

AREA SOURCE EMISSIONS FOR CALENDAR YEAR 2023

METHODOLOGY DOCUMENTATION

ARCHITECTURAL COATINGS AND RELATED SOLVENT

DESCRIPTION OF CATEGORIES

The categories below are used to estimate the emissions of volatile organic compounds (VOC) from architectural coatings and related solvent used in the South Coast AQMD.

CES	EIC	Description
46755	520-520-9200-0000	Architectural coatings (water based) - coatings (unspecified)
46763	520-520-9100-0000	Architectural coatings (oil) - organic solvent based coatings(unspecified)
85399	520-520-9105-0000	Architectural coatings (oil)- primers, sealers, and undercoaters
85407	520-520-9106-0000	Architectural coatings (oil) - quick dry primers, sealers & undercoaters
85423	520-520-9112-0000	Architectural coatings (oil based) - sanding sealers
85472	520-520-9136-0000	Architectural coatings (oil based)- stains - opaque
85506	520-520-9153-0000	Architectural coatings (oil based)- quick dry enamel coatings
85530	520-520-9159-0000	Architectural coatings (oil based)- flat coatings
85548	520-520-9161-0000	Architectural coatings (oil based)- high gloss nonflat coatings
85571	520-520-9164-0000	Architectural coatings (oil bases)- bituminous roof coatings
85589	520-520-9165-0000	Architectural coatings (oil based)- concrete curing compounds
85597	520-520-9166-0000	Architectural coatings (oil based) - dry fog coatings
85621	520-520-9169-0000	Architectural coatings (oil based) - floor coatings
85639	520-520-9170-0000	Architectural coatings (oil based) - form release coatings
85647	520-520-9171-0000	Architectural coatings (oil based) - high temperature coatings
85654	520-520-9172-0000	Architectural coatings (oil) - industrial maintenance coatings
85662	520-520-9173-0000	Architectural coatings (oil based) - metallic pigmented coatings
85670	520-520-9174-0000	Architectural coatings (oil based) - roof coatings
85696	520-520-9176-0000	Architectural coatings (oil based) - traffic coatings
85720	520-520-9205-0000	Architectural coatings (water based) - primers, sealers and undercoaters
85738	520-520-9206-0000	Architectural coatings (water) - quick dry primers, sealers & undercoaters
85753	520-520-9212-0000	Architectural coatings (water based) - sanding sealers
85803	520-520-9236-0000	Architectural coatings (water based) - stains - opaque
85852	520-520-9259-0000	Architectural coatings (water based) - flat coatings
85860	520-520-92610000	Architectural coatings (water based) - high gloss nonflat coatings
85894	520-520-92640000	Architectural coatings (water based) - bituminous coatings
85902	520-520-92650000	Architectural coatings (water based) - concrete curing compounds
85910	520-520-92660000	Architectural coatings (water based) - dry fog coatings
85936	520-520-92690000	Architectural coatings (water based) - floor coatings
85944	520-520-92720000	Architectural coatings (water based) - industrial maintenance coatings
85951	520-520-92730000	Architectural coatings (water based) - metallic pigmented coatings
85969	520-520-92740000	Architectural coatings (water based) - roof coatings
85977	520-520-92760000	Architectural coatings (water based) - traffic coatings
89771	520-520-91090000	Architectural coatings - bituminous roof primer (oil based)
89789	520-520-91220000	Architectural coatings - faux finishing
89797	520-520-91570000	Architectural coatings - lacquers
89813	520-520-91240000	Architectural coatings - mastic texture (oil based)
89821	520-520-91600000	Architectural coatings - nonflat - low gloss/medium gloss

