

Cayman Islands
Government



OER

Department of
Employment Relations

DEPARTMENT OF EMPLOYMENT RELATIONS

DRAFT

OCCUPATIONAL SAFETY & HEALTH CODE OF PRACTICE

FOR THE

CONSTRUCTION INDUSTRY

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I. Introduction

During the period from August 2004 to March 2005 the number of construction workers on Grand Cayman has increased by 460%, from 803 to 4496. This change reflects a dramatic increase of 3696 new work permits issued or a total increase of 460%.

Most of these workers are likely to be untrained and many of newly established construction companies are working with unsafe operating practices. This situation has created a high risk for accidents to occur, and regrettably we have already seen two deaths and several serious injuries in the construction industry. The Ministry of Education, Human Resources and Culture specifically the Department of Employment Relations (DER) is very concerned that more fatalities could occur unless a serious effort was made to correct many of these unsafe work practices. As a result the DER has devised a program to assist in the prevention of future Occupational Safety and Health (OSH) accidents. This program consists of three phases;

1. Awareness Program

Part 8 of the Cayman Islands Labour Law places the responsibility for investigating Health and Safety Issues within the workplace with the DER. Therefore the DER decided to create an awareness program that will specify the obligations of both employers and employees under the current law and inform both parties of all aspects concerning OSH.

2. Code of Practice

While investigating the recent industrial incidents the department concluded these incidents could have been avoidable if all parties concerned were aware of the safety measures to be taken for prevention. Unfortunately, there is no single document that could be used as a guideline to providing a safe workplace therefore the DER has drafted a code of practice which would be used within the construction industry with the view to improving safety practices. The following organizations have been invited to review and contribute to this code of practice.

- o Planning Department
- o Public Works Department
- o Contractors Association
- o All small business contractors

3. Certification of OSH Person on every Jobsite

The DER's long term objective will be to ensure that every company has at least one person/employee who is trained and certified as an occupational safety and health person available on site.

Objective

The objective of this code is to provide practical guidance on a legal, administrative, technical and educational framework for safety and health in construction with a view to:

- (a) preventing accidents and diseases and harmful effects on the health of workers arising from employment in construction;
- (b) ensuring appropriate design and implementation of construction projects;
- (c) providing means of analyzing from the point of view of safety, health and working conditions, construction processes, activities, technologies and operations, and of taking appropriate measures of planning, control and enforcement.

This code also provides guidance in the implementation of the provisions of the ILO Safety and Health in Construction Convention, 1988 (No. 167), and the ILO Safety and Health in Construction Recommendation, 1988 (No. 175) and the Cayman Islands Labour Law.

The provisions of this code are intended as guidelines and in no way supersedes any existing laws of the Cayman Islands.

II. General Duties

A. General rights and duties of Employees/Workers

You have the right and the duty at any workplace to participate in ensuring safe working conditions to the extent of your control over the equipment and methods of work and to express views on working procedures adopted as they may affect safety and health.

You have the right to obtain proper information from your employer regarding safety and health risks and safety and health measures related to the work processes. This information should be presented in forms and languages which you can easily understand.

You have the right to remove yourself from danger when you have good reason to believe that there is an imminent and serious danger to your safety or health. You have the duty to inform your supervisor immediately.

Workers should:

- (a) co-operate as closely as possible with your employer in the application of the prescribed safety and health measures;
- (b) take reasonable care for your own safety and health and that of other persons who may be affected by your acts or omissions at work;
- (c) use and take care of personal protective equipment, protective clothing and facilities placed at your disposal and not misuse anything provided for your own protection or the protection of others;
- (d) report forthwith to your immediate supervisor, and to your safety representative where one exists, any situation which you believe could present a risk and which you cannot properly deal with yourself;
- (e) comply with the prescribed safety and health measures;
- (f) participate in regular safety and health meetings.

Except in an emergency, unless duly authorized, you should not interfere with, remove, alter or displace any safety device or other appliance furnished for their protection or the protection of others, or interfere with any method or process adopted with a view to avoiding accidents and injury to health.

You should not operate or interfere with plant and equipment that you have not been duly authorized to operate, maintain or use.

You should not sleep or rest in dangerous places such as scaffolds, railway tracks, garages, or in the vicinity of fires, dangerous or toxic substances, running machines or vehicles and heavy equipment.

Alcohol and working in a high risk industry is not compatible. If you have had an alcoholic drink, don't be surprised if you are asked to leave the site. You are a danger to your self and others.

Don't use drugs, even outside of work time- you could be putting yourself and work colleagues at risk.

Keep your workplace tidy, and free of loose materials, etc.

Don't obstruct gangways or stairs with tools or materials.

B. General duties of Employers

Before commencing construction work, you should give written notice of such work to the Director of Employment Relations, containing such information as size, duration or characteristics in accordance with such time schedule as may be prescribed.

You should provide adequate means and organization and should establish a suitable programme on the safety and health of your workers consistent with national laws and regulations and should comply with the prescribed safety and health measures at the workplace.

You should so provide and maintain workplaces, plant, equipment, tools and machinery and so organize construction work that as far as is reasonably practicable there is no risk of accident or injury to health of your workers. In particular, construction work should be so planned, prepared and undertaken that:

- (a) dangers liable to arise at the workplace are prevented as soon as possible;

- (b) excessively or unnecessarily strenuous work positions and movements are avoided;
- (c) organization of work takes into account the safety and health of workers;
- (d) materials and products are used which are suitable from a safety and health point of view;
- (e) working methods are employed which protect workers against the harmful effects of chemical, physical and biological agents.

You should take all appropriate precautions to protect persons present at, or in the vicinity of, a construction site from all risks which may arise from such site.

You should arrange for regular safety inspections by competent persons at suitable intervals of all buildings, plant, equipment, tools, machinery, workplaces and systems of work under the control of yourself at construction sites. As appropriate, the competent person should examine and test by type or individually to ascertain the safety of construction machinery and equipment.

When acquiring plant, equipment or machinery, you should ensure that it takes account of ergonomic principles in its design and that it is so designed or protected that it can be operated safely and without risk to health.

You should provide such supervision as will ensure that workers perform their work with due regard to their safety and health.

You should assign workers only to employment for which they are suited by their age, physique, state of health and skill.

You should satisfy yourself that all workers are suitably instructed in the hazards connected with their work and environment and trained in the precautions necessary to avoid accidents and injury to health.

You should take all practicable steps to ensure that your workers are notified of instructions and advice relating to prevention of accidents and injuries to health.

Buildings, plant, equipment, tools, machinery or workplaces in which a dangerous defect has been found should not be used until the defect has been remedied.

Where there is an imminent danger to the safety of your workers, you should take immediate steps to stop the operation and evacuate of workers as appropriate.

On dispersed sites and where small groups of workers operate in isolation, you should establish a checking system by which it can be ascertained that all the members of a shift, including operators of mobile equipment, have returned to the camp or base at the close of work.

You should provide appropriate first aid, training and welfare facilities to workers and, whenever collective measures are not feasible or are insufficient, provide and maintain personal protective equipment and clothing. You should also ensure access for workers to occupational health services.

C. General duties of Self-Employed Persons

You should comply with the prescribed safety and health measures at the workplace according to national laws or regulations.

D. General duties of Designers, Engineers, Architects

Those concerned with the design and planning of a construction project should receive training in safety and health and should integrate the safety and health of the construction workers into the design and planning process.

Care should be exercised by engineers, architects and other professional persons, not to include anything in the design which would necessitate the use of dangerous structural or other procedures or materials hazardous to health or safety which could be avoided by design modifications or by substitute materials.

Those designing buildings, structures or other construction projects should take into account the safety problems associated with subsequent maintenance and upkeep where maintenance and upkeep would involve special hazards.

Facilities should be included in the design for such work to be performed with the minimum risk.

E. General duties of the Department of Employment Relations (DER)

The DER should, on the basis of an assessment of the safety and health hazards involved and in consultation with the most representative organization of employers and workers, adopt and maintain in force national laws or regulations to ensure the safety and health of workers employed in construction projects and to protect persons at, or in the vicinity of, a construction site from all risks which may arise from such site.

The DER should provide appropriate inspection services to enforce or administer the application of the provisions of the national laws and regulations and provide these services with the resources necessary for the accomplishment of their task, or satisfy itself that appropriate inspection is carried out.

The measures to be taken to ensure that there is organized co-operation between employers and workers to promote safety and health at construction sites should be prescribed by national laws or regulations or by the competent authority. Such measures should include:

- (a) the establishment of safety and health committees representative of employers and workers with such powers and duties as may be prescribed;
- (b) the election or appointment of workers' safety delegates with such powers and duties as may be prescribed;
- (c) the appointment by the employer of suitably qualified and experienced persons to promote safety and health;
- (d) the training of safety delegates and safety and health committee members.

REMEMBER It only takes one foolish action taken in haste or temper to cause a serious or fatal incident.

III. Personal Protective Equipment

A range of protective clothing is available and should be worn when hazards to health occur or when you are required to do so under the law.

The following checklist outlines the main personal protection equipment available.

A. Clothing

All clothing worn must comply with general work and safety practices

Do not wear clothing or jewelry that could get caught in machinery or otherwise cause an accident.

