

AIR MANAGEMENT PROGRAM FACT SHEET



VOC RACT Rules for Specific Industries

May 2022

Facilities that use certain coatings or coating applications may be required to meet reasonably available control technology (RACT). The Wisconsin Department of Natural Resources (DNR) writes RACT rules based on U.S. Environmental Protection Agency's (EPA) Control Techniques Guidelines (CTG). The control techniques in the CTG are intended to decrease air pollution from operations with volatile organic compound (VOC) emissions in areas that are or have been in nonattainment status of an ozone national ambient air quality standard. VOCs are a primary contributor to the formation of ground-level ozone, a major component of smog. DNR's VOC RACT rules require specific industries to operate with low-VOC containing materials or otherwise reduce VOC emissions. These rules can be found in chapter NR 422 of the Wisconsin Administrative Code (Wis. Adm. Code).

How do the RACT rules affect a business?

If a facility emits VOC, then depending on the location, industry type and level of VOC emissions, these rules may apply. Each section of chapter NR 422, Wis. Adm. Code, is written specific to an industry. Industry categories with VOC RACT rules include:

- adhesive use
- automobile and light-duty trucks
- automobile refinishing
- can coating
- coil coating
- fabric and vinyl coating
- fire truck and emergency response vehicles
- flat wood panel coating
- flexible package printing
- furniture metal coating
- graphic arts
- leather coating
- letterpress printing
- lithographic printing
- magnet wire coating
- miscellaneous metal parts and products
- molded wood parts
- paper coating
- plastic parts coating
- screen printing
- surface coating of large appliances
- wood door coating
- wood furniture coating

There are a range of emissions thresholds that dictate whether a business is affected. The thresholds range from facilities that have maximum theoretical emissions (MTE) of 100 tons per year (TPY) of VOC or more, to those facilities in certain areas of the state with very low actual VOC emissions from specific types of coating- and adhesive-related operations.

MTE are VOC emissions that the facility could produce if processes operated at the highest production levels allowed by their design. Restrictions written in a permit to limit the amount of VOCs emitted, can be taken into account when calculating MTE for the RACT rules. Any control device used to reduce emissions cannot be included.

MTE are not simply the highest level at which the facility operates a process line. They reflect the maximum possible in process operational design and thus could be much higher. For example, the process design factor may be the maximum conveyor line speed if the facility paints parts attached to an overhead conveyor line, maximum press speed, etc.

What locations are affected by RACT rules?

The air quality along the Lake Michigan shoreline of Wisconsin has often been unable to meet national standards set by EPA for ozone. Facilities in certain counties may be subject to additional requirements because those areas were once, or currently are, designated as nonattainment areas by the federal government.

The former and current ozone nonattainment areas where VOC rules apply are located along the southeast shoreline of Lake Michigan. Affected counties include:

- Kenosha
- Kewaunee
- Manitowoc
- Milwaukee
- Ozaukee
- Racine
- Sheboygan
- Washington
- Waukesha
- *Door and Walworth, in some rules

Counties that border the former nonattainment areas may be affected by some of these rules as well. The border counties include:

- Brown
- Calumet
- Dane
- Dodge
- Fond du Lac
- Jefferson
- Outagamie
- Rock
- Winnebago

More recent ozone nonattainment areas cover partial counties so newer RACT rules will apply in those partial county areas as well. Use the [interactive map](#) on the nonattainment permitting webpage to find current ozone nonattainment areas and the ozone nonattainment history of any area in Wisconsin.

Once a facility is affected by a RACT rule, the facility will have to meet the rule no matter the county's future attainment status or the facility's future level of VOC emissions until they no longer use the affected coatings or coating operations.

Are there exemptions to RACT rules?

There are multiple exemptions in chapter NR 422, Wis. Adm. Code, some of which are discussed below.

One exemption available to most facilities affected by chapter NR 422 is for small amounts of coatings or inks that do not meet the limits specified in the rule (except for facilities subject to the Part 2 plastic parts coatings rule in s. NR 422.084, that has different exemption thresholds). The coatings or inks are exempt from limits on VOC content if the facility uses less than 55 gallons during any 12 consecutive months. To show that it meets this exemption, the facility must keep monthly records and determine at the end of each month whether usage over the previous 12 consecutive months was less than 55 gallons.

A source may be exempt from VOC RACT rule requirements in ch. NR 422 if the source has an approved federally enforceable permit or state implementation plan revision that permanently restricts MTE, as defined in s. NR 419.02(11), to below the relevant applicability emission threshold(s) and meets all applicable federal VOC RACT exemption requirements.

