LNG Terminal Equipment

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Terminal equipment. General aspects

The aspects considered are:

- Main equipment used for cargo transfer are loading arms or hard arms, which are jetty based.

- It is necessary to consider:
  - Fitting of Emergency shut-down systems.
  - Emergency Release Couplings.

- Storage tanks.
- Fire-fighting equipment.
Terminal equipment. Cargo transfer systems

Cargo transfer systems are:

• Hoses
• Hard arms – loading arms
• Vapour return
• Insulating flanges
Terminal equipment. Cargo transfer systems

The main aspects have to be taken into consideration regarding hoses:

• Hoses used should be done according a suitable standard.
• Hoses correctly supported in a hose cradle.
• Hoses have to be treated with care so that they are not damaged: follow manufacturers’ instructions regarding use
• Materials suitable for LNG hoses:
  ▪ Composite
  ▪ Rubber
  ▪ Stainless steel
Terminal equipment. Cargo transfer systems

Loading Arm Schematic Picture

Source: Marine Insight
Terminal equipment. Cargo transfer systems

Typical loading arm operating envelope

Source: Liquefied Gas Handling Principles On Ships and in Terminals
Terminal equipment. Cargo transfer systems

Roots blower typically used for vapour return

Diagram of vapour return using a shore based blower

Source: Liquefied Gas Handling Principles On Ships and in Terminals
Terminal equipment. Cargo transfer systems

Insulating flanges:

- The need to prevent electrical flow through loading arm or hose makes it necessary to insert an insulating flange.
- It is inserted in the lower end of the outer loading arm.
- Insulating properties tested: 500 volt insulation resistance tester.
Terminal equipment. Shore storage

The storage of LNG can be done using the following:

- Double-wall tanks (LNG, LPG, chemical gases)
- Double-containment tanks (LNG, LPG)
- In-ground tanks (LNG)

Source: CB&I
Terminal equipment. Shore storage

LNG tank. Concrete bund

Source: Liquefied Gas Handling Principles On Ships and in Terminals
Terminal equipment. Shore storage

LNG tank. Double wall

Source: Liquefied Gas Handling Principles On Ships and in Terminals
Terminal equipment. Ancillary equipment

Pressure relief venting: pressure relief valves will be installed in LNG tanks.

Pipelines and valves: These equipment will be installed in accordance with the standard used for the LNG tank.

Pumps, compressors and heat exchangers: Either inside or outside of the tank. Different types:

- Deepwell pumps
- Vertical in-line pumps
- Horizontal foot-mounted pumps
- Submerged pumps within the tank
Terminal equipment. Ancillary equipment

LNG receiving terminal. Vaporiser/sendout

Source: Liquefied Gas Handling Principles On Ships and in Terminals
Terminal equipment. Instrumentation

**Product metering.** Typically the following types of metering:

- Positive displacement meter
- Turbine meter
- Vortex meter
- Ultrasonic meter
- Coriolis mass flow meter

**Pressure, temperature and level instrumentation.**

**Gas detection systems.** Detection of gas leakages. Installed in terminals and jetties.
Terminal equipment. Fire fighting

Fires can be classified into:

• Minor fires at pump glands, pipe flanges and relief valves
• Fires from confined liquid pools
• Fires from unconfined spillages
• Fires in confined spaces

Fire fighting mediums:

• Water: excellent cooling medium. However, a heat source for refrigerated product spills, promoting evaporation of spilled product.
• Foam: Application of foam to unignited LNG pools can reduce the distance traveled by flammable vapour.
• dry chemical powder: attacking the flame by absorbing the free radicals in the combustion process.
• Smothering gas (carbon dioxide): educing the oxygen content of the atmosphere to a level at which combustion cannot continue
• vaporising liquids (such as halon): when vaporising liquids are released in case of fire, the gas reacts with the combustion process and extinguishes the flames
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