



LIFTING APPLIANCES



Pocket Safety Guide
Lifting Appliances

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This publication has been prepared to deal with the subject of *Lifting Appliances*. This should not, however, be taken to mean that this publication deals comprehensively with all of the issues that will need to be addressed or even, where a particular issue is addressed, that this publication sets out the only definitive view for all situations.

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1 Introduction

This guide deals with general operational and safety matters when using lifting equipment.

Incidents relating to lifting have the potential for serious consequences on people, assets, environment and reputation.

In a lifting incident review¹ that was carried out for the 5-year period ending 2003, 59% of lifting incidents were attributed to human factors and 33% to equipment failure, the remainder for reasons unspecified.

The item of equipment most commonly involved in an incident was the chain hoist.



1.1 Definitions

The definition of “work equipment that is used for lifting and lowering loads” includes attachments used for anchoring, fixing or supporting the load.

Equipment includes cranes, vacuum lifting cranes, hoists, scissor lifts, fork lift trucks, passenger lifts, mobile elevating work platforms and pallet trucks.

Attachments include chains, ropes, slings, pulleys, eyebolts and shackles.

Engineered or ‘non-routine’ lifts, which should have written procedures and walkthroughs, comprise those with one or more of the following characteristics:

- Lifts made directly over the top of operating facilities
- lifts with a centre of gravity that cannot be determined

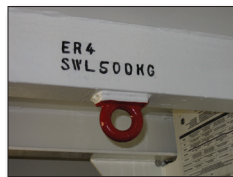
¹ Health and Safety Executive, Lifting Incident Review 1998-2003

- lifts requiring non-standard rigging configurations
- excessively heavy lifts
- lifts in excess of 5 metres in height or width
- lifts in excess of 20 metres in length
- lifts within restricted space.

This guide will deal with the more 'routine' lifting operations.

2 General Safety Rules by Type

All lifting appliances and items of lifting gear must be clearly marked with their Safe Working Load (SWL) and a way of identifying the equipment.



Any safety devices fitted to a lifting appliance must be checked before work starts.

Lifting appliances should always be securely anchored, supported or counterbalanced to ensure their stability when lifting.

Access to the work area and to the lifting equipment must be properly controlled, which may include the use of security measures and barriers.

Loads should not be lifted over a person or any accessway. You should not pass under a load that is being lifted.

No person should be lifted by lifting plant except where the plant has been designed or especially adapted and equipped for the purpose or for rescue or in similar emergencies.



This sequence illustrates the potential hazard of a lift, if the lifting appliance is not securely anchored.

If a load is immersed in the sea for any reason, be aware of the probable increase in weight from water retention.

All loads should be properly slung and attached to the lifting gear, and all gear must be properly attached to appliances. Only qualified or trained personnel should do this.

When any associated equipment, such as a hook or shackle, is replaced, care should be taken to ensure that the replacement is of the correct type, size and SWL necessary for its intended use.

On completion of any gear overhaul, all working places should be cleaned of oil or grease.

The person operating any lifting appliance should have, as far as practicable, a clear view of the whole operation.

If the operator of the lifting appliance does not have a clear view, appropriate precautions should be taken to prevent danger. This will usually be via a properly trained signaller, who will give instructions to the operator either by manual signals or by radio.



Lifting operations should be stopped if wind conditions make it unsafe to continue.

Before any attempt is made to free equipment that has become jammed under load, every effort should first be made to take the load off safely. Precautions should be taken to guard against sudden or unexpected freeing. Anyone not directly engaged in the operation should keep in safe or protected positions.

2.1 Risk Assessment

Every lifting operation has risks that must be assessed and controlled, and a thorough risk assessment must be conducted with specific consideration given to:

- Planning the lift
- identifying the hazards and restricted areas
- specifying the minimum number of people to conduct the lifting operation
- communicating lift requirements and hazards
- procedures for changing the lift plan
- emergency, recovery and contingency plans.

2.2 Load Security

For the majority of lifts, it will be intended that the load remains level when clear of the ground. To achieve this, it will be necessary to position the hook of any lifting appliance directly above the centre of gravity of the load.

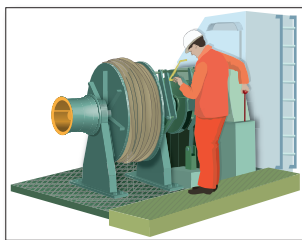
The legs of any slings or chains must be distributed as evenly as possible as the angle each makes will affect the proportion of the load it takes.

