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**Cast resin partitions for metal enclosed gas-filled high-voltage switchgear and controlgear**

Cast resin partitions for metal enclosed gas-filled high-voltage switchgear and controlgear

Gießharz-Zwischenwände für metallgekapselfte gasgefüllte Hochspannungs-Schaltgeräte und -Schaltanlagen

Cloisons en résine moulée pour l'appareillage sous enveloppe métallique à haute tension sous pression de gaz

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EUROPEAN STANDARD

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## ENGLISH VERSION

Cast resin partitions for metal enclosed gas-filled  
high voltage switchgear and controlgear

Cloisons en résine moulée pour  
l'appareillage sous enveloppe  
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This European Standard was approved by CENELEC on 24th March 1992. CENELEC members are bound to comply with the requirements of the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date list and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

## CENELEC

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

### FOREWORD

This European Standard has been prepared by CENELEC Technical Committee TC17C: High-voltage enclosed switchgear and controlgear. It was approved by CENELEC on 24th March 1992.

The following dates are applicable:

- latest date of publication of an identical national standard (dop) 1993-03-01
- latest date of withdrawal of conflicting national standards (dow) 1993-03-01

The document forms a supplement to

- EN 50052:1986, Cast aluminium alloy enclosures for gas-filled high-voltage switchgear and controlgear,  
 EN 50064:1989, Wrought aluminium and aluminium alloy enclosures for gas-filled high-voltage switchgear and controlgear,  
 EN 50068:1990, Wrought steel enclosures for gas-filled high-voltage switchgear and controlgear and  
 EN 50069:1990, Welded composite enclosures of cast and wrought aluminium alloys for gas-filled high-voltage switchgear and controlgear.

The specifications are appropriate for pressurized switchgear enclosures allowing an economic production without sacrificing aspects of safety. For unusual shapes dictated by electrical conditions they permit the verification of sound design by proof tests instead of calculations.

The present EN has been established as an international specification for the design, construction, testing, inspection and certification of pressurized enclosures used in high-voltage switchgear and controlgear. This standard follows to that extent also Article 2 of the Directive 76/767/EEC.

List of standards referred to in this standard:

HD 358 S3:1992 (IEC 517:1990) Gas-insulated metal-enclosed switchgear for rated voltage of 72.5 kV and above.

EN 29000:1988 Quality management and quality assurance.

**CAST RESIN PARTITIONS FOR METAL ENCLOSED  
GAS-FILLED HIGH VOLTAGE SWITCHGEAR AND CONTROLGEAR**

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- 1      **Introduction**

This standard covers the strength requirements for the mechanical aspects of design, manufacture, testing, inspection, certification and marking of cast resin partitions which are pressurized for use specifically in metal enclosed gas filled High Voltage Switchgear and associated equipment.

Electrical performance requirements have no bearing on mechanical strength and are therefore not considered in this standard.

Special consideration shall be given to these partitions for the following reasons:

- 1.1 For electrical reasons the partitions must be manufactured in insulating material. This standard deals only with cast resin.
  
- 1.2 The enclosures usually form the containment of electrical equipment, thus their shape and therefore the shape of the partitions is determined by electrical as well as mechanical considerations.
  
- 1.3 The enclosures in which the partitions are integrated are installed in restricted access areas and the equipment is operated by skilled and instructed persons only.

1.4 The enclosures are subjected to only small fluctuations of pressure as the gas-filling density shall be maintained within close limits to ensure satisfactory insulating and arc-quenching properties. Therefore the enclosures and hence the partitions are not liable to fatigue due to pressure cycling.

1.5 The operating pressure is relatively low.

For the foregoing reasons, and to ensure the minimum disturbance, hence reducing the risk of moisture and dust entering the enclosures which would prevent correct electrical operation of the switchgear, no repetition of pressure tests shall be carried out after installation and before placing in service and no periodic inspection of enclosure interiors or pressure tests shall be carried out after the equipment is placed in service.

## 2 Scope

### 2.1 Type of equipment

This standard applies to cast resin partitions pressurized with inert gases, for example sulphur hexafluoride or a mixture of gases such as sulphur hexafluoride and nitrogen used in indoor or outdoor installations of high-voltage switchgear and controlgear, where the gas is used principally for its dielectric and/or arc-quenching properties, with rated voltages

- 1 kV and up to and including 52 kV and with gas-filled compartments with design pressure greater than 3 bar (gauge)
- and with rated voltage 72,5 kV and above.

