

PM-039 Working at Heights**Authorised By: Jim Cunningham****Aim:**

This Working at Height Procedure provides the necessary guidelines and references for the management of working at height operations. This is a supporting Procedure to the Caledonia Health and Safety Management Plan and forms part of the overall Safety Management System.

Scope:

To describe the minimum requirements for assessing and controlling risks associated with working at height hazards. This procedure applies to all Caledonia sites.

All working at heights activities shall comply with the Model Work Health and Safety Act (WHS) and Regulations WA Occupational Safety and Health Act 1986 and Regulations 1996, Health and Safety at Work Act 2015 NZ and follow the guidance in the Safework Australia Managing the risk of falls at workplaces, WorkSafe WA Code of Practice for the Prevention of Falls at Workplaces and Best practice guidelines for working at height in New Zealand

All WAH equipment shall comply with the requirements of this Procedure, legislation and all relevant Australian and New Zealand Standards.

General Requirements

Work methods shall be developed to minimise work at heights, and the potential for dropped objects through the application of the hierarchy of control. Work at heights shall, as far as practicable, be planned so that any associated risks are eliminated.

Where not practicable, personnel shall be protected from work at heights risks by the use of equipment which provides fall prevention (in the first instance). Where fall prevention cannot be achieved, then fall protection shall be provided so that the risks are reduced to ALARP.

Where the potential for dropped objects is present, a drop zone, as per the Scaffolding Procedure barricading and signage is to be set up around the area so that personnel access is prevented.

Risk reduction shall not be solely reliant on the use of PPE (for example, a fall-arrest or fall restraint system) to undertake the work safely. Defaulting to PPE is unacceptable unless there is clear evidence that other fall prevention measures have been considered and are not practicable in the given work scenario.

Risk Assessment

Work at heights hazards shall be identified, controls specified and risk assessed, where possible, during the planning phase for the job.

JHAs shall, as a minimum, incorporate the controls specified in the Scaffolding procedure and the JHA process shall be fully implemented, in accordance with company procedure. Job Hazard Work at heights risk assessments shall be reviewed any time the scope of work changes or if any surrounding conditions change and there is a potential risk of a fall or of safety being compromised by personnel working above or at height.

The Dropped Objects LPI F-122 is to be utilised prior to work being undertaken to ensure all risks associated with dropped / falling objects are controlled.

Preference shall always be given to the assembly of structures and or equipment at, or as close as practicable to, ground level. Where this cannot be achieved, work at height risks shall be reduced by maximising the use of scaffolding, temporary work platforms

with fixed guardrails, scissor lifts or mobile elevated work platforms.

Note: Ropes, flagging, plastic mesh, or any combination of these, are not regarded as fall prevention and shall not be used as fall prevention or edge protection.

The order of risk control measures shall be determined against the hierarchy of control as listed below:

- **Elimination** of the hazard (avoid work at heights if practicable). Eliminate the risk of falling by conducting the work at ground level;
- **Substitution** or replacing a hazard or hazardous work practice with a less hazardous one (e.g. providing an alternative means of access such as a safe walkway or using an elevating work platform);
- **Isolation** or separating the hazard or hazardous work practice from people involved in the work or people in the general work areas (e.g. barricading or enclosing work at height risk area with edge protection, installing handrails and covering floor penetrations);
- **Engineering** modification of the work area, equipment and / or tools to mitigate work at height risks. This would include, but not be limited to;
 - Installing permanent / fixed or temporary work platforms, stairways. Scaffolding and barricades;
 - Application of non-slip surfaces to prevent slips and Securing ladders.
- **Personnel Protective Equipment (PPE)** such as fall restraint and fall arrest systems.

Control measures are not mutually exclusive. That is, there may be circumstances where more than one control measure should be used to reduce exposure to hazards.

Higher level control measures (i.e. elimination) shall be applied in the first instance with lower level control measures (e.g. substitution, then isolation, then engineering) used only where higher-level control measures have been exhausted and found not to be practicable.

Where it is practicable to undertake part of a task using a higher-level control that control shall be used. Where a risk associated with work at heights remains in undertaking the work, then the next level of controls shall be applied.

One or more control measures may be used to eliminate or control hazards.

The risk assessment shall also consider:

- The potential of objects and/or personnel to fall;
- Number of people exposed to work at heights;
- The likelihood and consequence of personnel and objects falling;
- Associated hazards and risks of the work task (i.e. fall clearance, proximity to electrical conductors; weather or other environmental conditions such as wind, rain, dust, gases, lighting or temperature);
- Other work occurring simultaneously in adjacent areas to the work at height.

