



# Play Equipment Standards Overview

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# Play Equipment Standards Overview Part 1 – Playgrounds Standards



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## Current Playgrounds Standards

- AS 4685, Part 0 (2017)  
Playground equipment and surfacing: Development, installation, inspection, maintenance & operation.
- AS 4685, Parts 1-6 (2021) & 11 (2014) / NZS 5828 (2015)  
Playground equipment: Safety requirements and test methods.
- AS 4422 (2016)  
Playground surfacing - specifications, requirements and test method.
- AS 3533.4.2 (2013)  
Contained Play Facilities (i.e. enclosed units within commercial premises)
- AS16630 (2021) not covered in this presentation, but includes many of the principles of AS4685  
Permanently installed outdoor fitness equipment – Safety requirements and test methods.
- AS EN 16899 (2020) not covered in this presentation, but includes many of the principles of AS4685  
Parkour equipment – Safety requirements and test methods.
- AS EN 14974 (2021) not covered in this presentation  
Skateparks – Safety requirements and test methods.

Not legislated so no legal requirement to conform to AS but playgrounds should conform to at least the "Safety Requirements". If an issue falls into a grey area of AS but has been deemed acceptable then put reason in writing, usually based on a risk/benefit assessment.

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## Playgrounds Standards

- AS 4685 and NZS 5828, Parts 1-6 & 11 are simply an adoption of the European Standard EN1176 (2017), Parts to 1-6 & 11; Page for page, word for word, figure for figure.
- As such, discussion on Parts 1-6 & 11 of the Standards are applicable to both the Australian and new NZ Standards.
- However, there are Appendices that list specific variations for Australia (App ZZ) and New Zealand (A to C – very few variations).
- NZS5828 also includes Parts 7 (guidance) and 10 (enclosed play) of the EN, and EN1177 (impact surfacing). The equivalents in Australia are, respectively: AS4685.0, AS3533.4.2 and AS4422.
- AS16630 (Fitness) is also an adoption of the equivalent European Standard EN 16630 (2015) with an Appendix ZZ listing specific variations for Australia.
- AS EN 16899 (Parkour) and AS EN 14974 (Skateparks) are both a direct adoption of the EN with no variations.

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## Playgrounds Standards

- Both the Australian and NZ Standards are adopted from European Standards to allow play equipment manufacturers in Australia, NZ and overseas to trade with reduced barriers.
- As such equipment certified to EN1176 should generally also meet AS4685 and/or NZS5828.
- However there are variations for Australian and New Zealand that need to be checked for imported equipment, and sometimes auditors may not agree with the outcome of an assessment done overseas – just like auditors in the same office sometimes don't agree on Standards interpretations! **The Standards have many subjective clauses in them.**

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## AS4685.0 - Inspection Regime

- **Comprehensive (and Post-Installation)**  
Full check including assessment against design Standards. Typically done annually by an independent auditor.
- **Operational**  
Check of operation and stability of equipment, especially for wear (e.g. bearings, chains), loose fasteners, protrusions, corrosion, rope fraying, swing and cableway ground clearance. Undertake every 1 to 3 months depending on size and usage.
- **Routine**  
Identification of obvious hazards such as damaged parts, vandalism, broken glass, rubbish, mulch displacement, etc. Undertake at least once a week, more at busier playgrounds.

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## Play Equipment Standards Overview

### Part 2 – Scope and Risk



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## Scope of AS4685 / NZS5828

- To specify safety requirements for playgrounds.
- It has been prepared with full recognition of the need for supervision of young children and of less able or less competent children.
- To ensure a proper level of safety in, on or around playground equipment, and at the same time to promote activities and features known to benefit children because they provide valuable experiences that will enable them to cope with situations outside the playground.
- To protect the child from hazards that they may be unable to foresee when using equipment as intended, or in manner that could be reasonably anticipated.

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## Risk and AS4685 / NZS5828

Notes relating to risk listed in the Introduction of AS4685.1 / NZS5828

- Risk-taking is an essential feature of play provision.
- Play provision aims to offer children the chance to encounter acceptable risk.
- Exposure to some degree of risk may be of benefit because it satisfies a basic human need and gives children the chance to learn about risk and consequences in a controlled environment.
- Aim at managing the balance between the need to offer risk and need to keep children safe from serious harm.

Other notes on risk

- Similar statements are made in the Forward of AS3353.4.2.
- Play should be as safe as necessary not as safe as possible. (Royal Society for the Prevention of Accidents)
- Play opportunities should not be limited by an over-emphasis on the provision of a 'safe' playspace.

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## Risk Statement

*Given children's appetite for risk-taking, one of the factors that should be considered is the likelihood that children will seek out risks elsewhere, in environments that are not controlled or designed for them, if play provision is not challenging enough. Another factor is the learning that can take place when children are exposed to, and have to learn to deal with, environmental hazards. Play provision is uniquely placed to offer children the chance to learn about risk in an environment designed for that purpose, and thus to help children equip themselves to deal with similar hazards in the wider world.*

(Ball, Gill and Spiegel (2008), *Managing Risk in Play Provision: Implementation Guide*, Play England) 11

## Kids Will Take Risks Anywhere

*Risk in play provision can help children deal with hazards elsewhere*



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## Risk Matrix used by Play DMC

This is based on the International Standard for Risk Management: ISO31000  
Organisations may have their own matrix with slightly different risk levels

For each hazard and defect identified in a playground a risk assessment should be undertaken to assist with prioritising works. The following needs to be determined:

- The likelihood of an accident occurring (ie. no chance to highly probable).
- The expected consequences of the accident (eg. minor to permanent injury).

This is then used to determine the Level of Risk of the hazard using the matrix shown below.

Injury Type		Little/None 1	Minor 2	Moderate 3	Serious 4	Permanent 5
Likelihood	Highly unlikely E (1)	Very Low (1)	Very Low (2)	Low (3)	Low (4)	Moderate (5)
Unlikely D (2)	Very Low (2)	Low (4)	Moderate (6)	Moderate (8)	High (10)	High (15)
Possible C (3)	Low (3)	Moderate (6)	Moderate (9)	High (12)	High (15)	Extreme (20)
Likely B (4)	Low (4)	Moderate (8)	High (12)	High (16)	Extreme (20)	Extreme (25)
Very likely A (5)	Moderate (5)	High (10)	High (15)	Extreme (20)	Extreme (25)	Extreme (25)

As assessments of likelihood and consequence are subjective and likely to differ over time and between individuals.

### Expected Injury Type Examples:

- 1 (Little-None) - scratches, pinching, minor bruising      2 (Minor) - surface cuts, major bruising  
3 (Moderate) - deep cuts (stitches), hairline fracture      4 (Serious) - full fracture, digital amputation/crush  
5 (Permanent) - amputation/crush (non-digital), spinal damage, brain damage, death

Remember: Many risks may be deemed acceptable subject to benefits of play assessment.

In AS4685.0 (2017) there is even a statement in Cl.8.5.2 that "A playground may be opened if it contains non-conformances that do not present unacceptable risk to users". This would be subject to risk / benefits assessment.

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## Play Equipment

### Standards Overview

#### Part 3a – AS4685.1 / NZS5828.1

#### Fall Height and Impact Areas



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## Falling & Free Space

- Impact Area (Cl.3.3)** (Previously this was called the Fall Zone)  
Area that can be hit by a user after falling through the falling space.
- Falling Space (Cl.3.8)**  
Space in, on or around the equipment that can be passed through by a user falling from the equipment.
- Free Space (Cl.3.6)**  
Space in, on or around the equipment that can be occupied by a user undergoing a movement forced by the equipment (e.g. sliding, swinging, rocking). Generally 1m for sitting and standing; and 0.5m for hanging.  
Important when determining how much impact areas can overlap, and when considering entrapments.

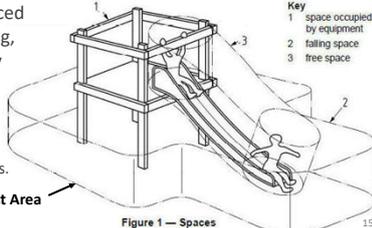


Figure 1 – Spaces

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## Falling Space Protection

- The falling space shall not contain any obstacles onto which a user could fall and cause injuries.  
(although minor knocks and bumps could be possible)
- However the following may be in the falling space:
- Adjacent parts of play structures with a Free Height of Fall difference <600mm.
  - Parts bearing or containing the user, or helping the user to keep balance.
  - Parts with an inclination of 60° or more from the horizontal (as only glancing contact). (Cl.4.2.8.4)
  - Clusters can still be used. That is, where separate pieces are designed to be installed in close proximity for continuity in a sequence of play. (Cl.3.20)

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## Easily Accessible

The extents to which equipment elements are Easily Accessible can affect the maximum allowable Free Height of Fall for Steep Play Elements (see next slide).

