

Handläggande organ

Svenska Elektriska Kommissionen, SEK

Fastställd

1998-09-25

Utgåva

1

Sida

1(1+32)

Ingår i

SEK Översikt 14

Reg 427 02 02

© INNEHÅLLET I SVENSK STANDARD ÄR UPPHOVSRÄTTSLIGT SKYDDAT. SIS HAR COPYRIGHT PÅ SVENSK STANDARD. EFTERTRYCK UTAN TILLSTÅND ÄR FÖRBJUDET.

Krafttransformatorer – Del 2: Temperaturstegring

*Power transformers –
Part 2: Temperature rise*

Som svensk standard gäller europastandarden EN 60076-2:1997. Den svenska standarden innehåller den officiella engelska språkversionen av EN 60076-2:1997.

Nationellt förord

Europastandarden EN 60076-2:1997

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60076-2, Second edition, 1993 - Power transformers - Part 2: Temperature rise**
utarbetad inom International Electrotechnical Commission, IEC.

Standarden skall användas tillsammans med SS-EN 60076-1, utgåva 1, 1998, och dess separat utgivna tillägg.

Tidigare utgiven svensk standard SS 427 02 02, utgåva 2, 1985, gäller ej fr o m 1998-09-25.

*) Se även bifogat Corrigendum, June 1997, till IEC 60076-2.

ICS 29.180

Standarder kan beställas hos SIS som även lämnar allmänna upplysningar om svensk och utländsk standard.
Postadress: SIS, Box 6455, 113 82 STOCKHOLM
Telefon: 08 - 610 30 00. Telefax: 08 - 30 77 57

Upplysningar om **sakinnehållet** i standarden lämnas av SEK.
Telefon: 08 - 444 14 00. Telefax: 08 - 444 14 30

Prisgrupp R

Tryckt i oktober 1998

English version

Power transformers
Part 2: Temperature rise
(IEC 76-2:1993, modified)

Transformateurs de puissance
Partie 2: Echauffement
(CEI 76-2:1993, modifiée)

Leistungstransformatoren
Teil 2: Übertemperaturen
(IEC 76-2:1993, modifiziert)

This European Standard was approved by CENELEC on 1997-03-11. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 76-2:1993, prepared by IEC TC 14, Power transformers, together with the common modifications prepared by the Technical Committee CENELEC TC 14 was submitted to the formal vote and was accepted by CENELEC as EN 60076-2 on 1997-03-11.

This European Standard supersedes HD 398.2 S1:1979 and its amendment A1:1988.

Technical differences relate mainly to certain measures to bring the standard in line with actual requirements of User's specifications.

The following dates were fixed

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 1997-09-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 1997-09-01

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given for information only. In this standard annex ZA is normative and annexes A, B and C are informative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 76-2:1993 was approved by CENELEC as a European Standard with agreed common modifications as given below.

A series of horizontal black bars of varying lengths and positions, resembling a barcode or a stylized graphic. The bars are arranged in a non-uniform, staggered pattern across the page.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 76-1 (mod)	1993	Power transformers Part 1: General	EN 60076-1	1997
IEC 85	1984	Thermal evaluation and classification of electrical insulation	HD 566 S1	1990
IEC 279	1969	Measurement of the winding resistance of an a.c. machine during operation at alternating voltage	-	-
IEC 354	1991	Loading guide for oil-immersed power transformers	-	-
IEC 606	1978 ¹⁾	Application guide for power transformers	-	-
IEC 726 (mod)	1982	Dry-type power transformers	HD 464 S1 ²⁾ + A2 + A3 + A4	1988 1991 1992 1995
IEC 905	1987	Loading guide for dry-type power transformers	-	-
ISO 2592	1973	Petroleum products - Determination of flash and fire points - Cleveland open cup method	EN 22592	1993

1) Under revision, latest edition will apply.

2) HD 464 S1 includes A1:1986 to IEC 726:1982, mod.

CONTENTS

	Page
Clause	
1 Scope	7
2 Normative references	7
3 Identification symbols according to cooling method	7
4 Temperature-rise limits	11
4.1 General	11
4.2 Normal temperature-rise limits at continuous rated power	11
4.3 Modified requirements because of unusual service conditions	15
4.4 Temperature rise during a specified load cycle	17
5 Test of temperature rise	17
5.1 General	17
5.2 Test methods for temperature-rise determination	19
5.3 Determination of oil temperatures	25
5.4 Determination of average winding temperature	27
5.5 Determination of winding temperature before shutdown	29
5.6 Corrections	29
Annexes	
A Note on oil temperature in transformers with forced oil circulation	31
B Transient loading – Mathematical model and testing	35
C Techniques used in temperature-rise testing of oil-immersed transformers	43

POWER TRANSFORMERS

Part 2: Temperature rise

1 Scope

This part of International Standard IEC 76 identifies transformers according to their cooling methods, defines temperature-rise limits and details the methods of test for temperature-rise measurements. It applies to transformers as defined in the scope of IEC 76-1.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 76. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 76 are encouraged to investigate the possibility of applying the most recent edition of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 76-1: 1993, *Power transformers – Part 1: General*

IEC 85: 1984, *Thermal evaluation and classification of electrical insulation*

IEC 279: 1969, *Measurement of the winding resistance of an a.c. machine during operation at alternating voltage*

IEC 354: 1991, *Loading guide for oil-immersed power transformers*

IEC 606: 1978, *Application guide for power transformers*

IEC 726: 1982, *Dry-type power transformers*

IEC 905: 1987, *Loading guide for dry-type power transformers*

ISO 2592: 1973, *Petroleum products – Determination of flash and fire points – Cleveland open-cup method*

