

Guide on Natural Play Structures and Furniture



developed by



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TECHNICAL SHEET

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PRESENTATION

Planning and implementing a nature-based play space requires looking at the terrain, considering landscaping and having a wide selection of natural play structures and furniture that align with the concept of “landscapes for play”.

This guide presents several ideas for playful and resting structures to create spaces for playing and enjoying integrated with nature, taking advantage of the characteristics of the terrain and using natural elements such as logs, trees, stones, water, among others.

The guide is organised into two parts. In the first one, you will learn, step by step, how to build natural play structures and furniture, including the technical details, construction methods and materials required for some of the play structures that have been tested and used in nature-based play areas installed in Brazilian municipalities.

In the second part, you will understand how safety standards can be applied to natural play structures and furniture. To do this, we use, as an example, the **technical standards for the implementation of playgrounds (NT 16.071)** of the Brazilian Association of Technical Standards (ABNT).

Observing safety standards is a relevant issue in the design of nature-based play structures and spaces, as it is for any kind of playground. At the same time, it is important to keep the balance between the prevention of serious accidents and the provision of risky play, which make play spaces interesting and challenging for children, and is a fundamental factor in promoting child development.

To learn more about this topic and get to know international references for playground safety standards, we recommend consulting the publication on **Paths for Implementing Natural Play Spaces - A Guide for Public Managers.**



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PART 2

- 49** Guidelines of the Technical Standard 16.071 of the Brazilian Association of Technical Standards (ABNT)

VERTICAL STEM CLIMBER

IMPORTANT INFORMATION

Risk: **high**

Inspection scale: **high demand**

Age group: **5 years and over**

POSSIBILITIES



Climbing



Conquering the top



Watching from above



Grabbing and hanging on

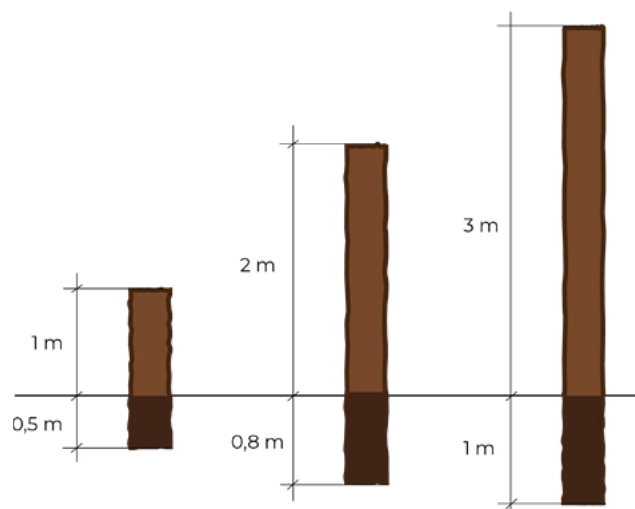
MATERIALS AND TOOLS

- A cylindrical log of the desired height (taking into account the footage needed to bury)
- For digging: excavator, shovel, hoe or pickaxe
- Stick to firm the soil around the trunk
- Chainsaw
- Sander or grinder with sandpaper
- Concrete/sand (optional)
- Transparent resin



CONSTRUCTION METHOD

The logs chosen must be of such a height as to include the base to be buried, as shown in the drawing below.



For play structures 1m high, the buried part must be 50cm. For logs 2m high, the buried base must be at least 80cm. For play structures 3m high, the buried base must be 1m.

Buried log foundation

Based on observation of the type of soil, its humidity, the incidence and runoff of rainwater on the site, and the strength of the wood used, the builder should assess the need to use gravel, lime and sand, with a little water or concrete in the mixture of the log foundation. This is to make the structure more secure.

The segment to be buried should be painted with asphalt, and the outcropping should be coated in resin, to make the logs last longer.

Notching the grips on the trunk

The use of a chainsaw is recommended for making grabs. They can also be made using a chisel or saw, but this requires more effort.

It is advisable to sand the grips with a sander to remove any roughness or splinters. The grips can have different shapes and angles.

Floor lining

To reduce the impact of children falling, a mitigating surface should be provided around the structure using materials such as bark, sand or fine wood chips.

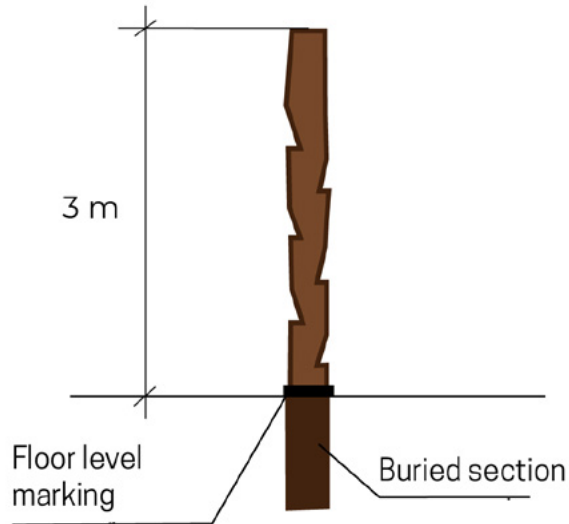
Waterproofing wood

The bark on the logs creates a favourable environment for decomposer organisms. It is necessary to remove the bark - which is not always easy - in order to apply resin so that the logs last longer. We recommend applying two coats, seeking maximum absorption and using transparent-coloured products to enhance the original tone of the wood.

POINTS OF ATTENTION IN RELATION TO ABNT TECHNICAL STANDARD 16.071

Maximum drop height

The standard recommends that the maximum height of any play structure should not exceed 3m.

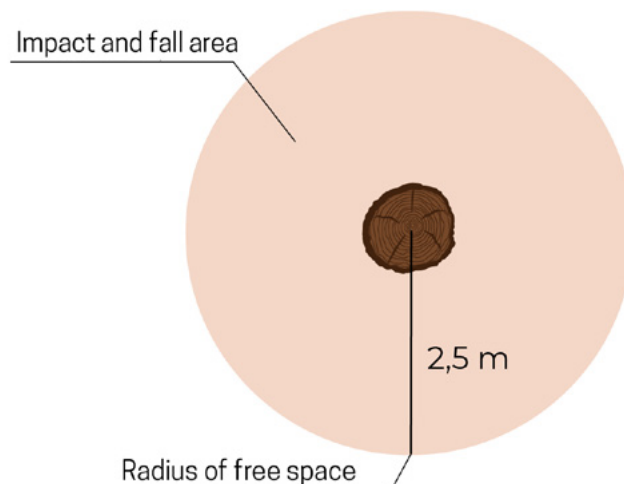


Floor level marking

At the end of installation, the level of the floor should be marked on the log to detect any future loss of length of the buried log or earth movement.

Drop impact area

The standard recommends that any play structure with a drop of more than 60cm should have a free, unobstructed area over which the user can fall without injury. The radius of this area is proportional to the height of the play structure. For a play structure 3m high, the free area must have a radius of 2.5m.



Attenuating surface

The standard recommends that every play structure with a fall radius should have an attenuating surface in the drop-impact area. The type of material indicated varies according to the height of the play structure. In the case of a vertical climbing frame, the attenuating surface indicated is sawdust or wood chips.

CHECKING AND MAINTENANCE

Monthly check

- Check that the logs are intact, without any cracks or fissures at the base where the log rests on the ground. If the base is cracked, the play structure should be replaced.
- Check for cracks to avoid trapping fingers. If there are any, they can be filled with resin or white glue mixed with sawdust.
- Check that the ground level around the play structure remains on the floor line marked when the structure was installed. If there is any change, the play structure must be rebuilt.

Monthly maintenance

- Renew the cushioning material under the trunk.

Annual maintenance

- If the logs are peeling, reapply the resin to the entire surface of the play structure.

HORIZONTAL STEM CLIMBER

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium requirement**

Age group: **2 years and over**

POSSIBILITIES



Balance



Crossing



Movement

MATERIALS AND TOOLS

- Logs of the desired size (taking into account the play structure's target audience)
- For digging: excavator, shovel, hoe or pickaxe
- Stick to firm the soil around the trunk
- Chainsaw
- Sander or grinder with sandpaper
- Threaded bar or nail
- Drill
- Transparent resin



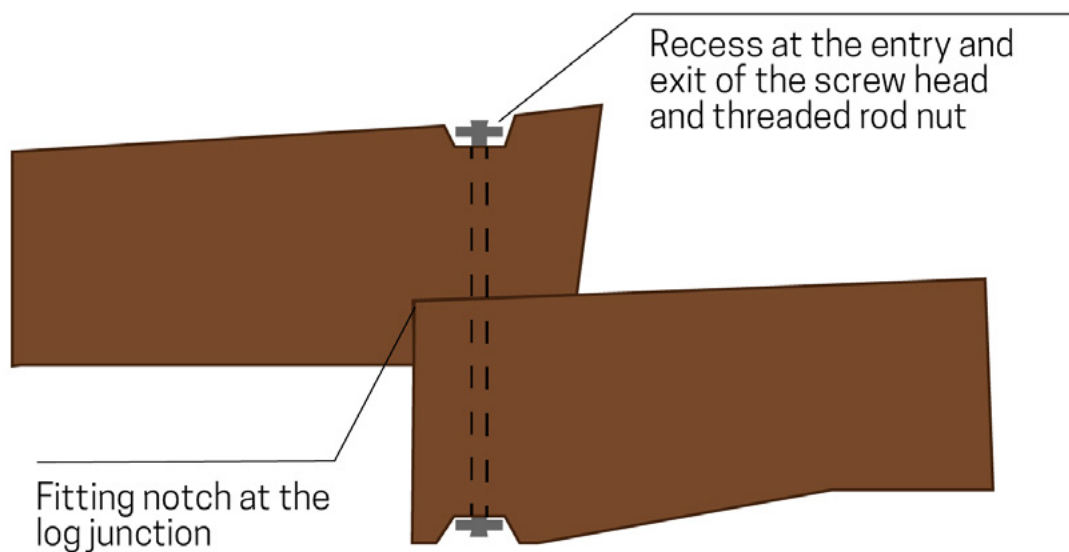
CONSTRUCTION METHOD

Arrangement of trunks

- Distribute the logs on the floor according to the best natural fit based on the shape of the pieces available.
- Develop a course of challenges to be overcome with the logs, taking into account the difficulty of the circuit.
- Choose the points of support and base on the ground, digging holes in the soil to bury the necessary pillars.

Fixing the logs

- Fix the logs to each other with the groove between the timbers and with threaded rods - with a nut and bolt on each side.
- You can also use nails. These are cheaper, although they are less resistant than the threaded rod. Another possibility is to use wooden or bamboo nails. They are more difficult to obtain and also last less, but their environmental impact is lower.
- The circuit can also be enhanced by support pillars, adding height to the course. These pillars can be made from wooden stumps fixed in the ground according to their height (the higher the pillar, the deeper the buried section).



