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High-Voltage Switchgear and Controlgear - Gas-filled wrought steel enclosures

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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English Version

High-Voltage Switchgear and Controlgear - Gas-filled wrought steel enclosures

Appareillage électrique haute tension - Enveloppes sous pression en acier corroyé et en alliage d'acier

Hochspannungs-Schaltgeräte und Schaltanlagen - Gasgefüllte Kapselungen aus Schmiedestahl

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European Committee for Electrotechnical Standardization
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European foreword

This document (EN 50068:2018) has been prepared by CLC/TC 17AC, "*High-voltage switchgear and controlgear*".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2019-08-27
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2021-08-27

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This document supersedes EN 50068:1991, EN 50068:1991/corrigendum Aug. 2007 and EN 50068:1991/A1:1993.

This document has been revised by CENELEC Technical Committee 17AC "High-voltage switchgear and controlgear". It supplements the relevant product standards on gas-insulated switchgear and controlgear in that it provides specific requirements for pressurized high-voltage switchgear and controlgear.

The present document has been written to get a European specification for the design, construction, testing, inspection and certification of pressurized enclosures used in high-voltage switchgear and controlgear.

In this respect, this document constitutes the exclusion of HV switchgear from the scope of the Directive 2014/68/EU (superseding 97/23/EC) concerning pressure equipment. Article 1, 2. (l) excludes "enclosures for high-voltage electrical equipment such as switchgear, controlgear, transformers, and rotating machines" from the scope of the Directive.

This document deals with gas-insulated switchgear enclosures of wrought steel and their welding. For different enclosure materials, other European Standards are available.

Introduction

This document covers the requirements for the design, construction, testing, inspection and certification of gas-filled enclosures for use specifically in high-voltage switchgear and controlgear, or for associated gas-filled equipment.

Special consideration is given to these enclosures for the following reasons.

(a) The enclosures usually form the containment of electrical equipment, thus their shape is determined by electrical rather than mechanical requirements.

(b) The enclosures are installed in restricted access areas and the equipment is operated by instructed, authorized persons only.

(c) As the thorough drying of the inert, non-corrosive gas-filling medium is fundamental to the satisfactory operation of the electrical equipment, the gas is periodically checked. For this reason, no internal corrosion allowance is required on the wall thickness of these enclosures.

(d) The enclosures are subjected to only small fluctuations of pressure as the gas-filling density will be maintained within close limits to ensure satisfactory insulating and arc-quenching properties. Therefore, the enclosures are not liable to fatigue due to pressure cycling.

(e) The operating pressure is relatively low.

Due to the foregoing reasons and to ensure maximum service continuity as well as to reduce the risk of moisture and dust entering the enclosures which could endanger safe electrical operation of the switchgear, no pressure tests should be carried out after installation and before placing in service and no periodic inspection of the enclosure interiors or pressure tests should be carried out after the equipment is placed in service.

1 Scope

This document applies to wrought steel enclosures and their welding. These enclosures are pressurized with dry air, inert gases, for example sulphur hexafluoride or nitrogen or a mixture of such gases, used in indoor and outdoor installations of high-voltage switchgear and controlgear with rated voltages above 1kV, where the gas is used principally for its dielectric and/or arc-quenching properties with rated voltages:

— above 1 kV and up to and including 52 kV concerning gas-filled compartments with design pressure higher than 300 kPa relative pressure (gauge);

— above 52 kV concerning all gas-filled compartments.

The enclosures comprise parts of electrical equipment not necessarily limited to the following examples:

— circuit-breakers;

— switch-disconnectors;

— disconnectors;

— earthing switches;

— current transformers;

— voltage transformers;

— surge arrestors;

— busbars and connections;

— etc.

The scope also covers enclosures of pressurized components such as the centre chamber of live tank switchgear, gas-insulated current transformers, etc.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13445-2:2014, *Unfired pressure vessels — Part 2: Materials*

EN 13445-3, *Unfired pressure vessels — Part 3: Design*

EN ISO 15614-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1)*

EN ISO 17636 (all parts), *Non-destructive testing of welds — Radiographic testing (ISO 17636)*

EN ISO 17640, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment (ISO 17640)*

EN 62271-1:2017, *High-voltage switchgear and controlgear — Part 1: Common specifications for alternating current switchgear and controlgear (IEC 62271-1:2017)*

EN ISO 898-1:2013, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread (ISO 898-1:2013)*

EN ISO 898-2:2012, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 2: Nuts with specified property classes — Coarse thread and fine pitch thread (ISO 898-2:2012)*

EN ISO 3452 (all parts), *Non-destructive testing — Penetrant testing (ISO 3452)*

EN ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels (ISO 9606-1)*

EN ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel (ISO 9712)*