

**KISH P & I LOSS PREVENTION CIRCULAR KPI-LP-11-2012**  
**(Health Hazards aboard Liquefied Gas Carriers)**

**Cargo health and safety information :**

Carrying and handling various liquefied gases pose significant potential hazards including risk of injury or death ,threats to environment and each person working on a gas carrier and terminal ashore needs to understand the risks involved, obtain the necessary training and take all the needed precautions. The information for each liquefied gas cargo grade being carried onboard at any one time should include:

1. appearance
2. conditions of carriage
3. reactivity data
4. special requirements
5. physical data
6. the main hazards
7. fire and explosion data
8. associated hazards
9. health data
10. compatible materials

Gas tankers are designed such that in normal operation, personnel should not be exposed to hazard from the products being transported, provided that the ship and its equipment are properly maintained and operating instructions are observed.

Hazard avoidance depends on:

- Hazard removal
- Hazard control
- Reliance on personal protection
- Training





It is important to realise that different cargo grades may well have different hazards associated with them. Liquefied gas relate to the specific hazards including asphyxia, toxicity, low temperature and flammability.

As per the MSDS contained in the ICS Tanker Safety Guide (Liquefied Gas) Data Sheet, at ambient temperatures , the flammable range of methane in air is 5% to 16% . In open spaces, the visible condensation cloud provides a safe estimate of the flammable vapour mixture. Although the visible condensation cloud may also include some zones where the gas is either too rich or too lean and is safe. So far as risk of frost burn is concerned, it is prudent to consider the whole visible cloud as potentially flammable and to avoid entry into the cloud, which may also be deficient in oxygen content. When natural gas vapours have warmed sufficiently to rise out of the visible condensation cloud, they will have diffused to below the lower flammable limit.

#### **Personnel protection:**

All vessels designated for the carriage of Liquefied Natural Gas should have on board suitable protective equipment and clothing for the protection of crew involved in cargo handling operations. The types and quantities of protective equipment as well as additional safety equipment should be in strict compliance with ICS recommendations.

All ships carrying dangerous cargoes should have on board first aid equipment including oxygen resuscitation in compliance with recommendations listed in IMO-MFAG (Medical First Aid) and WHO-IMGS(International Medical Guide for Ships).

Since LNG is carried at cryogenic temperatures, physical contact will produce frost burns. Such contact may occur either from a spillage, a leak, or from frosted pipes and flanges. Personnel having to work in the manifold area, or in other areas where leakage or contact with frosted pipes could occur, must wear clothing to cover the whole body, i.e. long-sleeved boiler suits, gloves, goggles or safety glasses and safety helmet and shoes, in order to minimise the risk of frost burn. Personnel not directly involved in cargo operations should keep well clear of operational areas.

#### **Exposure :**

Contact with liquid, or even cold vapour, will result in cold burns that, if extensive, could prove fatal. The symptoms of 'cold burns' are similar to 'hot burns', there is extreme pain in the affected area with attendant confusion, agitation and possibly fainting of the victim. If the area of the burn is large, shock will inevitably develop.

While the rapid evaporation of LNG will minimise the extent of chemical burning on the skin, cold vapour can be dangerous to the eyes. If liquid or cold vapour enters the eyes, they must be immediately bathed with running clean sea or fresh water for at least 15 minutes.

If liquid or cold vapour comes into contact with the skin, the patient should be treated urgently, but with great care, and the affected area immersed in tepid water until it is defrosted.

*Methane* has a Threshold Limit Value (TLV) of 1,000 ppm. Above this level, it acts as an anaesthetic to an increasing extent as the exposure increases. It is generally less harmful than most hydrocarbons at lower levels, but safe working practices dictate that all deliberate exposure should be avoided.

If a person is exposed to natural gas, they should be moved into fresh air immediately. Care must be taken that the rescuer is not also exposed. Since methane has an anaesthetic effect, a person exposed to an excessive amount of vapour will become uncoordinated and not necessarily realise the dangers. If



breathing has stopped or is weak or irregular, mouth to mouth resuscitation should be given without delay and the resuscitation equipment brought into use as quickly as possible.

In all cases of exposure to either liquid or gas, medical advice should be sought. Since natural gas is colourless and odourless in both liquid and vapour forms, it may not always be realised that a hazard exists, so extra vigilance must be exercised when approaching an area where free methane could be present.

#### **Toxicity :**

Some cargoes are toxic and can cause a temporary or permanent health hazard, such as irritation, tissue damage or impairment of faculties. Such hazards may result from skin or open-wound contact, inhalation or ingestion.

Contact with cargo liquid or vapour should be avoided. Protective clothing should be worn as necessary and breathing apparatus should be worn if there is a danger of inhaling toxic vapour. The toxic gas detection equipment provided should be used as necessary and should be properly maintained.

#### **Asphyxia :**

Asphyxia occurs when the blood cannot take a sufficient supply of oxygen to the brain. A person affected may experience headache, dizziness and inability to concentrate, followed by loss of consciousness. In sufficient concentrations any vapour may cause asphyxiation, whether toxic or not.

Asphyxiation can be avoided by the use of vapour and oxygen detection equipment and breathing apparatus as necessary.

#### **Anaesthesia :**

Inhaling certain vapours (e.g. ethylene oxide) may cause loss of consciousness due to effects upon the nervous system. The unconscious person may react to sensory stimuli, but can only be roused with great difficulty. Anaesthetic vapour hazards can be avoided by the use of cargo vapour detection equipment and breathing apparatus as necessary.

#### **Frostbite :**

Many cargoes are either shipped at low temperatures or are at low temperatures during some stage of cargo operations. Direct contact with cold liquid or vapour or un-insulated pipes and equipment can cause cold burns or frostbite. Inhalation of cold vapour can permanently damage certain organs (e.g. lungs).

Ice of frost may build up on un-insulated equipment under certain ambient conditions and this may act as insulation. Under some conditions, however, little or no frost will form and in such cases contact can be particularly injurious. Appropriate protective clothing should be worn to avoid frostbite, taking special care with drip trays on deck which may contain cargo liquid.



**Precaution against chemical burns :**

Chemical burns can be caused by; ammonia, chlorine, ethylene oxide and propylene oxide and certain other chemical gases. The symptoms are similar to heat burns, excepting that the product may be absorbed through the skin causing toxic side-effects. Chemical burns can seriously damage the eyes.

Symptoms: A burning pain with redness of the skin; an irritating rash; blistering or loss of skin; toxic poisoning (see later). Be sure you know where eye-baths and showers are located.

**Chemical burns treatment:**

- remove patient from source of contamination- including clothing
- attend first to the eyes and skin
- wash the eyes thoroughly for a minimum of fifteen minutes with large amounts of fresh water
- wash the skin thoroughly for a minimum of fifteen minutes with large amounts of fresh water
- seek urgent medical/first-aid attention

KPI Loss Prevention Team  
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