Shirts with a minimum of a four (4) inch sleeve and covers the upper body must be worn at all times.

Long pants must be worn at all times. Overalls or pants must not have loose, torn, or dragging fabric. Pant legs without cuffs are recommended.

B. Safety Helmet

Used to protect the head from falling objects and knocks against obstructions.

These are made from moulded plastic or fiberglass reinforced polyester.

Inside it has an adjustable harness. This provides ventilation and a clearance of 1 ¼ inches between the outer shell and the wearer's head.

The Labour Law suggest that every employer shall provide each of your employees, who is at work on operations or works to which these regulations apply, with suitable head protection and shall maintain it and replace it whenever equipment becomes unsafe.

During working hours, where required, employees must wear hard hats, which are in good condition and that meets American National Standards Institute [ANSI] Z89.1 and ANSI Z89.2 .

The bill of the hard hat must face forward unless a safety device is attached.

Hair must be contained in a manner that will not cause danger to an employee from fire or entanglement in machinery.

DO NOT MISUSE IT. YOUR LIFE MAY DEPEND ON IT.

C. Goggles

All employees must wear safety glasses meeting specifications of ANSI Z87 with side shields during working hours in all work areas except offices.

Goggles are to be worn in occupations where cutting, chipping, abrading or scrapping materials is required.

The type worn should be compatible with the operation being carried out

Flexible or soft box goggles with the correct safety lenses are suitable for the cutting of bricks and blocks with hand cutting tools.

Prescription glasses must meet the same specifications or suitable eye protection worn over them. Prescription eye wear will not be provided.

Additional eye and/or face protection such as goggles, face shields, and welding shields are required at all times when engaged in operations such as welding, burning, grinding, chipping, drilling, driving nails, pouring concrete, as well as when handling chemicals, corrosive liquids or molten materials.

Goggles suitable for use with mechanical brick cutters will be issued to you when you are given permission to use the machine.

Employees engaged in welding operations must use filter lenses or plates of not less than No. 10 shade.

Employees engaged in helping welders should not look directly at the welding process and must use approved eye protection at all times.

Burning goggles with a minimum No. 4 density and plastic cover plate on both sides of the filter lens are required for all gas welding and burning.

Employees engaged in operations using lasers must use laser safety goggles suitable for the density of the laser beam being used. Such goggles will be marked showing the visible light transmission, the laser wave length for which such goggles are intended, and your optical density.

Keep lenses clean, wash with warm water and mild detergent. Store in a dry, dust free area.

EYE PROTECTORS ARE REPLACEABLE –YOUR EYES ARE NOT.

D. Dust Masks

1. Disposal facemask respirators

These are simple facemasks designed to filter out harmful dust particles.

They are lightweight, comfortable to wear and cheap. They should not be worn by more than one person and should be disposed of at the end of each day.

In high dust levels they should be disposed of more frequently.

These are only suitable for non-toxic dust.

When toxic material is liable to create dust, full respiratory masks must be used.

USE THE WRONG RESPIRATOR AND YOUR HEALTH COULD BE SERIOUSLY AFFECTED.

E. Footwear

Safety footwear is used to prevent accidents caused by objects falling on the foot and by the soles being penetrated by sharp objects, e.g. projecting nails in timber.

You should have steel toe caps and the sole should have a steel plate inner sole embedded in the sole of the boot.

You are encouraged to wear safety boots or shoes.

Sneakers, sandals, and other shoes of this description are not to be worn at any time on projects/sites.

The wearing of low quarter shoes is discouraged.

Rubber boots with safety toe protection should be provided on all jobs subject to chemically hazardous conditions.

Metatarsal foot guards must be worn when using jack hammers, tamers, or similar equipment.

F. Gloves

Builders' hands are in constant use and because of this you are at risk when handling blocks, bricks, steel, lintels or glass.

To prevent hand and finger injuries, hand protection is required for the following activities:

- Handling sharp metal materials
- Operating a grinder
- Cutting with hand- held non-power cutters
- Handling chemicals and paints
- Handling wood materials
- Handling glass
- Concrete operations
- Handling hot or cold objects
- Pulling wire in electrical panels
- Welding/ cutting
- Rigging

Suitable gloves should be worn when handling materials and equipment.

Gloves are available to cover a wide range of operations.

GLOVES ARMoured WITH STAPLES

Used when handling heavy blocks, concrete and steel lintels.

LIGHTWEIGHT TWILL GLOVES

Used when handling cement and timber.

CHROME LEATHER GAUNTLET

Use when handling glass to give protection to the hand and wrist.

Always inspect gloves before using.

G. Ear defenders

A wide range of equipment on site can be harmful to your ears.

Even if you are not using the equipment, you can still be affected when someone is using it close by.

If you have to shout to be heard then ear defenders should be worn. Small fibre ear plugs can be used where noise is not too severe.

Hands should be clean before inserting plugs and plugs should be disposed of after one use.

Where excessive noise is encountered full earmuffs should be used.

Plain cotton is not an acceptable form of hearing protection.

H. Safety Equipment- Employers Responsibilities by Law

Eye protection or eye shields for dust, sparks or chipping. Section 62 (b) of the Labour Law

Respirators to avoid breathing dangerous dust and fumes. Section 62 © of the Labour Law

Ear protectors where noise levels cannot be reduced below 90dB (A) Leg 8 Hr. All noisy activities should be checked. Section 62 © of the Labour Law

Adequate protective clothing when exposed to high levels of lead, lead dust, fumes or paint. Section 62 (d) of the Labour Law

Safety helmets for protection against falls of materials or protruding objects. Section 62 © of the Labour Law

IV. Fall Arrest Systems & Travel Restraint Systems

These are personal protective equipment (PPE), which should only be used when other means of providing fall protection, such as scaffolding, guardrails and elevating work platforms have been considered and are not practicable.

Before using an individual fall arrest system or travel restraint system you should be trained in its use.

- Fall arrest and travel restraint systems require a risk assessment prior to use.
- Prior to use, a fall rescue plan should be developed. Workers using fall arrest systems should not work alone.
- Full body safety harness should be worn, **not waist belts**.
- Lanyard systems and inertia reels should be attached to the rear shoulder attachment point of the harness.
- Lanyard systems should be installed so that the maximum distance a person equipped with a harness would free fall before the fall arrest system takes affect is 2 meters.
- Energy or shock absorbers should be used with all lanyard, harness and inertia reel systems.
- Do not directly attach a lanyard snaphook to an anchorage point, i.e. a ring. Use a karabiner passed through the eye of the lanyard thimble to make the connection.
- Avoid using inertia reels in a horizontal configuration where, in the event of a fall, the line can be snagged on sharp edges.
- Beware of using an inertia reel when working on a steep pitched roof. In a fall down the inclined surface of a steep pitched roof the inertia reel line may not lock up.
- An arrest line may fail if it contacts an edge in a fall. Ensure that verification has been obtained from the manufacturer or supplier that it is safe.
- An arrest line may fail if it contacts an edge in a fall. Ensure that verification has been obtained from the manufacturer or supplier that it is safe to use with the specific type of edges involved in the work process.
- Inertia reels should not be used as working supports by locking the system and allowing it to support the user during normal work.

- In order to avoid rollout, make sure you use the fall arrest manufacturer's recommended hardware such as energy absorbers, karabiners etc.
- Seek advice when you set up an inertia reel- avoid the pendulum effect.
- Only a qualified rigger or scaffolders or other suitably trained person should install a static line system.
- Maintenance records on inertia reels should be available on request.
- Suitably competent persons should undertake inspection of fall arrest systems.

A. Safety Harnesses

Safety harnesses must be worn and tied off when working on any of the following;

- Sloping roofs
- Flat roofs without guardrails within six (6) feet of the edge or roof opening
- Any suspended platform or stage
- Any scaffold with incomplete guardrails or decking
- Ladders near the edge of roofs or floor openings
- In the area of roof or floor openings
- In areas more than six (6) feet above any adjacent working surface
- When placing and tying reinforcing steel in walls, piers, or columns
- When removing floor planks, floor grading, floor hole covers, etc.
- In areas exposed to protruding reinforcing steel
- When assembling and disassembling scaffolding
- When using mechanical aerial lifts requiring fall protection

Safety harness must be arranged so that the support point is in the rear.

Excess lanyard length must be so arranged to avoid tripping hazards

Lanyards must be secured to an anchorage point capable of supporting a minimum of five thousand pounds of dead weight

Maximum fall distance allowed is six (6) feet.

Safety harnesses shall be worn and attached to the manufacturer's designated anchorage point when working out of extensible and articulating boom platforms and to vertical drop lines when working from suspended scaffolding. 6 ft. fall protection requirement also applies to steel erection activities, leading edge work, roofing work and work on scaffolds.

Safety nets shall be provided when work places are more than 25 feet above the ground where the use of other fall protection devices is impractical.

V. Manual Handling

Almost 25% of all injuries at work are caused by accidents during manual handling. Mistakes made today can cause you health problems for the rest of your life.

Manual handling means using your own strength to lift, move or support objects rather than using machinery or equipment to bear the load.

