SG6:15

Manual handling in the scaffolding industry

NASC
National Access & Scaffolding Confederation

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CONTENTS

1. INTRODUCTION

More than a quarter of the injuries reported each year by NASC members to enforcing authorities are associated with manual handling[1]. Fatal manual handling accidents are rare, but analysis of NASC accident statistics show that the majority are sprains and strains to the upper body, shoulders, arms, wrists, hands and fingers.

Many scaffolders suffer long term effects from poor handling techniques or work related upper limb disorders (WRULD's) through the repetitive nature of scaffolding operations. Scaffolding has been referred to as a 'young man's game', with many leaving the industry prematurely due to manual handling related injuries or ill health.

Therefore, manual handling is the most significant occupational health hazard faced by the scaffolding industry today. Very rarely do scaffolders reach retirement age still working on the spanner!

Scaffolders spend most of their time lifting and handling scaffolding material under a variety of conditions. Manual handling is an inherent part of the scaffolding trade. The specialist skills and techniques used by scaffolders when handling heavy and often unwieldy materials are the basic enabling skills of the scaffolding industry.

In the average working day, a scaffolding gang can typically handle over 15 tonnes of materials. The average scaffolder, in their working life, could handle more than 150,000 tonnes of scaffolding materials, the equivalent of Cunard's cruise ship the Queen Mary II.

The nature of the job dictates that scaffolders must be mentally alert to the inherent dangers of a physically strenuous job.

Several factors in scaffolding can make manual handling tasks difficult. Scaffolders are often required to:

- support loads, often in awkward positions;
- move heavy and unwieldy materials;
- carry loads over rough, uneven ground or within buildings;
- carry out highly repetitive tasks.

Some items of scaffolding material are of such a weight that they require special handling techniques to prevent injury e.g. 6.4m (21ft) scaffold tube, 3.9m (13ft) scaffold board, a bag of loose fittings, long ladders or beams. Although scaffolders do require certain physical capabilities most of the more strenuous, awkward or unwieldy tasks rely more upon special techniques than pure strength.

The recommendations within this guidance note should help scaffolding operatives and their employers reduce the risk of injury and long-term health problems associated with manual handling in scaffolding.

1. Reported to the Health and Safety Executive (HSE) under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR). Source: NASC Safety Report 2009.

2. LEGISLATION

The Management of Health and Safety at Work Regulations 1999, require employers to make a suitable and sufficient assessment of the risks to the health and safety of their employees whilst at work. Where this general assessment indicates the possibility of risks from the manual handling of loads, the requirements of the Manual Handling Operations Regulations 1992 must be followed.

The Manual Handling Operations Regulations 1992 (MHO) apply to all scaffolding work, including yard operations. They set out a framework for employers to tackle the risk from manual handling. Under these Regulations, if you cannot avoid manual handling and there is a risk of injury, then you must assess the manual handling operations and take steps to reduce the risk of injury to the lowest level reasonably practicable.

The Construction (Design and Management) Regulations 2007 (CDM) apply to most construction work. Under CDM, everyone involved in the construction process must give adequate regard to health and safety. For manual handling this is especially appropriate for the Architects, Designers and Principal Contractors when considering the layout of the site and access for the scaffolding contractor and materials. Duties under CDM extend to temporary works design. Scaffold Design Engineers must consider manual handling hazards and where significant risks cannot be designed-out then such significant hazards or hazardous work sequences that remain should be highlighted to the scaffolders on the drawings.

Fig. 1

In addition to these statutory duties, employers have a common law duty of care towards employees to take all reasonable steps to prevent foreseeable manual handling injuries.

The Health and Safety Executive (HSE) does not publish an Approved Code of Practice (ACoP) for the Manual Handling Operations Regulations, but instead produces general guidance on manual handling at work which represents good practice. This guidance is very general and not specific to any particular trade or task. It contains information about establishing loads for lifting and lowering that MUST be considered in its entirety, as it is often misinterpreted or misquoted. There is no maximum load specified in the HSE guidance, as all manual handling operations must be subject to a manual handling risk assessment.

Fig. 2 HSE Guidance (L23)

3. PLANNING FOR MANUAL HANDLING

Scaffolding contractors must consider manual handling as an integral part of the planning process. Estimators, management and supervision must consider manual handling as part of the initial risk assessment process when they are surveying and considering the scope for the job. Manual handling issues should be raised with the client and considered together as part of the pre-contract negotiations and pre-start meetings.

Arrangements to reduce carrying distances and manual handling risks on site could include:

- **Access to site for vehicles and materials**
  - How close can vehicles be parked or materials stored to the workplace to minimise carry distances?
  - Are there any time / security constraints for materials being delivered or collected?
  - Are there any road closures or highway permits required, to allow the vehicle adjacent to the workplace?
  - Are there any safety considerations as a result of vehicle movement - is a Banksman required?
  - Local or site traffic restrictions one-way systems, waiting or parking limits that may hinder vehicle access?
  - Is the terrain suitable for the vehicles e.g. who's responsible for preparing the ground?
- **Loading and unloading requirements**
  - Specific location identified for delivery and removal of materials?
  - Fall prevention requirements for unloading/loading vehicles at site?
- **Storage of materials onsite and at the workplace**
  - Specified laydown area, storage facilities or satellite storage facilities at the workplace?
- **Use of shared mechanical handling equipment e.g. forklift truck, hoists or cranes**
  - Are mechanical means available when required?
  - Who is to operate the equipment?
  - Are all machinery operators competent for the equipment they intend to use e.g. hoist operators to be trained, is a slinger/signaller required?
- **Are the ground conditions suitable for manual handling of materials?**

Case Study #1 – Hoists

An NASC member has invested in a fleet of small goods hoists that attach to the scaffold for the purpose of raising and lowering scaffolding materials on taller structures.

The main benefit of these hoists on taller scaffolds has proven to be efficiency, both in the physical effort required and human resources used. Typically scaffolding contractors will chain materials hand to hand requiring more manpower or use a rope and wheel which is time consuming and causes fatigue.The hoists can carry many more items at a time.

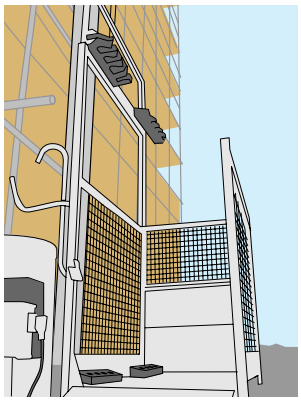
Often customers see these hoists in use by the scaffolders and ask for the hoist to be left on hire, thereby generating further business.

3.1. Avoiding Manual Handling

Where it has been assessed that there is a risk of injury from manual handling, the first consideration should be whether the load needs to be handled at all, or whether the requirement for handling can be minimised. The scope for eliminating the handling of loads in most scaffolding operations is very limited. However, through careful planning, organisation and, where appropriate, innovative scaffold design, manual handling risks can be avoided or reduced for some scaffolding tasks.

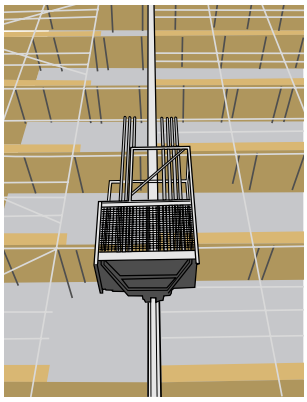
In most cases, the planning and organisation of material deliveries and storage areas can reduce carrying distances and the amount of handling required. Where load-handling operations are essential, consideration should be given to the use of mechanical handling, for example by the use of lifting equipment onsite such as forklifts, cranes and hoists. Management should arrange with their client for the use of shared mechanical handling equipment at the planning stage of each contract or job (see above).

More and more scaffolding contractors are seeing the benefits from greater use of mechanical handling equipment themselves, for example the use of demountable body vehicles, lorry-loader cranes, hoists and winches.



Specially adapted hoist for scaffolding materials

Tubes loaded in a secure rack



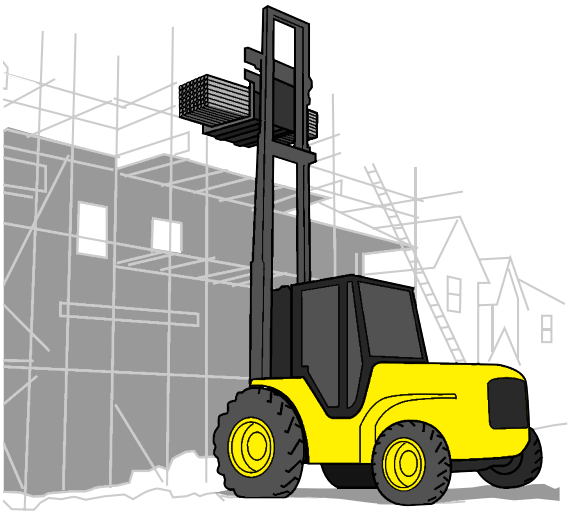
Fast, safe and efficient handling

Fig. 3 Example of a small goods hoist adapted for scaffolding materials.

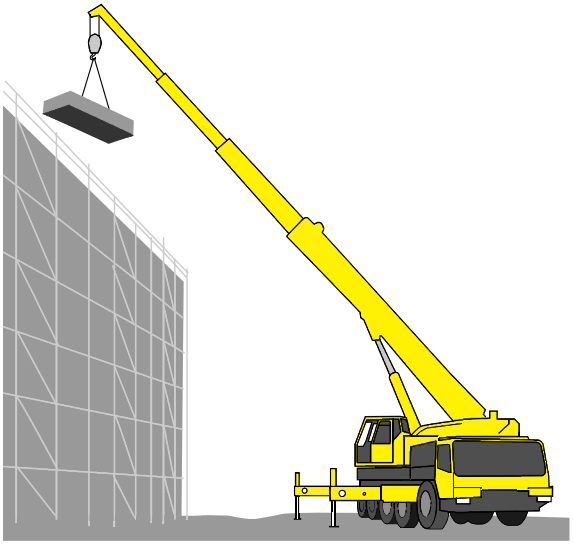
De-mountable body vehicles

Lorry loader cranes

Fig. 4 Examples of mechanical handling equipment for scaffolding.



Utilising site fork lift truck



Use of site cranes

Fig. 5 Examples of site mechanical handling equipment utilised for scaffolding.

3.2. Carrying out a manual handling assessment

When assessing the manual handling risk you need to consider the different characteristics that make up the activity. The areas to consider are the:

Task

Individual

Load

Environment

*Remember the acronym **T.I.L.E.***

Each of these on its own can have an effect, although, more commonly, it will be a combination of these factors that influences the risk of manual handling injury. When carrying out a manual handling assessment, it is important that the activity is taken as a whole and the interaction between these four characteristics is considered. Consultation with your workers, and those who have had past experience of such work, can be of considerable assistance when identifying manual handling hazards.

Task

- The nature of the task - find out how much reaching, bending, stooping, stretching and twisting is involved.
- The position of the load relative to the handler is important in determining the degree of control and effort required to do the task. If a load has to be lifted above head height, then the degree of control and effort needed will be greater than if the activity were carried out at waist height e.g. when topping out a standard on a tall hemp compared to a short one.
- The frequency and duration of the handling are important in determining the degree of risk. Where there are repetitive lifting operations combined with repeated bending, twisting and reaching over a period of time, the effect of all these tasks added together significantly increases the likelihood of injury, e.g. chaining materials in a restricted space or working on a short lift.

Individual Capability

- Does the job require someone of unusual height or strength?
- Does the individual have an existing health problem which increases the risk?
- An individual's age, strength, level of skill and experience will affect how much a person can safely handle.
- It is recognised that scaffolding requires certain physical capabilities, but it is more important to utilise the specialist techniques of the trade developed over decades, known as kinetic handling techniques.

