SLOVENSKI STANDARD
SIST EN 50386:2010

01-december-2010

Nadomešča:
SIST EN 50386:2004

Skoznjiki za napetosti do 1 kV in tokove od 250 A do 5 kA za transformatorje, polnjene s tekočino

Bushings up to 1 kV and from 250 A to 5 kA, for liquid filled transformers

Durchführungen bis 1 kV und von 250 A bis 5 kA für flüssigkeitsgefüllte Transformatoren

Traversées jusqu'à 1 kV et de 250 A à 5 kA, pour transformateurs à remplissage de liquide

Ta slovenski standard je istoveten z: **EN 50386:2010**

ICS:

29.080.20	Skoznjiki	Bushings
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SIST EN 50386:2010 **en,fr,de**

EUROPEAN STANDARD

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EN 50386

October 2010

ICS 29.180

Supersedes EN 50386:2002

English version

Bushings up to 1 kV and from 250 A to 5 kA, for liquid filled transformers

Traversées jusqu'à 1 kV et de 250 A à 5 kA, pour transformateurs à remplissage de liquide

Durchführungen bis 1 kV und von 250 A bis 5 kA für flüssigkeitsgefüllte Transformatoren

This European Standard was approved by CENELEC on 2010-10-01. 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.

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 36A, Insulated bushings. It was submitted to the Unique Acceptance Procedure and was accepted by CENELEC as EN 50386 on 2010-10-01.

This document supersedes EN 50386:2002.

This edition, compared to EN 50386:2002, improves and facilitates the interchangeability of bushings, and improves dimensions settings for interchangeability and requirements of mechanical test.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates are proposed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-10-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-10-01

Contents

Introduction

The object of this European Standard is to specify the requirements and the dimensions of bushings for voltages up to 1 000 V and rated currents from 250 A up to 5 000 A for insulating liquid filled transformers.

1 Scope

This European Standard is applicable to ceramic insulated bushings for rated voltages up to 1 000 V, rated currents from 250 A up to 5 000 A and frequencies from 15 Hz up to 60 Hz for insulating liquid filled transformers.

NOTE These bushings are suitable for operation at 1,1 kV in compliance with EN 50464-1.

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.

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

3 Requirements

3.1 Application

Bushings covered by this standard shall be suitable for operation with one end partially or fully immersed in an insulating liquid and with the other end in air.

3.2 Standard value of rated voltage (U_r)

The rated voltage U_r is 1 000 V (phase to phase). When a bushing is used only partially immersed, a reduced rated voltage shall be agreed between the purchaser and the manufacturer.

3.3 Standard values of rated current (I_r)

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

250 - 630 – 1 250 - 2 000 - 3 150 - 4 000 - 5 000

3.4 Minimum nominal creepage distance

The minimum nominal creepage distance for bushing ends intended for use in air, is given in Table 1.

Table 1 – Minimum nominal creepage distance

I_r A	250	630	1 250 – 3 150	4 000 – 5 000
Minimum nominal creepage distance mm	55 (standard type) 115 (extended type) [a]	70	75	85
[a] Type with extended creepage distance.				

3.5 Dielectric characteristics

Power-frequency withstand voltage (60 s): dry and wet 10 kV

Lightning impulse withstand voltage (1,2/50 µs): 20 kV

When a bushing is used only partially immersed, the reduced dielectric characteristics shall be agreed between the purchaser and the manufacturer.

3.6 Dimensions and components

Figure 1 and Figure 2 show the basic construction of the bushings and the dimensions covered by this standard. They do not purport to show constructional details.

Customized bushings are subject to agreement between purchaser and manufacturer.

The dimensions shall be as specified in Table 2.

The list of components is given in Table 4.

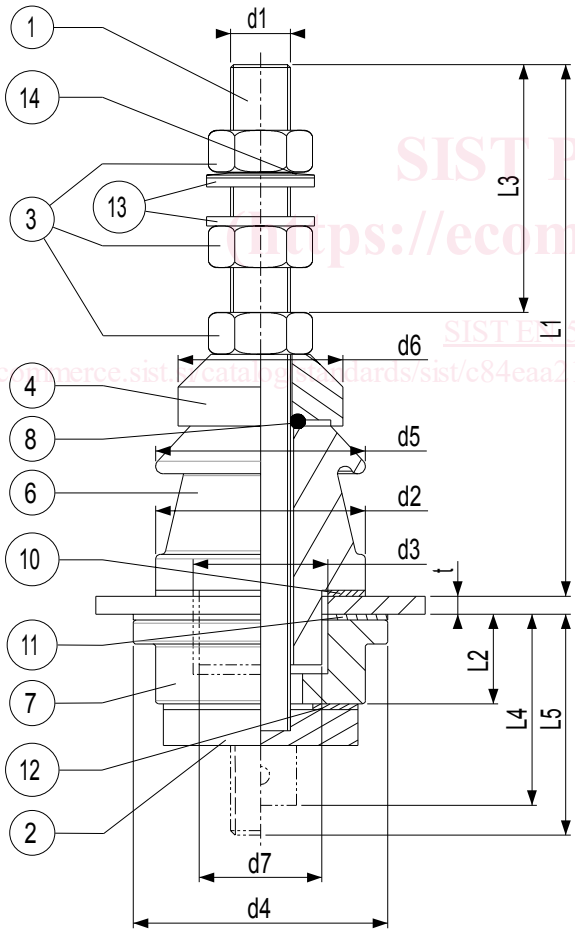

Figure 1 – Type 1 - 3 bushings (250 A to 630 A)

