American National Standard

STANDARD REQUIREMENTS AND TEST METHODS FOR TESTING AND RATING PORTABLE RIGGING DEVICES FOR SUSPENDED SCAFFOLDS

Scaffolding, Shoring & Forming Institute, Inc.

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SCAFFOLDING, SHORING & FORMING INSTITUTE
AMERICAN NATIONAL STANDARD
Standard Requirements and Test Methods for Testing and Rating
Portable Rigging Devices for Suspended Scaffolds

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Foreword  (This foreword is included for information only and is not part of ANSI/SSFI SPS1.1-1, Standard Requirements and Test Methods for Testing and Rating Portable Rigging Devices for Suspended Scaffolds.)

The following standard has been formulated by the Suspended Powered Scaffolding Engineering Committee of the Scaffolding, Shoring & Forming Institute, Inc. as an assistance and guide to the manufacturers, purchasers, and users of rigging devices.

SSFI recognizes the need to periodically review and update this standard. Suggestions for improvement should be forwarded to the Scaffolding, Shoring & Forming Institute, Inc., 1300 Sumner Avenue, Cleveland, Ohio, 44115-2851. All constructive suggestions for expansion and revision of this standard are welcome.

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At the time this standard was approved, the following were members of the SSFI Suspended Powered Scaffolding Section:

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1. SCOPE AND APPLICATION

1.1 This standard establishes methods for testing and rating portable rigging devices used to support transportable suspended scaffolds for construction, alteration, demolition, and maintenance of buildings or structures.

1.2 This standard does not cover permanently installed suspended scaffold systems (davits or roofcars).

1.3 Specially engineered temporary rigging devices shall comply with sections 3, 4, 5 and 6 and shall be evaluated by a professional engineer.

2. DEFINITIONS

2.1 Beam Clamp – A support device for suspended scaffold equipment that may be stationary or rolling (see trolley) and attaches to a flange, angle or channel, or other shape. The clamp transfers the suspended load to that member.

2.2 Column Clamp – A support device for suspended scaffold equipment that attaches to a vertical column and transfers the suspended load to the structure.

2.3 Cornice Hook – A curved support device for suspended scaffold equipment that is normally point loaded and transfers the suspended load to the building or structure.

2.4 Failure – Load refusal, breakage, or separation of component parts.

2.5 Outrigger Beam – A support device for suspended scaffold equipment that consists of a beam that extends out from the edge of the building or structure. Counterweights or engineered equivalent prevent the beam from overturning.

2.6 Outrigger Carriage – A stationary or rolling outrigger beam support system usually consisting of a front fulcrum carriage and a rear counterweight carriage. The carriage may be engineered scaffold frames, or part of an outrigger beam system. They may incorporate jacks on the fulcrum carriage to apply the load to the structure.

2.7 Parapet Clamp – A support device for suspended scaffold equipment that clamps to a building parapet and transfers the suspended load to the parapet.

2.8 Parapet Hook – A curved support device that fits over a parapet and supports suspended scaffold equipment. It may be provided with a standoff device to keep the suspension rope away from the building.

2.9 Rated Load – The manufacturer’s specified maximum load to be applied to the rigging device. Typically the same as rated hoist capacity on suspended scaffolding (e.g., 1000, 1500 lb. capacity).

2.10 Tank top Roller (pin type) – A support device for suspended scaffold equipment that normally rests on the edge of a storage tank and is restrained by a wire rope. It keeps the suspension rope away from the tank wall and transfers the suspended load to the tank.

2.11 Trolley – A support device for suspended scaffold equipment that rolls on a flange, angle or channel, or other shape and transfers the suspended load to that member. It may be moved by pushing, or by means of geared wheels, or motorization.

3. DESIGN & USE

3.1 General Design and Use Requirements

3.1.1 All rigging devices shall be designed to satisfy the test requirements specified in section 7.

3.1.2 All suspension scaffold support devices such as outrigger beams, cornice hooks, parapet clamps and hooks shall rest on surfaces capable of supporting at least 4 times the load imposed on them.

3.2 Stability

3.2.1 Carriages shall have a maximum height to base ratio of 2 to 1.
3.3 Strength

3.3.1 All rigging devices shall support without failure loads equal to or greater than four times the rated capacity of the device.

3.3.2 All rigging devices shall be designed so no plastic deformation (no yield) occurs when subjected to four (4) times the rated load of the device as specified in section 7.

4. MATERIAL REQUIREMENTS

4.1 Structural and mechanical components shall be fabricated from suitable materials. Structural and mechanical components shall be protected from corrosion.