- Requires only basic skills to access equipment, allowing users to move freely and quickly, without further considerations about the use of hands and feet. (Cl.3.25)
- Stairs, Ramps, Ladders where the first rung is <=400mm high, and Tiered Platforms with a height difference <600mm between platforms are all considered Easily Accessible.
- Designs which can delay access thus giving more time for carers to intervene as appropriate would not be considered Easily Accessible.

(Cl.4.2.9.5)

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## Steep Play Elements

- A Steep Play Element is an Access/egress play element of a gradient greater than 45 degrees from the horizontal. (Cl.3.28)
- Where there is a Steep Play Element on an Easily Accessible part of the equipment, the Free Height of Fall shall be <=2.0m (or <=1.8m for Aus SECS, 1.5m for NZ SECS)
- Any barrier openings shall be <=500mm wide, or <=1200mm wide if not Easily Accessible.
- Barrier Openings with a FHof >1m shall have hand supports that comply to grasp. (Cl.4.2.9.4)

SECS – Supervised Early Childhood Settings (eg. kinders, preschools, childcare)

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### Easily Accessible & Steep Play Elements example



There is easy access provided by the stairs and the ladder hence the steep play elements (fire pole, scramble net, rock climbing wall and ladder) can only have a maximum FHO=2.0m. The openings at the top of these must be <=500mm wide. Note: non-easily accessible Steep Play Elements can be up to 3m high and have openings up to 1200mm wide with a guardrail over the top (often a centre horizontal rail is used).

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### Free Height of Fall (FHO)

Greatest vertical distance from the clearly intended body support to the impact area below. (CI.3.7)

- Standing foot support to surface below
- Sitting seat to surface below (CI.4.2.8.1)
- Hanging hand support to surface below (where support is by hands only and whole body can be lifted up)
- Climbing foot support, or hand support -1m. (which ever is higher) (when body support is combination of feet/legs and hands)

**Unintended Access:** CI.3.7 indicates that intended body support includes those surfaces to which access is encouraged. The AS4685.0 Foreword indicates that unintended access should be discouraged through the elimination of unnecessary handholds and footholds, the inclusion of physical barriers, and the use of dimensions and profiles that are intrinsically difficult for children to climb.

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### Free Height of Fall (FHO)

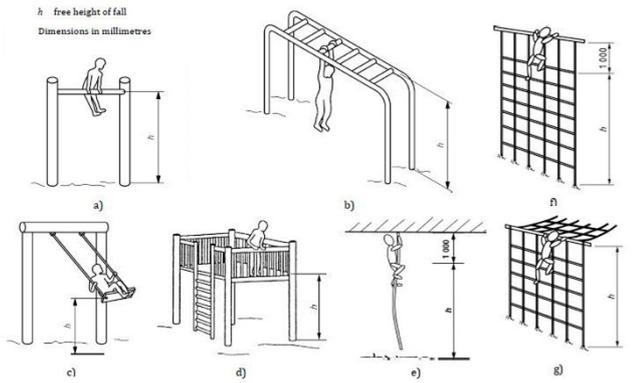


Figure 14 – Examples showing Free Heights of Fall (Annex F also gives many more examples)

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### FHO Typical Height Limits

- Generally 3.0m (e.g. climbers, platforms not Easily Accessible)
- Steep Elements 2.0m (or 3.0m if not Easily Accessible)
- Early Childhood 1.8 or 1.5m for moveable equipment (Aus) (this is not in the EN) 1.2 – 1.7m depending on equip't type (NZ)
- Bouncing 0.7m (above bed + bed can be up to 0.6m high=1.3m)
- Swing Seats 3.0m (when seat is raised by 60 degrees)
- Cableways 2.0m (sitting type cableway) 1.5m (hanging, measured 1.5m below grip)
- Carousels 1.0m (hanging is measured 1.5m below grip)
- Rockers 1.0m (or 1.5m for axial seesaws) 2.0m (for sweeping & overhead seesaws)
- Spatial Networks 3.0m (highest foot position giving unimpeded fall)

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### Fall Heights & Impact Area Graph

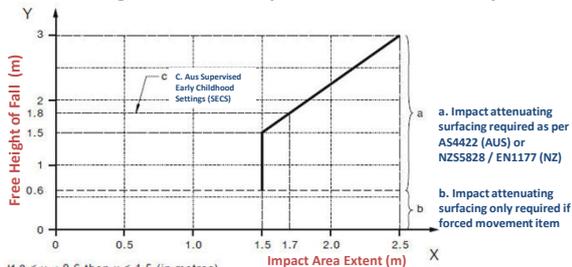


FIGURE 17 MINIMUM EXTENT OF IMPACT AREA

$0 \leq y < 0.6$  then  $x \leq 1.5$  (in metres)  
 $0.6 \leq y \leq 1.5$  then  $x = 1.5$  (in metres)  
 $y > 1.5$ , then  $x = 2/3 y + 0.5$   
 $y = 1.8$  then  $x = 1.7$

**LEGEND**  
 y = free height of fall  
 x = minimum dimension of impact area  
 a = impact attenuating surface with requirements (4.2.8.5.2)  
 b = surface provided in accordance with 4.2.8.5.3  
 c = maximum free height of fall and impact area for SECS (Aus: 1.5-1.8m. NZ: 1.2-1.7m)

Exception: if the height difference between adjacent platforms is <=1m then the lower platform does not require impact attenuation. (CI.4.2.8.5.4)

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### Specific equipment type IMPACT AREA requirements

(further details on these items are also provided later)

- Bouncing 1.5m (or 2m if bed area is >1.44m<sup>2</sup>), or Facilities: 3.0 if predetermined jumping to the outside
- Swings: (where "L" is the swing seat suspension length)  
 Swing Direction Impact Area (m) =  $0.867 * L + 2.25m$   
 or pull the seat out 60 degrees and add 2.25m. → or +1.75m if impact area level with adjacent surface, or +1.75m if at a SECS (Aus), or +1.5m if at a SECS (NZ).  
 Width = 1.75m (or 0.625m to the sides of seats >500mm wide)
- Slides: The impact area extents relate to the heights as per AS4685.1, apart from the runout which is 1m to the sides, and 1, 1.5 or 2m beyond the end (depending on the slide length and type of runout section)
- Cableways: 2m to the sides and 2m beyond the end swing (at 45°)
- Carousels: 2m (or 3m for giant revolving disks) with surfacing rated to a 1.0m height 1.5m for bowl-like carousels and spin poles.
- Rockers: 1m (or 1.5m for rockers intended for standing on) As per FHO graph for sweeping & overhead seesaws

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# Play Equipment Standards Overview

## Part 3a – AS4685.1 / NZS5828.1

### Barriers, Guardrails, Handrails



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## Barriers / Guardrails

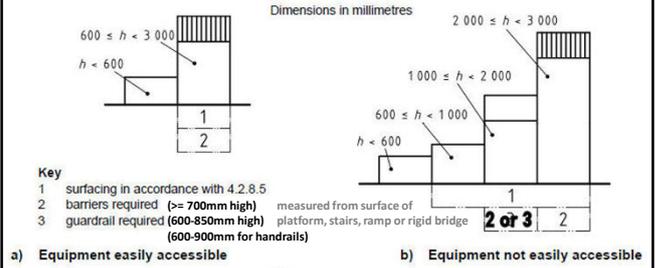


Figure 8 — Protection against falling

### Supervised Early Childhood Settings (SECS)

Australia: Barriers (>=700mm high) must be used for 0.6-1.8m high decks (formerly just for 1.2-1.8m).  
Single handrails are to be between 450-700mm high, double are to be between 450-900mm high.  
Australia and NZ: Moveable play equipment items do not require handrails, guardrails or barriers.

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## Barrier Openings

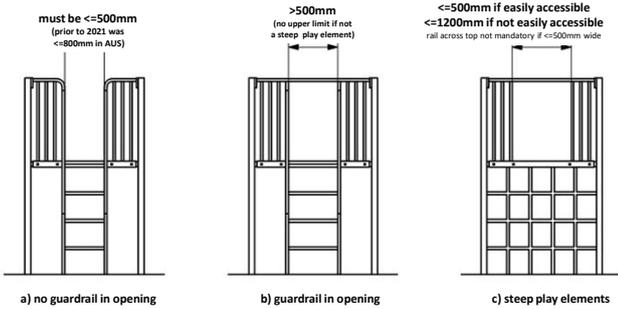


Figure 10 — Entrance and exit openings in barriers

Openings at the top of Steep Play Elements with a FHoF >1m shall have grip/graspable hand supports. For stairs, ramps and bridges the opening in the guardrail or barrier shall be no greater than the width of these elements (eg. if stairs are 2m wide then the opening can be 2m wide).

