

**The purpose of this guidance note is to help playground operators to calculate the thicknesses of Playtop needed around and under different types of play equipment, and the areas that need to be protected.**

It is based on the revised European Standard specifying safety requirements for playground equipment and for impact-attenuating playground surfacing, **EN 1176:2008**, which came into force in 2008.

### Specifying the Right Thickness of Playtop

Playground operators must choose a surface with a Critical Fall Height rating that matches or exceeds the maximum possible 'free height of fall' from their play equipment.

A separate Standard, **EN 1177:2008**, defines the Critical Fall Height tests. An instrumented 'head form' representing a child's head is dropped from various heights onto the test specimen, and its deceleration is monitored.

The greatest height of fall that keeps maximum deceleration below the permitted limit gives the rated Critical Fall Height for the surface product.

### Critical Fall Height Ratings

The Critical Fall Height ratings for our standard thicknesses of **Playtop** are:

THICKNESS											
Millimeters	20	40	50	60	70	80	90	100	110	120	130
FALL HEIGHT											
Metres	0.7	1.2	1.4	1.6	1.8	2.1	2.3	2.4	2.6	2.8	3.1

Under low play equipment with free heights of fall under **600 mm**, the surface is only required to have 'some impact-attenuating properties'. **We recommend 20 mm thickness here and for general run-about areas.**

But note that, because **20 mm** of **Playtop** requires a separate structural layer but **40 mm** can be laid directly on a dynamic (crushed-stone) base, the **40 mm** thickness may sometimes be cheaper. Please ask us for alternative quotations.

The top of the impact-attenuating surfacing should be at the level of the base level mark on the playground equipment.

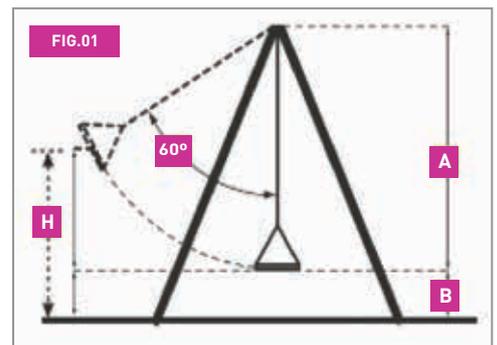
### Assessing the Fall Height

The free height of fall for a piece of play equipment is defined as follows:

- For equipment on which the child stands, it is the height above the ground of the highest platform intended for standing on, regardless of higher guard rails or roofs.
- For equipment from which the child hangs, it is normally the height of the hand support above the ground (to allow for climbing up). But for cable ways and for carousels with overhead grips, where climbing up is impossible, a height **1.5 metres** lower is taken.
- For equipment on which the child sits, it is normally the maximum height of the seat above the ground.

For swings of all types, this is taken to be the height of the seat when **60°** from the vertical:

**Fig.01,  $H = B + 1/2 A$**



- For climbing equipment, it is the height of the highest foot support. But for climbing frames, climbing ropes and fireman's poles where both hand and foot support are used, it is the height of the highest possible hand grip, less **1 metre**.
- For spatial networks, it is the highest foot position giving an unimpeded fall (falls from higher positions are safely into the network).

For vertical arrangements of planar nets separated by more than **1 metre**, the highest planar net with a mesh size greater than **420 mm** circular inner diameter is taken when considering the area under the nets.

The maximum permitted free height of fall for play equipment is **3 metres**. Lower limits apply to some items.

## Assessing the Area to be Protected

The higher a piece of play equipment is, the further away a child could fall. In addition, special rules apply to swings, slides, cableways and carousels whose use involves horizontal movement.

### Standard Rules

The protected area shall extend at least **1.5 metres** round the equipment.

This applies to fall heights from **600 mm** up to **1.5 metres**.

The distance then rises linearly to **2.5 metres** round the equipment at the maximum permitted fall height of **3 metres** (see Fig.2). These rules apply to static equipment.

The maximum free height off all for seesaws and rocking equipment is **1 metre** except for classic seesaws **1.5 metres** and overhead types **2 metres**.

## Swings

The protected area should extend **1.75 metres** beyond the horizontal limit of the swing movement in any foreseeable direction of use.

This is taken to be an angle of **60°** from the vertical.

So, for single-point (rotating) swings, the area should be circular, centred on the rest position, with a radius (**R**) given by the formula **R = (A x 0.867) + 1.75 metres**, where **A** is the length of the suspension member.

