SLOVENSKI STANDARD
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Zunanje polnilne postaje za plinasti vodik in postopki polnjenja

Outdoor hydrogen refuelling points dispensing gaseous hydrogen and incorporating filling protocols

Gasförmiger Wasserstoff - Betankungsanlagen - Teil 1: Allgemeine Anforderungen

Points de ravitaillement en hydrogène en extérieur distribuant de l'hydrogène gazeux et intégrant des protocoles de remplissage

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 268.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

European foreword

This document (prEN 17127:2020) has been prepared by Technical Committee CEN/TC 268 “Cryogenic vessels and specific hydrogen technologies applications”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 17127:2018.

This document has been prepared under Mandate M/533 given to CEN by the European Commission and the European Free Trade Association.

It applies to hydrogen refuelling points dispensing gaseous hydrogen to vehicles compliant with GTR13, UNECE R134 or Regulation (EC) No 79/2009.

Introduction

The European Commission in its standardization request M/533 of March 12th, 2015, aims to ensure that technical specifications for interoperability of refuelling points are specified in European Standards compatible with the relevant International Standards. These specifications aim to meet the European needs, be compatible and aligned as much as possible with relevant International Standards and as far as possible with existing refuelling infrastructure already in place and leave room to accommodate the adopted standard to local technical, analytical and regulatory needs. The requested European Standards aim to be technologically and commercially neutral and based on the know-how currently in possession of the EU industry and of the public sector on a fair, reasonable and non-discriminatory basis.

According to the legal requirements given in the Alternative Fuels Infrastructure Directive (AFID) and M/533, European Standards specifying only the required specifications for ensuring the interoperability of refuelling points have to be provided. European standards and common requirements with respect to "interoperability" mean the capacity of an infrastructure to supply energy (in this document hydrogen) that is compatible with all vehicle technologies and allows seamless EU-wide mobility and a clear definition of fuel pressure and temperature levels and connector designs.

The European Standardization Organizations (ESOs) should adopt European Standards in accordance with Article 10 of Regulation (EU) No 1025/2012 of the European Parliament and of the Council, and those standards should be based on current International Standards or ongoing international standardization work, where applicable.

Direction from the standardization request M/533 for European Standards for hydrogen supply are to *develop European Standards containing technical solutions for interoperability with technical specifications in regard to Article 5 and point 2 of Annex II, in particular for:*

a) outdoor hydrogen refuelling points dispensing gaseous hydrogen;

b) hydrogen purity dispensed by hydrogen refuelling points;

c) fuelling algorithms and equipment of hydrogen refuelling points;

d) connectors for vehicles for the refuelling of gaseous hydrogen.

This document specifies Items a) and c).

Item b) is covered by EN 17124 and Item d) by EN ISO 17268.

1 Scope

This document defines the minimum requirements to ensure the interoperability of hydrogen refuelling points, including refuelling protocols that dispense gaseous hydrogen to road vehicles (e.g. Fuel Cell Electric Vehicles*)* that comply with legislation applicable to such vehicles.

The safety and performance requirements for the entire hydrogen fuelling station, addressed in accordance with existing relevant European and national legislation, are not included in this document.

NOTE Guidance on considerations for hydrogen fuelling stations is provided in ISO 19880-1.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 17124, *Hydrogen fuel - Product specification and quality assurance - Proton exchange membrane (PEM) fuel cell applications for road vehicles*

EN ISO 17268, *Gaseous hydrogen land vehicle refuelling connection devices (ISO 17268)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

NOTE Units used in this document follow SI (International System of Units).

3.1
compressed hydrogen storage system
CHSS
hydrogen storage on-board vehicle, as defined in the GTR#13

3.2
hydrogen fuelling station
facility for the dispensing of compressed hydrogen vehicle fuel, often referred to as a hydrogen refuelling station (HRS) or hydrogen filling station, including the supply of hydrogen compression, storage and dispensing systems

3.3
interoperability
capability of a hydrogen dispensing point to supply hydrogen at the fuelling station/vehicle interface that is compatible with road vehicles and allows seamless EU-wide mobility through applying clear definitions of connector designs, fuel quality, pressure levels, temperatures and other applicable considerations

3.4
maximum allowable working pressure
MAWP
maximum pressure permissible in a vessel or system at the temperature specified for the pressure

Note 1 to entry: The maximum allowable working pressure may also be defined as the design pressure, the maximum allowable operating pressure, the maximum permissible working pressure, or the maximum allowable pressure for the rating of pressure vessels and equipment manufactured in accordance with national pressure vessel codes.