Records of work at heights risk assessments shall be maintained by the work crew at the work front and made available upon request.

At all times when working aloft where there is a potential for a fall from height a safety harness shall be worn and shall at all times be either attached to a fall restraint point, or a fall arrest point. The safety harness shall be correctly fitted. Personnel are not to work alone in a fall-arrest situation.

All persons who are required to use safety harnesses, lanyards, restraint systems and arrest systems

shall be trained in the proper use of those systems and specific equipment.

Fall Restraint Systems

Fall restraint systems shall only be utilised after all efforts to employ fall prevention systems have been exhausted or when being used in conjunction with other higher-level controls.

The use of fall protection equipment (e.g. full body harnesses and lanyard arrangements) shall be the last resort and their use will not be sanctioned if other safer options are practicable. When using personal fall protection equipment persons must maintain a system of one hundred percent (100%) tie off. Climbing while using personal fall prevention is prohibited.

Personnel using fall restraint systems shall be able to connect to the anchorage point or static line without being exposed to risk of falling and shall maintain one hundred percent (100%) tie off at all times.

All fall restraint systems shall be installed by licensed riggers or licensed scaffolders who are competent to install these systems and have undertaken the recognised national training to do so.

A restraint system comprises:

- Anchorage point(s);
- A static line or restraint line of appropriate strength and length; and
- A full-body harness.

A fall restraint system needs an anchor point to withstand a minimum force of 6kN or approximately 600kg.

The purpose of fall restraint systems is to limit horizontal movements from an anchorage point or a restraint line so that the user is totally restrained from reaching a position where either a free fall or limited free fall is possible.

A fall restraint system is suitable for use where:

- The user can maintain secure footing without having to tension the restraint line and without the aid of any other hand hold or lateral support. When deciding whether secure footing can be maintained, user shall consider:
 - The slope of the surface;
 - The supporting material type; and
 - The surface texture and whether it is likely to be wet, oily or otherwise slippery;
 - The static lines are fitted with an industrial shock absorber; and
 - The restraint system conforms to AS/NZS 1891.

Fall Arrest Systems

Fall arrest is defined as: 'The supporting of a person after a fall from heights has occurred, to limit injury'. Fall-arrest systems shall only be used where it is not reasonably practicable to use a fall prevention or fall restraint measure.

Limited Free Fall is a line or attachment that will allow a free fall of 600mm or less. This system needs to an anchor point to withhold 12kN of force. Free Fall is any fall greater than 600mm up to a maximum of 2m (prior to shock absorber activation). This system needs an anchor point to withhold 15 kN of force. Limited Free Fall is the preferred method to be used in fall arrest.

Fall arrest systems shall only be used where there is a fall clearance zone below the work activity to ensure that the worker cannot strike any structure, plant or equipment or the ground in the event of a fall.

The calculation of this fall clearance zone shall include consideration of the following:

- The distance to the next level below the working surface at which a fall will be halted;
- Free fall distance (maximum of 2 metres);
- Lanyard extension length under tension (maximum 2 metres);
- Energy absorber extension / deceleration distance (maximum of 1.7 metres);
- Personnel height;
- D-ring slide and harness stretch;
- Static line deflection / sag distance under load;
- Safety factor clearance (minimum 1 metre).

