

SG9:15

Use, Inspection & Maintenance of Lifting Equipment and Accessories for Lifting in Scaffolding



1. INTRODUCTION

Every year construction workers are killed or seriously injured during lifting operations.

This document is intended to provide guidance to the persons responsible for planning scaffolding operations, including the selection of appropriate equipment for hoisting scaffolding material, as well for those responsible for managing, supervising and using lifting equipment and accessories for lifting.

Hoisting equipment (such as cranes, fork lifts, gin wheels and accessories for lifting) are covered in this Guidance Note, including the proper inspection and maintenance arrangements required and the precautions to be taken to ensure the safety of the persons operating the equipment and those that may be affected by its use.



2. PLANNING

All lifting equipment should be used, examined and inspected in accordance with the requirements of the *Lifting Operations and Lifting Equipment Regulations* (abbreviated to 'LOLER').

These regulations place duties on people and companies who own, operate or have control over lifting equipment. This includes all businesses and organisations whose employees use lifting equipment, whether owned by them or not. All lifting operations involving lifting equipment must be properly planned by a competent person, appropriately supervised and carried out in a safe manner.

Where lifting equipment is also Work Equipment, the *Provision and Use of Work Equipment Regulations* (PUWER) also apply, including regulations for inspection and maintenance.

All accessories for lifting should be inspected by the user prior to first use and thoroughly re-examined within every twelve months (six months for equipment which lifts people).

The responsible person must plan the work, deciding on the hierarchy of control and the required control measures (including the size of any required exclusion zones).

Hierarchy of Control:

By working down the list, the responsible person will decide on the most appropriate means of lifting operations, dependent on the height of the building, complexity of lifting operations, hazards and risks, timescales, following the hierarchy of control.

NOTE: Clients/Users should always have input on location of lifting equipment on site. All concerned must ensure correct training in use of lifting equipment has been carried out.

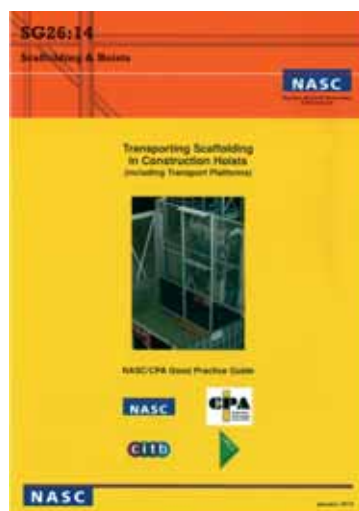
| | |
|---|--|
| 1 | Tower Cranes |
| 2 | Mobile Cranes |
| 3 | Fork Lift Trucks |
| 4 | Passenger/Goods Hoists (please refer to the latest revision of SG26) |
| 5 | Mechanical hoists (e.g. Winch hoists) |
| 6 | Gin Wheels (including proprietary gin wheels with “brakes”) |
| 7 | Hand lines |
| 8 | Manual Handling and “chaining material” (please refer to the latest revision of SG6) |

NOTE: Mechanical Lorry Loader operations are covered in NASC Guidance SG30.

Mechanical aids are preferred over manual handling to reduce the manual handling risks to operatives, but the chosen lifting equipment must be commensurate with the risk (e.g. it may be ridiculous to arrange a mobile crane for the construction of a 8m high scaffold, but it may be the preferred choice for very high level works).

Whenever a mechanical method is used to load materials onto the scaffold, including a hoist, crane or forklift, the materials must be loaded onto a loading bay that has been designed for the impact load and not directly onto the access scaffold.

NOTE: Hoists used to transport material are covered in SG26 and manual handling techniques in SG6.



Control Measures:

The responsible person must also decide on the required control measures, including the size of any required exclusion zones (e.g. an exclusion zone may only need to be the size of the hoist footprint, but for gin wheel operations a larger exclusion zone may be required to provide a suitable containment area in the event material slips out of the rope).

NOTE: the NASC consider Gin Wheel & Rope operations to be safe and industry standard, but nonetheless recognise that there is still a risk of materials falling – often due to human factors – and this must be taken into consideration during the planning stages and suitable measures put in place (such as exclusion zones) to reduce the risk.

