

# Complying With SARA, Title III (Section 313) A Guide for Composites Facilities

## DO YOU NEED TO FILE A FORM R?

A manufacturing facility must report if it meets all of the following criteria:

1. Employment exceeds 10 employees or 20,000 man-hours worked during the reporting year.
2. The facility falls into a certain group of SIC codes. (SIC Major Group 30 is included in this group. SIC Major Group 30 includes 3088 - Plastic Plumbing Fixtures, and 3089 - Miscellaneous Plastic Products. This includes almost all composites fabricators and almost all cultured marble manufacturers.)
3. In the course of a year, the facility meets threshold limits by using :
  - A. 25,000 lbs. of listed material for processes or combined manufacture and import.
  - B. 10,000 lbs. of "otherwise used" listed chemicals.



## WHAT CHEMICALS DOES YOUR FACILITY NEED TO REPORT?

Some typical products which are used in typical cast polymer facilities, and which would fall into the category of "manufactured or processed materials" are:

CAS # (section 1.2)	Chemical Name
000100-42-5	Styrene Monomer
000075-09-2	Dichloro Methane (Methylene Chloride)
000080-62-6	Methyl Methacrylate

Manufacturers should review the "List of Lists" in the Form-R instructions for any other materials that might be used in the plant.

In a typical composites facility, the chemicals most likely to exceed reporting thresholds are styrene monomer, and methylene chloride. Certain gel coats may contain a significant fraction of methyl methacrylate. Emissions of this chemical must be reported as well.

## DETERMINING THE AMOUNTS OF EMISSIONS TO REPORT:

After determining which chemicals need to be reported, the manufacturer should determine the emissions, or other releases and transfers, of each chemical that should be reported.

### Calculating Emissions from Casting Resins

For many years, the composites industry relied on the EPA Table AP-42 Emissions Factors for determining emissions from their manufacturing processes. Recent emissions testing, by the CFA has validated the AP-42 factors for polymer casting as being between 1% and 3% of the available styrene.

$$\begin{aligned}
 & X \text{ lb. Resin (on hand @1/1/03)} \\
 + & Y \text{ lb. (Annual purchase 2003)} \\
 - & Z \text{ lb. Resin (on hand @} \\
 & \text{12/31/03)} \\
 = & T \text{ lb. Resin Used}
 \end{aligned}$$

The way a manufacturer should calculate his emissions from casting is to total the amount of resin used during the calendar year (*Form R is a report of emissions or waste during a calendar year, January through December*). This is usually done by adding together the total amount of resin (by weight) on hand at the beginning of the year, adding the amount purchased (by weight) throughout the year, and subtracting the amount of resin on hand (by weight) at the end of the year.

This "**Total Resin Used**" number is then multiplied times the **percent styrene** content (by weight) of the resin. The styrene content for the resin can be obtained from the "Resin Specification Sheet" (obtainable from the resin supplier) or from the "Resin Batch Certification Sheet" (obtainable from the resin supplier). The information on the MSDS may be used, but it is generally not as accurate as the information on the "Resin Specification Sheet" or the "Resin Batch Certification Sheet". The number derived from multiplying the total resin used times the percent styrene will yield the total amount of styrene used in the casting process.

This "**total amount of styrene used**" number is then multiplied by the **emission factor**. The mid-point of the range, 2%, is commonly used.

This will yield up the total amount of styrene emissions from the mixing/pouring/curing portion of the manufacturing process.

### Calculating Styrene Emissions from Open Molding

For years the composites industry had relied on EPA Tale AP-42 Emissions Factors for determining emissions from open molding operations. Recent testing data suggests that the AP-42 factors significantly under-estimate emissions from open molding operations. The EPA has withdrawn the AP-42 emissions factors for open molding, and they should not be used for reporting emissions on Form R.

The composites industry has developed newer emissions factors, based on the latest testing data, and it is recommended that these emissions factors be used for Form R reporting. In any event, facilities are always obliged to use the "Best Available Data" to characterize emissions for Form R reporting. These Unified Emissions Factors are available on the CFA web site.

*The composites industry has developed newer emissions factors*

The way a manufacturer should calculate his emissions from open molding is to total the amount of each type of resin used in each process during the calendar year (*Form R is a report of emissions or waste during a calendar year, January through December*). This is usually done by adding together the total amount of each resin (by weight) on hand at the beginning of the year, adding the amount purchased (by weight) throughout the year, and subtracting the amount of resin on hand (by weight) at the end of the year.

This "**Total Resin Used**" number is then multiplied times an emissions factor number taken from the "Unified Emissions Model" (developed from the composites industry's comprehensive testing program). The emissions factor is based on the percent styrene content (by weight) of the resin. The styrene content for the resin can be obtained from the "Specification Sheet" (obtainable from the resin supplier) or from the "Batch Certification Sheet" (obtainable from the resin supplier). The information on the MSDS may be used, but it is generally not as accurate as the information on the "Specification Sheet" or the "Batch Certification Sheet". The number derived from multiplying the total resin (in tons) used in a given process, times the emission factor will yield the total amount of styrene emitted (in pounds) from the resin processed.

