Not applicable
 - * Safety Phrase
 - Not applicable
- o U.S. Federal regulations
 - * OSHA PROCESS SAFETY (29CFR1910.119)
 - Not applicable
 - * CERCLA Section 103 (40CFR302.4)
 - Not applicable
 - * EPCRA Section 302 (40CFR355.30)
 - Not applicable
 - * EPCRA Section 304 (40CFR355.40)
 - Not applicable
 - * EPCRA Section 313 (40CFR372.65)
 - Not applicable
- o Rotterdam Convention listed ingredients

- Not applicable
- o Stockholm Convention listed ingredients
 - Not applicable
- o Montreal Protocol listed ingredients
 - Not applicable

16. OTHER INFORMATION

A. Reference

- The information contained herein is believed to be accurate. It is provided independently of any sale of the product for purpose of hazard communication. It is not intended to constitute performance information concerning the product. No express warranty, or implied warranty of merchantability or fitness for a particular purpose is made with respect to the product or the information contained herein.
- This Safety Data Sheet was compiled with data and information from the following sources: KOSHA, NITE, ESJS, NLM, SIDS, IPCS

B. Issue date

- 2017-03-08

C. Revision number and Last date revised

- Not applicable

D. Other

- This SDS is prepared according to the Globally Harmonized System (GHS).



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name. .BiOH 2828
Document # .
Revision date 12-5-2013
Product use For research and development purposes only.
Synonym(s) Modified oligomeric vegetable oil
Manufacturer information Cargill Biobased Polyurethanes
9320 Excelsior Blvd.
Hopkins, Minnesota 55343
United States
CustomerService_Polyols@cargill.com
General Information: 1-877-Poly BiOH (765-9246)
24 Hour Emergency: 1-800-424-9300

2. Hazards Identification

Physical state Liquid.
Emergency overview CAUTION!

Prolonged or repeated skin contact may cause drying, cracking, or irritation.
OSHA regulatory status This product is not hazardous according to OSHA 29CFR 1910.1200.
Potential health effects
Routes of exposure Not applicable.
Eyes Direct contact with eyes may cause temporary irritation.
Skin Prolonged or repeated contact may cause itching, redness, and rash in some individuals.
Inhalation Under normal conditions of intended use, this material is not expected to be an inhalation hazard.
Ingestion No harmful effects expected in amounts likely to be ingested by accident.

3. Composition / Information on Ingredients

Components	CAS #	Percent
Modified oligomeric vegetable oil	Not Applicable	> 99

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First Aid Measures

First aid procedures
Eye contact Any material that contacts the eye should be washed out immediately with water. If easy to do, remove contact lenses. Get medical attention promptly if symptoms occur after washing.
Skin contact Wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.
Inhalation If symptomatic, move to fresh air. Get medical attention if symptoms persist.
Ingestion First aid is normally not required. However, if greater than 1/2 liter (pint) ingested, seek medical attention.

5. Fire Fighting Measures

Flammable properties No unusual fire or explosion hazards noted.
Extinguishing media
Suitable extinguishing media Water. Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Fire fighting equipment/instructions Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Hazardous combustion products Carbon oxides.

6. Accidental Release Measures

Personal precautions	Wear appropriate personal protective equipment (See Section 8).
Methods for cleaning up	Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Large Spills: Flush area with water. Prevent runoff from entering drains, sewers, or streams. Dike for later disposal.

7. Handling and Storage

Handling	Observe good industrial hygiene practices.
Storage	Keep container closed. Store totes and drums below 38°C (100°F); shelf life: 12 months. Store bulk containers below 46°C (114°F); shelf life: 6 months.

8. Exposure Controls / Personal Protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Engineering controls	Ensure adequate ventilation, especially in confined areas.
Personal protective equipment	
Eye / face protection	Wear safety glasses with side shields (or goggles).
Skin protection	Wear chemical-resistant gloves, footwear and protective clothing appropriate for risk of exposure. Contact glove manufacturer for specific information.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respirator type: Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical & Chemical Properties

Appearance	Not available.
Color	Pink / pale yellow.
Odor	Alcohol.
Odor threshold	Not available.
Physical state	Liquid.
Form	Viscous liquid.
pH	Not available.
Melting point	Not available.
Freezing point	Not available.
Boiling point	Decomposes.
Flash point	> 266 °F (> 130 °C) Closed Cup
Evaporation rate	Not available.
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Specific gravity	1.01 (25°C)
Solubility (water)	Insoluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	867.2 °F (464 °C)
Decomposition temperature	> 302 °F (> 150 °C)

Viscosity 3200 - 10000 cP
Density 8.4 lb/gal

10. Chemical Stability & Reactivity Information

Chemical stability Material is stable under normal conditions.
Conditions to avoid Excessive heat.
Incompatible materials Strong oxidizing agents.
Hazardous decomposition products No hazardous decomposition products are known.
Possibility of hazardous reactions Hazardous polymerization does not occur.

11. Toxicological Information

Toxicological data

Product

Test Results

Experimental Products A

Acute Oral LD50 Rat: > 2000 mg/kg

Sensitization No sensitizing effects known.
Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Mutagenicity Ames test: Negative.

12. Ecological Information

Ecotoxicity Not expected to be harmful to aquatic organisms.
Persistence and degradability No data available.
Bioaccumulation / Accumulation No data available.
Partition coefficient (n-octanol/water) Not available.
Mobility in environmental media No data available.

13. Disposal Considerations

Disposal instructions Dispose of contents/container in accordance with local/regional/national/international regulations. When this product as supplied is to be discarded as waste, it does not meet the definition of a RCRA waste under 40 CFR 261.
Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

TDG

Not regulated as dangerous goods.

15. Regulatory Information

US federal regulations This product is not hazardous according to OSHA 29CFR 1910.1200.

CERCLA (Superfund) reportable quantity (lbs)

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

Section 302 extremely hazardous substance No

Section 311 hazardous chemical No

Drug Enforcement Agency (DEA) Not controlled

WHMIS status Non-controlled

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings Health: 1
Flammability: 1
Physical hazard: 0

NFPA ratings Health: 1
Flammability: 1
Instability: 0

Disclaimer To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Issue date 10-14-2010

SAFETY DATA SHEET



1. Identification

Covestro LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC: (800) 424-9300
INTERNATIONAL: (703) 527-3887

NON-TRANSPORTATION

Emergency Phone: Call Chemtrec
Information Phone: (844) 646-0545

Product Name: MULTRANOL 3901
Material Number: 02916227
Use: Polyol components for the production of polyurethanes

2. Hazards Identification

This product is not classified as hazardous according to OSHA HazCom 2012 (29 CFR 1910.1200).

3. Composition/Information on Ingredients

Hazardous Components

There are no hazardous components above the relevant concentration limits according to OSHA HazCom 2012.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Not expected to cause adverse acute health effects.

Eye Contact

In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact

In case of skin contact, wash affected areas with soap and water. Thoroughly clean shoes before reuse. Wash clothing before reuse. Get medical attention if irritation develops and persists.

Inhalation

If inhaled, remove to fresh air. If breathing is difficult, give oxygen. Get medical attention if irritation

Material Name: MULTRANOL 3901

Material Number: 02916227

develops.

Ingestion

If ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention.

5. Firefighting Measures

Suitable Extinguishing Media: Carbon dioxide (CO₂), Dry chemical, Foam, water spray for large fires.

Unsuitable Extinguishing Media No Data Available

Fire Fighting Procedure

Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Toxic and irritating gases/fumes may be given off during burning or thermal decomposition. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture.

Hazardous Decomposition Products

By Fire and Thermal Decomposition: Carbon dioxide (CO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), dense black smoke., Other undetermined compounds

6. Accidental Release Measures

Spill and Leak Procedures

Dike or dam spilled material and control further spillage, if possible. Cover spill with inert material (e. g., dry sand or earth) and collect for proper disposal. Collect and place in appropriately marked sealable containers for disposal. Wash spill area with soap and water.

7. Handling and Storage

Handling/Storage Precautions

Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Keep container closed when not in use. Material is hygroscopic and may absorb small amounts of atmospheric moisture. If contamination with isocyanates is suspected, do not reseal containers. Avoid inhalation of vapour or mist.

Storage Temperature

Minimum: 15 °C (59 °F)
Maximum: 48 °C (118.4 °F)

Storage Conditions

Store separate from food products.

Employee education and training in the safe use and handling of this product are required under the OSHA Hazard Communication Standard 29 CFR 1910.1200.

Substances to Avoid

Oxidizing agents, Isocyanates

8. Exposure Controls/Personal Protection

The recommendations in this section should not be a substitute for a personal protective equipment (PPE) assessment performed by the employer as required by 29 CFR 1910 Subpart I.

Exposure Limits

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures

Use local and general exhaust ventilation to control levels of exposure.

Respiratory Protection

None required under normal conditions of use.

Hand Protection

Ensure gloves remain in good condition during use and replace if any deterioration is observed.

Permeation resistant gloves., Butyl rubber gloves., Nitrile rubber gloves., Neoprene gloves

Eye Protection

Safety glasses with side-shields

Skin Protection

No special skin protection requirements during normal handling and use.

Additional Protective Measures

Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product.

9. Physical and Chemical Properties

State of Matter:	liquid
Color:	Colorless
Odor:	slight
Odor Threshold:	No Data Available
pH:	Not Established
Freezing Point:	Not Established
Boiling Point:	not established
Flash Point:	193 °C (379.4 °F)
Evaporation Rate:	No Data Available
Lower Explosion Limit:	Not Established
Upper Explosion Limit:	Not Established
Vapor Pressure:	Not Established
Vapor Density:	No Data Available
Density:	1.01 g/cm ³ @ 25 °C (77 °F)
Relative Vapor Density:	No Data Available
Specific Gravity:	1.01 @ 25 °C (77 °F)
Solubility in Water:	completely soluble
Partition Coefficient: n-octanol/water:	No Data Available
Auto-ignition Temperature:	Not Established

Material Name: MULTRANOL 3901

Material Number: 02916227

Decomposition Temperature:	Not established
Unblocking Temperature:	No Data Available
Dynamic Viscosity:	1,020 - 1,220 mPa.s @ 25 °C (77 °F)
Kinematic Viscosity:	No Data Available
Bulk Density:	1,010 kg/m ³
Molecular Weight:	No Data Available
Hygroscopicity:	hygroscopic
Self Ignition:	not applicable

10. Stability and Reactivity

Hazardous Reactions

Hazardous polymerisation does not occur.

Stability

Stable

Materials to Avoid

Oxidizing agents, Isocyanates

Conditions to Avoid

None known.

Hazardous Decomposition Products

By Fire and Thermal Decomposition: Carbon dioxide (CO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), dense black smoke., Other undetermined compounds

11. Toxicological Information

Likely Routes of Exposure:	Skin Contact
	Eye Contact

Health Effects and Symptoms

Acute: Not expected to cause adverse acute health effects.

Chronic: Not expected to cause adverse chronic health effects.

Toxicity Data for: MULTRANOL 3901

No data available for this product.

Carcinogenicity:

No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Ecological Data for: MULTRANOL 3901

No data available for this component.

13. Disposal Considerations

Waste Disposal Method

Waste disposal should be in accordance with existing federal, state and local environmental control laws.

Empty Container Precautions

Recondition or dispose of empty container in accordance with governmental regulations. Empty containers retain product residue; observe all precautions for product. Do not heat or cut container with electric or gas torch.

14. Transportation Information

Land transport (DOT)

Non-Regulated

Sea transport (IMDG)

Non-Regulated

Air transport (ICAO/IATA)

Non-Regulated

15. Regulatory Information

United States Federal Regulations

US. Toxic Substances Control Act: Listed on the Active Portion of the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:

None

SARA Section 311/312 Hazard Categories:

Refer to hazard classification information in Section 2.

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:

None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:

None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):

Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

Concentration

>=1%

Components

Polyether Polyol

CAS-No.

9082-00-2

California Proposition 65 List:

None.

CFATS (Chemical Facility Anti-Terrorism Standards) Chemicals

To the best of our knowledge, this product does not contain Appendix A Chemicals of Interest (COI), at or above the Screening Threshold Quantity (STQ), as defined by the Department of Homeland Security Chemical Facility Anti-terrorism Standard (CFATS, 6 CFR Part 27).

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of product labels and safety data sheets. Safety data sheets for all of our products and general product declarations are available for download at www.productsafetyfirst.covestro.com.

Contact: Product Safety Department
Telephone: (412) 413-2835
Version Date: 05/07/2021
SDS Version: 2.8

Information contained in this SDS is believed to be accurate but is furnished without warranty, express or implied, including warranties of merchantability or fitness for a particular purpose. The information relates only to the specific material designated herein. Covestro LLC. assumes no legal responsibility for use of or reliance upon the information in this SDS and such information shall in no case be considered a part of our terms and conditions of sale. The user is responsible for determining whether the Covestro product is suitable for user's method of use or application. Covestro is not liable for any failure to observe the precautionary measures described in this SDS or for any misuse of the product.

|| Changes since the last version are highlighted in the margin. This version replaces all previous versions.

SAFETY DATA SHEET



1. Identification

Covestro LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC: (800) 424-9300
INTERNATIONAL: (703) 527-3887

NON-TRANSPORTATION

Emergency Phone: Call Chemtrec
Information Phone: (844) 646-0545

Product Name: HYPERLITE® POLYOL E-833
Material Number: 04216435
Use: Polyol components for the production of polyurethanes

2. Hazards Identification

This product is not classified as hazardous according to OSHA HazCom 2012 (29 CFR 1910.1200).

3. Composition/Information on Ingredients

Hazardous Components

There are no hazardous components above the relevant concentration limits according to OSHA HazCom 2012.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Not expected to cause adverse acute health effects.

Eye Contact

In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact

In case of skin contact, wash affected areas with soap and water. Thoroughly clean shoes before reuse. Wash clothing before reuse. Get medical attention if irritation develops and persists.

Inhalation

If inhaled, remove to fresh air. If breathing is difficult, give oxygen. Get medical attention if irritation

Material Name: HYPERLITE® POLYOL E-833

Material Number: 04216435

develops.

Ingestion

If ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention.

5. Firefighting Measures

Suitable Extinguishing Media: Carbon dioxide (CO₂), Dry chemical, Foam, water spray for large fires.

Unsuitable Extinguishing Media No Data Available

Fire Fighting Procedure

Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Toxic and irritating gases/fumes may be given off during burning or thermal decomposition. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture.

Hazardous Decomposition Products

By Fire and Thermal Decomposition: Carbon dioxide (CO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), dense black smoke., Other undetermined compounds

6. Accidental Release Measures

Spill and Leak Procedures

Dike or dam spilled material and control further spillage, if possible. Cover spill with inert material (e. g., dry sand or earth) and collect for proper disposal. Collect and place in appropriately marked sealable containers for disposal. Wash spill area with soap and water.

7. Handling and Storage

Handling/Storage Precautions

Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Keep container closed when not in use. Material is hygroscopic and may absorb small amounts of atmospheric moisture. If contamination with isocyanates is suspected, do not reseal containers. Avoid inhalation of vapour or mist.

Storage Temperature

Minimum: 20 °C (68 °F)

Maximum: 60 °C (140 °F)

Storage Conditions

Store separate from food products.

Employee education and training in the safe use and handling of this product are required under the OSHA Hazard Communication Standard 29 CFR 1910.1200.

Substances to Avoid

Oxidizing agents, Isocyanates

8. Exposure Controls/Personal Protection

The recommendations in this section should not be a substitute for a personal protective equipment (PPE) assessment performed by the employer as required by 29 CFR 1910 Subpart I.

Exposure Limits

Country specific exposure limits have not been established or are not applicable

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures

Use local and general exhaust ventilation to control levels of exposure.

Respiratory Protection

None required under normal conditions of use.

Hand Protection

Ensure gloves remain in good condition during use and replace if any deterioration is observed.

Permeation resistant gloves., Butyl rubber gloves., Nitrile rubber gloves., Neoprene gloves

Eye Protection

Safety glasses with side-shields

Skin Protection

No special skin protection requirements during normal handling and use.

Additional Protective Measures

Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product.

9. Physical and Chemical Properties

State of Matter:	liquid
Appearance:	viscous
Color:	Colorless
Odor:	mild
Odor Threshold:	No Data Available
pH:	no data available
Boiling Point:	> 200 °C (> 392 °F)
Flash Point:	> 93.33 °C (199.99 °F)
Evaporation Rate:	No Data Available
Lower explosion limit:	No Data Available
Upper Explosion Limit:	No Data Available
Vapor Pressure:	< 0.01 mmHg @ 20 °C (68 °F)
Vapor Density:	No Data Available
Density:	1.025 g/cm ³ @ 20 °C (68 °F) (DIN 51757)
Relative Vapor Density:	No Data Available
Specific Gravity:	1.025 @ 20 °C (68 °F)
Solubility in Water:	slightly soluble
Partition Coefficient: n-	No Data Available

Material Name: HYPERLITE® POLYOL E-833

Material Number: 04216435

octanol/water:
Auto-ignition Temperature: No Data Available
Decomposition Temperature: Not established
Unblocking Temperature: No Data Available
Dynamic Viscosity: No Data Available
Kinematic Viscosity: No Data Available
Bulk Density: 1,028 - 1,030 kg/m3
Molecular Weight: No Data Available
Pour point: -12.22 - -8.89 °C (10 - 16 °F)
Hygroscopicity: hygroscopic

10. Stability and Reactivity

Hazardous Reactions

Hazardous polymerisation does not occur.

Stability

Stable

Materials to Avoid

Oxidizing agents, Isocyanates

Conditions to Avoid

None known.

Hazardous Decomposition Products

By Fire and Thermal Decomposition: Carbon dioxide (CO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), dense black smoke., Other undetermined compounds

11. Toxicological Information

Likely Routes of Exposure: Skin Contact
Eye Contact

Health Effects and Symptoms

Acute: Not expected to cause adverse acute health effects.

Chronic: Not expected to cause adverse chronic health effects.

Toxicity Data for: HYPERLITE® POLYOL E-833

The components in this product are either not classified, below the relevant concentration limits, or do not have any toxicity data associated with them.

Carcinogenicity:

No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Ecological Data for: HYPERLITE® POLYOL E-833

Material Name: HYPERLITE® POLYOL E-833

Material Number: 04216435

No data available for this product.

13. Disposal Considerations

Waste Disposal Method

Waste disposal should be in accordance with existing federal, state and local environmental control laws.

Empty Container Precautions

Recondition or dispose of empty container in accordance with governmental regulations. Empty containers retain product residue; observe all precautions for product. Do not heat or cut container with electric or gas torch.

14. Transportation Information

Land transport (DOT)

Non-Regulated

Sea transport (IMDG)

Non-Regulated

Air transport (ICAO/IATA)

Non-Regulated

15. Regulatory Information

United States Federal Regulations

US. Toxic Substances Control Act: Listed on the Active Portion of the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:

None

SARA Section 311/312 Hazard Categories:

Refer to hazard classification information in Section 2.

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:

None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:

None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):

Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information

Material Name: HYPERLITE® POLYOL E-833

Material Number: 04216435

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

<u>Concentration</u>	<u>Components</u>	<u>CAS-No.</u>
>=1%	Polyether Polyol	CAS# is a trade secret
>=1%	Polyether Polyol	CAS# is a trade secret
>=1%	Polyether Polyol	CAS# is a trade secret
>=1%	Polyether Polyol	CAS# is a trade secret

California Proposition 65 List:

None.

CFATS (Chemical Facility Anti-Terrorism Standards) Chemicals

To the best of our knowledge, this product does not contain Appendix A Chemicals of Interest (COI), at or above the Screening Threshold Quantity (STQ), as defined by the Department of Homeland Security Chemical Facility Anti-terrorism Standard (CFATS, 6 CFR Part 27).

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of product labels and safety data sheets. Safety data sheets for all of our products and general product declarations are available for download at www.productsafetyfirst.covestro.com.

Contact: Product Safety Department
Telephone: (412) 413-2835
Version Date: 05/06/2021
SDS Version: 2.11

Information contained in this SDS is believed to be accurate but is furnished without warranty, express or implied, including warranties of merchantability or fitness for a particular purpose. The information relates only to the specific material designated herein. Covestro LLC. assumes no legal responsibility for use of or reliance upon the information in this SDS and such information shall in no case be considered a part of our terms and conditions of sale. The user is responsible for determining whether the Covestro product is suitable for user's method of use or application. Covestro is not liable for any failure to observe the precautionary measures described in this SDS or for any misuse of the product.

|| Changes since the last version are highlighted in the margin. This version replaces all previous versions.

SAFETY DATA SHEET



1. Identification

Covestro LLC
1 Covestro Circle
Pittsburgh, PA 15205
USA

TRANSPORTATION EMERGENCY

CALL CHEMTREC: (800) 424-9300
INTERNATIONAL: (703) 527-3887

NON-TRANSPORTATION

Emergency Phone: Call Chemtrec
Information Phone: (844) 646-0545

Product Name: HYPERLITE® POLYOL E-855
Material Number: 83470772
Chemical Family: Polymer Polyol
Use: Polyol components for the production of polyurethanes

2. Hazards Identification

This product is not classified as hazardous according to OSHA HazCom 2012 (29 CFR 1910.1200).

3. Composition/Information on Ingredients

Hazardous Components

There are no hazardous components above the relevant concentration limits according to OSHA HazCom 2012.

4. First Aid Measures

Most Important Symptom(s)/Effect(s)

Acute: Not expected to cause adverse acute health effects.

Eye Contact

In case of contact, flush eyes with plenty of lukewarm water. Get medical attention if irritation develops.

Skin Contact

In case of skin contact, wash affected areas with soap and water. Thoroughly clean shoes before reuse. Wash clothing before reuse. Get medical attention if irritation develops and persists.

Inhalation

Material Name: HYPERLITE® POLYOL E-855

Material Number: 83470772

If inhaled, remove to fresh air. If breathing is difficult, give oxygen. Get medical attention if irritation develops.

Ingestion

If ingested, do not induce vomiting unless directed to do so by medical personnel. Get medical attention.

5. Firefighting Measures

Suitable Extinguishing Media: Carbon dioxide (CO₂), Dry chemical, Foam, water spray for large fires.

Unsuitable Extinguishing Media No Data Available

Fire Fighting Procedure

Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Toxic and irritating gases/fumes may be given off during burning or thermal decomposition. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture.

Hazardous Decomposition Products

By Fire and Thermal Decomposition: Carbon dioxide (CO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), dense black smoke., Other undetermined compounds

6. Accidental Release Measures**Spill and Leak Procedures**

Dike or dam spilled material and control further spillage, if possible. Cover spill with inert material (e. g., dry sand or earth) and collect for proper disposal. Collect and place in appropriately marked sealable containers for disposal. Wash spill area with soap and water.

7. Handling and Storage**Handling/Storage Precautions**

Handle in accordance with good industrial hygiene and safety practices. Wash thoroughly after handling. Keep container closed when not in use. Material is hygroscopic and may absorb small amounts of atmospheric moisture. If contamination with isocyanates is suspected, do not reseal containers. Avoid inhalation of vapour or mist.

Storage Temperature

Minimum: 20 °C (68 °F)

Maximum: 60 °C (140 °F)

Storage Conditions

Store separate from food products.

Employee education and training in the safe use and handling of this product are required under the OSHA Hazard Communication Standard 29 CFR 1910.1200.

Substances to Avoid

Oxidizing agents, Isocyanates

8. Exposure Controls/Personal Protection

The recommendations in this section should not be a substitute for a personal protective equipment (PPE) assessment performed by the employer as required by 29 CFR 1910 Subpart I.

Exposure Limits

Country specific exposure limits have not been established or are not applicable

Any component which is listed in section 3 and is not listed in this section does not have a known ACGIH TLV, OSHA PEL or supplier recommended occupational exposure limit.

Industrial Hygiene/Ventilation Measures

Use local and general exhaust ventilation to control levels of exposure.

Respiratory Protection

None required under normal conditions of use., NIOSH approved air-supplied respirator during die cleaning, high temperature processing or when thermal decomposition is suspected.

Hand Protection

Ensure gloves remain in good condition during use and replace if any deterioration is observed.

Permeation resistant gloves., butyl-rubber, Nitrile rubber, Neoprene gloves

Eye Protection

Safety glasses with side-shields

Skin Protection

Wear as appropriate:, Impervious protective clothing.

Additional Protective Measures

Employees should wash their hands and face before eating, drinking, or using tobacco products. Educate and train employees in the safe use and handling of this product.

9. Physical and Chemical Properties

State of Matter:	liquid
Appearance:	viscous
Color:	White
Odor:	mild
Odor Threshold:	No Data Available
pH:	4 - 8
Boiling Point:	> 200 °C (> 392 °F) (DIN 53171)
Flash Point:	213 - 232 °C (415.4 - 449.6 °F) (DIN EN 22719)
Evaporation Rate:	No Data Available
Lower explosion limit:	No Data Available
Upper Explosion Limit:	No Data Available
Vapor Pressure:	< 0.001 mmHg @ 20 °C (68 °F)
Vapor Density:	No Data Available
Density:	1,055 kg/m ³ @ 20 °C (68 °F) (DIN 51757)
Relative Vapor Density:	No Data Available
Specific Gravity:	1.06 @ 25 °C (77 °F)

Solubility in Water:	slightly soluble
Partition Coefficient: n-octanol/water:	No Data Available
Auto-ignition Temperature:	No Data Available
Decomposition Temperature:	Not established
Dynamic Viscosity:	4,119 - 6,024 cps @ 25 °C (77 °F) (DIN 53019)
Kinematic Viscosity:	No Data Available
Molecular Weight:	< 130,000
Pour point:	-21 - -13 °C (-5.8 - 8.6 °F) (ISO 3016)
Hygroscopicity:	hygroscopic

10. Stability and Reactivity

Hazardous Reactions

Hazardous polymerisation does not occur.

Stability

Stable

Materials to Avoid

Oxidizing agents, Isocyanates

Conditions to Avoid

None known.

Hazardous Decomposition Products

By Fire and Thermal Decomposition: Carbon dioxide (CO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), dense black smoke., Other undetermined compounds

11. Toxicological Information

Likely Routes of Exposure:

Skin Contact
Eye Contact

Health Effects and Symptoms

Acute: Not expected to cause adverse acute health effects.

Chronic: Not expected to cause adverse chronic health effects.

Toxicity Data for: HYPERLITE® POLYOL E-855

The components in this product are either not classified, below the relevant concentration limits, or do not have any toxicity data associated with them.

Acute Oral Toxicity

Acute toxicity estimate: 4,249 mg/kg (Calculation method)

Carcinogenicity:

No carcinogenic substances as defined by IARC, NTP and/or OSHA

12. Ecological Information

Material Name: HYPERLITE® POLYOL E-855

Material Number: 83470772

Ecological Data for: HYPERLITE® POLYOL E-855

No data available for this product. The components in this product are either not classified, below the relevant concentration limits, or do not have any ecotoxicity data.

13. Disposal Considerations

Waste Disposal Method

Waste disposal should be in accordance with existing federal, state and local environmental control laws.

Empty Container Precautions

Recondition or dispose of empty container in accordance with governmental regulations. Empty containers retain product residue; observe all precautions for product. Do not heat or cut container with electric or gas torch.

14. Transportation Information

Land transport (DOT)

Non-Regulated

Sea transport (IMDG)

Non-Regulated

Air transport (ICAO/IATA)

Non-Regulated

15. Regulatory Information

United States Federal Regulations

US. Toxic Substances Control Act: Listed on the Active Portion of the TSCA Inventory.

No substances are subject to TSCA 12(b) export notification requirements.

US. EPA CERCLA Hazardous Substances (40 CFR 302) Components:

None

SARA Section 311/312 Hazard Categories:

Refer to hazard classification information in Section 2.

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A) Components:

None

US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required Components:

None

US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes and Appendix VIII Hazardous Constituents (40 CFR 261):

Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the SDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:

<u>Concentration</u>	<u>Components</u>	<u>CAS-No.</u>
>=1%	Polyether Polyol	CAS# is a trade secret
>=1%	Polymer	CAS# is a trade secret
>=1%	Polymer	CAS# is a trade secret
>=1%	Polymer	CAS# is a trade secret

New Jersey Environmental Hazardous Substances List and/or New Jersey RTK Special Hazardous Substances Lists:

<u>Concentration</u>	<u>Components</u>	<u>CAS-No.</u>
>=1%	Polymer	CAS# is a trade secret

Massachusetts Right to Know Extraordinarily Hazardous Substance List:

<u>Concentration</u>	<u>Components</u>	<u>CAS-No.</u>
<=25 ppm	Acrylonitrile	107-13-1
<=50 ppm	Styrene	100-42-5

California Proposition 65 List:

<u>Concentration</u>	<u>Components</u>	<u>CAS-No.</u>
<=25 ppm	Acrylonitrile	107-13-1
<=50 ppm	Styrene	100-42-5

CFATS (Chemical Facility Anti-Terrorism Standards) Chemicals

To the best of our knowledge, this product does not contain Appendix A Chemicals of Interest (COI), at or above the Screening Threshold Quantity (STQ), as defined by the Department of Homeland Security Chemical Facility Anti-terrorism Standard (CFATS, 6 CFR Part 27).

CFATS (Chemical Facility Anti-Terrorism Standards) Chemicals

To the best of our knowledge, this product does not contain Appendix A Chemicals of Interest (COI), at or above the Screening Threshold Quantity (STQ), as defined by the Department of Homeland Security Chemical Facility Anti-terrorism Standard (CFATS, 6 CFR Part 27).

Based on information provided by our suppliers, this product is considered "DRC Conflict Free" as defined by the SEC Conflict Minerals Final Rule (Release No. 34-67716; File No. S7-40-10; Date: 2012-08-22).

16. Other Information

The method of hazard communication for Covestro LLC is comprised of product labels and safety data sheets. Safety data sheets for all of our products and general product declarations are available for download at www.productsafetyfirst.covestro.com.

Contact: Product Safety Department
Telephone: (412) 413-2835
Version Date: 09/24/2019
SDS Version: 3.5

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|| Changes since the last version are highlighted in the margin. This version replaces all previous versions.