Stability describes the 'resistance to toppling' and is an important consideration. An object with a narrow base and high centre of gravity will need less effort to topple than one with a wide base and low centre of gravity. The more unstable a load, the greater the support that will be needed when lifting it to protect it from toppling forces such as wind, acceleration or braking.

2.3 Controls

Controls of lifting appliances should be permanently and legibly marked, with their function and operating directions shown by arrows or other simple means.

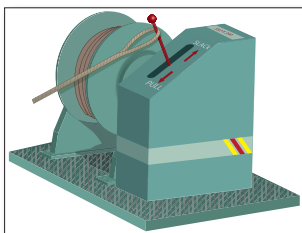
Makeshift extensions should not be fitted to controls, nor should any unauthorised alterations be made to them.



2.4 Powered Operations

A powered appliance should always have a person at the controls while it is in operation. It should never be left to run with a control secured in the 'on' position.

If any powered appliance is to be left unattended with the power on, loads should be taken off and controls put in 'neutral' positions.



When work is completed, the power should be shut-off.

3 Lifting Appliances

3.1 Winches and Mobile Cranes

Cranes should be properly operated and maintained in accordance with manufacturer's instructions.

The following information must always be observed:



- Length, size and SWL of falls and topping lifts
- SWL of all fittings
- boom limiting angles
- manufacturer's instructions for both regular maintenance, such as topping up hydraulics and greasing, and occasional maintenance, such as replacement of wires.

When a winch is changed from single to double gear, or *vice versa*, any load should first be released and the clutch secured.

When using a ship's crane, the position and operation of the crane can affect the ship's stability and this must be taken into account during operations.

3.2 Overhead Gantry Cranes



Anyone working in the vicinity of an overhead gantry crane must:

- Be clear of the lifted load at all times
- not work or move under a suspended load
- not ride on the hook or load.

All directional movement must be made smoothly and deliberately, avoiding rapid movements in any direction.

As with all cranes, it is important not to exceed the rated capacity of the crane, hoist, chain, sling or any other component.

The following practices will avoid a swinging load:

- Locate the lifting hoist directly above the lifting point of the load before lifting
- lower loads directly below the hoist. Do not allow the load to be pulled to one side while suspended
- maintain a minimum of 3 full wraps of cable on the hoisting drum at all times.

Ensure that all loads are lifted high enough to clear obstructions before moving the bridge or trolley. Wherever possible, maintain a minimum

clearance of 30 cm above obstacles and to the sides of the load. Raise the load only to the height needed to clear obstacles.

Where it is intended to 'turn over' the load when in the air, or position it at an inclined attitude, special consideration must be given to the balance and stability.

Power operated, rail mounted cranes, such as those used in the engine room, will have the following safety features:

- Facilities to prevent unauthorised start-up
- an efficient braking mechanism
- emergency braking facilities operated by readily accessible controls or automatic systems for stopping equipment in the event of failure
- guards to remove the risk of the wheels running over feet and also to remove loose materials from the rails.

3.3 Personnel Platforms and Carriers

Platforms designed to carry personnel must be designed to minimise tipping.

Any platform must be provided with a standard guardrail system that is enclosed from the toe board to the mid-rail to keep tools, materials and equipment from falling on personnel below.

Overhead protection will also be required if there is a risk of exposure to falling objects.

Access gates, if provided, must not swing outward and must have restraining devices that prevent accidental opening.



If hooks are used, they must have an operable latch that can be closed or locked with a pinned or positive locking device.

If a wire rope sling set is used, the slings must be connected to the master link or shackle so that the load is evenly positioned. Only safety bow shackles can be used.

Sling sets used for a personnel platform or carrier must not be used for any other purpose.





3.4 Colour Coding of Lifting Equipment

This is a method of identifying lifting equipment, typically marked with paint, to provide an immediate visual indication as to whether a particular item of lifting equipment is 'in date' and is designated for use.

The colour in use is changed at each examination interval and therefore only the designated material will be used, any items of lifting equipment without the correct colour coding for that period shall not be used as it may not have a valid inspection report.

