

Outdoor bushings for 24 kV and 36 kV and for 5 kA and 8 kA, for liquid filled transformers

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

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English version

Outdoor bushings for 24 kV and 36 kV and for 5 kA and 8 kA, for liquid filled transformers

Traversées d'extérieur pour
24 kV et 36 kV et pour 5 kA et 8 kA,
pour transformateurs
à remplissage de liquide

Durchführungen für Freiluft,
24 kV und 36 kV sowie 5 kA und 8 kA,
für flüssigkeitsgefüllte Transformatoren

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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.

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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 50243 on 2001-10-01.

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) 2003-02-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2005-02-01

Annexes designated "normative" are part of the body of the standard. In this standard, annex A is normative.

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Introduction

The object of this standard is to specify the requirements of outdoor bushings for highest voltages for equipment 24 kV and 36 kV and for rated currents 5 kA and 8 kA.

1 Scope

This standard is applicable to ceramic insulated outdoor bushings for highest voltages for equipment of 24 kV and 36 kV, with rated currents of 5 kA and 8 kA and frequencies from 15 Hz up to 60 Hz for insulating liquid filled transformers.

This standard establishes dimensions to ensure interchangeability and adequate mounting of bushings.

Two types of construction are specified, type A and type B, both types for highest voltages for equipment 24 kV and 36 kV and rated currents of 5 kA and 8 kA. The mechanical stresses of the conductor tube make the difference between type A and type B. The conductor tube of type A is axially and radially fixed in the top of the bushing. The inner line terminal of the transformer can be flexible and without any special support for the lower end of the conductor tube.

In case of type B, the conductor tube is only radially fixed in the top of the bushing. In that case, a rigid support has to be mounted to fix the lower end of the conductor tube (for example, in combination with a drip proofed sealing end). The drip proofed sealing end is often required in the service requirements. In this case, it is not possible to use type A because of the existing double fixation. Therefore, both bushing types A and B have to be specified.

The condition for the usage of type B is that the drip proofed sealing end is able to withstand the mechanical stress in axial direction.

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 60672-3	1997	Ceramic and glass-insulating materials - Part 3: Specifications for individual materials (IEC 60672-3:1997)
HD 329 S1	1977	Tests on hollow insulators for use in electrical equipment (IEC 60233:1974)
IEC 60815	1986	Guide for the selection of insulators in respect of polluted conditions
ISO 261		ISO general-purpose metric screw threads - General plan
ISO 286-2		ISO system of limits and fits - Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts
ISO 1101		Technical drawings - Geometrical tolerancing - Tolerancing of form, orientation, location and run-out - Generalities, definitions, indications on drawings
ISO 1302		Technical drawings - Method of indicating surface texture
ISO 2768		General tolerances

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1

bushing type A

a bushing with a conductor tube which is axially and radially fixed in the top of the bushing

3.2

bushing type B

a bushing with a conductor tube which is only radially fixed in the top of the bushing

4 Requirements

4.1 Application

The open type bushings covered by this standard shall be suitable for operation with one end fully immersed in an insulating liquid and with the other in air.

4.2 Standard values of highest voltage for equipment (U_m)

The value of U_m of a bushing shall be chosen from the standard values given below, in kilovolts:

24 - 36

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4.3 Standard values of rated current (I_r)

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

5 000 - 8 000
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4.4 Compliance

The bushings shall meet the requirements of EN 60137.

4.5 Common dimensions and creepage distances of bushings type A and type B

The common dimensions of bushings type A and type B shall be as specified in Figure 1 and Table 1.

The details of the components are given in Annex A.

The provisions for arcing horns should be made if required.

