
Vozila na zemeljski plin - Polnilne naprave za vozila na zemeljski plin

Natural gas vehicles - Vehicle fuelling appliances

Erdgasbetriebene Fahrzeuge - Fahrzeuge Füllanlagen

Véhicules fonctionnant au gaz naturel - Bornes de distribution de carburant véhicules

Ta slovenski standard je istoveten z: prEN 17278[oSIST prEN 17278:2020](https://standards.iteh.ai/catalog/standards/sist/a7db9339-c633-4c49-a0ab-1b3227e29133/osist-pren-17278-2020)<https://standards.iteh.ai/catalog/standards/sist/a7db9339-c633-4c49-a0ab-1b3227e29133/osist-pren-17278-2020>**ICS:**

43.060.40	Sistemi za gorivo	Fuel systems
75.060	Zemeljski plin	Natural gas

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 17278

March 2020

ICS 75.200

English Version

Natural gas vehicles - Vehicle fuelling appliances

Véhicules fonctionnant au gaz naturel - Bornes de distribution de carburant véhicules

Erdgasbetriebene Fahrzeuge - Fahrzeuge Füllanlagen

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European foreword

This document (prEN 17278:2020) has been prepared by Technical Committee CEN/TC 326 “Natural gas vehicles – Fuelling and operation”, the secretariat of which is held by NEN and TSE.

This document is currently submitted to CEN Enquiry.

This document has been prepared under mandate M/071 given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the European Directive 2014/68/EU.

For relationship with European Directive 2014/68/EU, see informative Annex ZA, which is an integral part of this document.

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1 Scope

This document covers the design and manufacturing, installation and testing, operation and maintenance for vehicle fuelling appliances (VFAs) – the assemblies of the pressure equipment with limited technical parameters, intended for the non-commercial fuelling of natural gas vehicles (NGVs) with compressed natural gas (CNG).

This document is applicable to VFAs supplied with natural gas as defined in local applicable gas composition regulations or EN 16723-2, or with other gases meeting these requirements including biomethane, upgraded coal-bed methane (CBM) and gas from liquefied natural gas (LNG) vaporizer (on-site or off-site).

In case of combination of the certified VFA assembly with additional equipment, such as external storage and/or dispenser, EN ISO 16923 applies to the new assembly - the certified VFA assembly with added external equipment.

In case of combinations of interconnected VFA assemblies, EN ISO 16923 applies to the whole new assembly of the certified VFA assemblies.

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 1779:1999, *Non-destructive testing - Leak testing - Criteria for method and technique selection*

EN 60204-1:2018, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*

EN 60079-10-1:2015, *Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres*

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code)*

EN 13445-1:2014, *Unfired pressure vessels — Part 1: General*

EN 13480-1:2017, *Metallic industrial piping — Part 1: General*

EN 16723-2:2017, *Natural gas and biomethane for use in transport and biomethane for injection in the natural gas network - Part 2: Automotive fuels specification*

EN ISO 4126-1:2013, *Safety devices for protection against excessive pressure - Part 1: Safety valves (ISO 4126-1:2013)*

EN ISO 4126-3:2006, *Safety devices for protection against excessive pressure — Part 3: Safety valves and bursting disc safety devices in combination*

EN ISO 9809-1:2019, *Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing. Quenched and tempered steel cylinders with tensile strength less than 1100 MPa*

EN ISO 9809-2:2019, *Gas cylinders — Refillable seamless steel gas cylinders — Design, construction and testing — Quenched and tempered steel cylinders with tensile strength greater than or equal to 1 100 MPa*

EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 14469:2017, *Road vehicles - Compressed natural gas (CNG) refuelling connector (ISO 14469:2017)*

EN ISO 30013:2011, *Rubber and plastics hoses - Methods of exposure to laboratory light sources - Determination of changes in colour, appearance and other physical properties (ISO 30013:2011)*

EN IEC 60079-0:2018, *Explosive atmospheres — Equipment — General requirements*

ISO 18119:2018, *Gas cylinders — Seamless steel and seamless aluminium-alloy gas cylinders and tubes — Periodic inspection and testing*

ISO 11119-1:2012, *Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 1: Hoop wrapped fibre reinforced composite gas cylinders and tubes up to 450 l*

ISO 11119-2:2012, *Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 l with load-sharing metal liners*

ISO 11119-3:2013, *Gas cylinders — Refillable composite gas cylinders and tubes — Design, construction and testing — Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450L with non-load-sharing metallic or non-metallic liners*

