



Working at Height Standard

November 2022 | V1 |
OP-HSW-SD-0004

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Section 1

Overview

1. Overview

1.1 Intent

Working at height occurs on a regular basis at Mace. It is a high risk activity and needs careful management. Mace recognise that when this is not correctly managed, it can result in catastrophic events, including life changing outcomes and/or death.

The intent of this standard is to detail how working at height (WAH) activities must be managed at all stages of our projects.

This standard should be used when designing and planning works. While it has a construction and facilities management focus, it should act as a guidance for our consultancy and development activities where Mace has a role in influencing or defining work involving working at height.

Please note this document now combines the requirements of the previous Work at Height Guidelines and Standards (MG-H&S-PR-2800), Riser Standards Guidance (MG-H&S-GD-3010) and the Tool Tethering Policy (MG-H&S-PL-1002).

1.2 Scope

This applies to all Mace employees and Mace supply chain at our operations. It is applicable to all sectors.

1.3 Risk management

All working at height activities must be planned and organised. Table 1 below details the process that must be followed. Additional details on individual steps are found in this standard.

Risk assessment

Task specific risk assessments must be in place for all working at height. These must be reviewed and signed off as part of the work approval process e.g. Work Method Statement sign off.

Risk ratings

Preferred controls for working at height are provided in this document and rated as per Table 1 below. Controls must be incorporated into WAH plans. In some instances multiple controls may be required.

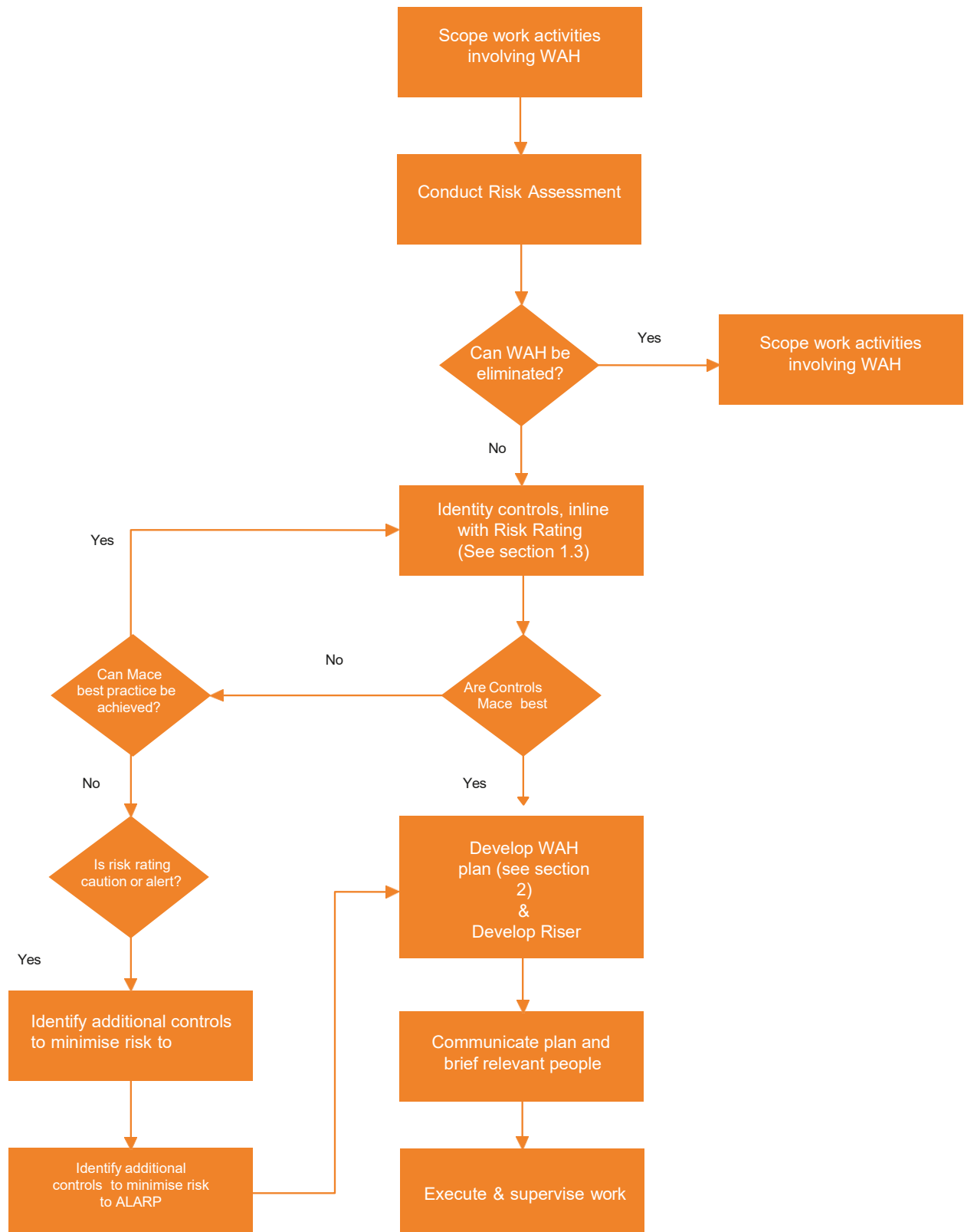
Note: This document does not cover all potential working at height scenarios, for example working on tower cranes, roofs, top of lift cars, jump form, slip form and decking will require working at height. Where these activities are occurring on a Mace project then they must be fully risk assessed and documented in the working at height plan.

| Risk ratings | Description |
|----------------------|--|
| Best Practice | This should be the first consideration and is the preferred option. |
| Caution | In the event the 'Best practice' option is not selected this would be the second choice. In choosing this option there will be additional management controls required and more consideration required of the residual risks. Additional controls must be documented in the WAH plan. |
| Alert | Must only be used by exception when all other options have been considered. Approval from the Managing Director/BUD AND the HSW business unit lead is required. Approval can either be through signing the WAH Plan or email confirmation. |

Table 1: Risk Ratings

1. Overview

Figure 1: Working at Height Control Planning Process



* ALARP = As low as reasonably practicable

1. Overview

1.4 Roles and responsibilities

Table 2: Roles and responsibilities

Roles and responsibilities are detailed in Table 2 below.

| Roles | Responsibilities |
|----------------------|--|
| Designers | <ul style="list-style-type: none"> Design work to prevent or minimise WAH activities. Review the risk ratings of this document and design work in-line with best practice rating, wherever possible. |
| Mace project team | <ul style="list-style-type: none"> Develop project WAH and Riser Strategy and delivery plan. Plan, organise and coordinate WAH activities and work relating to risers. Review and sign off on Safe System of Work (SSOW), including risk assessment and method statement (RAMS). Review work and report on any issues or opportunities for improvement. |
| Supply chain | <ul style="list-style-type: none"> Develop and work to approved SSOW. Provide adequate resources. Supervise and report on any issues or opportunities for improvement. |
| WAH coordinator | <ul style="list-style-type: none"> Co-ordinate the development of the WAH plan with the Mace Project team. Confirm compliance with the WAH plan and requirements of this standard. Review the WAH plan and arrange for appropriate sign off. Additional responsibilities are outlined in the Mace appointed coordinators procedure. |
| Scaffold coordinator | <ul style="list-style-type: none"> See Mace appointed coordinators procedure. |
| Riser coordinator | <ul style="list-style-type: none"> Co-ordinate the development of the Riser Strategy and Delivery plan with the Mace project team. Confirm compliance with the Riser standard and requirements of this standard. Lead the Riser coordination meetings. Review the Riser Strategy and arrange for appropriate sign off. Additional responsibilities are outlined in the Mace appointed coordinators procedure. |

1.5 Training, supervision and behaviours

Adequate processes are required for identifying and providing training for individuals and supervisors involved in working at height. As a minimum it must include:

- Any person undertaking work at height is suitably trained to understand the risks, the safe system of work and safe use of any work equipment.
- The risk assessment provided for the task identifies any competence and training needs to be specific to the activity taking place and

associated equipment being used.

- All works at height must be supervised by a competent person; the level of supervision (continual or at regular intervals etc.) will be dependent on the level of risk. Details of supervision must be listed in the safe system of work.

1. Overview

1.6 Four steps to safety

Mace employees and contractors are required to conduct the Four Steps to Safety before commencing any work. This is designed to stop and review the working environment and controls to confirm that the work can be completed safely. Considerations for Four Steps to Safety when working at height are provided below and in Fig 2.

Are you in a safe place?

Are you able to get to and from your work area safely?

Has a suitable means of access to height been provided?

Is the work area clean and tidy?

Are suitable controls in place to prevent you being affected by adjacent works?

Do you have a safe system of work?

Has an assessment been completed to determine if works at height can be avoided?

Have collective measures been identified ahead of personal measures?

Do you fully understand the safe system of work and has it been communicated to those carrying out the task?

If required, is an emergency rescue plan in place?

Are the correct safe tools, plant and equipment available for you to use?

Are you trained to use the tools and equipment you are using?

Have you inspected the equipment prior to use?

Is the equipment suitable for the task?

Have you tethered your tools and equipment?

Are your colleagues safe?

Have suitable measures been taken to prevent materials falling from height?

Have adequate controls been provided to protect against any materials that may fall?

Is suitable supervision in place?

