



TEST REPORT
UL 867
Standard for Safety
Electrostatic Air Cleaners

Report Number: HK2405301364-SR

Date of issue: 2024-06-04

Total number of pages.....: 95 pages

Testing Laboratory.....: Shenzhen HUAK Testing Technology Co., Ltd.

Testing location.....: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Applicant's name.....: Guangzhou Beshion Electric Co., Ltd.

Address: Room 202, Donghui business center, 99Zhucun East Ring Road, TianheDistrict, Guangzhou City, Guangdong Province, China

Test specification:

Standard.....: UL 867:2018

Test procedure: UL test report

Non-standard test method.....: N/A

Test Report Form No.....: UL867A

Test Report Form(s) Originator: HUAK

Master TRF.....: Dated 2020-03

Test item description.....: Air purifier

Trade Mark: N/A

Manufacturer.....: Guangzhou Beshion Electric Co., Ltd.

Manufacturer address.....: Room 202, Donghui business center, 99Zhucun East Ring Road, TianheDistrict, Guangzhou City, Guangdong Province, China

Model/Type reference: KJ-169, KJ-01, KJ-03, KJ-05, KJ-08, KJ-167, KJ-168, KJ-282, KJ-283

Ratings: Input: 110V~, 60Hz, 13W

TRF No. UL867A

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Testing procedure and testing location:		
<input checked="" type="checkbox"/>	Testing Laboratory:	Shenzhen HUAKE Testing Technology Co., Ltd.
Testing location/ address		1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
<input type="checkbox"/>	Associated Laboratory:	
Testing location/ address		
	Tested by (name + signature).....:	Kevin Yao <i>Kevin Yao</i>
	Approved by (+ signature).....:	Dendi Wei <i>Dendi Wei</i>
<input type="checkbox"/>	Testing procedure: TMP	
Testing location/ address		
	Tested by (name + signature)	
	Approved by (+ signature)	
<input type="checkbox"/>	Testing procedure: WMT	
Testing location/ address		
	Tested by (name + signature)	
	Witnessed by (+ signature)	
	Approved by (+ signature)	
<input type="checkbox"/>	Testing procedure: SMT	
Testing location/ address		
	Tested by (name + signature)	
	Approved by (name + signature) :	
	Supervised by (name + signature)	
<input type="checkbox"/>	Testing procedure: RMT	
Testing location/ address		
	Tested by (name + signature)	
	Approved by (name + signature) :	
	Supervised by (name + signature):	

TRF No. UL859A

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List of Attachments (including a total number of pages in each attachment): -Appendix 1: Photo attachments. (5 pages)	
Summary of testing:	
Tests performed (name of test and test clause): All clauses.	Testing location: 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Summary of compliance with National Differences: N/A	
<input checked="" type="checkbox"/> The product fulfils the requirements of <u>UL 867:2018.</u>	

TRF No. UL859A

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Copy of marking plate

The artwork below may be only a draft.

Air purifier
Model: KJ-169
Input: 110V~, 60Hz, 13W
Made in China

TRF No. UL859A

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POSSIBLE TEST CASE VERDICTS:	
- test case does not apply to the test object..... :	N/A
- test object does meet the requirement..... :	P (Pass)
- test object does not meet the requirement :	F (Fail)
- Date of receipt of test item..... :	May 30, 2024
-Date (s) of performance of tests..... :	May 30, 2024 to June 04, 2024
GENERAL REMARKS:	
<p>"(See Enclosure #)" refers to additional information appended to the report. "(See appended table)" refers to a table appended to the report.</p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator. Determination of the test result includes consideration of measurement uncertainty from the test equipment and methods.</p>	
Manufacturer's Declaration per sub-clause 4.2.5 of IECCE 02:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies)	Same as Manufacturer
GENERAL PRODUCT INFORMATION:	
All models are identical, only different in the model name, so the model KJ-169 is selected as representative model for full tests.	

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
4	CONSTRUCTION		P
	General		P
4A	Components	Complied with related cert.	P
5	Accessories		P
5.1	An appliance having provision for the use of an electrical accessory intended to be attached in the field shall comply with the requirements in this standard, with or without the accessory installed.		P
5.2	Installation of an accessory by the user shall be by means of a locking type receptacle and plug-in connector.		P
5.3	When an accessory is to be installed by the user, the appliance shall comply with the requirements in Section 7, Accessibility of Uninsulated Live Parts and Moving Parts, during and after the installation of the accessory.		P
5.4	The installation of an accessory by service personnel shall be by means of receptacles, plug-in connectors, insulated wire connectors, or by connection to existing wiring terminals.		N/A
5.5	With reference to 5.4, an installation shall not require the cutting of wiring or the soldering of connections by the installer. Installations shall not require cutting, drilling, or welding in electrical enclosures and in other areas where such operations may damage electrical components and wiring within the cabinet or enclosure.		N/A
5.6	A means for strain relief shall be provided and comply with the strain relief test in Section 42, Strain Relief Test, at a force of 20 pounds (89 N), for the wiring in the accessory if there is a possibility of transmitting stress to the terminal connections during installation.		P
5.7	All terminals and wiring intended to be field connected shall be identified on the accessory, on the appliance if connections are made between the accessory and the appliance, and on the wiring diagram.		P
5.8	The intended installation of the accessory shall be indicated in the installation instructions included on or with the accessory. See 59.8.		P
5.9	As part of the investigation, an accessory is to be trial installed to determine that the installation is feasible, the instructions are detailed and correct, and the use of the accessory does not introduce a risk of electric shock, fire, or injury to persons.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
5.10	An electrical accessory intended for field installation shall be marked in accordance with 57.9.		P
6	Frame, Cabinet and Enclosure		P
6.1	General		P
6.1.1	Electrical parts shall be provided within a cabinet or enclosure.		P
6.1.2	Other than as noted in 6.1.3, an air-inlet or an air-outlet opening of a duct-type product may be considered enclosed by the adjacent duct work if an insulated or an uninsulated live part accessible without the duct work installed is at an energy level equal to or below that of a partially-protected part as specified in Partially Protected Parts, Section 37.		N/A
6.1.3	An air-inlet or an air-outlet opening not always intended to be attached to duct work is not considered to be enclosed.		P
6.1.4	The cabinet, enclosure and parts of the cabinet or enclosure such as doors, covers, and the like, shall be provided with means for securing them in place.		P
6.1.5	An enclosure or cabinet shall be formed and assembled so that it will have the strength and rigidity necessary to resist the abuses to which it is likely to be subjected, without increasing its risk of fire, electric shock, or injury to persons due to total or partial collapse with resulting reduction of spacings, loosening or displacement of parts, or other serious defects.		P
6.1.6	A cast-metal or die-cast metal cabinet or enclosure shall be investigated to determine that it is equivalent to sheet metal.		P
6.1.7	Deleted		P
6.1.8	Deleted		P
6.1.9	Glass covering an observation opening shall be secured in place so that it cannot be readily displaced in service, and shall provide mechanical protection for the enclosed parts.		N/A
6.1.10	Glass for an opening not more than 4 inches (102 mm) in any dimension shall not be less than 0.055 inch (1.40 mm) thick. Glass for a larger opening, but not more than 144 square inches (929 cm ²) in area and having no dimensions greater than 12 inches (305 mm), shall not be less than 0.115 inch (2.92 mm) thick.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
6.1.11	Glass used to cover an opening larger than 144 square inches (929 cm ²) shall be investigated to determine that it has the necessary mechanical strength and is otherwise suitable for the purpose.		N/A
6.1.12	Each gasket required to seal an enclosure against the entrance of rain and condensate shall be held in place by mechanical fasteners or adhesives except as indicated in 6.1.13, and shall:		N/A
	a) Be neoprene, rubber, thermoplastic, polyvinyl chloride or other materials with equivalent properties that comply with Section 49C; or		N/A
	b) Comply with the Standard for Gaskets and Seals, UL 157 if the gasket physical properties are equivalent to those specified in 49C.2 – 49C.10.		N/A
6.1.13	In reference to 6.1.12, gaskets which are not held in place by mechanical fasteners or adhesives but are intended to be retained in the correct position by some other means shall be prevented from displacement either:		N/A
	a) Due to their location within the equipment, or		N/A
	b) By the placement of other components in the enclosure so that if the equipment cover is removed, the gasket will be reengaged in the intended manner when the cover is replaced.		N/A
6.1.14	Adhesives required to secure gaskets shall comply with 49C.11.		N/A
6.1.15	Products intended for outdoor use shall comply with the Rain Test, Section 49B.		N/A
6.1.16	For products intended for installation within a concealed space of a building structure, an opening complying with Section 7, Accessibility of Uninsulated Live Parts and Moving Parts, but located on a part of the product concealed by the building structure shall not have any dimension exceeding 17/64 in. (6.75 mm) or a cross-sectional area exceeding 0.055 in ² (35.5 mm ²) and there shall be no more than:		P
	a) Four openings in the rear of the enclosure; and		N/A
	b) Two openings in each of the other four sides of the enclosure.		N/A
6.2	High-voltage power supply		P
6.2.1	A high-voltage power supply shall:		P

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UL 867			
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	a)Be housed within its own enclosure or comply with 49.4.1 – 49.4.3 if the power supply has uninsulated live parts; or		P
6.2.2	A power-supply enclosure shall be:		P
	a)Uncoated sheet steel not less than 0.026 inch (0.66 mm) thick;		N/A
	b)Zinc-coated sheet steel not less than 0.029 inch (0.74 mm) thick;		N/A
	c)Copper, brass, or aluminum not less than 0.036 inch (0.91 mm) thick; or	UL approved	P
	d)A polymeric material complying with the applicable requirements in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.	UL approved	P
6.3	Fixed products	Portable products	N/A
6.3.1	Other than as noted in 6.3.2, the thickness of a sheet-metal enclosure of a control panel, a duct door, or a similar component shall be as specified in Tables 6.1 and 6.2.		N/A
6.3.2	A sheet-metal wall to which a wiring system is to be connected in the field shall have a thickness of not less than:		N/A
	a)0.032 inch (0.81 mm) if uncoated steel,		N/A
	b)0.034 inch (0.86 mm) if galvanized steel, or		N/A
	c)0.045 inch (1.14 mm) if nonferrous.		N/A
6.3.2.1	Metallized or painted polymeric parts shall comply with Section 6A, Nonmetallic Parts.		N/A
6.3.3	Tables 6.1 and 6.2 are based on a uniform deflection of the enclosure surface for any given load concentrated at the center of the surface regardless of metal thickness.		N/A
6.3.4	With reference to Tables 6.1 – 6.3, a supporting frame is an angled structure, or channel, or a folded rigid section of sheet metal that is:		N/A
	a)Rigidly attached to the enclosure surface,		N/A
	b)Has essentially the same outside dimensions as the enclosure surface, and		N/A
	c)Has sufficient torsional rigidity to resist the bending moments that may be applied by the enclosure surface if it is deflected.		N/A

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6.3.5	Equivalent reinforcing may be accomplished by constructions that will produce a structure as rigid as one that is built with a frame of angles or channels. Construction types without a supporting frame include:		N/A
	a)A single sheet with single formed flanges – formed edges;		N/A
	b)A single sheet that is corrugated or ribbed; or		N/A
	c)An enclosure surface loosely attached to a frame, for example, with spring clips.		N/A
6.3.6	The thickness of a sheet-steel enclosure of an ionizer-collector frame assembly shall be as specified in 6.3.2 and Table 6.3.		P
6.3.7	A duct-mounted product shall be provided with flanges that are acceptable for connection to a duct system on the air-inlet and air-outlet sides.		N/A
6.4	Portable products		P
6.4.1	A sheet-metal enclosure shall be evaluated with respect to its size, shape, thickness of metal, and its suitability for the application, considering the intended use of the complete air cleaner. The thickness of sheet steel shall not be less than 0.026 inch (0.66 mm) if uncoated or 0.030 inch (0.76 mm) if galvanized. Other sheet metal shall have a thickness not less than 0.036 inch (0.91 mm) except for small areas or for surfaces that are curved or otherwise reinforced.		P
6.4.2	A wooden cabinet or enclosure shall not be less than 1/2 inch (12.7 mm) thick.		P
6A	Nonmetallic Parts		P
6A.1	Except as specified in 6A.3, all nonmetallic parts shall comply with Sections 6A – 6C and the tests for each respective nonmetallic part as described in Table 51A.1. Nonmetallic fasteners used as a part of an enclosure or cabinet shall comply with the Fastener Strength Test, Section 51B.		P
6A.2	In addition to the requirement in 6A.1, nonmetallic materials serving as electrical insulation or located within 1/8 in (3 mm) of:		P
	a)Line-voltage uninsulated live parts shall comply with the Electrical Insulation section in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C; or		P
	b)High-voltage uninsulated live parts shall:		N/A
	1)Comply with the High-Voltage Insulating Material Arcing Test, Section 51; or		N/A

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	2)Be used only with high-voltage uninsulated live parts that operate within the voltage and current limitations specified in the Partially Protected Parts Test, Section 37 if the product is rated 250 V or less.		N/A
6A.3	Nonmetallic parts not complying with 6A.1 shall be one of the following:		P
	a)Air-cleaner filters that comply with Section 22, Filters;		P
	b)A nonfunctional part having a total surface area of less than 1 ft ² (0.093 m ²), located so it cannot propagate flame from one area to another or to other ignitable parts and does not connect a source of ignition to other ignitable parts; or		P
	c)An insulating barrier of a size and location as specified in (b) and complying with 11.4.		P
6B	Nonmetallic Materials		P
6B.1	Materials shall be classified with respect to flammability characteristics that are established by the tests specified in the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.		P
6B.2	Materials shall be assigned flammability ratings based on greatest to least resistance to flame and are identified as: 5VA, 5VB, V-0, V-1, V-2, HF-1, HF-2, HB, and HBF.		P
6B.3	In reference to 6B.2, the assigned flammability rating shall be appropriate for the material-use application in accordance with Table 51A.1.		P
6C	Nonmetallic Material Ignition Sources Separation		P
6C.1	A nonmetallic part shall be positioned as shown in Figure 6C.1 if the part:		P
	a)Has a flame rating of HB as determined in accordance with Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94; or	V-0 used	N/A
	b)Complies with either the Flammability – 12 mm Flame or the Flammability – 20 mm (3/4- Inch) Flame Test as specified in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C.		P
6C.2	<i>A nonmetallic part as specified in 6C.1 shall be separated from ignition sources by means of a mechanical barrier, extending at least to the boundary surface of the space whenever such parts are located:</i>		P
	a)Below an ignition source and within Space A;		P
	b)Above an ignition source and within Space B; and		N/A
	c)In the vertical plane relative to an ignition source and within Space C.		N/A

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6C.3	The nonmetallic parts referenced by 6C.1 shall be located such that the distance between:		P
	a)Line-voltage wiring not employing VW-1 insulation and the nonmetallic parts shall be a minimum of 2 inches (51 mm); and		P
	b)Any other ignition source and the nonmetallic parts shall be a minimum of 4 inches (102 mm).		P
6C.4	With reference to 6C.3 and Figure 6C.1, the minimum distance for the nonmetallic materials located:		P
	a)Above the ignition source shall be as shown in Distance X + Y; and		P
	b)In the vertical plane relative to the ignition source shall be as shown in straight-line Distance Z.		N/A
7	Accessibility of Uninsulated Live Parts and Moving Parts		P
7.1	In reference to 7.5 and except as specified in 7.2, an opening in a cabinet or enclosure shall comply with the following to reduce the likelihood of unintentional contact that may involve a risk of electric shock from an uninsulated live part or film-coated (magnet) wire, or injury to persons from a moving part:		P
	a)For an opening that has a minor dimension less than 1 inch (25.4 mm), a wire or moving part shall not be contacted by the probe illustrated in:		N/A
	1)Figure 7.1; or		P
	2)Figure 7.2, for those products intended only for ceiling mounting.		P
	b)For an opening that has a minor dimension of 1 inch or more, such a part or wire shall be spaced from the opening as specified in Table 7.1.		N/A
7.2	In reference to 7.1, an opening in an integral enclosure of a motor shall:		P
	a)Have a minor dimension less than 3/4 inch (19.1 mm) if:		P
	1)A moving part cannot be contacted by the probe illustrated in Figure 7.3.		P
	2)Film-coated (magnet) wire cannot be contacted by the probe illustrated in Figure 7.4.		N/A
	3)No uninsulated live part in a directly accessible motor, as described in 7.7, can be contacted by the probe illustrated in Figure 7.5.		N/A
	4)No uninsulated live part in an indirectly accessible motor, as described in 7.6, can be contacted by the probe illustrated in Figure 7.3.		N/A
	b)Be spaced not less than the distance specified in Table 7.1 from any wire or moving part if the opening has a minor dimension of 3/4 inch or more.		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.3	The probes mentioned in 7.1 and 7.2 and illustrated in Figures 7.1 – 7.5 shall be applied to any depth that the opening will permit. They shall be rotated or angled before, during, and after insertion through the opening to any position that is necessary to examine the enclosure or cabinet. The probes illustrated in Figures 7.1 and 7.5 shall be applied in any possible configuration. If necessary, the configuration shall be changed after insertion through the opening.		P
7.4	The probes mentioned in 7.3 and 7.5 are to be used as measuring instruments to evaluate the accessibility provided by an opening, and not as instruments to evaluate the strength of a material. They are to be applied with the minimum force necessary to determine accessibility.		P
7.5	With reference to the requirements in 7.1 and 7.2, the minor dimension of an opening is the diameter of the largest cylindrical probe having a hemispherical tip that can be inserted through the opening.		P
7.6	With reference to the requirements in 7.2, an indirectly accessible motor is a motor that is:		P
	a) Accessible only by opening or removing a part of the cabinet, such as a guard or panel, that can be opened or removed without using a tool; or		P
	b) Located at such a height or is otherwise guarded or enclosed so that it is unlikely to be contacted.		P
7.7	A directly accessible motor is a motor that:		P
	a) Can be contacted without opening or removing any part or		P
	b) Is located so as to be accessible to contact.		N/A
7.8	During the examination of a product to determine whether it complies with the requirements in 7.1 or 7.2, a part of the cabinet or enclosure that may be opened or removed by the user without using a tool shall be opened or removed.		P
7.9	With reference to the requirements in 7.1 and 7.2, insulated brush caps are not required to be additionally enclosed.		N/A
7.10	If the opening or removal of a door, a cover, or any other component required for user servicing permits access to a part that is considered to present a risk of electric shock (see 37.1), the door, cover, or component shall be provided with an interlock switch as specified in 29.2.1 – 29.2.5 to de-energize the primary circuit of the high-voltage power supply.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
7.11	Unless a mechanical means is provided to discharge to ground any residual charge existing in the high-voltage parts after the primary circuit is de-energized, a time-delay feature shall be provided so that live parts do not become accessible until residual charges decay as required in 47.1.		N/A
8	Mechanical Assembly		P
8.1	General		P
8.1.1	A product shall be assembled so that it will not be adversely affected by the vibration of normal operation.		P
8.1.2	Provision shall be made for mounting a product securely. Bolts, screws, or other parts used for mounting the product shall be independent of those used for securing components of the product to the frame, base, or panel.		P
8.1.3	The mounting assembly shall be capable of supporting four times the weight of the product for 1 minute.		P
8.1.4	A switch, a lampholder, an attachment-plug receptacle, a motor-attachment plug, or similar component shall be mounted securely and shall be prevented from turning		P
	a)The switch is of a plunger or other type that does not tend to rotate. A toggle switch is considered to be subjected to forces that turn the switch during its normal operation.		P
	b)It is unlikely that the operation of the switch will loosen its mounting means.		P
	c)Spacings are not reduced below the minimum values if the switch rotates.		P
	d)Normal operation of the switch is by mechanical means rather than by direct contact by persons.		N/A
8.1.5	Means for preventing the turning mentioned in 8.1.4 is to consist of more than friction between surfaces. For instance, a properly applied lock washer can be used as a means to prevent a small stem-mounted switch or other device having a single-hole mounting means from turning.		P
8.1.6	If a vertically-mounted switch or circuit breaker is such that movement of the operating handle results in one position being above the other position, the upper position shall be the on position.		N/A
8.2	Assembly for shipping		N/A
8.2.1	A product shall be completely assembled when it is shipped from the factory.		N/A
8.2.2	If mismatching of components of a product that is shipped disassembled presents a risk of fire, electric shock, or injury to persons, the parts shall be marked as specified in 56.2. See also 8.2.4.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.2.3	If a cord-connected product is shipped partially disassembled, internal connections that must be made in the field shall be made by plug and receptacle connections. If a product intended for permanent connection to the power supply is shipped partially disassembled, internal connections that must be made in the field shall be made in accordance with 12.1.1.1 – 12.1.5.5 or by plug and receptacle connections.		N/A
8.2.4	A product that is shipped from the factory partially disassembled shall be shipped in a single shipping container or marked in accordance with 57.2.		N/A
8.3	Mechanical barriers		P
8.3.1	A mechanical barrier shall be formed from one or more of the following:		P
	a)Metal with at least the thickness specified in Tables 6.1 or 6.2 as provided under the columns titled "With supporting frame or equivalent reinforcing" for the dimensions of the mechanical barrier;		P
	b)A nonmetallic material of the necessary strength and rigidity and:		P
	1)Rated 5VA; or		N/A
	2)Evaluated to the 127 mm (5 inch) Flammability Test as described in the Standard for Polymeric Materials – Use in Electrical Equipment Evaluations, UL 746C;		N/A
	c)Any other material or construction determined to be equivalent to (a) – (b).		N/A
9	Live Parts		P
9.1	A current-carrying part shall have the necessary mechanical strength and ampacity, and shall be made of a metal that can be used for the application.		P
9.2	An uninsulated live part shall be secured to its supporting surface by a means other than friction between surfaces so that it will be prevented from turning or shifting in position if such motion may result in a reduction of spacings below the minimum required values. The construction of a contact assembly shall be such that the alignment of the contacts will be maintained.		P
10	Protection Against Corrosion		N/A
10.1	Products intended for indoor use		N/A
10.1.1	Iron and steel parts shall be protected against corrosion by enameling, galvanizing, sherardizing, plating, or other means that have been determined to be equivalent.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
10.1.2	The requirement in 10.1.1 applies to all parts of the framework, cabinet and enclosure; all iron and steel current-carrying parts, except resistors; all spring-door fasteners; and other parts upon which proper mechanical operation may depend.		N/A
10.1.3	Iron and steel used within a cabinet or enclosure that is intended to be washed down during normal maintenance of the product shall be protected against corrosion. A zinc coating that withstands, without a fixed deposit, three 1-minute dips in a standard copper sulphate solution, or some other equivalent coating shall be used. Painting or baked enamel is not considered to provide the required protection.		N/A
10.1.4	Bonderized steel parts provided with a primer coat and covered by a baked-alkyd-enamel finish are considered to comply with the requirements in 10.1.3.		N/A
10.2	Products intended for outdoor use		N/A
10.2.1	A sheet-steel cabinet or enclosure intended for outdoor use shall be protected against corrosion by one of the following coatings:		N/A
	a) Hot-dipped, mill-galvanized sheet steel complying to the coating Designation G90 in the Weight (Mass) of Coating Requirements table in the Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, ASTM A653, with not less than 40 percent of the zinc on any side, based on the minimum single-spot test requirement in this ASTM designation.		N/A
	b) A zinc coating, other than that provided on hot-dipped, mill-galvanized sheet steel, uniformly applied to an average thickness of not less than 0.00061 inch (0.015 mm) on each surface with a minimum thickness of 0.00054 inch (0.014 mm). An annealed coating shall comply with 10.2.2 and 10.2.3.		N/A
	c) A zinc coating complying with (1) or (2) and with one coat of an organic finish of the epoxy or alkyd-resin type or other outdoor paint on both surfaces. If necessary, the acceptability of the paint may be determined by evaluation of its composition or by corrosion tests.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	1) Hot-dipped, mill-galvanized sheet steel complying with the coating Designation G60 or A60 in the Weight (Mass) of Coating Requirements table in the Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, ASTM A653, with not less than 40 percent of the zinc on any side, based on the minimum single-spot test requirement in this ASTM designation. An A60 (alloyed) coating shall also comply with 10.2.2 and 10.2.3.		N/A
	2) A zinc coating, other than that provided on hot-dipped, mill-galvanized sheet steel, uniformly applied to an average thickness of not less than 0.00041 inch (0.010 mm) on each surface with a minimum thickness of 0.00034 inch (0.009 mm). An annealed coating shall also comply with 10.2.2 and 10.2.3.		N/A
	d) A cadmium coating not less than 0.0010 inch (0.025 mm) thick on both surfaces.		N/A
	e) A cadmium coating not less than 0.00075 inch (0.019 mm) thick on both surfaces with one coat of outdoor paint on both surfaces, or not less than 0.00051 inch (0.013 mm) thick on both surfaces with two coats of outdoor paint on both surfaces. The paint shall be as described in (c).		N/A
	f) Other finishes, including paints, metal finishes, or combinations of the two may be used when comparative tests with galvanized sheet steel (without annealing, wiping, or other surface treatment) complying with (a), indicate they provide equivalent protection. Among the factors that are taken into consideration when judging such coating systems are exposure to salt spray, moist carbon dioxide-sulphur dioxide-air mixture, moist hydrogen sulphide-air mixtures, ultraviolet light, and water.		N/A
10.2.2	A hot-dipped, mill-galvanized A60-alloyed-coating or an annealed coating on sheet steel that is bent or similarly formed or extruded or rolled at the edge of a hole after annealing shall be additionally painted in the affected area if the process damages the zinc coating.		N/A
10.2.3	If flaking or cracking of the zinc coating at the outside radius of the bent or formed section is visible at 25-power magnification, the zinc coating is considered to be damaged.		N/A
10.2.4	Simple sheared or cut edges and punched holes are not required to be additionally protected.		N/A

