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DL

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

DL/T 1998-2019

**Technical conditions for the use of induction filter transformers
(English Translation)**

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Foreword

This standard is compiled in accordance with the rules of GB/T 1.1-2009 "Guidelines for Standardization Part 1: Standard Structure and Compilation".

This standard was proposed by the China Electricity Council.

This standard is under the jurisdiction of the Power Transformer Standardization Technical Committee (DL/T C 02) of the power industry.

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1 Scope

This standard specifies the terms and definitions, abbreviations, working principles, Use conditions, technical requirements, test items and methods, operation and maintenance, as

well as nameplates, transportation and storage, etc.

This standard applies to the design of complete sets of equipment with a nominal voltage of 6kV to 220kV on the high-voltage side of an induction filter transformer and a rated capacity of 5MVA and above.

Manufacturing, ordering and use.

2 Normative references

The following documents are indispensable for the application of this standard. For dated reference documents, only the dated version applies to this standard quasi. For undated reference documents, the latest version (including all amendments) is applicable to this standard.

GB 1094.1 Power Transformer Part 1 General Rules GB 1094.2 Power Transformer Part 2 Temperature Rise of Liquid-immersed Transformer GB 1094.5 Power Transformer Part 5 Ability to withstand short circuit GB/T 1094.6 Power Transformer Part 6 Reactor GB 1094.11 Power Transformer Part 11 Dry-type Transformer GB 20840 Transformer GB 1984 AC high voltage circuit breaker GB 1985 High voltage AC isolation switch and grounding switch GB/T 6451 Oil-immersed power transformer technical parameters and requirements GB/T 10228 Dry-type power transformer technical parameters and requirements GB/T 11024.1~11024.4 Shunt capacitors for AC power systems with nominal voltages above 1000V GB 11032 AC gapless metal oxide surge arrester GB/T 13729 Telecontrol terminal equipment GB/T 17626.7 Electromagnetic compatibility test and measurement technology Power supply system and connected equipment harmonic, interharmonic wave measurement and measuring instrument Guidelines GB/T 19862 General requirements for power quality monitoring equipment GB/T 26868 Guidelines for the Design and Application of High-Voltage Filtering Devices GB 50150 Electrical equipment installation engineering electrical equipment handover test standard DL/T 393 Power transmission and transformation equipment condition inspection and repair test procedure DL/T 572 Power Transformer Operation Regulations DL/T 573 Power Transformer Maintenance Guide DL/T 596 Preventive test procedures for electrical equipment DL/T 672 Technical conditions for ordering voltage and reactive power adjustment control devices of substations JB/T 10931 High-voltage power filter device SD 325 Technical Guidelines for Power System Voltage and Reactive Power

3 Terms and definitions

The following terms and definitions apply to this standard.

Inductive filtering

A way to filter out harmonics by adding special windings to the transformer.

Inductive filtering winding in the transformer, the added equivalent short-circuit impedance percentage is close to zero to connect the winding of the tuning and reactive power compensation device.

Inductive filtering transformer (iFT) Transformer with inductive filter winding.

Tuning and var compensating installation (iTVC) Composed of capacitors and reactors, etc., connected to the transformer induction filter windings to provide near-zero impedance for harmonic currents of specific frequencies Path, a combination of equipment with reactive power compensation functions.

Inductive filtering control system (iFC) an integrated software and hardware system for monitoring and controlling the induction filter transformer (iFT) and the tuning and reactive power compensation device (iTVC).

Inductive filtering transformer equipment the complete set of equipment consists of an induction filter transformer (iFT), a tuning and reactive power compensation device (iTVC) and a monitoring system (iFC).

Tuned branch

A circuit mainly composed of reactors (L), capacitors (C), etc., which presents low impedance to specific harmonics. Compensable for fundamental wave Capacitive reactive power.

Rated capacity of inductive filtering transformer equipment the rated capacity of the induction filter transformer.

4 Abbreviations

The following acronyms apply to this standard.

AGC. automatic generation control (automatic generation control) AVC. automatic voltage control (automatic voltage control)

5.1 Inductive filtering realization method

By adding a winding to the transformer core, and together with the external tuning branch to form a loop with an impedance approaching zero at a specific frequency, to suppress the harmonic main magnetic flux in the iron core, the total impedance of the harmonic current loop should be as small as possible.

5.2 Connection mode of complete equipment

The connection diagram of a typical three-winding induction filter transformer complete set of equipment is shown in Figure 1.

5.3 Induction filter transformer winding arrangement

The position of the transformer induction filter winding should be set between the high-voltage winding and the low-voltage winding. The induction of a typical three-winding induction filter transformer the location of the filter winding is shown in Figure 2.

Figure 2 Schematic diagram of the location of the induction filter winding of a typical three-winding transformer

6 Conditions of use

The use conditions of the components of the complete set of equipment should comply with the relevant standards.

- a) The induction filter transformer should meet the requirements of GB 1094.1, GB 1094.11 or DL/T 941;
- b) The tuning and reactive power compensation device should meet the requirements of JB/T 10931;
- c) The induction filter monitoring system should meet the requirements of GB/T 19862.

7.1 General provisions

The performance parameters and technical requirements of each component of the complete set of equipment shall comply with the relevant standards.

- a) The induction filter transformer should meet the requirements of GB/T 6451 or GB/T 10228, and the user should provide the harmonic content and Current size
- b) Tuning and reactive power compensation devices should comply with GB/T 1094.6, GB/T 11024.1~11024.4, GB/T 26868 and JB/T 10931 Provisions;
- c) The induction filter monitoring system should meet the requirements of GB/T 13729, GB/T 19862 and DL/T 672.

7.2.1 Rated voltage of induction filter winding

The rated voltage of the induction filter winding should be selected according to the relevant national and industry standards and actual needs.

7.2.2 Rated capacity of induction filter winding

The rated capacity of the induction filter winding should be selected at least 1.2 times the fundamental wave capacity of the tuning and reactive power compensation device.