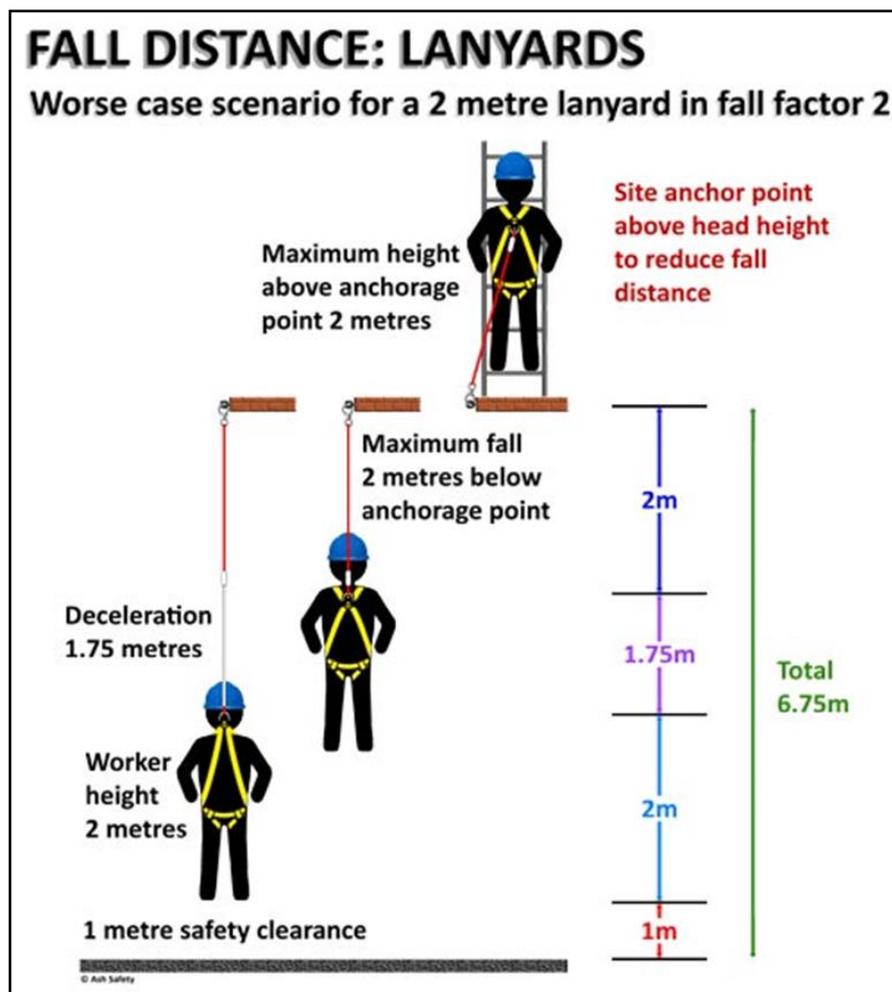


Figure 1: Calculation of Fall Distance

Personnel using fall arrest systems shall be able to connect to an anchorage point or static line without being exposed to a risk of falling whilst connecting and shall maintain one hundred percent (100%) tie-off at all times.

Work Controls

Overhead Work – Falling / Dropped Objects

Where there is a risk of an object falling from one level to another or more, the following controls shall be implemented to eliminate or minimise the risk of harm:

- Completion of a Dropped Object Loss Prevention Inspection (LPI) prior to work starting to identify and eliminate the potential of dropped objects
- A drop zone with hard barricades and signage erected below work to prevent access;
 - Barricading consisting of a minimum of Danger tape can be used, but a risk assessment requires to be carried out if the use of hard barricading is not practicable.
- Deflection potential for falling objects is to be planned into dropped object protection
- Supervisors with control of work areas where drop zones have been set up, shall ensure that relevant information and instruction is communicated to personnel about the restrictions of drop zones, and that there are adequate control measures to ensure that no unauthorised personnel enter the drop zones;
- Erection of suitable screening, such as infill panels attached to guardrails, monoflex plastic, leather blankets or awnings immediately under the work area to act as a catch sheet;
- Use of tool lanyards, tool pouches to secure tools and equipment to the individual;
- Use of suitable and appropriate containers (e.g. buckets) for storing materials and tools;
- Developing a safe system of work that ensures objects are otherwise removed from an elevated work area and that they are lowered in a controlled fashion – not dropped or thrown; and
- Where the controls above are found to be impracticable, approval for alternatives shall be obtained from the most Senior On-site Company Representative and the Company Area Construction Manager (or equivalent).

Personnel working above or below another work area shall inform all personnel working at each level of their presence, and place signage at each level and at each entry point, warning all personnel entering the area of the activities being performed overhead.

Where personnel are required to walk through or work in areas where overhead work is taking place and there is a risk of dropped objects, then overhead protection shall be provided in the form of boarded overhead scaffold structures and/or cantilevered fan.

Where there is a potential of dropped objects occurring whilst working at height, the following shall be considered and wherever practicable controls implemented:

- Lanyards or an approved and suitable means of securing tools to be used for the task. Also, checks to see that no tools are forgotten once the task is completed;
- Securing of equipment mounted at height that following contact, vibration or environmental conditions could have the potential to fall;
- Equipment temporarily positioned at height;
- Personnel working below that could be in the “line of fire”
- Lifting operations and the securing of the equipment to be lifted;
- Not lifting over people and preventing people from working under suspended loads;

Consequences of a dropped object eventuating could include:

- Personal injury including permanent and significant disability leading to loss of life;
- Structural damage;
- Damage to equipment;
- Release of hydrocarbons which could result in fire and damage/harm to the natural environment.