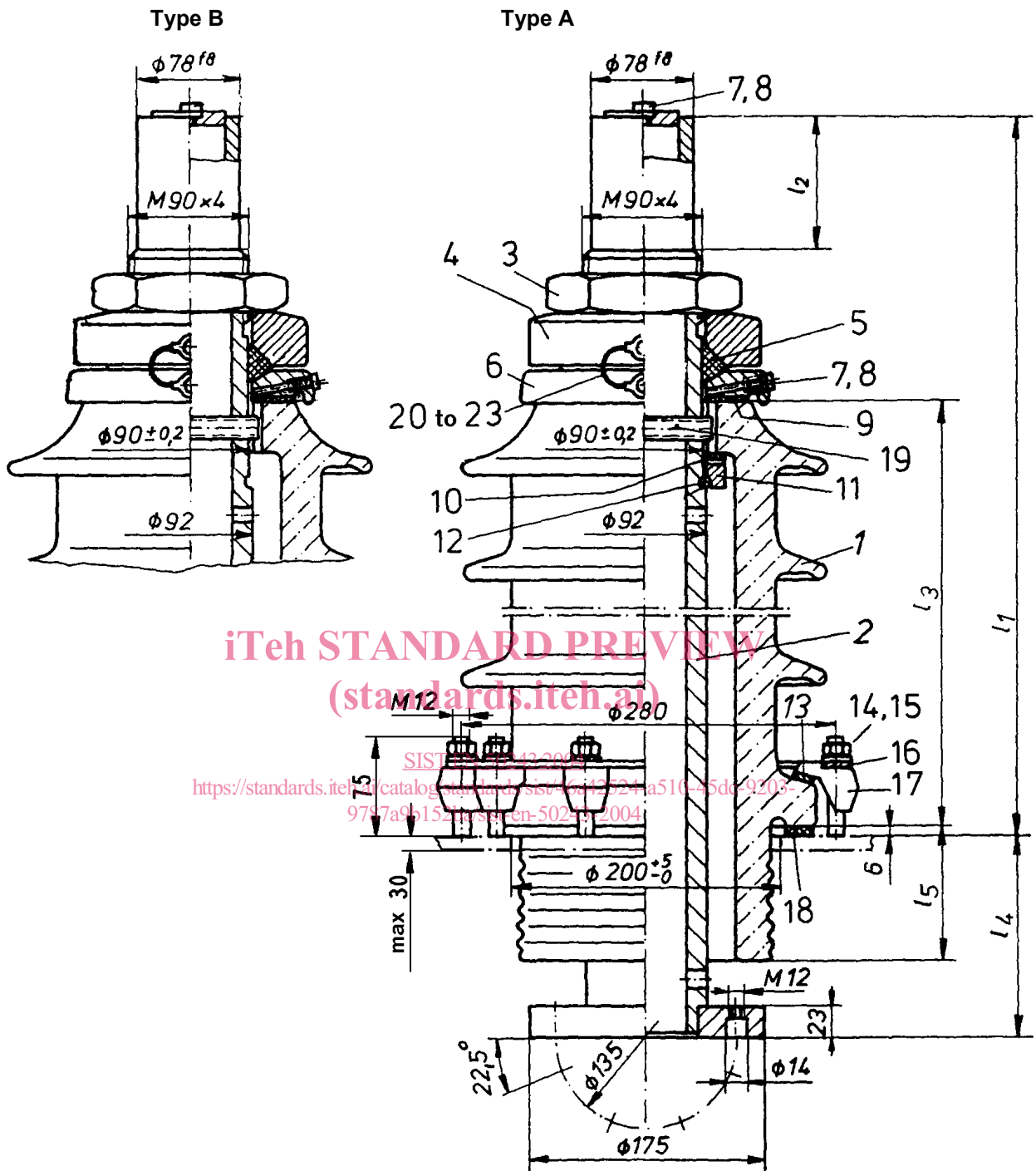
In case of environmental conditions, which do not require pollution level II or more according to IEC 60815, an insulator with a reduced creepage distance can be agreed between the purchaser and the manufacturer without changing the common dimensions.

Table 1 - Common dimensions of bushings type A and type B

Designation	U_m kV	I_r A	Min. nominal creepage distance acc. to IEC 60815 mm	Insulator type	Arcing distance mm	l_1 mm	l_2 min. mm	l_3 mm	l_4 max. mm	l_5 max. mm
24-5/P2-A 24-5/P2-B	24	5 000	480	24-P2	270	540	100	320	150	100
24-8/P2-A 24-8/P2-B	24	8 000			270	570	130	320	150	100
24-5/P4-A 24-5/P4-B	24	5 000	744	36-P2	380	635	100	415	175	125
24-8/P4-A 24-8/P4-B	24	8 000			380	665	130	415	175	125
36-5/P2-A 36-5/P2-B	36	5 000	720	36-P2	380	635	100	415	175	125
36-8/P2-A 36-8/P2-B	36	8 000			380	665	130	415	175	125
36-5/P3-A 36-5/P3-B	36	5 000	900	36-P3	370	635	100	415	175	125
36-8/P3-A 36-8/P3-B	36	8 000			370	665	130	415	175	125

NOTE Designation of a complete bushing type A according to EN 50243 for U_m 24 kV and I_r 5 kA, with a creepage distance suitable for pollution level II according to IEC 60815:1986: 24-5/P2-A.

