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Standard Specification for Methane Thermophysical Property Tables[1]

This standard is issued under the fixed designation D 3956; 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.

ε1 NOTE—Footnote 2 was editorially corrected in November 2005.

1. Scope

1.1 The methane thermophysical property tables are for use in the calculation of the pressure-volume-temperature (PVT), thermodynamic, and transport properties of methane for process design and operations. Tables are provided for gaseous and liquid methane at temperatures between 90 and 600K at pressures to 200 MPa. These tables were developed by the National Institute of Standards and Technology (formerly the National Bureau of Standards) upon culmination of four years of effort in acquiring available physical properties data, in performing experimental measurements, and in formulating these tables for use in thermal computations.

2. Sponsorship

2.1 The preparation of the tables and supporting work was done by the National Institute of Standards and Technology (NIST) under the sponsorship of the Gas Research Institute, the American Gas Association, and the Standard Reference Data Program of NIST.

3. Applicability

3.1 These tables apply directly only to pure gaseous and liquid methane. However, it is expected that they will find substantial use in mathematical models and tables for the thermophysical properties of mixtures containing methane, such as natural gas.

4. Tables

4.1 These thermophysical property tables[2] are:

4.1.1 *Thermophysical Properties of Coexisting Gaseous and Liquid Methane*, in SI units (Table in Appendix E, pp. 584–586).[3]

4.1.2 *Thermophysical Properties of Methane Along Isobars*, in SI units (Table in Appendix E, pp. 588–641).[3]

4.2 These tables were produced by equations from a computer package, "NIST Thermophysical Properties of Fluids Database 12" (also designated MIPROPS) of the Standard Reference Data Program of NIST.[4] A wide selection of units (SI units, engineering units, chemical units) is available with this program.

5. Additional Information

5.1 These tables were originally published by the American Chemical Society and the American Institute of Physics for the National Institute of Standards and Technology in a comprehensive report titled "Thermophysical Properties of Fluids. II. Methane, Ethane, Propane, Isobutane and Normal Butane."[5] This report also contains the following:

5.1.1 Properties and uncertainties data,

5.1.2 Correlation equations for methane,

5.1.3 Description of the research study culminating in the tables,

5.1.4 References to properties data, and

5.1.5 Computational methods used.

6. Keywords

6.1 natural gas tables

[1] This standard is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.08 on Thermophysical Properties.

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[2] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: D03–1001.

[3] Table from *Journal of Physical and Chemical Reference Data*, Vol 16, 1987.

[4] Available from Standard Reference Data, National Institute of Standards and Technology (NIST), 100 Bureau Drive, Stop 3460, Gaithersburg, MD 20899.

[5] Younglove, B. A., and Ely, J. F., *Journal of Physical and Chemical Reference Data*, Vol 16, 1987, pp. 577–798. Available from the American Chemical Society, Distribution Office, 1155 Sixteenth St. N.W., Washington, DC 20036-9976.