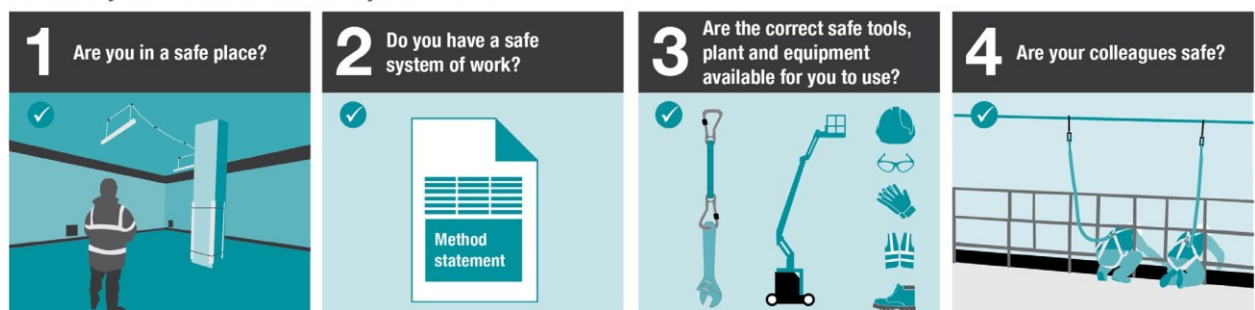
Are members of the public protected from falling objects?

Safety first. Second nature.



Four steps to safety

Before you start work ask yourself...



...If not, stop working and speak to your supervisor or Mace manager.

Figure 2: Four Steps to Safety

1. Overview

1.7 Hierarchy of fall protection

Work at height must be organised and planned to provide safe places of work and safe work equipment in line with the hierarchy for the protection of persons from falls. See Figure 3.

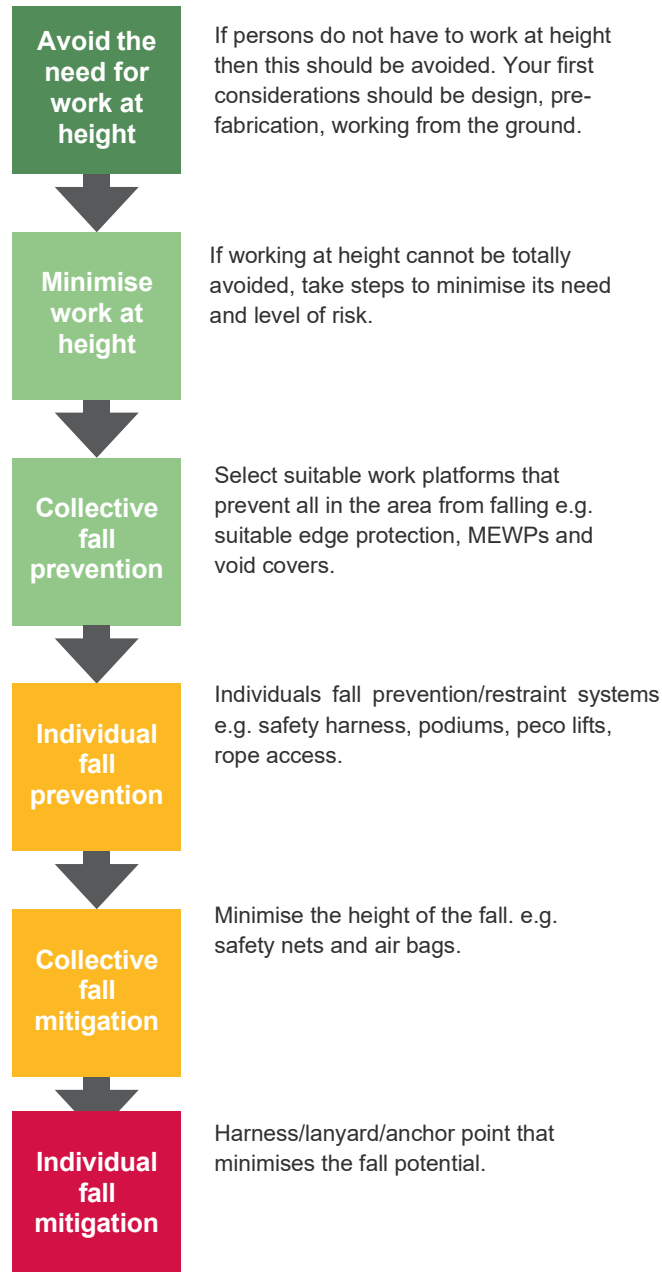


Figure 3: Hierarchy of fall protection

Section 2

General working at height

Minimum requirements

2.1 Work at height plan

Projects are required to develop a Work at Height (WAH) plan using the template provided [here](#). The WAH coordinator is responsible for coordinating the WAH plan. The WAH plan is a live document that should be reviewed at least every four (4) weeks and include looking forward for eight weeks during the life of the project. It should be updated as required.

The WAH plan is to be completed as set out in Table 3, below.

The WAH plan must be discussed with all members of the project delivery team and communicated to operatives during the Daily Activity Briefings (DAB) or Nightly Activity Briefings (NAB).

Sign off for ALERTS is required by both the Business Unit Director and the Health and Safety Business Unit Lead.

In working to protect our employees, colleagues and the public from the hazards of working at height your priority must be to remove and reduce the risk of working at height at design phase. (See section 1.7).

All working at height needs to be planned and coordinated. This must consider the compatibility of controls between temporary and permanent works.

| | |
|-------------------------------|---|
| Tender Stage | <ul style="list-style-type: none"> A high level review should be undertaken. Involve specialists (steel/MEP/decking). Note: Include all relevant trades e.g. substructure, RC frame, cladding etc. Allocate correct costs/package splits. Carry out a design review incorporating CDM/PD obligations are met (use Design Review checklist for this task). |
| Pre-construction phase | <ul style="list-style-type: none"> Produce WAH Plan, at the same time as the project 'Riser Strategy and Delivery Plan'. |
| Construction phase | <ul style="list-style-type: none"> Hold a workshop to communicate the WAH standard and plan to Mace employees and contractors. (Reference the WAH Training Presentation). Review every four (4) weeks as a part of the Project Delivery Plan review. Update the document as necessary picking up any changes from the working drawings and have a 'refresh' session with the whole team. The H&S Manager and the H&S BUL will audit the practical implementation of the WAH Plan at regular intervals using YellowJacket. |

Table 3: Working at height planning phases

2.2 Hazards

2.2.1 Hazard removed/ reduced through design

In working to protect our employees, colleagues and the public from the hazards of working at height your priority must be to remove and reduce the risk of working at height at design phase.

The following points must be considered:

- Eliminate need to work at height by working at ground level e.g. building roof at ground level and lifting into place.
- Edge protection must be positioned to avoid conflict with any other permanent works e.g. cladding or internal wall positions.
- Changes in floor level as works proceed e.g. screeding, installation of raised floor.
- Riser platform level in relation to Finished Floor Level (FFL) and Structural Slab Level (SSL).
- Prefabricated structural components should, if possible, include provision for temporary and/or permanent protection.
- Use of cast in or pre-installed fixings.
- The design and build and sequence, and maintenance of the permanent work, so as to minimise the need for temporary protection.
- Structural metal decking - Consider the use of double height edge trim and pre-installed shear studs
- Temporary waterproofing and flood mitigation strategies to be considered, avoiding adaptations.
- How temporary lighting design is achieved e.g. in risers

2.3 Tethering standard

Persons working at height or near a void/edge will usually require tools, phones or radios. These can drop and strike people/equipment. The standard for tool tethering is detailed below.

2.3.1 Mandatory tool tethering

All tools are to be tethered when being used on Mace construction projects in the following situations:

- When working within three metres of an opening or edge of a structure.
- Working externally to a structure.
- Where there is a risk of tools falling more than three metres (e.g. risers, stairwells, shafts, atria and entrance halls).
- Any location where tools could fall into PPE free zones or public area.

2.3.2 Risk assessment and expectations

- All contractors are required to carry out a risk assessment, following the hierarchy of fall protection measures that will identify and specify the measures necessary to control the risk of tools from falling.
- All personnel should have access to the risk assessment carried out by their contractor.
- In circumstances where a contractor's assessment of the risks associated with carrying out a task identifies that the tethering of any tool increases the risk of injury, then an exemption to the use of a tool tether may be accepted by Mace.

Tool tethering posters can be found [here](#).

- Subject to review by Mace, the contractor may then brief the personnel for the task and proceed without use of tool tethers. The contractor must maintain an adequate level of supervision to confirm control measures to manage the risk of tools falling are in place.

2.3.3 Tether suitability

Contractors are responsible for providing tool tethers that are suitable and appropriate for the tasks to be performed. Tool tethers must:

- Be designed specifically for tethering.
- Be provided with a test certificate to confirm the maximum weight of the tethered tool.
- Be matched to a tool that has been individually weighed to confirm it is within the maximum.
- Be provided with a locking mechanism at the connection points.

Tool tethers must not:

- Be modified in anyway unless approved by the manufacturer.
- Increase the overall risk associated with the work activities/conditions.

2.3.4. Inspection and maintenance

It is essential that tool tethers are inspected and maintained in accordance with the manufacturer's guidance. This should include the following as a minimum:

- A pre-use visual inspection by the user on a daily basis.
- An inspection by a competent person at intervals determined by the suppliers/manufacturers with appropriate records kept.

- A quarantine procedure for taking tools and/or tethers out of service when a defect is identified.

2.3.5 PPE

When working at height the following controls for PPE are required. These should be applied in conjunction with the requirements of the [Mace Operate PPE Standard](#).

Where working in a tether zone, the following is required:

- A helmet with four point chin strap or tether is required.
- Trousers/tool belts to have sealable pockets/pouches i.e. zips, velcro or buttons.
- Adapter system must be available for ear defenders, head torch and wide vision goggles.
- Mobile phones and radios should not be used. Where this is not possible, they must be tethered to a tool belt or belt loop.

