

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Power transformers –  
Part 11: Dry-type transformers**

**Transformateurs de puissance –  
Partie 11: Transformateurs de type sec**



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**Power transformers –  
Part 11: Dry-type transformers**

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 29.180

ISBN 978-2-8322-5910-8

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International Standard IEC 60076-11 has been prepared by IEC technical committee 14: Power transformers.

This second edition cancels and replaces the first edition published in 2004 and constitutes a technical revision.

The main changes with regard to the previous edition are as follows:

- Extension of the scope up to 72,5kV
- Enclosure management in regards of the performance
- Management of the dielectric and thermal features with altitude
- New climatic classes for a better adaptation of customers' need
- Establishment of the relation between location and environmental classes
- For fire behaviour classes, limitation at 1 000 kVA and process of test more robust

- Introduction of Seismic class
- Recommendations for amorphous transformers

The text of this International Standard is based on the following documents:

| FDIS        | Report on voting |
|-------------|------------------|
| 14/964/FDIS | 14/972/RVD       |

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60076 series, published under the general title *Power transformers*, can be found on the IEC website.

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## POWER TRANSFORMERS –

### Part 11: Dry-type transformers

#### 1 Scope

This part of IEC 60076 applies to dry-type power transformers (including auto-transformers) having values of highest voltage for equipment up to and including 72,5 kV and at least one winding operating at greater than 1,1 kV.

This document does not apply to:

- gas-filled dry-type transformers where the gas is not air;
- single-phase transformers rated at less than 5 kVA;
- polyphase transformers rated at less than 15 kVA;
- instrument transformers;
- starting transformers;
- testing transformers;
- traction transformers mounted on rolling stock;
- flameproof and mining transformers;
- welding transformers;
- voltage regulating transformers;
- small power transformers in which safety is a special consideration.

Where IEC standards do not exist for the transformers mentioned above or for other special transformers, this document may be applicable as a whole or in parts.

#### 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.

IEC 60068-3-3, *Environmental testing – Part 3-3: Guidance – Seismic test methods for equipments*

IEC 60071-1, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60071-2, *Insulation co-ordination – Part 2: Application guidelines*

IEC 60076-1:2011, *Power transformers – Part 1: General*

IEC 60076-2, *Power transformers – Part 2: Temperature rise for liquid-immersed transformers*

IEC 60076-3:2013, *Power transformers – Part 3: Insulation levels, dielectric tests and external clearances in air*

IEC 60076-5, *Power transformers – Part 5: Ability to withstand short circuit*

IEC 60076-10, *Power transformers – Part 10: Determination of sound levels*

IEC 60076-12:2008, *Power transformers – Part 12: Loading guide for dry-type power transformers*

IEC 60085, *Electrical insulation – Thermal evaluation and designation*

IEC 60270, *High-voltage test techniques – Partial discharge measurements*

IEC 60332-3-10, *Tests on electric cables under fire conditions – Part 3-10: Test for vertical flame spread of vertically-mounted bunched wires or cables – Apparatus*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60721-3-4, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 4: Stationary use at non-weatherprotected locations*

IEC TS 60815-1, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles*

IEC 61378-1, *Converter transformers – Part 1: Transformers for industrial applications*

IEC 62271-202, *High-voltage switchgear and controlgear – Part 202: High-voltage/low-voltage prefabricated substation*

ISO 12944-6, *Paints and varnishes – Corrosion protection of steel structures by protective paint systems – Part 6: Laboratory performance test methods*

### **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**

##### **dry-type transformer**

transformer of which the magnetic circuit and windings are not immersed in an insulating liquid

#### **3.2**

##### **totally enclosed dry-type transformer**

transformer in an un-pressurised enclosure cooled by the circulation of the internal air having no intentional exchange with external air

#### **3.3**

##### **enclosed dry-type transformer**

transformer in a ventilated enclosure cooled by the circulation of the external air