5. MANUFACTURING REQUIREMENTS

5.1 All mechanical connections (bolts, pins, etc.) shall be of a secure type to prevent loosening during use. When welding is employed for structural connections, the welding shall be done by an American Welding Society certified welder for that particular process. For foreign manufactured equipment, when welding is employed for structural connections, a registered professional engineer shall ascertain that weld designs employ weld configurations, materials, sizes, and processes that are listed by the American Welding Society. A United States registered professional engineer shall review foreign manufactured equipment to ensure that it complies with this standard.

6. MARKING AND LABELING

6.1 Parapet Clamps and Hooks

6.1.1 Parapet clamps and hooks shall be marked permanently or shall have a corrosion-resistant data tag or label securely attached to the clamp or hook, readily visible to interested persons. The marking(s), tag(s) or label(s) shall bear the following information:

a. Rated load and maximum reach.

b. Parapet use and size restrictions (min./max. opening of clamp/hook).

c. Name of manufacturer.

d. Notice that a tieback or tiedown is required.

e. “Caution - Before use comply with manufacturer’s instructions.”

f. “Design tested to ANSI/SSFI Standard SPS1.1.”

6.2 Cornice Hooks

6.2.1 Cornice hooks shall be marked permanently or shall have a corrosion-resistant data tag or label securely attached to the hook, readily visible to interested persons. The marking(s), tag(s) or label(s) shall bear the following information:

a. Rated load and size restrictions.

b. Name of manufacturer.

c. Notice that tieback is required.

d. “Caution - Before use comply with manufacturer’s instructions.”

f. “Design tested to ANSI/SSFI Standard SPS1.1.”

6.3 Outrigger Beams

6.3.1 Outrigger beams shall be marked permanently or shall have a corrosion-resistant data tag or label securely attached to the beam, readily visible to interested persons. The marking(s), tag(s) or label(s) shall bear the following information:

a. Rated load and size restrictions.

b. Name of manufacturer.

c. Notice that tieback is required.

d. Counterweight chart or formula.

e. “Caution - Before use comply with manufacturer’s instructions.”

f. “Design tested to ANSI/SSFI Standard SPS1.1.”

6.4 Beam and Column Clamps

6.4.1 Beam and column clamps shall be marked permanently or shall have a corrosion-resistant data tag or label securely attached to the clamp, readily visible to interested persons. The marking(s), tag(s) or label(s) shall bear the following information:

a. Rated load and size restrictions.

b. Name of manufacturer.
c. “Caution - Before use comply with manufacturer’s instructions.”

d. “Design tested to ANSI/SSFI Standard SPS1.1.”

6.5 Trolleys

6.5.1 Trolleys shall be marked permanently or shall have a corrosion-resistant data tag or label securely attached to the trolley, readily visible to interested persons. The marking(s), tag(s) or label(s) shall bear the following information:

a. Rated load and size restrictions.

b. Name of manufacturer.

c. “Caution - Before use comply with manufacturer’s instructions.”

d. “Design tested to ANSI/SSFI Standard SPS1.1.”

6.6 Tank Top Rollers

6.6.1 Tank top rollers shall be marked permanently or shall have a corrosion-resistant data tag or label securely attached, readily visible to interested persons. The marking(s), tag(s) or label(s) shall bear the following information:

a. Rated load and size restrictions.

b. Name of manufacturer.

c. “Caution - Before use comply with manufacturer’s instructions.”

d. “Design tested to ANSI/SSFI Standard SPS1.1.”

6.7 Outrigger Carriages

6.7.1 Outrigger Carriages shall be marked permanently or shall have a corrosion-resistant data tag or label securely attached, readily visible to interested persons. The marking(s), tag(s) or label(s) shall bear the following information:

a. Rated load and size restrictions.

b. Name of manufacturer.

c. “Caution - Before use comply with manufacturer’s instructions.”

7. TEST PROCEDURES

In order to validate the design and construction of a particular rigging device, at least one copy of the device must be destructively tested. The copy selected must be of “typical” materials and fabrication, with no special attention paid during its manufacture.

CAUTION: The testing process described herein may result in catastrophic failure of the device. Care must be taken to protect personnel and property during the testing.

7.1 Cornice Hook Test

This test shall be used to test rigging hooks which are intended to be supported at only one point (point loading).

7.1.1 Test Preparation and Setup

7.1.1.1 Determine the test load to be applied to the cornice hook. As a minimum, this will be four (4) times rated load of the hook.

7.1.1.2 Determine the maximum load that the point load fixture will be subjected to. Design and fabricate a point load fixture which will safely withstand this load.