If fixings are required for a task then safety bolt bags with draw cords to be attached to tool belt or trousers.

2.3.6 Training and competence

Each person required to use or inspect a tool or tether must be trained and competent in the use, maintenance, inspection of tools and tethers and the arrangements for taking out of use when a defect is identified.

2.3.7 Compliance monitoring

Contractors are responsible to provide suitable tools and tethers and ensure an adequate level of management, supervision and monitoring is in place to meet the requirements in this policy.

2.4 Exclusion zones and secondary protection/catch measures

2.4.1 Exclusion Zones

An exclusion zone must be in place for all overhead work where tools, materials, objects or equipment can fall. The Mace minimum standard for exclusion zones is:

- Exclusion zones must be established below/around all areas where there is a risk of people being struck by falling tools (which, through risk assessment, cannot be tethered)/equipment or materials (e.g. below works on the cladding of a building, around mobile crane works, loading/unloading activities, atriums and MEWPs in general use).
- Exclusion zones must be of adequate size, take into account the risks such as arc of fall, deflections and bounce distances, be delineated by physical barriers and have clear signage prohibiting unauthorised entry.
- The integrity of any exclusion zones must be checked prior to every shift or change in environment.
- Under no circumstance may a person enter an exclusion zone whilst work is being carried out overhead.
- 'Spotters' must be positioned to prevent access where there is a risk of persons entering.
- 'Spotters' must form part of the rescue plan i.e. emergency MEWP descent protocol.
- Exclusion zones must be incorporated into Project Work at Height Plan and communicated via DABs/NABs and briefings.

2.4.1 Secondary protection/catch measures

Overhead protection must be installed where the risk of falling objects exists and wherever a public interface on site exists (See section 2.6.1). The Mace standard for secondary protection/catch measures is:

- Identify any scenarios where overhead protection must be installed, particularly where an engineering control preventing the fall of material cannot be implemented, people below cannot be completely excluded, enclosure or tether/lanyard requirements cannot be met or where an object's position, height from next floor level and mass could cause a fatal injury if it fell onto a person.
- For all structural work on any vertical progressive multi-storey construction, a secondary catch system (e.g. a net, catch fan, horizontally projecting net or any other structurally designed element) must be positioned immediately below any areas where this work is being undertaken above and the application must consider the arc of any potential fall of material.

- Where there is the potential for members of the public and/or workers to be impacted by a fall of material, a designed and engineered overhead protection (e.g. crash deck) must be appropriately positioned and of adequate strength and coverage taking into account potential material types and the arc of any potential fall of material.
- Ensure overhead protection or catch systems avoid failure due to impact with the object it is designed to intercept as a result of over spilling, puncture holes, melting by hot objects, corrosion or overload by weather events (i.e. and assessment of seasonal maximum wind, rain, hail or snow).
- The methodology must include the safe retrieval of a fallen object from overhead protection or catch systems will be executed.



Figure 4: Example of an exclusion zone

2.5 Signage

All risers and edge protection must be clearly identifiable. The type and number of signs required should be appropriate to the riser and edge protection location, the number of access points, any loading restrictions, inspection requirements, where there is a risk of falling objects and any additional controls in place to restrict access.

Examples of suitable signs are provided below:



Inspection Tag System



2.6 Edge protection

Overview

Access and working platforms scaffold are not included in this section. These need to be designed as per TG20 or other recognised scaffolding standard. Where scaffold materials are used as edge protection outside of these areas, then the following risk controls need to be applied.

Triple lock protection

When working at edges greater than three metres, the Triple Lock Protection approach is required, with three independent controls. Each control must prevent people, tools or materials falling.

Examples of this may include use of Edge protection, additional protection fans/tunnels, tool tethering and exclusion zones.

Common management controls

Sections 2.5.1 - 2.5.5 describe different Edge Protection options and specific minimum requirements for working on flat surfaces. Where edge protection is required for incline surfaces over 10%, additional controls may be required inline with BSEN 13374. The following common management controls must be applied to each option, in addition to these:

- Comply to regional standards for temporary edge protection e.g. UK BS EN13374 - Temporary Edge Protection Systems. Where higher standards are noted within individual sections of this document then these must be applied. All work needs to be planned and supported by a SSOW. This includes erection and dismantling of edge protection.
- For extended edge protection (over 1 m), the requirements of CS001:2013 must also be applied.
- Installation:
 - Steel frame - edge protection system fixed to beams prior to erection.
 - RC frame - in position prior to stripping of soffit falsework/ formwork and associated temporary edge protection system.
- Early collaboration with the cladding design is essential for bracket locations to eliminate/ reduce adaptations. Only competent trained operatives to install, inspect, adapt or modify.
- Formal recorded inspection and tagging by competent resource (minimum every seven days and following any changes, adverse weather, impact or adaption). Needs to be inline with manufacturers/designers requirements. All tags to be visible. Location of these tags must be identified on a plan and clearly state what section of edge protection is covered by that tag.
- Coordination of activities for areas of work including consideration of vertical, and horizontal separation/ segregation and exclusion zones.
- No mixed systems requirements to be used within design verification.
- Where proprietary systems are being installed, adapted or dismantled at height, components are to be tethered.
- A sterile zone (three metres from the edge) needs to be established. No materials should be stored in this area. Where this is unavoidable, they must be weighted down/tied down or secured with cargo nets.
- Planning for edge protection must account for changes in working surface/floor level e.g. screeding may require additional guardrails.
- Where plant/machinery are being used at edge of building, additional protection measures are to be implemented, suitable for equipment being used e.g. stop blocks.
- Risk assessment to be undertaken to assess if a [control of access permit](#) to work should be implemented in the zone beyond the edge protection. Additional controls specific to the risks/ task must be implemented when working beyond the edge protection.
- Temporary works coordinator to be consulted.
- Robust defects/change management process.
- Wind loading to be considered in design.
- Horizontal and vertical gaps need to be filled e.g. skirts, rubber, gaskets or plywood.
- Early collaboration with the cladding design is essential for bracket locations to eliminate/ reduce adaptations.
- Minimise non captive fixings.
- Connection must be designed by suitably qualified and experienced engineers.

2.6 Edge protection

Best practice

2.6.1 Climbing screens

Overview

- Currently only applies to RC frame.
- Provide high level of safety for several floors.
- Designed to encapsulate the work area as the building progresses.
- May be fabricated offsite and craned straight into position or fabricated in a suitable assembly area.
- Screens are lifted by crane or jacked using hydraulics.

Minimum requirements

- Implement the common management controls in Section 2.6 (Page 15).
- Comply to regional standards for temporary works e.g. UK BS EN 975 Code of Practice for temporary works procedures and the permissible stress design of falsework.
- Additional edge protection can be installed behind the screens prior to screens climbing.
- Gaps between screen and slab edge need to be filled with skirts/ rubber gaskets or plywood flaps.
- Lifting plan must be in place.
- Only competent trained personnel to be involved during the design, installation, climbing process and removal.
- Temporary works department to be consulted during the design stage, installation, climbing process and removal.
- The Rated Load (in kilograms or pictograms) must be clearly marked at the point of access. This must not be exceeded in use.



Figure 5: Example of Climbing Screen

2.6 Edge protection

Best practice

2.6.2 Proprietary post and panel, with horizontal handrail and full height screen/netting

Overview

- Proprietary system preferably installed with the steel work or during RC frame construction.

Minimum requirements

- Implement the common management controls in section 2.6 (Page 15).
- Full height mesh panels.
- Minimum double guard rail system.
- Components can be bolted/clamped/welded (steel and concrete) or compression/friction posts (concrete).
- No vertical gaps between guard rails greater than 470 millimetres.
- Must be set out and installed as per manufacturers specifications.



Figure 6: Full height protection with double handrail protection

2.6 Edge protection

Caution

2.6.3 Proprietary post and panel, with horizontal handrail (1.5 metre height)

Overview

- Proprietary system preferably installed with the steel work or during RC frame construction.

Minimum requirements

- Implement the common management controls in section 2.6 (Page 15).
- Minimum 1.5 metre mesh panels.
- Minimum double guard rail system.
- Components can be bolted/ clamped/welded (steel and concrete) or compression/friction posts (concrete).
- Additional containment e.g. nets, may be used to increase controls over 1.5 metres.
- No vertical guard rail gap greater than 470 millimetres.
- Must be set out and installed as per manufacturers specifications.



Figure 7: Minimum 1.5 panel with double handrail protection

2.6 Edge protection

Caution

2.6.4 Triple rail tube and fitting edge protection with mesh panels (minimum 1.5 metre height)

Minimum requirements

- Implement the common management controls in section 2.6 (Page 15).
- Minimum 1.5 metres above structural slab level.
- Minimum triple guard rail system.
- No vertical guard rail gap greater than 470 millimetres.
- Engineered connection to frame e.g., excalibur bolt.
- No protruding materials that could cause injury.
- Only qualified and authorised scaffolders to erect, dismantle or modify (CISRS).
- Additional containment e.g. nets, may be used to increase controls over 1.5 metres.



Figure 8: Triple rail tube and fitting edge protection with mesh panel.

2.6 Edge protection

Alert

2.6.5 Proprietary post and panel minimum 1 metre, no rails

Overview

Proprietary system preferably installed with steel work or during RC frame construction.

This system has no rails, therefore has been rated as Alert.

