

**ISSC 34**  
**Guide for**  
**Height Safety**  
**within the**  
**NSW Electricity**  
**Supply Industry**

**June 2009**  
**Revised June 2013**

## PREFACE

The Industry Safety Steering Committee was re-constituted by the NSW Minister for Energy in mid 2002 to:

- 1) Review the safety performance and current practices of the electricity supply industry and Department of Trade and Investment Division of Resources and Energy (DRE) compliance strategies to identify opportunities for improvement.
- 2) Provide advice and make recommendations to the Minister for Energy on ways to convert the identified opportunities into improved safety outcomes for:
  - a) The community,
  - b) Electricity customers,
  - c) Industry employees,
  - d) Industry contractors,
  - e) Accredited Service Providers, and
  - f) Other workers working in the vicinity of electricity network assets.
- 3) Set up working groups where considered necessary to develop advice, document issues and draft Codes and Guides for consideration of the ISSC. Working groups are provided with terms of reference and timetables to report back to the ISSC

In the development of this Guideline, discussions were held with the following parties:

- Network Operators:
  - Ausgrid
  - Endeavour Energy
  - Essential Energy
  - TransGrid
  - RailCorp
- Regulators:
  - Department of Trade and Investment Division of Resources and Energy, NSW
  - WorkCover NSW

The Guideline was revised by a Working Group which consulted with all relevant stakeholders and was subsequently endorsed by the Industry Safety Steering Committee at their July 2013 meeting.

## DISCLAIMER

While due care has been exercised in the compilation of this Guide much of the content has been sourced externally to an ISSC working group formed to compile this Guide. Thus the working group cannot accept responsibility for the content.

This Guide is designed on the basis that it will be used in its entirety, and persons who use or observe parts of the publication without paying heed to the entirety of the publication do so at their own risk.

This Guide has been prepared on the basis that the user will have a certain minimum level of technical qualifications and/ or experience. The Guide is not intended for use by untrained or unqualified persons, and any one in that category using the Guide does so at the user's own risk.

This Guide does not purport to ensure compliance with all the relevant statutes and regulations, such as workplace health and safety laws. Users must satisfy themselves as to the requirements of all relevant laws.

This Guideline is advisory only and does not substitute for, or override any relevant legislation, regulation or safety rules implemented by jurisdictional regulators or network operators. However, it may be used as reference material for an industry-based approach to the consistent interpretation and implementation of legislation.

## CONTENTS

|          |                                                         |           |
|----------|---------------------------------------------------------|-----------|
| <b>1</b> | <b>REGULATORY BASIS</b> .....                           | <b>6</b>  |
| <b>2</b> | <b>SCOPE AND PURPOSE</b> .....                          | <b>6</b>  |
| <b>3</b> | <b>DEFINITIONS</b> .....                                | <b>7</b>  |
| <b>4</b> | <b>PRINCIPLES</b> .....                                 | <b>8</b>  |
| 4.1      | System Design.....                                      | 8         |
| 4.2      | Systems Based Approach.....                             | 8         |
| 4.3      | Continuous Improvement.....                             | 9         |
| 4.4      | Limiting Fall Distance.....                             | 9         |
| 4.5      | Application of PPE Based Systems.....                   | 9         |
| 4.6      | Access Vs Work.....                                     | 9         |
| <b>5</b> | <b>RISK MANAGEMENT</b> .....                            | <b>10</b> |
| 5.1      | General Application.....                                | 10        |
| 5.2      | Hierarchy of Control.....                               | 11        |
| 5.3      | Particular Considerations.....                          | 13        |
| <b>6</b> | <b>DESIGN 14</b>                                        |           |
| <b>7</b> | <b>PLANNING FOR HEIGHT SAFETY ACCESS AND WORK</b> ..... | <b>15</b> |
| <b>8</b> | <b>ANCHORAGE CRITERIA</b> .....                         | <b>16</b> |
| 8.1      | Location of Anchors.....                                | 16        |
| 8.2      | Installed Anchors.....                                  | 16        |
| 8.3      | Improvised Anchors.....                                 | 17        |
| 8.4      | Anchorage Connections.....                              | 17        |
| <b>9</b> | <b>ACCESS TO WORK POSITIONS</b> .....                   | <b>18</b> |
| 9.1      | Introduction.....                                       | 18        |
| 9.2      | Ladders.....                                            | 18        |
| 9.2.1    | Portable Ladders:.....                                  | 18        |
| 9.2.2    | Fixed Ladders.....                                      | 20        |
| 9.2.3    | Three Points of Contact – Climbing a Ladder.....        | 20        |
| 9.3      | Mobile Elevating Work Platforms.....                    | 21        |
| 9.4      | Climbing Attached.....                                  | 21        |
| 9.5      | Scaffolding.....                                        | 22        |
| 9.6      | Access in the vicinity of an unprotected edge.....      | 22        |
| 9.7      | Tree Works.....                                         | 22        |

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|           |                                                                      |           |
|-----------|----------------------------------------------------------------------|-----------|
| <b>10</b> | <b>WORKING AT HEIGHT</b> .....                                       | <b>23</b> |
| 10.1      | Principles and Rationale for Approach.....                           | 23        |
| 10.2      | Compatibility with Work Process.....                                 | 23        |
| 10.3      | Ladders (Portable, hanging and fixed).....                           | 23        |
| 10.3.1    | Principles for Working from Portable Ladders:.....                   | 23        |
| 10.3.2    | Principles for Working from Fixed Ladders .....                      | 23        |
| 10.3.3    | Three Points of Contact – Working from a Ladder.....                 | 23        |
| 10.3.4    | Use of PPE based fall protection systems on ladders .....            | 24        |
| 10.4      | Mobile Elevating Work Platforms .....                                | 25        |
| 10.4.1    | Principles and Rationale for Approach.....                           | 25        |
| 10.4.2    | Control Descent Devices (CDD) .....                                  | 25        |
| 10.4.3    | Mobiling.....                                                        | 25        |
| 10.4.4    | Load Capacity .....                                                  | 27        |
| 10.5      | Poles.....                                                           | 27        |
| 10.6      | Lattice structures.....                                              | 28        |
| 10.7      | Work in the vicinity of an unprotected edge .....                    | 28        |
| 10.7.1    | Work within 2m of an unprotected edge.....                           | 28        |
| 10.7.2    | Work outside 2m of an unprotected edge .....                         | 28        |
| 10.8      | Awnings and Roofs .....                                              | 29        |
| 10.8.1    | Principles and Rationale for Approach.....                           | 29        |
| 10.8.2    | Specific Considerations.....                                         | 29        |
| 10.9      | Tree Works .....                                                     | 30        |
| 10.10     | Substation Equipment.....                                            | 30        |
| 10.10.1   | Principles and Rationale for Approach.....                           | 30        |
| 10.10.2   | Power Transformers Typical Methodology.....                          | 30        |
| 10.10.3   | Other Substation Equipment .....                                     | 31        |
| 10.11     | Two Pole Distribution Substations .....                              | 32        |
| 10.11.1   | Principles and Rationale for Approach.....                           | 32        |
| 10.11.2   | Typical Methodology .....                                            | 32        |
| <b>11</b> | <b>TRAINING</b> .....                                                | <b>33</b> |
| 11.1      | General Requirements.....                                            | 33        |
| 11.2      | Training for Individuals Using Personal Fall Protection Systems..... | 33        |
| <b>12</b> | <b>RESCUE SYSTEMS</b> .....                                          | <b>34</b> |
| 12.1      | Rescue System Requirements .....                                     | 34        |
| 12.2      | Nominated Risks.....                                                 | 34        |
| 12.3      | Fall Protocol.....                                                   | 35        |

**13 EQUIPMENT ..... 35**

13.1 Scope..... 35

13.2 Equipment Approval Methodology ..... 35

13.3 Whole of Life Management of Height Safety Equipment ..... 35

13.4 Strength Rating ..... 36

13.5 Compatibility with Work Process..... 36

13.6 Compatibility of Equipment ..... 36

13.7 Climbing Helmets ..... 36

13.8 Suspension Trauma Relief Devices ..... 36

13.9 Personal Anchorage Slings..... 37

13.10 Tools ..... 37

13.11 Rescue Equipment..... 37

13.12 Personal Energy Absorber ..... 37

**APPENDIX A REFERENCED DOCUMENTS ..... 38**

**APPENDIX B IMPROVISED ANCHOR SELECTION EXAMPLE:  
TRANSFORMER ..... 39**

# 1 Regulatory Basis

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This Guide supports the New South Wales Electricity Supply Industry in the prevention of workplace illness, injuries and fatalities of persons working at height on their electricity networks, which is consistent with the intentions of the Work, Health and Safety Act 2011 (the associated WorkCover Codes of Practice, the Electricity Supply Act 1995 and the National Electricity Network Safety Code (ENA DOC 001-2008).

In 1997 the New South Wales Government moved away from prescriptive regulations to outcome driven regulations in the electricity supply industry. In accordance with the Electricity Supply (Safety and Network Management) Regulation 2008 the Network Operators are required to provide Network Management Plans to the Department of Trade and Investment Division of Resources and Energy. The plan to be lodged and implemented by the Network Operator shall consist of:

- a) Chapter 1 dealing with network safety and reliability,
- b) Chapter 2 dealing with customer installation safety,
- c) Chapter 3 dealing with public electrical safety awareness, and
- d) Chapter 4 dealing with bush fire risk management.