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10.2.5	In reference to 10.2.1(a) and (c)(1), the weight of the zinc coating may be determined by any method that has been determined to be acceptable; however, in case of question the weight of coating shall be established in accordance with the Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings, ASTM A90.		N/A
10.2.6	In reference to 10.2.1(b), (c)(2), (d) and (e), the thickness of the cadmium or zinc coating shall be established by the Metallic Coating Thickness Test, Section 50.		N/A
11	Electrical Insulation		P
11.1	All circuits		P
11.1.1	A thermoplastic or epoxy potting compound shall be used within its temperature rating and shall be a minimum of 1/32 inch (0.8 mm) thick. Prior to potting, the parts shall be mechanically secure.		P
11.2	Primary circuits		P
11.2.1	A base for the support of a live part shall be glazed slate, porcelain, phenolic, cold-molded composition, or other material that has been evaluated for such use. It shall be able to withstand the most severe conditions likely to be met in service.		P
11.2.2	Deleted		P
11.2.3	Vulcanized fiber shall not be used for the sole support for uninsulated live parts of other than low-voltage circuits.		P
11.3	Secondary circuits		P
11.3.1	A base for the support of a high-voltage part shall be of glazed porcelain, mica, glass, or other insulating material that has been evaluated for the application. It shall be moisture resistant and constructed so that, considering the material use, it will withstand the most severe conditions likely to be met in service.		P
11.3.2	Deleted		P
11.3.3	Insulating materials other than those specified in 11.3.1 shall comply with 11.4 or with the High-Voltage Insulating Material Arcing Test, Section 51.		P
11.4	Insulating barriers		P
11.4.1	An insulating barrier shall:		P
	a) Be constructed to withstand the most severe condition anticipated in service;		P
	b) Comply with requirements for mechanical barriers in 8.3 if exposed or otherwise subjected to mechanical damage; and		P
	c) Be reliably held in place.		P

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Clause	Requirement + Test	Result - Remark	Verdict
11.4.2	Materials used for an insulating barrier:		N/A
	a) Shall be of the material(s) and minimum thickness as specified in Table 11.1 for high, line or low-voltage circuits.		N/A
	b) Shall be vulcanized fiber or varnished cloth not less than 1/32 inch (0.8 mm) thick for line or low-voltage circuits.		N/A
	c) Shall be equivalent to those specified in (a) or (b) for each respective circuit.		N/A
	d) Are not specified for low-voltage circuits that do not contain a protective control.		N/A
12	Supply Connections		P
12.1	Permanently-connected products		P
12.1.1	General		P
12.1.1.1	A product shall have provision for the connection of a wiring system.		P
12.1.1.2	A product shall be provided with wiring terminals or leads for the connection of conductors having an ampacity rated for the sum of the following:		P
	a) The ampere rating of the power pack and		N/A
	b) One hundred twenty-five percent of the full-load motor current.		N/A
12.1.1.3	It is assumed that a product will be connected with conductors having 60°C (140°F) insulation unless otherwise marked.		N/A
12.1.1.4	A lead that is intended to be spliced in the field to a branch-circuit conductor shall not be smaller than 18 AWG (0.82 mm ²) and the insulation, if rubber or thermoplastic, shall not be less than 1/32 inch (0.79 mm) thick.		N/A
12.1.1.5	A product intended for duct- or plenum-mounting shall be permanently connected to the electrical supply source unless constructed as specified in 12.2.1.2.		N/A
12.1.2	Wiring compartment		P
12.1.2.1	A terminal box or compartment for making power-supply connections in the field shall be of ample size to accommodate such connections and shall be located so that the connections can be readily inspected after the product is installed as intended.		P
12.1.2.2	If inspection indicates that the volume of a compartment may be insufficient to accommodate the intended wiring, a trial installation is to be made using wires of the size specified in 12.1.1.2 and conduit and fitting sized for the wire in accordance with the National Electrical Code, ANSI/NFPA 70.		N/A

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12.1.2.3	Leads intended for connection to any external line-voltage circuit or to an external low-voltage circuit containing one or more protective controls shall be provided with strain relief if stress on the lead may be transmitted to terminals, splices, or internal wiring. Leads shall comply with 42.1 when subjected to a direct pull of 20 pounds-force (89 N).		P
12.1.3	Conduit connection means		P
12.1.3.1	A tapped hole for the attachment of threaded rigid conduit shall be provided with:		P
	a)At least three full threads tapped all the way through the wall of an enclosure and located so that a bushing may be attached to the end of the conduit or		N/A
	b)At least 3-1/2 full threads and a smooth, rounded inlet hole having a diameter approximately the same as the internal diameter of a standard bushing to provide protection for the conductors equivalent to that provided by such a bushing.		N/A
12.1.3.2	A knockout in a sheet-metal enclosure shall be reliably secured but shall be capable of being removed without undue deformation of the enclosure.		N/A
12.1.3.3	A plate or plug used to close an unused conduit opening or other hole in the enclosure shall be securely mounted and shall have:		N/A
	a)For an opening with a 1/4 inch (6.4 mm) or smaller maximum dimension, a thickness not less than 0.014 in (0.36 mm) for steel nor less than 0.019 inch (0.48 mm) for nonferrous metal.		N/A
	b)For an opening with a maximum dimension greater than 1/4 inch, but not greater than 1-3/8 inches (34.9 mm), a thickness not less than 0.027 inch (0.69 mm) for steel nor less than 0.032 inch (0.81 mm) for nonferrous metal.		N/A
	c)For an opening with a maximum dimension greater than 1-3/8 inches, a thickness equal to that required for the enclosure of the device or equal to that required for a standard knockout seal.		N/A
12.1.3.4	A flat surface shall be provided around all knockouts, and the location of the knockouts shall be such that the spacing between the installed conduit bushing and uninsulated live parts will not be less than the minimum values specified in Spacings, Section 23.		N/A
12.1.3.5	When measuring a spacing between an uninsulated live part and a bushing installed in the knockout referred to in 12.1.3.4, it is to be assumed that a bushing having the dimensions specified in Table 12.1 is in place, in conjunction with a single locknut.		N/A

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12.1.3.6	The opening or knockout intended for the attachment of a permanent wiring system shall be based on the product minimum supply circuit ampacity (MCA) and the required field-supplied wire size in accordance with Table 12.2.		N/A
12.1.4	Terminal parts		N/A
12.1.4.1	A field-wiring terminal shall be provided with a pressure terminal connector, firmly bolted or held by a screw.		N/A
12.1.4.2	A wire-binding screw to which field-wiring connections are made shall not be smaller than No. 8 (4.2 mm diameter).		N/A
12.1.4.3	A terminal plate tapped for a wire-binding screw shall be of metal not less than 0.030 inch (0.76 mm) thick for a 14 AWG (2.1 mm ²) or smaller wire and not less than 0.050 inch (1.27 mm) thick for a wire larger than 14 AWG.		N/A
12.1.4.4	A terminal plate tapped for a wire-binding screw shall be provided with no fewer than two full threads in the metal. The metal may be extruded at the tapped hole for the binding screw to provide two full threads.		N/A
12.1.4.5	A wire-binding screw shall thread into metal.		P
12.1.5	Terminal identification		P
12.1.5.1	A permanently connected product rated 125 or 125/250 volts (three-wire) or less employing a screw-shell lampholder, a single-pole switch, or a single-pole overcurrent-protective device other than an automatic control without a marked off position, shall have one terminal or lead identified for the connection of the grounded conductor of the supply circuit.		P
12.1.5.2	A field-wiring terminal intended for the connection of a grounded supply conductor shall be identified by means of a metallic coating that is substantially white in color. It shall be readily distinguishable from the other terminals, or proper identification of the terminal for the connection of the grounded conductor shall be clearly shown in some other manner, such as on a wiring diagram provided on the product. If wire leads are provided instead of terminals, the lead intended to be connected to the grounded supply conductor shall have a white or gray color and shall be readily distinguishable from the other leads.		N/A
12.1.5.3	The surface of an insulated lead intended for the connection of an equipment-grounding conductor shall be green with or without one or more yellow stripes. No other lead shall be so identified.		N/A

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12.1.5.4	A wire-binding screw intended for the connection of an equipment-grounding conductor shall have a green-colored head that is hexagonal, slotted, or both. It shall be located so that it is unlikely to be removed during normal servicing of the product.		N/A
12.1.5.5	A pressure wire connector intended for connection of an equipment-grounding conductor shall be plainly identified, such as by being marked G,GR,Ground, Grounding, the grounding symbol (from IEC 60417, Symbol 5019) as illustrated in Figure 12.1 or the like, or by a marking on a wiring diagram provided on the product. The pressure wire connector shall be located so that is unlikely to be removed during normal servicing of the product.		N/A
12.2	Cord-connected products		P
12.2.1	Cords and plugs		P
12.2.1.1	A cord-connected product, other than a duct- or plenum-mounted product, shall be provided with a flexible cord that is not less than 6 feet (1.83 m) nor more than 10 feet (3.05 m) long. The cord shall be provided with an attachment plug for connection to the supply circuit.		P
12.2.1.2	A duct- or plenum mounted product not complying with 12.1.1.5 shall comply with all of the following:		P
	a)Be provided with a flexible supply cord which is:		P
	1)A 3-conductor Type SJ or equivalent cord rated for at least 105°C (221°F);		P
	2)Terminated in a grounding attachment plug; and		
	3)Not more than 6 feet (1.83 m) long;		
	b)Be packaged with a field-wiring compartment containing a single receptacle for plug connection of the product if the product is intended for installation on and obtain its power supply from a furnace; and		N/A
	c)Be provided with installation instructions in accordance with 59.5.		N/A
12.2.1.3	Except as specified in 12.2.1.3.1, a flexible cord shall include a grounding conductor and a grounding-type attachment plug. The grounding conductor shall be:		N/A
	a)Green with or without one or more yellow stripes;		N/A
	b)Connected to the grounding blade of a grounding attachment plug; and		N/A

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	c)Connected to the frame, cabinet or enclosure of the product by means of a screw not likely to be removed during ordinary servicing, or by other reliable means. Solder alone shall not be used to make this connection.		N/A
12.2.1.3.1	In reference to 12.2.1.3, a cord-connected product not having a grounding conductor shall be portable, rated less than 150 volts and:		P
	a)Provided with a 2-blade polarized attachment plug; or,		P
	b)Intended only for connection to a low-voltage supply source and be provided with a plug appropriate for the low-voltage source (such as a USB type connector).		P
12.2.1.5	The flexible cord shall be Type SP-2, SPE-2, SPT-2, or of a type that has been evaluated for harder service.	UL approved	P
12.2.1.6	The voltage rating of the cord and the attachment plug shall not be less than the rated voltage of the product.		P
12.2.1.7	The ampacity of the cord shall not be less than the current rating of the product. The current rating of the attachment plug shall not be less than 125 percent of the current rating of the product, except that a 20-ampere plug can be used for a product rated not more than 4,000 watts at 240 volts.		P
12.2.1.8	The flexible cord shall be attached permanently to the product, or may be in the form of a separate cord set as specified in 12.2.1.9.		P
12.2.1.9	If a separate cord set is provided for the product as specified in 12.2.1.8, the product shall not be provided with terminal pins that will accommodate a standard flatiron or appliance plug.		P
12.2.2	Strain relief		P
12.2.2.1	A product shall be provided with means to prevent stress on the power-supply cord from being transmitted to terminals, splices, or wiring within the product. The product shall comply with the Strain Relief Test, Section 42.		P
12.2.2.2	A metal strain-relief clamp or band (without auxiliary protection) may be used with a Type S, SE, SJ, SJE, SJO, SJT, SJTO, SO, ST, or STO cord. A metal strain-relief clamp or band may be used with Type SP-2 rubber-insulated cord and with Type SPT-2 cord only if auxiliary, nonconducting, mechanical protection is provided with the cord and the combination is determined acceptable by investigation.		N/A
12.2.2.3	Means shall be provided so that the flexible cord or supply leads cannot be pushed into the product through the cord-entry hole when such displacement results in:		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	a)Mechanical damage to the cord or leads;		P
	b)Exposure of the cord or leads to a temperature higher than that for which it is rated; or		P
	c)A reduction of spacings, such as to a metal strain-relief attachment, below the minimum required values.		P
12.2.2.4	If a knot in a flexible cord serves as strain relief, any surface that the knot can touch shall be free from burrs, fins, projections, sharp edges, and the like that may abrade the cord.		N/A
12.2.3	Bushings		P
12.2.3.1	A bushing or the equivalent shall be provided at an opening in a cabinet, enclosure, partition or in a mechanical or insulating barrier through which a supply cord passes. The bushing or the equivalent shall be substantial, reliably secured in place, and shall have a smooth, rounded surface against which the cord may bear. If a cord other than Type S, SE, SJ, SJE, SJO, SJT, SJTO, SO, ST, or STO is employed and the cabinet, enclosure, partition or barrier is of metal, an insulating bushing shall be provided.		P
12.2.3.2	In general, ceramic materials and some molded compositions may be used for insulating bushings.		N/A
12.2.3.3	A separate neoprene or polyvinyl chloride bushing may be employed on a supply cord:		N/A
	a)Anywhere in a product if it is used in conjunction with a type of cord for which an insulating bushing is not required or		N/A
	b)Where the cord enters the frame of a motor or the enclosure of a capacitor that is physically attached to a motor if:		N/A
	1)The bushing is not less than 3/64 inch (1.2 mm) thick and		N/A
	2)The bushing is located so that it will not be exposed to oil, grease, oil vapor, or other substances that can have a deleterious effect on the compound employed.		N/A
12.2.3.4	The edges of the hole in which a neoprene or polyvinyl chloride bushing is used shall be free from burrs, fins, and the like that are capable of damaging the bushing.		P
12.2.3.5	A bushing of the same material as, and molded integrally with, the supply cord may be used with a Type SP-2 or heavier cord if the built-up section is not less than 3/64 inch (1.2 mm) thick at the point at which the cord passes through the enclosure.		P
12.2.3.6	An insulated metal grommet may be used in place of an insulating bushing if the insulating material used is not thinner than 1/32 inch (0.8 mm) and completely fills the space between the grommet and the metal in which the grommet is mounted.		P

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Clause	Requirement + Test	Result - Remark	Verdict
12.3	Cord-connected conversion to permanently connected		N/A
12.3.1	A product intended to be field-converted shall be manufactured as a cord connected product and have provision for permanent connection of a wiring system. Before conversion, the cord-connected product shall comply with 12.2 and after conversion the product shall comply with 12.1. In addition, the product shall comply with 12.3.2 and all relevant parts of this Standard.		N/A
12.3.2	In reference to 12.3.1, after conversion of the product, the opening provided for the power supply cord shall either comply with the accessibility requirements in Section 7, Accessibility of Uninsulated Live Parts and Moving Parts, or be used as the opening for connection of the permanent wiring system.		N/A
13	Polarization		P
13.1	The screw shell of each lampholder shall be connected:		P
	a)To the conductor or terminal intended to be connected to the grounded conductor of the supply circuit, for a permanently-connected product;		P
	b)To the conductor of the supply cord intended to be connected to the grounded conductor of the supply circuit, for a cord-connected product; or		P
	c)To the same supply conductor in the absence of a conductor or terminal intended to be connected to the grounded conductor of the supply circuit.		P
13.2	A fuseholder, a single-pole switch, an overcurrent-protective device, and an automatic control with a marked off position shall be connected to an ungrounded conductor of the supply circuit.		N/A
13.3	The screw shell of a plug-type fuseholder and the accessible contact of an extractor-type fuseholder shall be connected toward the load.		N/A
13A	Switches and Controllers		P
13A.1	Except as specified in 13A.6 or 13A.8, a switch or other control device shall have a rating not less than that of the load that it controls. Items to consider in determining the device rating could include the voltage, current, power factor, control device ambient temperature and other similar parameters. Power factor requirements for each specific load type are specified in 46C.5.		P
13A.2	A switch or other control device, other than as specified in 13A.2.1, shall be located within the confines of the frame, cabinet or enclosure of the product or be additionally protected so as to reduce the likelihood of contact by external objects.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
13A.2.1	In reference to 13A.2, if the actuating part of a switch or other control device is not located within the confines of the frame, cabinet or enclosure of the product:		N/A
	a)Unintentional operation of the switch or other control device shall not result in a risk of injury to persons; or		N/A
	b)The actuating part shall be guarded such as by recessing, ribs or barriers.		N/A
13A.2.2	A protective control shall be an integral part of the product and control the load either,		P
	a)Directly; or		P
	b)Indirectly through a switching device which is an integral part of the product and that complies with the endurance test requirements for protective controls in 13A.3 or 13A.3.1.		P
13A.3	A protective control shall comply with one of the following:		N/A
	a)Standard for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1 and the Standard for Automatic Electrical Controls – Part 2-6: Particular Requirements for Automatic Electrical Pressure Sensing Controls Including Mechanical Requirements, UL 60730-2-6. The endurance cycle requirements in Table AA.1DV of UL 60730-2-6 for cut-outs shall be applied.		N/A
	b)Standard for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1 and the Standard for Automatic Electrical Controls – Part 2-9: Particular Requirements for Temperature Sensing Controls, UL 60730-2-9. The endurance cycle requirements in Table CC.2 of UL 60730-2-9 for cut-outs shall be applied.		N/A
	c)Standard for Industrial Control Equipment, UL 508.		N/A
	d)Standard for Power Conversion Equipment, UL 508C		N/A
	e)Standard for Switches for Appliances – Part 1: General Requirements, UL 61058-1;		N/A
	f)Standard for General-Use Snap Switches, UL 20; or		N/A
	g)Standard for Nonindustrial Photoelectric Switches for Lighting Control, UL 773A.		N/A
	h)Standard for Solid-State Fan Speed Controls, UL 1917.		N/A
	i)13A.19 and the protective electronic circuits tests in Protective Circuit Tests, Section 49A.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
13A.3.1	In reference to 13A.3 (c) – (i), the endurance cycle requirements in the Standard for Automatic Electrical Controls – Part 2-9: Particular Requirements for Temperature Sensing Controls, UL 60730-2-9, Table CC.2 for cut-outs shall be applied to such controls.		N/A
13A.3.2	In reference to 13A.3 (a), (b), (e) and (i), when determining the acceptability of a protective control, the control pollution degree shall be as specified in 23.6.3 (a) – (e).		N/A
13A.3.3	If the protective control has a protective electronic circuit, the factors outlined in Table 13A.1 shall be considered.		N/A
13A.3.4	Software which is a required part of a protective electronic circuit shall comply with one of the following:		N/A
	a)The Standard for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1, as well as the specific applicable Part 2 and with the requirements for a Class B or C control function;		N/A
	b)Annex R of the Standard for Safety of Household and Similar Electrical Appliances, Part 1: General Requirements, UL 60335-1 and be for a software Class B control function; or		N/A
	c)Not create any risk of fire, electric shock, or injury to persons under abnormal conditions with the software rendered ineffective, e.g., use of independent redundant protective devices.		N/A
13A.3.5	In reference to 13A.3, a device providing motor overload protection shall comply with the requirements in Motors and Motor Overcurrent Protection, Section 20.		N/A
13A.3.6	The cutout calibration temperature of a heater protective (temperature-limiting) control shall be 10°F (6°C) of its maximum marked set-point temperature.		N/A
13A.3.7	The cutout calibration pressure of a pressure protective (limiting) control shall not exceed 105 percent of its maximum marked setting.		N/A
13A.3.8	The cutout calibration setting of ozone-monitoring circuitry in which the circuitry is relied upon to limit the ozone in accordance with 40.1.6 shall not permit the concentration of ozone to exceed the values specified in 40.1.2.		N/A
13A.3.9	Except as specified in 13A.13, an operating control, including of the electronic type, shall comply with:		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	a)One of the standards specified in 13A.3; b)The requirements in this Standard as far as they reasonably apply; or, c)One of the following standards: 1)Standard for Solid-State Controls for Appliances, UL 244A; or, 2)Standard for Clock-Operated Switches, UL 917.		N/A
13A.4	Deleted		N/A
13A.5	Deleted		N/A
13A.6	A switch that controls an inductive load, other than a motor, such as a transformer or a fluorescent-lamp ballast, shall have a current rating of not less than twice the rated full-load current of the transformer or ballast.		N/A
13A.7	A manually operated, line-connected, single pole switch for appliance on-off operation shall not be connected to the conductor of the power supply cord intended to be grounded.		N/A
13A.8	A switch used for controlling a tungsten-filament lamp load shall:		N/A
	a)Be provided with a T or L rating at least equal to the tungsten-filament lamp load; or		N/A
	b)Have an alternating-current rating at least six times, or a direct-current rating at least ten times greater than the tungsten-filament lamp load.		N/A
13A.9	Deleted		N/A
13A.10	A cord-connected product incorporating a motor rated more than 250 watts (1/3 horsepower) output shall be provided with a motor controller.		N/A
13A.11	A speed-control switch shall be provided as part of a product that employs a variable-speed or multispeed motor.		N/A
13A.12	Deleted		N/A
13A.13	An operating control not complying with 13A.3.9 shall:		N/A
	a)Comply with 13A.14(a), if the control is electronic; and		N/A
	b)Be powered entirely by no more than one low-voltage circuit; comply with the Limiting Impedance Test in UL 508; or comply with the low-power circuit requirement determined as specified in 19.11.1 of the Standard for Safety of Household and Similar Electrical Appliances, Part 1: General Requirements, UL 60335-1.		N/A
13A.14	An operating control that complies with 13A.3.9 shall also comply with all the following:		P

