

LADDERS

ACCESS AND EGRESS PROVISIONS

LEARNING OUTCOME

Describe the requirements of the Work Health and Safety legislation and associated standards relating to the use, maintenance and inspection of ladders and access and egress provisions.

ASSESSMENT CRITERIA

- Identify the various types of ladders and their uses.
- Describe the statutory and minimum requirements relating to the use, maintenance and inspection of ladders.
- Describe the statutory minimum provisions relating to access and egress.

REFERENCES

- Work Health and Safety Regulation 2011
- Sections 306K – 306O (Construction Work Only)
- –Managing risks of Plant in the Workplace Code of Practice 2013
- AS/NZS 1657 – Fixed Platforms, Walkways, Stairways and Ladders
- AS/NZS 1892.1 – Metal Ladders
- AS/NZS 1892.2 – Timber Ladders
- AS/NZS 1892.3 – Reinforce Plastic Ladders
- AS/NZS 1892.5 – Portable Ladders – Selection, Safe Use and Care

LADDERS

PORTABLE LADDERS

A ladder is used for gaining access to areas above or below the ground, or other levels not provided with permanent access. It is important to realise that there are limits to the safe use of a ladder. Most accidents involving ladders occur because these limits are exceeded.

Portable ladders should comply with the requirements of the relevant Australian Standard and must be marked for 'Industrial Use' for use in a construction workplace:

- AS/NZS 1892.1 – 1996 Portable ladders Part 1: Metal
- AS 1892.2 – 1992 Portable ladders Part 2: Timber
- AS/NZS 1892.3 – 1996 Portable ladders Part 3: Reinforced plastic
- AS/NZS 1892.5 – 2000 Portable ladders Part 5: Selection, safe use and care

GENERAL RULES

When using portable ladders, the following points should be observed:

All ladders should be adequately supported at the base

Wet grass with soft soil beneath it, or a makeshift support under one side, are not acceptable. If the surface is too soft to support the ladder, use a plank or board under the feet of a ladder to stop them from sinking. Depending on the degree of unevenness, a plank or board under one or both feet may be adequate, providing the plank(s) are stable, i.e. much wider than the thickness, and large enough not to sink into the ground on one side. If the ground is uneven, use a purpose-made device to steady the ladder. Do not erect a ladder on a slippery surface; its stability depends on the friction at the base of the ladder.

A ladder should never be 'walked' by the person standing on the ladder

The word 'walked' above describes the action of a person standing at the top of a ladder who, by moving their body, causes the bottom of the ladder to lift the ends of the stiles alternately to cause the ladder to move. This is a very dangerous practice, since the ladder is not under proper control.

Set the ladder at a slope of approximately 4 in 1

For every metre in height, the ladder should extend out from the vertical surface at the base by about 250 mm. This will minimise the chance of the ladder falling backward or the bottom of the ladder sliding away from the wall, and is the most comfortable and safe slope for climbing and working from the ladder.

One ladder, one person, and it is recommended that one should always have three limbs on the ladder at all times

This means either two feet and one hand, or one foot and two hands on the ladder when ascending, descending, or working on the ladder. To achieve this, always carry your tools in a tool belt, holster or pouch, not in your hands. Never attach a power tool to the side of a ladder when it is not in use.

Beware of contacting power lines when putting a ladder into position. If you **must** work near

power lines, including supply lines into a building, have them de-energised, or highlighted with 'tiger tails', before placing the ladder. In addition, any ladder used near power lines should be non-conducting, such as timber (without wire reinforcement, or with the wire reinforcement recessed and insulated) or reinforced plastics, but **NOT aluminium or any metal**.

Never climb higher than the third rung from the top of the ladder

The ladder should be long enough to provide at least one metre (1 m) of solid support beyond the height of the task. Where it is necessary to get onto or off at the top of the ladder, it should extend at least 1 m above the level being accessed. As a general rule, a ladder should be used as a means of access and not a place of work. If it is necessary to work from a ladder, do not climb higher than a position where the worker's shoulders are level with the top of the stiles. This allows for a secure hold to be maintained while working. Only use a ladder as a place of work if the worker can grasp the ladder near waist height, and only for tasks which allow the worker to hold the ladder with one hand. Ladders should be placed in a manner that permits the worker to face towards both the ladder and the task without leaning over the side of the ladder. When working from a ladder, **always work within easy arm's reach from the ladder**. This minimises the possibility of overbalancing and falling off. Extra care should be taken when painting eaves and fascia boards, as the ladder is usually below the work height.

