

# Low-voltage switchgear and controlgear assemblies —

## Part 5: Particular requirements for assemblies for power distribution in public networks

The European Standard EN 60439-5:2006 has the status of a  
British Standard

ICS 29.130.20; 29.240.99

## National foreword

This British Standard was published by BSI. It is the UK implementation of EN 60439-5:2006. It is identical with IEC 60439-5:2006. It supersedes BS EN 50300:2004 and BS EN 60439-5:1996, which are withdrawn.

The UK participation in its preparation was entrusted by Technical Committee PEL/17, Switchgear, controlgear, and HV-LV co-ordination, to Subcommittee PEL/17/3, Low voltage switchgear and controlgear assemblies.

A list of organizations represented on PEL/17/3 can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2006

© BSI 2006

ISBN 0 580 49680 5

### Amendments issued since publication

| Amd. No. | Date | Comments |
|----------|------|----------|
|          |      |          |
|          |      |          |
|          |      |          |
|          |      |          |

**Low-voltage switchgear and controlgear assemblies  
Part 5: Particular requirements for assemblies  
for power distribution in public networks  
(IEC 60439-5:2006)**

Ensembles d'appareillage  
à basse tension  
Partie 5: Règles particulières  
pour les ensembles pour réseaux  
de distribution publics  
(CEI 60439-5:2006)

Niederspannungs-  
Schaltgerätekombinationen  
Teil 5: Besondere Anforderungen  
für Schaltgerätekombinationen  
in Energieverteilungsnetzen  
(IEC 60439-5:2006)

This European Standard was approved by CENELEC on 2006-09-01. CENELEC members are bound to comply with 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 lists 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, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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

The text of document 17D/334/FDIS, future edition 2 of IEC 60439-5, prepared by SC 17D, Low-voltage switchgear and controlgear assemblies, of IEC TC 17, Switchgear and controlgear, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60439-5 on 2006-09-01.

This European Standard supersedes EN 60439-5:1996 + A1:1998 and EN 50300:2004.

The main change with respect to EN 60439-5:1996 is the inclusion of substation cable distribution boards (SCDBs). The title has therefore been amended.

In view of the fact that this publication should be read in conjunction with EN 60439-1:1999, the numbering of its clauses and subclauses correspond with the latter. The clauses of this standard supplement, modify or replace clauses in EN 60439-1.

Where there is no corresponding clause or subclause in this standard, the clause or subclause of the main document applies without modification.

Clauses, subclauses, figures and tables which are additional to those in Part 1 are numbered starting from 101.

The following dates were fixed:

- |                                                                                                                                                |       |            |
|------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------|
| – latest date by which the EN has to be implemented<br>at national level by publication of an identical<br>national standard or by endorsement | (dop) | 2007-06-01 |
| – latest date by which the national standards conflicting<br>with the EN have to be withdrawn                                                  | (dow) | 2009-09-01 |

Annexes ZA and ZB have been added by CENELEC.

---

## Endorsement notice

The text of the International Standard IEC 60439-5:2006 was approved by CENELEC as a European Standard without any modification.

---

## CONTENTS

|                                                                                                                            |                                                      |    |
|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----|
| 1                                                                                                                          | General .....                                        | 9  |
| 2                                                                                                                          | Definitions .....                                    | 11 |
| 3                                                                                                                          | Classification of ASSEMBLIES .....                   | 15 |
| 4                                                                                                                          | Electrical characteristics of ASSEMBLIES .....       | 17 |
| 5                                                                                                                          | Information to be given regarding the ASSEMBLY ..... | 17 |
| 6                                                                                                                          | Service conditions .....                             | 17 |
| 7                                                                                                                          | Design and construction .....                        | 19 |
| 8                                                                                                                          | Test specifications.....                             | 25 |
| Annex A (normative) Minimum and maximum cross-section of copper and aluminium<br>conductors, suitable for connection ..... |                                                      | 57 |

## LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

### Part 5: Particular requirements for assemblies for power distribution in public networks

#### 1 General

##### 1.1 Scope and object

###### *Replacement:*

Substation cable distribution boards (SCDBs) and cable distribution cabinets (CDCs) for power distribution in networks shall comply with all the requirements of IEC 60439-1 (1999) if not otherwise indicated hereinafter and shall also comply with the particular requirements contained in this publication.

This standard gives supplementary requirements for substation cable distribution boards (SCDBs) and cable distribution cabinets (CDCs), which are stationary, type-tested assemblies (TTA). They are used for the distribution of electrical energy in three-phase systems. Open-type ASSEMBLY are not covered by this standard.

Individual components, such as fuses and switching devices that comply with other standards, shall also comply with the supplementary requirements of this standard.

The object of this standard is to state the definitions and to specify the service conditions, construction requirements, technical characteristics and tests for SCDBs and CDCs. Higher performance and test levels may be required for particular networks, for example, those with meshed connections.

NOTE 1 If a CDC is equipped with additional equipment (for example meters), in such a way that the main function is changed considerably, then other standards may also apply as agreed between user and manufacturer (see 7.6).