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	a)For electronic controls – Installation Class 2 for electromagnetic compatibility (EMC) shall be in accordance with the voltage surge testing in 49A.3.6 and comply with the results specified in 49A.3.2;		P
	b)Category II shall be the overvoltage category;		P
	c)Insulating materials shall have a minimum comparative tracking index (CTI) of 100 (Material Group III);		P
	d)The applicable pollution degree shall be as specified in 23.6.3 (a) – (e); and		P
	e)The operating control (limiter) endurance cycle requirements specified by either:		N/A
	1)Table CC.2 of the Standard for Automatic Electrical Controls – Part 2-9: Particular Requirements for Temperature Sensing Controls, UL 60730-2-9, with the operating control (limiters) endurance cycle requirements being applied; or		N/A
	2)Endurance Test – Switching Devices, Section 46C.		N/A
13A.15	If an operating control complying with 13A.3.9 indirectly controls the load through a switching device, the endurance cycle requirements in 13A.14(e) shall be applied to the switching device.		N/A
13A.16	Appendix B, Operating and Protective (“Safety Critical”) Control Functions, shall be referenced to determine whether a control function is considered to result in a risk of fire, electrical shock or injury to persons.		N/A
13A.17	If a control can be used to reduce the risk of fire, electric shock or injury to persons under abnormal operating conditions of the product, but a redundant control (of similar or different design) operates to perform the identical function, the circuit shall be evaluated to determine which control will be relied upon as the protective control. The control determined to be the protective control shall comply with the protective control requirements in 13A.3. The control determined to be the operating control is not required to comply with the protective control requirements but shall comply with the operating control requirements in 13A.13 or with 13A.3.9 and 13A.14.		N/A
13A.18	A thermistor shall comply with Annex J of the Standard for Automatic Electrical Controls – Part 1: General Requirements, UL 60730-1 or the Standard for Thermistor-Type Devices, UL 1434. The calibration shall be as specified in 13A.3.6. If a thermistor is used:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a)To reduce the risk of fire, electric shock or injury to persons under abnormal operating conditions of the product, the minimum number of endurance cycles shall be 100,000.		N/A
	b)In other sensing applications of the product, the minimum number of endurance cycles shall be 6,000.		N/A
13A.19	A protective control as referenced in 13A.3(i) and having a protective electronic circuit:		P
	a)In which electronic disconnection of the circuit could fail, shall have at least two components whose combined operation provides the load disconnection;		P
	b)Shall prevent a risk of fire, electric shock or injury to persons under the relevant fault conditions specified in 49A.2;		P
	c)In which an overcurrent protective device opens during application of any of the fault conditions specified in 49A.2, shall utilize an overcurrent protective device complying with the requirements applicable to that component. The fault condition causing the overcurrent protective device to open shall be repeated and the overcurrent protective device shall again open the protective electronic circuit. If the overcurrent protective device complies with the Standard for Miniature Fuses: Part 1, Definitions for Miniature Fuses and General Requirements for Miniature Fuse-Links, IEC 60127-1, as well as an applicable Part 2, then the protective device shall additionally comply with the Fuse-Link Test in 49A.5;		N/A
	d)In which a conductor of the printed wiring board becomes open-circuited during the fault conditions test in 49A.2, then:		N/A
	1)The printed wiring board shall comply with the Needle-Flame Test in Annex E of Standard for Safety of Household and Similar Electrical Appliances, Part 1: General Requirements, UL 60335-1 or have a minimum flammability rating of V-0 when tested in accordance with the vertical flame test described in the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94;		N/A
	2)Any loosened conductor shall not reduce spacings below the values specified in relevant 23.1, 23.3, 23.6; and		N/A
	3)The specific test in which the printed wiring became open-circuited shall be repeated a second time. There shall be no risk of fire, electric shock or injury to persons and spacings shall not be reduced below the values specified in relevant 23.1, 23.3, 23.6;		N/A

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	e) Shall maintain its required functions when subjected to the EMC related stresses specified in the Electromagnetic CUoLmpCatOibiPlityY(REMIGC)HTTetsDs, 49MA.A3;TaEndRI		N/A
	f) That relies upon a programmable component for one or more of its safety functions shall be subjected to the Programmable Component Reduced Supply Voltage Test, Section 49A.4, unless restarting at any point in the operating cycle after interruption of operation due to a supply voltage dip will not result in a risk of fire, electric shock or injury to persons. The test shall be carried out after removal of all batteries and other components intended to maintain the programmable component supply voltage during supply source (mains) voltage dips, interruptions and variations.		N/A
13B	Remotely Operated Electrostatic Air Cleaners		P
13B.1	Any function of a product enabled in response to external communication or data signals shall be considered when determining normal and abnormal conditions of the product.		P
13B.2	Except as specified in 13B.3, a manual control shall be provided on a product such that actuation of the control is required before the product can be operated in any mode that permits remote operation, external communication or receiving/sending data signals.		P
13B.3	In reference to 13B.2, a product not provided with a manual control for actuating remote operation, external communication or receiving/sending data signals shall be:		N/A
	a) Capable of remote operation, external communication or receiving/sending data signals only within line-of-sight; or b) Limited only to monitoring external communication or data signals.		N/A
13B.4	A product shall include a means to manually disconnect, disable or override any remote operation commands, external communication or data signals. If the product attachment plug and receptacle serve as the manual means to disconnect data signals or remote operation commands, the product shall comply with 59.9.		P
13B.5	A control that operates in response to remote operation commands, external communication or data signals shall not introduce an operating condition or state that could lead to a risk of fire, electric shock or injury to persons. In addition, such a control shall not:		P

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	<p>a)Render inoperative any protective control or protective control function within the product;</p> <p>b)Alter the order of control response such as by forcing a protective control to operate instead of another control that would normally be intended to respond;</p> <p>c)Reset any protective manual reset feature;</p> <p>d)Supersede the response of any protective control; or</p> <p>e)Alter the response to or expected performance of:</p>		N/A
13B.6	Compliance with 13B.5 shall be determined by one of the following:		N/A
	<p>a)Using methods appropriate for determining the performance and reliability of protective control functions in accordance with Section 13A, Switches and Controllers; or</p> <p>b)Examining the product circuit diagram(s) to determine that a control which operates in response to remote operation commands, external communication or data signals operates wholly independent of the protective controls of the product and therefore is incapable of adversely affecting the operation of any protective controls.</p>		N/A
14	Grounding		N/A
14.1	General		N/A
14.1.1	Each product shall be provided with a means for grounding unless the product complies with 12.2.1.3.1.		N/A
14.1.2	Except as specified in 14.1.2.1, if a grounding means is provided on a product, all exposed dead metal parts that are likely to become energized and all dead metal parts within the product that are exposed to contact during any user-servicing operation and that are likely to become energized shall be reliably connected to the grounding means.		N/A
14.1.2.1	An ungrounded high-voltage transformer core not complying with 14.1.2 shall comply with the dielectric voltage-withstand test specified in 46.2.1.		N/A
14.1.3	With reference to the requirement in 14.1.2, the following dead metal parts are not considered likely to become energized:		N/A
	a)A small metal part (such as an adhesive-attached foil marking, a screw, a handle, or the like) that is:		N/A

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	b)A panel or cover that is insulated from all electrical components by an insulating barrier complying with 11.4.		N/A
	c)A panel or cover that does not enclose uninsulated live parts or is electrically isolated from other electrical components.		N/A
	d)Cores and assembly screws of relays, solenoids, and the like.		N/A
14.1.4	Upon insertion of a removable part, the grounding connection shall be made before the electrical connection, and, upon removal, the grounding connection shall be broken after the electrical connection.		N/A
14.1.5	Functional grounding shall not be relied upon for equipment grounding or bonding.		N/A
14.2	Bonding		N/A
14.2.1	Unless the dead-metal parts described in 14.1.2 are bonded together by mechanical fasteners, a separate bonding conductor or strap shall be used for this purpose.		N/A
14.2.2	The bonding shall be by positive means, such as clamping, riveting, bolted or screwed connections, brazing, or welding. The bonding connection shall penetrate a nonconductive coating. Bonding around a resilient mounting shall not depend on the clamping action of rubber or similar material unless the construction has been shown by investigation to be acceptable for the purpose. This investigation may include such tests as overload, short-circuit, and aging.		N/A
14.2.3	The bonding conductor shall be of a material and size that has been evaluated for use as an electrical conductor. It shall be protected from corrosion unless inherently corrosion resistant. A bonding conductor or strap shall be installed so that it is protected from mechanical damage.		N/A
14.2.4	The size of an electrical conductor or strap employed to bond an electrical enclosure or motor frame shall be determined by the rating of the overcurrent-protective device of the branch circuit to which the product will be connected in accordance with the National Electrical Code, ANSI/NFPA 70.		N/A

