

**SAN DIEGO AIR POLLUTION CONTROL DISTRICT  
SMALL BUSINESS ASSISTANCE**

**VOLATILE ORGANIC COMPOUND (VOC) CALCULATIONS**

**HOW TO CALCULATE VOLATILE ORGANIC COMPOUND (VOC) CONTENT  
FOR RULE 67.20 MULTI-STAGE TOPCOATS**

**RULE 67.20 - MULTI-STAGE TOPCOAT VOC CALCULATIONS**

(c)(34) **"Multistage Topcoat"** means a topcoat system consisting of either two coating stages (pigmented basecoat, and clearcoat), three coating stages (pigmented basecoat, translucent midcoat and clearcoat), or four coating stages (pigmented groundcoat or pigmented primer sealer, pigmented basecoat, translucent midcoat, and clearcoat). Coating stages using the same topcoat or topcoats that differ solely by the addition or removal of thinners, reducers, or coating additives are counted as a single stage for purposes of defining a multistage topcoat. The average VOC content of multistage topcoats shall be used to determine compliance with the VOC content standards in Subsection (d)(1). The average VOC content of multistage topcoats shall be calculated as follows:

$$\text{VOC (2-stage)*} = \frac{\text{VOC}_{bc} + 2 \text{VOC}_{cc}}{3}$$

$$\text{VOC (3-stage)} = \frac{\text{VOC}_{bc} + \text{VOC}_{mc} + 2 \text{VOC}_{cc}}{4}$$

$$\text{VOC (4-stage)} = \frac{\text{VOC}_{gc} + \text{VOC}_{bc} + \text{VOC}_{mc} + 2 \text{VOC}_{cc}}{5}$$

where:

VOC (2-stage) = the average VOC content, as applied, of a two-stage coating system.

VOC (3-stage) = the average VOC content, as applied, of a three-stage coating system.

VOC (4-stage) = the average VOC content, as applied, of a four-stage coating system.

VOC<sub>bc</sub> = the VOC content, as applied, of a basecoat.

2 VOC<sub>cc</sub> = two times the VOC content, as applied, of a clearcoat.

VOC<sub>mc</sub> = the VOC content, as applied, of a midcoat.

VOC<sub>gc</sub> = the VOC content, as applied, of a groundcoat.

and VOC(2-stage), VOC(3-stage), VOC(4-stage), VOC<sub>bc</sub>, 2 VOC<sub>cc</sub>, VOC<sub>mc</sub>, VOC<sub>gc</sub> have units of weight per volume of coating less water and exempt compounds.

\* See page 2 for compliant basecoat / clearcoat VOC combinations for a 2-stage coating system.

**2-Stage Coating System**

Rule 67.20(d)(1) limits the VOC content of multi-stage topcoats to 4.5 lbs/gallon. The following is a guide for evaluating 2-stage coating systems for compliance with this standard. The values listed in the table represent pounds of VOC per gallon of coating less water and exempt compounds.

Instructions: Select a basecoat VOC content value in the first column. The maximum clearcoat VOC content that can be used with this basecoat is listed in the second column. The VOC content of the 2-stage basecoat / clearcoat system combination is listed in the third column.

<b>BASECOAT VOC</b>	<b>CLEARCOAT VOC</b>	<b>2-STAGE COATING SYSTEM VOC</b>
<b>7</b>	<b>3.2</b>	<b>4.5</b>
<b>6.9</b>	<b>3.3</b>	<b>4.5</b>
<b>6.8</b>	<b>3.3</b>	<b>4.5</b>
<b>6.7</b>	<b>3.4</b>	<b>4.5</b>
<b>6.6</b>	<b>3.4</b>	<b>4.5</b>
<b>6.5</b>	<b>3.5</b>	<b>4.5</b>
<b>6.4</b>	<b>3.5</b>	<b>4.5</b>
<b>6.3</b>	<b>3.6</b>	<b>4.5</b>
<b>6.2</b>	<b>3.6</b>	<b>4.5</b>
<b>6.1</b>	<b>3.7</b>	<b>4.5</b>
<b>6</b>	<b>3.7</b>	<b>4.5</b>

Example:

$$\text{VOC (2-stage)*} = \frac{\text{VOC}_{bc} + 2 \text{VOC}_{cc}}{3}$$

$$4.5 \text{ lbs/gallon} = \frac{6.7 \text{ lbs./gallon} + 2 (3.4 \text{ lbs./gallon})}{3}$$

For assistance contact the Districts' Small Business Assistance Specialist or visit the Business Assistance, Small Business Assistance page of the APCD website at <http://www.sdapcd.org/>.