

A STUDY BOOK FOR THE

NEBOSH NATIONAL DIPLOMA

for Occupational Health and Safety Management Professionals

UNIT 3: SAFETY RISKS



SEVENTH
EDITION

Traffic routes not provided with barriers must be permanently marked on the floor with continuous stripes in a safety colour (preferably white or yellow depending on the colour of the surface they are on), and in a manner that helps to guide and separate pedestrians and vehicles, *see Figures 1-16*.

The following are specific locations that should be considered for provision of permanent signs:

- Where hazards are present, such as a hazardous substances store - suitable warning sign.
- Containers and visible pipes used for dangerous substances - suitable warning sign/labels on the visible side of containers and at important locations of the pipe, for example, at joints and valves, and at intervals.
- Where direction to a safe condition is required – suitable sign.
- Where there is a risk of colliding with obstacles or of falling - safety colour and/or with signs.
- Traffic routes - safety colour.
- Location and identification of firefighting equipment - signs and/or a safety colour.



Figure 1-16: Marking traffic routes.

Source: RMS.

Occasional signs

Permanent signboards are not required where a workplace or hazard is temporary and occasional signs can be used instead. For example, a portable signboard could be used if a hazard exists for a short period, which might be a slippery floor after routine cleaning or removal of a spill.

Illuminated signs, acoustic signals and/or verbal communication should be used as occasional signs, as the situation dictates. This could include to signal danger, to call people to take a specific course of action and for the purpose of emergency evacuation. For example, Regulation 24 of the Provision and Use of Work Equipment Regulations (PUWER) 1998 includes requirements for work equipment to incorporate warning devices that are necessary for reasons of health and safety. This could involve the use of acoustic signals and illuminated signs as the circumstances of using the equipment changes and hazards emerge.

"Illuminated sign – a sign made of transparent or translucent materials which is illuminated from the inside or the rear to give the appearance of a luminous surface."

Figure 1-17: Definition of illuminated sign.

Source: SSSR 1996, Reg 2.

Illuminated signs could be used where a hazard occurs intermittently during a process, for example an illuminated sign may display a requirement to wear hearing protection at specific times when a noisy process is carried out. They can also form part of fire alarm systems, which would be particularly useful in noisy workplaces or for situations where workers have hearing limitations.

Hand signals and/or verbal communication must be used, where the occasion requires, to guide workers carrying out hazardous or dangerous manoeuvres, for example reversing vehicles or moving a load on a crane. Hand signals must be precise, simple, easy to make and to understand, and clearly distinct from other signals. Examples of suitable hand signals and verbal communication are given in Schedule 1 of the SSSR 1996.

USE OF SAFETY SIGNS

Safety signs are not a substitute for other, better, health and safety control measures. They are for situations where, having conducted a risk assessment and applied all appropriate techniques for collective protection and higher-level controls, employers cannot reduce risks other than by the provision of signs to provide warnings or instructions. The provision of safety signs in a workplace does not automatically indicate that risks have been adequately reduced.

If the hearing or sight of a worker is impaired, for example by wearing personal protective equipment, measures should be taken to ensure that they can see/hear the safety sign, for example by increasing the brilliance of an illuminated sign or volume of and acoustic signal. In some cases, more than one type of safety sign may be necessary, for example an illuminated sign indicating a warning of a specific risk combined with an acoustic signal providing an audible warning to alert workers, or hand signals combined with verbal instructions.

Signboards

Where signboards are used in a workplace, they should be sufficiently large and clear to be easily seen and understood. Signboards that could be used in workplaces include conventional signboards and illuminated signboards. They should be installed at a suitable height and position appropriate to the line of sight from where they are observed, taking into account obstacles. Signboards illustrating hazards or mandatory action related to hazards should be located either at the access point to an area with a general hazard or in the immediate proximity to a specific hazard. They should also be durable, securely fastened and properly maintained to ensure they remain visible. Care should be taken to ensure that too many signboards are not located together as this can lead to confusion or difficulty in observing the intended information or instruction.

It is an advantage to have deliveries arranged in the form of a set of drums on a pallet, so that drums can be kept strapped together during unloading, stacking and storage. Precautions are necessary to prevent inadvertent mixing with other materials on filling drums or secondary containers and containment of any spillages that might foreseeably occur. Particular care should be taken to keep the floors free of contamination from spillages.

