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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 17623-2026

Replacing GB/T 17623-2017

Determination of the component contents of gases dissolved in insulating oil by gas chromatography

绝缘油中溶解气体组分含量的气相色谱测定法

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30 Implemented on August 1, 2026 State Administration for Market Regulation The State Administration for Standardization issued a statement.

1.Scope This document describes the method for determining dissolved gas components (including hydrogen, methane, ethane, ethylene, acetylene, etc.) in insulating oil using gas chromatography. Methods for determining the content of carbon monoxide, carbon dioxide, oxygen, and nitrogen (e.g.) This document applies to the determination of dissolved gaseous component content in insulating oils (mineral oils, natural esters, and synthetic esters, etc.) used in oil-filled electrical equipment. The determination of the component content of free gases (gas in gas relays, oil surface gases, etc.) in oil-filled electrical equipment shall be performed in accordance with

9.2 and 9.3.3. Related content in China.

3.Terms and Definitions This document does not contain any terms or definitions that need to be defined.

4.Method Overview For a given volume of oil sample, dissolved gases are obtained through headspace sampling or vacuum degassing, and gas chromatographs are used to analyze each gas group. The dissolved gas components in the oil are separated, detected, and calculated to obtain their content. The results of the dissolved gas component content determination are expressed as temperature. Expressed as the number of microliters (μL/L) of each gaseous component contained in one liter of oil at 20°C and a pressure of 101.3 kPa.

1 Scope

GB/T 17623-2026 is the Chinese national standard covering dissolved gas analysis - the hydrogen, methane, acetylene, ethylene and the rest that a fault inside a transformer produces, measured in a sample of its oil, and from whose proportions the kind of fault is inferred. DGA is the single most informative test on a power transformer, and it is why transformers are opened before they fail rather than after. It replaces GB/T 17623-2017 and has been in force since 1 August 2026, with the oil sampling standard GB/T 7597-2026. It was issued on 30 April 2026 and has been in force since 1 August 2026, replacing GB/T 17623-2017. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

7.5 Glass Injector Glass syringes with capacities of 100mL, 5mL, and 1mL should have good airtightness and flexible, non-jamming stoppers.

7.6 Rubber caps for syringes It should be compatible with the cone tip of a

7.5 glass syringe, have good elasticity, and be leak-proof.

7.7 Headspace vials Figure 2 shows a schematic diagram of an automatic headspace vial with a capacity of 20 mL, equipped with a perforated aluminum cap and a polytetrafluoroethylene pad. Figure

2 Headspace sample vial

7.8 Capping device It should be used with headspace sampling vials.

7.9 Standard gas mixture National standard samples/standard substances should be used, and their composition should be consistent with the component to be detected. Typical concentration ranges are shown in Table 1.

3 Gas filling operation

9.1.1.4 Oscillation Balancing. Place syringe B onto the oscillation plate inside the thermostatic timer oscillator. After placement, the syringe head should be higher than... The tail is at approximately a 5° angle, with the syringe cone at the bottom (the oscillator is designed and manufactured to meet this requirement). Start the oscillator operation by pressing the oscillation button, and oscillate continuously until Shake for the specified time (20 min for mineral insulating oil, 40 min for synthetic and natural ester insulating oils), then let stand for 10 min. When the temperature is below 10°C, syringe B should be properly preheated before shaking. After shaking reaches equilibrium, visually inspect the syringe for air. If the volume is too small to meet the requirements for chromatographic analysis, balance gas can be added directly to syringe B, the syringe re-oscillated to rebalance, and the amount of gas added should be adjusted to achieve the desired balance. The total volume of the gas phase should preferably not exceed 5 mL.

9.1.1.5 Transfer of Equilibrium Gas. Remove syringe B from the oscillating plate and immediately transfer the equilibrium gas therein to the syringe through the double-ended needle. Within syringe A, the transfer process should employ a micro-positive pressure method, i.e., using the wick of the micro-pressure syringe B to allow gas to enter syringe A through the double-ended needle. (Instrument) A is left at room temperature for 2 minutes, and its volume Vg is accurately read (accurate to

0.1 mL).

5 Sample Collection and Storage

5.1 Oil samples shall be taken from oil-filled electrical equipment in accordance with the provisions of GB/T 7597.

5.2 Free gas sampling from oil-filled electrical equipment shall be carried out in accordance with the provisions of DL/T 722.

5.3 Samples should be protected from dust, shock, light, and dryness during transportation

and storage.

5.4 Oil samples should be tested within 4 days of sampling, and gas samples should be tested as soon as possible after sampling.

6 Materials

6.1 Nitrogen (or argon). purity not less than 99.99%.

6.2 Hydrogen. purity not less than 99.99%.

6.3 Helium. purity not less than 99.999%.

6.4 Air. Dry and oil-free.

7.1 Oil-gas separation unit

7.1.1 Thermostatic Timer Oscillator The reciprocating oscillation frequency is 275 times/min ± 5 times/min, the amplitude is 35mm ± 3mm, the temperature control accuracy is ± 0.3°C, and the timing is precise. The temperature is ±2 min, and it is equipped with a fixing clip inside to hold a 100 mL glass syringe.

7.1.2 Vacuum Degassing Device The degassing efficiency should be no less than 90%, and the average annual change in degassing efficiency should be no more than 5%.

7.1.3 Automatic Headspace Sampler It possesses mechanical oscillation, temperature control, pressure regulation, and automatic quantitative injection functions, and should allow each dissolved gas component to react within a certain time. The two phases reach equilibrium.

Note. One of the above-mentioned oil-gas separation devices can be used during the test.

7.2 Gas Chromatograph It should include a gas path system, an injection system, a temperature control system, a chromatographic column, a detector, and recording and data processing devices. The detector should be equipped with thermal conductivity... Detectors (for measuring hydrogen, oxygen, and nitrogen), flame ionization detectors (for measuring hydrocarbons, carbon monoxide, and carbon dioxide), and nickel-catalyst conversion detectors. The device (converting carbon monoxide and carbon dioxide into methane), or equipped with a helium ionization detector. The nickel-catalyst converter in the gas path system... The optimal temperature is 350°C~360°C. The resolution of adjacent components detected by the chromatographic column should meet the requirements for quantitative analysis. Gas chromatography detection... The sensitivity should meet the minimum detection concentration requirements for each component in the oil as specified in this document. The commonly used gas path flow and chromatographic column for gas chromatographs are shown in Appendix A.

7.3 Stainless steel injection needles Dental No. 5 needle. 40mm in length. 18G No.1 needle.