

American Standard Design Tests for

**Distribution Cutouts and Fuse Links,  
Secondary Fuses, Distribution Enclosed  
Single-Pole Air Switches, Power Fuses,  
Fuse Disconnecting Switches,  
and Accessories**

Sponsor  
**Electrical Standards Board**

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**AMERICAN STANDARDS ASSOCIATION**  
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# American Standard

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# Foreword

(This Foreword is not a part of American Standard Design Tests for Distribution Cutouts and Fuse Links, Secondary Fuses, Distribution Enclosed Single-Pole Air Switches, Power Fuses, Fuse Disconnecting Switches, and Accessories, C37.41-1962.)

This publication is one of a series of complementary American Standards:

American Standard Service Conditions and Definitions for Distribution Cutouts and Fuse Links, Secondary Fuses, Distribution Enclosed Single-Pole Air Switches, Power Fuses, Fuse Disconnecting Switches, and Accessories, C37.40-1962

American Standard Design Tests for Distribution Cutouts and Fuse Links, Secondary Fuses, Distribution Enclosed Single-Pole Air Switches, Power Fuses, Fuse Disconnecting Switches, and Accessories, C37.41-1962

American Standard Specifications for Distribution Enclosed, Open, and Open-Link Cutouts, C37.42-1962

American Standard Specifications for Distribution Fuse Links for Use in Distribution Enclosed, Open, and Open-Link Cutouts, C37.43-1962

American Standard Specifications for Distribution Oil Cutouts and Fuse Links, C37.44-1962

American Standard Specifications for Distribution Enclosed Single-Pole Air Switches, C37.45-1962

American Standard Specifications for Power Fuses and Fuse Disconnecting Switches, C37.46-1962

American Standard Guide for Application, Operation, and Maintenance of Distribution Cutouts and Fuse Links, Secondary Fuses, Distribution Enclosed Single-Pole Air Switches, Power Fuses, Fuse Disconnecting Switches, and Accessories, C37.47-1962

These standards coordinate the following publications of the American Institute of Electrical Engineers, The Edison Electric Institute, and the National Electrical Manufacturers Association:

Fuses Above 600 Volts, AIEE Standard 25-1958

High-Voltage Fuses, NEMA Standard SG 2-1958

Standards for Distribution Fuse Links, EEI Publication TDJ-110; NEMA Publication 108-1960

Standards for Mounting Brackets for Distribution Cutouts and Distribution Class Lightning Arresters, EEI Publication TDJ-19; NEMA Publication 100-1960

Close liaison was maintained with AIEE, EEI, and NEMA during the development of American Standards C37.40-1962 through C37.47-1962 in order to incorporate the latest thinking up to the time of publication.

With the exception of the following subsections, these standards have been approved by the National Electrical Manufacturers Association as NEMA Standards:

40-3.4.6.1.1 of American Standard C37.40-1962

42-4 and 42-5.5.6.3 of American Standard C37.42-1962

44-5 of American Standard C37.44-1962

45-4 of American Standard C37.45-1962

46-5.1 of American Standard C37.46-1962

The American Standards Association wishes to acknowledge its indebtedness to all who have given so freely of their time and knowledge in compiling these standards. Suggestions for improvement

gained in the use of this standard will be welcomed. They should be sent to the American Standards Association, 10 East 40th Street, New York 16, N. Y.

The ASA Sectional Committee on Power Switchgear, C37, which developed this standard, had the following personnel at the time of approval:

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# American Standard Design Tests for Distribution Cutouts and Fuse Links, Secondary Fuses, Distribution Enclosed Single-Pole Air Switches, Power Fuses, Fuse Disconnecting Switches, and Accessories

This publication is one of a series of American Standards designated C37.40- through C37.47-1962. See back cover for titles.