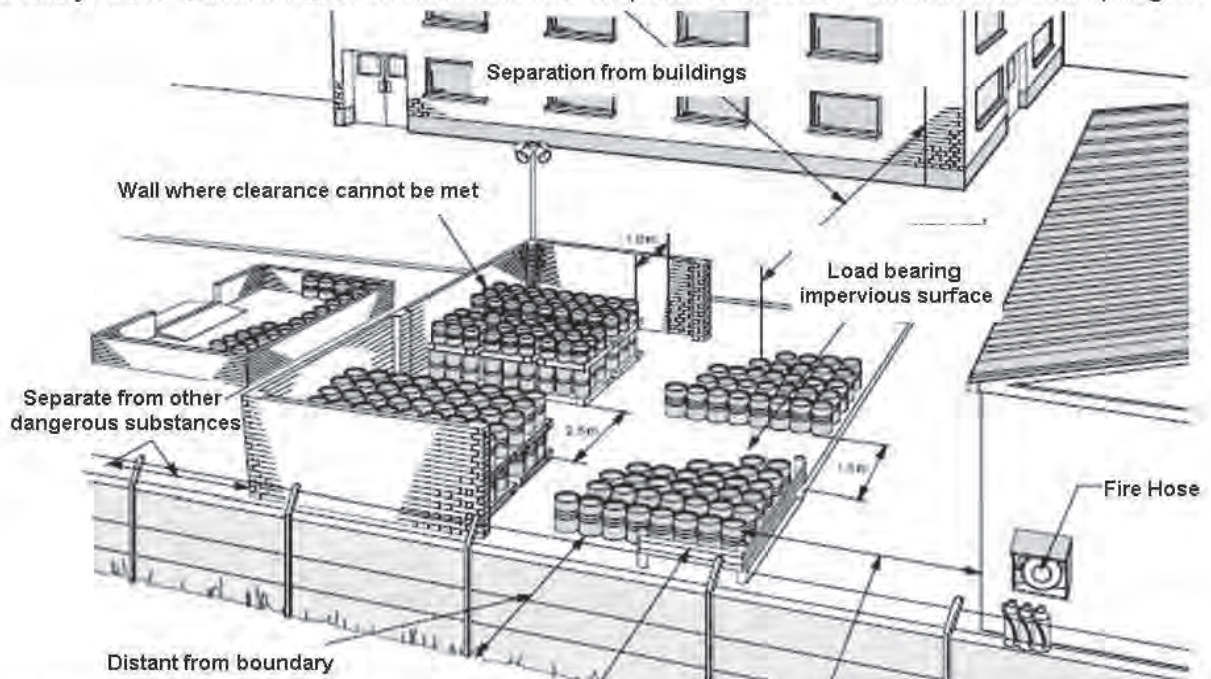


Figure 5-6: Storage of dangerous substances in drums.

Source: HSE, HSG 135 (withdrawn).

In addition to the need to establish segregation of incompatible dangerous substances, it is important to establish good separation. Separation not only protects people (and property) from the effects of an incident involving dangerous substances in the store itself, but it also protects the store from incidents that may occur elsewhere on site. Consequently, separation is an important means of protection for the storage of dangerous substances, including drum storage.

Separation distances for dangerous substances depend on various factors, including how the dangerous substance is stored and whether the location is considered to be 'high risk' or not. The use of separation as a protective measure for the storage of dangerous substances is essential to reduce the combination of risk in the event of a spillage or fire. Drums may also be damaged if the gangways between stacks are not wide enough for the method of handling used. Access ways of not less than 1.5 metres where single drums are handled manually or 2.5 metres for palletised drums using a fork lift truck are usually adequate.

In addition, it is important to ensure that drums are not unduly confined, such as by stacking them close to building walls or fire walls, it is recommended that at least 1 metre is provided between drums and the wall. Good separation will therefore assist with gaining access to the drums to place them in storage, to inspect them, to retrieve them and to deal with incidents that might occur, such as spills and leaks.

It is also advisable to restrict access to the store by unauthorised people and vehicles. This may prevent accidental damage to drums and the introduction of uncontrolled ignition sources. For outdoor storage, it may be useful to mark the extent of the storage area or erect suitable barriers. The standard of security at the store will depend not only on the nature of the dangerous substances stored, but also the conditions in the area surrounding the store and on the general level of security at the premises.

Specific locations

Dangerous substances will often need to be stored in specific locations in order to make sufficient amounts available for the use of the substances in processes and other work activities. It is usual to control the amount stored to the minimum necessary for immediate use during that day or work shift.

As with storage in other locations, it is important to ensure that incompatible substances are segregated from each other and that access to the dangerous substances is limited to those trained and competent to use them.

Many of the good practices needed to control the storage of dangerous substances in the workplace are reflected in the arrangements for storage of flammable dangerous substances. Flammable dangerous substances for immediate use by workers in the workplace should not exceed 50 litres. Safety storage cabinets should be used for storing flammable liquids in the workplace. Ideally, these should incorporate the following features:

- Double walls for improved thermal insulation.
- Fitted with low level vents housing flame arrestors in order for the vapours to be safely ducted away.
- Liquid traps to collect any leaks and spills from stored containers within the cabinet.

Specifically, Annex 1 of SMSR 2008 requires that the materials used to construct machinery or products used/ created during its use must not endanger health and safety. In particular, where fluids are used, machinery must be designed and constructed to prevent risks due to filling, use, recovery or draining.

Ergonomic, anthropometric and human reliability considerations

A significant factor in providing control measures for the use of work equipment are ergonomic, anthropometric and human reliability considerations. Ergonomists and designers take into account a wide range of human factors and consider biological, physical and psychological characteristics as well as the needs of people - how they see, hear, understand, make decisions and take action. They also consider individual differences including those that occur due to age, fitness/health, or disability and how these may alter the responses and behaviours of people.