3. TOWER CRANE

These are in almost all cases the primary responsibility of the principal contractor on large projects. However, the manager of the scaffolding contractor should request copies of relevant tower crane inspections on a regular basis to satisfy himself/herself that the crane is being maintained.

The scaffolding contractor may be required to supply their own CPCS Slinger Signaller and strops, including in date certification and a list of weights for the scaffold materials as well as details of the loading capacity of their lorries.

4. MOBILE CRANE

The use of mobile cranes is potentially dangerous and the responsible person must ensure that professional advice is sought where required.

4.1 Planning

When hiring mobile cranes, the competent person should ensure that the method of hire is clearly specified and understood (e.g. whether it is Contract Lift or Spot Hire), including the responsibilities for implementation of a lifting plan, subsequent inspection and maintenance, and that the ground is suitable for the imposed loadings of the mobile crane.



The competent person should ensure that

- the right crane is selected for the job;
- a lifting plan is produced;
- the crane is sited in a safe position with its outriggers fully extended;
- the weight of the load is calculated;

- all accessories for lifting have been tested, maintained and thoroughly examined and are suitable for the job;
- all lifts are properly planned and monitored by an appointed person with the necessary qualifications, training and experience;
- the correct method of slinging is adopted;
- the correct procedures are followed;
- the lift is controlled by a competent CPCS Slinger/Signaller;
- the correct supervision is in place; and
- all lifting equipment including lifting gear and accessories for lifting are regularly tested, thoroughly examined and inspected as per regulations.

Mobile cranes offer a safe and reliable means of lifting scaffold materials on site, however, their flexibility and ease of use can lead to misuse and complacency, resulting in accidents and/or dangerous occurrences.

The main causes of accidents and dangerous occurrences involving cranes are primarily lack of planning, training and maintenance, in particular,

- Failing to properly plan the lift;
- Selecting the wrong type of crane to undertake the lift;
- Incorrect siting of the crane when carrying out the lift;
- Failing to calculate the load correctly;
- Use of the wrong lifting gear;
- Failure of personnel to carry out the correct procedures;
- Lack of proper maintenance;
- Absence of properly trained personnel; and
- Absence of a competent supervisor.

A lifting plan must be produced by the appointed person. The lifting plan will address the following:

- Maximum Safe Working Load (SWL) of the lifting equipment in relation to the weights to be lifted;
- The height that the load is to be lifted to;
- Access to the general work area;
- Competence of the persons to supervise and operate the lifting equipment;
- Hazards that may be presented to any other trades or members of the public;
- General condition of the lifting equipment; and
- Ground conditions.

Please note this is a simple guide to a complex operation and the competent person must ensure that all crane operations are carried out safely. Further information can be found in HSE Documents (the latest copies of which can be downloaded from the HSE Website):



4.2 Selecting the method of Hire of the Crane

It is essential to first determine which hire option is suitable and appropriate for the particular lift. The two principal options are a Contract Lift or a Spot Hire. With a Spot Hire, all of the necessary planning, supervision and risk is the responsibility of the Scaffold Contractor. With a Contract Lift the planning, supervision and most of the risk, but not all of the risk, is the responsibility of the crane hire firm. In all but the very simplest of lifts, a Contract Lift would normally be considered the most appropriate.

Cranes should always be selected to handle the maximum anticipated load with capacity spare. The crane should be operated by a competent driver and the vehicle kept in good working order. Relevant documentation must be checked prior to use of the crane and will include:

- A lifting plan;
- A test certificate;
- Thorough examination certificate;
- Weekly inspection register;
- Lifting accessory certificates; and
- Proof of driver training (i.e. CPCS Card).

4.3 Siting the Crane

Unless otherwise stated by the manufacturer, the crane should have its outriggers fully extended and positioned so that:

- The driver has a clear view of the operations;
- There is sufficient operating space;
- It is well away from the edges of excavations, fixed structures against which people could be trapped by moving parts and overhead electric power lines;
- The ground should be level and capable of supporting the full weight of the crane and its load. In addition, and where necessary, sufficient and suitable packing in the form of sound timbers should be placed under the outriggers to distribute the weight evenly.

