

## SMAQMD BACT CLEARINGHOUSE

CATEGORY TYPE:

**COATING - ADHESIVES**

BACT Category: MINOR SOURCE BACT

<b>BACT Determination Number:</b>	320	<b>BACT Determination Date:</b>	11/16/2022	<b>ACTIVE</b>
<b>Equipment Information</b>				
<b>Permit Number:</b> N/A -- Generic BACT Determination <b>Equipment Description:</b> ADHESIVE APPLICATION <b>Unit Size/Rating/Capacity:</b> ≤ 7,404 LBS VOC/YEAR <b>Equipment Location:</b>				
<b>BACT Determination Information</b>				
<b>District Contact:</b> Jeff Quok      Phone No.: (279) 207-1145      email: jquok@airquality.org				
<b>ROCs</b>	<b>Standard:</b>	See Technology Description		
	<b>Technology Description:</b>	Compliance with SMAQMD Rule 460(A) and BACT #320/321 VOC limits (see Tables 1-9 in BACT evaluation)		
	<b>Basis:</b>	Achieved in Practice		
<b>NOx</b>	<b>Standard:</b>	See Technology Description		
	<b>Technology Description:</b>	For heaters < 1,200°F: 20 ppm or 0.024 lb/MMBtu For heaters ≥ 1,200°F: 30 ppm or 0.036 lb/MMBtu		
	<b>Basis:</b>	Achieved in Practice		
<b>SOx</b>	<b>Standard:</b>	No standard		
	<b>Technology Description:</b>			
	<b>Basis:</b>			
<b>PM10</b>	<b>Standard:</b>	Spray booth with dry filters or waterwash		
	<b>Technology Description:</b>			
	<b>Basis:</b>	Achieved in Practice		
<b>PM2.5</b>	<b>Standard:</b>	Spray booth with dry filters or waterwash		
	<b>Technology Description:</b>			
	<b>Basis:</b>	Achieved in Practice		
<b>CO</b>	<b>Standard:</b>	For heaters, low NOx burner, 400 ppmvd @ 3% O2		
	<b>Technology Description:</b>			
	<b>Basis:</b>	Achieved in Practice		
<b>Comments</b> T-BACT is compliance with SMAQMD Rule 460(A) BACT #320/321 VOC limits (see Tables 1-9 in BACT Evaluation) and emission limits of Table 3 to Subpart JJ of Part 63.  (A)Compliance with SMAQMD Rule 460 includes use of exemptions of this rule. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.				

## SMAQMD BACT CLEARINGHOUSE

CATEGORY TYPE:

**COATING - ADHESIVES**

BACT Category: MINOR SOURCE BACT

<b>BACT Determination Number:</b>	321	<b>BACT Determination Date:</b>	11/16/2022	<b>ACTIVE</b>
<b>Equipment Information</b>				
<b>Permit Number:</b> N/A -- Generic BACT Determination <b>Equipment Description:</b> ADHESIVE APPLICATION <b>Unit Size/Rating/Capacity:</b> > 7,404 LBS VOC/YEAR <b>Equipment Location:</b>				
<b>BACT Determination Information</b>				
<b>District Contact:</b> Jeff Quok      Phone No.: (279) 207-1145      email: jquok@airquality.org				
<b>ROCs</b>	<b>Standard:</b>	See Technology Description		
	<b>Technology Description:</b>	Compliance with SMAQMD Rule 460(A) and BACT 320/321 VOC limits (see Tables 1-9 in BACT Evaluation) and VOC control system with ≥90% collection efficiency and ≥95% destruction efficiency		
	<b>Basis:</b>	Cost Effective		
<b>NOx</b>	<b>Standard:</b>	See Technology Description		
	<b>Technology Description:</b>	For heaters < 1,200°F: 20 ppm or 0.024 lb/MMBtu For heaters ≥ 1,200°F: 30 ppm or 0.036 lb/MMBtu		
	<b>Basis:</b>	Achieved in Practice		
<b>SOx</b>	<b>Standard:</b>	No standard		
	<b>Technology Description:</b>			
	<b>Basis:</b>			
<b>PM10</b>	<b>Standard:</b>	Spray booth with dry filters or waterwash		
	<b>Technology Description:</b>			
	<b>Basis:</b>	Achieved in Practice		
<b>PM2.5</b>	<b>Standard:</b>	Spray booth with dry filters or waterwash		
	<b>Technology Description:</b>			
	<b>Basis:</b>	Achieved in Practice		
<b>CO</b>	<b>Standard:</b>	For heaters, low NOx burner, 400 ppmvd @ 3% O2		
	<b>Technology Description:</b>			
	<b>Basis:</b>	Achieved in Practice		
<b>Comments</b> T-BACT is compliance with SMAQMD Rule 460(A) BACT #320/321 VOC limits (see Tables 1-9 in BACT evaluation), emission limits of Table 3 to Subpart JJ of Part 63 and VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency.  (A)Compliance with SMAQMD Rule 460 includes use of exemptions of this rule. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.				

## **BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION**

**DETERMINATION NO.:** 320 & 321  
**DATE:** November 16, 2022  
**ENGINEER:** Jeffrey Quok

**Category/General Equip  
Description:**

Adhesive Application Operations

**Equipment Specific Description:**

Adhesives Application in a Spray Booth

≤ 7,404 lbs VOC/year (BACT #320)  
> 7,404 lbs VOC/year (BACT #321)

**Equipment Size/Rating:**

Minor Source

**Previous BACT Det. No.:**

226 & 227

This BACT determination will update determinations #226 & #227 for adhesive application operations. This BACT will apply to all adhesive operations that are subject to Rule 460. Adhesive operations include the use of adhesives and sealants and associated primers, and from related surface preparation solvents, cleanup solvents, and strippers. Per Rule 460, an adhesive is any material that is used to bond one surface to another surface by attachment.

### **BACT/T-BACT ANALYSIS**

#### **A. ACHIEVED IN PRACTICE (Rule 202, §205.1a):**

The following control technologies are currently employed as BACT/T-BACT for plastic parts coating operations by the following agencies and air pollution control districts:

#### **US EPA**

#### **BACT**

Source: [EPA RACT/BACT/LAER Clearinghouse](#)

Adhesive Application Operation	
VOC	No standard
NOx	No standard
SOx	No standard
PM10	No standard
PM2.5	No standard
CO	No standard

### **T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

### **RULE REQUIREMENTS**

#### [40 CFR 63 Subpart JJ – National Emission Standards for Wood furniture Manufacturing Operations](#)

This regulation applies for facilities that are engaged, either in part or in whole, in the manufacture of wood furniture or wood furniture components and that are located at a plant site that is a major source as defined in 40 CFR subpart A, §63.2 Since this BACT determination is only for minor sources, this NESHAP is not applicable.

Subpart JJ limits volatile hazardous air pollutants (VHAP) of finishing operations and contact adhesives and also limits the VOC strippable spray booth material. Only the limits that are applicable to adhesives will be shown. The limits can be seen in the table below.

Table 3 to Subpart JJ of Part 63—Summary of Emission Limits

<b>Emission point</b>	<b>Existing source</b>	<b>New source</b>
Contact Adhesives:		
(a) Use compliant contact adhesives (maximum kg VHAP/kg solids [lb VHAP/lb solids], as applied) based on following criteria:		
i. For aerosol adhesives, and for contact adhesives applied to nonporous substrates	<sup>a</sup> NA	<sup>a</sup> NA
ii. For foam adhesives used in products that meet flammability requirements	1.8	0.2
iii. For all other contact adhesives (including foam adhesives used in products that do not meet flammability requirements); or	1.0	0.2
(b) Use a control device	<sup>b</sup> 1.0	<sup>b</sup> 0.2
All Contact Adhesives:		
(a) Achieve total free formaldehyde emissions across all finishing operations and contact adhesives, lb per rolling 12 month period, as applied	400	400
(b) Use coatings and contact adhesives only if they are low-formaldehyde coatings and contact adhesives	<sup>c</sup> 1.0	<sup>c</sup> 1.0

- There is no limit on the VHAP content of these adhesives.
- The control device must operate at an efficiency that is equivalent to no greater than 1.0 kilogram (or 0.2 kilogram) of VHAP being emitted from the affected emission source per kilogram of solids used.
- The limits refer to the formaldehyde content by weight of the coating or contact adhesive, as specified on certified product data sheets.

### California Air Resources Board (CARB)

#### **BACT**

Source: [CARB BACT Clearinghouse](#)  
[CARB BACT Guidelines Search](#)

There are no applicable BACT determinations posted on CARB's BACT clearinghouse.

The CARB BACT Guidelines search contains SJVAPCD BACT Guidelines 4.9.1-4.9.14. See the SJVAPCD BACT summary for full BACT review.

#### **T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

#### **RULE REQUIREMENTS**

There are no statewide rule requirements for adhesive application operations.

### Sacramento Metropolitan AQMD

#### **BACT**

Source: [SMAQMD BACT Clearinghouse](#)

<b>BACT #226: Adhesive Application &lt; 1,170 lbs VOC/month and ≤ 4,019 lbs VOC/per year</b>	
<b>VOC</b>	Compliance with adhesive BACT VOC limits (see Tables 1-9 below)
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	Spray booth with dry filters or waterwash
<b>PM2.5</b>	Spray booth with dry filters or waterwash
<b>CO</b>	No standard

<b>BACT #227: Adhesive Application ≥ 1,170 lbs VOC/month and &gt; 4,019 lbs VOC/per year</b>	
<b>VOC</b>	Compliance with adhesive BACT VOC limits (see Tables 1-9 below) and VOC control system with ≥ 90% collection efficiency and ≥ 95% destruction efficiency (Technologically Feasible)
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	Spray booth with dry filters or waterwash
<b>PM2.5</b>	Spray booth with dry filters or waterwash
<b>CO</b>	No standard

<b>Table 1 Adhesives</b>		
<b>Adhesive</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
<b>Architectural Adhesive Applications:</b>		
Multipurpose Construction Adhesive	70 (0.6)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Structural Wood Member Adhesive	140 (1.2)	SCAQMD Rule 1168, SJVAPCD Rule 4653, SDCAPCD Rule 67.21
Ceramic Tile Installation Adhesive	65 (0.5)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Cove Base Installation Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Dry Wall and/or Panel Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168
<b>Flooring Adhesives:</b>		
All Other Indoor or Outdoor Floor Covering Adhesive	50 (0.4)	SCAQMD Rule 1168
Ceramic Floor Tile Installation	65 (0.5)	SCAQMD Rule 1168, SJVAPCD Rule 4653
Indoor Carpet Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Carpet Pad Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Rubber Flooring Adhesive	60 (0.5)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Wood Flooring Adhesive	20 (0.2)	SCAQMD Rule 1168,
Subfloor Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
VCT and Asphalt Tile Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
<b>Roofing Adhesives:</b>		
Single-Ply Roof Membrane Installation/Repair Adhesive (A)	200 (1.7)	SCAQMD 1 Rule 1168
All Other Roof Adhesives	200 (1.7)	SCAQMD Rule 1168
Structural Glazing Adhesive (A)	100 (0.8)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51

<b>Table 1 Adhesives</b>		
<b>Adhesive</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
<b>Plastic Welding Products:</b>		
ABS Welding Adhesive	325 (2.7)	SJVAPCD Rule 4653, SCAQMD Rule 1168
Cellulosic Plastic Welding Adhesive	100 (0.8)	SDCAPCD Rule 67.21
CPVC Welding Adhesive	490 (4.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
PVC Welding Adhesive	425 (3.5)	SCAQMD Rule 1168
ABS to PVC Transition Cement	510 (4.3)	SCAQMD Rule 1168
All Other Plastic Cement Welding Adhesive	100 (0.8)	SCAQMD Rule 1168
<b>Miscellaneous Adhesives:</b>		
Metal to Urethane/Rubber Molding or Casting Adhesive	250 (2.1)	SMAQMD Rule 460
Thin Metal Laminating Adhesive (A)	780 (6.5)	SCAQMD Rule 1168, SMAQMD Rule 460, SJVAPCD Rule 4653, SDCAPCD Rule 67.21, BAAQMD Rule 51
Tire Tread Adhesive (A)	100 (0.8)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Top and Trim Adhesive	250 (2.1)	SCAQMD Rule 1168
Waterproof Resorcinol Glue (A)	170 (1.4)	SCAQMD Rule 1168, SMAQMD Rule 460, SJVAPCD Rule 4653, SDCAPCD Rule 67.21, BAAQMD Rule 51
Computer Diskette Jacket Manufacturing Adhesive	350 (2.9)	SCAQMD Rule 1168
All Other Specialty Adhesives	250 (2.1)	SCAQMD Rule 1168
Adhesive Application Process – Wooden Door Assembly, Roller Applied	Use of an adhesive with a VOC content of 5.0 grams/liter (0.04 lb/gal) (less water and exempt compounds), or less	SJVAPCD BACT Guideline 4.9.8 (11/20/01)

<b>Table 1 Adhesives</b>		
<b>Adhesive</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Adhesive Application Process – Vinyl Door and Window Assembly, Non-Spray Applied	1) Use of adhesive with a VOC content of 3.0 g/l (0.03 lb/gal)(less water and exempt compounds), or less for automated adhesive application and assembly processes  2) Use of adhesive with VOC content of 76.5 g/l (0.6 lb/gal) (less water and exempt compounds), or less for manually applied adhesive operation when assembling	SJVAPCD BACT Guideline 4.9.9 (9/26/03)
Adhesive Application for Multi-Wall Packaging Manufacturing	1) Adhesives with a VOC content of $\leq 0.2$ lb/gal (24.0 g/l) (excluding water and exempt compounds) for the adhesion of plastic film to porous material  2) Adhesives with a VOC content of $\leq 0.13$ lb/gal (15.6 g/l) (excluding water and exempt compounds) for the adhesion of porous materials	SJVAPCD BACT Guideline 4.9.10 (11/18/04)
Corrugated Box Gluer	Use of adhesives with a VOC content (less water and exempt compounds) not exceeding 0.044 lb/gal (5.3 g/l)	SJVAPCD BACT Guideline 4.9.12 (9/22/06)
Corrugated Cardboard Manufacturing (Corrugator)	Adhesives – 0.015 lb/VOC/gal (1.8 g/l) (less water and exempt compounds)	SJVAPCD BACT Guideline 4.9.13 (1/30/15)

(A) Also listed in EPA's Control Techniques Guidelines for Miscellaneous Industrial Adhesives (EPA-453/R-08-005 (9/08)).