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## Handrails (Cl.4.2.4.2)

- Single Handrail: Height = 600 - 900mm(Aus) / 850mm(NZ)  
Handrail height is measured from the centre of a stair tread.  
Handrails shall conform to the requirements for grasp.
- AS4685 has an exception for SECS, being 450-700mm.
- AS4685 also specifically indicates that two or more handrails can be used as long as the upper one is at the required height and spacing is such that there are no entrapments.
- Stairs / Ramps / Bridges Handrail Requirements (Cl.4.2.9.2 / 4.2.9.3)  
Barriers OR guard/handrails can be used for Rigid Bridges and stairs/ramps to decks up to 1.0m high, provided the gap under the lower rail is <600mm (which could mean that an upper handrail would also be required).  
If the deck is higher than 1.0m then barriers shall be used.

Handrails can be used for non-easily accessible Rigid Bridges up to 2m high.

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## Means of Access (Cl.4.2.9)

### Ladders

Equal spacing is required between the rungs only. (NA to rope ladders)  
Rung / step spacing shall conform to head entrapment requirements.  
There shall be unobstructed space >=90mm to rear from the rung centres.  
Rungs and/or styles shall conform to grip or grasp (OR have handrails that do).

### Stairs

Inclination shall be constant with equally spaced treads.  
Tread Projection >=140mm. Tread depth >=110mm.  
Intermediate landing required for stairs >2m high.

### Ramps

Can be inclined at a constant angle of up to 38°.  
Ramps expected to be used by all children shall include means to improve foot grip.

No Limits of Slope are specified for stairs and ramps but the AS (but not EN / NZS) has a Figure 101 to provide GUIDANCE only on this.

This is from an AS relating to access to places normally used by servicing/works personnel. I think the less / more preferable text should be ignored.

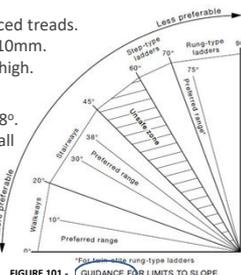


FIGURE 101. GUIDANCE FOR LIMITS TO SLOPE

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# Play Equipment Standards Overview

## Part 3a – AS4685.1 / NZS5828.1

### Entrapments



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## Entrapment Types (CI.4.2.7)

Listed below are entrapment types specifically discussed in the Standards, with details provided on the following pages.

- Head Entrapment (CI.4.2.7.2)
- Neck Entrapment (CI.4.2.7.2)
- Clothing / Hair Entrapment (CI.4.2.7.3)
- Whole Body Entrapment (CI.4.2.7.4)
- Foot or Leg Entrapment (CI.4.2.7.5)
- Finger Entrapment & Crush (CI.4.2.7.6)

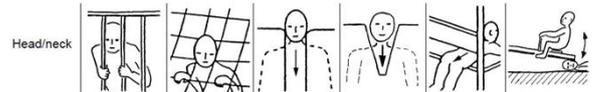
**General Requirements:** Distortion of materials that can occur during use should be taken into account when assessing entrapment.

**Openings shall have no parts that converge in a downwards direction at an angle less than 60°.** (could be hand/foot wedge points or neck traps)

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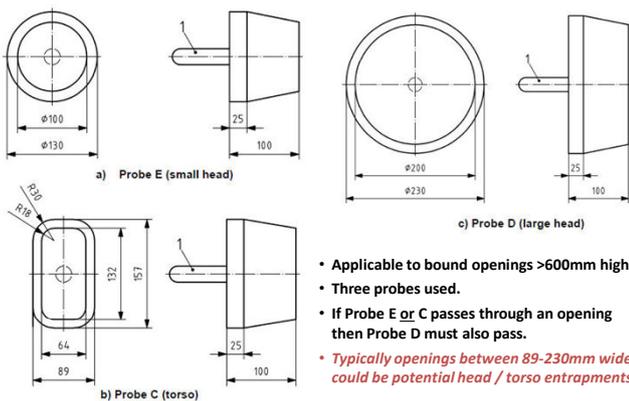
## Head / Neck Entrapment (CI.4.2.7.2)

- Openings that are greater than 600mm above the ground are required to be tested for head and neck entrapment.
- Hazardous situations could include:
  - Bound openings through which a user could slide feet or head first.
  - Partially bound or V-shaped openings.
  - Other openings (e.g. shearing or moving openings).



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## Head Entrapment Test (CI.4.2.7.2, Annex D.2)



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## Head Entrapment (CI.4.2.7.2)

- Openings between suspended bridges and rigid side members shall be  $\geq 230$ mm. (new to AS)
- If non-rigid members (eg. ropes) overlap then openings shall conform to head trap requirements. For example, scramble net openings shall not be 130-230mm square.
- A rope should not be able to be looped around probe C.

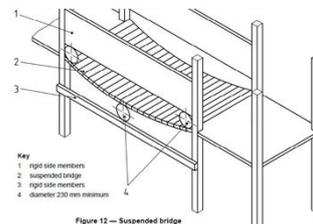


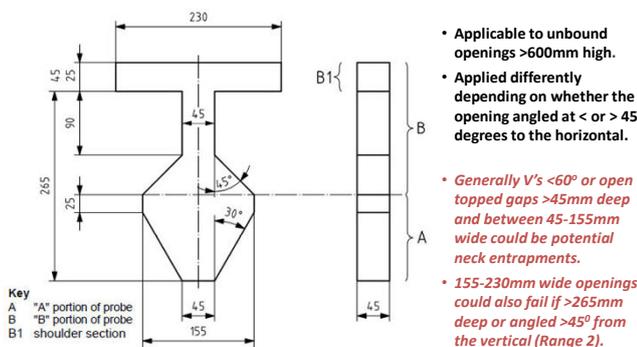
Figure 12 — Suspended bridge



Barrier head entrapment (gap >89mm wide)

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## Neck Entrapment Test (CI.4.2.7.2, Annex D.2)



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## Neck Entrapment Test (CI.4.2.7.2, Annex D.2)

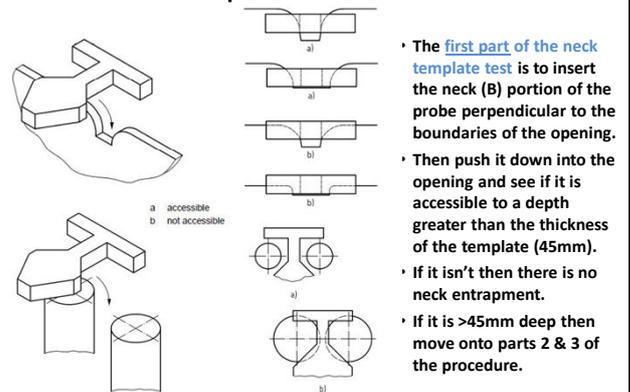


Figure D.3 — Method of insertion of the "B" portion of the test template

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### Neck Entrapment Test (Cl.4.2.7.2, Annex D.2)

Key  
a) insertion angle for assessing range  
b) template centre line  
c) check all insertion angles  
1, 2, 3 Ranges

Figure D.4 - Checking insertion angles to determine range (1, 2 or 3)

Figure D.5 - Range 1 (<=45°) Insertion of the Neck Probe

a) Passes if front section fully enters aperture to a maximum depth of 200 mm

Figure D.6 - Range 2 (>45 deg) insertion of neck probe 'A' portion followed by 'B' portion.

- The **second part** is to check the insertion angle Range (Figure D.4) for the **third part** below:
- **Range 1. If less than 45° then use Figure D.5 (top right) to determine pass / fail.** The base of the probe needs to touch the base of the opening.
- **Range 2. If greater than 45° then use Figure D.6 (bottom right) to determine pass / fail.** Simply, the gap needs to be greater than 230mm across.
- **Range 3. If a downwards gap then it passes.**

### Neck Entrapment Photos

Not recommended for enclosed fencing

Gaps between barrier slat tops are potential neck traps (as >45mm wide and >45mm deep)

Neck test Part 1

Neck test Parts 2 & 3

fixed

<60 degrees

25-45mm

25-45mm

No potential neck traps at sides by having a bar across the top of the gap

No potential neck traps at sides of slide by having gaps between 25-45mm

None of these have potential neck entrapments

straight section at base

small plate at the base

crossbars at the base

### Hair / Clothing Entrapment (Cl.4.2.7.3)

This could be caused by the following:

- Gaps or V-shaped openings where clothing can get trapped near, or in, forced movement areas.
- Protrusions.
- Spindles / rotating parts.

The free space areas of slides and fireman's poles, and roofs, shall not trap a toggle when tested in accordance with Annex D.3 of the Standards.

