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ICS

English Version

Power transformers - Additional European requirements: Part 3- 3 Large power transformer - Accessories

To be completed

To be completed

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2023-09-15.

It has been drawn up by CLC/TC 14.

If this draft becomes a European Standard, 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.

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17 **European foreword**

18 This document (prEN 50708-3-3:2023) has been prepared by CLC/TC 14 "Power transformers".

19 This document is currently submitted to the Enquiry.

20 The following dates are proposed:

- latest date by which the existence of this document has to be announced at national level (doa) dor + 6 months
- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) dor + 12 months
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) dor + 36 months (to be confirmed or modified when voting)

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21 Introduction

22 This part is a part of EN 50708 series that deals with the accessories for large power transformers.

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

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

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

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

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

34 The main clause numbering of each part follows the pattern and corresponding references of
35 EN 50708-1-1:2020. The numbers following the particular number of this document are those of the
36 corresponding parts, or clauses of the other parts of the EN 50708 series, valid at the time of publication of this
37 document.

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

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41 **1 Scope**

42 This document describes the typical accessories used for Large Power Transformers.

43 **2 Normative references**

44 The following documents are referred to in the text in such a way that some or all of their content constitutes
45 requirements of this document. For dated references, only the edition cited applies. For undated references, the
46 latest edition of the referenced document (including any amendments) applies.

47 EN 50708 (series), *Power transformers - Additional European requirements*

48 EN 60076-1, *Power transformers - Part 1: General (IEC 60076-1)*

49 EN IEC 60076-22 (series), *Power transformers - Part 22: Power transformer and reactor fittings (IEC 60076-22,*
50 *series)*

51 EN 13674-1, *Railway applications - Track – Rail - Part 1: Vignole railway rails 46 kg/m and above*

52 **3 Terms and definitions**

53 For the purposes of this document, the terms and definitions given in the EN 50708 series apply.

54 ISO and IEC maintain terminological databases for use in standardization at the following addresses:

55 — ISO Online browsing platform: available at <https://www.iso.org/obp>

56 — IEC Electropedia: available at <http://www.electropedia.org/>

57 **4 Service conditions**

58 In accordance with EN 60076-1.

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59 **5 Main accessories**

60 The list of the mandatory and optional accessories is reported in Table 1, with reference to two categories as
61 defined in the key of the table.

62 All the accessories shall be compliant with the relevant part of EN IEC 60076-22 series.

63 **Table 1 — list of the main accessories**

Accessory	Category II		Category III	
	Present	Minimum number	Present	Minimum number
Oil conservator, if not sealed type	Y	1 for main tank +1 for OLTC diverter switch if any, unless otherwise specified	Y	1 for main tank +1 for OLTC diverter switch if any, unless otherwise specified
Liquid level indicator (OLI)	Y	one per conservator	Y	one per conservator
Liquid-Temperature Indicator (top oil) OTI	Y	1	Y	1
Winding temperature indicator	O	1 on no-tapped winding	O	1 on each main winding
Gas and liquid actuated relay (Buchholz)	Y	1	Y	1
Gas and liquid sampling devices	O	1 per relay	O	1 per relay
Rating plate (if more than one)	O	1	O	1
Hydraulic plate	O	1	O	1
Earthing terminal(s)	Y	1	Y	2
Protective relay for hermetically sealed transformers (for transformers without conservator)	Y	1	Y	1
Liquid flow indicator (for forced cooling) OFI	Y	1 per pump	Y	1 per pump
Pressure relief device	O	1	O	2
Shutter valve	O	1 per link with conservator	O	1 per link with conservator
OLTC protection relay	Y	1	Y	1
Gas detecting device for sealed compartment	O	1 per compartment with rubber bag equipped	O	1 per compartment with rubber bag equipped
Leakage detector for insulating liquid to water heat exchanger	O	1 per cooler	O	1 per cooler
Wheels	O		O	
Possible other accessories (to be specified by the purchaser)	
Y: mandatory O: optional Category II: above 3 150 kVA up to and including 31 500 kVA Category III: above 31 500 kVA				

64 6 Specific requirements for certain accessories

65 6.1 Gas and liquid actuated relay (Buchholz relays)

66 The gas and liquid actuated relay shall be compliant with EN IEC 60076-22-1 and shall have at least two
67 separate switches with independent thresholds for gas accumulation, the first threshold being called “alarm”
68 and the second “trip”.

69 The functions of liquid loss and liquid surge shall be assigned to a specific switch. If this switch is identical to
70 one of the switches for gas accumulation, this shall be clearly stated in the relay’s nameplate.

71 If any of the switches is provided with a mechanism which holds it in position after a tripping until it is manually
72 reset, this shall be clearly stated in the relay’s nameplate.

73 The check list of the settings and arrangements of switches, compliant with the example in Table 2, shall be
74 filled out by the manufacturer, in accordance with the possible technical specifications by the purchaser.