Minimum requirements

- Implement the common management controls in section 2.6 (Page 15).
- Use of a Proprietary post and panel with no rails (min one metre) is classified as Alert. They should only be used as a last resort. Sign off required in line with Table 1 in Section 1.
- Minimum one metres above structural slab.
- Panels must be secured to the post.
- Must be set out and installed as per manufacturers specifications.
- Components can be bolted/ clamped/welded (steel and concrete) or compression/friction posts (concrete) into place.
- Consists mainly of mesh panel 1 metre high, with integrated toe board and post, which can be extended to the underside of the soffit using an extension panel.
- SSOW required where panels are raised, lowered or removed for interface works e.g. cladding, concreting.



Figure 9: Proprietary Post and Panel

2.6 Edge protection

Alert

2.6.6 Tube and fitting edge protection (scaffolding equipment)

Minimum requirements

- Implement the common management controls in Section 2.6 (Page 15).
- Use of tube and fitting edge protection is classified as Alert. They should only be used as a last resort. Sign off required in line with Table 1 in Section 1.
- Design required for layout and span.
- Scaffolding contractor to present installation methods.
- Minimum guard rail height 950 millimetres with toeboard.
- Lightweight steel mesh panels or debris netting/monoflex to be installed (check wind load calculations).
- Consideration for additional protection measures e.g. fans, exclusion zones.
- Scaffold tubes and components to be tethered during install or adaptation.
- Installed to specification during frame erection as soon as the structure is created.
- Only qualified and authorised scaffolders to erect, dismantle or modify (CISRS).



Figure 10: Tube and Fitting Edge Protection

2.7 Protection

Best practice

2.7.1 Fans/protection decks/tunnels

Minimum requirements

- Primary edge protection measures must be in place.
- Where there is the potential for members of the public and/or workers to be impacted by a fall of materials and tools, a designed and engineered overhead protection (e.g. fan, crash deck and or tunnel) must be appropriately positioned and of adequate strength and coverage taking into account potential material types and the arc of any potential fall of material. **Note:** SG34 provides additional guidance on protecting the public.
- Safety nets must conform to EN1263-1&2. They must meet the following requirements:
 - Designed to fit directly to the building (steel or concrete frame) or to scaffolding using a range of attachments.
 - Mesh density 60x60 millimetres and 20x20 millimetres debris net as standard. Consider fine mesh overlap to increase containment. **Note:** Additional mesh will affect wind loading.
 - Consultation with the temporary works department for fixings and ties.
 - Must be positioned immediately below area where work is being undertaken. Specific consideration to be given around access routes, hoist waiting areas, etc.
 - Catches and contains debris from a height of six metres.
- Formal inspection required;
 - Following any discharge into the net.
 - Annual UV degradation monitoring of test cords.
- Remove materials, tools and other items as soon as possible.
- A safe system of work must be in place to remove any potential debris from the nets/fans.
- Safety nets can be folded in to retrieve fallen items or during adverse weather.
- The Rated Load (in kilograms or pictograms) must be clearly marked at the point of access. This must not be exceeded in use.



Figure 11: Example of overhead protection fan

2.7 Protection

Best practice

2.7.2 Load bearing void protection

Minimum requirements

- All voids that present a fall hazard (people or objects) must be covered with load bearing void protection.
- Void protection must be installed securely.
- Void protection must be designed/ specified by the temporary works engineer.
- The void protection must be clearly identified with warning signage and state the load bearing capacity. The Rated Load (in kilograms or pictograms) must be clearly marked at the point of access. This must not be exceeded in use.
- Newly formed manholes or access chambers must have properly designed covers fixed to prevent falls of people or traffic, until the permanent covers are fixed in place.
- Formal inspection on a minimum weekly basis, recording and immediately rectifying any faults found. **Note:** Materials can be damaged, de-laminate, fixings loosen or warning paints fade.
- Weight of void protection to be identified and appropriate manual or mechanical means to be utilised for installation and removal.
- The installation, adaption and removal of void protection must be managed and controlled via the riser coordination meetings.
- The Rated Load (in kilograms or pictograms) must be clearly marked at the point of access. This must not be exceeded in use. Further guidance on loads can be found in [Technical note E16](#).



Figure 12: Void cover

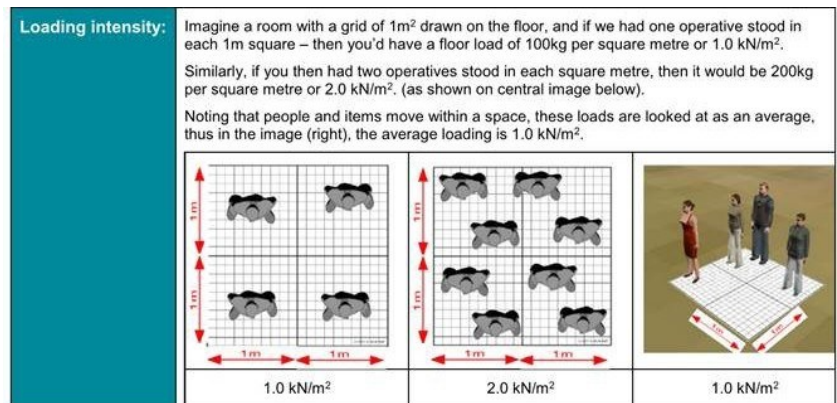


Figure 13: Loading pictogram - technical note E16

2.8 Access equipment

Common management controls

Section 2.8 provides different Working at Height Access work equipment options. Each of these must have the following common management controls in place, in addition to the specific minimum requirements detailed for each option:

- All work must be planned and supported by a SSOW.
- Emergency Rescue Plans and Procedures must be in place including, as appropriate, emergency lowering procedures. Relevant supervisors and operatives must be clearly briefed and competent persons available for rescue operations in-situ.
- Only competent, appropriately trained personnel are to install, inspect or use access equipment. Operatives using equipment must have received appropriate familiarisation training, in accordance with manufacturers recommendations.
- Daily equipment pre-use checks must be in place.
- Formal, recorded inspections and visible tagging are to be in place and undertaken by competent persons. These activities must be undertaken, as a minimum, every seven days (or sooner if required by manufacturers recommendations).
- Additional inspections are required following any changes, adjustments, impact, adverse weather or any circumstance or event that may affect the operation of any access equipment or its stability. In addition to this, a Mace manager needs to complete an independent check of scaffold on a minimum weekly basis.
- Exclusion zones should be considered and implemented as per section 2.4.
- Where work is undertaken near to public areas, risks and hazards must be properly assessed and controls put in place.
- Equipment used for lifting must display a Safe Working Load notice and have an in-date LOLER/other local lifting requirements certificate. Safe Working Loads must always be complied with.
- Weather conditions must always be considered for the safe use of access equipment. **Note:** Must include wind-loadings for plant used internally until cladding is installed and sealed-off.

2.8 Access equipment

Best practice

2.8.1 Access scaffold (tube and fitting or system scaffold)

Minimum requirements

- Implement the common management controls in Section 2.8 (Page 24).
- All scaffold must be designed to meet BS EN 12811. Confirmation must be supplied either using a competent scaffold designer, and/or through TG20:13 compliance sheets.
- System scaffold must additionally be shown to meet BS EN 12810, and to follow the manufacturers user instructions.
- Scaffold footing/bearing must be confirmed as of suitable capacity. Bearing/footing sole plates must be used as required.
- Tie positions and tie loads/duty must be confirmed, along with the capacity of the structure to accept such loads. A percentage of ties should be tested to confirm the soundness of the fixing.
- The required class load must form part of the specification and be clearly marked on the scaffold tag.
- Bracing patterns must be accurately followed (both face, plan, and ledger bracing). Ledger bracing may be replaced with "Readylock" transoms (dog-bones) up to 30 metres height, if included within the design.
- In the planning stage, always consider where gaps could exist. These must be planned to be as small as is reasonably practicable to avoid the risk of falling objects and creating a trap for a foot.

Where larger gaps are necessary, additional control measures will be required.

- Additional internal protection measures e.g, guard rails and toeboards, are required when a fall hazard exists at the building interface.
- Scaffolders must hold CISRS competence for the type of scaffold they are working with.
- Scaffold supervisors must hold advanced scaffolders (gold card) competence and have a minimum of SSSTS.
- The scaffold erection plan/RAMS must follow SG4:15 (Preventing falls in scaffolding operations). This involves creating a scaffolders safe zone using advanced guard rail methods (scaff-step is the most common), and using mini retractable lanyards anchored overhead when necessary.
- The detailed RAMS must be reviewed and agreed with the scaffold supervisor prior to work starting.
- A rescue plan must be in place before work starts, and all scaffolders proven competent to follow the rescue plan.
- All scaffold tools and equipment should be tethered. It is possible to tether clips, tubes and boards for all scaffolding works.
- Ties should be clearly marked and co-ordinated to render tampering or removal obvious.
- Care must be taken to ensure that only one lift is loaded to the Class load, and one lift simultaneously loaded to half the Class load, unless subject to specific, additional, load capacity through bespoke design.
- The scaffold must be visibly tagged at the primary access point to confirm the status of the inspection.
- Wherever there is a risk of falling tools or objects, the scaffold design must incorporate additional protection measures e.g. plastic sheeting, fall protection fans. **Note:** Cladding or covering must only be added if included within the design.
- Scaffold working surface must be maintained clear to prevent materials and waste falling into the area below.
- Access must be restricted to the area below and around the scaffold, both during erection and operation with due consideration to the type of work being carried out on the scaffold.
- Dismantling must be subject to specific RAMS, and suitable exclusion specified.
- Handover process between scaffolding company and receiving contractor, which is witnessed by Mace.
- A Mace manager needs to complete an interdependent check of scaffold on a minimum weekly basis. Mace manager must have received Scaffold Inspection training.