<b>Table 2 VOC Content for Adhesive Primers</b>		
<b>Type of Adhesive Primer</b>	<b>VOC Limits g/l (lbs/gal) (A)</b>	<b>Source</b>
Automotive Glass	700 (5.8)	SMAQMD Rule 460, SCAQMD Rule 1168, SJVAPCD Rule 4653, SDCAPCD Rule 67.21, BAAQMD Rule 51
Plastic Cement Welding	400 (3.3)	SMAQMD Rule 460, SJVAPCD Rule 4653,
Single-Ply Roof Membrane	250 (2.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SDCAPCD Rule 67.21
Traffic Marking Tape	150 (1.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Other	250 (2.1) (A)	SMAQMD Rule 460, SDCAPCD Rule 67.21, BAAQMD Rule 51

(A) Also listed in EPA's Control Techniques Guidelines for Miscellaneous Industrial Adhesives (EPA-453/R-08-005 (9/08)).

<b>Table 3 VOC Content for Contact Adhesives</b>		
<b>Type of Contact Adhesive</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Contact Adhesive	80 (0.7)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Contact Adhesive – Specialty Substrate	250 (2.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21

<b>Table 4 VOC Content for Sealants</b>		
<b>Type of Sealant</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Architectural		
Clear, Paintable, and Immediately Water-Resistant Sealant	380 (3.2)	SCAQMD Rule 1168
Grout	65 (0.5)	SCAQMD Rule 1168
Foam Sealant	250 (2.1)	SCAQMD Rule 1168
Roadway Sealant	250 (2.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51

<b>Table 4 VOC Content for Sealants</b>		
<b>Type of Sealant</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Non-Staining Plumbing Putty	150 (1.6)	SCAQMD Rule 1168
Roof Sealant	250 (2.1)	SCAQMD Rule 1168
All Other Architectural Sealants	50 (0.4)	SCAQMD Rule 1168
Marine Deck	760 (6.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
All Other Sealants	250 (2.1)	SCAQMD Rule 1168

<b>Table 5 VOC Content for Sealant Primers</b>		
<b>Type of Sealant Primer</b>	<b>VOC g/l (lbs/gal)</b>	<b>Source</b>
Architectural Nonporous Porous	250 (2.1) 775 (6.5)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Marine Deck	760 (6.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Modified Bituminous	500 (4.2)	SJVAPCD Rule 4653, SCAQMD Rule 1168
Other	750 (6.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51

<b>Table 6 VOC Content for Adhesives Applications onto Substrates</b>		
<b>Adhesive Applications onto Substrates</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Flexible Vinyl (A)	250 (2.1)	SMAQMD Rule 460
Fiberglass	80 (0.7)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Metal (A)	30 (0.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Porous Material	50 (0.4)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51

<b>Table 6</b> <b>VOC Content for Adhesives Applications onto Substrates</b>		
<b>Adhesive Applications onto Substrates</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Rubber (A)	250 (2.1)	SMAQMD Rule 460
Wood (A)	30 (0.3)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Plastic Foam	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168
Reinforced Plastic Composite	200 (1.7)	SCAQMD Rule 1168, SJVAPCD Rule 4653
Other Substrates (A)	250 (2.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SDCAPCD Rule 67.21, BAAQMD Rule 51

(A) All of the listed substrates and limits, except fiberglass, are listed in EPA's Control Techniques Guidelines for Miscellaneous Industrial Adhesives (EPA-453/R-08-005 (9/08)).

<b>Table 7</b> <b>Maximum VOC Content Percentages for Aerosol Adhesives</b> <b>(Percent by VOC by Weight)</b>		
<b>Type of Solvent Cleaning Operation</b>	<b>VOC Content Limit (Percent of VOC by Weight)</b>	<b>Source</b>
Adhesives – Aerosol Mist Spray Adhesives Web Spray Adhesives	65% 55%	SMAQMD Rule 460
Special Purpose Spray Adhesives Mounting, Automotive Engine Compartment, and Flexible Vinyl Adhesives Polystyrene Foam and Automobile Headliner Adhesives Polyolefin and Laminate Repair/Edge banding Adhesives	70% 65% 60%	SMAQMD Rule 460

<b>Table 8</b> <b>Solvent Cleaning VOC Limits</b>		
<b>Type of Solvent Cleaning Operation</b>	<b>VOC Content Limit grams of VOC/liter of material (lb/gal)</b>	<b>Source</b>
Product cleaning during manufacturing process or surface preparation for adhesive application		
General	25 (0.2)	SJVAPCD Rule 4653
Repair and maintenance cleaning	25 (0.2)	SJVAPCD Rule 4653

Table 8 Solvent Cleaning VOC Limits		
Type of Solvent Cleaning Operation	VOC Content Limit grams of VOC/liter of material (lb/gal)	Source
Cleaning of adhesive application equipment	25 (0.2)	SJVAPCD Rule 4653

Table 9 Stripper VOC Limits		
	VOC Content g/l (lbs/gal) including water and exempt compounds	VOC Composite Partial Pressure Millimeters of Mercury at 20 °C (68 °F)
Adhesive or Sealant Products on Wood	≤ 70 (≤ 0.6) (A)	≤ 2 (B)
Adhesive or Sealant Products on Substrates	--	≤ 9.5 (B)

(A) VOC limit is based on SDCAPCD Regulation IV, Rule 67.21.

(B) VOC vapor pressure limit is based on SMAQMD Regulation IV, Rule 460.

### **T-BACT**

#### **[SMAQMD BACT Clearinghouse](#)**

T-BACT #226: Adhesive Application < 1,170 lbs VOC/month and ≤ 4,019 lbs VOC/per year	
<b>Organic HAP/VHAP</b>	Compliance with adhesives, sealants, solvents, and strippers BACT VOC limits (see Tables 1-9 above) and emission limits of Table 3 to Subpart JJ of Part 63.

T-BACT #227: Adhesive Application ≥ 1,170 lbs VOC/month or > 4,019 lbs VOC/per year	
<b>Organic HAP/VHAP</b>	Compliance with adhesives, sealants, solvents, and strippers BACT VOC limits (see Tables 1-9 above), emission limits of Table 3 to Subpart JJ of Part 63 and VOC control system with ≥ 90% collection efficiency and ≥ 95% destruction efficiency.

### **RULE REQUIREMENTS**

#### **[Rule 460 – Adhesive and Sealants](#)** (Amended 11/30/2000)

This rule applies to adhesives and sealants and associated primers; and from related surface preparation solvents, cleanup solvents, and strippers.

VOC Content Limits:

<b>Table 1</b>	
<b>Adhesive</b>	<b>VOC Limits g/l(lbs/gal)</b>
ABS Welding Adhesive	400 (3.3)
Ceramic Tile Installation Adhesive	130 (1.1)
Computer Diskette Jacket Manufacturing Adhesive	850 (6.9)
Cove Base Installation Adhesive	150 (1.2)
CPVC Welding Adhesive	490 (4.0)
Indoor Floor Covering Installation Adhesive	150 (1.2)
Metal to Urethane/Rubber Molding or Casting Adhesive	250 (2.0)
Multipurpose Construction Adhesive	200 (1.6)
Non-Membrane Roof Installation/Repair Adhesive	300 (2.5)
Outdoor Floor Covering Installation Adhesive	250 (2.0)
PVC Welding Adhesive	510 (4.2)
Single-Ply Roof Membrane Installation/Repair Adhesive	250 (2.0)
Structural Glazing Adhesive	100 (0.8)
Thin Metal Laminating Adhesive	780 (6.4)
Tire Retread Adhesive	100 (0.8)
Perimeter Bonded Sheet Vinyl Flooring Installation Adhesive	660 (5.4)
Waterproof Resorcinol Glue	170 (1.4)
Other Plastic Cement Welding Adhesive	450 (3.7)

<b>Table 2 VOC Content for Adhesive Primers</b>	
<b>Type of Adhesive Primer</b>	<b>VOC Limits g/l(lbs/gal)</b>
Automotive Glass	700 (5.7)
Plastic Cement Welding	400 (3.3)
Single-Ply Roof Membrane	250 (2.0)
Traffic Marking Tape	150 (1.2)
Other	250 (2.0)

<b>Table 3 VOC Content for Contact Adhesives</b>	
<b>Type of Contact Adhesive</b>	<b>VOC Limits g/l(lbs/gal)</b>
Contact Adhesive	250 (2.0)
Contact Adhesive – Specialty Substrate	250 (2.0)

<b>Table 4</b> <b>VOC Content for Sealants</b>	
<b>Type of Sealant</b>	<b>VOC Limits g/l(lbs/gal)</b>
Architectural	250 (2.0)
Marine Deck	760 (6.2)
Nonmembrane Roof Installation/Repair	300 (2.5)
Roadway Sealant	250 (2.0)
Single-Ply Roof Membrane Sealant	450 (3.7)
Other	420 (3.4)

<b>Table 5</b> <b>VOC Content for Sealant Primers</b>	
<b>Type of Sealant Primer</b>	<b>VOC g/l(lbs/gal)</b>
Architectural Nonporous Porous	250 (2.0) 775 (6.3)
Marine Deck	760 (6.2)
Other	750 (6.1)

<b>Table 6</b> <b>VOC Content for Adhesives Applications onto Substrates</b>	
<b>Adhesive Applications onto Substrates</b>	<b>VOC Limits g/l(lbs/gal)</b>
Flexible Vinyl	250 (2.0)
Fiberglass	200 (1.6)
Metal	30 (0.2)
Porous Material	120 (1.0)
Rubber	250 (2.0)
Other Substrates	250 (2.0)

<b>Table 8</b> <b>VOC Content of Solvents for Surface Preparation, Cleanup, and Stripping</b>		
<b>Adhesive Applications onto Substrates</b>	<b>VOC Limits g/l(lbs/gal) Including water and exempt compounds</b>	<b>VOC Composite Partial Pressure Millimeters of Mercury at 20 °C (68 °F)</b>
SUBSTRATE PREPARATION: Single-Ply Roof Membrane Installation/Repair	--	≤ 45
SUBSTRATE PREPARATION: Electronic Components	≤ 900 (≤ 7.3)	≤ 33
SUBSTRATE PREPARATION: Medical Devices	≤ 900 (≤ 7.3)	≤ 33
SUBSTRATE PREPARATION: Other Substrates	≤ 70 (≤ 0.6)	--
CLEANUP: Cleaning a Spray Gun in an Enclosed Gun Cleaner	--	< 45
CLEANUP: Soaking of Application Equipment in a Closed Container	--	≤ 9.5
CLEANUP: Cleaning of Application Equipment —No Closed Container, No Enclosed Gun Cleaner	≤ 70 (≤ 0.6)	---
CLEANUP: Cleaning of Equipment Other Than Adhesive or Sealant Product Application Equipment	--	< 45
STRIPPING: Adhesive or Sealant Products on Wood	< 350	≤ 2
STRIPPING: Adhesive or Sealant Products on Substrates	--	≤ 9.5

[Rule 419 – NOx from Miscellaneous Combustion Units](#) (10/25/18)

This Rule applies to any miscellaneous combustion unit or cooking unit with a total rated heat input capacity of 2 MMBtu/hr or greater that is located at a major stationary source of NOx and to any miscellaneous combustion unit or cooking unit with a total rated heat input capacity of 5 MMBtu/hr or greater that is not located at a major stationary source of NOx.

The requirements of this rule do not apply to combustion equipment where its primary function is to operate as an air pollution control device including, but not limited to, afterburners, catalytic oxidizers, flares, thermal oxidizers, or vapor incinerators.

