4.2.2.2 Can Coating[1-4]

4.2.2.2.1 Process Description

Cans may be made from a rectangular sheet (body blank) and 2 circular ends (3-piece cans), or they can be drawn and wall ironed from a shallow cup to which an end is attached after the can is filled (2-piece cans). There are major differences in coating practices, depending on the type of can and the product packaged in it. Figure 4.2.2.2-1 depicts a 3-piece can sheet printing operation.

There are both "toll" and "captive" can coating operations. The former fill orders to customer specifications, and the latter coat the metal for products fabricated within one facility. Some can coating operations do both toll and captive work, and some plants fabricate just can ends.

Three-piece can manufacturing involves sheet coating and can fabricating. Sheet coating includes base coating and printing or lithographing, followed by curing at temperatures of up to 220°C (425°F). When the sheets have been formed into cylinders, the seam is sprayed, usually with a lacquer, to protect the exposed metal. If they are to contain an edible product, the interiors are spray coated, and the cans baked at up to 220°C (425°F).

Two-piece cans are used largely by beer and other beverage industries. The exteriors may be reverse roll coated in white and cured at 170 to 200°C (325 to 400°F). Several colors of ink are then transferred (sometimes by lithographic printing) to the cans as they rotate on a mandrel. A protective varnish may be roll coated over the inks. The coating is then cured in a single or multipass oven at temperatures of 180 to 200°C (350 to 400°F). The cans are spray coated on the interior and spray and/or roll coated on the exterior of the bottom end. A final baking at 110 to 200°C (225 to 400°F) completes the process.

4.2.2.2.2 Emissions And Controls

Emissions from can coating operations depend on composition of the coating, coated area, thickness of coat, and efficiency of application. Post-application chemical changes and nonsolvent contaminants like oven fuel combustion products may also affect the composition of emissions. All solvent used and not recovered can be considered potential emissions.

Sources of can coating VOC emissions include the coating area and the oven area of the sheet base and lithographic coating lines, the 3-piece can side seam and interior spray coating processes, and the 2-piece can coating and end sealing compound lines. Emission rates vary with line speed, can or sheet size, and coating type. On sheet coating lines, where the coating is applied by rollers, most solvent evaporates in the oven. For other coating processes, the coating operation itself is the major source. Emissions can be estimated from the amount of coating applied by using the factors in Table 4.2.2.1-1 or, if the number and general nature of the coating lines are known, from Table 4.2.2.2-1.

Incineration and the use of waterborne and low solvent coatings both reduce organic vapor emissions. Other technically feasible control options, such as electrostatically sprayed powder coatings, are not presently applicable to the whole industry. Catalytic and thermal incinerators both can be used. Primers, backers (coatings on the reverse or backside of the coil), and some waterborne low- to medium-gloss topcoats have been developed that equal the performance of organic