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14.2.5	If more than one size branch-circuit overcurrent device is involved, the size of the bonding conductor is to be based on the rating of the overcurrent device intended to provide ground-fault protection for the component bonded by the conductor. For example, if a motor may be individually protected by a branch-circuit overcurrent device smaller than the overcurrent devices protecting the overall product, the size of a bonding conductor for that motor is to be selected on the basis of the overcurrent device intended for the ground-fault protection of the motor.		N/A
14.3	Portable products		P
15	Internal Wiring		P
15.1	General		P
15.1.1	Internal wiring and connections shall be protected or enclosed to reduce the likelihood of stress on the connections or damage to the insulation.		P
15.1.1.1	To prevent particles from falling out of the product, open coil windings, internal wiring and wiring connections shall be:		P
	a) Located in a compartment such as a cabinet or enclosure which is provided with a complete base pan; or b) Mounted or similarly positioned away from any openings in the bottom of the product.		P
15.1.2	A bare conductor, including coil leads, shall be supported so that at least the minimum required spacings will be maintained.		P
15.1.3	Each splice and connection shall be mechanically secure and shall be arranged so that stress on the connections and terminals does not result.		P
15.1.4	A splice shall be provided with insulation if permanence of spacing between the splice and other metal parts cannot be maintained.		P
15.1.5	A wireway shall be smooth and free from sharp edges, burrs, fins, moving parts, and the like, that may abrade wire insulation.		P
15.1.6	An aluminum conductor, insulated or uninsulated, used as internal wiring, such as for interconnection between current-carrying parts or as motor winding, shall be terminated at each end by a method that has been evaluated for the combination of metals involved at the connection point.		P
15.1.7	If a wire-binding screw or a pressure wire connector is used as a terminating device for an aluminum conductor, it shall be for use with aluminum under the conditions involved (for example, temperature, heat cycling, and vibration).		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
15.1.8	A nominal 0.110-, 0.125-, 0.187-, 0.205-, or 0.250-inch wide quick-connect terminal shall comply with the Standard for Electrical Quick-Connect Terminals, UL 310. Other sizes of quick-connect terminals shall be investigated with respect to crimp pull-out, engagement-disengagement forces of the connector and tab, and temperature rises. All tests shall be conducted in accordance with UL 310.		N/A
15.1.9	Wiring routed to a hinged door, cover or other parts which may subject the wiring to movement shall comply with (a) – (g) if such movement is likely to cause a risk of fire, electric shock or injury to persons.		N/A
	a) Stranded conductors shall be used;		N/A
	b) The arrangement shall prevent undue twisting or stressing of conductors as a result of the movement;		N/A
15.2	Primary circuits		P
15.2.1	The internal wiring of a product shall consist of general-use wire or appliance-wiring material that has been determined to be acceptable for the application, when considered with respect to the temperature, voltage, and condition of service to which the wiring is likely to be subjected.		P
15.2.2	Regarding 15.2.1, wiring material of one or more of the types specified in Table 15.1 having insulation thickness not less than that specified in Table 15.1 may be used for internal wiring.		P
15.2.3	Holes in a sheet-metal wall through which insulated wires pass shall be provided with a bushing.		P
15.3	High-voltage circuits		P
15.3.1	Internal secondary wiring shall be general-use high-voltage wire or wiring material rated for the application. The voltage rating of the wire shall not be less than the maximum peak voltage measured between the wire and any other part.		P
15.3.2	A hole in a metal partition through which an ungrounded lead or ungrounded terminal passes shall have smooth, well-rounded edges or shall be provided with a bushing. If the bushing deforms the wire insulation, the bushing shall be subjected to the High-Voltage Insulating Arcing Test, Section 51.		P
15.3.3	A bushing of glazed porcelain, steatite, or that which has been determined to be the equivalent may be used for secondary leads and terminals.		N/A
15.3.4	A bushing of phenolic composition may be used if the voltage involved is less than 1000 volts.		N/A
15.3.5	Bushings other than those specified in 15.3.3 and 15.3.4 may be used based on results of the High-Voltage Insulating Materials Arcing Test, Section 51.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
16	Capacitors		P
16.1	Deleted		P
16.2	Deleted		P
16.3	Except as specified in 16.8, a motor start or run capacitor shall comply with the construction requirements in the Standard for Capacitors, UL 810.		P
16.4	A capacitor, mounted in an application not intended to be totally enclosed, shall be housed within a cabinet that protects the capacitor against mechanical damage and prevents the emission of flame or molten material resulting from malfunction or breakdown of the capacitor. The cabinet shall comply with the requirements in Section 6, Frame, Cabinet and Enclosure.		P
16.5	Deleted		N/A
16.6	A capacitor other than a motor start or run capacitor that is connected across-the-line or line to ground in other than a high-voltage circuit shall comply with one of the following:		N/A
	a)The Dielectric Voltage Withstand Test, Insulation Resistance Test, and Endurance Test in the Standard for Electromagnetic Interference Filters, UL 1283;		N/A
	b)The Temperature Test, Table 45.1, (B)(1)(b) and either the Dielectric Voltage Withstand Test in Section 46 or in the Standard for Electromagnetic Interference Filters, UL 1283; or		N/A
16.7	Deleted		N/A
16.8	In reference to 16.3, motor start or run capacitor that does not comply with UL 810 shall:		N/A
	a)Be housed within an enclosure or container that will reduce the risk of mechanical damage to the plates and the emission of flame or molten material resulting from breakdown of the capacitor;		N/A
	b)Be provided with a metal capacitor container providing the strength and protection not less than that of uncoated steel having a thickness of 0.020 inch (0.51 mm); and		N/A
16.9	In reference to 16.6, a capacitor shall consist of a single Class Y1 capacitor or two Class Y2 capacitors connected in series if it is connected between:		P
	a)Two line conductors in a primary circuit;		P
	b)One line conductor and the neutral conductor;		P
17	Coil Windings		P
17.1	Windings of a motor, relay, transformer, and the like shall resist the absorption of moisture.		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
17.2	With regard to the requirement in 17.1, film-coated (magnet) wire is not required to be additionally treated to resist absorption of moisture, but fiber slot liners, cloth coil wrap, and similar moisture-absorptive materials shall be impregnated or otherwise treated to resist moisture absorption.		P
18	Printed-Wiring Boards		N/A
18.1	A printed-wiring board shall comply with the Standard for Printed-Wiring Boards, UL 796, including direct support criteria and shall be classed V-0, V-1, or V-2 in accordance with the requirements in the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.		N/A
18.2	A resistor, a capacitor, an inductor, or other part that is mounted on a printed-wiring board to form a printed-circuit assembly shall:		N/A
	a) Be secured so that it cannot be displaced by a force likely to be exerted on it during assembly, intended operation, or servicing; or b) Be provided with a mechanical barrier or equivalent partition as part of the product to provide mechanical protection.		N/A
18.3	Deleted		N/A
19	Overcurrent Protection		P
19.1	A fuse and a fuseholder shall have voltage and current ratings that are for use in the circuit in which they are connected. A fuseholder shall be suitable for use with a cartridge fuse.		P
19.2	Fuses shall comply with the Standard for Low-Voltage Fuses – Part 1: General Requirements, UL 248-1; and the applicable UL 248 Part 2 (e.g. UL 248-5). Defined use fuses that comply with UL 248-1 and another appropriate UL standard for the fuse are considered to fulfill this requirement.	UL approved	P
19.3	Fuseholders shall comply with the Standard for Fuseholders – Part 1: General Requirements, UL 4248-1, and the applicable Part 2 (e.g. UL 4248-9).		N/A
19.4	Circuit breakers shall comply with the Standard for Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures, UL 489.		N/A
19.5	Circuit breakers having integral ground fault circuit interrupter capability for protection against electrical shock shall additionally comply with the Standard for Ground-Fault Circuit-Interrupters, UL 943.		N/A
19.6	Supplementary protectors shall comply with the Standard for Supplementary Protectors for Use in Electrical Equipment, UL 1077.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
19.7	Fusing resistors shall comply with the Standard for Fusing Resistors and Temperature-Limited Resistors for Radio- and Television-Type Appliances, UL 1412.		N/A
19A	General Purpose Transformer – Insulation Systems		P
20	Motors and Motor Overcurrent Protection		P
20.1	A motor shall be evaluated for the application and shall be capable of driving the maximum normal load of the product without introducing a risk of fire, electric shock, or injury to persons.		P
20.2	A brush-holder assembly shall be constructed so that when the brush is no longer capable of performing its function, the brush, spring, and other parts of the assembly are retained to the degree necessary not to cause:		N/A
	a) Accessible dead metal parts to become energized and b) Live parts to become accessible.		N/A
20.3	Each motor shall be provided with at least one of the following:		P
	a) Thermal protection complying with the applicable requirements in the Standard for Thermally Protected Motors, UL 1004-3.		P
	b) Impedance protection complying with the applicable requirements in the Standard for Motor-Operated Appliances, UL 73, when the motor is tested as used in the product under locked- rotor conditions.		P
20.3.1	In reference to 20.3 (a) and (d), a motor that moves air by means of a fan that is not integrally attached, keyed, or otherwise fixed to the motor shaft shall be evaluated for running heating protection.		P
20.4	Motor-overload protection provided for a product not required to have such protection shall:		P
	a) Comply with the requirements in 20.3. b) Be shown by test not to result in a risk of fire, electric shock, or injury to persons.		P
20.5	Openings in a motor shall be arranged to prevent particles from falling out of the motor onto flammable material within or under the product.		P
21	Washing		P
21.1	A duct-type product provided with fixed means for washing the ionizer-collector frame assembly shall comply with the following:		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	a)The circuitry of a product having provision for automatic or manual washing means shall be interlocked so that the power pack will be de-energized while the system is being washed. b)The primary circuit of a product shall be interlocked so that the blower-fan motor is de-energized while the system is being washed.		P
21.2	A duct-type product having fixed means for automatically or manually applying adhesive to the ionizer-collector frame assembly shall have the circuitry interlocked so that the power pack and blower-fan motor are de-energized while adhesive is being applied.		P
22	Filters		P
22.1	An air-cleaner filter together with any other materials, such as adhesives, mounting devices or other similar parts utilized as an integral part of the air filter and intended for use on a duct-type air cleaner shall comply with the Standard for Air Filter Units, UL 900.		P
22.2	An air-cleaner filter intended for use in a fixed-type product shall comply with 22.1 or with:		P
	a)The separation of ignition sources from nonmetallic materials requirements as shown in Figure 6C.1; or b)Table 51A.1 applying the flammability requirements for functional parts, if the filter is within 2 in. (50.8 mm) of but not underneath an ignition source.		P
22.2.1	An air-cleaner filter intended for use in a portable product shall comply with 22.1 or 22.2 or be located more than 2 in. (50.8 mm) away from and not underneath any ignition source.		P
22.3	An air-cleaner filter that is electrically charged by the product shall be tested as described in the Unenclosed High-Voltage Power Supply Test in 49.4.		P
23	Spacings		P
23.1	General		P
23.1.1	All uninsulated live parts connected to different line- or low-voltage circuits shall be spaced from one another as though they were parts of opposite polarity and shall be evaluated on the basis of the highest voltage involved.		P
23.1.2	The spacing at a field-wiring terminal is to be measured with wire of the size appropriate for the rating connected to the terminal as in actual service.		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
23.1.3	Wiring terminals are considered to be terminals to which connections are made in the field.		P
23.1.4	The spacings in a component device, such as a snap switch, a lampholder, a motor, and the like supplied as part of an air cleaner shall not be less than the minimum spacings required for the component device or the spacings specified in Table 23.1, whichever are smaller.		P
23.1.5	Regarding spacing requirements, film-coated (magnet) wire is considered to be an uninsulated live part.		P
23.2	Low voltage and isolated-limited-energy circuits		P
23.2.1	Spacings between components of low-voltage and isolated-limited-energy circuits are not specified.		P
23.3	Line-voltage circuits		P
23.3.1	The spacings in a line-voltage circuit shall comply with one of the following:		P
23.3.1.1	In reference to 23.3.1(c)(1) and 23.4.3(c), the conformal coating shall comply with the Conformal Coatings section in UL 746E, Polymeric Materials – Industrial Laminates, Filament Wound Tubing, Vulcanized Fibre, and Materials Used in Printed Wiring Boards.		P
23.4	High-voltage circuits		P
23.4.1	Spacings in high-voltage circuits shall comply with 23.4.2, 23.4.3, 23.4.4 or 23.4.5.		P
23.4.2	Spacings between the following parts shall comply with Table 23.2:		P
	a) Insulated or uninsulated high-voltage parts and other insulated or uninsulated high-voltage parts of opposite polarity or different high-voltage circuits. b) Insulated or uninsulated high-voltage parts and insulated or uninsulated line-voltage or low-voltage parts. c) Insulated or uninsulated high-voltage parts and dead metal parts.		P
23.4.3	Insulated or uninsulated high-voltage parts shall comply with one of the following:		P
	a) Be potted in an insulating compound such that the through-air and over-surface spacings before potting are a minimum of 1/32 inch (0.8 mm). The insulating potting compound shall comply with the High-Voltage Insulating Material Arcing Test, Section 51; b) Be provided with an insulating barrier complying with Section 11.4;		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
23.4.4	The spacings between insulated or uninsulated high-voltage parts and dead metal, other than the cabinet or enclosure, are not specified if:		P
	a)The high-voltage power supply complies with 49.1.1 following the High-Voltage Spacings Short Circuit Test in 49.3.1; or, b)Insulation on the high-voltage part complies with the High-Voltage Insulating Material Arcing Test, Section 51.		P
23.4.5	The spacings between high-voltage parts of opposite polarity or between high-voltage parts and dead metal parts, other than the cabinet or enclosure, are not specified if:		P
	a)The parts have current levels complying with the Partially Protected Parts Test, Section 37; and b)The insulating materials withstand the potentials specified in the Dielectric Voltage-Withstand Test, Section 46.		P
23.4.6	If a high-voltage circuit terminal is provided with an insulating cap, the spacing to the live part of the terminal shall be measured through the crevice where the surface of the cap abuts the remainder of the insulator.		N/A
23.5	Insulating barriers		P
23.5.1	Deleted		P
23.6	Alternate spacings – clearances and creepage distances		P
23.6.1	Except as specified in 23.6.2, the spacings requirements in the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840, are applicable as an alternative to the specified spacings requirements in the following:		P
	a)Line-voltage circuits, 23.1 and 23.3; and b)Low voltage and isolated-limited-energy circuits, 23.2.		P
23.6.2	The spacings requirements in the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840 shall not be used for spacings between field wiring terminals or between uninsulated live parts and a metal cabinet or enclosure.		P
23.6.3	(a) – (g) shall be considered when evaluating a product to the requirements in the Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840:		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	a)Hermetically sealed or encapsulated enclosures are identified as pollution degree 1. b)Coated printed wiring boards are identified as pollution degree 1 if they comply with one of the following:		N/A
23.6.4	Clearance B (Controlled Overvoltage) clearances as specified in Standard for Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment, UL 840 shall be achieved by providing an overvoltage device or system as an integral part of the product.		N/A
24	Separation of Circuits		P
24.1	General		P
24.1.1	Unless provided with insulation rated for the highest voltage involved, factory-installed insulated conductors of different circuits shall be spaced as specified in Table 23.2, or separated by insulating or mechanical barriers. In any case, the conductors shall be segregated (see 24.1.2) from uninsulated live parts of a different circuit.		P
24.1.2	Segregation of insulated conductors may be accomplished by clamping, routing, or means that have been determined to be equivalent to maintain separation from insulated or uninsulated live parts of a different circuit.		P
24.1.3	Deleted		P
24.2	Class 2 circuits		N/A
24.2.1	The output of a transformer supplying a Class 2, low-voltage circuit and provided as a part of the equipment shall not be interconnected with the output of another such transformer. Each transformer shall be treated as a separate circuit, with each having its own separate wiring compartment. The output of each circuit shall be marked to warn that the separation shall be maintained.		N/A
24.3	Permanently-connected products		N/A
24.3.1	Except as specified in 24.3.1.1, the product shall be constructed so that a field-installed conductor of any circuit shall be segregated or separated by barriers from:		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	<p>a) Factory-installed conductors connected to any other circuit, unless the conductors of both circuits will be insulated for the maximum voltage of either circuit;</p> <p>b) Uninsulated live parts of any other circuit of the device; and</p> <p>c) Field-installed conductors connected to any other circuit.</p>		N/A
24.3.1.1	In reference to 24.3.1, if field-installed conductors contact low-voltage wiring terminals, any short-circuiting to such terminals that could occur shall not result in a risk of fire or electric shock.		N/A
24.3.2	In reference to 24.3.1, if field-installed conductors are segregated from other field-installed or factory-installed conductors and from uninsulated live parts of the product connected to different circuits, openings in the enclosure for the various conductors shall be located so that a minimum separation of 1/4 inch (6.4 mm) can be maintained between the field-installed conductors and any other field or factory-installed conductors or uninsulated live parts.		N/A
24.3.3	It is to be assumed, for the purpose of determining compliance with 24.3.1, that the conductors entering each opening of the enclosure will be connected to the terminals opposite the opening if:		N/A
	<p>a) The number of openings in the enclosure does not exceed the minimum required for the proper wiring of the device and</p> <p>b) Each opening is located opposite a set of terminals.</p>		N/A
24.3.4	To determine if a product complies with the requirement in 24.3.1, it is to be wired as it would be in service. A reasonable amount of slack is to be left in each conductor, within the enclosure, and no more than average care is to be exercised in stowing this slack into the wiring compartment.		N/A
25	General		P
25.1	A cabinet, an enclosure, an opening, a frame, a guard, a knob, a handle, or the like shall not be sufficiently sharp to cause a risk of injury to persons in normal maintenance or use.		P
25.2	If the breakage or damage of a part such as a cabinet, an enclosure, a frame, a guard, or the like may result in a risk of injury to persons, the part shall comply with the Impact Test, Section 28.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
25.3	The requirements in 25.2 apply to those portions of a part adjacent to a moving part or an exposed live part considered to present a risk of injury to persons.		N/A
26	Rotating Parts		N/A
26.1	A rotating member shall be constructed and made of materials having the necessary strength to reduce the likelihood of breakage or its release, or loosening of a part that could cause injury to persons.		N/A
26.2	A rotating part shall be assembled:		N/A
	a) So that the direction of rotation tends to tighten the means that holds the rotating part in place or b) Using a keyed nut or a nut locked in place with a pin or other positive means.		N/A
27	Enclosures and Guards		P
27.1	Each moving part that can cause injury to persons shall be enclosed or guarded.		P
	a) Degree of exposure necessary to perform its intended function, b) Sharpness of the moving part,		P
28	Impact Test		P
28.1	A part as mentioned in 25.2 shall withstand the impact test described in 28.2, 28.3 and 28.5 to the extent that:		P
	a) A moving part involving a risk of injury to persons or an exposed live part cannot be contacted by the probes illustrated in Figures 7.2 or 7.3 for ceiling mounted appliances and b) The appliance complies with the Dielectric Voltage-Withstand Test, Section 46.		P
28.2	A smooth steel sphere, 2 inches (51 mm) in diameter and weighing approximately 1.18 pounds (535 g), is to fall vertically from rest through a distance of 51 inches (1.3 m) to strike the part being tested. For a part not able to be struck from above by the free-falling sphere, the sphere is to be suspended by a cord and swung as a pendulum through a vertical distance of 51 inches. A guard for an air cleaner that is intended to be ceiling-mounted is to be subjected to an impact of 1.5 foot-pounds (6.7 N). The sphere is to be dropped from a height of 15 inches (381 mm) or is to be swung as a pendulum dropping through a vertical distance of 15 inches.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
28.3	If nonmetallic material is used for a part as mentioned in 25.2, the impact test is to be performed on a sample in the as-received condition. The test is then to be repeated on another sample that has cooled to room temperature after being conditioned for 7 hours in an air oven at uniform temperature not less than 10°C (18°F) higher than the maximum operating temperature of the material measured under intended operating conditions, but not less than 70°C (158°F).		N/A
28.4	Upon removal from the oven mentioned in		P
28.5	and before being subjected to the impact test, the samples shall not show checking, cracking or other deleterious effects from the oven conditioning. Also, the samples shall not show distortion sufficient to impair the intended operation of the product.		P
28.6	A nonmetallic part used in accordance with 25.2 and intended for outdoor use shall additionally be cooled to a temperature of minus 35 ± 2°C (minus 31 ± 4°F) and maintained at this temperature for 3 hours. While the unit is still cold, the samples shall be subjected to the impact tests described in 28.1 and 28.2.		P
29	Interlocks		P
29.1	Switches		P
29.2	Interlocks		N/A
29.2.1	A moving part that could cause injury to a person is considered to be guarded if protected by a cover with an interlock that complies with one of the following conditions		N/A
	a)The part stops moving within 3 seconds after the cover is opened or b)The interlock prevents the cover from being opened until the part stops moving.		N/A
29.2.2	Operation of an interlock in normal use shall not inconvenience the operator so as to encourage deliberate defeat of the interlock.		N/A
29.2.3	An interlock shall be located so that unintentional operation is unlikely. The interlock shall not be readily defeatable without damaging the product, or without making wiring connections or alterations.		N/A
29.2.4	An interlock that is required to reduce a risk of electric shock or injury to persons shall:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	a)Withstand 100,000 cycles of operation controlling a load not less than that controlled in the air cleaner, and shall function normally upon completion of the test; or, b) Comply with the protective control requirements in Section 13A, Switches and Controllers		N/A
29.2.5	An interlock that is required to reduce the risk of electric shock shall open:		N/A
	a)All supply conductors; or; b)The ungrounded conductors if the unit is permanently connected to the electrical supply source.		N/A
30	Electronic Circuits		P
30.1	Ozone monitoring circuitry shall not be user-defeatable or user-adjustable.		P
31	Stability		P
31.1	A portable product shall not overturn when tipped through an angle of 10 degrees from the horizontal as described in 31.2.		P
31.2	The product is not to be energized during the test mentioned in 31.1. The test is to be conducted under conditions most likely to cause the product to overturn. The following conditions of the test are to result in the least stability:		P
	a)The position of all doors, drawers, casters, and other movable or adjustable parts, including that of a supply cord, if any, resting on the surface supporting the air cleaner;		P
	b)Connection of or omission of any attachment made available by or recommended by the manufacturer; and		P
	c)Direction in which the product is tipped.		P
32	Collector Handle Securement Test		P
32.1	A handle used to remove air cleaner collector cells shall:		P
	a)Withstand a force of four times the weight of the cell without breakage of the handle, its securing means, or that portion of the cabinet to which the handle is attached; or		P
	b)Be used only on collector cells provided as part of a portable household product.		P

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32.2	To determine if a handle complies with the requirements in 32.1, the force is to be started at zero and gradually increased so that the force specified in 32.1 is attained in 5 to 10 seconds and maintained for 1 minute. When the handle is 76.2 mm (3 inches) or more in width, the force is to be uniformly distributed over a 76.2 mm width at the center of the handle without clamping. When the width is less than 76.2 mm, the force is to be distributed over the entire handle. When more than one handle is furnished on a cell and the cell cannot be lifted by only one handle, the force is to be distributed between the handles. The distribution of forces is to be determined by measuring the percentage of the cell weight sustained by each handle with the cell in the intended lifting position. When a cell is furnished with more than one handle and can be carried by only one handle, each handle is to sustain the total force.		P
33	External Surface Temperatures		P
33.1	During the Temperature Test, Section 45, the temperature of a surface that may be contacted by the user shall not exceed the value specified in Table 33.1. If the test is to be conducted at a room temperature other than 25°C (77°F), the results are to be corrected to that temperature.		P
34	General		P
34.1	The performance of the product shall be investigated by subjecting a representative sample or samples in commercial form to the tests described in Sections 35 – 51. The tests shall be performed in the order presented (or as close as is practical). A sample employed for the Leakage-Current Test, Section 35, shall be tested for leakage current prior to being used for other tests.		P
34.2	Unless otherwise indicated, the tests are to be conducted at rated frequency and at the voltage specified in Table 34.1.		P
35	Leakage Current Test		P
35.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
35.1.1	All exposed conductive surfaces of cord-connected products are to be tested for leakage currents. The leakage currents from these surfaces are to be measured to the grounded supply conductor individually as well as collectively if simultaneously accessible and from one surface to another if simultaneously accessible. Parts are considered to be exposed surfaces unless guarded by a cabinet or enclosure that reduces the risk of electric shock, as described in Accessibility of Uninsulated Live Parts and Moving Parts, Section 7. Surfaces are considered to be simultaneously accessible if they can be readily contacted by one or both hands of a person at the same time.		P
35.1.2	Leakage current refers to all currents, including capacitively coupled currents, that may be conveyed between exposed conductive surfaces of a product and ground or other exposed conductive surfaces.		P
35.1.3	If the product has a direct-current rating, measurements are to be made with the product connected in turn to each side of a 3-wire, direct-current supply circuit.		N/A
35.2	Normal use		P
35.2.1	For a product rated 250 volts or less, the leakage current at any accessible part shall not be more than 0.5 milliamperere when tested in accordance with 35.2.2 – 35.2.4 if the open-circuit potential between the accessible part and earth ground or any other accessible part is more than:		P
	a)42.4 volts peak for an indoor product or where wet contact is not likely to occur and		P
	b)21.1 volts peak for an outdoor product and where wet contact is likely to occur.		N/A
35.2.2	The measurement circuit for the leakage-current test is to be as illustrated in Figure 35.1. The measurement instrument is defined in (a) – (c). The meter that is actually used for a measurement need only indicate the same numerical value for the particular measurement as would the defined instrument. The meter used need not have all of the attributes of the defined instrument.		P
	a)The meter is to have an input impedance of 1500 ohms resistive shunted by a capacitance of 0.15 microfarad.		P
	b)The meter is to indicate 1.11 times the average of the full-wave rectified composite waveform of voltage across the resistor or current through the resistor.		N/A

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	c)Over a frequency range of 0 – 100 kilohertz, the measurement circuitry is to have a frequency response (ratio of indicated to actual value of current) that is equal to the ratio of the impedance of a 1500-ohm resistor shunted by a 0.15-microfarad capacitor to 1500 ohms. At an indication of 0.5 milliampere, the measurement is to have an error of not more than 5 percent at 60 hertz.		N/A
35.2.3	Unless it is being used to measure leakage from one part of a product to another, the meter is to be connected between an accessible part and the grounded supply conductor.		P
35.2.4	A sample of the product is to be tested for leakage current first in the as-received condition with all switches and thermostats closed. The grounding conductor, if any, is to be open at the attachment plug. The as-received condition is without prior energization except for what may occur as part of the production-line testing. The supply voltage is to be 120 or 240 volts, as applicable. The test sequence, with reference to the measuring circuit in Figure 35.1, is to be as follows:		P
	a)With switch S1 open, the product is to be connected to the measuring circuit. Leakage current is to be measured using both positions of switch S2 and with the switching devices of the product in their normal operating positions.		P
	b)Switch S1 is then to be closed, energizing the product. Within five seconds, the leakage current is to be measured using both positions of switch S2, and with the switching devices of the product in their normal operating positions.		P
36	Leakage Current Following Humidity Conditioning		P
36.1	A product shall comply with the requirements for leakage current in 35.2.1, following exposure for 48 hours to air having a relative humidity of 88 ± 2 percent at a temperature of 32 ± 2°C (90 ± 4°F).		P
36.2	To determine whether a product complies with the requirement in 36.2, a sample of the product is to be heated to a temperature just above 34°C (93°F) to reduce the likelihood of condensation of moisture during conditioning. The heated sample is to be placed in the humidity chamber and conditioned for 48 hours under the conditions specified in 36.1. Following the conditioning, the sample is to be tested unenergized as described in 35.2.4(a). The sample is then to be energized and tested as described in 35.2.4 (b) and (c). The test is to be discontinued when the leakage current stabilizes or decreases.		N/A
37	Partially Protected Parts		P

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Clause	Requirement + Test	Result - Remark	Verdict
37.1	The following requirement applies to a product rated 250 volts or less. The continuous current flow through a 500-ohm resistor connected between any part exposed only during user servicing and earth ground or any other accessible part shall not be more than the applicable value specified in Table 37.1. However, this value only applies if the open-circuit potential between the part and earth ground or any other accessible part is more than:		P
	a)42.4 volts peak for an indoor product or where wet contact is not likely to occur,		P
	b)21.2 volts peak for an outdoor product and where wet contact is likely to occur.		P
37.2	The measurements of the available current of partially protected parts are to be made under the following conditions:		P
	a)With any operating control, or adjustable control that is considered subject to user operation, in all possible positions of contact.		P
	b)Either with or without cells, separable connectors, and similar devices in place.		P
38	Input Test		P
38.1	The current or volt-ampere input to the product under any normal operating condition shall not exceed 110 percent of the marked rating.		P
38.2	To determine whether the power pack complies with the requirement in 38.1, the current and power input is to be measured while the equipment is operated at the secondary voltage and current settings that result in maximum input for each of the following conditions, when applicable to the unit:		P
	a)Variable resistance connected from positive to negative output terminal and adjusted from open to short circuit.		P
	b)Variable resistance connected from positive output terminal to ground, negative terminal open-circuited, resistance varied from open to short circuit.		P
	c)As specified in (b) except negative terminal short-circuited to ground.		P
	d)Variable resistance connected from negative output terminal to ground, positive terminal open-circuited, resistance varied from open to short circuit.		P
	e)As specified in (d) except positive terminal short-circuited to ground.		P

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38.3	A product intended for connection to a low-voltage supply source (such as by a USB type connector) shall be connected to a supply circuit using a test voltage that is 16.7 percent higher than the product rated voltage and capable of supplying a minimum 8 amperes at that test voltage. The product shall comply with 38.1.		P
39	Output Test		N/A
39.1	When the high-voltage circuit is delivering its rated load, the secondary-output voltage shall not be greater than 110 percent of the rated value.		N/A
39.2	The secondary-output voltage under all conditions of operation up to and including open-circuit shall be determined. The values obtained shall be used in determining the spacings required and the voltages to be employed during the Dielectric Voltage-Withstand Test, Section 46.		N/A
40	Ozone Test		P
40.1	General		P
40.1.1	Two samples of the product shall be supplied for testing. The test described in 40.2 – 40.4 shall be conducted on:		P
	a)One sample, if the measured maximum ozone concentration is less than 0.030 parts per million; or		P
	b)A second sample, if the measured maximum ozone level from the first sample tested is 0.030 ppm or more.		N/A
40.1.2	When tested as described in 40.2 – 40.4, a portable air cleaning product for household use shall not produce a concentration of ozone that exceeds:		P
	a)0.050 parts per million (ppm) by volume; or		P
	b)0.100 ppm by volume if the average of any five consecutive one minute average measurements are less than 0.050 ppm.		P
40.1.3	A product shall be tested in accordance with 40.2 – 40.4 under the most severe conditions for generating the maximum amount of ozone, taking into account all intended operating modes of the product. These conditions shall include the following:		P
	a)High fan speed;		P
	b)Low fan speed; and,		P
	c)Any other operating conditions that could include, but are not limited to: fan(s) inoperative, emitters(s)/ionizer(s) on, UV lamps on or other special features activated or inactivated.		P
40.1.4	In reference to 40.1.3, the testing in 40.2 – 40.4 shall include the product operating with:		N/A

