Hot work in docks

HSE information sheet

Docks Information Sheet No 6 (Revised)

This information sheet is one of a series issued by the Transportation Section of HSE's Services, Transportation and Safety Unit. It gives guidance to dock and harbour authorities, terminal operators, contractors, ship's masters and all other people carrying out hot work, on the precautions that should be taken in connection with hot work at docks and on ships in them. It is not intended to apply to hot work carried out in shipyards.

Introduction

Over the years hot work in docks, both on ships and onshore, has resulted in many serious fires and explosions that have caused death and serious injuries. As long ago as 1847, the legislation relating to docks and harbours was consolidated in the Harbours, Docks and Piers Clauses Act 1847. The Act contains standard clauses which can be deemed to be included in Acts relating to specific harbours, docks and piers. Many such Acts and bye-laws made under them are still in force today.

The 1847 Act included powers for dock authorities to make bye-laws for 'regulating the use of fires and lights' in dock premises, and on-board ships in docks. The Approved Code of Practice to the Dangerous Substances in Harbour Areas Regulations 1987 and a number of internationally recognised publications also advise or require that hot work which may constitute a hazard due to the presence of dangerous cargo should only be carried out in docks or on ships in docks with the permission or authorisation of the harbour authority. Many authorities have used these powers to make bye-laws which relate to hot work.

Hot work

Hot work means the use of open fires, flames and work involving the application of heat by means of tools or equipment. This includes the unintentional application of heat, for example by the use of power tools or hot rivets or hot particles from cutting or welding operations, falling onto and igniting flammable material or flammable vapours.

A lot of hot work at docks is undertaken in connection with construction, maintenance or repair operations. On ships in docks hot work may be carried out in connection with routine maintenance or voyage repairs and some cargo handling operations, eg the fitting and removal of guide bars to prevent snagging on the cleats of hatch covers.

Responsibilities

Most hot work operations involve a number of people, all of whom have responsibilities for ensuring that the work is carried out safely.

Too often incidents have occurred when people have assumed they had no responsibility for taking the necessary safety precautions to ensure hot work was carried out safely, because someone else agreed to the work. This is not so. The Management of Health and Safety at Work Regulations 1999 require all employers and self-employed people involved in hot work to make a suitable and sufficient assessment of the risks from proposed hot work to the health and safety of their employees and any others who may be affected by it.

In addition, all such employers and self-employed people should liaise and co-operate to ensure that appropriate precautions are taken and any necessary information is exchanged. The responsibilities of those likely to be involved are set out below.

Dock and harbour authorities and terminal operators should decide what controls of hot work are necessary in their premises and to what extent it is appropriate for them to use their powers to make bye-laws.

Authorities should bring the requirements of any such bye-laws to the notice of those with potential duties under them and enforce the bye-laws where necessary.

It is particularly important that the masters of visiting ships are informed of the procedures to be followed while their ships are in the dock, harbour or terminal,

and understand them. The requirements of bye-laws should be clear to all concerned. They should also be periodically reviewed and revised as necessary.

Individual employers of people carrying out hot work in docks should ensure that all necessary precautions for the protection of everyone that may be affected by it are taken. In many cases this will involve the use of permit to work systems. Often responsibilities will be shared. It should not be assumed that because someone else has agreed that hot work may be carried out, all necessary precautions will be taken by them.

Sometimes contractors may be in direct control of the hot work and have the prime responsibility for ensuring that all necessary precautions are taken. Employers who contract others to carry out hot work on their behalf should ensure that the contractors are competent to carry out the work safely and do so. **It is essential that there is no doubt as to who has overall control of the work.**

Masters of ships have the prime responsibility for the safety of their ship and all on board. No hot work should be carried out on board a ship in a dock without permission in writing from the master or other responsible officer or owner's superintendent if the ship is not manned by the regular crew, and from the dock or harbour authority and anyone else involved.

If the master or other officer agrees to the carrying out of hot work by shore personnel, they should draw the attention of such personnel to any relevant hazards and steps taken to ensure that any necessary precautions are taken. This should be in addition to action taken by anyone else involved.

Dock and harbour authority permission

Dock and harbour authorities should identify those areas of their premises or circumstances in which it is necessary for permission to be given by them before hot work is carried out. Permission on each individual occasion may not be necessary, eg in connection with work regularly carried out in workshops or in areas where hot work is unlikely to affect ships or cargoes, in the dock premises.

It may be appropriate for such permission to be included in a permit to work setting out the necessary precautions. If the permission does not constitute a permit to work, it is essential that this is made clear to all concerned.