7.1.1.3 Obtain the remainder of the equipment needed to perform the test: load cell, loading device, measuring device, and weights for the anchor. Ensure that the load cell and measuring device used are calibrated for the range of the testing.

7.1.1.4 Set up the test in a manner similar to Figure 1.

7.1.2 Test Process

7.1.2.1 Using the loading device, apply 100 pounds (0.44 kN) of load (as measured by the load cell) to the cornice hook.

7.1.2.2 As indicated in Figure 1, take measurement “D” to the nearest 0.030” (0.80mm). Record this value as the Nominal Hook Opening (NHO) on Table 1.

7.1.2.3 Using the loading device, increase the load on the cornice hook to 500 pounds (2.22 kN). Hold for at least one (1) minute, then
7.1.2.4 Increase the load on the cornice hook in 500 pound (2.22 kN) increments until the load applied is two (2) times the rated load. Measure and record “D” at each increment. NOTE: During the application of load, elastic or plastic deformation is occurring. Apply the load gradually, at approximately 500 pounds/minute (2.22 kN/min), to allow the deformation to keep pace with the load.

7.1.2.5 At two (2) times rated load, hold for five (5) minutes after the first measurement, then re-measure and record “D.” Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to two (2) times rated load, then recommence the five (5) minute wait.

7.1.2.6 Reduce the load on the cornice hook to 100 pounds (0.44 kN), then measure and record “D.”

7.1.2.7 Increase the load on the hook gradually until two (2) times rated load is re-achieved. There is no need to pause and take measurements during this step. Once the two (2) times rated load reading is reached, measure and record “D”.

7.1.2.8 Increase the load on the cornice hook in 500 pound (2.22 kN) increments until the required test load is achieved. Measure and record “D” at each increment.

CAUTION: Depending on the actual capacity of the hook, you may be approaching catastrophic failure. Pay close attention to how the hook is reacting to prevent sudden failure and the possibility of personal injury or equipment damage.

7.1.2.9 At the test load, hold for five (5) minutes after the first measurement. Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to the test load, then recommence the five (5) minute wait. Failure to hold the load for at least five (5) minutes indicates that the hook is yielding, resulting in a test failure.

7.1.2.10 Reduce the load to zero and de-rig the test apparatus. Note that the test hook should never be placed in service, regardless of its condition following this test. The application of the test load has, by definition, “failed” the hook.

7.1.3 Test Interpretation

7.1.3.1 By dividing the maximum load the hook can withstand for five (5) minutes by its rated load, the factor of safety is determined. As required by 29 CFR 1926, this value must be at least four (4). If it is, the hook has passed this test.

7.2 Parapet Hook Test

This test shall be used to test any rigging hook which is designed and constructed to be used on parapets (not point loaded). If the hook is also designed to be used in a point loaded condition, then the testing of 7.1 must also be performed.

If the hook being tested is designed for use with a stand off bracket, then the testing shall include the bracket, with the bracket set at its maximum designed stand off condition.

7.2.1 Test Preparation and Setup

7.2.1.1 Determine the test load to be applied to the parapet hook. As a minimum, this will be four (4) times the rated load of the hook.

7.2.1.2 Determine the maximum load that the parapet fixture will be subjected to. Design and fabricate a parapet fixture which will safely withstand this load.

7.2.1.3 Obtain the remainder of the equipment needed to perform the test: load cell, loading device, measuring device, and weights for the anchor. Ensure that the load cell and measuring device used are calibrated for the range of the testing.

7.2.1.4 Set up the test in a manner similar to Figure 2.

7.2.2 Test Process

7.2.2.1 Using the loading device, apply 100 pounds (0.44 kN) of load (as measured by the load cell) to the parapet hook.

7.2.2.2 As indicated on Figure 2, take measurement “D” to the nearest 0.030” (0.80mm). Record this value as the Nominal Hook Opening (NHO) on Table 2.

7.2.2.3 Using the loading device, increase the load on the parapet hook to 500 pounds (2.22 kN). Hold for at least one (1) minute, then
measure and record “D” (Loaded Hook Opening - LHO).

7.2.2.4 Increase the load on the parapet hook in 500 pound (2.22 kN) increments until the load applied is two (2) times the rated load. Measure and record “D” at each increment. NOTE: During the application of load, elastic or plastic deformation is occurring. Apply the load gradually, at approximately 500 pounds/minute (2.22 kN/min), to allow the deformation to keep pace with the load.

7.2.2.5 At two (2) times rated load, hold for five (5) minutes after the first measurement, then re-measure and record “D.” Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to two (2) times rated load, then recommence the five (5) minute wait.

