

**Physical properties LNG (Liquefied Natural Gas)**

- UN 1972/ GEVI 223
- Methane (CH<sub>4</sub>)/natural gas
- -162 °C
- 1 litre LNG = 0.5 kg. (1 litre LNG= 600 litre natural gas)
- Explosion limit 5 – 16 vol %
- See chemical cards book

**LNG RISKS**

- **Extremely flammable** gas.
- **Extremely low temperatures** (-162 °C (freezing injuries and effects on construction components (becoming brittle)). Use special protective clothing for possible contact.
- LNG is heavier than air **when released** (be aware of underground pools/sewers where LNG can accumulate).
- Risk of **explosion in closed spaces** (ATTENTION: parking garages, workshops and filling stations, etc.).
- **Suffocating** in high concentrations (take victim to fresh air and resuscitate).
- Warmed gas is no longer visible (cloud is no longer visible as white vapour).

**CHARACTERISTICS OF LNG INCIDENTS**

- Take account of the risk of low-lying gas at great distances. LNG warms up and mixes with air.
- The (visible) cloud depends on the temperature of the LNG and environmental factors such as the outside air temperature and humidity. A visible cloud does not always have to be LNG. It could be condensation! LNG is odourless and colourless (visible as white mist due to condensation of the surrounding air (water vapour)).

**SAFE ACTION**

- Start **OGS procedure** in connection with explosion risk and unknown (large) effect zone (assemble behind the safety line and remain upwind).
- Wear complete emergency response clothing, including breathing protection.
- ALWAYS use a methane detector (sniffer) or explosion danger meter and infra-red imaging camera (to make cold and gas clouds visible).
- Stay upwind (be aware of sloping terrain) and do NOT come into contact with the liquid/gas cloud.
- Only use mobile telephones, walkie-talkies, beepers, etc. in safe areas.

**OPERATING PROCEDURE FOR LNG INCIDENTS**

- Warn the operator or owner of the vehicle/filling station.
- Request expert assistance from the **LIOGS (Landelijk Informatiepunt Ongevallen Gevaarlijke stoffen) [national information centre for accidents involving dangerous substances] 010-2468642.**
- Warn/evacuate the area to a significant distance (100 metres).
- Be aware of ignition sources in the surroundings (e.g. cars).
- Preferably do not extinguish LNG fires. Where necessary, cool objects heated by radiated heat (prevent contact between water and LNG!). Only extinguish LNG fires if necessary (risk of escalation).
- Treat skin contact with the substance as a burn injury.
- Prevent water coming into contact with the blow-off safety feature in connection with the risk of it freezing closed. Only use water in consultation with an expert.



- **Check the degree of filling of all types of tanks** in connection with risk estimation (ask the owner/driver).

### CHARACTERISTICS OF LNG SCENARIOS

#### Scenario: blowing off an LNG tank

- If the pressure in a tank is excessive, the system blows off using a blow-off safety feature.
- Squeaking or growling noises are typical (a flare may occur).
- Occurs when pressure builds up in a tank as a consequence of little use or insufficient cooling capacity.
- **Action:** Ensure the safety of the immediate surroundings (approx. 10 metres) (measure the risk of explosion and evacuate), transfer after safe signal.
- LNG procedure: fuel tank, bunkering, tanker truck, filling station and loading & unloading.

#### Scenario: radiated heating of an LNG tank (different type of fire than LNG)

- Intact tank construction provides significant passive safety against heating caused by radiated heat.
- Heating of LNG installations increases the pressure in the relevant section/tank (activation of blow-off safety features).
- Cooling of this type of installation/tank is possible with water as long as there is NO LNG leakage.
- **Action:** cool the surroundings/prevent escalation, preferably do NOT extinguish an LNG fire (cool the LNG tank with 10l/m<sup>2</sup>/min).
- LNG procedure: fuel tank, bunkering, tanker truck, filling station and loading & unloading.

#### Scenario: LNG leakage

- Liquid or gaseous LNG will be released in the case of LNG leakage. Possible creation of a cold boiling pool.
- LNG leakage will be recognisable as a white mist.
- The visible limit of the gas cloud is overall also the contour of 100% LEL (always continue to measure!).
- **Action:** prevent fire/prevent escalation; mix up the gas cloud with a (street) water cannon.
- Do not apply water or foam to a cold boiling pool of LNG!
- LNG procedure: fuel tank, bunkering, tanker truck, filling station and loading & unloading.

#### Scenario: LNG fire (flare fire and pool fire)

- A LNG fire radiates a great deal of heat.
- **Action:** (Pool) do NOT extinguish the fire (pool will burn off very quickly).
- Cool the surroundings within a distance of 5 x the radius of the pool. Fight possible effects.
- Small LNG pool fire: extinguish with powder (if possible).
- LNG procedure: fuel tank, bunkering, tanker truck, filling station and loading & unloading.

#### Scenario: damaged LNG tank as a consequence of an accident (external influence)

- There can be several types of damage. Visible and also invisible.
- Recognise damage (dents, breaks in insulation or loss of vacuum).
- Use an infra-red imaging camera to detect damage.
- If vacuum is lost: accelerated heating of the contents of a tank.
- **Action:** Secure tank and surroundings, assist recovery/technical emergency service and transfer to the operator.
- LNG procedure: fuel tank, bunkering, tanker truck, filling station.