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UL 8782

**Outline of Investigation for Pollution Control Units for Commercial Cooking
Operations**

Issue Number: 1

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Summary of Topics

***This is the first issue of the Outline of Investigation for Pollution Control
Units for Commercial Cooking Operations, UL 8782.***

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INTRODUCTION

1 Scope

1.1 These requirements cover commercial pollution control unit assemblies that are intended to be installed in line with commercial grease ducts used to exhaust heat, smoke, and grease-laden vapors from commercial cooking operations to the outdoors as specified in the Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA 96, the International Mechanical Code, and the Uniform Mechanical Code.

1.2 These requirements include modular pollution control assemblies, unwelded connections between adjoining parts, fittings, access doors, and the like.

1.3 These requirements do not address NFPA 96 and the International Mechanical Code requirements for pollution control unit fire resistive enclosures. Pollution control units covered only by these requirements are intended to be installed in a fire resistive enclosure when required by NFPA 96 or the IMC.

1.4 Requirements used to evaluate the effectiveness of the combination of a pollution control unit and an enclosure as a fire rated enclosure system and through penetration firestop system, as well as the enclosure's effect on the pollution control unit are contained in Standard for Tests of Fire Resistive Grease Duct Enclosure Assemblies, UL 2221, and ASTM E 2336, Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems.

1.5 This Outline does not measure the efficacy of the pollution control unit to remove grease-laden effluent from the air stream, nor other factors that do not directly affect users or electrical and fire safety.

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards covering components used in the products covered by this standard.

2.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this outline, or
- b) Is superseded by a requirement in this Outline of Investigation.

2.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

5 Terminology

5.1 The term “pollution control unit” as used in these requirements refers to all pollution control units and pollution control unit assemblies covered by these requirements unless specifically noted otherwise.

6 Glossary

6.1 For the purpose of these requirements, the following definitions apply.

6.2 ACCESS DOOR – A door or cover plate that when opened provides a means for cleaning the pollution control unit.

6.3 CIRCUIT, HIGH-VOLTAGE – A circuit having characteristics in excess of those of a low-voltage circuit. See 6.4.

6.4 CIRCUIT, LOW-VOLTAGE – A circuit involving a potential of not more than 30 volts rms alternating-current (42.4 volts peak or direct current), and supplied by a primary battery or by a Class 2 transformer or by a combination of transformer and fixed impedance which, as a unit, complies with all the performance requirements for a Class 2 transformer.

6.5 COMBUSTIBLE MATERIAL – Material made of or surfaced with wood, compressed paper, plain fibers, or other material that will ignite and burn, as applied to materials adjacent to or in contact with heat-producing appliances, pollution control unit and vent connectors, steam and hot water pipes, and warm air ducts. Such material shall be considered as combustible even though flame-proofed, fire-retardant treated, or plastered.

6.6 GREASE FILTER – A removable component of the grease removal system intended to capture grease and direct it to a safe collection point.

6.7 NONCOMBUSTIBLE MATERIAL – A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. Materials that are reported as passing ASTM E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, are considered noncombustible materials.

CONSTRUCTION

7 Materials

7.1 Pollution control unit outer enclosures shall be made of noncombustible, corrosion-resistant materials. Metals shall not be used in combinations at any location within the assembly that are capable of causing galvanic action.

7.2 Pollution control unit enclosures shall be constructed of steel having a minimum thickness of 0.0575 inch (1.463 mm) (No. 16 gage) or stainless steel not less than 0.0450 inch (1.14 mm) (No. 18 gage) in thickness.