SAFETY DATA SHEET

THE DOW CHEMICAL COMPANY

Product name: VORANOL™ 360 Polyol DA

Issue Date: 01/11/2019

Print Date: 01/15/2020

THE DOW CHEMICAL COMPANY encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: VORANOL™ 360 Polyol DA

Recommended use of the chemical and restrictions on use

Identified uses: For industrial use. Component(s) for the manufacture of urethane polymers. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

COMPANY IDENTIFICATION

THE DOW CHEMICAL COMPANY
2030 DOW CENTER
MIDLAND MI 48674-0000
UNITED STATES

Customer Information Number:

800-258-2436

SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: CHEMTREC +1 800-424-9300

Local Emergency Contact: 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification

GHS classification in accordance with 29 CFR 1910.1200

Not a hazardous substance or mixture.

Other hazards

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Sucrose. propoxylated

This product is a substance.

Component

CASRN

Concentration

Sucrose, propylene oxide	9049-71-2	>= 65.0 - <= 75.0 %
Glycerol propylene oxide	25791-96-2	>= 25.0 - <= 35.0 %

4. FIRST AID MEASURES

Description of first aid measures

General advice:

First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Skin contact: Wash off with plenty of water. Suitable emergency safety shower facility should be immediately available.

Eye contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Ingestion: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed:

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed

Notes to physician: If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIREFIGHTING MEASURES

Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Unsuitable extinguishing media: Do not use direct water stream. May spread fire.

Special hazards arising from the substance or mixture

Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Isolate area. Refer to section 7, Handling, for additional precautionary measures. Keep unnecessary and unprotected personnel from entering the area. Spilled material may cause a slipping hazard. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and materials for containment and cleaning up: Contain spilled material if possible. Absorb with materials such as: Dirt. Sand. Sawdust. Collect in suitable and properly labeled containers. Wash the spill site with water. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: Wash thoroughly after handling. Keep container closed. This material is hygroscopic in nature. Product shipped/handled hot can cause thermal burns. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

Conditions for safe storage: Protect from atmospheric moisture. Store in a dry place. Avoid prolonged exposure to heat and air. Store in the following material(s): Carbon steel. Stainless steel. Polypropylene. Polyethylene-lined container. Teflon. Glass-lined container. Aluminum. Plasite 3066

lined container. Plaste 3070 lined container. 316 stainless steel. See Section 10 for more specific information.

Storage stability**Storage temperature:**

15 - 35 °C (59 - 95 °F)

Storage Period:

24 Month

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Exposure controls

Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields). When handling hot material: Use chemical goggles. Wear a face-shield which allows use of chemical goggles, or wear a full-face respirator, to protect face and eyes when there is any likelihood of splashes.

Skin protection

Hand protection: Chemical protective gloves should not be needed when handling this material. Consistent with general hygienic practice for any material, skin contact should be minimized. Use gloves with insulation for thermal protection, when needed.

Other protection: No precautions other than clean body-covering clothing should be needed. When handling hot material, protect skin from thermal burns. Selection of specific items will depend on the operation.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions, no respiratory protection should be needed; however, if material is heated or sprayed, use an approved air-purifying respirator.

The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance**Physical state**

Liquid.

Color

Colorless to yellow

Odor

Mild

Odor Threshold

No test data available

pH> 7 - < 12 *Estimated.***Melting point/range**

No test data available

Freezing point

No test data available

Boiling point (760 mmHg)	Decomposes at elevated temperature
Flash point	closed cup >163 °C (325 °F) ASTM D 93
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	Not Applicable
Lower explosion limit	No test data available
Upper explosion limit	No test data available
Vapor Pressure	Literature negligible at ambient temperature
Relative Vapor Density (air = 1)	>1 Literature
Relative Density (water = 1)	> 1.00 at 25 °C (77 °F) / 25 °C Literature
Water solubility	soluble
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No test data available
Decomposition temperature	No data available
Dynamic Viscosity	1,100 mPa.s at 25 °C (77 °F) Estimated.
Kinematic Viscosity	No test data available
Explosive properties	Not explosive
Oxidizing properties	No
Liquid Density	1.0840 g/cm3 at 25 °C (77 °F) ASTM D4669
Molecular weight	No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: No data available

Chemical stability: Stable under recommended storage conditions. See Storage, Section 7.

Possibility of hazardous reactions: Will not occur by itself.

Conditions to avoid: Product can oxidize at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible materials: Avoid contact with oxidizing materials. Avoid contact with: Strong acids. Strong bases. Avoid unintended contact with isocyanates. The reaction of polyols and isocyanates generates heat.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Carbon dioxide. Alcohols. Ethers. Hydrocarbons. Ketones. Polymer fragments.

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity

Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

Typical for this family of materials.

LD50, Rat, > 2,000 mg/kg No deaths occurred at this concentration.

Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Typical for this family of materials.

LD50, Rabbit, > 2,000 mg/kg No deaths occurred at this concentration.

Acute inhalation toxicity

At room temperature, exposure to vapor is minimal due to low volatility; single exposure is not likely to be hazardous. Vapor from heated material or mist may cause respiratory irritation.

The LC50 has not been determined.

Skin corrosion/irritation

Prolonged exposure not likely to cause significant skin irritation.

Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

Serious eye damage/eye irritation

May cause pain disproportionate to the level of irritation to eye tissues.

May cause slight temporary eye irritation.

Corneal injury is unlikely.

Sensitization

Contains component(s) which have not demonstrated the potential for contact allergy in mice.

Based on information for component(s):

Did not cause allergic skin reactions when tested in guinea pigs.

For respiratory sensitization:

No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Specific Target Organ Systemic Toxicity (Repeated Exposure)

Based on available data, repeated exposures are not anticipated to cause significant adverse effects.

Carcinogenicity

Similar polyols did not cause cancer in long-term animal studies.

Teratogenicity

Based on information for component(s): Did not cause birth defects or any other fetal effects in laboratory animals.

Reproductive toxicity

Contains component(s) which did not interfere with reproduction in animal studies.

Mutagenicity

Based on information for component(s): In vitro genetic toxicity studies were negative.

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

COMPONENTS INFLUENCING TOXICOLOGY:

Sucrose, propylene oxide

Acute inhalation toxicity

Typical for this family of materials. No deaths occurred following exposure to a saturated atmosphere.

Glycerol propylene oxide

Acute inhalation toxicity

The LC50 has not been determined.

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Toxicity

Sucrose, propylene oxide

Acute toxicity to fish

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Danio rerio (zebra fish), static test, 96 Hour, 6,310 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), static test, 48 Hour, 9,890 mg/l, OECD Test Guideline 202 or Equivalent

Chronic toxicity to aquatic invertebrates

NOEC, Daphnia magna (Water flea), semi-static test, 21 d, mortality, >= 10 mg/l

Glycerol propylene oxide

Acute toxicity to fish

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

For this family of materials:

LC50, Leuciscus idus (Golden orfe), semi-static test, 96 Hour, > 1,000 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates

For this family of materials:

EC50, Daphnia magna (Water flea), static test, 48 Hour, > 100 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants

For this family of materials:

EC50, *Desmodesmus subspicatus* (green algae), static test, 72 Hour, Growth rate inhibition, > 100 mg/l, OECD Test Guideline 201 or Equivalent

Chronic toxicity to aquatic invertebrates

NOEC, *Daphnia magna* (Water flea), semi-static test, 21 d, mortality, ≥ 10 mg/l

Persistence and degradability

Sucrose, propylene oxide

Biodegradability: Based on information for a similar material: Material is inherently biodegradable (reaches > 20% biodegradation in OECD test(s) for inherent biodegradability).

Glycerol propylene oxide

Biodegradability: For this family of materials: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions. Material is ultimately biodegradable (reaches > 70% mineralization in OECD test(s) for inherent biodegradability).

10-day Window: Fail

Biodegradation: 40 %

Exposure time: 28 d

Method: OECD Test Guideline 301B or Equivalent

10-day Window: Not applicable

Biodegradation: 99 %

Exposure time: 28 d

Method: OECD Test Guideline 302B or Equivalent

Bioaccumulative potential

Sucrose, propylene oxide

Bioaccumulation: Bioconcentration potential is low ($BCF < 100$ or $\log Pow < 3$).

Partition coefficient: n-octanol/water(log Pow): -3.38 - -3.25 Estimated.

Glycerol propylene oxide

Bioaccumulation: No bioconcentration is expected because of the relatively high water solubility.

Mobility in soil

Sucrose, propylene oxide

No relevant data found.

Glycerol propylene oxide

No relevant data found.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local

laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler. Reclaimer. Incinerator or other thermal destruction device. For additional information, refer to: Handling & Storage Information, MSDS Section 7 Stability & Reactivity Information, MSDS Section 10 Regulatory Information, MSDS Section 15

14. TRANSPORT INFORMATION

DOT

Not regulated for transport

Classification for SEA transport (IMO-IMDG):

Transport in bulk
according to Annex I or II
of MARPOL 73/78 and the
IBC or IGC Code

Not regulated for transport
Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Not regulated for transport

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

No SARA Hazards

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)
Section 103**

This material does not contain any components with a CERCLA RQ.

Pennsylvania Worker and Community Right-To-Know Act:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Prop. 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

United States TSCA Inventory (TSCA)

All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

16. OTHER INFORMATION

Revision

Identification Number: 377078 / A001 / Issue Date: 01/11/2019 / Version: 6.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA -

Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

THE DOW CHEMICAL COMPANY urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

US



SAFETY DATA SHEET

THE DOW CHEMICAL COMPANY

Product name: VORANATE™ T-80 Type I TDI DA

Issue Date: 07/26/2019

Print Date: 01/15/2020

THE DOW CHEMICAL COMPANY encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: VORANATE™ T-80 Type I TDI DA

Recommended use of the chemical and restrictions on use

Identified uses: Component(s) for the manufacture of urethane polymers. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative. For industrial use only.

COMPANY IDENTIFICATION

THE DOW CHEMICAL COMPANY
2030 DOW CENTER
MIDLAND MI 48674-0000
UNITED STATES

Customer Information Number:

800-258-2436
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: CHEMTREC +1 800-424-9300

Local Emergency Contact: 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification

GHS classification in accordance with 29 CFR 1910.1200

Acute toxicity - Category 1 - Inhalation

Skin irritation - Category 2

Eye irritation - Category 2A

Respiratory sensitisation - Category 1

Skin sensitisation - Category 1

Carcinogenicity - Category 2

Specific target organ toxicity - single exposure - Category 3

Label elements

Hazard pictograms



Signal word: **DANGER!**

Hazards

Causes skin irritation.

May cause an allergic skin reaction.

Causes serious eye irritation.

Fatal if inhaled.

May cause allergy or asthma symptoms or breathing difficulties if inhaled.

May cause respiratory irritation.

Suspected of causing cancer.

Precautionary statements

Prevention

Obtain special instructions before use.

Do not handle until all safety precautions have been read and understood.

Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

Wash skin thoroughly after handling.

Use only outdoors or in a well-ventilated area.

Contaminated work clothing must not be allowed out of the workplace.

Wear protective gloves/ protective clothing/ eye protection/ face protection.

In case of inadequate ventilation wear respiratory protection.

Response

IF ON SKIN: Wash with plenty of soap and water.

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

IF exposed or concerned: Get medical advice/ attention.

If skin irritation or rash occurs: Get medical advice/ attention.

If eye irritation persists: Get medical advice/ attention.

Take off contaminated clothing and wash before reuse.

Storage

Store in a well-ventilated place. Keep container tightly closed.

Store locked up.

Disposal

Dispose of contents/ container to an approved waste disposal plant.

Other hazards

No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Toluene Diisocyanate

This product is a substance.

Component	CASRN	Concentration
Toluene-diisocyanate, mixture of toluene-2,4-di-isocyanate and toluene-2,6-di-isocyanate	26471-62-5	100.0%

Note

Toluene-diisocyanate (TDI) with CAS# 26471-62-5 describes a mixture of toluene-2,4-di-isocyanate and toluene-2,6-di-isocyanate.

4. FIRST AID MEASURES

Description of first aid measures**General advice:**

First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Skin contact: Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. An MDI skin decontamination study demonstrated that cleaning very soon after exposure is important, and that a polyglycol-based skin cleanser or corn oil may be more effective than soap and water. This may also apply to other isocyanates. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands. Suitable emergency safety shower facility should be available in work area.

Eye contact: Immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention without delay, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.

Ingestion: Do not induce vomiting. Give one cup (8 ounces or 240 ml) of water or milk if available and transport to a medical facility. Do not give anything by mouth unless the person is fully conscious.

Most important symptoms and effects, both acute and delayed:

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed

Notes to physician: Maintain adequate ventilation and oxygenation of the patient. May cause respiratory sensitization or asthma-like symptoms. Bronchodilators, expectorants and antitussives may be of help. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. If you are sensitized to

diisocyanates, consult your physician regarding working with other respiratory irritants or sensitizers. Due to irritant properties, swallowing may result in burns/ulceration of mouth, stomach and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal/esophageal control if lavage is done. Cholinesterase inhibition has been noted in human exposure but is not of benefit in determining exposure and is not correlated with signs of exposure. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Excessive exposure may aggravate preexisting asthma and other respiratory disorders (e.g. emphysema, bronchitis, reactive airways dysfunction syndrome).

5. FIREFIGHTING MEASURES

Extinguishing media

Suitable extinguishing media: Water fog or fine spray.. Dry chemical fire extinguishers.. Carbon dioxide fire extinguishers.. Foam.. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective..

Unsuitable extinguishing media: Do not use direct water stream.. May spread fire..

Special hazards arising from the substance or mixture

Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating.. Combustion products may include and are not limited to:.. Nitrogen oxides.. Isocyanates.. Hydrogen cyanide.. Carbon monoxide.. Carbon dioxide..

Unusual Fire and Explosion Hazards: Material reacts slowly with water, releasing carbon dioxide which can cause pressure buildup and rupture of closed containers. Elevated temperatures accelerate this reaction.. Container may rupture from gas generation in a fire situation.. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.. Dense smoke is produced when product burns..

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry.. Stay upwind. Keep out of low areas where gases (fumes) can accumulate.. Water is not recommended, but may be applied in large quantities as a fine spray when other extinguishing agents are not available.. Do not use direct water stream. May spread fire.. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles.. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container.. Move container from fire area if this is possible without hazard.. Use water spray to cool fire-exposed containers and fire-affected zone until fire is out.. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage.. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS..

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves).. Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing

with self-contained breathing apparatus and fight fire from a remote location.. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections..

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Keep personnel out of low areas. Spilled material may cause a slipping hazard. Keep upwind of spill. Ventilate area of leak or spill. If available, use foam to smother or suppress. Refer to section 7, Handling, for additional precautionary measures. See Section 10 for more specific information. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and materials for containment and cleaning up: Contain spilled material if possible. Absorb with materials such as: Dirt. Vermiculite. Sand. Clay. Do NOT use absorbent materials such as: Cement powder (Note: may generate heat). Collect in suitable and properly labeled open containers. Do not place in sealed containers. Suitable containers include: Metal drums. Plastic drums. Polylined fiber pacs. Wash the spill site with large quantities of water. Attempt to neutralize by adding suitable decontaminant solution: Formulation 1: sodium carbonate 5 - 10%; liquid detergent 0.2 - 2%; water to make up to 100%, OR Formulation 2: concentrated ammonia solution 3 - 8%; liquid detergent 0.2 - 2%; water to make up to 100%. If ammonia is used, use good ventilation to prevent vapor exposure. Contact your supplier for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: Do not breathe vapors, mist or gas. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling. Use with adequate ventilation. This material is hygroscopic in nature. Keep container tightly closed. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

Conditions for safe storage: Store in a dry place. Protect from atmospheric moisture. Do not store product contaminated with water to prevent potential hazardous reaction. See Section 10 for more specific information.

Storage stability

Storage temperature:	Storage Period:
18 - 40 °C (64 - 104 °F)	12 Month

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Component	Regulation	Type of listing	Value
-----------	------------	-----------------	-------

Toluene-diisocyanate, mixture of toluene-2,4-di-isocyanate and toluene-2,6-di-isocyanate	Dow IHG	TWA Inhalable fraction and vapor	0.005 ppm
Further information: SKIN, DSEN, RSEN: Absorbed via Skin, Skin Sensitizer, Respiratory sensitizer			
	Dow IHG	C Inhalable fraction and vapor	0.02 ppm
Further information: SKIN, DSEN, RSEN: Absorbed via Skin, Skin Sensitizer, Respiratory sensitizer			
	OSHA Z-1	C	0.14 mg/m3 0.02 ppm
Further information: (b): The value in mg/m3 is approximate.; °: Ceiling limit is to be determined from breathing-zone air samples.			
	ACGIH	TWA Inhalable fraction and vapor	0.001 ppm
Further information: DSEN: Dermal Sensitization; RSEN: Respiratory sensitization; pulm func: Pulmonary function; eye irr: Eye irritation; asthma: Asthma; A3: Confirmed animal carcinogen with unknown relevance to humans; Skin: Danger of cutaneous absorption			
	ACGIH	STEL Inhalable fraction and vapor	0.005 ppm
Further information: DSEN: Dermal Sensitization; RSEN: Respiratory sensitization; pulm func: Pulmonary function; eye irr: Eye irritation; asthma: Asthma; A3: Confirmed animal carcinogen with unknown relevance to humans; Skin: Danger of cutaneous absorption			

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Toluene-diisocyanate, mixture of toluene-2,4-di-isocyanate and toluene-2,6-di-isocyanate	26471-62-5	toluene diamine	Urine	End of shift	5 µg/g creatinine	ACGIH BEI

Exposure controls

Engineering controls: Use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations. Provide general and/or local exhaust ventilation to control airborne levels below the exposure guidelines. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. The odor and irritancy of this material are inadequate to warn of excessive exposure.

Individual protection measures

Eye/face protection: Use chemical goggles. If exposure causes eye discomfort, use a full-face respirator.

Skin protection

Hand protection: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Butyl rubber. Polyethylene. Chlorinated polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Viton. Neoprene. Polyvinyl chloride ("PVC" or "vinyl"). Nitrile/butadiene rubber ("nitrile" or "NBR"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task. Remove contaminated clothing immediately, wash skin area with soap and water. Contaminated clothing should be disposed of properly or decontaminated and laundered before reuse. Items which cannot be decontaminated, such as shoes, belts and watchbands, should be removed and disposed of properly.

Respiratory protection: Atmospheric levels should be maintained below the exposure guideline. When atmospheric levels may exceed the exposure guideline, use an approved air-purifying respirator equipped with an organic vapor sorbent and a particle filter. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive-pressure air-supplying respirator (air line or self-contained breathing apparatus). For emergency response or for situations where the atmospheric level is unknown, use an approved positive-pressure self-contained breathing apparatus or positive-pressure air line with auxiliary self-contained air supply. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	
Physical state	Liquid.
Color	Colorless to yellow
Odor	Sharp
Odor Threshold	0.05 - 0.2 ppm <i>Based on Literature for TDI.</i> Odor is inadequate warning of excessive exposure.
pH	Not applicable
Melting point/range	9.5 - 10 °C (49.1 - 50 °F) <i>EU Method A.1 (Melting / Freezing Temperature)</i>
Freezing point	9.5 - 10 °C (49.1 - 50 °F) <i>EU Method A.1 (Melting / Freezing Temperature)</i>
Boiling point (760 mmHg)	252 - 254 °C (486 - 489 °F) at 1,013 hPa <i>EU Method A.2 (Boiling Temperature)</i>
Flash point	closed cup 126 °C (259 °F) <i>ASTM D 93</i>
Evaporation Rate (Butyl Acetate = 1)	<1 <i>Literature</i>
Flammability (solid, gas)	Not Applicable
Lower explosion limit	0.9 % vol <i>Literature</i> (2,4 isomer of TDI)
Upper explosion limit	9.5 % vol <i>Literature</i>
Vapor Pressure	0.015 hPa at 20 °C (68 °F) <i>Calculated.</i> 0.01 mmHg at 20 °C (68 °F) <i>Literature</i>
Relative Vapor Density (air = 1)	6.0 <i>Literature</i>
Relative Density (water = 1)	1.22 at 20 °C (68 °F) / 20 °C <i>EU Method A.3 (Relative Density)</i>
Water solubility	insoluble
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	> 595 °C (> 1,103 °F) <i>EC Method A15</i>
Decomposition temperature	No test data available

Dynamic Viscosity	3 mPa.s at 25 °C (77 °F) <i>Literature</i>
Kinematic Viscosity	2.221 mm2/s at 20 °C (68 °F) <i>Literature</i>
Explosive properties	Not explosive
Oxidizing properties	No
Liquid Density	1.22 g/cm3 at 20 °C (68 °F) <i>Literature</i>
Molecular weight	No test data available
Percent volatility	No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: Diisocyanates react with many materials and the rate of reaction increases with temperature as well as increased contact; these reactions can become violent. Contact is increased by stirring or if the other material mixes with the diisocyanate. Diisocyanates are not soluble in water and sink to the bottom, but react slowly at the interface. The reaction forms carbon dioxide gas and a layer of solid polyurea. Reaction with water will generate carbon dioxide and heat.

Chemical stability: Stable under recommended storage conditions. See Storage, Section 7.

Possibility of hazardous reactions: Can occur. Exposure to elevated temperatures can cause product to decompose and generate gas. This can cause pressure build-up and/or rupturing of closed containers. Polymerization can be catalyzed by: Strong bases. Water.

Conditions to avoid: Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems. Pressure build-up can be rapid. Avoid moisture. Material reacts slowly with water, releasing carbon dioxide which can cause pressure buildup and rupture of closed containers. Elevated temperatures accelerate this reaction.

Incompatible materials: Avoid contact with: Acids. Alcohols. Amines. Water. Ammonia. Bases. Metal compounds. Moist air. Strong oxidizers. Diisocyanates react with many materials and the rate of reaction increases with temperature as well as increased contact; these reactions can become violent. Contact is increased by stirring or if the other material mixes with the diisocyanate. Diisocyanates are not soluble in water and sink to the bottom, but react slowly at the interface. The reaction forms carbon dioxide gas and a layer of solid polyurea. Reaction with water will generate carbon dioxide and heat. Avoid contact with metals such as: Aluminum. Zinc. Brass. Tin. Copper. Galvanized metals. Avoid contact with absorbent materials such as: Moist organic absorbents. Avoid unintended contact with polyols. The reaction of polyols and isocyanates generate heat.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials.. Gases are released during decomposition..

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity

Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury. Swallowing may result in gastrointestinal irritation or ulceration.

LD50, Rat, female, 4,130 mg/kg

Acute dermal toxicity

Prolonged skin contact is unlikely to result in absorption of harmful amounts.

LD50, Rabbit, male and female, > 9,400 mg/kg

Acute inhalation toxicity

Easily attainable vapor concentrations may cause serious adverse effects, even death. Excessive exposure to TDI may cause severe irritation of the upper respiratory tract and lungs, fluid in the lungs, permanent decrease of lung function, neurologic disorders, cholinesterase depression and gastrointestinal distress.

LC50, Rat, 1 Hour, vapour, 0.48 mg/l

LC50, Mouse, 6 Hour, dust/mist, 0.1 mg/l

Skin corrosion/irritation

Prolonged contact may cause severe skin irritation with local redness and discomfort.

Serious eye damage/eye irritation

May cause severe eye irritation.

May cause moderate corneal injury.

Vapor may cause eye irritation experienced as mild discomfort and redness.

Sensitization

Skin contact may cause an allergic skin reaction.

Animal studies have shown that skin contact with isocyanates may play a role in respiratory sensitization.

May cause allergic respiratory reaction.

Reexposure to extremely low isocyanate concentrations may cause allergic respiratory reactions in individuals already sensitized.

Asthma-like symptoms may include coughing, difficult breathing and a feeling of tightness in the chest.

Occasionally, breathing difficulties may be life threatening.

Effects may be delayed.

Specific Target Organ Systemic Toxicity (Single Exposure)

May cause respiratory irritation.

Route of Exposure: Inhalation

Target Organs: Respiratory Tract

Specific Target Organ Systemic Toxicity (Repeated Exposure)

Based on available data, repeated exposures are not anticipated to cause additional significant adverse effects.

Carcinogenicity

An oral study in which high doses of TDI were reported to cause cancer in animals has been found to contain numerous deficiencies which compromise the validity of the study. TDI did not cause cancer in laboratory animals exposed by inhalation, the most likely route of exposure.

Teratogenicity

TDI did not cause birth defects in laboratory animals. Slight effects were observed in the fetus but only at doses which caused toxic effects to the mother.

Reproductive toxicity

In animal studies, TDI has been shown not to interfere with reproduction.

Mutagenicity

In vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative. Results of a Drosophila study were reported to be weakly positive; however, these positive findings are believed to be due to degradation of TDI in the solvent delivery vehicle.

Aspiration Hazard

Based on physical properties, not likely to be an aspiration hazard.

Carcinogenicity

Component	List	Classification
Toluene-diisocyanate, mixture of toluene-2,4-di-isocyanate and toluene-2,6-di-isocyanate	IARC	Group 2B: Possibly carcinogenic to humans
	US NTP	Reasonably anticipated to be a human carcinogen
	ACGIH	A3: Confirmed animal carcinogen with unknown relevance to humans.

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Toxicity**Acute toxicity to fish**

Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested).

LC50, *Oncorhynchus mykiss* (rainbow trout), static test, 96 Hour, 133 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates

EC50, *Daphnia magna* (Water flea), static test, 48 Hour, 12.5 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants

EC50, *Skeletonema costatum* (marine diatom), static test, 96 Hour, 3,230 mg/l, OECD Test Guideline 201 or Equivalent

EC50, *Chlorella vulgaris* (Fresh water algae), static test, 96 Hour, 4,300 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria

EC50, activated sludge, Respiration inhibition, 3 Hour, > 100 mg/l, OECD 209 Test

Long-term (chronic) aquatic hazard**Chronic toxicity to aquatic invertebrates**

NOEC, Daphnia magna (Water flea), static test, 21 d, number of offspring, 1.1 mg/l

LOEC, Daphnia magna (Water flea), static test, 21 d, number of offspring, 2.2 mg/l

Persistence and degradability

Biodegradability: In the aquatic and terrestrial environment, material reacts with water forming predominantly insoluble polyureas which appear to be stable. In the atmospheric environment, material is expected to have a short tropospheric half-life, based on calculations and by analogy with related diisocyanates.

Bioaccumulative potential**Bioaccumulation:** No data available.**Mobility in soil**

In the aquatic and terrestrial environment, movement is expected to be limited by its reaction with water forming predominantly insoluble polyureas.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler. Reclaimer. Incinerator or other thermal destruction device. For additional information, refer to: Handling & Storage Information, MSDS Section 7 Stability & Reactivity Information, MSDS Section 10 Regulatory Information, MSDS Section 15

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Toluene diisocyanate
UN number	UN 2078
Class	6.1
Packing group	II
Reportable Quantity	Toluene diisocyanate

Classification for SEA transport (IMO-IMDG):

Proper shipping name	TOLUENE DIISOCYANATE
UN number	UN 2078
Class	6.1
Packing group	II

Marine pollutant	No
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Proper shipping name	Toluene diisocyanate
UN number	UN 2078
Class	6.1
Packing group	II

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Respiratory or skin sensitisation
Carcinogenicity
Specific target organ toxicity (single or repeated exposure)

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Components	CASRN
2,4-Toluene diisocyanate	584-84-9
2,6-Toluene diisocyanate	91-08-7

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Section 103

Components	CASRN	RQ (RCRA Code)
Toluene-diisocyanate, mixture of toluene-2,4-di-isocyanate and toluene-2,6-di-isocyanate	26471-62-5	100 lbs RQ

Pennsylvania Worker and Community Right-To-Know Act:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Prop. 65

WARNING: This product can expose you to chemicals including 2,4-Toluene diisocyanate, 2,6-Toluene diisocyanate, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

United States TSCA Inventory (TSCA)

All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

16. OTHER INFORMATION

Product Literature

Additional information on this product may be obtained by calling your sales or customer service contact.

Revision

Identification Number: 148691 / A001 / Issue Date: 07/26/2019 / Version: 15.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	ACGIH - Biological Exposure Indices (BEI)
C	Ceiling limit
Dow IHG	Dow Industrial Hygiene Guideline
OSHA Z-1	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
STEL	Short-term exposure limit
TWA	8-hour, time-weighted average

Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No

Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

THE DOW CHEMICAL COMPANY urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

US

SAFETY DATA SHEET

HUNTSMAN

Enriching lives through innovation

RUBINATE® 7304

Version	Revision Date:	SDS Number:	Date of last issue: 05/20/2016
1.2	10/27/2016	400001000139	Date of first issue: 05/19/2016

SECTION 1. IDENTIFICATION

Product name : RUBINATE® 7304

Manufacturer or supplier's details

Company name of supplier : Huntsman Polyurethanes
Address : P.O. Box 4980
The Woodlands,
TX 77387
United States of America
Telephone : Tech Info:(800) 257-5547

E-mail address of person responsible for the SDS : MSDS@huntsman.com

Emergency telephone number : Chemtrec: (800) 424-9300 or (703) 527-3887

Recommended use of the chemical and restrictions on use

Recommended use : Component of a Polyurethane System.

Restrictions on use : For industrial use only.

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Acute toxicity (Inhalation) : Category 4
Skin irritation : Category 2
Eye irritation : Category 2B
Respiratory sensitisation : Category 1
Skin sensitisation : Category 1
Specific target organ toxicity - single exposure : Category 3 (Respiratory system)

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : H315 + H320 Causes skin and eye irritation.
H317 May cause an allergic skin reaction.

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H332 Harmful if inhaled.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335 May cause respiratory irritation.

Precautionary statements

: **Prevention:**

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P272 Contaminated work clothing should not be allowed out of the workplace.
P280 Wear protective gloves.
P285 In case of inadequate ventilation wear respiratory protection.

Response:

P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333 + P313 If skin irritation or rash occurs: Get medical advice/attention.
P337 + P313 If eye irritation persists: Get medical advice/attention.
P342 + P311 If experiencing respiratory symptoms: Call a POISON CENTER/doctor.
P362 Take off contaminated clothing and wash before reuse.