Load

- The nature of the load: is it heavy, bulky, hard to grasp?
- The weight, size, shape and stability of the load all contribute to the degree of control and effort needed for the activity.
- The unwieldy nature in which the load needs to be handled e.g. long components held vertically such as a hoisted tube, or away from the centre of gravity when passing out scaffold boards in advance to form a working platform.

Environment

- The nature of the working environment: is it hot, cold, windy or poorly lit?
- Working at height adds another dimension to manual handling tasks and scaffolders must ensure that they create a safe working platform so that manual handling at height does not increase the risk of a fall or even the risk of manual handing injury (All work at height must be carried out in accordance with NASC Safety Guidance SG4). The risk of falling objects from poor manual handling techniques also needs to be considered when working at height.
- Are there slopes, uneven ground or poor access arrangements? Poor ground conditions make slips and trips more likely.
- Constraints on posture (such as confined or restricted spaces) increase the degree of control and effort needed for the task, increasing the risk of injury.
- Carrying items on slopes requires greater effort than carrying on the level.
- Adverse weather conditions need to be considered, as carrying sheet materials in windy conditions could make the manual handling task more difficult.

If manual handling cannot be avoided then the objective for employers is to reduce the possible harmful effects of manual handling to as low a level as is reasonably practicable.

As manual handling is an inherent part of scaffolding, the manual handling risk assessment does not necessarily need to be recorded as a separate assessment and should considered as part of the general risk assessment, method statement or scaffold plan.

3.3. Training, Information and Instruction

The special manual handling skills and techniques are covered as part of the Construction Industry Scaffolders' Record Scheme (CISRS) for Part 1, Part 2 and Advanced.

Specific manual handling requirements for system scaffolding are covered by the CISRS System Scaffold Product Training Scheme (SSPTS). For other proprietary products not covered by this scheme, employers must ensure that all scaffolding operatives receive the necessary information, instruction and training.

Management and supervision must ensure that any specific control measures identified in the risk assessment, method statement or scaffold plan are effectively communicated as part of the pre-start briefing.

Where mechanical handling equipment is to be supplied or operated by the scaffolding contractor, employers must ensure that operatives have the necessary training and experience to be deemed competent.

Fig. 6 A CISRS Manual Handling Training Session

3.4. Physical Capabilities, Health Screening & Surveillance

It is important employers ensure that scaffolding operatives, including drivers, labourers and yard staff, have the physical capabilities to carry out the manual handling aspects of their job.

The health screening and surveillance arrangements carried out by employers could include, in addition to statutory medicals and those required by clients:

- **Pre-employment Medical Questionnaires** - can be used to vet potential new employees to ensure they have the necessary physical capabilities for the role and identify pre-existing conditions to be considered.
- **Baseline Medical Examination** - used to establish the base fitness for work and to help identify any underlying health problems that might affect an employee's ability to work safely.
- **Health Surveillance Medicals** - carried out periodically, at a frequency to suit the nature of the work and determined by the employers own risk assessment.
- **Return to Work Medical Checks** - an employee returning to work after injury or an extended period of absence from ill health could have a medical check to prove their fitness.

Case Study #2 – Medical Questionnaire

A man was employed as a yard labourer in a busy scaffolding yard. He received a company induction and some basic training from the yard foreman, which included some handling techniques and a manual handling video. After a few days he was placing scaffold tube into a stillage, when his back seized and was unable to move. An ambulance was called, as he was in a great deal of pain and he was taken to hospital for treatment.

When he was interviewed as part of the accident investigation, it came to light that he had been involved in a car accident some years earlier that required major surgery to a back injury.

Doctors had advised him not to carry out any heavy lifting for the rest of his life.

However, he had spent his compensation and was desperate for work to avoid having his home repossessed.

He had lied on the pre-employment questionnaire that he completed as part of the application form. A subsequent personal injury claim was successfully defended by the scaffolding contractor.

4. REDUCE MANUAL HANDLING RISKS IN SCAFFOLDING

Scaffolding contractors need to consider manual handling from both a strategic level for the business as a whole and on a job-by-job basis. This section explores the steps employers and scaffolding operatives can take to reduce the risk of injury where manual handling cannot be avoided. We also look at the measures taken by employers that can be considered as best practice.

4.1. Manual Handling Aids

The use of manual handling aids can benefit scaffolding operations by increasing efficiency and reducing the risk of fatigue and manual handling related injuries.

- **Gin Wheel and Rope** – if used correctly are a safe method of raising and lowering materials when working at higher levels. However, this tends to be laborious as only small quantities of materials can be raised or lowered at a time. The gin wheel and rope must be serviced and inspected in accordance with the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER). Care must be taken to segregate the work area and ensure the suitable knots and hitches are used to secure materials. Employers must ensure that all operatives including labourers have been training in the safe use of gin wheels and ropes. Note: The use of gin wheels is part of the Construction Industry Scaffolders' Record Scheme (CISRS) syllabus.

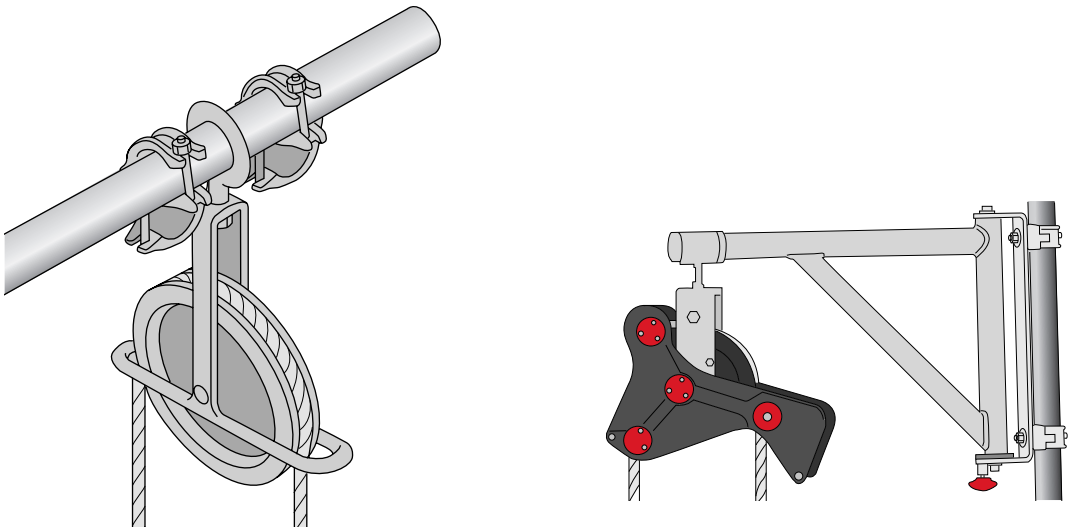
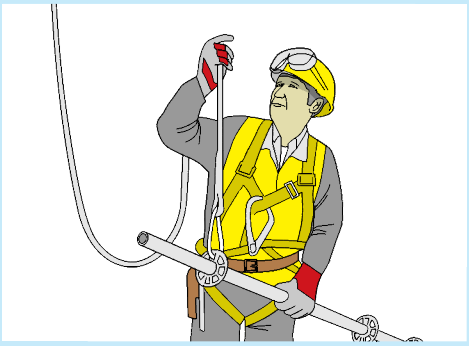


Fig. 7 Traditional gin wheel and braked version.

- **Hand Lines (or light lines as they are sometimes referred to)** - offer a similar advantage to scaffolders as gin wheels but at lower levels where materials cannot be passed hand to hand.

Case Study #3 – Hand lines

A major scaffolding contractor issues each gang with a 10m rope and a karabiner or hook spliced to the end. The hook is used for quickly and securely attaching system scaffold components and fitting bags. For tubes and boards standard knots and hitches are used.



- **Fitting Bags** – are used for raising and lowering quantities of loose scaffold fittings. Bags can be passed from hand to hand or by rope. Proprietary bags and buckets are marked with a maximum load which must be observed.

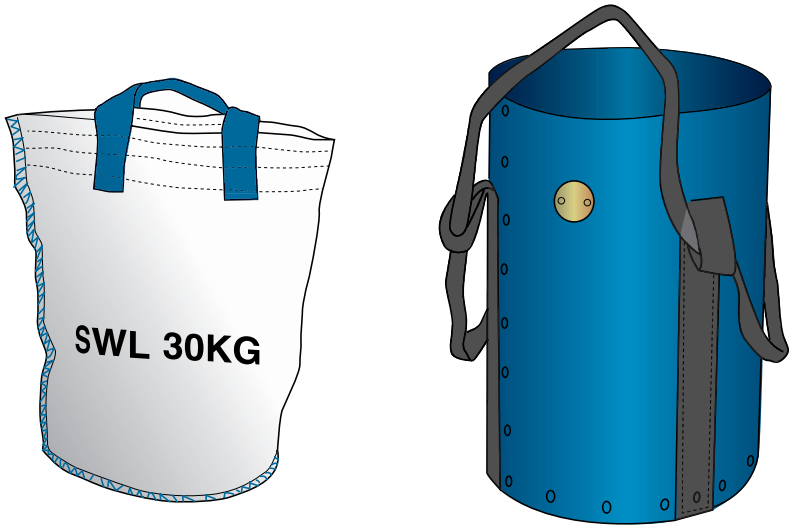


Fig. 8 Fitting bag and bucket displaying the load rating.

- **Trolleys, trucks and wheel barrows** – can be used to move bulk materials around site where mechanical handling equipment is not accessible e.g. building floors.

Fig. 9 Pallet trucks and wheelbarrows are examples of manual handling aids used in scaffolding operations.

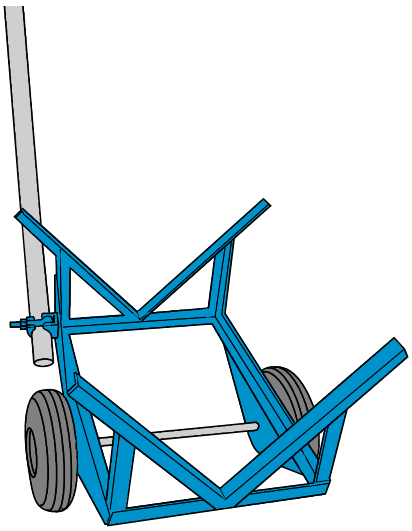


Fig. 10 Bespoke scaffolding trolley for moving tube and/or boards.

4.2. Selection of Materials

- **Long Scaffold Tubes** – The use of long tubes has been the subject of much debate in recent years. An EN39 (BS1139) 6.4m (21') x 48.3mm (1 29/32") galvanised steel scaffold tube, with a 4mm wall thickness, typically weighs more than 28 kilograms (62lbs). The practice of hoisting and hemping a long tube is one of the most strenuous and unwieldy tasks for scaffolders. It requires special techniques, skill and physical strength to do safely.

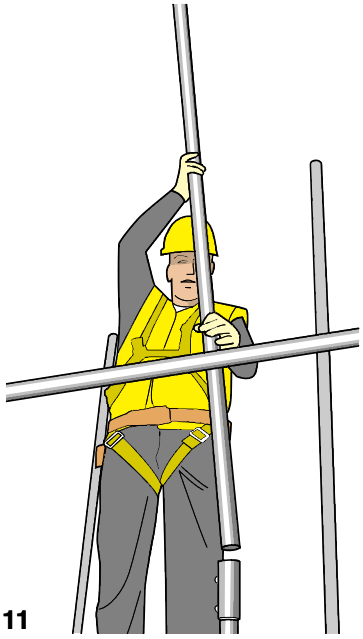


Fig. 11

Case Study #4 – Shorter Tubes

A scaffolding contractor has opted to use shorter tubes for hemping standards at height following their own risk assessment. Whereas they still routinely use long tubes (6.4m/21ft) for ledgers, guardrails and standards at the base. Special consideration had to be given to the design of scaffolds for the greater frequency of joints in standards, particularly for taller structures.