### Calculating Styrene Emissions from Gel Coating

For years the composites industry had relied on EPA Table AP-42 Emissions Factors for determining emissions from gel coating operations. Recent testing data suggests that the AP-42 factors significantly under-estimate emissions from gel coating operations. The EPA has withdrawn the AP-42 emissions factors for gel coating, and they should not be used for reporting emissions on Form R.

The composites industry has developed newer emissions factors, based on the latest testing data, and it is recommended that these emissions factors be used for Form R reporting. In any event, facilities are always obliged to use the "Best Available Data" to characterize emissions for Form R reporting.

The way a manufacturer should calculate his emissions from gel coating is to total the amount of gel coat used during the calendar year (Form R is a report of emissions or waste during a calendar year, January through December). This is usually done by adding together the total amount of gel coat (by weight) on hand at the beginning of the year, adding the amount purchased (by weight) throughout the year, and subtracting the amount of gel coat on hand (by weight) at the end of the year.

This "**Total Gel Coat Used**" number (in tons) is then multiplied times an emissions factor number taken from the "Unified Emissions Model" which was developed from the composites industry's comprehensive testing program. The emissions factor is based on the percent styrene content (by weight) of the gel coat. The styrene content for the gel coat can be obtained from the "Specification Sheet" (obtainable from the resin supplier) or from the "Batch Certification Sheet" (obtainable from the resin supplier). The information on the MSDS may be used, but it is generally not as accurate as the information on the "Specification Sheet" or the "Batch Certification Sheet". The number derived from multiplying the total gel coat used (in tons) times the emission factor will yield the total amount of styrene emitted from the gel coating process (expressed in pounds).

### Calculating Methyl Methacrylate Emissions from Gel Coating

The recent emissions testing which was conducted by the boat building industry suggested that "acrylic modified" gel coats (these gel coats contain methyl methacrylate) have different emissions characteristics than gel coats containing only styrene.

It was demonstrated that the methyl methacrylate is emitted from acrylic modified gel coats at a higher rate than styrene. Therefore a separate calculation must be performed for these gel coats.

To calculate these emissions, first determine the total amount of acrylic modified gel coat used during the reporting year. Then multiply this amount times the percentage of methyl methacrylate in the material. The resulting number is the total amount of methyl methacrylate processed.

This number is then multiplied times 0.75 to determine the total methyl methacrylate emissions.

To calculate the styrene emissions from the acrylic modified gel coat, calculate the total styrene percentage of the acrylic modified gel coat, and then select the appropriate emissions rate from the Unified Emissions Factors model. Multiply this number times the total amount of acrylic modified gel coat used.

### Calculating Emissions from Closed Molding Processes

For many years, the composites industry has relied on the EPA Table AP-42 Emissions Factors for determining emissions from their closed molding manufacturing processes. Recent evaluation of emissions data has caused the EPA to remove the AP-42 factors for open molding processes.

However, the AP-42 emissions factors for closed molding processes are presumed to be valid and correct.

The way a manufacturer should calculate his emissions from closed molding is to total the amount of resin used during the calendar year (Form R is a report of emissions or waste during a calendar year, January through December). This is usually done by adding together the total amount of resin (by weight) on hand at the beginning of the year, adding the amount purchased (by weight) throughout the year, and subtracting the amount of resin on hand (by weight) at the end of the year.

This "Total Resin Used" number is then multiplied times the percent styrene content (by weight) of the resin. The styrene content for the resin can be obtained from the "Resin Specification Sheet" (obtainable from the resin supplier) or from the "Resin Batch Certification Sheet" (obtainable from the resin supplier). The information on the MSDS may be used, but it is generally not as accurate as the information on the "Resin Specification Sheet" or the "Resin Batch Certification Sheet". The number derived from multiplying the total resin used times the percent styrene will yield the total amount of styrene used in the closed molding process.

This "total amount of styrene used" number is then multiplied by the emission factor. The mid-point of the AP-42 range, 2%, is commonly used for closed molding processes like RTM or compression molding. For pultrusion, 6% is commonly used.

This will yield up the total amount of styrene emissions from the closed molding manufacturing processes.

### **Calculating Emissions of Methylene Chloride**

Methylene chloride is considered to be 100% volatile. That makes this calculation fairly simple.

Take the amount of methylene chloride on hand at the beginning of the reporting year, add to that any purchases of methylene chloride throughout the reporting year. From this total, subtract the amount of methylene chloride shipped off site as hazardous waste, plus any methylene chloride on hand at the end of the reporting year.

If methylene chloride is recovered through distillation, either on site, or off site, the amount taken to recovery is treated as a "Hazardous Waste" shipment. This amount is subtracted from the total amount of material, as noted above. Any material returned from a recycling operation for use at the facility, is then added into the above calculation as though it were a new purchase.

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