Storage:

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

Chemical name	CAS-No.	Concentration (% w/w)
4,4'-methylenediphenyl diisocyanate	101-68-8	60 - 100
Diphenylmethanediisocyanate	9016-87-9	13 - 30
Diphenylmethane-2,4'- diisocyanate	5873-54-1	13 - 30

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SAFETY DATA SHEET

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SECTION 4. FIRST AID MEASURES

- General advice : Move out of dangerous area.
Do not leave the victim unattended.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
- If inhaled : If breathed in, move person into fresh air.
Call a physician or poison control centre immediately.
Keep patient warm and at rest.
Keep respiratory tract clear.
If breathing is difficult, give oxygen.
If breathing is irregular or stopped, administer artificial respiration.
If unconscious place in recovery position and seek medical advice.
Consult a physician immediately if symptoms such as shortness of breath or asthma are observed.
A hyper-reactive response to even minimal concentrations of diisocyanates may develop in sensitised persons.
LC50 (rat) : ca. 490 mg/m³ (4 hours) : using experimentally produced respirable aerosol having aerodynamic diameter <5microns.
- In case of skin contact : In case of contact, immediately flush skin with soap and plenty of water.
Take off contaminated clothing and shoes immediately.
Wash contaminated clothing before reuse.
Thoroughly clean shoes before reuse.
Call a physician if irritation develops or persists.
An MDI study has demonstrated that a polyglycol-based skin cleanser (such as D-TamTM, PEG-400) or corn oil may be more effective than soap and water.
- In case of eye contact : In case of eye contact, remove contact lens and rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Protect unharmed eye.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.
- If swallowed : Gently wipe or rinse the inside of the mouth with water.
DO NOT induce vomiting unless directed to do so by a physician or poison control center.
Keep respiratory tract clear.
Keep at rest.
Do not give milk or alcoholic beverages.
If a person vomits when lying on his back, place him in the recovery position.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.
Take victim immediately to hospital.
- Most important symptoms and effects, both acute and : None known.

SAFETY DATA SHEET

HUNTSMAN

Enriching lives through innovation

RUBINATE® 7304

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delayed

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.
It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.
If potential for exposure exists refer to Section 8 for specific personal protective equipment.
First Aid responders should pay attention to self-protection and use the recommended protective clothing

Notes to physician : Symptomatic and supportive therapy as needed. Following severe exposure medical follow-up should be monitored for at least 48 hours.

The first aid procedure should be established in consultation with the doctor responsible for industrial medicine.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Foam
Carbon dioxide (CO₂)
Dry powder

Unsuitable extinguishing media : High volume water jet

Specific hazards during firefighting : Do not allow run-off from fire fighting to enter drains or water courses.
The pressure in sealed containers can increase under the influence of heat.
Exposure to decomposition products may be a hazard to health.

Hazardous combustion products : Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).
Nitrogen oxides (NO_x)
Hydrogen cyanide (hydrocyanic acid)

Specific extinguishing methods : Cool containers/tanks with water spray.

Further information : Standard procedure for chemical fires.
Due to reaction with water producing CO₂-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed.
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
Prevent fire extinguishing water from contaminating surface

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water or the ground water system.

Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Special protective equipment for firefighters : Wear an approved positive pressure self-contained breathing apparatus in addition to standard fire fighting gear.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.
Immediately evacuate personnel to safe areas.
Ensure adequate ventilation.
Keep people away from and upwind of spill/leak.
Only qualified personnel equipped with suitable protective equipment may intervene.
Never return spills in original containers for re-use.
Treat recovered material as described in the section "Disposal considerations".
For disposal considerations see section 13.
Make sure that there is a sufficient amount of neutralizing/absorbent material near the storage area.
The danger areas must be delimited and identified using relevant warning and safety signs.

Environmental precautions : Do not allow uncontrolled discharge of product into the environment.
Do not allow material to contaminate ground water system.
Prevent product from entering drains.
Prevent further leakage or spillage if safe to do so.
Local authorities should be advised if significant spillages cannot be contained.
If the product contaminates rivers and lakes or drains inform respective authorities.

Methods and materials for containment and cleaning up : Clean-up methods - small spillage
Dilute with plenty of water.
Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).
Clean contaminated surface thoroughly.
Sweep up or vacuum up spillage and collect in suitable container for disposal.
Neutralize small spillages with decontaminant.
The compositions of liquid decontaminants are given in Section 16.
Remove and dispose of residues.
Clean-up methods - large spillage
If the product is in its solid form:
Spilled MDI flakes should be picked up carefully.
The area should be vacuum cleaned to remove remaining dust particles completely.
If the product is in its liquid form:
Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust)

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Leave to react for at least 30 minutes.
Shovel into open-top drums for further decontamination.
Wash the spillage area with water.
Test atmosphere for MDI vapour.
Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

- Technical measures : Ensure that eyewash stations and safety showers are close to the workstation location.
- Local/Total ventilation : Use only with adequate ventilation.
- Advice on protection against fire and explosion : Normal measures for preventive fire protection.
- Advice on safe handling : For personal protection see section 8.
Avoid formation of aerosol.
Do not breathe vapours/dust.
Avoid exposure - obtain special instructions before use.
Avoid contact with skin and eyes.
Smoking, eating and drinking should be prohibited in the application area.
Provide sufficient air exchange and/or exhaust in work rooms.
Open drum carefully as content may be under pressure.
Dispose of rinse water in accordance with local and national regulations.
Persons susceptible to skin sensitisation problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
- Conditions for safe storage : Keep container tightly closed in a dry and well-ventilated place.
Observe label precautions.
Electrical installations / working materials must comply with the technological safety standards.
- Keep container tightly closed in a dry and well-ventilated place.
Observe label precautions.
Electrical installations / working materials must comply with the technological safety standards.
- Recommended storage temperature : 20 - 35 °C
- Storage period : 6 Months

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis

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4,4'-methylenediphenyl diisocyanate	101-68-8	TWA	0.005 ppm	ACGIH
		C	0.02 ppm 0.2 mg/m3	OSHA Z-1

Personal protective equipment

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.
Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hand protection
Remarks

: For prolonged or repeated contact use protective gloves. Protective gloves should be worn when handling freshly made polyurethane products to avoid contact with trace residual materials which may be hazardous in contact with skin.

Use chemical resistant gloves classified under Standard EN374: protective gloves against chemicals and microorganisms. Examples of glove materials that might provide suitable protection include: Butyl rubber, Chlorinated polyethylene, Polyethylene, Ethyl vinyl alcohol copolymers laminated ("EVAL"), Polychloroprene (Neoprene*), Nitrile/butadiene rubber ("nitrile" or "NBR"), Polyvinyl chloride ("PVC" or "vinyl"), Fluoroelastomer (Viton*).

When prolonged or frequently repeated contact may occur, a glove with protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN374) is recommended.

When only brief contact is expected, a glove with protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN374) is recommended.
Contaminated gloves should be decontaminated and disposed of.

Notice: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all requisite workplace factors such as, but not limited to : other chemicals that may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), as well as instructions/specifications provided by the glove supplier.

Eye protection

: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
Chemical splash goggles.
Always wear eye protection when the potential for inadvertent eye contact with the product cannot be excluded.
Please follow all applicable local/national requirements when

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- selecting protective measures for a specific workplace.
Ensure that eyewash stations and safety showers are close to the workstation location.
- Skin and body protection : Impervious clothing
Choose body protection according to the amount and concentration of the dangerous substance at the work place.
- Protective measures : Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing
The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Ensure that eye flushing systems and safety showers are located close to the working place.
- Hygiene measures : Handle in accordance with good industrial hygiene and safety practice.
Wash face, hands and any exposed skin thoroughly after handling.
Remove contaminated clothing and protective equipment before entering eating areas.
When using do not eat or drink.
When using do not smoke.
Contaminated work clothing should not be allowed out of the workplace.
Wash hands and face before breaks and immediately after handling the product.
Wash hands before breaks and at the end of workday.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance : liquid
- Colour : brown
- Odour : No data is available on the product itself.
- Odour Threshold : No data is available on the product itself.
- pH : No data is available on the product itself.
- Boiling point : > 300 °C
No information available.
- Flash point : > 110 °C Method: closed cup
- Evaporation rate : No data is available on the product itself.
- Flammability (solid, gas) : No data is available on the product itself.
- Flammability (liquids) : No data is available on the product itself.
- Upper explosion limit : No data is available on the product itself.
- Lower explosion limit : No data is available on the product itself.

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Vapour pressure : No data is available on the product itself.

Relative vapour density : No data is available on the product itself.

Relative density : 1.2 (25 °C)

Density : 1.21 g/cm³ (25 °C)

Solubility(ies)

Water solubility : No data is available on the product itself.

Solubility in other solvents : No data is available on the product itself.

Partition coefficient: n-octanol/water : No data is available on the product itself.

Auto-ignition temperature : No data is available on the product itself.

Thermal decomposition : No data is available on the product itself.

Self-Accelerating decomposition temperature (SADT) : No data is available on the product itself.

Viscosity

Viscosity, dynamic : 18 - 32 mPa.s (25 °C)

SECTION 10. STABILITY AND REACTIVITY

Reactivity : Stable under recommended storage conditions.

Chemical stability : Stable under normal conditions.

Possibility of hazardous reactions : Reaction with water (moisture) produces CO₂-gas. Exothermic reaction with materials containing active hydrogen groups.

The reaction becomes progressively more vigorous and can be violent at higher temperatures if the miscibility of the reaction partners is good or is supported by stirring or by the presence of solvents.

MDI is insoluble with, and heavier than water and sinks to the bottom but reacts slowly at the interface.

A solid water-insoluble layer of polyurea is formed at the interface by liberating carbon dioxide gas.

No decomposition if stored and applied as directed.

Conditions to avoid : Extremes of temperature and direct sunlight. Exposure to air or moisture over prolonged periods.

Incompatible materials : Acids
Bases
Amines
Steam

Hazardous decomposition products : Carbon dioxide (CO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), dense black smoke

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Hydrocarbons
Hydrogen cyanide (hydrocyanic acid)
Burning produces noxious and toxic fumes.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure : No data is available on the product itself.

Acute toxicity

Components:

4,4'-methylenediphenyl diisocyanate:

Acute oral toxicityComponents : LD50 (Rat, male): > 10,000 mg/kg
Method: OECD Test Guideline 401

Diphenylmethanediisocyanate:

Acute oral toxicityComponents : LD50 (Rat, male): > 10,000 mg/kg
Method: OECD Test Guideline 401

Acute inhalation toxicity - Product : Acute toxicity estimate: 1.42 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: Calculation method

Components:

4,4'-methylenediphenyl diisocyanate:

Acute dermal toxicity : LD50 (Rabbit, male and female): > 9,400 mg/kg
Method: OECD Test Guideline 402

Diphenylmethanediisocyanate:

Acute dermal toxicity : LD50 (Rabbit, male and female): > 9,400 mg/kg
Method: OECD Test Guideline 402

Diphenylmethane-2,4'- diisocyanate:

Acute dermal toxicity : LD50 (Rabbit, male and female): > 9,400 mg/kg
Method: OECD Test Guideline 402

Acute toxicity (other routes of administration) : No data available

Skin corrosion/irritation

Components:

4,4'-methylenediphenyl diisocyanate:

Species: Rabbit

Method: OECD Test Guideline 404

Result: Irritating to skin.

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Diphenylmethanediisocyanate:

Species: Rabbit

Assessment: Irritating to skin.

Method: OECD Test Guideline 404

Result: Skin irritation

Diphenylmethane-2,4'- diisocyanate:

Species: Rabbit

Assessment: Irritant

Method: OECD Test Guideline 404

Result: Irritating to skin.

Serious eye damage/eye irritation

Components:

4,4'-methylenediphenyl diisocyanate:

Species: Rabbit

Result: Mild eye irritation

Diphenylmethanediisocyanate:

Species: Rabbit

Result: Irritation to eyes, reversing within 7 days

Assessment: Mild eye irritant

Method: OECD Test Guideline 405

Diphenylmethane-2,4'- diisocyanate:

Species: Humans

Result: Irritation to eyes, reversing within 7 days

Assessment: Mild eye irritant

Method: OECD Test Guideline 405

Remarks: Mild eye irritation

Respiratory or skin sensitisation

Components:

4,4'-methylenediphenyl diisocyanate:

Exposure routes: Skin

Species: Mouse

Method: OECD Test Guideline 429

Result: May cause sensitisation by skin contact.

Exposure routes: Respiratory Tract

Species: Guinea pig

Result: May cause sensitisation by inhalation.

Diphenylmethanediisocyanate:

Exposure routes: Skin

Species: Guinea pig

Method: OECD Test Guideline 406

Result: May cause sensitisation by skin contact.

Exposure routes: Respiratory Tract

Species: Rat

Result: May cause sensitisation by inhalation.

Diphenylmethane-2,4'- diisocyanate:

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Exposure routes: Skin
Species: Mouse
Assessment: May cause sensitisation by skin contact.
Result: Causes sensitisation.

Exposure routes: Respiratory Tract
Species: Guinea pig
Assessment: May cause sensitisation by inhalation.
Result: Causes sensitisation.

Components:

4,4'-methylenediphenyl diisocyanate:
Assessment: May cause sensitisation by inhalation and skin contact.

Diphenylmethanediisocyanate:
Assessment: May cause an allergic skin reaction., May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Diphenylmethane-2,4'- diisocyanate:
Assessment: Mild eye irritation

Germ cell mutagenicity

Components:

4,4'-methylenediphenyl diisocyanate:
Genotoxicity in vitro : Concentration: 200 ug/plate
Metabolic activation: with and without metabolic activation
Method: Directive 67/548/EEC, Annex, B.13/14
Result: negative

Diphenylmethanediisocyanate:
Genotoxicity in vitro : Concentration: 200 ug/plate
Metabolic activation: with and without metabolic activation
Method: Directive 67/548/EEC, Annex, B.13/14
Result: negative

Diphenylmethane-2,4'- diisocyanate:
Genotoxicity in vitro : Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Components:

4,4'-methylenediphenyl diisocyanate:
Genotoxicity in vivo : Application Route: Inhalation
Exposure time: 3 Weeks
Dose: 118 mg/m³
Method: OECD Test Guideline 474
Result: negative

Diphenylmethanediisocyanate:
Genotoxicity in vivo : Application Route: Inhalation
Result: Not classified due to inconclusive data.

Application Route: Inhalation

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Exposure time: 3 Weeks
Dose: 113 mg/m³
Method: OECD Test Guideline 474
Result: negative

Diphenylmethane-2,4'- diisocyanate:

Genotoxicity in vivo : Application Route: Inhalation
Exposure time: 3 Weeks
Dose: 118 mg/m³
Method: OECD Test Guideline 474
Result: negative

Components:

Diphenylmethanediisocyanate:

Germ cell mutagenicity- : Tests on bacterial or mammalian cell cultures did not show
Assessment mutagenic effects.

Germ cell mutagenicity- : No data available
Assessment

Carcinogenicity

Components:

4,4'-methylenediphenyl diisocyanate:

Species: Rat, (male and female)
Application Route: Inhalation
Exposure time: 24 month(s)
Dose: 1 mg/m³
Frequency of Treatment: 5 daily
Method: OECD Test Guideline 453
Result: positive
Target Organs: Lungs

Diphenylmethanediisocyanate:

Species: Rat, (male and female)
Application Route: Inhalation
Exposure time: 24 month(s)
Dose: 1 mg/m³
Frequency of Treatment: 5 daily
Method: OECD Test Guideline 453
Result: positive

Diphenylmethane-2,4'- diisocyanate:

Species: Rat, (male and female)
Application Route: Inhalation
Exposure time: 24 month(s)
Dose: 1 mg/m³
Frequency of Treatment: 5 daily
Method: OECD Test Guideline 453
Result: positive
Target Organs: Lungs

Carcinogenicity - : No data available
Assessment

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IARC No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

NTP No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Components:

Diphenylmethanediisocyanate:
Effects on fertility

: Species: Rat, male and female
Application Route: Inhalation
Method: OECD Test Guideline 414
Remarks: No significant adverse effects were reported

Diphenylmethane-2,4'- diisocyanate:

Species: Rat, female
Application Route: Inhalation
Method: OECD Test Guideline 414
Result: Animal testing did not show any effects on fertility.

Species: Rat, male and female
Application Route: Inhalation
Method: OECD Test Guideline 414
Result: Animal testing did not show any effects on fertility.

Components:

4,4'-methylenediphenyl diisocyanate:

Effects on foetal
development

: Species: Rat, female
Application Route: Inhalation
General Toxicity Maternal: No observed adverse effect level: 4 mg/m³
Method: OECD Test Guideline 414
Result: No teratogenic effects

Diphenylmethanediisocyanate:

Species: Rat, male and female
Application Route: Inhalation
General Toxicity Maternal: 4 mg/m³
Method: OECD Test Guideline 414
Result: No teratogenic effects

Diphenylmethane-2,4'- diisocyanate:

Species: Rat, male and female
Application Route: Inhalation
General Toxicity Maternal: No observed adverse effect level: 4 mg/m³
Method: OECD Test Guideline 414

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Result: No teratogenic effects

Components:

Diphenylmethanediisocyanate:

Reproductive toxicity -

Assessment

: No toxicity to reproduction

No evidence of adverse effects on sexual function and fertility, or on development, based on animal experiments.

STOT - single exposure

Components:

4,4'-methylenediphenyl diisocyanate:

Exposure routes: Inhalation

Target Organs: Respiratory Tract

Assessment: May cause respiratory irritation.

Diphenylmethanediisocyanate:

Exposure routes: Inhalation

Target Organs: Respiratory Tract

Assessment: May cause respiratory irritation.

Diphenylmethane-2,4'- diisocyanate:

Exposure routes: Inhalation

Target Organs: Respiratory system

Assessment: The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation.

STOT - repeated exposure

No data available

Repeated dose toxicity

Components:

4,4'-methylenediphenyl diisocyanate:

Species: Rat, male and female

NOEC: 0.2 mg/m3

Exposure time: 2 yr

Number of exposures: 5 d

Method: OECD Test Guideline 453

Diphenylmethanediisocyanate:

Species: Rat, male and female

NOEC: 0.2 mg/m3

Test atmosphere: dust/mist

Exposure time: 2 yr

Number of exposures: 5 d

Method: OECD Test Guideline 453

Diphenylmethane-2,4'- diisocyanate:

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Species: Rat, male and female
NOEC: 0.2 mg/m3
Exposure time: 2 yr
Number of exposures: 5 d
Method: OECD Test Guideline 453

Components:

Diphenylmethane-2,4'- diisocyanate:
Repeated dose toxicity - : Mild eye irritation
Assessment

Aspiration toxicity

No data available

Experience with human exposure

General Information: No data available

Inhalation: No data available

Skin contact: No data available

Eye contact: No data available

Ingestion: No data available

Toxicology, Metabolism, Distribution

No data available

Neurological effects

No data available

Further information

Ingestion: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

4,4'-methylenediphenyl diisocyanate:
Toxicity to fish : LC50 (Brachydanio rerio (zebrafish)): > 1,000 mg/l
Exposure time: 96 h
Test Type: static test
Method: OECD Test Guideline 203

Diphenylmethanediisocyanate:

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Toxicity to fish : LC50 (Brachydanio rerio (zebrafish)): > 1,000 mg/l
Exposure time: 96 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 203

LC0: > 1,000 mg/l
Exposure time: 96 h

Diphenylmethane-2,4'- diisocyanate:

Toxicity to fish : LC50 (Brachydanio rerio (zebrafish)): > 1,000 mg/l
Exposure time: 96 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 203

Components:

4,4'-methylenediphenyl diisocyanate:

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 1,000 mg/l
Exposure time: 24 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 202

Diphenylmethanediisocyanate:

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 1,000 mg/l
Exposure time: 24 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 202

Diphenylmethane-2,4'- diisocyanate:

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 1,000 mg/l
Exposure time: 24 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 202

Components:

Diphenylmethanediisocyanate:

Toxicity to algae : EC50 (Desmodesmus subspicatus (Scenedesmus subspicatus)): > 1,640 mg/l
Exposure time: 72 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 201

M-Factor (Acute aquatic toxicity) : No data available

Toxicity to fish (Chronic toxicity) : No data available

Components:

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4,4'-methylenediphenyl diisocyanate:

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): ≥ 10 mg/l
Exposure time: 21 d
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 211

Diphenylmethanediisocyanate:

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): ≥ 10 mg/l
Exposure time: 21 d
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 211

Diphenylmethane-2,4'- diisocyanate:

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): ≥ 10 mg/l
Exposure time: 21 d
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 211

M-Factor (Chronic aquatic toxicity) : No data available

Components:

Diphenylmethanediisocyanate:

Toxicity to bacteria : EC50 (activated sludge): > 100 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 209

Diphenylmethane-2,4'- diisocyanate:

Toxicity to bacteria : EC50 (activated sludge): > 100 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 209

Components:

4,4'-methylenediphenyl diisocyanate:

Toxicity to soil dwelling organisms : NOEC (Eisenia fetida (earthworms)): $\geq 1,000$ mg/kg
Exposure time: 336 h
Method: OECD Test Guideline 207

Diphenylmethanediisocyanate:

Toxicity to soil dwelling organisms : EC50 (Eisenia fetida (earthworms)): $> 1,000$ mg/kg
Exposure time: 336 h
Method: OECD Test Guideline 207

Diphenylmethane-2,4'- diisocyanate:

Toxicity to soil dwelling organisms : NOEC (Eisenia fetida (earthworms)): $\geq 1,000$ mg/kg
Exposure time: 336 h
Method: OECD Test Guideline 207

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Plant toxicity : No data available

Sediment toxicity : No data available

Toxicity to terrestrial organisms : No data available

Ecotoxicology Assessment
Acute aquatic toxicity : No data available

Chronic aquatic toxicity : No data available

Toxicity Data on Soil : No data available

Other organisms relevant to the environment : No data available

Further information:
No data available

Persistence and degradability

Components:

4,4'-methylenediphenyl diisocyanate:

Biodegradability : Inoculum: Domestic sewage
Concentration: 30 mg/l
Result: Not biodegradable
Biodegradation: 0 %
Exposure time: 28 d
Method: Inherent Biodegradability: Modified MITI Test (II)

Diphenylmethanediisocyanate:

Biodegradability : Inoculum: Domestic sewage
Concentration: 30 mg/l
Result: Not biodegradable
Biodegradation: 0 %
Exposure time: 28 d
Method: Inherent Biodegradability: Modified MITI Test (II)

Diphenylmethane-2,4'- diisocyanate:

Biodegradability : Inoculum: Domestic sewage
Concentration: 30 mg/l
Result: Not biodegradable
Biodegradation: 0 %
Exposure time: 28 d
Method: Inherent Biodegradability: Modified MITI Test (II)

Biochemical Oxygen Demand (BOD) : No data available

Chemical Oxygen Demand (COD) : No data available

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BOD/COD : No data available

ThOD : No data available

BOD/ThOD : No data available

Dissolved organic carbon (DOC) : No data available

Physico-chemical removability : No data available

Components:

4,4'-methylenediphenyl diisocyanate:

Stability in water : Degradation half life(DT50): 20 hrs (25 °C)
Method: No information available.
Remarks: Fresh water

Diphenylmethanediisocyanate:

Stability in water : Degradation half life(DT50): 0.8 d (25 °C)
Method: No information available.
Remarks: Fresh water

Photodegradation : No data available

Impact on Sewage Treatment : No data available

Bioaccumulative potential

Components:

4,4'-methylenediphenyl diisocyanate:

Bioaccumulation : Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): 200
Remarks: Bioaccumulation is unlikely.

Diphenylmethanediisocyanate:

Bioaccumulation : Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): 200
Remarks: Bioaccumulation is unlikely.

Diphenylmethane-2,4'- diisocyanate:

Bioaccumulation : Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): 200
Remarks: Bioaccumulation is unlikely.

Components:

4,4'-methylenediphenyl diisocyanate:

Partition coefficient: n-octanol/water : log Pow: 4.51 (20 °C)
pH: 7
Method: OECD Test Guideline 117

Diphenylmethane-2,4'- diisocyanate:

Partition coefficient: n-octanol/water : log Pow: 4.51 (20 °C)

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octanol/water

pH: 7

Method: OECD Test Guideline 117

Mobility in soil

Mobility : No data available

Distribution among
environmental compartments : No data available

Stability in soil : No data available

Other adverse effectsEnvironmental fate and
pathways : No data availableResults of PBT and vPvB
assessment : No data availableEndocrine disrupting
potential : No data availableAdsorbed organic bound
halogens (AOX) : No data available**Hazardous to the ozone layer**

Ozone-Depletion Potential : Regulation: 40 CFR Protection of Environment; Part 82
Protection of Stratospheric Ozone - CAA Section 602 Class I
Substances
Remarks: This product neither contains, nor was
manufactured with a Class I or Class II ODS as defined by the
U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A +
B).

Additional ecological
information : No data availableGlobal warming potential
(GWP) : No data available

SECTION 13. DISPOSAL CONSIDERATIONS**Disposal methods**

Waste from residues : Do not dispose of waste into sewer.
Do not contaminate ponds, waterways or ditches with
chemical or used container.
Send to a licensed waste management company.

Contaminated packaging : Empty remaining contents.
Dispose of as unused product.
Do not re-use empty containers.

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SECTION 14. TRANSPORT INFORMATION

International Regulation

IATA

Not regulated as dangerous goods

IMDG

Not regulated as dangerous goods

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

National Regulations

DOT Classification

UN/ID/NA number	: NA 3082
Proper shipping name	: OTHER REGULATED SUBSTANCES, LIQUID, N.O.S. (Methylene Diphenyl Diisocyanate)
Class	: 9
Packing group	: III
Labels	: CLASS 9
ERG Code	: 171
Marine pollutant	: no

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
4,4'-methylenediphenyl diisocyanate	101-68-8	5000	8308
chlorobenzene	108-90-7	100	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 311/312 Hazards : No SARA Hazards**SARA 313** : The following components are subject to reporting levels established by SARA Title III, Section 313:

4,4'-methylenediphenyl diisocyanate	101-68-8	60.1825 %
Diphenylmethanediisocyanate	9016-87-9	23.1 %

The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 12 (40 CFR 61):

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4,4'-methylenediphenyl diisocyanate	101-68-8	60.1825 %
--	----------	-----------

California Prop. 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

CH INV	: The formulation contains substances listed on the Swiss Inventory, On the inventory, or in compliance with the inventory
TSCA	: On the inventory, or in compliance with the inventory
DSL	: All components of this product are on the Canadian DSL
AICS	: On the inventory, or in compliance with the inventory
NZIoC	: On the inventory, or in compliance with the inventory
ENCS	: On the inventory, or in compliance with the inventory
KECI	: On the inventory, or in compliance with the inventory
PICCS	: On the inventory, or in compliance with the inventory
IECSC	: On the inventory, or in compliance with the inventory
TCSI	: On the inventory, or in compliance with the inventory

Inventories

AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan); ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

TSCA - 5(a) Significant New Use Rule List of Chemicals

No substances are subject to a Significant New Use Rule.

US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)

No substances are subject to TSCA 12(b) export notification requirements.

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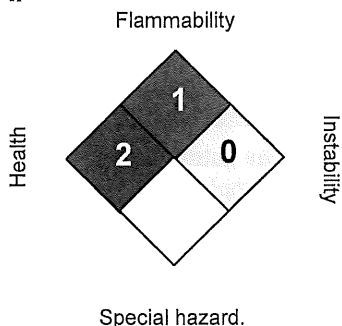
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SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS III:

HEALTH	3*
FLAMMABILITY	1
PHYSICAL HAZARD	0

0 = not significant, 1 = Slight,

2 = Moderate, 3 = High

4 = Extreme, * = Chronic

Liquid decontaminants (percentages by weight or volume) :

Decontaminant 1 : *- sodium carbonate : 5 - 10 % *- liquid detergent : 0.2 - 2 % *- water : to make up to 100 %

Decontaminant 2 : *- concentrated ammonia solution : 3 - 8 % *- liquid detergent : 0.2 - 2 % *- water : to make up to 100 %

Decontaminant 1 reacts slower with diisocyanates but is more environmentally friendly than decontaminant 2.

Decontaminant 2 contains ammonia. Ammonia presents health hazards. (See supplier safety information.)

Revision Date : 10/27/2016

The information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PURPOSE.

THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.

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Section 1: Identification**1.1 Product identifier:**

Diethanolamine LFG 85

Other means of identification:

01456

Chemical names: DEA LFG 85; Diethanolamine Low Freezing Grade 85

1.2 Recommended use:

Chemical raw material for industrial and professional uses.

Restrictions on use: Not for food or drug use. Keep out of reach of children.

1.3 Details of the supplier of the Safety Data Sheet:

INEOS Oxide

Block 5501

21255 A Louisiana Hwy. 1 South

Plaquemine, LA 70764

(866) 865-4767

www.ineosoxide.com**1.4 Emergency Phone No.**

CHEMTREC 1-800-424-9300, 24-hours

Section 2: Hazard Identification**2.1 Classification:**

Serious eye damage – Cat. 1; H318

Acute toxicity (Oral) – Cat. 4; H302

Skin irritation – Cat. 2; H315

Reproductive toxicity – Cat. 2; H361

Specific target organ toxicity (repeated exposure) – Cat. 2 ; H373

2.2 Label elements:

Danger.

Causes serious eye damage.

Harmful if swallowed.

Causes skin irritation.

Suspected of damaging fertility or the unborn child.

May cause damage to organs (blood, kidneys, liver) through prolonged or repeated exposure if swallowed.

Prevention:

Obtain special instructions before use.

Do not handle until all safety precautions have been read and understood.

Wear eye protection, face protection, protective gloves and protective clothing.

Do not breathe fume, mist, vapors or spray.

Wash hands and exposed skin thoroughly after handling.

Do not eat, drink or smoke when using this product.

Response:

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor.

IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell. Rinse mouth.

IF ON SKIN: Wash with plenty of water and soap.

If skin irritation occurs: Get medical attention. Take off contaminated clothing and wash it before reuse.

If exposed or concerned: Get medical advice.

Storage

Store locked up.

Disposal:

Dispose of contents and container in accordance with local, regional, national and international regulations.

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2.3 Other hazards:

May be corrosive to copper and copper alloys (e.g. brass), some aluminum alloys, zinc, zinc alloys and galvanized surfaces.
Harmful to aquatic life with long lasting effects.

Section 3: Composition/Information on Ingredients

3.1 Substances:

Chemical Name	CAS No.	EC #	Wt. %	GHS Classification
Diethanolamine Other identifiers: DEA; 2,2'-iminodiethanol	111-42-2	203-868-0	85	Eye dam. 1; H318 Acute tox. 4; H302 Skin irrit. 2; H315 Repr. tox. 2; H361 STOT RE 2; H373 Aquatic chronic 3; H412
Water	7732-18-5	231-791-2	15	Not classified

Section 4: First-Aid Measures

4.1 First-aid measures:

Inhalation: Remove source of exposure or move to fresh air. Get medical advice or attention if you feel unwell or are concerned.