### Whole Body Entrapment (Cl.4.2.7.4)

This could be caused by the following:

- Tunnels into which children can crawl.
- Suspended parts that are heavy or have rigid suspension.

Table 1 — Requirements for tunnels Linear dimensions in millimetres

	Open one end		Open both ends		
	≤ 5° and upwards only when entering	≤ 15°	≤ 15°	≤ 15°	> 15°
Inclination					
Minimum internal dimension <sup>a</sup>	≥ 750	≥ 400	≥ 500	≥ 750	≥ 750
Length	≤ 2 000	≤ 1 000	≤ 2 000	≤ 10 000	None
Other requirements	None	None	None	None	Provision for climbing e.g. steps or handles

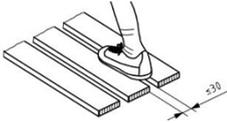
NOTE For tunnel slides, see EN 1176-3.

<sup>a</sup> Measured at the narrowest point.

## Foot or Leg Entrapment (Cl.4.2.7.5)

This could be caused by the following:

- Completely bound rigid openings in surfacing on which children can run or climb.
- Footholds, handholds, etc. extending from these surfaces.
- Surfaces intended for running/walking shall not contain gaps measured across the main direction of travel that are >30mm wide.
- This requirement does not apply to surfaces inclined more than 38°.
- It is generally accepted that gaps in nets are not considered potential foot entrapments.



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## Finger Entrapment (Cl.4.2.7.6)

This could be caused by the following:

- Gaps in which fingers can be trapped while the remainder of the body is moving.
- Variable gaps (excluding chains).
- Gaps that can close to <12mm are finger crush points.

Openings or holes within a free space area, or that are >1000mm above the potential impact area shall pass the finger probe test as detailed in Annex D.2. In short:

- If an 8mm diameter finger probe enters an opening, then a 25mm diameter probe shall also pass through the opening. That is:
- *Avoid openings/holes between 8-25mm diameter/wide.*

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## Finger Entrapment Examples



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## Chains / Finger Traps (Cl.4.2.13)

- Chains shall have a maximum opening of 8.6mm in any one direction. (so a chain opening can be <8.6mm in one direction but >8.6mm in the other)
- Where connections are made the maximum opening shall be >12mm or <8.6mm. (I prefer the latter)
- There are 8.6 and 12mm diameter probes to test this.



**Fail**  
8.6mm probe fits

**Fail**  
8.6mm probe fits  
12mm probe doesn't

**Fail & Pass!**  
missing grommet

**Pass**  
12mm probe fits

**Pass (best)**  
8.6mm probe doesn't fit

**Pass**  
Holes filled with bolts / grommet

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## Moving Parts (Cl.4.2.6)

- There shall be no crushing or shearing points between moving and/or stationary parts of the equipment. In addition, there shall be no entrapment points.
- Parts from which high impact force can emanate should be impact attenuated (eg. at the ends of track rides).
- If a moving part can endanger the body, there shall be a ground clearance of at least 400mm. (some exceptions to this are made for specific equipment items such as swings, carousels and rockers)

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# Play Equipment Standards Overview

## Part 3a – AS4685.1 / NZS5828.1

### Miscellaneous



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## AS4685.1 / NZS5828.1 - Miscellaneous

- **Grip:** Holding of the hand around the entire circumference of a support (16-45mm). (Cl. 3.15)
- **Grasp:** Holding of the hand around part of the circumference of a support (<=60mm). (Cl. 3.16)
- **Structural Integrity** can be assessed by calculation (Annexes A & B) or by physical testing (Annex C); or a combination. (Cl. 4.2.2)
- **Finish of Equipment.** (Cl. 4.2.5)
  - Wood shall have low susceptibility to splintering.
  - Surfaces of other material shall be non-splintering.
  - No protruding nails, wire rope ends or pointed / sharp edged components.
  - Rough surfaces should not present risk of injury. All welds to be ground smooth.
  - Accessible bolt threads shall be permanently covered.
  - Nuts and bolt heads shall not have sharp edges and be free from burrs.
  - Corners, edges and projecting parts shall have a minimum radius of 3mm.

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Exposed horizontal rigid bar at base of scramble net could be a risk



Flexible chain at base of scramble net is good

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Small foot pad (and footbars) at end of track glide could be a risk – have nothing at one end at least. The leading edge of the decks require impact attenuation.



Horizontal rigid footbar at end of monkey bars could be a risk

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Wide rubber footpad at end of monkey bars is better than a bar



Small foot support to the side of the end of monkey bars (or a track glide) is best

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## Standards and Landscaped Play

The application of Standards to play design certainly does not inhibit the creation of challenging playspaces, including natural and landscaped elements.

Two important statements in AS4685.1 to consider:

- For falls less than 600mm from non-moving equipment the impact area (fall zone) may be less than 1.5m.
- For this equipment it is not necessary to provide an impact attenuating surfacing beneath or surrounding it.

This allows for the creation of elements such as stepping routes, balance walks, rock embankments, dry creek beds.

## Landscaped Play

Step Route / Balance Walks - Play DMC Recommendations:

- If significant balance skills not required and less than 600mm high then any surfacing can be used, and items can be clustered.
- If significant balance skills required then arrange items in a linear or curvilinear fashion so possible to fall to either side of the direction of travel. Surfacing with some impact attenuation is recommended for items over 300mm high.
- Impact attenuating surfacing must be provided for items equal to or greater than 600mm high.
- Horizontal gaps between elements should be 150-600mm.
- Vertical steps between elements should be less than 400mm, preferably less than 250mm high in most cases.

## Landscaped Play



**Rock Slopes and Mounds - Play DMC Recommendations:**

- Mounds and slopes have no free height of fall but it is recommended that slopes >1:2 (~27°) steep have surfacing with some impact attenuation on the slope and at the base.
- Rocks slopes shall have rock step heights <600mm.
- It is also recommended that the height of a rock be less than the step width of the rock at the base of it. (i.e. max. slope angle=1:1 / 45°)

## Landscaped Play Examples



# Play Equipment Standards Overview

## Part 3b – AS4685.2 / NZS5828.2

### Swings

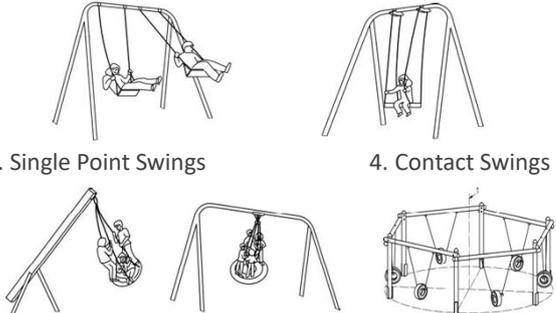


57

## Swing Types (Cl.3)

There are 4 types of swings.

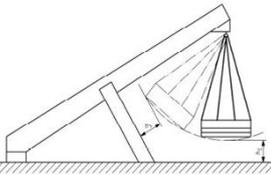
1. One Rotational Axis
2. Several Rotational Axes (rare)
3. Single Point Swings
4. Contact Swings



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## Swing Seat Clearances (Cl.4.2 & 4.3)

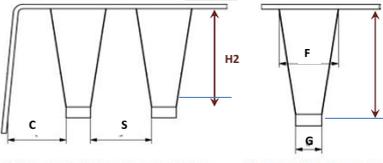
- Minimum Ground Clearance = 400mm (300mm at SECS). In NZ this is 350mm. 450-550mm is preferred to reduce mulch displacement or rubber wear.
- Group swings (nest / basket / tyre) shall have a minimum **400mm ground clearance from the lowest rigid part at all points of movement.** (this is important as there have been several reported instances of broken lower legs)
- Single point suspension seats shall have at least 400mm clearance from the ground and frame, expect in the direction of the beam to which it is fixed.