This Guide is relevant to the Network Management Plan Chapter 1. It sets out minimum standards for Network Operators in New South Wales and the basic technical content will help Network Operators set up uniform systems for the protection of people working at height on their networks.

## 2 Scope and Purpose

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This Guide has been prepared to provide industry specific guidance in the practical application of the relevant legislation, codes of practice, standards and guidelines in the design of safe systems of work for the people accessing and working on or near NSW Electricity Network assets (network assets) where a fall hazard exists.

This Guide applies to Network Operator employees, contractors, accredited service providers and any other persons that work on network assets. These assets include all relevant infrastructure including:

- Overhead structures, wires and associated cables
- Substation structures and equipment, and
- Communication infrastructures.

This Guide is not intended for work on non-network related assets such as office blocks and other buildings where non-industry specific Codes of Practice and other references provide guidance and protection for workers.

For the benefit of those designing assets and the associated safe systems of work for the people accessing and working on network assets at heights this Guide:

- Interprets the framework provided by the following:
  - The NSW WHS Regulation 2011
  - WorkCover NSW Codes and Guides
  - The ENA DOC 005 National Fall Protection Guidelines for the Electrical Industry
  - AS/NZS 1891: Industrial fall arrest system and devices, parts 1, 2, 3 & 4
  - AS 1657: Fixed platforms, walkways, stairways and ladders - Design, construction and installation
  - National Code of Practice for the Prevention of Falls in General Construction.

- Documents principles to be used for the development of safe fall protection systems; and
- Documents an industry specific position for height safety issues where general or electricity supply industry standards/guides/regulations do not provide sufficient guidance.

This Guide is not intended to be used as a primary reference directly by persons working at heights.

## 3 Definitions

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**Adjustable Lanyard** – A lanyard incorporating a length adjusting device. (AS/NZS1891.1, 2007 [mod])

**Competent Person** – A person who has acquired through training, qualification or experience, or a combination of them, the knowledge and skills to carry out that task. (WHS Regulation 2011)

**Drop zone** – The area where it may be reasonably assumed that material falling from aerial works will impact.

**Free Fall distance** – When attached to a Fall Protection System it is the potential vertical distance that the attachment point on the harness could travel prior to the system commencing control of the fall. When not attached to a Fall Protection System it is the distance from the level on which the person is standing to the lowest point below to which it is reasonably foreseeable that the person could fall.

**Fall protection system** – A system which will eliminate a fall or reduce the consequences of a fall by means such as reducing the fall distance.

**Free fall, free fall arrest** – A fall or the arrest of a fall where the fall distance before the fall-arrest system begins to take any loading, is in excess of 600 mm either vertically or on a slope on which it is not possible to walk without the assistance of a handrail or hand line. (AS/NZS 1891.1, 2007)

**Lanyard** – An assembly of a line and components which enables a connection between a harness and an anchorage and which will absorb energy in the event of a fall. (AS/NZS1891.1, 2007)

**Limited free fall, limited free fall arrest** – A fall or the arrest of a fall either vertically or on a slope on which it is not possible to walk without the assistance of a handrail or hand line where under reasonably foreseeable circumstances the fall distance does not exceed 600mm. (AS/NZS 1891.1, 2007 [mod])

**Pole strap** – A work positioning strap designed to be placed around a pole or other vertical structural member and attached at two points, one on each side of a harness whilst the wearer is working on the pole. (ASZNS1891.1, 2007)

**Restraint** – The control of a person's movement by means of a combination of a harness, a lanyard and an anchorage which will physically prevent the person from reaching a position at which there is a risk of a fall. (AS/NZS1891.4, 2009[mod])

**Restraint Technique** – A technique using adjustable fall arrest rated equipment which focuses on not allowing a fall.

**Restrained fall, restrained fall arrest** – A fall or the arrest of a fall where the person suffering the fall is partially restrained by a restraining device such as a pole strap under tension. (AS/NZS 1891.1, 2007)

**Shall, Must** – Indicates that the statement is mandatory.

**Should** – Indicates a recommendation.

**Total fall distance** – When attached to a Fall Protection System it is the maximum potential vertical distance that the attachment point on the harness will travel when all energy absorption elements have fully extended.

**Work attached** – Climbing and or working while using a Fall Protection System at all times.

**Work positioning** – Use of a system that enables a person to work supported in a harness in tension in such a way that the risk of a free fall or limited free fall is eliminated or suitably controlled / minimised. (AS/NZS 1891.1, 2007 [mod])

## 4 Principles

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### 4.1 System Design

In designing electricity network asset systems or management practices, where applicable the design shall address the need for safe access, egress and work at height through the asset life cycle including installation, maintenance, life extension and removal. Considerations shall include but shall not be limited to:

- The hierarchy of controls for height safety;
- Access to work positions;
- Work activity requirements eg. Frequency / likelihood of activity, duration of activity;
- Adopting appropriate features into the asset design (eg anchorage points, defined ladder points, platforms.);
- Minimum training requirements;
- Appropriate emergency and rescue plans; and
- Minimum height safety equipment requirements.

Consideration of these factors may result in adoption of alternative height safety systems to those detailed in this Guide. Such systems must have a risk of injury not greater than that which could occur through use of the systems detailed in this Guide. The detailed implementation of this Guide may vary between organisations as appropriate based on local conditions. This Guide does not in any way seek to limit the development or adoption of improved height safety systems.

### 4.2 Systems Based Approach

A systems based approach shall be adopted in the management of working at heights.

The system must address:

MANAGEMENT - Site hazards and site management

OPERATORS - Operator skills appropriate for the level of works they are undertaking – including proper supervision

EQUIPMENT - Appropriate equipment for the works being undertaken (including rescue) (including proper management of equipment itself)

TECHNIQUES - Appropriate techniques for the works being undertaken



### *4.3 Continuous Improvement*

It is acknowledged that height safety systems will continue to be refined. If new systems find general application it will be appropriate for this Guide to be amended accordingly. It is further recognised that equipment technology, acceptable industry practices or legislation could shift the acceptance of an existing fall protection work system.

### *4.4 Limiting Fall Distance*

Where a height safety system requires the use of fall arrest equipment, the system should endeavour to eliminate or restrict a fall as much as reasonably practicable but must ensure that the maximum distance a person would free fall before the fall-arrest systems takes effect is 2m.

### *4.5 Application of PPE Based Systems*

PPE based fall protection systems are generally not appropriate where the distance measured from the feet of the worker to the landing level is less than 2m and no additional hazard, which may increase the consequences of a fall, exists where it is likely that the worker could fall. Where PPE based fall protection systems are not used, other controls must be implemented to manage the risks.

Examples of additional hazards include:

- A fall to a lower level than that upon which the ladder is erected;
- A fall on to a stake or similar item that may induce a puncture wound; and
- A fall on to any object of sufficient size or configuration that may cause more severe injuries than falling onto the bare ground.

### *4.6 Access Vs Work*

The risk associated with undertaking work at heights is generally greater than that associated with accessing a location at heights. This is due to the lesser degree of conscious attention that a worker is able to apply to maintaining their safety at heights while also undertaking other work. While work is being undertaken additional controls are generally required in recognition of this increased risk.

## 5 Risk Management

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### 5.1 *General Application*

Risk management principles shall be applied to the development of height safety systems. In this process particular attention is to be focused on ensuring that the overall risk exposure is not elevated through the unintended consequences of the introduction of any particular risk control measure or set of controls.

Users of this Guide are reminded that the risk management process undertaken in the development of height safety systems for particular organisations does not eliminate the need to undertake site specific risk assessments.

In managing risks relating to height safety, if the risk cannot be eliminated then the controls at each level in the hierarchy of controls must be considered in order. That is, everything reasonably practicable at a higher level must be implemented before progressing to lower level controls. After including a control in the system if the residual risk is assessed as being above the acceptable level, then lower level controls must be added to the system until the residual risk is within the acceptable range. If the residual risk is not in the acceptable range, and all reasonably practicable controls at all levels in the hierarchy have been included in the system, the system may be used if the residual risk is in the as low as reasonably practicable (ALARP) range.

