IEEE STANDARDS ASSOCIATION IEEE

IEEE Std C37.41™-2016
(Revision of IEEE Std C37.41-2008)

Errata to IEEE Standard Design Tests for High-Voltage (>1000 V) Fuses and Accessories

Sponsor

Switchgear Committee

of the

Power and Energy Society

Correction Sheets
Issued 4 April 2017

1. Overview

1.3 Background

1.3.2 Expulsion fuses

Insert the correct reference to Annex A as shown below:

Many expulsion fuses listed in 1.1 are covered in IEC 60282-2:2008 [B4][1]. The test requirements for Class A [distribution class][2] expulsion fuses are similar to the requirements for IEC class "A" fuses, and the Class B [power class] expulsion fuse requirements are similar to the IEC class "B" fuse requirements. However several minor differences exist between the specified testing requirements of IEC and IEEE/ANSI. There are more significant differences in the types of testing covered (for example IEC includes no specific testing for expulsion fuses in enclosures, or for fuses using polymeric insulators). Certain fuses common in North American practice, but not covered by IEC 60282-2, (e.g., open-link cutouts) are included in ~~**Error! Reference source not found.**~~ Annex A of this standard.

3. Definitions

Insert the correct reference to Annex A as shown below:

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.[6] Definitions of terms used in the main body of this standard appear in Clause 3, while definitions of terms used in ~~**Error! Reference source not found.**~~ Annex A appear in A.1.

9. Interrupting tests

9.1 Requirements common to all interrupting tests

9.1.2 Test circuit

9.1.2.1 Test circuit configuration

Insert the correct reference to Annex E as shown below:

Typical test circuits are shown in Figure E.1. Methods of determining transient recovery voltage (TRV) parameters are also shown in ~~**Error! Reference source not found.**~~ Annex E. Overvoltage protective equipment used for protecting test circuit apparatus shall not significantly affect the current through the fuse or the recovery voltage across the fuse.

Replace Table 5 with the table on the next page (the footnotes are on the page following Table 5).

[1] The numbers in brackets correspond to those of the bibliography in Annex G.

[2] The information in the brackets is a term used in IEC standards that may be similar to the term used in this document, a term that is common in some parts of the world, or a term that has been used previously in IEEE or ANSI standards.

[6] *IEEE Standards Dictionary Online* subscription is available at: http://www.ieee.org/portal/innovate/products/standard/standards_dictionary.html.

Table 5—Interrupting performance tests and test circuit parameters for expulsion fuses

Parameters	Class	Test Series							
		1		2		3		4	5
Power-frequency recovery voltage	A and B	Rated maximum voltage, V: +5%, −0% (see footnote a)							
TRV characteristics	A	See Table 6						See Table 7	See footnote b
	B	See Table 8 (column 1)						See Table 8 (column 2)	
Prospective current—rms symmetrical	A	Rated maximum interrupting current, I_1 +5%, −0%		I_2, from 0.6 I_1 to 0.8 I_1		I_3, from 0.2 I_1 to 0.3 I_1 [c]		See 9.2.2.2[d]	I_5, from 2.7 to 3.3 times fuse rated current, I_r [e]
	B							I_4, from 400 A to 500 A[e]	
X/R ratio (power factor)	A	See Table 9 (column 1)						See Table 9 (column 2)	From 1.3 to 0.75 (from 0.6 to 0.8)
	B	Not less than 15 (not greater than 0.067)						See Table 10	
Making angle related to voltage zero—degrees	A	1st test: from −5 to +15 2nd test: from 85 to 105 3rd test: from 130 to 150				From 85 to 105		Random timing	Random timing
	B							From −5 to +15	
Rated current of fuse link or fuse unit[f]	A	Min.	Max.	Min.	Max.	Min.	Max.	See 9.2.2.2	Min.
	B	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.
Number of tests required with above fuse link or fuse unit rating[g]	A	3	3	3	3	1	1	See 9.2.2.2	2
	B	3	3	3	3	1	1	2	2
Number of tests required before replacing fuseholder and fuse support[g]	A	3	3	3	3	2		6	
	B	3	3	3	3	2		4	
Number of fuseholders to be tested[g]	A and B	1	1	1	1	1		1	
Maximum number of fuse supports to be tested[g]	A and B	1	1	1	1	1		1	
Number of tests on each exhaust-control device, if applicable	A and B	3	3	3	3	2		4	
Duration of power-frequency recovery voltage after interruption	A and B (drop-out)	Not less than dropout time, or 0.5 s, whichever is greater							
	A (non drop-out)	Not less than 0.5 s							
	B (non drop-out)	Not less than 10 min[h]						Not less than 1 min	