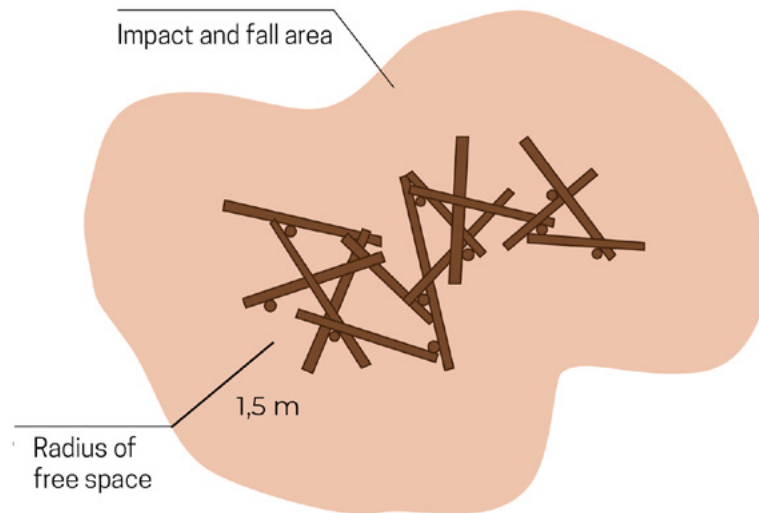
Waterproofing wood

The bark on the logs creates a favourable environment for decomposing organisms. It is necessary to remove the bark and apply resin, so that the logs last longer. We recommend applying two coats, seeking maximum absorption and using transparent-coloured products to enhance the original tone of the wood.

POINTS OF ATTENTION IN RELATION TO ABNT TECHNICAL STANDARD 16.071

Drop impact area

The standard recommends that any play structure with a drop of more than 60cm should have a free, unobstructed area over which the user can fall without injury. The radius of this area is proportional to the height of the play structure. For structures 60cm high or less, the radius of the free area around it should be 1.5m.

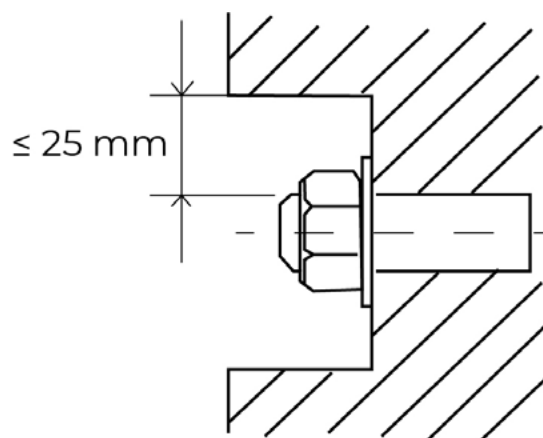


Attenuating surface

The standard recommends that every play structure with a fall should have an attenuating surface in the drop impact area. The type of material indicated varies according to the height of the structure. For a horizontal climbing frame, the recommended surface is grass, although it is possible to use bark or wood chips, or sand.

Nut and bolt protection

The maximum distance between the centre of the screw shaft and the side of the recess in the wood is 25mm.



Metal components must be weather-resistant and protected against oxidation to prevent rust.

CHECKING AND MAINTENANCE

Monthly check

- Check that the trunks are intact, without any cracks at the base.
- Check that all fittings are tight and secure.
- Check if the iron fixings (such as the screw bar or nail) are exposed. If there are exposed nails or screws, try tapping and sinking them into the wood. If this is not possible, dismantle the play structure.

Monthly maintenance

- Maintain the grass underneath which is recommended for fall protection.

Annual maintenance

- If the logs are peeling, reapply resin to the entire surface of the play structure.

DNA BRIDGE

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium requirement**

Age group: **5 years and over**

POSSIBILITIES



Balance



Crossing



Movement

MATERIALS AND TOOLS

- 6 sturdy logs to structure the side beams: two pairs of thicker logs as pillars, and two for the beams
- Tiles of equal length for the bridge floor
- For digging: excavator, shovel, hoe or pickaxe
- Stick to firm up the earth around the pillars
- Chainsaw
- Sander or grinder with sandpaper
- Concrete/sand (optional)
- Threaded bar
- Drill
- Transparent resin



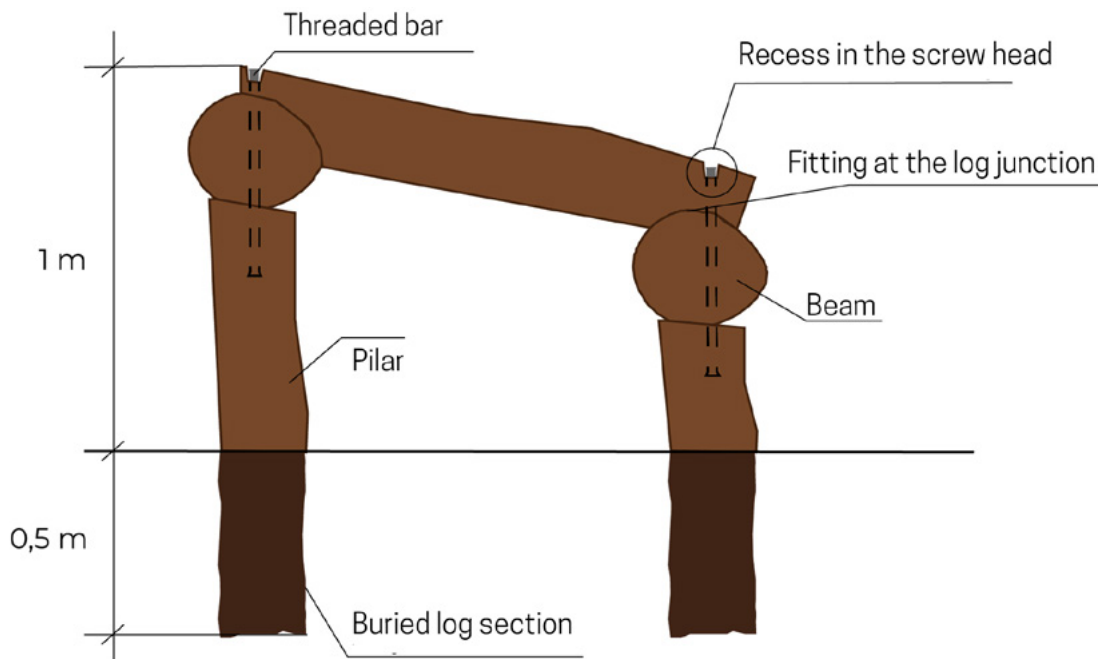
CONSTRUCTION METHOD

Fixing the pillars

- Build two beams, using two wide logs as pillars, and two thinner logs as beams supported between the two pillars.
- The pillars must be buried and, optionally, concreted. The depth at which the pillar should be buried is calculated according to its height (see drawing below).
- The end of a beam should be higher at one end and lower at the other, with each pair of pillars having symmetrically opposite heights (which will cause the bridge to feel “twisted”).
- The height of the pillars will determine the height of the playground, influencing children’s access and movement.
- The segment to be buried should be painted with asphalt, and the outcropping should be coated in resin, to make the logs last longer.

Fixing the beam

- The beam with one end is attached to each pillar by means of fittings and wood glue.
- If the wood is rounded, fix it with fittings and a threaded rod or nail.



Construction of the bridge floor

- Fix logs between the beams of each beam, by fitting the timbers together and using a threaded bar.
- If the logs are too smooth, the surface can be roughened to reduce the difficulty of accessing and crossing the play structure.

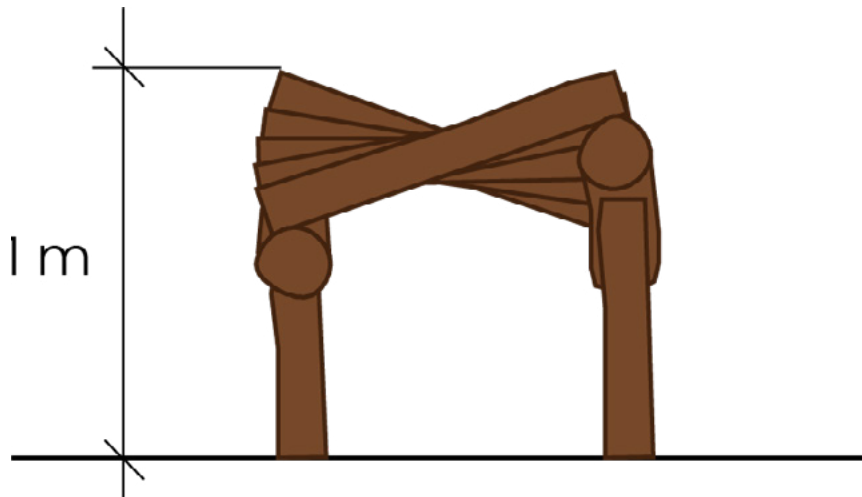
Waterproofing wood

The bark on the logs creates a favourable environment for decomposing organisms. It is necessary to remove the bark and apply resin, so that the logs last longer. We recommend applying two coats, seeking maximum absorption and using transparent-coloured products to enhance the original tone of the wood.

POINTS OF ATTENTION IN RELATION TO ABNT TECHNICAL STANDARD 16.071

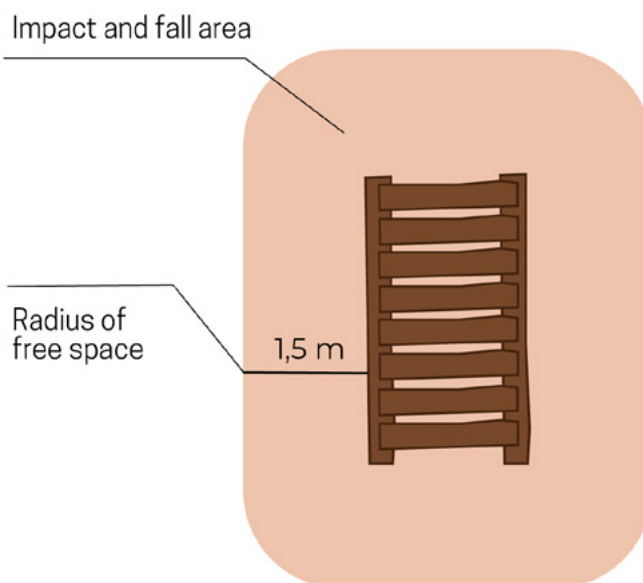
Drop height

The standard recommends that the maximum height of any play structure should not exceed 3m. We suggest that the maximum height of the DNA Bridge is 1m.



Drop impact area

The standard recommends that any play structure with a drop of more than 60cm should have a free, unobstructed area over which the user can fall without injury. The radius of this area is proportional to the height of the play structure. For a structures 1m high, such as the DNA Bridge, the free area must have a radius of 1.5m.

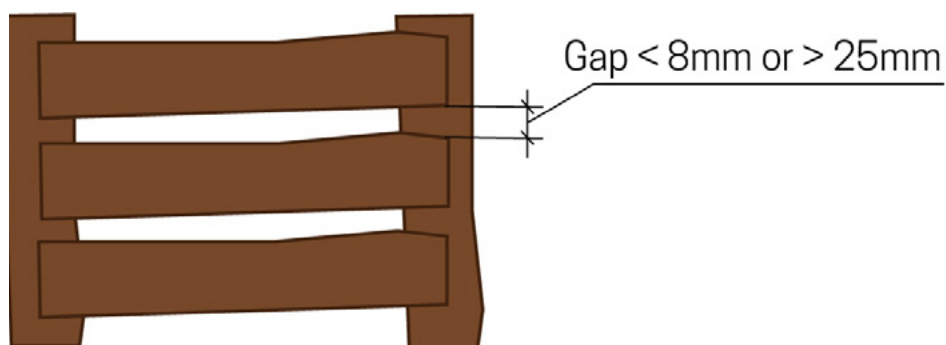


Attenuating surface

The standard recommends that every play structure with a fall should have an attenuating surface in the drop impact area. The type of material indicated varies according to the height of the structure. In the case of the DNA Bridge (height greater than or equal to 1m), the attenuating surface is grass, although it is possible to use bark or wood chips, or even sand.

