IEEE Standard Service Conditions and Definitions for External Fuses for Shunt Capacitors

Supplement to IEEE Std C37.40-1993

Sponsor
Switchgear Committee
of the
IEEE Power Engineering Society

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Abstract: Definitions for high-voltage external capacitor fuses (above 1000 V) used for the protection of shunt capacitor banks are covered in this supplement.
Keywords: external capacitor fuses

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Introduction

(This introduction is not part of IEEE Std C37.40b-1996, IEEE Standard Service Conditions and Definitions for External Fuses for Shunt Capacitors, Supplement to IEEE Std C37.40-1993.)

This document is a supplement to IEEE Std C37.40-1993 and covers fuses that are to be used for overcurrent protection of shunt capacitor banks.

Initial work on this supplement began in 1981 to fill a void in fuse standards.

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Supplement to IEEE Std C37.40-1993

The contents of this document will be incorporated into IEEE Std C37.40 in a future edition. The clauses of this document are ordered to parallel the order of clauses in the base standard. This supplement is intended to be used in conjunction with IEEE C37.40-1993. Editing instructions necessary to incorporate this supplement into IEEE Std C37.40 are provided in *italics.*

*On page 1, add item i) to **1.1** Scope as follows:*

i) External capacitor fuses of the expulsion or current limiting type or a combination of both, used with capacitor units, groups of units, or capacitor banks.

*Add the following reference to **1.2** References:*

IEEE Std 100-1996, IEEE Standard Dictionary of Electrical and Electronics Terms.[1]

*Add the following definitions to **3.1** General:*

capacitor bank overcurrent protection: Common name for all or part of the overcurrent protective equipment at a capacitor installation.†[2]

capacitor group fuse: *See:* capacitor line fuse.

capacitor line fuse (capacitor group fuse): A fuse applied to disconnect a faulted phase of a capacitor bank from a power system.†

capacitor(s) stored energy: The value of energy, measured in Joules, that is stored in a capacitor or group of capacitors at a given instantaneous value of voltage:

[1]As this standard goes to press, IEEE Std 100-1996 is approved but not yet published. This standard will be available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA, in Spring 1997.
[2]The dagger (†), following a definition, indicates the definition is new or modified based on the terms in IEEE Std 100-1996 .

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$$E = \frac{CV^2}{2}$$

where

E is the energy in Joules
C is the capacitance in microfarads
V is the instantaneous voltage in kilovolts†

capacitor unbalance protection: A protective system sensitive to unbalanced voltages and/or currents in a normally balanced capacitor bank. The imbalance may be the result of blown fuses or due to an insulation failure within the capacitor bank.

capacitor unit fuse (capacitor fuse) (individual capacitor fuse): A fuse applied to disconnect an individual faulted capacitor from its bank.†

external capacitor fuse: A fuse external to, and in series with, a capacitor unit or group of units.†

***I*^{2}*t*:** The integral of the square of the current during a given time interval in ampere-squared-seconds:

$$I^2t = \int_{t_0}^{t_1} i^2\,dt \qquad \text{(ampere-squared-seconds)}$$

where

The melting I^2t is equal to the integral of the square of the current during the melting time of the fuse.

The clearing I^2t is equal to the integral of the square of the current during the clearing time of the fuse. The clearing time is equal to the sum of melting time and arcing time.

The I^2t (ampere-squared-seconds) multiplied by the resistance (ohms) through which the current flows is equal to the energy (Joules) that will be produced in the resistance.

melting (pre-arcing) time of a fuse: The time required for an overcurrent to sever the current responsive element.

pre-arcing time of a fuse: *See:* melting (pre-arcing) time of a fuse.

Add the following definitions to ***3.2,*** *Ratings:*

breaking capacity: *See:* rated interrupting current.

rated interrupting current (rated interrupting capacity) (breaking capacity) (current interrupting rating) of a fuse: The designated value of the highest available rms short-circuit current that the fuse is required to interrupt successfully under stated conditions.†

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