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## Swing Seat Clearances (Cl.4.4)

- Seat Edge to Frame (C)  $\geq (0.2 \times H2) + 200\text{mm}$  or for group swings this is:  $(0.2 \times H2) + 400\text{mm}$
- Seat Edge to Edge (S)  $\geq (0.2 \times H2) + 300\text{mm}$
- Distance between the tops of the suspension chains (F)  $\geq (0.05 \times H2) + G$  (where G=seat width) or  $\geq (0.30 \times H2) + G$  for group swings



**H2 is Suspension Length, which is the vertical distance from the top fulcrum to the lowest part of the top surface of the seat.**

a) Minimum space between the seats of swings and an adjacent structure      b) Lateral stability of swing seats

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## Swing FHO and Impact Areas (CI.4.10)

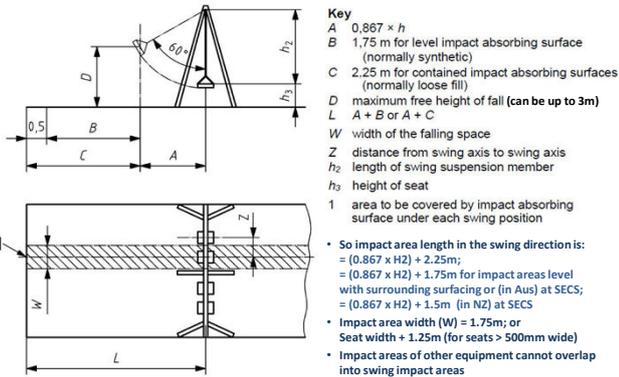


Figure 9 — Free height of fall and surfacing requirements beneath a swing

## Contact Swings (CI.4.13)

- Type 4 Swings are known as Contact Swings.
- The swing seat surfaces must be a minimum of 400mm from the central axis when swung through 90 degrees.
- The swing seats shall discourage jumping from them towards the central axis (e.g. use a vertical tyre or restraining bar).

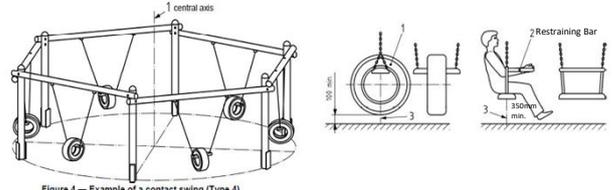


Figure 4 — Example of a contact swing (Type 4)

## Play Equipment Standards Overview

### Part 3c – AS4685.3 / NZS5828.3

#### Slides



## Slides - Access & Starting Section (CI.4.2 & 4.3)

- Access to a slide Starting Section can be by ladder, stairs, climber or directly from a mound.
- Free-standing slides can have stairs up to 2.5m high with no intermediate deck. (usually 2.0m)
- Attachment slides with a fall height greater than 1000mm shall have a 600-900mm high crossbar above the Starting Section.
- Starting Section length  $\geq 350$ mm and 0-5 degrees.
- Starting Section shall have guarding/barriers as per Part 1 of the Standard if:  $> 400$ mm long; OR is easily accessible and FHO is  $> 1$ m; OR FHO is  $> 2$ m.
- If attachment slide Starting Section is beyond the deck edge, it shall have 500mm high guarding at some point.

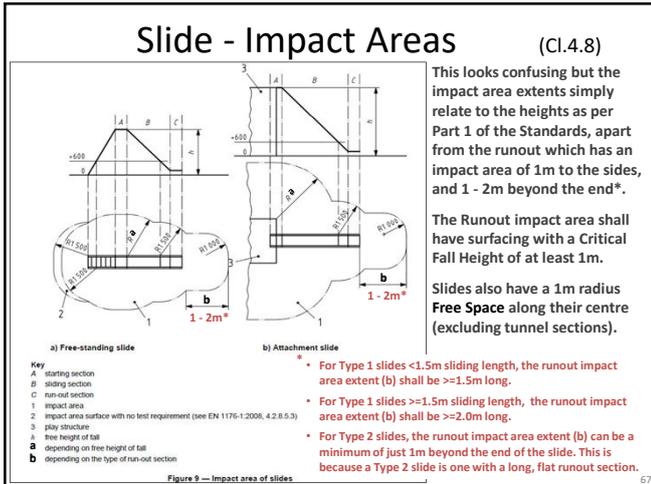
## Slides - Sliding Section (CI.4.4)

- Initial straight length shall be  $\leq 7$ m, and subsequent  $\leq 5$ m long.
- Maximum sliding angle  $\leq 60$  degrees, and not exceed an average of 40 degrees over the Sliding Section..
- For changes in angle of  $> 15$  degrees, the radius shall be:  $\geq 450$ mm for the initial 2m change in height; and  $\geq 1000$ mm for the remainder of the slide.
- Widths
  - Open and straight slides:  $< 700$ mm or  $> 950$ mm
  - Helical and curved slides:  $< 700$ mm
  - Tunnel sections of slides:  $> 750$ mm wide & high (CI.4.9)
- Side heights
  - $\geq 100$ mm for FHO  $< 1.2$ m;  $\geq 150$ mm for FHO 1.2-2.5m;
  - $\geq 500$ mm for FHO  $> 2.5$ m, or easily accessible and FHO  $> 2$ m.
- Flat slide sides shall be at least 60 degrees steep.
- Curved sides shall pass the template test as per Figure 5.

## Slides - Runout Section (CI.4.5)

There are two types of slide runout:

- Type 1 Runouts can have an average declination of up to 10 degrees and generally have a shorter length.
  - Length  $\geq 300$ mm for Sliding section length of  $< 1.5$ m.
  - Length  $> 500$ mm for Sliding section length of 1.5-7.5m.
  - Length  $> 1500$ mm for Sliding section length  $> 7.5$ m.
- Type 2 Runouts can have a declination of up to 5 degrees.
  - Length  $> 0.3$  the length of the sliding section.
  - It is expected users have almost stopped once at the end.
- End drop height  $\leq 200$ mm, for sliding section length  $\leq 1.5$ m.
- End drop height  $\leq 350$ mm, for sliding section length  $> 1.5$ m.
- Type 1 runouts shall turn down with a radius of at least 50mm; and reverse at an angle of at least  $100^\circ$  (or  $90^\circ$  in Aus) if not all the way to the ground.



### Embankment Slides - Side Impact Area

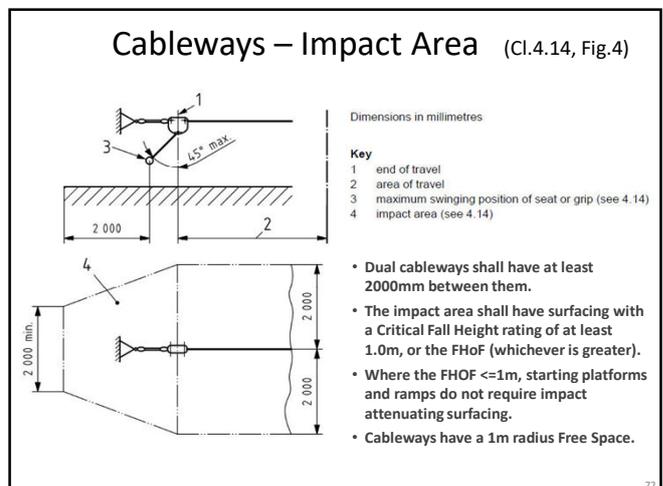
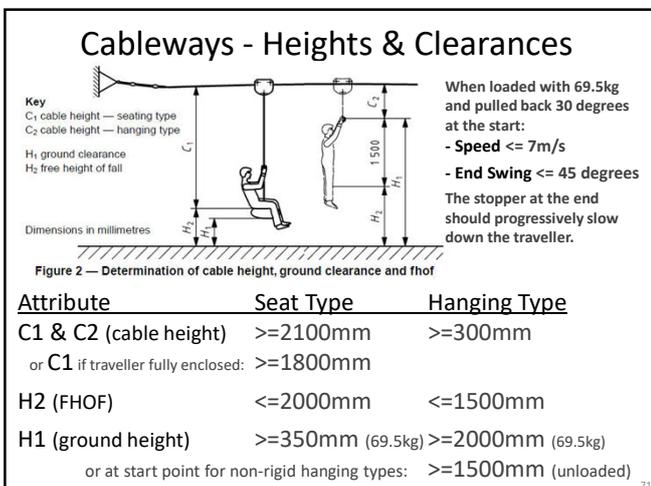
- Unfortunately Standards do not clearly indicate what impact area (if any) is required to the sides of an embankment slide that is less than 600mm above the slope, and many instances of rocks and other hard elements have been observed adjacent to slides both in Australia and in Europe.
- Play DMC reckons that to strictly comply with the Standards there should be an impact area to the sides of slide (for at least the free space).
- However on the basis of risk assessment it may be acceptable to have no formal impact area, and certainly this is becoming more common and accepted by Councils in Australia. This can be based on:
  - Slide sides are designed to contain the user, hence children should not fall out.
  - Children can walk or run up a slide, but should be capable of assessing the risk associated with this; and the risk would not be significantly greater than for a child walking/running/climbing up a terraced rock embankment or rubber slope.
  - An alternative of having a rubber slope has its own risk in that it could become slippery when wet or covered with sand. This is especially a concern of older carers / supervisors. Using a terraced embankment could be easier for some people.

