

**PERMIT BOILERPLATE PROCEDURES FOR
WOOD FURNITURE MANUFACTURING SPRAY COATING OPERATIONS**

I. **PURPOSE**

To specify requirements for permit approval for spray booth coating of wood furniture. This boilerplate applies only to emission units which would have the potential to emit less than 100 tons per year of any air pollutant, and more than the exemption levels found in 9 VAC 5-80-11 of State Regulations. This boilerplate does not apply to PSD or Nonattainment permit review.

The boilerplate is meant to provide a guideline for the minimum requirements of the Department of Environmental Quality. More stringent requirements may be imposed if necessary to demonstrate compliance with the NAAQS or other special requirements such as 40 CFR 63 Subpart JJ (MACT).

II. **REFERENCES**

Commonwealth of Virginia Regulations for the Control and Abatement of Air Pollution: Part V; Part VIII, 9 VAC 5-80-10.

III. **DEFINITIONS**

The following definitions are for use in this guideline and do not necessarily have the same meaning in other portions of the regulations.

construction - fabrication or assembly of a new emissions unit.

modification - see the definition of "modification" under 9 VAC 5-80-10 B.3. of State Regulations.

reconstruction - the replacement of an emissions unit or its components to such an extent that the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost required to construct a comparable entirely new unit.

relocation - installation of an emissions unit that has been in service at another off-site location.

wood furniture - as used in these procedures, refers to both "wood furniture" and "wood furniture components" as defined below. (Definitions from 40 CFR 63 Subpart JJ (MACT) - "National Emission Standards for Wood Furniture Manufacturing Operations".)

- wood furniture - any product made of wood, a wood product such as rattan or wicker, or an engineered wood product such as particleboard that is manufactured under any of the following standard industrial classification codes: 2434, 2511, 2512, 2517, 2519, 2521, 2531, 2541, 2599 or 5712.
- wood furniture component - any part that is used in the manufacture of wood furniture. Examples include, but are not limited to, drawer sides, cabinet doors, seat cushions and laminated tops.

IV. EMISSIONS CALCULATIONS

Particulate and VOC emissions can typically be calculated using information found on the coating Material Safety Data Sheet (MSDS). Parameters such as specific gravity, VOC content, and weight % solids are normally provided. Also, the major components are usually given in % by weight. In some instances, the MSDS is not specific enough, and the manufacturer must supply additional information. Particulate emissions should be calculated from weight % solids when possible, and VOC emissions should be calculated from VOC content. Remember that along with VOC emissions from coatings, the VOC emissions from various solvents used as coating thinners and in spray booth clean-up should also be calculated.

The Uncontrolled hourly emissions are typically calculated by using the maximum hourly coating throughput, assuming no particulate or VOC controls. The uncontrolled annual emissions should be calculated based upon 8760 hours of operation, in accordance with John Seitz memo of January 1995. Also, a particulate transfer efficiency must be taken into consideration when calculating uncontrolled emissions. The current agency policy is to base exemptions for surface coating operations upon these uncontrolled annual emissions. While it is technically more correct to base this calculation on the hourly rating of the spray nozzle, this is usually something that is difficult for the source to supply, and difficult for the engineer to confirm. The Predicted emissions are then estimated using operational and design

constraints such as the permitted operating schedule, the expected consumption of the coatings, and control efficiencies.

Particulate transfer efficiencies vary according to the size and shape of the item being coated, as well as the type of spray nozzle used. For most wood spray coating operations, when the source cannot provide an estimate and when relatively broad, flat surfaces are covered, a 50% particulate transfer efficiency is considered average. Of course, if the coated item is narrow, or has many edges, the transfer efficiency can drop dramatically. Electrostatic spray coating of wood (e.g., wood which has already received a conductive coating) can yield very high transfer efficiencies, 90% or more. All transfer efficiencies should be documented by the source when possible.

Particulate control afforded by cellulose, fiberglass, or polyester dry paint filters is assumed to be 85%, unless the source can document or demonstrate otherwise. Control by water curtain also exhibits a control efficiency of about 85%. The source should document these efficiencies.

(Example Calculations)

Assume a coating is being applied in a spray booth to cabinet faces. The coating contains four listed volatile toxics and one listed toxic particulate, and has the physical properties shown (see attached Lotus spreadsheet, converted to WP format). The spray booth emissions are controlled by fiberglass filters (85% control), and the transfer efficiency is assumed to be 50%.