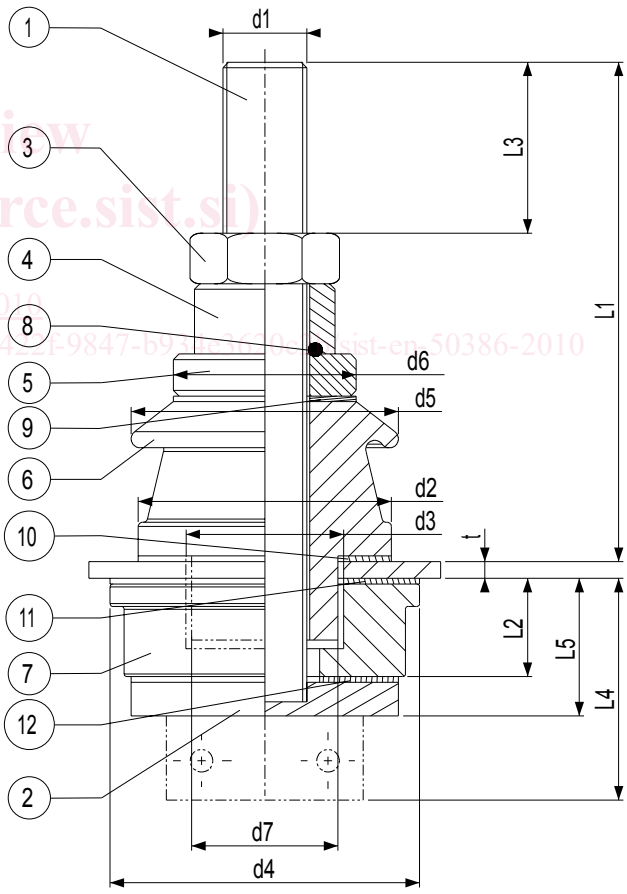

Figure 2 – Type 4 - 8 bushings (1 250 A to 5 000 A)

NOTE 1 Internal terminal connections are not defined in this standard.

NOTE 2 This is a basic design.

Table 2 – Standard dimensions

Types	I_r A	l_1 max. mm	l_2 min. mm	t max. mm	d_1 mm	d_2 max. mm	$d_3\ ^{+2}_{0}$ mm	d_4 max. mm	l_3 min. mm	d_5 max. mm	d_6 max. mm	d_7 max. mm	l_4 max. mm	l_5 max. mm
1	250	138	30	6	M12	56	28	60	40	56	43	27	70	70
2	250 [a]	170	30	6	M12	56	34	60	30	70	43	33	70	70
3	630	178	30	6	M20	70	45	85	65	70	56	43	80	82
4	1 250	200	35	6	M30 × 2	90	56	110	70	90	68	54	95	62
5	2 000	240	35	10	M42 × 3	104	70	125	90	104	85	68	120	72
6	3 150	250	35	10	M48 × 3	125	90	150	90	125	100	87	120	75
7	4 000	300	40	10	M55 × 3	160	118	180	110	180	129	115	135	87
8	5 000	310	40	10	M64 × 3 or ∅ 58 [b]	160	118	180	110	180	135	115	140	110

[a] Type with extended creepage distance.

[b] Plain terminations are allowed but are limited to the length l_3.

3.7 Cantilever load withstand test

For all test methods and procedures, refer to EN 60137.

Table 3 – Cantilever test load

Types	I_r A	F N Cantilever Test load
1	250	400
2	250 [a]	400
3	630	500
4	1 250	600
5	2 000	1 000
6	3 150	1 600
7	4 000	1 600
8	5 000	1 600
[a] Type with extended creepage distance.		

These are only test values for type testing and can not be considered for operating load. The connection of the bushings has to be mechanical stress relive.

Table 4 – List of components

Item	Designation	Remarks
1	Terminal stud	Types 1 - 3: Brass Types 4 - 8: Copper If brass is used for types 4 - 8 or if aluminium-alloy for all types the rated current I_r shall be reduced subject to an agreement.
2	Conductor	Formed as terminal stud, busbar or flange
3	Nut	
4	Pressure plate	
5	Pressure plate	Only for types 4 – 8
6	Ceramic body	
7	Insulation body	
8	Gasket	insulating liquid resistant material
9	Gasket	Only for types 4 – 8, insulating liquid resistant material
10	Gasket	insulating liquid resistant material
11	Packing	Only necessary if material of insulation body item 7 is ceramic
12	Packing	Only necessary if material of insulation body item 7 is ceramic
13	Washer	Only for types 1 - 3
14	Spring washer	Only for types 1 - 3

Bibliography

EN 50464-1, Three-phase oil-immersed distribution transformers 50 Hz, from 50 kVA to 2 500 kVA with highest voltage for equipment not exceeding 36 kV - Part 1: General requirements

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

IEC Guide 109 and CENELEC TC 111X document [1)], Environmental aspects - Inclusion in electrotechnical product standards

NOTE It is highly recommended to minimize the impact of bushings on the environment during all phases of their life (including manufacturing, operation during service life, dismantling after their end of life and disposal or recycling).

IEC Guide109 and document by CENELEC TC 111X [1)] "*Environmental standardization for electrical and electronic products and systems*" after finalization can be used as helpful reference.

1) Under development.