New Jersey Department of Environmental Protection
Division of Air Quality, Bureau of Stationary Sources

State of the Art (SOTA) Manual for the Surface Coating Industry

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Section 3.7 - State of the Art (SOTA)
Manual for the Surface Coating Industry

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3.7 SOTA MANUAL FOR THE SURFACE COATING INDUSTRY

3.7.0 Definitions

All terms used in this State of the Art (SOTA) Manual are defined in N.J.A.C. 7:27-16.1, Title 40 of the Code of Federal Regulations (40 CFR), Parts 59, 60, and 63. Additional definitions used in this SOTA Manual are as follows:

"Aerospace" means any material applied to an aerospace vehicle or component as an adhesive, coating, primer, or topcoat.

"Anti-Wicking Wire Coating" means the outer coating of a wire which prevents fluid wicking into insulation of the wire.

"Automobile and Light Duty Truck Coating" means an assembly line conveyor coating operation applying an adhesive, coating, primer, or topcoat to new automobiles and light duty trucks.

"Can Coating" means the manufacture of two-piece cans (e.g., beer and other beverages) and three-piece cans (e.g., edible and non-edible products).

"Chemical Agent-Resistant Coating" means an exterior topcoat designed to withstand exposure to chemical warfare agents or the decontaminants used on these agents.

"Class 2 Finish on Hardboard Panels" means finishes which meet the specifications of Voluntary Product Standard PS-59-73 as approved by the American National Standards Institute.

"Conductive or Conformal Coating" means a coating used on electrical or electronic equipment to protect against electromagnetic interference, radio frequency interference, static discharge, and/or corrosion.

"Electronic Wire Coating" means the outer electrical insulation coating applied to tape insulation of a wire specifically formulated to smooth and fill edges.

"Electrostatic Discharge Protection Coating" means a coating applied to space vehicles, missiles, aircraft radomes, and helicopter blades to disperse static energy.

"Exterior Body Spray" means a coating sprayed on the exterior of the container body to provide a decorative or protective finish.

"Extreme High Gloss" means any coating which achieves at least 95% reflectance on a 60° meter when tested by ASTM Method D-523.

"Filler" means a material whose primary function is to fill voids.

"Fire Insulation Coating" means a coating used to provide a layer of insulation in the event of an aircraft or engine fire.

"Fire-Resistant Civilian Coating" means fire-resistant interior coatings that are used on passenger cabin interior parts that are subject to FAA fireworthiness requirements.

"Flexible Vinyl" means non-rigid polyvinyl chloride plastic with at 5 percent by weight plasticizer content.

"High Solids" means a coating that contains at least 120 grams solids per liter (1 pound of solids per gallon) of coating.

"Interior Body Spray" means a coating sprayed on the interior of the container body to provide a protective film between the product and the container.

"Interior Topcoat" means a topcoat used in interior habitable spaces of aircraft.

"Line-Sealer Maskant" means a temporary coating, not covered under other maskant categories, used to protect selected areas of aerospace parts from strong acid or alkaline solutions. Materials used for repairs or to bridge gaps left by scribing operations (i.e., line sealer) are also included in this category.

"Low Activation Interior Coating" means a special composition coating used on interior surfaces aboard ships to minimize the activation of pigments on painted surfaces within a radiation environment.

"Low Solids" means coating that contains less than 120 grams solids per liter (1-pound solids per gallon) of coating.

"Lubricating Wax/Compound" means a protective lubricating material, used at a facility that is not an automobile or light-duty truck assembly coating facility, applied to vehicle hubs and hinges.

"Metal to Urethane/Rubber Molding or Casting" means any adhesive intended by the manufacturer to bond metal to high density or elastomeric urethane or molded rubber materials, in heater molding or casting processes, to fabricate products such as rollers for computer printers or other paper handling equipment.

"Natural Finish Hardwood Plywood Panels" means panels whose original grain pattern is enhanced by essentially transparent finishes frequently supplemented by fillers and toner.

"Nonflexible Primer" means any coating without the ability to withstand dimensional changes that is not required to comply with engineering specifications for impact resistance, mandrel bend, or elongation as defined by the original equipment manufacturer.

"Off-Line Coating" means a prime coat applied outside of the assembly line and not subject to the automobile and light duty truck assembly line requirements.

"Overvarnish" means a coating applied directly over a design coating to reduce the coefficient of friction, to provide gloss and to protect the finish against abrasion and corrosion.

"Paint Stripe" means extra coating applied to edges, welds, fasteners, or other irregular and difficult to reach areas to achieve the specified coating thickness on all parts and surfaces.

"Phosphates Ester Resistant Ink" means a coating that is used for surface identification or marking which inhibits phosphate ester fluid corrosion.

"Pigmented Primer, Sealer, Undercoating" means an opaque coating that contains binders and colored pigments formulated to hide the wood surface, that is applied prior to the topcoat to provide a firm bond, level the wood product surface, or seal the wood product surface.

"Pigmented Topcoat" means a final opaque coating that contains binders and colored pigments and is formulated to hide the wood surface and form a solid protective film.

"Plastic Parts Coatings for Business Machines" means coatings applied to plastic parts used in the assembly of business machines to improve appearance, protect parts from chemical and physical stress, or attenuate EMF/RFI.

"Polymeric Coating of Supporting Substrates" means a web coating process other than paper coating that supplies elastomer or other polymeric material to a substrate (woven, nonwoven, textiles, fiberglass, leather, yarn, and cord). Typical products include rainwear, conveyor belts, V-belts, diaphragms, gaskets, printing blankets, luggage, and aircraft and military products.

"Pre-Bonding Etchant" means an acid or basic substance that is used to increase the strength of an adhesive bond by chemically altering the substrate surface morphology to increase the bonding surface area of aerospace wire coatings to the underlying insulation layer.

"Primer Compatible with Rain Erosion-Resistant Coating" means a primer to which rain erosion resistant topcoat is applied.

"Printed Interior Panels" means panels whose grain or natural surface is obscured by fillers and basecoats upon which a simulated grain or decorative pattern is printed.

"Rubber" means any natural or manmade rubber-like substrate, and includes, but is not limited to, styrene-butadiene, polychloroprene (neoprene), butyl, nitrile, chlorosulfonated polyethylene, and ethylene propylene diene terpolymer.

"Scale Inhibitor" means a coating that is applied to the surface of a part prior to thermal processing to inhibit the formation of scale.

"Screen Print Ink" means ink used in screen printing processes during fabrication of decorative laminates and decals not covered by the Graphic Arts Industry SOTA Manual (Section 17).

"Sealant Bonding Primer" means a coating applied in a very thin film to an aerospace component for the purpose of providing a primer for a subsequent coat of silicone sealant.

"Sealant Primer" means any film-forming product applied to a substrate, prior to the application of a sealant, to enhance the bonding surface.

"Sheet Rubber Lining Installation" means the process of applying sheet rubber liners by hand to metal or plastic substrates to protect the underlying substrate from corrosion or abrasion. These operations also include laminating sheet rubber to fabric by hand.

"Single Application Conversion Varnish" means a coating comprised of an alkyd or other resin blended with amino resin in a homogeneous liquid that, when acid-catalyzed and applied, hardens upon exposure

to air or heat, by evaporation and polymerization, to form a continuous film that imparts protective or decorative properties to wood surfaces. This conversion varnish is used as a combined sealer and topcoat in one coating application.

"Single Ply Roof Membrane Adhesive (except EPDM/TPO)" means any adhesive to be used for the installation or repair of any non-EPDM or TPO single ply roof membrane. Installation includes, but is not limited to, attaching the edge of the membrane to the edge of the roof and applying flashings to vents, pipes, or ducts that protrude through the membrane.

"Single Ply Roof Membrane Adhesive Primer" means any primer labeled for use to clean and promote adhesion of the single-ply roof membrane seams or splices prior to bonding.

