SLOVENSKI STANDARD
oSIST prEN 17963:2023

01-maj-2023

Vozila na zemeljski plin - Postopki polnjenja vozil na utekočinjeni zemeljski plin

Natural gas vehicles - LNG vehicle fuelling procedures

Betankungsabläufe für LNG-Fahrzeuge

Ta slovenski standard je istoveten z: **prEN 17963**

ICS:

75.060	Zemeljski plin	Natural gas
75.200	Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment

oSIST prEN 17963:2023 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 17963

April 2023

ICS 75.200

English Version

Natural gas vehicles - LNG vehicle fuelling procedures

Betankungsabl?fe f? LNG-Fahrzeuge

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 17963:2023) has been prepared by Technical Committee CEN/TC 326 “Natural gas Vehicles”, the secretariat of which is held by TSE.

This document is currently submitted to the CEN Enquiry.

Introduction

This document addresses the general operational and safety instructions for fuelling of LNG vehicles. Training of LNG vehicle drivers is not part of this procedure.

1 Scope

This document provides guidelines for safe fuelling operations of vehicles that use liquefied natural gas (LNG) as a fuel for propulsion, covering the activities and procedures to be followed for safe operation. It provides procedures applicable to different fuelling systems and technologies.

NOTE The document has been based on the consideration that it is the employers' duty to protect the health, safety and welfare of the employees (as organized in Directive 89/391 EEC).

As such, it is considered to be the responsibility of the driver's employer to ensure that LNG vehicle drivers are properly trained.

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 511, *Protective gloves against cold*

EN ISO 16321-1, *Eye and face protection for occupational use - Part 1: General requirements (ISO 16321-1)*

3 Terms and definitions

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

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

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
LNG vehicle fuel system
assembly of components (tank(s), valves, flexible fuel lines, etc.) and connecting parts (rigid fuel lines, pipes fitting, etc.) fitted on motor vehicles using LNG in their propulsion system

3.2
liquefied natural gas
LNG
natural gas that has been liquefied, after processing, for storage or transportation purposes used as a transport fuel, regardless of its production pathways (e.g. renewable, synthetic or fossil)

3.3
vehicle tank
cryogenic tank mounted on a vehicle for the storage of LNG as a fuel

3.4
ignition source
source of energy sufficient to ignite a flammable atmosphere

3.5
dispenser
equipment through which the liquefied natural gas is supplied to the vehicle

3.6
operator
person executing the fuelling

3.7
cryogenic burns
cold burns caused by cryogenic gas

4 LNG fuelling operations

4.1 General

How to operate the dispenser can vary from station to station. This paragraph sets out the general instructions for this activity. Specific operating instructions shall be provided at the station.

4.2 Safety precautions

4.2.1 General

Before starting fuelling, the operator shall ensure that no ignition sources (e.g. naked flames, exposed incandescent material, sparks, electrical equipment) are present in the close surroundings of the vehicle and the no smoking prescription is met. Fuelling shall not take place during thunderstorms.

Before starting fuelling, the operator shall read the emergency procedures of the station.

4.2.2 Personal safety

During the entire fuelling operation, it is necessary to protect operator against cryogenic burns. Operator shall at least wear the following protective equipment:

— Face shield (EN ISO 16321-1);

— Long cryogenic gloves (EN 511);

— Clothes with long sleeves fully covering exposed skin including legs and arms;

— Closed shoes.

4.3 Pre-fuelling

4.3.1 General

Tanks can be filled at the station only if they are in the proper conditions of pressure and temperature. If tank conditions are not suitable for fuelling, the vapour pression reduction procedure listed in 4.4.5 shall be followed.

If the vehicle has been parked with an empty tank for several days, the Vehicle tank is considered “warm” (i.e. expected close to ambient temperature) and the specific procedure in Annex B shall be followed.