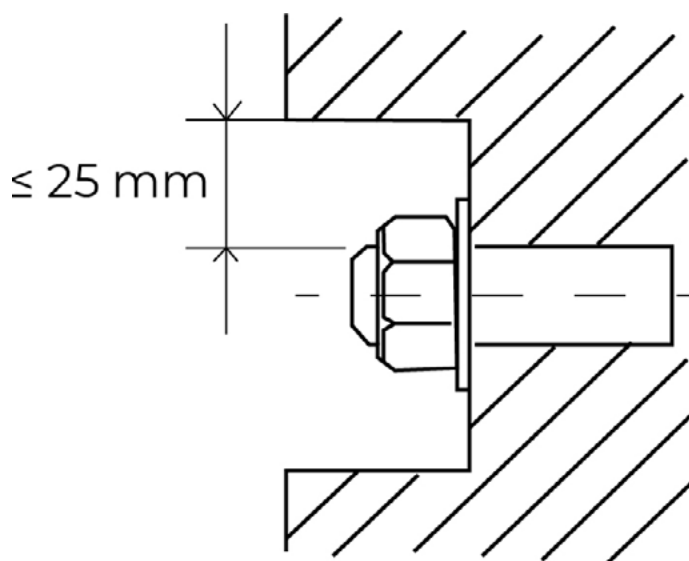
Prevention of finger entrapment

The distance between the transverse logs that form the bridge surface must be ≤ 8 mm or ≥ 25 mm.



Nut and bolt protection

The maximum distance between the centre of the screw shaft and the side of the recess in the wood is 25mm.



Metal components must be weather-resistant and protected against oxidation to prevent rust.

CHECKING AND MAINTENANCE

Monthly check

- Check that the trunks are intact, without any cracks at the base or in the fittings.
- Check to see if the fixings made with threaded rods are exposed. If there are exposed screws, try tapping and sinking them into the wood. If this is not possible, dismantle the play structure.
- If there are any signs of weakness in the bridge beams, where the pillars meet the ground, or in the girders, the bridge should be dismantled.

Monthly maintenance

- Maintain the grass underneath which is recommended for fall protection

Annual maintenance

- If the logs are peeling, reapply resin to the entire surface of the play structure.

BALANCE BEAM

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium requirement**

Age group: **5 years and over**

POSSIBILITIES



Balance



Walk through



Movement

MATERIALS AND TOOLS

- 3 sturdy trunks for each module on the route
- For digging: excavator, shovel, hoe or pickaxe
- Stick to firm the earth around the pillar
- Chainsaw
- Sander or grinder with sandpaper
- Concrete/sand (optional)
- Threaded bar
- Drill
- Transparent resin



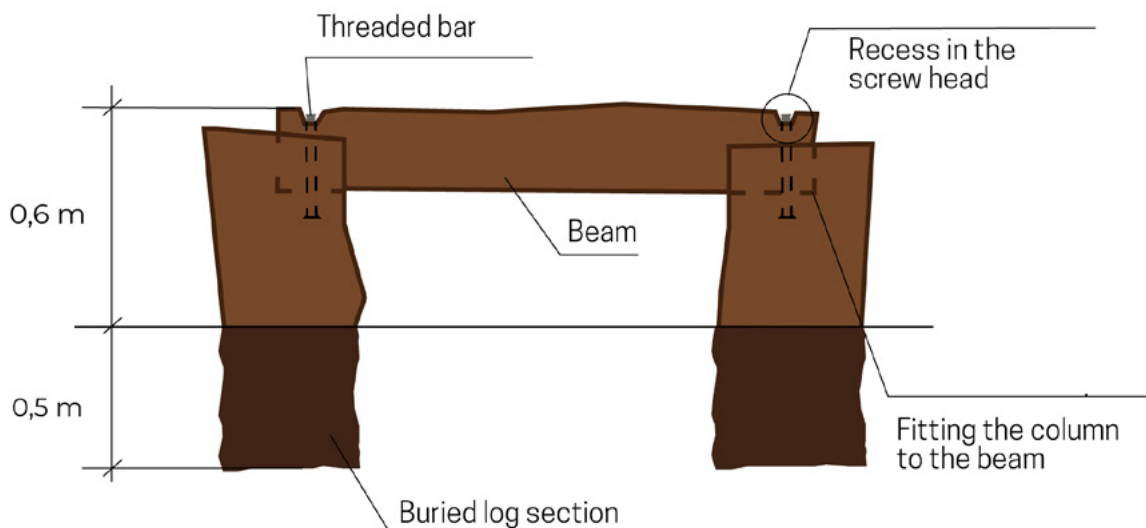
CONSTRUCTION METHOD

Route

- The balance beam is assembled by modules made up of two wider trunks, used as pillars, and a beam that acts as a bridge between the two pillars.
- The pillars must be buried and, optionally, concreted. The depth at which the pillar should be buried is calculated according to its height (see drawing below).
- The segment to be buried should be painted with asphalt, and the outcropping should be coated in resin, to make the logs last longer
- The height of the pillars determines the height of the play structure and the slope of the path, influencing children's access and crossing.
- A greater inclination of the beams increases the challenge of the play structure.

Fixação das vigas

- The beams of each beam are fastened to the pillars by fitting the timbers together with wood glue and, optionally, nails or threaded rods.
- If the beams are smooth and round, they can be roughened or flattened to reduce the difficulty of accessing and crossing the play structure.



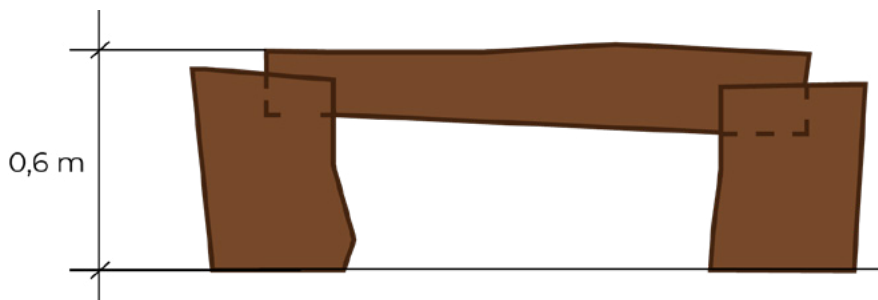
Waterproofing wood

The bark on the logs creates a favourable environment for decomposing organisms. It is necessary to remove the bark and apply resin, so that the logs last longer. We recommend applying two coats, seeking maximum absorption and using transparent-coloured products to enhance the original tone of the wood.

POINTS OF ATTENTION IN RELATION TO ABNT TECHNICAL STANDARD 16.071

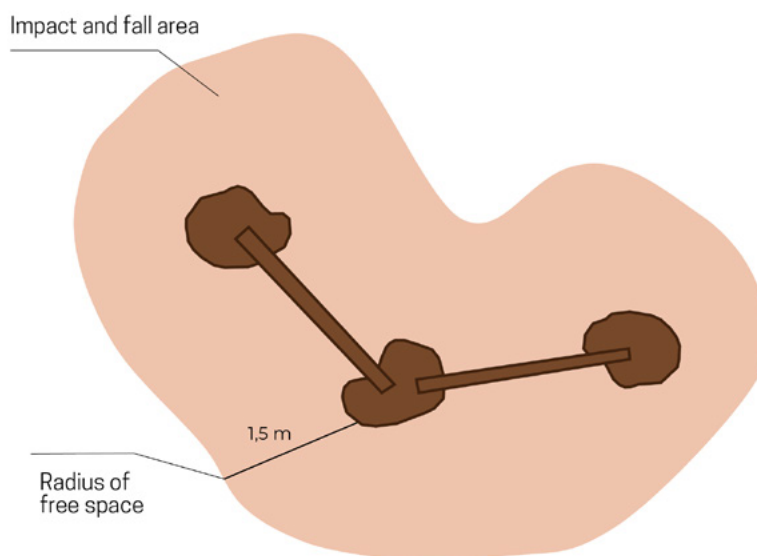
Drop height

The standard recommends that the maximum height of any play structure should not exceed 3m. We suggest that the maximum height of the balance beam is 60cm.



Drop impact area

The standard recommends that any play structure with a drop of more than 60cm should have a free, unobstructed area over which the user can fall without injury. The radius of this area is proportional to the height of the structure. For a play structure with a height of 60cm, such as the Balance Beam, the free area should have a radius of 1.5m.

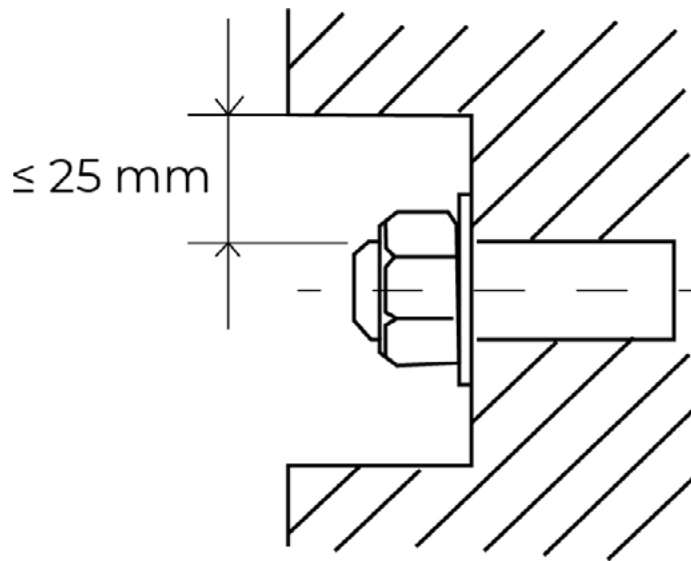


Attenuating surface

The standard recommends that every play structure with a fall should have an attenuating surface in the drop impact area. The type of material indicated varies according to the height of the play structure. In the case of the Balance Beam (height 60 cm), the recommended surface is grass, although it is possible to use bark or wood chips or sand.

Nut and bolt protection

The maximum distance between the centre of the screw shaft and the side of the recess in the wood is 25mm.



Metal components must be weather-resistant and protected against oxidation to prevent rust.

CHECKING AND MAINTENANCE

Monthly check

- Check that the trunks are intact, without any cracks at the base or in the fittings.
- Check if the iron fixings (such as the screw bar or nail) are exposed. If there are exposed nails or screws, try tapping and sinking them into the wood. If this is not possible, dismantle the play structure.
- If there are any signs of weakness where the pillars meet the ground or in the beams, the beam should be dismantled.

Weekly/monthly maintenance

- Maintain the grass underneath which is recommended for fall protection

Annual maintenance

- If the logs are peeling, reapply resin to the entire surface of the play structure.