- **System Scaffolding** – Proprietary system scaffolding requires different manual handling techniques to traditional tubes, fittings and boards, which needs to be addressed as part of the risk assessment and planning process. Manufacturers are required to carry out ergonomic assessments when designing components to ensure they can be handled and used safely.

Case Study #5 – System Scaffolding

A popular modular system scaffold is available in bay sizes of up to 3.09m. However, a scaffolding contractor who uses this system scaffolding extensively, chose to standardised on a maximum bay size of 2.57m, after carrying out a manual handling risk assessment, to reduce the weight of ledgers, steel decks and braces making them easier to handle by their scaffolders.

4.3. Basic Manual Handling Techniques

The nature of their work dictates that scaffolders must be mentally alert to the inherent risks of a physically strenuous job. Muscles and joints can be strained by sudden and awkward movements, twisting or jerking whilst lifting or carrying a load, or by attempting to lift too heavy a load.

The risk of injury can be reduced by adopting the correct mental attitude, which encourages good lifting technique. Poor posture such as 'stooping' when lifting should be avoided; it greatly increases the chance of back injury. The stress imposed on a rounded back is much greater than if the trunk is kept upright maintaining the natural curve of the spine, using the leg and thigh muscles to power the lift.

Attitude towards manual handling in scaffolding has a large influence on behaviour and poor manual handling technique, increasing the risk of injury. These mind sets are known as the four M's:

Macho Scaffolding is full of bravado and one-upmanship with shows of strength and physical ability. Who's the strongest – look at me - I can lift more than you – I can hemp higher than you! Unwilling to learn from experienced hands or pace themselves.

Martyr Similar to a macho attitude in many ways. A willingness to constantly suffer – seek sympathy or favour from peers – keen to make a good impression! Unwilling to ask for help.

Mindless No or little forethought - following the bad examples set by others – not thinking for yourself - like a sheep following the flock! Set in their ways, unable to change or accept new techniques or technology, even if readily available!

Mean Carrying too much to avoid another trip – also known as a 'lazy man's load'! Unwilling to use safer options or equipment because they couldn't be bothered, even when readily available!

4.3.1. Kinetic Lifting Techniques

The kinetic methods of lifting enable the worker to make full use of the body's own weight and momentum to initiate the lift. The natural shape of the spine is maintained throughout (although the body may be bent forward the spine should remain straight) and the lift is powered by the strong leg and thigh muscles. This method of lifting involves the minimum amount of muscular effort and thus reduces stress and fatigue.

The following six key factors should be practised until they become second nature, a single co-ordinated action.

1. **Feet** - Any lifting or handling can only be successful if it is carried out on a firm base. The scaffolder may work on the ground or from a temporary platform, but it is essential that the feet are placed so that a good balance is maintained throughout the lift. There is no correct or exact distance apart for the feet. Each individual has to consider their own weight, height and build. In general terms the feet should be in line with the lift, comfortably apart, with one foot slightly in front of the other. The rear foot should point forward when lifting, in the direction of movement. This position gives a good, adaptable balance and a wide enough base to perform the lift.

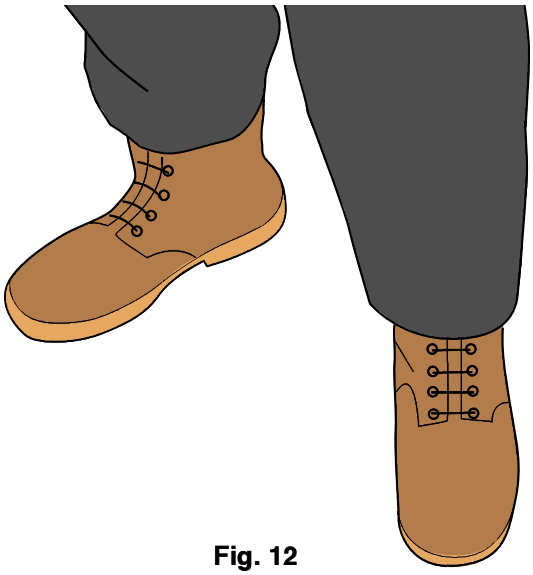


Fig. 12

2. **Legs** - Having established a good base for the lift and realised that it may be necessary to make adjustments to balance, it naturally follows that the legs must be relaxed sufficiently to achieve flexibility. To obtain flexibility, both knees must be unlocked to allow the feet to adjust automatically. This is a requirement for all good movement. While it is important to unlock and bend the knees, they should not be placed into the complete squat position, as this will place extreme pressure on the knee joints. Fig. 12 shows the forward leg facing the direction of the lift while the back leg is positioned to provide the thrust for the lift. Although the lifter is only using one hand, the weight will be taken through the centre line of the body, thus maximising the use of body weight (Fig 13).

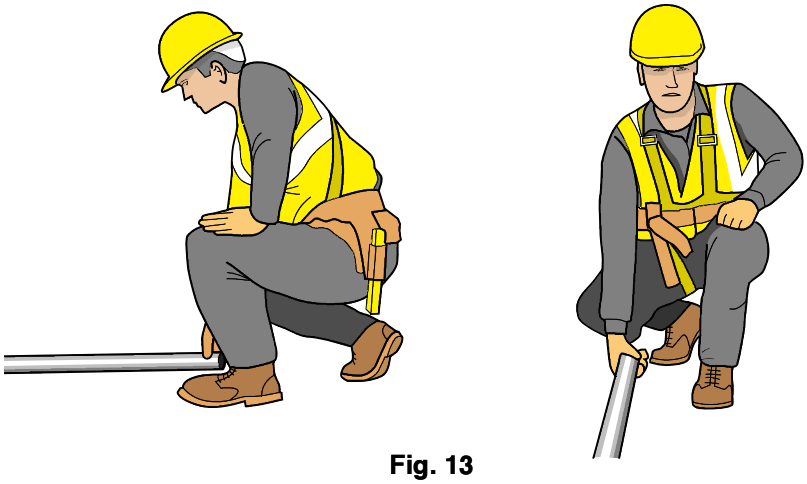


Fig. 13

3. **Head** - The head should be gently raised and the chin tucked firmly in. This will not only straighten the neck but also the whole spine and it will bring about many other corrections in body movement, automatically lifting the chest and preparing the arms for a more efficient action. This head action should be carried out at the initial stage of all lifting movements.

Fig. 14

4. **Straight back** - A bent back is a weak back. It will lead to excessive muscular tension and damage to the spine. It will also undermine shoulder and arm efficiency. Generally, if the correct head position is adopted, then the back can be kept straight, even if it is not vertical. The back should straighten automatically, prior to the hands taking the load. Fig. 14 shows a difficult lift: the feet are well planted, the knees well positioned and the back straightened as the chin is being drawn in.

5. **Arms** - The arms should be as close to the body as possible. The further they are extended the greater the strain. The elbows should be kept into the body.

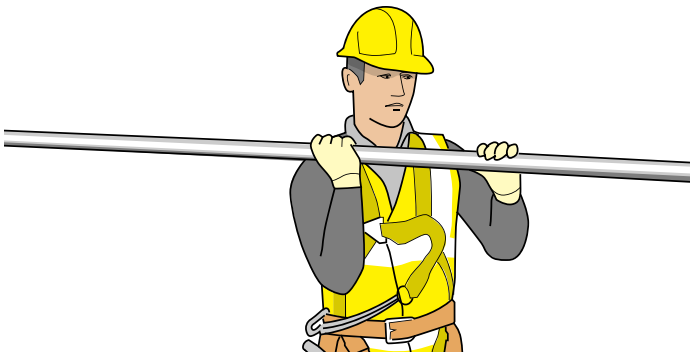


Fig. 15

6. **Grip** - A good hand grip is essential. Scaffolders spend the majority of their time handling tube, which, because of its shape, is difficult to grasp. Whenever possible, one hand should be below the load, with most of the weight being taken by the palm and roots of the fingers.

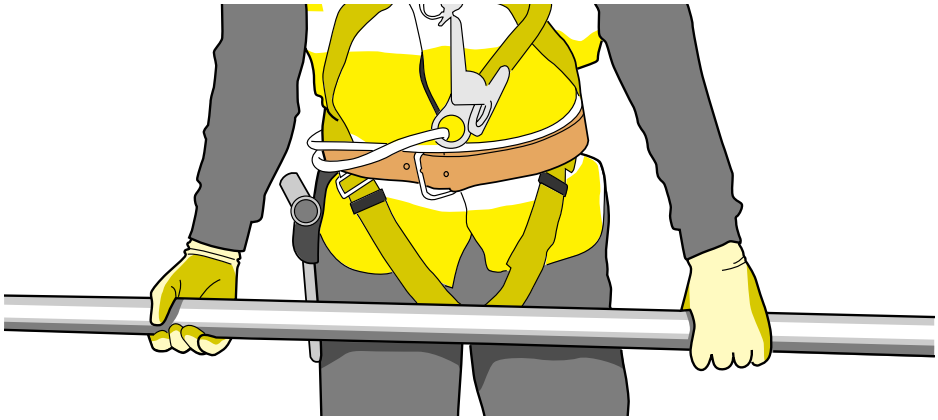


Fig. 16

Remember!

Aches and pains are warning signals and indicate fatigue and stress. If ignored, the outcome may well be some form of injury as a result of incorrect lifting techniques

4.3.2. Handling Scaffold Tubes

Before lifting any weight, a worker must ensure that the ground area is clear and free from tripping hazards. It is important to see that no-one is in the way and that there is nothing likely to obstruct the lift. The weight should be within the lifting capacity of the individual worker. The load should be approached squarely, facing in the direction of travel. The feet must be placed apart with one foot slightly in front of the other to maintain a comfortable balance, the knees bent and the body as close to the load as possible.

The tube should be grasped firmly, with the arms kept as close in to the body as possible, grasping the tube in front of the body. Adjust the position of the head (head up – chin in) and begin to lift using the leg and thigh muscles. As the tube is raised transfer the grip to maintain a balanced grasp on the tube, holding it close to the body.

The weight of the body can be easily transferred from one foot to another, ensuring that the balance is maintained and enabling the load to be taken by the whole body.

This use of the bodyweight if best illustrated when the scaffolder is carrying long tubes in the vertical position. Fig. 17 shows the back leg still in the thrust position, and the front foot in the direction of the lift. The back is straight and the head erect. The weight is taken on the palms of the hands and the entire bodyweight is positioned to resist any movement of the tube. Note that the top forefinger is extended along the tube and will act as a sensor to give early warning of any movement of the tube, enabling the feet to be repositioned to maintain a good balance.

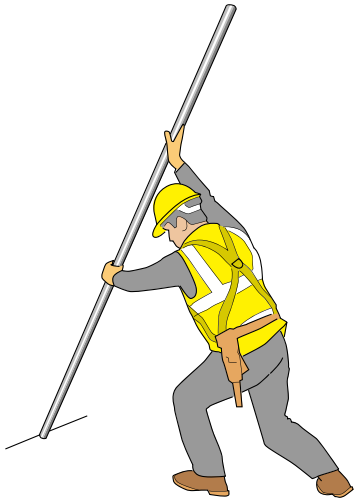


Fig. 17

• LIFTING SCAFFOLD TUBES

The following sequences show some of the common handling and lifting tasks required of scaffolders every day.