Some of the injuries that can result from poor manual handling include back injury, muscle sprains and strains, abdominal hernias and chronic pain. Many of these injuries are not felt straight away but develop over some time into more or less continuous pain.

Not all manual handling tasks are hazardous. The ones that can lead to problems include those in the following table.

Task	Examples
Handling unstable, unbalanced or difficult to grasp loads	Handling reo sheets Handling long lengths of timber

Difficult repetitive or sustained use of force	Using a nail gun
Repetitive or sustained awkward posture (even if no load is being handled)	Working on plaster board ceiling
Repetitive or sustained movement	Bricklaying
Application of high force	Lifting heavy loads
Exposure to sustained vibration	Using jackhammer, pneumatic drill

All tasks must be assessed for risk of injury.

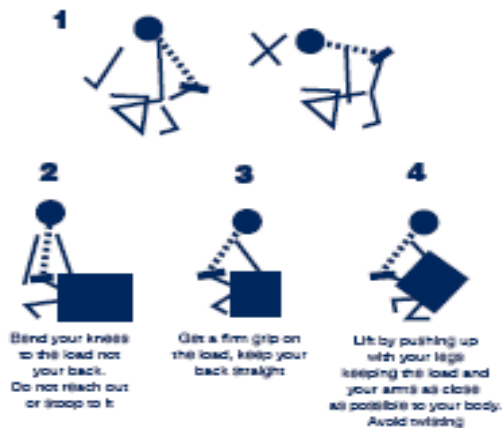
Control Measure	Examples
Eliminate the task if possible	Do not manually lift or carry awkward dead weights such as cement blocks and cement bags
Change the workplace layout or environmental conditions	Place materials at waist level rather than at floor level so they are easier to pick up
	Eliminate the need to push or pull objects up steep ramps Provide good lighting and work areas free of obstacles with plenty of room to move with
Change systems	Timing and placement of deliveries to reduce the frequency of handling and to avoid double handling Team handling to reduce forces, postures on one person
Change the object	Change the load so it is easier to handle (e.g. 20kg cement bags) Use tools that are light and have good grips and supports
Use mechanical aids	Use cranes, forklifts, trolleys, chain blocks, pipe-horses, hoists and similar aids to move loads
Information training and instruction	Workers understand risks and know how to use proper manual handling techniques and equipment

Considerations when manual handling:

1. Always use mechanical handling methods instead of manual handling if possible. These include forklifts, pulleys, leavers, etc.
2. Be aware of your own capabilities and only tackle loads you are comfortable with.
3. Decide if it is a one-man load or you need help.
4. Is there a clear walkway with good lighting in the work area?
5. Be sure you know the weight of the load before lifting.
6. Wear gloves to protect your hands.
7. Wear safety boots to protect your feet from falling objects.
8. Get the feel of the load before you lift fully.

Rules for manual handling:

1. Keep your back straight and upright. Bend your legs and let your legs do the work.
2. Keep your arms as close to your body as possible and as straight as possible.
3. Avoid sudden movements and twists of the spine. Let your feet, not your spine, take the weight.
4. Grip loads with the palm of the hand, not just the fingers.
5. When loads are carried on the shoulder, the centre of gravity has to be directly above it. This calls for the least effort.



VI. Housekeeping

A. Cleanliness of Working Areas

When you see a good craftperson at work the chances are the area in which they are working will be clean and tidy. Quality work and a tidy workspace go hand in hand.

There are three (3) good reasons for this:

1. Safety
 2. Health
 3. Economy
- o Waste material left lying about can cause serious accidents.
 - o Scaffolds, doorways, passages and runways should always be kept clear and free of materials.
 - o Material is expensive- don't waste it. Broken brick, tiles, stone, etc. can be used as hardcore below paths if kept free of plaster, plasterboard off cuts, timber off cuts, etc.
 - o Waste food left lying around mess huts makes the perfect breeding ground for vermin.

B. Working Area

1. Keep your work area tidy by stacking the bricks correctly
2. Do all your cutting in one place using a cutting mat
3. Don't overload the "spot boards"
4. Keep the tools you are not using in your tool bag
5. Sweep through the area occasionally
6. Remove waste and debris from the site as it is generated or at least daily.
7. Salvage of reusable waste and storing reusable materials separate to reduce waste removed from the site.
8. Identify hazardous materials and handle according to manufacturer's recommendations or codes of practice.
9. All access points to the site should remain clear and accessible at all times. This may be a life-and-death issue in an emergency.
10. Leave time at the end of the day to clean the area and leave it ready for the next day

C. Sorting and Stacking Material

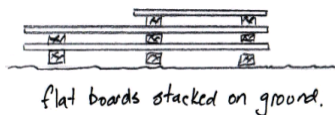
Materials on a construction site often need to be stacked in stockpiles to allow them to be stored safely, or be made ready to move. The materials can be sorted into:

- Flat (boards)
- Round (pipes and bars)
- Drums (paints, glue etc.)
- Fabric (paper, shadecloth, plastic etc.)
- Blocks (bricks, concrete blocks, Hebel etc.)
- Bags (cement, plaster, additives, etc.)
- Loose Materials (some waste, nails, screws, sittings, etc.)

Some of the ways that these materials can be safely stacked are shown in the following diagrams. These are not the only ways to safely stack materials. Most suppliers or manufacturers supply information regarding the safe stockpiling of their materials. When materials are being stored in larger quantities, it is very important that they be stacked according to the manufacturer's instructions.

1. Flat boards

These are best stacked to keep them straight and flat. If Particleboard or MDF is being stacked, it is best to use spacers to make sure that air is allowed to circulate between the boards. Timber boards will stay straight and remain useful. If they are to be stacked outside, the stack may need to be covered to protect the materials from the weather.



2. Round materials – Pipes and bars

These are often hard to stack in a stable way.

The best methods are to use wedges to prevent the lower layer from rolling away or to use stakes in the ground to hold all layers and prevent the stack from rolling away. Only light materials should be stacked this way and the stacks should not be built too high.

Manufacturers or suppliers often pack these materials in a way that makes them stable during transport. If they can be unloaded and stored without unpacking, they will also be well restrained on the site.



Some stock material can be banded to restrain it in bundles or stacks. Banding methods usually involve a strong strap with some method of packing tension on the bands and locking them in place when tensioned. Bands are made of metal or plastic. Banding and unbanding materials can be dangerous. It is important that all appropriate PPE is worn.

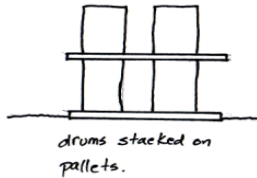


3. Drums

These are often hard to stack safely. Before they are stacked, the manufacturer's instructions must be consulted.

Do not stack drums that are not designed to be stacked.

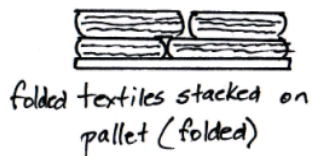
When drums are stacked, they should be stacked on pallets or specially designed "plates" that ensure that each layer is restrained and on a solid base. Manufacturers often supply plates that are used to link layers together and act as spacers or compact pallets.



4. Fabric

The term fabric is used for a range of materials in construction. We can consider lightweight sheet materials as being fabrics. These include tarpaulins, plastic sheeting, fiberglass, waterproofing barriers and shade cloth materials. The term is also used for reinforcing materials used in concrete.

Fabrics are best stored by folding and stacking together or on pallets. It is important that the materials are allowed to dry before being stacked or stored.



5. Blocks

These materials are often referred to as masonry units, the most common of which are bricks. They also include concrete blocks, aerated concrete (Hebel) blocks, pavers and stone.

When stacking these materials, it is important that they are stacked to avoid damage to the materials, the site and injury to the people who work in and around them. Most blocks are modular and can be interlocked to ensure that the blocks near the end of the stack do not come loose and fall, causing damage and/or injury.

An example of this stacking for bricks is shown here. It can be clearly seen how the modular size of the bricks is used to build a locking pattern on the ends of the stack.

All blocks should be stacked in safe numbers that ensure the stack is not too high. Never stack bricks in columns.

Brick stacks must not be more than 7 feet in height. When a loose brick reaches a height of 4 feet, it must be tapered back 2 inches in every foot above the 4 foot level.

Bricks must never be stacked for storage purposes on scaffolds or runways. This does not prohibit normal working supplies on bricklayers' scaffolds during actual bricklaying operations.

Masonry blocks should be limited to a stacked pile height of 6 feet. If blocks are stacked higher than 6 feet, the stack must be tapered back one-half block per tier above the 6-foot level.



6. Bags

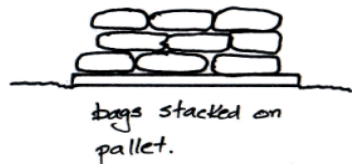
Many materials are delivered in and used from bags. These include;

- cement,
- plaster,
- additives,
- glues,
- resins,
- some surface coatings.

The bags often contain materials that will quickly spoil if the bag is punctured. It is very important that they are sorted to avoid contamination and stacked to avoid damage to the bags. This often means that they must be stacked on a smooth surface or on a protective layer (sheet of ply or MDF or tarp).

