

INTERNATIONAL STANDARD

NORME INTERNATIONALE



High-voltage switchgear and controlgear –
Part 200: AC metal-enclosed switchgear and controlgear for rated voltages
above 1 kV and up to and including 52 kV

Appareillage à haute tension –
Partie 200: Appareillage sous enveloppe métallique pour courant alternatif
de tensions assignées supérieures à 1 kV et inférieures ou égales à 52 kV



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CONTENTS

| | |
|--|----|
| FOREWORD..... | 5 |
| 1 General | 7 |
| 1.1 Scope..... | 7 |
| 1.2 Normative references | 8 |
| 2 Normal and special service conditions | 8 |
| 3 Terms and definitions | 9 |
| 4 Ratings..... | 15 |
| 4.1 Rated voltage (U_r) | 15 |
| 4.2 Rated insulation level | 16 |
| 4.3 Rated frequency (f_r)..... | 16 |
| 4.4 Rated normal current and temperature rise | 16 |
| 4.5 Rated short-time withstand currents (I_k)..... | 16 |
| 4.6 Rated peak withstand current (I_p) | 16 |
| 4.7 Rated durations of short circuit (t_k) | 17 |
| 4.8 Rated supply voltage of closing and opening devices and of auxiliary and control circuits (U_a)..... | 17 |
| 4.9 Rated supply frequency of closing and opening devices and of auxiliary circuits..... | 17 |
| 4.10 Rated pressure of compressed gas supply for controlled pressure systems | 17 |
| 4.11 Rated filling levels for insulation and/or operation | 17 |
| 4.101 Ratings of the internal arc classification (IAC)..... | 17 |
| 4.102 Rated cable test voltages | 19 |
| 5 Design and construction | 19 |
| 5.1 Requirements for liquids in switchgear and controlgear | 19 |
| 5.2 Requirements for gases in switchgear and controlgear | 19 |
| 5.3 Earthing of switchgear and controlgear | 20 |
| 5.4 Auxiliary and control equipment | 21 |
| 5.5 Dependent power operation | 21 |
| 5.6 Stored energy operation | 21 |
| 5.7 Independent manual or power operation (independent unlatched operation) | 21 |
| 5.8 Operation of releases | 21 |
| 5.9 Low- and high-pressure interlocking and monitoring devices..... | 21 |
| 5.10 Nameplates | 21 |
| 5.11 Interlocking devices | 23 |
| 5.12 Position indication | 23 |
| 5.13 Degrees of protection by enclosures | 24 |
| 5.14 Creepage distances for outdoor insulators | 24 |
| 5.15 Gas and vacuum tightness..... | 24 |
| 5.16 Liquid tightness | 24 |
| 5.17 Fire hazard (flammability) | 24 |
| 5.18 Electromagnetic compatibility (EMC) | 24 |
| 5.19 X-ray emission..... | 24 |
| 5.20 Corrosion..... | 24 |
| 5.101 Internal arc fault | 25 |
| 5.102 Enclosure | 25 |
| 5.103 High-voltage compartments | 27 |