In Fig. 18, the correct foot position has been adopted – the front foot in the direction of the lift, and the rear foot ready to thrust behind the load. The chin is still to be tucked in, but the back is straight.

The tube is lifted – the feet have been adjusted to allow the lifter to walk to the centre of the tube using a hand-overhand movement to maintain the weight of the load. The chin has been tucked in, thus maintaining a straight back.

Fig. 18

Fig. 19

Fig. 20

Having reached the centre of the tube, the hands adjust for balance. The hand, which is placed over the tube, is bearing very little weight because the hand under the tube is positioned closer to the centre of the tube and is therefore taking most of the load.

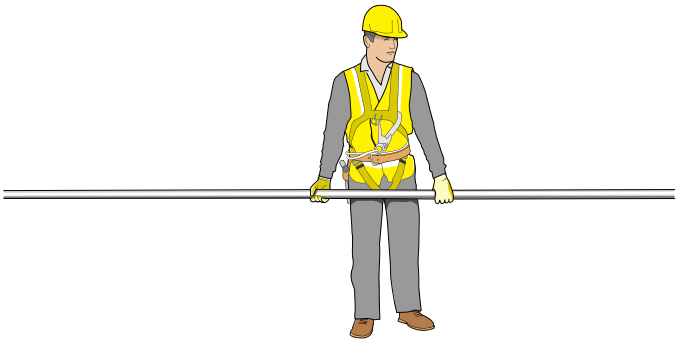


Fig. 21

Now the tube is ready to be raised to the carrying position, which in this case is on the shoulder.

As the lift is carried out it will be necessary for the body to be turned in the direction of the intended line of carry.

The knees are unlocked and ready to allow the feet to adjust to the new position. The arms and shoulders are used to begin the lift.

As the lift nears the correct height the feet have begun the adjustment that will allow the body to turn under the tube and allow the shoulder to receive the weight.

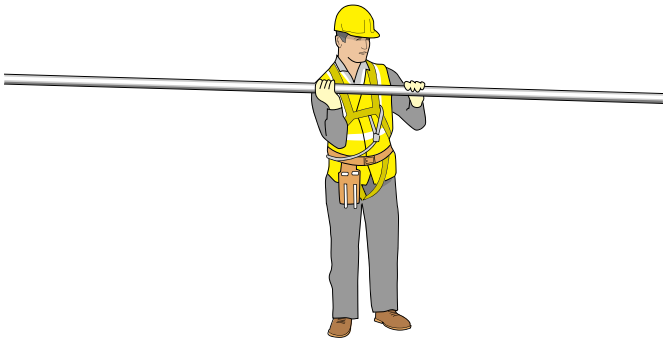


Fig. 22

The load has been released by the load-bearing hand and transferred to the shoulder, and the other hand is kept in position to steady the tube. The feet have nearly completed the adjustments.

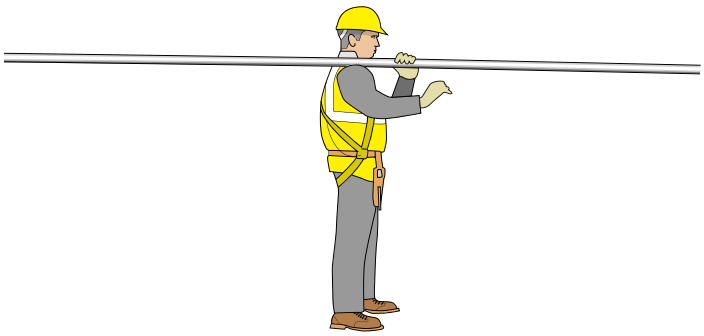


Fig. 23

The shoulder hand has been placed into the steadying position and the feet have completed the adjustments, thus allowing the body to complete the turn safely.

The lift is complete, and the carry can begin. To place the tube back on the ground, the actions are reversed.

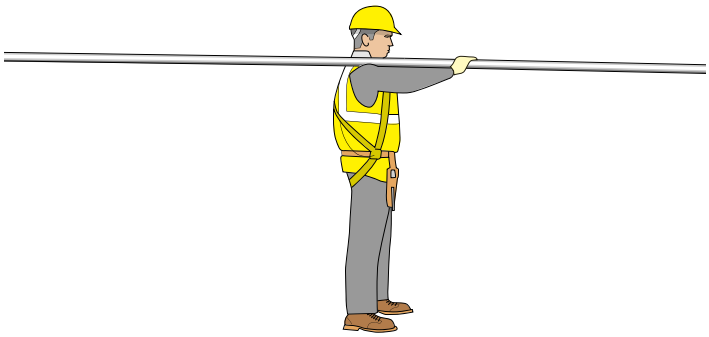


Fig. 24

- **LONG TUBE (vertical carry)**

Again before performing the lift, ensure:

- the area is clear of tripping hazards, including the route you are going to take and where you will land the tube.
- your lift action will not endanger anyone.
- you are capable of handling the load.

As you are about to carry the tube in the vertical position, ensure:

- the area and space above head height are clear along the entire length of the carry.
- there are no overhead cables in the vicinity.

The same actions as in the previous lift are carried out until the load is taken in the centre by the hands. The end of the tube should be butted against something solid. If nothing is available, another worker can use the instep of their boot to 'block' the end of the tube.

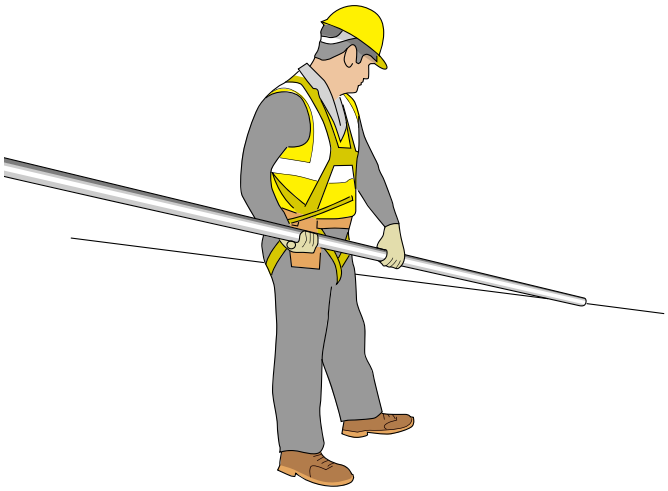


Fig. 25

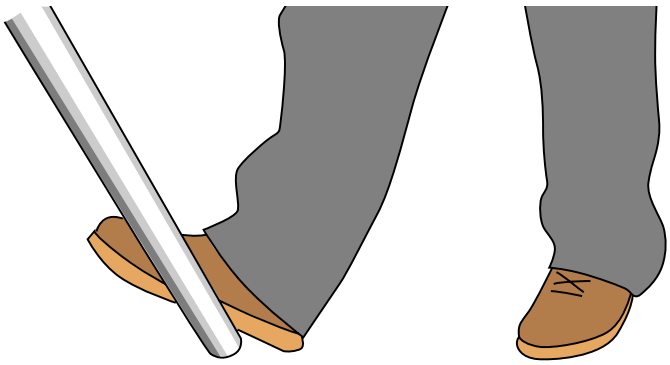


Fig. 26

Note: **Never** use the toe of the boot because the tube could twist out on either side and cause a very painful injury.

Having butted the tube, it can be raised above the head and, with the bodyweight behind the tube and the palms and heels of the hands bearing the weight, the tube can be walked to a near upright position.

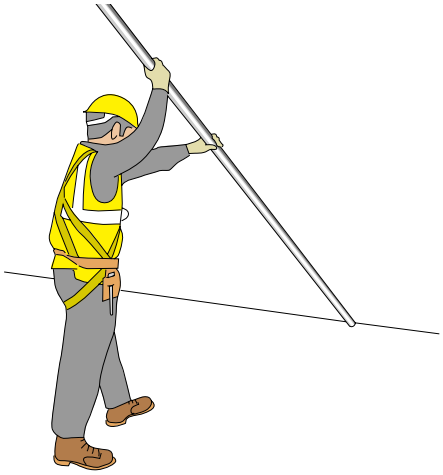


Fig. 27

The tube is now ready to be lifted. With the knees unlocked, the back straight and the chin tucked in, the bodyweight is in a position to resist the movement of the tube.

Note: The high-hand forefinger is again acting as a sensor.

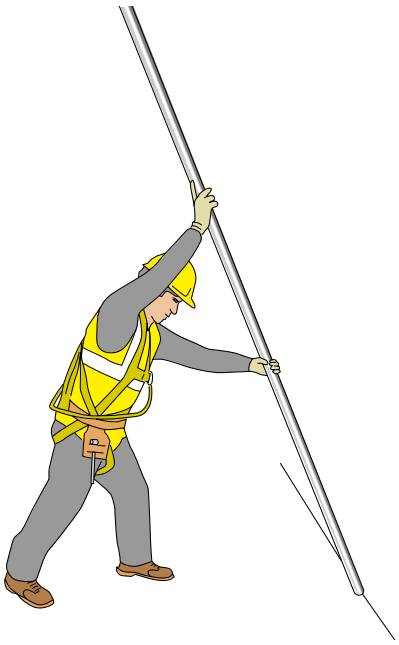


Fig. 28

To begin the lift, the knees bend and the hands maintain the same distance apart when sliding down the tube. This will incline the tube even more towards the lifter, who accommodates the movement by bending the high arm slightly. It is this arm that is about to take the entire load – the bottom hand is only acting as a guide and restraint.

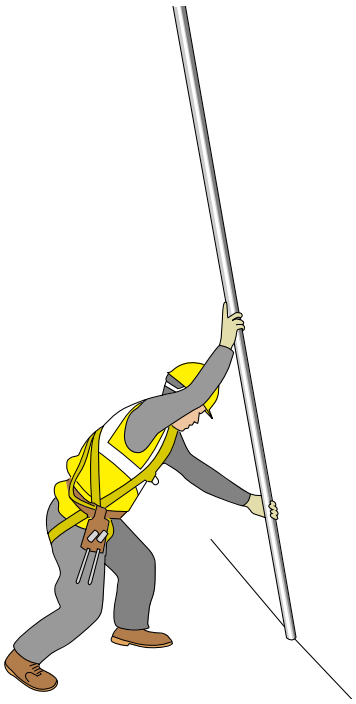


Fig. 29

The lift is completed as the legs straighten. The legs must remain unlocked to allow the feet to make the necessary adjustments that will permit the body to change to the direction of carry.

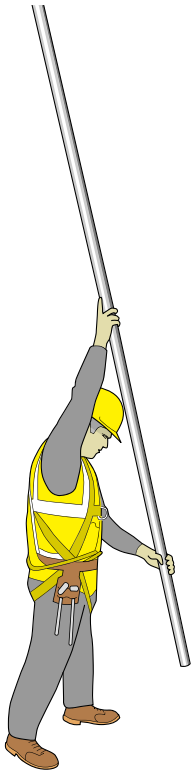


Fig. 30

With the manoeuvre completed the carry can begin.

Note: The bottom hand is placed round the outside of the tube to act as a restraint, while the top hand bears the full weight of the tube.

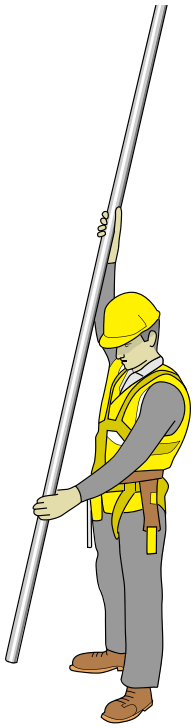


Fig. 31

LIFTING SHORT TUBES

This method is normally used when lifting short tubes (between 1.5 m and 2.4 m) that are placed at ground level.