Eye Contact: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Take care not to rinse contaminated water into the unaffected eye or onto the face. Immediately call a Poison Centre or doctor. Immediate treatment is required.

Skin Contact: Take off immediately contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Immediately wash gently and thoroughly with lukewarm, gently flowing water and mild soap for 15-20 minutes. If skin irritation occurs, get medical advice or attention. Thoroughly clean clothing, shoes and leather goods before reuse or dispose of safely.

Ingestion: Immediately call a Poison Centre or doctor. Do not induce vomiting. If vomiting occurs naturally, lie on your side in the recovery position. Rinse mouth with water.

4.2 Most important symptoms and effects, acute and delayed:

See Section 11 of this SDS where additional symptoms and important health effects are described.

Inhalation: Symptoms of exposure may include coughing, wheezing, sore throat, chest pain, difficult breathing, nausea and vomiting.

Eye Contact: Causes severe irritation and eye damage. Serious damage, even blindness, may result if treatment is delayed. Symptoms include redness, pain and tearing. If DEA is rinsed out of the eye immediately, eye injury may be prevented.

Skin Contact: Causes severe skin irritation. Symptoms include local pain, redness and swelling. Prolonged contact may cause chemical burns, blister formation and possible tissue destruction.

Ingestion: Harmful if swallowed; oral toxicity in rats ranged from 680 to 1820 mg/kg (LD₅₀). Swallowing can cause severe irritation and/or burns of the digestive tract. Symptoms include abdominal and chest pain, nausea, vomiting and diarrhea. Exposure by ingestion may cause reproductive toxicity. Repeated exposure by ingestion may cause adverse effects to the kidney and liver and may cause anemia. Aspiration into the lungs during ingestion or vomiting may cause lung injury.

4.3 Immediate medical attention and special treatment:

If in eyes or if swallowed, call emergency medical services.

Section 5: Fire-fighting Measures

5.1 Suitable extinguishing media:

Water fog or fine spray, alcohol-resistant foam or dry chemical. Use water spray to cool fire-exposed containers.

Unsuitable extinguishing media: High pressure water streams may scatter hot liquid and may spread the fire. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

SAFETY DATA SHEET**5.2 Specific hazards arising from the chemical:**

Product can burn if heated or if involved in a fire [Flash point = 163°C (325°F)].
Heat from a fire can cause a rapid build-up of pressure inside containers, which may cause explosive rupture.
During a fire, smoke may contain vaporized DEA in addition to unidentified toxic and/or irritating compounds.
Thermal decomposition and combustion products may include toxic nitrogen oxide, hydrogen cyanide, formaldehyde carbon monoxide, carbon dioxide and ammonia gases.

5.3 Special protective equipment and precautions for fire-fighters:

Evacuate the area and fight fire from a safe distance or a protected location.
Thermal decomposition products such as nitrogen oxides and hydrogen cyanide are hazardous to health.
Do not enter without specialized protective equipment suitable for the situation.
Approach the fire from upwind to avoid hazardous vapors.
Burning liquids may be extinguished by dilution with water. Water spray may be used to flush spills away from ignition sources. Avoid all contact with this material during fire-fighting operations. Wear chemical resistant clothing (chemical splash suit) and positive-pressure self-contained breathing apparatus.
Contain water run-off if possible.

Section 6: Accidental Release Measures**6.1 Personal precautions, protective equipment and emergency procedures:**

Isolate the area; keep all unprotected people away from the spill area. Ventilate the area.
Extinguish or remove all ignition sources.
Prevent inhalation exposures, skin and possible eye contact.
Wear protective gloves, protective clothing and face protection (See Section 8).
Ensure clean-up is conducted by trained personnel only.
Do not touch or walk through the spilled material.
Spilled material may pose a slipping hazard.

6.2 Environmental precautions:

Prevent material from contaminating soil and from entering sewers or waterways.

6.3 Methods and material for containment and cleaning up:

Stop or reduce leak if safe to do so. Contain the spill with earth, sand or other suitable non-combustible absorbent.
Keep materials which can burn away from spilled product. Do not absorb with sawdust, woodchips or other cellulose materials.
Clean up spills immediately.
Scoop up spilled product and any contaminated absorbents into appropriate, labeled containers. Contaminated absorbent may pose the same hazards as the spilled product. Flush the area with water and collect wash-water for proper disposal.

Section 7: Handling and Storage**7.1 Precautions for safe handling:**

Do not eat, drink or smoke when using this product.
Wear eye/face protection and protective gloves and other equipment required for the workplace.
Wash hands and exposed skin after handling.
Do not breathe fume/mist/vapors/spray.
Avoid generating airborne fumes/vapors/mist from this product.
Handle this product with adequate ventilation.
Keep away from flames and hot surfaces.
Prevent handling with incompatible materials such as sodium nitrite, strong acids and oxidizing agents (see Section 10).
Prevent release of this material to the environment; prevent spills and keep away from drains.
Never perform any welding, cutting, soldering, drilling or other hot work on an empty vessel, container or piping until all liquid and vapors have been cleared.
Inspect containers for leaks before handling. Prevent damage to containers. Assume that empty containers contain residues which are hazardous.
Remove contaminated clothing promptly. Keep contaminated clothing in closed containers; discard or launder before rewearing. Maintain good housekeeping. Inform laundry personnel of contaminant's hazards. Do not take working clothes home.

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7.2 Conditions for safe storage:

Keep containers tightly closed when not in use.
Store in a cool, dry and well-ventilated place. Store away from sunlight, heat and ignition sources.
Keep storage area away from work areas.
Store away from strong oxidants, strong acids and other incompatible materials (see Section 10).
Do not store in containers made of aluminum, copper, brass or other copper alloys, zinc, zinc alloys or galvanized steel.
Store separated from food and feedstuffs.

Section 8: Exposure Controls / Personal Protection

8.1 Control parameters

Occupational Exposure Limits: Consult the local jurisdiction (e.g. province/territory) for their occupational exposure limits.
Legislation for Canadian OH&S is available at : <http://www.ccohs.ca/oshanswers/information/govt.html>

<u>Ingredient</u>	<u>ACGIH® TLV®</u>	<u>U.S. OSHA PEL</u>	<u>Other exposure limits</u>
Diethanolamine (Inhalable fraction and vapor)	1 mg/m ³ Skin	15 mg/m ³ (3 ppm)	NIOSH REL: 3 ppm (15 mg/m ³) Quebec (Canada) VEMP: 3 ppm (13 mg/m ³)

8.2 Engineering controls

Engineering controls: Use only in a well-ventilated area. Use local exhaust ventilation for operations involving heating or spraying. Use local exhaust ventilation in workplaces where general ventilation is not adequate to control the amount in air. Ventilation system should be made of corrosion-resistant material.

If engineering controls and work practices are not effective in controlling exposure to this material or if adverse health symptoms are experienced, then wear suitable personal protection equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire.

8.3 Individual protection measures (PPE)

Eye/Face protection: Wear chemical safety goggles. Wear a face-shield or full-face respirator when needed to prevent exposure to liquid, vapour or fume.

Skin protection: Wear chemical protective gloves. Wear clean, body-covering, protective coveralls to prevent skin exposure. If spill or splashing is possible, wear chemical protective apron and boots.

Recommended materials for protective gloves and clothing include butyl rubber, neoprene rubber. Resistance of specific materials can vary from product to product; evaluate resistance under conditions of use and maintain clothing carefully.

Respiratory protection: If concentrations in air exceed the occupational exposure limits, then wear respiratory protection. Respiratory protection should not be necessary unless the product is heated to release vapours or a mist is created. If airborne vapour or mist exposure is likely wear a chemical cartridge respirator with cartridges to protect against ethanolamine, or a powered air-purifying respirator with cartridges to protect against ethanolamine, or a full-face self-contained breathing apparatus. For spills or uncontrolled releases, wear a supplied-air respirator.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. A respiratory protection program that meets the regulatory requirement, such as OSHA's 29 CFR 1910.134, ANSI Z88.2 or Canadian Standards Association (CSA) Standard Z94.4, must be followed whenever workplace conditions warrant a respirator's use.

Other protection: Workplaces should have a safety shower, hand-wash station and eye-wash fountain available.

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Section 9: Physical and Chemical Properties

Basic physical and chemical properties:	
Appearance:	Liquid at temperatures above freezing point. Colorless, viscous. Solid at temperatures below freezing point.
Odor:	Ammonia-like, fish-like disagreeable odor.
Odor threshold:	0.27 ppm
pH:	11 (10% solution)
Melting point/freezing point:	27 °C (81 °F) (melting); -2 °C (28 °F) (freezing)
Initial boiling point and boiling range:	268°C (514°F)
Flash point:	163°C (325°F) PMCC; ASTM D93
Evaporation Rate:	< 0.01 (n-Butyl Acetate = 1)
Flammability (solid, gas):	Not applicable
Upper/lower flammability or explosive limits:	Not available
Vapor pressure:	0.000037 kPa at 25 °C (77 °F)
Vapor density:	3.7 (air=1)
Relative density:	1.09 (water = 1)
Solubility (ies):	95.4 g/L @ 20°C. Soluble in water
Partition coefficient (n-octanol/water, log K _{ow}):	-2.46 25°C; OECD 107
Auto-ignition temperature:	> 662 °C (1224 °F)
Decomposition temperature:	200 °C (392 °F)
Viscosity:	190 - 270 mPa.s at 20 °C (dynamic)
Absolute density:	1090.7 kg/m ³ @ 25°C

Section 10: Stability and Reactivity

10.1 Reactivity:

Not reactive under normal conditions of use.

10.2 Chemical stability:

Unstable under certain conditions - see Conditions to Avoid.

Alkanolamine substances are decomposed by light and slowly oxidized by air, turning yellow and then brown. This reaction is accelerated by heat and the presence of metals.

Alkanolamine substances are oxidized by air slowly with evolution of heat. This reaction may lead to spontaneous combustion if the substance is on an adsorbent or on a high surface area material (e.g. absorbent material or thermal insulation).

10.3 Possibility of hazardous reactions:

Heating increases the risk of fire.

Heating above 60°C in aluminum can result in corrosion and generation of flammable hydrogen gas.

Reacts with cellulose nitrate causing fire and explosion hazard.

Reacts violently with strong acids and strong oxidants (e.g. nitric acid, hydrogen peroxide).

Contact with nitrosating agents, under acidic conditions such as nitrous acid, sodium nitrite or nitrogen oxides, can form nitrosamines some of which are potent carcinogens.

10.4 Conditions to avoid:

Avoid high temperatures and contact with sources of ignition.

Avoid exposing product to air, light and moisture.

Avoid direct sunlight.

10.5 Incompatible materials:

Contact with strong acids, strong oxidizing agents, halogenated hydrocarbons, nitrating agents may increase risk of vigorous or violent reaction.

Contact with alkali metals, metal hydrides and aluminum may generate flammable hydrogen gas.

Contact with Isocyanates and Isothiocyanates: reaction may be rapid, evolving heat.

Product may be corrosive to aluminum alloys at elevated temperatures, many 400 series stainless steel alloys, copper, zinc, and aluminum bronze.

In combination with water, the product may be corrosive to copper and copper alloys (e.g. brass), some aluminum alloys, zinc, zinc alloys, and galvanized surfaces.

Diethanolamine attacks some polymers including polyvinylchloride, polyurethane, polyamide imide, polyvinylidene fluoride and high-density polyethylene at elevated temperatures.

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10.6 Hazardous decomposition products:

Decomposes at temperatures above 200°C; hazardous decomposition products may include nitrogen oxides, ammonia, hydrogen cyanide, formaldehyde. Hazardous decomposition products depend upon temperature, air supply and the presence of other materials.

Oxidation in air may form transient, organic peroxides or thermally unstable N-oxides such as hydroxylamines and carbamates form as well as nitrosamines, which are suspected cancer causing chemicals. Oxidation of Diethanolamine and decomposition of products is accelerated by light, heat, and/or presence of metals or metal oxides.

Section 11: Toxicological Information**11.1 Information on toxicological effects****Likely routes of exposure**

Ingestion, Eye contact, Skin contact, Inhalation.

Acute toxicity

Inhalation: LC₅₀ of pure DEA was greater than 0.2 mg/L (greater than saturated vapor concentration and no mortalities). Inhalation test equivalent to OECD test guideline 403 and was for an 8 hour exposure time. Calculated 4-hour exposure LC₅₀ = 0.4 mg/L.

Based on information from animal tests, breathing vapors, spray or fume may cause nose and throat irritation, lung injury. Symptoms may include coughing, shortness of breath, difficult breathing and tightness in the chest. Symptoms may develop hours after exposure and are made worse by physical effort.

Ingestion: Harmful if swallowed. Acute toxicity estimate for the mixture is 1886 mg/kg (rat). Based on information from animal tests swallowing may cause liver and kidney damage, brain damage and blood changes.

Skin: Acute toxicity estimate for the mixture is 10,000 mg/kg (rabbit). Dermal exposures caused dose-related anemia and toxicity to the liver and kidneys in rats and mice.

11.2 Acute toxicity data:

<u>Ingredient</u>	<u>LD₅₀ Oral</u>	<u>LD₅₀ Dermal</u>	<u>LC₅₀ Inhalation (4 hrs.)</u>
Diethanolamine (DEA)	1600 mg/kg (rat)	8180 mg/kg (rabbit)	> 0.4 mg/L (rat)

Skin corrosion / irritation:

Human experience and animal studies caused moderate or severe skin irritation.

Irritating to skin in an animal study according to OECD test guideline 404 (24, 48, 72 hours) in rabbit.

Serious eye damage / irritation:

Human experience and animal tests caused serious eye damage.

Highly irritating, causing serious eye damage in an animal study according to OECD test guideline 405 (24, 48, 72 hours) in rabbit.

STOT (Specific Target Organ Toxicity) Single Exposure:

Inhalation: Short-term inhalation of 858-6000 mg/m³ (cited as 200-1400 ppm) Diethanolamine aerosol or vapor caused breathing difficulties and some deaths in male rats. Continuous inhalation of 107 mg/m³ (cited as 25 ppm) for 216 hours (9 days) resulted in increased liver and kidney weights and altered kidney and liver function.

Ingestion: Ingestion of large quantities may cause liver and kidney damage, brain damage and blood changes. Skin and ingestion exposures have caused dose-related anemia and toxicity to the liver and kidneys in rats and mice.

Skin absorption: In male rats, a significant increase in relative kidney and liver weights occurred following a single oral dose of 200 mg/kg and higher. Signs of anemia were present in female rats ingesting 79 mg/kg/day and higher for 2 weeks and in male rats ingesting 162 mg/kg/day and higher for 2 weeks.

Aspiration hazard:

Due to the alkaline property of DEA, any aspiration during ingestion or vomiting could result in lung injury.

Does not meet the criteria for classification in the class: Aspiration hazard.

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11.3 Chronic toxicity:

STOT (Specific Target Organ Toxicity) Repeated Exposure:

In tests with animals, long-term ingestion, inhalation and skin contact exposures to high doses caused anemia and damage to the liver and kidney.

A NOAEC for systemic effects in rats was 15 mg/m³, exposure by inhalation.

A NOAEC for upper respiratory tract irritation was 3 mg/m³.

A LOAEL for systemic effects by dermal application was 32 mg/kg bw/day in rats. Effects included dermal hyperkeratosis, anemia, liver toxicity and nephropathy.

In female rats, repeated oral doses, a LOAEL of 14 mg/kg bw/day was reported for anemia.

Respiratory and / or skin sensitization:

Not known to be a skin sensitizer. Not known to be a respiratory sensitizer.

Not sensitizing in a study conducted according to OECD guideline 406, in Guinea pig.

Germ cell mutagenicity:

Evidence from animal studies, cultured mammalian cells, and bacterial studies does not indicate that DEA is a mutagen.

Negative results from in vitro tests according to OECD guidelines 471 (*E. coli*) and 476 (*S. typhimurium*).

Negative results from in vivo tests in mice according to OECD guideline 474.

Reproductive effects:

Suspected of damaging fertility or the unborn child. For DEA, an extended One-Generation Reproductive Toxicity Study according to OECD TG 443 was performed. The NOAEL (no observed adverse effect level) for fertility and reproductive performance in P0 and F1 rats was 300 ppm, oral in drinking water based on lower number of implants and effects to reproductive organs in both males and females at the LOAEL (lowest observed adverse effect level) of 1000 ppm.

Developmental effects:

Suspected of damaging fertility or the unborn child. For DEA, an extended One-Generation Reproductive Toxicity Study according to OECD TG 443 was performed. The NOAEL for developmental toxicity in F1 rats was 100 ppm, oral in drinking water based on impaired pup survival at the LOAEL of 300 ppm.

Effects on or via lactation:

No information was located.

Carcinogenicity:

NTP Report: Under the conditions of 2 year dermal studies, there was no evidence of carcinogenic activity of DEA in F344/N rats administered 16, 32 or 64 mg/kg DEA or in female F344/N rats administered 8, 16 or 32 mg/kg. There was clear evidence of carcinogenic activity of DEA in male and female B6C3F1 mice based on increased incidences of liver neoplasms in males and females and increased incidences of renal tubule neoplasms in males. IARC Monograph Volume101 reports a mechanism for liver tumor induction in mice exposed to DEA that involves the inhibition of choline uptake in the liver. As humans are less susceptible to choline deficiency than rats or mice, the results may not be predictive of induction of cancer in humans.

IARC lists DEA in Group 2B – Possibly carcinogenic to humans.

ACGIH designates DEA as A3 – confirmed animal carcinogen with unknown relevance to humans.

DEA is not listed on the NTP Report On Carcinogens.

Interactions with other chemicals:

Diethanolamine may react chemically with nitrosating compounds under certain conditions to form nitrosamines, which are mutagenic and possibly carcinogenic.

Section 12: Ecological Information**12.1 Ecotoxicity:**

Data for pure Diethanolamine:

LC₅₀ fish = 1460 mg/L (*Pimephales promelas*; 96-hour; fresh water; static)

EC₅₀ crustacea = 55 mg/L (*Daphnia magna*; 48-hour; fresh water; static)

ErC₅₀ algae = 2.2 mg/L (*Pseudokirchneriella subcapitata*; 96-hour; fresh water; semi-static)

NOEC crustacea = 0.78 mg/L (*Daphnia magna*; 21-day; fresh water; semi-static)

12.2 Persistence and degradability:

Degrades rapidly based on quantitative tests.

Biodegradation in water: 93% in 28 days, test according to OECD 301F.

12.3 Bioaccumulative potential:

Low potential to bioaccumulate based on log K_{ow} -2.46 @ 20°C, test data according to OECD 107.

SAFETY DATA SHEET**12.4 Mobility in soil:**

Volatilization of DEA from water is very slow (Henry's Law Constant (H) is $5.35\text{E-}14 \text{ atm m}^3/\text{mol}$).

Potential for mobility in soil is very high (Koc between 0 and 50).

Log soil organic carbon partition coefficient (log Koc) is estimated to be 0.60.

12.5 Other information:

Not dangerous for the ozone layer (According to EU Council Regulation No 1005/2009)

For detailed Ecological data, write to the address in Section 1 or email INEOS Oxide Technical Services at oxide.us.techservices@ineos.com.

Section 13: Disposal Considerations**13.1 Disposal methods**

Do NOT discard into any sewers, on the ground or into any body of water. Store material for disposal as indicated in Section 7 Handling and Storage.

Dispose of in accordance with local/regional/national/ international regulations.

For unused, uncontaminated product, the preferred options include sending to a licensed, permitted recycler, reclaimer incinerator or other thermal destruction device.

USA: Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste.

Other information:

Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. INEOS Oxide HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN SDS SECTION 2.

As a service to its customers, INEOS Oxide can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or manage chemicals or plastics, and that manage used drums. Email INEOS Oxide Technical Services at oxide.us.techservices@ineos.com.

Section 14: Transport Information**14.1 U.S. Hazardous Materials Regulation (DOT 49CFR):**

U.S. Bulk shipments exceeding >117 lbs (>53.4 kg) ship as:

UN3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (DIETHANOLAMINE), Class 9, PG III

Reportable Quantity (RQ) for U.S. Shipments: 100 lbs (45.4 kg) for Diethanolamine

14.2 IMO classification:

Not regulated

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Diethanolamine: Category Y

14.3 ICAO/IATA classification:

Not regulated

14.4 Canadian Transportation of Dangerous Goods (TDG):

Not regulated

For regulatory information regarding transportation, if required, consult product shipping papers, or your INEOS Oxide representative.

SAFETY DATA SHEET

Section 15: Regulatory Information

15.1 Safety, health and environmental regulations:

USA:

OSHA: This material is considered a hazardous chemical by the OSHA Hazard Communication Standard 29 CFR 1910.1200 (2012).

Toxic Substances Control Act (TSCA) Section 8(b): All ingredients are listed on the TSCA Inventory.

Additional USA regulatory lists: Clean Air Act -Diethanolamine.

SARA Title III - Section 313. Diethanolamine

California Safe Drinking Water and Toxic Enforcement Act, Proposition 65: Diethanolamine (CAS No. 111-42-2) is on the list of chemicals known to the State to cause cancer.

State Right To Know - Diethanolamine: Massachusetts. New Jersey. Pennsylvania.

Canada:

DSL status: Listed on the DSL (Domestic Substances List).

NPRI Substances: Diethanolamine (and its salts) NPRI Part (Threshold Category): 1A, Reportable to NPRI if manufactured, processed, or otherwise used at quantities greater than: 10 tonnes.

European Union:

European Inventories: 2',2"-iminodiethanol listed in EINECS # 203-868-0.

Other international inventories

Australia: Present on the Inventory of Chemical Substances (AICS).

China: Present on the Chinese inventory (IECSC), 11481.

Japan: Present on ENCS ; Diethanolamine (2)-354; (2)-302.

Korea: Present on the Inventory of Existing and Evaluated Chemical Substances; Diethanolamine KE-20959.

Mexico: Present on the inventory (INSQ).

New Zealand: Present on the inventory (NZIoC) HSNO Approval: HSR002962.

Philippines: Present on the inventory (PICCS).

Taiwan: Present on the inventory (TCSI).

Thailand: Present on the inventory (TCSI / TECI) 55-1-00670.

Turkey: Present on the inventory. EC# 203-868-0

Vietnam: Present on the national chemicals inventory NCI 0623.

SAFETY DATA SHEET

Section 16: Other Information**Revision date:**

February 20, 2020

Revision summary:

Replaces previous version June 2018 with the following revisions:

Section 1.2: Recommended use and restrictions on use

Section 2.1, 2.2: new classification and labeling for reproductive toxicity hazard

Section 3.1: new GHS classification for DEA Reproductive toxicity category 2; H361

Section 9: new data for Physical and Chemical properties

References and sources for data:

CCOHS – ChemInfo

www.ccohs.ca/oshanswers/information/govt.html

ECHA - Information on Chemicals, Registered Substances

HSDB – Hazardous Substances Data Bank®

IARC Monograph Volume101

National Toxicology Program (NTP) – Report on Carcinogens.

NIOSH – National Institute for Occupational Safety and Health

RTECS® - Registry of Toxic Effects of Chemical Substances

Additional information:

The information provided on this SDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

Appendix D - Public Notice

PUBLIC NOTICE

Adient US LLC has applied to the Tennessee Department of Environment & Conservation, Division of Air Pollution Control (Division identification number 28-0076/980244) for approval to expand its polyurethane foam manufacturing process at the facility in Pulaski, Giles County, Tennessee. Adient US LLC proposes to increase production of the three polyurethane foam production lines. The project is subject to review under the State rule for Prevention of Significant Deterioration of Air Quality (PSD), Paragraph 1200-03-09-.01(4) of the Tennessee Air Pollution Control Regulations, which requires a public notification and 30-day public comment period.

The Division of Air Pollution Control has reviewed the application with respect to the above-mentioned PSD regulations and has determined that construction can be approved if certain conditions are met. A copy of the PSD application materials, a copy of the PSD preliminary determination, and a copy of the draft construction permit are available for public inspection during normal business hours at the following locations:

Columbia Environmental Field Office
Division of Air Pollution Control
1421 Hampshire Pike
Columbia, TN 38401

Tennessee Department of Environment & Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243

Electronic copies of the draft permits are available by accessing the TDEC internet site located at:

<https://www.tn.gov/environment/ppo-public-participation/ppo-public-participation/ppo-air.html>

Questions concerning the source(s) may be addressed to Tracy Kefauver at (615) 532-0536 or by e-mail at Tracy.Kefauver@tn.gov.

Interested parties are invited to review these materials and comment. In addition, a public hearing may be requested at which written or oral presentations may be made. To be considered, written comments or requests for a public hearing must be received no later than 4:30 PM on **September 19, 2022**. To assure that written comments are received and addressed in a timely manner, written comments must be submitted using one of the following methods:

1. **Mail, private carrier, or hand delivery:** Address written comments to Ms. Michelle W. Owenby, Director, Division of Air Pollution Control, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue 15th Floor, Nashville, Tennessee 37243.
2. **E-mail:** Submit electronic comments to air.pollution.control@tn.gov.

A final determination will be made after weighing all relevant comments.

Individuals with disabilities who wish to review information maintained at the above-mentioned depositories should contact the Tennessee Department of Environment and Conservation to discuss any auxiliary aids or services needed to facilitate such review. Such contact may be in person, by writing, telephone, or other means, and should be made no less than ten days prior to the end of the public comment period to allow time to provide such aid or services. Contact the Tennessee Department of Environment and Conservation ADA Coordinator, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue 22nd Floor, Nashville, TN 37243, 1-(866)-253-5827. Hearing impaired callers may use the Tennessee Relay Service, 1-(800)-848-0298.

Air Pollution Control

DATE: August 19, 2022

Assigned to – Tracy Kefauver

Appendix E – Correspondence

The following are EPA Region IV modeling correspondence (dated April 19, 2022) on the Adient Pulaski air quality analysis.

Tracy Kefauver

From: Howard, Chris <Howard.Chris@epa.gov>
Sent: Tuesday, April 19, 2022 1:43 PM
To: Haidar Alrawi; Gillam, Rick; Shepherd, Lorinda
Cc: Paul LaRock; Lacey Hardin; Richard Smrz; Tracy Kefauver; Travis Blake; Lusky, Katy
Subject: [EXTERNAL] RE: Adient -Pulaski, TN - PSD Application

*** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. ***

Haidar,

I hope you are doing well.

Thanks for providing the VOC-only air quality analysis for Adient-Pulaski to us for review. We have reviewed the air quality analysis in Sections 6 and 7 of the application and we have no comments regarding the modeling.

-Chris

Christopher M. Howard
Regional Meteorologist
US EPA Region 4 - Atlanta
404/562-9036
Howard.chris@epa.gov

From: Haidar Alrawi <Haidar.Alrawi@tn.gov>
Sent: Wednesday, April 13, 2022 3:03 PM
To: Howard, Chris <Howard.Chris@epa.gov>; Gillam, Rick <Gillam.Rick@epa.gov>; Rinck, Todd <Rinck.Todd@epa.gov>; Shepherd, Lorinda <Shepherd.Lorinda@epa.gov>
Cc: Paul LaRock <Paul.LaRock@tn.gov>; lacey.hardin@tn.gov; Richard Smrz <Richard.Smrz@tn.gov>; Tracy Kefauver <Tracy.Kefauver@tn.gov>; Travis Blake <travis.blake@tn.gov>
Subject: RE: Adient -Pulaski, TN - PSD Application

Good afternoon,

Attached, please find a PSD construction permit application that was received on 3/30 for the Adient facility in Pulaski, TN. This source manufactures cushion seats for the automotive industry and only VOC emissions are subject to PSD review at a potential-to-emit emission rate of about 500 tons per year. The modeling analyses are addressed in sections 6 and 7 of the application.

Please let me know if you have any questions or need additional information.

The following are responses to questions from EPA Region IV (dated August 9, 2022) after review of Adient's construction permit application

Jill Pratt

From: Tracy Kefauver
Sent: Tuesday, August 9, 2022 9:38 AM
To: Ferrando, Emily
Cc: Tawanna Reid
Subject: FW: Adient PSD Application
Attachments: 220808_TDEC_PSD Construction Permit Application_EPA Region 4 Comments_Response_final.pdf

Tracking:	Recipient	Delivery
	Ferrando, Emily	
	Tawanna Reid	Delivered: 8/9/2022 9:38 AM

Good Morning Emily,

Please see replies to your questions below and in the attachment. Please contact me with any further questions, comments or to discuss.

We hope to have a draft permit and preliminary determination to you for review no later than August 22, 2022.

Thanks
Tracy

Thanks,



Tracy Kefauver | TDEC-Environmental Protection Specialist 2
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue,
Nashville, TN 37243
p. 615-532-0536
Tracy.Kefauver@tn.gov
<https://www.tn.gov/environment/permit-permits/permit-air-home.html>

We value your opinion.
Please take a few minutes to [complete our customer service survey](#).
Internal Customers please complete our [customer satisfaction survey](#).

From: Kris Patrick Foster <kris.patrick.foster@adient.com>
Sent: Monday, August 8, 2022 5:24 PM
To: Tracy Kefauver <Tracy.Kefauver@tn.gov>
Cc: Tawanna Reid <Tawanna.Reid@tn.gov>
Subject: [EXTERNAL] RE: Adient PSD Application

Tracy,

Please see attached responses to the below EPA questions. If you have any further inquiries, please don't hesitate to contact me!

Thank you!



Kris P. Foster

Environmental, Health and Safety Lead

1890 Mines Road

Pulaski, TN 38478

Cell: 931-638-5918

Office: 931-424-7848

Adient – INTERNAL

From: Tracy Kefauver <Tracy.Kefauver@tn.gov>
Sent: Tuesday, August 2, 2022 2:39 PM
To: Kris Patrick Foster <kris.patrick.foster@adient.com>
Cc: Tawanna Reid <Tawanna.Reid@tn.gov>
Subject: FW: Adient PSD Application

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Kris,

Please see the bulleted items in the below email from EPA regarding Adient's PSD construction permit application. The first and last bullet items have already been included in the permit and/or preliminary determination (my comment in red below). Please respond to us regarding bullets 2-4. We will evaluate and include if necessary, in the preliminary determination and/or permit.

We plan to have a draft permit and preliminary determination document to you for your review by end of this week.

Also of note, we submitted this PSD construction application to EPA on April 14, 2022.

Please contact me with any questions.