ISO 11119-4:2016, *Gas cylinders — Refillable composite gas cylinders — Design, construction and testing — Part 4: Fully wrapped fibre reinforced composite gas cylinders up to 150 l with load-sharing welded metallic liners*

EN ISO 15609-1:2019, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*

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>

3.1

automatic restart

system designed to initiate a fuelling sequence without a physical action by a person at the appliance

3.2

biomethane

gas comprising principally methane, obtained from either upgrading of biogas or methanation of bio-syngas

[SOURCE: EN 16723-2:2017, 3.3]

prEN 17278:2019 (E)**3.3****breakaway device**

coupling which separates at a predetermined section when required and each separated section contains a self-closing shut-off valve which seals automatically

[SOURCE: EN ISO 16923:2018, 3.5]

3.4**burst pressure**

pressure which causes failure and consequential fluid loss through the component envelope

[SOURCE: EN ISO 16923:2018, 3.8]

3.5**compressed natural gas**

natural gas that has been compressed and stored for use as vehicle fuel

[SOURCE: EN ISO 16923:2018, 3.12]

3.6**compressor**

system that is inherent to the VFA, which increases the pressure of gas from a lower to a higher level

3.7**cylinder**

pressure vessel designed to store CNG (standards.iteh.ai)

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3.8**domestic area**

area where people live and possibly work

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EXAMPLE A yard or a garage of a private house.

3.9**dryer**

equipment which decreases the water vapour content (moisture) of natural gas

[SOURCE: EN ISO 16923:2018, 3.16]

3.10**enclosure**

structure being not a building or canopy that encloses a component of the fuelling station

EXAMPLE Housing, container and machine cabinet.

[SOURCE: EN ISO 16923:2018, 3.17]

3.11**examiner**

person who has been appointed to verify compliance with the applicable standard

Note 1 to entry: In certain cases, an external independent examiner can be required.

[SOURCE: EN ISO 14732:2013, 3.12]

3.12**fast leakage**

leakage inside the VFA component that results in a sudden pressure drop in this component, which can be detected by pressure sensing means

3.13**fuelling pressure discharge system**

system that is inherent to the VFA, which is designed to reduce the pressure of CNG in the fuelling nozzle to allow safe disconnection from the NGV

3.14**fuel delivery system**

system that is inherent to the VFA, which is intended for CNG delivery from the VFA to the vehicle, including a fuelling hose, a fuelling nozzle and a break-away device

3.15**gas containment system**

system that is inherent to the VFA, which comprises at least one cylinder and its associated safety devices

3.16**hose**

pipeline of flexible material with end fittings attached

[SOURCE: EN ISO 16923:2018, 3.31]

3.17**locking system**

system that is inherent to the VFA, which is designed to block the activation of VFA functions for unauthorized access

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3.18**maximum allowable pressure**

maximum pressure to which a component or system is designed to be subjected during normal operation

3.19**natural gas**

complex gaseous mixture of hydrocarbons, primary methane, but generally includes ethane, propane and higher hydrocarbons, and some non-combustible gases such as nitrogen and carbon dioxide

Note 1 to entry: Natural gas can also contain components or containments such as sulfur compounds and/or other chemical species.

[SOURCE: EN 16723-2:2017, 3.12]

3.20**non-domestic area**

area where people do not live, but only work

EXAMPLE A territory, a workshop or a garage of a small commercial entity.

3.21**non-commercial fuelling**

fuelling for own needs, not for the retail of CNG

prEN 17278:2019 (E)**3.22****periodic inspection**

thorough examination by a qualified person, of which records are made to provide the basis for a continuing evaluation

3.23**qualified person**

person whose competence and knowledge have been obtained by education, training and/or relevant practical experience

Note 1 to entry: In order to demonstrate the level of competence and knowledge, a qualification test may be required.

[SOURCE: EN ISO 3834-1:2005, 3.2]

3.24**slow leakage**

leakage inside the VFA component, which is detected by gas sensing means (internal or external)

Note 1 to entry: Slow leakage cannot be detected by pressure sensing means.

3.25**temperature compensation system**

system or device intended to limit the maximum gas outlet pressure.