CES	EIC	Description
89839	520-520-91260000	Architectural coatings - rust preventative
89847	520-520-91080000	Architectural coatings - specialty primers, sealers and undercoaters
89854	520-520-91310000	Architectural coatings - stains - clear/semitransparent
89862	520-520-91410000	Architectural coatings - varnishes - clear/semitransparent
89870	520-520-91130000	Architectural coatings - waterproofing sealers
89888	520-520-91180000	Architectural coatings - waterproofing concrete/masonry sealers
89896	520-520-91770000	Architectural coatings - wood preservatives
89904	520-520-92090000	Architectural coatings - bituminous roof primer (water based)
89912	520-520-92220000	Architectural coatings - faux finishing
89920	520-520-92230000	Architectural coatings - form release compounds
89938	520-520-92570000	Architectural coatings - lacquers
89946	520-520-92240000	Architectural coatings - mastic texture (water based)
89953	520-520-92600000	Architectural coatings - nonflat - low gloss/medium gloss
89961	520-520-92260000	Architectural coatings - rust preventative
89979	520-520-92080000	Architectural coatings -specialty primers, sealers, and undercoaters
89987	520-520-92310000	Architectural coatings - stains - clear/semitransparent
89995	520-520-92410000	Architectural coatings - varnishes - clear/semitransparent
90001	520-520-92130000	Architectural coatings - waterproofing sealers
90019	520-520-92180000	Architectural coatings - waterproofing concrete/masonry sealers
90027	520-520-92770000	Architectural coatings - wood preservatives
92106	520-522-83500000	Architectural - cleaning solvent
92114	520-522-83020000	Architectural - thinning solvent
92122	520-522-83100000	Architectural - additives
94474	520-520-92810000	Colorant-architectural coatings, excluding IM coatings (50 g/L)
94482	520-520-92820000	Colorant-solvent-based IM (600 g/L)
94490	520-5209-2830000	Colorant-water-based coating IM (60g/L)

METHODOLOGY AND ASSUMPTIONS

Rule 314 – Fees for Architectural Coatings (Rule 314) subdivision (e) – Requirement to Submit an Annual Quantity and Emissions Report (AQER) requires architectural coating manufacturers who sell architectural coatings into or within the South Coast AQMD’s jurisdiction and are subject to Rule 1113 – Architectural Coatings (Rule 1113) to electronically submit an AQER by April 1 of each year. Rule 314 improves the accuracy of emissions inventory for architectural coatings.

Determination of Reported VOC Emissions for each CES

Annual quantity and emission data reported pursuant to Rule 314 is used to determine the annual Reported VOC Emissions in tons per day (tpd) for each CES listed above. The VOC emissions are calculated using the equations below:

$$\begin{aligned}
 & \text{Reported VOC Emissions (tpd)} \\
 &= (\text{Annual Sales Vol in } \frac{\text{gal}}{\text{year}}) \left(\frac{3.78541 \text{ L}}{1 \text{ gal}} \right) (\text{reported Material VOC in } \frac{\text{g}}{\text{L}}) \left(\frac{1 \text{ lb}}{453.592 \text{ g}} \right) \left(\frac{1 \text{ ton}}{2000 \text{ lbs}} \right) \left(\frac{1 \text{ year}}{365 \text{ days}} \right)
 \end{aligned}$$

Reported VOC Emissions (tpy)

$$= (\text{Annual Sales Vol in } \frac{\text{gal}}{\text{year}}) (\frac{3.78541 \text{ L}}{1 \text{ gal}}) (\text{reported Material VOC in } \frac{\text{g}}{\text{L}}) (\frac{1 \text{ lb}}{453.592 \text{ g}}) (\frac{1 \text{ ton}}{2000 \text{ lbs}})$$