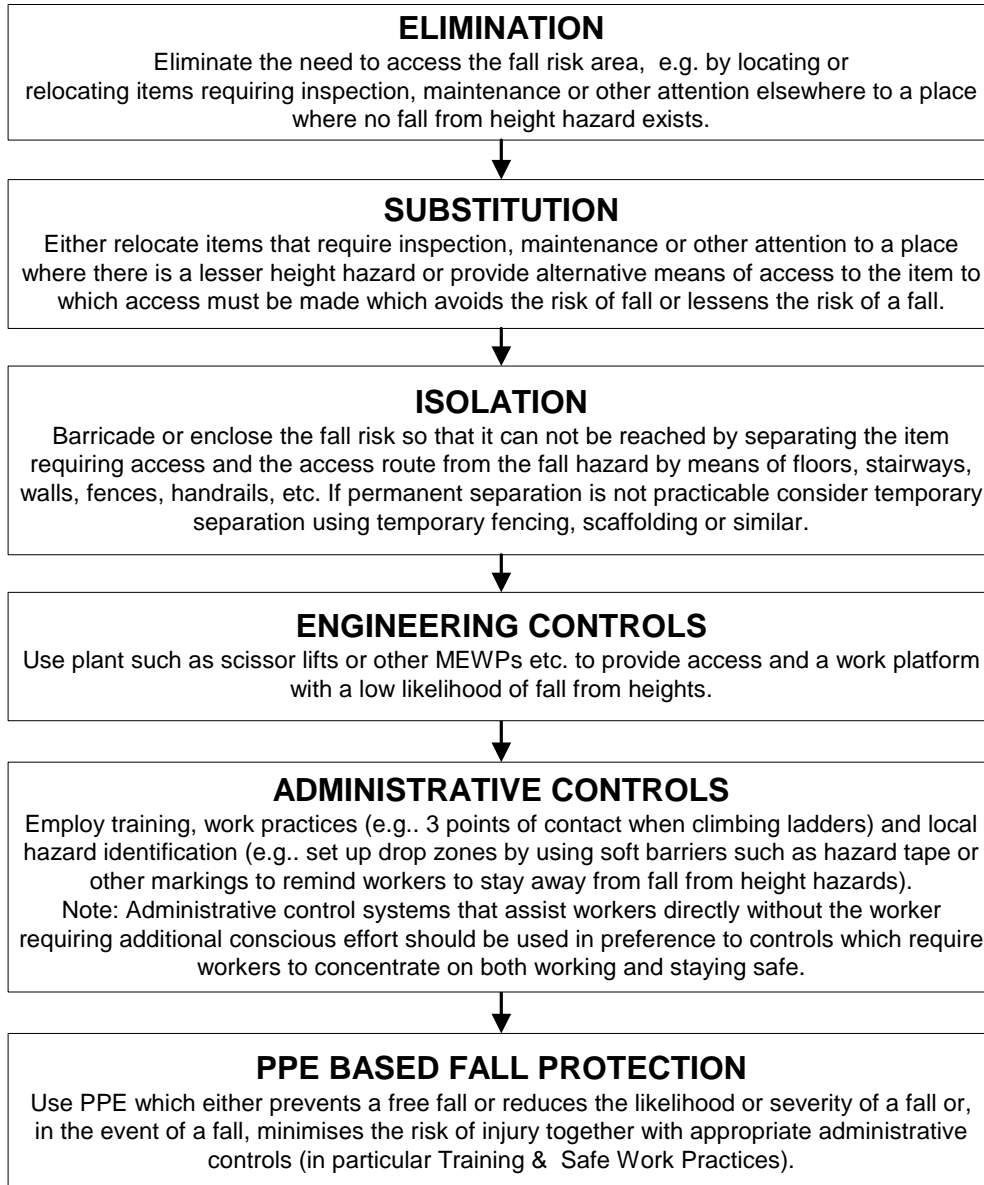
Users of this Guide are further reminded of the need to include both workers and appropriate subject matter experts in the risk assessment process.

## 5.2 Hierarchy of Control

In applying the risk management approach the general hierarchy of control shall be used:

### Height Safety Hierarchy of Control

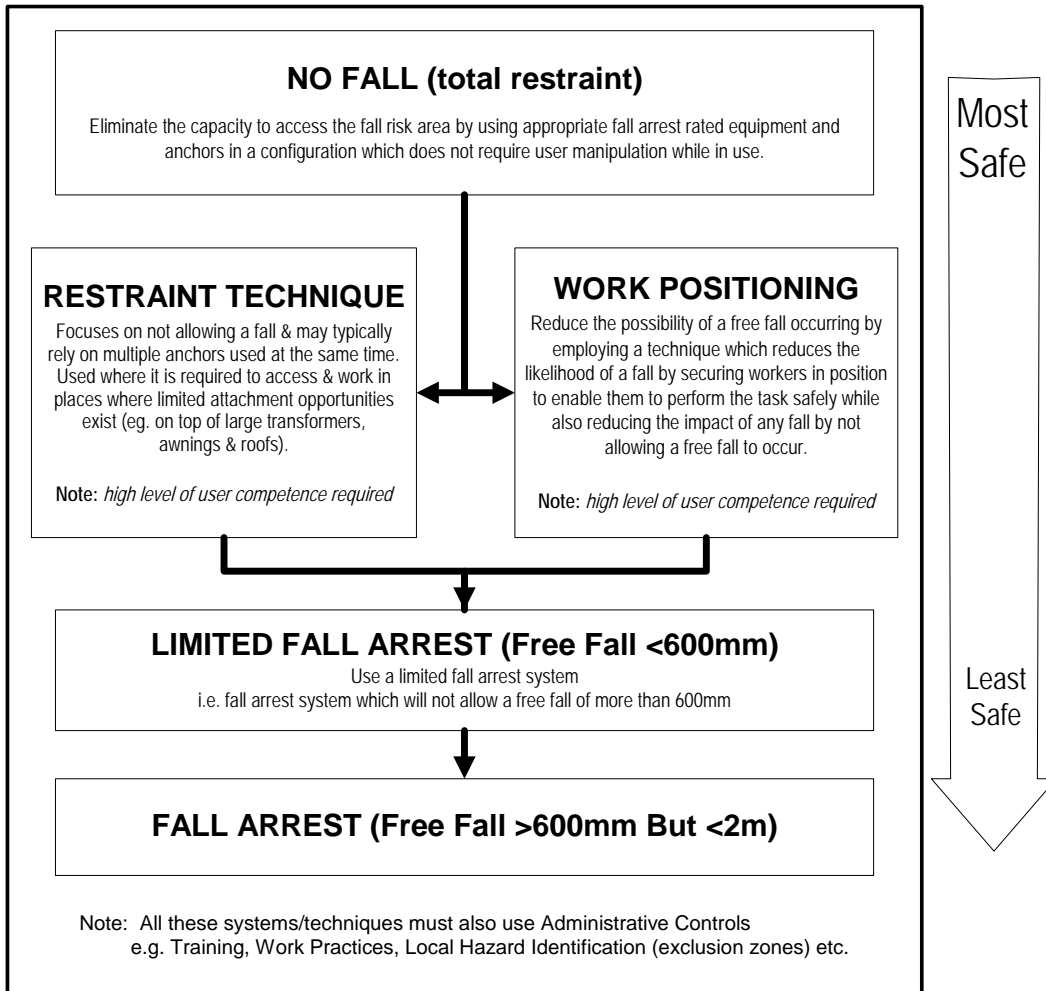
A combination of the measures listed below is required to be taken to minimise the risk to the lowest level reasonably practicable if no single measure is sufficient for that purpose.



The following risk management approach will be applied to the use of a PPE based fall protection system:

## PPE Based Fall Protection Hierarchy of Control

Appropriate administrative controls must be employed when ever any of the following PPE based systems are used.



### 5.3 Particular Considerations

Risk assessments must consider the risk, or increased risk, that may relate to the following factors:

- The integrity of any structure or element of a structure being relied on for safety at heights. Account must be taken of potential unseen degradation due to corrosion or decay.
- Access methodology.
- Frequency, both frequency of task and frequency of access during the task:
  - High frequency - may require more effort in applying the hierarchy of control; and
  - Low frequency - may result in increased overall risk if higher order controls are implemented (installing the higher order control measure may incur a higher risk than that posed by the infrequent access to the fall risk).
- Number of people involved in the task.
- Factors that may cause a person to fall.
- Type of fall and fall distance.
- Total fall distance, electrical and physical hazards in the fall zone. Note: Consideration must be given to adding an allowance for body dimensions beyond the harness attachment point.
- Communications within the worksite and from the worksite for emergency situations. Consideration shall be given to the presence of background noise and noise from the work processes.
- Emergency conditions - increased risk associated with factors such as inclement weather, less than normal advance planning and utilisation of resources different to those normally used.
- First response rescue appropriate to the likely injuries to a person and the possible situation of the injured person.
- Specific site issues which may impact on any of the above eg:
  - Electrical Hazards; and
  - Confined space.
- Traffic both road and / or pedestrian which may:
  - impact on sight lines for safety observer positioning; or
  - present a hazard to persons working with dangling ropes; or
  - pose a risk through unauthorised access.
- Falling objects.
- Radio frequency radiation exposure from communications equipment.
- Requirements for PPE to suit the work process.
- Mobile phones and other items that may cause distraction or interfere with communication and situational awareness.
- The need to carry and use tools, equipment or materials; and
- The need to reassess worksite risks after gaining initial access at heights.

## 6 Design

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The design, construction, maintenance, and purchase of equipment and infrastructure and the development of working at heights safe work practices shall be undertaken in accordance with the risk management principles of the Work, Health and Safety Regulation 2011. Guidance on acceptable application of the Regulation will be derived from WorkCover NSW publications, Australian Standards, suitable International Standards and other Electricity Supply Industry Guides.

Design of work places shall comply with the WHS Regulation (in particular part 3.1). Existing work places that do not comply with NSW Code of Practice Managing the Risk of Falls at Workplaces part 3.1 should be redesigned to comply where it is reasonably practicable.