NOTE 2 Where local regulations and practices permit, an SCDB or CDC according to this standard may be used in other than public networks.

SCDBs are suitable for installation in places where only skilled persons have access for their use; however, outdoor types may be installed in situations which may be accessible to the public.

SCDBs are connected to the low voltage terminals of distribution transformers by means of connecting bars, rods or cables.

CDCs are for outdoor installation in places which are accessible to the public, and where only skilled persons have access for their use.

##### 1.2 Normative references

*This subclause of Part 1 applies with the following additions:*

IEC 60068-2-11:1981, *Environmental testing – Part 2: Tests – Test Ka: Salt mist*

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12+12-hour cycle)*

IEC 60238:2004, *Edison screw lampholders*

IEC 60269-1:1998, *Low-voltage fuses – Part 1: General requirements*

IEC 60439-1:1999, *Low-voltage switchgear and controlgear assemblies – Part 1: Type-tested and partially type-tested assemblies*  
Amendment 1 (2004)

IEC 60446:1999, *Basic and safety principles for man-machine interface, marking and identification – Identification of conductors by colours or numerals*

IEC 60529:2001, *Degrees of protection provided by enclosures (IP code)*

IEC 60695-11-10:1999, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

ISO 3231:1993, *Paints and varnishes – Determination of resistance to humid atmospheres containing sulphur dioxide*

ISO 4628-3:2003, *Paints and varnishes – Evaluation of degradation of coatings – Designation of quantity and size of defects, and of intensity of uniform changes in appearance – Part 3: Designation of degree of rusting*

ISO 4892-2:1994, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc sources*

ISO 6506-1:2005, *Metallic materials – Brinell hardness test – Part 1: Test method*

ISO 9223:1992, *Corrosion of metals and alloys – Corrosivity of atmosphere – Classification*

## 2 Definitions

*The definitions of Part 1 apply with the following additions and modifications:*

### 2.1.1.2

#### **partially type-tested low-voltage switchgear and controlgear assembly**

**PTTA**

Not applicable.

### 2.1.101

#### **cable distribution cabinet**

**CDC**

cubicle-type ASSEMBLY for outdoor installation which in use receives electrical energy via cables from one or more substation cable distribution boards (SCDBs), and distributes that energy through one or more cables to other equipment

NOTE This other equipment is not intended to consume electrical energy (see Figure 101).

### 2.1.101.1

#### **ground-mounted cable distribution cabinet**

cable distribution cabinet for installation at ground level on a foundation

NOTE The cabinet entries for external conductors are suitable for cables.

**2.1.101.2****pole-mounted cable distribution cabinet**

cable distribution cabinet for installation on a pole, on which a transformer is normally mounted, in an aerial network

NOTE The cabinet entries for external conductors are suitable for cables or insulated overhead line conductors.

**2.1.101.3****wall-mounted surface type cable distribution cabinet**

cable distribution cabinet for installation on the surface of a wall

NOTE The cabinet entries for external conductors are suitable for cable.

**2.1.101.4****wall-mounted recessed type cable distribution cabinet**

cable distribution cabinet for installation into a recess in a wall

NOTE 1 A CDC is not designed to support the portion of the wall above the CDC.

NOTE 2 The cabinet entries for external conductors are suitable for cables.

**2.1.102****substation cable distribution board****SCDB**

an ASSEMBLY for direct connection to one or more distribution transformers, incorporating one or more incoming circuits (disconnecter, switch disconnecter, circuit breaker, etc.) that are connected via busbars to one or more outgoing functional units (fuse disconnectors, fuse switch disconnectors, circuit breakers, etc.) so as to provide protection for, and a means of isolating and controlling, the outgoing circuits.

NOTE An SCDB is installed, operated and maintained solely by skilled persons.

**2.1.102.1****SCDB – indoor****SCDB-I**

substation cable distribution board (SCDB) for installation indoors, including all structural parts necessary to support busbars, functional units and other ancillary devices, necessary to complete the ASSEMBLY

**2.1.102.2****SCDB – outdoor cable connected****SCDB-CCO**

cubicle type substation cable distribution board (SCDB) for outdoor installation which is independently mounted and connected to the distribution transformer by means of cables

**2.1.102.2.1****SCDB-CCO – ground mounted**

SCDB-CCO suitable for outdoor installation at or slightly above ground level in a situation which may be accessible to the public

**2.1.102.2.2****SCDB-CCO – pole mounted**

SCDB-CCO suitable for outdoor installation above ground level on a pole

### **2.1.102.3**

#### **SCDB – outdoor transformer mounted**

##### **SCDB-TMO**

cubicle type substation cable distribution board (SCDB) for outdoor installation, which is suitable for fixing to the low voltage flange of a distribution transformer

### **2.1.102.3.1**

#### **SCDB-TMO – ground mounted**

SCDB-TMO which is suitable for fixing to the low voltage flange of a ground mounted distribution transformer

### **2.1.102.3.2**

#### **SCDB-TMO – pole mounted**

SCDB-TMO which is suitable for fixing to the low voltage flange of a pole mounted distribution transformer

## **2.2**

### **constructional units of ASSEMBLIES**

#### **2.2.1**

##### **section**

Not applicable.