Exception: The pollution control unit enclosure shall comply with all of the following:

a) The minimum thickness of sheet metal of the outer enclosure, including any coatings, and of other materials shall comply with Table 7.1.

b) Parts of a pollution control unit subject to contact by grease-laden vapors shall be of stainless steel or porcelain-coated steel of the minimum thickness specified in Table 7.1.

c) An outer casing or other structural part shall be of stainless steel, galvanized steel, or aluminum-coated steel when:

1) Deterioration or corrosion would cause the air purification unit to collapse or otherwise increase the risk of injury to persons; or

2) It is subject to condensation.

d) Components of a pollution control unit, or subassemblies, shall be of materials and thicknesses as specified in Table 7.1.

e) A painted part made of steel not less than 0.053 inch (1.35 mm) thick, or of cast iron not less than 0.125 inch (3.18 mm) thick, and for use only in the interior of buildings, is corrosion resistant provided that coatings remain intact at the maximum temperatures obtained on the part during the tests specified in these requirements.

Table 7.1
Minimum thickness of sheet metal

	Minimum thickness of sheet metal	
	inches	(mm)
Aluminum alloys (1100, 3003)	0.018	(0.46)
Steel	0.0598	(1.52)
Galvanized steel (G90 coating class)	0.018	(0.46)
Aluminum-coated steel [0.40 ounce per square foot (0.12 kg/m ²)]	0.018	(0.46)
Stainless steel	0.012	(0.30)
Porcelain-coated steel-base metal	0.026	(1.35)

7.3 A ferrous metal part required to be provided with corrosion protection shall be provided with one of the following corrosion-protection systems:

- a) A zinc coating complying with the coating Designation G60 or A60 in Table I of the Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, ASTM A653/A653M, with not less than 40 percent of the zinc on any side, based on the minimum single spot test requirement in this ASTM Designation. The weight of the zinc coating is to be determined by any method; in case of question shall be established in accordance with the test method in the Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles, ASTM A90.
- b) A zinc coating, other than that specified in (a), uniformly applied to an average thickness of not less than 0.00041 inch (0.0104 mm) on each surface with a minimum thickness of 0.00034 inch (0.00864 mm). The thickness of the coating is to be established in accordance with the test method in the Standard for Measurement of Electrodeposited Metallic Coating Thicknesses by the Dropping Test, ASTM B555.

7.4 Interior thermal insulation materials shall be noncombustible.

7.5 Thermal insulation shall not come into contact with the grease-laden vapors.

7.6 Thermal insulation that is not self-supporting shall be applied to solid surfaces, or held with pins or similar attachments, so that the insulation does not sag. An adhesive or cement used to attach such material shall retain its adhesive qualities at any temperature the adhesive may attain when tested in accordance with these requirements and at 0°F (minus 18°C).

7.7 A water-absorbing insulating material shall not be subject to wetting by condensation or rain when installed as intended.

7.8 Asbestos material shall not be used.

8 Assembly

8.1 A pollution control unit shall consist of all the essential parts necessary for the intended installation of a complete assembly. Each part of the assembly shall be constructed for ready attachment of one to the other without requiring alteration by the installer, such as by cutting, threading, drilling, or similar tasks.

Exception: An assembly or component part intended to be cut to length or to be fitted by the installer may be provided if means and instructions are furnished for joining any altered part to a companion part or assembly. All fasteners required to complete the assembly shall be provided with the product by the manufacturer. Drilling is acceptable if:

- a) The drilling operation does not weaken the assembly or penetrate into the inner casing of the pollution control unit, and*
- b) The size of the required drill bit is specified and the instructions clearly describe the locations to be drilled, such as by the use of drawings, descriptions, templates, or the like. Field welding of pollution control unit parts such as for connection to grease ducts is permitted.*

8.2 Two or more parts or subassemblies that bear a definite relationship to each other in the intended application shall:

- a) Be arranged and constructed so that they are capable of being incorporated into the complete assembly without need for alteration or alignment and only in the correct relationship with each other; or
- b) Be assembled and shipped from the factory as one unit.

8.3 Each part, such as an air purification unit section or length, tee, or support component, shall be completely assembled by the manufacturer at the factory.