The human characteristics and capacities considered in ergonomics include:

Anatomy	Anthropometry - dimensions of the body (static and dynamic). Biomechanics - application of forces by gravity and muscles.
Physiology	Work physiology - expenditure of energy. Environmental physiology - effects on humans of the physical environment.
Psychology	Skill psychology - information processing and decision-making. Occupational psychology - training, motivation, individual differences, stress.

For example, ergonomic design takes account of the size and shape of the human body (anthropometrics) and should ensure that the design is compatible with human dimensions. Operating positions, heights of workstations, reach distances should accommodate the intended operator. Operation of the equipment should not place undue strain on the user. Operators should not be expected to exert undue force or stretch or reach beyond their normal strength or physical reach limitations to carry out tasks.

Specifically, Annex 1 of SMSR 2008 requires that for machinery the discomfort, fatigue and physical/psychological stress faced by operators must be reduced to the minimum possible, taking into account ergonomic principles such as:

- Allowing for the variability of the operator's physical dimensions, strength and stamina.
- Providing enough space for movements of the parts of the operator's body.
- Avoiding a machine-determined work rate.
- Avoiding monitoring that requires lengthy concentration.
- Adapting the operator/machinery interface to the foreseeable characteristics of the operators.

LAYOUT AND OPERATION OF CONTROLS AND EMERGENCY CONTROLS

At the operator-equipment interface, the operator may have to manipulate parts of the equipment to pass a message to it, the equipment will then act according to the message received and pass a message back to the operator. The operator must be trained to communicate in a way the equipment understands, and the equipment must be manufactured to be able to act according to instructions and communicate in an understandable way with the operator. It would be impossible to carry out a task if every time a red button was pressed a different response took place.



Figure 7-3: Control panel – clear layout and markings.

Source: Kirk & Crane Electrical Co. Ltd.

Arrangements

SITE RULES

Site rules will vary at different sites or premises due to the wide range of activities that may be undertaken. Site rules provide instructions that must be followed by permanent site staff and visitors and also other important information relating to site/location specific hazards. Occupiers of premises or clients may have different standards of site rules and some may enforce them more stringently than others. Contractors should always enforce their own site rules in addition to client/occupier rules.

CO-OPERATION

Co-operation between client, contractor and occupier is a very important factor. The occupier of a premises or site will have a detailed knowledge of any site-specific hazards that may or may not be obvious to a contractor undertaking construction works and this may impact upon the works. In addition, the client or occupier has the authority to place controls and restrictions on the site. The contractor should be experienced in the activities that will be carried out and will have assessed any hazards related to the activities that are to be carried out at site.

It is vital that all parties co-operate and communicate in order that this knowledge and information can be assessed to determine any new hazards that may arise and to enable appropriate information to be cascaded to other people at risk on the site. Co-operation will also be required where site activities need to be controlled or access restricted or where a shared knowledge is required to undertake a task, for example, decommissioning or removal of machinery.

SHARED FACILITIES

Occupied premises will quite often have various facilities available for existing workers/occupiers, for example, hot and cold water, toilets and rest facilities. It may be acceptable, with the agreement of the party in control of the premises and its facilities, for these to be shared for mutual benefit. CDMR 2015 establishes a duty on the client, contractors and the principal contractor to ensure that welfare facilities are provided. Therefore, where CDMR 2015 applies and the client occupies the premises where construction work is to take place, it is in the interests of both the client and contractors to agree what facilities are required and what can be made available to the contractors.



Figure 11-20: Protection of others.

Source: RMS.



Figure 11-21: Sanitary conveniences.

Source: RMS.

FIRST AID

It is the duty of the employer (this could be the main contractor), under the Health and Safety (First Aid) Regulations (FAR) 1981, to provide first-aid provisions and to inform the employees of these arrangements. These facilities should be in a clean environment, probably sited in a separate site office or portacabin. RIDDOR 2013 requires a record of prescribed incidents to be kept on site and dangerous occurrences, deaths and 'specified injuries' to be notified by telephone directly to the HSE.

WELFARE FACILITIES

Drinking water should be from a source approved by the competent authority. Where such water is not available, the necessary steps must be taken to make any water to be used for drinking fit for human consumption. Drinking water for common use should only be stored in closed containers from which the water should be dispensed through taps or cocks. If drinking water has to be transported to the worksite, the transport arrangements should be approved by the competent authority and tanks used should be cleaned and disinfected at suitable intervals. Water that is unfit to drink should be conspicuously indicated by notices prohibiting workers from drinking it. Drinking water should never be connected to a supply of water that is unfit for human consumption.

The facilities provided should be kept clean and maintained and sufficient for the number of workers on the site. The scale of provision of toilet or sanitary facilities, and the construction and installation of water flush toilets, privies, chemical closets, plumbing or other toilet fixtures should comply with the requirements of the competent authority.