| | | |
|-------|--|----|
| 5.104 | Removable parts | 30 |
| 5.105 | Provisions for dielectric tests on cables | 30 |
| 6 | Type tests | 31 |
| 6.1 | General | 31 |
| 6.2 | Dielectric tests | 32 |
| 6.3 | Radio interference voltage (r.i.v.) test | 35 |
| 6.4 | Measurement of the resistance of circuits | 35 |
| 6.5 | Temperature-rise tests | 36 |
| 6.6 | Short-time withstand current and peak withstand current tests | 37 |
| 6.7 | Verification of the protection | 38 |
| 6.8 | Tightness tests | 39 |
| 6.9 | Electromagnetic compatibility tests (EMC) | 39 |
| 6.10 | Additional tests on auxiliary and control circuits | 39 |
| 6.11 | X-radiation test procedures for vacuum interrupters | 40 |
| 6.101 | Verification of making and breaking capacities | 40 |
| 6.102 | Mechanical operation tests | 41 |
| 6.103 | Pressure withstand test for gas-filled compartments | 42 |
| 6.104 | Tests to verify the protection of persons against dangerous electrical effects | 43 |
| 6.105 | Weatherproofing test | 44 |
| 6.106 | Internal arc test | 44 |
| 7 | Routine tests | 47 |
| 7.1 | Dielectric test on the main circuit | 48 |
| 7.2 | Tests on auxiliary and control circuits | 48 |
| 7.3 | Measurement of the resistance of the main circuit | 48 |
| 7.4 | Tightness test | 48 |
| 7.5 | Design and visual checks | 48 |
| 7.101 | Partial discharge measurement | 48 |
| 7.102 | Mechanical operation tests | 49 |
| 7.103 | Pressure tests of gas-filled compartments | 49 |
| 7.104 | Tests of auxiliary electrical, pneumatic and hydraulic devices | 49 |
| 7.105 | Tests after erection on site | 49 |
| 7.106 | Measurement of fluid condition after filling on site | 50 |
| 8 | Guide to the selection of switchgear and controlgear | 50 |
| 8.101 | General | 50 |
| 8.102 | Selection of rated values | 50 |
| 8.103 | Selection of design and construction | 50 |
| 8.104 | Internal arc fault | 55 |
| 8.105 | Summary of technical requirements, ratings and optional tests | 59 |
| 8.106 | Ratings of earthing circuits | 61 |
| 8.107 | Ratings for cable testing | 61 |
| 9 | Information to be given with enquiries, tenders and orders | 61 |
| 9.1 | Information with enquiries and orders | 61 |
| 9.2 | Information with tenders | 62 |
| 10 | Transport, storage, installation, operation and maintenance | 63 |
| 10.1 | Conditions during transport, storage and installation | 63 |
| 10.2 | Installation | 63 |
| 10.3 | Operation | 63 |

| | |
|---|----|
| 10.4 Maintenance..... | 63 |
| 11 Safety..... | 63 |
| 11.101 Procedures..... | 64 |
| 11.102 Internal arc aspects..... | 64 |
| 12 Influence of the product on the environment..... | 64 |
| Annex AA (normative) Internal arc fault – Method to verify the internal arc classification (IAC)..... | 65 |
| Annex BB (normative) Partial discharge measurement..... | 80 |
| Annex CC (informative) Regional deviations | 86 |
| Bibliography..... | 87 |
| Figure 101 – LSC1..... | 54 |
| Figure 102 – LSC2..... | 54 |
| Figure 103 – LSC2..... | 54 |
| Figure 104 – LSC2A | 54 |
| Figure 105 – LSC2B | 54 |
| Figure 106 – LSC2B | 54 |
| Figure AA.1 – Mounting frame for vertical indicators | 73 |
| Figure AA.2 – Horizontal indicator..... | 73 |
| Figure AA.3 – Position of the indicators | 74 |
| Figure AA.4 – Room simulation and indicator positioning for accessibility A, classified rear side, functional unit of any height | 75 |
| Figure AA.5 – Room simulation and indicator positioning for accessibility B, classified rear side, functional unit greater than or equal to 1 900 mm high | 76 |
| Figure AA.6 – Room simulation and indicator positioning for accessibility B, classified rear side, functional unit less than 1 900 mm high..... | 77 |
| Figure AA.7 – Test arrangement for overhead connected pole-mounted switchgear and controlgear..... | 78 |
| Figure AA.8 – Ceiling height stated from the floor or false floor level where the switchgear is actually placed | 79 |
| Figure BB.1 – Partial discharge test circuit (three-phase arrangement)..... | 84 |
| Figure BB.2 – Partial-discharge test circuit (system without earthed neutral) | 85 |
| Table 101 – Nameplate information | 21 |
| Table 102 – Locations, causes and examples of measures to decrease the probability of internal arc faults | 56 |
| Table 103 – Single phase-to-earth arc fault current depending on the network neutral earthing | 58 |
| Table 104 – Summary of technical requirements, ratings and optional tests for metal-enclosed switchgear | 59 |
| Table AA.1 – Parameters for internal fault test according to compartment construction..... | 72 |
| Table BB.1 – Test circuits and procedures..... | 83 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 200: AC metal-enclosed switchgear and controlgear
for rated voltages above 1 kV and up to and including 52 kV**

FOREWORD

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International Standard IEC 62271-200 has been prepared by subcommittee 17C: High-voltage switchgear and controlgear assemblies, of IEC technical committee 17: Switchgear and controlgear.

