

Specification for the Structural Inspection of Artificial Climbing Structures

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Climbing Wall Association, Inc.
(A Non-Profit Corporation)
8200 South Quebec Street, Box 413
Centennial, CO 80112
U.S.A.

<https://www.cwapro.org>

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About the Climbing Wall Association, Inc. (CWA)

The CWA is a 501(c)(06), non-profit, industry trade association incorporated in May of 2003 for manufacturers of climbing wall equipment, builders of climbing walls, operators of climbing walls, and others involved in the climbing industry. The CWA is the *only* trade association addressing the needs and interests of the climbing wall industry and climbing wall operators. The mission of the Climbing Wall Association is to support the growth, health, independence and professionalism of the climbing wall industry.

CWA Engineering Standards Committee

The Climbing Wall Association is the standard setting organization for the manufactured climbing wall industry. The CWA develops standards in four key areas: standards for the design and engineering of manufactured climbing structures, standards for the structural inspection of climbing structures, operational standards for climbing facilities (*Industry Practices*), and certification standards for climbing wall instructors. The CWA sponsors the Engineering Standards Committee which is responsible for the development, maintenance, and revision of this specification. The CWA reserves the exclusive right to issue, or not to issue, official interpretations of any of the information contained herein. Requests for interpretations must be made in writing to the CWA.

CWA structural inspection standards are intended to assist inspectors, engineers, and builders in the periodic structural inspection of manufactured climbing structures. The CWA structural inspection specification addresses: terminology, inspector qualifications, inspection frequency, inspection procedures, and the inspection report.

The structural inspection standards do not purport to address the safety concerns associated with the operation or use of a manufactured climbing structure. It is the responsibility of the user of this standard to consult our operational standards, establish appropriate safety and health practices, and to determine the applicability of any regulatory requirements for work at height prior to use.

CWA standards are developed and maintained in the best interests, mutually, of consumers who use climbing specialty products, manufacturers of these products, and other properly interested parties such as commercial climbing gyms and other climbing wall operators. Standards are intended to promote industry self-regulation, and to provide useful information to government, consumers, manufacturers, and owners/operators of climbing walls. The use or observance of any CWA standard is strictly voluntary.

Disclaimer: This specification is intended for use by experienced professionals. Misuse or improper interpretation of this specification may result in serious injury or death. CWA disclaims all duty, responsibility or liability to engineers, inspectors, builders, installers, climbing wall owners, operators, employees, clients, participants or any other parties for any injury, death, or other loss resulting from any cause claimed to be related to a party's access to or use of this document.

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1.0 SCOPE

1.1 This specification addresses the requirements for the Acceptance Inspection, and periodic structural inspection of Artificial Climbing Structures by a qualified Inspector, Qualified Manufacturer's Representative, or Qualified Owner/Operator Representative.

1.2 This specification does not specifically address requirements, if any, for Routine Inspection and maintenance of Artificial Climbing Structures that are intended to be performed by an owner or operator on an ongoing basis.

1.3 This specification does not address requirements for inspection of personal protective equipment such as quick links, quick draws, ropes, carabiners, belay devices, or harnesses. Personal Protective Equipment inspection is addressed in CWA's *Industry Practices* and manufacturers' instructions. However, it is assumed that only equipment and practices generally accepted by the climbing industry are in use on the ACS.

1.4 This specification applies to ACSs that are fixed-in-place and stationary while in use, including temporary installations. This specification does not apply to moving surface treadmill type climbing structures, mobile climbing structures, inflatable climbing structures, or any structures of a similar nature.

1.5 This specification does not apply to challenge courses using wire rope anchors. Please see The Association for Challenge Course Technology (ACCT) Standards.

1.6 This standard does not address the safety concerns associated with the use or operation of an ACS. It is the responsibility of the owner or operator of the ACS to establish appropriate safety, health, and operational practices for the use of the ACS.

2.0 REFERENCED DOCUMENTS

2.1 ASTM Standards

F1773 Terminology Relating to Climbing and Mountaineering Practices.