The emissions of VOC, particulate, and both volatile and particulate toxic species can be estimated in the following manner:

Uncontrolled Emissions

VOC

Form: [gal] x [lb VOC/gal] = lb VOC
(1.2 gal/hr)(6.49 lb VOC/gal) = 7.79 lb/hr
(5000 gal/yr)(6.49 lb VOC/gal)(1 T/2000 lb) = 16.23 T/yr

Particulate

Form: [gal] x [lb solids/gal] (preferred) OR [density - lb VOC/gal] x [1 - transfer eff.] = lb PM
(1.2 gal/hr)(10.3 lb/gal - 6.49 lb/gal)(1 - 0.5) = 2.29 lb/hr

$$(5000 \text{ gal/yr})(10.3 \text{ lb/gal} - 6.49 \text{ lb/gal})(1 - 0.5)(1 \text{ T}/2000 \text{ lb}) \\ = 4.76 \text{ T/yr}$$

Predicted Emissions

VOC

Form: [gal] x [lb VOC/gal] x [1 - control eff.] = lb VOC
(1.2 gal/hr)(6.49 lb VOC/gal)(1 - 0) = 7.79 lb/hr

(5000 gal/yr)(6.49 lb VOC/gal)(1 - 0)(1 T/2000 lb) = 16.23

T/yr

Particulate

Form: [gal] x [density - lb VOC/gal] x [1 - transfer eff.]
x [1 - control eff.] = lb PM

(1.2 gal/hr)(10.3 lb/gal - 6.49 lb VOC/gal)(1 - 0.5)(1 - 0.85)
= 0.34

lb/hr

(5000 gal/yr)(10.3 lb/gal - 6.49 lb VOC/gal)(1 - 0.5)(1 -
0.85) (1 T/2000 lb) = 0.71

T/yr

Xylene

Form: [gal] x [density] x [wt% Xylene/100] x [1 - control
eff.] =

lb Xylene

(1.2 gal/hr)(10.3 lb/gal)(0.3)(1 - 0) = 3.71 lb/hr

(5000 gal/yr)(10.3 lb/gal)(0.3)(1 - 0)(1 T/2000 lb) = 7.73

T/yr

Toluene

Form: [gal] x [density] x [wt% Toluene/100] x [1 - control
eff.] =

lb Toluene

(1.2 gal/hr)(10.3 lb/gal)(0.22)(1 - 0) = 2.72 lb/hr

(5000 gal/yr)(10.3 lb/gal)(0.22)(1 - 0)(1 T/2000 lb) = 5.67

T/yr

Methyl Ethyl Ketone

Form: [gal] x [density] x [wt% MEK/100] x [1 - control eff.]
= lb MEK

(1.2 gal/hr)(10.3 lb/gal)(0.17)(1 - 0) = 2.10 lb/hr

(5000 gal/yr)(10.3 lb/gal)(0.17)(1 - 0)(1 T/2000 lb) = 4.38

T/yr

Ethylbenzene

Form: [gal] x [density] x [wt% Ethylbenzene/100] x [1 -
control eff.] =

lb Ethylbenzene

(1.2 gal/hr)(10.3 lb/gal)(0.05)(1 - 0) = 0.62 lb/hr

(5000 gal/yr)(10.3 lb/gal)(0.05)(1 - 0)(1 T/2000 lb) = 1.29

T/yr

Manganese

Form: [gal] x [density] x [wt% Mn/100] x [1 - transfer eff.]
x [1 - control eff.] = lb Mn

(1.2 gal/hr)(10.3 lb/gal)(0.03)(1 - 0.5)(1 - 0.85) = 0.028
lb/hr

(5000 gal/yr)(10.3 lb/gal)(0.03)(1 - 0.5)(1 - 0.85)(1 T/2000
lb) = 0.058
T/yr

V. REQUIREMENTS

A. **Applicability**

This boilerplate is applicable to construction, reconstruction, modification, or relocation of wood furniture manufacturing spray booths which have the potential to emit less than 100 tons per year of any air pollutant, and which are not exempt from permit by 9 VAC 5-80-11 of State Regulations. This boilerplate does not apply to either PSD or Nonattainment permit review.

B. **Permit Limits**

Permit limits are necessary for each criteria pollutant having emissions equal to or greater than 0.5 tons/yr. A distinction is made in the boilerplate regarding VOC emissions: limits are set both on the amount of VOC throughput for the emissions unit and on the VOC emissions. Permit limits for toxic pollutants shall be assigned according to current toxic policy guidance. The permit should include both short-term (hourly and/or daily and/or weekly and/or monthly) and annual emission limits.