Reported Architecture Coatings VOC Emissions in tons per day

CES	EIC Description	Rule 1113 Category Code	Type	Coating Category	VOC (tpd)
46763	Oil based (organic solvent based) coatings (unspecified)	10	SB (Solvent-borne)	Fire Proofing Coatings	0.01
85530	Oil based flat coatings	13	SB	Flats	0.0004
85621	Oil based floor coatings	14	SB	Floor Coatings	0.019
85639	Oil based form release coatings	16	SB	Form Release Compound	0.19
46763	Oil based (organic solvent based) coatings (unspecified)	17	SB	Graphic Arts Coatings	0.008
85647	Oil based high temperature coatings	18	SB	Industrial Maintenance - High Temperature IM Coatings	0.006
85654	Oil based industrial maintenance coatings	19	SB	Industrial Maintenance	0.20
85654	Oil based industrial maintenance coatings	19a	SB	Non-Sacrificial Anti-Graffiti Coatings	0
89797	Oil based lacquers (unspecified)	20	SB	Clear Wood Finishes - Lacquer (includes Lacquer Sanding Sealer)	0.09
46763	Oil based (organic solvent based) coatings (unspecified)	21	SB	Low Solids Coatings	0
46763	Oil based (organic solvent based) coatings (unspecified)	22	SB	Magnesite Cement coatings	0.007
89813	Oil based mastic texture	23	SB	Mastic Coatings	0.008
85662	Oil based metallic pigmented coatings	24	SB	Metallic Pigmented Coatings	0.0003
46763	Oil based (organic solvent based) coatings (unspecified)	25	SB	Multi-Color Coatings	0
89821	Oil based nonflat - low gloss/medium gloss	26	SB	nonflat coatings- low gloss	0.0004
89821	Oil based nonflat - low gloss/medium gloss	27	SB	non flat coatings - medium gloss	0.0001
85548	Oil based high gloss nonflat coatings	28	SB	nonflat - high gloss	0.003

CES	EIC Description	Rule 1113 Category Code	Type	Coating Category	VOC (tpd)
46763	Oil based (organic solvent based) coatings (unspecified)	29	SB	Pre-Treatment Wash Primers	0.0004
85399	Oil based primers, sealers, and undercoaters	30	SB	Primers, Sealers, and Undercoaters	0.2
85506	Oil based quick dry enamel coatings	31	SB	Quick-Dry Enamels	0
85407	Oil based quick dry primers, sealers, and undercoaters	32	SB	Quick-Dry Primers, Sealers, and Undercoaters	0.0004
46763	Oil based (organic solvent based) coatings (unspecified)	33	SB	Recycled Coatings	0.1
85571	Oil based bituminous roof coatings	34	SB	Roof Coatings	0.07
89839	Oil based rust preventative	35	SB	Rust Preventative Coatings	0.06
85423	Oil based sanding sealers	36	SB	Clear Wood Finishes - Sanding Sealers	0.005
46763	Oil based (organic solvent based) coatings (unspecified)	37	SB	Shellac - Clear	0.042
46763	Oil based (organic solvent based) coatings (unspecified)	38	SB	Shellac - Pigmented	0.45
89847	Oil based specialty primer, sealer, and undercoater	39	SB	Specialty Primers	0.03
89771	Oil based bituminous roof primer	4	SB	Roof Primers - Bituminous	0.06
89854	Oil based stains - clear/semitransparent	40	SB	Stains, Interior (Clear/Semitransparent)	0.6
85472	Oil based stains - opaque	41	SB	Stains (Clear/Semitransparent/Opaque)	0.05
46763	Oil based (organic solvent based) coatings (unspecified)	42	SB	Swimming Pool Coatings - Other	0.009
46763	Oil based (organic solvent based) coatings (unspecified)	43	SB	Swimming Pool Coatings - Repair	0
85696	Oil based traffic coatings	45	SB	Traffic Coatings	0.05
89862	Oil based varnish - clear/semitransparent	46	SB	Clear Wood Finishes - Varnish (Clear)	0.1
89862	Oil based varnish - clear/semitransparent	47	SB	Clear Wood Finishes - Varnish (Semitransparent)	0.03