## 41-1. Scope

This standard applies to tests for high voltage fuses (above 600 volts), secondary fuses, distribution enclosed single-pole air switches, and accessories, as follows:

- (1) Enclosed, open, and open-link types of distribution cutouts and fuses for alternating-current distribution systems.
- (2) Secondary fuses, 600 volts and below, used on supply circuits. Cartridge-type fuses, rated 600 volts and below, and screw plug fuses are not included.
- (3) Distribution oil cutouts.
- (4) Distribution enclosed single-pole air switches.
- (5) Power fuses for systems or circuits above 600 volts.
- (6) Outdoor and indoor fuse disconnecting switches.
- (7) Fuse supports, fuse mountings, fuse hooks, fuse tongs, and fuse links, all of the type used exclusively with products listed in (1), (2), (3), (4), (5), and (6).
- (8) Removable switch blades for products listed in (1) and (3).

## 41-2. Design Tests

**41-2.1** The design tests to be conducted upon completion of a design or following a change that affects the performance are specified in the following American Standards:

American Standard Specifications for Distribution Enclosed, Open, and Open-Link Cutouts, C37.42-1962

American Standard Specifications for Distribution Fuse Links for Use in Distribution Enclosed, Open, and Open-Link Cutouts, C37.43-1962

American Standard Specifications for Distribution Oil Cutouts and Fuse Links, C37.44-1962

American Standard Specifications for Distribution Enclosed Single-Pole Air Switches, C37.45-1962

American Standard Specifications for Power Fuses and Fuse Disconnecting Switches, C37.46-1962

**41-2.2** Table 1 summarizes these tests.

## 41-3. Common Test Practices

**41-3.1 Condition of Device To Be Tested.** The device shall be new and in good condition, and tests shall be applied before the device is put into commercial service, unless otherwise specified.

### 41-3.2 Mounting of Specimen and Grounding

**41-3.2.1 Mounting of Power Fuses.** The fuse equipment to be tested shall be mounted on a grounded metal structure in the normal service position or positions for which it is designed.

**41-3.2.2 Mounting of Distribution Cutouts and Enclosed Air Switches.** For distribution enclosed, open, and open-link cutouts and enclosed air switches, mount the cutout or switch on a wood crossarm which measures  $3\frac{1}{2}$  x  $4\frac{1}{2}$  inches. The cutout or switch shall be tested with the hanger in all positions for which it is designed. Tests in every case are to be made with the cutout or switch mounted at right angles to the vertical face of the crossarm.

For distribution oil cutouts, mount the cutout on a rigid mounting structure in the position normally used in service.

**41-3.2.3 Grounding of Distribution Cutouts and Enclosed Air Switches.** The fuse hanger or housing shall be grounded by a lead attached to the housing, or to the hanger on the side away from the support, unless otherwise specified.

### 41-3.3 Frequency and Wave Shape of Test Voltage

**41-3.3.1 Low-Frequency Tests.** The frequency for all low-frequency tests shall be 60 cycles per second, except as otherwise specified. A sine wave of acceptable commercial standards shall be applied to the device. For definition of the wave shape see

4-A-3 of American Standard for Measurement of Voltage in Dielectric Tests, C68.1-1953.

**41-3.3.2 Impulse Tests.** The wave shape for all impulse tests shall be 1.5 x 40 microseconds, unless otherwise specified. For definition of the wave shape see 4-A-12 of American Standard C68.1-1953.

## 41-4. Dielectric Tests

**41-4.1 Test Practices.** Dielectric test practices shall be as specified in 41-3 and as follows:

### 41-4.1.1 Electrical Connections

**41-4.1.1.1 Distribution Enclosed, Open, and Open-Link Cutouts.** Electrical connections shall be made by means of No. 6 AWG (American Wire Gage), or equivalent solid bare wire, inserted in each terminal.

**41-4.1.1.1.1** These bare wires shall project horizontally, at least 12 inches from the terminals, in a straight line approximately parallel to the face of the crossarm or steel structure and in such a manner as not to decrease the withstand value. Any necessary bends may be made at the terminals. In enclosed cutouts (and air switches), the bare wires shall be located approximately in the center of the entrance holes.