BENCHES MADE OF NATURAL ELEMENTS

IMPORTANT INFORMATION

Risk: **low**

Inspection scale: **low demand**

Age group: **1 year or older**

POSSIBILITIES



Balance



Walk through



Movement



Sitting



Lying down



Relax

MATERIALS AND TOOLS

- Wide trunk, at least 30 cm in diameter
- If necessary, digging equipment: excavator, shovel, hoe or pickaxe
- Stick to firm the soil around the trunk
- Chainsaw
- Sander or grinder with sandpaper
- Axe
- Hoe



CONSTRUCTION METHOD

Part installation

- A large wooden log is needed to build the bench. The larger the diameter of the log, the more durable the structure. To move it, you may need to use a forklift or tractor.
- After installing the trunk in the desired location, if it is possible to move it by hand, it is important to fix it in the ground by burying part of its base. If necessary, add concrete the buried base.

Cutting the part

- If the trunk does not have a naturally flat face, you will need a chainsaw to handle wide trunks.
- Each bench can be cut into different shapes and inclinations, and the photos compiled here provide some inspiration. It's important to always carve anatomical surfaces, both for children and adults to sit or lie on.
- As well as the shape, the method for making the cuts can vary, but we suggest first marking out the perimeter of the cut on the sides of the trunk, using chalk or a shallow cut, drawing a line.
- Then make perpendicular cuts close together with the chainsaw, up to the cut line marked out for the contour of the bench.

- To remove the cut wood, use an axe and a hoe, using the marked line as a guide.
- Finally, finish with sandpaper, removing rough, sharp or cracked areas.

Note: You can keep some branches of the trunk for children to climb on and trim them if necessary.

Waterproofing wood

The bark on the logs creates a favourable environment for decomposing organisms. It is necessary to remove the bark and apply resin, so that the logs last longer. We recommend applying two coats, seeking maximum absorption and using transparent-coloured products to enhance the original tone of the wood.

CHECKING AND MAINTENANCE

Monthly check

- Check that the trunks are intact, without any cracks when they come into contact with the decomposing earth.

Annual maintenance

- Applying resin to the cut areas or bark-free trunks.

LOG PYRAMID

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium requirement**

Age group: **5 years and over**

POSSIBILITIES



Balance



Crossing



Movement



Climbing

MATERIALS AND TOOLS

- Around 30 logs of the same diameter (or very close to it) and the same length
- Sander or grinder with sandpaper
- Sturdy 8 mm rope
- Threaded bar, nail and/or plank
- Drill and hammer and/or sledgehammer



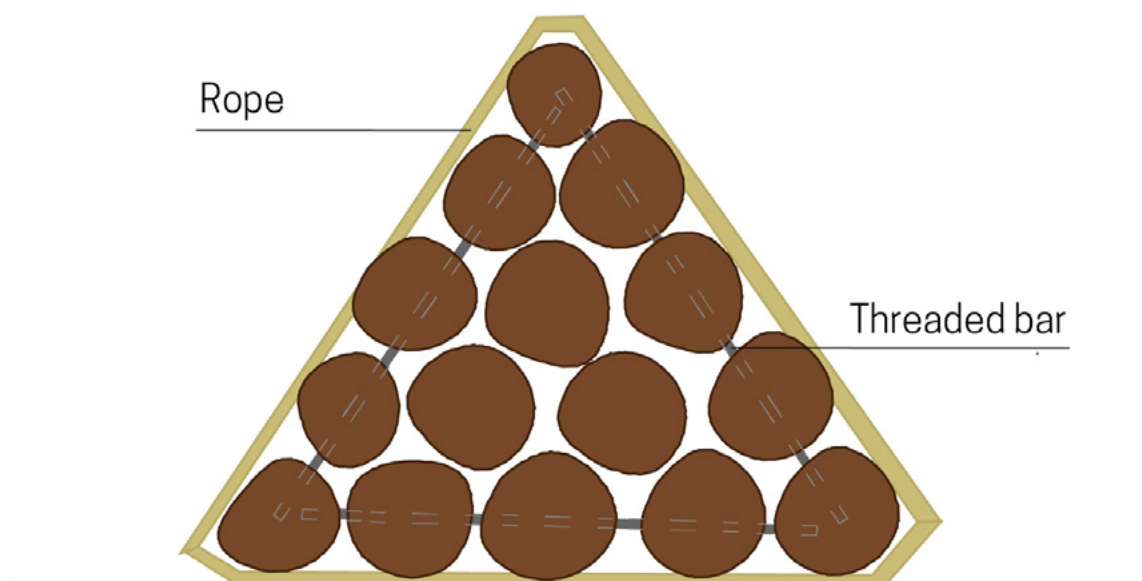
CONSTRUCTION METHOD

Trunk positioning

- Place the rope under the logs and spread out the first row of logs.
- The number of logs per row and the number of rows depends on the availability of logs and the desired size of the pile. However, it is recommended that the logs are distributed in seven layers, with the first containing nine logs, the second seven, the third five, the fourth four, the fifth three, the sixth two and the last just one log, centred at the top of the pyramid.

Fixing

- It is important to secure the logs to each other using threaded rods or boards at both ends of the length of the logs.
- Use a sturdy rope to make a trucker's hitch at both ends of the pile of logs, as shown in the image. **This video** explains one of the many ways of making a trucker's hitch.
- Using a sander or grinder with sandpaper, it is important to sand the parts to remove splinters, sharp sides or roughness.



Waterproofing wood

The bark on the logs creates a favourable environment for decomposing organisms. It is necessary to remove the bark and apply resin, so that the logs last longer. We recommend applying two coats, seeking maximum absorption and using transparent-coloured products to enhance the original tone of the wood.

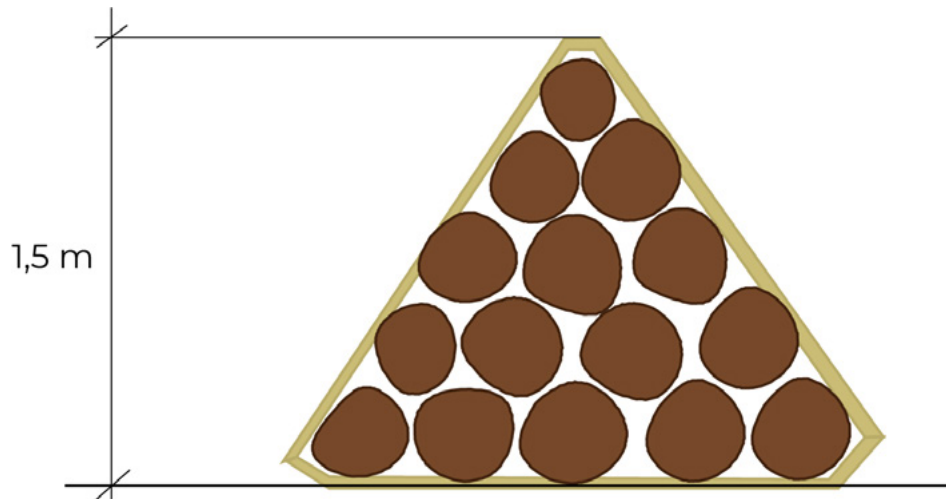
Floor lining

To reduce the impact of children falling, a softer surface should be provided around the structure using materials such as bark, sand or fine wood chips.

POINTS OF ATTENTION IN RELATION TO ABNT TECHNICAL STANDARD 16.071

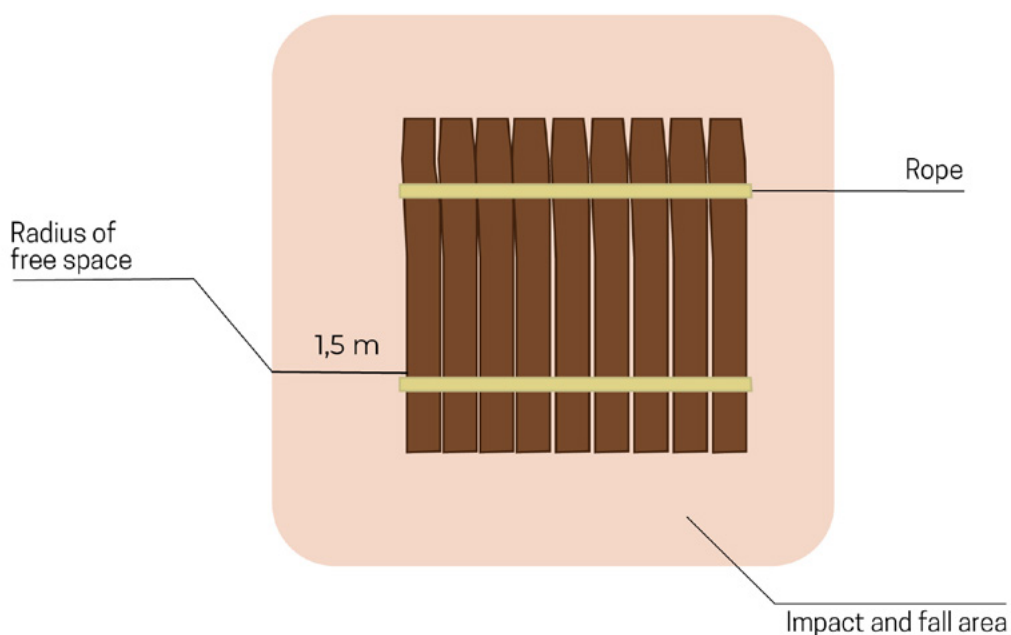
Drop height

The standard recommends that the maximum height of any play structure should not exceed 3m. We suggest that the maximum height of the Log Pyramid is 1.5m.



Drop impact area

The standard recommends that any play structure with a drop of more than 60cm should have a free, unobstructed area over which the user can fall without injury. The radius of this area is proportional to the height of the play structure. For a structure with a height of 1.5m, such as the Log Pyramid, the free area must have a radius of 1.5m.

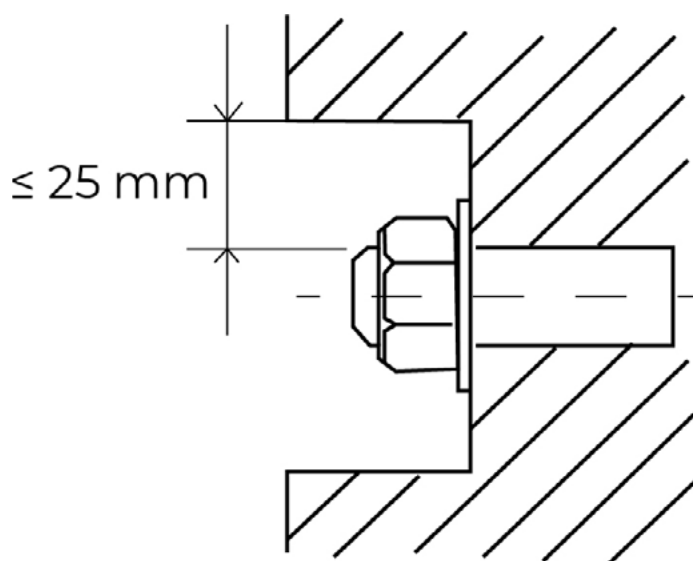


Attenuating surface

The standard recommends that every play structure with a fall should have an attenuating surface in the drop impact area. The type of material indicated varies according to the height of the structure. In the case of the Log Pyramid (height 1.5 m), the attenuating surface recommended is bark, sand or fine wood chips.

Nut and bolt protection

The maximum distance between the centre of the screw shaft and the side of the recess in the wood is 25mm.



Metal components must be weather-resistant and protected against oxidation to prevent rust.

CHECKING AND MAINTENANCE

Monthly check

- Check that the trunks are intact, without any cracks.
- Check the pile for exposed nails or screws. If there are, try tapping and sinking them into the wood. If this is not possible, dismantle the play structure.