Other exemptions in the rule depend on the industry sector and when the RACT rule was issued. Because the exemptions can vary by rule, it is best to review the section(s) that fit the industry and/or operations at the facility to find which exemptions are included. Some possible exemptions include:

1. Any affected coating process(es) with less than 15 pounds VOC per day.
2. All facilities located outside the nonattainment counties.
3. Facilities located outside counties of Brown, Calumet, Dane, Dodge, Door, Fond du Lac, Jefferson, Kenosha, Kewaunee, Manitowoc, Milwaukee, Outagamie, Ozaukee, Racine, Rock, Sheboygan, Walworth, Washington, Waukesha, and Winnebago and emit less than 100 tons per year (TPY) of VOCs.
4. Facilities with VOCs less than 100 TPY and located in Door, Kewaunee, Manitowoc or Sheboygan counties or less than 25 TPY and located in one of the other nonattainment counties.
5. Facilities with < 2.7 tons VOC per year, over any 12 consecutive month period, actual emissions from all coating lines and related cleaning, without use of control, in any nonattainment county.

Some RACT rules have exemptions based on the maximum theoretical emissions (MTE) of VOCs. Calculations of MTE can be complicated for facilities with VOC emissions. MTE is the level of emissions that would be generated if the facility operated continuously at full capacity, seven days per week for 365 days per year, not taking into account emissions reductions from any control device. For assistance with calculating the MTE of VOCs for a facility, contact the Small Business Environmental Assistance Program (SBEAP) toll free at 855-889-3021 or email DNRSsmallbusiness@wi.gov. Staff can help go over calculations or provide a fact sheet or spreadsheet with example calculations.

What if a facility is exempt?

How a facility shows it meets an exemption from the VOC rules depends on which exemption is being met. If the facility is exempt solely because of location, there are no additional records needed. If the facility is exempt because the VOC emissions are below an exemption threshold, then the facility will need to keep records to demonstrate that emissions do not meet the threshold at all times.

Each exemption level is based on some quantity of VOC emissions over a specified period of time. The time-period in the exemption determines how often the facility needs to keep records. For example, for the 15 pounds per day exemption, daily records must be kept showing emissions are below 15 pounds every day of operation. To calculate the quantity of VOC emissions:

1. Find records of the amount of coatings used for the time period in the exemption. These may be found in monthly purchase records from the coating supplier. The information from invoice records will only give an estimate of usage amounts. If exempt, the facility should maintain exact records of usage appropriate to the time frame of the exemption level.
2. Obtain copies of the Safety Data Sheets (SDS) for each coating used. These can be obtained from the coating supplier. Verify that the "Physical Characteristics" section of the SDS contains information for:
 - a. VOC content in pounds per gallon (lb/gal), or
 - b. VOC content in percent (%) by weight (wt) and density of coating in lb/gal.
3. If any SDS does not list VOC content in pounds per gallon, obtain that information from the supplier. Suppliers should know the VOC content of the materials they sell.
4. If the supplier will not provide the information needed, calculate VOC content in pounds per gallon using the VOC content in percent by weight (% by wt) and the coating density. VOC content is more commonly listed in percentage by weight than in pounds per gallon.

How does a business comply with these regulations?

Rules vary as to required limits and the records necessary to show that those limits have been met. All rules are based on the amount of VOCs in the material used to coat products rather than the volume of material either used or coated.

Limits in the rules are measured in units such as:

- pounds VOC per gallon of coating applied, excluding water
- pounds VOC per gallon of coating applied, excluding water and exempt materials
- percent by weight or volume of VOC in the coating applied
- pounds VOC per pound of coating applied
- pounds VOC emitted per square foot of material coated

To comply with the limits, keep records on each coating used. Those records should include the following at a minimum:

- name or an identifying number for each coating
- VOC content for each coating, in pounds VOC per gallon, excluding water (or whatever unit of measure the limit requires)

A facility might need to average the VOC contents of all coatings used because some coatings are well below the limit while others are higher. The rules require that averages be calculated over each day of operation. If using any kind of averaging, the facility must keep records of the amount of each coating used. Contact DNR or SBEAP staff to confirm the averaging calculations are done according to the rule requirements.

The unit of "pounds VOC per gallon, excluding water" or "excluding water and exempt materials" is used by most sections in NR 422, Wis. Adm. Code. The SDS may provide this number directly. If coatings do not have any water content, then this calculation is unnecessary, and the VOC content calculation shown previously is all that is needed. Otherwise, it is possible to calculate this VOC content from the information in the SDS, as explained below. Confirm whether the facility has exempt materials by reviewing the list of substances excluded from the definition of VOC in s. [NR 400.02\(162\)\(a\)](#), Wis. Adm. Code.

How is VOC content used in emissions calculations?

When calculating emissions of VOCs to compare against exemption or applicability thresholds, do not use the VOC content in units of "pounds VOC per gallon, excluding water" that may be listed on the SDS. That value is used for demonstrating compliance with the RACT limits. For these calculations, do not swap VOC content in percent by **volume** for percent by **weight**. These are different values and the percent by volume is not appropriate for calculating VOC emissions from the coatings used.