This second edition cancels and replaces the first edition, published in 2003. It is a technical revision.

This second edition of IEC 62271-200 has been further updated and improved to the experience gained with the first edition of IEC 62271-200. As maintenance result, this second edition of IEC 62271-200 introduces the following significant changes:

- definitions, classifications and testing procedures are specified more precisely;
- categories LSC2A and LSC2B have been clarified and LSC2 has been assigned a separate definition;
- specific ratings related to fault level to earth (4.5 to 4.7) are introduced;

- solid insulated high-voltage parts are no longer considered as compartments on their own;
- an optional rating "cable test voltage" and the associated requirements and type tests are introduced;
- for testing the internal arc classification, when assigned by the manufacturer, more specific guidance is provided regarding the test arrangement, room simulation and arc initiation;
- a single phase to earth ignition is also recognised for internal arc testing;
- the Annexes A and B are renumbered Annexes AA and BB.

The level of severity of internal arc testing is maintained without changes.

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

| | |
|--------------|------------------|
| FDIS | Report on voting |
| 17C/523/FDIS | 17C/534/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.

This International Standard should be read in conjunction with IEC 62271-1:2007, to which it refers and which is applicable unless otherwise specified. In order to simplify the indication of corresponding requirements, the same numbering of clauses and subclauses is used as in IEC 62271-1. Amendments to these clauses and subclauses are given under the same numbering, whilst additional subclauses, are numbered from 101.

A list of all parts of the IEC 62271 series can be found, under the general title *High-voltage switchgear and controlgear*, 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The contents of the corrigendum of June 2015 have been included in this copy.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV

1 General

1.1 Scope

This part of IEC 62271 specifies requirements for prefabricated metal-enclosed switchgear and controlgear for alternating current of rated voltages above 1 kV and up to and including 52 kV for indoor and outdoor installation, and for service frequencies up to and including 60 Hz. Enclosures may include fixed and removable components and may be filled with fluid (liquid or gas) to provide insulation.

NOTE 1 For the use of this document high-voltage (IEC 60050-601:1985, 601-01-27) is the rated voltage above 1 000 V. However, medium voltage (IEC 60050-601:1985, 601-01-28) is commonly used for distribution systems with voltages above 1 kV and generally applied up to and including 52 kV; refer to [1] of Bibliography

NOTE 2 Although primarily dedicated to three-phase systems, this standard can also be applied to single-phase or two-phase systems.

This standard defines several categories of metal enclosed switchgear and controlgear which differ due to

- the consequences on network service continuity in case of maintenance on the switchgear and controlgear;
- the need and convenience of maintenance of the equipment.

NOTE 3 Safety of an installation results from the design, implementation and coordination of products, installations and operations.

For metal-enclosed switchgear and controlgear containing gas-filled compartments, the design pressure is limited to a maximum of 300 kPa (relative pressure).

NOTE 4 Gas-filled compartments having a design pressure exceeding 300 kPa (relative pressure) should be designed and tested in accordance with IEC 62271-203; refer to [6] of Bibliography.

Metal-enclosed switchgear and controlgear for special use, for example, in flammable atmospheres, in mines or on board ships, may be subject to additional requirements.

Components contained in metal-enclosed switchgear and controlgear are to be designed and tested in accordance with their various relevant standards. This standard supplements the standards for the individual components regarding their installation in switchgear and controlgear assemblies.