Thanks,



Tracy Kefauver | TDEC-Environmental Protection Specialist 2

Division of Air Pollution Control

William R. Snodgrass Tennessee Tower, 15th Floor

312 Rosa L. Parks Avenue,

Nashville, TN 37243

p. 615-532-0536

Tracy.Kefauver@tn.gov

<https://www.tn.gov/environment/permit-permits/permit-air-home.html>

We value your opinion.

Please take a few minutes to [complete our customer service survey](#).

Internal Customers please complete our [customer satisfaction survey](#).

From: Ferrando, Emily <Ferrando.Emily@epa.gov>
Sent: Friday, July 29, 2022 12:45 PM
To: Tracy Kefauver <Tracy.Kefauver@tn.gov>
Cc: Tawanna Reid <Tawanna.Reid@tn.gov>
Subject: [EXTERNAL] Adient PSD Application

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****

Hi Tracy,

I hope that you are doing well! I have been looking over the Adient PSD Application and there were a few things that I saw and wanted to touch base with you on. I know you are working on the draft permit so you may have already addressed these items but I just wanted to share what we found when looking through the application. I would be happy to further discuss any of these items with you, feel free to give me a call or I can set up a Teams meeting for us to go over them.

- It appears as though a baseline of 0 in the emission calculations was used because Adient became a major PSD source by relaxing enforceable limits, in accordance with TDEC rule 1200-03-09-.01(4)(a)6, and did not obtain a PSD permit at that time as included in Adient's February 2022 consent decree. Because this reasoning is not very clear in the application, it is recommended to include it in the preliminary and final determinations so that it is present in the permit record. **This is included in the preliminary determination.**
- The emission rates used in the calculations in Appendix B of the application are noted to be from a source test conducted on October 1, 1997. It is recommended to use emission factors from a more recent source test. **See Adient's reply in attachment**
- The applications included discussion of filterable PM emissions but does not address condensible PM emissions. It is recommended to include any condensible PM emissions and further explain how no PM2.5 emissions are expected. **See Adient's reply in attachment**
- The application states that 2006 dollars were used to calculate the control costs in the BACT analysis and Appendix C lists the cost base date as April 1988. Per Section 2.5.3 of EPA's Control Cost Manual, *"It should be noted that the accuracy associated with escalation (and its reverse, de-escalation) declines the longer the time period over which this is done. Escalation with a time horizon of more than five years is typically not considered appropriate as such escalation does not yield a reasonably accurate estimate."* It is recommended to perform the cost analysis with more recent data than that of either 1988 or 2006. Additionally, the inclusion of more detailed cost calculations used to estimate the equipment costs or a quote, if a quote was used to determine the equipment costs, would be helpful in order to better understand the cost of add on controls. **See Adient's reply in attachment**
- In the conclusion paragraph of the BACT analysis, the application states *"Adient concludes and asserts the current configuration without VOC abatement is BACT for this project and for the existing process"* and does not provide a numerical BACT limit. Even if no add on control technology is chosen as BACT, it is recommended to include a numerical BACT limit in the construction permit. **The numerical limit is provided in the preliminary determination and the construction permit 980244.**

Thank you,
Emily

Emily Ferrando
Air Permits Section
EPA Region 4, Atlanta GA
(404) 562-9042
Pronouns: [she/her](#)

1890 Mines Road
Pulaski, Tennessee 38478
Tel 931.363.5666 Fax 931.424-6722



August 8, 2022

Michelle Owenby, Technical Secretary
State of Tennessee, Department of Environment and Conservation
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

SUBJECT: Air Construction Permit Application, Prevention of Significant Deterioration
Response to USEPA Region 4 Comments
Adient US, LLC
1890 Mines Road, Pulaski, TN 38478

Ms Owenby,

We are in receipt of comments from Emily Ferrando, Air Permits Section, USEPA Region 4 forwarded to us by Tracy Kefauver, Environmental Protection Specialist 2, TDEC, Division of Air Pollution Control. Below are our responses to the comments.

- *It appears as though a baseline of 0 in the emission calculations was used because Adient became a major PSD source by relaxing enforceable limits, in accordance with TDEC rule 1200-03-09-.01(4)(a)6, and did not obtain a PSD permit at that time as included in Adient's February 2022 consent decree. Because this reasoning is not very clear in the application, it is recommended to include it in the preliminary and final determinations so that it is present in the permit record.*

We understand from Tracy's email of August 2, 2022, that TDEC has addressed this comment and included the requested information in the preliminary determination.

- *The emission rates used in the calculations in Appendix B of the application are noted to be from a source test conducted on October 1, 1997. It is recommended to use emission factors from a more recent source test.*

The emission rates about which USEPA Region 4 is referring are toluene diisocyanate (TDI) and methylene diphenyl diisocyanate (MDI). The vapor pressures of these constituents are 0.01 mmHg @ 25 °C and 0.000005 mmHg @ 20 °C, respectively. These constituents are used in the manufacture of the foam car seats. In regard to TDI, current formulations have less free TDI in the raw component (the ISO portion) and are largely pre-catalyzed meaning they are partially reacted and are applied within the closed mold, allowing containment within the reactive application equipment and accordingly, are less likely to volatilize. While the source test was conducted in 1997, the foam manufacturing process has not changed and the units of measurement are expressed as "lb emitted/lb used" meaning the units are still applicable. Given the vapor pressures of these two constituents and the current formulation of TDI, they have little propensity to evaporate and they are used in the exact same manner as they were in 1997. Consequently, Adient does not support or see any reason to conduct another source test for TDI and MDI.

- *The applications included discussion of filterable PM emissions but does not address condensible PM emissions. It is recommended to include any condensible PM emissions and further explain how no PM_{2.5} emissions are expected.*

Adient addressed PM emissions in the application:

“Particulate emissions result from overspray of the mold release agent. The purpose of the mold release application is to apply the release wax to the mold which prevents the foam from sticking to the mold surface. The process uses high volume, low pressure (HVLP) spray applicators for improved transfer efficiency. Overspray in the form of total suspended particulate (TSP) has been equated to particulate matter 10 microns and smaller (PM₁₀ filterable) particulates. The spray wax particles are highly cohesive such that they stick to the mold surface as larger agglomerated overspray particles. Since the process is not heated in a separate curing oven and does not involve combustion or by-products of incomplete combustion, it is assumed PM_{2.5} is negligible, if emitted at all.”

In regard to condensable PM emissions, condensable PM is typically present as a gas in stacks operating at an elevated temperature and condenses into liquid or solid particles smaller than 1 micron in diameter when cooled to near ambient conditions at the stack’s exit. All condensable PM is smaller than 2.5 microns in diameter, so condensable PM represents condensable matter for PM, PM₁₀, and PM_{2.5}. As was included in the application, the process is not heated and therefore, Adient concludes that condensable PM is not present in the exhaust stream.

- *The application states that 2006 dollars were used to calculate the control costs in the BACT analysis and Appendix C lists the cost base date as April 1988. Per Section 2.5.3 of EPA’s Control Cost Manual, “It should be noted that the accuracy associated with escalation (and its reverse, de-escalation) declines the longer the time period over which this is done. Escalation with a time horizon of more than five years is typically not considered appropriate as such escalation does not yield a reasonably accurate estimate.” It is recommended to perform the cost analysis with more recent data than that of either 1988 or 2006. Additionally, the inclusion of more detailed cost calculations used to estimate the equipment costs or a quote, if a quote was used to determine the equipment costs, would be helpful in order to better understand the cost of add on controls.*

In accordance with EPA’s request, we have supplemented the BACT analysis (**Attachment A**) based on a proposal from Durr Systems, Inc. (Durr) dated March 29, 2022 (**Attachment B**). The quoted cost estimates provided by Durr are based on the purchase and operation of one regenerative thermal oxidizer (RTO) with a capacity of 60,000 standard cubic feet per minute (scfm). The Adient operations require add-on pollution control equipment with a minimum capacity of 360,000 scfm in order to allow for backup needed in the event of control equipment failure, uninterrupted operations during routine maintenance operations, and the potential for increased production rates, Adient assumes six RTOs and filter systems will be needed (**Figure 1**).

In keeping with proper control configurations, the large volume of air per process line will require duplicate equipment on each line in order to handle the total line exhaust volumes. As shown in **Figure 1**, the retrofit configuration would otherwise require the collection of all process air for each line, and then a split of that air volume into two equal plenum volumes to accommodate the available size for the RTO equipment. Each RTO will require a prefiltration device to protect the wax from accumulating and blocking the heat exchange media.

The attached BACT analysis addresses regenerative thermal technology only. Adient performed an evaluation of recuperative or catalytic technology as was explained in the construction permit

1890 Mines Road
Pulaski, Tennessee 38478
Tel 931.363.5666 Fax 931.424-6722



application. And, regenerative thermal technology results in the lowest capital investment costs and direct and indirect operating costs.

While Adient has conducted a BACT analysis for regenerative thermal oxidation technology, there is a potential for the media to foul given the physical characteristics of the wax mold release material being vented to the RTOs. To mitigate that potential, Durr recommended and included a bake-out option in the proposal. This technology will heat the media on a routine basis (for example, on a weekly basis) in order to burn off any wax that may have bypassed the filter media. Because a routine "bake-out" is necessary it suggests that an accidental disruption to or failure of the baghouse confirms our concern that add-on control technology for this type of operation may not be technically feasible, and it supports our position that redundant RTOs are necessary in the event of media fouling in one or more of the RTOs at any given time.

- *In the conclusion paragraph of the BACT analysis, the application states "Adient concludes and asserts the current configuration without VOC abatement is BACT for this project and for the existing process" and does not provide a numerical BACT limit. Even if no add on control technology is chosen as BACT, it is recommended to include a numerical BACT limit in the construction permit.*

We understand from Tracy's email of August 2, 2022, that "the numerical limit is provided in the preliminary determination and the construction permit 980244."

Should you have any questions or need additional information, please contact Mr. Kris Patrick Foster, EHS Analyst at (931) 363 - 5666 or kris.patrick.foster@adient.com. You can also contact Ms. Stephanie Taylor, Project Professional with SCS Engineers. Stephanie can be reached at (913) 749 - 0733 or staylor@scsengineers.com.

Thank you for your assistance in processing this permit application. We look forward to receiving a draft construction permit shortly.

Sincerely,

A handwritten signature in blue ink that reads "Ryan Speck". The signature is written in a cursive, flowing style.

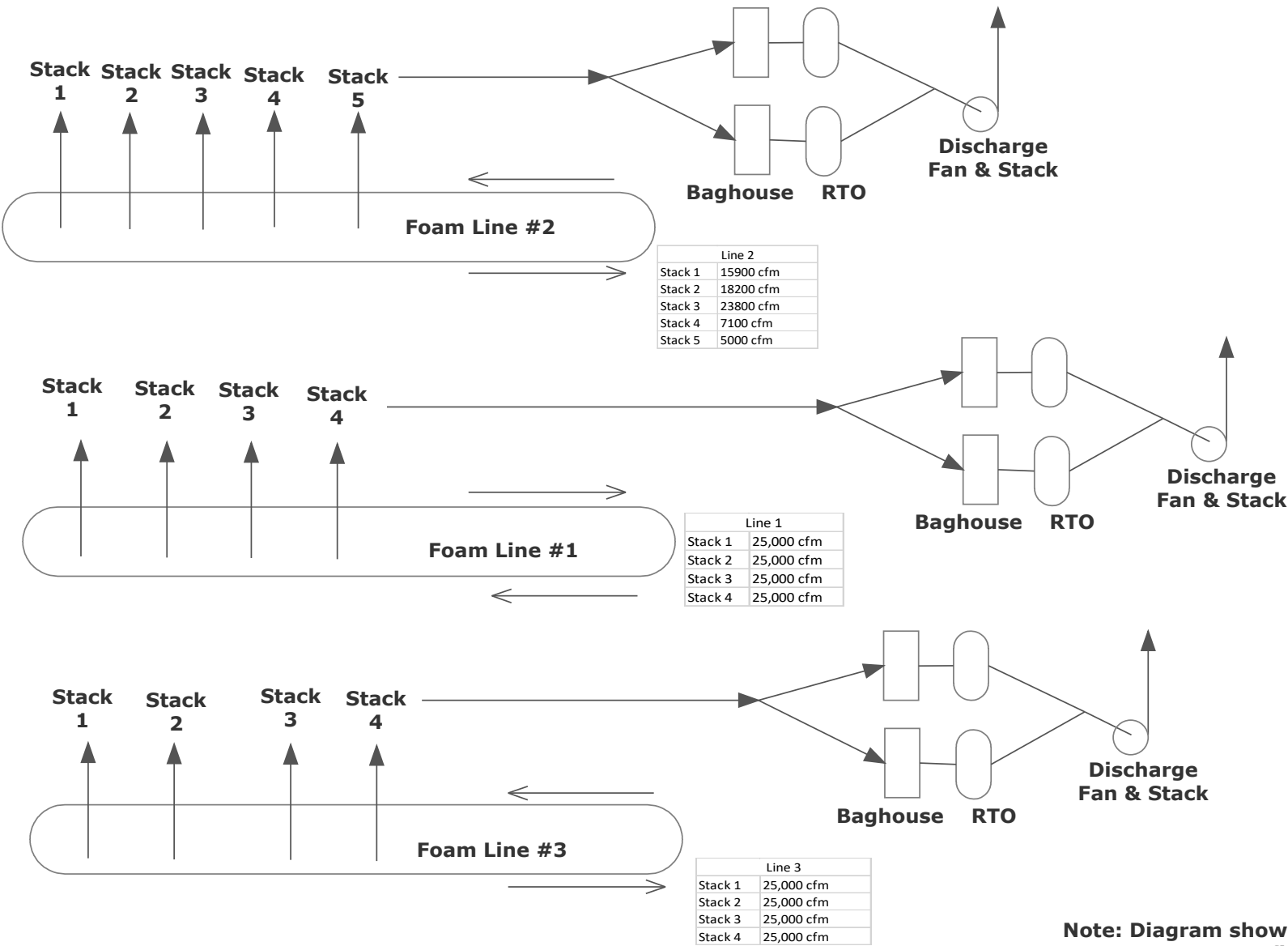
Ryan Speck
Plant Manager

Encl: Figure 1 RTO and Baghouse Configuration
Attachment A BACT Analysis - Summary
Attachment B Durr Systems, Inc. Proposal - Add-on Pollution Control Equipment

Cc: Mr. Kris Patrick Foster, EHS Analyst
Mr. Rick H. Palmer, Regional EHS Manager
Ms. Stephanie Taylor, SCS Engineers
Ms. Ann O'Brien, SCS Engineers
Mr. Jeff Pfost, Environmental Partners, Inc.

Figure 1 RTO and Baghouse Configuration

Figure 1. RTO and Baghouse Configuration



Adient Pulaski Foam Process Stack Diagram

Note: Diagram shown with RTO treatment configuration for comparison only.

Attachment A

BACT Analysis

Item	Direct & Indirect Capital Costs (DURR Proposal, March 29, 2022)				
	Description	No.	Cost/Item	Total Cost	Comments
		Needed	\$\$	\$\$	
1A	Epopure 60,000 SCFM RTO	6	\$128,630	\$771,780	
1B	50 foot Stacks	6	\$110,180	\$661,080	
2	RTO Installation	6	\$176,240	\$1,057,440	
3	Installation Supervision	6	\$38,540	\$231,240	
4	Start-up & Training	3	\$31,680	\$95,040	
5A	Ducting	3	\$282,790	\$848,370	
5B	Duct installation	3	\$166,960	\$500,880	
5C	Isolation and start-up dampers	6	\$82,690	\$496,140	
5D	Engineering			\$0	Included in 5C
5E	Duct Commissioning			\$0	Included in 5C
6A	Baghouses - 1 for each RTO	6	\$352,620	\$2,115,720	
6B	VFD and Fan	6	\$104,540	\$627,240	
6C	Baghouse installation	6	\$121,990	\$731,940	
6D	Baghouse installation Supervision			\$0	Included in 6C
6E	Baghouse Commissioning			\$0	Included in 6C
8	Monitoring Controls	3	\$19,900	\$59,700	
9	Bake-out on-line	6	\$89,370	\$536,220	
10	Freight			\$70,000	Engineering estimate
Subtotal				\$8,802,790	
Item	Direct & Indirect Operating Costs				
	Direct Operating Costs	Assumptions	Cost	Comments	
			\$\$		
11	Operating Labor				
	Operator (0.5 hrs/shift)(shifts/yr)(\$/hr)	1,095 shifts/yr @ \$28/hour	\$15,330	Wages @ \$20/hr + benefits @ 40%	
	Supervisor	15% of operator labor	\$2,300		
12	Maintenance Labor and Materials				
	Labor (0.5 hrs/shift x shifts/yr x \$/hr)	1,095 shifts/yr @ \$28/hour	\$15,330		
	Material	Equal to labor costs	\$15,330		
	Subtotal (Direct Cost O & M)		\$48,290		
	Utilities	See utility assumptions below			
	Fuel [(1.1)(Flow Rate)(Heat Capacity)				
	x (T outlet - T inlet)				
	- Process Flue Gas VOC Energy Contribution]				
	x (60 min/hr)(operating hours/yr)				
	x (Therm/100,000BTU)(Fuel Cost)		\$1,982,402		
	Fuel usage		221	MMcf/year	
13	Electricity = (1.17xE-04)(Flow Rate)(Delta P)				
	x (hrs/yr)(Electrical Cost)				
	/ (Fan-Motor Efficiency)		\$899,967		
	Electric usage		8,763	mw hours/year	
	Total direct operating costs/year		\$2,930,659		
	Indirect Operating Costs	Assumptions	Cost	Comments	
			\$\$		
14	Overhead	60% of Direct O & M	\$28,974		
15	Administrative	2% of TCI	\$176,056		
16	Insurance	1% of TCI	\$88,028		
17	Capital Recovery	Recovery factor X TCI	\$1,253,517	0.1424 capital recovery factor for 20-year period	
	Total indirect operating costs/year		\$1,546,575		
	Total Annualized Cost for RTO and Baghouse		\$4,477,233		

VOC Capture Efficiency (%)	80
VOC Destruction Efficiency (%)	95
VOC Combined Capture and Destruction Efficiency (%)	76
Uncontrolled VOC Emissions (TPY) - PTE	491
Controlled Emissions (TPY)	117.84
Emissions Removed (TPY)	373.16
Estimated Cost Effectiveness (\$/ton of VOC Removed)	\$11,998.16

Utility Assumptions

Flowrate	270,000 scfm	
Combustion temperature	1,600 deg F	
Heat capacity at combustion temperature	0.0193 btu/scf F	
Heat exchanger temperature at outlet	80 deg F	
Energy contribution from CO and VOC	38,089 btu/min	
Operation	8,760 hr/yr	
Natural gas cost	\$0.897 \$/therm	EIA, Industrial Price @ \$8.97/Mcf, TN 2020
Electric costs	\$0.1027 \$/kW hr	EIA, Average Retail Price from Full Service Providers, TN, 2020
System pressure drop	19 inches H2O	

Attachment B

Durr Systems, Inc.
Proposal
March 29, 2022



LEADING IN PRODUCTION EFFICIENCY

Adient US LLC - Pulaski, TN Budgetary Proposal US04-88332.4 RL60 and Source Ductwork, Bag Filter House, Online Bake-Out & Installation Options

Dürr Systems, Inc.
Clean Technology Systems
26801 Northwestern Highway
Southfield, MI 48033
USA

Contact:
Greg Thompson
Phone: +1 248-450-2314
E-mail: greg.thompson@Durrusa.com



Adient US LLC – Pulaski, TN
Budgetary US04-88332.4 RL60 and
Source Ductwork, Bag Filter House,
Online Bake-Out & Installation Options



Adient US LLC – Pulaski
Mr. Rob Boomer
47700 Halyard Dr.
Plymouth, MI 48170
USA

Your reference: US04-88332.4
Our reference: US04-88332.4
Your contact person: Greg Thompson
Business Unit: Clean Technology Systems
Department: Sales
Phone: +1 248-450-2314
Fax: +1 734-459-5837
E-mail: Greg.thompson@durrrusa.com
Date: 03/29/2022

Subject: Dürr Systems, Inc. Proposal No. US04-88332.4

Dear Mr. Boomer:

Dürr Systems, Inc. is pleased to offer this proposal with options to supply an **Ecopure®** RL Regenerative Thermal Oxidizer (RTO) system to treat the VOCs from your automotive foam seat manufacturing process exhaust. The choice of the RL unit from our range of control technology options is based on an analysis of your actual process conditions, utility costs, and space considerations:

- **Utility costs:** An **Ecopure®** RL RTO with ceramic honeycomb heat exchange block media offers the lowest operating cost for this application.
- **Limited space:** The **Ecopure®** RL offers the smallest footprint of any RTO on the market and will fit within your requested and designated area.
- **Limited installation window:** The Dürr **Ecopure®** RL is a unique pre-assembled modular RTO designed for quick, effective, and cost efficient installation.
- **Ease of operation and low maintenance:** The **Ecopure®** RL uses a single rotary valve with machined seats and air seals instead of multiple inlet, outlet and purge dampers. The single moving part reduces maintenance that conventional, multi-tower, multi-valve RTOs require.
- **Highest uptime:** The electric drive system replaces all pneumatic and hydraulic valve drive requirements which leads to the highest uptime.

This revision includes the requested duct work package and an option for upstream filtration to ensure mitigation of particulate plugging in the RL.

We invite you to visit our fabrication facilities or a local site to see the benefits of this unit first hand. Please contact me to arrange a site visit or if you require additional information.

Best regards,
Dürr Systems, Inc.

Greg Thompson
Key Account Manager

Cc: Andrew Vanbrakel – Application Engineering



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This proposal contains confidential and proprietary information of Dürr Systems, Inc. (CTS) and is not to be disclosed to any third parties without the express prior written consent of Dürr Systems. This proposal is submitted solely for the purpose of enabling the client to evaluate Dürr Systems bid on the project within and shall be returned to Dürr or destroyed if so requested by Dürr Systems, Inc.

1 Executive summary

Thank you for your consideration of Dürr products, services, and solutions for your emissions control requirements. We have deployed the **Ecopure®** RL RTO at the Adient facility in Greenfield, OH, which has been in operation since 2003, with great success. The **Ecopure®** RL is an ideal fit for your foam seat application. Additionally, based on our experiences with this application, we have provided an option for upstream filtration to mitigate particulate carry over from your process. This will allow for a safer operating environment and mitigate costly maintenance and downtime if this particulate consistently made its way to the RTO. Please see below for more details on this highly valuable filtration system option.

While the **Ecopure®** RL is slightly different than a conventional, multi-valve, multi-chamber RTO, its uniqueness is what provides the ease of its operation and ease of its maintenance. A few more reasons why we truly believe that the **Ecopure®** RL is the right product for your application:

- **Simplicity.** One single diverter valve. This is the heart of the **Ecopure®** RL RTO. Our diverter valve guides air flow through our combustion chamber pie sections with very low pressure fluctuations as opposed to multi-valve, multi-chamber systems that shift the entirety of your air flow each time the valve cycles. A typical 2-Tower RTO in this application could see pressure bounce as high as + or – 4". With the **Ecopure®** RL, we typically only see + or - 0.1" of pressure variation in comparison. This is critical in sensitive applications where back pressure to the process may cause product issues.
- **Maintenance.** The simplicity of having a single valve leads to very low maintenance requirements. See the graph below:

RTO style	Valve port	Actuator / drive	Solenoids	Speed control	Total items
Ecopure® RL	1	1	0	1	3
Conventional 2-tower RTO w/ poppet valves	4	2	4	4	14

As you can see, with the **Ecopure®** RL, you have significantly less parts and moving parts on your system. The more moving parts you have, the more maintenance a system requires. That includes more greasing, more spare parts on the shelf, more time your maintenance team is dedicated to keeping the unit online. The single valve with a single drive system greatly reduces all of this time and money dedicated to upkeep and uptime of the RTO. The **Ecopure®** RL RTO will provide the uptime you need from an RTO system.

- **Electric Drive System:** While most conventional RTO systems have multiple valves being actuated by pneumatics or hydraulics, Dürr uses the electric drive system. This system has NEVER had a failure. No leaking hydraulic fluid lines, no freezing instrument lines because of moisture in your compressed air, the electric drive keeps indexing the single valve system. Some lubricating of gears and the gear box ANNUALLY is all this drive requires.
- **Skid mounted, pre-piped, pre-wired modular design:** Dürr's **Ecopure®** RL RTO comes on one skid. The valve, the gas train, everything is on one skid. This includes a climate controlled control room. This modular design allows for a very small footprint. The **Ecopure®** RL RTO has been fit into many small areas that conventional RTOs simply cannot fit. Less than 3 weeks is all that is required from arrival on-site to an operable system.

1.1 Why Dürr?

Dürr is the one and only company for your environmental and energy solutions, from the initial planning stages to decades after the RL has been installed. We conduct the necessary engineering studies and analyses to ensure the right equipment design for your company's compliance needs.

Dürr is a worldwide company operating in 28 countries. The North American office is strategically located in Southfield, Michigan in a 226,745 ft² facility that is QS-9000/TE certified.

Dürr skills, strength and resources are that:

- We are the air pollution technology leader with the widest range of technology options available to solve your specific application and compliance issues.
- With over four decades of experience, Dürr will apply the proper application and complete integration of available technology.
- We provide 24 hour/7 days a week global service and support for Dürr and competitor systems.
- We employ dedicated, hardworking individuals whose number one goal is to provide you with the best product and experience possible.



Following a detailed analysis of your process conditions and parameters and a review of all the available solutions, we conclude that the **Ecopure®** RL is the best system for your application.

The RL is a state-of-the-art RTO design featuring a single rotary diverter valve, twelve heat recovery chambers enclosed in a single tower, and structured ceramic heat exchange media for maximum thermal efficiency and the lowest operating costs.

The modular RL system is designed for maximum pre-assembly in the factory ensuring quality and minimal field installation time.

The RL60 unit proposed is designed to treat 60,000 SCFM of exhaust from your process and offers the highest destruction efficiency of any RTO available on the market. The following are some of the key features of the RL system:

Standard RL Features	Customer Benefits
Skid mounted design (pre-piped, pre-wired)	Fast installation reduces cost
Single rotary valve	Reduced maintenance, increased reliability, high destruction efficiency
Integral air-conditioned control room	No need to find space for control panel, and pre-wiring reduces installation cost
Rotary valve is always in contact with hot exhaust gas	Reduces potential build-up of condensables on valve
Electric rotary valve drive	Increased reliability over hydraulic or pneumatic systems.
All drive components external to unit	Ease of access for maintenance
All fuel train components located at grade	Ease of access for maintenance
Compact design	Reduced foundation costs
Twelve heat recovery chamber design	Minimal pressure fluctuations Better air distribution Improved RTO performance
Continuous purge	Maximizes destruction efficiency
Bakeout	Reduces organic buildup and improves energy efficiency
Variable frequency drive (VFD)	Minimizes energy usage
Fresh air/purge damper	Independent start-up from RTO

Our proposal is for an RTO system to be delivered to your facility. Optional installation services, source ductwork, foundations and freight to site are included for your consideration, as well as clarifications on utilities and other services to be provided for the installation.



Ecopure® RL electric drive

1.2 References

Location: Adient, Greenfield
Industry: Auto Seat Manufacturing; 40k scfm



Location: Indiana
Industry: Automotive Parts Painting; 40k scfm



Location: Michigan
Industry: Automotive Parts Coating; 15k scfm



Location: Michigan
Industry: Automotive Parts Painting; 25k scfm



Location: Ohio
Industry: Automotive Parts Coating; 50k scfm



Location: Michigan
Industry: Automotive Parts Painting; 70k scfm



1.3 Equipment pricing and schedule

1.3.1 Equipment pricing (breakdown pricing for accounting purposes only)

Item 1-A: Equipment

One (1) **Ecopure**® RL60 as described within. Includes standard 30 ft. self-supported stack. \$1,280,630

Item 1-B: Stack Upgrade

Includes 50 ft. free standing stack in lieu of standard 30 ft. self-supported stack. \$110,180

Item 2: RL Installation Package

Includes management, engineering, supervision, fabrication and installation labor, materials, rentals and crane with rigging and operators to install the RL60 with free standing stack. \$176,240

Item 3: Installation Supervision* of RL60

Estimated time required is 3 consecutive weeks (Monday – Saturday at 10 hrs/day), including living and travel expenses. \$38,540

Item 4: Start-up and Training* of RL60

Estimated time required is 2 consecutive weeks (Monday – Saturday at 10 hrs/day), including living and travel expenses. \$31,680

*additional time shall be per Field Service Rates sheet attached

Item 5-A: Ductwork from RL60 to 3 Source Stacks on Roof

Includes engineering, design and fabrication of aluminized source ductwork as described by the attached drawing G001. \$282,790

- Ductwork includes maintenance hatches on 20 foot centers,
- Bolted seal welded flanges on 10 foot centers
- Load distributing duct support stands on 10 foot centers.
- Includes all ductwork from the source stacks to the RL60.
- Includes tees for face/bypass dampers at each source stack
- Includes expansion joints, hardware and gaskets.

