CGA H-3—2013

CRYOGENIC HYDROGEN STORAGE

SECOND EDITION

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Work Item 08-062
Hydrogen Technology Committee

NOTE—Technical changes from the previous edition are underlined.

NOTE—Appendices A and B (Informative) are for information only.

SECOND EDITION: 2013
FIRST EDITION: 2006

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1 Introduction

This standard contains the suggested minimum design and performance requirements for shop-fabricated, vacuum-insulated cryogenic tanks (vertical and horizontal) intended for above ground storage of liquid hydrogen.

2 Scope

This standard applies to liquid hydrogen storage tanks with maximum allowable working pressures (MAWP) up to and including 175 psi (1210 kPa).[1,2] Tanks less than 1000 gal (3785 L) gross volume or greater than 25 000 gal (94 600 L) gross volume and all transportable containers are excluded. Tanks outside these pressure and volume constraints may also meet the requirements of this standard when agreed upon by the owner/manufacturer and the authority having jurisdiction (AHJ). This standard does not include operation and installation requirements or emergency response information.

3 Definitions

For the purpose of this standard, the following definitions apply.

3.1 Ancillary equipment
Group of components used for operation of the tank including valves, gauges, fittings, telemetry systems, etc.

3.2 Annular space
Volumetric space between the inner vessel and outer jacket that contains insulation materials and is evacuated to lessen heat flux.

3.3 Annular space piping
Interconnected piping between the inner vessel and outer jacket.

3.4 Cold net volume
Net capacity of the inner vessel at –423 °F (–253 °C) in liters or gallons.

NOTE—This value is also referred to as the full trycock volume or the net liquid capacity of the inner vessel. It may be expressed as the cold gross volume minus the ullage (vapor space) of the inner vessel.

3.5 Cold spot
Surface temperature that is 10 °F (5 °C) or more below ambient in-the-shade air temperature.

3.6 Gross volume
Total internal volume of the inner vessel in liters or gallons.

3.6.1 Cold gross volume
Total internal volume at –423 °F (–253 °C).

NOTE—Cold gross volume is the warm gross volume adjusted for the thermal contraction of the inner vessel. It may be expressed as the cold net volume plus the ullage (vapor space) of the inner vessel.

3.6.2 Warm gross volume
Total internal volume at 68 °F (20 °C)

NOTE—Warm gross volume is frequently referred to as water volume.

3.7 Inner vessel
Internally pressurized envelope (including nozzle penetrations) that contains the liquid hydrogen.

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[1] kPa shall indicate gauge pressure unless otherwise noted as (kPa, abs) for absolute pressure or (kPa, differential) for differential pressure. All kPa values are rounded off per CGA P-11, *Metric Practice Guide for the Compressed Gas Industry* [1].

[2] References are shown by bracketed numbers and are listed in order of appearance in the reference section.