8.4 To comply with the requirements of 8.3, a pollution control unit section comprised of the inner casing of the pollution control unit, formed insulation or other intermediate assembly, and an outer jacket, all of which may be separable, shall be preassembled and packaged as one unit. In such cases, each separable part shall be completely formed, including the joining of all seams.

8.5 Any access doors and penetrations shall employ a liquid-tight continuous weld.

Exception: This requirement does not apply to access doors and fittings that have been subjected to the Leakage Test, Section 28, or the Fire and Leakage Tests of Pollution Control Unit Access Doors and Fittings, Section 30.

9 Joints

9.1 Parts of a pollution control unit shall be joined and secured so that they do not disengage when tested in accordance with these requirements.

9.2 When screws are employed to join assemblies during installation, the assemblies to be joined shall provide for use of screws without being punched or drilled, except as referenced in 8.1. When a joint sealant material is employed for this purpose, the installation instructions shall specify the cure time for the joint sealant material. A screw shall not extend into an inner casing of the duct.

9.3 A joint shall not retain grease vapors nor permit grease-laden vapors to flow from the interior to the exterior of the inner casing of the pollution control unit.

9.4 A joint between sections of the inner casing of the pollution control unit, fabricated in accordance with the manufacturer's instructions, shall not permit passage of a 1/32 inch (0.81 mm) diameter rod.

9.5 A joint shall not reduce the capacity of the pollution control unit to the extent that it interferes with exhaust flow.

9.6 An pollution control unit joint shall be constructed to resist the entrance of rain such that moisture will not flow from the exterior of the air purification unit section to the interior of a lower section.

10 Support Assembly

10.1 A support assembly, such as a ceiling or floor support, shall establish and maintain the minimum required clearance between a pollution control unit section and combustible construction.

10.2 A support assembly intended to be secured by nails or screws shall be arranged so that the load on such holding means will be a shear load.

11 Filters

11.1 Electrostatic precipitator

11.1.1 When the pollution control unit includes an electrostatic precipitator (ESP), the ESP or its components shall comply with the Standard for Electrostatic Air Cleaners, UL 867.

11.1.2 The power supply for an ESP shall be one in which the voltage falls off as the current draw increases, such as a ferro resonant type transformer.

11.2 Grease filters

11.2.1 A grease filter, if used, shall comply with the Standard for Grease Filters for Exhaust Ducts, UL 1046. Grease captured shall drain into a container that does not have more than a 1 quart (0.95 l) capacity.

11.2.2 Overflow of grease containers, if used, shall not result in a risk of fire or in grease contacting uninsulated electrical parts or internal wiring.

12 Electrical Enclosure

12.1 General

12.1.1 A control unit enclosure shall comply with the Standard for Enclosures for Electrical Equipment, Non-Environmental Considerations, UL 50, the Standard for Safety for Enclosures for Electrical Equipment, Environmental Considerations, UL 50E, and with the requirements in 12.1.2 – 12.4.11.

12.1.2 All electrical parts of a control unit shall be enclosed to provide protection against contact with uninsulated live parts.

12.1.3 The enclosure of a control unit installed in or attached to a pollution control unit shall be of a liquid-tight construction.

Exception No. 1: The door or cover of a control unit is not required to form a liquid-tight seal between itself and the enclosure when attached to the exterior surface of an air purification unit at a location not subject to exposure to any cooking smoke or vapors.

Exception No. 2: An enclosure or junction box installed on a pollution control unit that does not penetrate the unit is not required to be of a liquid-tight construction.

12.1.4 The enclosure of a control unit which is recessed in a pollution control unit shall comply with 12.1.3 and shall be attached to the unit with a continuous liquid-tight weld.

Exception: The attachment of the control unit enclosure to the pollution control unit shall be permitted to be other than a continuous liquid-tight weld when subjected to the Fire and Leakage Tests of Pollution Control Unit Access Doors and Fittings, Section 30.