Permits to work

Permits to work are the key to ensuring that safe hot work procedures are followed. It is essential that those who issue permits to work or carry out associated analysis or environmental monitoring are competent to do so. Permits to work should not be confused with gas-free certificates, eg those for spaces on board ships. The information that should be contained in a permit to work for hot work will depend on the job to be done. Generally it should include:

- the location and nature of the hot work;
- the proposed time and duration of the work;
- the limits of time for which the permit is valid;
- the precautions that should be taken before the work starts, during the work, and on completion of the work;
- the person in direct control of the work.

It is essential that all those involved in the work are aware that it does not follow that once a permit to work is issued the situation will remain safe. If conditions change, for example if other work is to be carried out in the vicinity or a hold is ballasted, the permit to work should be withdrawn, the situation reviewed and, if appropriate, a new permit to work issued with the conditions amended as necessary. If the timescale of changes can be foreseen, the period of validity of the permit to work should be correspondingly limited. This may well be to less than the full duration of the proposed work.

The precautions necessary may include ensuring that:

- the area is free from flammable materials or residues of flammable materials such as sludge and is gas-free. It should be remembered that small quantities of solid or liquid residues or sludges can generate large quantities of flammable vapours. Gas-free means that the concentration of flammable gas is less than 25% of the lower flammable limit, and will remain so for a specified period. For hot work on oil tankers the concentration of flammable gas should not be more the 1% of the lower flammable limit, as recommended by the International Safety Guide for Oil Tankers and Terminals (see Further reading);
- the opposite side of any plating, such as a bulkhead or deck, to that on which the hot work is to be carried out is free from flammable materials or residues and is gas-free. When repairs are carried out to freight containers, particular care should be taken to ensure that any hot work does not ignite any wooden floor or insulation, or the cargo in it, when freeing a jammed container;
- the area below the hot work is free from flammable materials or residues and is gas-free. There can be no exception from the requirement

for such areas to be gas-free. Every year major fires occur due to hot particles from cutting or welding operations falling onto flammable materials. Where it is not practicable to remove all flammable materials, eg for very short maintenance operations ashore, it may be sufficient to ensure that they are temporarily covered by non-flammable material, but this will never apply to residues of flammable liquid cargoes in the holds of tankers;

- no dangerous substances enter the area during the operation, these may be flammable, toxic, very hot, eg steam, or very cold;
- the atmosphere is, and remains, safe to breathe. The concentration of toxic substances should be as low as reasonably practicable and in all cases below the relevant occupational exposure limit. Many hot work processes generate toxic fumes, where it is not reasonably practicable to provide adequate ventilation appropriate respiratory protective equipment should be worn. Particular care should be taken before entry into enclosed spaces on ships to ensure that the atmosphere in them is not deficient in oxygen;
- any other necessary personal protective equipment is provided and worn. This may include protective footwear, overalls, gloves and eye protection;
- appropriate fire-fighting equipment is available at the site of the work, together with a person trained in its use, this may be a person carrying out the hot work. If areas not visible to the people carrying out the work may be affected, a person with a suitable fire extinguisher should keep watch on them;
- when work stops any cylinders of flammable gas or oxygen or hoses and torches attached to them which it may have been necessary to take into an enclosed space are not left in the space. Leakage of such gases into enclosed spaces has led to many serious explosions and fires;
- no smouldering residues remain after the work has been completed. Many serious fires have broken out several hours after the completion of hot work. The sites of such work should be visited periodically until all likelihood of ignition has passed;
- after the permit to work has been signed a copy should be given to the person in direct control of the hot work and, where appropriate, a copy should be displayed at the site of the work. A record of the issue and withdrawal of permits to work should be kept.

Training and supervision

Everyone involved in hot work operations should be adequately instructed, trained and supervised. Training should cover not only the carrying out of the operation but also:

- the hazards associated with the work and the precautions to be taken;
- the operation of relevant permit to work systems; and
- the action to be taken in the event of an unintended fire or other emergency.

More detailed training should be given to people responsible for issuing permits to work to ensure that they are aware of all relevant hazards and that these are considered before the permit is issued. Such people should be trained to be able to identify the circumstances in which atmospheric monitoring may be necessary before a permit to work can be issued. This may be to confirm that areas are gas-free and, if appropriate, that they are safely respirable.

If they are not able to carry out such monitoring themselves, dock and harbour authorities should know the local competent analysts who are available and capable of carrying out monitoring when required.

Hot work on tankers

Particular care needs to be taken before any hot work is undertaken on board a tanker to ensure that all flammable materials and residues are removed from the area before the work begins and that the area remains gas-free throughout the work. Guidance on such work can be found in the International Safety Guide for Oil Tankers and Terminals (see Further reading).