Item 5-B: Install of Ductwork from RL60 to 3 Source Stacks

Includes all skilled labor, lifting equipment with rigging including large crane, operators, equipment and tools to completely install all ductwork and support stands from the source stacks to the RL60. \$166,960

- Includes full time Dürr site supervision.
- Includes mounting of all dampers and flex connections
- Includes compressed air piping to all actuators
- Includes wiring to all proximity switches and solenoids with tie-ins back to RL60 skid mounted control room and controls

Item 5-C: Damper Package for Source Ductwork	
Includes face, bypass and isolations dampers complete as follows:	\$82,690
<ul style="list-style-type: none"> • Pneumatic actuators with spring return on loss of pressure. • Open & closed AB proximity switches. • Solenoids with speed controls. • Linkages for face/bypass dampers. 	
Barometric relief damper is included with	
<ul style="list-style-type: none"> • Adjustable weighted lever arm • AB proximity switch for proof of closure. 	
Eight dampers total up to 60" diameter in size.	
Item 5-D: Engineering, Programming & I/O for Damper Package	
Includes engineering, PLC programming and HMI screen development as well as additional PLC I/O and interlock relays for the (8) dampers offered in 5-C	Included with Item 5-C
Item 5-E: Source Ductwork & Damper Commissioning	
Includes setup and debug of damper actuators, open/close proximity switches, barometric damper adjustments, checking of interlocks in RL control panel, etc., for Item 5-C.	Included with Item 5-C
Item 6-A: Bag Filter House Option	
Supply of one (1) 66,000 cfm bag filter house as described in the attached drawing. Includes the following:	\$352,620
<ul style="list-style-type: none"> • Installation, with all crane work, skilled labor & equipment • Additional ductwork fabrication and installation to tie into existing ductwork (requires relocation of RL south 50 ft.) • Wiring to RL Control Room mounted Control Panel • Commissioning. 	
FCA Origin.	
Item 6-B: RL60 Upgrades Required for Bag Filter House	
<ul style="list-style-type: none"> • Increases fan size to achieve higher static pressure while providing 5:1 turndown capability to overcome duct and filter house losses. • Increase motor to 450 hp. • Increases VFD, power distribution and wiring for 700 hp. • Adds longer large-tall control room. • Extends RL60 skid for control room. • Increases size of control room A/C. Required for Item 6-A. • Includes electrical engineering and upgrades the RL fan, motor and VFD to 600 hp. • Includes control engineering and programming 	\$104,540



Item 6-C: Bag Filter House Installation Package Includes management, engineering, supervision, fabrication and installation labor, materials, rentals and crane with rigging and operators to install the bag filter house, <u>intake manifold and additional inlet and outlet ductwork and supports</u> to incorporate the filter house upstream of the RL60.	\$121,990
Item 6-D: Bag Filter House Installation Supervision by Dürr	Included with Item 6-C
Item 6-E: Bag Filter House Commissioning by Dürr	Included with Item 6-C
Item 8: Remote Monitoring Service Program See attached brochure for description.	\$19,900
Item 9: Optional On-Line Bakeout Adds the On-Line Bakeout feature for item 1 as described within. Offers regular bakeouts without interruption of production.	\$89,370
Item 10: Budgetary Freight for RL60 only – Pre-Pay & Add Budget cost	Estimated at time of order

1.3.2 Payment terms and payment schedule

- 25% due upon receipt and acceptance of purchase order
- 25% invoiced with drawing submittal, due net 30 days
- 45% due upon equipment ready for shipment, due net 30 days
- 5% due after successful performance testing
 - Or - thirty days after equipment is made operational
 - Or - if due to delays beyond Dürr's control, 90 days after final material shipment, whichever occurs first

Dürr will furnish detailed project schedule to meet the customer's needs after receipt and acceptance of purchase order.

1.3.3 Typical delivery milestones

RTO delivery	24-28 weeks*
RTO installation	3-4 additional weeks
System start-up	1-2 additional weeks

*RTO delivery to be confirmed at the time a purchase order is issued by buyer and accepted by Dürr



Dürr Systems, Inc.'s acceptance of any order or contract (commercial agreement) resulting from this proposal is subject to and expressly contingent upon the prior credit review and approval of Buyer and/or Buyer's client by Dürr's Finance department. If for any reason this information is withheld from Dürr, the third milestone payment will be due net 0 days.

1.3.4 Bid validity

Due to the continued escalation of cost, firm quoted proposals are valid for 15 days.

Purchase Orders will not be accepted based on budgetary proposals.

Please note that the above pricing is in U.S. Dollars.

For your convenience, purchase orders should be sent to our PO e-mail address or to our fax number provided below:

E-mail address: po@durrusa.com

Fax number: 734-459-5837

Using these two means of sending your Purchase Order will ensure timely response and processing of your order.

All prices exclude any taxes, duties, broker fees, value-added taxes, income taxes, withholding taxes or any other allowances.

Customer must supply tax-exemption certificate with purchase order.

Dürr Systems, Inc.

A handwritten signature in black ink, appearing to read "Greg Thompson", written over a light blue rectangular background.

Greg Thompson
Key Account Manager

A handwritten signature in black ink, appearing to read "A Van Brakel", written over a light blue rectangular background.

Andrew VanBrakel
Senior Applications Engineer

1.4 Performance guarantee

1.4.1 Volatile organic compounds (VOCs)

Subject to the General Provisions below, Dürr guarantees that when the inlet VOC concentration is above **500** ppm_v as propane, the RTO will destroy or convert at least **99%** of the incoming gaseous, non-methane volatile organic compounds (Inlet VOC as identified in Section 2.0 of this document). When the inlet VOC concentration is below **500** ppm_v as propane, the outlet non-methane VOC concentration will not exceed **5** ppm_v as propane.

EPA Method 25A will be used to determine VOC performance.

1.5 General provisions

The following General Provisions will apply to all of the above guarantees:

- a) The RTO will be installed (if applicable), operated and maintained by Buyer in accordance with Dürr instructions. This will include replacing of consumable or replaceable components by Buyer, as required.
- b) Buyer agrees to operate the system within the system design data as specified in this proposal.
- c) The performance guarantees apply only during normal operation when the cold face and exhaust side of the RTO are free of particulate, not during any maintenance procedures.
- d) All functional tests will be arranged and paid for by Buyer. Dürr will be notified in writing 14 days prior to the tests for scheduling purposes.
- e) Methane is excluded from outlet emissions.
- f) Dürr reserves the right to adjust the burner chamber operating temperature as required to meet the guarantees.

If Dürr fails to meet the Performance Guarantee, Dürr will be given reasonable time to investigate and take corrective action within the scope of this contract.

1.6 Work to be provided by buyer

- Supply the following utilities to the connection points on the RL
 - Fuel: Adequate supply of Natural Gas at 1,000 Btu/ft³ and regulated to 5.0 PSI steady.
 - Power: 480 V, 3 PH, 60 Hz, with earth grounding. Two power feeds are required.
 - Air: 2 CFM of intermittent compressed air at 80 psig. Clean, dry air, suitable for outdoor use at local plant conditions is required.
- Barometric damper or vacuum relief damper required (only included with ductwork package option).
- Isolation damper (only included with ductwork package option).
- Source stack face & by-pass dampers (only included with ductwork package option).

- Source ductwork and support stands from source stacks (only included with ductwork package option).
- Building structural analysis and reinforcements for support of ductwork.
- Ground soil analysis.
- Foundations, foundation design, permits, etc.

1.7 Clarifications

- Buyer certifies that there are no halogenated, acid generating, silicon bearing or phosphor compounds present in the inlet air stream coming to the proposed equipment. This includes, but is not limited to, fluorides, chlorides, bromides, iodides, astanides and sulfonated compounds. This warranty excludes deterioration arising from the presence of any of these compounds.
- If present, silicon-bearing compounds may cause plugging of the ceramic media and may require periodic cleaning and/or replacement of the media.
- If present, phosphor compounds may cause permanent plugging of the ceramic media and therefore require replacement.
- Dürr takes exception to liability related to fire hazards due to process particulate in any form including deposits, buildup, coatings, agglomeration, etc. whether in solid form, liquid form, vapor form, or other phase. It is the sole responsibility of the buyer to equip, inspect, clean and maintain the RTO to the degree necessary to prevent a hazardous situation from occurring.
- Fan, valve, RL skid ductwork and stack insulation are not included.
- Unless noted otherwise in this proposal, the equipment quoted is to Dürr Systems, Inc. standard design specifications. Any specification not mentioned but required by owner is subject to review and price adjustment.
- If invoices in excess of \$1000 USD are paid by credit or debit card, any resulting handling fees, processing fees or other additional charges incurred by Dürr will be reimbursed, in full, by the Customer.
- Building structural analysis, calculations, PE stamps, fees, etc. are by others.
- Any modifications required for the building including (but not limited to) penetrations, flashings, installation of pitch pockets and/or reinforcements of building structural supports are by others.
- Interlock wiring to be provided and installed by others.
- Customer will create space for crane and lay down area by moving items stored outside west of the storage buildings.

2 Technical data and responsibility matrix

2.1 Technical data

Customer specification	Design (per RTO)
Inlet temperature	Max. 120°F
Inlet static pressure	(-) 2 in. w.c. @ inlet to RL unit
Moisture content	Std.
Altitude	708 ft.
Specified actual max. volume	60,000 scfm total from three (3) sources.
VOC loading	As listed below, to be confirmed prior to final engineering.
VOC type	TBD, to be confirmed prior to final eng.
Total particulate loading maximum	TBD, to be confirmed prior to final eng.
Estimated operating conditions	
Process airflow and temperature	60,000 scfm at 120°F process air inlet temp.
Natural Gas	Please see graph in Section 1.4
Electric at 60,000 SCFM Inlet and zero VOC	RL60 - 282 kW
Compressed air	2 scfm @ 80 psig
Design parameters	Design
Number of chambers	12 individual chambers
Heat exchanger media	Structured packing (monolith block)
Heat exchanger thermal efficiency	Minimum 95% mass corrected (all cases)
Combustion chamber operating temperature	1,550°F
Bake-out	Type, manufacturer or comment
Off-line	Included
On-line bakeout	Optional, see detailed descriptions
Utilities connections	
Natural Gas (burner max capacity)	9,000 scfh @ 5 psi connection point at RL skid (not including online bakeout)
Compressed air	2 scfm @ 80 psi connection point at RL skid (connected peak)
Electric	584 FLA, at 480/3/60 to connection point on RL Skid
Interlocks	

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Specifications incorporated	
CTS standard specification	RL60
Customer specifications	None provided
Ecopure® RL chamber	Type, manufacturer or comment
Materials of construction - upper chamber	3/16" thick, A36 plate., A992 structural
Materials of construction - lower chamber	1/4" thick, A36 plate., A992 structural
External coating	Finish paint, #34 Medium Gray
Internal coating	Not required
Ecopure® RL chamber insulation	Type, manufacturer or comment
Interior combustion chamber	6" thick, 10 lb/ft³
Media support	Corten
Burners	Type, manufacturer or comment
Manufacturer	North American or Dürr approved equal
Number of burners	One (1) per RL unit
Flame monitor	UV scanner
Air injection	Included
Gas trains	Type, manufacturer or comment
Blocking valve manufacture	Maxon or equivalent.
Combustion blower	New York Blower, with silencer, arrangement #4, 3600 rpm, 50 HP
NFPA 86 standard	pre-approved
Gas train enclosure	Not included
Burner/gas train access platform	Diamond plate
Platform access	OSHA standard-caged ladder
Individual components UL & FM listed	Included
Diverter valve and drive system	Type, manufacturer or comment
Diverter valve	Heavy duty carbon steel construction
Drive motor	3 hp, 480 volt, 3 ph, 60 hertz
Drive motor VFD manufacturer	SEW Movidrive
Gear drive guards	Personnel protection

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Fan	Type, manufacturer or comment
Type	Centrifugal
Quantity	One (1)
Manufacturer	New York Blower or equal
Volume	68,400 cfm at 120°F inlet temperature
Type	Arrangement 8
Materials of construction	Mild steel
Inlet/Outlet flex connections	Included
Inlet/Outlet flex connections materials of construction	Fabric
Fan insulation and cladding	Not included
Motor size, RPM, manufacturer	RL60 only 450 hp, 1,780 rpm, Marathon or Toshiba
Motor service factor	1.00
Fan bearing and motor mounting plate	Included
Fan vibration switch	Included
System controls	Type, manufacturer or comment
Master control panel	NEMA 12 for dust free and temperature controlled environment.
Programmable controller (PLC)	Allen-Bradley Compact Logix
Human machine interface (HMI)	Panel View Plus 700
PLC software	RS Logix
Programming, screen development, etc.	Included
Operating modes	Type, manufacturer or comment
Automatic sequence start	Included
Automatic sequence stop	Included
Fresh air stand-by mode	Start-up capability on fresh air
Hot shutdown mode	Included
Chart recorder	Endress+Hauser
Inlet temperature	Included
Outlet temperature	Included
Combustion chamber temperature	Included
Flame safeguard control	Honeywell
High temperature limit	Honeywell
Variable Frequency Drive	Type, manufacturer or comment
VFD manufacturer	Yaskawa
VFD size/quantity	450 hp

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

Control room	Type, manufacturer or comment
Manufacturer	Dürr
Control room lighting	Included
Lighting transformer	Included
Heated & air conditioned	Included
Personnel access door with removable header	Included
Power distribution panel	Included
Exhaust stack	Type, manufacturer or comment
Height	30 ft. self-supporting stack is base bid with option to upgrade to 50' free standing stack
Materials of construction	A36
Personnel protection	Expanded metal to 8' level.
Insulation & cladding	Not included
Test ports	Included
Stack drain	Included
Sampling platform	Included
Safety ladder	Included
Interconnecting manifolds	Type, manufacturer or comment
Inlet/outlet manifold diameter	Varies
Inlet/outlet manifold construction	12 ga. minimum carbon steel
Inlet/outlet manifold flex connectors	Fabric
Inlet/outlet manifold velocity	3,500 fpm
Personnel protection	Not included
Insulation and cladding	Not included
Dampers	Type, manufacturer or comment
Inlet isolation damper	Included only with Dürr ductwork option
Outlet isolation	None
Fresh air intake damper	Included
Source duct vacuum breaker	Included only with Dürr ductwork option
Miscellaneous	Type, manufacturer or comment
Foundations with grounding grid and underground conduit if required	Not included
Area lighting on the RTO only	One (1)
Source duct work	Type, manufacturer or comment
Process ductwork	Optional
Duct supports	Included only with Dürr ductwork option
Additional Ductwork for bag filter house	Included only with Dürr bag filter house option
Added ductwork supports for bag filter house	Included only with Dürr bag filter house option
Fire detection and suppression systems	Not included

Dürr Systems, Inc. reserves the right to make modifications as deemed necessary during final engineering.

2.2 Responsibility matrix

	Work Item	Owner	Dürr	Remarks
1.0	General conditions			
1.1	Building permits	X		
1.2	EPA permits	X		
1.3	Taxes	X		
2.0	General site work conditions			
2.1	Temporary utilities	X		
2.2	Daily job site clean-up	X		Optional installation
2.3	Building alterations, penetrations	X		If required
2.4	Temporary storage area on-site	X		If required
2.5	Demolition and disposal work			NA
3.0	Civil			
3.1	Footings and foundations	X		
3.2	Structural support steel	X		
4.0	Mechanical			
4.1	Piping fuel and gas	X		To RL connection point
4.2	Compressed air piping	X		To RL connection point
4.3	Fire protection	X		If required
5.0	Electrical			
5.1	Power feed	X		To Dürr RL control room
5.2	Process interlock wiring	X		
6.0	Abatement equipment			
6.1	Engineering and fabrication of the abatement equipment as described in Technical Section		X	
6.2	Freight	X		Pre-pay and add
6.3	Installation	X		Optional
6.4	Installation supervision	X		Optional
6.5	Start-up	X		Optional
6.6	Operator training	X		Optional
7.0	Plant acceptance			
7.1	Functional testing	X		
7.2	Compliance testing	X		
7.3	Spare parts		X	List only
7.4	Maintenance and operating manuals		X	One (1) CD copy, English only
7.5	Record mechanical and electrical drawings		X	One (1) CD copy, English only

3 Link to Dürr terms and conditions (online document)

Please click [**HERE**](#) to view Dürr's Terms and Conditions, under the DSNA General Terms and Conditions of Sale link.

4 List of RL system drawings attached

4.1 RL-60

- P&ID legend
- P&ID of RL60
- RL60 general arrangement
- RL60 foundation loading

4.2 Optional Source Ductwork

- RL60 with ductwork
- RL60 relocated with bag filter house and ductwork

4.3 Optional 66,000 CFM Bag Filter House

- Bag Filter House general arrangement
- Location study of RL60 relocated for bag filter house and ductwork

5 RL brochure

Please see the attached RL brochure.

6 Service rates

Please see attached Service Rates.

7 Process Monitoring Service Program

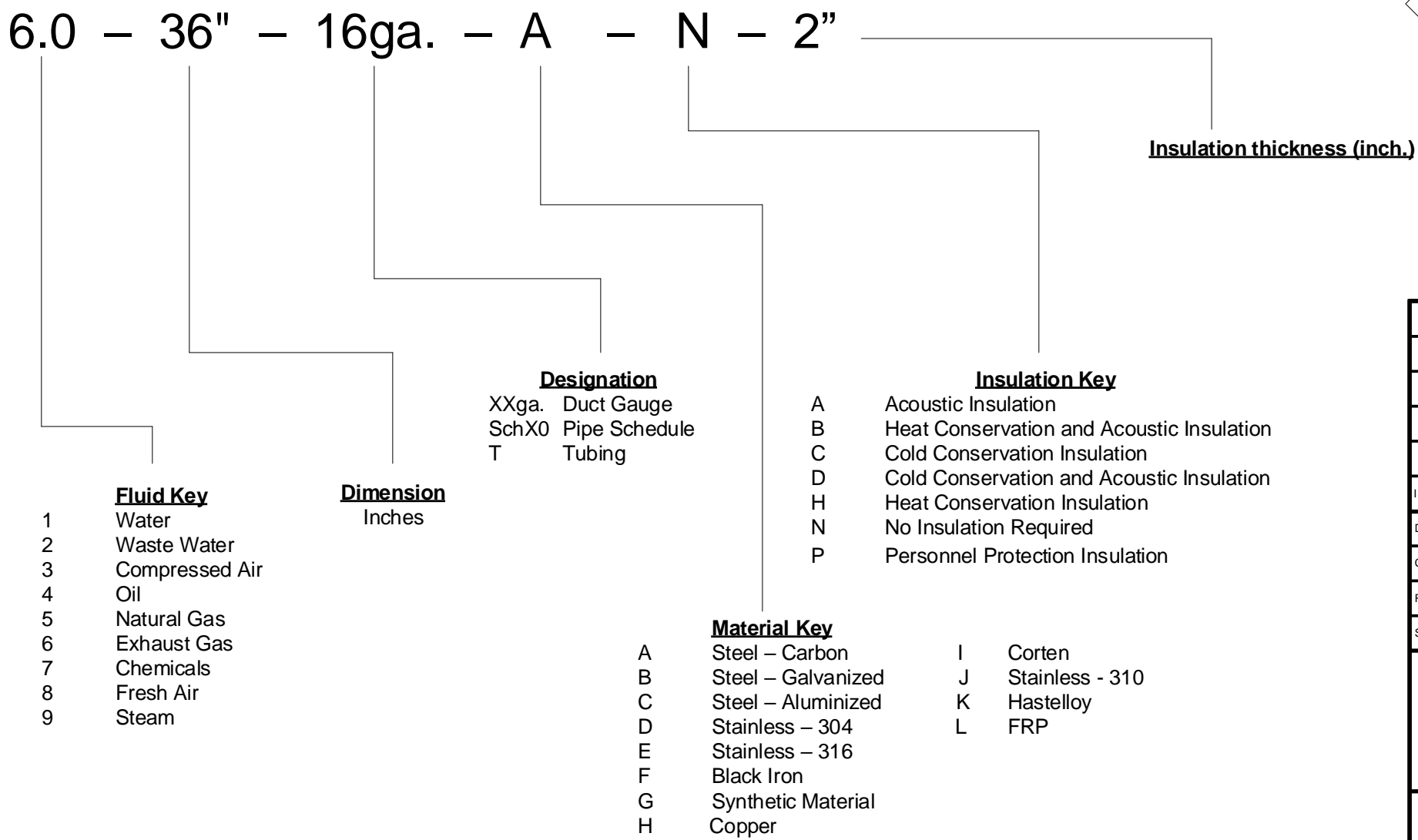
Please find the attached Dürr MEGTEC ProcessMonitor™ Brochure.

Valves and accessories	Valve, relief - excess pressure	Funnel	Louver type damper	Shaping machine
Valve, general	Flow straightener	Vent	Motorized louver type damper	Rotary valve feeder
Three way valve	Valves and Accessories	Heating	Silencer	Proportioner for solids
Manual valve	Ball valve, general	Heat exchanger, general	Burner, general	Motor
Motorized valve	Three way ball valve	Other Piping Components	Line burner	Agitator, general
Pneumatic valve	Manual ball valve	Liquid filter, general	Flame arrestor	Agitator with anchor
Electro pneumatic valve	Motorized ball valve	Strainer	Air Handling	Agitator with propeller
Solenoid valve	Pneumatic ball valve	Pumps, Fans, Compressors	Explosion relief door	Mixer
Double solenoid valve	Electro pneumatic ball valve	Pump, general	Ceiling outlet	Machines and Devices
Spring valve	Hand wheel ball valve	Centrifugal pump	Air filter, general	Kneader
Cap valve	Rinsing connection	Water seal pump	Vessels and Basins	Centrifuge
Vent valve	Non return device	Diaphragm pump	Vessel, general	Decanter
Butterfly valve, general	Non return / check valve	Electr. dosing pump	Vessel, dished heads	Conveyor, general
Motorized butterfly valve	Flap trap	Piston pump	Vessel, conical heads	Other Symbols
Pneumatic butterfly valve	Safety valve	Helical rotor pump	Spherical vessel	Lamp
Electro pneumatic butterfly valve	Three way safety valve	Hose pump	Steam boiler	Socket
Pinch valve	Other Piping Components	Injection pump	Expansion tank	IR heating
Suction basket	Flange	Positive-displacement pump	Level of liquid	Emergency shower
Pressure + vacuum relief valve	Sight glass	Gear pump	Basin, general	Hoisting gear
Steam trap	Compensator	Screw pump	Pit	Gas cylinder
Ball syphon	Reducer	Fan, general	Machines and Devices	Stack
Breather valve	Hose	Compressor, general	Mill	Static Mixer
Pressure reducer	Tube ground	Air Handling	Chrushingmaschine, general	Test Port
Orifice plate	Compressed air connection	Damper, general	Chrusher, general	Transfer Point
Pressure controller, regulator	Service unit	Pneumatic damper	Screening device	
Rupture disc	Nozzle	Motorized damper	Separator	

Code letters for other process equipment components according to DIN EN 81346-2		
Code letter	as first letter	as consecutive letter *)
A		
B	Electr. instruments	Limit switch, level sensor
C	Storing	Container, condenser
D		
E	Radiation, thermal	Cooling/ heating register, lamp, heating
F	Protection device	Safety valve, safety switch
G	Initiating a flow of energy/ material/ inform.	Pump, fan, compressor
H	Seperate/ mixing	Filter, separator, mill, agitator
I		
J		
K	Controlling	Controler, CPU
L		
M	Driving	Motor (not for pump, fan)
N		
O		
P	Mechanical instruments	Thermometer, manometer
Q	Switching	Shut-off valve, control valve
R	Restricting, stabilizing	Compensator, non return valve
S	Manuel operation	Push button, selector switch
T	Transforming	Frequency convertor, transformer
U	Holding, fixing	Foundation, bearing, control cabinet
V	Moistening, dehydrating, cleaning	Nozzle
W	Guiding, transporting	Pipe, duct, cable
X	Connecting	Coupling, plug socket, bus distributor
Z		
Example for identification of components		
Q01	Code number of component xx electrical component xxx mechanical component Identifier for type of component	

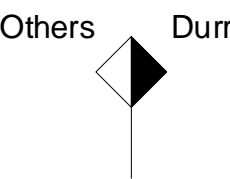
Performance values of pumps:	ft³/m; psi; HP; L/min
Perorfmance values of fans:	ft³/m; °w.c.; HP; L/min

Identification of Pipes



Code letter for I&C equipment according to ISO 3511-2) sequence of consecutive letters: D, V, Q, I, R, C, S, Z, A		
Code letter	as first letter	as consecutive letter *)
A		Alarm
B		Brake
C		Controlling
D	Density	Difference
E	Electrical variable	
F	Flow rate	Ratio
G	Gauging, position, length	
H	Hand (manually initiated) operated	
I		Indicating
J		
K	Time or time programme	
L	Level	
M	Moisture or humidity	
N		
O		
P	Pressure	
Q	Quality (analysis, concentration)	Integrating or summing
R	Radiation	Recording
S	Speed, frequency	Switching
T	Temperature	Transmitting
U	Multivariable	
V	Viscosity	
W	Weight, force	
X	Miscellaneous	
Z		Emergency or safety acting
+		Upper limit
-		Lower limit
<div><div> Local</div><div> DCS</div><div> Dürr Control Panel</div></div> <div>Quality letter (outside circle) CD: conductivity pH: pH-value TU: turbidity CO: carbon monoxide concentration</div> <div>Analog signal alarms/fauls LL: Fault low L: Alarm low H: Alarm high HH: Fault high</div>		

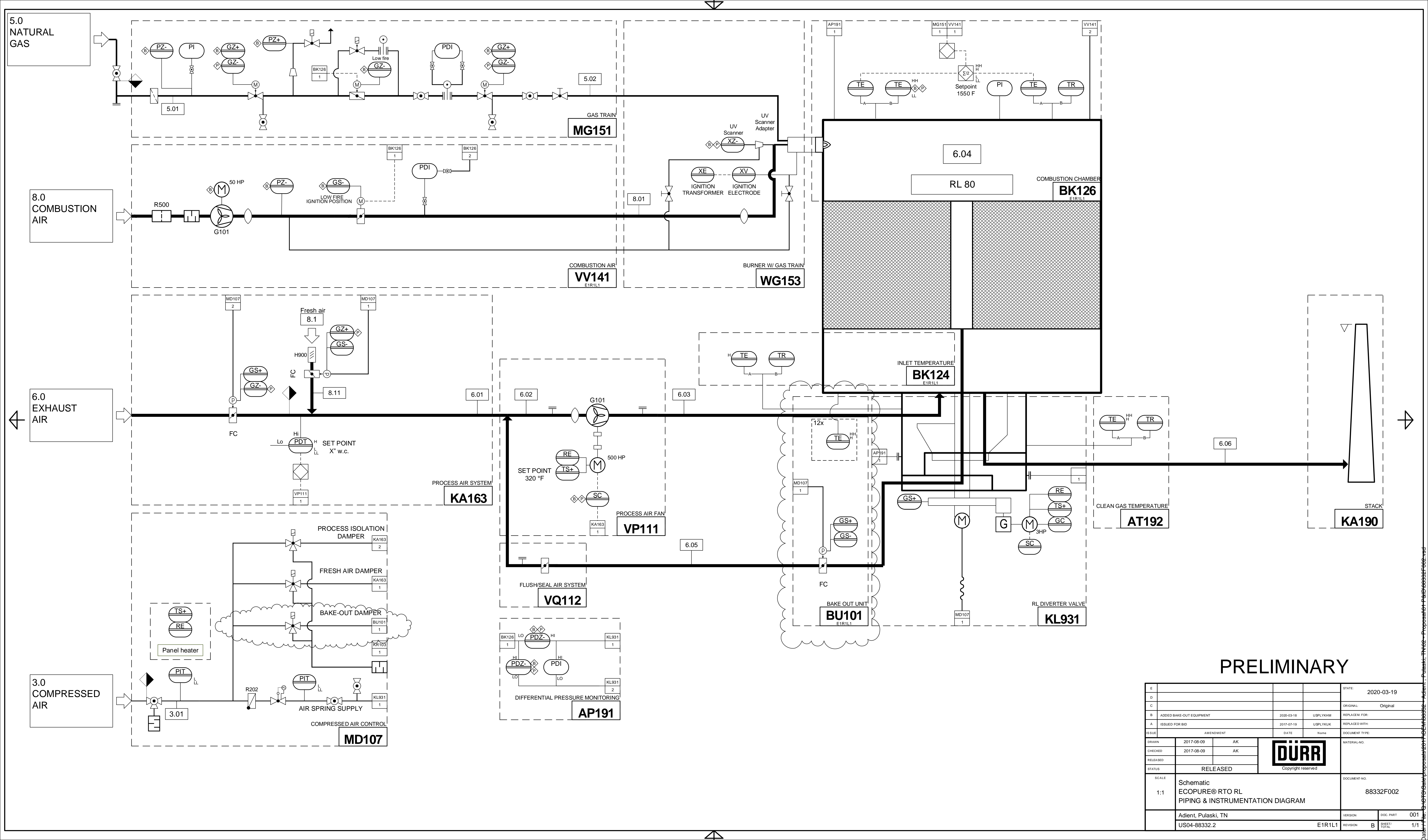
Scope



Burner & Purge Premissives

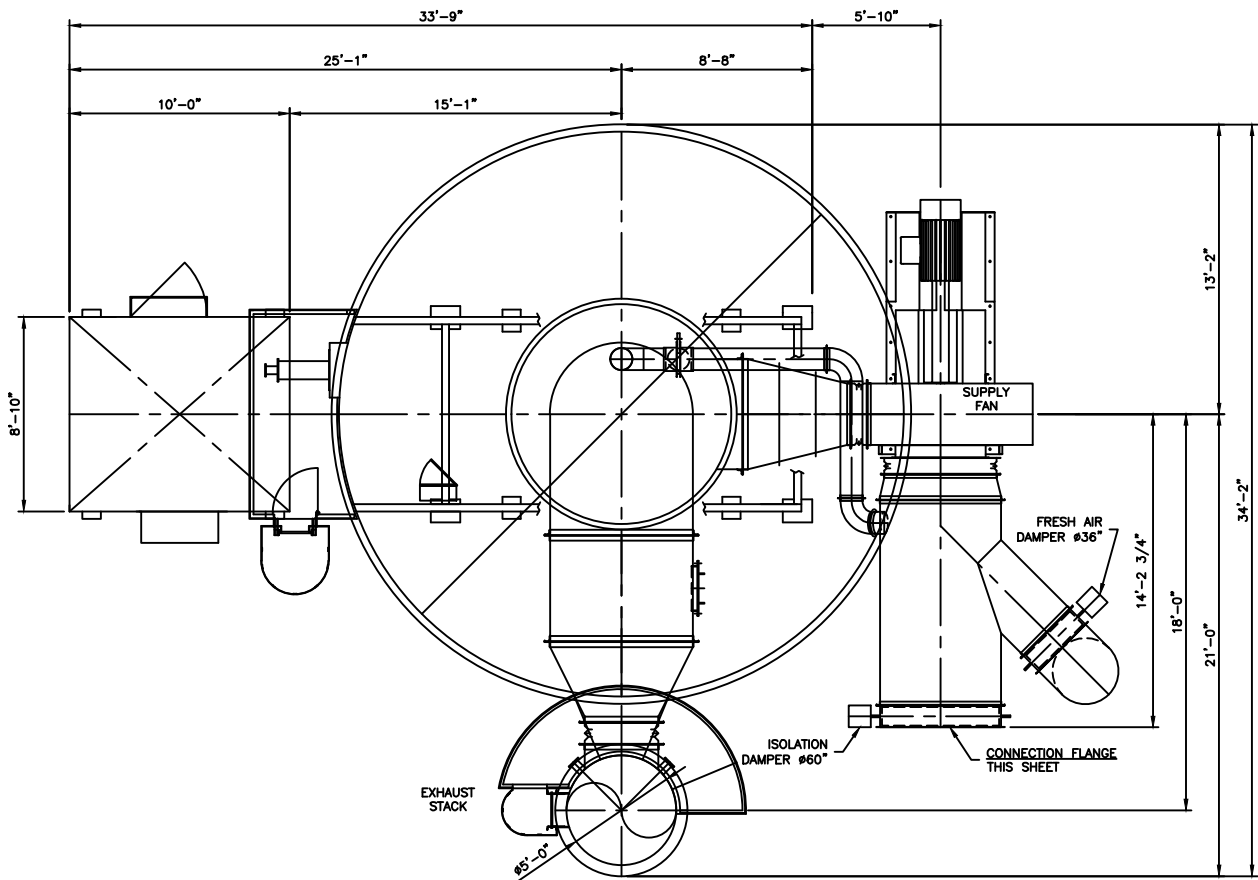
- THIS INDICATES THAT THE DEVICE IS USED IN THE HARDWIRED PURGE CIRCUIT.
- THIS INDICATES THAT THE DEVICE IS USED IN THE HARDWIRED BURNER CIRCUIT. SEE ELECTRICAL DRAWING FOR PURGE AND BURNER PERMISSIVES.

