



UL 977

STANDARD FOR SAFETY

Fused Power-Circuit Devices

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UL Standard for Safety for Fused Power-Circuit Devices, UL 977

Fifth Edition, Dated April 30, 2012

Summary of Topics:

This revision to ANSI/UL 977 dated October 26, 2020 includes barriers to address inadvertent contact on line side of service disconnect; Section [24A](#) and [50.37](#)

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new requirements are substantially in accordance with Proposal(s) on this subject dated July 10, 2020.

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Fifth Edition

April 30, 2012

This ANSI/UL Standard for Safety consists of the Fifth Edition including revisions through October 26, 2020.

The most recent designation of ANSI/UL 977 as an American National Standard (ANSI) occurred on October 26, 2020. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

The Department of Defense (DoD) has adopted UL 977 on August 28, 1984. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

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CONTENTS

INTRODUCTION

1	Scope	5
2	Components	6
3	Units of measurement	6
4	References	6

CONSTRUCTION

5	General	6
6	Enclosure	8
	6.1 General	8
	6.2 Rainproof enclosures	8
7	Ventilation	10
8	Sheet-Metal Enclosures	11
9	Doors and Covers	11
10	Hinges	13
11	Latches	13
12	Operating Mechanism	13
	12.1 General	13
	12.2 Electrical operators	15
13	Ground Fault Protection	15
14	Insulating Material	17
15	Current-Carrying Parts	17
16	Wiring Terminals	18
17	Control Circuit	18
18	Lockout	19
19	Fusing	19
20	Spacings	22
21	Wiring Space	23
22	Disconnecting Means	26
23	Provision for Grounding	27
24	Provision for Bonding	27
24A	Accessibility of Live Parts in Service Equipment	28

PERFORMANCE

25	General	29
26	Temperature Test	31
27	Strength of Insulating Base and Support	33
28	Overvoltage Test	34
29	Water Spray Test	34
30	Operation Test	37
31	Endurance Test	37
32	200-Percent Overload	38
33	Dielectric Voltage-Withstand Test	40
34	Close-Open Test	40
35	Dielectric Voltage-Withstand (Repeated) Test After the Close-Open Test	41
36	Contact Opening Test	41
37	Dielectric Voltage-Withstand (Repeated) Test After the Contact Opening Test	42
38	Short-Circuit Withstand Test	42
39	Closing Test	46
40	Low-Level Dielectric Voltage-Withstand Test	47

41	Metallic Coating Thickness Test.....	47
----	--------------------------------------	----

INSTRUMENTATION AND CALIBRATION OF HIGH-CAPACITY CIRCUITS

42	Galvanometers	48
43	Circuit Measurement Verification	49
44	Calibration of Test Circuit	50
44.1	Details	50
44.2	Current	50
44.3	Voltage	52
44.4	Power factor	52
44.5	Recovery voltage	52

MANUFACTURING AND PRODUCTION TEST

45	Operation	54
----	-----------------	----

RATINGS

46	Current	54
47	Voltage	54
48	Withstand	55
49	Control Circuit	55

MARKING

50	Details	55
----	---------------	----

INSTALLATION TEST PROCEDURES

51	Details	59
----	---------------	----

APPENDIX A

	Standards for Components	60
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INTRODUCTION

1 Scope

1.1 These requirements cover fused power-circuit devices to be employed in accordance with the National Electrical Code.

1.2 Fused power-circuit devices, as covered by these requirements, are considered to be either bolted pressure contact switches or high-pressure butt-type contact switches.

1.3 Bolted-pressure contact switches are devices in which the blade-jaw connections have an additional pressure or clamping action provided at both ends of the switch blades when the blades are in the fully closed position.

1.4 High-pressure butt-type contact switches are devices having butt-type contacts and a spring-charged mechanism.

1.5 These requirements do not apply to low-voltage AC power circuit protectors as covered by the Standard for Low Voltage AC Power Circuit Protectors Used in Enclosures, ANSI/IEEE C37.29, or to low-voltage AC integrally fused power circuit breakers as covered by the Standard for Low-Voltage AC Power Circuit Breakers Used in Enclosures, ANSI/IEEE C37.13.

1.6 Fused power-circuit devices may be manually or electrically operated and may incorporate electrical tripping means.

1.7 An electrically tripped device is one whose closing is performed manually or electrically but contact opening is performed by a release energized by a separate source of voltage.

1.8 A device with an electrical operator is one whose contact closing and opening is performed by electrical means.

1.9 Fused power-circuit devices have continuous current ratings of more than 600 A and voltage ratings of 600 V or less AC, DC, or both. Devices rated AC are intended for use on circuits having maximum available short-circuit currents of 100,000, 150,000, or 200,000 A (rms symmetrical). Devices rated DC are intended for use on circuits having maximum available short-circuit currents of 20,000, 50,000, 100,000, 150,000, or 200,000 A DC.

