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

GB/T 1094.3-2017

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

电力变压器 第3部分：绝缘水平、绝缘试验和外绝缘空气间隙

(English Translation)

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Foreword

GB/T 1094 "Power Transformer" is divided into the following parts.

- Part 1. General;
- Part 2. Temperature rise of liquid immersed transformers;
- Part 3. Insulation level, insulation test and external insulation air gap;
- Part 4. Guidelines for lightning impulse and operational shock tests of power transformers and reactors;
- Part 5. Ability to withstand short circuits;
- Part 6. Reactors;
- Part 7. Oil-immersed power transformer load guide;
- Part 10. Sound level measurement;
- Section 10.1. Guidelines for the application of sound level determination;
- Part 11. Dry-type transformers;
- Part 12. Dry power transformer load guidelines;
- Part 14. Design and application of liquid immersed transformers using high temperature insulating materials;
- Part 16. Transformers for wind power generation;
- Part 18. Frequency response measurement.

This part is the third part of GB/T 1094.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part replaces GB/T 1094.3-2003 "Power transformers Part 3. Insulation level, insulation test and external insulation air Gap", compared with GB/T 1094.3-2003, the main technical changes are as follows.

- Adjusted the normative references (see Chapter 2, Chapter 2 of the 2003 edition);
- Increased the definition of the rated voltage of the winding (see Chapter 3, Chapter 3 of the 2003 edition);
- Adjusted the insulation level mark (see Chapter 5, Chapter 5 of the 2003 edition);
- Adjusted the insulation test sequence and test items (see Chapter 7, Chapter 7 of the 2003 edition);
- Operational impact test for $U_m=126\text{kV}$ transformers (see Chapter 7, Chapter 7 of the 2003 edition);
- Inductive withstand voltage (voltage) test adjusted to U_r based, and adjusted pre-applied voltage, measured voltage, measurement of partial discharge measurement Time and partial discharge limits (see Chapter 11, Chapter 12 of the 2003 edition);
- Added winding insulation level and neutral point insulation level of the system with nominal voltage of 750kV and 1000kV transformer the air gap is added and the relevant test requirements are added (see Chapters 7 and 16 and Chapters 7 and 16 of the 2003 edition);
- Take the winding line end AC withstand voltage test as a separate test item (see Chapter 7 and Chapter 12, Chapter 7 of the 2003 edition);
- The requirements for lightning impulse test and operational impact test have been adjusted (see Chapters 13 and 14 and the 13th edition of the 2003 edition).

Chapters 14 and 15);

---The air gap of the external insulation has been adjusted (see Chapter 16, Chapter 16 of the 2003 edition);

--- The appendix has been adjusted, and the appendix "Test Voltage for ACSD Test" has been deleted. The new "Inquiry and Ordering" are required.

"Information on transformer insulation requirements and insulation test" and "Basic principles for determining insulation test, insulation level and insulation clearance" Appendix (see Appendix B and Appendix D, Appendix D of the 2003 edition).

This part uses the redrafting method to modify the use of IEC 60076-3:2013 "Power Transformers Part 3. Insulation Level, Insulation Test and external insulation air gap.

There are technical differences between this part and IEC 60076-3:2013. The terms involved in these differences have been passed on the outer side of the page.

The vertical single line (I) at the white position is identified, and a list of the corresponding technical differences and their causes is given in Appendix A.

This section also made the following editorial changes.

--- The voltage in the full text example has been adjusted according to the actual situation in China;

--- Removed the "Note" of 3.6 in IEC 60076-3:2013;

--- Removed the comment on "Line-end lightning intercept shock test" in 7.1 of IEC 60076-3:2013;

--- Added the suggestive content that the induced voltage between phases may exceed the specified insulation level in the test in 7.3.2.1;

--- The "Lightning Crash Impact Test (LIC)" and "Neutral Terminal Lightning" in 7.3.2.2 of IEC 60076-3:2013 Test (LIN) is adjusted to type test and as part of 7.3.2.2 of this part, 7.3.2.2 of IEC 60076-3:2013 the other three pilot projects in the series continue to serve as special tests and serve as the content of 7.3.2.3 of this section;

--- "Thunder Cut Shock Test (LIC)" in 7.3.3.1 of IEC 60076-3:2013 and "Neutral Terminal" in 7.3.3.2 the lightning full impact test (LIN) is adjusted to the type test and, as part of 7.3.3.2 of this part, IEC 60076-3.

