



Standard Test Method for Water Vapor Content of Gaseous Fuels by Measurement of Dew-Point Temperature¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the determination of the water vapor content of gaseous fuels by measurement of the dew-point temperature and the calculation therefrom of the water vapor content.

NOTE 1—Some gaseous fuels contain vapors of hydrocarbons or other components that easily condense into liquid and sometimes interfere with or mask the water dew point. When this occurs, it is sometimes very helpful to supplement the apparatus in Fig. 1 with an optical attachment² that uniformly illuminates the dew-point mirror and also magnifies the condensate on the mirror. With this attachment it is possible, in some cases, to observe separate condensation points of water vapor, hydrocarbons, and glycolamines as well as ice points. However, if the dew point of the condensable hydrocarbons is higher than the water vapor dew point, when such hydrocarbons are present in large amounts, they may flood the mirror and obscure or wash off the water dew point. Best results in distinguishing multiple component dew points are obtained when they are not too closely spaced.

NOTE 2—Condensation of water vapor on the dew-point mirror may appear as liquid water at temperatures as low as 0 to -10°F (-18 to -23°C). At lower temperatures an ice point rather than a water dew point likely will be observed. The minimum dew point of any vapor that can be observed is limited by the mechanical parts of the equipment. Mirror temperatures as low as -150°F (-100°C) have been measured, using liquid nitrogen as the coolant with a thermocouple attached to the mirror, instead of a thermometer well.

1.2 *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. Terminology

2.1 Definitions of Terms Specific to This Standard:

2.1.1 *saturated water vapor or equilibrium water-vapor content*—the water vapor concentration in a gas mixture that is in equilibrium with a liquid phase of pure water that is saturated with the gas mixture. When a gas containing water vapor is at the water dew-point temperature, it is said to be saturated at the existing pressure.

2.1.2 *specific volume*—of a gaseous fuel, the volume of the gas in cubic feet per pound.

2.1.3 *water dew-point temperature*—of a gaseous fuel, the temperature at which the gas is saturated with water vapor at the existing pressure.

3. Significance and Use

3.1 Generally, contracts governing the pipeline transmission of natural gas contain specifications limiting the maximum concentration of water vapor allowed. Excess water vapor can cause corrosive conditions, degrading pipelines and equipment. It can also condense and freeze or form methane hydrates causing blockages. Water-vapor content also affects the heating value of natural gas, thus influencing the quality of the gas. This test method permits the determination of water content of natural gas.

4. Apparatus

4.1 Any properly constructed dew-point apparatus may be used that satisfies the basic requirements that means must be provided:

4.1.1 To permit a controlled flow of gas to enter and leave the apparatus while the apparatus is at a temperature at least 3°F above the dew point of the gas.

4.1.2 To cool and control the cooling rate of a portion (preferably a small portion) of the apparatus, with which the flowing gas comes in contact, to a temperature low enough to cause vapor to condense from the gas.

4.1.3 To observe the deposition of dew on the cold portion of the apparatus.

4.1.4 To measure the temperature of the cold portion on the apparatus on which the dew is deposited, and

¹ This test method is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.05 on Determination of Special Constituents of Gaseous Fuels.

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² Several pieces of apparatus for this purpose are commercially available. Information concerning this apparatus is available from ASTM Headquarters.