1.10 Fused power-circuit devices have provisions for mounting (or are intended to be used with upstream) Class L fuses or Class T fuses rated more than 600 A.

1.11 These requirements cover complete, enclosed fused power-circuit devices in which the switch is integral with the enclosure; open-type fused power-circuit devices intended for mounting in other equipment, such as switchboards or in a separately shipped enclosure; and enclosures intended for mounting open-type fused power-circuit devices.

1.12 These requirements also cover electrically tripped and/or operated devices that have been investigated to determine their acceptability for ground-fault protection when combined with ground-fault sensing and relaying equipment as follows:

- a) Switches for use with Class I ground-fault sensing and relaying equipment including those devices that are capable of interrupting 12 times their rated current or that have integral means intended to prevent disconnecting at levels of fault current exceeding the contact interrupting capability of the switch.

b) Switches for use with Class II ground-fault sensing and relaying equipment are capable of interrupting at 10 times their rated current and are for use in ground-fault protection systems where means intended to prevent disconnecting levels at fault current exceeding the contact interrupting capabilities of the switch are incorporated within the ground-fault sensing and relaying equipment.

1.13 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this standard, and that involves a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements to determine that the level of safety as originally anticipated by the intent of this standard is maintained. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this standard shall not be judged to comply with this standard. Where appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this standard.

2 Components

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

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

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

3 Units of measurement

3.1 If a value for measurement is followed by a value in other units, the use or recognition of either value can be expected to provide equivalent results in the application of such requirements.

4 References

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

CONSTRUCTION

5 General

5.1 A fused power-circuit device shall employ materials throughout that are acceptable for the particular application, and shall be made and finished with the degree of uniformity and grade of workmanship practicable in a well-equipped factory.

5.2 The construction of a fused power-circuit device shall be such as to provide ample strength and rigidity.

5.3 All parts of a fused power-circuit device shall be properly assembled in place when shipped from the factory, except as noted in [5.4](#), [5.6](#), [5.7](#), [5.8](#), and [5.9](#).

5.4 If a fused power-circuit device is acceptable for use without a neutral assembly as well as with such assembly, the neutral assembly need not be shipped from the factory with the switching unit provided that:

- a) The neutral assembly is shipped from the factory completely assembled with the necessary barriers and all other accessories that are required for its installation and use; and
- b) The neutral assembly and switch are marked in accordance with [50.12](#).

5.5 With reference to [5.4](#), hardware for mounting the neutral assembly must be furnished with that assembly but need not be assembled in place.

5.6 External operating handles need not be assembled in place but in place of such assembly, they are to be packaged and shipped with the switching unit.

5.7 When a fused power-circuit device without enclosure is shipped for assembly in a switchboard or similar equipment, the load fuse terminal assembly need not be mounted in place when all the following conditions are met:

- a) All poles of the load fuse terminal assembly are secured to a common base that can be installed as a single unit by a simple assembly operation;
- b) Assembly instructions and markings are provided;
- c) The construction is such that alignment of fuse mounts will be assured;
- d) Barriers or stops intended to prevent over-sized fusing will continue to be effective; and
- e) The load fuse terminal assembly is packaged and shipped with the switching unit.

5.8 If the proper operation or installation of an open type fused power-circuit device is dependent upon an insulating barrier, liner, shield or similar member being mounted on the device or elsewhere, the insulating barrier shall be provided with the device and a marking as specified in [50.29](#) shall be provided.

5.9 If a fused power-circuit device is intended for use with or without an accessory assembly, the assembly need not be shipped from the factory with the fused power-circuit device provided that:

- a) The fused power-circuit device is acceptable for use with or without the accessory.
- b) Each accessory is acceptable for the intended use.
- c) Installation instructions for the proper installation operation, and necessary adjustments are provided:
 - 1) With the accessory;
 - 2) With the fused power-circuit device; or
 - 3) The accessory is marked with reference to a specific installation instruction drawing unless the construction makes the installation obvious. If a filing, drilling, or cutting operation is involved the instructions include a caution statement, that such operation is to be accomplished only in the prescribed area.
- d) The installation of an accessory shall not require the use of a special tool, unless such a tool and instructions for its use are furnished with each accessory.
- e) A barrier that is necessary because spacing would otherwise be less than required, or for any other reason, is securely attached at the factory to either the fused power-circuit device or to the accessory to be installed.
- f) The accessory is an essentially complete unit and does not require detailed assembly in the field.

g) The accessory is provided with a marking in accordance with [50.30](#).

h) The fused power-circuit device is provided with a marking in accordance with [50.30](#).

6 Enclosure

6.1 General

6.1.1 An enclosure for a switch shall be of metal and shall be constructed so as to provide the required strength and rigidity. The enclosure shall have one or more of the type designations specified in [Table 6.1](#).