Because the bags have a soft form, they must also be interlocked where possible to avoid them sliding or rolling and falling from the stack. Most bagged materials should also be protected from moisture by covering with a tarp or plastic.

Carrying bags can be a hazard, due to their weight and difficulty gripping the bag. The use of hand trucks and wheelbarrows is often necessary. When bags need to be carried by hand, they should be carried close to your body. One method is to carry the bag in the arms, against the body, closely wrapping the mid-section. Another is to carry the bag on the shoulder, held steady by one arm

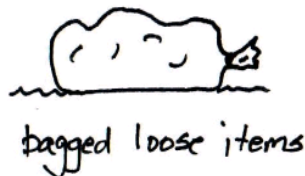


7. Loose materials

Many materials on a site are loose. These may include nails, screws, fittings, concrete chairs, straps, bags, wrappings, and many waste materials.

The best way to handle these materials is often to containerize them. This usually involves placing them in tins, tubs, drawers or bags. Bagging the materials is a good way to handle them as waste. This allows them to be moved, contained (not blowing away) and controlled more easily.

- bagging is an effective method of containing toxic materials during handling and disposal.
- bags must be handled carefully to avoid items puncturing the bag and possibly causing injury. PPE is still important when handling bagged materials.



8. Rules for Stacking Materials

1. Never store materials in front of doorways or emergency exits or firefighting equipment
2. Stacks should be made on level ground, prepared level sites or level platforms
3. Materials should be stored near a work site without hindering traffic or movement of others
4. Never stack materials in large quantities on elevated platforms
5. Always be aware of excavations and possible cave-in dangers when stacking materials
6. Never hinder access to walkways or stairwells with materials being stacked, even if the stack is regarded as temporary
7. Materials should not be stockpiled or stored in public access areas such as footpaths or verges
8. Access to stockpiles may need to be limited by erection of barriers such as barricades or enclosures

B. Inspecting Ladders

1. Timber ladders

Ladders are frequently taken for granted even though they are the cause of many serious accidents.

New ladders should be protected by coating with wood preservative and clear varnish. Painting is illegal as it can hide defects.

All ladders should be inspected frequently and the following points checked;

1. **The stile-** for splits or cracks, splintering, warping or bruising. A bruised stile absorbs moisture which will cause decay and lead to fracture.
2. **The rungs-** for sign of undue wear. No rung should be missing
3. The wedges and tie rods- for tightness
4. **The feet-** for splitting and fraying.

If a ladder cannot be properly repaired then scrap it.

On inspection, if defects are found, they must be reported to your line manager, clearly marked up as defective and removed from the site.

2. Metal ladders

These should not be used for main access to scaffolding.

On inspection check the following:

1. Cracks or corrosion at welded joints.
2. Brackets and hooks for condition and anchorage.
3. Rubber feet for firmness and condition.

C. Storage of ladders

Ladders left lying in the open will soon deteriorate. Store them in a dry, well ventilated area. Lay flat on racking along the full length.

D. Erecting Ladders

1. Base of ladder

Ladders should stand on a firm, level base equally supported on each stile.

Before raising a ladder make sure the foot is secure and firm. Check that it will not be in contact with any overhead danger such as live cables or lamps.

The correct angle for a ladder is about 75% to the horizontal, i.e. 3 ¼ ft out at the base for every 13 ft in height.

Regulations state that a ladder over 10 ft in height must be tied or footed before use. However, it is good practice to tie ladders of any height.

Ladders should be lashed or secured at its upper most resting point. This prevents the base from slipping outwards or the top moving sideways.

If a ladder cannot be lashed then it must be held by someone at the base when in use.

All ladders must extend 3 ft above its uppermost resting place. This provides an adequate handhold.

Ladders should always be placed so that there is space behind each rung for a proper foothold. Care must be taken on this point on landing platforms.

Always climb ladders by holding the stiles **not** the rungs.

2. Stepladder

Stepladders are not designed to carry excess weight. Before using them check if a mobile scaffold tower would be safer.

Before using inspect the following;

1. Stiles- for cracks and splinters
2. Treads- securely held in stiles and no undue wear
3. Hinges- working freely and fixed securely
4. Restraining rope- fixed securely to both legs, correct length and not frayed
 - Steps should not be painted as this may hide faults.
 - Never lean outwards or sideways from steps, move them.
 - Ensure steps are fully extended before you climb them.
 - Report damage immediately, mark as defective and remove from site.
 - Never work on steps higher than two thirds the height of the steps.
 - Never place a plank on treads as you are not designed to take this type of load.

3. Adjustable Trestles

Before using the following checks should be made;

- Welds are secure and free of corrosion
- Adjustable transom moves freely within the sleeve
- Adjusting pins are correct for purpose and in place

4. Use of Trestles

Always ensure correct pins are used. Do not use reinforcing rods or nails
If using normal scaffolding boards, space stands 4 ft apart.

If using lightweight staging, check allowable loads.

If it is possible to fall 6 ft or more, guard rails and toe boards must be fitted

5. Maintenance

After use clean off all mortar droppings, etc. and lightly oil.

6. Split Heads

Split heads are a system that provides an adjustable height staging suitable for carrying out work at ceiling level.

Maintenance as for adjustable trestles.

7. Hop Ups

“Hop ups” are small platforms that enable an operative to reach work that is just out of reach from the floor.

They can be permanently constructed from timber having a maximum height of 24 inches.

They should have a working platform of at least 20 inches square.

An intermediate step provides safe access.

On a more temporary basis ‘hop ups’ can be constructed from joinery trestles and planks.

Care must be taken to ensure the trestles are on a level base.

Material should not be stored on this type of platform.

VIII. Scaffolding

A. Introduction

Where work cannot be safely carried out from the ground or from part of a building or other permanent structure, scaffolding shall be provided or where appropriate ladders or other means of support, all of which shall be sufficient and suitable for the purpose.

And where reasonably practicable, be suitable and sufficient to provide safe access to and egress from every working place.

Scaffolds shall be erected by trained scaffolders or other competent persons possessing adequate experience of such work. All material for any scaffold shall be inspected before use, by a competent person. Materials used shall be of suitable quality and in good condition, free from patent defect likely to affect your material strength. Items not meeting the standard should be discarded.

B. Note

Every scaffold shall be securely supported or suspended. Where necessary it shall be sufficiently and properly strutted or braced to prevent collapse, and shall be rigidly connected with the building or structure, unless the scaffold is so designed and constructed as to ensure stability without such connection.

No unstable objects such as concrete blocks shall be used to support scaffolds or planks.

As stated above, scaffolds shall be erected by trained scaffolders or other competent persons.

This statement does not exempt any person who works on such scaffolding from having a sound knowledge of the safe working practices required for working on scaffolds and an awareness of the hazards caused by poor scaffolding and inferior scaffolding materials.

If you identify a hazard or have any doubts about the scaffolding you are using or have been asked to work on, report them immediately to your line manager.

Failure to do so may cost a life and it may be yours.

C. Use of All Scaffolds

Inspect the scaffold assembly before each use to see that it is assembled correctly, that it is level and plumb, base plates are in firm contact with sills, bracing is in place and connected, platforms are fully planked, guardrails in place, safe access is provided, that it is properly tied and/or guyed and that there are no overhead obstructions or electric lines within 12 feet of the scaffold assembly.

Use only the safe means of access that is provided. Do not climb bracing or frames not specifically designed for climbing. If such access is not provided, insist that it be provided.

1. Climb Safely

- Face the rungs as you climb up or down.
- Use both hands.
- Do not try to carry materials while you climb.
- Be sure of your footing and balance before you let go with your hands.
- Keep one hand firmly on frame or ladder at all times.
- Do not work on slippery rungs to avoid slipping.
- Do not overload platforms with materials.

Working heights should not be extended by planking guardrails or by use of boxes or ladders on scaffold platforms.

Do not remove any component of a completed scaffold assembly except under the supervision of a qualified person. Any component that has been removed should be immediately replaced.

2. Working off Scaffolds

You should only work off scaffolding if it is

- On a stable, level foundation with proper base plates.
- Complete, properly braced and tied to the supporting structure.
- Not overloaded (225kg max. per platform, per bay for light duty scaffold) (450kg max per platform, per bay for medium duty) (675kg max. per platform, per bay for heavy duty)
- Fully planked and fitted with guardrails, mid-rails and toeboards on the working deck wherever a person or material could fall more than 1.8 meters.
- Fitted with a safe, secure temporary stairway or ladder to access the working deck.
- Scaffolding components must not be located within 4.0 meters of any conductors of an overhead electrical power line without written permission from the owner of the power line (CUC).

D. Static and Mobile Towers

A wide range of proprietary towers are manufactured giving choice in size, shape and bearing capacity. You are used to provide quick access to small isolated areas of work.

Manufacturers' instructions on erecting and dismantling must be followed in detail.