"Strippable Booth Coating" means a coating that (1) is applied to a spray booth wall to provide a protective film to receive overspray during the finishing operations; (2) that is subsequently peeled off and disposed; and (3) by achieving (1) and (2) reduces or eliminates the need to use organic solvents to clean spray booth walls.

"Toner" means a wash coat that contains binders and dyes or pigments to add tint to a coated surface.

"Truck Interior Coating" means a coating, used at an automobile or light-duty truck assembly coating facility outside of the primer-surfacer and topcoat operations, applied to the trunk interior to provide chip protection.

"Wash Premixer" means material that is used to soak an oxide to ensure a uniform dispersion of the resin solution. Premixing is conducted prior to dispersion of the magnetic particles onto the tape.

"Waterproof Resorcinol Glue" means a two-part resorcinol-resin-based adhesive designed for applications where the bond line must be resistant to conditions of continuous immersion in fresh or salt water.

"Weatherstrip Adhesive" means an adhesive, used at a facility that is not an automobile or light-duty truck assembly coating facility, applied to weatherstripping materials for the purpose of bonding the weatherstrip material to the surface of the vehicle

"Wood Furniture Manufacturing Surface Coating" means the coating of any product made of wood, a wood product such as rattan or wicker, or engineered wood product such as particleboard, used in the manufacture of wood furniture.

3.7.1 Scope

This SOTA Manual establishes emissions performance levels and control technologies for the best performing sources within the United States. Conformance to the requirements established in this manual by a permit applicant alleviates the need for the applicant to review and establish a case-by-case SOTA for any air contaminant source included in this manual.

The SOTA performance levels included in this manual apply to all surface coating processes.

The SOTA thresholds for source operations, which must obtain a Preconstruction Permit pursuant to N.J.A.C. 7:27-8, can be found in:

1. N.J.A.C. 7:27-8, Appendix 1, Table A for criteria pollutants; and
2. N.J.A.C. 7:27-17.9, Tables 3A and 3B for hazardous air pollutants (HAP) and toxic substances (TXS) regulated by the New Jersey Department of Environmental Protection (the Department).

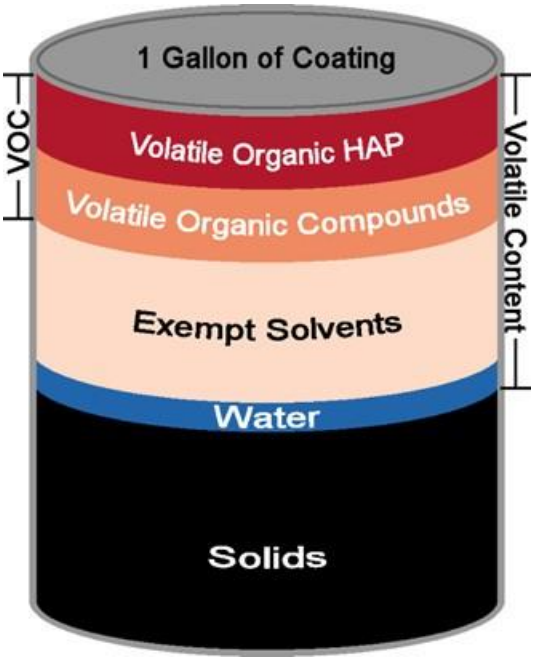
The SOTA thresholds for source operations which must obtain an Operating Permit, pursuant to N.J.A.C. 7:27-22 can be found in:

1. N.J.A.C. 7:27-22, Appendix, Table A; and
2. N.J.A.C. 7:27-17.9, Tables 3A and 3B for HAP and TXS.

If a source operation was omitted in this manual or the surface coating process is not included in this manual, the applicant must represent SOTA technology using a case-by-case approach, if applicable, pursuant to N.J.A.C. 7:27-8.12 and N.J.A.C. 7:27-22.35. For air contaminants that may be emitted from the sources described in this manual, but for which a performance level is not specified, SOTA will be done on a case-by-case basis pursuant to N.J.A.C. 7:27-8 and N.J.A.C. 7:27-22.

This SOTA Manual does not include standards for the application of inks and coatings to a substrate. Coatings are applied to the substrate to change its primary decorative or functional appearance. Printing uses inks to apply words, designs, or pictures on a substrate. Both coating and printing are done on similar equipment and a facility may have coating stations prior to printing stations. SOTA standards for the application of a coating to a substrate co-located with a printing press can be found in the SOTA Manual for Graphic Arts, Section 17.

3.7.1.1 Types of Surface Coating Technologies



Coatings consist of solids (including resins, pigments, and various additives) and a carrier solvent. The coating solids are suspended in the carrier solvent; after the carrier solvent dries, the coating solids remain, providing a thin film decorative and/or protective finish to the surface. Coatings are applied in a variety of ways including spraying, dipping, electrodeposition, and rolling.

Organic solvents have been commonly used as the carrier solvent since they evaporate quickly and allow the coating to dry rapidly. The amount of organic solvents used in a conventional solvent-borne coating varies greatly, (typical formulations consist of between 50 to 90 percent organic solvent by volume). Since the regulation of volatile organic compounds (VOC) and HAP content in coatings, many coatings have been reformulated to use water and other VOC exempt solvents, like acetone, as carrier solvents. For many applications, a drying oven is used to evaporate the carrier solvent more quickly.

A single surface coating operation ends after drying or curing and before other surface coating formulations are applied. For any web coating line, this term means an entire coating application system, including any associated drying ovens or areas between the supply roll and take-up roll, that is used to apply surface coating formulations onto a continuous strip or web. This term does not include operations or inks contained in the Graphic Arts Industry SOTA Manual, Section 17. This SOTA Manual applies to multiple coating operations, including the following:

- Aerospace Manufacturing & Rework;
- Automobile and Light Duty Truck Coating;
- Automotive / Transportation and Business Machine Plastic Parts;
- Business Machines;
- Can Coating;
- Drums, Pails, and Lids;
- Flat Wood Panel Coating;
- Large Appliance Coating;
- Magnetic Tape Manufacturing;
- Metal Coil Coating;
- Metal Furniture Coating;
- Miscellaneous Metal Parts;
- Miscellaneous Surfaces;
- Mobile Equipment Repair & Refinishing;
- Paper Coating;
- Paper, Film, and Foil (presses not included in the Graphic Arts Industry SOTA Manual, Section 17);
- Plastic Parts and Products;
- Plastic Parts Coating for Business Machines;
- Pleasure Craft;
- Polymeric Coating of Supporting Substrates;
- Pressure Sensitive Tapes and Labels;
- Shipbuilding and Ship Repair Facilities;
- Urethane Coating;
- Vinyl Coating; and
- Wood Furniture Manufacturing.

3.7.2 SOTA Performance Levels

This SOTA Manual includes operational requirements, emissions limitations, and control efficiency requirements for different air contaminants, depending on the type of surface coating operation.