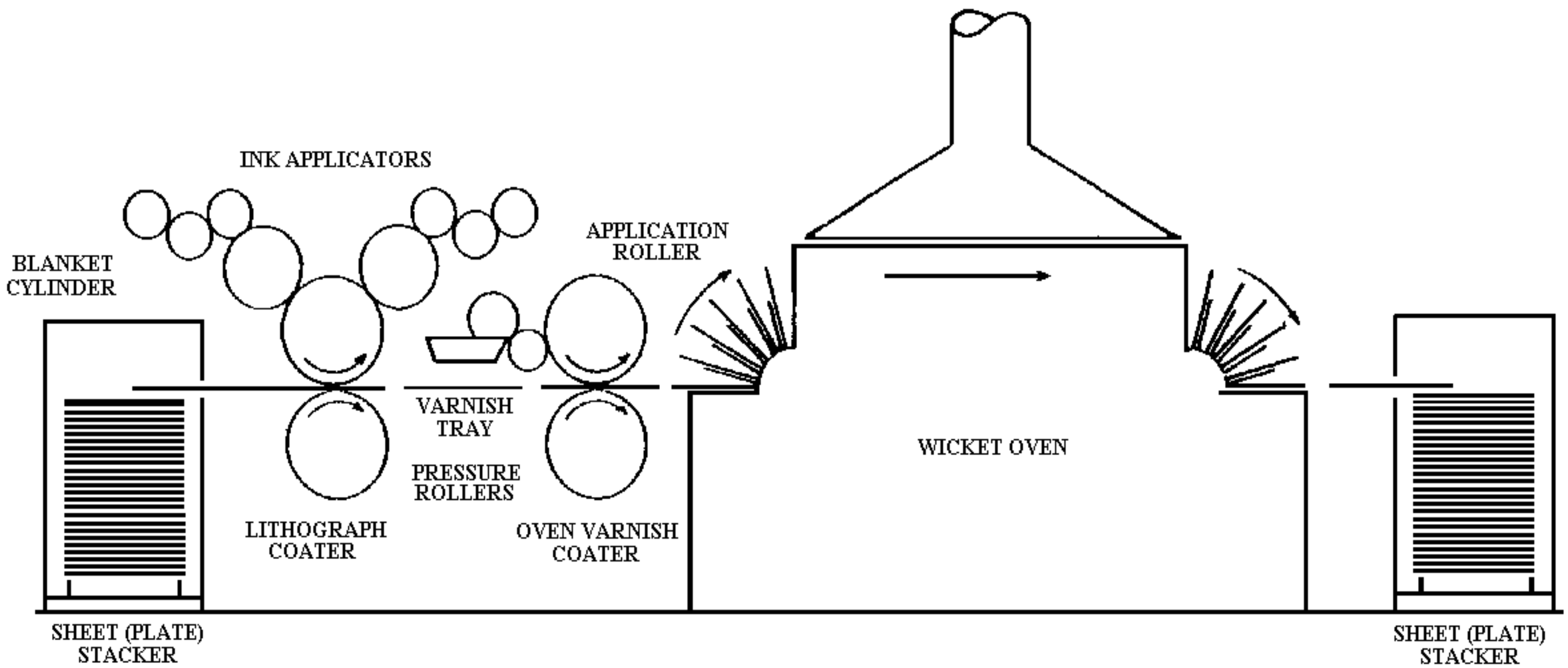

Figure 4.2.2.2-1. Three-piece can sheet printing operation.

Table 4.2.2.2-1 (Metric And English Units). VOC EMISSION FACTORS FOR CAN COATING PROCESSES[a]

EMISSION FACTOR RATING: B

Process	Typical Emissions From Coating Line[b]		Estimated Fraction From Coater Area (%)	Estimated Fraction From Oven (%)	Typical Organic Emissions[c]	
	kg/hr	lb/hr			Mg/yr	ton/yr
Three-piece can sheet base coating line	51	112	9 - 12	88 - 91	160	176
Three-piece can sheet lithographic coating line	30	65	8 - 11	89 - 92	50	55
Three-piece beer and beverage can — side seam spray coating process	5	12	100	air dried	18	20
Three-piece beer and beverage can — interior body spray coating process	25	54	75 - 85	15 - 25	80	88
Two-piece can coating line	39	86	ND	ND	260	287
Two-piece can end sealing compound line	4	8	100	air dried	14	15

[a] Reference 3. ND = no data.
[b] Organic solvent emissions will vary according to line speed, size of can or sheet being coated, and type of coating used.
[c] Based upon normal operating conditions.

solventborne coatings for aluminum but have not yet been applied at full line speed in all cases. Waterborne coatings for other metals are being developed.

Available control technology includes the use of add-on devices like incinerators and carbon adsorbers and a conversion to low solvent and ultraviolet curable coatings. Thermal and catalytic incinerators both may be used to control emissions from 3-piece can sheet base coating lines, sheet lithographic coating lines, and interior spray coating. Incineration is applicable to 2-piece can coating lines. Carbon adsorption is most acceptable to low temperature processes which use a limited number of solvents. Such processes include 2- and 3-piece can interior spray coating, 2-piece can end sealing compound lines, and 3-piece can side seam spray coating.

Low solvent coatings are not yet available to replace all the organic solventborne formulations presently used in the can industry. Waterborne basecoats have been successfully applied to 2-piece cans. Powder coating technology is used for side seam coating of noncemented 3-piece cans.

Ultraviolet curing technology is available for rapid drying of the first 2 colors of ink on 3-piece can sheet lithographic coating lines.

The efficiencies of various control technologies for can coating lines are presented in Table 4.2.2.2-2.

Table 4.2.2.2-2. CONTROL EFFICIENCIES FOR CAN COATING LINES[a]

Affected Facility[b]	Control Option	Reduction (%)[c]
Two-piece Can Lines		
Exterior coating	Thermal and catalytic incineration	90
	Waterborne and high solids coating	60 - 90
	Ultraviolet curing	≤100
Interior spraying coating	Thermal and catalytic incineration	90
	Waterborne and high solids coating	60 - 90
	Powder coating	100
	Carbon adsorption	90
Three-piece Can Lines		
Sheet coating lines		
Exterior coating	Thermal and catalytic incineration	90
	Waterborne and high solids coating	60 - 90
	Ultraviolet curing	≤100
Interior spray coating	Thermal and catalytic incineration	90
	Waterborne and high solids coating	60 - 90
Can fabricating lines		
Side seam spray coating	Waterborne and high solids coating	60 - 90
	Powder (only for uncemented seams)	100
Interior spray coating	Thermal and catalytic incineration	90
	Waterborne and high solids coating	60 - 90
	Powder (only for uncemented seams)	100
	Carbon adsorption	90
End Coating Lines		
Sealing compound	Waterborne and high solids coating	70 - 95
Sheet coating	Carbon adsorption	90
	Thermal and catalytic incineration	90
	Waterborne and high solids coating	60 - 90

[a] Reference 3.
[b] Coil coating lines consist of coaters, ovens, and quench areas. Sheet, can, and end wire coating lines consist of coaters and ovens.
[c] Compared to conventional solvent base coatings used without any added thinners.

References For Section 4.2.2.2

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