Ladders should not be used outdoors when strong winds are blowing. If their use cannot be avoided under these conditions, the ladder must be firmly secured by tying it off or by other acceptable methods. While the ladder is being secured, it must be held firmly by another person.

Ladders are to be fitted with rubber (or similar non-slip material) feet to prevent slipping.

Ladders shall be firmly secured, or tied off. If tied, the ties should be attached to the stiles of the ladder, **not** the rungs. While the ladder is being secured, it should be held firmly by another person.

If it is not practicable to tie off or secure a ladder for whatever reason, the ladder must be 'footed' at the base by another person with both hands on the stiles to prevent any movement or overturn of the ladder.

Fully enclosed slip resistant footwear should always be worn when using ladders.

Ladders should be stored under cover, with adequate support to prevent sagging.

TYPES OF LADDERS

Extension Ladders

Extension ladders such as rope and pulley types, are suitable for accessing high areas such as rooftops and tall trees. One specialist design is the pole ladder, which has a curved top rung to give the ladder stability when used for accessing a pole or round column. To erect a rope and pulley ladder, place the unextended ladder into position and then extend it a few rungs at a time, using the rope. Always ensure that the latching hooks are properly engaged after each extension.

Some extension stepladders made before August 1996 used spring clips to retain the extended rear legs. While they may be used safely when the top of the extended ladder rests against a wall, **they are not safe if the top of the ladder is above the wall – when a person steps off or onto the ladder the clips may disengage and allow the ladder to fold. These extension stepladders must never be used in this configuration.** Such ladders do not conform to the requirements of AS/NZS 1892.1: 1996.

Long ladders and heavy ladders (greater than 20 kg) should only be handled by **two persons**.

Stepladders

Stepladders should only be used in the fully open position. They should be positioned on a stable surface, with no tendency to wobble. They should be made as rigid as possible by the use of side braces. Some specialised types of step ladders have a working platform for standing on at their top; this platform should be surrounded by a handrail. Platform ladders should only be used for handling items that are located at a height compatible with the height of the platform.

Multipurpose Ladders

Where used as a single ladder, the length of the front edge of the stile, including feet, shall not exceed 9 m for industrial ladders.

Where used as a stepladder, the length of the front edge of the stile, including feet to the centre of the hinge pivot-pin, shall not exceed 5.1 m for industrial ladders.

Where used as a stepladder, the slope of the front and rear stiles shall not be less than 65 degrees and not greater than 80 degrees above the horizontal.

Where used as a work platform, the slope of the front and rear stiles shall not be less than 65 degrees and not greater than 80 degrees above the horizontal.

Maximum length of ladders listed in AS/NZS 1892 – 1996 Parts 1 and 3, and AS 1892 – 1992, Part 2 are:

	Single	Extension	Stepladders	Trestle
Metal ladders and reinforced plastic ladders	9 m industrial 5 m domestic	15 m industrial 7 m domestic	6.1 m industrial 2.4 m domestic	5 m
Timber ladders	Runged 9.2 m Cleated 4.9 m	15.3 m	5.5 m industrial 2.4 m domestic 5.5 m platform	5.1 m

- Industrial ladders have a load rating of 120 kg
- Domestic ladders have a load rating of 100 kg

Domestic ladders should NOT be used in an industrial environment.

MAINTENANCE

Metal Ladders

Ladders should be checked frequently and maintained in good condition. All pivoting or rotating surfaces should be lubricated with light machine oil. Bolts and rivets should be present and secure before the ladder is used. If a bolt or rivet is found to be loose or missing, the ladder should not be used until repairs are completed. Ladder feet that are excessively worn or missing should be replaced before use. Ropes showing sign of fraying, wear, rot or other damage, should be replaced. Under no circumstances shall any temporary repairs be made to any ladder.

Broken or bent ladders or ladders with parts missing shall be marked and taken out of service until they are repaired by a competent person or destroyed in such a manner as to render them useless, e.g. by cutting into lengths of approximately 1 m, or not more than two rungs. Repairs carried out to ladders shall not weaken the ladder from the original design specification. Due to the complexity of design, material specification and the requirement for electrical non-conductivity, refer to the original manufacturer or importer for advice or information prior to starting any repairs to damaged stiles.