7.2.2.6 Reduce the load on the parapet hook to 100 pounds (0.44 kN), then measure and record “D.”

7.2.2.7 Increase the load on the hook gradually until two (2) times rated load is re-achieved. There is no need to pause and take measurements during this step. Once the two (2) times rated load reading is reached, measure and record “D”.

7.2.2.8 Increase the load on the parapet hook in 500 pound (2.22 kN) increments until the required test load is achieved. Measure and record “D” at each increment.

CAUTION: Depending on the actual capacity of the hook, you may be approaching catastrophic failure. Pay close attention to how the hook is reacting to prevent sudden failure and the possibility of personal injury or equipment damage.

7.2.2.9 At the test load, hold for five (5) minutes after the first measurement. Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to the test load, then recommence the five (5) minute wait. Failure to hold the load for at least five (5) minutes indicates that the hook is yielding, resulting in a test failure.

7.2.2.10 Reduce the load to zero and de-rig the test apparatus. Note that the test hook should never be placed in service, regardless of its condition following this test. The application of the test load has, by definition, “failed” the hook.

7.2.3 Test Interpretation

7.2.3.1 By dividing the maximum load the hook can withstand for five (5) minutes by its rated load, the factor of safety is determined. As required by 29 CFR 1926, this value must be at least four (4). If it is, the hook has passed this test.

7.3 Parapet Clamp Test

This test shall be used on any parapet clamp. Test procedure shall include the parapet clamp set to the minimum throat opening and maximum reach as prescribed by the manufacturer.

This test does not apply to applications in which the load is applied in a direction other than vertical. For applications in which the load is applied to the clamp in a direction other than vertical, refer to Section 1.3 of the standard.

7.3.1 Test Preparation and Setup

7.3.1.1 Determine the test load to be applied to the parapet clamp. As a minimum, this will be four (4) times rated load of the clamp.

7.3.1.2 Determine the maximum load that the parapet fixture will be subjected to. Design and fabricate a parapet fixture which will safely withstand this load and will not deflect during testing.

7.3.1.3 Obtain the remainder of the equipment needed to perform the test: load cell, loading device, measuring device, and weights for the anchor. Ensure that the load cell and measuring device used are calibrated for the range of the testing.

7.3.1.4 Set up the test in a manner similar to Figure 3.

7.3.2 Test Process

7.3.2.1 Using the loading device, apply 100 pounds (0.44 kN) of load (as measured by the load cell) to the parapet clamp.

7.3.2.2 As indicated on Figure 3, take measurements “D” and “E” to the nearest 0.030” (0.80mm). Record these values as the Nominal Deflection (ND) and Stand Deflection (SD), respectively, on Table 3.
7.3.2.3 Using the loading device, increase the load on the parapet clamp to 500 pounds (2.22 kN). Hold for at least one (1) minute, then measure and record "D" (Loaded Deflection - LD) and "E" (Stand Deflection - SD). During the conduct of this test, the Stand Deflection should not change, with the exception of normal measurement variations.

7.3.2.4 Increase the load on the parapet clamp in 500 pound (2.22 kN) increments until the load applied is two (2) times the rated load. Measure and record at each increment. NOTE: During the application of load, elastic or plastic deformation is occurring. Apply the load gradually, at approximately 500 pounds/minute (2.22 kN/min), to allow the deformation to keep pace with the load.

7.3.2.5 At two (2) times rated load, hold for five (5) minutes after the first measurement, then re-measure and record "D" and "E." Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to two (2) times rated load, then recommence the five (5) minute wait.

7.3.2.6 Reduce the load on the parapet clamp to 100 pounds (0.44 kN), then measure and record "D" and "E."

7.3.2.7 Increase the load on the clamp gradually until two (2) times rated load is re-achieved. There is no need to pause and take measurements during this step. Once the two (2) times rated load reading is reached, measure and record.

7.3.2.8 Increase the load on the parapet clamp in 500 pound increments (2.22 kN) until the required test load is achieved. Measure and record at each increment.

CAUTION: Depending on the actual capacity of the clamp, you may be approaching catastrophic failure. Pay close attention to how the clamp is reacting to prevent sudden failure and the possibility of personal injury or equipment damage.

7.3.2.9 At the test load, hold for five (5) minutes after the first measurement. Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to the test load, then recommence the five (5) minute wait. Failure to hold the load for at least five (5) minutes indicates that the clamp is yielding, resulting in a test failure.

7.3.2.10 Reduce the load to zero and de-rig the test apparatus. Note that the test clamp should never be placed in service, regardless of its condition following this test. The application of the test load has, by definition, “failed” the clamp.

