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**BUSHINGS FOR TRANSFORMERS AND  
REACTOR CABLE BOXES NOT EXCEEDING  
36 KV**

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EUROPEAN STANDARD

**EN 50336**

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2002

ICS 29.080 20; 29.180

English version

**Bushings for transformers and reactor cable boxes  
not exceeding 36 kV**

Traversées pour boîtes à câbles  
de transformateurs et d'inductances  
ne dépassant pas 36 kV

Durchführungen für Kabelanschluss-  
kästen von Transformatoren und  
Drosselspulen bis 36 kV

This European Standard was approved by CENELEC on 2001-12-04. 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.

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**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**

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### Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 36A, Insulated bushings.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50336 on 2001-12-04.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 2002-12-01
  - latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2004-12-01
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## 1 Scope

This standard is applicable to insulated bushings for use in air insulated, shroud insulated and fully insulated cable boxes for liquid filled transformers and reactors for rated voltages up to 36 kV, and rated currents up to 4 000 A at frequencies from 15 Hz to 60 Hz.

## 2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies (including amendments).

EN 60137	1996	Insulated bushings for alternating voltages above 1 kV (IEC 60137:1995)
EN 61099	1992	Specification for unused synthetic organic esters for electrical purposes (IEC 61099:1992)
EN 22768-1	1993	General tolerances - Part 1: Tolerances for linear and angular dimensions without individual tolerance indications
HD 329 S1	1977	Tests on hollow insulators for use in electrical equipment (IEC 60233:1974)
• HD 428.2.1 S1	1994	Three phase oil-immersed distribution transformers 50 Hz, from 50 kVA to 2,5 MVA with highest voltage for equipment not exceeding 36 kV - Part 2: Distribution transformers with cable boxes on the high-voltage and/or low-voltage side - Section 1: General requirements
HD 565 S1	1993	Specifications for silicone liquids for electrical purposes (IEC 60836:1988)
IEC 60296	1992	Specification for unused mineral insulating oils for transformers and switchgear

## 3 Definitions

For the purposes of this standard the following definitions apply:

### 3.1

#### **air insulated cable box**

a metallic cable box designed to protect the ends of the cables and bushings, providing a weatherproof enclosure with a minimum rating of IP54. An air filled cable box within which the cable cores are electrically terminated by stress control appropriate to the cable design and voltage; air being the sole insulation for the terminal connections

### 3.2

#### **shroud insulated cable box**

an air filled cable box as in 3.1 but within which the cable cores are terminated with local insulation enhancement, e.g. phase barrier, bushing protection or taping

### 3.3

#### **fully insulated cable box**

a cable box where those parts of the termination and bushing within the enclosure including live metal parts and cable cores are insulated by liquid or compound suitable for the appropriate system voltage. The box shall be suitably sealed to contain the liquid or compound and allow for their expansion due to temperature changes

**3.4****ceramic, glass or analogous inorganic material bushing**

bushing in which the major insulation consists of a ceramic, glass or analogous inorganic material

**3.5****cast or moulded resin insulated bushing**

bushing in which the major insulation consists of a cast or moulded organic material with or without an inorganic filler.

**4 Requirements**

Bushings covered by this specification are suitable for operation with one end fully immersed in an insulating liquid and the other end either fully immersed in an insulating liquid; or with shrouded insulation in air; or in air but not exposed to external atmospheric conditions.

All other requirements shall be as specified herein.

**4.1 Rating****4.1.1 Standard values of rated voltage ( $U_r$ )**

The value of  $U_r$  of a bushing shall be chosen from the standard values of the highest voltage for transformers and reactors  $U_m$  given below in kilovolts:

12 - 24 - 36

NOTE 1 For ceramic bushings

where  $U_m$  is 1,1 then  $U_r$  12 is to be used

where  $U_m$  is 3,6 then  $U_r$  12 is to be used

where  $U_m$  is 7,2 then  $U_r$  12 is to be used

where  $U_m$  is 17,5 then  $U_r$  24 is to be used.

NOTE 2 For resin insulated bushings the permitted highest rated voltages  $U_r$  are

Liquid / air or air / air 1,1

Liquid / liquid 12

**4.1.2 Standard values of rated current ( $I_r$ )**

The value  $I_r$  of a bushing shall be chosen from the standard values given below in amperes:

250 - 400 - 630 - 800 - 1 250 - 1 600 - 2 000 - 2 500 - 3 150 - 4 000

**4.2 Compliance****4.2.1 General - Ceramic bushings**

Ceramic bushings shall meet the requirements for both type and routine tests laid out in EN 60137 and in addition the following shall also apply:

Bushings shall be capable of sealing a liquid filled chamber. The design of 24 kV and 36 kV bushings shall be such that free entry of liquid is allowed into the space between the conductor and the ceramic. In such instances the sealing integrity of the bushing shall be maintained.

The conductor size, material and nut and thread dimensions of the bushing terminal for the appropriate current rating shall comply with Table 1.

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