Monthly maintenance

Renew the ground surface under the logs.

Annual maintenance

- If the logs are peeling, reapply resin to the entire surface of the play structure.

CABIN

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium**

Age group: **5 years and over**

POSSIBILITIES



Imagining



Creating



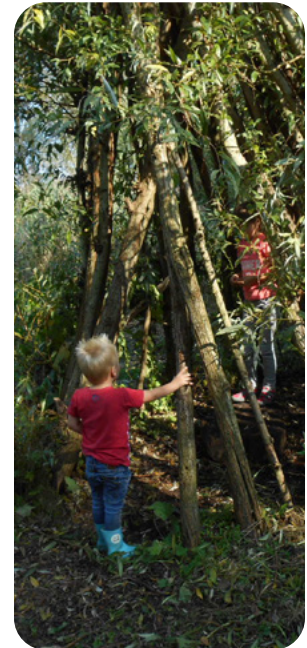
Relax



Hiding

MATERIALS AND TOOLS

- At least three bamboos with an average diameter of 7cm and the desired height, taking into account the play structure's target audience
- For digging: excavator, shovel, hoe or pickaxe
- Stick to firm the soil around the trunk
- Chainsaw
- Sander or grinder with sandpaper
- Threaded bar, rope or planking
- Drill



TYPES OF HUTS AND HIDEAWAYS

Children's involvement in building or discovering a secret, private place is an ancient experience that seems to run through generations of children around the world. Hides, huts and refuges are fundamental elements in many games, and have fostered the desire to expand and build a home for themselves in the natural world.

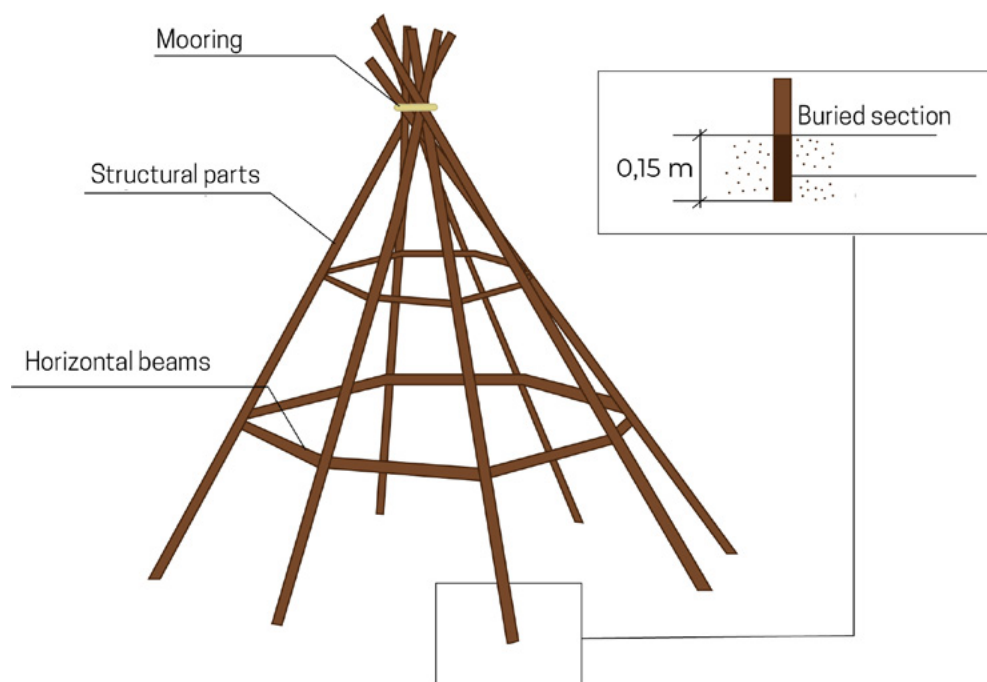
There are several possible types and structures for a hut: little houses, huts that use wooden forks, simple roofs to protect from the sun, wattle and daub houses, among other possible models.

The tipi hut is shown here. Widely used by Indigenous communities across North America, it consists of a pyramid of bamboo tied together at the top, with various possible coverings.

CONSTRUCTION METHOD

Bamboo structure

- The height of the bamboo pieces depends on the desired height of the hut. We recommend using the “*Bambusa tulidoides*” species, between 5 and 7 cm in diameter.
- For the structure, the minimum number of pieces needed is three, in order to build a tripod. With each new piece of bamboo inserted into the structure, a new geometric shape is created as a base on the ground (triangle, square, pentagon, etc.).
- The bamboos are always tied together at the top by means of a twist, and they can be secured using a 4mm rope, a threaded bar or wooden or bamboo nails.
- Once the bamboo have been tied, their bases should be buried about 15cm down, to prevent them from moving or falling.



Coating

- Define the location of the cabin's entrance door before covering it.
- It is advisable to tie one or two crossbars made of thin branches horizontally between the bamboos, across their entire internal diameter. These branches define the internal space of the hut and serve as support for cladding.
- The cladding can be done in a variety of ways: using woven straw or vertical branches - attached to both the upper bamboo tie and the horizontal beams. Wooden planks can also be used.
- Fabric can also be used to cover the hut, but it's important to bear in mind that fabric exposed to the weather is less durable and is prone to mildew. For this reason, it should be removed after playtime is over.

POINTS OF ATTENTION IN RELATION TO ABNT TECHNICAL STANDARD 1.607

Nut and bolt protection

Metal components must be weather-resistant and protected against oxidation to prevent rust.

CHECKING AND MAINTENANCE

Monthly check

- Check that the bamboos are intact, without any cracks at the base or along the length.
- Check the fixings of the structure and covering. If the cover is made of straw or small sticks, replace the material. If it is covered in fabric, check the integrity of the material.

Annual maintenance

- Replacing the bamboos.

CLAY OVEN

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium**

Age group: **any age, always with supervision**

POSSIBILITIES



Burning



Baking



Warming up

A stove should always be used under the supervision of adults, who guide the children in handling the fire. Children can gain autonomy as their experience increases.

MATERIALS AND TOOLS

- Solid bricks
- Optional: firebrick for the base
- Clay
- Cal
- Sugar
- Flexible rod (acrylic or flexible wood, such as plywood strip)
- Cement
- Wood for burning



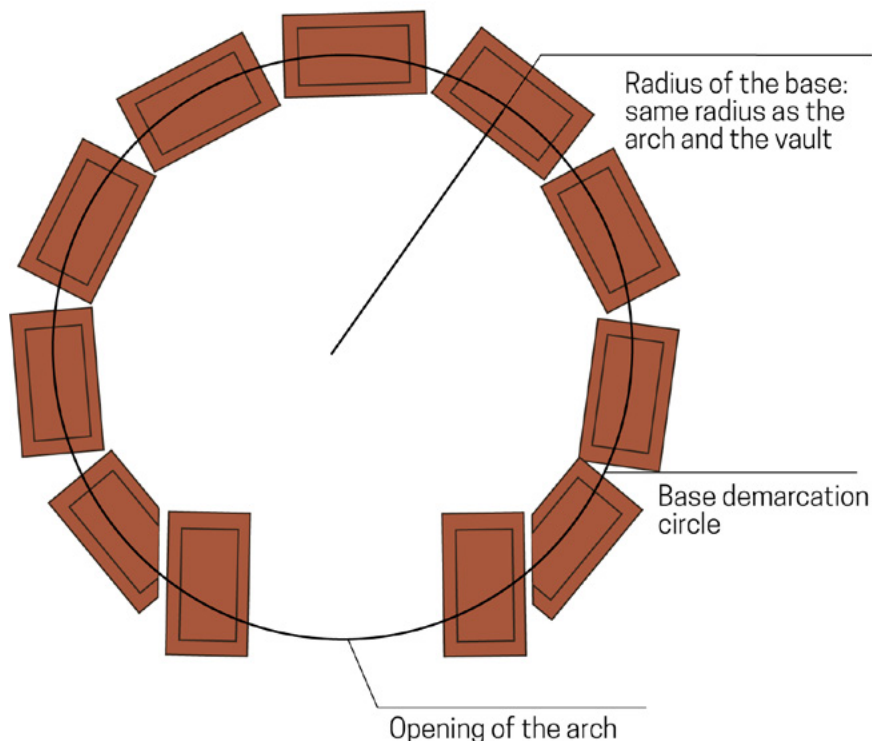
BENEFITS AND PRECAUTIONS WHEN PLAYING WITH FIRE

Learning to play and handle fire, while respecting the danger, broadens children's horizons. It represents autonomy and opens up possibilities for interaction with this natural element that is so rarely present in urban childhoods, and which brings with it joy, transformation, creativity and social relationships.

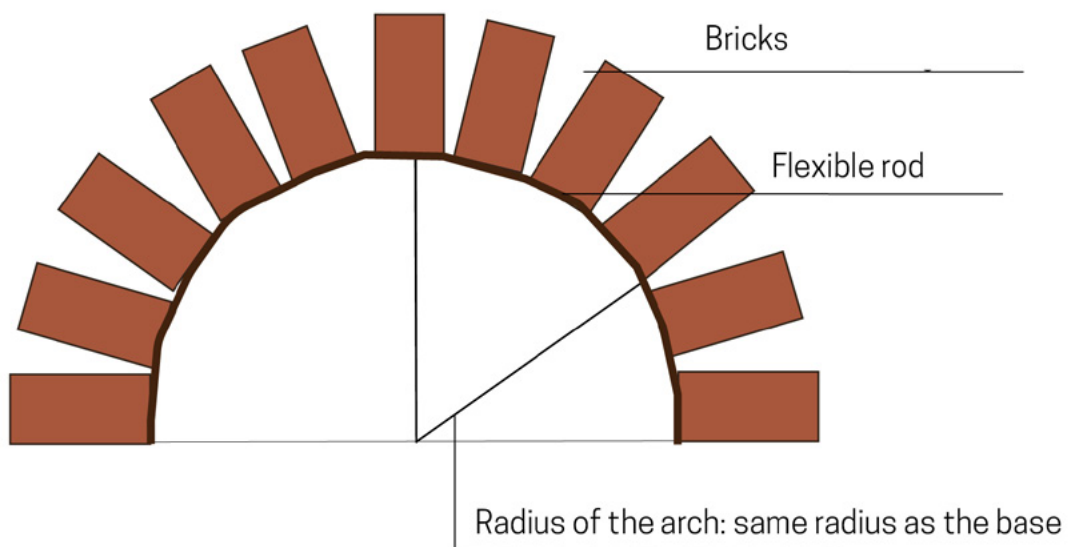
For this to be possible, children must have active adult supervision to help them gradually develop the motor and risk assessment skills to handle the stove safely, for themselves and for others involved.

