



Standard Terminology Relating to Gaseous Fuels¹

This standard is issued under the fixed designation D 4150; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This standard defines the terms used in standards that are the responsibility of Committee D03 on Gaseous Fuels. These terms are used in:

- 1.1.1 The sampling of gaseous fuels,
- 1.1.2 The analysis of gaseous fuels for composition and various other physical properties, and
- 1.1.3 Other practices related to the processing, transmission, and distribution of gaseous fuels.

2. Referenced Documents

- 2.1 *ISO Standard:*
ISO NP 14532 Natural Gas—Terminology²

3. Terminology

acid gas—natural gas containing high concentrations of hydrogen sulfide or carbon dioxide, or both, which is acidic when in contact with water or water vapor.

associated gas—natural gas, also known as gas-cap gas or dome gas, that overlies and is in immediate contact, but not in solution, with crude oil in a reservoir.

at-line instrument—instrument requiring operator interaction to sample gas directly from the pipeline.

base conditions—temperature and pressure conditions at which natural gas volumes are determined for purposes of custody transfer. In natural gas measurement the properties of interest are temperature, pressure, and composition. Assuming ideal gas properties, for simplicity, tables of pure compounds can be prepared for use in calculating gas properties for any composition at “base conditions.” These “base conditions” are chosen near ambient.

Btu—British thermal unit, the amount of energy required to raise the temperature of one pound of water one degree

Fahrenheit. One Btu_{IT} (International Table) is equal to 1055.056 J.

compressed natural gas (CNG)—natural gas that is typically pressurized to 3600 psi. CNG is primarily used as a vehicular fuel.

compressibility—the property of a material that permits it to decrease in volume when subjected to an increase in pressure.

compressibility factor (z)—a factor calculated by taking the ratio of the actual volume of a given mass of gas at a specified temperature and pressure to its volume calculated from the ideal gas law at the same conditions.

dew point—the temperature at any given pressure at which liquid initially condenses from a gas or vapor. It is specifically applied to the temperature at which water vapor starts to condense from a gas mixture (**water dew point**), or at which hydrocarbons start to condense (**hydrocarbon dew point**).

dissolved gas—natural gas held in solution in reservoir liquids at the prevailing temperature and pressure of the reservoir.

dry gas—natural gas containing little or no water vapor.

gas quality—quality of gaseous fuel, which is defined by its composition and its physical properties.

gross heating value (also called higher heating value)—the amount of energy per volume transferred as heat from the complete, ideal combustion of the gas at standard temperature in which all the water formed by the reaction condenses to liquid.

hydrate—a solid, crystalline material composed of water and components of natural gas formed under pressure at temperatures above the freezing point of water.

hydrocarbon dew point—(see **dew point**)

inert components—those elements or components of natural gas (fuel gas) that do not contribute to the heating value.

in-line instrument—instrument whose active element is installed in the pipeline and measures at pipeline conditions.

lean gas—natural gas containing little or no hydrocarbons commercially recoverable as liquid products.

DISCUSSION—Water and recoverable hydrocarbons (ethane and heavier hydrocarbons) are customarily removed from natural gas to meet contractual or state statutory requirements.

¹ This terminology is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.92 on Terminology Classification and Specifications.

Current edition approved Aug. 10, 2003. Published September 2003. Originally approved in 1982. Last previous edition approved in 2000 as D 4150 – 00.

² Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

liquefied natural gas (LNG)—natural gas that has been liquefied, after processing, for storage or transportation purposes. (This definition is from ISO NP 14532.)

natural gas—a naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in porous geological formations (reservoirs) beneath the earth's surface, often in association with petroleum. The principal constituent of natural gas is methane.

natural gas odorant—an intensively smelling organic chemical or combination of chemicals (for example, sulfur compounds), added to fuel gases to impart a characteristic and distinctive (usually disagreeable) warning odor so gas leaks can be detected.

natural gas, processed—a methane-rich commercial gaseous product derived from naturally occurring gas mixtures by processing (also referred to as merchantable natural gas).

net heating value (also called lower heating value)—the amount of energy per volume transferred as heat from the complete, ideal combustion of the gas at standard temperature in which all the water formed by the reaction remains in the vapor state.

nonassociated gas—natural gas not in contact with, nor dissolved in, reservoir liquids.

on-line instrument—automated instrument that samples gas directly from the pipeline, but is installed externally.

relative density (specific gravity)—ratio of the density of the gaseous fuel, under specified conditions of temperature and pressure, to the density of normal dry air,³ at the same

temperature and pressure.

rich gas—natural gas containing commercially recoverable amounts of condensable hydrocarbons.

sour gas—natural gas containing concentrations of sulfur compounds which make it impractical to use without purification because of toxicity or corrosive effects, or both, on piping and equipment.

sweet gas—natural gas with sulfur compounds low enough that it can be used without further purification.

water dew point—(see **dew point**)

wet gas—natural gas that contains water vapor in excess of sales or contractual specifications, or both.

DISCUSSION—The term is subject to varying legal definition as specified by contract or state statutes.

Wobbe index—a numerical value that is calculated as the heat value (calorific value/heat) on a volume basis at specified reference conditions, divided by the square root of the relative density at the same specified reference conditions. The Wobbe index is a measure of heat input to gas appliances derived from the orifice flow equation. It indicates the relative amount of energy that would flow through a small burner orifice jet.

³ *Journal of Research*, National Institute of Standards and Technology, Vol 83, pp. 419, 1978.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).