Reinforced Plastic Ladders

Ladders should be maintained in good condition, clean and free from splinters. Fittings and rungs or treads should be tight and securely attached. Pivoting and rotating components should be lightly oiled and all moving parts should operate freely without bending or play. Ropes showing signs of fraying, wear, rot or other damage should be replaced.

Under no circumstances shall any temporary repairs be made to any ladder.

If the surface of a reinforced plastic ladder has degraded, for example, as a result of exposure to ultraviolet radiation, some reinforcing fibres may become exposed.

The ladder stiles should be washed with a commercial solvent or liquid detergent solution compatible with the stile material and allowed to air dry. The stile should be coated with a polyurethane or acrylic lacquer. More than one coat of lacquer may be required to fully encapsulate the exposed fibres.

Broken, cracked, delaminated, split, fractured, crushed or bent ladders or ladders with parts missing shall be marked and taken out of service until they are repaired by a competent person or destroyed in such a manner as to render them useless, e.g. by cutting into lengths or approximately 1 m, or not more than two rungs. Repairs carried out to ladders shall not weaken the ladder from the original design specification. Due to the complexity of design, material specification and the requirement for electrical non-conductivity, refer to the original manufacturer or importer for advice or information prior to starting any repairs to damaged stiles.

Timber Ladders

Ladders should be maintained in good condition, clean and free from splinters, spilt paint or other opaque deposits. Fittings and rungs or treads should be tight and securely attached. Pivoting and rotating components should be lightly oiled and all moving parts should operate freely without bending or play. Ropes showing signs of fraying, wear, rot or other damage should be replaced.

Under no circumstances shall any temporary repairs be made to any ladder.

Broken, spilt or bent ladders, ladders with parts missing or otherwise damaged ladders, shall be marked and taken out of service until they are repaired by a competent person or destroyed in such a manner as to render them useless, e.g. by cutting into lengths of approximately 1 m or not more than two rungs. Repairs carried out to the ladder stiles shall not weaken the ladder from the original design specification. Due to the complexity of design, material specification and requirement for electrical non-conductivity refer to the original manufacturer or importer for advice or information prior to starting any repairs to damaged stiles.

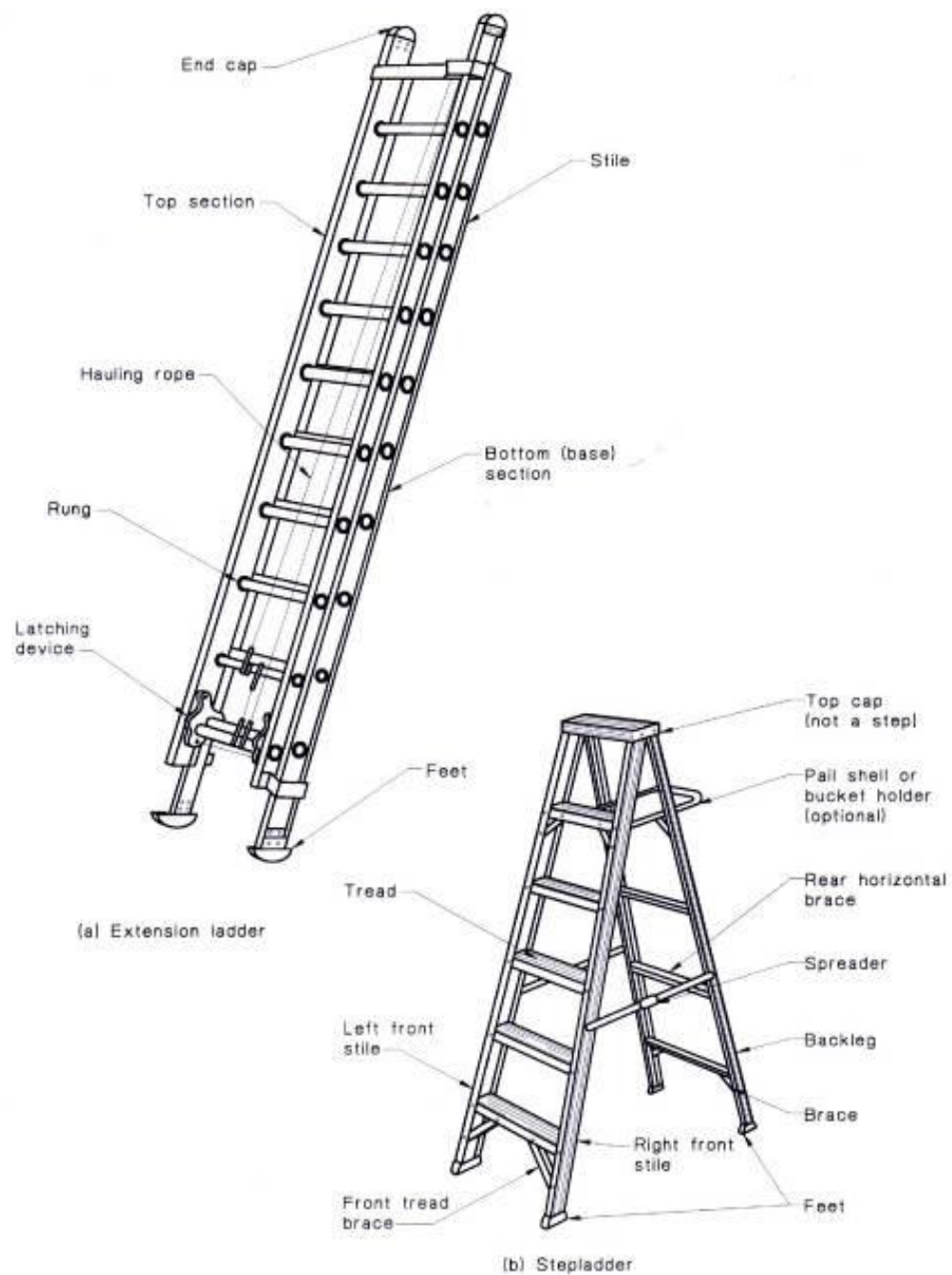
Note: Wooden ladders should **never** be painted. If a preservative is used, it should be transparent and remain transparent during the life of the ladder to enable visual inspections to detect deterioration or defects.