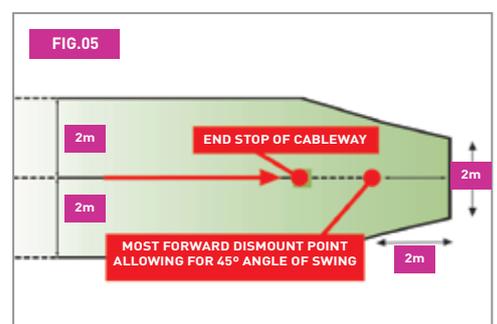
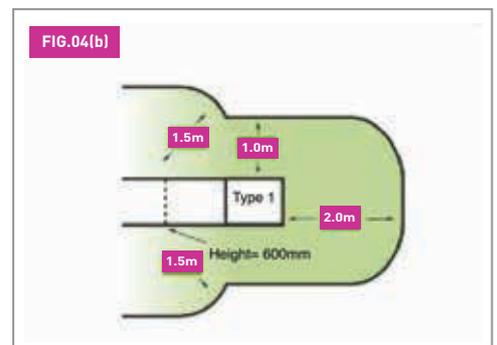
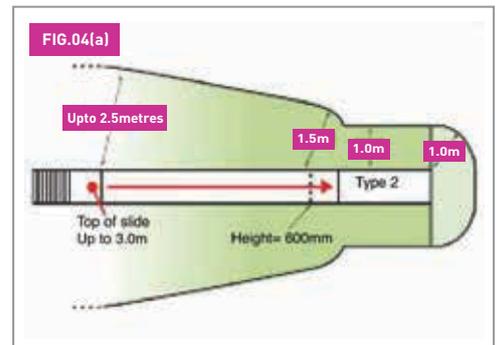
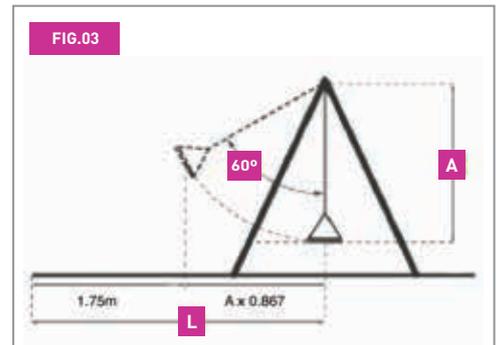
For swings that move to-and-fro (along one axis or more), the length (**L**) of the protected areas at front and back is given by essentially the same formula, (see Fig.3) **L = (A x 0.867) + 1.75 metres**.

The width of the protected area should be **1.75 metres**, centred on the seat, or, if the seat is wider than **500 mm**, increase this by the amount seat-width exceeds **500 mm**.

## Slides

For the ladder, starting section and upper part of the sliding section down to a height of **600 mm**, the standard rules apply: the protected area round the slide should extend to a radius of between **1.5 and 2.5 metres**, depending on the free height of fall of different parts (see the graph, Fig.2). The exact shape of the area will depend on the height, length and profile of the slide. Flanking the bottom part of the sliding section and the final run-out section of the slide, the protected area should extend at least **1 metre** on each side.

For Type 2 slides with a long run-out section, the protection should continue into the area beyond the slide end for a distance of **1 metre**, radiused as shown in Fig 4a.



### Assessing the Area to be Protected

The higher a piece of play equipment is, the further away a child could fall. In addition, special rules apply to swings, slides, cableways and carousels whose use involves horizontal movement.

Technical guidance notes are also available for:

**Substructure Specifications**

**Additional Tests**

**Maintenance and Repair**

**[www.playtop.com](http://www.playtop.com)**

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For Type 1 slides with a shorter run-out section and hence faster arrival, the length of the extra protected area should be **2 metres**, with the last **1 metre** radiused, as shown in **Fig 4b**. We can tell you which Type you have.

The whole protected run-out area is taken to have a free height of fall of **1 metre** to compensate for speed of arrival, and thus requires **40 mm** thickness of **Playtop**. For enclosed drop-slides of any type, the distance beyond the slide end can be limited to **1 metre** provided the child comes to rest before the slide end.

### Cableways

For cableways (cable runways) down which children travel either seated or hanging by their hands, the protected area should extend **2 metres** on either side of the cableway's centre line. At the arrival end, it should extend **2 metres** beyond the most forward dismount position. A **45°** forward swing beyond the end-stop is the standard allowance.

The area should taper in width from 4 metres level with the end-stop down to **2 metres** at the extreme position (see Fig.5). The maximum free height of fall for cableways is **2 metres** seated or **1.5 metres** hanging. The standard rules apply if the free height of fall is greater than 1 metre, but the surfacing should have a Critical Fall Height of at least **1 metre** (**40 mm** thickness of **Playtop**) in all cases.

### Carousels and Rotating Equipment

The standard rules apply to carousels up to **500 mm** in diameter. For carousels over **500 mm** diameter, the protected area should extend **2 metres** out from the outer edge of the carousel to allow for centrifugal force (although some safety inspectors may allow the protected area to be reduced round small and/or low carousels).

For high carousels with overhead 'hanging glides', an extra **150 mm** should be added to allow for swinging out up to **30°** from the vertical. For carousels of the 'giant revolving disk' type, the protected area should extend **3 metres** out. The maximum free height of fall for carousels is **1 metre** (except for overhead types where it is: grip height less **1.5 metres**).

The surfacing should have a Critical Fall Height of at least **1 metre** (**40 mm** thickness of **Playtop**) in all cases. Surfacing under the carousel must be at the same level as that surrounding it, but no inward extent of protective surfacing is specified. We recommend **300 mm** in from the outer edge for most carousels, but for types with overhead grips, surfacing should extend in to the central support.

### Enclosed Equipment

The standard rules apply except that, for free heights of fall up to **1.5 metres**, the extent of the protected area may be reduced from **1.5 metres** to **1 metre** if surrounding vertical surfaces provide protection against impact. The maximum free height of fall for enclosed equipment is **2 metres**.

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