12.2 Transparent covers

12.2.1 Glass covering an observation opening in an electrical enclosure shall be secured in place so that it is not displaced in service and shall provide mechanical protection for the enclosed parts. The thickness of a glass cover shall be not less than that indicated in Table 12.1.

Table 12.1
Thickness of glass covers

Maximum size of opening				Minimum thickness,	
Length or width,		Area		Inches	(mm)
Inches	(mm)	Square inches	(cm ²)		
4	(102)	16	(103)	1/16	(1.6)
12	(305)	144	(929)	1/8	(3.2)
Over 12	(305)	Over 144	(929)	a	

^a 1/8 inch (3.2 mm) or more, based upon the size, shape, and mounting of the glass panel.

12.2.2 A glass panel for an opening having an area of more than 144 square inches (929 cm²), or having any dimension greater than 12 in. (305 mm), shall be continuously supported at least 3/16 inch (4.8 mm) along all four edges of the panel, or an equivalent arrangement.

12.2.3 A transparent material other than glass shall be used for the cover of an observation opening when the material does not introduce a risk of fire, distort, nor become less transparent at the temperature to which it shall be subjected under either normal or abnormal service conditions.

12.3 Battery storage compartments

12.3.1 A storage compartment for batteries, shall have a total volume not less than twice the volume occupied by the batteries. Ventilating openings shall be provided so located as to permit circulation of air for dispersion of gas while the battery is being charged at the highest rate permitted by the means incorporated in the control unit.

12.3.2 The interior of a battery storage compartment shall be so protected that it resists detrimental action by the electrolyte.

12.4 Ventilation openings

12.4.1 Ventilation openings are not permitted within electrical enclosures installed in or attached to a pollution control unit.

12.4.2 Ventilation openings shall be provided within the enclosure of a control unit not installed in or attached to a pollution control unit when they comply with 12.4.3 – 12.4.11.

12.4.3 Openings in the top of the enclosure shall be constructed and sized to prevent entry of foreign objects.

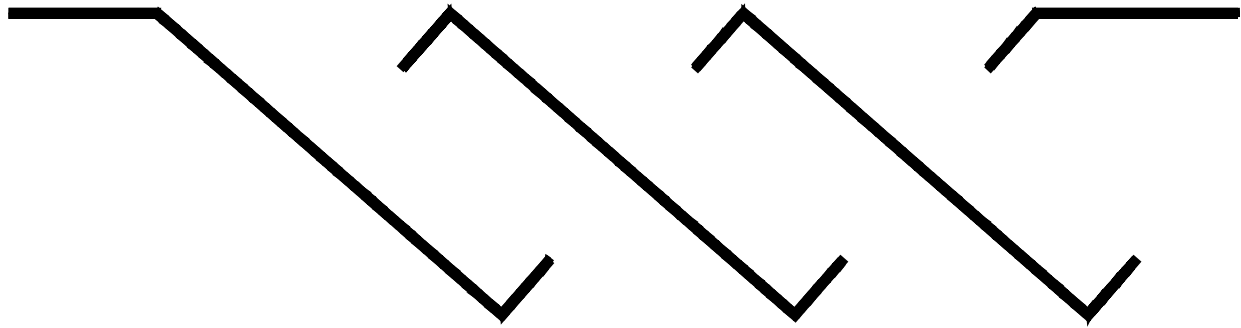
12.4.4 To comply with the requirements in 12.4.3, openings directly over uninsulated live parts shall not exceed 0.187 inch (475 mm) in any dimension unless the configuration of the openings prevents direct access to uninsulated live parts. See Figure 12.1 for examples of top cover designs.