Design and use of infrastructure or equipment for movement between levels must comply with the relevant current Australian Standards for safe access. Existing access infrastructure that does not comply should be redesigned to comply or be replaced where it is reasonably practicable.

Maintenance documentation should include details of a safe system for access to undertake installation, commissioning and maintenance tasks.

Equipment should be designed where practicable to eliminate the need for persons to work at heights in order to undertake installation, commissioning and maintenance tasks.

Equipment design shall make provision for the safe conduct of installation, commissioning and maintenance tasks where it is necessary that they are carried out at heights. The design shall also consider the requirements necessary to facilitate rescue. The hierarchy of controls shall guide development of the design.

## 7 Planning for Height Safety Access and Work

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Pre-work planning for height safety is critical in ensuring that risks are minimised. The distinct function of pre-work planning must be recognised as part of the overall work plan.

The combination of 'prior to the day' and 'on the day' planning shall form the basis of the on site hazard identification, risk assessments, and staff briefings.

**Prior to the day** planning can be one of two different types; either general for activities that are undertaken on a regular basis, or more specific planning for unique jobs.

1. Planning for the general type of work.

This shall include consultation and the application of the risk management framework contained within this Guide. This planning shall be documented and available on the day of the task. Documentation examples include organisational procedures and generic safe work method statements. Emergency work will typically be carried out on the basis of such planning documentation.

2. Planning in advance for the specific job.

This shall include assessment of the requirements for access and work at heights for each stage of the work, and the personnel and equipment needed for each stage. This planning shall be documented and available on the day of the task. Documentation examples include specific work method statements.

**On the day** of the job pre-work planning is also required, and shall be documented. This shall include:

- Review and implementation of the outcomes of levels 1 and/or 2 above
- Task allocation
- Identification and use of the anchorage systems
- Rescue systems; and
- Extent of and control of drop zones.

## 8 Anchorage Criteria

### 8.1 Location of Anchors

In selecting anchor locations, the following must be considered:

- Stability of the parent structure;
- The practicality of good anchorage connections (see Clause 8.4);
- Load capabilities of particular anchorage configurations;
- Range of movement of worker while attached;
- Safe access;
- Provision for safe rescue; and
- The height of the anchor relative to the total fall distance in the case of anchors used for fall arrest systems.

### 8.2 Installed Anchors

All installed anchors shall meet the compliance requirements of AS/NZS 1891.4 Industrial Fall Arrest System and Devices Part 4: Selection, Use and Maintenance. Attention is drawn to draft standard AS/NZS 5532 Manufacturing requirements for single point anchor device used for harness based work at height expected to be issue shortly after this revision.

Anchors to be used for height safety shall have a minimum ultimate strength as follows:

|                                             |                                                          |
|---------------------------------------------|----------------------------------------------------------|
| • Limited Free Fall Arrest                  | 12kN                                                     |
| • Restrained falls and restraint situations | 12kN or 15kN depending on the fall distance.             |
| • Free Fall Arrest                          | 15kN for one person connection and 21kN for two persons. |

Note: The two person figure is not double the single load rating as it is considered that both of the peak forces generated by arresting the two falls will not be applied to the anchor at the same instant.

Where a new system requires multiple installed anchors which could be of different ratings consideration should be given to installing all anchors at the highest rating to avoid confusion.

Where a system requires the use of multiple existing installed anchors which have different ratings the system design should give consideration to how to avoid inappropriate use of the lower rated anchors.



### 8.3 *Improvised Anchors*

Not all network assets were designed with provision of suitable anchorages for height safety. Where purpose designed anchors are not included in the equipment design it may be necessary to utilise suitable structural elements of equipment as anchorage points in a height safety system.

The use of existing asset features used as improvised anchors shall be accompanied by a system which employs:

- Guidelines for selection based on competent engineering and risk assessment; and
- Training to ensure competence to use the guidelines for selection.

Improvised anchors shall be identified and inspected by an appropriately competent person. The identification and use of improvised anchors shall take into account the provisions of Clauses 8.1 and 8.2 and the following:

- Strength of the attachment point in relation to the potential magnitude and direction of the force that would be applied in the event of a fall; and
- The likely fall distances, and the forces generated that may be expected with the chosen fall protection system.

The assessed ultimate strength of an improvised anchor shall:

- Be based on a minimum of 6kN for direct attachment; and
- Make allowance for any multiplier factor\* which arises from the geometry of the rigging if multiple anchors are used; and
- Be multiplied by a safety factor appropriate to the material and its condition (which shall be not less than 2).

\* the multiplier factor may be less than 1 if the load is well shared between the anchors but will be significantly greater than 1 if the geometry is adverse. Where the geometry changes as the worker moves the worst case geometry must be considered.

Deformation of an improvised anchor is permissible in the event of arresting a fall.

### 8.4 *Anchorage Connections*

Connections to anchor points must take into account and avoid the following:

- Side loading of gates of connection hardware;
- Side loading of large hooks;
- Damage to slings or lanyards through contact with sharp or abrasive edges; and
- Damage to slings, lanyards and other connection devices through excessive loads caused by unequal sharing of loads with multiple anchors or excessive angles between multiple anchors.

## 9 Access to Work Positions

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### 9.1 Introduction

This section outlines the techniques for access to, egress from and transfer between work positions where there is a height safety risk.

A safe means of access must be provided and engineered in accordance with the hierarchy of controls. Prior to using an access methodology on a structure, the integrity of the structure must be assessed by a competent person as being safe for the proposed system of access.

A safe means of access could include the use of one, or combination of, the following appropriate methods:

- Fixed ladders and stairways;
- Scaffolding;
- Mobile Elevating Work Platforms (MEWP);
- Portable ladders; and
- Approved attached climbing methods.

### 9.2 Ladders

#### 9.2.1 Portable Ladders:

Portable ladders complying with ISSC 14 Guide to Electrical Workers' Safety Equipment used in accordance with the principles set out below are considered to provide a safe means of access.

Portable ladders used as a safe means of access must be:

- climbed using safe climbing practices in accordance with this Guide and appropriate to:
  - the site
  - the ladder set up; and
  - the use of the ladder.
- set up so that the head of the ladder will not slide, twist, or roll from its intended position while in use, and
- set up so that the ladder feet will not inadvertently move while the ladder is in use, and
- set up correctly. This can be achieved by using:
  - **Step ladders and platform ladders** (including multi-use ladders in step ladder configuration) in the fully locked open position on a level footing, or
  - **Extension ladders and single ladders** (including multi use ladders in the straight configuration) applying the rule of thumb for angle (i.e. 4 units of height for every 1 unit of horizontal reach or 4:1 ratio). A portable ladder which is unable to be set up at 4:1 due to site conditions may be used as a safe means of access provided appropriate controls, determined by risk assessment, are applied. The risk assessment must consider the intended use of the ladder along with all related site hazards.

In addition to the above the following shall be considered in the design of safe work systems that employs a portable ladder for access to a work location:

- Correct ladder selection:
  - Height to be reached. Where a ladder is used to gain access to a working platform or roof, the top of the ladder should extend above the level of the working platform or roof by a distance of not less than one metre. Ladders must not be modified or raised onto supports to gain extra height;
  - Available method/s for securing ladder;
  - Ground (surface type, slope etc.); and
  - Work and transport requirements.
- Security and environment:
  - A stable level footing;
  - The prevention of damage to or unexpected movement of the ladder (eg. by a door opening onto a ladder or vehicle impact); and
  - The prevention of unauthorised climbing.
- Safe climbing requirements:
  - Maintaining 3 points of contact when climbing;
  - Carrying tools or equipment in a manner that does not interfere with the climber's ability to climb safely (refer Clause 13.10);
  - Ensuring only one person is on a ladder except in an emergency; and
  - Ensuring additional controls are put in place to prevent users of step or platform ladders falling to a lower level than that which the ladder is set up on.
- Manufacturer's instructions.

Controls that may be used to secure a ladder could include:

- Tying the base of ladders to the structure being climbed or an adjacent structure. The tie rope can be secured to the ladder on either the stiles or a rung;
- Footing the base of a ladder;
- Pegging the feet of ladders;
- Tying the head of ladders to the structure being climbed or an adjacent structure;
- Locating the head of a ladder in a ladder bracket;
- Stabilising the ground under the ladder feet with a non slip product which will spread the load and prevent uneven sinkage of the feet;
- The use of an appropriately designed wedge or other product where sloping conditions exist; and
- Using ladders with adjustable stiles or feet where sloping ground exists.

### 9.2.2 Fixed Ladders

Fixed ladders complying with AS 1657 used in accordance with the principles set out below are considered to provide a safe means of access.

Fall protection while climbing fixed ladders may take the form of using 3 points of contact, a fall arrest system, a ladder cage or a combination of these. The appropriate fall protection for any given installation must be determined through risk assessment.

AS 1657 defines three categories of fixed ladder:

- Rung ladder (similar construction to a portable single ladder);
- Step ladder (a steep stairway type ladder provided with a handrail and designed to be climbed by a person facing the ladder); and
- Individual rung ladder (step irons).

In the case of Rung Ladders and Individual Rung Ladders erected at an angle of 75° or greater and where the maximum possible fall distance is greater than two metres, consideration should be given to requiring controls additional to three points of contact.

