

STANDARD INFORMATION

Standard Number: UL 1077

Standard Name: Supplementary Protectors for Use in Electrical Equipment

Standard Edition and Issue Date: 7th Edition Dated June 25, 2015

Date of Revision: June 25, 2015

Date of Previous Revision of Standard: 6th Edition Revision Dated February 27, 2013

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **October 18, 2019**

IMPACT, OVERVIEW, AND ACTION REQUIRED

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revise requirements and which products will require re-evaluation. **NOTE:** Effective immediately, this revised standard will be exclusively used for evaluation of new products unless the Applicant requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revise requirements.

Overview of Changes:

- Addition of Requirements for Field Wiring Terminals for Supplementary Protectors
- Addition of Requirements for DC Rated Protectors with Poles Wired in Series
- Additional Requirements for Other Protective Types and Accessories
- Addition of requirements for the Test Method for the Overvoltage Test for Undervoltage Protectors/Accessories

Specific details of new/revise requirements are found in table below.

If the applicable requirements noted in the table are not described in your report(s), these requirements will need to be confirmed as met and added to your report(s) such as markings, instructions, test results, etc. (as required).

Client Action Required:

Information – To assist our Engineer with review of your Listing Reports, please submit technical information in response to the new/revise paragraphs noted in the attached or explain why these new/revise requirements do not apply to your product (s).

Current Listings Not Active? – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.



STANDARD INFORMATION

CLAUSE	VERDICT	COMMENT
<i>Additions to existing requirements are <u>underlined</u> and deletions are shown lined out below.</i>		
1	Info	Scope <i>New clause added;</i> Devices which ensure a manual restart due to the complete loss of voltage are covered by the Standard for Solid-State Controls for Appliances, UL 244A. Compliance with the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1, and/or the applicable Part 2 standard from the UL 60730 series fulfills these requirements.
1.4		<i>New clause added;</i> Automatic reset devices designed to open the circuit automatically on a predetermined value of time versus current or voltage within an appliance or other electrical equipment are covered by the Standard for Solid-State Controls for Appliances, UL 244A. Compliance with the Standard for Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements, UL 60730-1, and/or the applicable Part 2 standard from the UL 60730 series fulfills these requirements.
1.5		<i>New clause added;</i> Terminals intended for field wiring shall be pressure wire connectors, terminal leads or wire binding screws that <u>comply with Sections 11, 12 or 13 and shall be rated for use with the conductor size in Table 10.1 based on the applicable current.</u>
10	Info	Wiring Terminals
10.2		<i>New clause added;</i> A dc rated supplementary protector intended to have poles wired in series shall have specific instructions as to the correct wiring of the device. If specific hardware or parts are required they shall be: a) Assembled to the supplementary protector; b) Shipped with the supplementary protector as a kit with instructions for assembly; or c) Made available separately as a kit. See also 18.12 – 18.17, and 34.7.
10.3		



New table added;

Terminal current and conductor size

Terminal current in amperes ^a	Copper conductor			Aluminum or copper-clad aluminum conductor		
	Number of conductors	Size AWG or kcmil		Number of conductors	Size AWG or kcmil	
		60°C	75°C		60°C	75°C
15 or less	1	14	14	1	12	12
20	1	12	12	1	10	10
25	1	0	10	1	10	10
30	1	10	10	1	8	8
40	1	8	8	1	6	8
50	1	6	8	1	4	6
60	1	4	6	1	3	4
70	1	4	4	1	2	3
80	1	3	4	1	1	2
90	1	2	3	1		2
100	1	1	3	1		1
110	1		2	1		1/0
125	1		1	1		2/0
150	1		1/0	1		3/0
175	1		2/0	1		4/0
200	1		3/0	1		250
225	1		4/0	1		300
250	1		250	1		250
275	1		300	1		500
300	1		350	1		500
325	1		400	2		4/0
350	1		500	2		4/0
400	2		3/0	2		250
	1		500	1		750
450	2		4/0	2		300
500	2		250	2		350
550	2		300	2		500
600	2		350	2		500
700	2		500	3		250
800	3		300	3		400
1000	3		400	4		250
				3		600
1200	4		350	4		500
	3		600			
1400	4		500	5		500
1600	5		400	5		600
	4		600			
2000	6		400	6		600
	5		600			
2500	8		400	8		600
	7		500	7		750
	6		600	9		500
3000	9		400	10		500
	8		500	9		600
	7		600	8		750