This standard does not preclude that other equipment may be included in the same enclosure. In such a case, any possible influence of that equipment on the switchgear and controlgear is to be taken into account.

NOTE 5 Switchgear and controlgear assemblies having an insulation enclosure are covered by IEC 62271-201.

NOTE 6 Metal-enclosed switchgear and controlgear for rated voltages above 52 kV insulated by ambient air may be covered by this standard taking into account the insulation levels of IEC 62271-1.

1.2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60050-151, *International Electrotechnical Vocabulary – Part 151: Electrical and magnetic devices*

IEC 60050-441:1984, *International Electrotechnical Vocabulary – Chapter 441: Switchgear, controlgear and fuses*

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60270, *High-voltage test techniques – Partial discharge measurements*

IEC 60470:1999, *High-voltage alternating current contactors and contactor-based motor-starters*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

IEC 62271-1:2007, *High-voltage switchgear and controlgear – Part 1: Common specifications*

IEC 62271-100, *High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers*

IEC 62271-102:2001, *High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches* [IEC 62271-200:2011](https://standards.iteh.ai/catalog/standards/sist/6fbaec6c-3651-40a6-b1d1-62271-200:2011)

IEC 62271-103, *High-voltage switchgear and controlgear – Part 103: Switches for rated voltages above 1 kV up to and including 52 kV*

IEC 62271-105, *High-voltage switchgear and controlgear – Part 105: Alternating current switch-fuse combinations*

IEC 62271-201:2006, *High-voltage switchgear and controlgear – Part 201: AC insulation-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC/TS 62271-304, *High-voltage switchgear and controlgear – Part 304: Design classes for indoor enclosed switchgear and controlgear for rated voltages above 1 kV up to and including 52 kV to be used in severe climatic conditions*

ISO/IEC Guide 51:1999, *Safety aspects – Guidelines for their inclusion in standards*

2 Normal and special service conditions

Clause 2 of IEC 62271-1 is applicable with the following addition:

Unless otherwise specified in this standard, the metal-enclosed switchgear and controlgear is designed to be used under normal service conditions.

Metal-enclosed switchgear and controlgear, under the scope of IEC/TS 62271-304 and intended to be used in service conditions more severe with respect to condensation and pollution than the normal service conditions specified in this standard, may be classified with a "design class" 1 or 2 according to IEC/TS 62271-304 to demonstrate its ability to withstand such severe conditions.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-151, IEC 60050-441 and IEC 62271-1 as well as the following apply.

NOTE Additional definitions are classified so as to be aligned with the classification system used in IEC 60050-441.

3.101

switchgear and controlgear

general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures

[IEC 60050-441:1984, 441-11-01]

3.102

metal-enclosed switchgear and controlgear

switchgear and controlgear assemblies with an external metal enclosure intended to be earthed and completely assembled, except for external connections

[IEC 60050-441:1984, 441-12-04, modified]

3.103

functional unit

part of metal-enclosed switchgear and controlgear comprising all the components of the main circuits and auxiliary circuits that contribute to the fulfilment of a single function

[IEC 60050-441:1984, 441-13-04, modified]

NOTE Functional units may be distinguished according to the function for which they are intended, for example, incoming unit, outgoing unit, etc.

3.104

multi-tier design

design of metal-enclosed switchgear in which the main switching devices of two or more functional units are arranged vertically (one above the other) within a common enclosure

3.105

transport unit

part of metal-enclosed switchgear and controlgear, prefabricated, and suitable for shipment without being dismantled

3.106

enclosure

part of metal-enclosed switchgear and controlgear providing a specified degree of protection of equipment against external influences and a specified degree of protection against approach to or contact with live parts and against contact with moving parts

[IEC 60050-441:1984, 441-13-01 modified]

3.107

high-voltage compartment

compartment of metal-enclosed switchgear and controlgear containing high-voltage conducting parts, enclosed except for openings necessary for interconnection, control or ventilation. Four types of high-voltage compartments are distinguished, three that can be opened, called accessible (see 3.107.1 to 3.107.3) and one that cannot be opened, called non-accessible (see 3.107.4)

NOTE 1 General definition of "compartment" is provided by IEC 60050-441:1984, 441-13-05, as "a part of an assembly enclosed except for openings necessary for interconnection, control or ventilation".