CONSTRUCTION METHOD

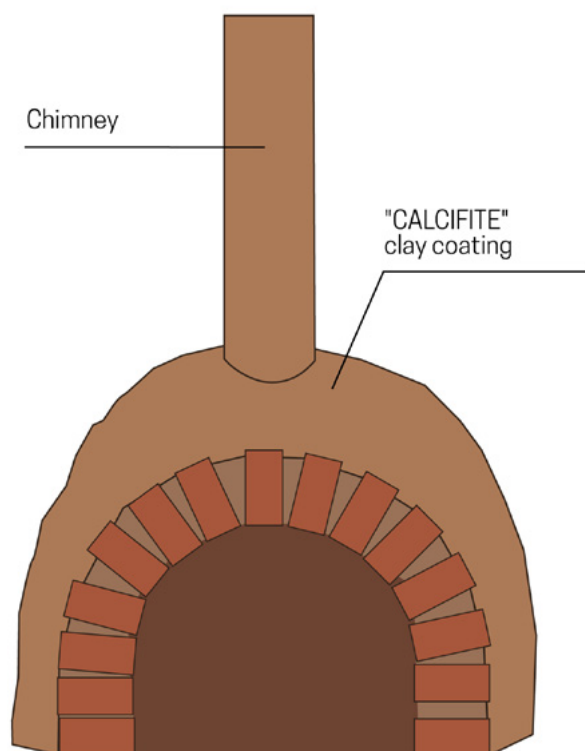
- Build a rammed earth or concrete base where the oven will be mounted. A common option is to build a brick base directly on the ground.
- Using a piece of string fixed in the centre of the base and using it as a compass, draw the circle that will determine the base and height of the oven vault.
- Using the outline drawn, assemble the brick base to the desired diameter and shape for the oven.



- Determine the location of the door arch with two bricks. To do this, it is important to have acrylic or flexible wood to shape the arch and support the gap formed by the bricks.



- Add the layers of bricks, building a vault. The arches start at the sides and are locked with a central brick at the end.
- In the centre of the oven, leave a circular space to install a metal, ceramic or brick chimney.
- Mix clay with sugar in a 10:1 ratio, which vitrifies the clay and prevents it from collapsing and increases the internal heat.
- Use this mixture to coat the inside of the oven.
- On the outside of the kiln you can apply a layer of “calfitice” grout - a composition of lime, fibers, earth and cement. This unique blend ensures stability, insulation, and durability, and can be used as a coating for all clay furniture, increasing the durability of the structure.
- You can sculpt playful mouth or head shapes in the oven (see photos).
- It is important to fire the oven immediately after construction, for at least two hours.



Watch [the video](#) demonstrating the construction of an oven in a didactic way.

CHECKING AND MAINTENANCE

Half-yearly check

- Check that the outer and inner coating layers are intact.

Biannual maintenance

- If there are cracks or water is seeping in, repair with clay on the inside and apply “calfitice” grout on the outside.

SLIDE

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium**

Age group: **2 years and over**

POSSIBILITIES



Slipping



Conquering the top



Watching from above

MATERIALS AND TOOLS

- Screened board
- Sander
- Pillar trunks
- Jigsaw or Drill
- Nails or threaded rods
- Resin

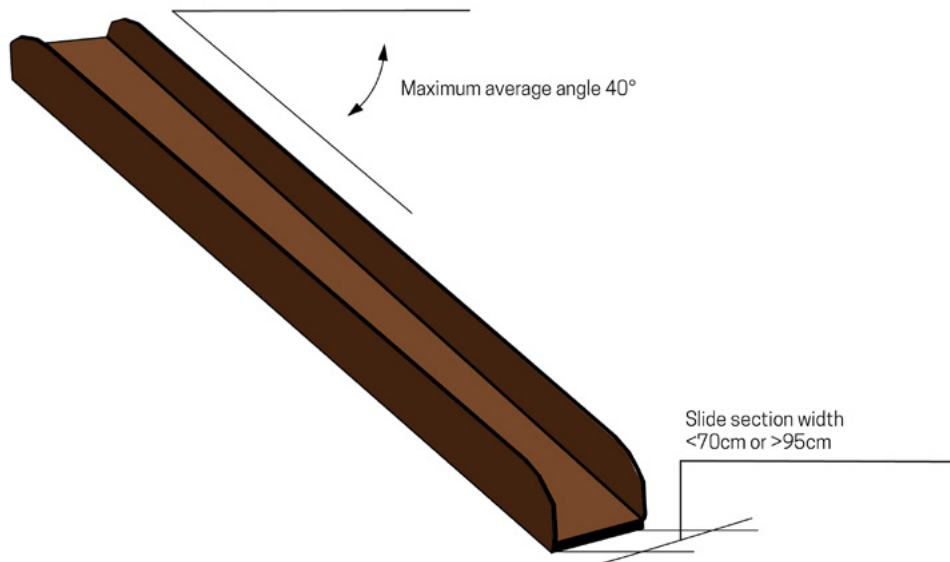


TYPES OF SLIDES

Slides can be made from a variety of materials and shapes. Stainless steel - extremely durable, but more expensive - cement, using a log with a planed face - in this case, it is recommended that it be at least 40 cm in diameter - bamboo or even using the simple slope of a grassy slope or hill - in this case, cardboard can be used as a support for sliding on a grassy area. Here we describe how to build a wooden slide on an existing slope.

CONSTRUCTION METHOD

- Select a natural slope that you think is suitable for installing a slide.
- Select a wooden board with a sliding section with a width of less than 70cm or more than 95cm. The board must be very well sanded and primed.
- The slide can have a side restraint or not. If so, it can be made using two other wooden boards on the sides, of equal length, taking care never to screw the boards together in such a way that nuts, washers or nails get into the slide area.



- The angle of the board will determine the speed of descent and therefore the age rating. The greater the angle, the steeper the slope. ABNT Technical Standard 16.071 indicates that the angle of a slide should be a maximum of 40°.
- The board can be supported by pillars 40 cm high and about 15 cm in diameter at their ends. The positioning and height of the pillars depends on the slope at which the slide is installed.
- It is essential that this support is fixed to the sides of the play structure, never to the central board, so that there is no danger of exposed nails or screws in the sliding area.

Waterproofing wood

The bark on the logs creates a favourable environment for decomposing organisms. It is necessary to remove the bark and apply resin, so that the logs last longer. We recommend applying two coats, seeking maximum absorption and using transparent-coloured products to enhance the original tone of the wood.

CHECKING AND MAINTENANCE

Monthly check

- Check that the boards and pillars are intact, without any cracks.
- Check for exposed nails or screws. If there are, try tapping and sinking them into the wood. If this is not possible, dismantle the play structure.
- If there are any signs of weakness at the bases of the pillars, where the stump meets the ground or in the main board, the slide should be dismantled.

Annual maintenance

- Reapply the impregnating resin to the entire surface of the play structure.

STUMP CLIMBER

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium requirement**

Age group: **2 years and over**

POSSIBILITIES



Movement



Climbing



Balance



Skip

MATERIALS AND TOOLS

- Various logs with different diameters
- For digging: excavator, shovels, pickaxes and hoes
- Stick to firm the soil at the edges of the stumps
- Chainsaw and a sander (or grinder with sandpaper)



CONSTRUCTION METHOD

- Choose a cozy spot with pleasant surroundings - with shade, especially in hot regions, and accessible from all sides. The terrain doesn't have to be flat, just gently sloping.
- Gather the available logs by height. Eliminate the corners and leave the top flat. The widths don't have to be homogeneous and the circular section of the top can be irregular. Using a sketch, mark out the desired shape on the ground, compatible with the number of logs available.
- The logs chosen must be of such a height that they cover the base to be buried. In the example shown, we have heights ranging from 15 to 50cm. For heights over 60cm, the logs must be 50cm buried. For logs with a height of less than 60cm, the base must be at least 30cm.
- The earth must be excavated as you place log after log, all fitted together like a jigsaw puzzle, so that the soil surrounding the play structure exerts the pressure to keep them stable.
- The segment to be buried should receive asphalt paint and the outcropping portion should be coated in resin, to make the logs last longer.
- The tallest logs should be distributed in such a way that there are no "steps" greater than 35 to 40cm.

Waterproofing wood

The bark on the logs creates a favourable environment for decomposing organisms. It is necessary to remove the bark and apply resin, so that the logs last longer. We recommend applying two coats, seeking maximum absorption and using transparent-coloured products to enhance the original tone of the wood.

POINTS OF ATTENTION IN RELATION TO ABNT STANDARD 16.071

Drop impact area

The standard recommends that any play structure with a drop of more than 60cm should have a free, unobstructed area over which the user can fall without injury. The radius of this area is proportional to the height of the structure. For play structures 60cm high or less, the radius of the free area around it should be 1.5m.

CHECKING AND MAINTENANCE

Monthly check

- Periodically check that the trunks are tight and secure. Special attention should be paid to the gaps between the trunks, so that there is no danger of trapping part of the body in the gap.

Monthly maintenance

- Replace any trunks that have rotted and make sure they are firmly planted in the ground.

Annual maintenance

- If the logs are peeling, reapply resin to the entire surface of the play structure.

FOREST KITCHEN

IMPORTANT INFORMATION

Risk: **low**

Inspection scale: **low demand**

Age group: **0 years and over**

POSSIBILITIES



Imagining



Create



Test and
experiment

COMPONENTS

- Utensils
- Kitchen equipment
- Loose parts of nature
- Water
- Earth



HOW TO ASSEMBLE

Playing at making food, and all the infinite experiments that a kitchen allows, is one of the favourite activities of children all over the world.

And what more perfect place for this than a garden? All it takes is a little bit of nature and you get earth cakes, mud soups, seed juices and flower pies.

Combining experimentation with art, the Forest Kitchens allow children to explore multiple possibilities using natural materials, developing autonomy and cultivating their creativity.

It's also notable that a relatively simple structure like this invites children to play for longer, leading small groups to spend hours playing with food.

The construction of a Forest Kitchen can be done entirely with reused and/or donated materials.

There are endless possibilities for how to set up a Forest Kitchen. Some spaces have more fixed kitchens, others have a more flexible and removable layout, often using wooden crates. The important thing is that it is cozy and welcoming.

Accessibility

All the elements and structures must be within children's visual and motor reach so that they can play independently.

Containment

The room should create a "little house" atmosphere and have enough space to accommodate several children playing simultaneously. This atmosphere of privacy and coziness can be created with light wooden crates that are easy for the children themselves to manipulate, arranged next to a hedge or wall.

Shadow

Playing with food often engages children for long periods of time, so protecting them from direct sunlight is essential. Plan the Forest Kitchen in a well-shaded area, either naturally or by means of pergolas or roofs.

Neighbourhood

It is desirable for the Forest Kitchen to be close to meeting places where the children can sit down to serve themselves, such as tables and stools. It's always good to have a good supply of "ingredients" nearby, such as plants, seeds, flowers, earth and sticks.

DETAILING THE COMPONENTS

Utensils: pots, pans, roasters, jars, spoons, the more utensils the better. Think about the activities they will provide: measuring, straining, mixing, serving, sorting. Give preference to "real" utensils made from natural materials such as wood, bamboo and straw, avoiding plastic items.

Kitchen equipment: an old microwave, a kettle, an orange squeezer, a sink, shelves and chairs help the children put together different scenarios in a rich culinary "pretend".

Loose parts of nature: plants, seeds, twigs, stones and flowers become natural ingredients in a Forest Kitchen. Plan an ample supply of these elements.

Water: it is essential that the Forest Kitchen is close to a water source. This can be a tap with a timer or a ram pump. Make sure the water is drinkable.

Earth: mud, sand, soil are also essential elements.

CHECKING AND MAINTENANCE

A Forest Kitchen is a living structure that will be continually modified and therefore needs more careful maintenance, with repairs and replacement of components.