6.1.2 An enclosure is not required for a switching unit that is intended for installation in a switchboard or other enclosure.

6.1.3 Live parts shall be enclosed whether the switching unit is in the open or closed position.

6.1.4 An enclosure shall be provided with means for reliable mounting or support.

6.1.5 Unless the enclosure is of metal that will resist corrosion, both inside and outside surfaces shall be protected by painting, galvanizing, plating, or other equivalent means.

6.2 Rainproof enclosures

6.2.1 A Type 3R enclosure shall be constructed so that it withstands a simulated beating rain as described in the Water Spray Test, Section [29](#). Any opening associated with an opening handle shall be shielded from rain. Hinges and other attachments shall be resistant to corrosion. Metals shall not be used in such combinations as to result in galvanic action that affects adversely any part of the device. Any live part shall be located at least 12 inches (305 mm) above the mounting surface on concrete-pad-mounted equipment. See [50.28](#).

Table 6.1
Enclosure types

Type number	Intended use and description	Environmental construction and performance requirements
1	Indoor use primarily to provide a degree of protection against contact with the enclosed equipment.	Corrosion protection as specified in 6.1.5 , or the Rust Resistance Test described in the Standard for Enclosures for Electrical Equipment, Non-Environmental Considerations, UL 50.
2	Indoor use to provide a degree of protection against limited amounts of falling water and dirt.	Corrosion protection as specified in 6.1.5 , or the Rust Resistance Test described in UL 50, and the Drip Test described in UL 50.
3R	Outdoor use to provide a degree of protection against falling rain, sleet, and external ice formation.	Protective coating as specified in 6.2.3 – 6.2.6 , the Water Spray Test described in Section 29 , and the Icing Test described in the Standard for Enclosures for Electrical Equipment, Non-Environmental Considerations, UL 50.

6.2.2 A hole for conduit in a Type 3R enclosure shall be threaded unless it is entirely located below the lowest terminal lug or other live part within the enclosure or unless it accommodates a specific hub or closure fitting (see [50.27](#) and [50.28](#)). A threaded hole for conduit shall be reinforced to provide metal at least 1/4 inch (6.4 mm) thick. There shall be provision for drainage of the enclosure. A threaded hole for conduit shall be provided with a conduit end stop unless the thread is tapered.

6.2.3 A Type 3R sheet steel enclosure shall be protected against corrosion by one of the following coatings:

a) Hot-dipped, mill-galvanized sheet steel conforming with the coating Designation G90 in Table I of ASTM Designation A653/A653M-94, with not less than 40 percent of the zinc on any side, based on the minimum single spot test requirement in this ASTM Designation. The weight of the zinc coating is permitted to be determined by any appropriate method; however, in case of question the weight of coating shall be established in accordance with the test method of ASTM Designation A90.

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). The thickness of coating shall be established by the metallic coating thickness test as indicated in the Metallic Coating Thickness Test, Section 41. An annealed coating shall comply with 6.2.4.

c) A zinc coating conforming with (1) or (2) below and with one coat of an organic finish of the epoxy or alkyd-resin type or other outdoor paint applied after forming on each surface. The acceptability of the paint is permitted to be determined by consideration of its composition or by corrosion tests when these are determined to be required.

1) Hot-dipped, mill-galvanized sheet steel conforming with the coating Designation G60 or A60 in Table I of ASTM Designation A653/A653M-94, with no less than 40 percent of the zinc on any side, based on the minimum single spot test requirement in this ASTM Designation. The weight of zinc coating is permitted to be determined by any appropriate method; however, in case of question the weight of coating shall be established in accordance with the test method of ASTM designation A90.

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). The thickness of the coating shall be established by the metallic coating thickness test as indicated in the Metallic Coating Thickness Test, Section 41. An annealed coating shall also comply with 6.2.4.

d) A cadmium coating not less than 0.0010 inch (0.025 mm) thick on both surfaces. The thickness of coating shall be established by the metallic coating thickness test as indicated in the Metallic Coating Thickness Test, Section 41.

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 thickness of the cadmium coating shall be established by the metallic coating thickness test as indicated in the Metallic Coating Thickness Test, Section 41, and the paint shall be as specified in (c).

f) Other finishes, including paints, special metal finishes, or combinations of the two are permitted to be accepted when comparative tests with galvanized sheet steel (without annealing, wiping, or other surface treatment) conforming with item (a), indicate they provide equivalent protection. Among the factors which are taken into consideration when determining the acceptability of such coating systems are exposure to salt spray, moist carbon dioxide-sulphur dioxide-air mixtures, moist hydrogen sulphide-air mixtures, ultraviolet light, and water.

6.2.4 An annealed coating on sheet steel that is bent or similarly formed or extruded or rolled at edge of holes after annealing shall be additionally painted in the affected area if the process damages the zinc coating.