2.8 Access equipment

Caution

2.8.2 High level access. Mast equipment climbing working platforms (MCWP)

Minimum requirements

- Implement the common management controls in Section 2.8 (Page 24).
 - Mast climbing work platforms must comply with BS EN 1495.
 - The following are key features and safety precautions required on mast climbers:
 - Limit switches.
 - Mast proximity switch.
 - Levelling system.
 - Emergency stop button.
 - Directional controls.
 - Gate interlock limit.
 - Manual descent.
 - Over speed safety brake.
 - A suitable exclusion zones must be in place with adequate access and egress. (see Section 2.4) management controls.
- The following control measures must be applied for the use of MCWPs:
- Familiarisation/training of the operators of the MCWP must be in place.
 - The preparation of a plan/ safe system of work, including emergency arrangements.
 - Daily inspection and documented (checklist) maintenance must be carried out. This regime must align with the manufacturers/installers recommendations, including daily pre-start checks. These need to be conducted by user appointed person.
 - Prevent unauthorised use or movement of MCWPs at all times.
 - Anemometers to be provided with the mast climber. Guidance on allowable wind-speed is to be gained from the supplier/designer.
 - The risk of materials and equipment falling from the mast climbers must be prevented – debris netting, regular housekeeping. It is recommended the whole platform (including lattice beam member) are fully wrapped in fire rated debris netting. This is to be checked with the installer and temporary works engineer.
 - LOLER or similar regulatory requirement examination required.
 - Risk assessment to be undertaken to determine if a harness is to be used. Refer to manufacturers advice.



Figure 14: MCWP with debris netting

2.8 Access equipment

2.8.3 Temporary suspended access equipment (TSAE)

temporary cradles.

Minimum requirements

- Implement the common management controls in Section 2.8 (Page 24).
- All TSAE use must follow BS EN 5974 Code of practice for the planning, design, setting up and use of temporary suspended access equipment.
- Support points (fixings or counter weights) must be subject to temporary works engineering confirmation, testing, and sign off. Note: All counter weights must be secured to prevent any unauthorised tampering or removal.
- The TSAE cradle, supports and anchors are all subject to daily pre-use checks which must be recorded and regular checks in line with LOLER or similar regulatory requirement examination, along with a 6 monthly thorough examination.
- The access point must be clearly defined with suitable exclusion zones for both access and the work overhead. These exclusion zones must be monitored.
- Exclusions must be established for unauthorised access to the cradle support structure at high level.
- The Rated Load or safe working load (SWL) (in kilograms or pictograms) must be clearly displayed at the point of access. This must not be exceeded in use.
- Specific limits for wind speed, and any other weather limitations (rain, lightning, snow, etc), must be clearly displayed within the cradle.
- Harness anchor points must be provided, along with their maximum capacity.

Caution

- TSAE must have an overspeed brake, and/or secondary support system, and façade restraints as required, to prevent swing.
- The installation must be covered in detail with suitable SSOW.
- Only competent contractors are to be used for the design and installation of TSAE, and they are required to follow the SAEMA (Specialist Access Engineering and Maintenance Association) guidance.
- A handover certificate confirming compliance (with BS EN 5974), capacity, and fitness for purpose, must be provided.
- A user-appointed person, suitably competent and experienced, is to undertake the management and supervision of the training to use, the use, and the daily pre-start inspection. They are also responsible for ensuring no unauthorised use, for securing the TSAE when not in use, and for management/monitoring of the exclusion zone below.
- Users must follow SAEMA guidance on the management, control, and safe use of TSAE.
- User familiarisation training must be provided for all who use the TSAE.
- The task for which the TSAE is being used must be covered by suitable RAMS. These must include emergency hazard identification and a rescue plan.
- Operatives must be suitably harnessed within the TSAE, to specific anchor points, and all tools and materials must be tethered.
- If debris net is to be used to prevent items falling, the design (in terms of loading and swing) must evidence that this has been allowed for.
- An anemometer is to be carried within the TSAE and calibrated every 12 months, to regularly check that the windspeed is less than the maximum rated wind speed.
- All TSAE must be left free and clean from debris and secured against unauthorised use.

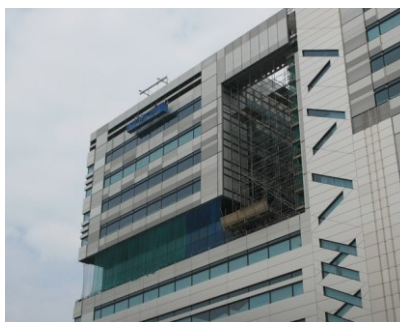


Figure 15: TSAE cradle

2.9 MEWPs and low level access equipment

Common management controls

Section 2.9 provides different MEWP and low level access equipment options. Each of these must have the following common management controls in place, in addition to the specific minimum requirements detailed for each option:

- Specific machine selection to be carried out by competent person e.g. MEWPS for managers course.
- The MEWP must be clearly marked with the rated capacity for lifting.
- A lifting plan is required.
- The management or supervision of contractors using MEWPs are to attend the 'MEWP's for Managers Course' or similar.
- Emergency rescue plans and emergency lowering procedures must be known to trained rescue personnel. Rescue personnel must be readily available.
- Six monthly examination certificates must be in place, and test date displayed clearly on the machine itself.
- Where there is a significant change in level, edge or void present in/ adjacent-to the MEWP working zone, suitable measures must be taken to prevent instability. E.g. Stop-blocks, steel plates of an appropriate SWL over voids, exclusion zones etc.
- The SWL of any platform or void covers, and the bearing pressure of other support substrates must be confirmed prior to use.
- Mobile elevated working platforms (MEWPs) must not be used for transporting materials or goods, unless designed for the task.

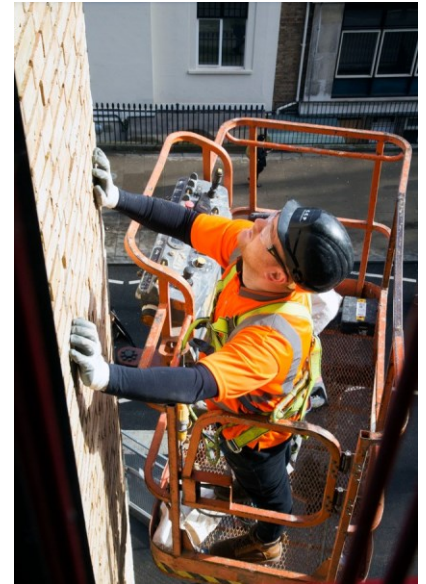
2.9 MEWPs and low level access equipment

Best practice

2.9.1 High level access. Mobile elevated work platforms (MEWPs)

Minimum requirements

- Implement the common management controls in Section 2.9 (Page 28).
- All boom type MEWPs must be fitted with a 'CE' marked 'anti-entrapment device/secondary guardrail. Examples of which are Sky Siren or SIOP (Sustained Involuntary Operation Prevention Systems).
- MEWPs must only be operated by operatives holding appropriate IPAF level of training.
- Depending on where the MEWP is being used e.g. uneven ground, rough terrain, operatives may require PAL+ qualification.
- A suitable harness, with as short a lanyard as possible, must be worn and fixed to the anchorage point within the boom type access platform, as per IPAF guidance.



Figures 16: Examples of scissor lifts and boom operated MEWPs

2.9 MEWPs and low level access equipment

Best practice

2.9.2 Low level powered access equipment (up to five metres) - Power tower/ POP-UP, push around vertical (PAV)

Minimum requirements

- Implement the common management controls in Section 2.9 (Page 28).
- Power towers to comply with BS EN 280.
- Suitable for use internally on flat level surfaces only.
- The SWL of working platforms, suspended slabs etc are to be checked prior to use.
- If an operative has a 1a, 3a, 3a+ category IPAF card operatives will only need a familiarisation on how to use PAV (push around vertical).
- If an operative does not have a 1a, 3a category – then PAV training is required.



Figure 17: Example of a PAV



Figures 18: Examples of power operated towers/pop ups

2.9 MEWPs and low level access equipment

Best practice

2.9.3 Low level manual access equipment - Peco/eco/nano type units

Minimum requirements

- Implement the common management controls in Section 2.9 (Page 28).
- Preferred access solution for low level access work and the preferred choice of access before the use of podiums.
- Familiarisation training is required.
- For use on level surfaces.
- Tool tray and harnessing clips are to be used where practicable.

Note: Wind rated machines available.



Figures 19: Manual access equipment

2.10 Access towers, steps and ladders

Common management controls

Section 2.10 provides different towers, steps and ladders access equipment options. Each of these must have the following common management controls in place, in addition to the specific minimum requirements detailed for each option:

- Mobile towers only to be erected, dismantled or altered by PASMA trained persons.
- Daily pre-use for all access equipment by PASMA trained persons.
- Towers to be inspected and visibly tagged (minimum every seven days and following alteration/adaption).
- Never leave an unsafe tower. Towers to be fully erected and tagged, or fully dismantled and stacked safely. Do not start to erect, dismantle or alter, unless the tower can be left in a safe condition.
- Tower platforms must not be overloaded with materials or equipment.
- Surfing is prohibited e.g. access equipment should not be moved when somebody is on it.
- Podium towers only to be erected, dismantled or altered by PASMA trained persons.

2.10 Access towers, steps and ladders

Caution

2.10.1 Mobile aluminium towers

Minimum requirements

- Implement the common management controls in Section 2.10 (Page 32).
- Mobile aluminium towers must meet the requirements of BS EN 1004.
- Advanced Guard Rail (AGR) Towers are the preferred option for mobile aluminium tower access.
- Towers that are not with AGR must be able to follow the 3T method of erection (through the trapdoor).
- Outriggers to be used as per manufacturers requirements. Wheels must be locked prior to use.
- Additional stability controls need to be considered where there is wind exposure or working on uneven surface, e.g. use of soffit poles for bracing when working within two metres of uncladded building.

