

TR 142-1:2025
(ICS 13.220; 23.020)

TECHNICAL REFERENCE

Hydrogen refuelling stations

– Part 1: Land transportation of gaseous hydrogen



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Foreword

This Technical Reference (TR) was prepared by the Working Group on Hydrogen Refuelling Stations set up by the Chemical Standards Committee.

This TR provides specifications and guidelines for high-pressure hydrogen transportation, hydrogen refuelling stations (HRS), and hydrogen transport vehicles. It addresses personnel competency requirements, equipment specifications, and installation requirements to support the implementation of hydrogen fuel cell vehicle (HFCV) applications.

This TR is intended for organisations involved in the design, construction, and operation of HRS and high-pressure hydrogen transport systems, including their safe handling and operation.

It complements the current Petroleum & Flammable Materials Transportation (P&FMT) criteria set out by the relevant authority.

This TR is a provisional standard made available for application over a period of three years. The aim is to use the experience gained to update the TR so that it can be adopted as a Singapore Standard. Users of the TR are invited to provide feedback on its technical content, clarity and ease of use. Feedback can be submitted using the form provided in the TR. At the end of the three years, the TR will be reviewed, taking into account any feedback or other considerations, to further its development into a Singapore Standard if found suitable.

It is presupposed that in the course of their work, users will comply with all relevant regulatory and statutory requirements. Some examples of relevant regulations and acts are listed in the Bibliography. The Singapore Standards Council and Enterprise Singapore shall not be responsible for identifying all of such legal obligations.

In preparing this TR, reference was made to the following publications:

1. EN 17339 – Transportable gas cylinders – Fully wrapped carbon composite cylinders and tubes for hydrogen
2. ISO 11119-2 – Gas cylinders – Design, construction and testing of refillable composite gas cylinders and tubes – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners
3. ISO 11120:2015 Gas cylinders – Refillable seamless steel tubes of water capacity between 150 l and 3000 l – Design, construction and testing
4. ISO 11515:2022 – Gas cylinders – Refillable composite reinforced tubes of water capacity between 450 l and 3000 l – Design, construction and testing
5. ISO 11623:2015 – Gas cylinders – Composite construction – Periodic inspection and testing
6. ISO 19881:2018 – Gaseous hydrogen – Land vehicle fuel containers
7. DOT 49 CFR § 178.37 – Specification 3AA and 3AAX seamless steel cylinders
8. IGC Doc 100/20 – Hydrogen cylinders and transport vessels

Permission has also been sought from the following organisations for the reproduction of materials from their publications into this standard:

1. Asia Industrial Gases Association

Adapted the Introduction from AIGA 092/15 Prevention of tow-away incidents

Reproduced the Introduction from AIGA 119/22 Overview on fleet safety technology and vehicle specification

2. European Industrial Gases Association

Reproduced the scope and segment of learning more about training from EIGA TS 03/20 Training: Induction and refresher training of drivers, management and other transport function personnel

Acknowledgement is made for the use of information from the above publications.

Attention is drawn to the possibility that some of the elements of this TR may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions. Where SSs are deemed to be stable, i.e. no foreseeable changes in them, they will be classified as "mature standards". Mature standards will not be subject to further review unless there are requests to review such standards.*
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Hydrogen refuelling stations – Part 1: Land transportation of gaseous hydrogen

1 Scope

This TR sets out provisions for the design, fabrication, operation, and periodic inspection and maintenance of high-pressure hydrogen transport vehicles for land transportation of gaseous hydrogen.

The scope covers designs for Type 1, Type 2, Type 3 and Type 4 cylinders and tubes, as well as specifications for the prime mover, skeletal trailer chassis, and running gears for tube trailers.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

DIN 74081	Coupling devices for articulated road trains; 50 fifth wheel; dimensions, requirements
ISO 1185	Road vehicles – Connectors for the electrical connection of towing and towed vehicles – 7-pole connector type 24 N (normal) for vehicles with 24 V nominal supply voltage
ISO 3842	Road vehicles – Fifth wheels – Interchangeability
ISO 7375-2	Road vehicles – Coiled tube assemblies for air brake connection between towing and towed vehicles – Part 2: Performance requirements
ISO 7638	Road vehicles – Connectors for the electrical connection of towing and towed vehicles
ISO 12098	Road vehicles – Connectors for the electrical connection of towing and towed vehicles – 15-pole connector for vehicles with 24 V nominal supply voltage
SS 152	Specification for identification of contents of industrial gas cylinders
SS 586 series	Specification for hazard communication for hazardous chemicals and dangerous goods