Strategies that may assist in reducing the occurrence of a dropped object

- Consider the creation of area specific dropped object work groups/action teams
- Identify and assess areas with high risk exposure;
- Embrace a disciplined approach to the use of the dropped object audit checklist.
- Monitor the effectiveness of the dropped objects prevention efforts;
- Seek out and implement continuous and sustainable improvement opportunities with respect to the prevention of dropped object events.
- Where SIMOPs activities are occurring within high risk zones, communication between the workgroups must take place, and control measures are to be put into place to control the access/egress from the exclusion zone.
- Warning signs and barriers for areas beneath work at height must be displayed or other effective means of physical protection used to prevent personnel below being struck by dropped objects.

Working Over water or other Liquids

Where personnel are erecting scaffold and working in a position where there is a possibility of a fall into water, they must use the hierarchy of control to minimise the risk. If they identify the wearing of working with heights personal protection equipment as the only practical method of controlling the risk, they must choose working with heights systems that are in line with working with heights training, Australian standards and Company, Client requirements/procedures and where a suitable overhead anchor exists the use of this in conjunction with a retractable lanyard.

All scaffolding erected over or a water body or other liquids requires, a specific risk assessment a (SWMS) shall be developed to identify controls needed before work can commence.

For all scaffolding conducted above water (or where personnel have the potential to fall into water or other liquids while working at heights) personnel must wear a full body harness complete with a personal flotation device (either flotation harness or separate PFD). All equipment must be compliant with the relevant Australian Standards

Careful consideration should be given to the wearing of an integrated type personal floatation device with Harness which are compact and lightweight and elevate restrictions in body movement during erecting of scaffolding.

When working over a water body or another liquid, the anchor point shall be independent of the entire scaffold system.

Where a suitable overhead separate working at heights anchor exists (or can be built) this should be the preferred method. No scaffold should be used as the anchor point when working over water in event of the structural collapse of that scaffold.

Other Considerations when Working Over water (Floatation Devices)

- A minimum of three personnel within sight and sound of each other must be used where there is a risk of personnel falling into water
- A life ring should be available not more than 25 metres from the work location

Note: The wearing of only a personal floatation device when working over water should be adequately risk assessed to determine

- Fall height to water
- Structures underneath the scaffolding which is being erected
- Availability of rescue craft for retrieval of person in event of fall into water

Working at Height Equipment

Harnesses

All harnesses shall comply with AS/NZS 1891.1. Harnesses shall be fit for the intended purpose and shall be compatible with the specific requirements of the work and the Rescue Plan. Suspension intolerance (trauma) straps shall be considered and used as determined by the Rescue Plan and JHA.

Lanyards

All lanyards shall comply with AS/NZS 1891 Industrial Fall Arrest Systems and Devices. Whenever harnesses are used, they shall be connected to a lanyard incorporating a personal energy / shock absorber (N.B. not to be used in conjunction with inertia reel).

The maximum length of lanyards under tension shall be not greater than two (2) metres. Personal energy absorbers complying with AS/NZS 1891 shall be used in conjunction with all lanyards used in a fall protection system. The maximum engaged extension length of personal energy absorbers is 1.95 metres.

Static Lines

Static lines and associated anchorages, used in association with fall restraint/arrest systems, shall be manufactured and installed in accordance with AS/NZS 1891.2:2001 Industrial Fall-Arrest Systems and Devices - Horizontal Lifeline and Rail Systems and AS/NZS 1891.4:2000 Industrial Fall-Arrest Systems and Devices – Inspection, Care, Use and Maintenance.

The maximum span between anchorages for a static line shall be no greater than four (4) metres unless specifically designed by an engineer to be a longer length. This is due to the dynamic sag factor of static lines and shall be considered when calculating the minimum fall clearance zone distance. If fibre / nylon rope static lines are used, the diameter shall be in the range of 11mm -16mm (inclusive with a tolerance of any given diameter of +/- 5%) and be of “Kernmantle” construction that complies with Australian Standard, AS 4142.3 Fibre Ropes – Man-made Fibre Rope for Static Life Rescue Lines.

All static lines shall provide a minimum safety factor of 10 and have a guaranteed breaking strain (GBS) of 80kN (approximately equivalent to eight tonnes). Static lines shall only be used where there is a fall clearance zone below the work activity to ensure that the worker cannot strike any structure, plant or equipment or the ground in the event of a fall.

