



# SLOVENSKI STANDARD SIST EN 50673:2019

01-junij-2019

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## Vtični skoznjiki za napetosti 72,5 kV s 630 A in 1250 A za električno opremo

Plug-in type bushings for 72,5 kV with 630 A and 1 250 A for electrical equipment

Einsteck-Durchführungen für 72,5 kV mit 630 A und 1 250 A für elektrische Betriebsmittel

Traversées de type embrochable, 72,5 kV, pour transformateurs à diélectrique liquide et autres équipements

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Ta slovenski standard je istoveten z: **EN 50673:2019**

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### ICS:

29.080.20

Skoznjiki

Bushings

**SIST EN 50673:2019**

**en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 50673**

March 2019

ICS 29.080.20

English Version

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

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## European foreword

This document (EN 50673:2019) has been prepared by CLC/TC 36A "Insulated bushings".

The following dates are fixed:

- latest date by which this document has to be (dop) 2019-12-27  
implemented at national level by publication of  
an identical national standard or by  
endorsement
- latest date by which the national standards (dow) 2021-12-27  
conflicting with this document have to be  
withdrawn

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## Introduction

The object of this document is to specify dimensions, properties, requirements and tests to ensure interchangeability between plug-in type bushings and separable connectors, installed high voltage power cables with extruded insulation and connected to electrical equipment, like liquid filled transformers and gas insulated switchgear and controlgear. The application of such plug-in type bushings is limited to  $U_m = 72,5$  kV and rated currents of 630 A and 1 250 A.

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## 1 Scope

This document is applicable to plug-in type bushings, according to EN 60137, 72,5 kV, rated currents from 630 A up to 1 250 A and frequencies from 15 Hz up to 60 Hz for single or three-phase arrangements in electrical equipment like liquid filled transformers or gas insulated switchgear and controlgear. It complements and amends, if necessary, the relevant EN standards.

The application of such plug-in type bushings is derived from EN 50180 and EN 50181 but applied for higher voltages with described deviations to EN 50299-2 and EN 62271-209.

This standard does not cover the connection assembly as described in EN 50299-2 and EN 62271-209.

EN 60137 and HD 632 series outline the qualification, type test, routine and sample test of plug-in type bushings according to this standard.

This document establishes essential dimensions and testing procedures, to ensure adequate mounting and interchangeability of mating plug-in separable connectors of equivalent ratings.

## 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 60076 series, *Power transformers (IEC 60076 series)*

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

EN 62271 series, *High-voltage switchgear and controlgear (IEC 62271 series)*

EN 62271-209, *High-voltage switchgear and controlgear - Part 209: Cable connections for gas-insulated metal-enclosed switchgear for rated voltages above 52 kV - Fluid-filled and extruded insulation cables - Fluid-filled and dry-type cable-terminations (IEC 62271-209)*

HD 632 series, *Power cables with extruded insulation and their accessories for rated voltages above 36 kV ( $U_m = 42$  kV) up to 150 kV ( $U_m = 170$  kV)*

## 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:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1

#### **plug-in type bushing**

bushing, one end of which is immersed in an insulating medium and the other end designed to receive a separable insulated cable connector without which the plug-in type bushing cannot function

**3.2****separable connector**

fully insulated termination permitting the connection and disconnection of the cable to and from the mating plug-in type bushing

**3.3****interface type**

plug-in type bushing dimensions that insure mechanical interchangeability of plug-in type bushing and separable connector of similar rating and type

Note 1 to entry: Each interface type is designated by a letter or a number or a combination.

**3.4****shielding electrode**

electrode intended for the reduction of electromagnetic interference signals in order to control the electrical field on high voltage or ground potential

**3.5****insulation fluid**

fluid for insulation purpose

**4 Rated values****4.1 Standard values of maximum voltage ( $U_m$ )**

The value of  $U_m$  of a plug-in type bushing shall be chosen from the standard values of the highest voltage for equipment  $U_m$  as given below, in kilovolts:

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72,5

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

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

630 - 1 250

**5 Requirements****5.1 Compliance**

Plug-in type bushings shall meet the requirements of EN 60137.

**5.2 Mechanical forces**

Mechanical forces are referred to chapter mechanical requirements in EN 50299-2 and to chapter mechanical forces on cable terminations in EN 62271-209.

**5.3 High voltage shielding electrode**

In consultation with the equipment manufacturer, the connection area can be equipped with a high voltage shielding electrode.



The fastening of the high voltage shielding electrode shall not restrict the current-carrying contact surfaces of the connection interface between plug-in type bushing and equipment. The high voltage shielding electrode shall be designed so that it can be vented in every installation position. There is a field-free region within the high voltage shielding electrode, i.e., the connection interface does not contribute to control the electrical field.

#### 5.4 Ground shielding electrode

The ground shielding electrode inside the plug-in type bushing shall be established with a connection point to be grounded.

#### 5.5 Transformer drying process

In case plug-in type bushings shall be used when drying the transformer, the maximum allowed temperature shall be agreed between plug-in type bushing supplier and transformer manufacturer.

### 6 Tests

#### 6.1 General

Type-tests, routine-tests and sample tests for such plug-in type bushings shall be done according to EN 60137.

Type-tests, routine-tests and sample tests for the corresponding application shall be performed according to the relevant product standards EN 60076 series, EN 62271 series or HD 632 series.

#### 6.2 Interchangeability of plug-in type bushings and separable connectors

Compliance is given only with the combination of the plug-in type bushing and separable connector and cable used in the type test.

Users should be aware that separable connector performances and compatibility shall be checked if the plug-in type bushing installed in the separable connector is different from that used for the insulated termination qualification.

General procedures for extension of range of approval are described in HD 629.1 S2.

For the extension of compliance to other combinations of separable connectors and plug-in type bushings, in order to ensure an interchangeability of plug-in type bushings, the following minimum requirements shall be satisfied.

The alternative plug-in type bushing shall be qualified in accordance to dielectric type test requirements of HD 632 series represented by following test sequence:

- a) partial discharge test at ambient temperature;
- b) 24h power frequency voltage test at  $2,5 U_0$ ;
- c) lightning impulse voltage test;
- d) 24h power frequency voltage test at  $2,5 U_0$ ;
- e) partial discharge test at ambient temperature;
- f) examination of all component after completion of the above tests.