

# **CIRSA**

## **Loss Control Guidelines**

### **For**

## **Outdoor Climbing Structures**

Outdoor climbing structures can be a challenging addition to the recreational environment. However, unless properly designed, installed, and maintained, these structures can pose a substantial safety risk. These guidelines are intended to assist entities in making sound decisions when selecting an outdoor climbing structure.

### **Climbing Structures Defined**

For the purpose of this guideline, an outdoor climbing structure is defined as any pre-manufactured structure that has an engineered fall height greater than eight feet and is intended for outdoor climbing. These may include outdoor monolithic structures, sculpted rock, or structures constructed with exposed metal tubing and netting. They also include rocks and boulders that have been modified with handrails/hand holes, steps or other equipment or devices and are intended for climbing. Indoor structures and rock climbing walls are not covered under these guidelines. These guidelines do not include natural boulders that have not been modified and are located near the recreational setting for aesthetic purposes.

### **Conformance With Standards**

Organizations such as the Consumer Products Safety Commission (CPSC), the Climbing Wall Industry Group (CWIG), and the American Society of Testing Materials (ASTM) have established national standards for a variety of recreational equipment. However, there are currently no national design standards established specifically for outdoor climbing structures. Some of the existing standards established by these groups may be helpful by way of analogy.

Because many of these structures are located in playgrounds, some of the standards in the CPSC's Handbook for Public Playground Safety may be helpful as a general guideline for addressing loss control concerns. For instance, portions of the CPSC standards for playground equipment may be helpful in evaluating hazards such as protrusion and entanglement.

Some manufacturers advertise that their climbing structures meet ASTM standards for strength properties, moisture resistance, and concrete coatings. Others state that their structures are constructed in compliance with CWIG standards for load capacity and structural requirements.

Guidelines established pursuant to the Americans With Disabilities Act (ADA) may also be applicable. For instance, outdoor climbing structures are classified as ground level play components that are approached and exited at ground level; if placed in playgrounds, the structures must be included when calculating the percentage of accessible play equipment.

## Critical Height

The CPSC defines the critical height for a surfacing material as the maximum height from which an instrumented metal headform, upon impact, yields both a peak deceleration of no more than 200 G's and a Head Injury Criteria (HIC) of no more than 1,000 when tested in accordance with the procedure described in ASTM F1292. The Critical Height of a surfacing material can be considered as an approximation of the fall height below which a life-threatening head injury would not be expected to occur.

## Acceptability of Various Surfacing Materials

Acceptable surfacing materials are available in two basic types: unitary; or loose-fill.

Unitary Materials are generally rubber mats or a combination of rubber-like materials held in place by a binder at the play area and then cured to form a unitary shock-absorbing surface.

Loose-Fill Materials are materials such as sand, gravel, shredded wood products, and shredded tires. These materials can also have acceptable shock absorbing properties when installed and maintained at a sufficient depth.

**TABLE 1 — CRITICAL HEIGHTS (in feet) OF TESTED MATERIALS**

| <b>MATERIAL</b>            | <b>UNCOMPRESSED DEPTH (inches)</b> |               |                | <b>COMPRESSED DEPTH</b> |
|----------------------------|------------------------------------|---------------|----------------|-------------------------|
|                            | <b>6 inch</b>                      | <b>9 inch</b> | <b>12 inch</b> | <b>9 inch</b>           |
| Wood Chips*                | 7                                  | 10            | 11             | 10                      |
| Double Shredded Bark Mulch | 6                                  | 10            | 11             | 7                       |
| Engineered Wood Fibers**   | 6                                  | 7             | >12            | 6                       |
| Fine Sand                  | 5                                  | 5             | 9              | 5                       |
| Course Sand                | 5                                  | 5             | 6              | 4                       |
| Fine Gravel                | 6                                  | 7             | 10             | 6                       |
| Medium Gravel              | 5                                  | 5             | 6              | 5                       |
| Shredded Tires***          | 10-12                              | N/A           | N/A            | N/A                     |

\*This product was referred to as Wood Mulch in previous versions of the CPSC Handbook For Public Playground Safety. The term Wood Chips more accurately describes the product.

\*\* This product was referred to as Uniform Wood Chips in previous versions of the CPSC handbook. In the playground industry, the product is more commonly known as Engineered Wood Fibers.

\*\*\* This data is from tests conducted by independent testing laboratories on a 6 inch depth of uncompressed shredded tire samples produced by four manufacturers. The tests reported critical heights which varied from 10 feet to greater than 12 feet. It is

recommended that persons seeking to install shredded tires as a protective surface request test data from the supplier showing the critical height of the material when it was tested in accordance with ASTM F1292.