2.2 CWA Standards

Industry Practices, A Sourcebook for the Operation of Manufactured Climbing Walls, Third Edition.

CWA General Specification for the Design and Engineering of Artificial Climbing Structures, First Edition.

3.0 TERMINOLOGY

3.1 Description of terms specific to this specification:

Acceptance Inspection. The first inspection of an Artificial Climbing Structure after initial installation and prior to its first use. This inspection is intended to establish that the structure is installed as per the manufacturer's and/or engineer's requirements, is suitable for use, and to establish the structure's baseline condition.

Artificial Climbing Structure (ACS), a structure designed and built for the sport of rock climbing, including ascending, descending, and traversing over simulated rock surfaces that use Belay Systems and/or impact attenuating surfaces in their normal operation. ACSs may be designed and used for lead climbing, top rope climbing, and/or bouldering. ACSs may be transportable or permanent.

Belay System, a system of equipment, and corresponding techniques, which control a climbing rope, lanyard, cable or other material to provide fall protection to a moving climber. Belay Systems may employ a variety of equipment and techniques and may be human-operated or automated mechanical systems.

Critical Finding. A structural or safety related deficiency that requires immediate follow-up inspection or action.

Damage Inspection. This is an inspection, which may be limited in scope, to assess structural damage resulting from environmental factors or human actions. The Damage Inspection procedure may be determined on a case by case basis appropriate to the issue being explored.

Fall Zone. The volume of space which a climber might fall or swing into during normal operation of the ACS.

Hands-on Inspection. Inspection within arms length of the component. Inspection uses visual techniques that may be supplemented by non-destructive testing.

Inspector. An individual who is qualified by experience, education, or training to inspect Artificial Climbing Structures.

Inspection Experience. Experience that qualifies an individual as an Inspector. Appropriate experience includes active participation in the field during an ACS inspection conducted in accordance with this specification. Other forms of Inspection Experience include experience in design, maintenance, construction, installation, or previous Inspection Experience.

Inspection Training - Comprehensive. Training that covers all aspects of ACS inspection and enables Inspectors to relate conditions observed on an ACS to established criteria set by the manufacturer.

Inspection Training - Continuing. Training that addresses new techniques, procedures, or information, or requirements in the inspection of ACSs. Training intended to improve inspection quality and consistency.

Normal Use, use of the ACS by roped teams consisting of a single moving climber and a stationary belayer.

Protection Anchors, any anchor used to secure the belayer and/or the climbing rope to protect the moving climber during their ascent or to lower from on their descent. Various types of Protection Anchors are distinguished based on function and are defined in CWA General Specification for the Design and Engineering of Artificial Climbing Structures.

Professional Engineer (PE). An individual, who has fulfilled education and experience requirements and passed rigorous exams that, under State licensure laws, permits him or her to offer engineering services to the public.

Qualified Manufacturer's Representative. A person qualified by prior experience, education, or training, and designated by the manufacturer, to inspect Artificial Climbing Structures. The Qualified Manufacturer's Representative must be trained by the manufacturer to conduct inspections of Artificial Climbing Structures.

Qualified Owner/Operator Representative. A person qualified by prior experience, education, or training, and designated by the owner/operator, to inspect Artificial Climbing Structures. The Qualified Owner/Operator's Representative must be trained by the manufacturer and/or owner/operator to conduct inspections of Artificial Climbing Structures.

Routine Inspection. The regularly scheduled inspection, consisting of visual and/or Hands-on Inspection of the Artificial Climbing Structure to determine the physical and functional condition of the structure. The purpose of the Routine Inspection is to identify any changes from initial or previously recorded condition, and to ensure that the structure satisfies service requirements.

Special Inspection. An inspection scheduled at the discretion of the manufacturer or owner/operator of the Artificial Climbing Structure, which may be limited in scope, used to monitor a particular known or suspected issue. The Special Inspection procedure may be determined on a case by case basis appropriate to the issue being explored.

Visual Inspection. Inspection which may be conducted at a distance from the component or conducted from the ground.