7.3.3 Test Interpretation

7.3.3.1 By dividing the maximum load, the clamp can withstand for five (5) minutes by its rated load, the factor of safety is determined. As required by 29 CFR 1926, this value must be at least four (4). If it is, the clamp has passed this test.

7.4 Outrigger Beam Test

This test shall be used to test outrigger beams, either stationary or rolling. Test procedure shall include the outrigger beam reach and load set to the worst case load condition (such as, but not limited to, maximum overturning moment, shear, torsion, back span bending moment, buckling) allowed by the manufacturer.

7.4.1 Test Preparation and Setup

7.4.1.1 Determine the test load to be applied to the outrigger beam. As a minimum, this will be four (4) time the rated load of the beam.

7.4.1.2 Determine the maximum load that the Outrigger Test Fixture will be subjected to. Design and fabricate an Outrigger Test Fixture, which will safely withstand this load and not deflect during testing.

7.4.1.3 Determine the maximum moment that the outrigger beam will be subjected to. Multiply this figure by 1.5 and then divide by the outrigger backspan length. This amount, in pounds (kg), is how much counterweight should be applied to the back of the beam to prevent it from overturning.

7.4.1.4 Obtain the remainder of the equipment needed to perform the test: load cell, loading device, measuring device, and weights for the anchor. Ensure that the load cell and measuring device used are calibrated for the range of the testing.

7.4.1.5 Set up the test in a manner similar to Figure 4.
7.4.2 Test Process

7.4.2.1 Using the loading device, apply 100 pounds (0.44 kN) of load (as measured by the load cell) to the outrigger beam.

7.4.2.2 As indicated on Figure 4, take measurements “D” and “E” to the nearest 0.030” (0.80mm). Record these values as the Nominal Deflection (ND) and Stand Deflection (SD), respectively, on Table 4.

7.4.2.3 Using the load device, increase the load on the outrigger beam to 500 pounds (2.22 kN). Hold for at least one (1) minute, then measure and record “D” (Loaded Beam Deflection - LBD) and “E” (Stand Deflection - D). During conduct of the test, the Stand Deflection should not change, with the exception of normal measurement variations.

7.4.2.4 Increase the load on the outrigger beam in 500 pound (2.22 kN) increments until the load applied is two (2) times the rated load. Measure and record at each increment. NOTE: During the application of load, elastic or plastic deformation is occurring. Apply the load gradually, at approximately 500 pounds/minute (2.22 kN/min), to allow the deformation to keep pace with the load.

7.4.2.5 At two (2) times rated load, hold for five (5) minutes after the first measurement, then remeasure and record “D” and “E”. Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to the test load, and then recommence the five (5) minute wait. Failure to hold the load for at least five (5) minutes indicates that the beam is yielding, resulting in test failure.

7.4.2.6 Reduce the load on the outrigger beam to 100 pounds (0.44 kN), then measure and record “D” and “E”.

7.4.2.7 Increase the load on the beam gradually until two (2) times rated load is reached. There is no need to pause and take measurements during this step. Once the two (2) times rated load reading is reached, measure and record.

7.4.2.8 Increase the load on the outrigger beam in 500 pound increments (2.22 kN) until the required test load is achieved. Measure and record at each increment.

CAUTION: Depending on the actual capacity of the beam, you may be approaching catastrophic failure. Pay close attention to how the beam is reacting to prevent sudden failure and the possibility of personal injury or equipment damage.

7.4.2.9 At the test load, hold for five (5) minutes after the first measurement. Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to the test load, and then recommence the five (5) minute wait. Failure to hold the load for at least five (5) minutes indicates that the beam is yielding, resulting in test failure.

7.4.2.10 Reduce the load to zero and de-rig the test apparatus. Note that the test beam should never be placed in service, regardless of its condition following this test. The application of the test load has, by definition, “failed” the beam.

7.4.3 Test Interpretation

7.4.3.1 By dividing the maximum load the beam can withstand for five (5) minutes by its rated load, the factor of safety is determined. As required by 29 CFR 1926, this value must be at least four (4). If it is, the beam has passed this test.

7.5 Beam and Column Clamp Test

This test shall be used to test beam and column clamps used for support of suspended scaffolds. Test procedure shall include the clamp and load in the most unfavorable position (shear or bending) as allowed by the manufacturer.

7.5.1 Test Preparation and Setup

7.5.1.1 Determine the test load to be applied to the clamp. As a minimum, this will be four (4) times the rated load of the clamp.

7.5.1.2 Determine the maximum load to which the test fixture will be subjected. Design and fabricate the test fixture, which will safely support this load and will resist deflection.