The natural position is adopted for the selection of the tube.

Because the initial selection is made by inserting the fingers into the ends of the tubes, it is essential to ensure the tubes are free of sharp edges, and so it is advisable that suitable gloves are worn.

Fig. 32

As soon as they are clear of the ground, the free hand is placed under the tubes to assist in control.

Note: Three tubes have been raised, although the third one is hidden by the other two.

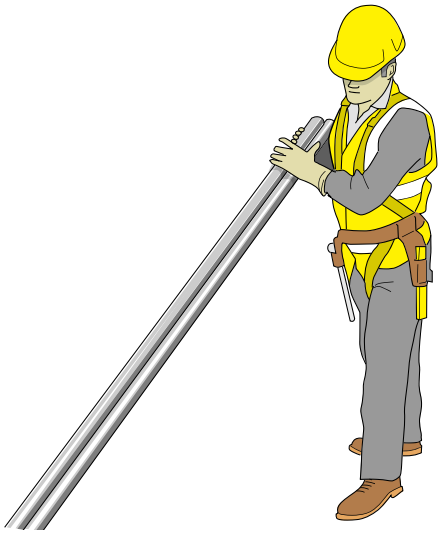


Fig. 33

The tubes are now upright and can be adjusted to form a pyramid pattern with the base towards the shoulder.

The knees have remained unlocked and the back is still straight. The feet have made the necessary adjustments. The chin remains firmly tucked in. The bodyweight is still behind the load.

Fig. 34

Both the top and bottom hands slide down the tubes as the knees bend. This will allow the shoulder to be positioned just below the centre of the tubes.

The weight is taken on the shoulder with the forward hand and shoulder arm acting as a restraint.

Note: The rear foot is in the thrust position and the bodyweight is positioned behind the load.

As the shoulder is below the centre point of the load, the load will easily tip over into the horizontal position, with the front hand steadying the momentum.

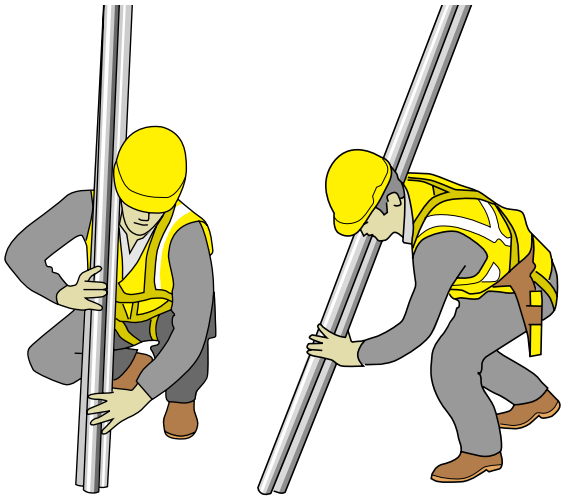


Fig. 35

As the tubes reach the horizontal position, the legs carry out and complete the lift.

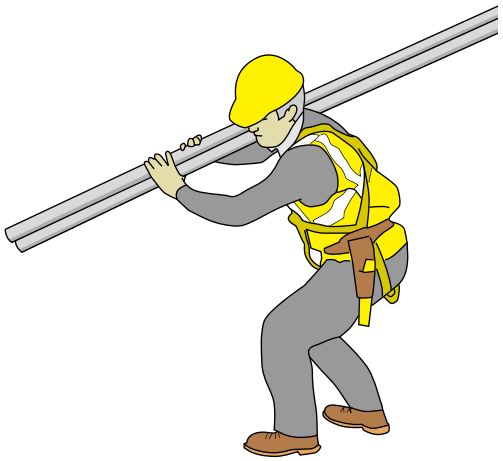


Fig. 36

With the lift completed, the carry can begin.

To place the tubes back on the ground the movements are repeated in reverse.

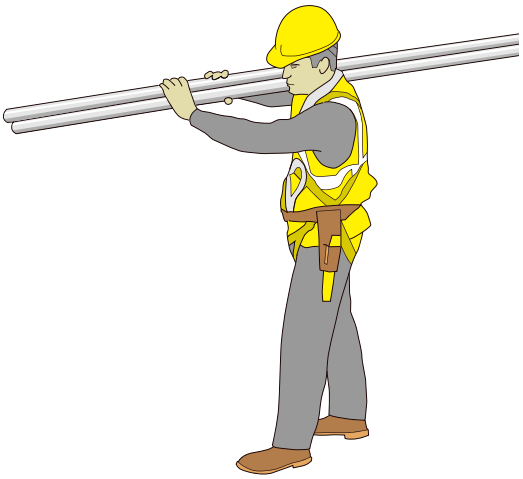


Fig. 37

The previous figures have shown a scaffolder lifting tubes at ground level. It can be clearly seen that this job is physically strenuous. Scaffold tubes are somewhat unwieldy and difficult to handle, which is one of the reasons why mechanical handling should be used whenever possible. This problem is made even more difficult when tubes are handled vertically.

The scaffolder has to use the same handling skills when working on a temporary platform that is at a considerable height above the ground. Apart from using the correct techniques, a scaffolder must be even more careful when making the usual pre-lift checks before handling long tubes vertically. Some of the hazards that must be considered include:

- Uneven ground conditions;
- Unstable platform;
- Inadequate fall protection;
- Working above fellow workers and/or general public exposing them to a risk of falling objects;
- Overhead power lines;
- Overhead obstructions e.g. ornate window sills, copings, windows, balconies, satellite dishes etc;
- High winds, especially gusting conditions;
- Tall hemps resulting in over stretching.

4.3.3. Handling Scaffold Boards

Emphasis for manual handling in scaffolding is more often associated with heavy steel tubes. However, accidents and injuries also occur when handling boards. The weight of timber scaffold boards can vary depending the moisture content of the boards.

There are substantial differences in weight between traditional 38mm x 225mm scaffold boards and timber battens or steel decking for system scaffolding. Battens and decks for system scaffolding will require specific handling techniques and skills. The CISRS System Scaffold Product Training Scheme should ensure that specific handling techniques required for each system are covered. For further information refer to the specific manufacturers' instruction manuals.

- **LIFTING LONG BOARDS**

For the purpose of this guide long boards are considered as board sizes 3.05m (10') to 3.9m (13') in length.

The natural position is adopted to pick up the end of the board. Facing the direction of travel.

Fig. 38

Use the legs to lift the board to waist height maintaining the natural line of the back.

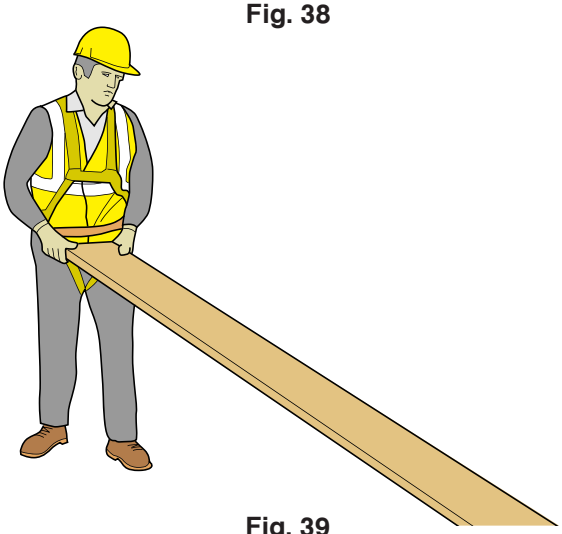


Fig. 39

Lift the board above the preferred shoulder.

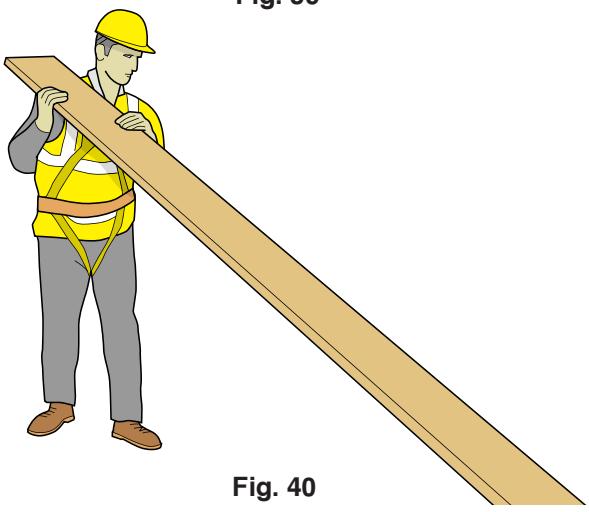


Fig. 40

Move to the centre of the board or drag the board towards you hand over hand until you reach the centre of gravity.

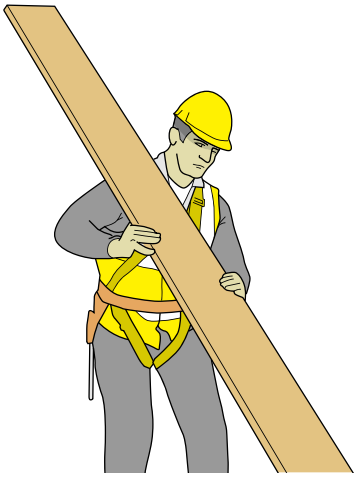


Fig. 41

Place the board on the shoulder slightly off centre with the weight behind.

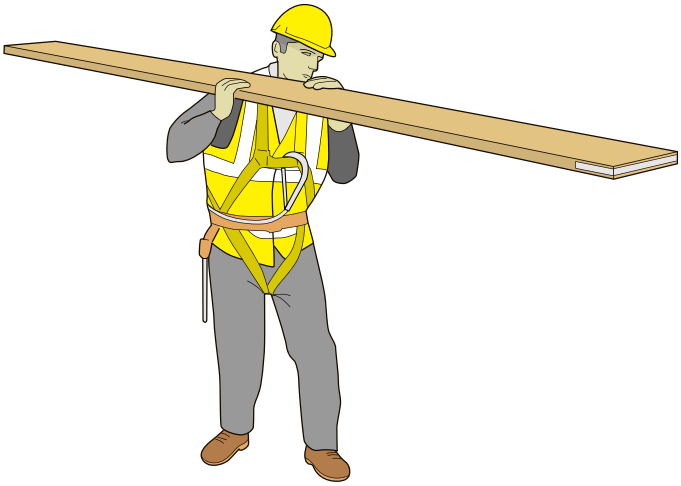


Fig. 42

The shoulder hand has been placed into the steadying position. Move the feet change direction and avoid twisting the trunk.

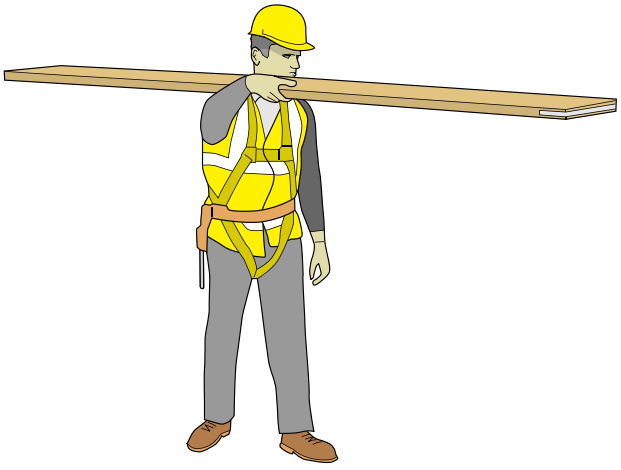


Fig. 43

UP-RIGHTING LONG BOARDS

In readiness for lifting a long board up a scaffold the board needs to be placed upright.