NOTE 2 A compartment may contain barriers, structures or components that are intended to provide various functions, such as mechanical or dielectrical, but not to function as a partition or enclosure.

NOTE 3 High-voltage compartments are identified according to the main component(s) contained therein or to the main function provided (refer to 5.103.1).

3.107.1

interlock-controlled accessible compartment

high-voltage compartment, intended to be opened for normal operation and/or normal maintenance as stated by the manufacturer, in which access is controlled by integral design of the switchgear and controlgear

NOTE Installation, extension, repair, etc. are not considered as normal maintenance.

3.107.2

procedure-based accessible compartment

high-voltage compartment, intended to be opened for normal operation and/or normal maintenance as stated by the manufacturer, in which access is controlled by a suitable procedure combined with locking

NOTE Installation, extension, repair, etc. are not considered as normal maintenance.

3.107.3

tool-based accessible compartment

high-voltage compartment that may be opened only through the use of tools, but not intended for opening during normal operation and maintenance

NOTE Special procedures are required.

3.107.4

non-accessible compartment

high-voltage compartment that must not be opened

NOTE Opening may destroy the integrity of the compartment.

3.107.5

connection compartment

high-voltage compartment in which electrical connections are made between the main circuit of the switchgear assembly and the external conductors (cables or bars) to the electrical network or high-voltage apparatus of the installation

3.108

partition

part of metal-enclosed switchgear and controlgear separating one high-voltage compartment from other compartments and providing a specified degree of protection

[IEC 60050-441:1984, 441-13-06, modified]

NOTE 1 Movable shutters intended for shielding may become an integral part of the partition.

NOTE 2 Partitions may be fitted with parts that allow interconnection between compartments (e.g. bushings).

3.109

partition class

class defining whether metallic or non-metallic material is used for partitions

3.109.1**partition class PM**

metal-enclosed switchgear and controlgear providing continuous metallic partitions and/or shutters (if applicable), intended to be earthed, between opened accessible compartments and high-voltage live parts

3.109.2**partition class PI**

metal-enclosed switchgear and controlgear having one or more non-metallic partitions or shutters between opened accessible compartments and high-voltage live parts

3.110**shutter**

part of metal-enclosed switchgear and controlgear that can be moved from a position where it permits contacts of a removable part, or moving contact of a disconnecter, to engage fixed contacts, to a position where it becomes a part of the enclosure or partition shielding the fixed contacts

[IEC 60050-441:1984, 441-13-07, modified]

3.111**segregation (of conductors)**

arrangement of conductors with earthed metal interposed between them in such a manner that disruptive discharges can only occur to earth

[IEC 60050-441:1984, 441-11-11]

NOTE 1 A segregation may be established between the conductors as well as between the open contacts of a switching device or disconnecter.

NOTE 2 This definition does not specify any mechanical protection (IP and IK).

3.112**bushing**

structure carrying one or more conductors through an enclosure or partition and insulating it there from, including the means of attachment

3.113**component**

essential part of the high-voltage or earthing circuits of metal-enclosed switchgear and controlgear which serves a specific function (for example, circuit-breaker, disconnecter, switch, fuse, instrument transformer, bushing, busbar)

3.114**main circuit**

all the high-voltage conductive parts of metal-enclosed switchgear and controlgear included in a circuit which is intended to carry the rated normal current

[IEC 60050-441:1984, 441-13-02, modified]

3.115**earthing circuit**

conductors, connections, and the conducting parts of earthing devices intended to connect the high-voltage conductive parts to the earthing system of the installation

NOTE Parts of metallic enclosures connected to the earthing system may be considered as part of the earthing circuit, refer to 5.3

3.116

auxiliary circuit

all the conductive parts of metal-enclosed switchgear and controlgear included in a circuit (other than the high-voltage parts) intended to control, measure, signal and regulate

[IEC 60050-441:1984, 441-13-03, modified]

NOTE The auxiliary circuits of metal-enclosed switchgear and controlgear include the control and auxiliary circuits of the switching devices.