4.4 The Load

The weight of the load should always be calculated and not left to guesswork. The weight of any accessory for lifting should also be taken into account when calculating the load.

4.5 Lifting Accessories (e.g. Slings)

All accessories used for lifting, including any chain slings, wire ropes or webbing should be well maintained, tested and suitable for the job. Accessories for lifting should be inspected by the user prior to use and must also have six monthly thorough examination certificates.

NOTE: Some principal contractors require webbing slings to be scrapped after six months use on site.

4.6 Managing the Lift

All lifts should be properly planned before the event by an Appointed Person with the necessary training and experience. Either the scaffold contractor's Appointed Person for spot hire, or the crane hire firm's appointed person for a contract lift, will prepare the lifting plan.

All operations should be monitored by the Appointed Person to ensure that the lift is being undertaken correctly. The following aspects of managing the lift are also vital to ensure the safety of all involved:

- A trained (i.e. CPCS Card) and competent slinger/signaller must control the lift;
- Before any lifting operations take place, the appointed person and the driver should ensure that all personnel are clear of the load and all moving parts of the crane;
- Loads should always be suspended under the lifting point and not dragged or pulled along the ground;
- Slewing should be done only in a controlled manner to maintain control of the load and minimise swinging;
- The driver should stay at the controls when a load is suspended and the crane should not travel, unless specifically designed for such duties;
- Loads should only be slung by properly trained and appointed slingers/signallers;
- A trial lift with the load just off the ground will show whether it is correctly balanced and secured;
- Tailing ropes should be used to control large bundles of scaffold tubes or beams etc; and
- Lifting should not be attempted if wind conditions are likely to adversely affect the load.

NOTE: The principle must be: "As Safe in the Air as on the Ground".

4.7 Methods of Slings Scaffold Materials by Crane

When slinging, the following should be done:

- The operation should be carried out using appropriate certificated webbing/chain slings;
- The slings must be equidistant from each end of the bundle and double-wrapped round the load;
- All chain, slings and webbing slings etc must be clearly marked with identification, date of manufacture and safe working load;
- When slinging scaffold tubes using chain slings, packing such as timber may be used to provide added support to the load;
- The hooks on the slings must face away from the centre of the load;
- The angle between sling legs should be as wide as possible but should not exceed 90 degrees;
- When lifting board stacks, they are usually single wrapped with webbing slings;
- Fitting bins are usually treated as part of the load and are double wrapped with webbing slings;
- Bins must be regularly checked for damage or wear;

- If a specially made lifting bin (for example one with integral lifting points) is used, it must be tested, certificated and thoroughly examined every 6 months by a competent person (i.e. treat as an accessory for lifting);
- Do not mix tubes and boards in the same load;
- The lifting plan should specify the method of slinging to be used; and
- The slinger/signaller must ensure the load is secure and a proper system of communication with the crane driver is in place, which is understood by both the slinger/signaller and the crane driver. A trial lift should then be carried out prior to the main lift.

4.8 Slinger/Signaller

The Slinger/Signaller must have received suitable training and both the crane driver and the slinger/signaller must know and understand the required crane signals.

The Slinger/Signaller must be over the age of 18.

The Slinger/Signaller should stand in a secure position where she/he can SEE the LOAD and can be SEEN CLEARLY by the driver.

The Slinger/Signaller must face the driver if possible. Each signal should be distinct and clear.

5. FORK LIFT TRUCKS

Safe procedures must be adopted for fork lift use with all work planned.