A non-compliant fixed ladder may be used as a safe means of access provided appropriate controls, determined by risk assessment, are applied. The risk assessment must consider the nature of the non-compliance and the intended use of the ladder along with all related site hazards. Where the maximum possible fall distance is greater than two metres, relying only on three points of contact is generally not considered to be a safe means of access.

In assessing the risks associated with a system which incorporates a ladder cage the following points should be considered:

- Ladder cages offer some protection in the event of a fall;
- A ladder cage does not require deployment by the user on each occasion that the ladder is climbed;
- Specialist training is generally not required to climb a ladder fitted with a ladder cage;
- A ladder cage may not arrest the fall in a satisfactory manner, particularly where the ladder is vertical or near vertical;
- The level of protection offered is very much determined by the construction;
- A fall within a cage may cause severe injuries to the person as they fall down the cage in an uncontrolled manner. Typical injuries may include loss of consciousness from head strike and broken or incapacitated limbs;
- A fall may result in a person becoming lodged part way down a ladder;
- Ladder cages add significant restrictions if tools or equipment need to be moved; and
- Ladder cages cause great obstruction should a rescue be required.

### 9.2.3 Three Points of Contact – Climbing a Ladder

For the purpose of climbing a ladder, three points of contact means maintaining contact with the ladder with either:

- Two hands and one foot, or
- One hand and two feet.

### 9.3 *Mobile Elevating Work Platforms*

When no safer access method exists per the hierarchy of controls, transfer from mobile elevating work platforms (MEWPs) may be used as a means of access.

Where a height safety system includes access via transfer from a MEWP the following considerations, in addition to the requirements of AS 2550.10, shall be addressed in the design of the system:

- Transfer must only be used as part of a documented and approved safe work method or emergency procedure;
- The work position or landing area being accessed is assessed for structural integrity;
- If attachment at the work position is required, attachments to a person's harness shall be manipulated in a make before break sequence; that is when at heights the person shall always be attached to the MEWP, or the structure or both;
- The duration for which a person is attached to both the MEWP and the structure shall be minimised;
- The MEWP must be positioned to minimise the gap to the structure. The MEWP must have the capability to extend beyond the landing area or work position in both vertical and horizontal directions by the lesser of:
  - 0.2 times that required to access the landing area or work position, or
  - 2 metres.
- No part of a person's body shall be placed between the MEWP and the structure;
- The MEWP should be positioned so that the floor of the basket and the transfer point on the structure are approximately level. The transfer should not require the person to move significantly above the anchor point to which they are attached;
- The likelihood that the basket will rise as load is removed and fall as load is added due to the flexure of the boom sections; and
- If the MEWP is to be allowed to move away from the transfer point after the transfer, the work method must address the issue of how a person could descend from the structure without the MEWP.

### 9.4 *Climbing Attached*

This section applies to circumstances when PPE based climbing methods are utilised to gain access to a work position. This includes systems utilising pole steps or tower bolts.

Unless required by the risk assessment or particular situations stipulated in section 9.2, climbing attached is generally not required for access via a compliant ladder.

A system that requires a person to free climb a ladder to access a structure and then work attached, shall require persons to secure themselves to the structure before climbing off the ladder and remain attached to the structure at all times. When passing around obstructions a make-before-break process shall be utilised.

A system must require that when pole straps are used, slack shall be eliminated or minimised at all times. The position of the strap around the structure must be kept at or above the attachment point on the full body harness.

A system must require that when lanyards are used, the position of the attachment point on the structure shall minimise the fall distance to two metres or less.

### **9.5 Scaffolding**

When erecting scaffolding, appropriate controls must be implemented to ensure the risk of a fall from a height is eliminated or suitably controlled/minimised in accordance with the hierarchy of controls.

The requirements of AS/NZS 4576 and WorkCover NSW Industry Safety Standard Erecting, Altering and Dismantling Scaffolding shall be considered.

### **9.6 Access in the vicinity of an unprotected edge**

When accessing a work position in the vicinity of an unprotected edge, appropriate controls must be implemented to ensure the risk of a fall from a height is eliminated or suitably controlled/minimised in accordance with the hierarchy of controls.

Where the surface of the access area is flat or is at a slope up to and including fifteen degrees from horizontal, maintenance of a two metre set back from an unprotected edge is deemed as an acceptable control measure. Appropriate controls must be implemented to ensure that the two metre set back is maintained. Factors such as surface condition, surface contamination and footwear used may indicate that a larger setback is appropriate for a given slope. The required setback should be re-addressed if conditions change during the course of the work.

Risk assessments shall consider the hazards atop the landing area eg. slips/trips.

### **9.7 Tree Works**

When climbing a tree to conduct vegetation works, persons shall secure themselves to the tree and / or climbing rope and remain attached to the tree and / or climbing rope at all times. When passing around obstructions a make-before-break process shall be utilised.

The requirements of WorkCover NSW Code of Practice for Tree Work shall be considered when documenting specific tree access methods.

## 10 Working at Height

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### 10.1 Principles and Rationale for Approach

Height safety systems must be designed with due consideration of the amount of conscious thought and physical effort that workers can reasonably apply to managing their safety at height whilst also undertaking the work process.

When selecting a height safety system for work on a particular asset, and there exists alternative access systems, a risk assessment process following the principles of Section 5 should be used to assist selection.

### 10.2 Compatibility with Work Process

When designing a height safety system for a particular work process, the compatibility of the height safety system with the work process must be considered. This is especially the case where the work process involves heat, solvents, flammable materials, or cutting tools / sharp edges.

### 10.3 Ladders (Portable, hanging and fixed)

Where a safe system of work at heights includes a ladder, the system must include appropriate ladder and fall protection measures for the tasks being undertaken and the following considerations shall be addressed in the design of the system.

#### 10.3.1 Principles for Working from Portable Ladders:

- Ladders must be chosen, set-up and climbed in accordance with Section 9.2;
- Appropriate controls must be employed when reaching out sideways from a ladder;
- An appropriate method for raising or lowering tools and materials must be used to assist with both manual handling and control of materials; and
- Three points of contact must be maintained while working in accordance with Section 10.3.3.

#### 10.3.2 Principles for Working from Fixed Ladders

- A work positioning system must be used when working from a fixed ladder. Note that while the elements of a fixed ladder may not necessarily be suitable as anchor points for a fall arrest system they will generally be suitable for anchoring a work positioning system; and
- Three points of contact must be maintained while working in accordance with Section 10.3.3.

#### 10.3.3 Three Points of Contact – Working from a Ladder

Three points of contact while working from a fixed ladder or non-self supporting portable ladder (eg. an extension ladder) means maintaining contact with the ladder with either:

- One hand and two feet; or
- Two feet and a work positioning system (eg. harness and pole strap); or
- Two feet and the knee or shin of one or both legs (i.e. the knee or shin pressed into the step/s above which the worker stands) provided the requirements of Clause 4.5 are observed. This is not appropriate where the fall distance is greater than 2m.

Three points of contact while working from a step ladder means maintaining contact with the ladder with either:

- One hand and two feet; or
- Two feet and the knee or shin of one or both legs (i.e. the knee or shin pressed into the step/s above which the worker stands). Where the fall distance is greater than 2m consideration should be given to using a platform ladder or other alternative controls.

Three points of contact on a platform ladder means standing on the platform and maintaining contact with the ladders platform rails with the torso or thigh. Any gate supplied with the ladder for the platform must be secured in the closed position.

#### **10.3.4 Use of PPE based fall protection systems on ladders**

When working from correctly set up ladders PPE fall prevention systems are not required where the distance measured from the feet of the worker to ground is less than 2m and no additional hazard, which may increase the consequences of a fall, exists where it is likely that the worker could fall.

Examples of additional hazards may include:

- A fall to a lower level than that upon which the ladder is erected; and
- A fall on to a stake or other item that may induce a puncture wound

A fall on to any object of sufficient size or configuration that may cause more severe injuries than falling onto the bare ground.



## 10.4 Mobile Elevating Work Platforms

### 10.4.1 Principles and Rationale for Approach

This section applies to work using a mobile elevating work platform (MEWP) including equipment such as boom or scissor lift MEWPs.

The material within this section is also generally applicable to the use of a work-box used with a crane or boom handler.

Where a safe system of work at heights includes working from MEWPs the following must be considered:

- Stability of the MEWP;
- Communication between persons aloft and on the ground;
- Positioning of the MEWP at the worksite to provide optimum efficiency, emergency escape or rescue capability;
- Live conductors; and
- Starting and use of chainsaws in restricted area.

Arrangements for timely incident response shall be included in accordance with AS 2550.10.

### 10.4.2 Control Descent Devices (CDD)

All boom type MEWPs shall have a CDD system for each person working in the MEWP for emergency escape from the basket in addition to any means provided through the hydraulic systems of MEWPs.

The MEWP must not be used in a configuration where the CDD rope is not of adequate length to reach the ground below the basket.

Every person working from a boom type MEWP shall be trained and competent in the use of the CDD.

The CDD should only be used to exit the basket if all other options for returning to the ground have been exhausted and it is not appropriate to continue to wait for repair of the MEWP.