#### **2.2.2**

##### **sub-section**

Not applicable.

## **2.3**

### **External design of ASSEMBLIES**

#### **2.3.1**

##### **Open-type ASSEMBLY**

Not applicable.

#### **2.3.3.3**

##### **desk-type ASSEMBLY**

Not applicable.

#### **2.3.4**

##### **busbar trunking system**

##### **busway**

Not applicable.

## **2.5**

### **conditions of installation of ASSEMBLIES**

#### **2.5.4**

##### **movable ASSEMBLY**

Not applicable

## **3 Classification of ASSEMBLIES**

*The third dash is not applicable.*

## 4 Electrical characteristics of ASSEMBLIES

### 4.101 Rated current (of SCDB or CDC)

The rated current of an SCDB or CDC is that stated by the manufacturer as the rated current of the incoming circuit. If there is more than one incoming circuit, the rated current of that SCDB or CDC is either the arithmetic sum of the rated currents of all incoming circuits that are intended to be used simultaneously or the rated current of the main phase busbars, whichever is the lower value. This current shall be carried without the temperature rise of the individuals part exceeding the limits specified in 7.3 when tested according to 8.2.1.

## 5 Information to be given regarding the ASSEMBLY

### 5.1 Nameplates

r) Not applicable

*Addition:*

u) rated current of an ASSEMBLY as defined in 4.101 .

Nameplates may be placed inside enclosures of the ASSEMBLY provided their intended place ensures good legibility and visibility when the door is open or the cover is removed.

NOTE Further information may be included by agreement between the user and the manufacturer.

### 5.2 Markings

*Add at the end of the subclause:*

It shall be possible to identify each functional unit in a clearly visible manner.

In the case of removable fuse-carriers which are specific to a fuseway, a label shall be placed on the fuse-carrier as well as on the fuse base, to avoid incorrect interchanging of the fuse-carrier.

## 6 Service conditions

### 6.2.8 *Addition:*

NOTE Exposure to traffic vibration is a normal service condition for ground mounted SCDBs and CDCs.

### 6.2.9 Installation in such a manner that the current-carrying capacity or breaking capacity is affected

*Addition:*

NOTE Recessing into a wall is not considered to be a special condition for a CDC.

#### 6.2.101 Exposure to heavy snowfall and snowdrift

For installations in regions where heavy snowfalls and snowdrift occur, which necessitate snow clearance by ploughing, subject to agreement between manufacturer and user, an arctic climate can be considered a normal condition; however, the lower temperature limit of -25°C may be applied (see 8.2.101.2.2).

## 7 Design and construction

### 7.1.1 General

*Replace the second sentence of the first paragraph:*

The insulating materials used for enclosures, barriers and other insulating parts shall have a resistance to thermal stress and flame retardant properties in accordance with 8.2.102.

*Add at the end of the second paragraph:*

The materials of coatings shall be subject to agreement between user and manufacturer and shall be sufficient to pass the appropriate tests of 8.2.103.

*Add at the end of the third paragraph:*

The mechanical properties of a SCDB-CCO, SCDB-TMO and CDC shall comply with 8.2.101.

Parts of the SCDB-CCO and CDC intended to be embedded in the ground shall withstand the stresses imposed on them during installation and normal service (see 8.2.101.6).

*Add the following paragraphs at the end of the subclause:*

Except in the case of an ASSEMBLY providing protection by total insulation, the frame or enclosure of the ASSEMBLY shall incorporate a suitable earth terminal of an appropriate size to provide a connection for an external protective conductor.

For an ASSEMBLY which is expected to feed overhead cable lines, outgoing units shall be designed in such a way that an attached cable(s) can be earthed at the termination(s).

#### 7.1.1.101 Marking of CDC as an obstacle to snow clearance

Where a ground mounted CDC is suitable for use in an arctic climate in accordance with 6.1.1.2 or alternatively, if required by the user, it shall be possible to mark it as an obstacle to snow clearance. Holders shall be provided, attached to the CDC, to accommodate marking rods and it shall be possible to install and make adjustments to the position of the marking rod from outside the CDC. The holders shall be constructed in a manner which ensures that the holder or marking rod will give way to a mechanical force before the transmitted force to the CDC enclosure reaches the value which would adversely affect the degree of protections (IP code).

#### 7.1.1.102 Ease of operation and maintenance

All parts of the ASSEMBLY shall, as far as practicable, be readily accessible and replaceable without excessive dismantling. The conditions for interchangeability of parts of the ASSEMBLY may be subject to an agreement between the user and the manufacturer.

The design shall be such that the cables can be readily connected from the front.

When an SCDB does not have a means of measurement incorporated, it shall be possible, by the use of a portable instrument, to readily and safely measure voltages in all phases of incoming units and on both sides of all current breaking and/or switch devices of outgoing units, also the current in one phase of all outgoing units. During this operation all live parts of