### Tunnel Slides – Barriers on Top

- AS4685.3 Clause 4.9.101 (not in the EN or NZS) states:  
*A physical barrier shall be provided to significantly reduce the likelihood of climbing on the outside of a tunnel slide to a height in excess of the maximum free height of fall .*
- The portion of the tunnel slide below the barrier shall have an impact area with impact attenuating surfacing.
- A barrier at least 400mm high is recommended.
- This barrier should be positioned at a height where it is not relatively easy to climb on top of the tunnel behind the barrier, say >1.5m high. Sometimes two barriers could be required, and / or possibly a fin.
- Given tunnel slides are now considered climbable; a tunnel slide on an embankment could require an impact area, should the top of the tunnel be readily accessible and greater than 600mm above the slope.

## Play Equipment Standards Overview

### Part 3d – AS4685.4 / NZS5828.4 Cableways (Runways / Flying Foxes)



# Play Equipment Standards Overview

## Part 3e – AS4685.5 / NZS5828.5

### Carousels

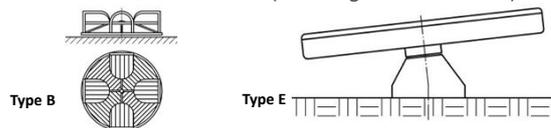


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### Carousels – Types (Cl.3)

There are 6 defined types of Carousels:

- A. Rotating Chairs
- B. Classic Carousel (most common type)
- C. Spinning Mushrooms / Hanging Glides
- D. Track Driven Carousel
- E. Giant Revolving Discs (becoming more common)
- F. Bowl-Like Carousels (both single and multi-user)



Note: Carousels <500mm diameter are considered to have no forced movement and can be used in a cluster.

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### Carousels – Impact Areas / Spaces (Cl.4.2 & 4.3)

- FHOFF  $\leq 1000\text{mm}$  (on Type C, measured from 1500mm below grip)
- Impact Area  $\geq 2\text{m}$  from the edge  
 $\geq 3\text{m}$  for Type E (giant discs)  
 $\geq 1.5$  for Type F (bowls) & spin poles
- Free Space / Falling Space are the same as the Impact Area, and up to 2m above the carousel.  
But single-use bowl-like carousels and carousels <500mm do not require Free Space.
- The Impact Area shall have surfacing with a Critical Fall Height rating of at least 1.0m (0.6m for spin poles), or the FHOFF - whichever is greater.
- Maximum Speed at periphery  $\leq 5\text{m/s}$ .

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### Carousels – Type B, Classic (Cl.5.2)

There are several clauses relating to Ground Clearance which cannot be easily summarised in a talk but some points are listed below:

- If flush with ground, the gap around the outer edge shall be  $< 8\text{mm}$  and the platform shall be  $\leq 20\text{mm}$  above the ground.
- If not flush, then ground clearance shall be at least 60mm.
- If ground clearance is between 60-110mm then the underside shall not have hazardous deviations within the first 300mm towards the axis.
- Clearance between 110-400mm (or 300mm for loose-fill) is not allowed at the circumference but can taper to less than this towards the axis.
- If ground clearance  $> 400\text{mm}$  (or 300mm for loose-fill), the underside of the platform shall not have deviations that could cause injury.

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### Carousels – Type E, Giant Discs (Cl.5.5)

- These have an inclined axis up to 5 degrees, with no clearly defined user stations.
- The upper side shall be a continuous smooth surface.
- The underside of the platform shall not have deviations that could cause injury.
- Ground Clearance  $\geq 300\text{mm}$  (or  $\geq 400\text{mm}$  for rubber)

- Key
- 1 bearing
  - 2 upper side
  - 3 inclination
  - 4 underside
  - 5 footing/mounting

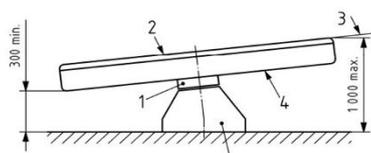


Figure 11 — Example of carousel type E (giant revolving disk) showing requirements for ground clearance

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# Play Equipment Standards Overview

## Part 3f – AS4685.6 / NZS5828.6

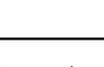
### Rockers



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## Rockers – Types (CI.3)

There are 6 Types of Rockers:

1. Axial Seesaw (on a central fulcrum, no spring) 
2. Single Point Seesaw / Rocker (most common type)
  - 2A has a pre-determined main direction of movement 
  - 2B has multi-directional Movement 
3. Multi-Point Seesaw / Rocker
  - 3A has a pre-determined main direction of movement 
  - 3B has multi-directional Movement 
4. Rocking Seesaw (e.g. like a traditional rocking horse. Rare) 
5. Sweeping Seesaw (supported above the user position) 
6. Overhead Single Axis Seesaw (e.g. scale rocker) 

## Rockers – FHO, Slopes, Clearance (CI.4)

Table 1 — Safety requirements

Type	Maximum free height of fall (see 4.2) mm	Maximum slope of seats/stand (see 4.3) °	Ground clearance <sup>a</sup> mm
1	1 500	20	230 min.
2A	1 000	30	optional
2B	1 000	30	230 min.
3A	1 000	30	optional
3B	1 000	30	230 min.
4	1 000	20	230 min.
5	2 000	–	230 min.
6	2 000	–	230 min.

<sup>a</sup> Minimum ground clearance is not required when:

- 1) there is a damping effect, e.g. the supporting component is a spring;
- 2) the motion of the extremity of the structure is mainly in a horizontal direction (deflecting effect).

## Rockers – Miscellaneous (CI.4.5 – 4.9)

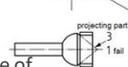
- Restraint of motion at the extremities should be regulated so there is no sudden reversal of movement (e.g. damping such as a spring)
- Foot rests and hand supports, when provided, shall be firmly fixed and be unable to rotate (without tools).
- Hand supports should meet the requirements for grip (16-45mm but pref.  $\leq 30$ mm), and pass the 44mm ring gauge test. 
- Equipment should be designed to prevent entrapment. E.g. Have a minimum ground clearance of 230mm; OR use damping or deflecting effects. The Spring shall not compress by more than 5% and the 12mm probe shall be able to be inserted at all positions. 

Fig. E1 & E2 – Gauge Test

## Rockers – Impact Areas / Spaces (CI.4.10)

For Rocker Types 1 to 4 when measured from the perimeter of the equipment in its most extreme positions the falling space shall be  $\geq 1.0$ m (or 1.5m for stand-on rockers). For all types, the Impact Area shall have surfacing with a Critical Fall Height rating of at least 0.6m, or the FHO (whichever is greater)

- Key
- 1 space occupied by the equipment
  - 2 falling space
  - 3 free space
  - 4 impact area
  - x extent of falling space
  - y height of falling space

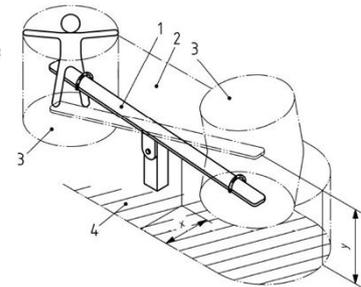


Figure 9 — Examples of falling space of rocking equipment Type 1

For equipment Types 5 and 6, the requirements for the impact and falling space shall be in accordance with EN 1176-1:2008, 4.2.8.2.4. and 4.2.8.2.5.

## Rockers – Type 6 (CI.5.4)

- Overhead seesaws are now formally recognised in the Standards.
- The seat / pommel can have FHO  $\leq 2000$ mm. This will limit the maximum inclination of the beam.

NOTE: As the main motion of the user is rocking, the angle of the swinging part of the motion should be not more than  $20^\circ$ . (but how?)

Key

- $\alpha$  maximum inclination of the beam during use of the equipment
- a free height of fall

Dimensions in millimetres

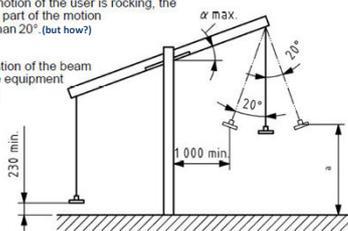


Figure 13 — Free height of fall of overhead single axis seesaw (Type 6)

# Play Equipment Standards Overview

Part 3g – AS4685.11 / NZS5828.11

Spatial Networks



## Spatial Networks

Spatial Network is defined as geometric 3-dimensional assembly of flexible elements which will yield by design.