3.7.2.1 Maximum Achievable Control Technologies for Surface Coating Operations

The U.S. Environmental Protection Agency (EPA) has issued multiple Maximum Achievable Control Technology (MACT) standards for surface coating operations. These MACT standards are considered equivalent to SOTA, pursuant to N.J.A.C. 7:27-8.12(e)(3) for preconstruction permits and N.J.A.C. 7:27-22.35(c) for operating permits. Generally Available Control Technology (GACT) standards are considered equivalent to SOTA for HAPS, pursuant to N.J.A.C. 7:27-22.35(c) for operating permits; both standards are found in Title 40 of the Code of Federal Regulations (CFR), Part 63, National Emissions Standards for Hazardous Air Pollutants (NESHAP). Emissions of other air pollutant emissions from surface coating

operations not subject to a NESHAP are addressed in other sections of this SOTA Manual. The NESHAP may contain additional restrictions or exemptions that are not listed within this subsection. The NESHAP for surface coating operations include:

A. 40 CFR, Part 63, Subpart II: NESHAP for Shipbuilding and Ship Repair

This NESHAP applies to major sources of shipbuilding or ship repair operations. This NESHAP does not apply to coatings used in volumes of less than 52.8 gallons per year, provided the total volume of exempt coating does not exceed 264 gallons per year, and that they are not subject to another NESHAP. This NESHAP includes the following limits for volatile organic HAP (VOHAP)[1]:

Coating Category	VOHAP Limits		
	lbs./gal (minus water and exempt compounds)	lbs./gal solids	
		Coating Application Temperature ≥40 °F	Coating Application Temperature <40 °F
General Use	2.83	4.76	6.07
Specialty:	--	--	--
Air Flask	2.83	4.76	6.07
Antenna	4.42	12.00	--
Antifoulant	3.33	6.38	8.10
Heat resistant	3.50	7.01	8.92
High-gloss	3.50	7.01	8.92
High-Temperature	4.17	10.32	13.32
Inorganic zinc high-build	2.83	4.76	6.07
Military exterior	2.83	4.76	6.07
Mist	5.09	18.65	--
Navigational aids	4.58	13.32	--
Nonskid	2.83	4.76	6.07
Nuclear	3.50	7.01	8.92
Organic zinc	3.00	5.25	6.69
Pretreatment wash primer	6.50	92.59	--
Repair and maintenance of thermoplastics	4.58	13.32	--
Rubber camouflage	2.83	4.76	6.07
Sealant for thermal spray aluminum	5.09	18.65	--
Special marking	4.08	9.83	--
Specialty interior	2.83	4.76	6.07
Tack coat	5.09	18.65	--
Undersea weapons systems	2.83	4.76	6.07
Weld-through preconstruction primer	5.42	24.07	--

[1] Title 40 of the Code of Federal Regulations, Part 63, Subpart II, Table 2

B. 40 CFR, Part 63, Subpart IIII: NESHAP for Surface Coating of Automobiles and Light-Duty Trucks

This NESHAP applies to major sources that apply topcoat to new automobile or new light-duty truck bodies or body parts for new automobiles or new light-duty trucks, except if the coating operation is located at a plastic or composites molding facility, and that they are not subject to another NESHAP. The NESHAP includes the following emissions limits for organic HAP:

1. For facilities using electrodeposition surface coating: 0.30 lbs. of organic HAP per gallon of coating solids deposited during each month combined from electrodeposition primer, primer-surfacer, topcoat, final repair, glass bonding primer and glass bonding adhesive operations plus all coatings and thinners, except for deadener materials and for adhesive and sealer materials that are not components of glass bonding systems; or
2. For facilities not using electrodeposition surface coating: 0.50 lbs. of organic HAP per gallon of applied coating solids used during each month combined from primer-surfacer, topcoat, final repair, glass bonding primer, and glass bonding adhesive operations plus all coatings and thinners, except for deadener materials and for adhesive and sealer materials that are not components of glass bonding systems; and
3. 0.010 lbs./lb. of adhesive and sealer material used during each month from all adhesive and sealer materials other than materials used as components of glass bonding systems; and
4. 0.010 lbs./lb. of deadener material used during each month from all deadener materials.[2]

C. 40 CFR, Part 63, Subpart KKKK: NESHAP for Surface Coating of Metal Cans

This NESHAP applies to major sources that apply surface coating to metal cans and ends (including decorative tins) and metal crowns and closures, that are not subject to another NESHAP. The NESHAP includes the following emissions limits for organic HAP[3]:

Subcategory	Type	Organic HAP† (lbs./gal solids)
One and two-piece draw and iron can body coating	Two-piece beverage cans- all coatings	0.59
	Two-piece food cans- all coatings	0.51
	One-piece aerosol cans- all coatings	0.99
Sheetcoating	Sheetcoating	0.26
Three-piece can assembly	Inside spray	2.43
	Aseptic side seam stripes on food cans	16.16
	Nonaseptic side seam stripes on food cans	6.57
	Side seam stripes on general line nonfood cans	9.84
	Side seam stripes on aerosol cans	12.14

[2] Title 40 of the Code of Federal Regulations, Part 63, Subpart IIII
[3] Title 40 of the Code of Federal Regulations, Part 63, Subpart KKKK, Table 1

Subcategory	Type	Organic HAP† (lbs./gal solids)
End coating	Aseptic end seal compounds	0.54
	Nonaseptic end seal compounds	0.00
	Repair spray coatings	17.17

†Applied over a 12-month compliance period

Additionally, the NESHAP includes the following emissions limits for organic HAP for emissions that are controlled with an emissions control system:

1. Reduce emissions of total HAP, measured as total hydrocarbon (THC) – as carbon, by 97%, or
2. Limit emissions of total HAP, measured as THC – as carbon to 20 parts per million by volume, dry basis (ppmvd) at the control device outlet and use a permanent total enclosure (PTE).[4]

D. 40 CFR, Part 63, Subpart MMMM: NESHAP for Surface Coating of Miscellaneous Metal Parts and Products

This NESHAP applies to major sources that apply surface coating to miscellaneous metal parts and products, except coatings used in volumes of less than 50 gallons per year, provided that the total volume of exempt coatings does not exceed 250 gallons per year and that they are not subject to another NESHAP. This NESHAP includes the following emissions limits (for a new or reconstructed affected source) for organic HAP:

1. 1.9 lbs. of organic HAP per gallon of coating solids used during each 12-month compliance period for general use coating;
2. 27.5 lbs. of organic HAP per gallon of coating solids used during each 12-month compliance period for high performance coating;
3. 0.44 lbs. of organic HAP per gallon of coating solids used during each 12-month compliance period for magnet wire coating;
4. 6.8 lbs. of organic HAP per gallon of coating solids used during each 12-month compliance period for rubber-to-metal coating; and
5. 12.4 lbs. of organic HAP per gallon of coating solids used during each 12-month compliance period for extreme performance fluoropolymer coating.[5]

E. 40 CFR, Part 63, Subpart NNNN: NESHAP for Surface Coating of Large Appliances

This NESHAP applies to major sources that apply coatings to large appliance parts or products, except the surface coating of heat transfer coils or large commercial and industrial chillers and that are not subject to another NESHAP. The NESHAP limits coatings (for new or reconstructed affected sources) to 0.18 lbs. of organic HAP per gallon of coating solids used during each compliance period.[6]

F. 40 CFR, Part 63, Subpart PPPP: NESHAP for Surface Coating of Plastic Parts and Products

This NESHAP applies to major sources that apply surface coating to plastic parts and products, that are not subject to another NESHAP. The NESHAP includes the following emissions limits (for a new or reconstructed affected source) for organic HAP:

[4] Title 40 of the Code of Federal Regulations, Part 63, Subpart KKKK, Table 3
[5] Title 40 of the Code of Federal Regulations, Part 63, Subpart MMMM
[6] Title 40 of the Code of Federal Regulations, Part 63, Subpart NNNN

1. 0.16 lbs. of organic HAP emitted per pound coating solids used during each 12-month compliance period for general use coating;
2. 0.26 lbs. of organic HAP emitted per pound coating solids used during each 12-month compliance period for new automotive lamp coating;
3. 0.22 lbs. of organic HAP emitted per pound coating solids used during each 12-month compliance period for thermoplastic olefin (TPO); and
4. 1.34 lbs. of organic HAP emitted per pound coating solids used during each 12-month compliance period for assembled on-road vehicle coating.[7]

G. 40 CFR, Part 63, Subpart QQQQ: NESHAP for Surface Coating of Wood Building Products

This NESHAP applies to major sources that apply surface coating to wood building products, that are not subject to another NESHAP. NESHAP includes the following emissions limits (for new or reconstructed affected sources) for organic HAP:[8]

Subcategory	Organic HAP† (lbs. HAP/gallon solids)
Exterior siding and primed doorskins	0.00
Flooring	0.00
Interior wall paneling or tileboard	0.04
Other interior panels	0.00
Doors, windows, and miscellaneous	0.48

†Determined as a rolling 12-month emission rate

H. 40 CFR, Part 63, Subpart RRRR: NESHAP for Surface Coating of Metal Furniture

This NESHAP applies to major sources that apply surface coating to metal furniture and metal furniture components, that are not subject to another NEHSHAP. These sources may not emit any organic HAP during each compliance period. An alternative emission limit may be requested for the following reasons:

1. Low dried film thickness requirements (e.g., less than 0.001 inch);
2. Flexibility requirements for parts subject to repeated bending;
3. Chemical resistance to withstand chemical exposure in environments such as laboratories;
4. Resistance to the effects of exposure to ultraviolet light;
5. Adhesion characteristics related to the condition of the substrate;
6. High gloss requirements;
7. Custom colors such as matching the color of a corporate logo; or
8. Non-uniform surface finishes such as an antique appearance that requires visible cracking of the dried film.