The other three pilot projects in 7.3.3.1 of 2013 continue to be routine tests and will serve as the content of 7.3.3.1 of this section.

The other two test items in 7.3.3.2 of IEC 60076-3:2013 continue to be special tests and serve as part of this the content of 7.3.3.3;

--- Adjust the contents of Table 1 of IEC 60076-3:2013 to the content of E.1 of this part;

--- Adjust the contents of Tables 2 and 3 of IEC 60076-3:2013 to the content of E.2 of this part;

--- Adjust the contents of 7.4 of IEC 60076-3:2013 to the content of E.3 of this part;

--- Added a fully insulated transformer in 13.4.1, the neutral point is not taken out when the lightning full wave impact test voltage value and Relevant instructions on how to apply;

--- Removed the notes in Chapter 9 of IEC 60076-3:2013 and Note 2 of 16.1;

--- The principle of determining the minimum air gap for external insulation in Chapter 16 of IEC 60076-3:2013 and the minimum air between external insulation the gap value is adjusted to the content of E.4 of this part;

--- Adjust the order of the appendix, add Appendix A to this section, and change Appendix A of IEC 60076-3:2013 to this Part of Appendix F, Appendix B is changed to Appendix C of this part, Appendix C is changed to Appendix D of this part, and Appendix D is changed to

this part.

For the contents of Appendix E.5, Appendix E is changed to Appendix B of this part.

This part was proposed by China Electrical Equipment Industry Association.

This part is under the jurisdiction of the National Transformer Standardization Technical Committee (SAC/TC44).

This section was drafted. Shenyang Transformer Research Institute Co., Ltd., Baoding Tianwei Baobian Electric Co., Ltd., China Electric Power Institute of Research, National Transformer Quality Supervision and Inspection Center, Special Transformer Shenyang Transformer Group Co., Ltd., Xi'an Xidian Transformer Ren, Zhengtai Electric Co., Ltd., TBEA Hengyang Transformer Co., Ltd., Changzhou Xidian Transformer Co., Ltd., State Grid Lin Power Co., Ltd. Electric Power Research Institute, Shunte Electric Equipment Co., Ltd., Mingzhu Electric Co., Ltd., Xinhua Special Electric Co., Ltd., Electric Power Research Institute of Guangdong Power Grid Co., Ltd., State Grid Shaanxi Electric Power Company Electric Power Research Institute, Guangdong Olympics Ryan Power Technology Co., Ltd., Guangdong Zhongpeng Electric Co., Ltd., Guangzhou Zhongche Junfa Electric Co., Ltd., Baoding Baoling Transformer Limited company, Baoding Tianwei Group Special Transformer Electric Co., Ltd., China Guangdong Nuclear Power Engineering Co., Ltd.

Introduction

This section specifies the insulation requirements and corresponding insulation tests for the specified windings and their terminals. This section also recommends the power transformer outside Air gap at the edge (Chapter 16).

The insulation levels and insulation tests specified in this section apply only to internal insulation. Although the specified rated withstand voltage value of the transformer is insulated as a basis for external insulation is reasonable, but this approach may not meet all the actual conditions. Failure of non-self-recoverable internal insulation it is catastrophic and usually causes the transformer to run out for a long time. When an external flashover occurs, it may only cause a short interruption in operation.

Does not cause permanent damage. Therefore, in order to improve safety, the user can specify the test voltage value of the insulation inside the transformer than the system the outer insulation of his equipment is higher. When there is such a difference, the outer insulation gap of the transformer should be adjusted to fully withstand the internal insulation test.

Inspection requirements.

Appendix B proposes to determine the insulation test, insulation level and external insulation air gap of the transformer according to the highest voltage U_m of the equipment.