Equation for VOC content:

$$\text{Coating Density (lb/gal)} \times \text{VOC Content (\% by wt)} / 100 = \text{VOC Content (lb VOC/gal)}$$

MSDS information:

Coating Density = 14 lb/gal

VOC Content = 40% by wt

Calculate:

$$14 \text{ lb coating per gal coating} \times 40 \text{ lb VOC per lb coating} = 5.6 \text{ lb VOC per gal coating}$$

Once the VOC content in lb/gal is determined, then calculate the VOC emissions. Multiply the VOC content by the amount of each coating used in a day, measured in gallons, to calculate pounds of VOCs per day for that coating. If the facility used 2.5 gallons of the coating with 5.6 lb VOC for one day:

Product	Usage (gal/day)	x	Density (lb/gal)	x	VOC content (% by wt)	=	VOC emissions (lbs/day)	
Coating ABC	2.5	x	14.0	x	0.4	=	14.0	
Total pounds VOC/day								14.0

Do this calculation for each coating used, determining amounts for each day of operations. Include VOCs from clean up solvents directly related to the process, like gun cleaner for painting operations. Then, combine the VOC emissions from all coatings and solvents used to obtain the total VOC emissions in pounds per day. In the example above, if the daily emissions are less than 15 pounds VOC, then the facility would meet one of the exemptions.

The calculations required are similar, regardless of which exemption a facility meets. Add emissions from coatings used for the period of time indicated in the exemption (pounds per month, tons per year, etc.). Keep records of these calculations to verify the facility meets an exemption. Any records, whether paper or electronic, must be kept on site for five years.

How is "pounds VOC per gallon of coating applied, excluding water" calculated?

Use information from the SDS to calculate the lb VOC/gal, excluding water. To calculate "excluding water and exempt solvents" treat the exempt solvents (like acetone or others excluded from the definition of VOC) as water in the calculation. Where possible, it is best to obtain this data from the coating manufacturer or supplier. But if it is not available from them, use the following calculation:

- Water content, in percent by weight (% by wt). See the calculation example above.
 - Use 5% as percentage by weight, or 5 pounds water per 100 pounds water.
- Total volatile content, in percent by weight (% by wt).
 - Use 40% VOC + 5% water = 45% from above example.
- Density of coating, in pounds per gallon (lb/gal).
 - Use 14 lb/gal from above example.
- Density of water = 8.34 pounds per gallon.

Once the items listed above have been obtained, calculate the "pounds VOC per gallon coating applied, excluding water" for each coating used as follows:

1. Water in coating:

$$14 \text{ lb coating per gal coating} \times 5 \text{ lb water per 100 lb coating} = 0.7 \text{ lb water per gal coating}$$

2. Volume water in coating:

$$0.7 \text{ lb water per gal coating} \div 8.34 \text{ lb water per gal water} = 0.084 \text{ gal water per gal coating}$$

3. Mass of VOC in coating:

$$45\% \text{ volatile} - 5\% \text{ water} = 40\% \text{ VOC}$$

$$14 \text{ lb coating per gal coating} \times 40 \text{ lb VOC per 100 lb coating} = 5.6 \text{ lb VOC per gal coating}$$

4. lbs VOC per gallon, less water:

$$5.6 \text{ lb VOC per gal coating} \div (1 - 0.084) \text{ gal less water per gal coating} \\ = \mathbf{6.11 \text{ lb VOC per gal less water}}$$

The value of 6.11 lb VOC per gallon, excluding water, is what is recorded to show the facility meets the VOC content limit. Repeat this calculation with the values specific to each coating.

Another value that may need to be calculated is "lb VOC per 1000 square feet coated." This applies to the leather or flat wood paneling RACT rules. For this value, three items are needed:

- VOC content of the coatings used, in pounds VOC per gallon
- amount of coatings used for a specified time period, in gallons
- amount of material coated for a specified time period, in square feet of surface area coated

Calculating lb VOC per 1000 square feet coated is similar to the daily emissions calculations shown above.

1. Multiply the VOC content by the amount of coating used to get pounds of VOC emitted for a particular time period.
2. Divide the VOC emissions by the total square footage of surface area coated for the same time period. The resulting value shows lb VOC per 1 square foot.
3. Multiply this value by 1000 to calculate the emission rate in lb VOC/1000 square feet.

Example:

VOC content = 5.6 lb/gal

Amount of coating used = 50 gal/mo

Amount of material coated = 13,485 square feet/mo

VOC emissions

$$= 5.6 \text{ lb VOC per gal coating} \times 50 \text{ gal coating per month} \div 13485 \text{ sq ft per month}$$

$$= 0.02076 \text{ lb VOC per sq ft} \times 1000 \text{ sq ft}/1000 \text{ sq ft}$$

$$= 20.76 \text{ lb VOC per 1000 sq ft}$$

Similar calculations can be followed for all the units in the different VOC rules. Contact the Small Business Environmental Assistance Program (SBEAP) for assistance with calculations or help determining how the facility is affected by these rules.

For more information:

- Review [NR 422](#).
- Visit DNR's [painting and coating operations](#) webpage.
- Contact the SBEAP at DNRSMBusiness@wisconsin.gov or 1-855-889-3021.

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