^a For terminal current other than indicated, the next higher rating is to be used – for example, if rated

Table 10.1



35 A, enter at 40 A.										
mm ²	2.1	3.3	5.3	8.4	13.3	21.1	26.7	33.6	42.4	53.5
AWG	14	12	10	8	6	4	3	2	1	1/0
<hr/>										
mm ²	67.4	85.0	107.2	127	152	177	203	250	304	380
AWG	2/0	3/0	4/0	250	300	250	400	500	600	750

12 Info **Wiring Leads**

12.4 Field wiring lead shall be constructed so as to withstand the stress of normal handling without damage to itself or to the protector and shall comply with Section 26.

18 Info **General**

Info **PERFORMANCE**

New clause added;

18.11 When a protector is tested in an oven to simulate a higher than room ambient temperature, the oven shall be of the natural convection or gravity type.

New clause added;

18.12 Multipole protector intended for dc use shall have poles tested individually unless marked in accordance with 34.8 and investigated in accordance with 18.13 – 18.17.

New clause added;

18.13 For the purposes of this Standard, testing in the forward direction requires the positive terminal of the source to be connected to the normal line terminal of the device. Wiring in the reverse direction requires the positive terminal of the source to be wired to the normal load terminal of the device.

New clause added;

18.14 A multipole dc protector marked for more than one wiring configuration shall be subjected to a sufficient number of tests to represent all configurations. Examples:
 a) For interrupting tests, a configuration with the least number of poles energized would represent configurations with more poles energized.
 b) For temperature tests, a configuration with the most number of poles energized would represent configurations with a fewer number of poles energized.
 c) Calibration tests shall be conducted on the configurations with both the most and least number of poles energized.

New clause added;

18.15 For the endurance, overload, and interrupting tests, a dc supplementary protector intended for use on a system having one conductor grounded shall be tested with the enclosure or mounting surface connected to the negative conductor through a fuse as described in 21.7.



New clause added;

18.16 If a dc supplementary protector is intended to be wired in series and complies with a) through d) below, tests shall be conducted in accordance with 18.17.

- a) Is a multi-pole type;
- b) Is marked for 2 or more poles to be wired in series;
- c) Is marked for use in a grounded system; and
- d) Requires a direct connection to both the grounded and ungrounded circuit conductors.

New clause added;

18.17 The protector shall be wired to both the grounded and ungrounded circuit conductor of the test station with the fewest number of poles intended to be connected in series in accordance with the protector instructions. The load side terminal(s)/pole(s) intended to be connected to the grounded circuit conductor shall not be used, and instead the load side positive terminal shall be connected directly to the grounded terminal of the test station.

20 Info **Temperature**

20.6 A protector shall be connected for the temperature test with 4 feet (1.2 m) of 14 AWG (2.1 mm²) or larger wire, per terminal on both the line and the load side terminals. The wire size shall correspond to the rating of the protector. When the terminals of the device are too small to receive that wire size, the maximum wire size the terminal is intended to accept is to be used.

20.11 Temperature is considered to be constant when three successive readings, taken at intervals of 10 percent of the previously elapsed duration of the test, but not less than 10-minute intervals, indicate no change. The thermocouples and related instruments are to be accurate and calibrated in accordance with good laboratory practice. The thermocouple wire is to conform with the requirements specified in the initial calibration Tolerances for thermocouples table on Initial Values of EMF versus Temperature tables in the Standard Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples, ANSI/ISA MC96.1 ASTM E230/E230M.

New section added;

26 **Strain Relief**

26.1 The strain-relief means provided on accessory leads to which field connections are made, when tested in accordance with 26.2 shall be capable of withstanding for 1 minute, without displacement, the force as required in Table 26.1.