<b>TABLE 1: Miscellaneous Combustion Units</b> <b>Emission Limits Expressed As PPMV, corrected to 3% O<sub>2</sub></b>			
<b>Equipment Category</b>	<b>NOx Limit ppmv, corrected to 3% O<sub>2</sub> (lb/MMBtu)</b>		<b>CO Limit ppmv, corrected to 3% O<sub>2</sub> (lb/MMBtu)</b>
Gaseous Fuel-Fired Equipment	<b>Process Temperature</b>		<b>All Temperatures</b>
	< 1,200°F	≥ 1,200 °F	
Oven, Dehydrator, Dryer, Heater, or Kiln	30 (0.036)	60 (0.073)	400 (0.30)

### South Coast AQMD

#### **BACT**

Source: [SCAQMD BACT Guidelines \(Part D\) for Non-Major Polluting Facilities, page 117 & 118 \(2/5/2021\)](#)

<b>Spray Booth – Other Types</b>	
<b>VOC</b>	<p><u>VOC Emissions &lt; 14,040 lb/year (&lt;1,170 lb/month)</u> <sup>(A)</sup></p> <p>A. Compliance with Applicable SCAQMD Regulation XI Rules</p> <p><u>VOC Emissions ≥ 14,040 lb/year (≥1,170 lb/month)</u> <sup>(A)</sup></p> <p>A. Compliance with Applicable SCAQMD Regulation XI Rules, and VOC Control System with ≥ 90% Collection Efficiency and ≥ 95% Destruction Efficiency, or</p> <p>B. Use of Super Compliant Materials (&lt; 5% VOC by weight); or</p> <p>C. Use of Low-VOC Materials Resulting in an Equivalent Emission Reduction</p>
<b>NOx</b>	If booth has a make-up air unit or a heater; compliance with Rule 1147
<b>SOx</b>	No standard
<b>PM10</b>	Dry filters or water wash
<b>PM2.5</b>	No Standard
<b>CO</b>	No standard

(A) Monthly emissions have been annualized to be consistent with District methodology for determining cost effectiveness for add-on control (Cost per ton per year of emissions reduced).

#### **T-BACT**

The above BACT determination did not address T-BACT.

## **RULE REQUIREMENTS**

[Regulation IX, Rule 1168 – Adhesive and Sealant Applications \(amended 10/06/2017\)](#)

This rule applies to adhesives, adhesive primers, sealants, or sealant primers.

VOC Content Limits:

<b>Architectural Applications</b>	VOC Limits g/l
Building Envelope Membrane Adhesive	250
Structural Wood Member Adhesive	140
Indoor Carpet Adhesives	50
Carpet Pad Adhesives	50
All Other Indoor or Outdoor Floor Covering Adhesives	50
Wood Flooring Adhesive	100
Rubber Floor Adhesives	60
Subfloor Adhesives	50
Ceramic Tile Adhesives	65
VCT and Asphalt Tile Adhesives	50
Dry Wall and Panel Adhesives	50
Cove Base Adhesives	50
Multipurpose Construction Adhesives	70
Structural Glazing Adhesives	100
Roof Adhesives	250

<b>Specialty Applications</b>	VOC Limits g/l
Computer Diskette Manufacturing Contact Adhesive	350
Contact Adhesive	80
Edge Glue Adhesive	250
Plastic Welding Cement	
ABS Welding	325
ABS to PVC Transition Cement	510
CPVC Welding	490
PVC Welding	510
All Other Plastic Cement Welding	100
Rubber Vulcanization Adhesive	850

<b>Specialty Applications</b>	VOC Limits g/l
Special Purpose Contact Adhesive	250
Thin Metal Laminating Adhesive	780
Tire Tread Adhesive	100
Top and Trim Adhesive	540
Waterproof Resorcinol Glue	170
All Other Adhesives	250

<b>Substrate Specific Applications</b>	VOC Limits g/l
Metal to Metal	30
Plastic Foams	50
Porous Material (except wood)	50
Wood	30
Fiberglass	80
Reinforced Plastic Composite	200

\*\* These limits apply to any adhesive, bonding primer or any other primer not regulated by the previous table.

<b>Sealants</b>	VOC Limits g/l
Architectural	
Clear, Paintable, and Immediately Water-Resistant Sealant	380
Foam Insulation	250
Foam Sealant	250
Grout	65
Roadway Sealant	250
Non-Staining Plumbing Putty	150
Roofing	
Single-Ply Roof Membrane	450
All Other Roof Sealants	300
All Other Architectural Sealants	50
Marine Deck	760
All Other Sealants	420

<b>Adhesive Primers</b>	VOC Limits g/l
Plastic	550
Pressure Sensitive	785
Traffic Marking Tape	150
Vehicle glass	700
All Other Adhesive Primers	250

<b>Sealant Primers</b>	VOC Limits g/l
Architectural Nonporous Porous	250 775
Modified Bituminous	500
Marine Deck	760
Other	750

**Reg XI, Rule 1147 – NO<sub>x</sub> Reductions from Miscellaneous Sources**  
**(Last amended 5/6/2022)**

This rule applies to ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, soil and water remediation units and other combustion equipment with nitrogen oxide emissions that require a District permit and are not specifically required to comply with a nitrogen oxide emission limit by other District Regulation XI rules.

<b>Equipment Category</b>	<b>Emission Limit PPMV @ 3% O<sub>2</sub>, dry or pound/MMBtu heat input</b>		
	<b>NO<sub>x</sub></b>		<b>CO</b>
Oven, Dehydrator, Dryer, Heater, Kiln, Calciner, Cooker, Roaster, Furnace, or Heated Storage Tank	<b>Process Temperature</b>		1,000 ppmv
	<b>&lt; 1,200° F</b>	<b>≥ 1,200 ° F</b>	
	20 ppmv or 0.024 lb/MMBtu	30 ppmv or 0.036 lb/MMBtu	

**San Joaquin Valley APCD**

**BACT**

Source: [SJVAPCD BACT Guidelines](#)

Source: SJVAPCD BACT Guideline 4.9.1 (8/21/20)

<b>Adhesive Application Operation – Tire Retreading</b>	
<b>VOC</b>	Use of adhesives with a VOC content of 100 gram per liter (less water and exempt compounds) <sup>(A)</sup>
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

(A) Current Rule 4653 limit is equivalent.

Source: SJVAPCD BACT Guideline 4.9.2 (5/11/22)

<b>Adhesive Application Operation – Rubber Parts and Products, Brush Applied *Rescinded*</b>	
<b>VOC</b>	This BACT was rescinded on 5/11/22
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

Source: SJVAPCD BACT Guideline 4.9.3 (5/11/22)

<b>Adhesive Application Process – Foam Products *Rescinded*</b>	
<b>VOC</b>	This BACT was rescinded on 5/11/22
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

Source: SJVAPCD BACT Guideline 4.9.4 (4/3/00)

<b>Adhesive Application Process – Non-Porous Materials, Specialty Contact Adhesives, Spray Application</b>	
<b>VOC</b>	Using adhesives with a VOC content of 400 g/l or less (less water and exempt compounds) <sup>(A)</sup>
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

(A) Current Rule 4653 limit is more restrictive.

Source: SJVAPCD BACT Guideline 4.9.5 (5/11/22)

<b>Adhesive Application Process – Wooden Case Manufacturing *Rescinded*</b>	
<b>VOC</b>	This BACT was rescinded on 5/11/22
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

Source: SJVAPCD BACT Guideline 4.9.7 (8/3/01)

<b>Corrugated PVC Sheet Products – Special Contact Adhesive, Roller Applied</b>	
<b>VOC</b>	PVC welding adhesive compliant with District Rule 4653
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

Source: SJVAPCD BACT Guideline 4.9.8 (11/20/01)

<b>Adhesive Application Process – Wooden Door Assembly, Roller Applied</b>	
<b>VOC</b>	Use of an adhesive with a VOC content of 5.0 grams/liter (less water and exempt compounds), or less <sup>(A)</sup>
<b>NOx</b>	No standard
<b>SOx</b>	No standard

<b>Adhesive Application Process – Wooden Door Assembly, Roller Applied</b>	
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

(A) This limit is more restrictive than Current Rule 4653.

Source: SJVAPCD BACT Guideline 4.9.9 (9/26/03)

<b>Adhesive Application Process – Vinyl Door and Window Assembly, Non-Spray Applied</b>	
<b>VOC</b>	1) Use of adhesive with a VOC content of 3.0 g/l (less water and exempt compounds), or less for automated adhesive application and assembly processes <sup>(A)</sup> 2) Use of adhesive with VOC content of 76.5 g/l (less water and exempt compounds), or less for manually applied adhesive operation when assembling <sup>(A)</sup>
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

(A) These limits are more restrictive than Current Rule 4653.

Source: SJVAPCD BACT Guideline 4.9.10 (11/18/04)

<b>Adhesive Application for Multi-Wall Packaging Manufacturing</b>	
<b>VOC</b>	Adhesives with a VOC content of $\leq 0.2$ lb/gal (excluding water and exempt compounds) for the adhesion of plastic film to porous material <sup>(A)</sup>  Adhesives with a VOC content of $\leq 0.13$ lb/gal (excluding water and exempt compounds) for the adhesion of porous materials <sup>(A)</sup>
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

(A) These limits are more restrictive than Current Rule 4653.

Source: SJVAPCD BACT Guideline 4.9.11 (11/3/05)

<b>Adhesive Application Operation – Bonding of Fiberglass Boat Hulls and Decks, Non-Atomizing Application</b>	
<b>VOC</b>	Use of adhesives with VOC content of 80 grams/liter or less (less water and exempt compounds) <sup>(A)</sup>
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

(A) Current Rule 4653 limit is equivalent.

Source: SJVAPCD BACT Guideline 4.9.12 (8/29/18)

<b>Corrugated Box Gluer</b>	
<b>VOC</b>	Use of adhesives with VOC content of 0.021 lb-VOC/gal (less water and exempt compounds) <sup>(A)</sup>
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

(A) This limit is more restrictive than Current Rule 4653.

Source: SJVAPCD BACT Guideline 4.9.13 (8/29/18)

<b>Corrugated Board Manufacturing (Corrugator)</b>	
<b>VOC</b>	Adhesives – 0.015 lb-VOC/gal (less water and exempt compounds) <sup>(A)</sup>
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

(A) This limit is more restrictive than Current Rule 4653.

Source: SJVAPCD BACT Guideline 4.9.14 (6/6/19)

<b>Wood Parts and Products Subfloor Adhesive Application Operation</b>	
<b>VOC</b>	Use of adhesives and solvents with a VOC content and application methods compliant with District Rule 4653 (Adhesives and Sealants)
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

### **T-BACT**

The above BACT determinations did not address T-BACT

### **RULE REQUIREMENTS:**

[Rule 4653 – Adhesives and Sealants \(Last amended 09/16/2010\)](#)

This Rule applies to the application of adhesive products, sealant products, and associated solvent cleaning operations.

VOC Content limits:

<b>Table 2 - VOC Content Limits for Adhesive Products (Effective on and after January 1, 2012)</b>	
<b>Applications</b>	<b>VOC limit (Grams Per Liter)</b>
	<b>Architectural Adhesive Products:</b>
Multipurpose Construction	70
Ceramic Tile Adhesive	65
Cove Base Installation	50
Dry Wall and/or Panel Adhesive	50
Flooring Adhesives:	
Floor Covering Installation	150
Ceramic Floor Tile Installation	65
Indoor Carpet Adhesive	50
Carpet Pad Adhesive	50
Outdoor Carpet Adhesive	150
Rubber Flooring Adhesive	60
Perimeter Bonded Sheet Flooring Installation	660
Subfloor Adhesive	50

<b>Table 2 - VOC Content Limits for Adhesive Products (Effective on and after January 1, 2012)</b>	
<b>Applications</b>	<b>VOC limit (Grams Per Liter)</b>
	<b>Architectural Adhesive Products:</b>
VCT and Asphalt Tile Adhesive	50
Wood Flooring Adhesive	100
Roofing Adhesives:	
Single-Ply Roof Material Installation	250
Non-Membrane Roof Adhesive	300
Structural Glazing	100
Structural Wood Member Adhesive	140
Miscellaneous Adhesives:	
Contact Adhesive	80
Contact Adhesive – Specialty	250
Rubber Vulcanization Adhesive/Primer	850
Tire Retread	100
Motor Vehicle Adhesive	250
Motor Vehicle Weather-strip Adhesive	750
Traffic Marking Tape Adhesive/ Primer	150
Top and Trim Adhesive	540
Waterproof Resorcinol Glue	170
Staple and Nail Manufacturing	640
Thin Metal Laminating Adhesive	780
Elastomeric Adhesive	750
Flexible Vinyl Adhesive	250

<b>Table 2 - VOC Content Limits for Adhesive Products continued (Effective on and after January 1, 2012)</b>	
<b>Applications</b>	<b>VOC Limit (Grams per Liter)</b>
Plastic Welding Products	
ABS Welding Adhesive	325
Cellulosic Plastic Welding Adhesive	100
CPVC Welding Adhesive	490
PVC Welding Adhesive	510

<b>Table 2 - VOC Content Limits for Adhesive Products continued (Effective on and after January 1, 2012)</b>	
<b>Applications</b>	<b>VOC Limit (Grams per Liter)</b>
Styrene-Acrylonitrile Welding Adhesive	100
Plastic Cement Welding Adhesive Primer	400
Other Plastic Cement Welding Adhesive	250
Adhesive Primers:	
Automotive Glass Primer	700
Adhesive Primer	250

