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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Shunt capacitors for AC power systems having a rated voltage above 1 000 V – Part 4: Internal fuses

Condensateurs shunt pour réseaux à courant alternatif de tension assignée supérieure à 1 000 V – Partie 4: Fusibles internes

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SHUNT CAPACITORS FOR AC POWER SYSTEMS HAVING A RATED VOLTAGE ABOVE 1 000 V –

Part 4: Internal fuses

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International Standard IEC 60871-4 has been prepared by IEC technical committee 33: Power capacitors and their applications.

This second edition cancels and replaces the first edition published in 1996. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

– The disconnecting requirements have been modified.

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The text of this standard is based on the following documents:

FDIS	Report on voting
33/548/FDIS	33/561/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60871 series, published under the general title *Shunt capacitors for AC power systems having a rated voltage above 1 000 V*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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SHUNT CAPACITORS FOR AC POWER SYSTEMS HAVING A RATED VOLTAGE ABOVE 1 000 V –

Part 4: Internal fuses

1 Scope and object

This part of IEC 60871 applies to internal fuses which are designed to isolate faulty capacitor elements, in order to allow operation of the remaining parts of that capacitor unit and the bank in which the capacitor unit is connected. Such fuses are not a substitute for a switching device such as a circuit-breaker, or for external protection of the capacitor bank or any part thereof.

The object of this part of IEC 60871 is to formulate requirements regarding performance and testing and to provide a guide for coordination of fuse protection.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60871-1:2005, *Shunt capacitors for a.c. power systems having a rated voltage above 1000 V – Part 1: General*

3 Terms and definitions

For the purpose of this part of IEC 60871, the terms and definitions in IEC 60871-1, as well as the following, apply.

3.1
rated voltage of a capacitor element
U_{Ne}
r.m.s. value of the alternating voltage for which the capacitor element has been designed

4 Performance requirements

4.1 General

The fuse is connected in series to the element(s) which the fuse is intended to isolate if the element(s) becomes faulty. The range of currents and voltages for the fuse is therefore dependent on the capacitor design, and in some cases also on the bank in which the fuse is connected.

The requirements are valid for a bank or a capacitor switched by restrike-free circuit-breakers. If the circuit-breakers are not restrike-free, other requirements shall be agreed between manufacturer and purchaser.

The operation of an internal fuse is in general determined by one or both of the two following factors:

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– the discharge energy from elements or units connected in parallel with the faulty element or unit;
– the power-frequency fault current.

The additional current and voltage resulting from the blowing of some fuses should be taken into account in the design.

4.2 Disconnecting requirements

The fuse shall enable the faulty element to be disconnected when electrical breakdown of elements occurs in a voltage range, in which $u_1 = 0{,}9 \times \sqrt{2} U_{\mathrm{Ne}}$ is the lowest, and $u_2 = 2{,}5 \times \sqrt{2} U_{\mathrm{Ne}}$ is the highest (instantaneous) value of the element voltage at the instant of fault.

The range u_1 to u_2 is based on the voltage that might occur across the capacitor element at the instant of electrical breakdown.

The u_2 value is of a transient nature, mostly related to switching operations, and some allowance has been made for the extra voltage increase that might occur (before activation of protection) due to earlier disconnection of parallel elements in a series group of elements (See B.1).

If the application of capacitors leads to u_1 and u_2 value, other than those indicated, for example for filter capacitors or when the protection settings limit the value of overvoltage, the lower and upper test voltage limits shall be changed according to an agreement between manufacturer and purchaser.

4.3 Withstand requirements

After operation, the fuse assembly shall withstand full element voltage, plus any unbalance voltage due to fuse action, and any short-time transient overvoltages normally experienced during the life of the capacitor.

Throughout the life of the capacitor, the fuses shall be capable of carrying continuously a current equal to or greater than the maximum permissible unit current divided by the number of parallel fused paths.

The fuses shall be capable of withstanding the inrush-currents due to the switching operations expected during the life of the capacitor.

The fuses connected to the undamaged elements shall be able to carry the discharge currents due to the breakdown of elements.

The fuses shall be able to carry the currents due to short-circuit faults on the bank external to the unit(s) occurring at a peak voltage of 2,5 × U_{N} .

5 Tests

5.1 Routine tests

5.1.1 General

The fuses shall be able to withstand all routine tests of the capacitor unit in accordance with IEC 60871-1.

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