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	a)Only one operating mode occurring at a time if the product is intended to operate in this manner; or		N/A
	b)Multiple operating modes occurring simultaneously if simultaneous operation of the product in different modes is intended and testing the product in multiple operating modes represents the most severe condition(s) for maximizing ozone emission.		N/A
	c)All air filter(s) removed unless an interlock switch causes ozone production to stop if the air filter(s) are removed, as specified in 40.1.5.		N/A
40.1.5	In reference to 40.1.4(c), for a product having an interlock switch causing ozone production to decrease or stop if an air filter is removed:		N/A
	a)The testing in 40.2 – 40.4 shall be conducted with the interlock switch bypassed; or		N/A
	b)The interlock switch shall comply with Section 29, Interlocks, and the operating instructions of the product shall specify the intended filter(s), including replacement filters, in accordance with 59.10.		N/A
40.1.6	If ozone-monitoring circuitry is provided as part of the product, the test described in 40.2 – 40.4 shall be conducted with the circuitry bypassed unless the circuitry complies with the protective control requirements in Section 13A, Switches and Controllers.		N/A
40.2	Chamber specifications		N/A
40.2.1	The test is to be conducted in a chamber having a volume of 950 – 1100 cubic feet (26.9 – 31.1 m3) with a minimum side dimension of 8 feet (2.4 m) and a maximum height dimension of 10 feet (3.0 m) without openings. The test chamber walls, ceiling, and floor are to be surface treated (polished) stainless steel or other nonporous and non-reactive material. The suitability of chamber materials shall be validated by the half-life procedure of 40.2.3.		N/A
40.2.2	The following test chamber criteria shall be met:		N/A
	a)The test chamber shall be sufficiently airtight to avoid uncontrolled air exchange. The chamber is considered sufficiently airtight if at least one of the following requirements is fulfilled:		N/A
	b)The test chamber shall have proper mixing verified via the mixing procedure of the Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products, ASTM D6670, Sections titled Air Distribution in the Chamber and Air-Mixing in a Chamber, and shall not create local airflow across the surface of the product under test exceeding 0.1 m/s.		N/A

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	c)The test chamber supply air system shall be equipped with sufficient carbon and HEPA media to remove particles, reactive VOCs, and ozone.		N/A
40.2.3	Performance of the test chamber shall be verified prior to each test and after any modification or cleaning through:		N/A
	a)Determination of the chamber ozone half-life at 0 forced air changes,		N/A
	b)Calculation of the chamber deposition velocity under these conditions using the equation defined in 40.2.4,		N/A
	c)Calculation of the air exchange rate necessary to maintain an overall chamber ozone removal rate (Napparent) value of 1.33 using the equation defined in 40.2.5,		N/A
	d)Verification of the chamber ozone half-life of 31 2 minutes under the air exchange rate calculated in c), and if necessary, adjustment of the air exchange rate to achieve an ozone half- life of 31 2 minutes, repeating the verification as needed after adjustment of the air exchange rate.		N/A
40.2.4	The chamber deposition velocity (Vd) is defined by the following equation:		N/A
	$Vd = \left[\left(\frac{\ln \frac{C(t)}{C(0)}}{-t_{1/2}} \right) - AER \right] * \left(\frac{1}{AV} \right)$		N/A
40.2.5	The air exchange rate necessary to maintain an overall chamber ozone removal rate (Napparent) value of 1.33 is defined by the following equation:		N/A
	$AER = Napp - Vd * AV$		N/A
40.3	Equipment specifications		P
40.3.1	Ozone analysis equipment shall meet the following criteria:		P
	a)Ranges of 0.02, 0.04, 0.1, 0.2, and 0.4 mg/m3 on the full scale (or have auto ranging capability);		P
	b)The capability to detect 4 µg/m3 or lower concentration;		P
	c)A precision of 2 percent from the mean value in the 0 mg/m3 to 0.2 mg/m3 range (i.e. 2 µg/m3 or 1 percent on the full scale);		N/A
	d)A sampling rate of not less often than once every 60 seconds;		N/A
	e)A sampling line of minimum length, not to exceed 13 feet (4 m), made of a flexible material that is inert, such as PTFE.		N/A
40.4	Test method		N/A

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40.4.1	Prior to testing, the location of the peak ozone emission on a product shall be determined in accordance with 40.4.1.1 – 40.4.1.6.		N/A
40.4.1.1	The product shall be located in accordance with 40.4.4 and:		N/A
	a) Within the test chamber specified in 40.2; or,		N/A
	b) In an area where the local airflow across the surface of the product is not greater than 4 inches/s (0.1 m/s) and which has minimum dimensions of 10 feet (3 m) per side and not less than 8 feet (2.4 m) high.		N/A
40.4.1.2	The air stream discharge area shall be determined by measuring the air stream in a plane parallel to and 2 inches (50.8 mm) from the surface of the product air discharge grille. Each ozone sampling point shall be along this plane.		P
40.4.1.3	The location and number of ozone sampling points for a product shall be determined based on the discharge area of the air stream as follows:		P
	a) One ozone sampling point shall be allotted for and be directly in line with each ozone generating source.		P
	b) One ozone sampling point shall be located in the geometric center of the air stream discharge area with additional ozone sampling points provided based on the overall area of the air stream discharge of the product as follows:		P
40.4.1.4	For the sampling points specified in 40.4.1.3 (b)(1) and (2), the air stream discharge shall be divided into equal sized zones so that the number of ozone sampling points equals the number of zones. The ozone sampling point shall be located in the geometric center of each zone.		N/A
40.4.1.5	The product shall be subjected to a 48 hour run-in period. Run-in and determining the location of peak ozone emission shall be conducted with the room at a controlled temperature in the range of 77 9°F (25 5°C) and a supply of filtered air.		N/A
40.4.1.6	At the completion of the run-in period, the location of peak ozone emission shall be determined by measuring the emission of ozone at each sampling point for a minimum of 2 minutes. The ozone sampling device shall point directly into the air stream. Ozone values shall be allowed to stabilize between measurements.		N/A
40.4.1.7	The tests in 40.4.2 – 40.4.6 shall be conducted on a product to determine compliance with 40.1.2.		N/A
40.4.2	During the test, the test chamber is to be maintained at a temperature of 25 2°C (77 4°F) and a relative humidity of 50 5 percent.		N/A