All static lines shall be installed, regularly inspected and tagged by a competent person. Static lines shall be erected to ensure that the static lines or associated equipment are not exposed to sharp edges, hot work, equipment falling on or against them or chemicals, paints or alkalis.

Each competent person using a static line shall, prior to each use, inspect all anchorage points to ensure the anchorage has not been subjected to any damage or alteration.

An information tag shall be provided at each static line anchorage point. Information on the tag shall incorporate the name and qualification of the person erecting the static line, the date of erection, and the next scheduled inspection date.

Inertia Reel Devices

Inertia reel devices (self-retracting lanyards) are not designed for continuous support as they only become effective in the event of a fall. They are not to be used as working

supports by locking the system. Retractable lanyards shall only be used in fall potential areas that have a fall potential between vertical and 30 degrees.

- An inertia reel device shall be attached to a secure anchorage, or to a static line using a locked gate karabiner or roller;
- An inertia reel line shall be connected directly to a D-ring on the harness (not to a lanyard);

Consideration shall always be given to the potential of the “pendulum effect” when using an active fall protection system in a non-vertical position and every effort made to eliminate or reduce this risk.

Anchorage

All anchorages shall be designed, manufactured, constructed, selected, and installed so as to be capable of withstanding the force applied to it as a result of a person’s fall. Anchorages for single person use shall have a capacity of at least 15kN (approximately equivalent to 1500 kg), and 21kN if it is to be used by two (2) persons, except where verification of a lesser design load provides for a minimum safety factor of 10.

All permanent structural anchorage points shall be certified by an engineer and shall be non-destructive tested. Installation and non-destructive testing (NDT) documentation, including the engineer’s certificate, shall be available on-site for the duration of the works.

The diameter of the threaded sections of anchorage bolts shall not be less than 16mm and all eyebolts used as anchorages shall comply with AS 2317 Collared Eyebolts.

Friction and glued-in anchorage shall be certified by an engineer and proof loaded to 50% of the design ultimate strength in accordance with manufacturer’s instructions after installation and prior to its initial use.

Temporary anchorages / anchorage slings shall:

- have the same ultimate strength as fixed anchorages;
- Be protected by sharp edges using a sheath such as rubber, foam etc.
- only be installed by a competent person;
- comply with the requirements of the relevant part of AS/NZS 1891;
- not be installed with a basket hitch; and be installed with all slack removed.
- If installed with a choked hitch, the tail shall be kept as short as possible.

Fall Restraint Anchorages

Anchorage points engineered specifically for fall restraint systems shall not be used as anchorages for fall arrest systems. If an anchorage is to be used specifically for fall restraint, signage / tagging is to be attached indicating it is to be used for fall restraint systems only.

Permanent Anchorage Points

All permanent anchorages at the workplace shall be certified by an engineer and inspected by a competent person.

- An anchorage that is fixed for Construction purposes and in regular use shall be inspected prior to use;

- When the competent person identifies a worn, damaged or impaired anchorage they shall affix an 'Out of Service' tag, and complete a hazard report. A repaired or replaced anchorage shall not be used until it has been approved by an engineer, have NDT verification, and inspected by a competent person, who then removes the 'Out of Service' tag and advises that the anchorage can be used again.
- All permanent anchorage points shall be subject to inspection as recommended by manufacturer up to a maximum of 5 yearly intervals or 12 monthly in the absence of manufacturer recommendations.

Servicing

Mechanical components of work at height equipment such as inertia reels shall have a full service, including dismantling where appropriate at intervals as recommended by manufacturer to a maximum of 5 yearly intervals, or in the absence of such instructions 12 monthly.

Servicing of mechanical components shall be performed by a competent person who is approved by the manufacturer.

Manufacturer's recommendations shall be consulted as not all inertia reels are permitted to be serviced.

Inspections

Documented inspections and tagging shall be carried out by a competent and authorised person who has undertaken the recognised national training to do so, it shall be carried out on a quarterly basis (minimum) inclusive of all work at heights equipment, including, but not limited to harnesses, lanyards, static lines, inertia reels.

All inspection records/information shall be recorded in the fall protection equipment register.

The inspection colour coding tag shall be as follows:

- **December - February Red**
- **March - May: Green**
- **June - August: Blue**
- **Sept - November: Yellow**

Damaged or defective equipment shall be withdrawn from service and either destroyed or affix an 'Out of Service' tag for repair by a competent person. Equipment that has been used to arrest a fall shall be immediately removed from service. Such equipment shall be kept available only for the purposes of completing an incident investigation.

