

POLYESTER RESIN & FIBERGLASS REINFORCED PLASTIC OPERATIONS

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PROCESS DESCRIPTION: Many products are manufactured from polyester resin and fiberglass reinforced plastic (FRP). During the manufacturing process, liquid polyester resins are mixed with cross linking agents and catalysts to initiate polymerization reaction which produces a 'cured', hard plastic part of the desired shape. Chopped glass fiber may be mixed with the resin for additional structural strength. Materials may be vapor suppressed or non-vapor suppressed. The variety of manufacturing operations using polyester resins can be categorized as follows;

Open Mold Processes	Closed Mold Processes
Hand Layup (Gel Coat)	Marble Casting (Polyester Resin)
Hand Layup (Polyester Resin)	Closed Mold Casting (Polyester Resin)
Spray Layup (Gel Coat)	
Spray Layup (Polyester Resin)	
Continuous Lamination (Polyester Resin)	
Pultrusion (Polyester Resin)	
Filament Winding (Polyester Resin)	
Marble Casting (Polyester Resin)	

Organic emissions occur during the manufacturing process. Emissions typically consist of clean up solvents, volatile catalysts, and some portion of the cross linking agent / monomer (i.e. styrene, methyl methacrylate, vinyl toluene, vinyl acetate, etc.). District emission estimation procedures for polyester resin / fiberglass reinforced plastic operations are;

$$E_a = U_a \times D \times C_i \times MEF \times (1 - e)$$

$$E_h = U_h \times D \times C_i \times MEF \times (1 - e)$$

Where:

Ea = Annual emissions of each listed toxic air contaminant, (lbs/year)

Eh = Maximum hourly emissions of each listed toxic air contaminant, (lbs/hour)

Ua = Annual usage of each material, (gals/year)

Uh = Maximum hourly usage of each material, (gals/hour)

D = Density of each material used, (lbs/gal)

Ci = Concentration of each listed substance in each material used (lbs/lb)

MEF = Monomer emission factor, if applicable, (lbs released/lb monomer used)

e = Control device capture and removal efficiency, (%)

EMISSIONS INFORMATION:

Information regarding material composition can usually be obtained from MSDS documentation. All volatile solvents used in clean up activities or as catalysts are assumed released. The fraction of free monomer emitted is based on emission factors from Section 4.4 of AP-42 (1/95). Recent EPA guidance indicates some of the open mold monomer emission estimates may under predict actual emissions. Updated AP-42 emission factors are not yet published.

ASSUMPTIONS / LIMITATIONS:

- Site specific monomer test data may be more representative of actual emissions than the AP-42 default values and should be used when appropriate. Emissions of volatile solvents should always be based on mass balance procedures when possible.
- Some monomers and cross linking agents are solids or nonvolatile liquids (i.e.; diallyl phthalate, acrylamide, 2-ethyl hexylacrylate, etc.). Emissions of these substances are assumed negligible.
- AP-42 does not include emission factors for volatile monomers and cross linking agents other than styrene (i.e.; methyl methacrylate, vinyl toluene, vinyl acetate, etc.). The emission factor for styrene will be used to estimate releases of these compounds until more accurate information becomes available.
- Emissions of the polyfunctional alcohols used in the polyester resin manufacturing process are assumed to be negligible during casting.

- Emissions of fiberglass particulates must be calculated separately from the organic releases and should be based upon site specific information. Default particulate emission factors do not exist and cannot be developed due to the highly unique nature of each manufacturing operation.

FORMS:

Individual information for each material used in each polyester resin operation on site should be reported and evaluated separately.