Note: Checklist available from PASMA.



Figure 20: MI-tower (one person)



Figure 21: Example of Aluminium Tower

2.10 Access towers, steps and ladders

Caution

2.10.2 Aluminium podium towers/podium steps

Minimum requirements

- Implement the common management controls in Section 2.10 (Page 32).
- Podium towers with a working platform must comply with BS EN 8620 (formally PAS 250).
- Only two wheeled podiums (non-surfing type) must be used.
- Podiums that don't require outriggers are preferred. Where these are not used, then podiums must be erected in line with manufacturers requirement, and potential trip hazards from outriggers managed.
- Must only be used on clear, level surfaces.
- Operatives to have received appropriate instruction and training.
- 'Fold-out' type podiums are preferred as they are partially constructed and reduce abuse and incorrect assembly.

Note: Checklist available from PASMA.

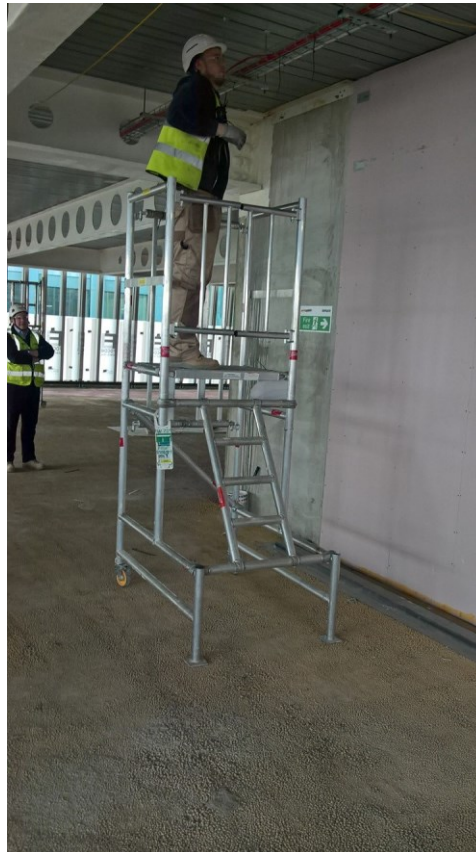


Figure 22: Podium tower example

2.10 Access towers, steps and ladders

Caution

2.10.3 Delta deck

Minimum requirements

- Implement the common management controls in Section 2.10 (Page 32).
- Instructions and equipment in accordance with BS EN 1298.

Delta Deck Go

- Multiple Working Heights - max. working height 2.6 metres.
- Safe Working Load 200 kilograms - tested and rated against the requirements of BS EN 1004.
- The equipment must only be used on flat level surfaces.



Figure 23: Examples of delta decks

2.10 Access towers, steps and ladders

Alert

2.10.4 Low level access equipment - Ladders and stepladders

Minimum requirements

- Implement the common management controls in Section 2.10 (Page 32).
- Use of ladders and stepladders is classified as Alert. They should only be used as a last resort. Sign off required in line with Table 1 in Section 1.
- Domestic grade equipment are prohibited on Mace projects or offices.
- The only types of ladder/step ladder permitted on Mace projects are:
 - Compliant with EN131 Professional, known in UK as BS EN131.
 - Step ladders of composite or metal construction.
- Timber step ladders can only be used if specifically justified through risk assessment. **Note:** Timber step-ladders and ladders must not be painted, and must be structurally sound.
- Step ladders must only be used when the use of alternative safer means of access is not possible.
- Ladders must not be used as a working platform. In exceptional circumstances where this is considered to be the safest option, additional controls must be put in place i.e. fall restraint, maintaining three points of contact.
- Ladders and step ladders must be secured when not in use. i.e. must be chained up.
- **Note:** Where the nature of the work does not allow for use of metal ladders i.e. working on or near live rail, then wooden ladders can be considered for use.
- Where step ladders are the safest option, equipment with a built-in working platform and integral edge protection should be chosen. Where it is not possible to achieve this, the top three steps must not be used.
- Rating information should be clearly marked on the ladder.



Figure 24: Examples of ladders

2.10 Access towers, steps and ladders

Alert

2.10.5 Extra wide hop-ups

Minimum requirements

- Implement the common management controls in Section 2.10 (Page 32).
- Use of extra wide hop-ups is classified as Alert. They should only be used as a last resort. Sign off required in line with Table 1 in Section 1.
- Hop-ups must be a minimum of 600 millimetres x 600 millimetres and no more than 450/500 millimetres high.
- Only to be used for short duration and light works.
- Platforms must have a minimum safe working load of 150 kilograms to meet the requirements of BS EN 131.
- Hop-ups must only be used as a last resort where no other means of low level access is possible.
- Hop-ups must be identified as a last resort for use as part of risk assessments and method statements.
- Hop-ups must be secured when not in use to prevent unauthorised access.
- A toolbox talk on the safe use and inspection of hop-ups must be delivered to operatives prior to use.



Figure 25: Example of a wide hop up

2.11 Personal fall prevention equipment (PFPE)

Caution

2.11.1 Work restraint systems

Please refer to 1.7 Hierarchy of fall protection before selecting this solution. Work restraint systems include a lanyard which prevents operatives from getting into a position where a fall could occur.

Restraint system consists of:

- BS EN 361 Full body harness.
- Connecting devices – connectors etc lanyard.
- Anchor devices.

Minimum requirements

1) Work restraint body harness:

Contractors should be encouraged to select an elasticated harness with a single dorsal connection. This is the most comfortable and operatives are more likely to wear the equipment correctly.

However, a 1 point harness may also be used.

2) Connecting devices - restraint lanyard:

The contractor must calculate how long the lanyard can be to allow work to be carried out safely. During on site inspections always check this safe working length.

Contractors should be encouraged to supply a fixed length lanyard to operatives. This requires the least supervision and management.

Contractors can use an adjustable restraint lanyard which allows the operative to set it to the working distance required, but this requires more stringent management upon set-up.

3) Anchoring systems:

The simplest and safest system to use is the Niko rail type system. This is installed on beams above operative at a set distance from leading edge along length of workface, to allow fixed-length restraint lanyard to be utilized, with no need for unclipping and moving to next anchor point.

Beam glider system or single fixed-point are fitted on beams above operative at set distance to allow a small working radius. It will need to be repositioned as works progress.

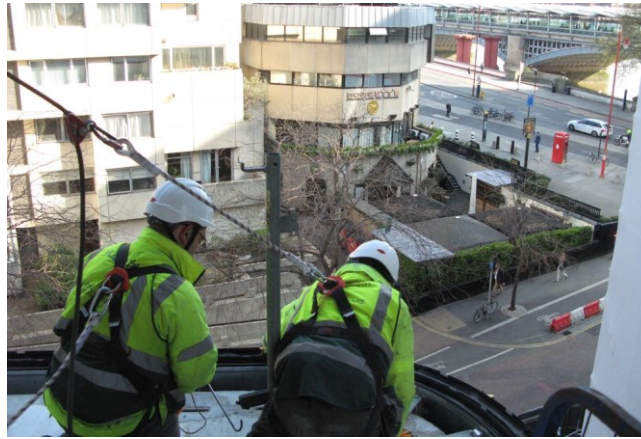
The least favourable solution is quick lock anchors fixed into the slab or weighted anchors at operative's foot level. These must be placed at least three metres from the edge. These are easy to install but require a deeper look into capacity and position and also need to be moved. They only protect a small radius in which the operative can work.

Management controls

- Site signage dictating type of PFPE required in the work area being entered.

- Visual inspection of PFPE carried out before being issued to operatives and daily prior to start.
- All PFPE to be checked and re-certified as fit for on-going use not less often than every three months, by a competent person with certificates kept on-site and regularly updated.
- Anchor points are subject to temporary works checks. Anchor devices must be labelled, defining their purpose, compliance with BSEN 795 (or other suitable standard), and clearly indicate the maximum number of people that can be attached at the same time.
- Exclusion zones required for both work area, and fall-zone below, including allowance for deflection/re-bound.
- Niko rail set up to be installed by qualified scaffolder and handover certificate obtained and checked weekly.
- All operatives involved to have received harness training and had competencies checked.
- Suitable storage of all PFPE to prevent damage, including weather exposure.

Figure 26: Work restraint systems



2.11 Personal fall prevention equipment (PFPE)

Alert

2.11.2 Fall arrest systems

Fall arrest

Please refer to 1.7 Hierarchy of fall protection before selecting this solution. Systems that minimise the height and consequence of any fall, by using short lanyards, raised anchor points, and energy absorbers at all times

Fall arrest systems should only be selected, where it is not reasonably practicable to carry out a task using access equipment or work restraint and there is a risk from falling. Fall arrest systems are classified as Alert. Sign off required in line with Table 1 in Section 1.

The severity of a fall can be represented by a fall factor. The fall factor relates to the position of the anchorage point and the length of the lanyard, relative to the proximity of the fall hazard.

The lower the fall factor, the shorter the free fall distance, the lower the arrest load, the lower the likely level of injury

- Fall Factor 0: Anchor point is directly overhead on a taut line.
- Fall Factor 1: Anchor point level with or above the attachment point on the harness.
- Fall Factor 2: Anchor point at the feet.

Fall arrest systems consist of:

- BSEN 361 Full body harness.
- Connecting devices. Energy absorbers and as short a lanyard as possible.
- Energy absorbent.
- Anchor devices.
- Lanyard.

All the above must be considered in choosing the correct access equipment and anchor point, in order to minimise potential fall distance and any chance of swing fall.