<b>Table 3 - VOC Content Limits for Adhesive Products (Effective on and after January 1, 2012)</b>	
<b>Materials Bonded</b>	<b>VOC Limit (Grams per Liter)</b>
Metal to Metal	30
Porous Materials	50
Plastic Foam	50
Wood	30
Pre-formed Rubber Products	250
Reinforced Plastic Composite	200
Fiberglass	80
All other Substrates	250

<b>Table 4 - VOC Content Limits for Sealants</b>	
<b>Sealant</b>	<b>VOC Limit Effective on and after January 1, 2012. (Grams Per Liter)</b>
Architectural	250
Marine Deck	760
Non-membrane Roof	300
Roadway	250
Single-Ply Roof Membrane	450
Other Sealants	420

<b>Table 5 - VOC Content Limits for Sealant Primers</b>	
<b>Sealant Primer</b>	<b>VOC Limit Effective on and after January 1, 2012. (Grams Per Liter)</b>
Architectural Non Porous	250
Architectural Porous	775
Modified Bituminous	500
Marine Deck	760
Other Sealant Primers	750

<b>Table 6 – VOC Limits for Organic Solvents Used in Cleaning Operations</b>	
<b>Type of Solvent Cleaning Operation</b>	<b>VOC Content Limit Grams of VOC/liter of material (lb/gal)</b>
Products Cleaning During Manufacturing Process or Surface Preparation for Adhesive Application	
A. General	25 (0.21)
B. Surface Preparation Prior to Rubber Vulcanization Process	850 (7.1)
Repair and Maintenance Cleaning	25 (0.21)
Cleaning of Adhesive Application Equipment	25 (0.21)

**San Diego County APCD**

**BACT**

Source: [NSR Requirements for BACT \(6/2011\) Page 3-2](#)

<b>Adhesive Application Operations (&lt;10 gal/day)</b>	
<b>VOC</b>	Compliance with Rule 67.21, Adhesive Material Application Operations
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	Spray booth if used, shall be equipped with over spray filters.
<b>PM2.5</b>	Spray booth if used, shall be equipped with over spray filters.
<b>CO</b>	No standard

\*\* The applicant has the option to limit the potential to emit (PE) to less than 10 lb/day for each pollutant in lieu of meeting the BACT requirements.

**T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

## **RULE REQUIREMENTS**

### [Regulation 4, Rule 67.21 – Adhesive Material Application Operations \(11/14/2008\)](#)

This rule is applicable to all adhesive material application operations. Adhesive material application operations include all steps involved in the application, drying, and/or curing of adhesive materials, and associated surface preparation, stripping, and cleanup materials, and the cleaning of application equipment.

VOC Content Limits:

<b>Architectural Products</b>	<b>VOC Limits (grams/liter)</b>
Architectural sealant	250
Architectural sealant primer for: - Non-porous materials - Porous materials	250 775
Ceramic tile installation adhesive	65
Cove base installation adhesive	50
Flooring adhesives: Indoor carpet or carpet pad adhesive Rubber flooring adhesive Subfloor adhesive VCT and asphalt tile adhesive Wood flooring adhesive Other floor covering adhesive	50 60 50 50 100 150
Multipurpose construction installation/repair adhesive	70
Non-membrane roof installation/repair adhesive/sealant	300
Perimeter bonding adhesive	660
Roadway sealant	250
Single-ply roof membrane installation/repair adhesive/primer	250
Single-ply roof membrane sealant	450
Structural glazing adhesive	100
Structural wood member adhesive	140
Traffic marking tape adhesive primer	150

<b>Plastic Welding Products</b>	<b>VOC Limits (grams/liter)</b>
ABS welding adhesive	400
CPVC welding adhesive	490
PVC welding adhesive	510
Plastic cement welding adhesive primer	650
Other plastic cement welding adhesives	510

<b>Specialty Adhesive Materials</b>	<b>VOC Limits (grams/liter)</b>
Automotive glass adhesive primer	700
Adhesive primers Computer diskette jacket manufacturing adhesive	850
Contact adhesive General Special	80 250
Elastomeric adhesive	750
Marine deck sealant/primer	760
Metal to elastomer molding or casting adhesive	850
Natural gas pipeline tape adhesive primer	600
Sheet rubber lining installation adhesive	850
Thin metal laminating adhesive	780
Tire retread adhesive	100
Top and Trim adhesive	540
Waterproof resorcinol glue	170

<b>Substrate Specific Adhesives</b>	<b>VOC Limits (grams/liter)</b>
Adhesives applied onto:	
Fiberglass	80
Metal	30
Porous material (except wood)	50
Wood	30
Other substrates	250

<b>All Other Adhesive Materials</b>	<b>VOC Limits (grams/liter)</b>
Adhesive primer	250
Sealants	420
Sealant primers	750

Surface preparation, stripping and cleanup materials are subject to the following:

- (i) The material contains 70 grams or less of VOC per liter of material; or
- (ii) The material has an initial boiling point of 190°C (374°F) or greater; or
- (iii) The material has a total VOC vapor pressure of 45 mm Hg or less, at 20°C (68°F).

Cleaning of application equipment is subject to the following:

- (i) The material contains 70 grams or less of VOC per liter of material; or
- (ii) The material has an initial boiling point of 190°C (374°F) or greater; or
- (iii) The material has a total VOC vapor pressure of 45 mm Hg or less, at 20°C (68°F); or

- (iv) The cleaning material is flushed or rinsed through the application equipment in a contained manner that will minimize evaporation into the atmosphere; or
- (v) The application equipment or equipment parts are cleaned in a container, which is open only when being accessed for adding, cleaning, or removing application equipment or when cleaning material is being added, provided the cleaned equipment or equipment parts are drained to the container until dripping ceases; or
- (vi) A system is used that totally encloses the component parts being cleaned during the washing, rinsing, and draining processes; or
- (vii) Other application equipment cleaning methods are used that are demonstrated to be as effective as any of the equipment described above in minimizing the VOC emissions to the atmosphere, provided that the method has been tested and approved in writing by the Air Pollution Control Officer prior to use.

### Bay Area AQMD

#### **BACT**

Source: [BAAQMD BACT Guideline](#)

Adhesive Application Operation	
<b>VOC</b>	No standard
<b>NOx</b>	No standard
<b>SOx</b>	No standard
<b>PM10</b>	No standard
<b>PM2.5</b>	No standard
<b>CO</b>	No standard

#### **T-BACT**

There are no T-BACT standards published in the clearinghouse for this category.

#### **RULE REQUIREMENTS**

[Regulation 8, Rule 51 – Adhesive and Sealant Products \(last amended 7/17/2002\)](#)

This rule applies to adhesive and sealant products.

VOC Content Limits:

Architectural	VOC Limits (grams/liter)
Indoor Floor Covering Installation	150
Multipurpose Construction	200
Nonmembrane Roof Installation/Repair	300
Outdoor Floor Covering Installation	250

<b>Architectural</b>	<b>VOC Limits (grams/liter)</b>
Single-Ply Roof Material Installation/Repair	250
Structural Glazing	100
Ceramic Tile Installation	130
Cove Base Installation	150
Perimeter Bonded Sheet Vinyl Flooring Installation	660

<b>Specialty</b>	<b>VOC Limits (grams/liter)</b>
Computer Diskette Jacket Manufacturing	850
ABS Welding	400
CPVC Welding	490
PVC Welding	510
Other Plastic Welding	500
Thin Metal Laminating	780
Tire Retread	100
Rubber Vulcanization Bonding	850
Waterproof Resorcinol Glue	170
Immersible Product Manufacturing	650
Top and Trim Installation	540

<b>Adhesive Primers</b>	<b>VOC Limits (grams/liter)</b>
Automotive Glass Primer	700
Pavement Marking Tape Primer	150
Plastic Welding Primer	650
Other	250

<b>Contact Bond Adhesives</b>	<b>VOC Limits (grams/liter)</b>
Contact Bond Adhesive	250
Contact Bond Adhesive – Special Substrates	400

<b>Adhesive Product, Substrate Limits</b>	<b>VOC Limits (grams/liter)</b>
Metal	30
Porous Materials	120
Other Substrates	250

Sealant	VOC Limits (grams/liter)
Architectural	250
Marine Deck	760
Roadways	250
Single Ply Roof Material Installation/Repair	450
Nonmembrane Roof Installation/Repair	300
Other	420

Sealant Primer	VOC Limits (grams/liter)
Architectural - Nonporous	250
Architectural - Porous	775
Other	750

The following control technologies have been identified and are ranked based on stringency:

SMAQMD has not permitted an adhesive application operation with a VOC control system with  $\geq 90\%$  collection efficiency and  $\geq 95\%$  destruction efficiency. Therefore, the SMAQMD BACT Determination requiring add-on control will not be considered Achieved in Practice. SCAQMD has permitted an aerospace adhesive facility with add on control under A/N 272587 (<http://www.aqmd.gov/docs/default-source/bact/laer-bact-determinations/aqmd-laer-bact/laer-bact-determination-272587.pdf?sfvrsn=2>). Therefore, SCAQMD BACT with add-on control will be considered Achieved in Practice.

SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES	
<b>VOC<sub>Controlled</sub></b>	<ol style="list-style-type: none"> <li>VOC Emissions <math>\geq 1,170</math> lbs VOC/month [SCAQMD] <ol style="list-style-type: none"> <li>Compliance with Applicable SCAQMD Regulation XI Rules, and VOC Control System with <math>\geq 90\%</math> Collection Efficiency and <math>\geq 95\%</math> Destruction Efficiency, or</li> <li>Use of Super Compliant Materials (<math>&lt; 5\%</math> VOC by weight): or</li> <li>Use of Low-VOC Materials Resulting in an Equivalent Emission Reduction</li> </ol> </li> </ol>
<b>VOC<sub>Uncontrolled</sub></b>	<ol style="list-style-type: none"> <li>Compliance with SMAQMD Rule 460<sup>(A)</sup> and adhesive BACT VOC limits (see Tables 1-9 above) [SMAQMD]</li> <li>Compliance with SJVAPCD Rules and Regulations [SVJAPCD]</li> <li>Compliance with SCAQMD Rules and Regulations [SCAQMD]</li> <li>Compliance with SDAPCD Rules and Regulations [SDAPCD]</li> <li>Compliance with BAAQMD Rules and Regulations [BAAQMD]</li> </ol>
<b>NO<sub>x</sub></b>	<ol style="list-style-type: none"> <li>For heaters <math>&lt; 1,200^{\circ}</math> F: 20 ppm or 0.024 lb/MMBtu, for heaters <math>\geq 1,200^{\circ}</math> F: 30 ppm or 0.036 lb/MMBtu [SCAQMD]</li> <li>Low NO<sub>x</sub> burner, For heaters <math>&lt; 1,200^{\circ}</math> F: 30 ppmvd @ 3% O<sub>2</sub> or 0.036 lb/MMBtu, for heaters <math>\geq 1,200^{\circ}</math> F: 60 ppmvd @ 3% O<sub>2</sub> or 0.073 lb/MMBtu [SMAQMD]</li> <li>No Standard [SDCAPCD, BAAQMD, SJVAPCD]</li> </ol>

<b>SUMMARY OF ACHIEVED IN PRACTICE CONTROL TECHNOLOGIES</b>	
<b>SO<sub>x</sub></b>	No standard [SMAQMD, SCAQMD, SJVAPCD, BAAQMD, SDCAPCD]
<b>PM<sub>10</sub></b>	<ol style="list-style-type: none"> <li>1. Spray booth with dry filters or waterwash [SMAQMD, SCAQMD]</li> <li>2. Spray booth if used, shall be equipped with over spray filters [SDAPCD]</li> <li>3. No Standard [SJVACPD, BAAQMD]</li> </ol>
<b>PM<sub>2.5</sub></b>	<ol style="list-style-type: none"> <li>1. Spray booth with dry filters or waterwash [SMAQMD]</li> <li>2. Spray booth if used, shall be equipped with over spray filters [SDAPCD]</li> <li>3. No Standard [SCAQMD, SJVACPD, BAAQMD]</li> </ol>
<b>CO</b>	<ol style="list-style-type: none"> <li>1. For heaters, low NO<sub>x</sub> burner, 400 ppmvd @ 3% O<sub>2</sub> [SMAQMD]</li> <li>2. For heaters, low NO<sub>x</sub> burner, 1,000 ppmvd @ 3% O<sub>2</sub> [SCAQMD]</li> </ol>
<b>Organic HAP/VHAP (T-BACT)</b>	<p><u>For VOC Emissions &lt; 1,170 lbs VOC/month and ≤ 4,019 lbs VOC/per year</u></p> <ol style="list-style-type: none"> <li>1. Compliance with adhesives, sealants, solvents, and strippers BACT VOC limits (see Tables 1-9 above) and emission limits of Table 3 to Subpart JJ of Part 63. [SMAQMD]</li> </ol> <p><u>For VOC Emissions ≥ 1,170 lbs VOC/month or &gt; 4,019 lbs VOC/per year</u></p> <ol style="list-style-type: none"> <li>1. Compliance with adhesives, sealants, solvents, and strippers BACT VOC limits (see Tables 1-9 above), emission limits of Table 3 to Subpart JJ of Part 63 and VOC control system with ≥ 90% collection efficiency and ≥ 95% destruction efficiency. [SMAQMD]</li> </ol>

(A) Compliance with SMAQMD Rule 460 includes use of exemptions of this rule. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.