Table 1 should be read as follows: If, for example, uncompressed wood chips are used at a minimum depth of 6 inches, the Critical Height is 7 feet. If 9 inches of uncompressed wood chips are used, the Critical Height is 10 feet. It should be noted that, for some materials, the Critical Height decreases when the material is compressed. The Critical Heights shown in the above table may be used as a guide in selecting the type and depth of loose-fill materials that will provide the necessary safety for equipment of various heights. There may be other loose-fill materials, such as bark nuggets, that have shock absorbing properties equivalent to those in the above table; however, CPSC has not conducted any tests on these materials.

As the chart indicates, 12 inches of uncompressed engineered wood fibers provide fall protection for heights greater than 12 feet; however, CIRSA does not recommend any outdoor climbing structure be over 12 feet in height. Some climbing structures on the market are as high as 23 feet. It is unknown whether any currently rated protective surfacing designed for the recreational environment will provide sufficient protection for a fall from this height. At a minimum, CPSC standards for surfacing materials should be followed. If the manufacturer recommends additional surfacing material, those recommendations should be followed. Also depending on playground location, weather conditions and frequency of use, frequent maintenance may be necessary to insure adequate depth and to loosen the materials which may have become packed.

### **Recommendations for Use Zones for Stationary Equipment**

The use zone should extend a minimum of 6 feet in all directions from the perimeter of the equipment. The use zone should also be extended outward as height increases. The manufacturer should provide detailed information for the use zone based on the height.

### **Locating Equipment and Age Separation of Equipment**

The play area should be organized into different areas to prevent injuries caused by conflicting activities and children running between activities. For younger children, separate areas with equipment and materials appropriate to their developmental levels should be set aside. Consult with the manufacturer to determine the challenge rating and intended age group for which the equipment was designed. The CPSC's Handbook For Public Playground Safety recommends separating play equipment into two age groups: pre-school age children (ages 2-5) and school age children (ages 5-12). The intended user group should be apparent from the design and scale of equipment. Signs posted in the play area can also give some guidance to adults as to the age appropriateness of the equipment.

The layout of pathways and the landscaping of the play area should delineate the distinct areas for the different age groups. The areas should be separated by a buffer zone, such as an area with shrubs or benches.

## **Supervision**

Play areas that are designed, installed and maintained in accordance with safety guidelines and standards can still present hazards to children in the absence of adequate supervision. Although some 8 foot climbing structures are advertised as designed for use by families and suitable for all ages without supervision, parental supervision should be encouraged.

## **Installation and Maintenance of Equipment:**

### **Assembly and Installation**

Proper assembly and installation are crucial for the structural integrity, stability, and overall safety of the climbing structure. Assembly and installation should be done in accordance with the manufacturer's instructions. After assembly and before first use, the structure should be thoroughly inspected by a qualified person. The manufacturer's assembly and installation instructions, and all other materials collected concerning the structure, should be kept in a permanent file.

### **Maintenance**

The manufacturer's maintenance instructions and recommended inspection schedules should be strictly followed. A comprehensive maintenance program should be developed for each structure. All equipment should be inspected frequently for potential hazards and for corrosion or deterioration from rot, insects, or weathering. Special attention should be given to moving parts and other components which can be expected to wear. Inspections should be carried out in a systematic manner by trained personnel.

Checklists can facilitate a thorough inspection. The person performing the inspection should sign and date the checklist. All hazards or defects identified during inspections should be repaired promptly. All repairs and replacements of equipment parts should be completed in accordance with the manufacturer's instructions.

Records of all maintenance inspections and repairs should be retained, including the manufacturer's maintenance instructions and any checklists used. A record of any accident and/or injury alleged to have occurred on the play area should also be retained. This will help identify potential hazards or dangerous design features that should be corrected.

### **Hardware**

When installed and tightened in accordance with the manufacturer's instructions, all fasteners, connectors and covering devices should not loosen or be removable without the use of tools.

### **Sharp Points, Corners, and Edges**

There should be no sharp points, corners, or edges on any component of play area equipment that could cut or puncture the skin. The exposed open ends of all tubing not resting on the ground or otherwise covered should be covered by caps or plugs that cannot be removed without the use of tools. All corners, metal and wood should be rounded. All metal edges should be rolled or have rounded capping.

### **Platforms, Guardrails, and Protective Barriers**

The CPSC recommends that platforms over 6 feet in height provide an intermediate standing surface where a decision can be made to halt the ascent and to pursue an alternative means of descent. Due to the design of many climbing structures, these platforms may not exist. Entities should be aware of the increased hazards resulting from the lack of such a platform.

The CPSC also recommends guardrails or protective barriers be provided on platforms depending on the intended user's age and potential fall height. For example, platforms that are over 48 inches above the protective surfacing should always have a protective barrier for school age children. However, because climbing structures are designed to be challenging, guardrails or protective barriers to completely surround an elevated platform may not be feasible. Entities should be aware that the lack of guardrails or barriers greatly increases the potential for fall injuries.

The CPSC recognizes that a guardrail or protective barrier is not required if it would interfere with the intended use of the equipment. A guardrail or protective barrier is not required for a platform that is layered so that the fall height does not exceed 20 inches on equipment intended for preschool-age children, or 30 inches on equipment intended for school-age children. This exemption could be pertinent to many of these outdoor climbing structures.