### 10.4.3 Mobiling

Mobiling is the practice of persons remaining within the basket of a vehicle mounted MEWP whilst travelling.

A safe system of work including mobiling MEWP's must consider:

- The provisions of AS 2550.10 such as the limiting of vehicle speed;
- Work method statements which include mobiling;
- Resting the basket in a travel position on the support frame with all booms cradled and with the stabiliser legs (if fitted) correctly stowed;
- The wearing of approved safety harness correctly attached to an appropriate and designated anchorage point by persons remaining in the MEWP basket;
- Persons travelling in the basket of a MEWP facing forward at all times during mobiling; and
- Activation of all traffic warning lights.

Staff while relocating the vehicle (EWP) within the work site, are permitted to stay within the EWP basket whilst travelling short distances between adjacent poles, trees and the like, on the proviso that the following procedures and guidelines have been adhered to and documented in accordance with each distributor's specific hazard identification, risk assessment and controls process.

The mobilising exemption would apply only to specific work activities when undertaking repetitive works and is limited to the following:

- Street light maintenance;
- Vegetation management;
- Installation of low-voltage conductor spreaders; and
- Overhead line minor construction and maintenance activities such as:
  - tightening line hardware, and
  - work equivalent in nature to the above.

The mobilising exemption would also apply only to short distance travel, provided that:

- The employer has developed and implemented an appropriate Job Safety Analysis process & safe work method statements covering the practice of mobilising;
- A thorough worksite hazard & risk assessment must be completed, identifying the associated hazards and ensuring appropriate control measures are adopted;
- The travel work element must be incorporated in this hazard and risk assessment and should consider such factors as incline and terrain (eg Hazard Risk Assessment, Hazard Assessment Checklist, Hazard Identification Risk Assessment & Controls);
- Appropriate Traffic Control plans must be used where applicable;
- Any person travelling in the MEWP basket must wear an approved safety harness correctly attached to an appropriate and designated anchorage point;
- Specialised tools and equipment i.e. Hydraulic Chainsaws, Crimpers, Hoses etc. must be secured to prevent falling or snagging on obstacles, all other tools & equipment shall be stowed within the MEWP basket;
- The basket rests in a travel position on the support frame with all booms cradled and with the stabiliser legs (if fitted) correctly stowed;
- At all times the driver must disengage the PTO before moving the vehicle;
- All warning lights are illuminated;
- Employees travelling in the basket of a MEWP must face forward and constantly observe for possible obstacles such as services, trees and street signage;
- Adequate communication between the driver and the employee in the basket must be maintained at all times, when the mobilising activity is in progress;
- The road speed of the vehicle is limited to 6 km/h (walking pace) and the driver takes special care to avoid gutters, bumps and dips;
- Travel within the MEWP is confined to a single work site;
- The MEWP vehicle cannot cross a controlled intersection eg Traffic lights, controlled boom or an intersection where it does not have right of way eg Stop and Give way signs or roundabouts; and
- The MEWP can only be reversed to position the vehicle, not to move between locations within worksite.

It is the responsibility of the user to conduct a full risk assessment before operating in this manner.

#### **10.4.4 Load Capacity**

A MEWP must be selected with an adequate load capacity taking account of:

- The provisions of AS 2550.10;
- Number of persons;
- Tools, equipment or materials to be transported in the MEWP; and
- Changes in the loads applied to the MEWP as a result of the work progressing.

A safe system of work must be implemented to ensure the working load limit of a MEWP is not exceeded.

### **10.5 Poles**

Height safety systems for working on poles shall take into consideration the following:

- Integrity of the pole and associated hardware;
- The use of attached climbing techniques at all times;
- Placement of pole straps and/or fall arrest lanyards;
- The need to manage tails of pole straps, lanyards and other equipment to prevent entanglement or inadvertent contact with conductors;
- The use of pole platforms in preference to working from a ladder or pole steps when appropriate to aid in the reduction of fatigue and ergonomic stress;
- The use of MEWPs in preference to pole platforms when appropriate to aid in the reduction of fatigue and ergonomic stress;
- Location of electrical and communications equipment;
- Interference between height safety equipment and temporary insulating mats;
- Appropriate Rescue systems;
- The need to manage tools and equipment;
- Manual handling of equipment when working aloft;
- Drop zones; and
- Changing direction and magnitude of loads on the structure.

Generally stand off insulators should not be used as personal attachment points or as a work platform.

## 10.6 Lattice structures

When developing height safety systems for lattice type structures consideration shall be given to access to, climbing on, work from, and rescue from these structures. Where the hierarchy of control leads to selection of a climbing system, an approved climbing technique that ensures personnel remain attached at all times must be used.

Some modern step bolts on steel work incorporate a rated attachment point for attachment during climbing. Other step bolts without attachment points may be selected as an improvised anchor if their use and associated attachment hardware is assessed and documented as a suitable work method. See Section 8.3.

The system must also consider any special requirements for site specific hazards including:

- radio frequency radiation exposure from communications equipment;
- live conductors either under or on the lattice structure (fall distance, minimum electrical safe approach distances, and rescue requirements);
- emergency planning in remote locations; and
- appropriate communications with personnel on the ground given mobile plant noise, wind noise or the excessive height distance.

Work positioning techniques must require the worker to maintain three points of contact and be appropriate to the task. Where possible the technique should nominate materials or equipment such as a bosun's chair or gondola to help reduce a worker's fatigue whilst working.

Work positioning equipment such as pole straps or lanyards shall be selected and used with minimal slack at all times. Attachment points for work positioning should be higher than the harness attachment points where possible to control the pendulum effect in the event of a fall.

Attachment points for fall arrest should be higher than the harness attachment points to control the pendulum effect in the event of a fall. Where this is not possible attachment points, or combinations of attachment points, must be selected so a fall distances in excess of 2m cannot occur.

The design of the system shall take particular account of the following:

- Avoidance of side-loading on scaffold type hooks.
- The availability of rated anchor points on hook ladders, gondolas or other equipment or the alternate need for the worker to maintain attachment to the primary structure; and
- The selection of lifting and/or rigging points to ensure that the structural integrity of the structure being worked on will not be compromised.

## 10.7 Work in the vicinity of an unprotected edge

### 10.7.1 Work within 2m of an unprotected edge

When working in the vicinity of an unprotected edge where a fall from height hazard exists, the risk must be managed in accordance with Section 5.

Risk assessments shall consider the hazards atop the landing area eg. Slips / trips.

### 10.7.2 Work outside 2m of an unprotected edge

Appropriate controls must be implemented to ensure that the 2m set back is maintained.

Where the surface of the access area is flat or is at a slope up to and including fifteen degrees from horizontal, maintenance of a 2m set back from an unprotected edge is deemed as an acceptable control measure.

Particular attention shall be given to the use of controls that will maintain the 2m set back despite the distractions and other contingencies arising from the conduct of the work.

## 10.8 Awnings and Roofs

### 10.8.1 Principles and Rationale for Approach

Generally awnings are a third party asset and are not normally a place of work however it may be necessary to use these to allow work on distribution network assets. Awnings may not be regularly maintained. Whilst awnings may appear sound, their structural integrity must be ascertained. Due to the unique nature of these work places, specialist systems must be developed and deployed to appropriately manage the risk.

Where a height safety system includes working from an awning or roof, the system must be designed in accordance with Sections 4 - 7 of this Guide and having regard to the following principles:

- Wherever practicable use a mobile elevating work platform (MEWP) or other appropriate equipment or safety measures such as scaffolding and guardrails;
- Workers must be attached to a suitable fall restraint or limited free fall-arrest system when they are at risk of coming closer than 2m to an unprotected edge; and
- Where possible, always establish a work positioning system that will not allow access to an edge or fragile area. In general it should not be possible for workers to forget to adjust a piece of equipment and place themselves at risk of a fall.

### 10.8.2 Specific Considerations

When designing a height safety system for work on awnings specific consideration shall be given to:

- Emergency rescue and first aid procedures. This must cover all areas of the process including all stages of accessing the work site and performing the work;
- General condition of awning or roof. This must be evaluated before accessing the awning or roof and it must be re-evaluated once the awning or roof is accessed;
- Protection from falling objects. An exclusion zone (a restricted entry area) may be needed around the access point and anywhere materials are being raised and lowered; and
- Delivery of materials and equipment onto the awning (edge safety issue).

Not all features of the work site will be able to be identified from street level. Worker/s accessing the awning must re-evaluate the situation once they are in a position to properly evaluate the work site. This evaluation should focus on details such as condition of roofing material, roofing material type and suitability of chosen anchorages.

## 10.9 Tree Works

Arboreal works for vegetation clearance around electrical network assets must be carried out in accordance with the requirements for both construction sites and tree work. It is important for designers of height safety systems to be familiar with both.

Systems for arboreal works must ensure the safety of electricity supply industry workers, vegetation management contractors, and the general public. Height safety requirements and Guidelines for vegetation control activities for tree climbing and work within trees must be addressed.

Where a safe system of work at heights includes working from within trees, the requirements of WorkCover NSW Amenity Tree Industry Code of Practice shall be included when documenting specific tree access and safe work methods. Examples of these requirements are:

- Training and accreditation;
- Maintenance of electrical clearances incorporating step and touch potentials;
- Minimum team composition;
- Rescue requirements;
- Attachment methodology;
- Use of chainsaws; and
- PPE selection and use.