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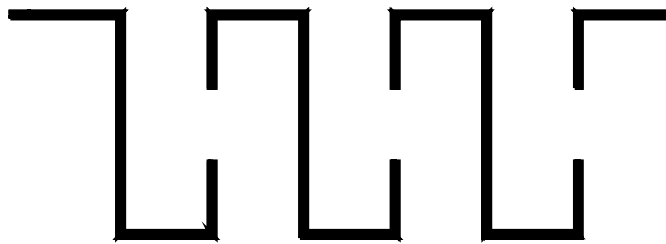


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Figure 12.1
Cross sections of top cover designs



SLANTED OPENINGS



EC500

VERTICAL OPENINGS

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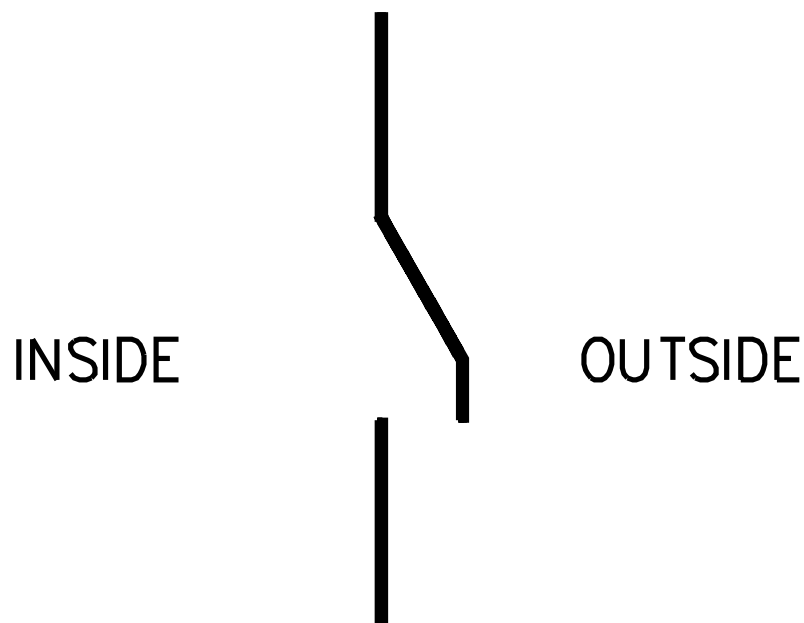
12.4.5 Openings in the sides of the enclosure shall be located and sized to prevent entry of a foreign object and to reduce the risk of personnel contacting internal parts. Louvers shall not be employed unless they are shaped to deflect external falling objects outward. See Figure 12.2 for examples of louver designs.

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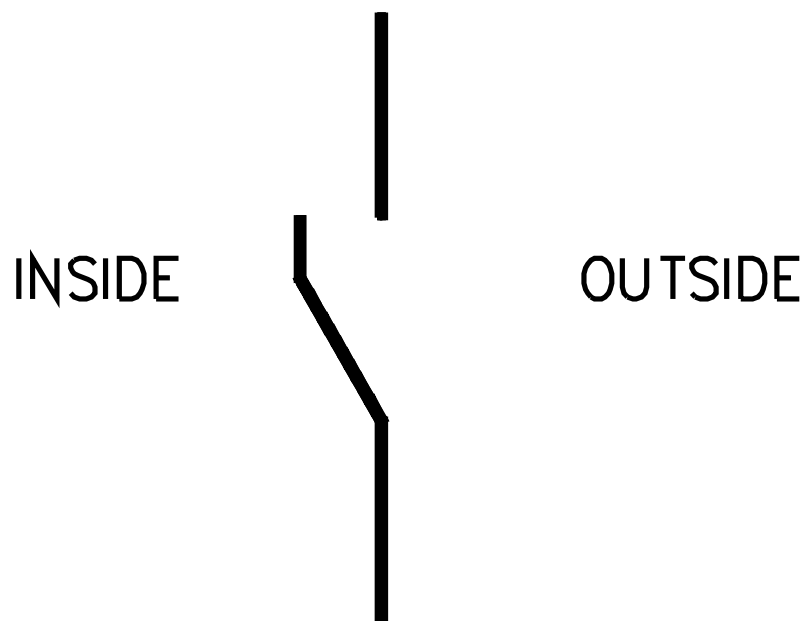