Inspection

A thorough ladder inspection should be made:

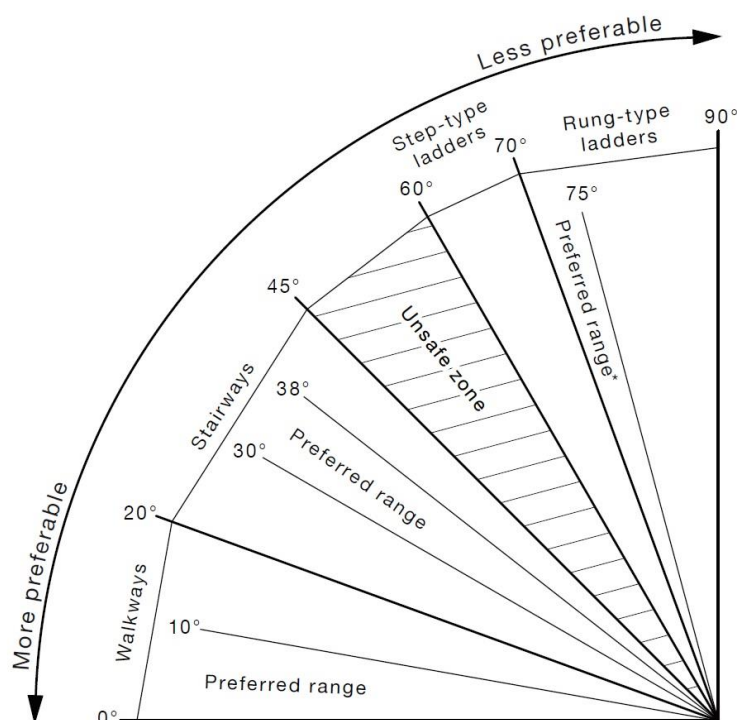
- when originally purchased, received and put into service
- before each use
- after mishaps, drops and impacts
- periodically.

Particular attention should be paid to shakes in the timber, loose rungs or treads, twisting and racking, evidence of termites, borers and decay, and corrosion of metal parts. Where any defect is found, the ladder shall be marked and taken out of service for their repair by a competent person or destruction.



Components and terms relating to ladders

STAIRWAYS – AS1657 – Fixed platforms, walkways, stairways and ladders



STAIRWAYS

Width and angle of slope

Stairways shall be not less than 600 mm wide, measured between the inside edges of the stiles. The clear space between handrails and midrails shall be not less than 550 mm. The angle of slope between the stiles and the horizontal shall be not less than 20° and not greater than 45°.