4.3.2 Pre-fuelling conditions

Before fuelling the vehicle shall be parked in the proper area and the following requirements shall be met:

— parking brake activated

— engine turned off

— external heating/cooling (e.g. cabin heating, refrigeration system, etc.) turned off

— windows of the vehicle closed

— electronic devices left inside the vehicle.

4.4 Fuelling operations

4.4.1 General

If all the pre-fuelling requirements are met, the operator can start fuelling operation.

4.4.2 Identification

If requested at the station, the operator shall start the identification procedure.

Operator may be asked to select the fuel type (i.e. “cold”/“unsaturated” or “warm”/“saturated”), or vehicle brand.

4.4.3 Grounding

If the instructions at the station prescribe the use of a grounding connection, the dispenser’s grounding cable shall be connected to the prescribed point on the vehicle tank.

4.4.4 Preparation of LNG nozzle connection

Tank cap shall be removed from the vehicle tank. Operator shall visually check that fuelling equipment on the dispenser and vehicle tank are not damaged; operator shall clean both nozzle and receptacle with the dispenser’s air blow gun.

4.4.5 Vapour pressure reduction

4.4.5.1 General

Pressure inside the tank can be higher than the supply pressure at the station. To allow fuelling operations, tank pressure shall be adjusted to the level required by the station. Pressure adjustment procedure depends on the type of vehicle tank connection, as described below.

4.4.5.2 Separate vapour return

If the vehicle has a separate vapour return connection, the following procedure applies:

— Remove the LNG vehicle tank vapour return cap. Remove the vapour return hose from its holder on the dispenser.

— Use the dispenser’s air blow gun to clean the vapour return hose and the vapour return connection point on the LNG vehicle’s tank.

— Attach the vapour return hose to the connection point.

— Open the shut-off (vent-to-station valve) valve on the tank of the vehicle.

— Monitor the pressure decrease on the vehicle tank pressure gauge.

— Once vapour return automatically stops or the desired pressure of the vehicle’s Vehicle tank is reached, close the shut-off valve on the vehicle tank.

— Disconnect the vapour return hose.

— Use the air blow gun to clean both the vehicle tank connection point and the vapour return hose.

— Place the vapour return hose back to its holder.

4.4.5.3 Integrated vapour return

If the vehicle tank has a single connection point with no separate vapour return connection, vapour return will occur through the fill line and the following procedure applies:

-Connect the LNG nozzle to the vehicle tank.

NOTE Nozzle designs can vary; current nozzle designs foresee that the connection is done by pushing the two nozzle's levers in one single gentle motion towards the vehicle and/or turning the coupler on the connection point until it locks into place.

— Open shut-off valve (vent-to-station valve) on the vehicle tank.

— Press start button (if required).

— Monitor the pressure decrease on the vehicle tank pressure gauge.

— Once vapour return automatically stops or the desired pressure of the vehicle tank is reached, close the shut-off valve on the vehicle tank.

4.4.5.4 Fuel the tank

4.4.5.4.1 Nozzle connection

If it has not been done before, the LNG nozzle shall be connected to the vehicle tank.

NOTE Nozzle designs can vary. Current nozzle designs foresee that the connection is done by pushing the two nozzle's levers in one single gentle motion towards the vehicle and/or turning the coupler on the connection point until it locks into place.

4.4.5.4.2 Fuelling operation

The start button shall be pressed. Some stations require pressing a button ("dead-man" button) throughout the entire refuelling procedure, while others require operating a button at a regular frequency indicated in the station's instructions. Any other instruction provided at the station, on dispenser screen or fuelling instructions, shall be followed.

Fuelling shall not start immediately as the dispenser can require pre-cooling before fuelling starts. This will usually be indicated on the dispenser display.

Refuelling automatically stops once the tank is filled to maximum capacity; the operator shall not attempt to fuel further, in order to avoid exceeding the maximum capacity of the tank.

Refuelling also stops if:

— The dead-man button is released or is not operated in due time;

— One of the station's safety systems is triggered;

— The emergency stop is activated.