3.117

pressure relief device

device intended to relieve over pressure from a compartment

3.118

fluid-filled compartment

high-voltage compartment of metal-enclosed switchgear and controlgear filled with a fluid, either gas, other than ambient air, or liquid, for insulation purposes

3.118.1

gas-filled compartment

refer to subclause 3.6.6.1 of IEC 62271-1

3.118.2

liquid-filled compartment

high-voltage compartment of metal-enclosed switchgear and controlgear in which the liquid is at atmospheric pressure, or under pressure that is maintained by one of the following systems:

- a) controlled pressure system; [IEC 62271-200:2011](http://standards.iteh.ai/catalog/standards/sist/6fbaec6c-3651-40a6-b1d1-789ff801013a/iec-62271-200-2011)
- b) closed pressure system; <http://standards.iteh.ai/catalog/standards/sist/6fbaec6c-3651-40a6-b1d1-789ff801013a/iec-62271-200-2011>
- c) sealed pressure system

NOTE For pressure systems, refer to subclause 3.6.5 of IEC 62271-1.

3.119

relative pressure

pressure, referred to the standard atmospheric pressure of 101,3 kPa

3.120

minimum functional level (of fluid-filled compartments)

gas pressure (relative pressure) in Pa (or density) or liquid mass at and above which the rated values of the metal-enclosed switchgear and controlgear are maintained

3.121

design level (of fluid-filled compartments)

gas pressure (relative pressure) in Pa (or density) or liquid mass used to determine the design of a gas-filled compartment or mass for a liquid-filled compartment

3.122

design temperature (of fluid-filled compartments)

highest temperature which can be reached by the gas or liquid under service conditions

3.123

ambient air temperature (of metal-enclosed switchgear and controlgear)

temperature, determined under prescribed conditions, of the air surrounding the enclosure of metal-enclosed switchgear and controlgear

3.124**removable part**

part of metal-enclosed switchgear and controlgear connected to the main circuit and that may be removed entirely from the metal-enclosed switchgear and controlgear and replaced, even though the main circuit of the functional unit is live

[IEC 60050-441:1984, 441-13-08, modified]

3.125**withdrawable part**

removable part of metal-enclosed switchgear and controlgear that can be moved to positions in which an isolating distance or segregation between open contacts is established, while the part remains mechanically attached to the enclosure

[IEC 60050-441:1984, 441-13-09, modified]

3.126**service position****connected position**

position of a removable part in which it is fully connected for its intended function

[IEC 60050-441:1984, 441-16-25]

3.127**earthing position**

position of a removable part or state of a disconnector in which the closing of a mechanical switching device causes a main circuit to be short-circuited and earthed

[IEC 60050-441:1984, 441-16-26, modified]

3.128**test position (of a withdrawable part)**

position of a withdrawable part in which an isolating distance or segregation is established in the main circuit and in which the auxiliary circuits are connected

[IEC 60050-441:1984, 441-16-27]

3.129**disconnected position (of a withdrawable part)**

position of a withdrawable part in which an isolating distance or segregation is established in the circuits of the withdrawable part, that part remaining mechanically attached to the enclosure

[IEC 60050-441:1984, 441-16-28, modified]

NOTE In high-voltage metal-enclosed switchgear and controlgear, the auxiliary circuits may not be disconnected.

3.130**removed position (of a removable part)**

position of a removable part when it is outside and mechanically and electrically separated from the enclosure

[IEC 60050-441:1984, 441-16-29, modified]

3.131**loss of service continuity category****LSC**

category defining the possibility to keep other high-voltage compartments and/or functional units energised when opening an accessible high-voltage compartment, as stated in definitions 3.107.1 to 3.107.3.