



**SLOVENSKI STANDARD**  
**SIST EN IEC 60076-22-5:2021**

**01-junij-2021**

**Nadomešča:**  
**SIST EN 50216-7:2002**

---

**Močnostni transformatorji - 22-5. del: Oprema močnostnega transformatorja in dušilke - Električne črpalke za transformatorje**

Power transformers - Part 22-5: Power transformer and reactor fittings - Electric pumps for transformers

Leistungstransformatoren Teil 22-5: Zubehörteile von Leistungstransformatoren und Drosselspulen - Pumpen

(standards.iteh.ai)

Transformateurs de puissance - Partie 22-5 : Accessoires pour transformateurs de puissance et bobines d'inductance - Electropompes pour transformateurs

**Ta slovenski standard je istoveten z: EN IEC 60076-22-5:2021**

---

**ICS:**

29.180      Transformatorji. Dušilke      Transformers. Reactors

**SIST EN IEC 60076-22-5:2021**      en

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN IEC 60076-22-5:2021](https://standards.iteh.ai/catalog/standards/sist/a9f41be1-e1e-437d-a5e7-677a4eb0cd2f/sist-en-iec-60076-22-5-2021)

<https://standards.iteh.ai/catalog/standards/sist/a9f41be1-e1e-437d-a5e7-677a4eb0cd2f/sist-en-iec-60076-22-5-2021>

EUROPEAN STANDARD

**EN IEC 60076-22-5**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2021

ICS 29.180

English Version

**Power transformers - Part 22-5: Power transformer and reactor fittings - Electric pumps for transformers (IEC 60076-22-5:2021)**

Transformateurs de puissance - Partie 22-5 : Accessoires pour transformateurs de puissance et bobines d'inductance  
- Electropompes pour transformateurs  
(IEC 60076-22-5:2021)

Leistungstransformatoren - Teil 22-5: Zubehörteile von Leistungstransformatoren und Drosselspulen - Pumpen  
(IEC 60076-22-5:2021)

This European Standard was approved by CENELEC on 2021-02-22. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

[SIST EN IEC 60076-22-5:2021](#)

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

**EN IEC 60076-22-5:2021 (E)****European foreword**

The text of document 14/1021/CDV, future edition 1 of IEC 60076-22-5, prepared by IEC/TC 14 "Power transformers" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60076-22-5:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-11-22
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-02-22

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

**Endorsement notice**

The text of the International Standard IEC 60076-22-5:2021 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60076-6 NOTE Harmonized as EN 60076-6  
<https://standards.iteh.ai/catalog/standards/sist/a941be1-e-437d-a5e7-677a4eb0cd2f/sist-en-iec-60076-22-5-2021>

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034-1	2017	Rotating electrical machines - Part 1: Rating and performance	-	-
IEC 60034-5	-	Rotating electrical machines - Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification	EN IEC 60034-5	-
IEC 60034-9	-	Rotating electrical machines - Part 9: Noise limits	EN IEC 60034-9 <sup>1</sup>	-
IEC 60076-1	2011	Power transformers - Part 1: General	EN 60076-1	2011
IEC 60076-7	-	Power transformers - Part 7: Loading guide for oil-immersed power transformers	-	-
IEC 60085	-	Electrical insulation - Thermal evaluation and designation	EN 60085	-
IEC 60296	-	Fluids for electrotechnical applications - Mineral insulating oils for electrical equipment	EN IEC 60296	-
IEC 60529	-	Degrees of protection provided by enclosures (IP Code)	-	-
ISO 179-1	2010	Plastics - Determination of Charpy impact properties - Part 1: Non-instrumented impact test	EN ISO 179-1	2010
ISO 185	-	Grey cast irons - Classification	-	-

<sup>1</sup> To be published. Stage at the time of publication: prEN IEC 60034-9:2021.

**EN IEC 60076-22-5:2021 (E)**

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 281	-	Rolling bearings - Dynamic load ratings and rating life	-	-
ISO 3522	-	Aluminium and aluminium alloys - Castings - Chemical composition and mechanical properties	-	-
ISO 4406	-	Hydraulic fluid power - Fluids - Method for coding the level of contamination by solid particles	-	-
ISO 7005-2	-	Metallic flanges; part 2: cast iron flanges	-	-
ISO 9906	-	Rotodynamic pumps - Hydraulic performance acceptance tests - Grades 1, 2 and 3	EN ISO 9906	-
ISO 12944	series	Paints and varnishes - Corrosion protection of steel structures by protective paint systems	-	-

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN IEC 60076-22-5:2021](https://standards.iteh.ai/catalog/standards/sist/a9f41be1-cf1e-437d-a5e7-677a4eb0cd2f/sist-en-iec-60076-22-5-2021)

<https://standards.iteh.ai/catalog/standards/sist/a9f41be1-cf1e-437d-a5e7-677a4eb0cd2f/sist-en-iec-60076-22-5-2021>



IEC 60076-22-5

Edition 1.0 2021-01

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Power transformers –  
Part 22-5: Power transformer and reactor fittings – Electric pumps for  
transformers**