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40.4.3	Prior to the start of each test, the ozone background level is to be measured with the product off. The background level shall be subtracted from the maximum measurement during the test. With respect to determining background level, the following measurement criteria shall be applied:		N/A
	a)The ozone background measurement shall not exceed 0.005 ppm at steady state. Measurements above this value may interfere with emissions determinations.		N/A
	b)Background measurements within the chamber shall be taken immediately prior to testing of the product.		N/A
40.4.4	The product is to be located in the center of the test chamber floor and		P
	30 inches (762 mm) above the floor for table-mounted products		P
	b)on the floor for floor mounted or supported products.		P
	c)attached to the ceiling or other horizontal non-reactive surface at a minimum height of 30 inches for ceiling-mounted products.		P
	d)attached to a non-reactive vertical surface at a minimum height of 30 inches for wall- mounted products.		P
40.4.5	A single ozone monitor sampling tube is to be positioned with the sample tube opening located 2 inches (50 mm) from the air outlet of the product and at the sampling point that provides the peak ozone emission as determined by 40.4.1 – 40.4.1.6. The sample tube is to point directly into the air stream.		N/A
40.4.6	To determine the concentration of ozone, the ozone emission is to be monitored for not less than:		N/A
	a)24 hours; or		N/A
	b)8 hours if the measured ozone concentration when plotted against time between the 7th and 8th hour of monitoring has:		N/A
41	Peak Ozone Emission Location Determination		N/A
42.1	For a product tested in accordance with 42.1.1 – 42.5, there shall be no movement of the cord or wiring leads to indicate that stress would be transmitted to internal connections or wiring.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
42.1.1	if a strain relief is connected to or integral with a nonmetallic part, one complete sample of the nonmetallic part is to be placed in a full draft circulating air oven maintained at least 18°F (10°C) higher than the maximum temperature of the nonmetallic part as measured during the Temperature Test, Section 45, but not less than 158°F (70°C). The nonmetallic part is to remain in the oven for 7 hours. After its careful removal from the oven and return to room temperature, the nonmetallic part is to be subjected to the test in 42.2 and comply with 42.1.		N/A
42.2	The cord-connections inside the product are to be disconnected. A strain relief means for a power supply cord is to be subjected to a direct pull of 35 pounds-force (156 N). The force may be generated by suspending a 35 pound (15.9 kg) weight on the cord of the product.		N/A
42.3	A strain relief means for wiring leads intended for connection of field-installed supply conductors as specified in 12.1.2.3 or power supply conductors of an internally-mounted accessory as specified in 5.6 are to be subjected to a direct pull of 20 pounds-force (89 N). The force may be generated by suspending a 20 pound (9.1 kg) weight on the wiring leads.		N/A
42.4	The force specified in 42.2 or 42.3 shall be applied so that the strain relief is stressed from any angle permitted by the construction of the product.		N/A
42.5	The force shall be applied for not less than 1 minute.		N/A
43	Pushback Relief Test		P
43.1	To determine compliance with 12.2.2.3, a product is to be tested as follows. The supply cord (or leads) is to be held 1 inch (25.4 mm) from the point where the cord emerges from the product. Then, the cord is to be pushed back with casual force as shown in Figure 43.1. The force is to be applied until the cord buckles, but in no case is the force to exceed 6 pounds-force (26.7 N).		P
44	Grounding Resistance Test		N/A
44.1	The resistance of the grounding path between the equipment-grounding means and any other metal part required to be grounded (see 14.1.2) shall not be more than 0.1 ohm when measured in accordance with 44.2.		N/A
45	Temperature Test		P
45.1	A product is to be tested under the conditions of load as described in 45.2 – 45.5.1. During the test:		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	a)The temperature at any point shall not be sufficiently high to constitute a risk of fire or to adversely affect any materials used in the product,		P
	b)The temperature at specific points shall not exceed those specified in Tables 33.1 and 45.1,		P
	c)A motor-protective device shall not operate, and		P
	d)A resistor shall neither burn out nor otherwise be adversely affected.		P
45.1.1	A product shall be operated under the most severe condition for generating the maximum temperatures, taking into account all intended operating modes of the product. Example operating modes include, but are not limited to: original and/or any alternate air filter(s) in place, air filter removed, fans operating at different speeds (e.g., high, medium, low), fans inoperative, emitters/ionizers on or off, UV lamps on or off or other special feature activated or inactivated.		N/A
45.1.2	For a product having an interlock switch to prevent operation if an air filter is removed:		N/A
	a)The testing in 45.2 – 45.13 shall be conducted with the interlock switch bypassed; or,		N/A
	b)The interlock switch shall comply with Section 29, Interlocks, and the operating instructions of the product shall indicate the intended filter(s), including replacement filters, as specified in 59.10.		N/A
45.2	Maximum load is to be any load from open circuit to short circuit to simulate actual loading conditions and to produce each of the following:		P
	a)Maximum output current,		P
	b)Maximum input current, and		P
	c)Maximum input power.		P
45.3	With reference to 45.2, maximum conditions may be obtained by connecting the power-pack output to the maximum number of filter cells for which it is intended. As an alternative an ionizer output terminal, if employed, may be connected to a resistive load, and the collector output may be connected to a capacitive load.		P
45.4	To determine whether a product complies with the requirements in 45.1 – 45.3, it is to be connected to a supply of rated voltage and operated continuously until constant temperatures have been reached.		P
45.5	A product that is rated for use at more than one voltage or for a range of voltages, and contains a tapped transformer or other means of being adapted to different supply voltages, is to be tested at the most unfavorable combination of supply voltage and internal adjustment.		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	a)A clear, permanent marking is provided adjacent to the cord or supply compartment to warn the user that internal adjustments must be made when the appliance is installed or moved.		P
	b)Detailed instructions clearly showing the adjustments that must be made for various voltages are permanently attached to the appliance. These instructions may be on the outside or on the inside of the overall enclosure where visible at the point at which adjustments for supply voltages must be made.		N/A
	c)The adjusting means provided for different voltages complies with the requirements for wiring terminals in 12.1.4.1 – 12.1.4.5.		N/A
45.5.1	A product powered entirely by a low-voltage supply source (such as by a USB type connector) shall be operated normally except with the air intake area restricted to any level between 0-50 percent of the overall air intake area so that the input current to the product is maximized.		P
45.6	Thermal equilibrium is considered to exist only if three successive readings indicate no change when taken at the conclusion of each of three consecutive, equal intervals of time where the duration of the interval is the longer of the following:		P
	a)5 minutes or		P
	b)10 percent of the total test time elapsed previous to the start of the first interval.		P
45.7	Rubber and other materials likely to deteriorate are to be removed from feet and other supports of the product if absence of the material may result in higher temperatures.		P
45.8	Ordinarily, temperatures are to be measured by thermocouples applied to the hottest accessible parts, except that motor-coil temperatures may be determined by the resistance method if the coil is inaccessible for mounting thermocouples.		P
45.9	The thermocouples are to consist of wires not larger than 24 AWG (0.21 mm ²) and not smaller than 30 AWG (0.05 mm ²). The thermocouples and related instruments are to be accurate and calibrated in accordance with good laboratory practice. The thermocouple wire is to comply to the requirements specified in the "Tolerances on Initial Values of EMF versus Temperature" tables in the Standard Specification and Temperature-Electromotive Force (EMF) Tables for Standardized Thermocouples, ANSI/ASTM E230.		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
45.10	Whenever referee temperature measurements are necessary in connection with the heating of electrical equipment, thermocouples consisting of 30 AWG (0.05 mm ²) iron and constantan wires and a potentiometer type of indicating instrument are to be employed.		P
45.11	A thermocouple junction and adjacent thermocouple lead wire are to be securely held in thermal contact with the surface of the material that is being measured. In most cases, thermal contact will result from securely taping or cementing the thermocouple in place. However, if a metal surface is involved, bracing or soldering the thermocouple to the metal may be necessary.		P
45.12	For the thermocouple-measured temperature of a coil in a motor the thermocouple:		P
	a)Is to be applied to the magnet wire;		P
	b)Is to be separated from the magnet wire by not more than the insulation on the conductor itself; or		P
	c)May be separated from the conductor by not more than the insulation on the conductor itself and the normal coil wrap.		P
45.13	In using the resistance method, the windings are to be at room temperature at the start of the test. The temperature of a winding is to be calculated using the following:		N/A
	$T = \frac{R}{r} (k + t) - k$		N/A
46	Dielectric Voltage-Withstand Test		P
46.1	General		P
46.1.1	A product shall withstand without breakdown for 1 minute the application of a test potential at any frequency between 40 and 70 hertz for ac circuits or a test potential as specified in Table 53.1, Condition A for dc circuits, as follows:		P
	a)Twice the maximum voltage rating of the line-voltage circuit plus 1000 volts applied between the line-voltage primary circuit and exposed or grounded dead metal.		P
	b)125 percent of the maximum measured or rated high-voltage circuit, whichever is higher, applied between:		N/A
	c)150 percent of the maximum measured or rated high-voltage circuit applied between:		P
46.1.1.1	If the test specified in 46.1.1(b)(1) is not conducted, then any point of a high-voltage circuit winding shall be grounded.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
46.1.1.2	If the test specified in 46.1.1(b)(2) is not conducted, then the resonating winding and the high-voltage circuit windings shall be common.		N/A
46.1.2	With reference to the test in 46.1.1(c) the frequency may be adjusted higher if needed, and:		N/A
	a)For any high-voltage transformer not having a grounded secondary winding, the test shall be:		N/A
	b)For any high-voltage transformer having a grounded secondary winding, neither the grounded (neutral) side nor the ungrounded (line) side of the line-voltage circuit shall be connected to any dead metal parts.		N/A
46.1.3	Each component of a product that is subjected to dc potentials during normal operation of the equipment shall withstand without breakdown for 1 minute, the application of a dc potential of 150 percent of the rated or measured dc voltage, whichever is greater, between that component and grounded metal. The values to be used in this test shall be based on the voltages measured in the Output Test, Section 39. The value used shall be the highest voltage existing at that component under any condition of operation.		N/A
46.1.4	The ionizer and collector cells are to be removed during the test described in 46.1.3.		N/A
46.1.5	If the application of a d-c potential of 150 percent of the measured dc voltage of one point causes the rated dc potential of another point to be more than 150 percent of the maximum voltage at these points, other places in the circuit may be grounded to prevent the excessive voltage condition from occurring.		N/A
46.1.6	Each meter provided with a product is to be disconnected from the circuit when the product is subjected to the dielectric voltage-withstand tests described in 46.1.1 – 46.1.5. Each meter is then to be separately subjected to the dielectric voltage-withstand tests in 46.1.1 and 46.1.3.		N/A
46.1.6.1	A product employing a low-voltage circuit or entirely powered by a low-voltage circuit shall be capable of withstanding, for 1 minute, without breakdown, the following test potential applied between low-voltage live parts of opposite polarity and between low-voltage live parts and dead metal parts. The test potential shall be one of the following:		N/A
	a)An ac potential of 500 V at any frequency between 40 and 70 Hz;		N/A
	b)A dc potential of 700 V; or		N/A
	c)A dc potential of 500V if the product is intended to be connected only to a USB supply source.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
46.1.6.2	With reference to 46.1.6.1, the test between low-voltage parts of opposite polarity shall be conducted on magnet coil windings of the transformer after breaking the inner coil lead where it enters the layer.		N/A
46.1.7	In determining whether a product complies with the requirements in 46.1.1 – 46.1.6.1, the potential is to be applied by a 500 volt-ampere or larger transformer with a regulated output voltage. The potential is to be increased from zero until the required test level is reached, and is to be held at that level for 1 minute. The increase in the applied potential is to be at a rapid and substantially uniform rate such that the potential is consistent with the value correctly indicated by a voltmeter.		N/A
46.2	High-voltage transformer core		N/A
46.2.1	An ungrounded high-voltage transformer core can be used if it withstands a dielectric voltage-withstand test of four times the maximum secondary voltage applied from the core to the primary and secondary windings connected together. The potential is to be applied for 1 minute. See the Exception to 14.1.2.		N/A
46.3	Induced potential		P
46.3.1	Three samples of a magnet coil winding as described in 4A.11.5(b)(3) are to be subjected to this test. While in a heated condition from operation as described in the Temperature Test, Section 45, the primary winding of each transformer shall withstand without breakdown an alternating potential of twice the rated voltage of the winding.		P
46.3.2	The potential is to be:		P
	a)Applied for 7200 cycles if the test potential frequency is 120 hertz or more and		P
	b)60 seconds if the frequency is less than 120 hertz.		P
46.3.3	With reference to 46.3.1, a transformer may be conditioned in an oven to obtain the temperature reached in the Temperature Test, Section 45, before conducting the induced-potential test.		N/A
46A	General Purpose Transformers		N/A
46A.1	General		N/A
46A.1.1	In addition to the end-product Temperature Test and Dielectric Voltage-Withstand Test, a general purpose transformer shall also be subjected to the tests of 46A.2 – 46A.4.		N/A
46A.2	Voltage measurement test		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
46A.2.1	For purposes of comparison with voltages measured as described in the Overload Test of Section 46A.3, each secondary open-circuit voltage shall be measured with the primary connected to a test voltage and frequency supply source as indicated in Section 38, Input Test.		N/A
46A.3	Overload test		N/A
46A.3.1	A transformer shall be subjected to the test conditions described in 46A.3.2. The stabilized surface or core temperature recorded on the transformer during the second 50 percent load operation shall not be more than 5°C (9°F) greater than the stabilized core temperature obtained during the initial 50-percent of load operation. The open-circuit output voltage determined following the final 50 percent load operation shall be within 2 percent of the output voltage measured during the Voltage Measurement Test in 46A.2. As an option, a protective device, if provided, may be bypassed when conducting this test.		N/A
46A.3.2	The transformer shall be operated as described in the Temperature Test in Section 45, except that the load shall be 50 percent of the rated value, until the core, or surface temperatures if encapsulated, stabilize. After stabilization, the load shall be adjusted until 200 percent of rated secondary current is reached. After 2 minutes of operation, the load shall be readjusted, if necessary, to restore the current to 200 percent, but no further adjustment is to be made thereafter. The duration of this overload shall be 30 minutes. The load is then to be restored to the original 50 percent of rated value. It shall be held at that value until the core temperature again stabilizes or until the temperature drops to within 5°C (9°F) of the original stabilized 50-percent load-current temperature (whichever occurs first). This temperature value shall be compared with the original 50-percent load stabilized condition, as specified in 46A.3.1. Then, the secondary load shall be removed. With the primary energized, the secondary voltage(s) shall be measured and compared with the original output voltage measurements.		N/A
46A.3.3	When the core of the transformer is not accessible for direct temperature measurement (due to the transformer construction or reasons such as encapsulation or filling with electrical insulating material), the surface of the transformer enclosure shall be used. The portion of the enclosure surface used to measure this temperature shall be the hottest spot occurring in the 100-percent load heating test.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
46A.3.4	A protective device, when provided, shall be bypassed when the device opens while the load is adjusted after the surface temperatures have stabilized.		N/A
46A.4	Repeated dielectric voltage-withstand test		N/A
46A.4.1	Following the Overload Test in Section 46A.3, the transformer shall be subjected to a repeated dielectric voltage-withstand test. The test potential shall be 65 percent of the value originally specified. After this test, the transformer shall perform as intended.		N/A
46B	Thermal Aging Test		N/A
46B.1	A polymeric material employed in a Class 105 (A) insulation system in accordance with 4A.11.3(b)(4) is to be aged for the amount of time corresponding to an aging temperature that appears on the Class 105 (A) system response shown in Figure 46B.1. The insulation system is to cool to room temperature and the applicable dielectric voltage-withstand requirements specified in Section 46 are to be applied between metal parts that are isolated from each other by the material under consideration.		N/A
46C	Endurance Test – Switching Devices		N/A
46C.1	This test applies to switches or other similar operating controls as specified in 13A.14(e)(2).		N/A
46C.2	A switching device in a product shall perform acceptably when tested as follows for endurance. There shall be no electrical or mechanical failure nor undue burning, pitting or welding of contacts, or striking of an arc to dead metal parts.		N/A
46C.3	The tests on switching devices shall be conducted by:		N/A
	a) Operating the switching device mechanisms within the product in accordance with 46C.4 and 46C.5 except using the normal switching device loads of the product; or,		N/A
	b) Cycling the switching devices individually or collectively while controlling the loads specified in 46C.5.		N/A
46C.4	If the test in 46C.3(a) is conducted, the:		N/A
	a) Enclosure of the product shall be connected through a 30 ampere cartridge fuse to the electrical test circuit pole considered least likely to strike (arc) to ground;		N/A
	b) Switching device shall be mounted as intended in service; and,		N/A
	c) Test cycling shall be as specified in 46C.5 unless a slower rate is required by the design of the product. A faster rate may be used if agreeable to all concerned.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
46C.5	A switching device shall be subjected to an endurance test at the ambient temperature for which it is intended. The endurance test shall consist of making and breaking the connected load for 6000 cycles of operation, with 1 second ON and 9 seconds OFF. The voltage shall be as specified in 34.2.		N/A
	a) Noninductive load(s) – 100 percent of the total connected load current. The power factor shall be 1.0.		N/A
	b) One or more motors together with one or more other loads – 100 percent of the locked-rotor current of the largest motor plus 100 percent of the full load current of all other motors and/or other loads. The power factor shall be 0.4 – 0.5.		N/A
	c) One or more inductive loads, such as a transformer or ballast, with or without other noninductive or pilot duty loads – 100 percent of the total inductive and other noninductive/pilot duty loads. The power factor shall be 0.7 – 0.8.		N/A
	d) One or more pilot duty loads, such as coils within a relay or electric valve – 100 percent of the total connected pilot duty loads. The power factor shall not exceed 0.35.		N/A
6C.6	At the conclusion of the test in 46C.3, each switching device shall be subjected to the Dielectric Voltage-Withstand Test, Section 46.		N/A
47	Stored Energy Test		P
47.1	The voltage across a capacitance at the time the capacitance is accessible during user servicing, 5 seconds or more after the power supply to the appliance has been interrupted by the removal of an interlocked cover, or the like, shall not exceed the applicable value specified in Table 47.1.		P
48	Evaluation of Reduced Spacings on Printed-Wiring Boards		P
48.1	General		P
48.1.1	Printed-wiring board traces of different potentials in the same circuit having reduced spacings and required to be tested in accordance with 23.3.1(c)(2)(i) or 23.4.3(d)(1) shall be evaluated by conducting the shorted trace test described in 48.2.1 – 48.2.4.		P
48.2	Shorted trace test		P
48.2.1	Printed-wiring board traces mentioned in 48.1.1 are to be tested as described in 48.2.2 – 48.2.4. As a result of the testing:		P
	a) The overcurrent protection associated with the branch circuit to the unit shall not open,		P
	b) The ground circuit fuse shall not open,		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	c)A wire or a printed-wiring board trace shall not open, and		P
	d)The device shall emit no flame or molten metal.		P
48.2.2	Following each shorted trace test, the device is to be subjected to the Dielectric Voltage- Withstand Test, Section 46.		P
48.2.3	Each location of reduced spacings between the traces on the printed-wiring board is to be tested separately. The traces at each location are to be short-circuited by connecting them together with a conductor having an ampacity high enough not to affect the test results prior to energizing the air cleaner. Exposed dead metal parts of the air cleaner are to be connected to ground through a 3-ampere nontime-delay fuse. The air cleaner is to be connected in series with a nontime-delay fuse of the maximum current rating that can be accommodated by the fuseholder of a branch circuit to which the air cleaner could be connected. The air cleaner is to be energized as in normal use.		P
48.2.4	Each test is to be continued until further changes, as a result of the test condition, are not likely. If the circuit is interrupted by the opening of a component, the test is to be repeated twice using new components as necessary.		P
49	Abnormal Operation Test		P
49.1	General		P
49.1.1	A product shall not cause a risk of fire or electric shock when operated under abnormal conditions that may occur during use. During the tests specified in 49.2.1 – 49.7.1:		P
	a)The cheesecloth mentioned in 49.1.2 shall not glow or flame;		P
	b)The tissue paper mentioned in 49.1.2 shall not glow or flame;		P
	c)The fuse in the ground circuit shall not open; and		P
	d)A permanent path shall not result between live parts and exposed metal, as determined by a repeat of the Leakage-Current Test, Section 35.		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
49.1.2	During the abnormal operation test, the product is to be connected in series with a nontime-delay fuse of the maximum current rating that can be accommodated by the fuseholder of a branch circuit to which the product could be connected. The product complies with the test if the branch-circuit fuse opens before any risk of fire or electric shock is evident. If an automatically reset protector functions in the air cleaner, the test is to be continued for 7 hours. If a manual reset protector functions, the test is to be continued until the protector operates for 10 cycles using the minimum resetting time, but not at a rate faster than 10 cycles of operation per minute. The protector is to be operational upon completion of the test. Only one abnormal condition is to be simulated at a time. Abnormal operation tests are to be conducted with the product supported in its normal operating position. A portable product is to be placed on a pine board covered with white tissue paper. All products are to be covered with cheesecloth as described in 49.1.6, arranged so that the cloth is close to any openings in the cabinet or enclosure. Exposed dead metal parts are to be connected to ground through a 3-ampere nontime-delay fuse.		P
49.1.3	Parts that may be removed during user servicing may be removed if they are not:		P
	a) Necessary for the functioning of the product,		P
	b) Exposed to view during operation, and		N/A
	c) Held captive.		N/A
49.1.4	The tests specified in 49.2.1 – 49.4.3 are first to be conducted with a resistive load connected to the output terminals so that three times the full-rated current will be drawn from the secondary winding. The test is to be repeated with the transformer secondary winding or windings shorted.		P
49.1.5	As a risk of fire or electric shock resulting from the abnormal operation tests will usually manifest itself within 1 hour, the tests are ordinarily to be limited to 1 hour. If at the end of 1 hour it appears possible that risk of fire or electric shock will eventually result, the test is to be continued until ultimate results are obtained (usually not more than 7 hours).		P
49.1.6	The cheesecloth mentioned in 49.1.2 is to be untreated cotton cloth 36 inches (0.9 m) wide, running 14 – 15 yards per pound (28 – 30 m/kg). Tests involving cheesecloth are to be conducted in a room free of drafts.		P
49.2	High-voltage supply		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
49.2.1	A power supply with an output that exceeds the limits in Partially Protected Parts, Section 37, is to be tested with the controls adjusted for maximum output voltage and current under each of the following conditions:		N/A
	a)With the ionizer output terminal, if employed, shorted to ground.		N/A
	b)With the collector terminal shorted to ground.		N/A
	c)With any ungrounded end of the secondary winding of the high-voltage transformer core. For a transformer having a completely insulated center-tapped winding, one-half of the secondary winding is to be shorted in lieu of connection to the core.		N/A
49.3	High-voltage spacings short circuit		N/A
49.3.1	The spacings referenced in 23.4.4(a) are to be short-circuited in turn.		N/A
49.4	Unenclosed high-voltage power supply		N/A
49.4.1	A product having a high-voltage power supply not enclosed within its own enclosure as described in 6.2.1(a), or a product employing a filter that is electrically charged by the product, shall comply with the requirements in 49.4.2 – 49.4.3 without formation of a heavy carbonizing, low resistive path, or ignition of the material under test.		N/A
49.4.2	An arc is to be established between parts that have a potential difference greater than 2500 volts peak or across the surface of a filter that is electrically charged by the appliance, using a conductive probe. Materials located between the parts are to be located in the path of the arc. The test is to be continued for 15 minutes unless the glowing or flaming occurs in a shorter time. Three samples are to be tested.		N/A
49.4.3	All secondary windings (including the resonant winding of the transformer, if provided) are to be short-circuited at the same time. If the circuit is interrupted by the opening of a component, the test is to be conducted a total of three times using new components when necessary.		N/A
49.5	Component short- and open-circuit test		P
49.5.1	Each high-voltage output is to be loaded as indicated in 45.3. Each component, such as a capacitor, a diode, a solid state device, or the like, connected in the line-voltage circuit is to be short-circuited and then open-circuited one component at a time.		P
49.6	Stalled rotor, restricted air inlet and blocked air outlet		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
49.6.1	These tests are applicable to a product if a risk of fire or electric shock is likely to occur due to shrinkage, warping or other deformation of any nonmetallic materials that may be heated under the conditions specified in (a) – (c). For each condition, the product is to be operated as specified in 49.1 and only one condition is to be applied at a time. At the conclusion of each condition, the product shall comply with 49.1.1.		P
	a)For products with a motor, the rotor of the motor is to be locked.		P
	b)Products having air inlet openings shall have the openings restricted by draping a single layer of cheesecloth over the product such that all air inlets are covered. The cheesecloth is to be the type as specified in 49.1.6.		P
	c)Products having air outlet openings shall have all air outlet openings blocked.		P
49.7	Low-voltage powered product overvoltage test		N/A
49.7.1	A product intended to be powered entirely by a low-voltage supply source (such as by a USB type connector) shall be connected to a supply circuit at an overvoltage condition using a test voltage that is 30 percent higher than the product rated voltage and capable of supplying a minimum 8 amperes at that test voltage. The product shall be operated as specified in 49.1. At the conclusion of the test, the product shall comply with 49.1.1.		N/A
49A	Protective Electronic Circuit Tests		P
49A.1	General		P
49A.1.1	The tests in 49A.2 – 49A.5 are applicable to products provided with a protective electronic circuit and intended to comply with 13A.3(i).		P
49A.1.2	User adjustable controls shall be adjusted to their most unfavorable setting		P
49A.2	Fault conditions abnormal test		P
49A.2.1	Following the application of the operational fault conditions in accordance with 49A.2.2 – 49A.2.5, there shall be no risk of fire, electric shock or injury to persons. Electrical live parts or moving parts shall not be exposed. The product shall comply with the Dielectric Voltage Withstand Test in Section 46.		P
49A.2.2	In accordance with 13A.19(b), a product provided with a protective electronic circuit intended to comply with 13A.3(i) shall be operated as specified in the Temperature Test, Section 45 except the room ambient shall be maintained at 70 – 80°F (21.1 – 26.7°C). The product protective electronic circuit shall then be subjected to any one of the following relevant operational fault conditions, each consecutively applied one at a time:		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	a)Open circuit at the terminals of any component;		P
	b)Short circuit of capacitors, unless they comply with the Standard for Fixed Capacitors for Use in Electronic Equipment – Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains, UL 60384-14;		P
	c)Short circuit of any two terminals of an electronic component, including a metal oxide varistor (MOV). For the test applicable to an integrated circuit, see (e);		P
	d)Failure of triacs in the diode mode;		P
	e)Failure of microprocessors and integrated circuits except components such as thyristors and triacs. All possible output signals occurring within the component which may result in the product not complying with 49A.2.1 shall be considered;		P
49A.2.3	In reference to 49A.2.2, the following shall be considered:		N/A
	a)If the fault specified in 49A.2.2(c) is not applied:		N/A
	b)For evaluating encapsulated or similar components, if the circuit and/or components cannot be evaluated by other methods, then 49A.2.2(e) shall be applied		N/A
49A.2.4	The operational fault conditions specified in 49A.2.2 (a) – (g) shall be considered completed if a manual reset (non-self-resetting) device opens the supply circuit. If the supply circuit is not opened by such a device, then the fault conditions shall be applied until thermal equilibrium is established.		P
49A.2.5	A product provided with a protective electronic circuit intended to comply with 13A.3(i) shall additionally be operated as specified 49A.2.2 except that the product shall first be subjected to the relevant abnormal condition(s) addressed by Sections 7, 20, 21, 27, 33, 40.1.6, 45, 49. The product protective electronic circuit shall then be subjected to any one of the relevant operational fault conditions as outlined in 49A.2.2 (a) – (g), each consecutively applied one at a time.		P
49A.3	Electromagnetic compatibility (EMC) tests		P
49A.3.1	In accordance with 13A.19(e), a product having a protective electronic circuit intended to comply with 13A.3(i) shall be subjected to the electromagnetic phenomena specified in 49A.3.3 – 49A.3.9, each applied one at a time. Each test shall be carried out:		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	a)After a protective electronic circuit has operated during the relevant abnormal condition(s) addressed by Sections 7, 20, 21, 27, 33, 40.1.6, 45, 49 taking into account the most severe results (e.g., highest temperatures, pressures, etc.);		P
	b)At conditions specified in the Temperature Test, Section 45 except that the room ambient shall be maintained at 70 – 80°F (21.1 – 26.7°C) unless different conditions are required by the specific abnormal condition being applied; and		P
	c)With surge protective devices disconnected unless they incorporate spark gaps.		P
49A.3.2	Following the application of each electromagnetic stress, a protective electronic circuit shall continue to operate as intended. In addition, there shall be no risk of fire, electric shock or injury to persons. Electrical live parts or moving parts shall not be exposed. The product shall comply with the Dielectric Voltage Withstand Test in Section 46.		P
49A.3.3	Electrostatic discharges shall be applied in accordance with the IEC 61000-4-2, Standard for Electromagnetic compatibility (EMC) – Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test, test level 4 being applicable. Ten discharges having a positive polarity and ten discharges having a negative polarity shall be applied at each preselected point.		N/A
49A.3.4	Radiated fields shall be applied in accordance with the IEC 61000-4-3, Standard for Electromagnetic compatibility (EMC) – Part 4-3: Testing and Measurement Techniques – Radiated, Radio-Frequency Electromagnetic Field Immunity Test. The frequency ranges tested shall be 80 MHz to 1000 MHz, test level 3; 1.4 GHz to 2.0 GHz, test level 3; and 2.0 GHz to 2.7 GHz, test level 2. The dwell time for each frequency shall be sufficient to observe a possible malfunction of the protective electronic circuit.		N/A
49A.3.5	Fast transient bursts shall be applied in accordance with the IEC 61000-4-4, Standard for Electromagnetic compatibility (EMC) – Part 4-4: Testing and Measurement Techniques – Electrical Fast Transient/Burst Immunity Test. Test level 3 with a repetition rate of 5 kHz is applicable for signal and control lines. Test level 4 with a repetition rate of 5 kHz is applicable for the power supply lines. The bursts are applied for 2 min with a positive polarity and for 2 min with a negative polarity		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
49A.3.6	Voltage surges shall be applied to the product power supply terminals in accordance with the IEC 61000-4-5, Standard for Electromagnetic compatibility (EMC) – Part 4-5: Testing and Measurement Techniques – Surge Immunity Test with five positive impulses and five negative impulses being applied at the selected points. An open circuit test voltage of 2 kV is applicable for the line-to-line coupling mode, a generator having a source impedance of 2 ohms being used. An open circuit test voltage of 4 kV is applicable for the line-to-ground coupling mode, a generator having a source impedance of 12 ohms being used. Sheathed heating elements in which a metal sheath is bonded in accordance with 14.1.2 shall be electrically disconnected during this test. For products having surge arresters incorporating spark gaps, the test shall be repeated at a level that is 95 percent of the flashover voltage. If a feedback system depends on inputs related to a disconnected heating element, an artificial network may be needed.		N/A
49A.3.7	Injected currents shall be applied in accordance with the IEC 61000-4-6, Standard for Electromagnetic compatibility (EMC) – Part 4-6: Testing and Measurement Techniques – Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields, test level 3 being applicable. During the test, all frequencies between 0.15 MHz to 80 MHz shall be covered. The dwell time for each frequency shall be sufficient to observe a possible malfunction of the protective electronic circuit.		N/A
49A.3.8	Voltage dips and interruptions specified as test level Class 3 shall be applied in accordance with:		N/A
	a)The IEC 61000-4-11, Standard for Electromagnetic compatibility (EMC) – Part 4-11: Testing and Measurement Techniques – Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests, for products having a rated current not exceeding 16 A. The values specified in Table 1 and Table 2 of IEC 61000-4-11 shall be applied at zero crossing of the supply voltage; or,		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b)The IEC 61000-4-34, Standard for Electromagnetic compatibility (EMC) – Part 4-34: Testing and Measurement Techniques – Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests for Equipment with Input Current More Than 16 A Per Phase for products having a rated current exceeding 16 A. The values specified in Table 1 and Table 2 of IEC 61000-4-34 shall be applied.		N/A
49A.3.9	Supply source (mains) signals shall be tested in accordance with the IEC 61000-4-13, Standard for Electromagnetic compatibility (EMC) – Part 4-13: Testing and Measurement Techniques – Harmonics and Interharmonics Including Mains Signalling at a.c. Power Port, Low Frequency Immunity Tests. Table 11 with test level Class 2 using the frequency steps according to Table 10 of IEC 61000-4-13 shall be applied.		N/A
49A.4	Programmable component reduced supply voltage test		N/A
49A.4.1	In accordance with 13A.19(f), the following test is applicable to a product provided with a protective electronic circuit intended to comply with 13A.3(i) and having a programmable component for one or more of its safety functions.		N/A
49A.4.2	Following the voltage changes specified in 49A.4.3, a product shall continue to either operate normally from the same point in its operating cycle at which the voltage decrease occurred or a manual operation shall be required to restart the product. In addition, there shall be no risk of fire, electric shock or injury to persons. Electrical live parts or moving parts shall not be exposed. The product shall comply with the Dielectric Voltage Withstand Test in Section 46.		N/A
49A.4.3	The product shall be operated at rated voltage and at conditions specified in the Temperature Test, Section 45 except that the room ambient shall be maintained at 70 – 80°F (21.1 – 26.7°C) until thermal equilibrium occurs. The power supply voltage shall then be changed, by approximately 10 V/s until the voltage reductions or increases specified in (a) – (d) are attained. The power supply voltage shall then be maintained at each voltage condition for not less than 60 s as follows:		N/A
	a)Voltage shall be reduced until the product ceases to respond to user inputs or parts controlled by the programmable component cease to operate, whichever occurs first. This value of supply voltage shall be recorded.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	b)Voltage shall be increased to rated voltage so that the product operates as intended.		N/A
	c)Voltage shall be reduced to a value that is approximately 10 percent less than the recorded voltage		N/A
	d)Voltage shall be increased so that the product operates as intended.ge.		N/A
49A.5	Fuse-link test		N/A
49A.5.1	In accordance with 13A.19(c), the following test is applicable to a product provided with a protective electronic circuit intended to comply with 13A.3(i) and in which a miniature fuse-link opens during the application of one or more of the operational fault conditions specified in 49A.2.		N/A
49A.5.2	The fault condition in which the miniature fuse-link opened shall be repeated in accordance with the relevant parts of 49A.2 except with the fuse replaced by an ammeter. The current in the circuit shall be measured.		N/A
49A.5.3	The resistance of the fuse-link shall be measured so that the rated current through the fuse can be determined. The current measured by the ammeter described by 49A.5.2 is to be multiplied by the ammeter internal resistance and then divided by the resistance of the fuse link to obtain the rated current of the fuse-link for making the determinations specified in 49A.5.4		N/A
49A.5.4	If the calculation determined in accordance with 49A.5.3:		N/A
	a)Is at least 2.75 times the rated current of the fuse-link, the circuit is considered to be protected and the results obtained during the tests of 49A.2 with the fuse-link in the circuit can be used to determine compliance with 49A.2.1.		N/A
	b)Is between 2.1 times and 2.75 times the rated current of the fuse-link, the relevant fault condition(s) in accordance with 49A.2 shall be repeated with the fuse-link short-circuited. The test shall be conducted until the lesser of one of the following occurs and the results shall comply with 49A.2.1:		N/A
	c)Is 2.1 times the rated current of the fuse-link or less, the circuit shall not be considered to be protected and the relevant fault condition(s) in accordance with 49A.2 shall be repeated with the fuse-link short-circuited. The results shall comply with 49A.2.1.		N/A
49B	Rain Test		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
49B.1	The rain test apparatus shall consist of three spray heads mounted in a water supply rack as shown in Figure 49B.1. The spray heads shall be constructed in accordance with Figure 49B.2. The product shall be brought into the focal area of the three spray heads in such position, and under such conditions, that the greatest quantity of water will enter the product.		N/A
49B.2	The spray shall be directed, at an angle of 45° to the vertical, towards the louvers or other openings closest to live parts. Water pressure shall be maintained at 5 psig (34.5 kPa) at each spray head.		N/A
49B.3	The product shall be tested under the intended conditions of use judged most likely to cause the entrance of water into or onto electrical components, including with electrical components energized or de-energized. Each exposure shall be for not less than 1 h.		N/A
49B.4	Openings intended for field conduit connection shall be provided with such connections, with the outer end sealed, but with pipe thread compound at the connection. Openings intended for the entry of conductors for low-voltage wiring shall not be sealed.		N/A
49B.5	Except as specified in 49B.6, water shall not enter a cabinet or enclosure above the lowest electrical component other than insulated wire.		N/A
49B.6	In reference to 49B.5, if water enters a cabinet or enclosure above the lowest electrical component, then the point of water entry shall not be in proximity to live parts and live parts shall not be wetted except for the following:		N/A
	a) Insulated wiring; or b) Film-coated motor windings.		N/A
49B.7	After the final exposure to the rain, the complete product shall be subjected to the Dielectric Voltage-Withstand Test, Section 46.		N/A
49B.8	When multiple exposures to rain are necessary, the Dielectric Voltage-Withstand Test shall be repeated in the wet condition if drying could occur between exposures.		N/A
49C	Accelerated Aging Tests – Gaskets		N/A
49C.1	The requirements in 49C.2 – 49C.10 apply to gaskets required as seals for enclosures of products intended for outdoor use.		N/A
49C.2	Tensile strength and elongation are to be determined using the test methods and apparatus described in the Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension, ASTM D412.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
49C.3	Neoprene or rubber compounds, except foamed materials, forming gaskets shall have physical properties as indicated in Table 49C.1 before and after an air oven aging as specified in Table 49C.2.		N/A
49C.4	Foamed neoprene or rubber compounds forming gaskets are to be subjected to an air oven aging as specified in Table 49C.2. The compounds shall not harden or otherwise deteriorate to a degree which will affect their sealing properties. A minimum of three gasket samples shall be tested.		N/A
49C.5	Thermoplastic materials, other than polyvinyl chloride materials, forming gaskets are to be subjected to an air oven aging as specified in Table 49C.2. The material shall not deform, harden, melt or otherwise deteriorate to a degree which will affect its sealing properties. A minimum of three gasket samples shall be tested.		N/A
49C.6	With reference to 49C.5, polyvinyl chloride gasket material shall have physical properties as indicated in Table 49C.1 before and after an air oven aging as specified in Table 49C.2.		N/A
49C.7	Gaskets of materials other than those mentioned in 49C.3 – 49C.6 shall be nonabsorptive, and shall provide equivalent resistance to aging and temperatures.		N/A
49C.8	The temperatures indicated in Table 49C.2 for the air oven aging shall correspond to the maximum temperatures measured on the gasket during the Temperature Test, Section 45.		N/A
49C.9	At least three samples of neoprene, rubber or polyvinyl chloride materials shall be used for each of the following tests:		N/A
	<ul style="list-style-type: none"> a) Recovery b) Before Elongation c) After Elongation d) Before Tensile Strength e) After Tensile Strength 		N/A
49C.10	A neoprene, rubber or polyvinyl chloride gasket material shall be considered as complying if the average results for all samples comply with the physical properties to which they were subjected as specified in Table 49C.1.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
49C.11	In reference to 6.1.14, the force required to peel a gasket that is secured by adhesives from its mounting surface after exposure shall not be less than 75 percent of the value determined on as-received samples. Samples of the adhesive and mounting surface are to be exposed for a period of 72 hours to each of the following conditions:		N/A
	a) 212°F 3.6°F (100°C 2°C); b) 89.6°F 3.6°F (32°C 2°C) at not less than 87 percent relative humidity; and c) 14°F 3.6°F (minus 10°C 2°C).		N/A
49D	Switch Mode Power Supply Units – Overload Test		P
49D.1	The test applies to switch mode power supply units as specified in 4A.9.1(c).		P
49D.2	Each output winding, or section of a tapped winding, is overloaded in turn, one at a time, while the other windings are kept loaded or unloaded, whichever load conditions of normal use is the least favorable.		P
49D.3	Overloading is carried out by connecting a variable resistor (or an electronic load) across the power supply output. The resistor is adjusted as quickly as possible and readjusted, if necessary, after 1 minute to maintain the applicable overload. No further readjustments are then permitted.		P
49D.4	For this test, any protective devices such as a fuse, manual reset circuit protector, thermal protector, etc. are allowed to remain in the circuit.		N/A
49D.5	If overcurrent protection is provided by an overcurrent protection device, the overload test current is the maximum current which the overcurrent protection device is just capable of passing for 1 hr. If this value cannot be derived from the specification, it is to be established by test.		N/A
49D.6	If no overcurrent protection is provided, the maximum overload is the maximum power output obtainable from the power supply.		N/A
49D.7	In case of voltage foldback, the overload is to be slowly increased to the point which causes the output voltage to collapse. The overload is then established at the point where the output voltage recovered and held for the duration of the test.		N/A
49D.8	The duration of the test is to be for 7 hours or until ultimate results are reached. At the conclusion of the test, there shall be no charring or burning of electrical insulation, no opening of any protective device or any circuit component.		N/A
50	Metallic Coating Thickness Test		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
50.1	The method of determining the thickness of a zinc or cadmium coating by test is described in 50.2-50.9.		N/A
50.2	The solution used for this test is to:		N/A
	a)Be made from distilled water, b)Is to contain 200 grams per liter of American Chemical Society (ACS) reagent grade chromic acid (CrO3), and 50 grams per liter of ACS reagent grade concentrated sulfuric acid (H2SO4). The latter is equivalent to 27 milliliters per liter of ACS reagent grade concentrated sulphuric acid, specific gravity 1.84, containing 96 percent of H2SO4.		N/A
50.3	The test solution is to be contained in a glass vessel such as a separatory funnel with the outlet equipped with a stopcock and a capillary tube having an inside bore of 0.025 inch (0.64 mm) and a length of 5.5 inches (140 mm). The lower end of the capillary tube is to be tapered to form a tip. The drops exiting the tube are to be about 0.025 milliliters each. To preserve an effectively constant level, a small glass tube is to be inserted in the top of the funnel through a rubber stopper. Its position is to be adjusted so that, when the stopcock is open, the rate of dropping is 100 5 drops per minute. If desired, an additional stopcock may be used in place of the glass tube to control the rate of dropping.		N/A
50.4	The sample and the test solution are to be kept in the test room for a duration that will enable them to reach room temperature. This is to be noted and recorded. The test is to be conducted at an ambient temperature of 21.1 – 32.2°C (70 – 90°F).		N/A
50.5	Each sample is to be thoroughly cleaned before testing. All grease, lacquer, paint, and other nonmetallic coating are to be removed completely by means of solvent. Samples are then to be thoroughly rinsed in water and dried. Care is to be exercised to avoid contact of the cleaned surface with the hands or any foreign material.		N/A
50.6	The sample to be tested is to be supported from 0.7 – 1 inch (17.8 – 25.4 mm) below the orifice, so that the drops of solution strike the point to be tested and run off quickly. The surface to be tested is to be inclined about 45 degrees from horizontal.		N/A
50.7	The stopcock is to be opened and the time in seconds is to be measured until the dropping solution dissolves the protective metallic coating, exposing the base metal. The end point is the first appearance of the base metal recognizable by a change in color.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
50.8	Each sample of a test lot is to be tested at three or more points (excluding cut, stenciled, and threaded surfaces) on the inside surface and at an equal number of points on the outside surface, at places where the metallic coating may be expected to be the thinnest. On enclosures made from precoated sheets, the external corners that are subjected to the greatest deformation are likely to have thin coatings.		N/A
50.9	To calculate the thickness of the coating being tested, select from Table 50.1 the thickness factor appropriate from the temperature at which the test was conducted and multiply by the time in seconds required to expose base metal as described in 50.7.		N/A
51	High-Voltage Insulating Material Arcing Test		N/A
51.1	High-voltage insulating materials other than glazed porcelain, glass, or mica shall be tested as specified in 51.2. There shall not be heavy carbonizing, low resistive path, or ignition of the insulating material.		N/A
51.2	With regard to 51.1, the high-voltage output near the insulating material is to be connected to a pointed brass electrode placed at an angle 45 degrees to the surface of the insulating material under test. It is to be positioned in a manner to sustain a continuous arc until ultimate conditions are observed. The test may be discontinued in the event an integral nonautomatic protective device, such as a fuse, opens or the supply stops operating. The test is to be conducted at room ambient conditions.		N/A
51.3	Ignition as mentioned in 51.1 is considered to have occurred if the material continues to burn for any duration of time after the arc is removed.		N/A
51A	Tests on Nonmetallic Materials		P
51A.1	Nonmetallic materials shall be evaluated as indicated in Table 51A.1.		P
51B	Fastener Strength Test		P
51B.1	With reference to the requirement in 6A.1, nonmetallic fasteners that can degrade and affect the integrity of an enclosure or cabinet shall comply with 51B.2 and 51B.3.		P
51B.2	The tightening torque and pull-off strength of nonmetallic fasteners shall be not less than 50 percent of the as-received value after the conditioning as specified in 51B.3.		P
51B.3	Three sets of samples, each set consisting of three specimens, is to be conditioned as indicated in Tables 51B.1 and 51B.2.		P
51C	Wiring Endurance Test		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
51C.1	A product with wiring subjected to movement as specified in 15.1.9 shall be tested in accordance with 51C.2 – 51C.5. At the conclusion of the testing, the product shall comply with all of the following:		P
	a)There shall be no broken conductors; b)Individual strands shall not penetrate the insulation; c)There shall be no damage to the wiring; and d)The product shall comply with the Dielectric Voltage-Withstand Test, Section 46.		P
51C.2	Wiring subject to movement shall be tested by cycling the moving part(s) through the maximum travel permitted by the design. If the electrical component to which the wiring is connected is exposed to the user, the duration of the endurance test shall be 100,000 cycles, otherwise the test shall be for 6,000 cycles.		P
51C.3	Door restraints, such as chains, clamps, and the like, are to be removed. However, such restraints may remain in place if their removal requires the use of a tool.		P
51C.4	The endurance test cycle rate shall be not less than 6 cycles per minute. One cycle shall be considered a complete flexing movement from the starting position through the maximum amount permitted by the design and then returned to the starting position.		P
51C.5	Following the endurance cycling, the product shall be subjected to the Dielectric Voltage-Withstand Test, Section 46.		P
52	Permanence of Marking		P
52.1	A marking required to be permanent (durable and securely affixed) shall be molded, die-stamped, paint-stenciled, stamped or etched on metal, or indelibly stamped on pressure-sensitive labels secured by adhesive. Pressure-sensitive labels secured by adhesive shall comply with the Standard for Marking and Labeling Systems, UL 969. Ordinary usage, handling, storage of the product shall be considered in determining the permanence of marking.		P
52.2	In reference to 52.1, markings or labels complying with UL 969 shall also comply with one of the following:		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
	a)Products intended for indoor use only – The indoor use, exposure to high humidity and occasional exposure to water at air ambient temperatures above 32°F (0°C), requirements shall be applied. b)Products intended for outdoor use – The indoor and outdoor use, where exposed to high humidity or occasionally to water, requirements shall be applied.		N/A
53	Dielectric Voltage-Withstand Test		P
53.1	Each product shall withstand without electrical breakdown, as a routine production-line test, the application of a potential at a frequency within the range of 40 – 70 hertz, or a dc potential		P
	a)Between the primary wiring, including connected components, and accessible dead metal parts that are likely to become energized and b)Between primary wiring and accessible low-voltage, 42.4 volts peak or less, metal parts, including terminals.		P
53.2	The production-line test shall be conducted in the time and at the potential specified in either Condition A or Condition B of Table 53.1.		N/A
53.3	A product may be in a heated or unheated condition for the test.		N/A
53.4	The test is to be conducted with the product fully assembled. It is not intended that the product be unwired, modified, or disassembled for the test.		N/A
53.5	The test equipment shall have a means of:		P
	a)Indicating the test potential, b)An audible or visual indicator of electrical breakdown, and c)Either a manually reset device to restore the equipment after electrical breakdown or an automatic reject feature of any noncomplying unit.		P
53.6	If the output of the test-equipment transformer is less than 500 volt-amperes, the equipment shall include a voltmeter in the output circuit to directly indicate the test potential.		N/A
53.7	If the output of the test-equipment transformer is 500 volt-amperes or more, the test potential may be indicated:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<p>a)By a voltmeter in the primary circuit or in a tertiary-winding circuit;</p> <p>b)By a selector switch marked to indicate the test potential; or</p> <p>c)For equipment having a single test-potential output, by a marking in a readily visible location to indicate the test potential. If a marking is used without an indicating voltmeter, the equipment shall include a positive means, such as an indicator lamp, to indicate that the manually reset switch has been reset following a dielectric breakdown.</p>		N/A
53.8	Test equipment other than that described in 53.5 – 53.7 may be used if determined to accomplish the intended factory control.		N/A
53.9	During the test,		P
	<p>a)The primary switch is to be in the on position,</p> <p>b)Both sides of the primary circuit of the product are to be connected together and to one terminal of the test equipment, and</p>		P
54	Grounding Continuity		N/A
54.1	The manufacturer shall determine by a routine production-line test that each product required to have grounding means complies with the requirement in 14.1.2.		N/A
54.2	Electrical continuity is to be checked between:		N/A
	<p>a)The external surface of the product and the metal portions of knobs or buttons that will be contacted by the user during operation of the product and</p> <p>b)For a cord-connected product, the grounding blade of the attachment plug, and</p> <p>c)For a permanently connected product, the grounding terminal of the product.</p>		N/A
54A	Protective Electronic Circuit Test		N/A
54A.1	The manufacturer shall periodically verify that protective electronic circuits evaluated in accordance with 13A.19 and Section 49A, Protective Electronic Circuits Tests, are functional for protecting against conditions that could cause risk of fire, electric shock or injury to persons.		N/A
55	Details		N/A
55.1	The input of a product shall be rated in volts, frequency, and amperes, volt-amperes, or watts. A product shall be rated in amperes or volt-amperes if a wattage rating is not a close indication of the volt-ampere input.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
56	Visible During Installation and Inspection		N/A
56.1	The markings required by 56.2 – 56.9 shall be permanent, except as noted in 56.2, plain, legible, and readily visible during installation and examination of the supply-wiring connections.		N/A
56.2	If a product is shipped in multiple cartons or not completely assembled when shipped from the factory (see 8.2.1 – 8.2.4) and if mismatching of components might result in a risk of fire, electric shock, or injury to persons each part shall be marked to indicate the other parts with which that part is intended for use. However, the marking may be on the package for small parts shipped in an envelope or other package.		N/A
56.3	Unless the proper wiring connections are plainly evident, wiring terminals shall be marked or the product shall have a wiring diagram to indicate the connections.		N/A
56.4	Information necessary for proper operation of the product and the selection of heaters for overload relays shall be provided.		N/A
56.5	With reference to wiring diagrams and installation instructions, the only connection that may be shown to a heating-cooling panel or furnace installation are those to be made to:		N/A
	a)Room thermostat terminals, b)The input or supply connections to a complete furnace, or c)The fan circuit on existing systems.		N/A
56.6	The wiring diagram shall clearly indicate that connections are to be made only at the points specified in 57.5 and shall not show other furnace components such as limit switches and heating controls that could possibly mislead installers to make connections at these locations.		N/A
56.7	If the maximum input of a product exceeds the full-load amperes, the locked-rotor amperes, or both, the wiring diagram, installation instructions, or both shall not indicate that the product is to be connected to the fan circuit of the heating-cooling panel or furnace.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
56.8	If a low-voltage device or part of a device is intended to be wired in the field to become part of a Class 1 circuit or a Class 2 circuit wired with Class 1 wire, the terminals of the device or part shall be marked accordingly. A low-voltage switching or power-consuming device, or part of a device intended to be wired in the field to become part of a Class 2 circuit only shall be marked accordingly. A low-voltage power-supply device that includes a transformer is not required to be marked to indicate that it is for use in a Class 2 circuit only. A low-voltage device or part of a device that is acceptable for connections to either a Class 1 or Class 2 circuit is not required to be so marked. If wiring instructions are provided with the device, they shall not conflict with the requirements.		N/A
56.9	A product intended to be powered by a Universal Serial Bus (USB) supply source shall be marked in proximity to the connection point with the abbreviation "USB" or with the USB symbol:		N/A
57	Visible After Installation		P
57.1	The markings required by 57.2 – 57.8.1 shall be:		P
	a)Permanent, plain, legible, and readily visible after the product is installed in the intended manner; or b)Readily visible by opening a door or removing a cover after installation if the installation wiring will not be disturbed by removing the cover.		P
57.2	A product shall be legibly and permanently marked, with the manufacturer's name, trade name, or trademark; the date or other dating period of manufacture not exceeding any three consecutive months; a distinctive catalog number or the equivalent; and the electrical rating.		P
	a)Does not repeat in less than 10 years for a household product and less than 20 years for a commercial product and b)Does not require reference to the production records of the manufacturer to determine when the product was manufactured.		P
57.3	The marking on a product shall include the rating of a motor in volts and amperes unless the motor is 1/20 horsepower (37 W output) or less.		N/A
57.4	If a manufacturer produces or assembles products at more than one factory, each finished product shall have a distinctive marking by which it may be identified as the product of a particular factory.		N/A
57.5	The position of an operating handle shall be marked as a guide for proper operation.		N/A
57.6	The operating handle referred to in 57.5 is one that is provided to control the electrical function of a product.		N/A

