

UL 363

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Knife Switches



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December 19, 1994

Standard for

Knife Switches

UL 363, Ninth Edition

Accompanying this transmittal notice is a copy of the Ninth edition of UL 363.

THIS EDITION OF THE STANDARD IS NOW IN EFFECT.

As indicated on the title page, this UL Standard for Safety is an American National Standard. Attention is directed to the note on the title page of this standard outlining the procedures to be followed to retain the approved text of ANSI/UL 363-1994.

Revised and/or additional pages may be issued from time to time.

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FOREWORD

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction differing from those detailed in the requirements of this Standard may be examined and tested according to the intent of the requirements and, if found to be substantially equivalent, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

INTRODUCTION

1 Scope

1.1 These requirements cover open knife switches for use in accordance with the National Electrical Code, ANSI/NFPA-70.

1.2 These requirements cover switches with or without fuseholders; switches having individual bases intended for either front or rear wiring connection; and switch parts without bases intended for mounting on switchboards and panelboards. Switches may be single- or multi-pole and with or without quick-break or auxiliary contacts, except where such contacts are specifically required.

1.3 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 as determined necessary to maintain the acceptable level of safety as originally anticipated by the intent of this Standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this Standard cannot be judged to comply with this Standard. Where considered appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this Standard.

2 Units of Measurement

2.1 If a value for measurement is followed by a value in other units in parentheses, the second value may be only approximate. The first stated value is the requirement.

3 Components

3.1 Except as indicated in 3.2, a component of a product covered by this standard shall comply with requirements for that component.

3.2 A component need not comply with a specific requirement that:

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

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

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

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 knife switch (including all parts) shall have the mechanical integrity to resist the abuses likely to be encountered during intended service.

6 Bases — Insulating Material

6.1 A base for mounting uninsulated live parts shall be of an insulating material that is mechanically strong, moisture-resistant, and as resistant to combustion as the materials mentioned in 6.2. The material shall be capable of withstanding the most severe conditions likely to be met in service.

6.2 Porcelain, slate, marble, phenolic composition, impregnated asbestos-cement composition, and cold-molded composition are acceptable for supporting an uninsulated live part.

6.3 A base of slate, marble, or porcelain shall not be less than 1/2 inch (12.7 mm) thick.

6.4 A material other than those mentioned in 6.2 may be used for supporting an uninsulated live part provided it demonstrates equivalent properties.

6.5 Unimpregnated fiber, rubber, asbestos-cement composition, and so-called hot-molded shellac and tar composition are not acceptable for supporting an uninsulated live part.

6.6 Insulating material, including barriers between live parts of opposite polarity, and material that may be in the arc path formed by the opening of the switch, shall be acceptable for the particular application. See 11.6 and 11.7.

6.7 A base shall have not less than two holes for mounting screws. A base with an area of more than 25 in² (161 cm²) shall have three or more holes for mounting screws. In any case, a mounting-screw hole shall be so located or counter-sunk that there is a spacing of not less than 1/2 inch (12.7 mm) over the surface of the insulating material between the head of the screw or washer and the nearest uninsulated live part. A mounting-screw hole located between uninsulated live parts of opposite polarity shall be countersunk unless barriers, or the equivalent, keep the screw head from being in the path of a possible arc between such live parts.

6.8 Live screw heads or nuts on the underside of a base shall be countersunk not less than 1/8 inch (3.2 mm) in the clear, and then covered with a waterproof, insulating, sealing compound which does not soften at a temperature 15°C (27°F) higher than the temperature observed at the point where it is used, but not lower than 65°C (149°F) in any case.

Exception: Parts that are staked, upset, or otherwise prevented from loosening may be insulated from the mounting surface by material other than sealing compound or by the provision of a spacing through air from the mounting surface of not less than 1/2 inch (12.7 mm).

7 Current-Carrying Parts

7.1 Except for plated No. 10 (4.8 mm diameter) and larger wire-binding screws, nuts, and stud terminals, iron or steel (plain or plated) shall not be used for parts that are depended upon to carry current. Plated iron or steel screws, nuts, and stud terminals, if not depended upon to carry current, may be used with soldering lugs and pressure-wire connectors.

7.2 Copper and brass are not acceptable for the plating of steel wire-binding screws, nuts, and stud terminals, but a plating of cadmium or zinc is acceptable.

7.3 Bolts, washers, and nuts at the hinges of knife switches are considered to be parts that are not depended upon to carry current.

7.4 Silver, copper, or a copper-base alloy is acceptable for current-carrying parts. Such parts may be of other metal provided an investigation demonstrates that the metal is acceptable for the particular application. Switch blades and jaws shall be of copper, but terminal parts and mounting pieces of a switch rated at 60 A or less may be of brass.

7.5 If brass is used instead of copper for any current-carrying parts, consideration is to be given to the fact that the resistance of brass is from two to four times that of copper.

7.6 All current-carrying parts shall have ample metal to provide mechanical strength and comply with the temperature requirement in 13.1.

7.7 A knife switch complies with the requirement in 7.6 if current-carrying parts are so proportioned that the current density is not greater than 1000 A/in^2 (155 A/cm^2) of cross section for commercially pure copper, and if the current density at clamped or bolted contacts is not greater than 200 A/in^2 (31.0 A/cm^2). The current density for contact surfaces of blades and jaws is not to be greater than 75 A/in^2 (11.6 A/cm^2).

7.8 A knife switch having current densities at surface contacts greater than indicated in 7.7 may have other means (such as positive pressure at contact surfaces) to reduce heating, if such means demonstrates equivalent performance.

7.9 A break jaw, a hinge jaw, a fuse contact, or a metal part carrying or holding such a part, shall be securely and rigidly fastened to the supporting base or mounting surface and shall be prevented from turning or shifting in position by means other than friction between surfaces. This may be accomplished by one of the following:

- a) Two screws or rivets,
- b) Square shoulders or mortises,
- c) A dowel pin, lug, or offset,
- d) A connecting strap or clip fitted into an adjacent part, or
- e) By some other equivalent method.

7.10 If parts are held together by screws, a threaded part shall have not less than two full, clean-cut threads, not finer than American National Standard threads, where the screw passes entirely through the piece. If the screw does not pass entirely through the threaded part, it shall engage full, clean-cut threads for a distance of not less than the diameter of the screw.

7.11 If a break jaw, hinge jaw, or fuse contact is held in a slot or hole milled in a mounting piece, the parts shall fit together closely and shall comply with Table 7.1.

Table 7.1
Securing of jaws and contacts

Construction	Rating in amperes	Means of securing
 SM334	100 or less	Pinning required, soldering not acceptable
	over 100	Pinning and soldering required
 SM333	100 or less	Pinning, soldering, or both acceptable but neither is required
Jaw or contact securely swaged on the under-side of the mounting piece	over 100	Soldering required, additional pinning acceptable but not required
Jaw or contact not securely swaged on the under-side	Any	Pinning and soldering required

8 Hinges and Blades

8.1 The dimensions of blades, break jaws, and hinge jaws shall be as indicated in Table 8.1.

8.2 An auxiliary contact of the quick-break type shall be provided on each blade of a switch rated at 600 V and more than 100 A. Such an auxiliary contact shall, when practicable, be used on all direct-current switches rated at more than 250 V.

8.3 For convenience in installation, the blades of a 30 or 60 A switch may be constructed for reversing the ends at which the blades are hinged.

8.4 A double-throw switch to be mounted so that the throw is vertical shall be provided with a locking device to maintain the blade or blades in the open position when so set.

8.5 A single-throw switch to be mounted in the inverted position shall be provided with a locking device so that the blades will remain in the open position when so set.