

Facility ID: 54-0047
 Permit: 981278
 Date: 08/25/23
 JMRh

Facility: ABB Installation Products Inc.

Sources 54-0047-14 and 16: Emission Summary

Potential Emission (Electroplating Lines)

Source	Process	Unit	Potential Emissions (lbs/hr)			Potential Emissions (tpy)			Federal Applicability
			HCl	Zn/PM	PM Total	HCl/PM	Zn/PM	PM Total	
54-0047-14	Pre-clean/Surface Prep	Acid Dip Tank	0.1023	--	--	0.4483	--	--	
		Acid Dip Tank	0.1023	--	--	0.4483	--	--	
	Electroplating	Alkaline Zinc Tank	--			--			
		Alkaline Zinc Tank	--			--			
		Alkaline Zinc Tank	--			--			
		Alkaline Zinc Tank	--	0.0008	0.0016	--	0.0034	0.0071	
		Alkaline Zinc Tank	--			--			
		Alkaline Zinc Tank	--			--			
	Chromate Conversion	Blue Bright Tank	--	--	--	--	--	--	40 CFR 63, Subpart WWWWWW
		Yellow Chromate Tank	--	--	--	--	--	--	
	Source Totals		0.20	0.0008	0.2063	0.88	0.0035	0.9036	
54-0047-16	Pre-clean/Surface Prep	Acid Dip Tank	0.1023	--	--	0.4483	--	--	
		Acid Dip Tank	0.1023	--	--	0.4483	--	--	
	Electroplating	Alkaline Zinc Tank	--			--			
		Alkaline Zinc Tank	--			--			
		Alkaline Zinc Tank	--			--			
		Alkaline Zinc Tank	--	0.0008	0.0016	--	0.0034	0.0071	
		Alkaline Zinc Tank	--			--			
		Alkaline Zinc Tank	--			--			
	Chromate Conversion	Blue Bright Tank	--	--	--	--	--	--	40 CFR 63, Subpart WWWWWW
		Yellow Chromate Tank	--	--	--	--	--	--	
	Source Totals		0.20	0.0008	0.2063	0.88	0.0035	0.9036	

SDS for the zinc electroplating tanks provided by the permittee during the permitting process contained no plating or polishing HAP, therefore the zinc electroplating tanks are not subject to Subpart WWWWWW.

Allowable Emissions (Electroplating Lines)

Source	Process	Unit	Allowable Emissions (lbs/hr)			Allowable Emissions (tpy)			Federal Applicability
			HCl	Zn/PM	PM Total	HCl/PM	Zn/PM	PM Total	
54-0047-14	Pre-clean/Surface Prep	Acid Dip Tank	--	--	--	0.88	--	--	
		Acid Dip Tank	--	--	--	--	--	--	
	Electroplating	Alkaline Zinc Tank	--	--		--	--		
		Alkaline Zinc Tank	--	--		--	--		
		Alkaline Zinc Tank	--	--		--	--		
		Alkaline Zinc Tank	--	--	0.00835	--	--	0.0366	
		Alkaline Zinc Tank	--	--		--	--		
		Alkaline Zinc Tank	--	--		--	--		
	Chromate Conversion	Blue Bright Tank	--	--	--	--	--	--	40 CFR 63, Subpart WWWWWW
		Yellow Chromate Tank	--	--	--	--	--	--	
	Source Totals		--	--	0.01	0.88	--	0.92	
54-0047-16	Pre-clean/Surface Prep	Acid Dip Tank	--	--	--	0.88	--	--	
		Acid Dip Tank	--	--	--	--	--	--	
	Electroplating	Alkaline Zinc Tank	--	--		--	--		
		Alkaline Zinc Tank	--	--		--	--		
		Alkaline Zinc Tank	--	--		--	--		
		Alkaline Zinc Tank	--	--	0.0075	--	--	0.0330	
		Alkaline Zinc Tank	--	--		--	--		
		Alkaline Zinc Tank	--	--		--	--		
	Chromate Conversion	Blue Bright Tank	--	--	--	--	--	--	40 CFR 63, Subpart WWWWWW
		Yellow Chromate Tank	--	--	--	--	--	--	
	Source Totals		--	--	0.01	0.88	--	0.91	

SDS for the zinc electroplating tanks provided by the permittee during the permitting process contained no plating or polishing HAP, therefore the zinc electroplating tanks are not subject to Subpart WWWWWW.