Whilst it is acknowledged that tree climbers generally use a work positioning system, non full fall arrest rated work positioning harnesses must not be used. A full body harness or a sit harness incorporating shoulder straps (compliant to AS1891.1) must be used for arboreal work where the work is undertaken near an Electricity Network.

All height safety equipment used must be industrially rated, appropriate for the construction industry and compliant with the appropriate Australian or International Standard.

## 10.10 Substation Equipment

### 10.10.1 Principles and Rationale for Approach

Where a safe system of work at heights includes working on or from substation equipment, the system must be designed in accordance with Sections 4 to 7 of this Guide in addition to this section.

Wherever practical, the design, construction and or installation of substation equipment shall primarily adopt these Guidelines as prescribed, in particular by Sections 4, 5 and 6. This approach suggests that new assets shall be commissioned with safe access and/or work positions with respect to height safety.

### 10.10.2 Power Transformers Typical Methodology

Each type of power transformer can be unique in its own design so when access to or work on a power transformer is planned it shall consider all relevant aspects in determining a safe and practical approach to height safety issues.

Power transformers are typically between 2 and 4 metres in height. Full fall arrest PPE methodologies are generally not suitable for these heights due to the magnitude of the total fall distance. Full fall arrest PPE methodologies could be considered where a suitable attachment point above the personnel can be provided. The hierarchy of controls shall be applied in determining the most suitable access and/or work positioning systems.

For existing equipment where height safety issues have not been provided for, the work method statements shall plan and identify the elements of the proposed height safety system being selected. Where the hierarchy selects the use of a restraint technique, identification and agreement of suitable improvised anchors should be made as part of the pre-work risk assessment discussion.

For new equipment, height safety risks should be addressed at the design stage by applying the hierarchy of controls to both the power transformers, the electrical connections and associated substation civil works.

Analysis of installation, commissioning and maintenance tasks should identify access requirements and duration of all tasks likely to occur during the assets service life and provide reasonably practical solutions to height safety issues.

Examples of possible controls could include:

- Relocating equipment to ground level;
- Provision of a platform and railings around diverter access hatches;
- Ladder points near driveshaft connections;
- Platforms under Buchholz relays to allow inspection or bleeding; and
- Designated walkways defined with coloured non-slip paint across the tank lid.

Note: Railings may need to be removable to maintain electrical clearances in which case consideration should be given to use of lightweight temporary rails and PPE attachment points for initial installation.

Bund walls or noise enclosures may physically constrain safe access methods from either a MEWP, ladder or scaffold. Layout designs shall consider providing suitable space to provide safe access. If a ladder is required for work positioning, an anchorage point must be provided in the immediate work area.

The likelihood of slippery conditions due to transformer oil identifies the departure from and return to a ladder onto the transformer tank lid as a high risk. Best design practice should incorporate designated ladder access points with adjacent anchorage points that can be readily accessed for PPE attachment prior to departure from the ladder. Ladder access points should allow the ladders to be secured at the top and bottom.

Techniques that use equipment like maypoles or restraint lines that require installation prior to use shall consider the safe access and manual handling during installation.

### **10.10.3 Other Substation Equipment**

Outdoor switchyard equipment is typically erected on structures to maintain high voltage clearances and consequently have inherent height safety issues. Eliminating height risks by locating gauges or secondary equipment so it can be interpreted from ground level should be considered. Design principles of switchyard layout should consider MEWP access to equipment.

Secondary equipment such as lighting or security equipment mounted on structures should be located in areas that are readily accessible by MEWP whilst also considering high voltage clearance issues. Preference should be given to the use of telescopic or tilt equipment that can be installed and maintained from ground level.

## 10.11 Two Pole Distribution Substations

### 10.11.1 Principles and Rationale for Approach

As part of the risk assessment carried out on site, staff requiring access to the platform of a two pole distribution substation must put in place both appropriate safety measures to protect against a fall and also a rescue system.

A fall arrest system must be employed if:

- the access method is to be via a permanently installed vertical ladder, or
- there is doubt about the structural integrity of the flooring, supporting structure or railings of the platform.

The following additional issues not found in regular pole work may exist on two pole distribution substations:

- Potential for fall through the platform;
- Potential for fall over an edge, out of reach of rescuer;
- Potential to fall from vertical ladder;
- Potential to have to rescue a person from or suspended beneath the platform after an electrical incident; and

These additional issues must be addressed through the implementation of a suitable fall protection system.

### 10.11.2 Typical Methodology

When additional height safety measures are required to address the issues listed above a typical method for working on two pole distribution substations is as follows:

- Install two temporary anchor points (slings rated in excess of 22kN). This should be within reach of the access ladder so that the fall arrest system can be reached by the climber before getting onto the platform (eg. use the pole and low voltage crossarm); and
- Attach lightweight self-retracting lifelines and install and deploy the rescue equipment as required. Note: self-retracting lifelines must be provided for the rescuer.



# 11 Training

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## 11.1 General Requirements

Appropriate training shall be provided to persons involved in the design and implementation of height safety systems including those in the following categories:

- Managers and supervisory staff
- Designers of network infrastructure
- Persons involved in the specification of equipment during purchase (Technical purchasing officers)
- Safe work practice developers
- Persons using height safety systems
- Persons delivering height safety training; and
- Persons involved in the assessment of improvised anchors.

This training shall cover the principles, hazard identification, risk management, work methods and equipment as appropriate.

All training shall apply to the systems and practices established for the work to be conducted.

## 11.2 Training for Individuals Using Personal Fall Protection Systems

In addition to the above, all persons using height safety systems shall be trained in equipment care, inspections and correct use methods.

Training shall also include appropriate rescue techniques associated with the use of personal fall protection systems.

Training shall be competency based and will be required prior to using height safety systems. The competency assessment shall include a basic knowledge and demonstrated ability to use the equipment with safety and confidence, for example:

- Workers performing tasks on facades, awnings or similar structures must have successfully completed an approved working at height safety course that specifically targets working on awnings and roofs and the use of improvised temporary anchor points as well as training in performing a pre climbing assessment of awnings;
- Workers performing tasks on two pole substation platforms or similar structures must have successfully completed an approved working at height safety course that specifically targets working on these structures;
- Training for height safety on power transformers shall include identification and selection of appropriate improvised anchors, consideration of entanglement of safety lines, specific rescue techniques to suit the work method and avoiding overloading of anchor points and their connections; and
- All persons involved in tree works from within trees for the electricity supply industry must hold a Certificate II in Electricity Supply Industry Vegetation Control or equivalent.

Training should take place in the field or in a specialised training environment. Competency must be maintained and verified by regular assessment.

Persons in training must be supervised by a person competent in the skill being learned.

The introduction of new equipment or an evolution in design requires appropriate training be provided to users.

## 12 Rescue Systems

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### 12.1 Rescue System Requirements

A safe system of work at heights shall include provision for rescue which addresses the following requirements:

- The principles of section 5 must be applied to the design of the rescue system in order to minimise the risk to the rescuer. The system shall take account of the need to provide fall protection for the rescuer and potentially the rescuer and casualty together. Minimising the risk of manual handling injury to the rescuer shall also be considered;
- Adequate provision, based upon risk assessment, must be made for the timely rescue of a person where there is potential for that person to be suspended in a harness. Reliance on external emergency services agencies for first response is generally not acceptable;
- Where indicated by the risk assessment process to achieve a timely response, the work method should require rescue equipment to be set up appropriately ready for use if required;
- A rescue system must be put in place to enable the transfer of a person to a stable environment whenever there is the potential for that person to be suspended in a harness after suffering a fall;
- The rescue system shall consider the need for the effective rendering of first aid and other assistance appropriate to foreseeable contingencies related to the work process;
- Where the work is to be carried out remote from the access point, additional rescue devices may be required and must be conveniently located as near the work site as possible;
- By preference the provision for rescue should be inherent in the fall protection system rather than requiring the deployment of additional rescue equipment. For example, a safety line which is anchored at ground level via a locked-off device such that if a person on the safety line falls they can be lowered without delay and without the need for the rescuer to be "at heights" in order to effect the rescue; and
- Where practicable a rescue system should make use of aids such as MEWPs if readily available.

### 12.2 Nominated Risks

When developing a rescue and emergency response system for a particular working at heights situation the following risks must be considered:

- A person falling;
- A person who has suffered an arrested fall and who is unconscious suffering an occluded airway;
- A person who has suffered an arrested fall being affected by "suspension trauma"; and
- A person who is working at heights being injured and incapacitated by such things as electric shock, physical injury, snake bite, insect sting or allergic reaction.

### *12.3 Fall Protocol*

A fall protocol should be in place to cover those situations in which the extent of injury might not be initially obvious and the person suffering the fall or their supervisor might not respond appropriately without some guidance. This should include:

- The criteria or triggering event for determining if the protocol applies;
- A requirement for a person who has suffered a fall to receive medical assessment, and the type of medical assessment to be carried out - medical practitioner, hospital emergency department, etc.
- How a person who has suffered a fall may be transported to medical assessment - work vehicle, taxi, private vehicle, ambulance, etc.
- The period for which a person who has suffered a fall is to be observed / accompanied / not left alone;
- The requirements for reporting and notification; and
- The requirements for quarantine of height safety equipment involved in the incident for investigation purposes and its possible subsequent disposal.