If the request is approved the source must meet an emission limit of 0.78 lbs. of organic HAP per gallon of coating solids used only for the components subject to the approval.[9]

[7] Title 40 of the Code of Federal Regulations, Part 63, Subpart PPPP
[8] Title 40 of the Code of Federal Regulations, Part 63, Subpart QQQQ
[9] Title 40 of the Code of Federal Regulations, Part 63, Subpart RRRR

I. 40 CFR, Part 63, Subpart SSSS: NESHAP for Surface Coating of Metal Coil

This NESHAP applies to major sources that have a coil coating line where an organic coating is applied to the surface of a metal coil, except coil coating lines on which at least 85% of the metal coil coated is less than 0.15 millimeter thick. The NESHAP includes the following emissions limits for organic HAP:

1. Reduction by 98% of the organic HAP applied for each 12-month compliance period;
2. 0.38 lbs. of organic HAP per gallon of solids applied during each 12-month compliance period; or
3. Use of an oxidizer to control organic HAP emissions to an outlet of 20 parts per million by volume, dry basis (ppmvd) with a capture efficiency of 100%.[10]

J. 40 CFR, Part 63, Subpart HHHHHH: NESHAP for Surface Coating Operations at Area Sources

This NESHAP applies to area sources (non-major sources) that have autobody refinishing operations applying coatings to motor vehicles and mobile equipment surfaces or to the spray application of coatings that contains any of the following metal HAP:

1. Chromium (Cr),
2. Lead (Pb),
3. Manganese (Mn),
4. Nickel (Ni), or
5. Cadmium (Cd).

The Surface Coating Operations at Area Sources NESHAP does not apply to onsite surface coating operations (including military munitions and equipment for transporting military munitions) performed at installations owned or operated by the U.S. Armed Forces (Air Force, Army, Coast Guard, Marines, Navy, and Space Force), New Jersey National Guard, National Aeronautics and Space Administration (NASA), or National Nuclear Security Administration (NNSA). This NESHAP includes control requirements for metal HAP: use of a spray booth, preparation station, or mobile enclosure that achieves at least 98% capture of paint overspray.[11]

3.7.2.2 New Source Performance Standards for Surface Coating

EPA has developed new source performance standards (NSPS) in 40 CFR, Part 60 for multiple categories of surface coating. These standards are as follows:

A. 40 CFR, Part 60, Subpart EE: NSPS for Surface Coating of Metal Furniture

The emissions limits for VOC in this NSPS are equivalent to or less stringent than the emissions limits determined to be SOTA in Section 3.7.2.3.[12]

B. 40 CFR, Part 60, Subpart MMa: NSPS for Automobile and Light Duty Truck Surface Coating Operations

This NSPS applies to the following facilities in an automobile or light-duty truck assembly plant:

1. Each prime coat operation, each guide coat operation, and each topcoat operation;
2. All storage containers and mixing vessels in which coatings, thinners, and cleaning materials are stored or mixed;

[10] Title 40 of the Code of Federal Regulations, Part 63, Subpart SSSS
[11] Title 40 of the Code of Federal Regulations, Part 63, Subpart HHHHHH
[12] Title 40 of the Code of Federal Regulations, Part 60, Subpart EE

3. All manual and automated equipment and containers used for conveying coatings, thinners, and cleaning materials; and
4. All storage containers and all manual and automated equipment and containers used for conveying waste materials generated by a coating operation.

Operations that are used to coat plastic body components on separate coating lines are exempt from this NSPS. The attachment of plastic body parts to a metal body before the body is coated does not cause the metal body coating operation to be exempted. The NSPS includes the following emissions limits for VOC:

1. For each electrodeposition (EDP) prime coat operation:
   a. 0.23 lbs. of VOC per gallon of applied coating solids when the solids turnover ratio (R_T) is 0.16 or greater;
   b. $0.027 \times 350^{(0.160-RT)}$ kilograms of VOC per liter of applied coating solids when R_T is greater than or equal to 0.040 and less than 0.160;
   c. When R_T is less than 0.040, there is no emission limit.
2. 0.23 lbs. of VOC per gallon of applied coating solids from each non-EDP prime coat operation;
3. 2.92 lbs. of VOC per gallon of applied coating solids from each guide coat operation; and
4. 3.53 lbs. of VOC per gallon of applied coating solids from each topcoat operation.[13]

C. 40 CFR, Part 60, Subpart RR: NSPS for Pressure Sensitive Tape and Label Surface Coating Operations

This NSPS applies to each coating line used in the manufacture of pressure sensitive tape and label materials, except for facilities that input less than 50 tons of VOC per 12-month period. The NSPS includes the following emissions limits for VOC:

1. 0.20 kilograms of VOC per kilogram of coating solids applied, as calculated on a weighted average basis for one calendar month; or
2. Demonstrate a 90% overall VOC reduction as calculated over a calendar month; or
3. Demonstrate the percent overall VOC emission reduction specified in § 60.443(b) as calculated over a calendar month.[14]

D. 40 CFR, Part 60, Subpart SS: NSPS for Industrial Surface Coating of Large Appliances

The emissions limits for VOC in this NSPS are equivalent to or less stringent than the emissions limits determined to be SOTA in Section 3.7.2.3.[15]

E. 40 CFR, Part 60, Subpart TT: NSPS for Metal Coil Surface Coating

This NSPS applies to the following affected facilities in a metal coil surface coating operation: each prime coat operation, each finish coat operation, and each prime and finish coat operation combined when the finish coat is applied wet on wet over the prime coat and both coatings are cured simultaneously. The NSPS includes the following emissions limits for VOC:

1. 1.16 lbs. VOC per gallon of coating solids applied for each calendar month for each affected facility that continuously uses an emission control device(s) operated at the most recently demonstrated overall efficiency; or

[13] Title 40 of the Code of Federal Regulations, Part 60, Subpart MMa
[14] Title 40 of the Code of Federal Regulations, Part 60, Subpart RR
[15] Title 40 of the Code of Federal Regulations, Part 60, Subpart SS

2. 90% emission reduction for each affected facility that continuously uses an emission control device(s) operated at the most recently demonstrated overall efficiency.[16]

F. 40 CFR, Part 60, Subpart WW: NSPS for the Beverage Can Surface Coating Industry

This NSPS applies to the following affected facilities in beverage can surface coating lines: each exterior base coat operation, each overvarnish coating operation, and each inside spray coating operation. The NSPS includes the following emissions limits for VOC, on a volume-weighted calendar-month average:

1. 2.42 lbs. of VOC per gallon of coating solids from each two-piece can exterior base coating operation, except clear base coat; and
2. 3.83 lbs. of VOC per gallon of coating solids from each two-piece can clear base coating operation and from each overvarnish coating operation.[17]

G. 40 CFR, Part 60, Subpart SSS: NSPS for Magnetic Tape Coating Facilities

This NSPS applies to each coating operation and each piece of coating mix preparation equipment used in magnetic tape coating facilities. The NSPS includes the following emissions limits for VOC:

1. 93% reduction of the VOC content of the coating applied at the coating applicator for coating operations;
2. A cover on each piece of equipment that vents VOC emissions to a 95% efficient control device for coating mix preparation equipment;
3. 1.66 lbs. of VOC per gallon of coating solids as calculated on a weighted average basis for each nominal 1-month period, (in lieu of the above 2 requirements).[18]

H. 40 CFR, Part 60, Subpart TTTa: NSPS for Industrial Surface Coating of Plastic Parts for Business Machines

This NSPS applies to each spray booth in which plastic parts for use in the manufacture of business machines receive prime coats, color coats, texture coats, or touch-up coats. The NSPS includes the following emissions limits for VOC:

1. 11.6 lbs. of VOC per gallon of coating solids applied for prime coating of plastic parts for business machines;
2. 11.6 lbs. of VOC per gallon of coating solids applied for color coating of plastic parts for business machines;
3. 11.6 lbs. of VOC per gallon of coating solids applied for texture coating of plastic parts for business machines; and
4. 11.6 lbs. of VOC per gallon of coating solids applied for touch-up coating of plastic parts for business machines.[19]

I. 40 CFR, Part 60, Subpart VVV: NSPS for Polymeric Coating of Supporting Substrates Facilities

This NSPS applies to each coating operation applying polymeric coating to supporting substrates where projected VOC usage is 104 tons per year. Excluded from the NSPS are coating operations that use waterborne coatings below 9% by weight VOC content and web coating operations that print an image

[16] Title 40 of the Code of Federal Regulations, Part 60, Subpart TT
[17] Title 40 of the Code of Federal Regulations, Part 60, Subpart WW
[18] Title 40 of the Code of Federal Regulations, Part 60, Subpart SSS
[19] Title 40 of the Code of Federal Regulations, Part 60, Subpart TTTa

on the surface of the substrate or any coating applied on the same printing line that applies the image. The NSPS includes the following emissions limits for VOC from the coating operation:

1. 90% reduction of VOC emissions to the atmosphere, or
2. A total enclosure that vents the captured VOC emissions that is at least 95% efficient.[20]

3.7.2.3 Other SOTA Performance Levels for Surface Coating

Additional requirements including emissions limits for VOC applicable to surface coating are included in Tables 3.7.2-1 through 3.7.2-25. Surface coating operations may opt to either use materials that satisfy the SOTA performance levels for VOC content as applied or an add-on control device (e.g., solvent recovery or thermal oxidation) that achieves a 95% reduction or outlet VOC concentration of 20 ppmvd, as hexane at 7% oxygen with a capture efficiency of 100%, as determined by U.S. EPA Method 204. If a thermal oxidizer is employed, the oxidizer may be assumed to have a reduction efficiency of 99% if operated at a temperature ≥1,500ºF with a residence time of ≥0.5 seconds; lower temperatures or residence times will be considered using the SOTA case-by-case approach, pursuant to N.J.A.C. 7:27-8.12 and N.J.A.C. 7:27-22.35.

Pursuant to N.J.A.C. 7:27-16.7(c), if a surface coating is not in compliance with the specified SOTA performance level, it can be combined with all surface coatings applied during that calendar day to obtain the daily weighted mean VOC content from all surface coatings applied within the same SOTA performance category. A surface coating will be considered in compliance with the specified SOTA performance level if the daily weighted mean VOC content of all surface coatings, as applied, does not exceed the applicable SOTA performance level. The daily weighted mean VOC content shall be calculated using the following equation:

$$\text{Daily Mean VOC Content (lbs./gallon, minus water and exempt solvents)} = \frac{\sum_{i=1}^{n}(C_i)(V_i)}{\sum_{i=1}^{n}(V_i)}$$

Where:

n = number of surface coatings subject to the same maximum allowable VOC content standard, applied in one day;
i = subscript denoting an individual surface coating;
C_i = maximum actual VOC content each surface coating formulation, in lbs. of VOC per gallons of coating, minus water and exempt solvents, applied in one day; and
V_i = volume in gallons of each surface coating formulation.

TABLE 3.7.2-1
VOC SOTA Performance Levels for Can Coating[21]

Coating Type†	VOC lbs./gal, minus water and exempt solvents
Base coat	1.9
Inside spray coating	1.84
Interior body spray; Two-piece cans	3.5
Interior body spray; Three-piece cans	3.0
Overvarnish	2.8

[20] Title 40 of the Code of Federal Regulations, Part 60, Subpart VVV
[21] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

Coating Type†	VOC lbs./gal, minus water and exempt solvents
Rim varnish	3.51
End sealing compound; general	3.7
End sealing compound; Food cans	0.1
End sealing compound; Non-Food cans	0.1
End sealing compound; Beverage cans	0.1
Three-piece can side stream spray	5.5
Exterior Body Spray	3.5

† Does not include printing of images on a can; SOTA for printing is contained in Section 17.

TABLE 3.7.2-2
VOC SOTA Performance Levels for Magnet Wire Coating[22]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Magnet Wire Coating	1.67

TABLE 3.7.2-3
VOC SOTA Performance Levels for Miscellaneous Metal Parts[23]

Coating Type	VOC lbs./gal, minus water and exempt solvents	
	Air Dried	Baked
General One-component	2.8	2.3
General Multicomponent	2.8	2.3
Military Specification	2.8	2.3
Prefabricated Architectural Multicomponent	3.5	2.3
Prefabricated Architectural One-component	3.5	2.3
Solar-absorbent	3.5	3.0
Heat-resistant	3.5	3.0
Extreme High-gloss	3.5	3.0
Touch-up and Repair	3.5	3.0
Etching Filler	3.5	3.5
Metallic	3.5	3.0
Silicone-release	3.0	3.5
Camouflage	3.5	3.0
Vacuum-metalizing	3.5	3.5
Mold-seal	3.5	3.5
High-temperature	3.5	3.5
Electric-insulating Varnish	3.5	3.5
Pan-backing	3.5	3.5
Pretreatment	3.5	3.5
Material used for stripping	1.7	1.7

[22] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[23] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

Coating Type	VOC lbs./gal, minus water and exempt solvents	
	Air Dried	Baked
Extreme Performance	3.5	3.0
High-performance Architectural	3.5	3.5

TABLE 3.7.2-4
VOC SOTA Performance Levels for Drums, Pails, and Lids[24]

Coating Type	VOC lbs./gal, minus water and exempt solvents
New, Exterior	2.8
New, Interior	3.5
Reconditioned, Exterior	3.5
Reconditioned, Interior	4.2
End Sealing Compound, Food Drums	0.5
End Sealing Compound, Non-Food Drums	0.5
Inks, all applications	2.5

TABLE 3.7.2-5
VOC SOTA Performance Levels for Flat Wood Panel Coating[25]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Coating and adhesive – interior	2.1
Inks – interior	2.1
Coatings – exterior	2.9
Printed interior panels made of hardwood, plywood, or particleboard	2.1
Natural finish hardwood plywood panels	2.1
Class II finished on hardboard panels	2.1
Tileboard	2.1
Exterior siding	2.1
Wood Flat Stock Coating	2.1

TABLE 3.7.2-6
VOC SOTA Performance Levels for Paper, Film, Foil, and Pressure Sensitive Tape and Labels Coating[26]

Coating Type[†]	VOC Content
Paper Coating (Exterior / Interior Base Coat)	2.2 lbs./gal, minus water and exempt solvents
Adhesives	0.067 lbs./lb. coating
Paper, Film, and Foil (Other than Paper Coating)	0.08 lbs./lb. coating

[24] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[25] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[26] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

† Does not include graphic arts printing presses; SOTA for printing is contained in Section 17.