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
57.7	Meters, pilot lights, and the like shall be marked to indicate their function.		N/A
57.8	A switch, other than a momentary contact switch, that controls the motor that drives a part that can cause injury to persons shall have a plainly marked off position.		N/A
57.8.1	In reference to 57.2, the electrical rating for a product intended to be permanently-connected to the electrical supply source shall include the minimum supply circuit ampacity and the maximum overcurrent protective device size calculated as follows:		N/A
	a)The minimum supply circuit conductor ampacity shall be the highest value calculated for each concurrent load condition and at least equal to:		N/A
	b)The maximum ampere rating of a supply-circuit overcurrent-protective device shall not exceed 400 percent of the rated current of the largest motor plus an amount equal to the sum of any additional concurrent loads. If the value of this rating does not equal a standard overcurrent device size, then the value of this rating shall be the next lower standard overcurrent device size, but in no case shall the value of this rating be lower than the minimum supply circuit conductor ampacity as calculated in (a).		N/A
57.8.2	In reference to 57.8.1, the largest motor shall be determined based on its rated current.		N/A
57.9	An electrical accessory intended for field installation in or on an appliance shall be marked with the name or identifying symbol of the manufacturer or private labeler, with a catalog number or equivalent with which it is intended to be used. See 5.10.		N/A
58	Cautionary Markings		P
58.1	A cautionary marking shall be permanent, contrasting with its background, easily read, and on the outside of the cabinet.		P
58.2	In a cautionary marking, the word CAUTION, WARNING, or DANGER shall be in letters not less than 1/8 inch (3.2 mm) high. The remainder of the marking shall be in letters not less than 1/16 inch (1.6 mm) high.		P
58.3	Each product shall be plainly marked to indicate the presence of high voltage. The marking shall be preceded by the word CAUTION .		P
58.4	Each product shall be marked with the word CAUTION and with the following or the equivalent:This equipment should be inspected frequently and collected dirt removed from it regularly to prevent excessive accumulation that may result in flashover or a risk of fire .		P

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Clause	Requirement + Test	Result - Remark	Verdict
58.5	A removable ionizer-collector cell of a product that is installed above floor level and that weighs more than 15 pounds (6.8 kg), shall be marked with the word CAUTION and the following or the equivalent: This Cell Weighs Pounds. Handle With Care When Removing For Cleaning or Servicing .		P
59	Manufacturer's Literature		P
59.1	A product shall be furnished with complete installation and operating instructions. The instructions shall not recommend any procedure that may result in a risk of fire, electric shock, or injury to persons.		P
59.2	If servicing instructions are provided, they shall be identified as servicing instructions, or the equivalent. They shall be separated from the installation and operating instructions in the manual or be provided in a separate manual.		P
59.3	If the servicing instructions of an air cleaner require access to parts that could result in a risk of electric shock, the servicing instructions shall be preceded by the signal word WARNING and the following or the equivalent: RISK OF ELECTRIC SHOCK – These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so .		P
59.4	Unless the proper method of assembly is obvious, a product that is shipped from the factory partially disassembled shall be provided with clear and detailed assembly instructions.		P
59.5	A duct- or plenum-mounted product shall be provided with installation instructions that include:		P
	a)The method of installation and user maintenance; b)A statement that the product is to be located so that connection can be made to the source of electrical supply without the use of an extension cord; and c)If intended for electrical connection to a furnace, the method of such electrical interconnection, a wiring diagram, and the intended location of the field-wiring compartment.		P
59.6	For equipment having a 2-blade polarized plug, the following instructions or the equivalent shall be provided: To reduce the risk of electric shock, this equipment has a polarized plug (one blade is wider than the other). This plug will fit in a polarized outlet only one way. If the plug does not fit fully in the outlet, reverse the plug. If it still does not fit, contact qualified personnel to install the proper outlet. Do not alter the plug in any way .		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
59.7	For equipment having a grounding-type plug, the following instructions or the equivalent shall be provided: To reduce the risk of electric shock, this equipment has a grounding type plug that has a third (grounding) pin. This plug will only fit into a grounding type power outlet. If the plug does not fit into the outlet, contact qualified personnel to install the proper outlet. Do not alter the plug in any way .		P
59.8	With reference to 57.9, instructions for installing the accessory shall be provided on or with the accessory. A statement shall be included in the instructions warning the user to disconnect the appliance from the electrical supply before attempting the installation and that the accessory is intended for use only with the appliance(s) described in the marking.		P
59.9	In reference to 13B.4, the instructions for a product intended to be remotely operated and in which the attachment plug of the product and receptacle serve as the manual means for disconnecting remote operation commands, external communication or data signals shall specify that unplugging the product disconnects the remote functions.		P
59.10	If a product has an interlock switch that is required to comply with Section 29, Interlocks, in accordance with 40.1.5(b) or 45.1.2(b) to prevent operation if an air filter is removed, then the product operating instructions shall specify all intended filter(s), including replacement filters, needed for the intended operation of the product.		P
59.11	If a product is intended to be connected to a Universal Serial Bus (USB) supply source, then the operating instructions shall specify the following or equivalent:		P
	a)That the product is not to be operated by any supply sources other than those specified in (b); and		P
	b)That the product is to be used only with the following products:		P
59.12	A product intended for installation within a concealed space of a building structure shall be provided with installation instructions that inform the installer:		P
	a)That permanent wiring is to be employed as required by local codes;		P
	b)Of specific directions for cutting the proper size hole in the building; and		P
	c)The correct method for mounting the product within the concealed space.		P

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict
59.13	A product intended to have the supply connection converted in accordance with 12.3 shall be provided with installation instructions that inform the installer how the supply connection is to be converted and that permanent wiring is to be employed as required by local codes.		P

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Clause	Requirement + Test	Result - Remark	Verdict

List of critical components

Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity ¹⁾
Plastics enclosure	LG CHEM LTD	LUMID GP2251BFH(#)	V-0, 130°C	UL 94, UL 746C	UL E67171 and tested with appliance
Internal wire	Xin Sheng Terminal Mfg Ltd	1007	80 °C, 300V~, 20AWG	UL 867	UL E328303 and tested with appliance
Plug	Interchangeable	Interchangeable	15A, 125V	UL 498	UL
Power cord	Interchangeable	Interchangeable	14AWG, 105°C, 300V	UL 498	UL
PCB	Fai Wong Star Electronic Co Ltd	FW-4	V-0, 130°C, min. 1.0mm	EN IEC 62368-1	UL E171766 and tested with appliance

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Clause	Requirement + Test	Result - Remark	Verdict

Test unit	<input checked="" type="checkbox"/> portable <input type="checkbox"/> stationary	Measured Leakage Current, mA							
	Condition	Switch S1	Switch S2 Position 1				Switch S2 Position 2		
(a)			(b)	(c)	(d)	(a)	(b)	(c)	(d)
As Received	Open	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
	Closed	--							
	0-5 s	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
	5 s – 1 h (thermal stability)	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005

Between parts	Test Voltage (Vac)	Breakdown
Line / Neutral and exposed surface	<input checked="" type="checkbox"/> 1480 / <input type="checkbox"/> 1240	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Line / Neutral and output terminals	<input checked="" type="checkbox"/> 1480 / <input type="checkbox"/> 1240	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
Sec. circuits and enclosure parts	<input type="checkbox"/> 500	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Both terminals of X-Cap / Y-Cap	<input checked="" type="checkbox"/> 2093 / <input type="checkbox"/> 1753 Vdc	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A

Model	Supply Voltage	Measured Input			Marked Rated Input <input type="checkbox"/> VA, <input type="checkbox"/> A, <input checked="" type="checkbox"/> W	Rating / measured value (%)
		<input checked="" type="checkbox"/> VA	<input checked="" type="checkbox"/> A	<input checked="" type="checkbox"/> W		
MF20	110V~	--	0.140	13.1	13.0	-0.76%

Test voltage (V) :	120 V~	--	--	--	--
Test load description:	--				
T1 (°C) :	23.8	--	--	--	--
T2 (°C) :	24.2	--	--	--	--
Part	Measured (K)				Required (°C)
Power surface	35.6	--	--	--	70
AC Inlet	32.3	--	--	--	Ref.
Internal wire	30.2	--	--	--	80
Inside enclosure	29.7	--	--	--	Ref.
Outside enclosure	28.3	--	--	--	Ref.
PCB	31.3	--	--	--	105
Ambient	23.9	--	--	--	--
Winding	R1 (Ω)	R2 (Ω)	Measured (K)	Required (K)	Insulation Class
Primary	--	--	--	--	--
Secondary	--	--	--	--	--

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UL 867			
Clause	Requirement + Test	Result - Remark	Verdict

Ambient temperature						
No.	component	fault	test voltage (V)	test time	Input current (A)	result

Note:
 S: Short-circuited; O: Open-circuited; O/L: Overloaded; B: Blocked; L: Locked.
 Observation: The observations during and after fault condition tests.
 Damaged: Which component (components) damaged during the fault condition test.
 Max. Voltage: The maximum accessible voltage of DC output terminal during the fault condition test.