## **13 Equipment**

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### *13.1 Scope*

This section applies to all height safety equipment nominated in a height safety system and does not detract from the requirements of other appropriate standards including AS 1891 series and ISSC 14.

### *13.2 Equipment Approval Methodology*

A process must be in place for the evaluation and approval of height safety equipment to be used by a work team. This evaluation must consider:

- Compliance with standards;
- Fit with the training that workers have previously received and the requirement for additional or different training;
- Suitability for the intended work process and rescue; and
- Fit with the organisation's existing arrangements for the whole of life management of height safety equipment.

### *13.3 Whole of Life Management of Height Safety Equipment*

Systems must be in place for the tracking and management of height safety equipment. Where applicable, such systems must be in accordance with ISSC 14. Where particular classes of equipment are not covered by ISSC 14 equivalent arrangements shall be put in place.

### 13.4 Strength Rating

All components shall have an appropriate strength rating in accordance with an AS/NZS or international standard. Guidance should first be sought from AS/NZS 1891 series of standards and the other standards referenced within.

Note that height safety equipment is usually rated with “*minimum breaking load*” (MBL) rather than the “*safe working load*” (SWL) or “*working load limit*” (WLL) rating normally applied to rigging or lifting equipment.

### 13.5 Compatibility with Work Process

Some work processes can damage height safety equipment. Processes involving heat, cutting equipment, or solvents and similar chemicals present special risks. Processes resulting in contamination that could clog items such as spring latches on connecting hardware may also be problematic. Height safety systems shall be assembled from equipment selected in consideration of such risks arising from the work process. It may be necessary to provide suitable protective covering for height safety equipment while in use to control the risk.

### 13.6 Compatibility of Equipment

Equipment from different manufacturers may be mixed in a single height safety system only if it has been established that the equipment is compatible and this has been documented. Establishment of compatibility may be assessed through Failure Modes, Effects and Criticality Analysis (FMECA), comprehensive physical trials, or through verification of common compliance with standards.

### 13.7 Climbing Helmets

In the event of an arrested fall there is the possibility of the climber's head striking obstructions below the work location or nearby due to the pendulum effect.

Where a safe system of work at heights includes the wearing of a safety harness (including tree works), and in particular the use of a fall arrest system, the risk assessment should consider the wearing of climbing helmets that provide improved protection from head strike.

Climbing helmets must comply with AS/NZS1801.

Note that a basic industrial safety helmet complying with AS/NZS1801 is designed primarily to protect from strike by falling objects and is not specifically designed to protect the head in the event of a fall.

Climbing helmets should have the following features appropriate to the design of the safe system of work at heights:

- Mounting points for ear muffs & face shield;
- Head torches; and
- Neck protection.

### 13.8 Suspension Trauma Relief Devices

A suspension trauma strap is a webbing loop carried on the harness and which allows a person to transfer their weight from the leg loops of their harness to their feet. This is intended to delay the onset of suspension trauma. Other devices may also be available to assist in this way.

In developing a height safety system which includes the potential for full fall arrest, the provision of suspension trauma relief devices should be considered.

### ***13.9 Personal Anchorage Slings***

A personal anchorage sling is a sling that may be placed around a pole or similar structure to provide an attachment point for climbing.

Personal anchorage slings shall not be used for lifting material or any purpose other than their intended use. A system should be implemented to ensure that personal anchorage slings are not used for any other purpose.

A personal anchorage sling shall have a minimum rating appropriate for the number of persons attaching to it and the most onerous configuration in which it might be used.

Personal anchorage slings shall only be “choked” if approved for this configuration.

If used in a “basket” configuration and connected directly to a snap hook, care must be taken to ensure that the angle between the legs of the sling is not excessive.

### ***13.10 Tools***

The tools used for the task must be selected and used such as not to increase the height safety risk. In particular:

- Small tools, equipment and materials that can be carried in suitable holders or containers without encumbering the climber may be carried by a climber;
- Other tools, equipment or materials must be lifted or lowered to the work position and not carried by a climber; and
- Tool holders or containers must not include fittings that might inadvertently be confused with the “D”-rings of the safety harness or interfere with the proper operation of height safety system attachment hardware.

### ***13.11 Rescue Equipment***

In the selection of devices for cutting webbing or rope in an emergency, consideration must be given to the risk of injury to the rescuer and the person being rescued from the device.

In conducting a rescue, insulating gloves may be subjected to potential mechanical damage that is different from their normal intended use. This must be considered in designing the rescue system.

Where the rescue techniques do not require the rescuer to utilise attached climbing techniques, a rescue belt may be used.

Where the rescue techniques require the rescuer to utilise attached climbing techniques, a full body harness must be used.

### ***13.12 Personal Energy Absorber***

When designing a height safety system in which the total fall distance is critical, the full extended length of any personal energy absorber must be ascertained and documented.

## Appendix A Referenced Documents

The following documents have been considered in the formulation of this document:

|                                                                               |                                                                                                                   |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| NSW Work Health and Safety Regulation 2011                                    |                                                                                                                   |
| National Code of Practice for the Prevention of Falls in General Construction |                                                                                                                   |
| WorkCover NSW<br>Codes of Practice                                            | Safe Work on Roofs, Part 1 Commercial and Industrial Buildings<br>2009                                            |
|                                                                               | Safe Work on Roofs, Part 2 – Residential Buildings 2004                                                           |
|                                                                               | Amenity Tree Industry – 1998 (Currently under review)                                                             |
| WorkCover NSW<br>Industry Safety Standards                                    | Erecting, Altering and Dismantling Scaffolding – Part 1:<br>Prefabricated Steel Modular Scaffolding – August 2008 |
| WorkCover NSW<br>Guides                                                       | Rigging, Part 1, Part 2 and Appendices - 1995                                                                     |
|                                                                               | Safe Working at Heights – 2006                                                                                    |
| WorkCover NSW<br>Safety Guide                                                 | No: 4503 Portable Ladders – February 1999                                                                         |
| WorkCover NSW<br>Position Papers                                              | Measures used to control the risks associated with working at<br>height – October 2002                            |
|                                                                               | Working off stepladders – August 2003                                                                             |
| ENA NENS 05 – 2006                                                            | National Fall Protection Guidelines for the Electricity Industry                                                  |
| ISSC 14                                                                       | Guide to Electrical Workers' Safety Equipment                                                                     |
| ISSC 24                                                                       | Guide to Electricity Workers' Escape & Rescue Procedures                                                          |
| AS 1657:1992                                                                  | Fixed platforms, walkways, stairways and ladders – Design,<br>construction and installation                       |
| AS/NZS1801:1997                                                               | Occupational protective helmets                                                                                   |
| AS/NZS 1891.1:2007                                                            | Industrial fall-arrest systems and devices – Part 1: Harnesses<br>and ancillary equipment                         |
| AS/NZS 1891.3:1997                                                            | Industrial fall-arrest systems and devices – Part 3: Fall-arrest<br>devices                                       |
| AS/NZS 1891.4:2009                                                            | Industrial fall-arrest systems and devices – Part 4: Selection,<br>use and maintenance                            |
| AS/NZS 1892.5:2000                                                            | Portable Ladders – Part 5: Selection, safe use and care                                                           |
| AS 2550.1:2002                                                                | Cranes, hoists and winches—Safe use, Part 1: General<br>Requirements                                              |
| AS 2550.10:2006                                                               | Cranes, hoists and winches—Safe use, Part 10: Mobile<br>elevating work platforms                                  |
| AS/NZS ISO 31000:2009                                                         | Risk management                                                                                                   |
| AS/NZS 4576:1995                                                              | Guidelines for scaffolding                                                                                        |
| HSE Research Report 258                                                       | Preliminary investigation into the fall-arresting effectiveness of<br>ladder safety hoops – 2004                  |
| The Policy and work practice documentation of ISSC member organisations       |                                                                                                                   |

## Appendix B Improved Anchor Selection Example: Transformer

The anchorage point shall be identified and inspected by a competent person.

Examples of suitable anchorage points include:

- Transformer lifting eyes and lugs;
- Collared eye-bolts attached to the transformer of 12mm or greater;
- Circular steel tube sections with an outside diameter of 50mm or greater that is fully welded and attached to the tank at regular intervals over its length;
- Inspection plate steel rod handles 8mm or greater fully welded at both ends;
- Flat metal plate or angle iron not less than 38mm wide x 5mm thick that are fully welded;
- The top of the turret that supports the HV bushing. (base of HV bushing); and
- Conservator tanks.

Care must be taken not to compromise the integrity of anchorage devices. Sharp edges will cause undue stress or damage to anchor slings or hardware.

**Structures which must not be used as anchorage points include handrails, kick plates, gratings, stair treads, piping (inferior to that described above) and pipe supports, electrical cables, porcelain items, mechanical equipment and electrical cable trays.**

Before a person transfers from the ladder to the transformer an evaluation of the intended work position anchorage points must be carried out while attached.