SLOVENSKI STANDARD
SIST EN 50708-2-1:2020

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Močnostni transformatorji - Dodatne evropske zahteve - 2-1. del: Srednji močnostni transformator- Splošne zahteve

Power transformers - Additional European requirements: Part 2-1 Medium power transformer - General requirements

Transformateurs de puissance - Exigences européennes supplémentaires : Partie 2-1 Transformateurs de moyenne puissance

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English Version

Power transformers - Additional European requirements: Part 2-1 Medium power transformer - General requirements

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To be completed

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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

Contents

European foreword

This document (EN 50708-2-1:2020) has been prepared by CLC/TC 14 “Power transformers”.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2020-11-22
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2023-05-22

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For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

Introduction

For the purpose of this document, the requirements of the general EN 50708-1-1:2020 apply.

This document contains particular requirements for specific transformers or transformer applications, which are based on the requirements of the general EN 50708-1-1:2020.

This document should be considered in conjunction with the requirements of the general parts.

The particular requirements of the different subparts of EN 50708 supplement, modify or replace certain requirements of the general parts of EN 50708-1 and/or EN 50708-1-X being valid at the time of publication of this document. The absence of references to the exclusion of a part or a clause of a general part means that the corresponding clauses of the general part are applicable (undated reference).

Requirements of other -X parts with X greater than 1 being eventually relevant for cases covered by this document also apply. This document could therefore also supplement, modify or replace certain of these requirements valid at the time of publication of this document.

The main clause numbering of each part follows the pattern and corresponding references of EN 50708-1-1:2020. The numbers following the particular number of this document are those of the corresponding parts, or clauses of the other parts of the EN 50708 series, valid at the time of publication of this document, as indicated in the normative references of this document (dated reference).

In the case where new or amended general parts with modified numbering were published after the subpart was issued, the clause numbers referring to a general part in subparts might no longer align with the latest edition of the general part. Dated references should be observed.

1 Scope

The scope of this document is to define the energy performance of Medium Power Transformers in compliance with EN 50708-1-1:2020.

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 50708-1-1:2020, *Power transformers - Additional European requirements: Part 1-1: Common part - General requirements*

EN 60076-1:2011, *Power transformers - Part 1: General*

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

EN IEC 60076-11:2018, *Power transformers - Part 11: Dry-type transformers*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50708-1-1:2020 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

4 Service conditions

See EN 60076-1:2011.

5 Rating and general requirements

5.1 General

5.1.1 Highest voltages for equipment for winding with U_m > 1,1 kV

Insulation levels and dielectric test shall be in accordance with the requirements of EN 60076-3:2013 and for dry type transformers in accordance with EN IEC 60076-11:2018.

The values of the highest voltage U_m for equipment are:

3,6 kV– 7,2 kV – 12 kV – 17,5 kV – 24 kV – 36 kV

NOTE National practices might require the use of highest voltages for equipment up to (but not including) 52 kV, when the rated voltage is less than 36 kV (such as U_m = 38,5 kV or U_m = 40,5 kV).

5.1.2 Rated voltage for winding with Um ≤ 1,1 kV

For U_m ≤ 1,1 kV, the preferred rated voltage value shall be chosen in the hereunder list:

400 V – 410 V – 415 V – 420 V – 433 V – 690 V

This document may be applied either as a whole or in part, to transformers with rated low voltages below 400 V and above 690 V.

The values for short duration power frequency withstand and/or for the lightning impulse withstand test between windings and earth need to be stated by the purchaser.

5.1.3 Tapping

For DETC (De-energized tap changer), the preferred tapping ranges shall be ± 2,5 % with 3 tap positions and ± 2 × 2,5 % with 5 tap positions. On special request ± 4 × 2,5 % with 9 tap positions can be provided. Tapping ranges greater than ± 10 % or with more than 9 tap positions are unusual and subject to specific agreement.

Tapping ranges outside the above definitions for DETC or any ranges for OLTC (On load tap changer) shall be specified by agreement between manufacturer and purchaser.

The level of losses of this standard shall be compliant whatever the ranges and methods of tapping.

NOTE OLTC means also transformers equipped with tapping connections suitable for operation while transformer is energised or on load for voltage adaptation purposes.

5.1.4 Connection designations for three phase transformers

Preferred connection designations (IEV [421-10-09]) shall be in accordance with clock notation 5 or 11 with Dyn, unless otherwise agreed between manufacturer and purchaser.

5.2 Energy Performance

5.2.1 General

5.2.1.1 Introduction

The tables below indicate the maximum level of losses for no-load losses and for load losses for TIER1 and TIER2.

