

IEEE Guide for Application of Expulsion Fuses in Enclosures

Supplement to

IEEE Guide for Application, Operation, and Maintenance of High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories

Sponsor

Switchgear Committee of the
IEEE Power Engineering Society

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Abstract: Guidelines are provided for the application and maintenance of liquid-submerged and in-air expulsion fuses in enclosures. The operation of liquid-submerged fuses is also covered.

Keywords: in-air expulsion fuses, liquid-submerged expulsion fuses

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On page 7 of IEEE C37.48-1987, add to 1.1, Scope, an additional item as follows:

- (9) Liquid-submerged expulsion fuses in switchgear

Update 1.2, References, as follows:

[7] IEEE C37.41-1988, IEEE Standard Design Tests for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories (ANSI).

[10] ANSI C37.32-1990, American National Standard for Switchgear—High-Voltage Air Switches, Bus Supports, and Switch Accessories—Schedules of Preferred Ratings, Manufacturing Specifications, and Application Guide.

[11] IEEE C37.100-1981 (Reaff 1989), IEEE Standard Definitions for Power Switchgear (ANSI).¹

On page 17, add Sections 7 and 8 as follows:

7. Application, Operation, and Maintenance of Liquid-Submerged Expulsion Fuses in Enclosures

7.1 General. This section applies to expulsion fuses that are immersed in liquid and used in switchgear (not directly associated with transformers) for alternating current distribution systems. It is intended to provide application, operation, and maintenance information necessary to correctly apply such fuses in an enclosure. It is not intended to apply to oil cutouts, which are devices covered by ANSI C37.44-1981 [2] and by other sections of this guide.

The switchgear manufacturer should ensure that the application of fuses in his switchgear meets the requirements of the fuse manufacturer and the applicable standards.

The fuse manufacturer should provide the design information necessary to properly apply the fuse.

The user should properly apply, operate, and maintain the devices covered by this section.

¹The references will be renumbered in the revision of the standard.

Adequate safety rules and manufacturer's instructions should be followed.

7.2 Application

7.2.1 Usual Service Conditions. Usual service conditions are defined in 2.1 of IEEE C37.40-1981 [6]. Fuses in enclosures that conform to this standard shall be suitable for operation at their nameplate rating when the ambient air temperature surrounding the enclosure is not above 40 °C or below -30 °C.

7.2.2 Unusual Service Conditions That May Affect Design and Application. Where unusual service conditions exist, they should be brought to the attention of the fuse and switchgear manufacturer(s). Unusual service conditions are defined in 2.2 of IEEE C37.40-1981 [6]. Additional unusual service conditions may include

- (1) Ambient temperatures outside stated range
- (2) Enclosure dimensions and fuse clearances smaller than those specified by the fuse manufacturer

7.2.3 Clearance and Spacings. Three-phase assemblies should be capable of withstanding the transient and power frequency recovery voltages associated with the simultaneous operation of fuses in all three phases. Fuses in enclosures generate high-pressure gases that are expelled during the interruption process. Clearances between fuses of adjacent phases and from each fuse to ground should be sufficient to maintain adequate dielectric withstand at all times. Manufacturer's recommendations for proper clearances and spacings should be followed.

7.2.4 Ambient Temperature. The reference ambient temperature for a fuse in a liquid is that of the liquid immediately surrounding the fuse. (The reference ambient temperature for an enclosure is that of the air surrounding the enclosure.) The fuse manufacturer may specify a maximum reference ambient temperature for the fuse. Various derating factors may be applicable up to this temperature.

7.2.5 Derating Factors. Time-current characteristics (TCC) for most fuses are based on a 25 °C reference ambient temperature. Higher or lower ambient temperatures will cause some shift of the TCC and may also affect the current-carrying capability of the fuse.