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Photo attachments:

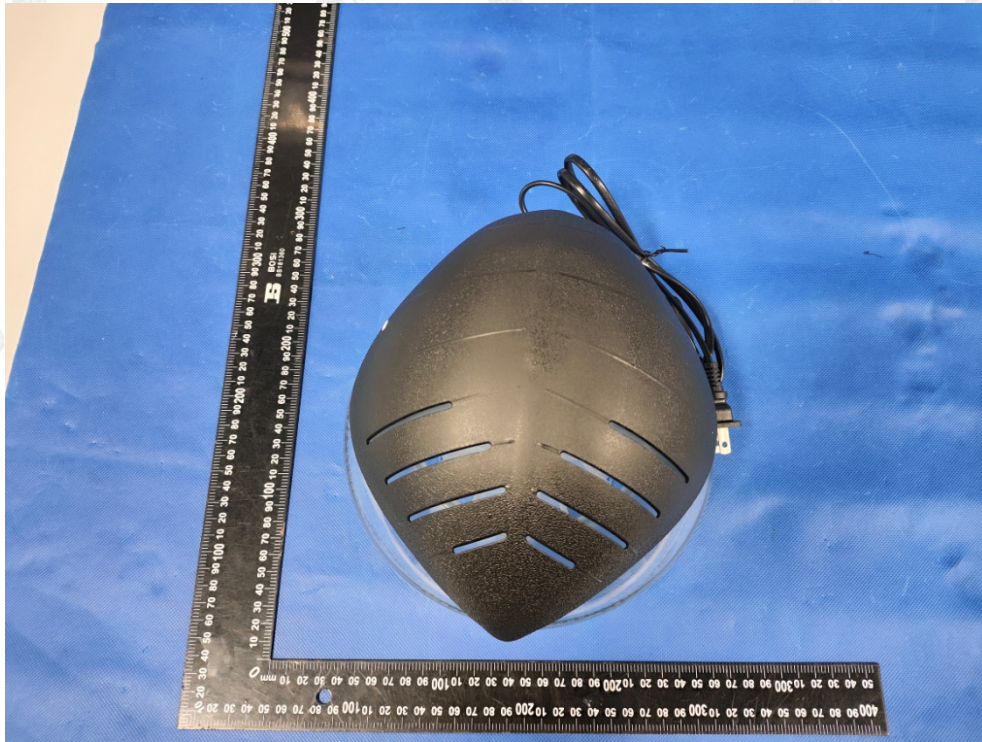


Photo 1: Overall view

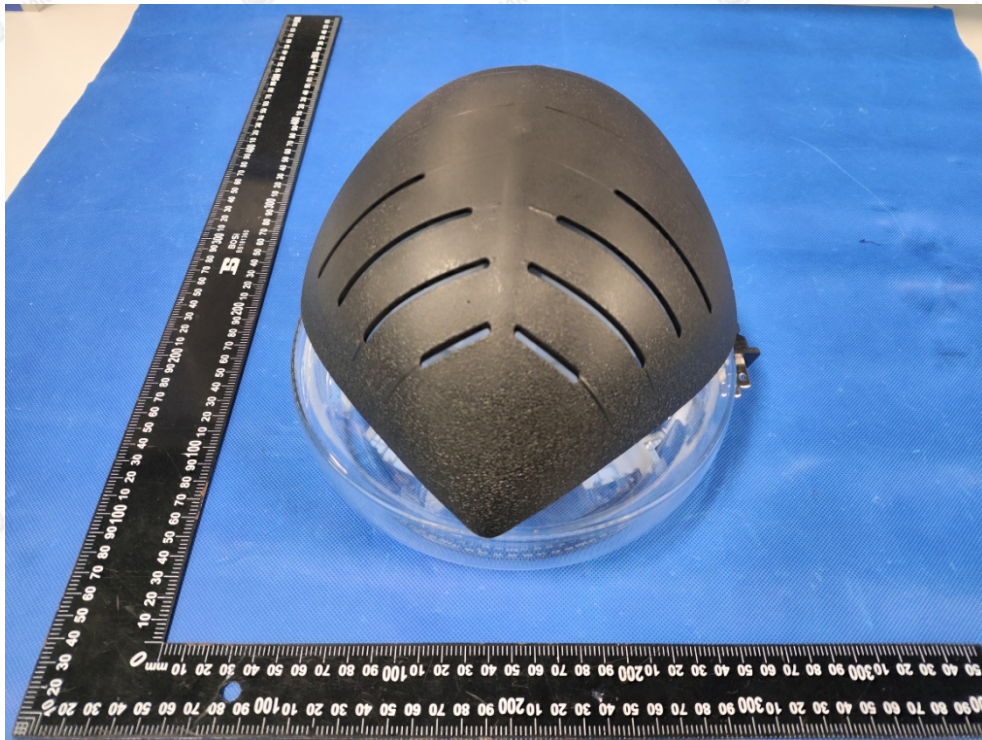


Photo 2: Overall view

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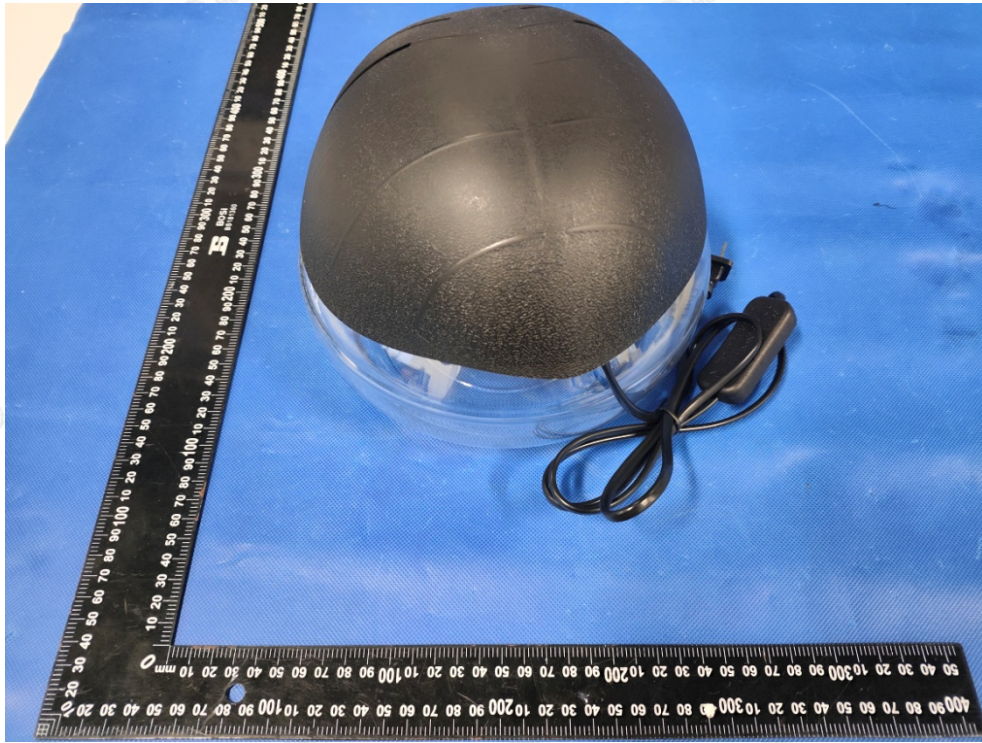


Photo 3: Side view

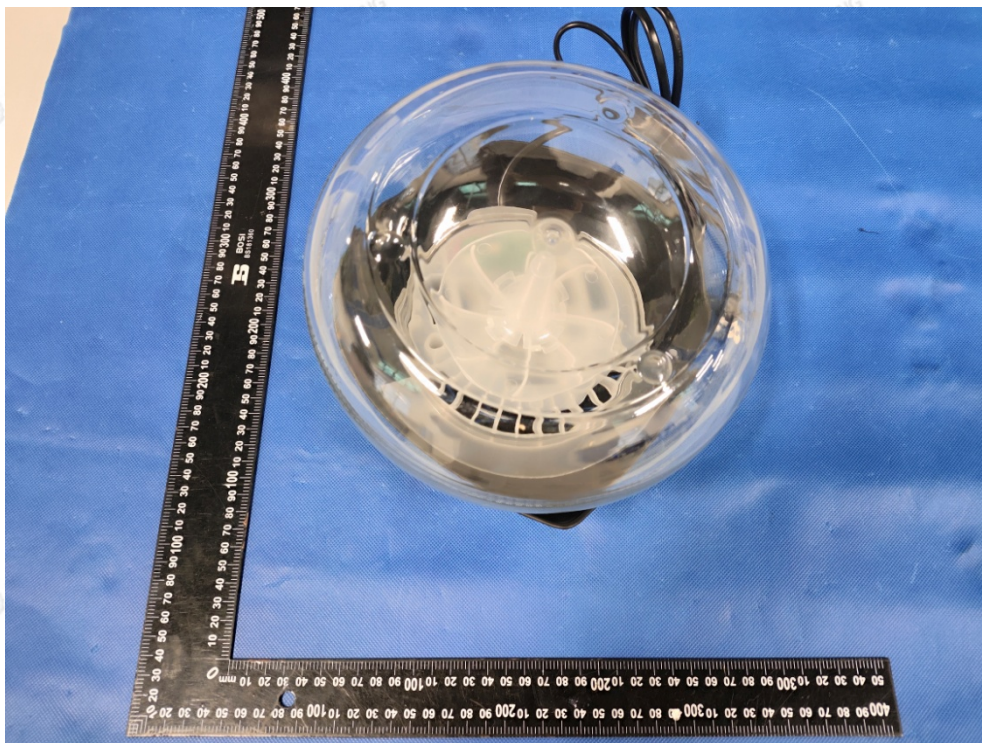


Photo 4: Side view

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Photo 5: Side view

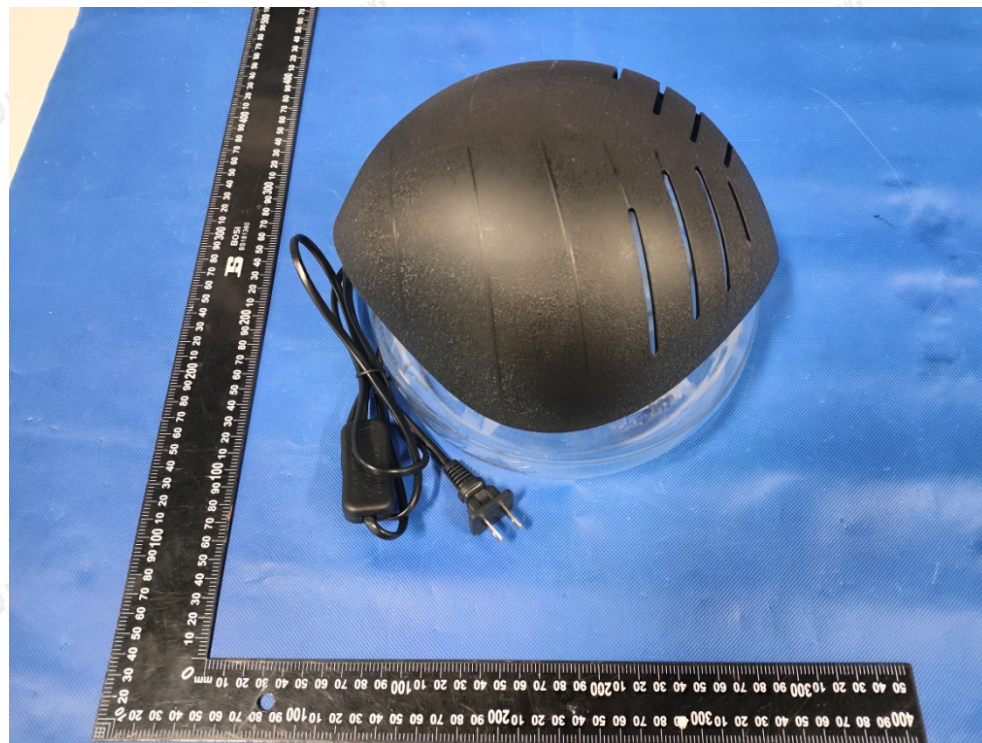


Photo 6: Side view

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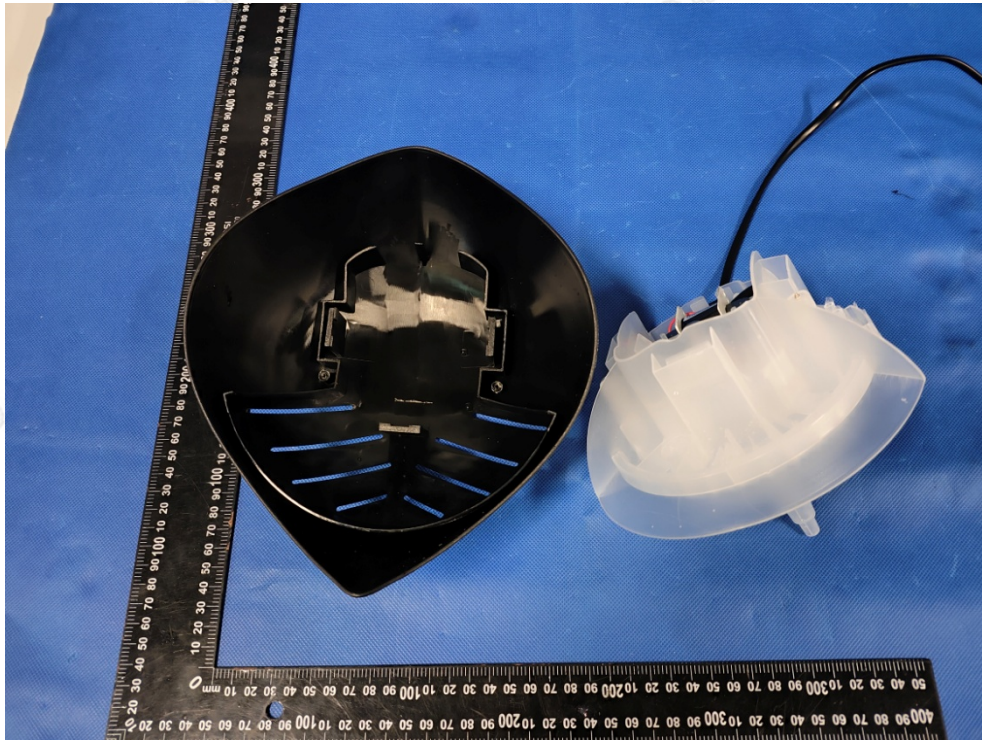


Photo 7: Internal view

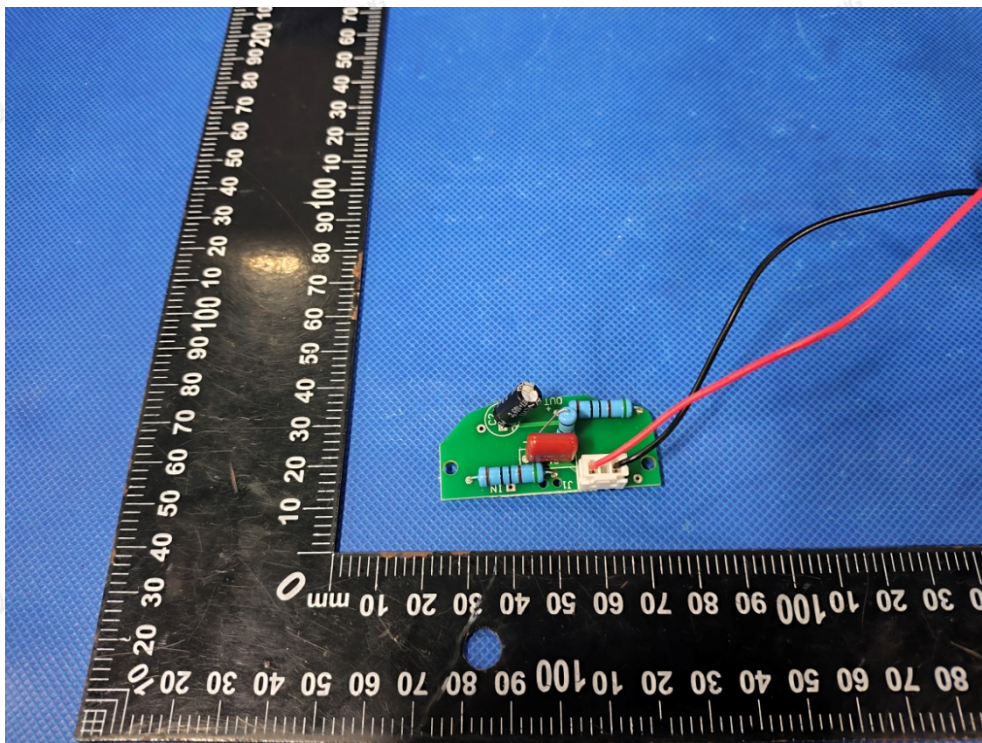


Photo 8: PCB view

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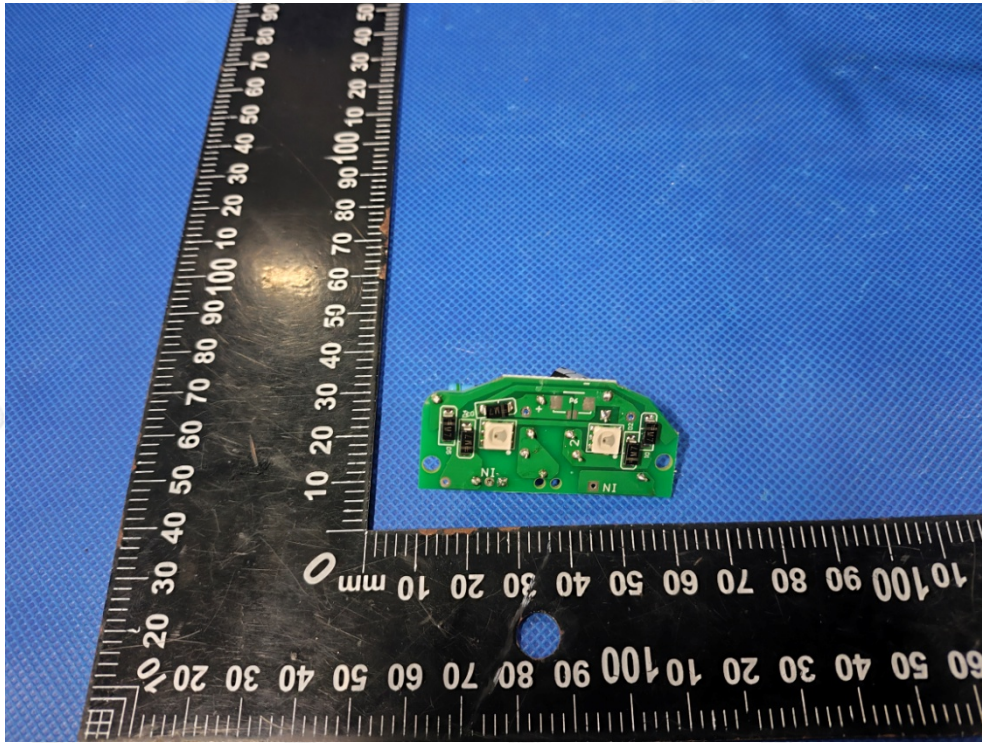


Photo 9: PCB view

-----End of report-----

TRF No. UL867A

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