Before using fork lift trucks, the responsible person should ensure that

- the right fork lift truck is selected for the job;
- a risk assessment is done and briefed, with records retained;
- only trained fork lift truck drivers operate machinery (e.g. keys removed);
- the fork lift truck only drives on areas that are capable of bearing its weight;
- the weight of the load is calculated;
- the fork lift truck has its outriggers fully extended, where required;
- all accessories for lifting have been tested, maintained and thoroughly examined and are suitable for the job;
- pre-use checks are carried out before the start of every shift and weekly checks are recorded and retained;
- pedestrians and vehicles are kept apart;

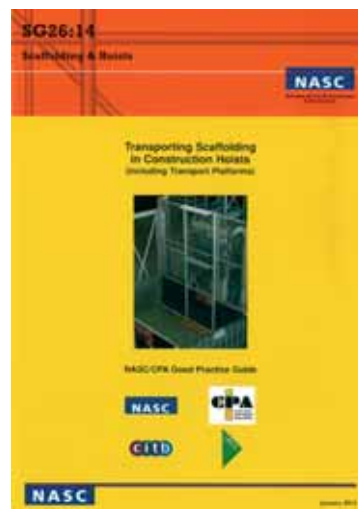
- the fork lift truck only lifts material onto platforms that have been designed to carry the load (e.g. loading bays); and
- all lifting equipment including accessories for lifting are regularly tested, thoroughly examined and inspected as per regulations.

Further information can be found in HSE Documents (the latest copies of which can be downloaded from the HSE Website):



6. PASSENGER/GOODS HOISTS

Please refer to NASC Guidance SG26 for guidance.



NOTE: Hoist information to be provided by Hoist Company (including tie details). The ties for these hoists should be installed in most cases by the hoist company's operatives. A discussion with the customer about fabric of building will be required to ensure stability of hoist and scaffolding. Input from a scaffolding designer may be required.

7. MECHANICAL HOISTS

If it is necessary to lift heavier loads than a gin wheel can accommodate – which is detailed on the next section – an alternative lifting device may be used. One such alternative is a scaffold jib crane, which is a small crane that has been specially designed to be mounted on a scaffold tube. Several varieties of crane are available, but a typical model is illustrated below:



Wherever a jib crane is used to lift loads greater than 50 kg, consideration should be given to the need for the scaffold to be strengthened at the location of the crane and additional or stronger ties to the building provided, following guidance from the manufacturer or from a scaffolding designer.

Alternatively, pulley blocks that support multiple ropes may be used to raise and lower greater loads than a gin wheel. Whenever this type of system is used, the scaffold and its ties should be specially designed at the location of the upper pulley block.

To reduce repetition, please refer to gin wheel installation in the next section, but please note that the responsible person must ensure that the specific manufacturer's guidelines are adhered to, and additional inspection arrangements as required by the manual are put in place.

If any of these lifting methods are used the scaffold may need to be locally strengthened (e.g. using supporting frames and braces). Consideration should be given to providing additional ties to the building by following guidance from the manufacturer or a scaffolding designer.

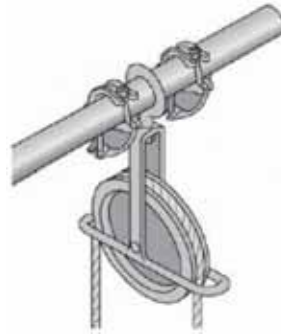
8. GIN WHEELS (INCLUDING THOSE WITH “BRAKES”)

The NASC considers Gin Wheels to be a safe method of transporting scaffold material at height providing that the work is planned and the following guidelines are adhered to:

8.1 Introduction

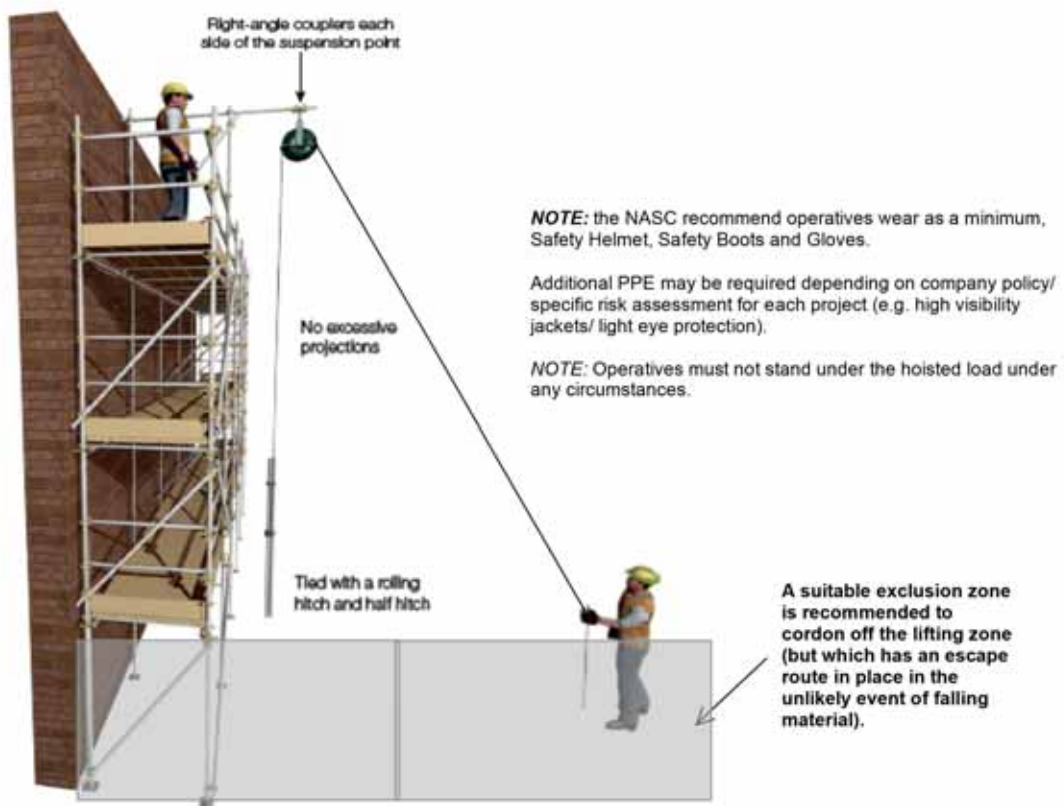
Most scaffolds require at least one simple lifting device to raise materials to the necessary working height. Gin Wheels are the most widely used.

Ring type gin wheel

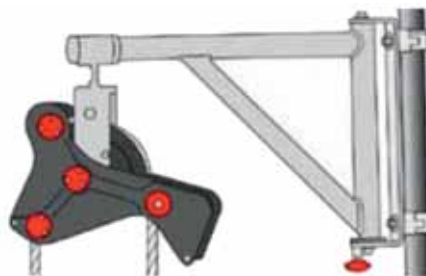


NOTE: load bearing double couplers **MUST** be fixed either side of the Gin Wheel.

Because of the risk of using lifting equipment, it is recommended that the operation is risk assessed and control measures put into place and monitored.



NOTE: there are proprietary Gin Wheels on the market with specialist differences (such as an integral brake system, which prevents the rope travelling when the brake is applied).



The NASC recommends that when more complex Gin Wheels are used the employer ensures that control measures are put in place to combat any potential side effects – such as, for instance, the potential chafing of the rope when the brake is applied (which may require regular additional checks/inspections) – and that any specialist requirements of the manufacturer’s manual are implemented (including additional manufacturer’s inspection requirements).

8.2 Competency Requirements

The employer must ensure that all those who carry out Gin Wheel & Rope operations are suitably trained.

Suitable training is given on CISRS training courses (e.g. Part 1, Part 2 and Advanced), but for those below this level, typical requirements may include certificated manual handling and Safety Gin Wheel & Rope training from a competent trainer. The employer should also monitor their attitude and aptitude towards safety and Gin Wheel & Rope work and ensure adequate supervision.

8.3 LOLER Certification

The employer must arrange for thorough inspections as per LOLER, with gin wheels inspected every year and all accessories (including ropes) inspected every six months. Copies of these certificates must be retained, with copies held on site.

The Gin Wheel and Rope must be fit for purpose (e.g. no cracks in the metal, no signs of corrosion, no sharp edges and the rope is in good condition with no fraying and no cuts). The serial number on the Gin Wheel must be the same as the certificate.