Management controls

- Site signage dictating type of PFPE required in the work area being entered.
- Visual inspection of PFPE carried out before being issued to operatives and daily works commence.
- All PFPE to be checked and re-certified as fit for on-going use not less often than every three months, by a competent person. Certificates kept on site and regularly updated.
- Lanyards to be visibly tagged with what capacity they are good for and date of next inspection.
- Any anchor points being utilized to tether operatives or materials to within the structure are to have temporary works check to that effect.
- Setting up of exclusions zones as required for works and areas affected below.
- Rescue plan to be location and task specific.
- All operatives involved to have full harness training, rescue training and competencies checked.

Minimum requirements

1) Fall arrest full body harness:

Contractors should be encouraged to select a 2 point fall arrest harness with click fasteners (for ease of use) which has a high comfort level.

1 point fall arrest harness are also permitted.

2) Connecting devices:

Contractors should ideally be asked to supply an inertia reel system (or similar) alongside Niko rail anchorage above operative – provides maximum flexibility in working area but keeps the lanyard perpendicular to leading edge to minimize any fall, and to reduce the chance of a swing fall.

Contractors are permitted to use energy absorbing lanyards attached to a suitable anchorage point, above the operative or level with his dorsal attachment. These will result in a significant fall, and a complicated and urgent rescue plan. They should only be selected after careful consideration of all alternatives.

3) Anchoring systems:

The simplest and safest system to use is the Niko rail type system. This is installed on beams above operative at a set distance from leading edge along length of workface, to allow fixed-length restraint lanyard to be utilized, with no need for unclipping and moving to next anchor point.

Beam glider system or single fixed-point are fitted on beams above operative at set distance to allow a small working radius. It will need to be repositioned as works progress.

The least favourable solution is quick lock anchors fixed into the slab or weighted anchors at operative's foot level at set distance from leading edge. These are quick and easy to install but require a deeper look into capacity required for anchor and also need to be moved, as they only provide a small radius in which the operative can work in.

Suitable storage of all PFPE to prevent damage including weather exposure.

2.11 Personal fall prevention equipment (PFPE)

Alert

2.11.3 Rope access equipment

Minimum requirements

Rope Access is considered to be personal fall prevention in the work at height hierarchy of options. This must only be selected where other methods of working at height have been deemed not practical. Sign off required in line with Table 1 in Section 1.

Rope access contractors must be a member of Industrial Rope Access Trade Association (IRATA).

All rope access works must fully comply with the IRATA International Code of Practice (ICOP) including the following management controls.

Management controls

- Contractors must share their documented rope access operating procedures and develop a work plan for each work location detailing methodologies to complete the specific task. Both of these items must be reviewed and signed off by the Mace Manager responsible for the works.
- The risk assessment must consider working in adverse weather e.g. working in extreme temperatures, high winds etc. and include a process for suspending work where the risk is unacceptable or can be easily reduced.
- All rope access work must be directly supervised by a certificated IRATA level 3 supervisor and all rope access technicians must be IRATA qualified.
- All equipment, harnesses, ropes, lanyards etc. must have six monthly thorough examination certificates and records of inspection must be available on request.
- Daily pre-use checks must be undertaken by the rope technician to include anchor points and recorded on a pre-work equipment checklist. Interim thorough inspections must be carried out after exceptional events, e.g. after circumstances which may have damaged the equipment. Interim inspections must be recorded and can be carried out in addition to the pre-use checks.
- Ropes must be protected from contact with sharp corners or edges or hot surfaces to prevent snagging on lines and must be prevented from sailing, i.e. high winds during, tangling on long drops, etc during the operations.
- Temporary anchor points need to be appropriately designed, checked, installed, tested and inspected in line with the Mace Temporary Works Procedure including checks for any signs of wear and tear.
- All anchor points must be installed, tested and inspected with Thorough Examinations carried out at 6 monthly intervals and must be tagged with date of inspection.
- Mechanical ties and fixing must be tagged with relevant pull test and information recorded. Counter weight ties must be tagged and locked off to prevent removal or tampering by others.
- Anchor points that are not monitored by a member of the rope access team must have a suitable and sufficient exclusion zone to avoid tampering.
- Exclusion zones must be established to prevent access beneath the work area.

Figure 27: Rope access example



2.11 Personal fall prevention equipment (PFPE)

Alert

- All tools and equipment must always be tethered, loose items must be secured to a fixing point and no loose items in pockets
- Emergency arrangements: A rescue plan must be included in the RAMS.
- A rescue drill must be conducted regularly and documented, i.e.. when the scope of work changes, changes in personnel, etc,
- Records of fitness for work, and training certification for all Rope Access Technicians must be available on request.
- Throughout the works, Supervisors must have access to the latest version of the RAMS and a completed rope access pre-work equipment checklist.
- Where there are multiple rope access works being undertaken simultaneously, all ropes left unattended must be marked with a tag at the main anchor point (if it is accessible to non-company personnel), and always at 1 metre above floor level. The tag must include the following information:
 - Company name
 - Date rigged
 - Display the wording 'For Company Use Only'
- Ropes and safety lines that are rated for rope access must not be used for other purposes such as rigging materials or equipment.
- Ropes/safety lines rigged on site are for the sole use of personnel for whom they were initially installed. The use of ropes/safety lines rigged by another company is strictly prohibited.
- Rope access equipment must be suitably stored to prevent damage and for protection from exposure to chemicals, oils, hot surfaces, etc.

Section 3

Risers

3.1 Riser management

3.1.1 Riser strategy delivery plan

Working in and around risers or vertical spaces may expose us to specific risks. This is due to the fact that the hazards involved can change on an almost daily/weekly basis and they remain a high priority from the very early stages of construction right through to project completion.

Key issues to overcome are:

- Numerous contractors are often involved.
- Split responsibilities for horizontal floor protection/edge protection.
- Different equipment/methods used.
- Heavy/odd shaped MEP services to be installed.
- During commissioning 'live' services are in place.
- All different shapes and sizes.

Each project is required to produce a riser strategy delivery plan ([CN-HSW-FM-0043](#)) which details how risers and vertical spaces will be constructed and managed. This must be developed in line with the requirements of this document.

The Riser Strategy template outlines the process for measuring the risk for riser protection. This requires both Floor (Section 3.2) and Edge Vertical Protection (Section 3.3). The overall risk rating will reflect the combination of these controls. For example, a Best Practice Edge Protection and Alert Flooring may result in an overall Caution rating, meaning that additional controls may be required.

Section 3.3 (Vertical access space protection) details minimum standards for lift shaft protection.

3.1.2 Riser controls and coordination

- In the Riser Strategy Delivery Plan the Riser Coordinator must be appointed. There may be more than one person but it must be clear what area they are responsible for.
- There must be clear ownership of the management of risers. This may change during different phases of construction e.g. from Mace to the M&E contractor. Where this occurs this must be documented and communicated.
- There may be a need for coordination meetings depending on, for example size of project or number of risers. The Riser Coordinator is to lead coordination meetings. Trade contractors to complete requests in advance.
- Trade Contractors must request access to risers in advance as set out in the Riser Strategy Delivery Plan.
- The Trade Contractor must provide a specific risk assessment for their work. The nature of a riser can change, for example, from an open shaft to a congested room with live services. Therefore, an authorised risk assessment and method statement may not address the current hazards.
- A [Control of Access Permit](#) will be used to control entry except where there is direct control by the Riser Coordinator because of low numbers of risers, trades etc. Its use will be defined in the Riser Strategy Delivery Plan. They will be issued by the Riser Coordinator.
- Where multiple contractors request to work in a single riser, the works are assessed as low or high risk.
- High risk works involve any activity involving intrusive works using tools, materials or other equipment.
- Controls applied include, floor protection, tool tethering and no other access to any risers below that point.
- Low risk works involve no physical works, such as inspections, witness tests, labelling etc. and can be carried out by multiple contractors at various levels within the same riser at the same time.
- All requests will be reviewed riser by riser, utilising a visual template or spreadsheet (daily riser coordination board) to assist visualisation of riser locations.

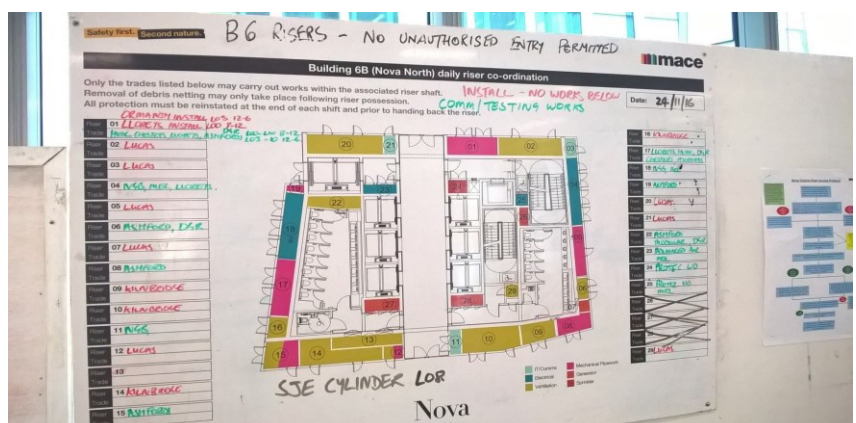


Figure 28 : Daily riser coordination board

3.2 Floor horizontal protection

Common management controls

Section 3.2.1 to 3.2.4 provides different Floor Horizontal Protection options. Each of these should have the following common management controls in place, in addition to the specific performance specifications detailed in each section:

- Fire rated/fire-stopped where required for temporary conditions.
- Where fire stopping is used in the horizontal platform, this must be risk assessed to confirm load bearing is not effected.
- **Only load bearing horizontal surfaces are allowed.**
- Only competent appointed person to install, adapt or modify.
- When there is a risk of a fall, the following are required:
 - Physical access control.
 - Riser-specific 'authorisation to enter' system.
 - Tools/materials to be tethered/ contained.
 - Activities above and below to be coordinated.
 - Daily visual inspection, with visible inspection record.
- All riser flooring and edge protection is to be subject to formal recorded inspection and tagging by competent resource (minimum every seven days and following any changes or adaption). All tags must be visible.
- Permit to work (from M&E contractor) where energised services are present.
- Space must be illuminated
- Signage - maintained in good order, robust material, not paper, min A4 size.
- Robust defects/change management process; all adaptations to be designed and planned by temporary works engineer.