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Figure 12.2
Louvers



OUTWARD PROJECTION



INSIDE OUTSIDE

EC510 INWARD PROJECTION

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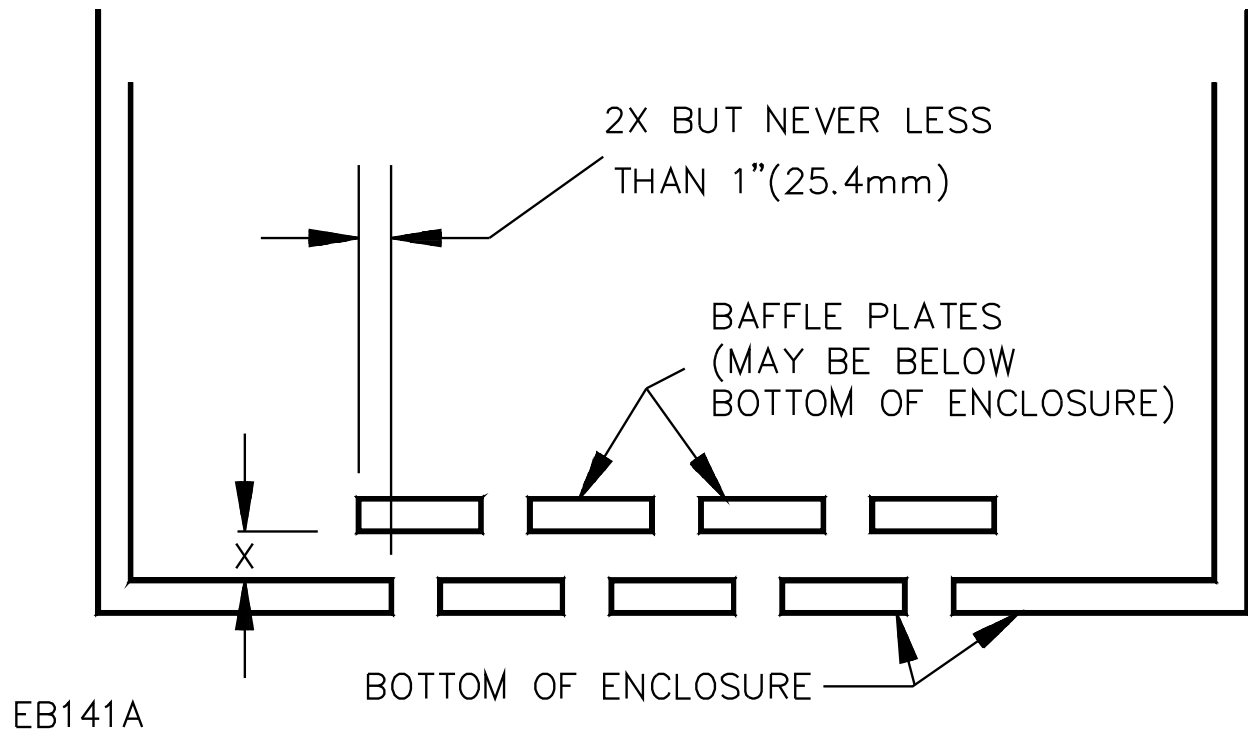
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12.4.6 The bottom of the enclosure under areas containing only materials classified as V-1 or better, as specified in the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94, shall have openings not larger than 1/4 inch (6.4 mm) square. Openings that are not square shall not have an area greater than 1/16 square inch (2.56 mm²).

12.4.7 The bottom of the electrical enclosure ventilated as specified in 12.4.6 under areas containing materials not classified as V-1 or better shall be provided with a baffle as shown in Figure 12.3.

Figure 12.3
Example of baffle



12.4.8 All combustible plastic material used within an enclosure shall be classified as V-2, HF-2, or better, in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.