The following control technologies have been identified as the most stringent, achieved in practice control technologies:

<b>BEST CONTROL TECHNOLOGIES ACHIEVED</b>		
<b>Pollutant</b>	<b>Standard</b>	<b>Source</b>
VOC	<u>For emissions &lt; 1,170 lbs VOC/month or ≤ 4,019 lbs VOC/year (uncontrolled)</u> 1. Compliance with SMAQMD Rule 460 <sup>(A)</sup> and adhesive BACT VOC limits (see Tables 1-9 above)	SMAQMD
	<u>For emissions ≥ 1,170 lbs VOC/month (controlled)</u> 1. Compliance with Applicable SCAQMD Regulation XI Rules, and VOC Control System with ≥ 90% Collection Efficiency and ≥ 95% Destruction Efficiency, or 2. Use of Super Compliant Materials (< 5% VOC by weight); or 3. Use of Low-VOC Materials Resulting in an Equivalent Emission Reduction	SCAQMD
NOx	1. For heaters < 1,200° F: 20 ppm or 0.024 lb/MMBtu 2. For heaters ≥ 1,200 ° F: 30 ppm or 0.036 lb/MMBtu	SCAQMD
SOx	No standard	
PM10	Spray booth with dry filters or waterwash	SMAQMD, SCAQMD
PM2.5	Spray booth with dry filters or waterwash	SMAQMD, SCAQMD
CO	For heaters, low NOx burner, 400 ppmvd @ 3% O <sub>2</sub>	SMAQMD
Organic HAP/VHAP (T-BACT)	<u>For VOC Emissions &lt; 1,170 lbs VOC/month and ≤ 4,019 lbs VOC/per year</u> 1. Compliance with adhesives, sealants, solvents, and strippers BACT VOC limits (see Tables 1-9 above) and emission limits of Table 3 to Subpart JJ of Part 63. [SMAQMD]  <u>For VOC Emissions ≥ 1,170 lbs VOC/month or &gt; 4,019 lbs VOC/per year</u> 1. Compliance with adhesives, sealants, solvents, and strippers BACT VOC limits (see Tables 1-9 above), emission limits of Table 3 to Subpart JJ of Part 63 and VOC control system with ≥ 90% collection efficiency and ≥ 95% destruction efficiency. [SMAQMD]	SMAQMD

(A) Compliance with SMAQMD Rule 460 includes use of exemptions of this rule. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.

**B. TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (RULE 202, §205.1.b.)**

**Technologically Feasible Alternatives:**

Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer.

The table below shows the technologically feasible alternatives identified as capable of reducing emissions beyond the levels determined to be "Achieved in Practice" as per Rule 202, §205.1.a.

<b>Pollutant</b>	<b>Technologically Feasible Alternatives</b>
<b>VOC</b>	<ol style="list-style-type: none"> <li>1. <u>VOC Emissions <math>\geq</math> 1,170 lbs VOC/month or <math>\geq</math> 4,019 lbs VOC/year [SMAQMD]</u> <ol style="list-style-type: none"> <li>A. Compliance with adhesive BACT VOC limits (see Tables 1-9 above) and VOC control system with <math>\geq</math> 90% collection efficiency and <math>\geq</math> 95% destruction efficiency</li> </ol> </li> <li>2. Carbon Adsorber</li> <li>3. Thermal Oxidizer</li> </ol>
<b>NO<sub>x</sub></b>	No other technologically feasible option identified
<b>SO<sub>x</sub></b>	No other technologically feasible option identified
<b>PM<sub>10</sub></b>	No other technologically feasible option identified
<b>PM<sub>2.5</sub></b>	No other technologically feasible option identified
<b>CO</b>	No other technologically feasible option identified

SMAQMD previous BACT Determinations listed VOC control systems with  $\geq$  90% collection efficiency and  $\geq$  95% destruction efficiency as Technologically Feasible. Therefore, this BACT Determination will also consider this standard as technologically feasible since SMAQMD has not permitted any facilities with add-on control. VOC control systems with  $\geq$  90% collection efficiency and  $\geq$  95% destruction efficiency will be analyzed by evaluating carbon adsorbers and thermal oxidizers to determine the cost effective threshold below.

**Cost Effective Determination:**

After identifying the technologically feasible control options, a cost analysis is performed to take into consideration economic impacts for all technologically feasible controls identified.

**Maximum Cost per Ton of Air Pollutants Controlled**

1. A control technology is considered to be cost-effective if the cost of controlling one ton of that air pollutant is less than the limits specified below:

<u>Pollutant</u>	<u>Maximum Cost (\$/ton)</u>
VOC	17,500
NO <sub>x</sub>	24,500
PM <sub>10</sub>	11,400
SO <sub>x</sub>	18,300
CO	TBD if BACT triggered

### Cost Effectiveness Analysis Summary

A previous cost effectiveness analysis determined that 4,019 lb VOC/year was the highest allowable uncontrolled emission rate that did not require any add-on control devices. The EPA has updated the cost manual for incinerators/oxidizers in 11/2017 and carbon adsorbers in 10/2018. Therefore, this BACT determination will revisit this limit in accordance with the updated EPA OAQPS Air Pollution Control Cost Manual. The electricity (13.80 cents/kWh) and natural gas (8.04 dollars/1,000 cubic feet) rates were based on a commercial application as approved by the District. The life of the equipment was based on the EPA cost manual recommendation. The interest rate was based on the previous 6-month average interest rate on United States Treasury Securities (based on the life of the equipment) and addition of two percentage points and rounding up to the next higher integer rate. The labor (Occupation Code 51-8099: Plant and System Operators - Other) and maintenance (Occupation Code 49-2094: electrical and electronics commercial and industrial equipment repairers) rates were based on data from the Bureau of Labor Statistics.

#### **Carbon Adsorber:**

As shown in Attachment C, the cost effectiveness for the add on carbon adsorber system to control VOC was calculated to be **\$17,503.69/ton** (see attached Paint Spray Booth for Plastic Coating Cost Effectiveness Analysis). The following basic parameters were used in the analysis.

Equipment Life = 15 years

Total Capital Investment = \$307,618

Direct Annual Cost = \$13,549 per year

Indirect Annual Cost = \$46,994 per year

Total Annual Cost = \$58,344 per year

VOC Removed = 3 tons per year

**Cost of VOC Removal = \$17,509.23 per ton reduced**

A detailed calculation of the cost effectiveness for VOC removal with a carbon absorber is shown in Attachment C. Uncontrolled VOC emissions of 7,404 lb/year or greater is the cost-effective threshold for control equipment using carbon absorption control technology

#### **Thermal Oxidizer:**

Equipment Life = 20 years

Direct Cost = \$193,478

Direct Annual Cost = \$73,514 per year

Indirect Annual Cost = \$134,493 per year

Total Annual Cost = \$208,007 per year

VOC Removed = 12.1 tons per year

**Cost of VOC Removal = \$17,657 per ton reduced**

A detailed calculation of the cost effectiveness for VOC removal with a thermal oxidizer is shown in Attachment C. Uncontrolled VOC emissions of 23,799 lb/year or greater is the cost-effective threshold for control equipment using thermal oxidation control technology.

Conclusion: In this analysis, different emission operating levels are presented with the corresponding total cost per ton of VOC controlled using either a carbon adsorption control or a thermal oxidizer. Uncontrolled VOC emission level of 7,404 lb per year or greater must be reached in order for the carbon adsorption control option to be cost effective. Uncontrolled VOC emission level of 23,799 lb per year or greater must be reached in order for a thermal oxidizer to be cost effective. The emissions levels for the cost effectiveness of controls are based on the District cost effective limit for VOC of \$17,500 per ton controlled.

With EPA's new cost data, the highest allowable uncontrolled emission rate to not require add-on control devices will be updated to 7,404 lb/year based on the cost of carbon adsorption.

**C. SELECTION OF BACT:**

Based on the review of SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, CARB, and EPA BACT Clearinghouses and cost effectiveness determinations, BACT for VOC, NOx, PM10, and PM2.5 will be the following:

<b>BACT #320 for Adhesive Application Operations ≤ 7,404 pounds VOC per year</b>		
<b>Pollutant</b>	<b>Standard</b>	<b>Source</b>
<b>VOC</b>	Compliance with SMAQMD Rule 460 <sup>(A)</sup> and BACT #320 VOC limits (see Tables 1-9 below)	SMAQMD
<b>NOx</b>	For heaters < 1,200° F: 20 ppm or 0.024 lb/MMBtu For heaters ≥ 1,200 ° F: 30 ppm or 0.036 lb/MMBtu	SCAQMD
<b>SOx</b>	No standard	
<b>PM10</b>	Spray booth with dry filters or waterwash	SMAQMD, SCAQMD
<b>PM2.5</b>	Spray booth with dry filters or waterwash	SMAQMD, SCAQMD
<b>CO</b>	For heaters, low NOx burner, 400 ppmvd @ 3% O <sub>2</sub>	SMAQMD

(A) Compliance with SMAQMD Rule 460 includes use of exemptions of this rule. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.

<b>BACT #321 for Adhesive Application Operations &gt; 7,404 pounds per year</b>		
<b>Pollutant</b>	<b>Standard</b>	<b>Source</b>
<b>VOC</b>	Compliance with SMAQMD Rule 460 <sup>(A)</sup> and BACT #321 VOC limits (see Tables 1-9 below) and VOC control system with ≥ 90% collection efficiency and ≥ 95% destruction efficiency	SMAQMD (Technologically Feasible and Cost Effective)
<b>NO<sub>x</sub></b>	For heaters < 1,200° F: 20 ppm or 0.024 lb/MMBtu For heaters ≥ 1,200 ° F: 30 ppm or 0.036 lb/MMBtu	SCAQMD
<b>SO<sub>x</sub></b>	No standard	
<b>PM<sub>10</sub></b>	Spray booth with dry filters or waterwash	SMAQMD, SCAQMD
<b>PM<sub>2.5</sub></b>	Spray booth with dry filters or waterwash	SMAQMD, SCAQMD
<b>CO</b>	For heaters, low NO <sub>x</sub> burner, 400 ppmvd @ 3% O <sub>2</sub>	SMAQMD

(A) Compliance with SMAQMD Rule 460 includes use of exemptions of this rule. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.

#### **D. SELECTION OF T-BACT:**

Based on the review of SMAQMD, SCAQMD, SDCAPCD, BAAQMD, SJVAPCD, ARB, and EPA BACT Clearinghouses, T-BACT for Organic HAP/VHAP will be the following:

<b>BACT #320 for Adhesive Application Operations ≤ 7,404 pounds VOC per year</b>		
<b>Pollutant</b>	<b>T-BACT Standard</b>	<b>Source</b>
<b>Organic HAP/VHAP (T-BACT)</b>	Compliance with SMAQMD Rule 460 <sup>(A)</sup> BACT #320 VOC limits (see Tables 1-9 below) and emission limits of Table 3 to Subpart JJ of Part 63.	SMAQMD

(A) Compliance with SMAQMD Rule 460 includes use of exemptions of this rule. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.

<b>BACT #321 for Adhesive Application Operations &gt; 7,404 pounds per year</b>		
<b>Pollutant</b>	<b>T-BACT Standard</b>	<b>Source</b>
<b>Organic HAP/VHAP (T-BACT)</b>	Compliance with SMAQMD Rule 460 <sup>(A)</sup> BACT #321 VOC limits (see Tables 1-9 below), emission limits of Table 3 to Subpart JJ of Part 63 and VOC control system with ≥ 90% collection efficiency and ≥ 95% destruction efficiency.	SMAQMD

(A) Compliance with SMAQMD Rule 460 includes use of exemptions of this rule. If the operation qualifies for exemption of VOC content limits the BACT VOC content limits are exempt as well.