E				STATE:	2020-03-19
D				ORIGINAL:	
C				REPLACEM. FOR:	
B				REPLACED WITH:	
A	ISSUED FOR DESIGN		2017-06-21	PS	
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DRAWN	2017-06-21	AK	Copyright reserved		
CHECKED	2017-06-21	PA			
RELEASED					
STATUS	RELEASED				
SCALE	1:1				DOCUMENT-NO.
	Schematic Legend of PID symbols (EN ISO 10628) Legend of P&ID symbols (EN ISO 10628)				88332F001
	Adient, Pulaski, TN				VERSION
	US04-88332				DOC. PART
				REVISION	A
					SHEET/TOTAL
					1/1

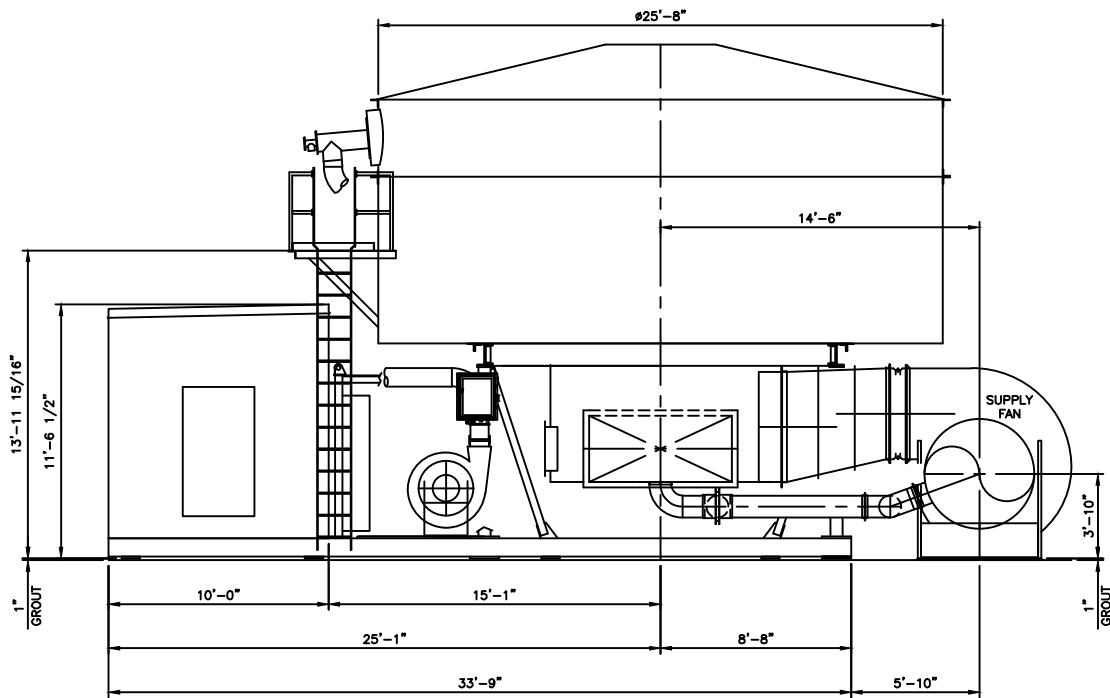


PRELIMINARY

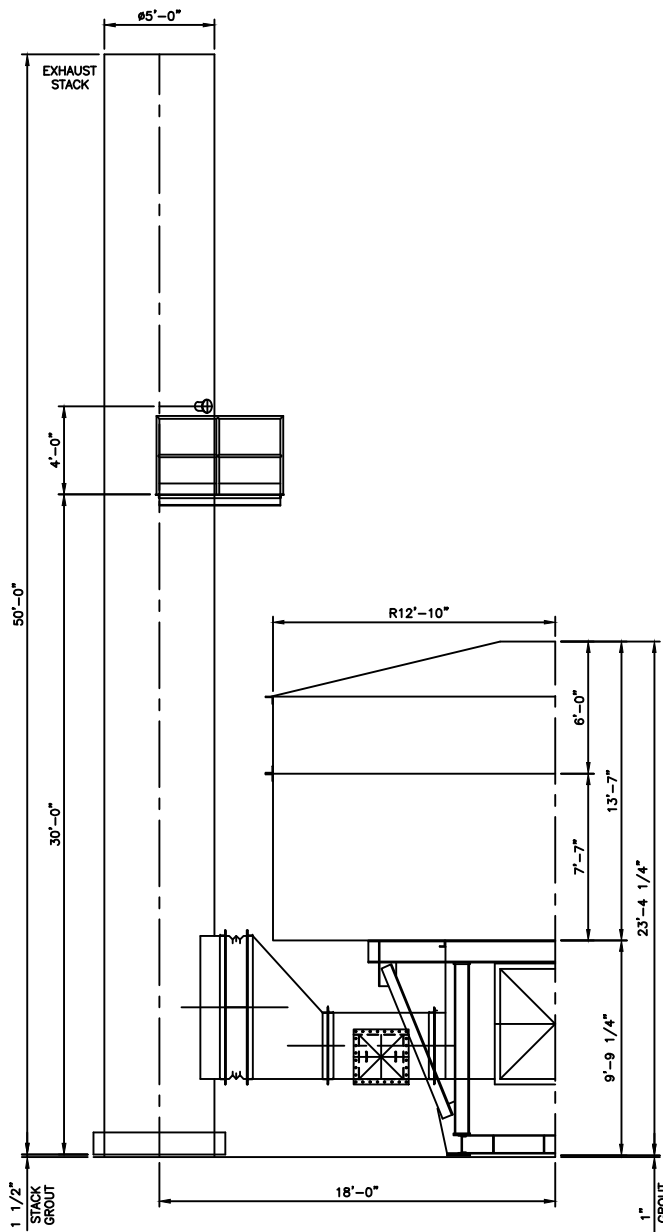
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CHECKED		2017-06-09		AK	
RELEASED		2017-07-19		USPLYKUK	
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		Schematic ECOPURE® RTO RL PIPING & INSTRUMENTATION DIAGRAM		88332F002	
		Adient, Pulaski, TN		VERSION	
		US04-88332.2		DOC. PART	
		E1R1L1		001	
		REVISION		SHEET/ TOTAL	
		B		1/1	



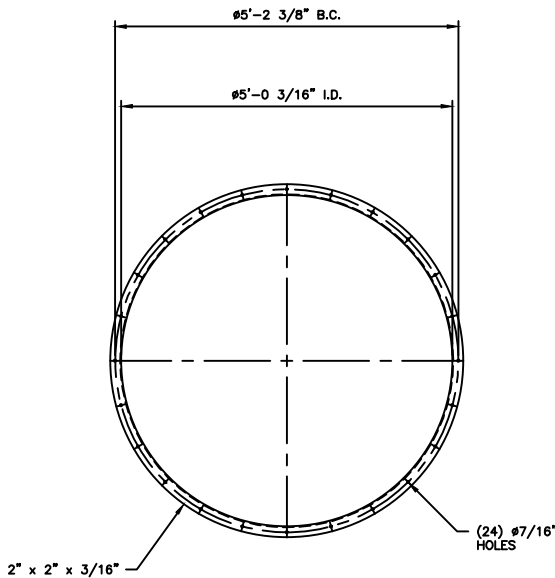
PLAN VIEW
SCALE: 1/4"=1'-0"



ELEVATION
SCALE: 1/4"=1'-0"



END VIEW
SCALE: 1/4"=1'-0"

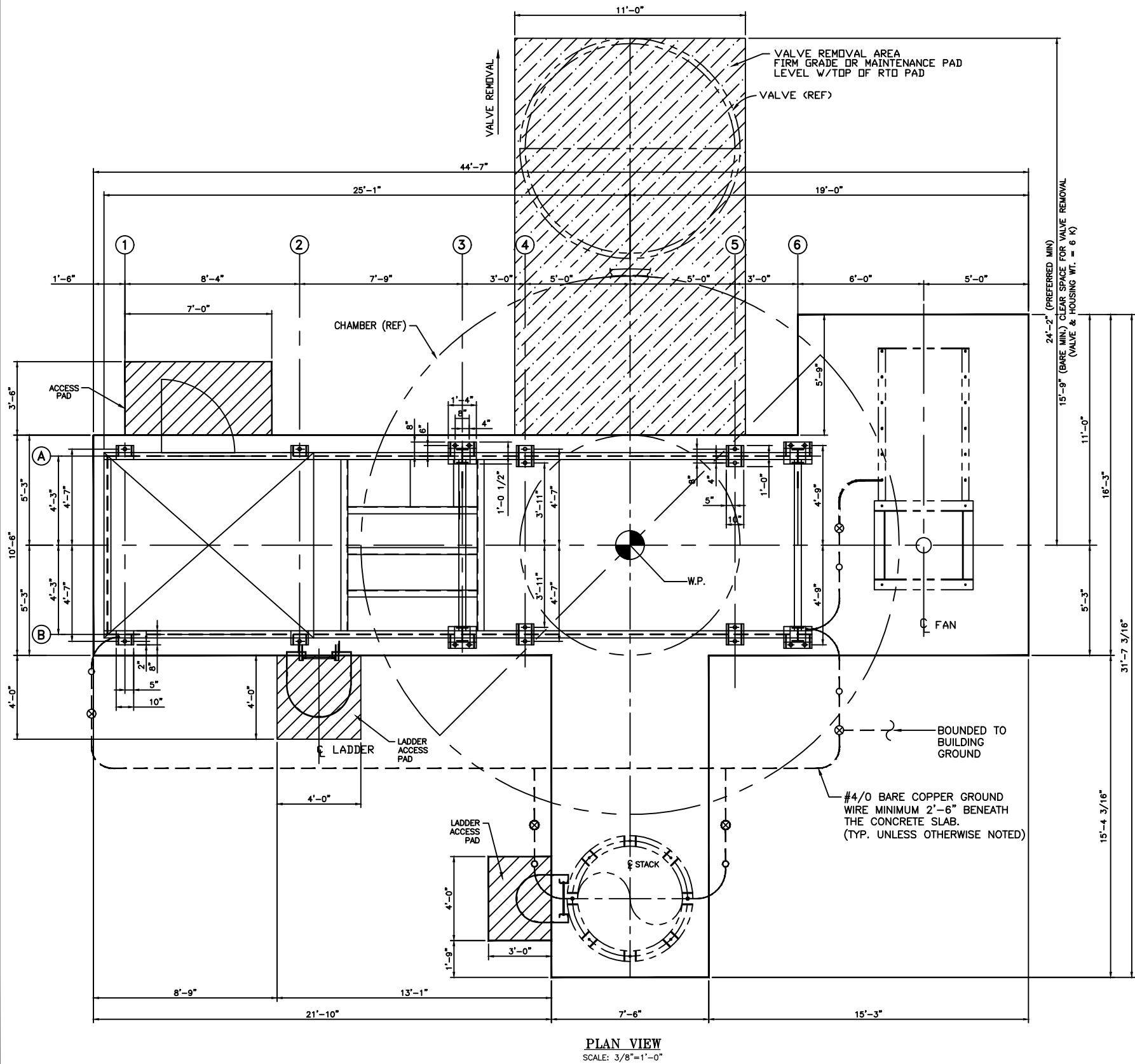


CONNECTION FLANGE
SCALE: 3/4"=1'-0"

PRELIMINARY

ADIANT
PULASKI, TN

REV	DATE	BY	DESCRIPTION OF CHANGE	DATE	BY
DRN	03.17.20	BRR			
CKD					
APPD		AV			
SCALE: NOTED					
THE INFORMATION CONTAINED IN THESE DRAWINGS IS FURNISHED AT YOUR REQUEST AND IS ACCEPTED BY YOU WITH THE UNDERSTANDING THAT IT IS STRICTLY CONFIDENTIAL AND WILL NOT BE USED NOR DISCLOSED TO OTHERS WITHOUT OUR WRITTEN CONSENT. DÜRR SYSTEMS, INC.					
PROJECT - ADIENT			JOB NUMBER US04-88332.2		
TITLE VOC EMISSION CONTROL ABATEMENT SYSTEM GENERAL ARRANGEMENT			DÜRR SYSTEMS, INC. CLEAN TECHNOLOGY SYSTEMS 26801 NORTHWESTERN HIGHWAY SOUTHFIELD, MICHIGAN		
			DÜRR DRAWING NUMBER M060		
			DÜRR STANDARD NUMBER -		



PLAN VIEW
SCALE: 3/8"=1'-0"

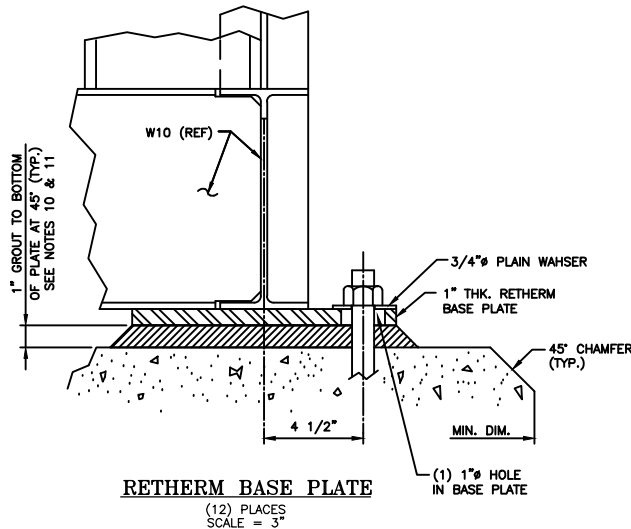
		LOADS IN KIPS											
		A						B					
DEAD LOAD	BLOCK LAYERS	1	2	3	4	5	6	1	2	3	4	5	6
	5	3.6	3.6	43.9	4.8	4.8	43.9	3.6	3.6	43.9	4.8	4.8	43.9
	4	3.6	3.6	38.1	4.2	4.2	38.1	3.6	3.6	38.1	4.2	4.2	38.1
	3	3.6	3.6	32.5	3.5	3.5	32.5	3.6	3.6	32.5	3.5	3.5	32.5
LIVE LOAD		2.0	2.0	2.8	0	0	0	2.0	2.0	2.8	0	0	0

NOTE:
WIND AND SEISMIC BY OTHERS.
BASED ON 60 PCF BLOCKS.

PRELIMINARY

INSTALLATION NOTES

1. ALL FOUNDATION ENGINEERING SHALL BE BY OTHERS.
2. PAD DIMENSIONS SHOWN SHALL BE CONSIDERED AS MINIMUMS FOR EQUIPMENT ACCESS. DURR SYSTEMS, C.T.S. RECOMMENDS THAT ALL EXPOSED FOUNDATION EDGES BE BEVELED TO PREVENT CHIPPING. TOP OF ACCESS PADS SAME ELEVATION AS RTO PAD.
3. FOUNDATION CONCRETE ELEVATION TOLERANCE SHALL BE $\pm 1/8"$.
4. FOUNDATIONS WILL BE CHECKED PRIOR TO EQUIPMENT PLACEMENT. ANY DISCREPANCIES IN FOUNDATION ELEVATIONS SHALL BE CORRECTED BY FOUNDATION INSTALLER BEFORE EQUIPMENT PLACEMENT WILL COMMENCE.
5. FOUNDATIONS SHALL BE FREE FROM DIRT, GREASE AND OTHER SUBSTANCES, PRIOR TO GROUT PLACEMENT.
6. ANCHOR BOLT DESIGN, INCLUDING MATERIAL SELECTION AND EMBEDMENT LENGTH, SHALL BE PERFORMED BY THE FOUNDATION DESIGN ENGINEER.
7. DURR SYSTEMS, C.T.S. RECOMMENDS THAT THE RTO INSTALLER USE "CHEMICAL SET" ANCHOR BOLTS, TO BE INSTALLED AT THE TIME OF SKID PLACEMENT; AND SEPARATE "CHEMICAL SET" ANCHOR BOLTS BE USED FOR THE RTO STACK AND FAN/MOTOR (IF APPLICABLE).
8. DRILLED-IN PLACE ANCHOR BOLTS AND ASSOCIATED HARDWARE SHALL BE FURNISHED AND INSTALLED BY THE RTO INSTALLATION CONTRACTOR.
9. RTO INSTALLATION CONTRACTOR SHALL SHIM AND GROUT RTO SKID AND STACK BASE PLATES, AND FAN AND MOTOR SUPPORTS (IF APPLICABLE). DURR SYSTEMS, C.T.S. RECOMMENDS A 1" ALLOWANCE FOR SHIMS AND GROUT. MATERIAL RECOMMENDATIONS:
9.1 SKID AND STACK SHIMS: _____ CARBON STEEL SHIM STOCK
9.2 FAN AND MOTOR SHIMS (IF REQUIRED): _____ 304ss SHIM STOCK
9.3 GROUT: _____ MASTERBUILDERS "MASTERFLOW" # 928 OR EQUAL (CONSULT DURR SYSTEMS, C.T.S. IF LESS THAN 1" OF GROUT IS REQUIRED)
FOR PROPER INSTALLATION, FOLLOW GROUT MANUFACTURER'S INSTRUCTIONS.
10. GROUT SHALL BE TRIMMED TO BOTTOM OF BASEPLATES AT A 45 DEGREE ANGLE - NOT TO TOP OF BASEPLATES!
11. CONSULT DURR SYSTEMS, C.T.S. FOR SPECIAL GROUTING APPLICATIONS:
11.1 AREAS OF KNOWN CHEMICAL ATTACK
11.2 APPLICATION OF GROUT IN AMBIENT TEMPERATURES OTHER THAN RECOMMENDED BY GROUT MANUFACTURER
11.3 EPOXY GROUT APPLICATION/USAGE.

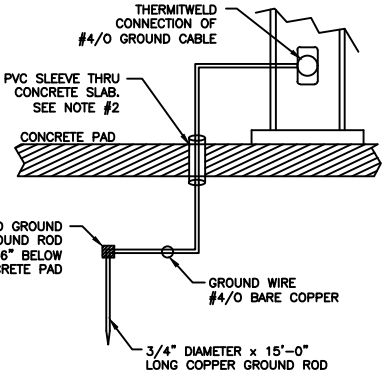


GROUNDING NOTES:

1. ALL CONNECTION OF GROUND WIRE TO GROUND RODS, PLATFORM STEEL, BUILDING STEEL, PERIMETER GROUND BUS, ETC., SHOULD BE THERMITWELDED.

LEGEND:

- THERMITWELD
- PVC SLEEVE $\phi = 1"$
- ⊗ 3/4" DIA x 15'-0" LG COPPER GROUND ROD

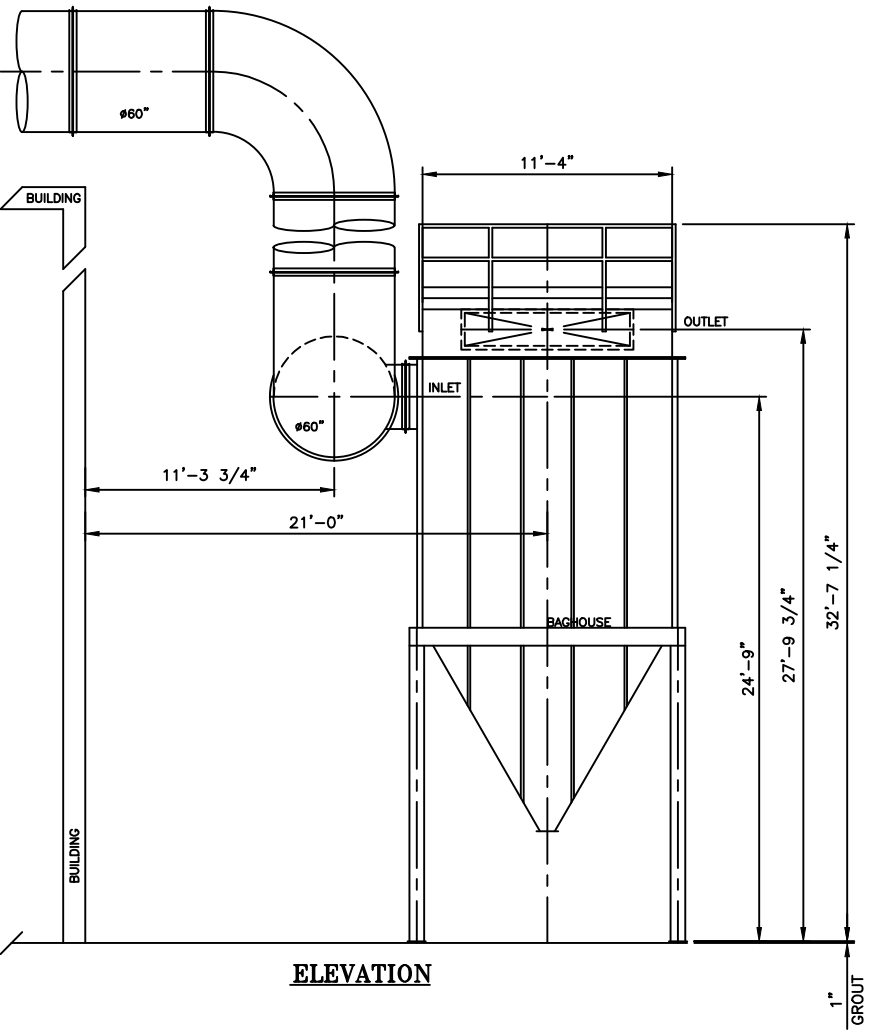
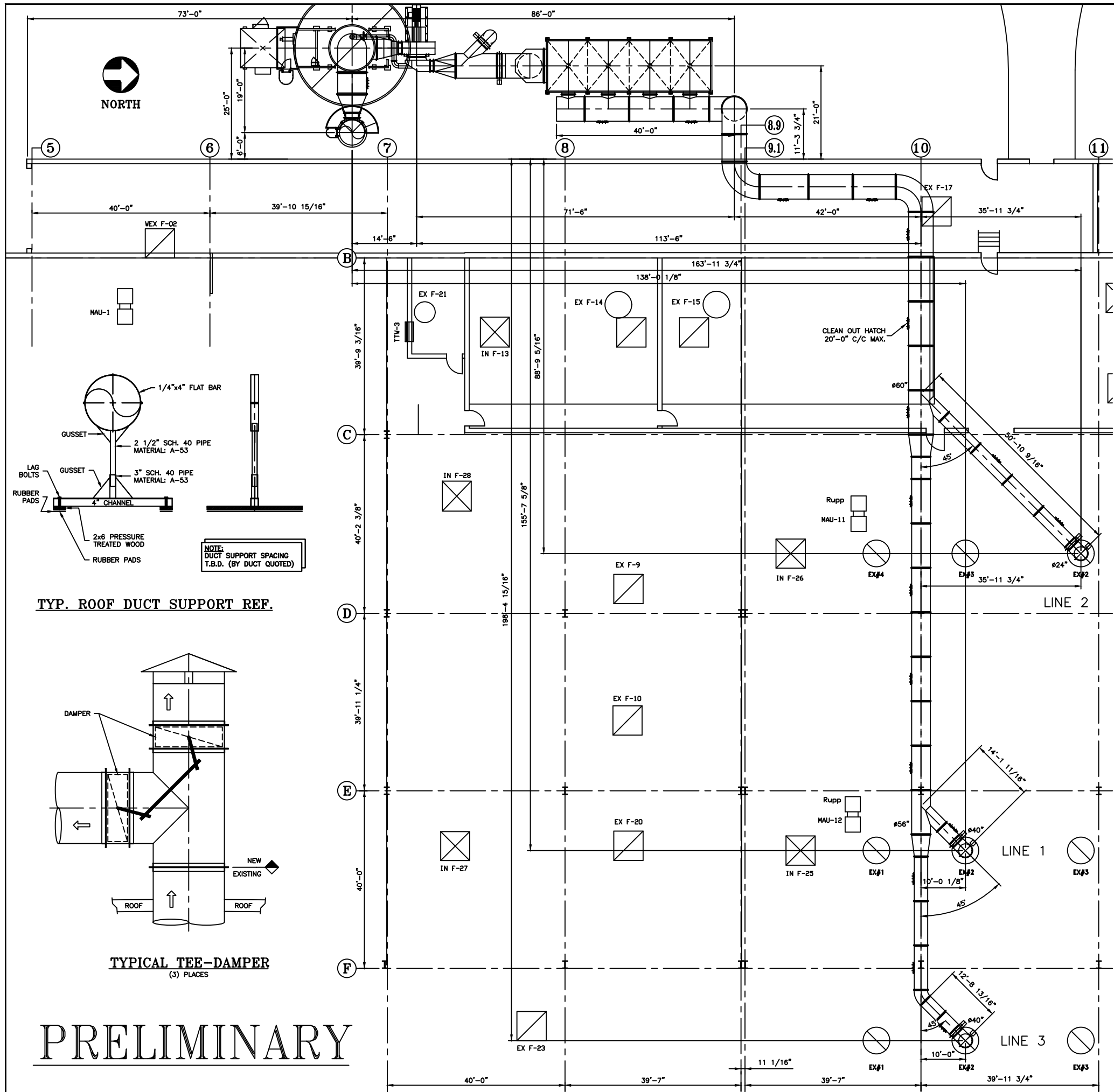


MOUNTING AND GROUNDING DETAIL
OF EQUIPMENT SKID / STRUCTURAL STEEL
OR FAN BASE, OR EXHAUST STACK
NOT TO SCALE

NOTE:
THESE ARE GROUND RECOMMENDATIONS ONLY.
ACTUAL GROUNDING DONE BY OTHERS.