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Sources 54-0047-14: Electroplating Line Emissions

HCl Emissions (Acid Dip Tanks)

HCl emissions are generated from surface evaporation. Since the facility plans to use a surfactant, evaporation losses/actual emissions will be significantly reduced. The uncontrolled emissions calculations are a worst case. PM emission are not expected from this process.

Tanks: 2 qty Width: 2 ft Length: 26 ft Depth: 6 ft Temp.: 75 °F
Max. HCl Conc. 14 wt%
Min. HCl Conc. 9 wt%
Fume Suppressant:
Partial Pressure HCl (P_a): 0.0316 mmHg @ 25 °C
Air Velocity Across Tank (V): 33.33 fps
Scrubber Emission Point: 51460 dscfm (Scrubber #1)

Evaporation Rate (E):
 $E = 25 * [0.46 + 0.117(V)] * \log[(760 - P_a) / (760 - P_v)]$
 $P_a = 0$
 $E = 0.001968 \text{ lbs/hr-ft}^2 \text{ (one tank)}$
 $0.003936 \text{ lbs/hr-ft}^2 \text{ (two tanks)}$

Uncontrolled Emission Rate (ER₁):
 $ER_1 = E * A$
Area (A) = 52 ft²
 $ER_1 = 0.102343 \text{ lbs/hr (one tank)}$
 $0.204686 \text{ lbs/hr (two tanks)}$
 $0.896524 \text{ tpy (two tanks)}$

Control Equipment Control Efficiency (CE)
Fume Suppressant: 95 % Added directly to the acid dip tank
Chevron Blade Mist Eliminator: 99 % Not used in controlled emissions calculation because capture efficiency is unknown
Wet Packed Bed Scrubber: 80 % Not used in controlled emissions calculation because capture efficiency is unknown

Controlled Emission Rate (ER₂):
 $ER_2 = ER_1 * [1 - (CE / 100)]$
 $ER_2 = 0.005117 \text{ lbs/hr (one tank)}$
 $0.010234 \text{ lbs/hr (two tanks)}$
 $0.044826 \text{ tpy (two tanks)}$

PM Emissions (Zinc Electroplating Tanks)

Tanks: 7 qty Width: 3.33 ft Length: 26 ft Depth: 6 ft Temp.: 110 °F
DC Power Supply (A): 10,000 Amps
Zinc Bath Concentration: 2 oz/gal
Scrubber Emission Point Flow Rate (F₃): 76255 dscfm (Scrubber #2)

Controlled PM Emission Factors, Zinc Plating (Based on AP-42, Chapter 12-20, Hard Chromium Electroplating, Equation (2), $EF_{Zn} = 0.028 * EF_{Cr} * C_{Cr}$)

Zinc Compounds 1.176E-06 gr/dscf (packed bed scrubber)
Total PM 2.464E-06 gr/dscf (packed bed scrubber)
Zinc Compounds 0.0000168 gr/dscf (fume suppressant & poly ball controls)
Total PM 3.528E-06 gr/dscf (fume suppressant & poly ball controls)
Zinc Compounds 1.456E-07 gr/dscf (packed bed scrubber & fume suppressant & poly ball controls)
Total PM 3.08E-07 gr/dscf (packed bed scrubber & fume suppressant & poly ball controls)

PM Emission Factors Chromium Electroplating (AP-42, Chapter 12-20, Hard Chromium Electroplating, Table 12.20-1)