4.0 INSPECTOR QUALIFICATIONS

4.1 An Inspector must be at least 21 years of age or older and meet one of the following qualifications:

4.1.1. Be a registered Professional Engineer;

4.1.2. Be a person holding a B.S. in engineering with a minimum of one year experience in the design, engineering, manufacturing, or installation of Artificial Climbing Structures; and who has successfully completed a Comprehensive Inspection Training course; and attends Continuing Inspection Training periodically;

4.1.3 Be a person with a minimum of two years' experience in the design, engineering, manufacturing, or installation of Artificial Climbing Structures; and who has successfully completed a Comprehensive Inspection Training course; and attends Continuing Inspection Training periodically;

4.1.4 Be a Qualified Manufacturer's Representative;

4.1.5 Be a Qualified Owner/Operator Representative.

5.0 INSPECTION FREQUENCY

5.1 An Acceptance Inspection shall be performed on all newly constructed Artificial Climbing Structures prior to first use. The Acceptance Inspection may be performed by the manufacturer or the manufacturer's representative.

5.2 Inspection frequency of the Artificial Climbing Structure will vary with the design, level of redundancy, types of Protection Anchors used, type of materials used, location, environment, amount of use, age, and other factors. The manufacturer shall determine the inspection frequency.

5.3 If the manufacturer provides no guidance, inspection frequency should not exceed 24 months for Artificial Climbing Structures located outdoors.

5.4 If the manufacturer provides no guidance, inspection frequency should not exceed 48 months for Artificial Climbing Structures located indoors.

5.5 Inspection frequency may be accelerated based upon past inspection findings and other known issues, for example proximity to marine environments, chlorinated/halogenated pools/spas/tubs, and heavy industrial/chemical zones subject to air pollution.

5.6 A Damage Inspection must be performed when an Artificial Climbing Structure sustains damage to the structure or any of its components which could adversely affect the structure's function. Examples of damage include but are not limited to: deflection, deformation, cracking, corrosion, pitting, broken parts, severe nicks, scoring or gouging, unusual or severe wear, degradation due to environmental conditions, or any other obvious damage to critical components.

6.0 STRUCTURAL INSPECTION PROCEDURE FOR ACCEPTANCE AND PERIODIC INSPECTION

6.1 The purpose of the structural inspection is to determine the structural integrity, stability, and serviceability of the Artificial Climbing Structure and to assess the condition of the Protection Anchors.

6.2 For Acceptance Inspection, an Inspector shall verify that the construction and installation conforms to the specifications set forth in the manufacturer's design documents.

6.3 The Inspector shall review any maintenance and repair reports or logs maintained by the owner or operator for maintenance or repairs performed subsequent to the date of the last structural inspection.

6.4 The Inspector shall review any bulletins or technical notices issued by the manufacturer subsequent to the date of the last inspection. These bulletins or notices shall be kept by the owner or operator and provided to the Inspector upon request.

6.5 The Inspector shall conduct a Visual Inspection of the Artificial Climbing Structure from the ground to identify any obvious hazards such as: evidence of damage, excessive wear, deformation, cracking, corrosion, pitting, missing parts, inappropriate replacement parts, inappropriate modifications or repairs, degradation due to environmental conditions, misuse, or any other obvious deficiency prior to conducting any hands-on inspection.

6.6 If applicable, the Inspector shall conduct a Visual Inspection of the interface between the parent structure and the Artificial Climbing Structure to assess any evidence of deflection, deformation, or cracking of any structural component of the parent structure. Deflection, deformation, or cracking of a structural component of the parent structure may be grounds for a Critical Finding.

6.7 The Inspector shall conduct a Visual Inspection of the structural frame of the Artificial Climbing Structure to assess any evidence of damage, deflection, deformation, cracking, corrosion, pitting, missing parts, inappropriate replacement parts, inappropriate modifications or repairs, degradation due to environmental conditions, or any other obvious deficiency.

6.8 The Inspector shall conduct a hands-on, non-destructive inspection of each protection anchor to assess any evidence of damage, deflection, deformation, cracking, corrosion, pitting, missing parts, inappropriate replacement parts, inappropriate modifications or repairs, degradation due to environmental conditions, or any other obvious deficiency.