ALL EQUIPMENT MUST DISPLAY A VALID INSPECTION TAG			
JAN to MARCH	APRIL to JUNE	JULY to SEPT	OCT to DEC

Where it is not practicable to mark certain types of lifting equipment (e.g. ropes, slings, strops, and harnesses), a coding system can be used to indicate the SWL of the equipment. Colour coding of lifting equipment substantially reduces the risk of unsuitable lifting equipment being used for a specific lift.

WIRE SLING AND SHACKLES	
<u>SWL</u>	<u>COLOUR CODE</u>
0.1 – 1.9 TON	
2.0 – 4.9 TONS	
5.0 – 9.9 TONS	
10 OR MORE TONS	

The colour coding of lifting equipment is intended to be used by lifting equipment such as: chainblocks, wire slings, hooks and shackles.

Colour coding of lifting equipment is an aid to visual identification. It does not replace the requirements to conduct a detailed inspection of each item prior to use, and is not intended to replace other means of identifying lifting equipment eg serial no., certifying stamps, etc.

Certain colour coding schemes have been accepted at international and national levels, in addition, many companies implement their own colour coding standards. While some companies use 3 monthly

marking schemes, others have adopted a 6 monthly scheme as shown:

Colour Code	Month (6 months interval)	Year
Blue	Jul to Dec	2009, 2011, 2013
Orange	Jan to Jun	2010, 2012, 2014
Green	Jul to Dec	2010, 2012, 2014
White	Jan to Jun	2011, 2013, 2015



4 Maintenance

Lifting plant should be kept in efficient working order and in good repair.

Systematic preventative maintenance should be carried out, including regular inspection by a competent person to assess whether the lifting plant is safe for continued use.

These inspections are separate from, and additional to, those required under the regulations and the interval between inspections will depend on the character and use of the plant.

An inspection should also be carried out following:

- Involvement in an accident
- exposure to overloads
- modification or repair
- prolonged use or inactivity
- a change in condition or use.



No lifting appliance onboard ship should be used unless a competent person has tested it within the preceding 5 years or in accordance with the manufacturer's instructions if they specify a shorter period.

Vessels will be provided with a Register of Ship's Lifting Appliances and an Inventory of Mooring Equipment. The register should be kept up to date and should be produced when required by any authorised Inspectorate. It should be retained for at least 5 years after the date of the last entry. This register should be maintained in conjunction with any official booklet issued by the Flag State or Classification Society.

Manufacturer's instructions should be consulted and followed for examination and testing of equipment, but the table below may provide a useful guide:

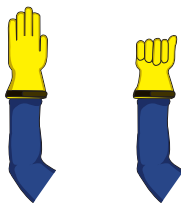
Type		Months		
	Pre-use	3	6	12
Overhead, gantry and stacker cranes	x			
Overhead hoists, underhung (chain blocks, air hoists)	x			X
Beam trolleys	x			x
Shackles	x			X
Wire rope slings	x			X

5 General Hand Signals for Lifting Operations

The following signals are commonly used basic coded signals for directing the movement of cranes. Other variants are in use and you should check what is being used onboard your ship.



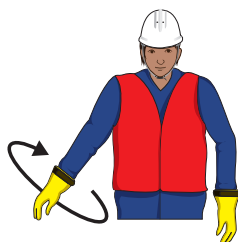
Start



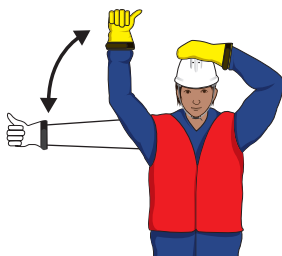
Take the strain



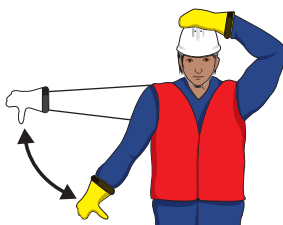
Raise hook



Lower hook



Jib up



Jib down



Extend the jib



Retract the jib



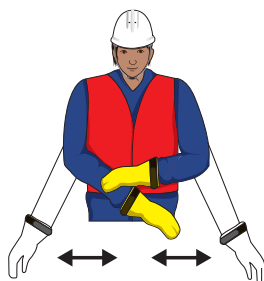
Move jib to right
(direction of arm)



Move jib to left
(direction of arm)



Stop



End of operations



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