<b>Table 1 Adhesives</b>		
<b>Adhesive</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
<b>Architectural Adhesive Applications:</b>		
Multipurpose Construction Adhesive	70 (0.6)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Structural Wood Member Adhesive	140 (1.2)	SCAQMD Rule 1168, SJVAPCD Rule 4653, SDCAPCD Rule 67.21
Ceramic Tile Installation Adhesive	65 (0.5)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Cove Base Installation Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Dry Wall and/or Panel Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168
<b>Flooring Adhesives:</b>		
All Other Indoor or Outdoor Floor Covering Adhesive	50 (0.4)	SCAQMD Rule 1168
Ceramic Floor Tile Installation	65 (0.5)	SCAQMD Rule 1168, SJVAPCD Rule 4653
Indoor Carpet Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Carpet Pad Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Rubber Flooring Adhesive	60 (0.5)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Wood Flooring Adhesive	20 (0.2)	SCAQMD Rule 1168
Subfloor Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
VCT and Asphalt Tile Adhesive	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
<b>Roofing Adhesives:</b>		
Single-Ply Roof Membrane Installation/Repair Adhesive (A)	200 (1.7)	SCAQMD Rule 1168
All Other Roof Adhesives	200 (1.7)	SCAQMD Rule 1168

<b>Table 1 Adhesives</b>		
<b>Adhesive</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Structural Glazing Adhesive (A)	100 (0.8)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
<b>Plastic Welding Products:</b>		
ABS Welding Adhesive	325 (2.7)	SJVAPCD Rule 4653, SCAQMD Rule 1168
Cellulosic Plastic Welding Adhesive	100 (0.8)	SDCAPCD Rule 67.21
CPVC Welding Adhesive	490 (4.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
PVC Welding Adhesive	425 (3.5)	SCAQMD Rule 1168
ABS to PVC Transition Cement	510 (4.3)	SCAQMD Rule 1168
All Other Plastic Cement Welding Adhesive	100 (0.8)	SCAQMD Rule 1168
<b>Miscellaneous Adhesives:</b>		
Metal to Urethane/Rubber Molding or Casting Adhesive	250 (2.1)	SMAQMD Rule 460
Thin Metal Laminating Adhesive (A)	780 (6.5)	SCAQMD Rule 1168, SMAQMD Rule 460, SJVAPCD Rule 4653, SDCAPCD Rule 67.21, BAAQMD Rule 51
Tire Tread Adhesive (A)	100 (0.8)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Top and Trim Adhesive	250 (2.1)	SCAQMD Rule 1168
Waterproof Resorcinol Glue (A)	170 (1.4)	SCAQMD Rule 1168, SMAQMD Rule 460, SJVAPCD Rule 4653, SDCAPCD Rule 67.21, BAAQMD Rule 51

<b>Table 1 Adhesives</b>		
<b>Adhesive</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Computer Diskette Jacket Manufacturing Adhesive	350 (2.9)	SCAQMD Rule 1168
All Other Specialty Adhesives	250 (2.1)	SCAQMD Rule 1168
Adhesive Application Process – Wooden Door Assembly, Roller Applied	Use of an adhesive with a VOC content of 5.0 grams/liter (0.04 lb/gal) (less water and exempt compounds), or less	SJVAPCD BACT Guideline 4.9.8 (11/20/01)
Adhesive Application Process – Vinyl Door and Window Assembly, Non-Spray Applied	<ol style="list-style-type: none"> <li>1) Use of adhesive with a VOC content of 3.0 g/l (0.03 lb/gal)(less water and exempt compounds), or less for automated adhesive application and assembly processes</li> <li>2) Use of adhesive with VOC content of 76.5 g/l (0.6 lb/gal) (less water and exempt compounds), or less for manually applied adhesive operation when assembling</li> </ol>	SJVAPCD BACT Guideline 4.9.9 (9/26/03)
Adhesive Application for Multi-Wall Packaging Manufacturing	<ol style="list-style-type: none"> <li>1) Adhesives with a VOC content of <math>\leq 0.2</math> lb/gal (24.0 g/l) (excluding water and exempt compounds) for the adhesion of plastic film to porous material</li> <li>2) Adhesives with a VOC content of <math>\leq 0.13</math> lb/gal (15.6 g/l) (excluding water and exempt compounds) for the adhesion of porous materials</li> </ol>	SJVAPCD BACT Guideline 4.9.10 (11/18/04)
Corrugated Box Gluer	Use of adhesives with a VOC content (less water and exempt compounds) not exceeding 0.044 lb/gal (5.3 g/l)	SJVAPCD BACT Guideline 4.9.12 (9/22/06)
Corrugated Cardboard Manufacturing (Corrugator)	Adhesives – 0.015 lb/VOC/gal (1.8 g/l) (less water and exempt compounds)	SJVAPCD BACT Guideline 4.9.13 (1/30/15)

(A) Also listed in EPA's Control Techniques Guidelines for Miscellaneous Industrial Adhesives (EPA-453/R-08-005 (9/08)).

<b>Table 2 VOC Content for Adhesive Primers</b>		
<b>Type of Adhesive Primer</b>	<b>VOC Limits g/l (lbs/gal) (A)</b>	<b>Source</b>
Automotive Glass	700 (5.8)	SMAQMD Rule 460, SCAQMD Rule 1168, SJVAPCD Rule 4653, SDCAPCD Rule 67.21, BAAQMD Rule 51
Plastic Cement Welding	400 (3.3)	SMAQMD Rule 460, SJVAPCD Rule 4653,
Single-Ply Roof Membrane	250 (2.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SDCAPCD Rule 67.21
Traffic Marking Tape	150 (1.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Other	250 (2.1) (A)	SMAQMD Rule 460, SDCAPCD Rule 67.21, BAAQMD Rule 51

(A) Also listed in EPA's Control Techniques Guidelines for Miscellaneous Industrial Adhesives (EPA-453/R-08-005 (9/08)).

<b>Table 3 VOC Content for Contact Adhesives</b>		
<b>Type of Contact Adhesive</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Contact Adhesive	80 (0.7)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Contact Adhesive – Specialty Substrate	250 (2.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21

<b>Table 4 VOC Content for Sealants</b>		
<b>Type of Sealant</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Architectural		
Clear, Paintable, and Immediately Water-Resistant Sealant	380 (3.2)	SCAQMD Rule 1168
Grout	65 (0.5)	SCAQMD Rule 1168
Foam Sealant	250 (2.1)	SCAQMD Rule 1168
Roadway Sealant	250 (2.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Non-Staining Plumbing Putty	150 (1.6)	SCAQMD Rule 1168

<b>Table 4 VOC Content for Sealants</b>		
<b>Type of Sealant</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Roof Sealant	250 (2.1)	SCAQMD Rule 1168
All Other Architectural Sealants	50 (0.4)	SCAQMD Rule 1168
Marine Deck	760 (6.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
All Other Sealants	250 (2.1)	SCAQMD Rule 1168

<b>Table 5 VOC Content for Sealant Primers</b>		
<b>Type of Sealant Primer</b>	<b>VOC g/l (lbs/gal)</b>	<b>Source</b>
Architectural Nonporous Porous	250 (2.1) 775 (6.5)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Marine Deck	760 (6.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Modified Bituminous	500 (4.2)	SJVAPCD Rule 4653, SCAQMD Rule 1168
Other	750 (6.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51

<b>Table 6 VOC Content for Adhesives Applications onto Substrates</b>		
<b>Adhesive Applications onto Substrates</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Flexible Vinyl (A)	250 (2.1)	SMAQMD Rule 460
Fiberglass	80 (0.7)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Metal (A)	30 (0.3)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Porous Material	50 (0.4)	SMAQMD Rule 460, SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21, BAAQMD Rule 51
Rubber (A)	250 (2.1)	SMAQMD Rule 460

<b>Table 6</b> <b>VOC Content for Adhesives Applications onto Substrates</b>		
<b>Adhesive Applications onto Substrates</b>	<b>VOC Limits g/l (lbs/gal)</b>	<b>Source</b>
Wood (A)	30 (0.3)	SJVAPCD Rule 4653, SCAQMD Rule 1168, SDCAPCD Rule 67.21
Plastic Foam	50 (0.4)	SJVAPCD Rule 4653, SCAQMD Rule 1168
Reinforced Plastic Composite	200 (1.7)	SCAQMD Rule 1168, SJVAPCD Rule 4653
Other Substrates (A)	250 (2.1)	SMAQMD Rule 460, SJVAPCD Rule 4653, SDCAPCD Rule 67.21, BAAQMD Rule 51

(A) All of the listed substrates and limits, except fiberglass, are listed in EPA's Control Techniques Guidelines for Miscellaneous Industrial Adhesives (EPA-453/R-08-005 (9/08)).

<b>Table 7</b> <b>Maximum VOC Content Percentages for Aerosol Adhesives</b> <b>(Percent by VOC by Weight)</b>		
<b>Type of Solvent Cleaning Operation</b>	<b>VOC Content Limit (Percent of VOC by Weight)</b>	<b>Source</b>
Adhesives – Aerosol Mist Spray Adhesives Web Spray Adhesives	65% 55%	SMAQMD Rule 460
Special Purpose Spray Adhesives Mounting, Automotive Engine Compartment, and Flexible Vinyl Adhesives Polystyrene Foam and Automobile Headliner Adhesives Polyolefin and Laminate Repair/Edge banding Adhesives	70% 65% 60%	SMAQMD Rule 460

<b>Table 8</b> <b>Solvent Cleaning VOC Limits</b>		
<b>Type of Solvent Cleaning Operation</b>	<b>VOC Content Limit grams of VOC/liter of material (lb/gal)</b>	<b>Source</b>
Product cleaning during manufacturing process or surface preparation for adhesive application		
General	25 (0.2)	SJVAPCD Rule 4653
Repair and maintenance cleaning	25 (0.2)	SJVAPCD Rule 4653
Cleaning of adhesive application equipment	25 (0.2)	SJVAPCD Rule 4653

<b>Table 9 Stripper VOC Limits</b>		
	<b>VOC Content g/l (lbs/gal) including water and exempt compounds</b>	<b>VOC Composite Partial Pressure Millimeters of Mercury at 20 °C (68 °F)</b>
Adhesive or Sealant Products on Wood	≤ 70 (≤ 0.6) (A)	≤ 2 (B)
Adhesive or Sealant Products on Substrates	--	≤ 9.5 (B)

(A) VOC limit is based on SDCAPCD Regulation IV, Rule 67.21.

(B) VOC vapor pressure limit is based on SMAQMD Regulation IV, Rule 460.

APPROVED BY: Brian F Krebs DATE: 11-15-2022

# **Appendix A**

**Review of BACT Determinations published by Other  
Air Districts**

## SMAQMD BACT CLEARINGHOUSE

CATEGORY:

**Coating Adhesives**

BACT Size: Minor Source BACT

Adhesive Application

<b>BACT Determination Number:</b>	226	<b>BACT Determination Date:</b>	5/24/2019
<b>Equipment Information</b>			
<b>Permit Number:</b>	26136		
<b>Equipment Description:</b>	Adhesive Application		
<b>Unit Size/Rating/Capacity:</b>	<1,170 lbsVOC/month and <=4,019 lbs VOC/year		
<b>Equipment Location:</b>	SUNERGY CALIFORNIA LLC 4741 URBANI AVE MCCLELLAN, CA		
<b>BACT Determination Information</b>			
<b>ROCs</b>	<b>Standard:</b>		
	<b>Technology Description:</b>	See BACT determination Evaluation	
	<b>Basis:</b>	Achieved in Practice	
<b>NOx</b>	<b>Standard:</b>		
	<b>Technology Description:</b>		
	<b>Basis:</b>		
<b>SOx</b>	<b>Standard:</b>		
	<b>Technology Description:</b>		
	<b>Basis:</b>		
<b>PM10</b>	<b>Standard:</b>		
	<b>Technology Description:</b>	Spray booth with dry filters or waterwash	
	<b>Basis:</b>	Achieved in Practice	
<b>PM2.5</b>	<b>Standard:</b>		
	<b>Technology Description:</b>	Spray booth with dry filters or waterwash	
	<b>Basis:</b>		
<b>CO</b>	<b>Standard:</b>		
	<b>Technology Description:</b>		
	<b>Basis:</b>		
<b>LEAD</b>	<b>Standard:</b>		
	<b>Technology Description:</b>		
	<b>Basis:</b>		
<b>Comments:</b> VOC BACT determination consists of 9 tables that are included in the BACT determination evaluation			
<b>District Contact:</b> Brian Krebs    Phone No.: 916-874-4856    email: bkrebs@airquality.org			

Printed: 6/10/2019

## SMAQMD BACT CLEARINGHOUSE

CATEGORY:

**Coating - Adhesives**

BACT Size:

Adhesive Application Operation

<b>BACT Determination Number:</b>	227	<b>BACT Determination Date:</b>	5/24/2019
<b>Equipment Information</b>			
<b>Permit Number:</b>	26136		
<b>Equipment Description:</b>	Adhesive Application Operation		
<b>Unit Size/Rating/Capacity:</b>	>=1,170 lb/month or >4,019 lb/yr		
<b>Equipment Location:</b>	SUNERGY CALIFORNIA LLC 4741 URBANI AVE MCCLELLAN, CA		
<b>BACT Determination Information</b>			
<b>ROCs</b>	<b>Standard:</b>		
	<b>Technology Description:</b>	Compliance with adhesive BACT VOC limits (see comment)	
	<b>Basis:</b>	Achieved in Practice	
<b>NOx</b>	<b>Standard:</b>		
	<b>Technology Description:</b>		
	<b>Basis:</b>		
<b>SOx</b>	<b>Standard:</b>		
	<b>Technology Description:</b>		
	<b>Basis:</b>		
<b>PM10</b>	<b>Standard:</b>		
	<b>Technology Description:</b>	Spray booth with dry filters or waterwash	
	<b>Basis:</b>	Achieved in Practice	
<b>PM2.5</b>	<b>Standard:</b>		
	<b>Technology Description:</b>	Spray booth with dry filters or waterwash	
	<b>Basis:</b>	Achieved in Practice	
<b>CO</b>	<b>Standard:</b>		
	<b>Technology Description:</b>		
	<b>Basis:</b>		
<b>LEAD</b>	<b>Standard:</b>		
	<b>Technology Description:</b>		
	<b>Basis:</b>		
<b>Comments:</b> Compliance with adhesive BACT VOC limits (see Tables 1-9 in BACT determination evaluation) and VOC control system with ≥90% collection efficiency and ≥ 95% destruction efficiency.			
<b>District Contact:</b> Brian Krebs    Phone No.: (916) 874 - 4856    email: bkrebs@airquality.org			