Note 2 to entry: See Annex A for application of pressure terminology to hydrogen dispenser systems and vehicles.

3.5
maximum/minimum allowable temperature
TS
values of the maximum/minimum temperatures at which safe and good functioning of the component is ensured and for which it has been designed, as specified by the manufacturer

3.6
maximum operating pressure
MOP
highest pressure that is expected for a component or system during normal operation

Note 1 to entry: See Annex A for application of pressure terminology to hydrogen dispenser systems and vehicles.

3.7
nominal working pressure
NWP
pressure of a-vehicle CHSS at 100% SOC at a gas temperature of 15 °C

Note 1 to entry: See GTR13 Clause II-3.37, on Page 54.

Note 2 to entry: For road vehicles, this is typically 35 MPa or 70 MPa.

Note 3 to entry: See Annex A for application of pressure terminology to hydrogen dispenser systems and vehicles.

3.8
refuelling protocol
automated process to ensure safe filling of vehicles, called refuelling algorithms in the Alternative Fuel Infrastructure Directive (2014/94/EU)

3.9
state of charge
SOC
density (or mass) ratio of hydrogen in the compressed hydrogen storage system (CHSS) between the actual CHSS condition and the capacity at NWP when the system is equilibrated at 15 °C

Note 1 to entry: SOC is expressed as a percentage and is computed based on the gas density according to formula below.

Note 2 to entry: The accuracy of the NIST formula has been quantified to be to within 0,01 % from 255 K to 1 000 K with pressures to 120 MPa at the publishing of this document.

$$SOC\ (\%) = \frac{\rho(P,\ T)}{\rho(NWP, 15\,°C)} \times 100 \quad (1)$$

The hydrogen densities at the two major nominal working pressures are:

— density of H2 at 35 MPa and 15 °C = 24,0 g/l;

— density of H_2 at 70 MPa and 15 °C = 40,2 g/l

Note 3 to entry: The ρ(P,T) function for hydrogen is available from the National Institute of Standards and Technology (NIST) at http://www.boulder.nist.gov/div838/Hydrogen/PDFs/Lemmon.2008.pV113.N06.A05.pdf

3.10
hydrogen service level
HSL
pressure level in MPa used to characterize the hydrogen service of the dispenser based on the NWP rating of the vehicle

Note 1 to entry: The numerical value of HSL also matches the number after the "H" in Pressure Class.

Note 2 to entry: See Annex A for application of pressure terminology to hydrogen dispenser systems and vehicles.

3.11
pressure class
non-dimensional rating of components that indicates the components are designed to dispense hydrogen to road vehicles at the required pressure and temperature

Note 1 to entry: The numbers following 'H' in the pressure class are numerically the same as HSL, but the HSL identifies only the level of the dispensing service whereas the pressure class designation shows the component are fully capable of meeting the pressure and temperature requirements for dispensing hydrogen at the indicated service level.

Note 2 to entry: See Annex A for application of pressure terminology to hydrogen dispenser systems and vehicles.

3.12
maximum fuelling pressure
MFP
maximum pressure applied to the vehicle high pressure hydrogen system during refuelling. The maximum fuelling pressure is 125 per cent of the Nominal Working Pressure

Note 1 to entry: See GTR#13 Clause II-3.36, on Page 54.

Note 2 to entry: Also referred to as Maximum fill pressure.

3.13
target pressure
dispenser fuel pressure that the hydrogen fuelling protocol targets for the end of refuelling

3.14
dispensing system
system downstream of the hydrogen supply system comprising all equipment necessary to carry out the vehicle refuelling operation, through which the compressed hydrogen is supplied to the vehicle

3.15
dispenser fuel pressure
pressure of the hydrogen gas supplied to the vehicle by the refuelling point

Note 1 to entry: See Annex A for discussion of pressure terminology and its application to dispensing systems.

3.16
dispenser fuel temperature
temperature of the hydrogen gas supplied to the vehicle by the refuelling point

3.17
dispensing system MAWP
minimum value of induvial component MAWP

3.18
dispenser
equipment in the dispensing system, including the dispenser cabinet(s) and support structure, that is physically located in the fuelling area

Note 1 to entry: The hydrogen dispenser typically includes, as a minimum, the fuelling assembly, required temperature and pressure instrumentation, filters, and the user interface to conduct vehicle fuelling.

Note 2 to entry: The manufacturer of the hydrogen dispenser can elect to include additional equipment in the dispenser, including the possibility of all equipment in the dispensing system.

3.19
dispenser cabinet
protective housing that encloses process piping and can also enclose measurement, control and ancillary dispenser equipment