Pull Force

Table 26.1

Wire size, AWG	Force, N (lb-f)
18 and larger	89 (20)
20-22	44.5 (10)



26.2 With the connections within the device disconnected and de-energized, the specified force shall be applied to the individual leads and so supported by the switch that the strain-relief means will be stressed from any angle that the construction of the switch permits. The strain relief is not acceptable if, at the point of disconnection of the conductors:

- a) There is enough movement of the leads to indicate that stress on the connections would have resulted;
- b) A metal strain-relief has moved to have reduced electrical spacings below the minimum acceptable values; or
- c) The mechanical operation of the switch or electrical operator is impaired.

Info **ACCESSORIES**

New section added;

27

All Accessories

27.1

General

27.1.1

A component part of an accessory shall comply with the requirements for that accessory.

27.2

Installation

A protector may have provision for separable accessories provided the following conditions are met:

27.2.1

- a) The protector is acceptable for use with or without the accessory.
 - b) Each accessory is acceptable for the intended use.
 - c) Each accessory may be installed without the disassembly of factory-installed protector parts except parts that if omitted are considered not to affect the intended performance of the protector.
 - d) Instructions for the installation, operation, and necessary adjustments shall be available for each accessory.
 - e) The accessory is an essentially complete unit and does not require detailed assembly. Except as permitted in (f), the installation of the accessory does not expose live or mechanical functional parts that would not be exposed during the replacement of an interchangeable trip unit. An arrangement that requires cutting, splicing of existing wires, or resoldering of connections within the protector housing is not acceptable.
 - f) Except as noted in (g) and (h) means for mounting the accessory require no drilling, cutting, or filing of holes. Openings to provide for the accessory actuator to operate the trip mechanism may be provided in the trip unit housing. If breakouts are provided for this purpose they shall be removable in one piece.
 - g) Drilling, cutting, or filing is acceptable in the protector housing only to provide an opening for the accessory leads and the location of such openings is indicated by drill points or breakouts.
 - h) It is possible to accomplish the operation described in (g) in a manner so that debris does not accumulate inside the protector housing.
-



- i) Strain or pushback relief, if required to meet the requirements of 27.5.1 and 27.5.2, is provided as an integral part of the accessory or is furnished as part of the kit along with any instructions or tools necessary to comply with the requirements of this standard.
- j) The accessory complies with the marking requirements of 34.8.
- k) The installation of the accessory does not inadvertently affect the performance of the protector.

27.3 Mounting

27.3.1 An accessory shall be securely mounted in position and prevented from loosening or turning if such motion may adversely affect the intended performance of the protector or reduce the minimum spacing to less than that indicated in 27.6.1.

27.4 Field Wiring

27.4.1 An accessory shall be provided with means for the connection of wires having ampacity corresponding to the rating of the accessory. See Tables 10.1 and 27.1.

Ampacities of insulated conductors

Table 27.1

Wire size		60°C (140°F)	
AWG	(mm ²)	Copper	Aluminum
22	(0.32)	3	-
20	(0.52)	5	-
18	(0.82)	7	-
16	(1.30)	10	-

27.4.2 Terminal leads of a protector accessory shall comply with Section 12.

27.4.5 A pressure connector provided for use with an accessory shall comply with Section 10.

27.5 Strain relief

27.5.1 Strain relief shall be provided to prevent a mechanical stress on the accessory supply leads to which field connections are made from being transmitted to terminals, splices, or interior wiring. See Section 12.

27.5.2 Means shall be provided to prevent the accessory supply leads to which field connections are made from being pushed into the housing of a protector through the lead entry holes, if such displacement is likely to subject the lead to mechanical injury, or if it is likely to reduce spacings - such as to a metal strain-relief clamp - below the minimum acceptable values, or if the mechanical operation of the protector or accessory is impaired.

27.5.3 Any surface with which the leads may come in contact shall be free from any projections, sharp edges, burrs, fins, or the like that may cause abrasion of the insulation on the conductors.

27.6 Spacings

27.6.1 With any combination of accessories installed, the protector spacings shall not be less than those required in Section 16.