1. Foundation

- The floor must be flat, even and strong
- Avoid soft or uneven ground, weak spots and other floor hazards
- Towers must never be supported or built on loose material of any kind
- The minimum base dimension must not be less than 3 ¾ ft
- On mobile towers the wheels must be at least 5 inches diameter, strong enough, locked into standards and provided with brakes.
- Always observe the proper height to weight ratio:
 - 30 times smallest base dimension indoors and
 - 3 times smallest base dimension outdoors

2. Working Platform

- Properly boarded and strong enough to support loads
- Minimum recommended thickness of boards is 1.5 inches.
- Boards less than 2 inches thick must be at least 8 inches wide
- Toe boards a minimum of 6 inches high on all sides
- Rigid guard rail on all four sides at between 36 inches and 45 inches above platform
- If material is stacked on platform a brick guard mesh is provided. If no mesh is provided an intermediate guardrail should be fitted leaving no gap greater than 18.5 inches.

Loads to be safely lifted and stored on platform.

The width of a working platform will be determined by its eventual use. Where it is to be used for persons only a minimum of 24 inches wide is permitted. If material is to be stored this should be increased to four boards wide which leaves two boards for persons to walk past.

A three board minimum passageway should be left clear when materials are being transported along the platform which would require it to be five boards wide.

a) Guard Rails

Working platforms from which a person may fall more than 6 ft should have a guardrail fixed inside the standard at a height of at least 36 inches above the level of the decking. With the guardrail set at 36 inches a second guard rail or higher toe board should be provided to limit the gap to 18 ½ inches.

Guards consisting of top rail (42" H): mid rail (21" H) and toe boards (4"), and capable of supporting 200 lbs., or secured, labeled floor covers capable of supporting 2 times the weight of personnel and material, shall be

erected by the contractor/sub contractor, or replaced in suitable condition if displaced by the contractor/ sub contractor's work, for all floor holes or leading edges 6 ft. or more above lower levels.

Suitable brick guards, which are used to prevent materials falling from the scaffold, are an acceptable alternative to a second guard rail.

b) Toe Boards

Toe boards should be suitably fixed to all working platforms where a person can fall more than 6 ft. You must be placed inside the standards.

Diagram of independent scaffold

c) Support of Working Platform

The space of putlogs and transoms should vary according to the thickness and length of boards being used.

Maximum space for boards 12 2/3 ft long.

Nominal thickness of boards inches	Maximum span between supports ft	Minimum overhang inches	Maximum overhang inches
1.5	5	2	6
2	8	2	8
2.5	10	2	9

Any group of boards within a set should be the same length and thickness.

Where the thickness of boards varies from set to set, provision must be made to prevent tipping.

Boards, which are technically 1.5 inches thick and less than 7 ft long, should not be used unless they are fixed down to stop tipping. If boards project too far beyond their bearing they are liable to tip. This fault is called a "trap". All putlogs and transoms must be securely fixed to ledgers to prevent rolling.

3. Access to Towers

- Stair type or ladder access must be provided. Ladders must be on the inside and secured vertically at the top and bottom on one of the smallest sides of scaffold.
- The ladder to be clear of the ground and wheels (on mobile towers) whilst extending above the working platform for a minimum height of 3' 2" (or five rungs).
- Have both hands free to climb the tower and close the guardrail or trap door once on the working platform.

4. Working on Tower

- Always use safe methods of work.
- NEVER attempt to stand on anything placed on the working platform to gain height.

5. Moving Mobile Towers

- When moving first clear the platform of personnel and material.
- Unlock brakes and push or pull the base.
- In addition to floor hazards look out for overhead obstructions.
- Avoid moving towers outside in windy conditions.

6. Inspections and Notices

- Towers must be inspected by competent persons at least once a week and results recorded on the relevant form.

- Additional inspections are necessary in adverse weather conditions and after alterations.
- Inspections are recommended everyday especially first thing in the morning.
- Use proper warning notices when scaffolding is incomplete and block off access.
- Avoid cladding towers with sheeting materials of any kind.

7. Staging

Many of the proprietary scaffolding systems provide staging purposely designed for system.

The advantages of this are:

1. You fit correctly ensuring no overhang or trap ends
2. You are light to handle even though you cover a greater area than standard scaffolding boards

8. Youngmans Staging

Constructed from timber and reinforced with steel wire you are made in various lengths up to 19' 2". You are designed to provide access for personnel using lightweight materials, i.e. painters and electricians.

E. Scaffold Tubes

Three main types of tube are in common use throughout the United Kingdom:

1. Black steel tubes
2. Galvanized steel tubes
3. Aluminum alloy tubes

Both black steel and galvanized steel tubes possess the same properties but galvanized tube is more resistant to corrosion. Aluminum tube is lighter, more flexible than and not as strong as steel tube. They should not be mixed in the same scaffold.

1. Inspection

Tubes must be checked to ensure you are:

- Straight
- Free from cracks, dents and excessive corrosion.

2. Common Faults

Diagrams to go here

3. Storage

Scaffold tubes are generally supplied in lengths of 20 1/2 ft. shorter tubes are available in lengths of 48 ft and 5ft 7 inches.

Tubes should be stored on level bearers or in racks in your correct sizes.

F. Scaffold Boards

Scaffold boards are manufactured from sawn and seasoned timber and should comply with BS 2482 "Specification of timber scaffolding boards."

Timber boards come in three thicknesses, 1.5 inches, 2 inches and 2.5 inches and are normally 9 inches wide and 13 ft long.

1. Identification of Boards

Each board should be identified by having the following information clearly marked on it;

Either British standard number (BS 2482) or ANSI

- The identification mark of the supplier
- The letter M or V denoting machine or visually graded
- The word “support” followed by the maximum span in meters over which the board has to be supported.

This information is normally given on the band or nail plate which provides the board end protection (e.g. BS 2482 ABCo. M SUPPORT 1.5 MAX).

2. Storage

Scaffold boards should be stacked no more than 20 high, bonded together with short timber battens and placed on level timbers, off the ground for protection from surface water. Boards should be protected from weather and have a free circulation of air.

3. Scaffold Board Faults

Diagrams go here

4. Inspection and Maintenance

Care should be taken of boards in use. No over stressing should be allowed, e.g. that caused by over-loading.

Boards should not be used as ramps or platforms over long spans, nor should you be placed where vehicular or other loads can be put on them.

Boards showing any evidence of damage from vehicles, i.e. tyre marks, should be destroyed.

Scaffold boards should be cleaned and bands or nail plates secured or replaced.

No cut out, burns, oil stains or projecting nails should be present. Boards should never be painted.

5. Common Faults

Diagram here

G. Scaffold Couplers

Diagram here

1. Care and Maintenance

Clips should be inspected before use. Damaged clips should be removed from site. When dismantling, scaffolding clips should be lowered to the ground, not thrown. You should be cleaned and lightly oiled. Store clips in bins, stored into type.

When tightening clips correct spanners should be used to avoid over tightening and stripping the threads with too much leverage.

Never leave clips lying around the site, they are very expensive pieces of equipment.

H. Putlog Scaffolding

Diagram of Putlog scaffold

Putlog scaffolding requires partial support from the building it is adjacent to.

It consist of a single row standards (upright poles), parallel to the face of the building and set as far away from it as is necessary to accommodate a working platform of four or five boards.

The standards are connected by a horizontal tube (ledger) fixed with right angled couplers.

Putlog tubes are then connected to the ledger with its spade end seated in the joints of the adjoining building.

Putlogs must never be used for storage of materials. They are designed for personnel use only. Special care should be taken when putlogs are used.

Putlogs should overhang the support joints by at least 6 inches. Use putlog hangers with bolts fastened to support putlogs on frames.

Putlog spans of greater than 12 feet require kneebracing and lateral support.

Putlogs used as side or end brackets need special bracing.

I. Independent Scaffolding

An independent scaffold consists of a double row of standards, with each row parallel to the building.

The standards are connected by ledgers parallel to the building fixed with right angled couplers.

Transoms are fixed across ledgers to provide a cross tie and support for the working platform.

As this type of scaffolding requires no partial support from the building, it must be provided with diagonal bracing.

The scaffolding is tied back to the building by means of a reveal or through ties at openings.

J. Scaffold Ties

Ties should be provided to resist inward and outward movement of independent and putlog scaffolding.

These ties are provided mainly at openings. You may pass through into the building or use the window reveal leaving the window or door opening secure.

1. Through tie-on independent scaffold

Diagram

2. Reveal tie on putlog scaffold

Diagram

AT NO TIME DURING THE LIFESPAN OF A SCAFFOLD SHOULD A TIE BE REMOVED BY AN UNAUTHORISED PERSON.

IX. Signs, Signals, Barricades and Lights

Signs, signals and barricades shall be visible at all times where a hazard exists.

All streets, roads, highways, and other public thoroughfares that are closed to traffic shall be protected by effective barricades on which shall be placed acceptable and highly visible warning signs.

Barricades shall be located at the nearest intersecting public highway or street on each side of the blocked section.

All open trenches and other excavations shall be provided with suitable barriers, signs, and lights to the extent that adequate protection is provided to the public. Obstructions, such as material piles and equipment, shall be provided with similar warning signs and lights.

All barricades and obstructions shall be illuminated by means of warning lights from sunset to sunrise.

Materials stored on or alongside public streets and highways shall be so placed, and the work at all times shall be so conducted, as to cause the minimum obstruction and inconvenience to the traveling public.