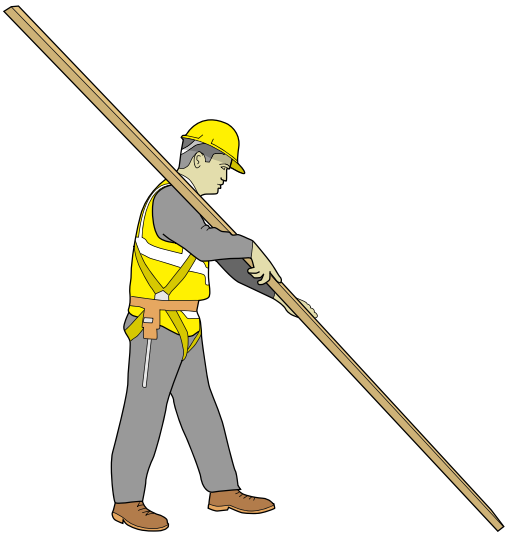


Fig. 44

Ground the end of the board.

Fig. 45

Use the arms to raise the board to the vertical.

Rest the board against the scaffold ready to pass up the scaffold.

Note that board should placed at a slight angle and rested into a corner (e.g. a standard or protruding transom), so that it cannot accidentally fall. Only materials that are to be raised imminently should be placed upright.

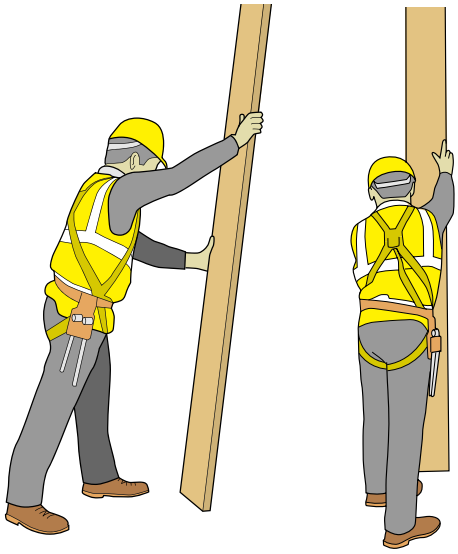


Fig. 46

CARRYING SHORT BOARDS

For the purpose of this guide short boards are considered as boards sizes 2.4m (8') or less in length. In which case it is recommended that no more than 3 boards should be lifted at a time.

The natural position is adopted to pick up the end of the board. Facing the direction of travel.

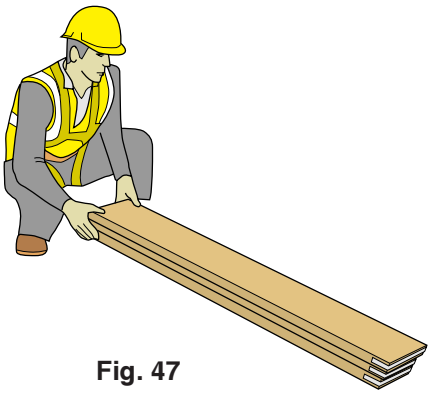


Fig. 47

Use the legs to lift the board to waist height maintaining the natural line of the back.

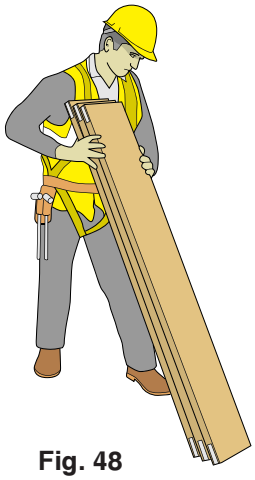


Fig. 48

Hold the boards vertically.

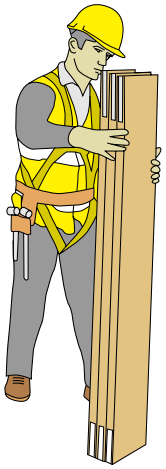


Fig. 49

Squat ready to receive the boards to the preferred shoulder.

Fig. 50

Then pull the boards into the shoulder at an angle.

Fig. 51

Lift the boards by using the legs.

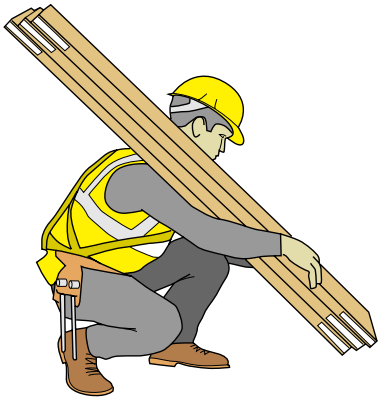


Fig. 52

Place the boards on the shoulder slightly off centre with the weight behind.

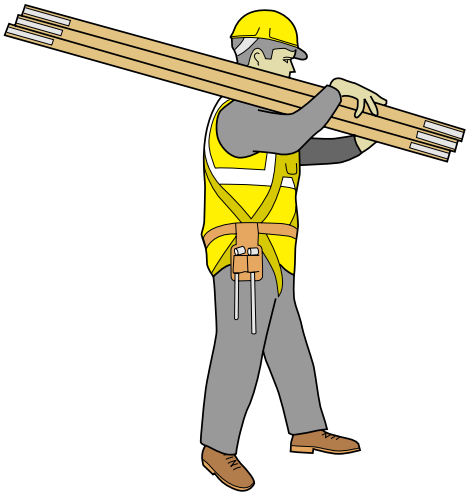


Fig. 53

The shoulder hand has been placed into the steadying position. Move the feet change direction and avoid twisting the trunk.

Fig. 54

4.3.4. Handling Loose Fittings by Hand

It is good practice to carry quantities of loose components in fitting bags or buckets. For smaller quantities scaffolders use special handling techniques for carrying a number of fittings in one hand (Fig. 55).

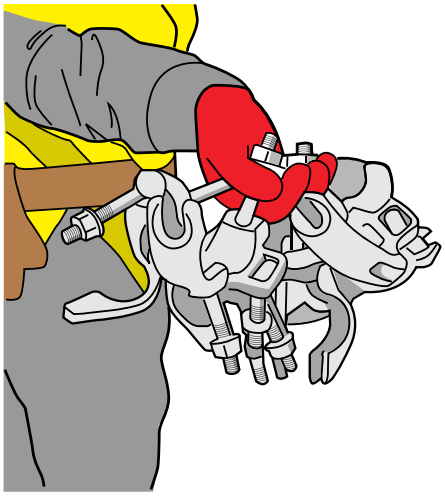


Fig. 55 A hand of fittings

4.3.5. Handling Long Items from a Rack or Vehicle Bed

When carrying a load avoid twisting the trunk. This is a particular problem when pulling long tubes, boards etc from a material storage rack or vehicle bed.

Take up a position anticipating the direction of travel and the preferred carrying shoulder when pulling out long items.

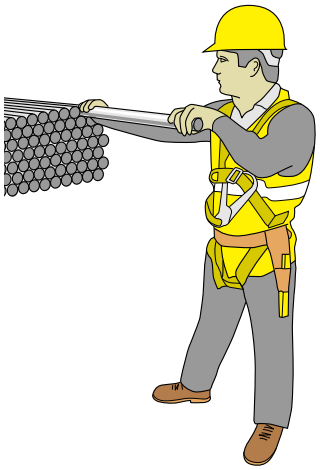


Fig. 56

Pull the long item using a hand over hand action until the centre of gravity is reached.

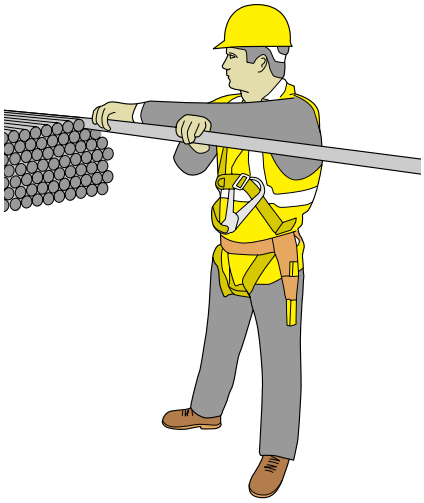


Fig. 57

Raise the item level with the shoulder and turn the body by moving the feet, placing the item on the shoulder. Now facing the direction of travel. To change direction move the feet and avoid twisting the trunk.

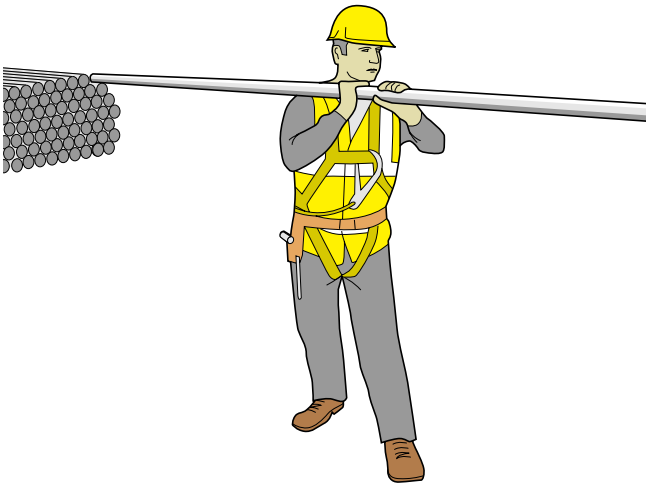


Fig. 58

4.3.6. Carrying Long Items Around Corners or Restricted Spaces

When manoeuvring in a restricted space or around a blind corner with a long item, care needs to be taken to avoid injuring others or damaging property.

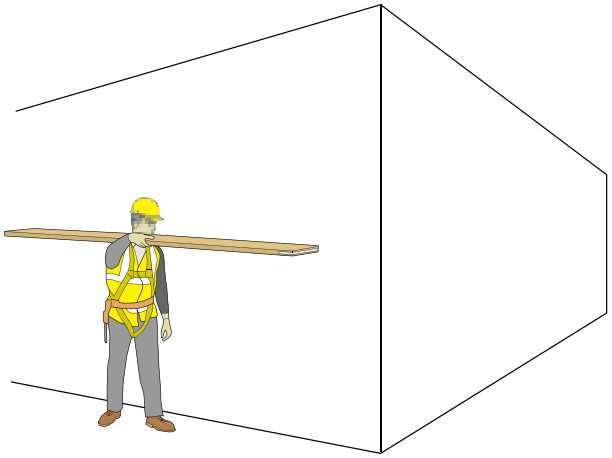


Fig. 59

Dip the front end down to ease manoeuvring taking care not to strike anything with the back end. Note that it may be more convenient and easier to negotiate by raising the front instead depending upon the circumstances.