BAMBOO STAR

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium requirement**

Age group: **2 years and over**

POSSIBILITIES



Create

Hanging

Climbing

Skip

Balance

MATERIALS AND TOOLS

- 12 pieces of bamboo approximately 1.80 m long
- Cut strips of bicycle tube rubber (truck tire tubes are better, although harder to find)



CONSTRUCTION METHOD

Cutting and processing bamboo

- Harvest the most mature - and therefore hardest - bamboo stalks.
- Make the cut just above the knot, taking care not to split it.
- Dry each piece of bamboo with a blowtorch from bottom to top.

Two symmetrically intertwined pyramids

- Set up two tripods with three bamboo poles each, joining them at the top end with rubber bands.
- Assemble two triangles with three bamboo stalks each, tying them together at the ends.
- Tie the bases of the first tripod onto one of the triangles, forming a pyramid.
- Attach the other triangle to the rods of the pyramid in a plane parallel to its base, so that when seen from above they have the shape of a six-pointed star.
- Attach the other tripod to the triangle that was attached to the pyramid rods. The result will be two pyramids intertwined symmetrically, forming a three-dimensional star.

CHECKING AND MAINTENANCE

Monthly check

- Periodically check that the pieces are tight and secure, and that there are no dangerous gaps between them.

Monthly maintenance

- Replace any parts that have rotted.

WATER PATH

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium requirement**

Age group: **2 years and over**

POSSIBILITIES



Imagining



Create



Test and experiment

MATERIALS AND TOOLS

- One or more cylindrical trunks at least 1.5 m long
- Chalk or pencil
- Chisel or other tool for hollowing out wood
- Buckets and containers for playing with water



CONSTRUCTION METHOD

- Choose a cylindrical log and, using chalk or a carpenter's pencil, draw a sinuous line between the two ends of the log. With a chisel-type tool, dig a groove at least 3 cm deep and 3 cm wide along the sinuous line.
- Support one end of the log on an available support - a rock, wall or other log - tilting it so that the water to be poured by the children into a container can drain away. Sand the groove until all the splinters are removed.
- The bark on the logs creates a favourable environment for decomposing organisms. It is necessary to remove the bark and apply resin, so that the logs last longer. We recommend applying two coats, seeking maximum absorption and using transparent-coloured products to enhance the original tone of the wood.

CHECKING AND MAINTENANCE

Monthly check

- Carry out periodic inspections for splinters.

Annual maintenance

- If the logs are peeling, reapply resin to the entire surface of the play structure.

LIVING TUNNEL

IMPORTANT INFORMATION

Risk: **medium**

Scale of inspection: **medium requirement**

Age group: **2 years and over**

POSSIBILITIES



Hiding



Calm encounters



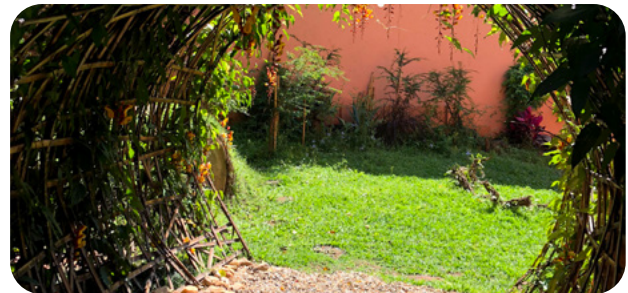
Protection from sun or rain



Privacy and solitude

MATERIALS AND TOOLS

- Iron rebar ½ inch
- Wire
- Used 1 gallon paint cans
- Cipó
- Cement
- Bamboo
- Sand
- Palm leaves/climbing plants
- Digger



CONSTRUCTION METHOD

The size of the tunnel will depend on the resources available. Here are two examples for inspiration: one in which the cover was made from palm leaves and the other in which seedlings of “Lady’s slipper vine” or “Trumpetvine” (*Thunbergia mysorensis*), a climbing species, were used.

STEP BY STEP:

- Draw up a plan of your tunnel, with height and distance measurements.
- Dig holes for the footings that will be made with the paint cans
- Buried and filled with cement.
- Bury the cans, fill them with cement.
- Before the cement dries, apply the rebar already cut to size and arch the structure - which should start at one footing and end at another.
- Make horizontal lines of wire, vine or bamboo tied to the rebar, to create enough structure to hold the leaves or for the vine to climb (if you use wire, make sure you don’t leave any exposed ends).
- If the cover is made of palm leaves, attach them to the wire using natural fibers.
- If the covering is made of vines, guide the plant so that it covers the entire tunnel structure.



MAINTENANCE AND CHECKING

Monthly check

- Check that there are no loose ends to the vine or wire that could cause accidents in the children's path.
- In the case of a tunnel made from dry leaves, after a while of use it may be necessary to replace the outer covering material (vine or wire and straw).
- In the case of a tunnel covered with climbing plants, take care of watering.

GUIDELINES OF THE TECHNICAL STANDARD 16.071 OF THE BRAZILIAN ASSOCIATION OF TECHNICAL STANDARDS (ABNT)

The Technical Standard 16.071 of the Brazilian Association of Technical Standards (ABNT) describes the safety and accessibility aspects that should be considered when implementing playgrounds and play equipment in Brazil.

The **ABNT NBR 16071/2021** consist of:

Part 1: Terminology

Part 2: Safety requirements

Part 3: Safety requirements for impact absorbing flooring

Part 4: Test methods

Part 5: Play area design

Part 6: Installation

Part 7: Inspection, maintenance and use

Part 8: Inclusive playground requirements

Although they are not mandatory rules, safety standards offer guidelines for making equipment safer and increasing its useful life. Our suggestion is that the main concepts of the standards be observed, without the play space ceasing to be diverse, challenging and rich in opportunities for free play and exploration.

There are various international standards on playground and play equipment safety, which aim to reduce the likelihood of physical injury and prevent life-threatening or debilitating accidents. When developing and installing natural play spaces and structures, consult and follow the guidelines of the standards specific to your country or region.

For some international references on safety standards for playgrounds, we recommend having a look at the publication **“Paths for Implementing Natural Play Spaces - A Guide for Public Managers”**.

Below, we highlight some aspects described in the Brazilian standard - ABNT NBR 16071/2021, which deserve attention when planning natural play spaces and structures.

1. GUIDELINES ON THE USE OF WOOD

Types of wood

The durability of the play structure or furniture is directly proportional to the species and diameter of the wood used. Some tree species are naturally more resistant to decay due to their density, and are suitable for use in outdoor structures¹.

Logs with a diameter of 30cm or more ensure greater stability and durability for the play structure and reduce the need for maintenance and replacement. At the same time, handling large, robust pieces usually requires more infrastructure, such as a crane for transportation and a chainsaw with a longer blade.

You should also try to use types of wood that have a low tendency to splinter².

At the same time, it is important to assess how to deal with the decay of wood and the replacement of play structures. Ideally, replacement should be linked to the search for safe and qualified experiences for children. It's always good for the park to look neat and beautiful. But that doesn't stop decaying wood from being incorporated into the play structure repertoire and providing new experiences.

These decisions are related to the project and the maintenance capacity of the body responsible for its implementation and the community where the park is located.

Origin of the wood

Ideally, the wood should come from the management of trees in the municipality or in the area where the natural play space will be set up, through pruning. In this way, a lot of quality wood stops becoming waste and becomes raw material for making play structures or structures. When this is not possible, legally produced wood should be used in reforestation or taken from native forests through forest management projects approved by the competent bodies³.

Wood treatment

The bark of the trunks produces a favourable environment for decomposer organisms. Waterproofing can prevent water infiltration and insect harbourage. To do this, it is necessary to remove the bark - which is not always easy, and apply resin, so that the logs last longer. You should apply two coats, aim and use transparent-coloured products to enhance the original tone of the wood.

The less dense the wood, the greater the need for waterproofing. The heavier and denser - the less resin is needed.

Care for wood that is buried and in contact with the ground

All buried wood must be treated with substances designed to increase its durability, as the soil can speed up its decomposition even more. These substances are called "preservatives".

In addition, based on observation of the type of soil, its humidity, the incidence and runoff of rainwater on the site and the strength of the wood used, the builder should assess the need to use sand or concrete to form the foundation of the buried log, making it safer for the structure.

Wood management

Fitting

The components of a play structure or furniture must be joined together in a way that prevents them from moving or turning. Nails or screws cannot be used as the only means of attachment⁴. Therefore, it is suggested that the construction method makes use of notches, threaded bars or glue.

Finishing

Nails, spikes and sharp corners must not protrude from the surface of the wood, nor must there be any components with sharp or pointed edges on any accessible part of the play structure or furniture. In addition, rough surfaces must not present any risk of injury⁵.

Cracks

No piece of equipment may have cracks with openings larger than 8 mm, in order to avoid risks related to trapped fingers⁶.

2. GUIDELINES ON THE LAYOUT OF EQUIPMENT AND STRUCTURES⁷

The organization of equipment in a play space should avoid conflicting activities in order to minimize injuries. In addition, use should be intentionally dispersed, avoiding crowds in one place.

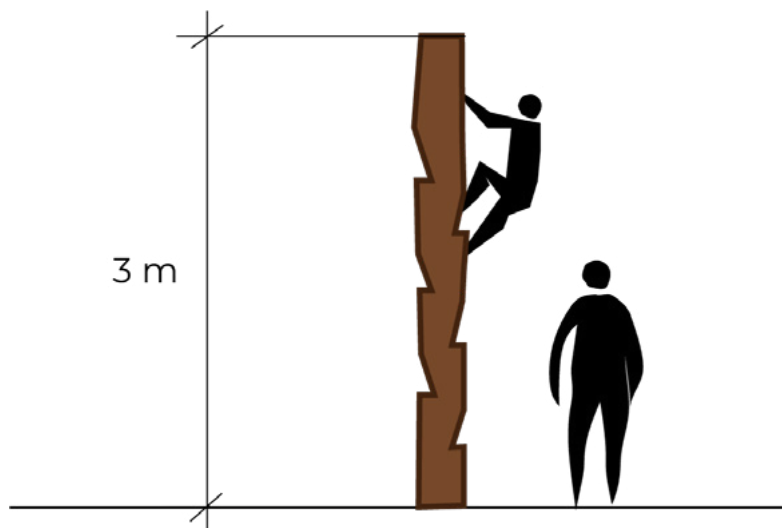
Equipment that involves movement, such as swings, should preferably be located on the edge of the naturalised park, avoiding the areas where users circulate most.

Ideally, the distribution of equipment should not form visual barriers, making it easier to monitor all movement and activity.