TABLE 3.7.2-7
VOC SOTA Performance Levels for Polymeric Coating of Supporting Substrates[27]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Leather coating	5.8
Fabric coating	2.9
Vinyl coating	3.8

TABLE 3.7.2-8
VOC SOTA Performance Levels for Automobile and Light Duty Truck Coating[28]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Primer surfacer	15.0
Spray topcoat	2.8
Flexible primer	4.1
Color topcoat	3.5
Basecoat/clearcoat	2.1
Off-line coatings	2.8
Paint Stripe	5.6
Repair	4.8
Electrodeposition	1.2
Final Repair	4.8
Topcoat Application	2.8
Prime Application	1.9
Glass Bonding Primer	7.51
Adhesive	2.08
Cavity Wax	5.43
Sealer	5.43
Deadener	5.43
Gasket/Gasket Sealing Material	1.66
Underbody Coating	3.6
Truck Interior	5.4
Bedliner	1.66
Weatherstrip Adhesive	6.26
Lubricating Wax/Compound	5.84
Refinishing, Base Coat	6.0
Refinishing, Clear Coat	4.4
Refinishing, All others	5.0

[27] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[28] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

TABLE 3.7.2-9
VOC SOTA Performance Levels for Automotive / Transportation and Business Machine Plastic Parts[29]

Coating Type	Drying Type	VOC lbs./gal, minus water and exempt solvents
Flexible Primer	High Bake	4.5
Nonflexible Primer	High Bake	3.5
Basecoat	High Bake	4.3
Clear Coat	High Bake	4.0
Non-basecoat/Clear Coat	High Bake	4.3
Primer (Exterior Parts)	Low Bake / Air Dried	4.8
Basecoat (Exterior Parts)	Low Bake / Air Dried	5.0
Clear Coat (Exterior Parts)	Low Bake / Air Dried	4.5
Non-basecoat/Clear Coat (Exterior Parts)	Low Bake / Air Dried	5.0
Interior Parts	Low Bake / Air Dried	5.0
Touch-up and Repair	N/A	5.2
Adhesion Promoter	N/A	4.5
Multi-colored coatings	N/A	5.7
Pretreatment Coating	N/A	5.5
Primer	N/A	2.1
Primer Sealer	N/A	2.1
Single-Stage Coating	N/A	2.8
Temporary Protective Coating	N/A	0.5
Uniform Finish Coating	N/A	4.5
Any Other Coating Type	N/A	2.1

N/A = not applicable

TABLE 3.7.2-10
VOC SOTA Performance Levels for Business Machines[30]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Primer	2.9
Topcoat	2.9
Texture Coat	2.9
Fog Coat	2.2
Touch-up and Repair	2.9

TABLE 3.7.2-11
VOC SOTA Performance Levels for Metal Coil Coating[31]

[29] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[30] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[31] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

Coating Type	VOC lbs./gal, minus water and exempt solvents
Metal Coil Coating	1.67

TABLE 3.7.2-12
VOC SOTA Performance Levels for Large Appliance Coating and Metal Furniture Coating[32]

Coating Type	VOC lbs./gal, minus water and exempt solvents	
	Air Dried	Baked
General, One Component	2.3	2.3
General, Multi-Component	2.8	2.3
Extreme High Gloss	2.8	2.3
Extreme Performance	2.8	2.3
Heat Resistant	2.8	2.3
Metallic	2.8	2.3
Pretreatment Coatings	2.8	2.3
Solar Absorbent	2.8	2.3

TABLE 3.7.2-13
VOC SOTA Performance Levels for Magnetic Tape Manufacturing[33]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Coating	2.21
Wash premixer	2.21

TABLE 3.7.2-14
VOC SOTA Performance Levels for Plastic Parts Coating for Business Machines[34]

Coating Type	VOC lbs./gal, minus water and exempt solvents
General Coating One-component	2.3
General Coating Two-component	3.5
Military Specification coating One-component	2.8
Military Specification coating Two-component	3.5
Multi-colored coatings	5.7
Electric Dissipating coatings and shock-free coatings	6.7
Metallic coatings	3.5

[32] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[33] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[34] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

TABLE 3.7.2-15
VOC SOTA Performance Levels for Plastic Parts and Products[35]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Extreme Performance Two-pack	3.5
Mold-seal	6.3
Optical Coatings	6.7
Vacuum-metalizing	6.7
Camouflage	3.5
Conductive	5.8
High Gloss	3.5
Multi-colored coatings	5.7

TABLE 3.7.2-16a
VOC SOTA Performance Levels for Wood Furniture Manufacturing[36]

Coating Type	VOC lbs./lbs. solids, as applied
Finishing materials applied with an air spray gun	1.0
Topcoat	0.8
Sealer	1.9
Sealer topcoat	1.8
Acid-cured alkyd amino sealer	2.3
Acid-cured alkyd amino conversion varnish topcoat	2.0
Strippable booth coating	0.8

TABLE 3.7.2-16b
VOC SOTA Performance Levels for Wood Furniture Manufacturing[37]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Clear Topcoat	2.3
Single Application Conversion Varnish	4.6
Pigmented Primer, Sealer Undercoat, and Topcoat	2.3
Multi-colored coatings	2.3
High Solids Stain	2.9
Filler	2.3
Low Solids Stain	1.0
Wash coat	6.1
Toner and Wash-coat	1.0

[35] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[36] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[37] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

Coating Type	VOC lbs./gal, minus water and exempt solvents
Semitransparent stain	6.8
Opaque Stain	4.7

TABLE 3.7.2-17
VOC SOTA Performance Levels for Aerospace Manufacturing & Rework[38]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Aerospace Primers	2.9
Self-Priming Topcoat	3.5
Aerospace Topcoats	3.5
Pretreatment Coating	6.5
Adhesive Bonding Primers cured at 250°F or below	2.1
Adhesive Bonding Primers cured above 250°F	2.1
Adhesive Bonding Primers	7.1
Flight-Test Coatings Missile or Single Use Aircraft	3.5
Flight-Test Coatings All Other	7.0
Fuel Tank Adhesive	5.1
Fuel Tank Coating	3.5
Electronic- or Radiation-Effect Coating	6.6
Touch-up, line seal maskants	6.2
Photolithography maskants	7.0
Bonding Maskant	10.2
Seal Coat Maskant	10.2
Temporary Protective Coating	2.1
Electrostatic Discharge and Electromagnetic Interference (EMI) Coating	6.63
Other space-vehicle coatings	8.3
Space-vehicle adhesives	6.63
Space-vehicle Wing Coating	6.21
Wing Coating	6.26
Space-vehicle Impact-Resistant Coating	3.5
Space-vehicle High-Temperature Coating	7.0
High-Temperature Coating	6.0
Space-vehicle Antichafe Coating	3.50
Antichafe Coating	3.50
Space-vehicle Rain Erosion-Resistant Coating	6.63
Rain Erosion-Resistant Coating	6.68
Fire-Resistant Civilian Coating	5.4
Fire-Resistant Military Coating	6.68
Fire-Resistant Conformal coating	6.2

[38] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

Coating Type	VOC lbs./gal, minus water and exempt solvents
Fire-Resistant Sealant	5.0
Fire-Resistant (interior) Coating	6.67
Fire insulation Coating	5.0
Nonstructural Adhesive	2.08
Structural Autoclavable Adhesive	0.41
Structural Nonautoclavable Adhesive	7.0
Optical Anti-Reflective Coating	5.8
Electronic wire coating	3.5
Anti-wicking	3.5
Pre-bonding etchant	3.5
Phosphates ester resistant ink	7.66
Metallized Epoxy Coating	5.8
Clear Coating	4.34
Scale Inhibitor Wire Coating	7.3
Primer Compatible with Rain Erosion-Resistant Coating	7.0
Ablative Coating	5.00
Adhesion Promoter	2.09
Commercial Interior Adhesive	6.34
Cyanoacrylate Adhesive	8.51
Rocket Motor Bonding Adhesive	7.42
Rubber-Based Adhesive	7.09
Chemical Agent-Resistant Coating	4.59
Bearing Coating	5.17
Chemical Agent-Resistant Coating	7.09
Commercial Exterior Aerodynamic Structure Primer	5.42
Compatible Substrate Primer	6.51
Corrosion Prevention Compound	5.92
Cryogenic Flexible Primer	5.38
Cryoprotective Coating	5.00
Dry Lubricative Material – General	7.34
Dry Lubricative Material - Fastener Installation	5.63
Dry Lubricative Material - Fastener Coating	1.0
Dry Lubricative Material - Non-Fastener Coating	5.63
Electric or Radiation-Effect Coating	6.67
Epoxy Polyamide Topcoat	5.50
Elevated-Temperature Skydrol-Resistant Commercial Primer	6.17
Flexible Primer	5.34
Insulation Covering	6.17
Intermediate Release Coating	6.26
Lacquer	6.92
Mold Release	6.51