**41-4.1.1.1.2** For terminal to ground tests,

the test lead connections shall be made to one of the wires projecting from the terminals.

**41-4.1.1.1.3** For terminal to terminal tests the test lead connections shall be made to the wire projecting from the top terminal, and with the wire connected to the bottom terminal grounded. The hanger shall not be grounded as specified in 41-3.2.3.

**41-4.1.1.2 Distribution Enclosed Air Switches.** Electrical connections shall be made by means of a 2/0 AWG, or equivalent stranded bare wire, inserted in each terminal.

The specifications in 41-4.1.1.1.1, 41-4.1.1.1.2, and 41-4.1.1.1.3 also apply to distribution enclosed air switches.

**41-4.1.1.3 Distribution Oil Cutouts.** Electrical connections shall be made by means of a No. 6 AWG, or equivalent solid bare wire, connected to each terminal, to the end of the full length of insulated cables furnished with the cutout, or to the end of an insulated cable attached to the terminal in accordance with the manufacturer's instructions. Entrance terminals requiring taping or compound filling shall be assembled and taped or filled in accordance with the manufacturer's instructions. The connections projecting from the cutout shall not approach the metal parts of the cutout closer than a

**Table 1**  
**Design Tests**

| Design Test Given in<br>Following Sections of<br>This Standard | C37.42-1962                                              |                               |               | C37.43-1962                    | C37.44-1962                   |               |                                                  | C37.45-1962                                       | C37.46-1962 |
|----------------------------------------------------------------|----------------------------------------------------------|-------------------------------|---------------|--------------------------------|-------------------------------|---------------|--------------------------------------------------|---------------------------------------------------|-------------|
|                                                                | Distribution Enclosed,<br>Open, and Open-Link<br>Cutouts |                               |               | Distribution<br>Oil<br>Cutouts |                               |               | Distri-<br>bution<br>Enclosed<br>Air<br>Switches | Power<br>Fuse<br>Supports<br>and<br>Fuse<br>Units |             |
|                                                                | Fuse<br>Cutouts                                          | Discon-<br>necting<br>Cutouts | Fuse<br>Links | Fuse<br>Cutouts                | Discon-<br>necting<br>Cutouts | Fuse<br>Links |                                                  |                                                   |             |
| 41-4 Dielectric                                                | X                                                        | X                             | —             | X                              | X                             | —             | X                                                | X                                                 |             |
| 41-5 Expendable Cap<br>Bursting Test                           | △                                                        | —                             | —             | —                              | —                             | —             | —                                                | —                                                 |             |
| 41-6 Interrupting                                              | X                                                        | —                             | #             | X                              | —                             | —             | —                                                | X                                                 |             |
| 41-7 Load Break                                                | X°                                                       | X°                            | —             | X                              | X                             | —             | —                                                | —                                                 |             |
| 41-8 Making Current                                            | —                                                        | —                             | —             | X*                             | —                             | —             | —                                                | —                                                 |             |
| 41-9 Radio Influence                                           | X                                                        | X                             | —             | X                              | X                             | —             | X                                                | X                                                 |             |
| 41-10 Short-Time Current                                       | —                                                        | X                             | —             | —                              | X                             | —             | X                                                | —                                                 |             |
| 41-11 Temperature Rise                                         | X                                                        | X                             | X             | X                              | X                             | X             | X                                                | X                                                 |             |
| 41-12 Time Current                                             | —                                                        | —                             | X             | —                              | —                             | X             | —                                                | X                                                 |             |

X Test required.

△ Only on expendable caps for expendable cap cutouts.

# On open-link fuse only.

X° Only on load-break cutouts having means provided for breaking load currents.

X\* The distribution oil cutout combines the functions of a current-interrupting and a load-switching device and thus requires a making current test.

projection of the center line of the entrance terminal. Insulated conductors shall terminate 12 or more inches from any grounded metal member of the terminal or of a cable sheathing attached to the grounded metal member in the normal assembly thereof.