C. **Particulate Emissions**

Although there is no BACT emission limit established for PM from spray booths, an 85% level of control should be the minimum expected from filtration by fiberglass or any other media. A scrubbing device or water curtain should provide a comparable degree of control, or another control method should be used.

An average 50% transfer efficiency should be assumed unless otherwise documented. Spray equipment types consist of: air-atomized conventional (AAC); airless conventional (ALC); air-assisted airless (AAL); high volume low pressure (HVLP); high volume, stepped down low pressure (HVSDLP); low pressure low volume (LPLV); thin film atomization (TFA); and rotary atomizers. The spray equipment can be used in an electrostatic, non-electrostatic, manual or automatic mode. The type of

spray equipment, mode of operation, coating type and spray booth ventilation can cause transfer efficiencies to vary with values from 40% to 70%. The low pressure systems (HVLP, HVSDLP, or LPLV) generally achieve higher transfer efficiencies (65% or greater), thus minimizing overspray, as compared to the conventional systems (AAC or ALC).

D. **VOC Emissions**

In general, VOC emissions resulting from the use of coatings and clean-up solvents in spray booths are not controlled; however, if a cost effective method is available, it should be analyzed for BACT determination.

In most cases at the current time, the economic considerations of BACT render VOC control strategies infeasible for emission units represented by this boilerplate. The boilerplate is, however, tailored for the case in which a source wishes to modify an operation that has some add-on control device for VOC emissions.

VOC emissions can be minimized by one of several methods.

These include, but are not limited to, the use of low solvent or water-base coatings, the use of non-photochemically reactive coatings, or coating application by low pressure spray systems, etc.. (See also C. "Particulate Emissions" above for discussion of types of spray systems.)

E. **Toxic Pollutant Emissions**

The number and type of toxics emissions can vary widely depending upon the coating being used. The more common solvents are to be expected, but various particulate emissions can result as well. In some cases, particulates having low TLVs may not comply with Rule 5-3 (9 VAC 5-50-160 et seq.), even at 85% control and 50% transfer. Special notice should be given to the waterborne coatings, because they typically contain VOCs that are more toxic. Coatings for wood finishing rarely contain any heavy metal components listed on the Priority List of AQP-5. Exemption determinations as well as compliance with Rule 5-3 (9 VAC 5-50-160 et seq.) should follow current agency policy and, where applicable, AQP-5 (Air Quality Program Policies and Procedures).

F. **Opacity**

Visible emissions shall not exceed 5 percent opacity. This condition should apply at all times, except in the case of malfunctions.

G. **Emissions Monitoring (CEMS)**

Emissions monitoring is generally not necessary for spray booth emissions.

H. **Emissions Testing**

Emissions testing is not usually required for spray booths, but the possibility of testing for a specific criteria or toxic pollutant should not be ruled out.

I. **Training, Operation, and Maintenance**

All spray booth operators must receive training in the proper operation of the spray booth system and the pollution control device. Training shall consist of review and familiarization of the manufacturer's operating instructions, at a minimum. In addition, the permittee must maintain on site operation and maintenance procedures. These procedures shall be based on the manufacturer's recommendations, at a minimum.

J. **Notification**

The owner or operator of all wood furniture manufacturing spray coating facilities shall submit notification of the following:

- a. the date of commencement of construction, installation, or reconstruction; and
- b. the actual date of startup.

The notification shall only be submitted to the appropriate regional office of the DEQ.

K. **Recordkeeping**

The standard boilerplate condition states that the permittee should keep any records "necessary to demonstrate compliance". At a minimum, records of monthly and annual VOC emissions (by material balance), including thinning and clean-up solvent, should be required. Monthly and annual records of any other pollutant which has a permit limit should also be required. In the case of multiple spray booths, records of emissions per spray booth may or may not be necessary for tracking emissions.

L. **Reporting**

Requirements for reports submitted by the permittee may vary depending upon the pollutants being emitted and the compliance history of the company. If a particularly hazardous compound is emitted in significant quantities, or if one of the NAAQS or a SAAC is approached, the region may wish to more closely track certain emissions by requiring periodic reports. Annual emissions of VOCs

or any pollutant which has a permit limit may be required.

M. **Modeling**

There are currently no screening models in use at the DEQ regional offices which are appropriate for modeling VOC emissions as ozone. Should such models become available, this procedure allows for their application. Particulate emissions should be modeled according to the guideline for modeling non-PSD sources. Toxics modeling should be conducted according to current modeling policy guidelines.

N. **Permit Approval**

Approval authority is given to the Regional Permit Manager to sign for the Executive Director.

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