

ANSI/ISEA

121-2018

American National Standard for Dropped Object Prevention Solutions

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Secretariat
International Safety Equipment Association

Approved July 2, 2018
American National Standards Institute, Inc.

American National Standard

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Published by

**International Safety Equipment Association
1901 North Moore Street, Arlington, Virginia 22209**

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Printed in the United States of America

Foreword (This Foreword is not part of American National Standard ANSI/ISEA 121-2018)

The International Safety Equipment Association (ISEA), in conjunction with industry stakeholders, has developed this standard to establish design, testing and performance criteria for active systems used to prevent dropped objects in the workplace. This standard is the first of its kind to address equipment used to tether and/or contain hand tools, components, structure and other objects from falling from at-heights applications. This standard was prepared by members of ISEA's Dropped Objects working group with the following companies as members at the time of the approval of the standard: 3M Company, Ergodyne, Guardian Fall Protection, Hammerhead Industries, Ty-Flot and West Coast Corporation.

Struck-by falling objects kill hundreds of individuals each year and injure tens of thousands more. Increasing numbers of employees are finding themselves ascending to heights to complete their work often directly over or adjacent to their colleagues, by-standers and other individuals at lower levels. Protective equipment, such as hard hats, have long been available to minimize the effects of struck-by incidents only after an object has fallen. Preventative measures such as netting and toe boards are also a mitigating practice for this risk, however there are challenges to these solutions and they do not entirely prevent incidents. Active controls utilized to prevent falling objects by tying them off or containing them while at heights are a rapidly growing practice. Recognizing the benefit of these active prevention practices, it is the mission of this group to create guidance for this equipment.

This standard refers to these active dropped object prevention controls and outlines four categories of equipment; Anchor Attachments, Tool Attachments, Tool Tethers, and Containers. The standard is limited to the identified scope as and offers further guidance in the appendices that follow. Utilization and use of the equipment outlined in this standard may differ between manufacturers offering it and employers using it.

Suggestions for the improvement of this standard are welcome. They should be sent to the ISEA, 1901 N. Moore Street, Suite 808, Arlington, VA 22209; e-mail standards@safetysafetyequipment.org.

This standard was processed and approved using consensus procedures prescribed by the American National Standards Institute. The following organizations were contacted prior to the approval of this standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

American Wind Energy Association
CH2M
Chevron BP
Chevron Phillips Chemical Company
East Coast Communications
Hilti
iEnvizion
Intertek
Liberty Mutual Insurance Company

ORCO Engineering
Strobel Energy
Tape Craft Corporation
UGI Utilities, Inc.
United Steel
Vertical Limit Constructions
WDP & Associations
We-Energies
West Coast Corporation

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American National Standard for Dropped Object Prevention Solutions

1. Scope

This standard establishes minimum design, performance, testing and labeling requirements for solutions that reduce dropped objects incidents in industrial and occupational settings. Dropped objects include hand tools, instrumentation, small parts, structural components and other items that have to be transferred and used at heights. These objects have the opportunity of becoming dropped objects potentially resulting in struck-by injury or fatality or damage to equipment. This standard focuses on preventative solutions actively used by workers to mitigate these hazards.

The scope of this standard includes tethering systems subsequently installed to the tools and anchors after original manufacture. The primary tools (hand tools, fasteners, power tools) and primary anchors (human body, lifts, structure) are considered native ends to the system and are specifically excluded from this standard.

This standard does not address passive preventative solutions such as netting, barricades and toe boards, nor does this standard address protective solutions for dropped objects that minimize damage from falling objects including head protection, foot protection, and eye protection. This standard also does not address hoisting or lifting requirements for material handling. These solutions are described in other standards, if applicable.

2. Definitions

Anchor: The beginning point (human body or structure) at which a tether is attached and is relied upon to prevent a tool from dropping.

Anchor attachments: Solutions that are applied to anchors being used at height to create secure connection points for tool tethers and that which are not integral to that anchor. (See Appendix C)

Anchor system: Any product that contains an integral anchor point or group of products that can be assembled or installed together as an anchor attachment.

Captive eye: A feature of a carabiner or snaphook-type connector that prevents the connector from being removed.

Closure system: System designed to secure items from inadvertently being removed from the container.

Connector: A component or element that is used to couple parts of the system together.

Container: A bucket, tool bag or similar device used to hold or transport tools or other equipment. (See Appendix C)

Container static test plate: A fixture such as a steel plate that is smaller than the footprint of the bottom of the container.

Dynamic test: A test where a shock load is exerted by using a test weight falling from a specific height.