7.5.1.3 Obtain the remainder of the equipment needed to perform the test: load cell, weights for the anchor, tensioning device. Ensure that the load cell used is calibrated and rated for the range of testing loads. Ensure that the tensioning device used is rated for the testing loads.

7.5.1.4 Set-up test similar to Figure 5.
7.5.2 Test Process

7.5.2.1 Using the tensioning device, apply 100 lbs. (0.44kN) of load (as measured by the load cell) to the clamp. The load shall be applied to the most unfavorable position to achieve maximum stress to the component. The clamp shall be tested at its widest opening and its smallest as allowed by the manufacturer.

7.5.2.2 Using the tensioning device, increase the load on the clamp to 500 pounds (2.22 kN). Hold for at least one (1) minute.

7.5.2.3 Using the tensioning device, increase the load on the clamp in increments not to exceed 50% of rated load until the load applied is two (2) times the rated load. NOTE: During the application of load, elastic or plastic deformation is occurring. Apply the load gradually to allow the deformation to keep pace with the load.

7.5.2.4 Increase the load gradually, in increments not to exceed 50% of rated load, until the test load is achieved (minimum four times rated load).

CAUTION: Depending on the capacity of the clamp you may be approaching catastrophic failure of the clamp. Pay close attention to how the clamp is reacting to avoid sudden failure and the possibility of personal injury or equipment damage.

7.5.2.5 At the test load, hold for five (5) minutes. Verify that there has been no reduction in load as measured by the load cell. If necessary, increase the load back to the test load, and restart the five (5) minute timing. Failure to hold the test load for five (5) minutes indicates that the clamp is yielding resulting in test failure.

7.5.2.6 Reduce the load to zero and de-rig the apparatus. Note the test clamp should never be placed in service, regardless of its condition after the test. The application of the test load has, by definition, “failed” the clamp.

7.5.3 Test Interpretation

7.5.3.1 By dividing the maximum load the clamp can withstand for five (5) minutes by its rated load, the factor of safety is established. As required by 29 CFR 1926, this value must be at least four (4). If it is, the clamp has passed this test.

7.6 Trolley Test

This test shall be used to test trolleys used to support suspended platforms or other devices used to support people. If the trolley has a range of flange sizes, it shall be tested in its most unfavorable position, generally the widest width. If the trolley is specific to a shape or profile, it shall be tested with that profile used as support. For applications in which the trolley is intended to be loaded at any angle other than vertical, it shall be tested at the maximum angle allowed by the manufacturer.

7.6.1 Test Preparation and Setup

7.6.1.1 Determine the test load to be applied to the trolley. As a minimum, this will be four (4) times the rated load of the trolley.

7.6.1.2 Determine the maximum load to which the trolley test fixture will be subjected. Design and fabricate a trolley test fixture which will safely withstand this load.

7.6.1.3 Obtain the remainder of the equipment needed to perform the test: load cell, loading device, and weights for the anchor. Ensure that the load cell is calibrated for the range of testing.

7.6.1.4 Set-up the test in a manner similar to figure 5.

7.6.2 Test Process

7.6.2.1 Affix the trolley to the beam or support profile as instructed by the manufacturer, paying attention to any clearances required between the wheels and the flange.

7.6.2.2 Using the loading device, apply 100 pounds (0.44kN) of load (as measured by the load cell) to the trolley.

7.6.2.3 Using the loading device, increase the load on the trolley to one half (½) of its rated load. Hold for at least one (1) minute. Increase to rated load.

7.6.2.4 Using the loading device, increase the load, in increments not to exceed 50% of rated load, to two (2) times its rated load. Hold for five (5) minutes.

7.6.2.5 Increase the load gradually, in increments not to exceed 50% of rated load, until the test load is achieved (minimum four times rated load).
CAUTION: Depending on the actual capacity of the trolley, beam, or profile, you may be approaching catastrophic failure. Pay close attention to how the trolley is reacting to prevent sudden failure and the possibility of personal injury or equipment damage.

7.6.2.6 At the test load, hold for five (5) minutes. Verify that there has been no reduction in the load as indicated by the load measuring device. Failure to hold the load for at least five (5) minutes indicates that the trolley is yielding, resulting in test failure.

7.6.2.7 Reduce the load to zero and de-rig the test apparatus. Note that the test trolley should never be placed in service, regardless of its condition after the test. The application of the test load by definition “failed” the trolley.

7.6.3 Test Interpretation

7.6.3.1 By dividing the maximum load the trolley can withstand for five (5) minutes by its rated load, the factor of safety is determined. As required by 29 CFR 1926, this value must be at least four (4). If it is, the trolley has passed the test.

