

AES RAPTOR™

Complete Mobile Fall Protection Systems



AES RAPTOR TESTING METHODOLOGY

Purpose of Testing

Testing of the AES Raptor, LLC Mobile Fall Protection Carts (AES) is to confirm their ability to meet or Exceed OSHA Compliance Regulations and Standards set forth for Personal Fall Arrest Systems in 1926.502 section d.

All Testing was performed to simulate stopping a fall in real-life situations. All life lines, lanyards, cables and connectors



AES Raptor R1000

hooked to the Raptor during testing have been ANSI certified and tested by the manufacturer.



AES Raptor TriRex

R1000-07	Fall Arrest for one
R1000-08.5	Fall Arrest for two (DogBone Attachment)
R1000-09	Fall Arrest for two
TriRex-09	Fall Arrest for three

AES RAPTOR, LLC

> The Raptor R1000 and TriRex Systems are compliant with OSHA regulation 1926.502 (d) for Fall Arrest.

> The Raptor Fall Protection Carts are part of complete fall arrest systems.

Testing Methodology

Testing the AES Raptor Mobile Fall Protection Carts was done in a precise scientific method allowing collection of data and analysis through observation, experimentation, formulation and testing of a Hypotheses. These steps must be done in a repeatable fashion in order to dependably predict any future results of the products.

AES used a Third party observer to verify that all of the test were performed and recorded in the aforementioned paragraph. AES also used an independent Engineering firm to confirm that all of the components used in the Patent Pending Arresting Arm meet the required OSHA standards and regulations.

OSHA [1926.502\(d\)\(15\)](#)

Anchorage used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or shall be designed, installed, and used as follows:

[1926.502\(d\)\(15\)\(i\)](#)

as part of a complete personal fall arrest system which maintains a safety factor of at least two; and

[1926.502\(d\)\(15\)\(ii\)](#)

under the supervision of a qualified person.





General Conditions Set Forth Prior to Test

- ▶ Locate the device parallel to the roof edge between 12 and 15 feet from the edge.
- ▶ The test weight should consist of a cradle capable of handling cylindrical weight plates needed for proper weight.
- ▶ The test weight for each test should be hoisted to the required level and should be quickly released without having an appreciable motion imparted to it.
- ▶ Prior to each drop test the location of tires should be marked.
- ▶ Following the test a full inspection should be completed before further operation of the system.

Strength Test

- ▶ During the testing of all systems, a test weight of 310 pounds, plus or minus 10 pounds, and a test weight of 160 pounds, plus or minus 10 pounds, should be used. Because arresting force is determined by the amount of weight that falls, creating the correlating digging / penetration force of the Patent Pending Engagement Arm, a low weight of 140 pounds was used to simulate a relatively low fall force. 310 pounds was used to simulate a maximum allowable fall force.
- ▶ The test consists of dropping the test weight once. A new unused lanyard should be used for each test.
- ▶ The test weight should fall free from anchorage level to its resting location (a total of 6 feet free fall distance) without interference, obstruction, or hitting the floor or ground during the test.
- ▶ The free fall distance to be used in the test should be the maximum fall distance physically permitted by the system during normal use conditions, up to maximum free fall distance for the test weight of 6 feet.

OSHA [1926.502\(d\)\(16\)\(v\)](#) Note: If the personal fall arrest system meets the criteria and protocols contained in Appendix C to subpart M, and if the system is being used by an employee having a combined person and tool weight of less than 310 pounds (140 kg), the system will be considered to be in compliance with the provisions of paragraph (d)(16) of this section. If the system is used by an employee having a combined tool and body weight of 310 pounds (140 kg) or more, then the employer must appropriately modify the criteria and protocols of the Appendix to provide proper protection for such heavier weights, or the system will not be deemed to be in compliance with the requirements of paragraph (d)(16) of this section.