Handrails

Every 'stairway' shall be provided with at least one handrail that is continuous between stair flight landings and have no obstruction on or above them that will tend to break a handhold.

Generally handrails must be

- located along at least one side of the ramp or flight; and
- located along each side if the total width of the stairway or ramp is 2 m or more; and
- in a primary school assembly including a trade workshop laboratory or the like
 - (a) have one handrail fixed at a height of not less than 865 mm; and
 - (b) have a second handrail fixed at a height between 665 mm and 750 mm, measured above the nosings of stair treads and the floor surface of the ramp, landing or the like; and
- in any other case, fixed at a height of not less than 865 mm measured above the nosings of stair treads and the floor surface of the ramp, landing, or the like; and
- continuous between stair flight landings and have no obstruction on or above them that will tend to break a hand-hold; and
- in a required exit serving an area required to be accessible, designed and constructed to comply with clause 12 of AS 1428.1 Design for access and mobility - General requirements for access - New building work.

NOTE: For machinery rooms, boiler houses, lift-machine rooms, plant-rooms, non-habitable rooms, such as attics, storerooms and the like that are not used on a frequent or daily basis in

the internal parts of a sole-occupancy unit, every stairway shall be provided with at least one handrail that is continuous between stair flight landings and have no obstruction on or above them that will tend to break a handhold and may comply with AS 1657, where the width of the stairway exceeds 1000 mm, a handrail shall be provided on each side.

Flights

The number of risers in a flight shall be not less than two and not more than 18. Where there is more than one flight, adjacent flights shall be connected by a landing complying with Landings below.

A means of preventing a person from falling more than 36 risers shall be provided, which shall include

- a barrier;
- a landing not less than 2 m in length; or
- a change in direction of the stairway of not less than 90°.

Landings

Any landing at a point of access to the stairway and any intermediate landing in the stairway shall be designed and constructed for the appropriate load rating and the following:

- The length of the landing shall be not less than 600 mm.
- The width of the landing shall be not less than the width of the stairway.
- The landing shall have minimum headroom of 2000 mm.
- Every access landing shall provide standing space of not less than 600 mm clear of cross-traffic, door swing or any other structure.

Treads

Flooring materials for treads shall be made of suitable material and may be

- Wood
- Metal Plate
- Concrete, or
- Expanded metal

The surface of every tread shall extend across the full width of the stairway and the tread surface shall be slip-resistant.

Risers and goings

All risers and all goings in the same flight of stairs shall be of uniform dimensions within a tolerance of ± 5 mm.

NOTE: In some cases, it may be necessary to modify the landing at the base of the stairway to achieve uniformity in the risers.

- A riser (R) shall be not less than 130 mm and not greater than 225 mm.
- The going (G) shall be not less than 215 mm and not greater than 355 mm.
- The going shall be not greater than the tread depth (TD) plus a maximum gap of 30 mm between the rear edge of one tread and the nosing of the tread above.

The combination of twice the riser plus the going ($2R + G$) shall be not less than 540 mm, and not greater than 700 mm [i.e. $540 \leq (2R + G) \leq 700$].