All barricades, signs, lights and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, where within railroad and highway right-of-way, as required by the authority having jurisdiction.

Work performed at night or where daylight is shut off or obscured, any artificial task lighting shall be provided as sufficient to permit work to be carried on efficiently, satisfactorily and safely and to permit thorough inspection. During such time periods the access to the place of work shall also be clearly illuminated. All wiring for electric light and power shall be installed and maintained in a first-class manner, securely fastened in place at all points, and shall be kept as far as possible from telephone wires, signal wires, and wires used for firing blasts.

Signs, signals, and barricades should be removed when the hazard no longer exists.

Employees working in an area of potential traffic hazard shall wear approved reflective type vests.

X. Tools

A. General

- Only qualified persons are to use tools and equipment
- Do not operate any tool without proper instructions
- Some activities will require permits before starting work
- Tools and equipment must be in good condition
- Tools or guards must not be altered
- Tools are to be used only for their designed purpose
- Personal hand tools are subject to inspection at any time
- Job or home made tools are prohibited on the project/site

B. Hand Tools

- Every tool was designed to do a certain job. Use a tool only for its intended purpose.
- Every tool needs care. Keep your hand tools in peak condition- sharp, clean, oiled, dressed, and not abused
- Worn tools are dangerous (i.e., the “teeth” in a pipe wrench can slip if worn smooth, an adjustable wrench can slip if the jaw are sprung, loose hammer heads can fly off hammers, etc.).
- Tools subject to impact (i.e., chisels, star drills, caulking irons, etc.) tend to “mushroom”. Tools should be dressed by a qualified person to avoid flying fragments.
- Use tool holders.
- Don’t force tools beyond their capacity or use “cheaters” to increase the capacity
- Don’t use tools as pry bars.

C. Major Hazards

- Torque is the circular or rotating motion in tools such as drills, impact wrenches, and saws that results in a strong twisting force. Be prepared in case of jamming.
- Have a good footing, use two (2) hands, obtain resistance when needed, and be ready to release the power switch or trigger. (This should be fail-safe so that it cannot be locked “on”. Also, watch for “coasting” or idling motion.)
- Flying objects can result from operating almost any power tool. You should always warn people around you and use the proper eye protection.
- Contact with moving parts can be hazardous. Keep moving parts directed away from your body. Never touch a power part (i.e., drills, chucks, blades, bits, etc.) unless the power source is discontinued.
- Beware of swinging around with the tool running; someone may be beside you.
- Tool condition should be monitored. Examine power tools before each use. Look for damaged parts, loose fittings, and frayed or cut electrical cords. Tag and return defective tools for repair.
- Air must be shut off or the electrical cord unplugged before making tool adjustments. Air must be “bled down” before replacement or disconnection.
- Power actuated tools should only be used by qualified persons.

D. Guarding

Proper guards or shields must be installed on all power tools before use. Do not use improper tools or tools without guards in place. No “homemade” handles or extensions (“cheaters”) are permitted.

E. Power Tools- Shop Type

Some power machines may only be run by qualified operators after completing proper training. Training, at a minimum, will include basic rules of operation.

Electrical power tools shall be grounded or double insulated with proper assured equipment grounding inspections or Ground Fault Interrupter circuit protection provided.

Pneumatic power tools shall be secured to the hose or whip by some positive means.

Cords, leads and hoses shall be kept at least seven feet off the ground or whatever height is necessary to be protected from traffic and creating tripping hazards.

F. Adjustments, Servicing and Repairs

- Shut down machines and take the necessary action (s) to prevent accidental starting. This may require a completed lock and tag procedure or simply unplugging the power cord.
- Replace all guards before start-up. Remove cranks, keys, or wrenches used in service work.
- Do not attempt field repairs on electrical power tools. Return them to the tool crib for proper repair and testing.
- Some machines use both air and electrical power. Both must be shift off prior to making repairs or adjusting moving parts. Perform a “bleed down” to remove any air left in the system.

XI. Welding & Cutting

A. General

Do not look at the welding arc even if you have tinted lenses. The ultraviolet rays from the welding operation may burn your eyes.

Keep welding leads and burning hoses clear of passageways and doorways. Protect them from damage as necessary.

Inspect all leads, grounds, clamps, welding machines, hoses, gauges, torches and cylinders daily before use.

Be sure that all fittings, couplings, and connections are tight.

Avoid breathing fumes. Use the exhaust systems in the shop, a blower, or a respirator.

No welding or burning should be done on a closed vessel or tank, or any vessel or tank that has not been decontaminated (cleaned).

Before striking an arc or lighting a torch, check with your supervisor to see if a Welding and Burning Permit is required.

Each welder is responsible for containing sparks and slag and/or removing combustibles to prevent fire.

A five (5) pound or larger, dry-chemical fire extinguisher must be within twenty (20) feet of any welding, burning, or open-flame work. Be sure you know how to operate the extinguisher.

A “Firewatch” may also be required. Check with your supervisor.

Proper barriers or screens should be erected in operating areas to prevent inadvertent exposure of employees to the arc (flash burn).

Welders are to wear hard hats whenever working in construction or maintenance areas where potential overhead hazards exists.

B. Protective Clothing

Protective clothing required for welding and burning varies with the size, nature, and location of the work to be performed.

Only cotton, woolen, or special fire retardant synthetic clothing should be worn. Generally, synthetics are very flammable and melt, causing more serious burns when exposed to flames and high temperature.

All welders should wear flameproof gauntlet gloves.

Clothing should be free from oil and grease.

Flameproof leather (or suitable material) aprons should be considered if long-term exposure to radiant heat or sparks is anticipated.

Consider using fire resistant leggings, high boots, or equivalent for heavy work.

C. Welding (Electric)

All work must have a separate and adequate ground. The ground lead must be pulled from the machine to the work location.

Do not leave a rod in the electrode holder when you lay it down or leave it unattended.

Put stub ends in proper container- not on the floor.

You are responsible for turning your machine off at the end of your shift.

An approved welding helmet must be worn. Use no less than a No. 10 filter plate, with safety plate on both sides of the filter plate.

Never do electric welding from a metal ladder.

Do not weld, but, or burn near or over aerosol cans or other flammables.

D. Burning (Gas)

Before connecting regulators to cylinders, carefully open the cylinder valve a crack to blow out any foreign particles. After the regulator is connected, stand to one side of the gauge while the cylinder valve is opened. Open the cylinder valve slowly. Be certain that the second stage of the regulator is closed before opening the cylinder valve.

Open valves on fuel gas cylinders (i.e. propane, acetylene, natural gas, etc.) a quarter turn only. Open oxygen cylinder valves wide open. The valve wrench must be kept in place during use.

Do not exceed fifteen (15) psi on the torch side of the gauge when using acetylene.

When lighting a torch, open the fuel gas valve on the torch before opening the oxygen valve. Use an approved spark lighter. Do not use matches, cigarettes, butane or gas cigarette lighters, or hot work to light a torch.

All compressed gas cylinders should be kept in bottle-carts while in transit or in use.

All burning rigs must be broken down at the end of the shift, with regulators removed and protective caps screwed down hand tight on compressed gas cylinder bottles.

Compressed gas cylinders must be tied off vertically to an adequate support while in storage, transit, or use.

Keep oil and grease away from oxygen regulator hoses and fittings. Do not store wrenches, dies, cutters, or other grease-covered tools in the same compartment with oxygen equipment.

Do not use compressed gas to clean your clothing, blow out anchor holes, or otherwise clean your work area.

All hoses, gauges, and torches must be inspected regularly.

Approved burning goggles must be worn. Use at least a No. 4 filter with a safety lens on both sides of the filter.

Never leave a torch in a vessel, tank, or other closed container because of the potential hazard of gas leakage.

Never use oxygen in pneumatic tools to pressurize a container, to blow out lines, or as a substitute for compressed air or other gases.

Place cylinders and hoses where they will not be exposed to sparks and slag from a burning operation.

XII. Compressed Gas Cylinders

Compressed gas cylinders shall be secured in an upright position while being utilized, stored and/or transported.

When transporting, moving and storing gas cylinders, valve protection cap shall be in place and secured.

Cylinders shall not be hoisted by magnets or choker slings. Valve protection caps shall be in place and secured.

Cylinders shall be kept away from sparks, hot slag and flames, or be adequately protected.

Cylinders shall not be placed where you can become part of an electrical circuit.

Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials a minimum of 20 feet, or by a non-combustible barrier at least five feet high having a fire resistant rating of at least one-half hour and empty cylinders shall be separated as above from full cylinders and stored like cylinders.

“No Smoking” signs shall be posted at storage areas and signs shall clearly indicate contents of cylinders.

Anti-flash back valves shall be provided on all oxygen and acetylene lines.

XIII. Cranes & Derricks

All crane operators shall be certified by a competent person capable of identifying existing and predictable hazards either in the surroundings or working conditions which may be unsanitary, hazardous, or dangerous to employees.

Load should not be swung over anyone. The swing radius of cranes shall be barricaded.

Hand signals prescribed by ANSI shall be posted at an operator’s station.