CES	EIC Description	Rule 1113 Category Code	Type	Coating Category	VOC (tpd)
89870	Oil based waterproofing sealers	48	SB	Waterproofing Sealers	0.32
89888	Oil based waterproofing concrete/masonry sealers	49	SB	Waterproofing Concrete/Masonry Sealers	0.19
46763	Oil based (organic solvent based) coatings (unspecified)	5	SB	Bond Breakers	0.0005
89896	Oil based wood preservatives	50	SB	Wood Preservatives - Below-Ground	0
46763	Oil based (organic solvent based) coatings (unspecified)	51	SB	Default	0.002
85696	Oil based traffic coatings	52	SB	Driveway Sealers	0
85670	Oil based roof coatings	53	SB	Roof Coatings - Aluminum	0.005
85589	Oil based concrete curing compounds	54	SB	Concrete Curing Compounds for Roadways and Bridges	0
89896	Oil based wood preservatives	55	SB	Wood Preservatives - Other	0.0006
85654	Oil based industrial maintenance coatings	56	SB	Industrial Maintenance - Zinc Rich IM Primers	0.001
89797	Oil based lacquers (unspecified)	57	SB	Pigmented Lacquer	0.03
46763	Oil based (organic solvent based) coatings (unspecified)	58	SB	Concrete Surface Retarder	0.0001
89888	Oil based waterproofing concrete/masonry sealers	59	SB	Reactive Penetrating Sealers	0.0005
89797	Oil based lacquers (unspecified)	6	SB	Clear Brushing Lacquer	0
46763	Oil based (organic solvent based) coatings (unspecified)	60	SB	Sacrificial Anti-Graffiti Coatings	0
89888	Oil based waterproofing concrete/masonry sealers	61	SB	Stone Consolidant	0
85589	Oil based concrete curing compounds	7	SB	Concrete -Curing Compounds	0.0007
85597	Oil based dry fog coatings	8	SB	Dry Fog coatings	0
89789	Oil based faux finishing	9	SB	Faux - Decorative Coatings	0.034
89789	Oil based faux finishing	9a	SB	Faux - Clear Topcoat	0.0001
89789	Oil based faux finishing	9b	SB	Faux - Glazes	0.001
89789	Oil based faux finishing	9c	SB	Faux-Japan	0

CES	EIC Description	Rule 1113 Category Code	Type	Coating Category	VOC (tpd)
89789	Oil based faux finishing	9d	SB	Faux-Trowel Applied Coatings	0
46755	Water based coatings (unspecified)	10	WB (Water-borne)	Fire Proofing Coatings	0.002
85852	Water based flat coatings	13	WB	Flats	1.39
85936	Water based floor coatings	14	WB	Floor Coatings	0.06
89920	Water based form release compounds	16	WB	Form Release Compound	0.017
46755	Water based coatings (unspecified)	17	WB	Graphic Arts Coatings	0.005
85644	Water based industrial maintenance coatings	18	WB	Industrial Maintenance - High Temperature IM Coatings	0
85944	Water based industrial maintenance coatings	19	WB	Industrial Maintenance	0.09
85894	Water-based Bituminous Coatings	4	WB	Bituminous Coatings	0
85944	Water based industrial maintenance coatings	19a	WB	Non-Sacrificial Anti-Graffiti Coatings	0.0002
89938	Water based lacquers (unspecified)	20	WB	Clear Wood Finishes - Lacquer (includes Lacquer Sanding Sealer)	0.008
46755	Water based coatings (unspecified)	21	WB	Low Solids Coatings	0
46755	Water based coatings (unspecified)	22	WB	Magnesite Cement coatings	0.02
89946	Water based mastic texture	23	WB	Mastic Coatings	0.001
85951	Water based metallic pigmented coatings	24	WB	Metallic Pigmented Coatings	0.0004
46755	Water based coatings (unspecified)	25	WB	Multi-Color Coatings	0.04
89953	Water based nonflat - low gloss/medium gloss	26	WB	nonflat coatings- low gloss	0.52
89953	Water based nonflat - low gloss/medium gloss	27	WB	non flat coatings - medium gloss	0.4
85860	Water based high gloss nonflat coatings	28	WB	nonflat - high gloss	0.04
46755	Water based coatings (unspecified)	29	WB	Pre-Treatment Wash Primers	0.00003
85720	Water based primers, sealers, and undercoaters	30	WB	Primers, Sealers, and Undercoaters	0.59
46755	Water based coatings (unspecified)	31	WB	Quick-Dry Enamels	0.00001