3. GUIDANCE ON CONSTRUCTION METHODS AND THE INSTALLATION OF EQUIPMENT AND STRUCTURES

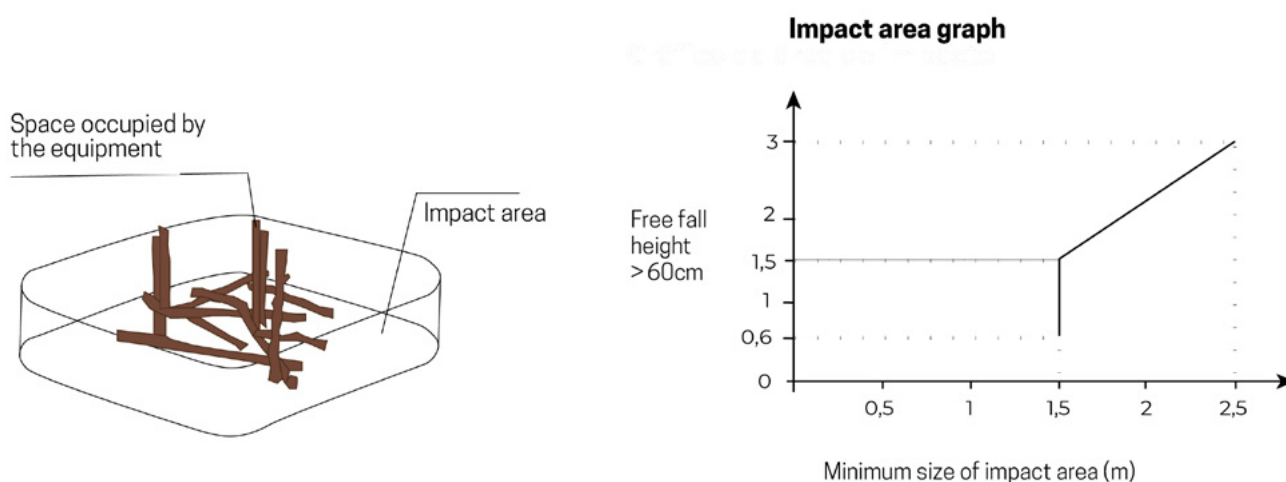
Maximum drop height

The standard recommends that the maximum height of any play structure should not exceed 3m⁸.



Drop impact area

The standard recommends that any play structure with a drop of more than 60cm should have a free, unobstructed area over which the user can fall without injury. The radius of this area is proportional to the height of the play structure, as shown in the graph below⁹.



The possible movements of the equipment and the user must be taken into account. In certain cases, such as when the child hangs and spins on a rope and acquires horizontal speed, the impact area can be extended to provide appropriate protection against injuries caused by falls.

There must be no overlap between the impact and fall areas.

Attenuating surface

The standard recommends that every play structure with a fall should have an attenuating surface in the impact-free area. The type of material indicated varies according to the height of the play structure¹⁰.

Types of impact attenuating floors

Material	Maximum fall	Minimum depth	Accessibility*	Maintenance*
Grass	< 1m	—	Not wheelchair-accessible	Constant maintenance: watering and pruning
Bark Wood chips Sand (without mud or clay) Gravel (without mud or clay)	< 3m	30 cm	Not wheelchair-accessible	Constant replenishment to maintain minimum depth 30 cm
Rubber flooring	According to the requirements of ABNT NBR 16071-3	—	Accessible	Low cost

*Information taken from the ERE LAB products catalog (2021) | link: <https://www.erehab.com.br/produtos>

Fall protection

When the play structure has some kind of raised platform, a barrier or guardrail must be provided, in accordance with the guidelines below, as well as attenuation of the drop impact surface¹¹.

Fall protection

Equipment by age group	Protection required		
	Height >600mm	Height >1000mm	Height >2000mm
Accessible to users under 36 months of age	Barrier		
Not accessible to users under 36 months of age	—	Guardrail	Barrier

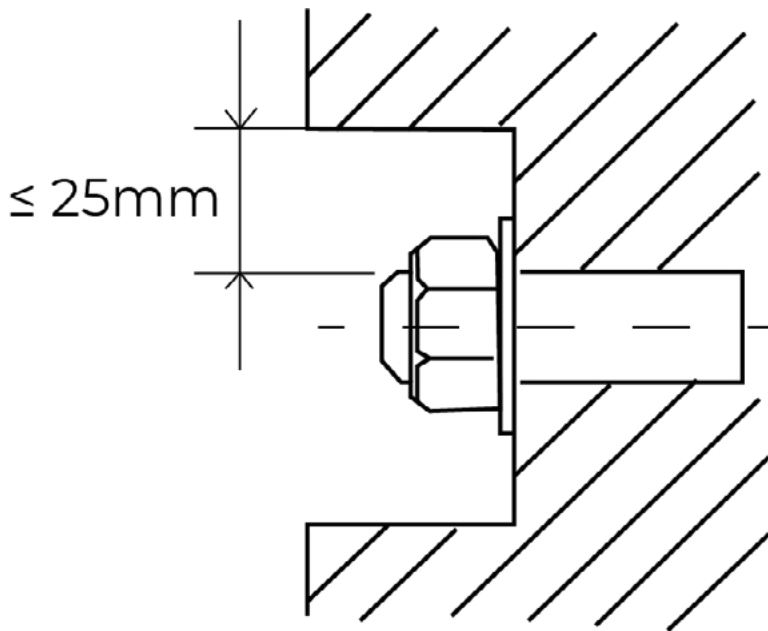
*The minimum height of the barrier must be 900 mm, measured from the surface of the platform, staircase or ramp

Floor level marking

At the end of the installation of equipment with buried structures, the floor level of the buried structure should be marked, so that any loss of length or earth movement can be identified in the future.

Nut and bolt protection

The maximum distance between the centre of the screw shaft and the side of the recess in the wood is 25mm¹².



Metal components must be weather-resistant and protected against oxidation to prevent rust.

Sandbox

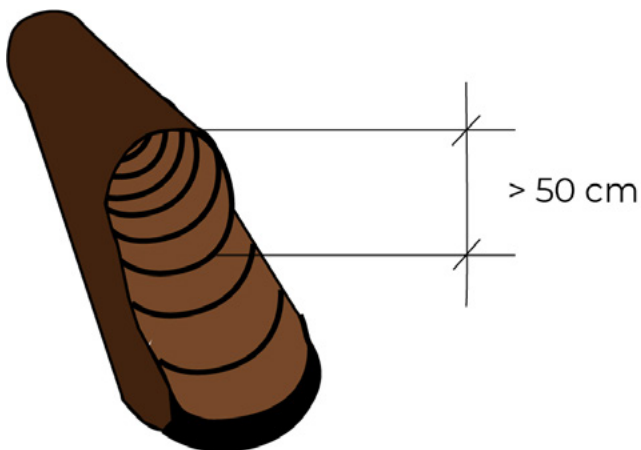
It is recommended that sandboxes be installed in sunny areas with no risk of contamination from animal or plant waste¹³.

4. SPECIFIC GUIDELINES FOR TUNNELS¹⁴

Accessibility for adults

All equipment must be designed to ensure that adults can access it if they need to help users inside.

- If the internal distance is greater than 2m from the entry point, the tunnel must have at least two access openings located on different sides of the equipment.
- Access openings must not be closed and must be accessible without additional help. They must also be no smaller than 50cm.



- The tunnel must be constructed in such a way as to avoid trapping a child or adult's body.
- All enclosed spaces, including tunnels, must be designed so that water cannot accumulate inside them.

Other construction requirements for tunnels can be found in the table below:

Tunnel requirements

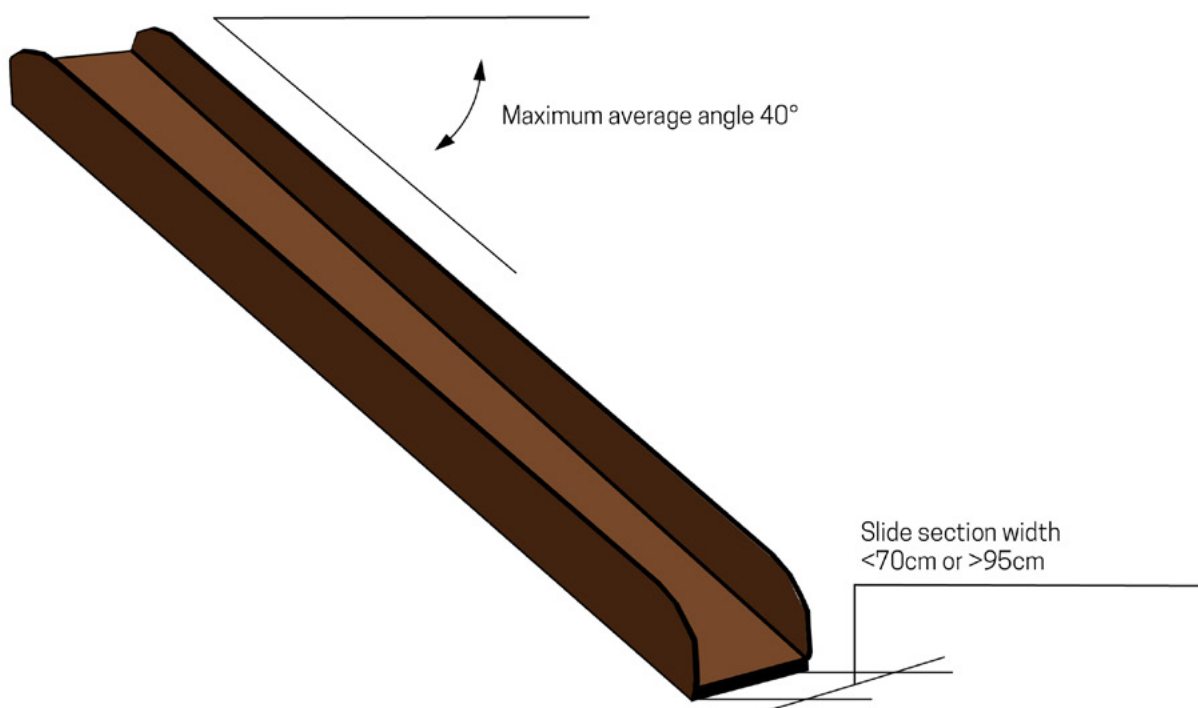
Inclination	$\leq 15^\circ$		$\geq 15^\circ$
Internal dimension (at the narrowest point)	$\geq 600 \text{ mm}$		$\geq 600 \text{ mm}$
Length	$\leq 1000 \text{ mm}$	$> 1000 \text{ mm}$	$> 1000 \text{ mm}$
Other requirements	None	Viewfinder	- Viewfinder - Climbing support (steps or handles)

5. SPECIFIC GUIDELINES FOR SLIDES¹⁵

Sliding section

Inclination: the angle of inclination in relation to the horizontal of the sliding section may not exceed 60° at any point, and the average may not exceed 40°. The slope of the sliding section must be measured on the centre line.

Section width: open, straight slides, other than tunnels, with a length in the slide section of more than 1.5m must have a width in the slide section that is less than 70 cm or greater than 95 cm.



‘NOTAS DE FIM’

- 1** BRAZILIAN ASSOCIATION OF TECHNICAL STANDARDS. NBR 16.071-2: Playgrounds. Part 2: Safety requirements. Rio de Janeiro, p. 3. 2012. [voltar ao texto](#)
- 2** BRAZILIAN ASSOCIATION OF TECHNICAL STANDARDS. NBR 16.071-2: Playgrounds. Part 2: Safety requirements. Rio de Janeiro, p. 3. 2012. [voltar ao texto](#)
- 3** BRAZILIAN ASSOCIATION OF TECHNICAL STANDARDS. NBR 16.071-2: Playgrounds. Part 2: Safety requirements. Rio de Janeiro, p. 3. 2012. [voltar ao texto](#)
- 4** BRAZILIAN ASSOCIATION OF TECHNICAL STANDARDS. NBR 16.071-2: Playgrounds. Part 2: Safety requirements. Rio de Janeiro, p. 3. 2012. [voltar ao texto](#)
- 5** BRAZILIAN ASSOCIATION OF TECHNICAL STANDARDS. NBR 16.071-2: Playgrounds. Part 2: Safety requirements. Rio de Janeiro, p. 3. 2012. [voltar ao texto](#)
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