27.6.2		<p>The requirements in 27.6.1 do not apply:</p> <p>a) Between uninsulated live parts of opposite polarity within a component, such as an auxiliary switch;</p> <p>b) Between uninsulated live parts of the component and dead metal that is part of the component; or</p> <p>c) Between uninsulated live parts of the component and that part of the dead metal surface of the protector or accessory on which the component is mounted in the intended manner.</p>
27.6.3		<p>The requirements in 27.6.1 do apply:</p> <p>a) Between live parts in different components; and</p> <p>b) Between an uninsulated live part of a component and a live part or the dead metal of the protector or accessory, other than the dead metal surface on which the component is mounted.</p>
27.6.4		The spacings at an accessory and its field-wiring terminals shall be in accordance with Table 16.1.
27.6.5		The spacing between the live part of the protector and an accessory or component of the same polarity shall be not less than 3.2 mm.
28	Info	Auxiliary Switches
		<i>New clause added;</i>
28.1.2		<p>Auxiliary switch contacts shall be permitted to be designated as “a” or “b” as indicated below, but other contact arrangements shall be permitted to be used:</p> <p>a) “a” contacts are opened when the protector contacts are opened, and are closed when the molded-case product contacts are closed.</p> <p>b) “b” contacts are closed when the protector contacts are opened, and are opened when the protector contacts are closed.</p>
29		<i>New section added;</i>
		Overvoltage-Trip Release Devices
29.1		An overvoltage-trip release device shall be so designed that the armature will be released for tripping under an overvoltage condition when the protector is in the ON position and also during the closing stroke of the protector.
30	Info	Overvoltage-Trip Appliance Protectors
30.3	Info	Overvoltage
		<i>New clause added;</i>
30.3.2		After the Temperature test, the same overvoltage release sample, with the protector closed and without current in the main circuit, shall withstand the application of 110 percent rated control supply voltage for 4 h without impairing its functions.
31		Undervoltage-Trip Protectors
31.3		Overvoltage



New clause added;

31.3.2 After the Temperature test, the same undervoltage release sample, with the protector closed and without current in the main circuit, shall withstand the application of 110 percent rated control supply voltage for 4 h without impairing its functions.

Info **MARKING**

34 **Specifics**

New clause added;

34.7 DC rated protector shall be marked to indicate the proper configuration of connections of the terminals. One or more of the following shall be used: “line” and “load”, or “positive”, “POS”, or “+”, and “negative”, “NEG”, or “-”.

New clause added;

34.8 A multipole dc rated protector that is required to be wired in series shall be marked to indicate the proper configuration of connections of the terminals. If there are multiple configurations, a separate document shall be included with the supplementary protector and the supplementary protector shall be marked with a permanently affixed label that reads: “For the proper configuration of connections of the terminals, refer to Publication No. _____ provided with this supplementary protector. If additional information is necessary, contact (supplementary protector manufacturer’s name)”. The document shall include:
 a) The manufacturer’s name and type designation or equivalent;
 b) Publication number and date or equivalent;
 c) The current ratings, voltage rating, number of poles, and
 d) A schematic of each of the intended wiring configurations.

New clause added;

34.9 Electrical rating for each type of accessory shall contain at least the information in Table 34.1.

Marked electrical rating

Table 34.1

Type of accessory	Volts	Amps	DC or Hertz	VA
Alarm switch	X	B	C	-
Auxiliary switch	X	B	C	-
Over-voltage switch	X	A	X	A
Shunt trip	X	A	X	A
Under-voltage trip	X	A	X	A

X - Indicates this information required.
 A - Indicates either amperes or VA information required.
 B - Indicates either amperes or pilot duty rating required.
 C - Indicates AC (or frequency in Hz), DC, or both.



New clause added;

34.10

If an accessory is shipped from the factory separately from the protector with which it is intended to be used:

- a) The accessory shall be marked with its own catalogue number or the equivalent, with the name or trademark of the manufacturer, and with the electrical rating, except that when physical space does not permit permanent marking on the accessory.
 - b) Instructions shall be available indicating the specific types of protectors with which the accessory is intended to be used.
 - c) Installation and wiring instructions shall be available unless the construction makes the installation obvious.
-

CUSTOMERS PLEASE NOTE: This Table and column “Verdict” can be used in determining how your current or future production is or will be in compliance with new/revised requirements.