Extendable tether: A tether that extends without a distinct stopping point when stretching.

Fixed anchor point: The primary anchoring point in a tethering system used for static and dynamic testing.

Fixed length tether: Tether with a distinct stopping point when stretching.

Free fall distance: The vertical distance travelled by the tool or the test mass from the start of a fall to the initiation of an arrest force.

Fluid weight: A volume of nominal 1-inch steel ball bearings that is equivalent to the desired test weight.

Integral: Not removable from any component, subsystem, or system without damaging any of its elements or using a special tool.

Lifting element: Integral or structural component(s) on the container used for lifting.

Locking gate: A closure mechanism on the gate of a connector that will prevent the inadvertent opening of the gate of the connector when in use.

Maximum total drop distance: The farthest possible dropping distance of a tool on a given tool tether at maximum extension, per the stated test requirements.

Retractable tether: A device with a self-managing tether where the tether is automatically drawn back into a housing.

Retrofit: Installation of a new attachment point on a tool or other object not integral to that object.

Rigid weight: Weights that, when assembled into one single unit, cannot separate or move in relation to each other during testing.

Shall: In this standard, use of the word "shall" indicates a mandatory requirement.

Should: In this standard, use of the word "should" indicates a recommendation.

Static Test: A test where a constant force is applied and held for a specific time.

Test Factor: A ratio to determine the test weight or load used to qualify a product's capacity.

Tool: An object protected from falling.

Tool Attachments: Solutions that are applied to tools being used at height to create secure connection points for tool tethers and that which are not integral to that tool. (See Appendix C)

Tool Tether: A length of material with at least one connector on each end that will connect a tool to an anchor. (See Appendix C)

3. Compliance

3.1 General

3.1.1 Demonstration of conformity to the requirements of this standard shall be in accordance with ANSI/ISEA 125-2014, *American National Standard for Conformity Assessment of Safety and Personal Protective Equipment*. The manufacturer shall select the level of conformity assessment claimed, and such level shall be clearly indicated in any claim, in any form, that references compliance with ANSI/ISEA 125-2014.

3.1.2 Manufacturers shall not claim compliance with any part of the requirements of this standard and shall not use the name or identification of this standard in any statements regarding their respective products unless the product conforms fully to this standard.

3.2 Documentation

3.2.1 Dropped object solutions shall be tested to verify compliance with the requirements specified in this standard. At a minimum, the information found in the Performance Testing Report (Appendix B1) shall be maintained by the manufacturer.

3.2.2 A Declaration of Conformity shall be developed for all models for which manufacturer's claims of compliance with this standard are made. At a minimum, the information found on the form in Appendix B2 shall be provided.

NOTE: A product solution with design parameters equivalent to a compliant product solution may be considered compliant if variations do not affect the integrity of the product's design or performance.

3.2.3 The issuer of the Declaration of Conformity shall have procedures in place to ensure the continued conformity of the product, as delivered or accepted, with the stated requirements of the declaration of conformity. The issuer of the Declaration of Conformity shall have procedures in place to re-evaluate the validity of the Declaration of Conformity, in the event of:

- a) changes significantly affecting the design or specification of the product;

- b) changes in the standards to which conformity of the product is stated;
- c) changes in the ownership or structure of the supplier, if relevant; or
- d) relevant information indicating that the product may no longer conform to the specified requirements.

4. Anchor Attachments

4.1 Design Requirements

Anchor attachments shall be defined by a manufacturer to include specific instructions and guidelines for the minimums and maximums of the anchor size and/or geometry.

4.2 Performance Requirements

4.2.1 Anchor attachments designed to be independently applied directly to a fixed anchor or person shall be dynamically tested. If the anchor attachment design refers to a specific size range or geometry, the anchor attachment shall be tested and perform to the weakest orientation(s) of that specified range or geometry.

When tested dynamically in accordance with Section 4.3, there shall be no failure of the anchor attachment that allows the test weight to be released as a result of any drop.

4.2.2 Anchor attachments that are identified by the manufacturer to be an anchor system shall be dynamically tested in accordance with Section 4.3.

Anchor attachments of multiple components designed to be assembled into or installed as an anchor system shall be applied to the test fixture and tested as a system. Independent testing of individual system components shall not determine performance of an anchor attachment designed to be used in an anchor system.

If the anchor system design refers to a specific size range or geometry the anchor system shall be tested and perform to the weakest orientation(s) for that range or geometry.

When tested dynamically in accordance with Section 4.3, there shall be no failure of the anchor system that allows the test weight to be released as a result of any drop.