Equipment shall not be operated where any of the equipment or load will come within 10 feet (3.1 M) of electrical distribution or transmission lines less than 50 kV. Minimum clearance between lines and any part of the crane or load must be 10 feet plus 0.4 inches for each 1 kV over 50 kV or twice the length of the line insulator but never less than 10 feet.

Employees shall not ride headache ball, hook, or load being handled by the crane.

Equipment shall not be lubricated while in use.

Rated load capabilities, recommended operating speeds, special hazard warning, specific hand signal diagram and special instructions shall be visible to the operator while he is at the control station.

Employees are not allowed to work under the load of cranes. Tag lines shall be used on all loads. Special caution should be used in concrete bucket operations.

Cranes and derricks shall be inspected prior to use and at monthly intervals.

Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or other moving parts or equipment shall be guarded if such parts are exposed to contact by employees, or otherwise create a hazard.

All exhaust pipes shall be guarded or insulated in areas where contact by employees is possible

Guardrails, handholds, steps and platforms shall be provided on cranes for easy access to the car and cab. They should have anti-skid surface

A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means

All employees shall be kept clear of loads about to be lifted and of suspended loads.

The number of employees occupying the personnel platform shall not exceed the number required for the work being performed

No part of the crane should come within 15 feet of energized electrical lines

XIV. Demolition

A. Initial Preparation

Prior to starting demolition operations, an engineering survey shall be made, by a competent person, of the structure to determine the condition of the framing, floors, and walls, and possibility of unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked.

When employees are required to work within a structure to be demolished which has been damaged by fire, flood, explosion, or other cause, the walls or floor shall be shored or braced.

In each case, any utility company which is involved shall be notified in advance.

It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the property. The hazard must be eliminated before demolition is started.

Where a hazard exists to employees falling through wall openings, the opening shall be protected. Signs or warnings of the hazard of falling materials shall be posted at each level.

All floor openings, not used as material drops, shall be covered over with material substantial enough to support the weight of any load which may be imposed. Such material shall be properly secured to prevent its accidental movement.

Employee entrances to multistory structures being demolished shall be completely protected by sidewalk, sheds or canopies, or both

B. Mechanical Demolition

No workers shall be permitted in any area, which can be adversely affected by demolition operations, when balling or clamming is being performed. Only those workers necessary for the performance of the operations shall be permitted in this area at any other time.

All steel members affected shall have been previously cut free.

During demolition, continuing inspections by a competent person shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, or walls, or loosened material. No employee shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

XV. Equipment & Motor Vehicles

All equipment shall be inspected daily before use by the operator.

Defective equipment shall be repaired or removed from service immediately.

All rubber-tired, self-propelled scrapers, rubber-tired, front-end loaders, rubber-tired dozers, wheel-type agricultural and industrial tractors, crawler tractors, crawler-type loaders and motor graders shall be equipped with rollover protective structures and seat harnesses.

All operators of construction equipment, including forklifts, lulls, etc., should be properly licensed and certified by a competent person.

All equipment with obstructed view to the rear must have a reverse signal alarm audible above the surrounding noise level or a flagman.

All cracked and broken glass shall be replaced before bringing vehicles on jobsite. If glass is broken or damaged on job site and if damage is severe enough to cause a potential safety problem, the machine shall be stopped until such damage is repaired.

Vehicles used to transport employees shall have seats firmly secured and adequate for the number of employees to be carried and all passengers should be properly seated. Standing on back of moving vehicles should be discouraged.

Locations for storage of all fuels, lubricants, starting fluids, etc., shall be reviewed by employer prior to use for storage.

Seatbelts shall be worn by all employees operating any motor vehicle and any equipment with rollover protective structures during performance of work.

XVI. Electrical

All electrical work, installation and wire capacities shall be in accordance with the pertinent provisions of the Cayman Islands Electrical Code.

Employer shall develop and implement a Lockout/Tagout procedure and strictly adhere to use of this procedure.

All temporary power panels shall have covers installed at all times. All open and exposed breaker spaces shall be adequately covered.

XVII. Floor & Wall Openings & Stairways

Any floor and wall opening or protective systems removed during the course of employee's work needs to be replaced.

Floor and all openings shall be guarded by a standard guardrail or adequately covered.

Covers must be adequately secured to prevent displacement and have "Danger" signs attached identifying the hazard.

Every flight of stairs having four or more risers shall be equipped with standard stair railings. Stairs are not to be used until raisers and railings are securely installed. Treads will be poured as soon as possible where poured treads apply.

Debris and other loose materials shall not be allowed on stairways or at access point to stairway. Debris shall not be allowed to accumulate in stairwells.

XVIII. Excavations & Trenching

Prior to opening any excavation or trench, the employer must be notified. Subsequently, the employer shall contact any other necessary personnel and underground utility locator service to determine whether underground installations, i.e. sewer, telephone, fuel, electric lines, etc., maybe encountered and where you are located.

Excavations and trenches shall be inspected daily by a competent person and after any rainfall to determine if you are safe.

All banks 4 feet high or more shall be sloped to the angle of repose (the greatest angle above the horizontal plane at which a material will lie without sliding), or shall be adequately shored.

Ladders or steps shall be provided in all trenches 4 feet or more in depth. Ladders or steps shall be located to require no more than 25 feet or lateral travel before having access or egress.

Material excavated shall be stored at least 2 feet from the edge of the excavation or trench shall be shored to prevent material from falling into the excavation.

All trenches and excavations shall be properly barricaded to prevent persons from walking into them.

All walkways or ramps crossing over excavations shall be securely fastened and equipped with standard guardrails.

XIX. Steel Erection

Steel erection shall not begin until concrete footings and piers is certified to be sufficient to support imposed loads.

Cranes shall be inspected for adequate condition of control mechanisms, rigging, hydraulics, pneumatics, hooks, and latches and ground conditions prior to hoisting.

Workers shall not walk top flange of coated steel unless a minimum slip resistance of 0.5 is achieved in the coating.

A minimum of 4 anchor bolts shall be installed per column

Bridging shall be installed and anchored on long span steel joists.

Connectors shall be protected from fall hazards of more than 6 feet.

Deckers, working in a controlled decking zone (CDZ) at 6 feet, shall wear fall arrest equipment.

No employees are permitted to walk the steel.

Employees must be tied off and “coon” the beam until safety cables are provided to which employees shall tie off. Two lanyards are needed to ensure 100% tie-off.

At no time shall there be more than four floors or 48 feet of unfinished bolting or welding above the foundation or uppermost permanently secured floors.

A temporary and/or permanent floor shall be maintained within 2 stories or 30 feet, whichever is less, below and directly under that portion of each tier of beams on which any work is being performed.

Planking or metal decking in temporary floors shall be of proper strength and thickness to carry the working load. Decking shall be secured to prevent movement.

Standard guardrails and toeboards shall be installed around open sides of permanent floors. During structural steel assembly, a safety railing (cable) shall be installed approximately 42 inches high, recessed into interior of floor around all temporary floors.

Taglines should be used to control all loads.

Containers shall be provided for storing or carrying bolts or rivets. When bolts, driftpins, or rivet heads are being removed, a means shall be provided to prevent accidental displacement. Tools shall be provided as well as lanyards to prevent falling.

During the final placing of solid web structural members, the load shall not be released from the hoisting line until the members are secured with not less than two bolts, or equivalent, at each connection.

A safe means of access to the level being worked shall be maintained. Climbing and sliding columns are not considered safe access.

XX. Confined Areas or Spaces

Employers shall develop an entry procedure to be used by employees when entering confined areas or spaces. Such areas include:

- Storage tanks
- Process vessels
- Bins
- Boilers
- Ventilation or exhaust ducts
- Sewers
- Underground utility vaults
- Tunnels

- Pipeline
- Open-topped pits
- Basements and temporary wood framing covered with plastic

Before an employee is permitted entry into a confined area or space, the atmosphere within the space shall be tested to determine the oxygen level and concentrations of flammable vapors, gases and toxic contaminants.

When welding, cutting or heating in confined areas or spaces, ventilation shall be provided. When sufficient ventilation cannot be provided without blocking the means of access, employees shall be protected by airline respirators and an additional employee shall be stationed outside the confined area to maintain communication with those working within and to aid in an emergency.

Hazardous atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury, or acute illness from:

- a. Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit
- b. Airborne combustible dust at a concentration that meets or exceeds its LFL (which may be defined as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.
- c. Atmospheric oxygen concentrated below 19.5 percent or above 23.5 percent
- d. Atmospheric condition or concentration of any substance that is immediately dangerous to life or health as published in 1910.146 (Z) or (G) or which may be capable of causing one of the above reaction.

XXI. Fire Safety

The employer shall be responsible for the development and maintenance of an effective fire protection and prevention program at the job site throughout all phases of the construction, repair, alteration, or demolition work. Emergency escape procedures and emergency escape route should be designed and implemented on site.

Procedures should be in place to account for all employees after an emergency evacuation has been completed and for employees who operated critical operations prior to evacuation.

The employer shall establish an employee alarm system which all employees should be aware of.

Before implementing the emergency action plan, the employer shall designate and train a sufficient number of persons to assist in the safe and orderly emergency evacuation of employees.