The partitions comprise pressurized barriers in 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,  
cable connections.

This standard does not apply to high voltage bushings (see HD 358 S3 (IEC 517)).

### 2.2 Quality assurance

It is the intention of this standard that the switchgear manufacturer shall be responsible for achieving and maintaining a consistent and adequate quality of product.

Sufficient examinations shall be made by the partition manufacturer to ensure that the materials, production and testing comply in all respects with the requirements of this standard. Inspections by the users inspectors shall not absolve the switchgear manufacturer from his responsibility to exercise such quality assurance procedures as to ensure that the requirements and intent of this standard are satisfied.

**NOTE:**

Reference should be made to the EN 29000 series of standards for Quality Assurance System.

### 3 Definitions

#### Design pressure

Since in service most partitions have the same or small differential pressure on either side, the significant pressure is that termed the maintenance pressure, this will exist when the partition is pressurized on one side and maintenance is being carried out on the other side at atmospheric pressure.

There are designs however, where the partition is pressurized on one side and atmospheric pressure exists at all times on the other side.

In both cases the pressure to be considered on the pressurized side of the partition is the pressure at maximum ambient temperature with solar radiation effects (where applicable) and rated continuous current (where applicable).

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In both cases the pressure so derived is the design pressure.

The manufacturer may if he so wishes prescribe that the pressure on the pressurized side of the partition be lowered to a specified and controlled pressure during maintenance, in such cases this pressure is the design pressure.

### 4 Materials

Any suitable cast resin system, liquid or solid and any suitable filler, e. g. alumina or bauxite, may be used provided the requirements of this standard are met.

The partitions shall be traceable to a given batch of material and manufacturing process either by serial number, batch number or date. (Refer to clause 8).

## 5 Design

### 5.1 Purpose

Consideration for design of partitions for gas insulated switchgear prescribed in this section takes into account that the partitions are subjected to particular operating conditions (clause 1) which distinguish them from parts for compressed air receivers and similar storage vessels.

### 5.2 Considerations for design

When designing a partition, account shall be taken of the following, if applicable

- (i) the full differential pressure across the partition during normal operation,
- (ii) evacuation of the enclosure on one side of the partition with normal operating pressure on the other, as part of the filling process,
- (iii) a controlled enhanced pressure on one side of the partition with normal operating pressure on the other during electrical testing of the equipment and associated circuits,
- (iv) for non-symmetrical partitions the worst case pressure direction,
- (v) superimposed loads and vibration,
- (vi) the possibility of maintenance being carried out adjacent to a pressurized partition.

### 5.3 Stresses due to pressure

The dimension of a partition under pressure may be determined by any method using the design pressure as defined in subclause 3.1 provided the requirements of clause 7 are met.

**NOTE:**

Pressure stresses due to an internal fault are not considered in the design of partition since after such an occurrence the partition would be carefully checked and, if necessary, replaced.

In the case of arcing due to an internal fault, the requirement of Publication HD 358 S3 (IEC 517) shall be applied.



## 6 Manufacture and workmanship

### 6.1 Consultation between switchgear manufacturer & partition manufacturer

It is strongly recommended, especially when the switchgear manufacturer and the partition manufacturer are not the same, that the switchgear manufacturer, having defined the necessary geometry and thickness of the partition, shall obtain the partition manufacturer's agreement to the design prior to casting to enable sound partitions to be produced consistently, having the required properties.

### 6.2 Manufacturing technique

The manufacturing technique shall be recorded by the partition manufacturer for each design of partition giving full details of method of pouring mould material, attitude of mould, temperature of moulds, curing procedure etc.

6.2.1 All subsequent production partitions shall be made by the same technique and under the same conditions without significant deviations.

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6.2.2 Where the technique, material or material supplier is altered, the partition so manufactured shall be type tested in accordance with clause 7 of this standard. Production shall only proceed in the event of a successful type test.

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6.2.3 If for any reason the manufacturer is changed, a new type test in accordance with Clause 7 of this standard shall be carried out on the partition. Production shall only take place after successful completion of the type test.

### 6.3 Geometry and dimensions

6.3.1 The geometry and dimensions of the partition shall be defined by the switchgear manufacturer's drawings, when the mould is made by the partition manufacturer

or

the mould, when this is supplied by the switchgear manufacturer

or

the accepted sample partition, when serial production methods are employed.