SLOVENSKI STANDARD
oSIST prEN 50243:2021

01-september-2021

Zunanji skoznjiki za 24 kV in 36 kV ter za 5 kA in 8 kA, za transformatorje, napolnjene s tekočino

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

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

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

Ta slovenski standard je istoveten z: **prEN 50243**

ICS:

29.080.20	Skoznjiki	Bushings
29.180	Transformatorji. Dušilke	Transformers. Reactors

oSIST prEN 50243:2021 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

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ICS

Will supersede EN 50243:2002 and all of its amendments and corrigenda (if any)

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 remplis de liquide

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

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2021-09-24.

It has been drawn up by CLC/TC 36A.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CENELEC in three official versions (English, French, German).
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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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European foreword

This document (prEN 50243:2021) has been prepared by CLC/TC 36A “Insulated bushings”.

This document is currently submitted to the Enquiry.

The following dates are proposed:

• latest date by which the existence of this document has to be announced at national level	(doa)	dor + 6 months
• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dor + 12 months
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)

This document will supersede EN 50243:2002 and all of its amendments and corrigenda (if any).

1 Scope

This document 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 for insulating liquid filled transformers and frequencies from 15 Hz up to 60 Hz.

This document 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 define 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.

For new installations bushings of Type A are expected to be used. Type B bushings can be supplied at the request of a customer.

In case of type B, the conductor tube is only radially fixed in the top of the bushing. In that case, a rigid support is 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 are be specified.

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 1652, *Copper and copper alloys - Plate, sheet, strip and circles for general purposes*

EN 12165:2016, *Copper and copper alloys - Wrought and unwrought forging stock*

EN 13600, *Copper and copper alloys - Seamless copper tubes for electrical purposes*

EN 60137, *Insulated bushings for alternating voltages above 1 000 V (IEC 60137)*

EN 60672-3, *Ceramic and glass-insulating materials - Part 3: Specifications for individual materials (IEC 60672-3)*

IEC TR 60815, *Guide for the selection of insulators in respect of polluted conditions*

IEC 62155, *Hollow pressurized and unpressurized ceramic and glass insulators for use in electrical equipment with rated voltages greater than 1 000 V*

ISO 261, *ISO general purpose metric screw threads — General plan*

ISO 286-2, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts*

ISO 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO 2768, *General Geometrical Tolerances and Technical Drawings*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
bushing type A
bushing with a conductor tube which is axially and radially fixed in the top of the bushing

3.2
bushing type B
bushing with a conductor tube which is only radially fixed in the top of the bushing

4 Requirements

4.1 General Requirements

Bushings specified by this document shall be installed with the transformer side of the bushing fully immersed in insulating liquid and the other end in air.

Bushings shall meet the requirements of EN 60137.

4.2 Ratings

4.2.1 Standard values of highest voltage for equipment (U_m)

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

24 - 36

4.2.2 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:

5 000 – 8 000

4.3 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 TR 60815, an insulator with a reduced creepage distance can be agreed between the purchaser and the manufacturer without changing the common dimensions.