- ▶ The device should be evaluated or tested under the environmental conditions (such as rain, ice, grease, dirt, etc) for which it is designed.
- ▶ After each test the forward travel of the device should be recorded from the start of the deceleration to the complete stop.



OSHA does not "approve" any product. They only provide rules and guidance for companies to comply with.

Roof Types Use for Testing

The Roofing configurations used for testing were constructed in various stages that an end user might see in everyday applications. At list of materials and assemblies are as follows:

- ½" CCA Treated Plywood
- ¾" CCA Treated Plywood
- 20ga. Metal Deck "type B" fastened to joist at 5' centers
- 22ga. Metal Deck "type B" fastened to joist at 5' centers
- 4,000 PSI Concrete Pads 30" x 30"
- 4,000 PSI Concrete Deck 108" x 216"
- 20ga. Metal Deck "type B" and 1 ½" ISO Insulation
- 20ga. Metal Deck "type B", 1 ½" ISO Insulation and ½" Hardboard
- 20ga. Metal Deck "type B", 3" ISO Insulation and ½" Hardboard
- 20ga. Metal Deck "type B", 3" ISO Insulation, ½" Hardboard and TPO Membrane Roofing
- 22ga. Metal Deck "type B", Tapered ISO insulation, ½" Hardboard and Derbigum Modified Roofing
- 20ga. Metal Deck "type B", 1 ½" ISO Insulation, ½" Dens Deck and TPO Membrane Roofing
- 20ga. Metal Deck "type B", 1 ½" ISO Insulation, ½" Hardboard and loose laid ballasted EPDM
- 20ga. Metal Deck "type B", 1 ½" ISO Insulation, ½" Hardboard and loose fully adhered EPDM
- 20ga. Metal Deck "type B", 1 ½" ISO Insulation, ½" Hardboard and loose laid ballasted EPDM
- 20ga. Metal Deck "type B", 1 ½" ISO Insulation, ½" Hardboard and 2ply tar and gravel

* All the above tests were performed on the R1000-08 and previous models. The R1000-09 and TriRex-09 were only tested with the loose laid ballasted EPDM and TPO because it was determined that those surfaces would be the most vulnerable to unsatisfactory results.



CONCLUSION

The Extensive testing that was done with the AES Raptor, LLC Mobile Fall Protection Carts proves that if used per manufactures instructions and recommendations it will properly arrest a fall within the criteria and practices of OSHA - 1926.502 section d.

Third party observation:
St. Louis Testing Laboratories
2810 Clark Avenue
St. Louis, MO
63103-2574

Independent Engineering Study:
Missouri Enterprise
4747 Troost Avenue
Suite 122
Kansas City, MO
64110-2499

Testing Summary

R1000-07 - Fall Arrest for one:

The analyzed test results revealed satisfactory outcomes in each of the test performed meeting the fall protection systems criteria and practices. OSHA - 1926.502 section d

R1000-08.5 - Fall Arrest for two (DogBone Attachment):

The analyzed test results revealed satisfactory outcomes in each of the test performed meeting the fall protection systems criteria and practices. OSHA - 1926.502 section d

R1000-09 - Fall Arrest for two:

The analyzed test results revealed satisfactory outcomes in each of the test performed meeting the fall protection systems criteria and practices. OSHA - 1926.502 section d

TriRex-09 - Fall Arrest for three:

The analyzed test results revealed satisfactory outcomes in each of the test performed meeting the fall protection systems criteria and practices. OSHA - 1926.502 section d

PHOTOS



20ga. Metal Deck "type B" fastened to joist at 5' centers



20ga. Metal Deck "type B", 3" ISO Insulation, 1/2" Hardboard and TPO Membrane Roofing



20ga. Metal Deck "type B", 1 1/2" ISO Insulation, 1/2" Hardboard and 2ply tar and gravel



20ga. Metal Deck "type B" fastened to joist at 5' centers



20ga. Metal Deck "type B", 1 1/2" ISO Insulation and 1/2" Hardboard



4,000 PSI Concrete Deck 108" x 216"