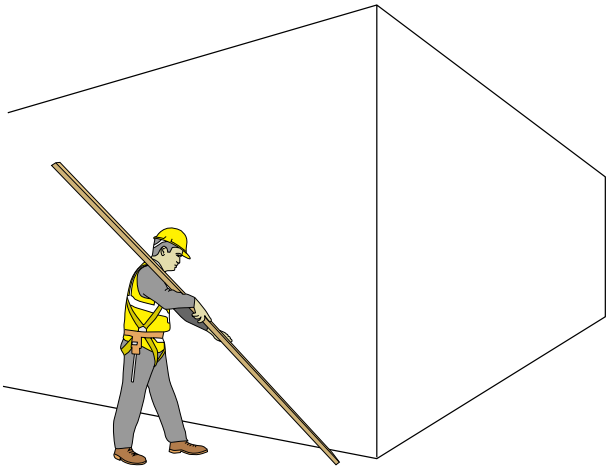


Fig. 60

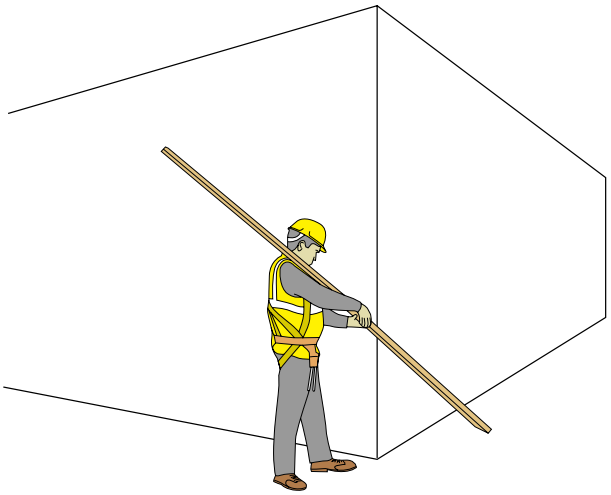


Fig. 61

4.3.7. Long Ladders

Long ladders present particular challenges to the scaffolder when carrying and up-righting them, especially where very long ladders in excess of 6m (20') are used.

Case Study #6 - Ladders

A major traditional tube and fitting scaffolding contractor has limited the maximum length of ladders they use to 5m. Typically they only install single lift ladders 3.5m-4.5m depending upon the lift heights. Small quantities of longer ladders up to 9m are kept in the yard for special applications only. In such cases permission must be granted from management.

A 6.1m (20') timber pole ladder weighs approximately 50kg (110lbs) and can be very awkward to carry and manoeuvre. Ideally long ladders should be handled by a minimum of two people.

- **UP-RIGHTING A LONG LADDER**

Up-righting a long ladder is a particularly strenuous task.

Place the ladder horizontally on the ground at the base of the scaffold,with the foot of the ladder in position.

Prepare the landing position and ladders stay(s) required to support the ladder.

The ladder should be footed by placing a foot on each stile, ensuring the ladder is in the correct orientation (way up and facing the right direction).

One, or more if necessary, scaffolders start raising the ladder from other end raising it. Once vertical allow the ladder to rest against the ladder stay. The ladder should remain footed until properly secured (e.g. a square lashing or equivalent ladder tie).

Two operatives may be needed to carry a long ladder depending upon its weight and length.

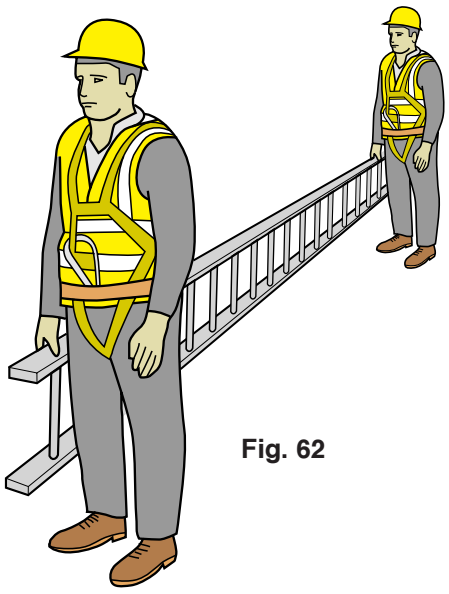


Fig. 62

The ladder is placed at the approximate position of the ladder base. One scaffolder foots the ladder with the soles of the feet on both stiles.

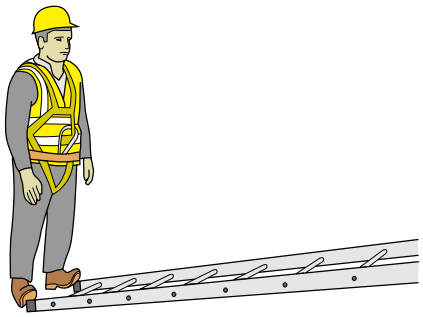


Fig. 63

The other scaffolder(s) then raise the ladder by lifting and moving towards the base. To maintain stability of the ladder it is recommended to hold the stiles allowing the hands to slide forward. Note: Depending upon the size and weight of the ladder more operatives may be required to raise it.

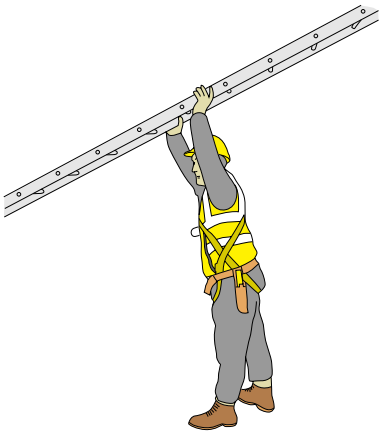


Fig. 64

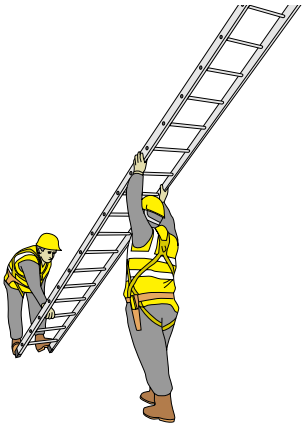


Fig. 65

Both scaffolders can then manoeuvre the ladder into position against the ladder stay.

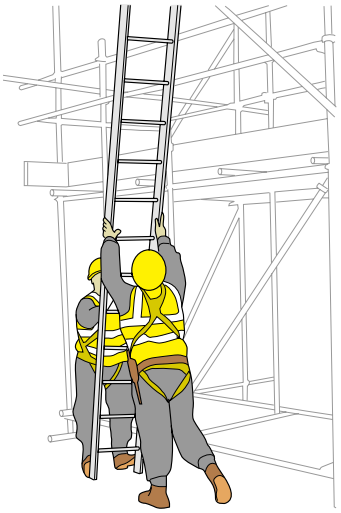


Fig. 66

Fig. 67

4.4. Controlled Handling of Materials

4.4.1. Handling Materials at Height

Handling scaffold materials on the ground is physically strenuous; they can be unwieldy and difficult to handle unless trained to do so. Scaffolders have to be able to adopt the same skills when handling materials at height; often working off a temporary platform (4 boards wide on a 5 board wide scaffold). Handling materials vertically when at height is even more difficult and hazards encountered include:

- Wind – steady or in gusts.
- Cables – electrical and telephone.
- Protruding architectural features; i.e. copings and sills.
- Other protruding sections of the structure; i.e. fixed platforms.

Note! Scaffolding materials should never be thrown, deliberately dropped or allowed to fall. The practice of bombing or throwing materials is now considered unsafe practice and all materials should be handling in a controlled manner e.g. passed hand to hand or via the use of manual handling aids.

4.4.2. Chaining Materials

'Chaining' or 'hand-balling' is traditionally the quickest method of raising or lowering scaffolding materials to and from the work area. It consists of operatives positioning themselves on different lifts of a scaffold structure and passing materials from one to the other up or down. Lengths of material are passed through the hands, sliding and gripping alternately. The distance between them will vary on the length of material; i.e. 1.5m transoms will require operatives to be on adjoining lifts and materials 2.4m and longer will require operatives to be on alternate lifts.

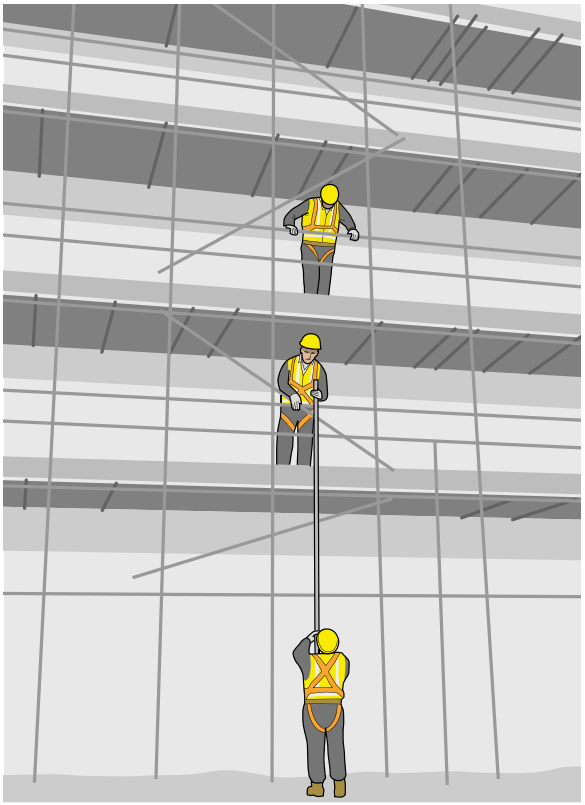


Fig. 68

Operatives will develop a form of communication to confirm that they have taken the weight of the piece of material from the operative passing it to them. Forms of communication could be a slight twist, a slight pushing up of the piece of material or a shout of 'mine'.

4.4.3. Storage of Materials at Height

Storing scaffold materials on a scaffold lift during both construction and dismantling presents obvious risks that need to be controlled in order to prevent materials falling, causing potentially serious injury and/or loss. Materials stacked on a temporary platform (non-working lift) are more likely to roll off or through the scaffold and fall to the ground because of the one board gap in the platform and lack of toeboards. Controls include:

- Fully board a fleet/section, including any inside boards and toeboards.
  Materials can be stored on this section behind a fixed toeboard.

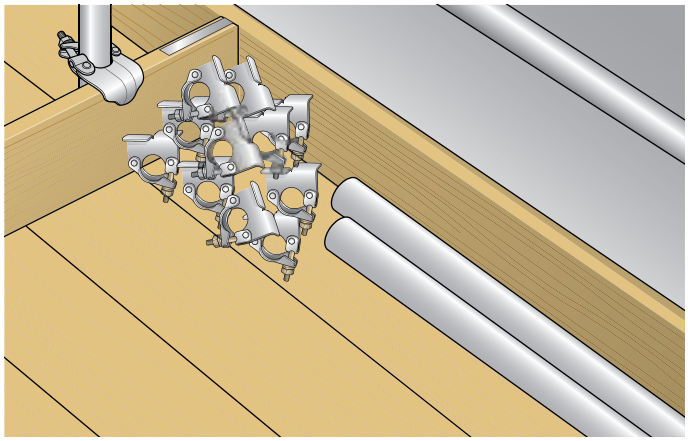


Fig. 69 Materials stored on a working platform against the toeboard.

- Position single couplers underneath the outside tubes to prevent rolling. Tubes can then be stacked as normal.
- Position tubes (especially short tubes) over a minimum of two transoms on the inside of the scaffold, against a wall/structure, to prevent them tipping and falling.
- Store fittings in the appropriate fitting sacks until they are to be used.

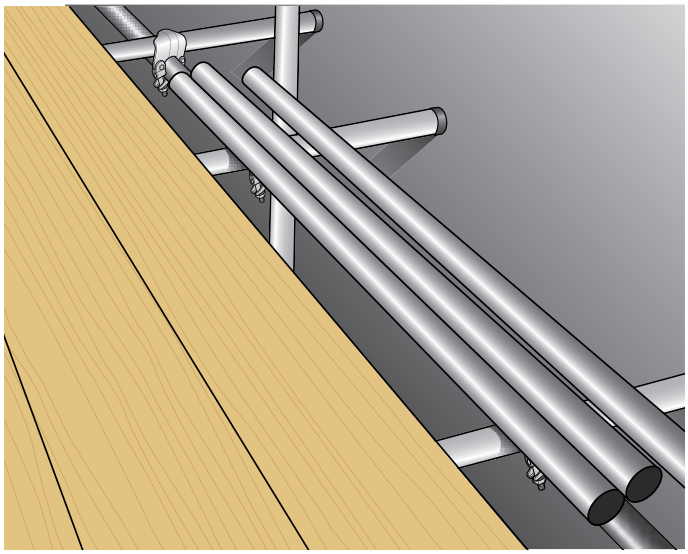


Fig. 70 Tubes stored on a scaffolders' platform on two transoms to the inside of the scaffold.