8.4 Pre-Use Check

A competent person (e.g. a CISRS Scaffolder) should carry out a pre-use inspection of the Gin Wheel & Rope at the beginning of every shift (and continue monitoring the equipment throughout the day).

8.5 Weekly Inspection

Until the scaffold is handed over – and the Gin Wheel & Rope becomes part of the scaffold and is inspected as part of the weekly scaffold inspection regime – the equipment must have a weekly recorded inspection by a competent person (e.g. a CISRS Scaffolder or a CISRS Scaffold Inspector).

NOTE: the NASC recommends that Gin Wheels & Rope are returned to the depot after the handover of the scaffold and not left on site (as the equipment can be abused). Where the client requests that the equipment is left in place, it is recommended that the scaffold contractor informs the client of their statutory duties in a formal manner (e.g. a letter).

8.6 Exclusion Zone

The area directly underneath the rope and wheel must be suitably cordoned off to prevent access by the general public and other contractors, using methods determined by the risk assessment (e.g. tube guardrails, barriers, heras fencing and/or look outs) with warning signs displayed, before work commences.

The integrity of the exclusion zone must be maintained and work must cease if anyone accesses the exclusion zone.

At all times the operative must have an escape route in place in the unlikely event of material falling from the rope and at no time stand under the hoisted load.

8.7 Protruding Tube Risks

There must be no protruding tube (e.g. transoms) underneath the Gin Wheel to ensure there is no risk of any material striking protruding tubes and falling to the ground. Where there are tubes protruding, these must be cut or replaced with shorter tubes, before operations commence.

8.8 Fixing Gin Wheel Safely

On typical independent access scaffolds, for example, the Gin Wheel & Rope tube should be fixed to the inner and outer uprights with double couplers. The wheel should be secured in position with 2no. right angle couplers either side of the wheel, with the wheel positioned no further than 750mm away from the outside leg.



If a joint occurs in an inner standard between the horizontal gin wheel support and the lift below, the joint should be made with a sleeve coupler, rather than a joint pin, to resist uplift. Alternatively, a short section of tube may be spliced across the joint and connected with two swivel couplers or band-and-plate couplers.

NOTE: The NASC recommends that the minimum length of rope is used and there is no excessive rope left lying around (so that there are no issues with trailing ropes and increased risk of damaged rope).

Similarly, putlog scaffolds will have a similar configuration (but with the addition of a short brace adjacent to the Gin Wheel).



Alternatively, a vertical tube may be fixed near to the wall to form a puncheon, connected to the putlogs at two working levels with right-angled couplers. This puncheon should extend upward to connect to the horizontal tube, forming a supporting structure similar to the one for an independent scaffold.

8.9 Maintaining Clear Sight of Each Other (ensuring good communication)

The operatives involved in lifting operations must have clear sight of each other and maintain good communication at all times.

They must agree on a system of verbal and non-verbal signals BEFORE work starts.

These include verbal calls as "Take the weight", "Mine", "Yours" and appropriate use of the rope such as the ground man taking up the slack on the rope during the dismantle so that the top man can feel the load being slightly hoisted. The top man will then lift the load over the guardrail – holding on to the rope and visually checking the ground man is ready – before steadying the load and releasing the rope. The ground man will then lower the load to the ground.