122 **Table 1 — Common dimensions of bushings type A and type B**

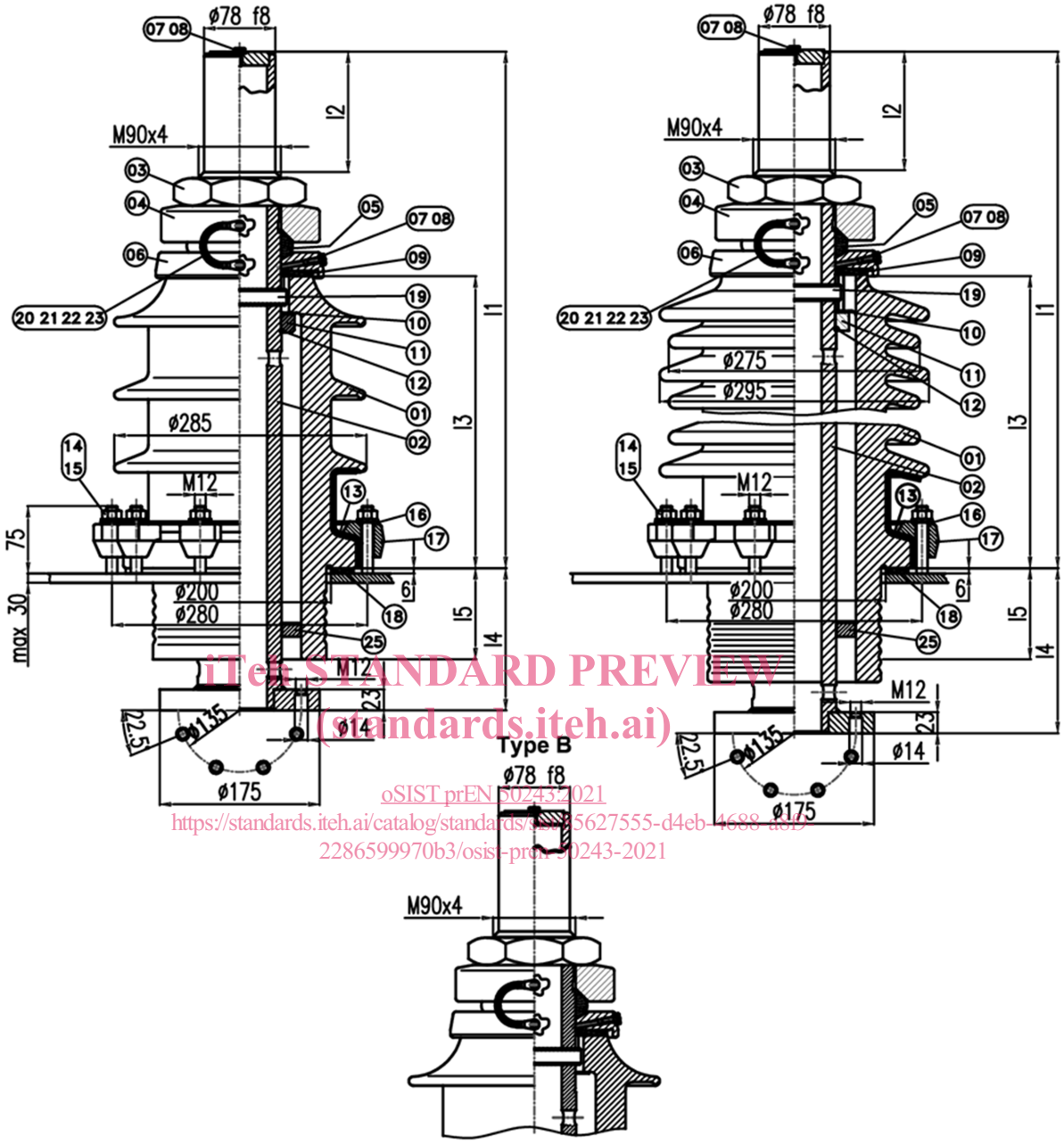
Designation	U_m kV	I_r A	Min. nominal creepage distance acc. to IEC TR 60815 mm	Insulator type	Arcing distance mm	l_1 mm	$l_{2\ min.}$ mm	l_3 mm	$l_{4\ max.}$ mm	$l_{5\ max.}$ mm
24–5/P2-A 24–5/P2-B	24	5 000	480	24-P2	270	540	100	320	150	100
24–8/P2-A 24–8/P2-B	24	8 000			270	570	130	320	150	100
24–5/P4-A 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
36–5/P4-A 36–5/P4-B	36	5 000	1 116	36-P4	436	701	100	481	200	149
36–8/P4-A 36–8/P4-B	36	8 000			436	731	130	481	200	149

123 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
124 distance suitable for pollution level II according to IEC TR 60815: 24 – 5/P2 – A.

24 kV/ P2 -Type A 36 kV / P3 – Type A

24 kV/ P3 (36kV/ P2) -Type A 36 kV / P4 – Type A

All dimensions in mm



NOTE 1 Flange metallization only on 36 kV bushings

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

NOTE 2 Dimensions without individual tolerance indications to be according to ISO 2768 – m and K, 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

4.4 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/P3A	36–5/P4-A	36–8/P4-A			
1	1	1									Insulator	24-P2	Porcelain (see A.2)
			1	1	1	1						36-P2	
							1	1				36-P3	
									1	1		36-P4	
2	1										Conductor tube	24–5	Copper (see A.3)
		1										24–8	
			1		1		1					36–5	
				1		1		1				36–8	
									1			36–5/P4	
										1		36–8/P4	
3	1										Nut		(see A.6)
4	1										Upper cap		(see A.4)
5	1										Sealing ring		(see A.7)
6	1										Lower cap		(see A.5)
7	2										Gasket		Polyamide (PA6)
8	2										Vent plug		Corrosion-resistant
9	1										Flat gasket		(see A.8)
10	1										Flat gasket		(see A.14)
11	1										Compression ring		(see A.12)
12	1										Retaining ring		(see A.13)
13	1										Interlayer		(see A.11)
14	10										Nut M12		Corrosion-resistant
15	10										Washer A13		Corrosion-resistant
16	1										Clamping ring		(see A.10)
17	10										Clamping paw		(see A.15)
18	1										Flat gasket		(see A.9)
19	1										Pipe 18 × 2		E-Cu
20	1										Cable 10 – E-Cu		70 mm length
21	2										Cable lug A6 × 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. Stainless Steel A2 minimum A4 optional

137 ## 4.5 Parts list according to bushing type B

138 **Table 3 — List of components, bushing type B**

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

139 Screws and nuts with thread profile according to ISO 261.