

© Copyright SEK Svensk Elstandard. Reproduction in any form without permission is prohibited.

Krafttransformatorer – Del 22-8: Transformator- och reaktortillbehör – Utrustning för användning i kommunikationsnätverk

Power transformers –

*Part 22-8: Power transformer and reactor fittings –
Devices suitable for use in communication networks*

Som svensk standard gäller europastandarden EN IEC 60076-22-8:2021. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 60076-22-8:2021.

Nationellt förord

Europastandarden EN IEC 60076-22-8:2021

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60076-22-8, First edition, 2021 - Power transformers - Part 22-8: Power transformer and reactor fittings - Devices suitable for use in communication networks**

utarbetad inom International Electrotechnical Commission, IEC.

ICS 29.180.00

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
Postadress: Box 1284, 164 29 KISTA
Telefon: 08 - 444 14 00.
E-post: sek@elstandard.se. Internet: www.elstandard.se

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 60076-22-8

August 2021

ICS 29.180

English Version

**Power transformers - Part 22-8: Power transformer and reactor
fittings - Devices suitable for use in communication networks
(IEC 60076-22-8:2021)**

Transformateurs de puissance - Partie 22-8: Accessoires
pour transformateurs de puissance et bobines d'inductance
- Dispositifs compatibles avec les réseaux de
communication
(IEC 60076-22-8:2021)

Leistungstransformatoren - Teil 22-8: Zubehörteile von
Leistungstransformatoren und Drosselspulen -
Einrichtungen mit Eignung zur Anwendung in
Kommunikationsnetzen
(IEC 60076-22-8:2021)

This European Standard was approved by CENELEC on 2021-07-20. 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.

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

© 2021 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Ref. No. EN IEC 60076-22-8:2021 E

European foreword

The text of document 14/1057/CDV, future edition 1 of IEC 60076-22-8, prepared by IEC/TC 14 "Power transformers" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60076-22-8:2021.

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) 2022-04-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-07-20

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.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60076-22-8:2021 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

- | | | |
|-------------|------|----------------------------|
| IEC 60076-1 | NOTE | Harmonized as EN 60076-1 |
| IEC 60296 | NOTE | Harmonized as EN IEC 60296 |
| ISO 9001 | NOTE | Harmonized as EN ISO 9001 |

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60076-22-1	2019	Power transformers - Part 22-1: Power transformer and reactor fittings - Protective devices	EN IEC 60076-22-1	2019
IEC 60076-22-7	-	Power transformers - Part 22-7: Power transformer and reactor fittings - Accessories and fittings	EN IEC 60076-22-7	-
IEC 61000-6-4	-	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments	EN IEC 61000-6-4	-
IEC 61000-6-5	-	Electromagnetic compatibility (EMC) - Part 6-5: Generic standards - Immunity for equipment used in power station and substation environment	EN 61000-6-5	-



IEC 60076-22-8

Edition 1.0 2021-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Power transformers –
Part 22-8: Power transformer and reactor fittings – Devices suitable for use in
communication networks**

**Transformateurs de puissance –
Partie 22-8: Accessoires pour transformateurs de puissance et bobines
d'inductance – Dispositifs compatibles avec les réseaux de communication**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.180

ISBN 978-2-8322-9861-9

**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
INTRODUCTION	6
1 Scope	7
2 Normative references	7
3 Terms and definitions	7
4 General requirements	8
4.1 Standard compliance	8
4.2 Modbus requirements	8
4.3 Type tests for EMC	9
4.3.1 Emission	9
4.3.2 Immunity	9
4.4 Additional requirements	9
4.4.1 Terminals	9
4.4.2 Signal and control ports	9
4.5 Cybersecurity	10
5 Power supply	10
6 Devices	10
6.1 Gas and liquid actuated relays (Buchholz relays)	10
6.1.1 General	10
6.1.2 4 mA to 20 mA output	10
6.1.3 Modbus output	10
6.1.4 Tests	11
6.2 Protective relays for hermetically sealed liquid-immersed equipment	11
6.2.1 General	11
6.2.2 4 mA to 20 mA output	11
6.2.3 Modbus output	11
6.2.4 Tests	11
6.3 Direct reading dial type liquid level indicators	12
6.3.1 General	12
6.3.2 4 mA to 20 mA output	12
6.3.3 Modbus output	12
6.3.4 Tests	12
6.4 Pressure relief devices with continuous pressure monitoring	12
6.4.1 General	12
6.4.2 4 mA to 20 mA output	13
6.4.3 Modbus output	13
6.4.4 Routine test	13
6.5 Electronic pressure and pressure rise monitoring systems	13
6.5.1 General	13
6.5.2 4 mA to 20 mA output	13
6.5.3 Modbus output	13
6.5.4 Tests	14
6.6 Direct reading mechanical dial type liquid temperature indicators	15
6.6.1 General	15
6.6.2 4 mA to 20 mA output	15
6.6.3 Modbus output	15

6.6.4	Routine tests	15
6.7	Direct reading mechanical dial type winding temperature indicators	15
6.7.1	General	15
6.7.2	4 mA to 20 mA output	15
6.7.3	Modbus output.....	16
6.7.4	Routine tests	16
6.8	Electrical and electronic liquid temperature measuring devices	16
6.8.1	General	16
6.8.2	4 mA to 20 mA output	16
6.8.3	Modbus output.....	16
6.8.4	Tests	16
6.9	Electrical and electronic winding temperature simulating devices	17
6.9.1	General	17
6.9.2	4 mA to 20 mA output	17
6.9.3	Modbus output.....	17
6.9.4	Tests	17
6.10	Dehydrating breathers, self-regenerating types	18
6.10.1	General	18
6.10.2	4 mA to 20 mA output	18
6.10.3	Modbus output.....	19
6.10.4	Routine tests	19
6.11	Dissolved gas analysis devices (DGA devices)	19
6.11.1	General	19
6.11.2	4 mA to 20 mA output	19
6.11.3	Modbus output.....	20
6.11.4	Tests	20
	Bibliography.....	21
	Figure 1 – Pressure rise response curves for oil (left) or gas (right) space applications	14
	Table 1 – Summary of Modbus parameters	9

INTERNATIONAL ELECTROTECHNICAL COMMISSION

POWER TRANSFORMERS –

Part 22-8: Power transformer and reactor fittings – Devices suitable for use in communication networks

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 60076-22-8 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:

CDV	Report on voting
14/1057/CDV	14/1062A/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. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the 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 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.

INTRODUCTION

Under the title "Power transformer and reactor fittings – Devices suitable for use in communication networks", IEC 60076-22-8 covers an exhaustive selection of devices that are currently used in communication networks.

POWER TRANSFORMERS –

Part 22-8: Power transformer and reactor fittings – Devices suitable for use in communication networks

1 Scope

This part of IEC 60076-22 applies to a selection of accessories and fittings mounted on liquid immersed power transformers according to IEC 60076-1 and reactors according to IEC 60076-6 with or without conservator for indoor or outdoor installation.

It outlines the operation requirements specific to each device as well as the data made available to the communication network and the type and routine test to be performed.

The communication network is not part of the scope of this document.

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 60076-22-1:2019, *Power transformers – Part 22-1: Power transformer and reactor fittings – Protective devices*

IEC 60076-22-7, *Power transformers – Part 22-7: Power transformer and reactor fittings – Accessories and fittings*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

IEC 61000-6-5, *Electromagnetic compatibility (EMC) – Part 6-5: Generic standards – Immunity for equipment used in power station and substation environment*