**41-4.1.1.4 Power Fuses.** Electrical connections shall be made by means of a bare wire inserted in each terminal. These conductors shall project from the terminals of the fuse in substantially a straight line parallel to the fuse unit or fuse holder for an unsupported distance of at least the break distance of the fuse.

Make the test lead connections as directed in 41-4.1.1.1.2 and 41-4.1.1.1.3.

**41-4.1.2 Temperature.** Dielectric tests shall be made at the temperature assumed under normal operation or at the temperature attained under the test conditions.

**41-4.1.3 Measurement of Voltage.** The voltage for dielectric tests shall be measured in accordance with American Standard C68.1-1953.

**41-4.2 Test Procedures.** Dielectric tests shall be conducted as follows:

**41-4.2.1 Low-Frequency Dry-Withstand Voltage Tests**

**41-4.2.1.1 Test Voltage and Time.** The test voltage specified for the device, with appropriate atmospheric corrections, shall be applied to the specimen for 1 minute without flashover or damage to the insulating material.

**41-4.2.1.2 Voltage Application.** Seventy-five percent of the rated dry-withstand voltage may be applied in one step and gradually raised to the required value in not less than 5 nor more than 30 seconds.

**41-4.2.1.3 Correction of Test Voltage to Standard Conditions.** The specified withstand voltage as given for standard atmospheric conditions shall be corrected for the existing atmospheric conditions at the time of test. This correction shall be made in accordance with American Standard Test Methods for Electrical Power Insulators, C29.1-1961.

**41-4.2.2 Low-Frequency Wet-Withstand Voltage Tests on Outdoor Devices**

**41-4.2.2.1 Test Voltage and Time.** The test voltage specified for the device, with appropriate atmospheric corrections, shall be applied to the specimen for 10 seconds without flashover or damage to the insulating material.

**41-4.2.2.2 Precipitation.** See Section 29-2 of American Standard for Wet Tests, C77.1-1943.

The water shall be projected downward toward the front of the device and at an angle of 45 degrees to the vertical and horizontal planes of the crossarm so the spray strikes equally on the front and on one side wall of the device.

**41-4.2.2.3 Voltage Application.** Seventy-five percent of the rated wet-withstand voltage may be applied in one step and gradually raised to the required value in not less than 5 nor more than 30 seconds.

**41-4.2.2.4 Correction of Test Voltage to Standard Conditions.** The specified wet-withstand voltage shall be corrected to standard air density in accordance with American Standard C29.1-1961. No correction for relative humidity shall be made on wet-withstand tests.

**41-4.2.3 Low-Frequency Dew-Withstand Tests on Indoor Devices**

**41-4.2.3.1 Test Voltage and Time.** The test voltage specified for the device, with appropriate atmospheric corrections, shall be applied to the specimen for 10 seconds without flashover or damage to the insulating material.

**41-4.2.3.2 Procedure.** Thoroughly clean the insulation unit of the device. Place the cleaned device in a cold chamber (refrigerator) having a temperature of  $-10$  to  $-15$  C [degrees Celsius (centigrade)] until it is thoroughly cooled (may take 10 or 12 hours). Then mount the device, as specified in 41-3.2, in a test chamber having a normal temperature of 22 to 25 C and a humidity of approximately 100 percent. When the device is completely covered with dew, immediately apply the test voltage as specified in 41-4.2.3.1 and 41-4.2.3.3.

**41-4.2.3.3 Voltage Application.** Seventy-five percent of the rated dew-withstand voltage may be applied in one step and gradually raised to the required value in not less than 5 nor more than 30 seconds.

**41-4.2.3.4 Correction of the Test Voltage to Standard Conditions.** The specified dew-withstand voltage shall be corrected to standard air density in accordance with American Standard C29.1-1961. No correction for relative humidity shall be made in dew-withstand tests.

**41-4.2.4 Impulse-Withstand Voltage Tests**

**41-4.2.4.1 General.** Withstand voltage tests are made to determine that the test specimen is ca-