3.26**user**

person who operates the VFA

3.27**vehicle fuelling appliance**

device, being manufactured, tested and certified as a single appliance, intended for non-commercial fuelling of NGVs with CNG enabling the fuelling directly into NGV's onboard fuel tank(s)

4 Abbreviations

CNG	compressed natural gas
MAWP	maximum allowable working pressure
NGV	natural gas vehicle
PRD	pressure relief device
TPRD	temperature pressure relief device
VFA	vehicle fuelling appliance

5 Risk management

Risk assessment shall follow the techniques described in EN ISO 12100 for assessment of machinery safety.

The VFA shall be designed to minimize risk to users, servicing personnel, properties, and environment.

Risk assessment shall include design, construction, operation and maintenance of the VFA. The risk assessment process shall be used to evaluate the consequences of hazardous events and to determine appropriate means of risk reduction and/or mitigation of consequences.

Measures to reduce fire and explosion risks shall be applied, including but not limited to:

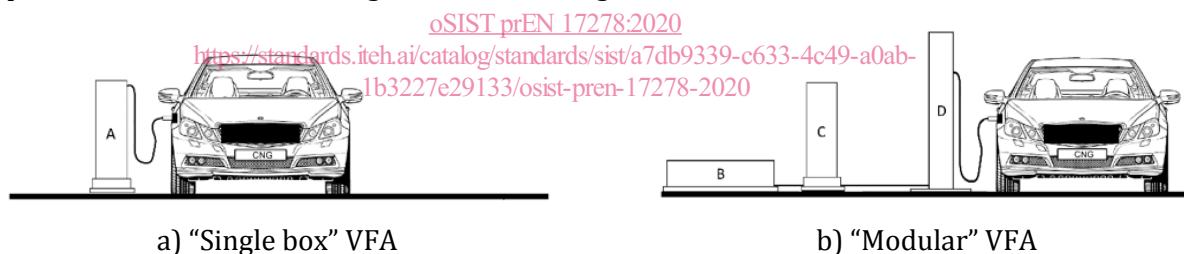
- a) prevention of the formation of a flammable or explosive mixture;
- b) prevention of static charge build-up;
- c) avoidance of ignition sources;
- d) mitigation of the effects of a fire or explosion.

Protection from ignition in explosive atmospheres shall be by the use of protection systems defined in EN IEC 60079-0.

6 General principles of design

6.1 General construction

The possible variants of VFA design are shown in Figure 1.



Key

- | | | | |
|---|----------------------------|---|----------------------------|
| A | body of a "single box" VFA | C | module 2 of a "modular VFA |
| B | module 1 of a "modular VFA | D | module 3 of a "modular VFA |

Figure 1 — General design of VFA

The VFA shall be equipped with a:

- a) fuel delivery system;
- b) fuelling pressure discharge system;
- c) locking system;
- d) compressor and/or gas containment system.

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The VFA can also be equipped with one or more of the following components:

- a dryer;
- a temperature compensation system with maximum pressure of 200 bar.

The VFA shall be certified by examiner as a unit. VFAs having gas containment system higher than 25 bar-l are subject to the European legislation for pressure equipment.

6.2 General requirements

The following requirements apply in the VFA design:

- 1) The pressure vessels of the VFA shall comply with EN 13445-1.
- 2) The piping of the VFA shall comply with EN 13480-1.
- 3) The number of connections and other possible points of leakage or release of gas to the atmosphere in the installation and equipment shall be minimized.
- 4) The generation of the possibility of a confined explosive atmosphere shall be avoided.
- 5) Fire and explosion risk prevention shall take into account foreseeable malfunctions and misuse.
- 6) The mounting of equipment shall be suitable for local conditions.
- 7) Barriers or other mechanisms to protect the VFA from collision damage shall be provided, if the VFA is exposed to the risk of vehicle collision.
- 8) The VFA shall shut down safely in the event of a loss of power.
- 9) The VFA shall have means of ensuring that oil carryover from the compressor, dust, water and other contaminants in the gas stream meet the requirements of EN 16723-2.
- 10) The specific climatic conditions of the site location and expected minimum and maximum temperatures during operation shall be taken into account.
- 11) Means ensuring maximal fuelling pressure 200 bar with temperature compensation (200 bar at 20 °C) shall be provided.

All VFA components, piping and fittings shall be manufactured, marked and assembled in a manner suitable for their intended use, applying the principles of sound engineering practice, to be suitable for the full range of pressures, temperatures, weather conditions and loadings which can occur under normal and fault conditions.

6.3 Materials

All materials shall be:

- a) suitable for their intended application;
- b) resistant to the rated temperature extremes, corrosion, moisture, natural gas or biomethane and aging.