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Standard Specification for Nitrogen Gas as an Electrical Insulating Material¹

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1. Scope

1.1 This specification covers three types of nitrogen used as an electrical insulating material in electrical equipment:

1.1.1 *Type I*, obtained from the air by liquefaction processes and dried,

1.1.2 *Type II*, obtained from the air by liquefaction processes, deoxidized with hydrogen over a platinum catalyst, and dried, and

1.1.3 *Type III*, obtained from the air by liquefaction processes and if necessary deoxidized by suitable means.

NOTE 1—The fact that metal containers are filled with materials meeting this specification does not exclude the possibility that the materials might become contaminated with unlisted impurities.

1.2 The following safety hazards caveat pertains only to the test method portion, Section 5, of this specification: *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. Referenced Documents

2.1 *ASTM Standards:*²

¹ This specification is under the jurisdiction of ASTM Committee D-27 on Electrical Insulating Liquids and Gases and is the direct responsibility of Subcommittee D27.02 on Gases and Synthetic Liquids.

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D 2029 Test Methods for Water Vapor Content of Electrical Insulating Gases by Measurement of Dew-Point² Point

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For Annual Book of ASTM Standards, Vol 10.03, volume information, refer to the standard's Document Summary page on the ASTM website.

- E 105 Practice for Probability Sampling of Materials³
- E 260 Practice for Packed Column Gas Chromatography³

3. Composition and Properties

3.1 Samples extracted from nitrogen containers shall conform to the requirements prescribed in Table 1.

4. Sampling

4.1 *Nitrogen Shipped as a Gas in High-Pressure Metal Containers*—Extract test specimens from the container or containers, preferably by means of a dual-stage high-pressure gas regulator, capable of reducing inlet gas pressures of ~~2200 psi (15 MPa)~~ 15 MPa (2200 psi) to a constant low discharge pressure. Screw the pressure regulator inlet connection on to the container valve outlet. Connect the regulator outlet connection to the gas sampling pipe or to the gas analyzing equipment by means of metal or glass tubing, except that rubber tubing may be used to secure butt joints in metal-to-glass or glass-to-glass tubing. Take care to ensure that all tubing is clean and dry and the sampling apparatus is thoroughly purged of atmospheric gases before the test specimen is taken. Where a multiplicity of cylinders are to be sampled, follow Practice E 105 if it is considered satisfactory to sample less than the total number of containers.

4.2 *Nitrogen Shipped as a Liquid in Metal Containers and Used as a Gas*—Use the same sampling procedure as that for nitrogen shipped as a gas in high-pressure metal containers with the following exception: Extract gas samples from the container or containers preferably by means of a single-stage gas regulator capable of reducing inlet gas pressures of ~~250 psi (1.7 MPa)~~ 1.7 MPa (250 psi) to a constant low discharge pressure.

5. Test Methods

5.1 Determine the properties enumerated in this specification in accordance with the following methods:

5.1.1 *Nitrogen and Rare Gases*—Calculate by difference after oxygen and hydrogen values are known.

5.1.2 *Hydrogen*—Practice E 260. Determine the hydrogen content by methods mutually agreed upon between the purchaser and the supplier or by Practice E 260.

5.1.3 *Oxygen*—Practice E 260 or by methods mutually agreed upon between the purchaser and the supplier.

5.1.4 *Dew Point*—Test Methods D 2029.

6. Shipping

6.1 Package nitrogen in metal containers that comply with the requirements of, and are approved by the Department of Transportation. Ensure the inside of the cylinder is dry and free from oil and corrosive chemicals.

7. Keywords

7.1 electrical insulating material; nitrogen gas; oxygen gas

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TABLE 1 Composition and Properties for Nitrogen

	Type I	Type II	Type III
Nitrogen and rare gases, min, volume %	99.8	98.998	99.993
Hydrogen, max, volume %	0.0	1.0	0.005
Oxygen, max, volume %	0.2	0.002	0.002
Dew point, max, °C	-55	-55	-59