ADIENT
PULASKI, TN

REV	DATE	BY	DESCRIPTION OF CHANGE	DATE	BY
DRN	03.17.20	BRR			
CKD					
APPD		AV			
SCALE: NOTED					
THE INFORMATION CONTAINED IN THESE DRAWINGS IS FURNISHED AT YOUR REQUEST AND IS ACCEPTED BY YOU WITH THE UNDERSTANDING THAT IT IS STRICTLY CONFIDENTIAL AND WILL NOT BE USED NOR DISCLOSED TO OTHERS WITHOUT OUR WRITTEN CONSENT. DURR SYSTEMS, INC.			PROJECT - ADIENT		
			JOB NUMBER US04-88332.2		
			TITLE VOC EMISSION CONTROL ABATEMENT SYSTEM FOUNDATION LOADING		
			DURR DRAWING NUMBER C060		
			DURR STANDARD NUMBER -		



ELEVATION

ADIANT
PULASKI, TN


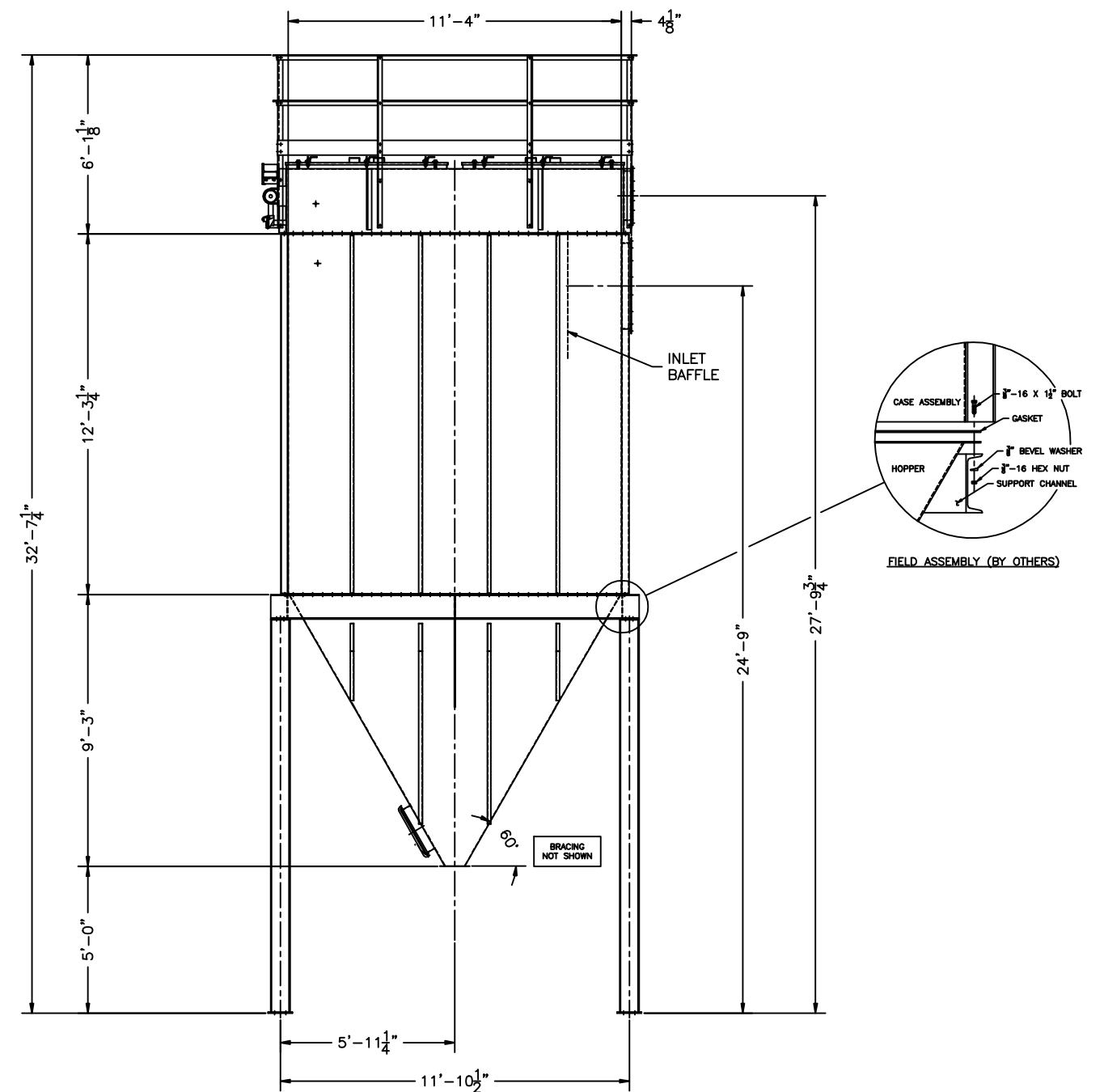
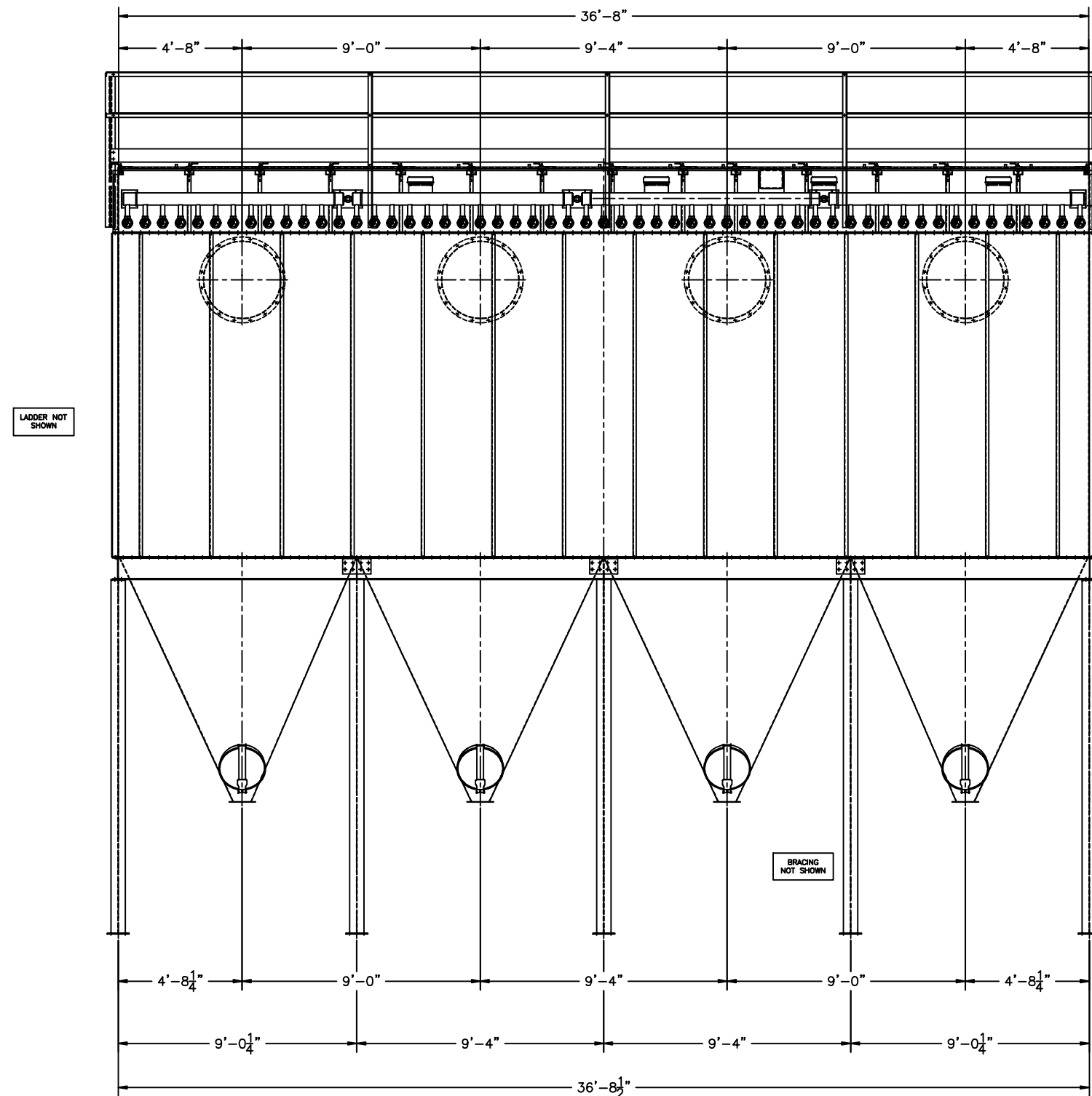
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DRN	08.23.20	BRR			
CKD					
APPD		AV			
SCALE: NOTED					
PROJECT - ADIENT			JOB NUMBER US04-88332.3		
TITLE VOC EMISSION CONTROL ABATEMENT SYSTEM SITE PLAN			DURR DRAWING NUMBER G003		
			DURR STANDARD NUMBER -		

TYP. ROOF DUCT SUPPORT REF.


TYPICAL TEE-DAMPER
(3) PLACES

PRELIMINARY

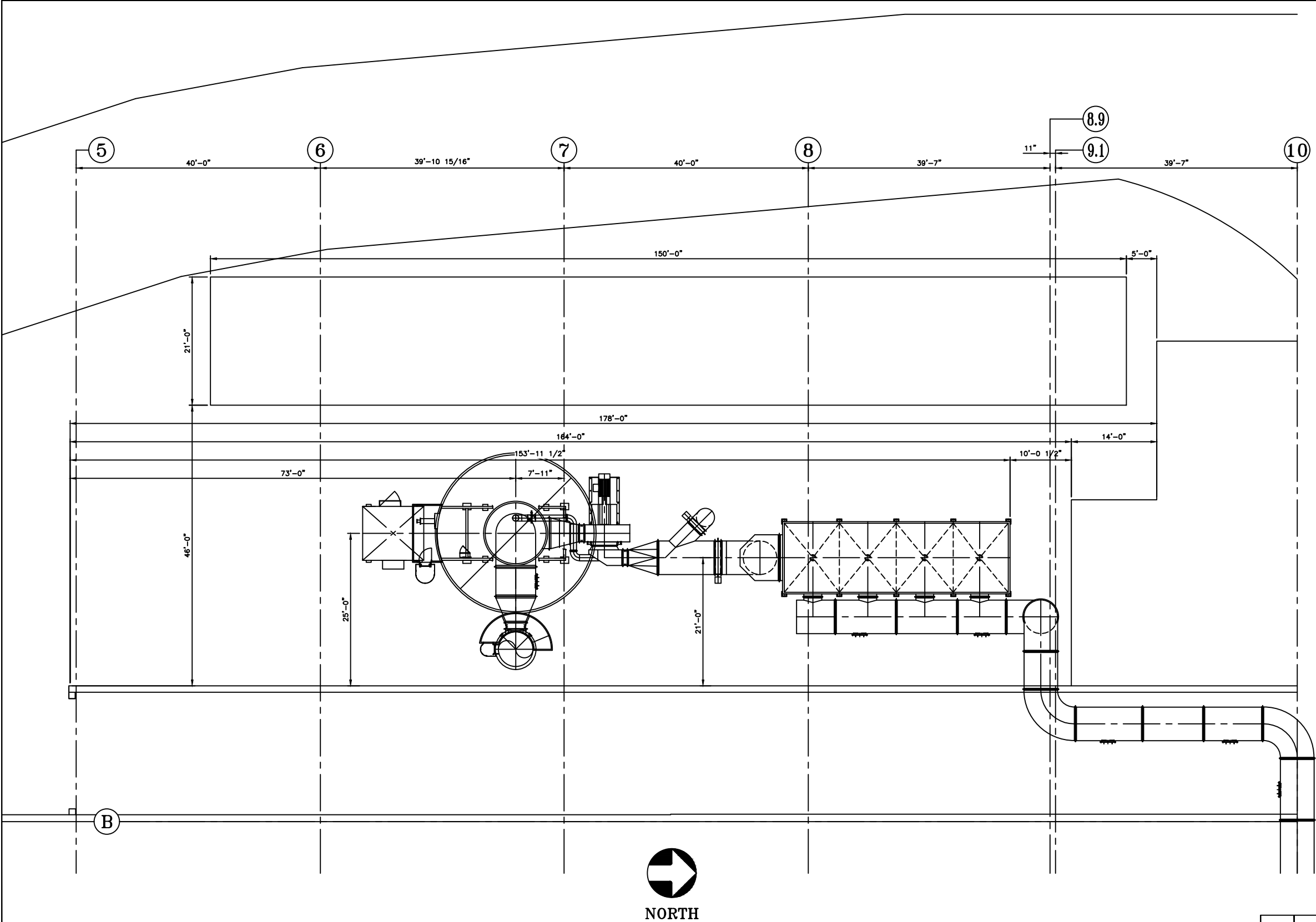
ACAD PART NAME:



PROPOSAL DRAWING
DO NOT USE FOR CONSTRUCTION


EQUIP. TAG NO.			
CUST. ORDER NO.			
THIS DRAWING IS THE PROPERTY OF SLY Incorporated STRONGSVILLE, OHIO WWW.SLYINC.COM FOR REPLACEMENT PARTS CALL 1-800-334-2957 AND SUBJECT TO RETURN UPON REQUEST. IT IS TO BE USED ONLY FOR THE PURPOSES FOR WHICH IT IS LOANED AND NOT TO BE USED IN ANY WAY DETRIMENTAL TO THE INTERESTS OF THE COMPANY.		TITLE STJ-5514-12 HI-2 TubeJet DUST COLLECTOR FOR DURR	
DRAWN BY CHECKED BY		DATE 6/24/20 +	DWS. No. STJ-5514-12 HI-2 REV.
ORDER No. 7191-DT		SHEET 1 of 1	

REV.	DATE	DESCRIPTION	BY	APP'D



ADIENT
PULASKI, TN

PRELIMINARY

REV			DESCRIPTION OF CHANGE	DATE BY
	DATE	BY	<div></div> <div>DÜRR SYSTEMS, INC. CLEAN TECHNOLOGY SYSTEMS 26801 NORTHWESTERN HIGHWAY SOUTHFIELD, MICHIGAN</div>	
DRN	08.28.20	BRR		
CKD				
APPD		AV		
SCALE:			NOTED	
<div>THE INFORMATION CONTAINED IN THESE DRAWINGS IS FURNISHED AT YOUR REQUEST AND IS ACCEPTED BY YOU WITH THE UNDERSTANDING THAT IT IS STRICTLY CONFIDENTIAL AND WILL NOT BE USED NOR DISCLOSED TO OTHERS WITHOUT OUR WRITTEN CONSENT. DÜRR SYSTEMS, INC.</div>			PROJECT - ADIENT	
			TITLE	
			VOC EMISSION CONTROL ABATEMENT SYSTEM INSTALLATION PLAN	
			JOB NUMBER US04-88332.3	
			DÜRR DRAWING NUMBER G004	REV -
			DÜRR STANDARD NUMBER -	



DÜRR SYSTEMS, INC.
CLEAN TECHNOLOGY SYSTEMS
26801 NORTHWESTERN HIGHWAY
SOUTHFIELD, MICHIGAN

ACAD PART NAME:



LEADING IN PRODUCTION EFFICIENCY

NEXT GENERATION RTO TECHNOLOGY

ECOPURE RL - SINGLE VALVE THERMAL OXIDIZER

Advanced Modular RTO System

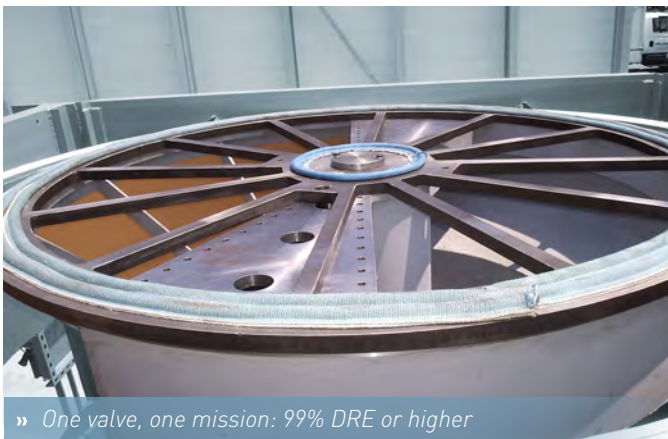
What makes the Dürr Ecopure RL different?

The Ecopure RL is the most advanced regenerative thermal oxidizer (RTO) available. With a compact, rugged design, the RL offers the highest destruction efficiency and heat recovery of any RTO in the market today.

This state-of-the-art design features a single rotary diverter valve, twelve heat recovery chambers enclosed in a single tower, and a pre-piped, pre-wired package that maximizes quality and minimizes field assembly.

99% VOC Removal is Standard

The Ecopure™ RL provides the highest standard VOC removal of any RTO on the market - 99%+. All RTOs use a combination of time, high temperature, and turbulence to destroy pollutants. Only the RL does so with a minimum of moving parts.



» One valve, one mission: 99% DRE or higher



» The Ecopure RL provides a modular, cost high performance, and cost efficient RTO system that fits in even the smallest footprints

Reliability Through Simplicity

The heart of the Ecopure RL is its simplicity. A single outlet diverter valve replaces all butterfly or poppet valves on a conventional RTO.

This heavy-duty valve features machined, metal seats with a unique air seal, whose close tolerance provides 99% destruction of VOCs and HAPs. This ensures compliance for your facility now and in the future.



Scan to see a video of how
the Dürr RL operates

www.durr.com

COST EFFECTIVE ENGINEERING

Advantages That Set the Ecopure RL Apart

Performance, performance, performance. The Dürr Ecopure RL simply outperforms the competition.

- » Standard 99% destruction efficiency - GUARENTEED
- » Up to 95% thermal energy recovery (TER)
- » Low pressure drop
- » Particulate and condensible tolerant

Durable, Low-Maintenance Design

If uptime is crucial, and system downtime is unacceptable, the Dürr Ecopure RL is your only choice.

- » Skid mounted design (pre-piped, pre-wired) makes for more cost effective install
- » All drive components external to unit
- » All fuel train components at grade
- » Replaces multiple dampers used on conventional RTO
- » Fewer moving parts, greater reliability
- » Electric valve drive system replaces hydraulic and pneumatic drives found on typical RTOs
- » Online bake-out option allows for removal of particulate, aerosols, and condensables without process interruption.

Diversity in Industry

Dürr Clean Technology Systems is your source for proven cost effective air emissions compliance solutions, with over 40 years experience and over 4,000 pollution control systems operating in a broad range of industries.

The RL is available in pre-engineered sizes up to 100,000 SCFM+ per unit. The equipment is highly versatile and applicable in most industries and processes.

Ecopure RL systems are used in a broad range of industrial applications:

- » Automotive and Industrial Painting
- » Chemical and Petrochemical
- » Coating
- » Printing
- » Semiconductor
- » Pharmaceutical
- » Food Processing
- » Odor Control
- » Wood Products
- » Carbon Fiber
- » Biofuels
- »and many more

Conventional RTO	Ecopure RL
	
<ul style="list-style-type: none">» Typical 3-Chamber RTO has 9 valves» Many valves, many actuators» Valve sealing & chamber flushing are optional	<ul style="list-style-type: none">» One valve» One electric drive» Minimized leak paths» Valve sealing & chamber flushing are standard
<p>» Less valves, less maintenance, greater reliability</p>	



1.0 DÜRR SYSTEMS, INC. FIELD SERVICE RATES

1.1 Term of Proposal: Unless otherwise provided, this Proposal is subject to acceptance by Buyer within thirty (30) days from the Proposal date.

1.2 Domestic:

a. From the hour the Seller's representative leaves the basing point and including the hour of Seller's representative's return to its basing point, payment shall be made by Buyer to Seller at the rates listed below.

b. A workday is defined as any day, Monday through Friday, whether actual work is performed or not. Also, any travel time to or from the base point is considered a workday and payment shall be made in accordance with the applicable workday rates defined herein.

Straight Time (Service)	\$166.00/hour	Up to 8 hours per day Monday through Friday
Straight Time (fitter, confined space attendant)	\$134.00/hour	Up to 8 hours per day Monday through Friday
Overtime	\$250.00/hour	Over 8 hours up to 12 hours Monday through Friday Saturdays up to 8 hours
Premium Time	\$300.00/hour	Over 12 hours Monday through Friday Over 8 hours on Saturday All day on Sunday
Travel Time	\$165.00/hour	All travel based on actual travel hours Billed at straight time rate
Holiday Time	\$350.00/hour	All work and travel on Holidays and Holiday weekends
Weekend Layover Fee	8 hours straight time/Day	Plus actual expenses
Trainer / Service Engineer	\$230.00/hour (straight time)	Customer plant training. Process Support, Second level field service support.
24/7 Technical Support	Dürr provides 24 hour, 365 day phone technical support. After business hours, a charge of \$500.00 dollars per troubleshooting issue will apply.	

- ***Prices are subject to change without notice.***
- ***All service calls are billed at a rate of 4 hours minimum service plus travel.***
- ***Rates are in US dollars***

2.0 EXPENSES

2.1 Transportation

Travel by air will be Coach Class for US, Canada and Mexico, Business Class for International. Round trip transportation to and from the job site location will be billed at cost plus a ten percent (10%) processing fee.

2.2 Room, Board and Local Transportation

Meals, living expenses, such as lodging, laundry, etc., and local car/equipment rental will be billed at cost plus a ten (10) % percent processing fee.

2.3 Subcontractor Charges

Charges from Seller's subcontractors will be billed at cost plus a fifteen percent (15%) processing and administration fee.

2.4 Mileage Charges

Mileage charges for the usage of personal vehicles will be billed at \$0.79 per mile from the representative's basing point.

2.5 Daily Rate

\$185.00/day (ground transportation & food) \$85.00/day (Regional Technician Daily Rate)

3.0 MISCELLANEOUS

3.1 Rate Adjustments

Unless otherwise agreed, rates will be paid as set forth in this Proposal and may be adjusted to those in effect at the time the service is performed. **The listed rates are available only for calculating additional labor cost. These rates are not to be used for calculating deducts of labor cost without the expressed written consent of Dürr Systems, Inc.**

3.2 Lay-Over Expense

Where circumstances require that a service representative be held over on weekends during which no work is performed, charges will be made for eight (8) hours per day at the straight time rate and living expenses will be billed per Section 2.

3.3 Cancellation

In the event the Buyer should cancel a service requirement less than five (5) business days in advance of a previously agreed upon start date, a cancellation fee of one (1) day's service will be charged per Section 1 above.

3.4 Reporting/Engineering Services Charges

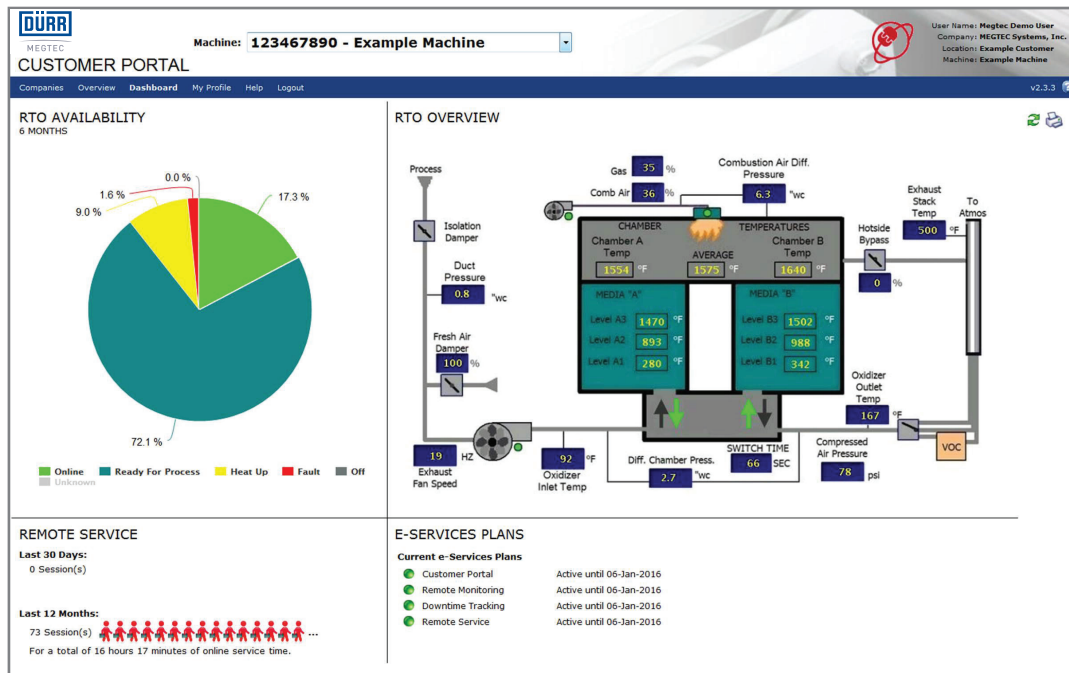
Standard reports may be issued for all field service visits, whether completed on-site or after departure from site. Appropriate report writing time will be invoiced accordingly.

Unless otherwise provided, all engineering services or other work performed by the Seller at its basing point or its offices, including report research and/or writing will be billed at \$166 per hour per Section 1.1 above.

Dürr MEGTEC ProcessMonitor™ Monitoring & Reporting

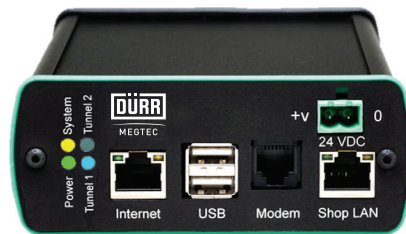
The Dürr MEGTEC ProcessMonitor™ data acquisition and reporting system provides secure, managed remote RTO/RCO monitoring and support to observe, store and report equipment operational data. The system is comprised of a network address translation (NAT) router with a built-in firewall, a PLC connection, and an Ethernet-based communication port which allows VPN access.

The ProcessMonitor™ system has an option to continually collect data for regular analysis and reporting. An additional feature is the remote dashboard that can be used to view machine operation.



Advantages

- Remote access
- Security
- Dashboard view of equipment process from any location
- Secure back-up of data
- Reliability and protection
- Ease of set up
- Data collection and cloud storage
- Out of compliance notification
- Instantaneous email alerts and alarms
- E-mailed data reports and automatic generation of EPA reports
- Monitor alarm history in real-time



Monitor your environmental controls with confidence

Security

- Only connects to the Internet and does not allow access into a customer's network
- Remote service function permits access only to authorized service technicians for diagnostics and control system adjustments

Ease of use

- No VPN required
- Cellular connection option if Ethernet is not available

Efficient

- Stores data continually, not retroactively after an event
- Alerts can be programmed for kit items

Remote monitoring

- Monitor equipment remotely
- Receive alerts via Dürr MEGTEC
- Collect running data

Services

- Bundles with other Dürr MEGTEC services
- 24/7 support

A white paper is available on the system's security features. The ProcessMonitor is a VPN endpoint device, firewall and NAT router in one box. It provides a secure connection for remote monitoring and remote access to the equipment.

Dürr MEGTEC, LLC

830 Prosper Street
De Pere, Wisconsin, U.S.A.
Phone: +1 920.336.5715

www.megtec.com
info@megtec.com



The information contained herein is provided for general information purposes only and is not intended nor to be construed as a warranty, an offer, or any representation of contractual or other legal responsibility.

ProcessMonitor is a trademark of MEGTEC Systems, Inc.



The following is the revised response requested by EPA Region IV (dated August 16, 2022) to clarify TDI emission factor

Tracy Kefauver

From: Kris Patrick Foster <kris.patrick.foster@adient.com>
Sent: Tuesday, August 16, 2022 1:12 PM
To: Tracy Kefauver
Subject: [EXTERNAL] Requested clarification

***** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. *****

Tracy,

Please see clarification of TDI emissions factors:

The testing conducted on October 1, 1997 was specific to TDI and MDI from foam manufacturing. This is the most recent testing event representative of the foam types used by the Company. A more recent testing event at the company sites is not available for use.

Further, current formulations and process knowledge would indicate the emissions factors from the October 1997 testing, used to predict TDI and MDI emissions, are believed to provide the worst case emissions rates resulting in an overstatement and estimate of TDI and MDI emissions. Since the projected emissions for TDI and MDI are worst case and possibly an overstate of emission, the very low emission rates are believed a reasonable and conservatively high estimate for permitting purposes and provides an adequate margin of compliance with applicable regulations.



Kris P. Foster

Environmental, Health and Safety Lead

1890 Mines Road

Pulaski, TN 38478

Cell: 931-638-5918

Office: 931-424-7848

Adient – INTERNAL

Appendix F – Email transmittals to EPA and Affected States

Tracy Kefauver

From: Tracy Kefauver
Sent: Friday, August 19, 2022 3:31 PM
To: R4TitleVTN@epa.gov
Cc: 'denesia_cheek@nps.gov'; 'Don_Shepherd@nps.gov'; 'kirsten_king@nps.gov'; 'Tim_Allen@fws.gov'; 'andrea_stacy@nps.gov'; John_Notar@nps.gov; 'Catherine_Collins@fws.gov'; baanderson02@fs.fed.us; susan_johnson@nps.gov; Pitrolo, Melanie -FS (melanie.pitrolo@usda.gov); Ferrando, Emily; 'Jennifer.Youngpeter@adem.alabama.gov'; Jill Pratt; Tawanna Reid
Subject: 28-0076 | 980244 | Adient US LLC | PSD Preliminary Determination and Draft/Proposed Permit
Attachments: 980244-PSD Preliminary Determination_8.19.2022.pdf; 980244_TV CONSTRUCTION permit_8.19.2022.pdf; 980244-PubNotice-8.19.2022.pdf

Attached for your information is a PSD preliminary determination, draft/proposed PSD construction permit, and public notice for:

Adient US LLC
1890 Mines Road
Pulaski TN 38478

This notice is available on the Division of Air Pollution Control's public participation web page ([Air Notices & Hearings \(tn.gov\)](#)). You are invited to review and comment. Please contact me if you have any questions or comments concerning this source. My contact information is provided below.

Thanks,



Tracy Kefauver | TDEC-Environmental Protection Specialist 2
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue,
Nashville, TN 37243
p. 615-532-0536
Tracy.Kefauver@tn.gov
<https://www.tn.gov/environment/permit-permits/permit-air-home.html>

We value your opinion.

Please take a few minutes to [complete our customer service survey](#).

Internal Customers please complete our [customer satisfaction survey](#).

Appendix G – Response to Comments

Tracy Kefauver

From: Ferrando, Emily <Ferrando.Emily@epa.gov>
Sent: Tuesday, September 13, 2022 2:03 PM
To: Tracy Kefauver
Cc: Tawanna Reid
Subject: [EXTERNAL] RE: Adient Draft Permit Initial Comments

Hi Tracy,

Thank you for sending this over so quickly! With your changes below in red, we have no further comments on the Adient Draft permit at this time.

Thanks again for all your helpful communication throughout this application and permit review.

Best,
Emily

From: Tracy Kefauver <Tracy.Kefauver@tn.gov>
Sent: Tuesday, September 13, 2022 2:58 PM
To: Ferrando, Emily <Ferrando.Emily@epa.gov>
Cc: Tawanna Reid <Tawanna.Reid@tn.gov>
Subject: RE: Adient Draft Permit Initial Comments

Hi Emily,

Thank you for your review and comments. Please see my responses/resolutions in red below.

Feel free to contact me with any further questions.

Thanks,



Tracy Kefauver | TDEC-Environmental Protection Specialist 2
Division of Air Pollution Control
William R. Snodgrass Tennessee Tower, 15th Floor
312 Rosa L. Parks Avenue,
Nashville, TN 37243
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Tracy.Kefauver@tn.gov
<https://www.tn.gov/environment/permit-permits/permit-air-home.html>

We value your opinion.
Please take a few minutes to [complete our customer service survey](#).
Internal Customers please complete our [customer satisfaction survey](#).

From: Ferrando, Emily <Ferrando.Emily@epa.gov>
Sent: Monday, September 12, 2022 1:26 PM

To: Tracy Kefauver <Tracy.Kefauver@tn.gov>

Subject: [EXTERNAL] Adient Draft Permit Initial Comments

*** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. ***

Hi Tracy,

Thanks for taking the time to talk with me today! Below are written versions of the comments we discussed over the phone. Please let me know if you are planning to update the permit or include any of this information in the final determination and don't hesitate to reach out with any questions.

- PTE calculations for PM assume that the HVLP spray applicators have a transfer efficiency of 55%. No set transfer efficiency is given in the permit to calculate PM emissions. It is recommended to include either a value for the transfer efficiency of the equipment or a method of determining the appropriate transfer efficiency to be used in the logs. **Included the transfer efficiency of 55% in the logs for calculations**
- At the bottom of step 1 of the BACT analysis, it is stated that "*After further review, the Division proposes Adient utilize good work practice standards to reduce VOC emissions.*" It appears as though the intent behind this sentence is to add good work practices as one of the 8 control options proposed by the applicant since good work practices is not included. Since the first step of the BACT analysis is to identify all available control technologies and the control is not chosen until step five, it is recommended to update the sentence to read "*After further review, the Division proposes **to add** good work practice standards **to the list of control options under consideration** to reduce VOC emissions.*" This will clarify that the control is not chosen until the final step of BACT. **Incorporated wording as suggested**
- TDEC sent the EPA an email on 8/9/2022 that included additional information on PM emissions at the facility, source testing, and included an updated BACT cost calculation for the regenerative thermal oxidizer using a 2022 estimate from Adient. It is recommended to include this as an attachment in appendix E to ensure the permit record is complete. **Added to Appendix E. The document (dated August 8, 2022) is also available on the TDEC dataviewer.**

Thanks again,
Emily

Emily Ferrando
Air Permits Section
EPA Region 4, Atlanta GA
(404) 562-9042
Pronouns: [she/her](#)

The public notice for PSD construction permit 980244 was published on the Division of Air Pollution Control's Public Participation Opportunities Website on August 19, 2022, beginning the 30-day public comment period. No public comments were received during the 30-day public comment period.