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Standard Practice for Sampling Gas from a Transformer Under Positive Pressure¹

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1. Scope

1.1 This practice covers the sampling of gas above the insulating liquid of a transformer. A gas sampling bottle collects the gas sample from the gas space that is at a positive pressure.

1.2 Representative samples of gas are taken for analysis to determine their compositions.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Significance and Use

2.1 A gas sample from above the insulating liquid in transformers and other electrical power apparatus can be used to give an early indication of developing fault conditions. Combustible gases are formed from the breakdown of the insulating materials under thermal and electrical stress. Excessive concentrations of combustible gases indicate the need to take appropriate action.

2.2 It is important that gas samples from equipment be taken from the gas space directly above the liquid level, and not from remote expansion compartments, such as tank bracing bands.

2.3 The procedure described should be carefully followed to ensure that the sample is not diluted by air or nitrogen, or contaminated by residual materials in the sampling bottle.

3. Apparatus

3.1 *Gas Sampling Bottle*—stainless steel, Monel metal, or glass, of at least 250-cm³ capacity, with a valve and a hose connector on each end.

3.1.1 The gas sampling bottle must be free of dirt, moisture, oil, or other contaminants. It should be cleaned by washing

with anhydrous isopropyl alcohol, or other suitable cleaning agent that is free from residue upon evaporation. The bottle should then be dried by blowing out with dry air or nitrogen, oven baking, or be dried under vacuum.

3.2 *Plastic Bag*—The bag should have only one opening arranged to fit over one of the hose connectors on the sampling bottle. The plastic bag should have a volume, when fully expanded, of approximately 15 times the volume of the sampling bottle.

4. Procedure

4.1 Before connecting the sampling bottle to the transformer, purge the outlet valve on the transformer by exhausting a small amount of gas to remove any moisture, oil, or other contaminants.

4.2 Attach one end of the gas sampling bottle by plastic hose to the transformer outlet valve, and the other end of the sampling bottle to the plastic bag, making sure that a leakproof connection is obtained.

4.3 Purge the sampling bottle and hose of air by first opening both valves of the sampling bottle and then slightly opening the outlet valve on the transformer. As the gas flows through the sampling bottle, the plastic bag will expand.

4.4 When the bag has expanded to its full volume, first close the valve adjacent to the bag; then close the valve at the other end of the sampling bottle; and, finally, close the transformer gas outlet valve. Remove the hose and plastic bag from the sampling bottle.

5. Marking

5.1 Attach a tag to the gas sampling bottle showing the following:

- 5.1.1 Serial number of transformer,
- 5.1.2 Date of sample,
- 5.1.3 Transformer oil temperature, and
- 5.1.4 Location of transformer.

6. Precision and Bias

6.1 This is a sampling method, and as such precision and bias do not apply.

7. Keywords

7.1 gas; positive pressure; sampling gas; transformer

¹ This practice is under the jurisdiction of ASTM Committee D27 on Electrical Insulating Liquids and Gases and is the direct responsibility of Subcommittee D27.07 on Physical Test.

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