**Transformateurs de puissance –  
Partie 22-5: Accessoires pour transformateurs de puissance et bobines  
d'inductance – Électropompes pour transformateurs**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 29.180

ISBN 978-2-8322-9249-5

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references .....	6
3 Terms and definitions .....	7
4 Service conditions .....	7
4.1 General.....	7
4.2 Degree of protection of electrical components (IP) .....	8
4.3 External corrosion protection .....	8
4.4 Internal corrosion protection .....	8
4.5 Insulating liquid characteristics .....	8
5 General characteristics and requirements.....	8
5.1 Rating plate information .....	8
5.2 Direction of liquid flow and rotation .....	9
5.3 General mechanical requirements.....	9
5.4 Casing or enclosure .....	9
5.5 Terminal box.....	10
5.6 Materials.....	10
5.7 Preferred sizes .....	10
5.8 Performance requirements.....	10
5.8.1 General .....	10
5.8.2 Hydraulic performance.....	11
5.8.3 Hydraulic interchangeability.....	11
5.8.4 Electrical performance.....	12
5.8.5 Noise .....	13
5.9 Tests .....	13
5.9.1 General .....	13
5.9.2 List of tests.....	13
5.9.3 Routine tests .....	13
5.9.4 Type tests.....	14
5.9.5 Special tests.....	15
Annex A (informative) Preferred sizes of end suction pumps.....	16
Annex B (informative) Preferred sizes of in-line pumps .....	18
Annex C (informative) Information required with enquiry, proposal and purchase order.....	19
Annex D (informative) Example of use of hydraulic interchangeability tolerances .....	20
Bibliography.....	24
Figure 1 – Hydraulic interchangeability across the allowable operating range .....	11
Figure 2 – Hydraulic interchangeability across an actual flow range.....	12
Figure A.1 – Dimensions of end suction pumps.....	16
Figure B.1 – Dimensions of in-line pumps .....	18
Figure D.1 – Pressure-flow characteristics.....	20
Figure D.2 – Tolerances as given in 5.8.3 applied to pump A.....	21
Figure D.3 – Pressure-flow characteristic of pump B superimposed on the characteristic of pump A .....	22



Figure D.4 – Pressure-flow characteristic of pumps C and D superimposed on the characteristic of pump A .....	22
Figure D.5 – Flow ranges .....	23
Table A.1 – Dimensions of preferred sizes of end suction pumps (mm).....	17
Table B.1 – Dimensions of preferred sizes of in-line pumps (mm) .....	18

## **iTeh STANDARD PREVIEW** **(standards.iteh.ai)**

[SIST EN IEC 60076-22-5:2021](https://standards.iteh.ai/catalog/standards/sist/a9f41be1-e437-d45e7-677a4eb0cd2f/sist-en-iec-60076-22-5-2021)

<https://standards.iteh.ai/catalog/standards/sist/a9f41be1-e437-d45e7-677a4eb0cd2f/sist-en-iec-60076-22-5-2021>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## POWER TRANSFORMERS –

Part 22-5: Power transformer and reactor fittings –  
Electric pumps for transformers

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60076-22-5 has been prepared by IEC technical committee 14: Power transformers. It is an International Standard.

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

Draft	Report on voting
14/1021/CDV	14/1040A/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN IEC 60076-22-5:2021](https://standards.iteh.ai/catalog/standards/sist/a9f41be1-e437d-a5e7-677a4eb0cd2f/sist-en-iec-60076-22-5-2021)

<https://standards.iteh.ai/catalog/standards/sist/a9f41be1-e437d-a5e7-677a4eb0cd2f/sist-en-iec-60076-22-5-2021>

## POWER TRANSFORMERS –

### Part 22-5: Power transformer and reactor fittings – Electric pumps for transformers

#### 1 Scope

This part of IEC 60076 covers electric pumps used in the cooling circuits of power transformers and reactors. It applies to electric pumps mounted on liquid immersed power transformers according to IEC 60076-1 and reactors pumps according to IEC 60076-6 with and without conservator for indoor or outdoor installation.

It outlines the operation requirements for the electrical and hydraulic performance, mechanical design, routine testing and type testing. Additionally, performance and dimensions of preferred sizes of pump sets are specified in informative annexes.

The pumps covered in this document are rotodynamic pumps driven by a squirrel cage induction motor that is immersed in the insulating liquid.

Pump sets conforming to this document can be of in-line or end suction design.

#### 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 60034-1:2017, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-5, *Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification*

IEC 60034-9, *Rotating electrical machines – Part 9: Noise limits*

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

IEC 60076-7, *Power transformers – Part 7: Loading guide for mineral-oil-immersed power transformers*

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

IEC 60296, *Fluids for electrotechnical applications – Mineral insulating oils for electrical equipment*

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

ISO 179-1:2010, *Plastics – Determination of Charpy impact properties – Part 1: Non-instrumented impact test*

ISO 185, *Grey cast irons – Classification*