3.2 Floor horizontal protection

Best practice

3.2.1 Type F1a - floor horizontal protection - full modular prefabricated solution

Performance Specification

- Implement the common management controls in Section 3.2 (Page 43).
- Self-supporting modular solution with fully or partially integrated MEP services.
- Complete (or partially complete) modules installed into structural frame/riser shaft by specialist installation team.
- Integral load-bearing permanent floor deck— solid deck or grillage system, e.g. steel 'durbar' plate or GRP grating.
 - Integral permanent edge protection as per section 3.3 Edge Vertical Protection - G1 and G2 to any open edges.
 - Any voids/penetrations ≥ 225 millimetres, where MEP services not pre-installed consider edge protection.
- All edge protection designed and positioned to facilitate safe installation of any remaining MEP services or riser walls without adaption.
- Kick plates to all voids/ penetrations where there is the potential for falling materials/tools.
- Fire rated/fire-stopped where required for temporary conditions.
- SWL designed to suit plant/ equipment being used, or physical barriers to prevent overloading.
- **Note:** Where fire stopping is used it may affect SWL. This needs to be considered as part of the design and risk assessment.



Figure 29: Example of full modular prefabricated solution

3.2 Floor horizontal protection

Best practice

3.2.2 Type F1b - floor horizontal protection - modular prefabricated deck unit

Please note vertical edge protection needs to be in place before installing riser protection

Performance specification:

- Implement the common management controls in Section 3.2 (Page 43).
 - Proprietary load-bearing solid deck or grillage system, e.g. steel 'durbar' plate or GRP grating.
 - Modular deck units installed by frame contractor, as the frame progresses.
 - Covers the full opening to vertical space.
 - Wall to wall floor installed below level of construction
 - Designed and pre-cut service penetrations with temporary cover plates (e.g. durbar plate), or cut on-site (e.g. GRP grating).
 - Support-structure designed to accommodate MEP service positions without adaption.
 - Engineered support structure and connections to frame.
 - SWL to suit plant/equipment being used or physical barriers to prevent overloading.
 - Grating systems – reduce mesh size SFARP, closed grid to be used where possible.
- Fire rated/fire-stopped where required for temporary conditions.
 - When voids present (e.g. when plates removed/holes cut), additional protection measures will be required e.g.:
 - Edge protection to any open edges or voids/penetrations ≥ 225 millimetres, where MEP services not installed
 - Kick plates to all voids/penetrations where there is a risk of items falling, including when services have been put in.

Note: Consider incorporation of the following as part of the manufacturing process:

- Provision of proprietary edge protection fixing points
- Kick plates



Figure 30: Modular prefabricated deck unit. Reference 3.2.2

3.2 Floor horizontal protection

Caution

3.2.3 Type F2 - Floor horizontal protection - Floor deck Installed following frame erection

Performance specification

- Implement the common management controls in Section 3.2 (Page 43).
- Proprietary load-bearing deck or grillage system.
- Floor deck installed 'piece-small' following frame erection, working from the installed safe deck below.
- Covers the full opening to vertical space.
- Service penetrations cut on-site.
- Support structure designed to accommodate MEP service positions without adaption.
- Engineered support structure and connections to frame.
- SWL to suit plant/equipment being used or physical barriers to prevent overloading.
- Grating systems – reduce mesh size, so far as reasonably practical closed grid to be used where possible.
- Fire rated/fire-stopped where specified in the fire plan.
- When voids present (e.g. when holes cut), additional protection measures will be required e.g.
 - Edge protection to any open edges or voids/penetrations ≥ 225 millimetres, where MEP services not installed.
 - Kick plates to all voids/penetrations where there is a risk of items falling.

Note: Consider incorporation of the following as part of the installation process:

- Provision of proprietary edge protection fixing points.
- Kick plates.



Figure 31: Floor deck installed following frame erection.



Figure 32: Floor deck installed following frame erection.

3.2 Floor horizontal protection

Alert

alternative solution required

3.2.4 Type F3 - Floor horizontal protection - Timber or scaffold-based solution

Performance specification

- Implement the common management controls in Section 3.2 (Page 43).
- Use of Type F3 - Floor horizontal protection (timber or scaffold solution) is classified as Alert. They should only be used as a last resort. Sign off required in line with Table 1 in Section 1.
- Engineer-designed load-bearing system.
- Covers the full opening to vertical space.
- Support structure must to be designed to accommodate MEP service positions without further adaption.
- Engineered support structure and connections to frame (where applicable).
- SWL to suit plant/equipment being used or physical barriers to prevent overloading.
- When voids present/holes formed, additional protection measures will be required e.g.
 - Edge protection to any open edges or voids/penetrations ≥ 225 millimetres, where MEP services not installed.
 - Toe boards/kick plates to all voids/penetrations where there is a risk of items falling.
- Platform installed 'piece-small' following frame erection, working from the installed safe deck below.

Note: Not suitable for provision of temporary fire compartmentation -

Figure 33: Timber or scaffold based solution.



3.3 Edge vertical protection

Common management controls

Section 3.3.1 to 3.3.2 provides different Edge Vertical protection options. Each of these should have the following common management controls in place, in addition to the specific performance specifications detailed in each section:

- Comply to regional standards for temporary edge protection e.g. UK BS EN13374 - Temporary Edge Protection Systems. Where higher standards are noted within individual sections of this document then these must be applied. All work needs to be planned and supported by a SSOW. This includes erection and dismantling of edge protection.
- For extended edge protection (over 1 m), the requirements of CS001:2013 must also be applied.
- Planning for edge protection must account for changes in working surface/floor level e.g. screeding may require additional guardrails. When no access required (i.e. mesh panels and toe boards in place) - edge protection is subject to formal recorded inspection and tagging by competent resource (minimum every seven days following any changes or adaption). All tags must be visible.
- When access required (**Note** – access beyond these areas should be a last resort), additional protection measures are required. See section 2.8. Daily visual inspections must be conducted and recorded.
- Space beyond must be illuminated when accessed.
- Robust defects/change management process; all adaptations to be designed and planned by a temporary works engineer.
- Signage - maintained in good order, robust material, not paper, min A4 size.
- Manage access at all times.
- Coordinated with other trades.
- No vertical guard rail gap greater than 470millimetres, no horizontal guardrail gap greater than 100millimetres.
- Capable of withstanding impact from plant or machinery being used on same level – or additional protection required.
- No protruding materials that could cause injury.
- Toe board no gaps or spaces to riser.

3.3 Edge vertical protection

Caution

3.3.1 G1-Tube and fitting (scaffolding)

Performance specification

- Implement the common management controls in section 3.3 (Page 48).
- Minimum 1.5 metres above structural slab level.
- Minimum triple-rail system.
- Full debris netting or steel mesh – no gaps or spaces.
- Engineered support structure and connection to frame e.g. excalibur bolt.
- All tubes capped.
- Installed to specification during frame erection as soon as the structure is created.
- Only qualified and authorised scaffolders to erect, dismantle or modify.



Figure 34: Tube and fitting riser protection

3.3 Edge vertical protection

Alert

3.3.2 G3 - Proprietary post and panel (1.5 metre high) - no rails

Performance specification

- Implement the common management controls in section 3.3 (Page 48).
- Minimum 1.5 metres above structural slab level.
- **Note:** Only use where no access beyond the line of edge protection is required, as removing panels creates unprotected edges.
- Approved design and fixings where required.
- Installed during frame erection as soon as the structure is created



Figure 35: Proprietary Post and Panel at least 1.5 metre high

3.4 Vertical access space protection

Best practice

3.4.1 Single specialist contractor i.e. lift

Minimum requirements

- Proprietary system.
- Edge protection to be in place before doors are fitted.
- Covers the full opening to vertical space.
- Locked with unique key and thumb turn inside.
- Secondary internal fall prevention to comply with minimum legislative requirements.
- Able to be opened from inside without a key.
- Designed fixings.
- Mesh surface unless fire separation required.
- Vision panels or CCTV must be provided when activities in progress in vertical space.
- Fire rated/fire-stopped where required for temporary conditions.
- Key access control by Mace until handed over to specialist contractor.
- Specialist contractor to implement key control and permit to work system.
- Controlled access process for working in these areas e.g. General Permit.
- Installed by competent persons.
- Signage - maintained in good order, robust material, not paper, min A4 size.
- Robust defects/change management process.

Note: Friction fitting to reveals are not permitted.

When no access required - edge protection is subject to formal recorded inspection and tagging by competent resource (minimum every seven days and following any changes or adaption). All tags must be visible.

- When access required - daily visual inspection with visible inspection record.
- Space beyond must be illuminated when accessed.



Figure 36: Example of specialist contractor riser protection

End of Document

Mace
155 Moorgate
London EC2M 6XB
+44 (0)20 3522 3000

www.macegroup.com