CES	EIC Description	Rule 1113 Category Code	Type	Coating Category	VOC (tpd)
85738	Water based quick dry primers, sealers, and undercoaters	32	WB	Quick-Dry Primers, Sealers, and Undercoaters	0.003
46755	Water based coatings (unspecified)	33	WB	Recycled Coatings	0.37
85894	Water based bituminous roof coatings	34	WB	Roof Coatings	0.56
89961	Water based rust preventative	35	WB	Rust Preventative Coatings	0.026
85753	Water based sanding sealers	36	WB	Clear Wood Finishes - Sanding Sealers	0.004
46755	Water based coatings (unspecified)	37	WB	Shellac - Clear	0
46755	Water based coatings (unspecified)	38	WB	Shellac - Pigmented	0
89979	Water based specialty primer, sealer, and undercoater	39	WB	Specialty Primers	0.005
89904	Water based bituminous roof primer	4	WB	Roof Primers - Bituminous	0
89987	Water based stains - clear/semitransparent	40	WB	Stains, Interior (Clear/Semitransparent)	0.04
85803	Water based stains - opaque	41	WB	Stains (Clear/Semitransparent/Opaque)	0.07
46755	Water based coatings (unspecified)	42	WB	Swimming Pool Coatings - Other	0.015
46755	Water based coatings (unspecified)	43	WB	Swimming Pool Coatings - Repair	0.0001
85977	Water based traffic coatings	45	WB	Traffic Coatings	0.31
89995	Water based varnishes - clear/semitransparent	46	WB	Clear Wood Finishes - Varnish (Clear)	0.16
89995	Water based varnishes - clear/semitransparent	47	WB	Clear Wood Finishes - Varnish (Semitransparent)	0.02
90001	Water based waterproofing sealers	48	WB	Waterproofing Sealers	0.13
90019	Water based waterproofing concrete/masonry sealers	49	WB	Waterproofing Concrete/Masonry Sealers	0.1
46755	Water based coatings (unspecified)	5	WB	Bond Breakers	0.09
90027	Water based wood preservatives	50	WB	Wood Preservatives - Below-Ground	0.0001
46755	Water based coatings (unspecified)	51	WB	Default	0.004

CES	EIC Description	Rule 1113 Category Code	Type	Coating Category	VOC (tpd)
85977	Water based traffic coatings	52	WB	Driveway Sealers	0.003
85969	Water based roof coatings	53	WB	Roof Coatings - Aluminum	0.004
85902	Water based concrete curing compounds	54	WB	Concrete Curing Compounds for Roadways and Bridges	0.07
90027	Water based wood preservatives	55	WB	Wood Preservatives - Other	0.00003
85944	Water based industrial maintenance coatings	56	WB	Industrial Maintenance - Zinc Rich IM Primers	0.00001
89938	Water based lacquers (unspecified)	57	WB	Pigmented Lacquer	0.0002
46755	Water based coatings (unspecified)	58	WB	Concrete Surface Retarder	0.02
90019	Water based waterproofing concrete/masonry sealers	59	WB	Reactive Penetrating Sealers	0.0002
89938	Water based lacquers (unspecified)	6	WB	Clear Brushing Lacquer	0
46755	Water based coatings (unspecified)	60	WB	Sacrificial Anti-Graffiti Coatings	0.0001
90019	Water based waterproofing concrete/masonry sealers	61	WB	Stone Consolidant	0
85902	Water based concrete curing compounds	7	WB	Concrete -Curing Compounds	0.015
85910	Water based dry fog coatings	8	WB	Dry Fog coatings	0.01
89912	Water based faux finishing	9	WB	Faux - Decorative Coatings	0.01
89912	Water based faux finishing	9a	WB	Faux - Clear Topcoat	0.002
89912	Water based faux finishing	9b	WB	Faux - Glazes	0.004
89912	Water based faux finishing	9c	WB	Faux-Japan	0.00004
89912	Water based faux finishing	9d	WB	Faux-Trowel Applied Coatings	0.0014

Determination of colorant emissions

Colorants are solutions of dyes or suspensions of pigments and are used to tint coatings to a desired color. Rule 1113 utilizes category codes derived from CARB category codes to streamline classification and assist manufacturers with their Rule 314 reporting. Each coating category is assigned one or multiple codes; for example, non-flat coatings are designated with codes 26, 27, and 28.

Emissions from colorants are estimated based on the following assumptions:

- Colorant will be added to 80% of coatings listed in the table below, and
- Four ounces of colorant is added at current VOC of Material (g/L) limit of Rule 1113.

Sales volume reported pursuant to Rule 314 for the calendar year of interest, 2023 in this case, is compiled for the following:

- (1) Flat coating (Rule 1113 code 13),
- (2) Non-flat coatings (Rule 1113 codes 26, 27, and 28),
- (3) Industrial Maintenance (IM) waterborne (Rule 1113 codes 18, 19, 19a, and 56), and
- (4) Industrial Maintenance (IM) solvent-borne (same categories as waterborne).