Printed: 6/10/2019

**EXPIRED**

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**  
**Best Available Control Technology (BACT) Guidelines for Non-Major Polluting Facilities\***

10-20-2000 Rev. 0  
2-1-2019 Rev 1  
2-5-2021 Rev. 2

Equipment or Process:     Spray Booth

Subcategory/ Rating/Size	Criteria Pollutants					Inorganic
	VOC	NOx	SOx	CO	PM <sub>10</sub>	
Fully-enclosed, Down-Draft Type, < 667 Lbs/Month of VOC Emissions (2-5-2021)	Compliance with Applicable Regulation XI Rules (10-20-2000)	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147 (2-5-2021)			Dry Filters or Waterwash (1990)	
Other Types, < 1170 Lbs/Month of VOC Emissions	Compliance with Applicable Regulation XI Rules (10-20-2000)	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147 (2-5-2021)			Same as Above (1990)	
Fully-enclosed, Down-Draft Type, ≥ 22 Lbs/Day of VOC Emissions (2-5-2021)	- Compliance with Applicable Regulation XI Rules, and VOC Control System with ≥ 90% Collection Efficiency and ≥ 95% Destruction Efficiency, or - Use of Super Compliant Materials (<50 grams of VOC per liter of material); or - Use of Low-VOC Materials Resulting in an Equivalent Emission Reduction (10-20-2000)	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147 (2-5-2021)			Same as Above (1990)	

\* Means those facilities that are not major polluting facilities as defined by Rule 1302 - Definitions

**SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT**  
**Best Available Control Technology (BACT) Guidelines for Non-Major Polluting Facilities\***

Other Types, ≥ 1170 Lbs/Month of VOC Emissions	<ul style="list-style-type: none"> <li>- Compliance with Applicable Regulation XI Rules, and VOC Control System with ≥ 90% Collection Efficiency and ≥ 95% Destruction Efficiency, or</li> <li>- Use of Super Compliant Materials (&lt;50 grams of VOC per liter of material); or</li> <li>- Use of Low-VOC Materials Resulting in an Equivalent Emission Reduction (10-20-2000)</li> </ul>	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147 (2-5-2021)			Same as Above (1990)	
Enclosed with automated spray nozzles for wood cabinets, < 1170 Lbs/Month of VOC Emissions (2-5-2021)	Compliance with Rule 1136 or use of Rule 1136 compliant UV/EB or water-based coatings.	If booth has a Make-up Air Unit or a Heater; Compliance with Rule 1147				

Note: The sum of all VOC emissions from all spray booths within the same subcategory applied for in the previous two years at the same facility are considered toward the emission threshold.

\* Means those facilities that are not major polluting facilities as defined by Rule 1302 - Definitions

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.1\***

Last Update: 8/21/2020

**Adhesives Application - Tire Retreading**

<b>Pollutant</b>	<b>Achieved in Practice or contained in the SIP</b>	<b>Technologically Feasible</b>	<b>Alternate Basic Equipment</b>
VOC	Use of adhesives with a VOC content of 100 gram per liter (less water and exempt compounds)	1) Use of adhesives with zero VOC content  2) Capture of VOCs and thermal or catalytic oxidation or equivalent achieving 98% control  3) Capture of VOCs and carbon adsorption or equivalent achieving 95% control	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.2\***

Last Update: 5/11/2022

**Adhesive Application Operation - Rubber Parts and Products,  
Brush Applied \*RESCINDED\***

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.3\***

Last Update: 5/11/2022

**Adhesive Application Process - Foam Products \*RESCINDED\***

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.4\***

Last Update: 4/3/2000

**Adhesive Application Process - Non-Porous Materials,  
Specialty Contact Adhesives, Spray Application**

<b>Pollutant</b>	<b>Achieved in Practice or contained in the SIP</b>	<b>Technologically Feasible</b>	<b>Alternate Basic Equipment</b>
VOC	Using adhesives with a VOC content of 540 grams/liter or less (less water and exempt compounds) until July 1, 2000. Using adhesives with a VOC content of 400 grams/liter or less (less water and exempt compounds) after July 1, 2000.	1. VOC capture and control with thermal or catalytic incineration 2. VOC capture and control with carbon adsorption	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.5\***

Last Update: 5/11/2022

**Adhesive Application Process - Wooden case manufacturing \*RESCINDED\***

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.7\***

Last Update: 8/3/2001

**Corrugated PVC Sheet Products - Special Contact  
Adhesive, Roller Applied**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	PVC welding adhesive compliant with District Rule 4653	1. Thermal / catalytic incinerator. 2. Carbon adsorption system. 3. Low VOC adhesive (= or < 0.3 lb/gal, less water and exempt compounds).	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.8\***

Last Update: 11/20/2001

**Adhesive Application Process – Wooden Door  
Assembly, Roller applied**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	Use of an adhesive with a VOC content of 5.0 grams/liter (less water and exempt compounds), or less.	1. Thermal incineration 2. Carbon Adsorption or Use of an adhesive with a VOC content of 1.0 grams/liter (less water or exempt compounds), or less.	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.9\***

Last Update: 9/26/2003

**Adhesive Application Process - Vinyl Door and Window Assembly, Non-Spray  
Applied**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	1) Use of adhesive with VOC content of 3.0 g/l (less water and exempt compounds), or less for automated adhesive application and assembly processes  2) Use of adhesive with VOC content of 76.5 g/l (less water and exempt compounds), or less for manually applied adhesive operations when assembling custom window assemblies	1) Thermal Oxidizer 2) Carbon Adsorption	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.10\***

Last Update: 11/18/2004

**Adhesive Application for Multi-Wall Packaging Manufacturing**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	adhesives with a VOC content of $\leq 0.2$ lb/gal (excluding water and exempt compounds) for the adhesion of plastic film to porous material  adhesives with a VOC content of $\leq 0.13$ lb/gal (excluding water and exempt compounds) for the adhesion of porous materials	1. Capture and thermal incineration 2. Capture and carbon adsorption	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.11\***

Last Update: 11/3/2005

**Adhesive Application Operation - Bonding of Fiberglass Boat Hulls and Decks,  
Non-Atomizing Application**

Pollutant	Achieved in Practice or contained in the SIP	Technologically Feasible	Alternate Basic Equipment
VOC	use of adhesives with VOC content of 80 grams/liter or less (less water and exempt compounds)	1. VOC capture and incineration  2. VOC capture and carbon adsorption  3. use of low VOC content adhesives with VOC content of 50 grams/liter or less (less water and exempt compounds)	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.12\***

Last Update: 8/29/2018

**Corrugated Box Gluer**

<b>Pollutant</b>	<b>Achieved in Practice or contained in the SIP</b>	<b>Technologically Feasible</b>	<b>Alternate Basic Equipment</b>
VOC	Use of adhesives with a VOC content of 0.021 lb-VOC/gal (less water and exempt compounds)	1. VOC Capture and Thermal/Catalytic Oxidation  2. VOC Capture and Carbon Adsorption	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.13\***

Last Update: 8/29/2018

**Corrugated Board Manufacturing (Corrugator)**

<b>Pollutant</b>	<b>Achieved in Practice or contained in the SIP</b>	<b>Technologically Feasible</b>	<b>Alternate Basic Equipment</b>
VOC	Steam conditioning of paper - 3.5 lb-VOC/10 <sup>6</sup> sq ft;  Adhesives - 0.015 lb-VOC/gal (less water and exempt compounds)	1. VOC Capture and Thermal/Catalytic Oxidation  2. VOC Capture and Carbon Adsorption	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

San Joaquin Valley  
Unified Air Pollution Control District

**Best Available Control Technology (BACT) Guideline 4.9.14\***

Last Update: 6/6/2019

**Wood Parts and Products Subfloor Adhesive Application Operation**

<b>Pollutant</b>	<b>Achieved in Practice or contained in the SIP</b>	<b>Technologically Feasible</b>	<b>Alternate Basic Equipment</b>
VOC	Use of adhesives and solvents with a VOC content and application methods compliant with District Rule 4653 (Adhesives and Sealants)	1) At least 98% overall capture and control using a properly designed capture system served by a thermal/catalytic oxidizer, or other equivalent control achieving device or technology  2) At least 95% overall capture and control using a properly designed capture system served by a carbon adsorption system, or other equivalent control achieving device or technology	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a State Implementation Plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source**

# SDAPCD BACT

## **ADHESIVE MATERIAL APPLICATION OPERATIONS (<10 gal/day)** **Fee Schedules 27 U, V, & W**

Review the BACT Control Option listed below. The applicant must propose the Control Option listed or perform a Top-down BACT Analysis as described in Section 4 to justify the selection of another Control Option. The applicant will be required to provide documentation that the Control Option selected meets the requirements listed in the table.

	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>x</sub></b>	<b>PM</b>
<b>BACT Emission Rate Limit</b>	Not Determined	(N/A)	(N/A)	Not Determined
<b>BACT Control Option</b>	Compliance with Rule 67.21, Adhesive Material Application Operations (A/P)	(N/A)	(N/A)	Spray booth if used, shall be equipped with over spray filters. (A/P)

The applicant may choose to limit the Potential to Emit (PTE) from the equipment to less than 10 pounds per day for each pollutant in lieu of meeting the stated BACT requirement

*(This table does not apply to operations applying, on average, 10 or more gallons of adhesive application materials per day.)*

# **Appendix B**

**Cost Effectiveness Determination for Carbon  
Adsorption and Thermal Oxidizers**

# COST EFFECTIVENESS ANALYSIS FOR CARBON ADSORPTION

## Data Inputs

Select the type of carbon adsorber system:

Fixed-Bed Carbon Adsorber with Steam Regeneration

RESET

For fixed-bed carbon adsorbers, provide the following information:

Select the type of operation:

Continuous Operation

Select the type of material used to fabricate the carbon adsorber vessels:

Stainless Steel, 304

Select the orientation for the adsorber vessels:

Horizontal

## Enter the design data for the proposed Fixed-Bed Carbon Adsorber with Steam Regeneration

Number of operating hours per year ( $\Theta_s$ )	2,080 hours/year	
Waste Gas Flow Rate (Q)	10,000 acfm (at atmospheric pressure and 77°F)	
VOC Emission Rate ( $m_{voc}$ )	3.560 lbs/hour	
Required VOC removal efficiency (E)	90 percent	
Superficial Bed Velocity ( $v_b$ )	75.00 ft/min	
Estimated equipment life of adsorber vessels and auxiliary Equipment (n)	15 Years*	* 15 years is a default equipment life. User should enter actual value, if known.
Estimated Carbon life (n)	5 Years	
Total Number of carbon beds ( $N_{total}$ )	3 Beds*	* 3 beds is the default. User should enter actual number of beds, if known.
Number of carbon beds adsorbing VOC when system is operating ( $N_A$ )	2 Beds*	* 2 beds is the default. User should enter actual number of beds, if known.
Total time for adsorption ( $\Theta_A$ )	12 hours*	* 12 hours is a default value. User should enter actual value, if known.
Total time for desorption ( $\Theta_D$ )	5 hours*	* 5 hours is a default value. User should enter actual value, if known.
Estimated Carbon Replacement Rate (CRR)	379 lbs/hour*	* 379 lbs./hour is a default value. User should enter actual value, if known.

Enter the Characteristics of the VOC/HAP:

Name of VOC/HAP	Toluene
Partial Pressure of Toluene in waste gas stream	0.0104 psia
Parameter "k" for Toluene	0.551 <b>Note:</b>
Parameter "m" for Toluene	0.110 Typical values of "k" and "m" for some common VOCs are shown in Table A.

Enter the cost data for the carbon adsorber:

Desired dollar-year	2022			
CEPCI* for 2022	567.5	CEPCI value for 2022	390.6	1999
Annual Interest Rate (i)	4	percent (Current bank prime rate)		

\* CEPCI is the Chemical Engineering Plant Cost Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purpose of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

Electricity ( $P_{elec}$ )	\$0.1380 per kWh	
Steam ( $P_s$ )	\$5.00 per 1,000 lbs*	* \$5.00/1,000 lbs is a default value. User should enter actual value, if known.
Cooling Water ( $P_{cw}$ )	\$3.55 per 1,000 gallons of water*	* \$3.55/1,000 gallons is a default value. User should enter actual value, if known.
Operator Labor Rate	\$27.48 per hour*	* \$27.48/hour is a default value. User should enter actual value, if known.
Maintenance Labor Rate	\$30.23 per hour*	* \$30.23/hour is a default value. User should enter actual value, if known. If the rate is not known, use 1.10 x operator labor rate.
Carbon Cost (CC)	\$4.20 per lb	* \$4.20/lb is a default value based on 2018 market price. User should enter actual value, if known.
Re-Sale Value of Recovered VOC ( $P_{voc}$ )	\$0.33 per lb*	* \$0.33/lb is a default value for recovered toluene based on 2018 data. User should enter actual value of
Disposal/Treatment Cost for Recovered VOC ( $D_{voc}$ )	\$0.00 per lb*	* \$0/lb is a default value for disposal and/or treatment of recovered VOC/HAP. User should enter actual value,
If known, enter any additional costs for site preparation and building construction/modification:		
Site Preparation (SP) =	\$0	* Default value. User should enter actual value, if known.
Buildings (Bldg) =	\$0	* Default value. User should enter actual value, if known.
Equipment Costs for auxiliary equipment (e.g., ductwork, dampers, and stack) ( $EC_{aux}$ ) =	\$32,000	* Default value. User should enter actual value, if known.
Contingency Factor (CF)	10.0 percent*	* 10 percent is a default value. The contingency factor should be between 5 and 15 percent.