Hot work on combination carriers

Combination carriers are specialised ships that may carry oil, bulk or ore cargoes (OBOs) or oil or ore cargoes (OOs). A combination carrier that is carrying, or last carried, oil should be treated in the same way as any other tanker.

Particular care should be taken before hot work is carried out on combination carriers carrying dry bulk cargoes. A number of serious accidents have occurred due to the unappreciated presence of residues of previous oil cargoes.

When a combination carrier is carrying, or last carried, a cargo other than oil it should be also treated as a tanker unless:

- it has never carried a cargo of oil; or
- all its cargo tanks, including slop tanks, the pumproom, cargo pumps, pipelines, cofferdams,

duct keel and other void spaces have been emptied of oil and oil residues, cleaned and completely gas-freed and the cargo tanks and void spaces have been internally inspected and tested to confirm they are gas-free and there is no deficiency of oxygen which could be attributable to leakage of inert gas from another compartment. Further tests in the cargo holds should be carried out at intervals during the loading or unloading of solid cargoes to ensure that there has been no generation of hydrocarbon gas or leakage of hydrocarbon gas from slop tanks or any of the adjacent spaces.

Combination carriers carrying dry bulk cargoes should have on-board certificates certifying that their holds and tanks are clean and gas-free. However, this does not guarantee that the situation has not changed since the certificates were issued and that all the residual oil has been stripped out from all pumps and pipelines.

Accidents have occurred due to oil being flushed into holds, eg to ballast empty holds to reduce the air draught of the ship during unloading. Such oil may be present because the pipeline system has not been properly water flushed and drained, there are dead legs in the system that have not been cleared of oil or that not all pumps have been washed and drained or the ballasting operation is carried out with a dirty pump. The residual oil will then be flushed into the hold with the ballast water and may result in a flammable atmosphere in the hold that can be ignited by hot work in or above the hold, or in an adjacent hold or space.

Ship repair work in docks

Most ship repair operations in docks by people other than the crew will be subject to the Shipbuilding and Ship-repairing Regulations 1960. Advice on these Regulations is not covered by this information sheet but can be obtained from the Manufacturing Sector via the HSE Infoline (see Further information)

Smoking and other naked lights

Dock authorities should also consider whether smoking, the lighting of fires and the use of naked lights other than those for hot work should be prohibited in any areas of the dock premises. Where prohibition is necessary it should be drawn to the attention of all those in the area and prohibition signs displayed in appropriate places where they will be easily seen by all those concerned.

Further reading

Guidance on permit-to-work systems: A guide for the petroleum, chemical and allied industries HSG250 HSE Books 2005 ISBN 978 0 7176 2943 5

The cleaning and gas freeing of tanks containing flammable residues Chemical Safety Guidance Note CS15 HSE Books 1985 ISBN 978 0 7176 1365 6

Code of safe working practices for Merchant Seamen The Stationery Office ISBN 978 0 1170 3693 2

Fires and explosions resulting from welding and flamecutting operations Merchant Shipping Notice No M957 Maritime Coastguard Agency

The International Safety Guide for Oil Tankers and Terminals. International Chamber of Shipping

Other HSE Docks Information Sheets

The freeing of jammed freight containers and container fittings on ships Docks Information Sheet DIS1(rev1) HSE Books 2008 www.hse.gov.uk/pubns/dockindx.htm

Health hazards from dusty cargoes during the loading and unloading of ships Docks Information Sheet DIS2(rev) HSE Books 1998 www.hse.gov.uk/pubns/dockindx.htm

Explosives aspects of port emergency plans Docks Information Sheet DIS3(rev) HSE Books 1998 www.hse.gov.uk/pubns/dockindx.htm

Fatigue in dock work Docks Information Sheet DIS4 HSE Books 1994 www.hse.gov.uk/pubns/dockindx.htm

Ships radar in ports Docks Information Sheet DIS5 HSE Books 1994 www.hse.gov.uk/pubns/dockindx.htm

Safe working on top of containers on board ship Docks Information Sheet DIS7 HSE Books 2000 www.hse.gov.uk/pubns/dockindx.htm

Further information

Additional advice and information may be obtained from your local HSE office, via the HSE Infoline, or by email to docks@hse.gsi.gov.uk.

HSE Docks webpage: www.hse.gov.uk/docks/index.htm.

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For information about health and safety ring HSE's Infoline Tel: 0845 345 0055 Fax: 0845 408 9566 Textphone: 0845 408 9577 e-mail: hse.infoline@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

This information sheet can be found at: www.hse.gov.uk/pubns/dis6.pdf.

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.