7.7 Tank Top Roller (Pin Style) Test

This test shall be used to test the pin style tank top roller used to support suspended scaffolding.

7.7.1 Test Preparation and Setup

7.7.1.1 Determine the rated load and maximum reach for which the equipment is rated. The minimum test load will be four (4) times the rated load.

7.7.1.2 Determine the maximum load to which the test fixture will be subjected. Design and fabricate the test fixture so that it will safely support test, tieback and rim loads.

7.7.1.3 Obtain the remainder of the equipment needed to perform the test: Load cell, tensioning device and weights for the anchor. Ensure that the load cell used is calibrated and is rated for the range of testing loads. Ensure that the tensioning device used is rated for the testing loads

7.7.1.4 Set-up test similar to Figure 6.

7.7.2 Test Process

7.7.2.1 Set-up the tank top roller per manufacturer’s instructions.

7.7.2.2 Using the tensioning device, apply a 100 lb. (0.44kN) load (as measured by the load cell) to the tank top roller. Measure the reach. The tank top roller shall be tested at the maximum reach allowed by the manufacturer.

7.7.2.3 Using the tensioning device, increase the load on the tank top roller to one half (1/2) its rated load. Hold for at least one (1) minute. Increase the load to rated load.

7.7.2.4 Using the tensioning device, increase the load on the tank top roller in increments not to exceed 50% of rated load until the load applied is two (2) times the rated load.

7.7.2.5 At two (2) times rated load, hold for five (5) minutes after the first measurement. Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to two (2) times rated load, then recommence the five (5) minute wait. Check the reach of the tank top roller.

7.7.2.6 Increase the load gradually, in increments not to exceed 50% of rated load, until the test load is achieved (minimum four times rated load).

CAUTION: Depending on the actual capacity of the tank top roller, you may be approaching catastrophic failure. Pay close attention to how the tank top roller is reacting to prevent sudden failure and the possibility of personal injury or equipment damage.

7.7.2.7 At the test load, hold for five (5) minutes. Verify that there has been no reduction in load as indicated by the load cell. If necessary, increase the load to maintain the test load and then restart the five (5) minute timing. Failure to hold the test load for five (5) minutes indicates that the tank top roller is yielding, resulting in test failure.

7.7.2.8 Reduce the load to zero and de-rig the apparatus. Note that the test tank top roller should never be placed in service, regardless of its condition after the test. The application of the test load by definition “failed” the tank top roller.
7.7.3 Test Interpretation

7.7.3.1 By dividing the maximum load the tank top roller can withstand for five (5) minutes by its rated load, the factor of safety is established. As required by 29 CFR 1926, this value must be at least four (4). If it is, the tank top roller has passed this test.

7.8 Outrigger Carriage (Rolling And Stationary) Test

This test shall be used to test the outrigger support carriages (stationary or rolling) used for the support of outrigger beams.

7.8.1 Test Procedure and Setup

7.8.1.1 Determine the maximum rated fulcrum load of the outrigger support carriage. The minimum test load shall be four (4) times the rated fulcrum load.

7.8.1.2 Determine the maximum load to which the test fixture will be subjected. Design and fabricate the test fixture so that it will safely support the maximum load.

7.8.1.3 Obtain the remainder of the equipment needed to perform the test: load cell, measuring device and weights or ram. Ensure that the load cell used is calibrated and is rated for the range of testing loads. Ensure that the ram used is adequately rated for the test load.

7.8.1.4 Set up the test similar to Figure 7. The bearing area shall simulate the outrigger beam bearing area.

7.8.2 Test Process

7.8.2.1 Assemble the carriage per manufacturer’s instructions. Separate tests shall be conducted if the carriage is used in both stationary and rolling applications.

7.8.2.2 Using the loading device, apply 100 pounds (0.44kN) of load (as measured by the load cell) to the carriage bearing member.

7.8.2.3 Using the measuring device, take an initial measurement reading, “D”, to the nearest 0.030" (0.80mm).

7.8.2.4 Using the loading device, increase the load on the carriage to one half (1/2) its rated load. Hold the load for at least one minute and take a measurement reading. Increase the load to rated load, hold for one minute and take measurement reading, “D”.

7.8.2.5 Increase the load gradually, in increments not to exceed 50% of rated load, to two (2) times the rated load. Take measurement reading, “D”.

7.8.2.6 At two (2) times the rated load, hold for five (5) minutes after the measurement reading and take a second measurement reading, “D”. Verify that there has been no reduction in the load as indicated by the load cell. If necessary, increase the load back to two (2) times the rated load and recommence the five (5) minute wait.