Prior to the Commencement of each work task

Items to inspect or check before work starts include, but are not limited to, the following:

- D rings - ensure that the harness attachment point for specific types of lanyards is correct. Some harness attachment points may not be rated for fall-arrest;
- If a Restraint line is being used with a rope grab, ensure that the rope and all rope grabs are compatible, especially with regard to rope diameter and direction;
- When setting up the fall-arrest equipment, inspect it for sharp edges, pinch points and sources of heat, which could wear, cut or burn through the lanyard if a person should fall and be left suspended;
- Ensure a rescue plan is approved and equipment available;

- Ensure that there is always a second competent person when personnel are performing work at a height or in an elevated position as personnel are not to work alone;
- Ensure persons do not climb above the anchorage point of a fall-arrest lanyard since the falling factor would be greater than one (1);
- Ensure that fall-restraint components are not mixed with fall-arrest components. Fall arrest and fall-restraint components shall incorporate a personal energy / shock absorber;
- Do not allow fall-restraint anchorage points, which have a much lower strength requirement, to be confused with fall-arrest anchorage points. Attach signs at each anchorage point indicating the type of anchorage point (i.e. whether it is for fall restraint or fall-arrest) (refer also section: Fall Arrest Anchorages); Always inspect the double action snap hook visually after attaching it to a harness or anchorage point.
- Harnesses and fall protection equipment shall be protected from damage which could be sustained through the heat generated or exposure to falling molten metal or slag resulting from the work activity been performed or carried out.
- Always set up the attachment point for fall-arrest or fall-restraint between the safe access point and the hazard. If a person needs to walk past the hazard to reach the attachment point, the purpose of the whole fall-arrest system is not fit for purpose;
- Always inspect all fall protection equipment and hardware before use. Should the item be damaged, it shall be taken out of service and inspected by a competent and authorised person prior to re-use.

Barricading and Signage

Where personnel / objects can fall from one level to another and there is a risk of personal injury / damage, exclusion zones with suitable hard barricades shall be erected to prevent this from occurring. Although there are no set dimensions given for the size of the drop zone it should be of sufficient size to provide protection against dropped objects, taking into account objects deflecting off objects e.g. steel work etc. This may also require barricading and/or cantilevered fans to be built on multiple levels around the work area.

Barricading consisting of a minimum of Danger tape can be used, but a risk assessment requires to be carried out if the use of hard barricading is not practicable. Information tags should be attached to the barricading stating date, contact details and reason for barricading.

If Barrier fencing is to be used it shall be erected on solid stable supports and maintained by the scaffolding crew until such time as the scaffold is complete, whereupon the scaffolding crew shall dismantle the barrier fencing, and neatly stack the components in a safe manner in an approved location (i.e. not in the middle of an access way).

Adequate signage in accordance with AS 1319-1994 and information tags shall be appropriately displayed and placed on all faces and access points, to inform personnel of work at heights hazards. Spotters shall be used as required by this procedure. The erection and maintenance of barricading and signage shall be in accordance with Caledonia Scaffolding Procedure - *Barricading and Signage*.

Training and Competency

Any person who uses personal fall protection equipment must have received Work at Height training from a Registered Training Organisation and shall be renewed every 2 years.

Register

A register of all fall protection equipment, anchorage points and subsequent inspections and reports shall be maintained on site by the Contractor at all times. All Company and Contractor equipment certification shall be readily available on site while the equipment is in use or available for use at the site.

All fall protection systems and anchorage points shall be recorded in the register and scheduled for inspection and tagging, as required above. Inspection and maintenance records of all fall prevention / restraint / arrest equipment shall be maintained by Contractor and provided to Company upon request.

References

- AS/NZS 1576: Scaffolding Parts 1-6
- AS 1657: Fixed Platforms, Walkways, Stairways and Ladders.
- AS/NZS 1891: Industrial Fall Arrest Systems and Devices Parts 1-4.
- AS/NZS 1891.1: Industrial fall-arrest systems and devices - Harnesses and ancillary equipment
- AS/NZS 1891.2: Industrial fall-arrest systems and devices - Horizontal lifeline and rail systems
- AS/NZS 1891.3: Industrial fall-arrest systems and devices - Fall-arrest devices
- AS/NZS 1891.4: Industrial fall-arrest systems and devices - Selection, use and maintenance
- AS/NZS 1892: Portable Ladders
- AS 2317: Collared Eyebolts.
- AS 2319: Rigging Screws and Turnbuckles
- AS 3569: Steel Wire Ropes.
- AS 4142: Fibre Ropes