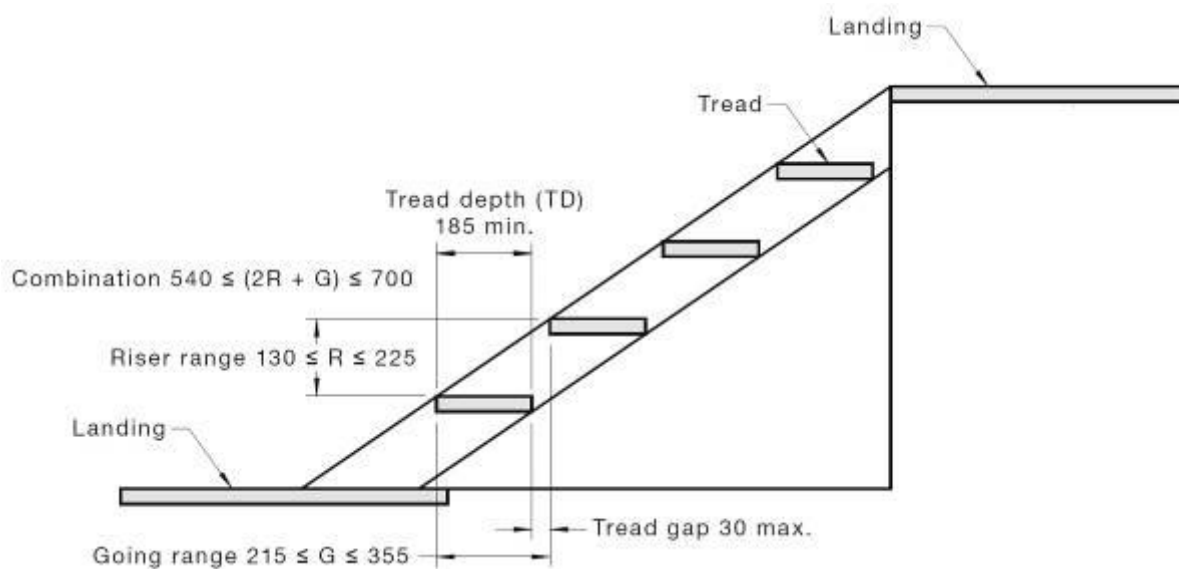
Headroom

The minimum headroom shall be 2000 mm. In applications where helmets are worn, additional headroom may be necessary to accommodate the effective increased height of a person. In limited applications where the minimum headroom cannot be achieved, other measures should

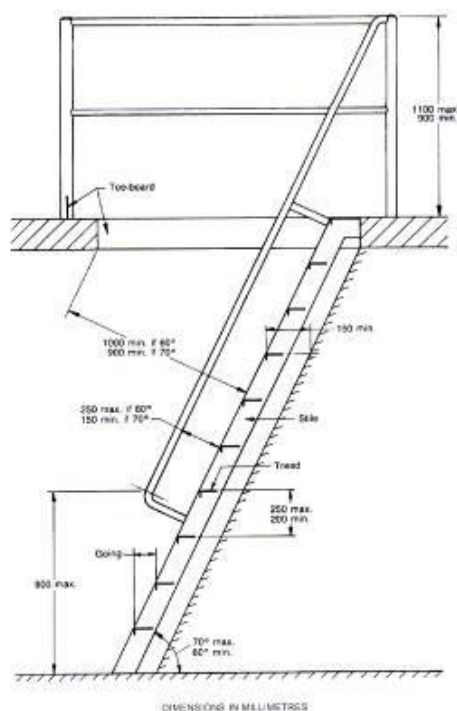
be taken to protect the health and safety of users such as padding, highlighting, signage and additional lighting.

Nosing

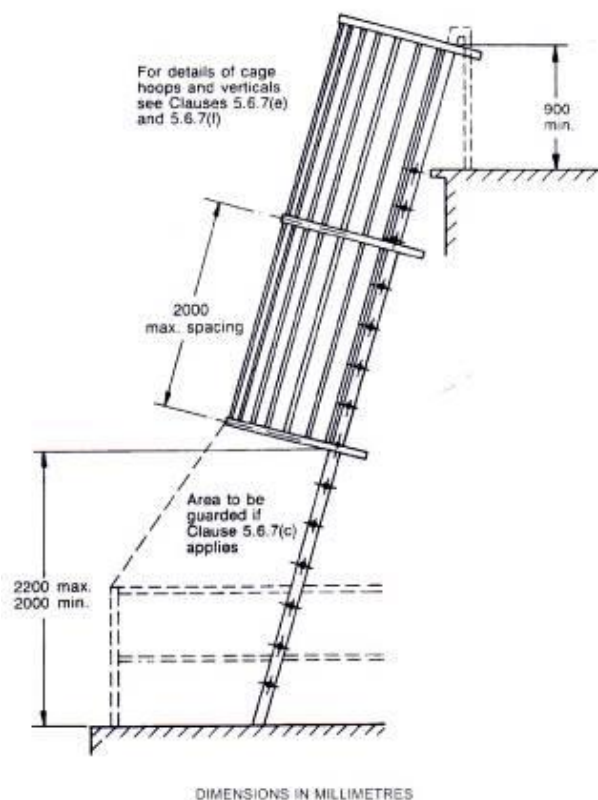
The nosing shall be such that the edge of the tread is clearly visible against the background, especially where the stairs could be used in a variety of lighting conditions.



Rise, going and actual tread depth
Stairway rises and goings



Clearances for step ladders



Ladder cage

Version	Date	Author
1	30/06/2018	WHSQ