Chromium 0.000021 gr/dscf (packed bed scrubber)
Total PM 0.000044 gr/dscf (packed bed scrubber)
Chromium 0.00003 gr/dscf (fume suppressant & poly ball controls)
Total PM 0.000063 gr/dscf (fume suppressant & poly ball controls)
Chromium 2.6E-06 gr/dscf (packed bed scrubber & fume suppressant & poly ball controls)
Total PM 5.5E-06 gr/dscf (packed bed scrubber & fume suppressant & poly ball controls)

*Note: Cr emission factors are only used in the calculation of Zn emission factors

Zinc and Total PM Emissions (E_{Zn} and E_{PM}) Calculations (AP-42):

$E_{Zn} = [F_3 * EF_{Zn} * 60 \text{ (min/hr)}] / [7000 \text{ (gr/lb)}] \text{ (Wet Packed Bed Scrubber Control)}$
 $= 0.000769 \text{ lbs/hr}$
 0.003367 tpy

 $E_{PM} = [F_3 * EF_{PM} * 60 \text{ (min/hr)}] / [7000 \text{ (gr/lb)}] \text{ (Wet Packed Bed Scrubber Control)}$
 $= 0.001611 \text{ lbs/hr}$
 0.007054 tpy

Chromium Conversion Coating Tanks (Yellow Chromate and Blue Bright chemistry)

Based on AP-42 Chapter 12.20, PM emissions from Cr electroplating processes are emitted when hydrogen gas bubbles, generated from from the electroplating processes, pop at the tank's surface. However, chromium conversion coating is an electroless process that does not generate gaseous emissions. Therefore, Cr emissions are not expected from the chromium conversion coating tanks.

1200-03-07 Allowable Particulate Matter Calculation

		Units
Material Input Rate ¹ :		lbs/hr
Exhaust Flow Rate:	89,360.00	CFM
Material Input Rate ¹ :	0	ton/hr
Emission Flow Rate:	89360	dscf/min
Factor (3.59 or 17.31):	3.59	
Exponent (0.62 or 0.16):	0.62	

	PM Emission Rate (lbs/hr)	PM Emission Rate (tpy)
Applicable Standard 1200-03-07-(XX)(X)		
Table 2 (03(1))	0.0000	0.0000
0.02 gr/dcfm (04(1))	15.3189	67.0966
0.25 gr/dcfm (04(2))	191.4857	838.707

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HCl emissions are generated from surface evaporation. Since the facility plans to use a surfactant, evaporation losses/actual emissions will be significantly reduced. The uncontrolled emissions calculations are a worst case. PM emission are not expected from this process.

Tanks:	2	qty	Width:	2	ft	Length:	26	ft	Depth:	6	ft	Temp.:	75	°F
Max. HCl Conc.	14	wt%												
Min. HCl Conc.	9	wt%												
Fume Suppressant:														
Partial Pressure HCl (P _a):	0.0316	mmHg @ 25 °C												
Air Velocity Across Tank (V):	33.33	fps												
Scrubber Emission Point:	37900	dscfm	(Scrubber #3)											
Evaporation Rate (E):	E = 25 * [0.46+0.117(V)] * log[(760-Pa) / (760-Pv)]													
	P _a = 0													
	E = 0.0019681 lbs/hr-ft ² (one tank)													
	0.0039363 lbs/hr-ft ² (two tanks)													
Uncontrolled Emission Rate (ER _u):	ER _u = E * A													
	Area (A) = 52	ft ²												
	ER _u = 0.1023429	lbs/hr (one tank)												
	0.2046858	lbs/hr (two tanks)												
	0.896524	tpy (two tanks)												

