



SLOVENSKI STANDARD
oSIST prEN ISO 5124:2023
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**Nalaganje in raztovarjanje cistern/kontejnerjev z utekočinjenim zemeljskim plinom
(ISO/DIS 5124:2023)**

LNG tank wagon/container loading & unloading (ISO/DIS 5124:2023)

Anlagen und Ausrüstung von LNG - Anwendungen von LNG Kesselwagen (ISO/DIS 5124:2023)

Chargement et déchargement de wagons-citernes/conteneurs de GNL (ISO/DIS 5124:2023)

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ICS:

75.200	Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment
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LNG tank wagon/container loading & unloading

Chargement et déchargement de wagons-citernes/conteneurs de GNL

ICS: 75.200

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 67/SC9, *Production, transport and storage facilities for cryogenic liquefied gases*.

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LNG tank wagon/container loading & unloading

1 Scope

This International Standard gives guidelines and recommendations for the design, construction and operation for newly installed liquefied natural gas (LNG) railway loading and unloading facilities for use on onshore LNG terminals, LNG satellite plants, handling LNG tank wagons or tank containers engaged in (inter)national trade.

This International Standard is supplementary to local or national standards and regulations:

The designated boundary limits of this standard are between the LNG terminal's inlet/outlet piping headers at the beginning of the rail (un)loading area and the rail track area used for tank wagons/containers. It includes all rail loading bays, weighbridge(s) and related hereto subsystems.

2 Normative references

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

ISO 8943, *Refrigerated light hydrocarbon fluids – sampling of liquefied natural gas – Continuous method*

ISO 16903, *Petroleum and natural gas industries — Characteristics of LNG, influencing the design, and material selection*

ISO 21593, *Ships and marine technology — Technical requirements for dry-disconnect/connect couplings for bunkering liquefied natural gas*

EN 1473:2021, *Installation and equipment for liquefied natural gas — Design of onshore installations*

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:

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

3.1 ageing of LNG

the gradual change in the molecular composition of LNG throughout the supply chain caused by differential evaporation because LNG has components with different boiling points

3.2 boil-off gas BOG

natural gas resulting from slow evaporation of LNG at its equilibrium state or rapid evaporation of LNG, also called flashing, inside equipment

3.3 control room

core functional entity, and its associated physical structure, where control room operators are stationed to carry out centralized control, monitoring and administrative responsibilities

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3.4

emergency release coupling

ERC

a device to provide a means of quick emergency disconnection of hose transfer systems as well as loading arms when such action is required only as an emergency measure

3.5

emergency shut down

ESD

method that safely and effectively stops the whole plant or individual sections to minimize incident escalation

3.6

flare

system to ignite the vapour on a safe location in a controlled manner

3.7

impounding basin

area defined at the site for the purpose of collecting any accidental spill of hydrocarbons

3.8

LNG

colourless and odorless cryogenic fluid in the liquid state at normal pressure composed predominantly of methane which can contain minor quantities of ethane, propane, butane, nitrogen, or other components normally found in natural gas LNG is designated as "UN 1972" by United Nations.

3.9

LNG Tank wagon

a railway goods wagon with a tank and loading/ discharge arrangement for the transport of LNG permanently mounted

3.10

LNG Tank container

a transportable tank for the transport of LNG that may be mounted on railway wagons and may also be loaded or unloaded while mounted.

3.11

local regulation

set of rules, laws, national agreements, international conventions which apply to a site

3.12

natural gas

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

3.13

quick connect disconnect coupler

QCDC coupler

manual or hydraulic mechanical device used to connect the transfer system to the LNG tank wagon/container

3.14

transfer

loading or unloading operation

3.15

transfer system

flexible (hose) or rigid (articulated arm) transfer system used for transferring LNG between terminal and LNG tank wagon/container

Note 1 to entry: It can be referred to as a "loading arm or loading hose" or "unloading arm or unloading hose".

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

BOG	Boil-off gas(es)
ESD	emergency shutdown
LNG	liquefied natural gas
NG	natural gas
N₂	nitrogen gas
QCDC	quick connect disconnect coupler

5 Equipment design & operations

5.1 LNG tank wagon

The tank shall be designed, homologated, tested and equipped according to the requirements of dangerous goods transport of the national regulatory body following the UN transport recommendations [orange book, e.g. RID for Europe and MED]. Regular inspections and maintenance shall be performed according to the applicable laws and regulations for dangerous goods applicable for LNG UN1972.

The dimensions of a tank wagon shall be chosen in a way that payload and tank volume are corresponding when loaded with LNG. The wagon shall be in line with regional responsible local railway regulations. It shall be homologated, registered and be maintained according to regional and domestic railway regulations.

Tank wagons shall be equipped with cabinets on both sides of the wagon which contain the operating valves and connections. It is recommended to execute these cabinets to work as drip trays.

5.2 LNG tank container

The tank shall be designed, tested and equipped according to the requirements of IMO-IMDG or requirements of the valid national regulatory body following the UN transport recommendations [orange book, e.g. RID for Europe and MED]. Regular inspections and maintenance shall be performed according to the applicable laws and regulations for dangerous goods mandatory for LNG UN1972.

The dimensions of a tank container shall be chosen in a way that payload and tank volume are corresponding when loaded with LNG. The tank container shall be homologated either according to IMO-IMDG regulations or according to local regulations in case of use for domestic transport only.

Tank containers shall be equipped with cabinets which contain the operating valves and connections. These shall be provided on the side or at the face of the tank container. It is recommended to execute these cabinets to work as drip trays.

5.3 Tanks for tank wagons and tank containers

Tanks for the transport of LNG shall provide the following connections:

- Product connection Liquid phase
- Product connection Vapour phase
- Drive away protection
- Electric earthing connecting point

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- Air connection, if applicable

Tanks shall provide the following equipment:

- Overpressure protection valve
- Thermal relief valves on lines between block valves
- Closing installation for first closure valves in case the wagon moves

It can be useful to provide a regasification / pressurizing circuit to speed up the discharge in case no external source of pressure is available.

The tank of the wagon or container shall be insulated sufficiently to minimize boil off during possible transportation time. Vacuum insulation is strongly recommended as it reduces the thermal ingress from the environment and thus significantly reduces the associated safety risks.

The tank shall be designed in order to withstand liquid nitrogen (for commissioning) temperatures on the low range and up to +50 °C on the high range.

The manufacturer of the tank shall provide for its appropriate operation:

- Approval of the tank by a surveying institute including calculation of the shell;
- Operating manual including a description of the tank;
- Context diagram of initial filling, holding time and payload;
- Context diagram of initial pressure and holding time;
- Flow schemes;
- Information about spare parts.

Loading of a tank wagon/ container can be controlled by scales or by using level-check valves (if level-loading) to prevent overloading.

The basic layout of tanks for tank wagons or tank containers is shown in Figure 1a and Figure 1b. An example of a tank wagon is given in Figure 1c.