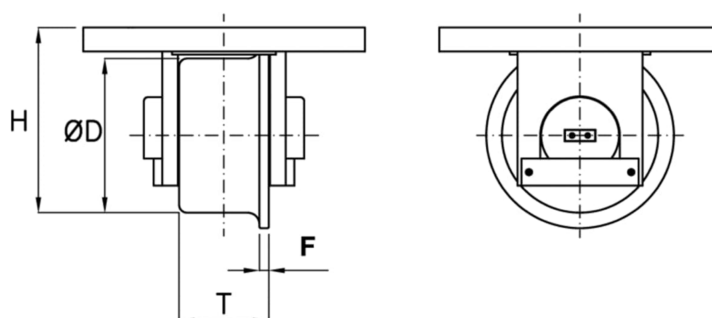
75 **Table 2 — Example of check list for gas and liquid actuated relay**

Function	Setting (tripping threshold)	Assigned to switch	Manually resettable switch
Gas accumulation – alarm	200 cm ³	#1	No
Liquid surge	2 m/s	#2	Yes
Liquid loss	-	#2	Yes
Gas accumulation – trip	400 cm ³	#2	Yes

76 6.2 Specific requirement for wheels

77 When wheels are requested, the relevant information shall be given at the enquiry stage and the scope of the
78 supply shall be agreed between manufacturer and purchaser.

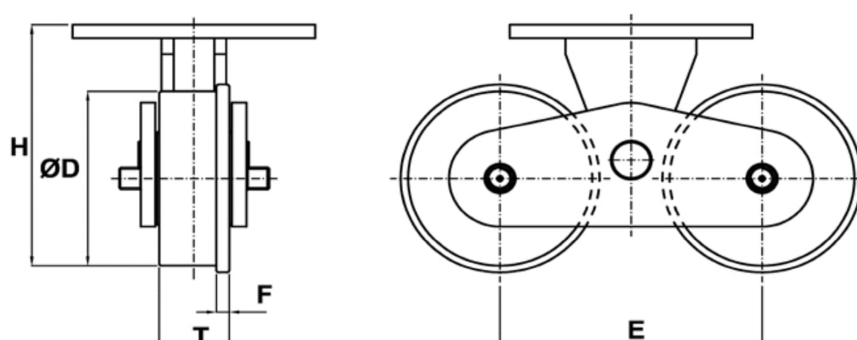
79 Unless otherwise specified, the wheels shall be compliant either with the type W2 “flanged single wheel”
80 (Figure 1) or with type W3 “flanged double wheel” (Figure 2) as described in Annex B of
81 EN IEC 60076-22-7:2020.



82

83

Figure 1 — Dimensions of the wheel assembly type W2



84

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Figure 2 — Dimensions of the wheel assembly type W3

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- 86 The wheels shall be compatible with rail type 50E4 or larger, as defined in standard EN 13674-1.
- 87 Table 2 and Table 3 list the relevant dimensions of the wheels, pursuant to Tables B.4 and B.5 of
88 EN IEC 60076-22-7:2020, and include the maximum load that each wheel assembly can bear.
- 89 The calculations of the maximum load have been performed using the Formula (B.3) in
90 EN IEC 60076-22-7:2020 for rail type 50E4, as defined in EN 13674-1, with the following assumptions:
- 91 • Rail grade R200 with maximum compressive pressure $p_{c,r} = 2000 \text{ MPa}$;
- 92 • Wheel made of a steel with maximum compressive pressure not lower than that of rail $p_{c,w} \geq p_{c,r}$;
- 93 • Young's modulus of elasticity of rail and wheel $E_r = E_w = 210 \text{ GPa}$;
- 94 • Poisson's ratio of rail and wheel $\nu_r = \nu_w = 0,3$;
- 95 • Contact line equal to the resting surface as defined in Table B.3 of EN IEC 60076-22-7:2020 $a = 20,0 \text{ mm}$
96 .

97 Those values can also be applied safely for rail types 60E1, 50E4, 50E5, 50E6, 55E1 and any grade greater
98 than R200.

99 **Table 3 — Characteristics of the wheels type W2**

Type	Diameter (mm) D	Height (mm) H	Thickness (mm) T	Flange thickness (mm) F	Max load (kN)	Equivalent mass (metric ton)
W2 – A	200	240	115	12	100	10
W2 – B	250	300	130	15	350	35
W2 – C	300	350	130	15	500	50
W2 – D	315	365	125	15	500	50
W2 – E	380	525	145	27,5	400	40
W2 – F	400	455	125	15	550	55
W2 – G	500	555	125	15	600	60

NOTE 1 t = 10 kN

100 **Table 4 — Characteristics of the wheels type W3**

Type	Diameter (mm) D	Height (mm) H	Thickness (mm) T	Flange thickness (mm) F	Interaxis (mm) E	Max load (kN)	Equivalent mass (metric ton)
W3 – A	200	285	115	12	250	500	50
W3 – B	250	350	130	15	310	700	70
W3 – C	300	420	130	15	390	1000	100
W3 – D	315	400	125	12	430	800	80
W3 – E	380	525	145	27,5	600	800	80
W3 – F	400	485	125	12	525	1000	100
W3 – G	500	590	125	12	625	1200	120

NOTE 1 t = 10 kN