The employer shall review the plan with each employee covered by the plan when:

- a) The employee's responsibilities or designated actions under the plan change
- b) Whenever the plan has been changed

The written plan shall be kept at the workplace and made available for employee review. For those employers with 10 or fewer employees the plan may be communicated orally to employees and the employer need not maintain a written plan.

Combustible materials and flammable liquids should be kept away from heat.

Employers and employees should smoke only in designated areas.

Fire extinguishers should be located on site.

XXII. Hazards in Construction

A. What are the main hazards in construction?

Among the dangers in construction are;

- Falls from work at height
- Crush injuries in excavation work
- Slips and trips
- Structural Collapse
- Collapse of trenches
- Compressed Air
- Being struck by falling objects
- Moving heavy loads
- Bad working positions, often in confined spaces
- Being struck or crushed by a workplace vehicle
- Receiving injuries from hand tools
- Inhalation of dust
- Handling rough materials
- Exposure to dangerous substances (chemical and biological)
- Working near, in, or over water
- Explosive Powered tools
- Welding fumes, gases and arcs
- Exposure to radiation
- Loud noise
- Vibration from tools or vibrating machinery

B. What are the hazardous substances within the construction sector?

1. Silica Dust

Silica dust is created when concrete is cut, sawn or scabbled. Respirable dusts containing crystalline silica can cause irreparable damage to your lungs. Such dusts may be generated from bricks, mortar, aggregate sandstone, and concrete particularly when dry cutting, chasing, sawing, grinding or scabbling.

Alternatives to avoid silica dust should always be considered and applied as far as possible.

A risk assessment should be developed for all tasks where silica dust may be created.

The risk assessment should include at least the following;

- Use of wet working methods as far as practicable.
- Isolation and restriction of entry to affected methods.
- Use of tools with dusts extraction methods fitted.
- Use of protective cartridge respirator masks.
- Use of eye, hearing protection and protective clothing.
- Removal of dry dust using vacuum cleaner fitted with a HEPA (high efficiency particulate arrester) filter.
- Removal of wet slurry using a wet vacuum or squeegee.
- Decontamination of work clothing and personal hygiene.
- Control measures if necessary.

2. Asbestos

Before any refurbishment or demolition of an existing building or plant, the project should be inspected for asbestos and if present, an assessment of risks arising from the work must be carried out.

If you find asbestos in your workplace:

- Do not disturb it in any way.
- Report the matter to your supervisor and health and safety representative.
- Do not work in the affected area unless clearance had been obtained from a competent person and it is safe to do so.

3. Synthetic Mineral Fibres (SMF)

SMF are used for insulation, usually as batt, ceiling tiles, blankets, and loose wool.

SMF can cause dermatitis and irritation of the nose, eye and throat. They may also cause respiratory illness and are possibly carcinogenic.

When using SMF products the following health and safety requirements should be observed:

- A documented risk assessment should be developed for removal and /or installation tasks.
- All those required to work with SMF should receive full information, instruction and training in relation to hazards and risks and be made aware of the relevant risks assessment for the work.

The risks assessment should aim to identify the possibility of generating fibres and dust in the first place. However, where this is not practicable the risk assessment should include the following controls:

- Measures to minimize creation and spread of dust fibres.
- Isolation and restriction of entry to affected areas.
- Use of hand tools in preference to power tools or tools fitted with dust extraction.
- Use of full or half face protective cartridge respirator masks.
- Use of eye protection, gloves and protective coveralls.
- Removal of contamination using an appropriate vacuum cleaner.
- Decontamination of work clothing and personal hygiene.
- Bagging and disposal of SMF waste.

Where practicable, all products should be delivered on site in a form that minimizes the release of fibres and/or dust (encapsulated, wrapped or painted with PVA sealant.)

4. Medium Density Fibreboard (MDF) and Wood Products

MDF, particle boards and some timbers such as western red cedar, birch, oak, walnut, and others release wood dust when cut which may cause cancer and/or respiratory illness, MDF and other particle boards may also release toxic chemicals.

These toxic materials include Formaldehyde, which is the bonding agent for MDF. When MDF is cut, the cut edges release the gas into the environment.

Health Effects

EYES: The dust, gas and vapour may irritate the eye causing discomfort and redness.

SKIN: The dust, gas and vapour may irritate the skin resulting in itching and a red rash.

INHALED: The dust, gas and vapour may irritate the nose, throat and lungs, especially in people with upper respiratory tract or chest complaints such as asthma.

CHRONIC: Repeated exposure over many years to uncontrolled wood dusts increases the risk of nasal cancer. Inhalation of wood dust may also increase the risks of lung fibrosis (scarring).

There are also increased risks of respiratory and skin sensitization from wood dust and formaldehyde resulting in asthma and dermatitis respectively.

All those required to work with these products should receive full information, instruction and training in relation to hazards and risks and be made aware of the relevant risk assessment for the work.

This risk assessment should include the following controls:

- Measures to minimize creation and spread of dust.
- Provision of a fully enclosed area where necessary.
- Isolation and restriction of entry to affected areas.
- Use of hand tools in preference to power tools or tools fitted with dust extraction.
- Use of half face protective cartridge respirator masks.
- Removal of dust using an appropriate vacuum cleaner.

- Decontamination of work clothing and personal hygiene.

Always store MDF and other particle boards in a well-ventilated area.

5. Noise

High noise levels are almost always present on construction sites but hearing damage may not be felt immediately. Loss of hearing ability is irreversible and may take years to develop. Employers must identify if there are risks to employees, visitors and the public and must address whether the exposure standard for noise is likely to be exceeded.

If employees are likely to be exposed, a written plan of control measures must be developed. Signs must identify noise areas, machinery and tasks where hearing protection must be worn.

Those required to wear hearing protection should have:

- hearing tests (Audiometric testing) (within 3 months of start and every two years)
- training about the effects of exposure to noise, control measures and selection, fit and maintenance of hearing protectors

The table below shows how quickly you can be exposed to the maximum allowable daily noise dose (85dBA) if not wearing hearing protection.

Activity	Decibel Level	Time to reach allowed daily dose	Noise reduction needed (dBA)
Drilling wood	80	8 hr	0
Angle grinder on metal	90	2 hr	5
Circular saw	105	3.5 min	20
Chainsaw	115	22 sec	30
Pneumatic rock breaker	120	9 sec	35
Pile hammer	125	3 sec	40

Note: levels are indicative only

If excessive noise remains after all other practicable noise control measures have been implemented, the appropriate hearing protection should be provided and worn.

Personal Protective Equipment should only be relied upon where all other measures fail to eliminate the risk.

To prevent hearing loss always use noise control measures in accordance with the training and instruction provided by your employer.

C. What are the main causes of accidents in the construction sector?

Slips, trips and low falls

These are probably the most common form of accident in construction. Although usually minor, they can lead to many different injuries and ill health outcomes, from musculoskeletal disorders (e.g. strained ankle) to puncture wounds (from falling on sharp materials). Fatalities from apparently innocuous slips have been known.

Falls from height

This is the main cause of fatal accidents. These often occur due to:

- Inadequate scaffolding
- Lack of edge protection
- Unprotected openings in buildings
- Lack of edge protection in roof work
- Dangerous demolition work, and
- Inappropriate use of inappropriate ladders and hoist.

Crush injuries

These occur in unsafe excavations often lead to fatal accidents or serious injuries. They occur when there is inadequate support for trench sides, especially after rainfalls, or when vehicles are operating too close to the edge. Buildings and walls may collapse when supporting structures are undermined.

Being struck by falling objects, materials or tools

This is a potentially deadly occurrence. Such falling objects can be due to:

- The lack of toe boards on scaffolding,
- Lack of tool belts for workers,
- Bad storage and stacking, and
- Poor housekeeping.

Injuries may also result from improper use of hoists and cranes, and from being struck, crushed or trapped by vehicles, trucks and machinery.

Electrocutions

This can be due to cable strikes on buried services, or to contact with overhead cables.

XXIII. Occupational Diseases within Construction

A. Respiratory Diseases

1. Pneumoconiosis- Produced by inhaling dust and fibers.
2. Silicosis- Masons and workers employed in drilling concrete, the machine-cutting of various materials and the polishing of marble and other stones are particularly exposed.

B. Asbestosis- Induced Cancer

This applies not only to those engaged in demolition but also maintenance workers such as electricians and plumbers, who may unknowingly disturb asbestos material in their work.

Because the symptoms only manifest themselves some years after the beginning of exposure which may have occurred 15 to 20 years earlier, asbestosis, lung cancer and mesothelioma continue to figure in the list of occupational diseases, typical of the construction industry.

Diseases caused by contact with asbestos are serious and all contact with airborne asbestos must be avoided.

C. Dermatitis- Skin Disease

This is linked to growing use of irritant or toxic chemical substances, such as:

- solvents in paints adhesive,
- sealant,
- products used for protective treatment of wood,
- oils used in shuttering work,
- soluble chrome and
- other substances used in making and application of concrete.

D. Noise-Induced Hearing Loss

Affects many employees including drivers, drillers and demolition workers. Those working with vibrating tools, such as pneumatic chisels, drills and compactors are exposed to the risk of vibration-induced white finger or hand-arm vibration syndrome [HAVS].