## Cost Estimate

### Capital Costs

**Estimated capital costs for a Fixed-Bed Carbon Adsorber with Steam Regeneration with the following characteristics:**

VOC Controlled/Recovered = Toluene  
 Adsorber Vessel Orientation = Horizontal  
 Operating Schedule = Continuous Operation

#### Total Capital Investment (TCI) (in 2020 dollars)

Parameter	Equation	Cost
Costs for Each Carbon Adsorber Vessel ( $C_v$ ) =	$271 \times F_m \times S^{0.778} =$	\$25,175
Total Cost for All Carbon Adsorber Vessels and Carbon ( $EC_{Adsorb}$ ) =	$5.82 \times Q^{-0.133} \times [C_c + (N_A + N_D) \times C_v] =$	\$131,885
Auxiliary Equipment ( $EC_{aux}$ ) =	(Based on design costs or estimated using methods provided in Section 2)	\$32,000
Total Purchased Equipment Costs for Carbon Adsorber (A) =	$= EC_{Adsorb} + EC_{aux} =$	\$163,885
Instrumentation =	$0.10 \times A =$	Included in A
Sales taxes =	$0.03 \times A =$	\$4,917
Freight =	$0.05 \times A =$	\$8,194

Total Purchased Equipment Costs (B) = \$176,995

#### Direct Installation Costs (in 2020 dollars)

Parameter	Equation	Cost
Foundations and Supports =	$0.08 \times B =$	\$14,160
Handling and Erection =	$0.14 \times B =$	\$24,779
Electrical =	$0.04 \times B =$	\$7,080
Piping =	$0.02 \times B =$	\$3,540
Insulation =	$0.01 \times B =$	\$1,770
Painting =	$0.01 \times B =$	\$1,770
Site Preparation (SP) =		\$0
Buildings (Bldg) =		\$0

Total Direct Costs (DC) =  $B + (0.3 \times B) + SP + Bldg =$  \$230,094

Total Indirect Installation Costs (in 2020 dollars)			
Parameter	Equation	Cost	
Engineering =	$0.10 \times B =$	\$17,700	
Construction and field expenses =	$0.05 \times B =$	\$8,850	
Contractor fees =	$0.10 \times B =$	\$17,700	
Start-up =	$0.02 \times B =$	\$3,540	
Performance test =	$0.01 \times B =$	\$1,770	
		Total Indirect Costs (IC) =	\$49,559
Contingency Cost (C) =	$CF(IC+DC)=$	\$27,965	
Total Capital Investment (TCI) =		$DC + IC + C = (1.28 \times B) + SP + Bldg. + C =$	\$307,618 in 2020 dollars
Annual Costs			
Direct Annual Costs			
Parameter	Equation	Cost	
Annual Electricity Cost =	$Q_{Elec} \times P_{elec} =$	\$738	
Annual Steam Cost ( $C_s$ ) =	$3.50 \times m_{voc} \times \Theta_s \times P_s =$	\$130	
Annual Cooling Water Cost ( $C_{cs}$ ) =	$3.43 \times C_s/P_s \times P_{wc} =$	\$316	
Operating Labor Costs:	Operator = 0.5 hours/shift $\times$ Labor Rate $\times$ (Operating hours/8 hours/shift)	\$3,572	
	Supervisor = 15% of Operator	\$536	
Maintenance Costs:	Labor = 0.5 hours/shift $\times$ Labor Rate $\times$ (Operating Hours/8 hours/shift)	\$3,930	
	Materials = 100% of maintenance labor	\$3,930	
Carbon Replacement Costs:	Labor = $CRF_{carbon} \times (Labor\ Rate \times M_c)/CRR =$	\$7	
	Carbon = $CRF_{carbon} \times CC \times M_c \times 1.08 =$	\$392	
Direct Annual Costs (DAC) =		\$13,549	in 2020 dollars

Indirect Annual Costs			
Parameter	Equation	Cost	
Overhead	= 60% of sum of operator, supervisor, maintenance labor Plus maintenance materials	\$7,181	
Administrative Charges	= 2% of TCI	\$6,152	
Property Taxes	= 1% of TCI	\$3,076	
Insurance	= 1% of TCI	\$3,076	
Capital Recovery	= $CRF_{\text{Adsorber}} \times (TCI - [(1.08 \times CC \times M_c) + (LR \times M_c / CRR)])$	\$27,508	
Indirect Annual Costs (IAC) =		\$46,994	in 2020 dollars

#### Recovered Solvent Credit/Disposal Costs

Disposal Cost			
Parameter	Equation	Cost	
VOC Disposal/Treatment Costs ( $Disposal_{\text{cost}}$ )	$= m_{\text{voc}} \times \theta_s \times D_{\text{voc}} \times E =$	\$0	
VOC Recovery Credit			
Parameter	Equation	Cost	
Annual Recovery Credit for Condensate (RC)	$= m_{\text{voc}} \times \theta_s \times P_{\text{voc}} \times E =$	\$2,199	
Total Annual Cost (TAC) =		\$58,344	in 2020 dollars

#### Cost Effectiveness

Cost Effectiveness			
Parameter	Equation	Cost	
Total Annual Cost =	TAC =	\$58,344	per year in 2020 dollars
Annual Quantity of VOC Removed/Recovered =	$W_{\text{voc}} = m_{\text{voc}} \times \theta_s \times E =$	3	tons/year
Cost Effectiveness =	Total Annual Cost (TAC) / Annual Quantity of VOC Removed/Recovered =	\$17,509.23	per ton of pollutants removed/recovered in 2020 dollars

# COST EFFECTIVENESS ANALYSIS FOR THERMAL INCINERATION

## Data Inputs

Select the type of oxidizer

Regenerative Thermal Oxidizer

RESET

Enter the following information for your emission source:

### Composition of Inlet Gas Stream

Pollutant Name	Concentration (ppmv)	Lower Explosive Limit (LEL) (ppmv)*	Heat of Combustion (Btu/scf)	Molecular Weight
Toluene	40	11,000	4,274	92.13

Note: The lower explosion limit (LEL), heat of combustion and molecular weight for some commonly used VOC/HAP are provided in the table below.

Enter the design data for the proposed oxidizer:

Number of operating hours/year

2,080 hours/year

Inlet volumetric flow rate( $Q_{wi}$ ) at 77°F and 1 atm.

20,000 scfm\*

Inlet volumetric flow rate( $Q_{wi}$ ) (actual conditions)

20,900 acfm\*

Pressure drop ( $\Delta P$ )

19 inches of water

Motor/Fan Efficiency ( $\epsilon$ )

60 percent\*

Inlet Waste Gas Temperature ( $T_{wi}$ )

77 °F

Operating Temperature ( $T_{fi}$ )

1,900 °F

Destruction and Removal Efficiency (DRE)

99 percent\*

Estimated Equipment Life

20 Years\*

Heat Loss ( $\eta$ )

1 percent\*

Percent Energy Recovery (HR) =

70 percent

\* 20,000 scfm is a default volumetric flow rate. User should enter actual value, if known.

\* 20,900 acfm is a default volumetric flow rate. User should enter actual value, if known.

\* 23 inches of water is the default pressure drop for thermal oxidizers; 19 inches of water is the default pressure drop for catalytic oxidizers. Enter actual value, if known.

\* 60% is a default fan efficiency. User should enter actual value, if known.

\* Note: Default value for  $T_{fi}$  is 2000°F for thermal regenerative oxidizers. Use actual value if known.  $T_{fi}$  for regenerative oxidizers typically between 1800 and 2000°F.

\* 99 percent is a default control efficiency. User should enter actual value, if known.

\* 20 years is the typical equipment life. User should enter actual value, if known.

\* 1 percent is a default value for the heat loss. User should enter actual value, if known. Heat loss is typically between 0.2 and 1.5%.

# Enter the cost data:

Desired dollar-year

CEPCI\* for 2022

Annual Interest Rate (i)

Electricity (Cost<sub>elect</sub>)

Natural Gas Fuel Cost (Cost<sub>fuel</sub>)

Operator Labor Rate

Maintenance Labor rate

Contingency Factor (CF)

2022		
541.7	Enter the CEPCI value for 2022	541.7 2016 CEPCI
4	Percent	
0.138	\$/kWh	
0.00804	\$/scf	
\$27.48	per hour	
\$30.23	per hour	
10.0	Percent	

\* 10 percent is a default value for construction contingencies. User may enter values between 5 and 15 percent.

\* CEPCI is the Chemical Engineering Plant Cost Escalation/De-escalation Index. The use of CEPCI in this spreadsheet is not an endorsement of the index for purposes of cost escalation or de-escalation, but is there merely to allow for availability of a well-known cost index to spreadsheet users. Use of other well-known cost indexes (e.g., M&S) is acceptable.

## Cost Estimate

### Direct Costs

#### Total Purchased equipment costs (in 2020 dollars)

Incinerator + auxiliary equipment <sup>a</sup> (A) =		
Equipment Costs (EC) for Regenerative Oxidizer	$= [2.664 \times 100,000 + (13.98 \times Q_{tot})] \times (2020 \text{ CEPI} / 2016 \text{ CEPI}) =$	\$546,548 in 2020 dollars
Instrumentation <sup>b</sup> =	$0.10 \times A =$	\$54,655
Sales taxes =	$0.03 \times A =$	\$16,396
Freight =	$0.05 \times A =$	\$27,327

Total Purchased equipment costs (B) = \$644,926 in 2020 dollars

#### Footnotes

a - Auxiliary equipment includes equipment (e.g., duct work) normally not included with unit furnished by incinerator vendor.

b - Includes the instrumentation and controls furnished by the incinerator vendor.

#### Direct Installation Costs (in 2020 dollars)

Foundations and Supports =	$0.08 \times B =$	\$51,594
Handlong and Errection =	$0.14 \times B =$	\$90,290
Electrical =	$0.04 \times B =$	\$25,797
Piping =	$0.02 \times B =$	\$12,899
Insulation for Ductwork =	$0.01 \times B =$	\$6,449
Painting =	$0.01 \times B =$	\$6,449
Site Preparation (SP) =		\$0
Buildings (Bldg) =		\$0
	Total Direct Installaton Costs =	\$193,478
Total Direct Costs (DC) =	Total Purchase Equipment Costs (B) + Total Direct Installation Costs =	\$838,404 in 2020 dollars

#### Total Indirect Installation Costs (in 2020 dollars)

Engineering =	$0.10 \times B =$	\$64,493
Construction and field expenses =	$0.05 \times B =$	\$32,246
Contractor fees =	$0.10 \times B =$	\$64,493
Start-up =	$0.02 \times B =$	\$12,899
Performance test =	$0.01 \times B =$	\$6,449

Total Indirect Costs (IC) = \$180,579

Continency Cost (C) =	$CF(IC+DC) =$	\$101,898
Total Capital Investment =	$DC + IC + C =$	\$1,120,882 in 2020 dollars

Direct Annual Costs		
Annual Electricity Cost	= Fan Power Consumption × Operating Hours/year × Electricity Price =	\$22,227
Annual Fuel Costs for Natural Gas	= Cost <sub>fuel</sub> × Fuel Usage Rate × 60 min/hr × Operating hours/year	\$39,319
Operating Labor	Operator = 0.5hours/shift × Labor Rate × (Operating hours/8 hours/shift)	\$3,572
	Supervisor = 15% of Operator	\$536
Maintenance Costs	Labor = 0.5 hours/shift × Labor Rate × (Operating Hours/8 hours/shift)	\$3,930
	Materials = 100% of maintenance labor	\$3,930
Direct Annual Costs (DC) =		\$73,514 in 2020 dollars
Indirect Annual Costs		
Overhead	= 60% of sum of operating, supervisor, maintenance labor and maintenance materials	\$7,181
Administrative Charges	= 2% of TCI	\$22,418
Property Taxes	= 1% of TCI	\$11,209
Insurance	= 1% of TCI	\$11,209
Capital Recovery	= CRF[TCI-1.08(cat. Cost)]	\$82,476
Indirect Annual Costs (IC) =		\$134,493 in 2020 dollars
Total Annual Cost = DC + IC =		\$208,007 in 2020 dollars
Cost Effectiveness		
Cost Effectiveness = (Total Annual Cost)/(Annual Quantity of VOC/HAP Pollutants Destroyed)		
Total Annual Cost (TAC) =	\$208,007 per year in 2020 dollars	
VOC/HAP Pollutants Destroyed =	11.8 tons/year	
Cost Effectiveness =	\$17,657 per ton of pollutants removed in 2020 dollars	

