This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: D8000 – 15 (Reapproved 2020)

Standard Practice for Flow Conditioning of Natural Gas and Liquids[1]

This standard is issued under the fixed designation D8000; 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 practice covers flow conditioners that produce a fully developed flow profile for liquid and gas phase fluid flow for circular duct sizes 1- to 60-in. (25.4- to 1525-mm) diameter and Reynolds Number (Re) ranges from transition (100) to 100 000 000. These flow conditioners can be used for any type of flow meter or development of a fully developed flow profile for other uses.

1.2 The central single-hole configuration that is derived using fundamental screen theory is referenced as the flow conditioner described herein.

1.3 Piping lengths upstream and downstream of a flow conditioner are considered a critical component of a flow conditioner and constitute the complete flow conditioner system.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D4150 Terminology Relating to Gaseous Fuels

2.2 *AGA Standard:*[3]

AGA Report No. 8 Compressibility Factor of Natural Gas and Related Hydrocarbon Gases

3. Terminology

3.1 Refer to Terminology D4150 for general definitions related to gaseous fuels. Definitions specific to this standard follow.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *annuli, n*—ring-shaped object, structure, or region.

3.2.2 *axial symmetry, n*—symmetry around an axis; an object is axially symmetric if its appearance is unchanged if rotated around an axis.

3.2.3 *Reynolds number, n*—dimensionless number used in fluid mechanics to indicate whether fluid flow past a body or in a duct is steady or turbulent.

3.2.4 *velocity profile, n*—variation in velocity along a line at right angles to the general direction of flow.

4. Significance and Use

4.1 Flow conditioners are used for the conditioning of the turbulent flow profile of gases or liquids to reduce the ADD (velocity profile distortion) DEL (turbulence), swirl, or irregularities caused by the installation effects of piping elbows, length of pipe, valves, tees, and other such equipment or piping configurations that will affect the reading of flow measurement meters thus inducing measurement errors as a result of the flow profile of the gas or liquid not having a fully developed flow profile at the measurement point.[4]

5. Flow Conditioner Design Methodology

5.1 *Pipe Flow Profiles*—Almost any description can be prescribed by using the perforated plate utilizing screen theory. That is, any upstream velocity profile, U_1, can be changed to a downstream velocity profile, U_2, with the use of a screen (herein referred to as a flow conditioner) (see Fig. 1).

[1] This practice is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.12 on On-Line/At-Line Analysis of Gaseous Fuels.

Current edition approved Nov. 1, 2020. Published December 2020. Originally approved in 1986. Last previous edition approved in 2015 as D8000 – 15. DOI: 10.1520/D8000-15R20.

[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* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from the American Gas Association, 400 N. Capital St., NW, Washington, DC 20001, www.techstreet.com/aga.

[4] Per various Coriolis Flow Meter manufacturer statements: A Coriolis Flow Meter reportedly does not require flow conditioning, therefore this ASTM standard does not apply.

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