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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 1094.7-2024

Replacing GB/T 1094.7-2008

**Power transformers - Part 7: Loading guide for
mineral-oil-immersed power transformers
(English Translation)**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is Part 7 of GB/T 1094 "Power Transformers". GB/T 1094 has published the following parts.

- Part 1: General;
- Part 2: Temperature rise of liquid immersed transformers;
- Part 3: Insulation levels, insulation tests and external insulation air gaps;
- Part 4: Guidelines for lightning impulse and switching impulse tests on power transformers and reactors;
- Part 5: Ability to withstand short circuit;
- Part 6: Reactors;
- Part 7: Guidelines for loading of oil-immersed power transformers;
- Part 10: Determination of sound levels;
- Part 101: Application Guidelines for Sound Level Determination;
- Part 11: Dry-type transformers;
- Part 12: Guidelines for loading of dry-type power transformers;
- Part 14: Liquid immersed power transformers using high temperature insulating materials;
- Part 15: Gas-filled power transformers;
- Part 16: Transformers for wind power generation;
- Part 18: Frequency response measurement;
- Part 23: DC bias suppression device.

This document replaces GB/T 1094.7-2008 "Power transformers Part 7: Loading guidelines

for oil-immersed power transformers" and Compared with GB/T 1094.7-2008, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

- Added some new research results on insulation life (see Chapter 6);
- Added the recommended maximum core temperature (see Chapter 7);
- Increased the number of fiber optic sensors recommended for use in temperature rise tests (see Chapter 8);
- The thermal model has been modified and rewritten in a generally applicable mathematical form (see Chapter 8, Chapter 8 of the 2008 edition).

This document is modified to adopt IEC 60076-7:2018 "Power transformers Part 7: Guidelines for loading of oil-immersed power transformers".

This document has made the following structural adjustments compared to IEC 60076-7:2018.

Adjust Annex H, Annex E and Annex G of IEC 60076-7:2018 to Annex E, Annex G and Annex H respectively.

The technical differences between this document and IEC 60076-7:2018 and their reasons are as follows.

- The normative references GB/T 1094.2 and GB/T 1094.14 replace IEC 60076-2 and IEC 60076-14 respectively, to apply According to the technical conditions of our country;
- Added normative references to GB/T 2900.95 (see Chapter 3);
- Deleted the last paragraph of 5.5. "For sealed transformers without pressure relief devices, the problem of excessive pressure should be considered to avoid the fuel tank is not allowed to deform permanently when the load exceeds the nameplate rating, in order to meet the actual situation in my country.

The following editorial changes were made to this document.

- The content of Chapter 1 has been adjusted;
- Adjust "Note 1" in 3.4, 3.5, 3.11, 3.13, 3.14, 3.15 and 3.16 to "Note";
- In Chapter 4, an introductory phrase is added, and "WOP" is changed to "WCO", "ppm" is changed to "mg/L", and the arrangement of symbols and abbreviations is adjusted.

The column order was adjusted;

- Change IEC 60076-1:2011 in Note 5.2 to GB/T 1094.1-2013;
- Change "ppm" in paragraph 5 of 6.2 to "uL/L", "200%" in paragraph 6 to "200", and "ppm" in the title of Figure 3 Change to "uL/L";

- Correct the paragraph in Table 1 of 6.3 to a note;
- Correct "150mWb/phase or less" in c) of 8.1.3 to " $\leq 150\text{mWb/phase}$ ";
- Correct Table 5 in the note of 8.2.1 to Table 4;
- Change EA (kJ/mol) in the third row of Table A.1 to EA (J/mol), 128 to 128000, 89 to 89000, 86 to 86000, 82 changed to 82000; Deleted the fifth paragraph of A.2 "The same method can also be used to improve the IEEE on aging the content of "Equation for the speed coefficient FAA and the equivalent aging coefficient FEQA"; Correct the paragraphs in Table A.3 and Table A.4 to Notes; Change Table A.4 Correct 10.07 to 10.1; Correct "E" in formula (A.3) to "EA";
- The text structure of Appendix C and Appendix E (Appendix G in this document) has been adjusted;
- Correct 8.2.3 in paragraph 1 of F.1 to 8.2.2;
- In Appendix G (Appendix H in this document), the "x-axis --- loss, in kW" and "y-axis --- loss, in kW" in the symbol description of Figure G.1 are replaced by the time in hours is corrected to "x-axis --- time in hours (h)" and "y-axis --- loss in kilowatts" (kW); Correct the first sentence of 3) in G.4. "After recording the thermal resistance measurement value at rated current" to "70% of rated current" After the thermal resistance measurement value of the flow is recorded";
- Correct "time (y axis)" in the symbol description of Figures I.1 and I.2 to "abscissa axis --- time";
- Correct " $\theta(t=1)=76.5^{\circ}\text{C}$ " and " $\theta(t=1)=111^{\circ}\text{C}$ " in Appendix K to " $\theta(t=31)=76.5^{\circ}\text{C}$ " respectively.
- and " $\theta(t=31)=111^{\circ}\text{C}$ ", " $\Delta\theta_1=4.95\text{K}$ " was corrected to " $\Delta\theta_2=4.95\text{K}$ ", and Table K.1 and Table K.2 were adjusted.
- structure;
- The references were adjusted.

Introduction

The purpose of formulating the power transformer standard is to establish a set of optimal evaluation criteria for power transformers, and to provide a reference for the selection of raw materials for power transformers.

GB/T 1094 series of standards aims to provide guidance on the matters needing attention in selection, design, production, inspection, selection, operation and maintenance.

The 16-part series of regulations will be used to formulate principles and rules for the design, manufacture, testing, operation and maintenance of power transformers.