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All dimensions in mm

NOTE 1 It is not permitted to apply a corrosion protection on the metallic coating of the insulating body of the bushings U_m 36 kV before the bushing respectively the insulating body is mounted on the transformer cover.

NOTE 2 Dimensions without individual tolerance indications have to be toleranced according to ISO 2758 – mK, holes and shafts according to ISO 286-2. Definitions of threads according to ISO 261.

NOTE 3 The specified tightening torque of the nut M 90 x 4 (Item 3) is 140 Nm (greased).

Figure 1 - Dimensions of bushings type A and type B

4.6 Parts list according to bushing type A

Table 2 - List of components, bushing type A

Item	Quantity								Designation	Remarks	
	24-5/P2-A	24-8/P2-A	24-5/P4-A	24-8/P4-A	36-5/P2-A	36-8/P2-A	36-5/P3-A	36-8/P3-A			
1	1	1							Insulator	24-P2	Porcelain (see A.1)
			1	1	1	1				36-P2	
							1	1		36-P3	
2	1								Conductor tube	24-5	Copper (see A.2)
		1								24-8	
			1		1		1			36-5	
				1		1		1		36-8	
3				1					Nut	(see A.5)	
4				1					Upper cap	(see A.3)	
5				1					Sealing ring	(see A.6)	
6				1					Lower cap	(see A.4)	
7				2					Gasket	Polyamid (PA6)	
8				2					Vent plug	Corrosion-resistant	
9				1					Flat gasket	(see A.7)	
10				1					Flat gasket	(see A.13)	
11				1					Compression ring	(see A.11)	
12				1					Retaining ring	(see A.12)	
13				1					Interlayer	(see A.10)	
14				10					Nut M12	Corrosion-resistant	
15				10					Washer A13	Corrosion-resistant	
16				1					Clamping ring	(see A.9)	
17				10					Clamping paw	(see A.14)	
18				1					Flat gasket	(see A.8)	
19				1					Pipe 18 x 2	E-Cu	
20				1					Cable 10 – E-Cu	70 mm length	
21				2					Cable lug A6 x 4,3		
22				2					Screw M6x8	Stainless steel	
23				2					Spring washer A6	Stainless steel	

Screws and nuts with thread profile according to ISO 261.

4.7 Parts list according to bushing type B

Table 3 - List of components, bushing type B

Item	Quantity								Designation	Remarks	
	24-5/P2-A	24-8/P2-A	24-5/P4-A	24-8/P4-A	36-5/P2-A	36-8/P2-A	36-5/P3-A	36-8/P3-A			
1	1	1							Insulator	24-P2	Porcelain (see A.1)
			1	1	1	1				36-P2	
							1	1		36-P3	
2	1								Conductor tube	24-5	Copper (see A.2)
		1								24-8	
			1		1		1			36-5	
				1		1		1		36-8	
3	1								Nut	(see A.5)	
4	1								Upper cap	(see A.3)	
5	1								Sealing ring	(see A.6)	
6	1								Lower cap	(see A.4)	
7	2								Gasket	Polyamid (PA6)	
8	2								Vent plug	Corrosion-resistant	
9	1								Flat gasket	(see A.7)	
13	1								Interlayer	(see A.10)	
14	10								Nut M12	Corrosion-resistant	
15	10								Washer A13	Corrosion-resistant	
16	1								Clamping ring	(see A.9)	
17	10								Clamping paw	(see A.14)	
18	1								Flat gasket	(see A.8)	
19	1								Pipe 18 x 2	E-Cu	
20	1								Cable 10 – E-Cu	70 mm length	
21	2								Cable lug A6 x 4,3		
22	2								Screw M6x8	Stainless steel	
23	2								Spring washer A6	Stainless steel	

Screws and nuts with thread profile according to ISO 261.