4.4.4. Controls For Handling Materials at Height

Whenever scaffolding materials are being moved by scaffolders, the general public and other tradesmen are at risk. Effective working practices need to be established to ensure that the risks are minimal.

Hazards include:

- Dropping materials from height;
- Materials rolling off structures;
- Being struck by materials being carried;

A risk assessment must identify methods of controlling these risks. Controls include:

- The work area must be segregated using a hard, physical barrier;
- Signs warning of men working overhead must be displayed;
- The route to the work area must be identified as safe;
- Materials should be placed as close to the work area as possible;
- Where practical, materials should be passed up or down the inside of the scaffold reducing the potential for struck;
- When materials are passed up or down the outside of the scaffold this must be carried out in a controlled manner. When receiving materials from a work mate you must communicate to him when it is under control. This can be achieved by twisting it slightly, gently pushing it up or verbally, i.e. “mine”;
- Materials stored on a scaffold structure must be secured to prevent uncontrolled movement.

4.4.5. Storage of Materials on Ground Level

Leaning scaffold materials against horizontal tubes, vertically, un-secured is an accepted practice only IF they are to be used in the immediate future and are at an effective angle against a standard or protruding transom to prevent them sliding and falling.

If operatives leave the area for any length of time, i.e. natural break, lunch or end of shift, materials must be laid down or secured with rope or tubes and fittings.

4.4.6. Carrying Uneven Tubes

Extra caution is needed when picking up and carrying scaffold tubes of unequal length. Because of the unequal lengths and distribution of unequal weight, different tubes can pivot on your shoulder causing a scissoring effect.

It then becomes a trapping risk to your fingers when attempting to correct this.

If tubes are of such an unequal length that it makes this scissoring action a high probability just take the one tube and come back for the second tube.

To carry more than one tube of unequal length safely, follow the practice set out below.

It is best practice to ensure that the tube ends are level/even at the front end. This is the direction of travel.

When first placing the tubes on your shoulder. With the unequal length placed over your shoulder, carry out any adjustments required to get the balance correct, before attempting to move off.

Place the hand and arm from the shoulder you are carrying the tubes on around the tubes. This will allow you to apply a downward pressure to control the tubes.

This will also allow you to ensure that the tube ends are kept below face and head height, when walking around corners, or should other persons walk into your path.

The same degree of caution is also required when you are removing the unequal length tubes from your shoulder.

By taking this extra bit of caution an accident incident will be avoided.

4.4.7. Roping Up & Landing Long Beams

There are difficulties associated with landing beams on relatively narrow scaffolds (4 or 5 boards). Traditionally the man at the top of the rope has had to struggle to take the weight of the beam and steer it onto the narrow platform after 'breaking' it over the handrail. This top man is exposed to:

- Manual handling associated injuries, i.e. back strains, Work Related Upper Limb Disorders (WRULDs).
- Being 'catapulted' over the handrail if balance is lost.
- Losing sufficient grip of the beam and it falling whilst landing it.

By tying beams off in a different way, the man on the rope continues to take the weight until the man at the top of the rope has steered the beam onto the narrow platform and untied it once it is positioned safely with no chance of falling.

- The beam is laid down at 90° to the scaffold.
- The beam is tied off with a rolling hitch at the scaffold end of the beam to the top chord.

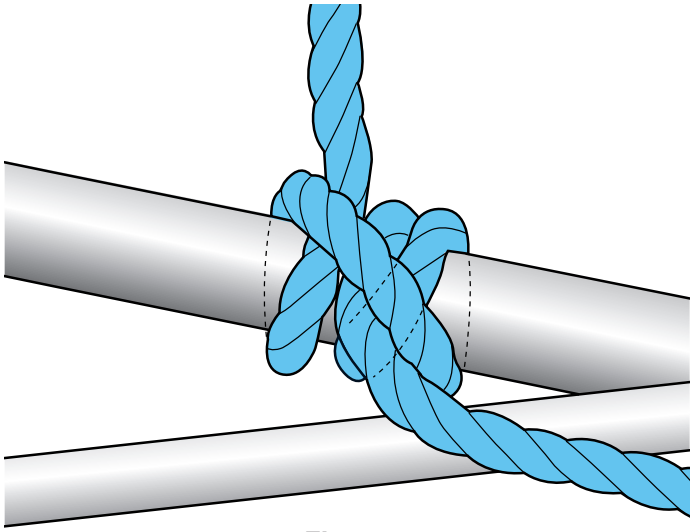


Fig. 71

- The rope is then dragged along the length of the beam to the opposite end and tied onto the same chord using a half hitch, ensuring it is tied the correct way in order to take grip.

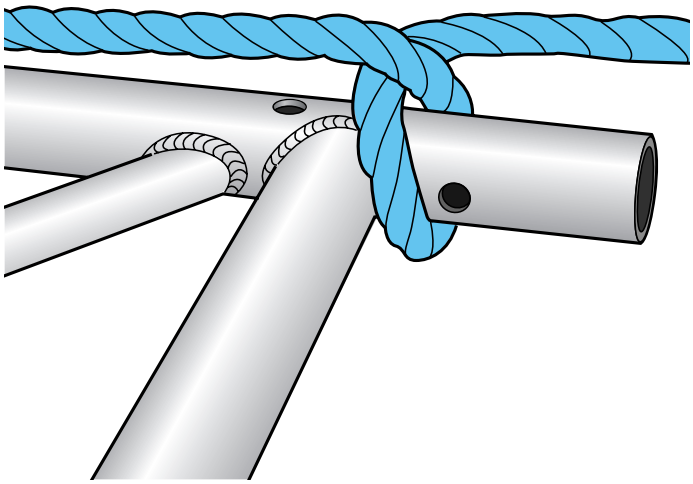


Fig. 72

- The beam is now ready to be pulled up.

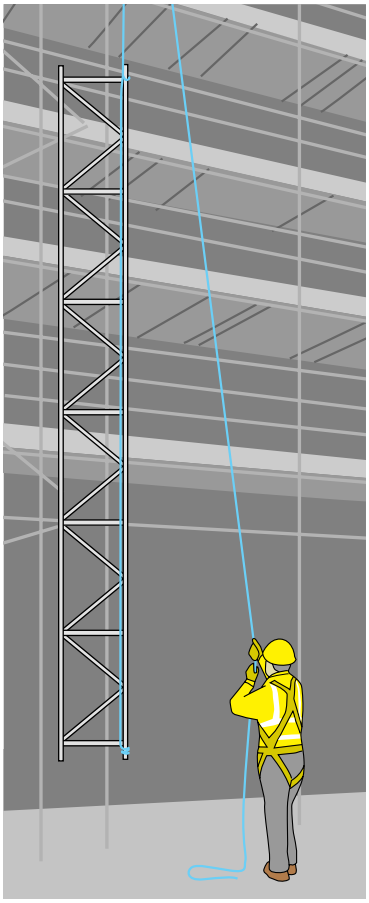


Fig. 73

- When the top of the beam (the half hitch end) reaches the top man, he can take the weight of the beam with one hand and loosen the half hitch quickly with the other, while the rope man releases a little slack.

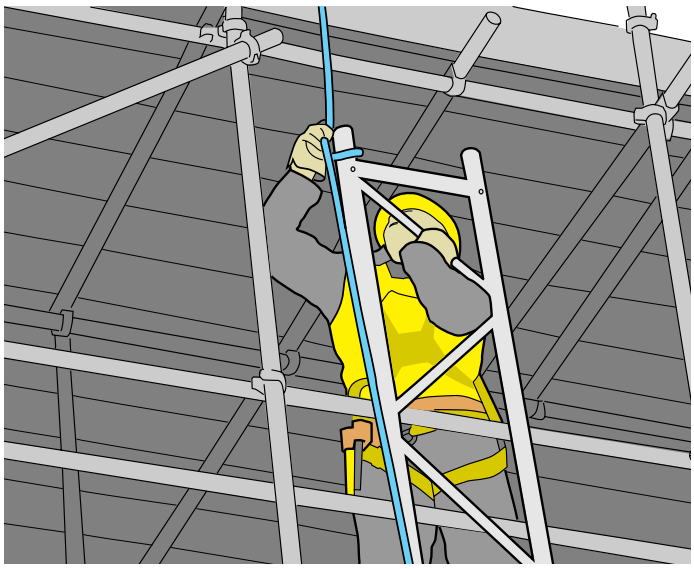


Fig. 74

- The rope man can then take the weight of the beam and continue to pull it up, allowing the top man to concentrate on steering the beam over the handrail and onto the platform.

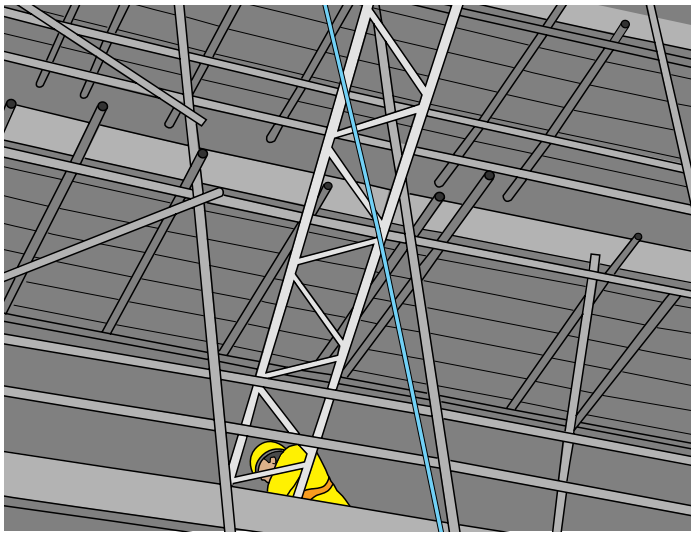


Fig. 75

4.4.8. Leverage

The use of scaffold tubes and swivel fittings to move sections of scaffolding eliminates or reduces the risks associated with manual handling injuries incurred during lifting, pushing and pulling. i.e. the use of a butt tube and swivel to take the weight out of a cantilevered section with one hand and tying off the fitting on the spur with the other. The use of a 1.5m tube and swivel to align a temporary roof truss in order to square it up to allow the smooth filling in of frames.

4.5 Personal Protective Equipment

When carrying out a manual handling risk assessment, personal protective equipment (PPE) needs to be considered as a last resort. However, the intensive physical nature of scaffolding means that most employers and site rules require minimum levels of PPE that can help prevent manual handling related injuries.

In relation to the risks associated with handling scaffolding materials hand and head protection have become minimum requirements for the majority of the scaffolding industry.

Under the Personal Protective Equipment at Work Regulations 1992 (PPE Regs) employers have to carry out a PPE assessment to determine the suitability of the equipment for the task. For example do the gloves selected provide adequate grip for steel and timber with the right level of protection and dexterity to prevent injury without compromising performance.

Employers should consult with the operatives, trial samples and seek feedback into how different PPE performs. Employers who involve operatives in the selection of PPE and value feedback, generally experience greater levels of co-operation and compliance.

NOTES

NASC

NASC, 4th Floor, 12 Bridewell Place, London EC4V 6AP
Tel: 020 7822 7400 Fax: 020 7822 7401
enquiries@nasc.org.uk www.nasc.org.uk