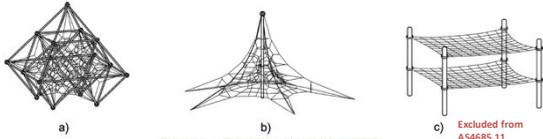


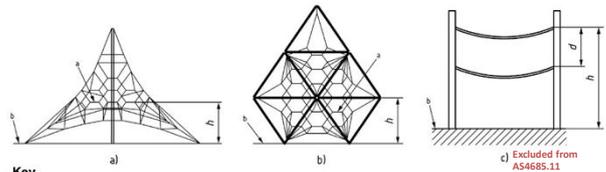
Figure 1 — Examples of spatial network

- Structural elements outside the net are not considered to be in the falling space, because of the way the equipment is used with users expected to fall vertically downward into the net. (Cl.3.1)
- Meshes of a spatial network shall not be so large as to allow an imaginary cylinder 600mm diameter and 1800mm high to pass through. (Or FHOFF and impact attenuation shall relate to the higher sections) (Cl.4.1)
- Where 2 linear elements converge at least one shall be flexible. If the angle formed has a lower edge above the horizontal then the angle shall be  $>20^\circ$ .

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## Spatial Networks – FHOFF / Falling Space

FHOFF ( $h$ ) is the highest foot position giving an unimpeded fall, and is measured as shown below. (This Figure is from the 2014 EN, but same principal applies to 2012 AS)



Key

- a mesh size smaller than the diameter of the imaginary cylindrical body (see 4.1)
- b impact absorbing surface
- d distance between the nets:
- h free height of fall

$d = \text{max. } 1.8 \text{ m for mesh size up to } 420 \text{ mm} \times 420 \text{ mm}$   
 $d = \text{max. } 1.0 \text{ m for mesh size bigger than } 420 \text{ mm} \times 420 \text{ mm}$

Figure 5 — Free height of fall

The Impact Area and Falling Space extents around a Spatial Network are based on the Free Height of Fall ( $h$ ) as per Part 1 of the Standards, including Figure 17.

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## Spatial Networks – Internal Falls

When non-flexible elements (e.g. support poles) are arranged in a slanted position and have a smooth surface they have a deflecting character and the impact energy is reduced. The maximum internal height of fall can then be increased in accordance with Table 1.

Table 1 — Maximum internal height of fall

Deviation from horizontal °	Factor	Height of fall equivalent to 600 mm vertical mm
30	1,15	700
45	1,41	850
60	2,00	1 200
70	2,92	1 750
80	5,76	3 000 max.

NOTE This table shows mathematical ratios that relate only to the structure. Appropriate IAS materials are required on any surrounding impact area.

Rope structures which are designed to yield in use are not regarded as hard objects in the falling space.

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## Play Equipment Standards Overview

### Part 3h – AS4685 / NZS5828 Supervised Early Childhood Settings



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## Supervised Early Childhood Settings

Both AS4685 (parts of Appendix ZZ) and NZS5828 (Appendix A) list specific extra requirements for Supervised Early Childhood Settings (SECS).

A Supervised Early Childhood Setting is defined as:

- (Aus) A defined play space used by an education and care service or children's services, for children under school age, which is supervised by educators (early childhood practitioners). (Cl. 3.101)
- (NZ) Services licensed in accordance with the Education (Early Childhood Services) Regulations 2008.

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## SECS – AS4685: FHOFF & Impact Area

- The maximum allowable FHOFF = 1.8m.
- For Moveable Equipment FHOFF shall be  $\leq 1.5\text{m}$ .

Impact Area extents are determined as usual, this being:

- $<600\text{mm}$  high – impact attenuating surfacing not required unless there is forced movement (e.g. spinning, rocking).
- 600-1500mm - minimum impact area of 1.5m. (Fig. 17)
- 1500-1800mm - minimum impact area of 1.5-1.7m based on  $(2/3 \text{ FHOFF}) + 0.5\text{m}$ . (Fig. 17)

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## SECS - AS4685.1: Barriers / Guardrails

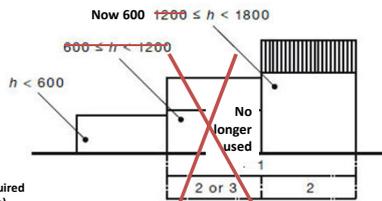


Fig. 8 c) Equipment for SECS

- **Stairs / Ramps** (Cl.4.2.9.2 & .3)  
Barriers or handrails (450-700mm high) can be used for stairs / ramps to platforms up to 1.0m high. This is provided the gap beneath the handrail is less than 600mm when measured from the middle of the tread. If deck is >1.0m high then barriers shall be used.
- **Rigid Bridges** (based on Cl.4.2.9.2 & .3)  
Just handrails / guardrails can be used if bridge height  $\leq 1.0\text{m}$ , provided the gap beneath the handrail / guardrail shall be less than 600mm.
- **Moveable Play Equipment:** Handrails, guardrails or barriers not required.

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## SECS - AS4685.1: Moveable Play Equipment

This is now formally recognised and defined as: (Cl. 3.102)  
a range of purpose-made manufactured equipment used in supervised settings (e.g. SECS, schools etc.) that is not permanently fixed in place and can be adjusted and moved by educators on a regular basis to vary play opportunities.

Educators should apply a risk assessment approach to the setting up of moveable play equipment suitable to the ages and developmental stages of the children utilising the moveable play equipment. (Cl. 4.2.101)

Related to this is the use of Clusters, being where: two or more separate pieces are designed to be installed in close proximity for continuity in a sequence of play activity. (Cl. 3.19)

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## SECS - AS4685.1: Moveable Play Equipment

Apply risk assessment when setting up especially in relation to falling.



Too close to edging / wall

Cluttered too close together



Well spaced equipment allowing falls to either side of the intended travel routes

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## SECS – NZS5828: Some Requirements

- FHO for moveable boxes or similar equipment  $\leq 1200\text{mm}$
- FHO for overhead equipment  $\leq 1700\text{mm}$
- FHO for all other equipment  $\leq 1500\text{mm}$
- The NZ Standard defines Moveable Equipment as:  
a range of equipment that is not permanently fixed in place, and can be moved on a regular basis to extend play opportunities.
- Examples of Moveable Play Equipment are provided (e.g. climbing boxes, planks, A-frames, nets, slides) and states they shall be under constant supervision, and be stable on hard and soft surfaces.
- Swings may have more than 2 swings per bay and may be combined with swinging ropes and other suspended equipment. The fall zone shall be determined by using the 60 degree angle and extending this by 1500mm (instead of the usual 1750 or 2250mm).

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# Play Equipment Standards Overview

Part 4 – AS4422 / EN1177 (used in NZ)

Playground Surfacing



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## Impact Attenuating Surfacing

AS4422 (2016) and EN1177 (2008) provide information on testing of impact attenuating undersurfacing.

- Specialist training and equipment are required to undertake impact attenuation testing hence just an overview is provided as part of this documentation.
- Critical Fall Height ( $h_c$ ) is the “maximum free height of fall, for which the surface will provide an acceptable level of impact attenuation”. (i.e.  $HIC^* \leq 1000$ ,  $g_{max} \leq 200$ )
- Testing uses a 4.6kg headform with an accelerometer on it to measure impact. This headform is dropped onto the surface with the  $g_{max}$  and HIC then calculated by an attached data recorder.

\*HIC – Head Injury Criteria

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## Impact Attenuation Testing

In Australia, field testing can be undertaken by testing a prescribed number of locations in a playspace and dropping the headform from the adjacent equipment fall height +10% and checking HIC and  $g_{max}$ .

For laboratory testing in AUS & NZ and field testing in NZ (also could be used in field testing in AUS on sites that fail between 1 to 1.1 times the required fall height rating), three sets of drop tests are performed on each surfacing sample to determine the Critical Fall Height ( $h_c$ ).

- **Loose Fill** (e.g. mulch). Each of the 3 drop test sets consists of three impacts performed at four different drop heights (so 72 drops in total as need to test both wet and dry samples).  
The worst result of each of the three impact drops is used.  
Two of the four drop heights should have HIC >1000 or  $g_{max}$  >200.
- **Solid / Unitary** (e.g. rubber). Each of the 3 drop test sets consists of four consecutive impacts (so 12 drops in total).  
Two of the four impacts should have HIC >1000 or  $g_{max}$  >200.

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## Impact Attenuation Testing

Each of the four drop heights are then plotted on graphs of  $g_{max}$  against drop height, and HIC against drop height (sample below). The heights at which HIC = 1000 and  $g_{max}$  = 200 are determined, and the lowest of the 2 heights is then deemed to be the Critical Fall Height ( $H_c$ ) for that test. The Lowest  $H_c$  for all three tests is then taken as the Critical Fall Height ( $H_c$ ) of the sample being tested.