The annual emissions are calculated using the following equations:

VOC Emissions = waterborne colorant emissions + solvent-based colorant emissions

VOC Emissions =

$$\left(\frac{\text{Rule 1113 Limit MatVOC} \frac{\text{g}}{\text{L}}}{119.83} \right) \left(\frac{4 \text{ oz colorant}}{128 \text{ oz mat}} \right) \left(\frac{80 \text{ tinted}}{100 \text{ mat}} \right) (\text{Vol}_{\text{IM water}} + \text{Vol}_{\text{flat/non-flat}}) + \left(\frac{\text{Rule 1113 Limit Material VOC} \frac{\text{g}}{\text{L}}}{119.83} \right) \left(\frac{4 \text{ oz colorant}}{128 \text{ oz material}} \right) \left(\frac{80 \text{ tinted}}{100 \text{ material}} \right) (\text{Vol}_{\text{IM solvent}})$$

$$\left(\frac{2000 \text{ lbs}}{1 \text{ ton}} \right) \left(\frac{365 \text{ days}}{1 \text{ year}} \right)$$

Emissions for Colorants in tons per day

CES	Colorants Type	Coating Type	Rule 1113 Code	VOC (tpd)
94474	Flat Coatings	Solvent-borne (SB)	13	0.00001
94474	Non-Flat Coatings	Water-borne (WB)	26,27,28	0.02
94482	Industrial Maintenance	Solvent-borne	18, 19, 19a, 56	0.005
94490	Industrial Maintenance	Water-borne	18, 19, 19a, 56	0.002

Determination of emissions from usage of thinners, additives, and clean-up solvents

Waterborne coatings are predominantly thinned with water; however, some paint incorporate additives containing VOCs to enhance performance—such as improving flow, brushability, and leveling.

In 2001, CARB initiated a study aimed at refining the emission inventory for various coating categories, including thinning and cleanup solvents associated with architectural coatings. Completed in 2004, this study produced updated emission factors for estimating VOC emissions from thinning solvents, cleanup solvents, and additives (see table below).

Similar to colorant emissions, the sales volume for solvent based and waterborne coatings that are reported annually under Rule 314 can be used to estimate the total VOC emissions for thinning, additive, and cleanup solvents using the usage ratios in the table below.

To determine emissions for each of these solvents, the following equation is used:

$$\text{VOC Emissions} = \frac{\text{Volume (gal)} \times \text{VOC Content (g/L)}}{119.83 \times 2000 \text{ lbs/ton} \times 365 \text{ days/yr}}$$

$$\times 119.83 = \frac{453.592 \text{ g/lb}}{3.7854 \text{ l/gal}}$$

Once the emissions are determined, they are then multiplied by the solvent/additive usage ratio.

Emissions for thinners, additives, and clean up solvents in tons per day

CES	Solvent	Coating Type	Solvent/Additive Usage Ratio ¹	Notes	VOC Content (lb VOC/gal solvent)	VOC (tpd)
92144	Thinning	Solvent-borne (SB)	0.0597	Gallon thinning solvent per gallon SB coating	25	0.179
92122	Additives	Water-borne (WB)	0.0044	Gallon additive per gallon WB coating	110.24	0.023
92106	Cleanup	Solvent-borne & Water-borne	0.0193	Gallon cleanup solvent per gallon SB + WB coating	25	0.16

¹ Table 1 of Attachment A – New Method for Estimating Emissions from Thinning and Cleanup Solvents (ARB, March 2006): [Estimation Methodology: 2006-03-09 New Method for Estimating Emissions from Thinning and Cleanup Solvents \(ca.gov\)](#)

SUMMARY AND UPDATED EMISSIONS

Emissions for Base Year 2018 (as reported in the 2022 AQMP) and for Base Year 2023 for the South Coast Air Basin.

Pollutants	2022 AQMP (tpd)	2027 AQMP (tpd)
ROG	11.23	8.34

Monthly Temporal Profile for the Updated Emission Category (in percentage)

Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3