TIER1 has been applied since 1 July 2015 for the values of losses following Commission Regulation (EU) No 548/2014 of 21 May 2014 and its amendment No 2019/1783 of 1 October 2019.

TIER2 shall be applied from 1 July 2021 for the values of losses following Commission Regulation (EU) No 548/2014 of 21 May 2014 and its amendment No 2019/1783 of 1 October 2019.

Table 1 and 2 define load losses and no-load losses for one winding with Um ≤ 24 kV and the other one with Um ≤ 3,6 kV. Additional corrections are defined for highest voltage, dual voltage or special on load tapping, given in Table 3, 4, 5 and other clauses. Corrections factors in Table 3, 4, 5 are cumulative.

During factory acceptance tests, the measured values of no-load and load losses shall not exceed the respective maximum values determined with Table 1 and 2 and 6 and corrected by corrections factor as stated above.

The reference conditions defined in EN 50708-1-1:2020 applies.

Other values of short-circuit impedance can be specified by the purchaser for particular system service conditions, e.g. in the case of parallel operations in all tables of this clause.

The sound power levels are given in Tables 1 and 2. Transformers can be requested or offered with sound power level L_{WA} other than the listed values.

Unless otherwise agreed between manufacturer and purchaser the sound power level L_{WA} given in Tables 1 and 2 are considered for no load condition.

NOTE Loss levels and correction factors defined in 5.2.1.3 and 5.2.1.4 refer to two winding medium power transformers. Loss levels for three windings medium power transformers are not defined due to lack of data at the time of the publication of this standard.

EXAMPLE cumulative corrections:

In case of transformers having primary highest voltage for equipment Um = 36kV and secondary highest voltage for equipment Um ≤ 3,6kV allowing 10 % on Pk and 15 % on P0 according to Table 3, and having dual voltage on one winding allowing 10 % on Pk and 15 % on P0 according to Table 4.

The total corrections on Pk is 21 % (1,1x1,1–1) and P0 is 32,25 % (1,15x1,15–1)

5.2.1.2 Load losses and no-load losses for one winding with U_m ≤ 24 kV and the other one with U_m ≤ 3,6 kV

The following tables are defined for step down or step up transformers with one winding with U_m ≤ 24 kV and the other one with U_m ≤ 3,6 kV. Table 1 is for liquid immersed transformers and Table 2 for dry-type transformers.

Table 1 — Losses, short circuit impedance and sound power level for liquid immersed transformers

Rated power	TIER1 P_k	TIER1 P_0	TIER2 P_k	TIER2 P_0	L_{WA}	*Short-circuit Impedance*
kVA	W	W	W	W	dB(A)	%
≤ 25	900	70	600	63	37	4
50	1 100	90	750	81	39	4
100	1 750	145	1 250	130	41	4
160	2 350	210	1 750	189	44	4
250	3 250	300	2 350	270	47	4
315	3 900	360	2 800	324	49	4
400	4 600	430	3 250	387	50	4
500	5 500	510	3 900	459	51	4
630	6 500	600	4 600	540	52	4 or 6
800	8 400	650	6 000	585	53	6
1 000	10 500	770	7 600	693	55	6
1 250	11 000	950	9 500	855	56	6
1 600	14 000	1 200	12 000	1 080	58	6
2 000	18 000	1 450	15 000	1 305	60	6
2 500	22 000	1 750	18 500	1 575	63	6
3 150	27 500	2 200	23 000	1 980	64	6

Table 2 — Losses, short circuit impedance and sound power levels for dry-type transformers

Rated power	TIER1 P_k	TIER1 P_0	TIER2 P_k	TIER2 P_0	L_{WA}	*Short-circuit Impedance*
kVA	W	W	W	W	dB(A)	%
≤ 50	1 700	200	1 500	180	49	6
100	2 050	280	1 800	252	51	6
160	2 900	400	2 600	360	54	6
250	3 800	520	3 400	468	57	6
400	5 500	750	4 500	675	60	6
630	7 600	1 100	7 100	990	62	6
800	8 000	1 300	8 000	1 170	64	6
1 000	9 000	1 550	9 000	1 395	65	6
1 250	11 000	1 800	11 000	1 620	67	6
1 600	13 000	2 200	13 000	1 980	68	6
2 000	16 000	2 600	16 000	2 340	70	6
2 500	19 000	3 100	19 000	2 790	71	6
3 150	22 000	3 800	22 000	3 420	74	6