6.8.1 The Inspector must visually inspect for broken welds and broken base metal and conduct a Hands-on Inspection of all mechanical fastenings which comprise a protection

anchor. The Inspector may conduct this Visual Inspection aided by a strong light, magnifiers, or other suitable equipment if necessary.

6.9 The Inspector may inspect for broken welds and mechanical fastenings of the structural framework on a sampling basis during the inspection process. The Inspector and/or the manufacturer will determine the number and distribution of welds to be inspected and will inspect an appropriate number in order to assess the integrity of the structure.

6.10 Inspection and retirement criteria for mechanical fastenings used in Protection Anchors include by way of example but are not limited to:

- Signs of overloading or slippage;
- Excessive deflection or distortion under load;
- Elongation or change in pitch length (i.e. chain);
- Bent or distorted eye or shank;
- Change in diameter of eye or shank;
- Stripped head or threads;
- Excessive wear or abrasion;
- Severe nicks, gouges, or scoring;
- Longitudinal or transverse cracks;
- Pitting, rusting, or evidence of galvanic action due to corrosion;
- Evidence of heat damage and discoloration (i.e. fire, lightning strike, etc.);
- Inappropriate mechanical fastening for application;
- Poor alignment with high loads;
- Severe impact damage;
- Improper functioning of fastening;
- Improper use or placement of fastening.

6.11 If any component or mechanical fasteners are repaired or replaced the component or mechanical fasteners shall meet the ACS manufacturer's design specifications.

6.12 The Inspector shall inspect for alterations or obstructions in the climbing environment that intrude into Fall Zones; for example: placement of fixed equipment, new architectural features, and other obstacles.

7.0 INSPECTION REPORT

7.1 The Inspector shall provide a written inspection report to the owner or operator, conducted according to the manufacturer's instructions, within a reasonable amount of time. The Inspector shall document any Critical Findings and immediately notify the owner, or the owner's representative, of such Critical Findings. Critical Findings shall be immediately addressed if possible. The Inspector shall not approve an ACS, or component thereof, for use unless and until the Critical Findings have been appropriately addressed.

7.2 In the event the manufacturer provides no guidance; the written inspection report should include:

7.2.1 The date the inspection was conducted;

7.2.2 The name and address of the company employing the Inspector;

7.2.3 The name of the Inspector;

7.2.4 A listing of the documents reviewed during the inspection process, including but not limited to: the ACS manufacturer's manual, the previous inspection report, maintenance and repair reports or logs maintained by the owner or operator, and bulletins or technical notices issued by the manufacturer and provided by the owner/operator;

7.2.5 A summary of Critical Findings from the inspection report, including a listing of any Critical Findings that could not be appropriately abated or resolved on site at the time of the inspection;

7.2.6 A summary of manufacturer specified repairs, modifications, inspection or maintenance requirements that have not been performed by the owner or operator as required;

7.2.7 A summary of any maintenance or repairs performed during the inspection.

7.2.8 A summary of any issues that require attention, ongoing monitoring, or further observation, including adjustments, tightening of fastenings, anticipated maintenance, repairs, or replacement of parts.

7.2.9 Any other recommendations the Inspector deems necessary.

**CLIMBING WALL ASSOCIATION, INC. (CWA)
CONTACT INFORMATION & RESOURCES**

The Climbing Wall Association (CWA) has many resources available for climbing wall designers and manufacturers, climbing equipment manufacturers, retailers, sales representatives, and climbing facilities.

The CWA has an informative consumer information program titled ClimbSmart!® that is designed to promote responsible climbing. The ClimbSmart Program is CWA's principle national public awareness campaign addressing risk in climbing sports, climbers' safety, and personal responsibility. Contact CWA for more information or visit: <https://www.cwapro.org/climbsmart>

Address:

Climbing Wall Association, Inc.
8200 South Quebec Street, Box 413
Centennial, CO 80112
Phone: 720-838-8284

Web Site:

<https://www.cwapro.org>

Email:

hello@cwapro.org