Anchor systems with multiple anchor points with the same construction need only one anchor point to be tested to qualify all similarly designed anchor points within the same system.

4.2.3 Anchor attachments that are identified by the manufacturer to be integral or exclusive to tethers, regardless of tether type, shall be dynamically tested in accordance with Section 6.3.

When tested dynamically in accordance with Sections 6.3, there shall be no failure of the anchor attachment that allows the test weight to be released as a result of any drop.

4.3 Test Requirements

4.3.1 Preparation of Test Samples

Anchor attachment samples shall be selected in accordance with Section 8.1 and shall be applied to the test fixture in accordance with the manufacturer's instructions and conditioned in accordance with Section 8.2.

4.3.2 Test Equipment

The test equipment shall consist of the following:

- a) Anchor attachment sample.
- b) Test cable of fabricated steel with swaged looped ends measuring a minimum of twice the length of the manufacturers allowable maximum tether length for the anchor attachment or system, plus two feet.
- c) A rigid weight, weighing a total of the specified test factor listed in test schedule. (See Section 8, Table 1)
- d) A test fixture designed and built accordingly to allow installation onto the fixed anchor point.

If a specific fixed anchor or person's size range or geometry is detailed for use with the anchor attachment, the test fixture shall mimic that fixed anchor or person's characteristics.

4.3.3 Dynamic Test Procedure for Independent Anchor Attachments

Each anchor attachment test sample that requires a dynamic test shall be subjected to a minimum of 3 drops without replacement or adjustment of the sample. Each test sample shall

be tested within 5 minutes of removal from conditioning. If testing cannot be completed within the allotted time, samples shall be reconditioned between drops.

Install test fixture onto fixed anchor point. Attach the anchor attachment to the test fixture in a position that exposes the weakest orientation of the anchor attachment. Attach one end of the test cable to the anchor attachment and the other end to a rigid test weight.

Perform a drop with a test weight equal to the manufacturer's published capacity with a free fall distance of twice the specified tether length allowed by the manufacturer. The test weight shall be released from a point no more than 6 inches (152 mm) horizontally from the center of the fixed anchor point. The test weight shall be orientated in a way that allows the weight to experience a straight fall. Follow this procedure for two additional drops. A total of three drops shall be recorded. (Refer to Figure 1)

4.3.4 Dynamic Test Procedure for Anchor Systems

Each anchor system test sample that requires a dynamic test shall be subjected to a minimum of 3 drops without replacement or adjustment of the sample. Each test sample shall be tested within 5 minutes of removal from conditioning. If testing cannot be completed within the allotted time, samples shall be reconditioned between tests.

Install test fixture onto fixed anchor point. Attach anchor system to the test fixture in a position that exposes the weakest orientation of the attachment point on that system. Attach one end of the test cable to the attachment point on the system and the other end to a rigid weight.

Perform a drop with a test weight equal to the manufacturer's published capacity with a free fall distance of twice the specified tether length allowed by the manufacturer. The test weight shall be released from a point no more than 6 inches (152 mm) horizontally from the center of the cable on the system. The test weight shall be orientated in a way that allows the weight to experience a straight fall. Follow this procedure for two additional drops. A total of three drops shall be recorded. (Refer to Figure 1)

5. Tool Attachments

5.1 Design Requirements

Tool attachments shall be defined by a manufacturer to include specific instructions and guidelines for the minimums and maximums of a tool or type of tool's geometry.

5.2 Performance Requirements

5.2.1 Tool attachments designed to be independently applied directly to a tool shall be dynamically tested. If the tool attachment design refers to a specific size range or geometry, the tool attachment shall be tested and perform to the weakest orientation(s) of that specified range or geometry.

When tested dynamically in accordance with Section 5.3, there shall be no failure of the tool attachment that allows the test weight to be released as a result of any drop.

5.2.2 Tool attachments of multiple components designed to be used as a system shall be applied to the test weight or test fixture and tested as a system. Independent testing of individual system components shall not determine performance of a tool attachment designed to be used as system. If tool attachment design refers to a specific size range or geometry of a tool, the tool attachment shall be tested and perform to the weakest orientation(s) for that range or geometry.

When tested dynamically in accordance with Section 5.3, there shall be no failure of the tool attachment that allows the test weight to be released as a result of any drop.

5.2.3 Tool attachments that are identified by the manufacturer to be integral or exclusive to tethers, regardless of tether type, shall be dynamically tested in accordance with Section 6.3.

When tested dynamically in accordance with Sections 6.3, there shall be no failure of the tool attachment that allows the test weight to be released as a result of any drop.