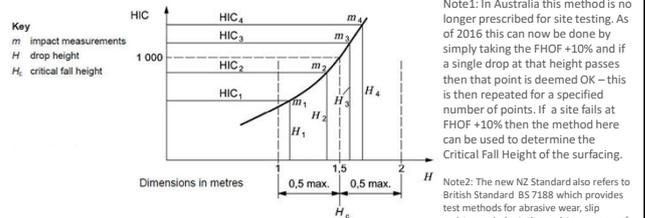


Figure B.2 — Typical curve of HIC values against drop height

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## Play Equipment Standards Overview Part 5 – AS3533.4.2 (2013) Contained Play Facilities



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## AS3353.4.2 – Contained Play Facilities

This Standard sets out minimum safety requirements for the design (covered in this talk), development, installation, inspection, maintenance, supervision level and operation of Contained Play Facilities. These are defined as:

- Composite of children's play equipment and associated facilities within commercial premises (e.g. pubs, shopping centres, fast food outlets and pay-for-play centres) which may be free access or paid access.

Part 1 and 2 of AS3353 should also be referred to.

Note that just because a playspace is at a commercial premises, doesn't mean AS3353.4.2 is always used. Playspaces that are like a traditional public playspace may still be assessed under AS4685.

Note: The new NZ Standard is likely to adopt EN1176.10 - Fully Enclosed Play Equipment, which has many of the same principals as AS3353.4.2. However this talk provides information only on AS3353.4.2. It may be updated once sure of what Standards NZ are to adopt and any amendments for NZ conditions.

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## Contained Play Facilities – Design (Cl.3)

Many of the design requirements are the same as those in AS4685, however significant differences and important issues are noted below and on the following pages.

- **Fire.** Safe egress of patrons in the event of fire shall be ensured, and be part of design risk assessment. Enclosed parts with an internal distance >2m from an entry point shall have at least 2 access openings with no dimensions <500mm. (Cl.3.2.1 & 2)
- **Structural Integrity** can be assessed by calculation (Appendices A & B) or by physical testing (Appendix C); or a combination. (Cl.3.2.4)
- **Free Height of Fall** ≤3m, or <1.5m in toddler areas. This is measured that same way as per AS4685. (Cl.3.2.5)

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## Contained Play Facilities – Design (Cl.3)

- **Free Space.** This is the same as defined in AS4685. (Cl.3.2.6)
- **Fall Zones.** This differs from AS4685 as per the graphs below. Where FHOF > 600mm (or ≤600mm and the equipment is used for climbing or has forced movement), then any objects or surfacing within the fall zone shall have impact attenuating surfacing or covering with HIC < 1000 and  $g_{max}$  < 200. (Cl.3.2.7)

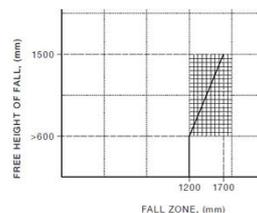


FIGURE 3.4 MINIMUM EXTENT OF FALL ZONE—TODDLER AREAS

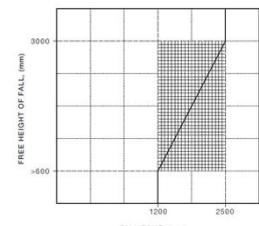


FIGURE 3.5 MINIMUM EXTENT OF FALL ZONE—OTHER CASES

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## Contained Play Facilities – Design (Cl.3)

- **Entrapments.** This is almost exactly the same as 4685.1, (Cl.3.2.8) with the main difference being the requirements for tunnels (which are commonly used in Contained Play Facilities).

TABLE 3.3 REQUIREMENTS FOR TUNNELS

Description	Open one end		Open both ends	
	≤5° and upwards only when entering	≤20°	20° > inclination ≤ 45°	20° > inclination ≤ 45°
Inclination	≤5° and upwards only when entering	≤20°	20° > inclination ≤ 45°	20° > inclination ≤ 45°
Minimum internal dimensions*, mm	≥750	≥750	≥750	≥750
Length, mm	≤2000	≤5000	>5000	>5000
Other requirements, mm	None	None	Provision of additional access or egress every 5000	Provision of additional access or egress every 5000 and provision to assist climbing and prevent sliding, e.g. steps or handles

\* Measured at the narrowest point.

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## Contained Play Facilities – Items (Cl.4)

- **Inflatable Devices.** If used these shall comply with AS3533.4.1. (Cl.4.2)
- **Ball Pools.** (Cl.4.3)
  - Balls should not be able to be pushed through a 44.5mm diameter test template with a force of 30N as per Appendix H.
  - Guidance on cleaning ball pools is provided in Appendix I.
  - Balls that can absorb fluid (e.g. foam, fabric) shall not be used.
  - The depth shall not exceed 400mm when no patrons in it.
  - Opportunities for jumping into the pool shall be minimised.
  - Entry points and platforms shall be <300mm above top of balls.
  - The base shall have a Critical Fall Height rating of >=700mm.
  - Ball pools can be used as a landing area for forced movement (e.g. slides) but shall be separated from ball pool areas used for general play and the base shall have a Critical Fall Height rating of >=1000mm over a minimum fall zone of 2000mm.

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## Contained Play Facilities – Items (Cl.4.4)

### Contained Play Structures

are those typically used in commercial centres with netting on the sides and many different play items. Some components are indicated on the right but could also include balance beams, spider web and activity ramps. Cl.4.4 has four pages of design requirements for the components, hence not summarised here apart for some points on **climbing ramps**:

- Angle: 15-45 degrees.
- If >2000mm high there shall be intermediate landings >=950mm long with a Critical Fall Height >=1m.
- The final falling surface shall be 500mm to the sides and 1500mm out from the base of the ramp, OR 950mm out to a 1500mm high impact attenuated vertical surface.

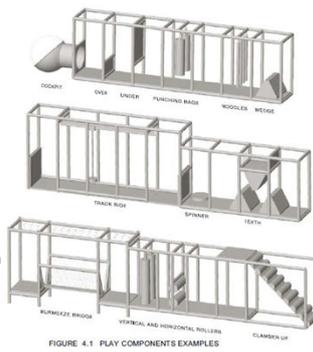


FIGURE 4.1 PLAY COMPONENTS EXAMPLES

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## Contained Play Facilities – Items (Cl.4)

- **Other Play Areas** (tables, machines, etc.). These shall be risk assessed. (Cl.4.5.1)
- **Patron Propelled Vehicles.** (Cl.4.5.2)
  - Contained within a barrier not less than 400mm high.
  - No crushing, shearing, entrapment hazards.
- **Toddler Area** (Cl.4.6)
  - Contained within a barrier >=400mm high. If a gate is a provided it shall be self-closing with a child-proof latch.
  - The floor shall have impact attenuating surfacing commensurate with the associated fall height.

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## Contained Play Facilities – Forced Movement (Cl.4.7)

The requirements of Clause 4.7 take precedence over other general requirements where they conflict.

- **Slides.** There are many attributes that differ from AS4685, with some of the more important ones listed below: (Cl.4.7.2 - 4)
  - If Stating Section FHOFF >1.5m, the slide shall be fully enclosed to at least 1500mm beyond the start of the sliding section.
  - Parts of the sliding section >1.5m FHOFF shall be fully enclosed.
  - Width >=300mm for toddlers area, 410mm otherwise.
  - Lateral Protection height >=100mm, or >150mm for FHOFF >1.2m.
  - End Velocity shall be 0m/s unless a bump stop is provided.
  - Bump Stop height >=800mm with HIC<=1000 and  $g_{max}$ <=200.
  - No runout section fall zone required for fall height <=100mm. If fall height >100mm then Surfacing Critical Fall Height >=1m.
- **Swings.** Shall comply to AS4685.2 and be in a fenced area. (Cl.4.7.5)

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## Contained Play Facilities – Other Items (Cl.4.7 - 10)

- **Track Rides.** These shall be risk assessed, with the end stop positions and the free space provision increased commensurate with increased risk. (Cl.4.7.6)
  - End stops shall be at least 800mm from end of the enclosure.
  - Overhead parallel track rides shall have a barrier between them.
  - Seats shall be impact attenuating and at least 350mm high.
- **Spider Mountains.** Test for entrapment loaded and unloaded. (Cl.4.7.7)
- **Trampolines.** Shall comply with AS4989 and be risk assessed. (Cl.4.7.8)
- **Fireman's Poles.** Not recommended but can be used if risk assessed. (Cl.4.7.9)
- **Rotating Seats and Poles.** Locate in a dedicated area with a free space of 500mm (seats) or 1500mm (poles), and surfacing with a Critical Fall Height of >=1m (seats) or >=1.5m (poles). (Cl.4.7.10)
- **Mechanical Rides.** Shall be controlled and supervised. (Cl.4.8)
- **Airplay Devices.** Shall be risk assessed. Balls to use low density foam. (Cl.4.9)
- **Climbing Walls.** Height<=2.5m. If used to access a deck the wall shall be at least 600mm above the deck with a safety rail over the top. (Cl.4.10)
  - Note: Walls >2.5m high can be used if in accordance AS2316.1.

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