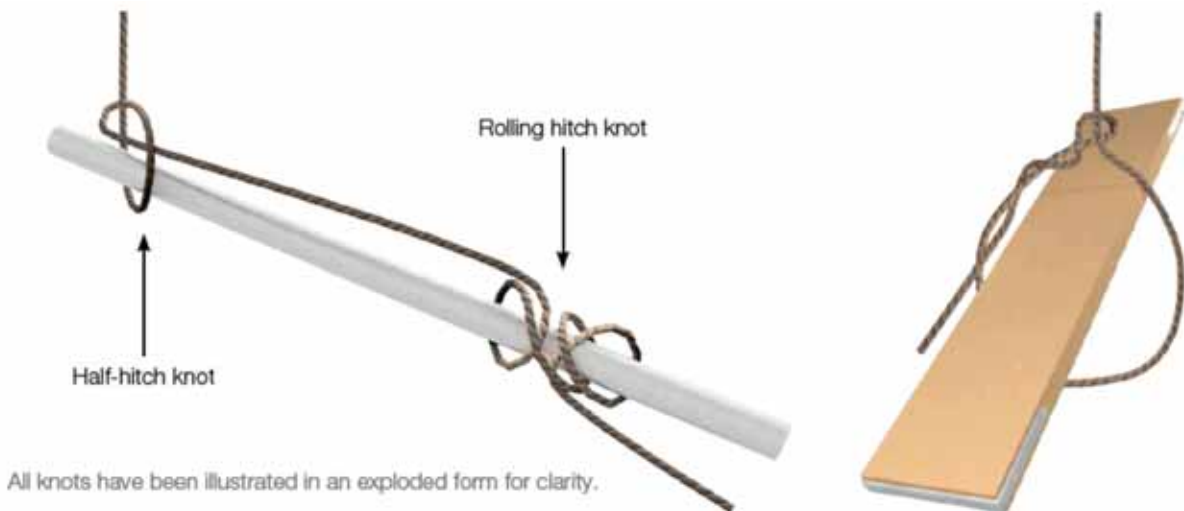
8.10 Tying Material Off Correctly

All material must be securely tied whether hoisting or lowering material (please see sketches and text below).

A single tube should be securely fastened by tying a rolling hitch knot approximately a third of the way along its length. Alternatively, if the tube is to be lifted vertically, the rolling hitch knot should be tied approximately halfway and a half hitch knot should be tied at the top to keep it suspended vertically.

When lifting multiple tubes the NASC recommends that they are lifted in bundles of three, where possible, to maximise the frictional contact between the rope and the tubes. The tubes should be of the same length, tied with a rolling hitch knot approximately halfway along their length and a half hitch knot at the top to prevent the tubes from scissoring.

A timber hitch is normally used to tie boards, as shown below and scaffold fittings must be hoisted in proprietary bags/buckets tied with a rolling hitch.



As a general guide, the following amounts of materials will be the maximum to be lifted or lowered by rope and wheel:

- Two boards up to 4m (13 feet) long (45kg);
- One tube up to 6.4m (21 feet) long (28kg);
- Two tubes up to 3.0m (10 feet) long (27kg);
- Three tubes up to 3.0m (10 feet) long (40kg).

All hoisted loads must be of the same length (e.g. no mixing 2.4m tubes with 2.0m tubes for instance).

The maximum mass that can be hoisted on a Gin Wheel is 50kg, but please note that this also includes the weight of the rope. It is therefore critical that the weight of the rope is taken into consideration when hoisting tube/boards at very high levels.

8.11 Tying Material Off (Hoisting Material Upwards)

When the scaffold operative ties off the material and hoists it up to the operative at the top he must have clear sight of the top man (and vice versa), and maintain good communication.

For example:

When the material has been hoisted to the top, the top man will signal to for the ground man to hold the load still while he takes control of the material and stacks it neatly and safely on the scaffold. He will then untie the rope and send the rope down to the bottom again. The same sequence will be used again until all the required material is hoisted to the top.

8.12 Tying Material Off (Lowering Materials)

The same sequence will be used in reverse.

For example:

The top man will check the ground man is ready and then lift the load over the guardrail – holding on to the rope and visually checking the ground man is ready – before steadying the load and releasing the rope. The ground man will then lower the load to the ground.

8.13 Inclement Weather

The employer must risk assess inclement weather and when work must cease due to inclement weather (e.g. high winds). The employees also have a duty to contact their employer where they perceive a risk due to bad weather.

8.14 Close Down Operations

The Gin Wheel & Rope must be made safe at breaks and at the end of the shift (which may require the removal of the equipment to a safe place, if it is likely that others might abuse the equipment).