Table 5—Interrupting performance tests and test circuit parameters for expulsion fuses *(continued)*

[a] When the fuse is intended to be used only in three-phase effectively grounded circuits, the manufacturer may elect to replace the Test Series 1 (100% V and 100% I_1) by one test duty at 87% V and 100% I_1 and a second test duty with 100% V and 87% I_1. The tolerances for voltages and currents are the same as those indicated in Table 5.

[b] The TRV for this test circuit shall be critically damped. Shunting the load reactance with a resistance having a value equal to approximately 40 times the value of the reactance is usually adequate to critically damp the circuit. However, if this value does not result in critical damping, then the resistance may be reduced to achieve critical damping. For testing convenience, an oscillatory TRV may be acceptable with the agreement of the manufacturer. Critical damping is obtained when:

$$R = \frac{f_o}{2f_n} X$$

where

f_o is the natural frequency of the test circuit without damping

f_n is the power frequency

X is the reactance of the test circuit at power frequency

[c] For fuses with an interrupting rating of 2.8 kA or less, Test Series 3 need not be made.

[d] For Class A fuses rated above 100 A, Test Series 4 need not be made.

[e] The melting time shall be no less than 2 s. If the test involves a melting time appreciably higher than 2 s, the current may be increased to obtain a melting time closer to 2 seconds.

[f] "Min" and "Max" represent the minimum and maximum rated currents of a homogeneous series; see 9.2.2.

[g] After each test, the refill unit or fuse link and expendable cap (if used) shall be replaced. A fuseholder and fuse support shall be capable, at a minimum, of the number of tests listed as "Number of tests required before replacing fuseholder and fuse support." Only the manufacturer has the discretion to permit a fuseholder, or fuse support to be used for more than the specified number of individual tests.

After each test on a fuseholder that uses replaceable links, only the fuse link and the expendable cap, if used, may be replaced. Only the manufacturer has the discretion to use an expendable cap for more than one test if it is determined that the cap was not damaged during a previous test.

If the fuse element is an integral part of the fuseholder, then the number of fuseholders to be tested is the number listed for "Number of tests required with above fuse link or fuse unit rating."

The mounting brackets used for the cutout testing should be as specified in IEEE Std C37.42. Any deviation from this specification shall be noted in the test report for the device.

[h] If leakage current through the fuse is monitored following interruption, then the recovery voltage may be removed after leakage current has been less than 1 mA for a 2 min duration.

Annex D

(informative)

Simplified fault-current calculation—interrupting duty and rated short-time withstand current

Insert the variable in the variable list for the equation as shown:

$$I_{asymetrical} = \sqrt{\left(\frac{\mathrm{A}}{2.828}\right)^2 + \mathrm{D}^2}$$ is the peak-to-peak value of alternating component

A is the peak-to-peak value of alternating component

D is the direct component (at the peak current)

Annex G

(informative)

Bibliography

Change the title of Bibliographic item [B5] as shown:

[B5] IEEE Std C37.45™, IEEE Standard ~~for Test Requirements~~ Design Tests and Specifications for High-Voltage (> 1000 V) Distribution Class Enclosed Single-Pole Air Switches.

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