Coating Type	VOC lbs./gal, minus water and exempt solvents
Part Marking Coating	7.09
Rocket Motor Nozzle Coating	5.50
Screen Print Ink	7.01
Extrudable/Rollable/Brushable Sealant	2.33
Sprayable Sealant	5.00
Sealant	5.0
Silicone Insulation Material	7.09
Solid Film Lubricant – General	7.34
Solid Film Lubricant - Fastener Installation	2.08
Solid Film Lubricant - Fastener Coating	7.34
Specialized Function Coating	7.42
Thermal Control Coating	6.67
Wet Fastener Installation Coating	5.63
Interior Topcoat	2.8
Extreme Performance Interior Topcoat	3.5
Pretreament Wash Primer	3.5
Sealant Bonding Primer	6.0

TABLE 3.7.2-18
VOC SOTA Performance Levels for Vinyl Coating[39]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Vinyl Coating	2.2

TABLE 3.7.2-19
VOC SOTA Performance Levels for Urethane Coating[40]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Urethane Coating	2.2

TABLE 3.7.2-20
VOC SOTA Performance Levels for Miscellaneous Surfaces[41]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Fabric coating	2.2
Tablet coating	5.5
Glass coating	3.0
Metal and Concrete Pipe: Clear Coating	4.3
Metal and Concrete Pipe: Air Dried	3.5

[39] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[40] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[41] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

Coating Type	VOC lbs./gal, minus water and exempt solvents
Metal and Concrete Pipe: Extreme Performance	3.5
Metal and Concrete Pipe: Other	3.0

TABLE 3.7.2-21
VOC SOTA Performance Levels for Pleasure Craft[42]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Extreme High-gloss Topcoat	4.09
High Gloss Topcoat	3.5
Pretreatment Wash Primer	6.5
Finish Primer/Surfacer	3.5
High Build Primer Surfacer	2.8
Aluminum Substrate Antifoulant Coating	4.7
Antifoulant Sealer/Tiecoat	3.5
Other Substrate Antifoulant Coating	2.75
All Other Pleasure Craft Surface Coatings for Metal or Plastic	3.5

TABLE 3.7.2-22
VOC SOTA Performance Levels for Shipbuilding and Ship Repair Facilities[43]

Coating Type	Drying Type	VOC lbs./gal, minus water and exempt solvents
General Use	N/A	2.83
Air flask	N/A	2.83
Antenna	N/A	2.83
Antifoulant Sealer/Tiecoat	N/A	3.3
Heat Resistant	N/A	3.5
Heat Resistant	Air Dried	3.5
Heat Resistant	Baked	3.0
High Gloss	N/A	3.5
High Gloss	Air Dried	2.8
High Gloss	Baked	2.3
High Temperature	N/A	4.17
Inorganic zinc high build primer	N/A	2.8
Weld-through (shop) primer	N/A	5.42
Military Exterior	N/A	2.8
Mist	N/A	5.08
Navigational Aids	N/A	4.58
Nonskid	N/A	2.83

[42] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023
[43] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

Coating Type	Drying Type	VOC lbs./gal, minus water and exempt solvents
Nuclear	N/A	3.5
Organic Zinc	N/A	2.83
Pre-treatment Wash Primer	N/A	3.5
Repair and Maintenance of Thermoplastic Coating of Commercial Vessels	N/A	2.8
Rubber Camouflage	N/A	2.83
Sealant Coat for Thermal Spray Aluminum	N/A	5.08
Special marking	N/A	4.08
Specialty Interior	N/A	2.83
Tack Coat	N/A	5.08
Undersea Weapons Systems	N/A	2.83
Undersea Weapons Systems	Air Dried	2.8
Undersea Weapons Systems	Baked	2.3
Extreme High Gloss	Air Dried	4.1
Extreme High Gloss	Baked	3.5
Low Activation Interior Coating	N/A	3.5

N/A = not applicable

TABLE 3.7.2-23
VOC SOTA Performance Levels for Mobile Equipment Repair & Refinishing[44]

Coating Type	VOC lbs./gal, minus water and exempt solvents
Automotive pretreatment	6.5
Automotive primer-surfacer	4.8
Automotive primer-sealer	2.8
Automotive single stage-topcoat	5.0
Automotive 2 stage basecoat/clearcoat	5.0
Automotive 3 or 4-stage basecoat/clearcoat	5.2
Automotive multi-colored topcoat	5.7
Automotive specialty	7.0

3.7.3 Control Technologies

Reductions in VOC emissions can be achieved using different add-on control technologies or reformulated materials. The use of reformulated coatings may be limited in some cases, due to specific requirements for the material being coated.

[44] SC&A, Inc. *Analysis of Surface Coating Emissions Limits and Control Requirements*, November 2023

3.7.3.1 Add-on Control Technologies

Adsorber

An adsorber removes VOC in the exhaust gas stream by capturing the VOC in a solid adsorbent, such as activated carbon, zeolite, or polymers. The VOC in the exhaust gas is selectively held on the surface of the solid adsorbent by an attractive force weaker than a chemical bond, (the VOC only adheres to the adsorbent; there is no chemical reaction between the VOC and the adsorbent). The adsorbent has a limited capacity to collect VOC before it becomes saturated and breakthrough (reduced VOC collection) occurs. The VOC concentration in the adsorber exhaust must be monitored for breakthrough. Adsorbers can be regenerated (desorbed) by increasing the temperature or decreasing the pressure to displace the adsorbed VOC; however, the desorbed VOC must be recovered or destroyed. Adsorbers may be used in conjunction with thermal oxidizers for onsite desorption.

Condenser

A condenser converts the VOC in the exhaust gas stream from a gas to a liquid. A refrigerated condenser cools the exhaust gas to a temperature below the dew point for the VOC. Alternatively, a condenser may increase the pressure of the exhaust gas until the dew point for the VOC is increased above the temperature of the exhaust gas. Condensers are useful to recover VOC in the exhaust gas for reuse as a product and are limited to applications with a high VOC concentration in the exhaust gas. Condensers may have to achieve cryogenic conditions (-352ºF) to meet a 99% control efficiency.

Thermal Oxidizer

A thermal oxidizer is a combustion control technology. VOC collected from the printing press is combusted at a temperature high enough to cause incineration. VOCs are oxidized into carbon dioxide and water, although incomplete combustion can form carbon monoxide. There are three different types of thermal oxidizers: recuperative, regenerative, and catalytic. A recuperative thermal oxidizer uses a heat exchanger to recover 30-60% of the exhaust combustion heat to preheat the incoming gas stream. A regenerative thermal oxidizer alternates between an even number of ceramic beds. The incoming gas stream is combusted in the first bed (pre-heat), further combusted in a burner to reach combustion temperature, then exhausted over the second bed (post-heat). The heat of the exhaust gases is transferred to the ceramic media in the post-heat bed, with about 95% of the heat recovered. The gas flow switches, with each bed alternating between pre-heat and post-heat every few minutes, allowing for lower fuel usage. A catalytic thermal oxidizer uses a noble metal or other chemical to assist in the oxidation reaction to lower the combustion temperature for the VOC. As used in this manual, a catalytic oxidizer is not included in the control efficiencies for any listed thermal oxidizer.