Exception No. 1: Motors, relays, capacitors, semiconductors, transformers, switches, insulating tubing or tape, and other electrical elements that have been investigated for flammability.

Exception No. 2: Meter faces and cases (for mounting live parts) and indicator lamps or jewels, or both, are exempt from flammability requirements.

Exception No. 3: The following requirements apply to parts that are isolated either:

a) By at least 1/2 inch (12.5 mm) of air; or

b) By a solid barrier of V-1 or less flammable material from uninsulated electrical parts that involve a risk of electric shock.

1) Gears, cams, belts, bearings, strain-relief bushings applied over PVC jacketed cords, and other small parts that contribute negligible fuel to a fire are not required to be investigated.

2) Tubing for air or fluid systems, and foamed plastics, shall not be more flammable than HB. Foamed plastics classed HBF in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94, meet this requirement.

12.4.9 Openings in the enclosure shall not give access to any relays, terminals, controls, or related components that are subject to tampering.

12.4.10 An electrical enclosure intended for recessed mounting and whose front panel is to be flush with the surface of the wall shall have no openings that vent into concealed spaces of a building structure, such as into hollow spaces in the wall, when the product is mounted as intended.

12.4.11 The requirement in 12.4.10 does not apply to an opening for a mounting screw or nail or for a manufacturing operation (such as paint drainage) when:

a) The opening does not have a dimension greater than 17/64 inch (6.75 mm) or an area greater than 0.055 square inches (35.5 mm²); and

b) There is no more than one mounting screw hole for each 12 inches (305 mm) of length of mounting surface, or fraction thereof.

13 Field-Wiring Connections

13.1 General

13.1.1 Each product shall have provision for the connection of one of the applicable wiring systems in accordance with the National Electrical Code, ANSI/NFPA 70. A power supply cord shall not be provided.

13.1.2 The electrical enclosure of a pollution control unit shall be provided with wiring terminals or with leads not less than 6 inches (152 mm) long, for connection of field-wiring conductors. The terminals or leads shall be sized for connection as required by the National Electrical Code, ANSI/NFPA 70, corresponding to the marked rating of the product and the marked conductor type, such as AL and CU. See 37.5.

13.1.3 The location of an outlet box or compartment in which field wiring connections are to be made shall permit inspection of the connections after the product is installed as intended. The connections shall be accessible without removing parts other than service covers or panels and the cover of the outlet box or compartment in which the connections are to be made.

13.1.4 An outlet box or compartment in which field wiring connection is to be made shall comply with 13.1.3 and 13.1.4 with respect to its enclosure construction.

13.1.5 The outlet box or compartment to which field-wiring connections are made shall provide space for installation of the conductors of the number and size required by the National Electrical Code, ANSI/NFPA 70 when at least a 6 inch (152 mm) length of each conductor is brought into the wiring compartment.

13.1.6 A wire-binding screw shall not thread into material other than metal.

13.1.7 Field-wiring terminals shall be secured to their supporting surfaces by methods other than friction between surfaces so that they do not turn or shift in position when such motion results in reduction of spacings to less than the minimum required. This shall be accomplished by two screws or rivets; by square shoulders or mortices; by a dowel pin, lug, or offset; by a connecting strap or clip fitted into an adjacent part; or by some other equivalent method.

13.2 Grounding

13.2.1 An equipment-grounding terminal or lead shall be provided in a product intended for connection to the power supply by means other than a metal-enclosed wiring system, such as by nonmetallic-sheathed cable.

13.2.2 A field-wiring terminal intended solely for connection of an equipment grounding conductor shall be capable of securing a conductor of the size indicated in Table 16.1 for the rating of the branch-circuit overcurrent protective device to which the product is connected. See 13.2.5.

13.2.3 The surface of an insulated lead intended solely for the connection of an equipment-grounding conductor shall be green with or without one or more yellow stripes and no other leads visible to the installer shall be so identified.