Control Equipment	Control Efficiency (CE)	
Fume Suppressant:	95 %	Added directly to the acid dip tank
Chevron Blade Mist Eliminator:	99 %	Not used in controlled emissions calculation because capture efficiency is unknown
Wet Packed Bed Scrubber:	80 %	Not used in controlled emissions calculation because capture efficiency is unknown
Controlled Emission Rate (ER _c):	ER _c = ER _u * [1 - (CE / 100)]	
	ER _c = 0.0051171	lbs/hr (one tank)
	0.0102343	lbs/hr (two tanks)
	0.0448262	tpy (two tanks)

PM Emissions (Zinc Electroplating Tanks)

Tanks:	7	qty	Width:	3.33	ft	Length:	26	ft	Depth:	6	ft	Temp.:	110	°F
DC Power Supply (A):	10,000	Amps												
Zinc Bath Concentration:	2	oz/gal												
Scrubber Emission Point Flow Rate (F _s):	76255	dscfm	(Scrubber #4)											

Controlled PM Emission Factors, Zinc Plating [Based on AP-42, Chapter 12.20, Hard Chromium Electroplating, Equation (2), EF_{Zn} = 0.028 * EF_{Cr} * C_{Cr}]

Zinc Compounds	1.176E-06	gr/dscf	(packed bed scrubber)
Total PM	2.464E-06	gr/dscf	(packed bed scrubber)
Zinc Compounds	0.00000168	gr/dscf	(fume suppressant & poly ball controls)
Total PM	3.528E-06	gr/dscf	(fume suppressant & poly ball controls)
Zinc Compounds	1.456E-07	gr/dscf	(packed bed scrubber & fume suppressant & poly ball controls)
Total PM	3.08E-07	gr/dscf	(packed bed scrubber & fume suppressant & poly ball controls)

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Chromium	0.00003	gr/dscf	(fume suppressant & poly ball controls)
Total PM	0.000063	gr/dscf	(fume suppressant & poly ball controls)
Chromium	2.6E-06	gr/dscf	(packed bed scrubber & fume suppressant & poly ball controls)
Total PM	5.5E-06	gr/dscf	(packed bed scrubber & fume suppressant & poly ball controls)

*Note: Cr emission factors are only used in the calculation of Zn emission factors

Zinc and Total PM Emissions (E_{Zn} and E_{PM}) Calculations (AP-42):

$$\begin{aligned} E_{Zn} &= [F_s * EF_{Zn} * 60 \text{ (min/hr)}] / [7000 \text{ (gr/lb)}] \quad \text{(Wet Packed Bed Scrubber Control)} \\ &= 0.0007687 \text{ lbs/hr} \\ &\quad 0.0033667 \text{ tpy} \\ E_{PM} &= [F_s * EF_{PM} * 60 \text{ (min/hr)}] / [7000 \text{ (gr/lb)}] \quad \text{(Wet Packed Bed Scrubber Control)} \\ &= 0.0016105 \text{ lbs/hr} \\ &\quad 0.007054 \text{ tpy} \end{aligned}$$

Chromium Conversion Coating Tanks (Yellow Chromate and Blue Bright chemistry)

Based on AP-42 Chapter 12.20, PM emissions from Cr electroplating processes are emitted when hydrogen gas bubbles, generated from from the electroplating processes, pop at the tank's surface. However, chromium conversion coating is an electroless process that does not generate gaseous emissions. Therefore, Cr emissions are not expected from the chromium conversion coating tanks.

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		Units
Material Input Rate ¹ :		lbs/hr
Exhaust Flow Rate:	114,155.00	CFM
Material Input Rate ¹ :	0	ton/hr
Emission Flow Rate:	114155	dscf/min
Factor (3.59 or 17.31):	3.59	
Exponent (0.62 or 0.16):	0.62	

	PM Emission Rate	PM Emission Rate
Applicable Standard	(lbs/hr)	(tpy)
Table 2 [03(1)]	0.0000	0.0000
0.02 gr/dcfm [04(1)]	19.5694	85.7141
0.25 gr/dcfm [04(2)]	244.6179	1071.426