3.7.3.2 Material Reformulation

Some coatings can be reformulated to reduce their VOC content by increasing the solids content (high-solids coating) or by replacing some or all the VOC with water or an exempt solvent (low solvent coating). Material reformulation works well for operations that coat many parts to achieve a similar look or property. It does not work well for custom coating jobs or for coating parts that are sensitive to water or exempt solvents, (e.g., acetone degrades plastics and rubber).

High Solids Coatings

High solids coatings are paints with solids content of 62% or higher by volume. VOC emissions are reduced because of the lower solvent content. Most VOC content requirements that apply to existing surface coating operations assume the use of high solids coatings.

Low Solvent Coatings

Low solvent coatings use water and/or exempt solvents as the carrier solvent, reducing or eliminating the concentration of organic solvents. The organic solvent is required to aid in wetting the pigments, to produce solubility and to promote good flow and viscosity characteristics in the coating application system. The amount of organic solvent in a low solvent coating varies between 2% and 15% of the total volume of the coating formulation.

There are other types of coatings that do not use organic solvents:

Powder Coating

Powder coatings are thermoplastic or thermosetting powders that contain no organic solvents. These powder coatings melt and flow when heated; however, they continue to have the same chemical composition upon cooling and solidifying. Powder coatings are applied from spray guns using air pressure and heated to melt the powder. Upon heating, the powder flows into a uniform thin layer and cross-links chemically with other reactive components to form the protective or decorative coating. Electrostatic application techniques or the fluidized bed process can also be used to apply powder coatings.

Radiation-Cured Coatings

Radiation-cured coatings typically contain no organic solvents. These coatings consist of mixtures of low molecular weight polymers or oligomers dissolved in low molecular weight acrylic monomers. Electron beam or ultraviolet light sources are used to cure these coatings.

3.7.3.3 Transfer Efficiency

Transfer efficiency is the ratio of the amount of coating solids deposited on the surface to the amount of coating solids used. If the transfer efficiency for a particular surface coating operation is increased, the amount of coating (and the resultant VOC emissions) is reduced. Typical technologies used to improve transfer efficiency and reduce emissions in surface coating operations include dip-coating, flow-coating and electrostatic spraying.

Dip-Coating

Dip-coating can be used for some surface coating operations such as metal furniture, some vehicles, and large appliances to improve transfer efficiency. The mixed coating is applied in a large main tank. After emerging from the tank, coated parts are moved into an area where excess paint drips off. The excess paint is collected and returned to the main tank. Fresh, properly mixed paint and water or organic solvent is added to the main tank to compensate for usage and evaporation and to maintain a constant solids concentration. Transfer efficiencies for dip-coating can be as high as 85%.

Flow-Coating

Flow-coating can also be used for metal furniture and large appliance surface coating. In this technique, articles on a conveyor line are coated from overhead nozzles from which the coating is fed in a steady stream. The excess coating dripping from the coated articles collects in a holding tank for reuse. The transfer efficiency of flow-coating can also be as high as 85%.

Electrostatic Spraying

Electrostatic spraying uses an electrical transformer capable of delivering more than 60,000 volts to create an electric potential between paint particles and the metal surface to be coated. Transfer efficiency is increased because the paint particles are electrically attracted to the surface. There are electrostatic

versions of air atomized and airless spray guns. Transfer efficiency will vary depending upon the type of surface sprayed and the capabilities of the gun operator, but transfer efficiencies of 65% to 80% can be achieved. An alternate type of electrostatic spraying uses a rotating bell or disk that is negatively charged to atomize the coating, which is attracted to the positively grounded metal surface. Bell or disk electrostatic spraying can achieve efficiencies of 90% to 95%.

Automation

Automation, referring to the use of robotic equipment to apply a coating, can increase transfer efficiency, as robots can be programmed to coat parts consistently with each pass, with a superior range of motion. Automated coating is used whenever a high volume of parts are coated with a consistent shape and size, including automotive, aerospace, appliance, and marine equipment. Automation can increase transfer efficiency by 10 to 30% over traditional operator-applied coating.

3.7.4 Technical Basis

Information from the following sources were used as the basis for developing this SOTA Manual:

A. Title 40 of the Code of Federal Regulations, Part 60, Subpart EE, "Standards of Performance for Surface Coating of Metal Furniture."

B. Title 40 of the Code of Federal Regulations, Part 60, Subpart MMa, "Standards of Performance for Automobile and Light Duty Truck Surface Coating Operations for which Construction, Modification or Reconstruction Commenced After May 18, 2022."

C. Title 40 of the Code of Federal Regulations, Part 60, Subpart RR, "Standards of Performance for Pressure Sensitive Tape and Label Surface Coating Operations."

D. Title 40 of the Code of Federal Regulations, Part 60, Subpart SS, "Standards of Performance for Industrial Surface Coating: Large Appliances."

E. Title 40 of the Code of Federal Regulations, Part 60, Subpart TT, "Standards of Performance for Metal Coil Surface Coating."

F. Title 40 of the Code of Federal Regulations, Part 60, Subpart WW, "Standards of Performance for Beverage Can Surface Coating Industry."

G. Title 40 of the Code of Federal Regulations, Part 60, Subpart SSS, "Standards of Performance for the Magnetic Tape Coating Facilities."

H. Title 40 of the Code of Federal Regulations, Part 60, Subpart TTTa, "Standards of Performance for Industrial Surface Coating: Surface Coating of Plastic Parts for Business Machines for Which Construction, Reconstruction, or Modification Commenced After June 21, 2022."

I. Title 40 of the Code of Federal Regulations, Part 60, Subpart VVV, "Standards of Performance for Polymeric Coating of Supporting Substrates Facilities."

J. Title 40 of the Code of Federal Regulations, Part 63, Subpart II, "National Emission Standards for Shipbuilding and Ship Repair (Surface Coating)."

K. Title 40 of the Code of Federal Regulations, Part 63, Subpart IIII, "National Emission Standards for Hazardous Air Pollutants: Surface Coating of Automobiles and Light-Duty Trucks."

L. Title 40 of the Code of Federal Regulations, Part 63, Subpart KKKK, "National Emission Standards for Hazardous Air Pollutants: Surface Coating of Metal Cans."

M. Title 40 of the Code of Federal Regulations, Part 63, Subpart MMMM, "National Emission Standards

for Hazardous Air Pollutants for Surface Coating of Miscellaneous Metal Parts and Products."

N. Title 40 of the Code of Federal Regulations, Part 63, Subpart NNNN, "National Emission Standards for Hazardous Air Pollutants: Surface Coating of Large Appliances."

O. Title 40 of the Code of Federal Regulations, Part 63, Subpart PPPP, "National Emission Standards for Hazardous Air Pollutants for Surface Coating of Plastic Parts and Products."

P. Title 40 of the Code of Federal Regulations, Part 63, Subpart QQQQ, "National Emission Standards for Hazardous Air Pollutants: Surface Coating of Wood Building Products."

Q. Title 40 of the Code of Federal Regulations, Part 63, Subpart RRRR, "National Emission Standards for Hazardous Air Pollutants: Surface Coating of Metal Furniture."

R. Title 40 of the Code of Federal Regulations, Part 63, Subpart SSSS, "National Emission Standards for Hazardous Air Pollutants: Surface Coating of Metal Coil."

S. Title 40 of the Code of Federal Regulations, Part 63, Subpart HHHHHH, "National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources."

T. SC&A, Inc. Analysis of Surface Coating Emissions Limits and Control Requirements, November, 2023.

3.7.5 Recommended Review Schedule

This SOTA Manual will be reviewed periodically and revised if new collection and control technologies that minimize emissions become available, and any time a new MACT standard or standard of performance for new or existing sources is published.