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Appropriate Transfer Efficiencies for Metal Furniture and Large Appliance Coating

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Several metal furniture and large appliance coaters have asked for credit under State Implementation Plans for reductions in volatile organic compound (VOC) emissions at existing surface coating operations that result from use of more efficient coating application techniques. Metal furniture and large appliance coaters should receive such credit when they achieve greater than 60 percent transfer efficiency\* (TE). This memo outlines the procedures we recommend to determine the TE achieved by metal furniture and large appliance coaters, and the credit allowable to these coaters when they achieve greater than 60 percent TE.

Procedure to determine TE achieved by metal furniture and large appliance coaters:

Since no universal method is available now to measure TE, the Emission Standards and Engineering Division (ESED) developed the attached Table 1 which reflects the relative efficiencies of the various coating application methods used in the metal furniture and large appliance industries. The TEs listed in Table 1 are based on discussions with coaters and equipment venders, and on laboratory demonstrations. The values in Table 1 approximate TEs that could be realistically expected when these industries coat their most common substrate configurations. The same type of equipment may achieve slightly different TE when used to coat metal furniture than when used to coat large appliances. This reflects the effect of variations in product shape on TE.

The values in Table 1 should be used to determine the TE achieved by metal furniture and large appliances coaters. A State may accept a higher TE for a particular operation if the operator presents data which demonstrate to the control agency's satisfaction that the TE for that operation is higher than shown in Table 1. An example of how to determine average TE when several different application methods are used is presented in Attachment I.

\*Transfer efficiency is the ratio of the amount of coating solids deposited onto the surface of a part or product to the total amount of coating solids used.

				CONCURRENCES			
SYMBOL	TCS	T65	MEW				
SURNAME	Polymer	Nichols					
DATE	12/1/80	1 Dec 80					

Procedure to credit metal furniture and large appliance coaters who achieve greater than 60 percent TE:

Credit can be given to metal furniture and large appliance coaters who achieve greater than 60 percent TE by allowing them to use coatings with higher VOC content than recommended in the metal furniture and large appliance CTGs. The limit to this credit is that allowed emissions should never be more than emissions that would result when a coating that exactly meets the recommended CTG limit is deposited at 60 percent TE. The recommended units for representing such limits are mass of VOC/volume of coating solids deposited. Assuming a solvent density of .89 Kg/liter, the recommended limit for metal furniture coaters who achieve 60 percent TE is 1.0 Kg VOC/liter of coating solids deposited and the recommended limit for large appliance coaters who achieve 60 percent TE is 0.9 Kg VOC/liter of coating solids deposited. If the mass of VOC emitted/volume of coating solids deposited is  $\leq 1.0$  Kg/liter for metal furniture or  $\leq 0.9$  Kg/liter for large appliances, equivalence with the CTG is demonstrated.\*

The derivation of these emissions limits and a sample compliance calculation is given in Attachment II. In Attachment III, a formula is derived which determines the highest VOC content (Kg VOC/liter of coating less water) coating that could be deposited at a given TE greater than 60 percent and would still meet the applicable CTG emission limit.

Metal furniture and large appliance coaters who do not achieve greater than 60 percent TE need not be penalized. We do not expect States to require such coaters to use coatings with VOC content lower than recommended in the CTGs to compensate for TE below 60 percent.

For those plants with high efficiency coating application equipment installed and currently meeting the VOC limit cited in the CTG, higher VOC content coatings may be calculated and utilized; however, in these cases it will be necessary to readjust the emission inventory and determine the effect on the attainment of the ozone standard.

Please contact the Technical Guidance Section (Brock Nicholson, FTS 629-5516), should you have any questions.

Attachments

\*If a coating contains VOC with a density that varies greatly from the CTG reference coating density, i.e., 0.89 Kg/liter, then the allowable mass of VOC/liter of solids deposited may be calculated for the specific coating.

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Retyped: 1kf: 12/1/80

TABLE I  
TRANSFER EFFICIENCIES

<u>Application Method</u>	<u>Metal Furniture</u>	<u>Large Appliance</u>
Air-atomized spray	0.25	0.40
Airless spray	0.25	0.45
Manual electrostatic spray	0.60	0.60
Non-rotational automatic electrostatic spray	0.70	0.85
Rotating head electrostatic spray (manual and automatic)	0.80	0.90
Dip coat	0.90	0.85
Flow coat	0.90	0.85
Electrodeposition	0.95	0.95
Powder application	0.95	0.95