### **Other Design Considerations**

Climbing equipment should allow children to descend as easily as they ascend. One way of implementing this recommendation is to provide an easier, alternate means of descent. For example, a stairway can be added to provide a less challenging mode of descent than a vertical rung ladder or flexible climbing device.

## Suggested General Maintenance Checklist

The following checklist may be used to determine the condition of a climbing structure. Place a check mark in the appropriate column and list comments as necessary.

| <b>Surfacing</b>                                                                                                                          | <b>YES</b> | <b>NO</b> | <b>N/A</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|------------|
| Is there an inadequate amount of protective surfacing under and around the structure and/or is it deteriorated?                           |            |           |            |
| Are there foreign objects or debris in the loose-fill surfacing materials?                                                                |            |           |            |
| Are loose-fill surfacing materials compacted or the depth reduced in heavy use areas?                                                     |            |           |            |
| <b>General Hazards</b>                                                                                                                    |            |           |            |
| Are there sharp points, corners or edges on the equipment?                                                                                |            |           |            |
| Are there missing or damaged protective caps or plugs?                                                                                    |            |           |            |
| Are there hazardous protrusions and projections?                                                                                          |            |           |            |
| Are there potential clothing entanglement hazards such as protruding bolts?                                                               |            |           |            |
| Are there pinch, crush, and shearing points or exposed moving parts?                                                                      |            |           |            |
| Are there trip hazards, such as exposed footings on anchoring devices and rocks, roots, or any other environmental obstacles in the area? |            |           |            |

|                                                                                                                  |  |  |  |
|------------------------------------------------------------------------------------------------------------------|--|--|--|
| <b>Deterioration of the Equipment</b>                                                                            |  |  |  |
| Does the equipment have rust, rot, cracks or splinters, especially where it comes in contact with the ground?    |  |  |  |
| Are there broken or missing components on the structure?                                                         |  |  |  |
| Is the structure not securely anchored?                                                                          |  |  |  |
| <b>Security of Hardware</b>                                                                                      |  |  |  |
| Are there any loose fastening devices or worn connections?                                                       |  |  |  |
| Are moving components worn?                                                                                      |  |  |  |
| <b>Drainage</b>                                                                                                  |  |  |  |
| Is there poor drainage in the area, especially in heavy use areas?                                               |  |  |  |
| <b>General Upkeep of Play Area</b>                                                                               |  |  |  |
| Is there miscellaneous debris or litter such as tree branches, soda cans, bottles, glass, etc. in the play area? |  |  |  |
| Are there are missing trash receptacles?                                                                         |  |  |  |
| Are trash receptacles full?                                                                                      |  |  |  |
| <b>Signage</b>                                                                                                   |  |  |  |
| Does the structure lack signage stating the age group of the intended users?                                     |  |  |  |
| Are signs in poor condition or are they defaced or faded due to sun exposure?                                    |  |  |  |
| <b>Use the back of this page for any comments.</b>                                                               |  |  |  |

## CIRSA Loss Control Guidelines

1. The structure should be located on a protective surface that complies with the critical heights of tested materials as indicated in Table 1 of the CPSC Handbook for Public Playground Safety.
2. A minimum 6 foot use zone should exist around the structure.

3. Structures should be separated by age group for the intended users. The play areas should have signage posted stating the age group for which the equipment is designed.
4. Signage should also state that minors should be closely supervised when climbing on structures greater than 8 feet in height.
5. Where provided, rung hand grips/steps should have a slope of 75-90 degrees.
6. The space from one rung to the next rung should be no greater than 12 inches.
7. Rung diameter should be 0.95 inches to 1.55 inches and the rungs should be secured to prevent turning.
8. Monthly documented inspections of the structure(s) should be conducted.
9. The structure should be securely anchored, assembled and installed according to the manufacturer's specifications.
10. There should be no protrusions or entanglement hazards. Any angles should be greater than 55 degrees, unless the lower leg is horizontal or projects downwards. An exception to this recommendation can be made if a rigid shield is attached to the vertex between adjacent components and the shield does not allow a template at least 9 inches in diameter to simultaneously touch components on either side of the vertex.
11. There should be no pinching, crushing or shearing points.
12. Climbing handholds should be securely anchored and meet CWIG design standards.

## **Underwriting Considerations**

To reduce the risk to the insurance pool, the following annual rating structure has been established. This is exclusive of any additional charge by the excess carrier.

| <u>Fall Height (ft)</u> | <u>Complies with CIRSA Loss Control Guidelines</u> |           |
|-------------------------|----------------------------------------------------|-----------|
|                         | <u>Yes</u>                                         | <u>No</u> |
| 8-12                    | \$2,000                                            | \$5,000   |

>12

\$5,000

\$10,000

## Examples of Unique Climbing Structures