The NASC recommends that where the Gin Wheel & Rope must be left in position overnight, the rope must be curled up and tied off at high level to reduce the risk of abuse and damage.

NOTE: the NASC recommends that Gin Wheels and Rope are returned to the depot after the handover of the scaffold and not left on site (as the equipment can be abused). Where the client requests that the equipment is left in place, it is recommended that the scaffold contractor informs their client of their statutory duties in a formal manner (e.g. a letter).

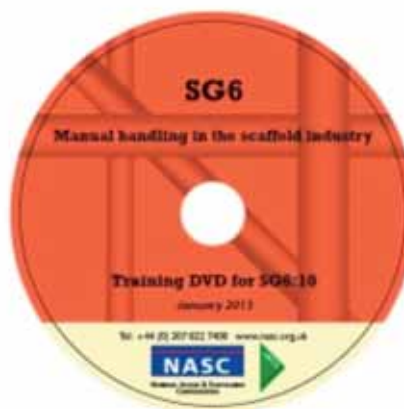
9. HAND LINES

Instead of using Gin Wheels, a 'hand line' may be used to tie materials to a fibre rope, typically of a 12 mm diameter, and haul them up by hand.

Hand lines are typically suitable for lifting materials of up to 20 kg.

10. MANUAL HANDLING, INCLUDING "CHAINING"

Please refer to NASC Guidance SG6 for full details.



11. TEST AND THOROUGH EXAMINATION OF LIFTING EQUIPMENT

- The following maximum intervals should be maintained;
- The results of any test or thorough examination or inspection should be recorded, maintained and be available; and
- All equipment certification and training certificates should be retained (with copies accompanying the equipment to site).

| | <i>Thorough Examination</i> | <i>Test and Thorough Examination</i> |
|--|--------------------------------------|--------------------------------------|
| Tower and Mobile Cranes | Within every 12 months See Note 3 | Before first use See Note 2 |
| Fork Lift Trucks | Within every 12 months See Note 3 | Before first use See Note 2 |
| Passenger Hoists | Within every 6 months See Note 3 | Before first use See Note 2 |
| Goods Hoists | Within every 12 months See Note 3 | Before first use See Note 2 |
| Mechanical hoists | Within every 12 months See Note 3 | Before first use See Note 2 |
| Gin Wheel | Within every 12 months | Before first use |
| Hand lines | Within every 6 months (accessory) | Before first use |
| Slings, Chains, ropes and lifting accessories | Within every 6 months | Before first use |

Note 1: General

Lifting Equipment (e.g. mobile cranes and Gin Wheels) must be inspected by a competent person weekly when in use and subject to a pre-use check by the operator/user. Lifting accessories must be subject to a pre-use check by the user.

Note 2:

These may also be subject to an examination plan drawn up by a competent person. Where the safety of lifting equipment depends on installation conditions at a new site or location, for example tower cranes, these must be thoroughly examined before being put into service.

Note 3:

Cranes used for lifting people must be thoroughly examined every 6 months.

12. REFERENCES

Approved Code of Practice: Rider-operated Lift Trucks L117 [latest revision];
BS7121 – Code of practice for the safe use of Cranes;
HSE Guidance: INDG457 Use Lift Trucks Safely [latest revision];
HSE Website: <<http://www.hse.gov.uk/>>;
HSE Report OC 406/5: Safe Lifting of Scaffold Tubes Using Fibre Ropes;
NASC Guidance: SG6 Manual Handling in the Scaffolding Industry [latest revision];
NASC Guidance: SG26 Scaffolding & Hoists [latest revision];
NASC Guidance: SG30 Working from Vehicles [latest revision];
NASC Guidance: TG20 Operational Guide [latest revision];
Lifting Operations and Lifting Equipment Regulations 1998 LOLER);
Provision and use of Work Equipment Regulations 1998 (PUWER) and relevant ACOP.

Whilst every effort has been made to provide reliable and accurate information, we would welcome any corrections to information provided by the Writer which may not be entirely accurate, therefore and for this reason, the NASC or indeed the Writer, cannot accept responsibility for any misinformation posted.



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