7.8.2.7 Increase the load gradually, in increments not to exceed 50% of rated load, until the test load is achieved (minimum four times rated load). Take a measurement reading, “D”, at each increment.

CAUTION: Depending on the actual capacity of the carriage, you may be approaching catastrophic failure. Pay close attention to how the carriage is reacting to prevent sudden failure and the possibility of personal injury or equipment damage.

7.8.2.8 At the test load, hold for five (5) minutes. Verify that there has been no reduction in load as indicated by the load cell. If necessary, increase the load to maintain the test load then recommence the five (5) minute wait. Failure of the carriage to hold the test load for five (5) minutes indicates that the carriage is yielding, resulting in test failure.

7.8.2.9 Reduce the load to zero and de-rig the apparatus. Note that the carriage should never be placed in service, regardless of its condition after testing. The application of the test load has, by definition, failed the carriage.

7.8.3 Test Interpretation

7.8.3.1 By dividing the maximum load the carriage can withstand for five (5) minutes by its rated load, the factor of safety can be determined. As required by 29 CFR 1926, this value must be at least four (4). If it is, the carriage has passed this test.
Table 1. Cornice Hook Test Data

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>NHO</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>LHO at 2 times Rated Load (first time)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NHO following application of 2 times Rated Load</td>
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<td></td>
<td></td>
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<tr>
<td>LHO at 2 times Rated Load (second time)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A  Nominal Hook Opening (NHO)        _____ inches
B  LHO at 2 times Rated Load (first time)  _____ inches
C  NHO following application of 2 times Rated Load  _____ inches
D  LHO at 2 times Rated Load (second time)  _____ inches

Test Date:________________________________________

Test Part Number:_______________________ Test Number:__________________________

Tested By:______________________________ Witnessed By:____________________________
Table 2. Parapet Hook Test Data

Load Rating of the Parapet Hook _______ pounds

2 times Load Rating _______ pounds (Multiply the figure above by 2)

Test Load _______ pounds (Multiply the load rating by at least 4)

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>pounds</td>
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<tr>
<td>pounds</td>
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</tr>
<tr>
<td>pounds</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

A Nominal Hook Opening (NHO) _______ inches

B LHO at 2 times Rated Load (first time) _______ inches

C NHO following application of 2 times Rated Load _______ inches

D LHO at 2 times Rated Load (second time) _______ inches

Test Date: ________________________________

Test Part Number: _______________________ Test Number: ________________________________

Tested By: _____________________________ Witnessed By: ________________________________
#### Table 3. Parapet Clamp Test Data

<table>
<thead>
<tr>
<th>Load Rating of the Parapet Clamp</th>
<th>_____ pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 times Load Rating</td>
<td>_____ pounds (Multiply the figure above by 2)</td>
</tr>
<tr>
<td>Test Load</td>
<td>_____ pounds (Multiply the load rating by at least 4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load</th>
<th>1st meas.</th>
<th>2nd meas.</th>
<th>3rd meas.</th>
<th>Stand defl.</th>
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<tbody>
<tr>
<td>100</td>
<td>“D”</td>
<td>“D”</td>
<td>“D”</td>
<td>“E”</td>
</tr>
<tr>
<td>pounds</td>
<td>_____</td>
<td>ND</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>pounds</td>
<td>_____</td>
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<tr>
<td>pounds</td>
<td>_____</td>
<td>_____</td>
<td>_____</td>
<td>_____</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal Deflection (ND)</th>
<th>_____ inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD at 2 times Rated Load (first time)</td>
<td>_____ inches</td>
</tr>
<tr>
<td>ND following application of 2 times Rated Load</td>
<td>_____ inches</td>
</tr>
<tr>
<td>LD at 2 times Rated Load (second time)</td>
<td>_____ inches</td>
</tr>
</tbody>
</table>

**Test Date:** ________________________________

**Test Part Number:** _________________________ **Test Number:** ______________________________

**Tested By:** ______________________________ **Witnessed By:** ____________________________
Table 4. Outrigger Beam Test Data

Load Rating of the Outrigger Beam  _______ pounds (The load at the maximum allowed moment)

2 times Load Rating  _______ pounds (Multiply the figure above by 2)

Test Load  _______ pounds (Multiply the load rating by at least 4)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>pounds</td>
<td>ND</td>
<td>pounds</td>
<td>pounds</td>
<td></td>
</tr>
</tbody>
</table>

A Nominal Deflection (ND)  _______ inches

B LBD at 2 times Rated Load (first time)  _______ inches

C ND following application of 2 times Rated Load  _______ inches

D LBD at 2 times Rated Load (second time)  _______ inches

Test Date: ________________________________

Test Part Number: _______________________ Test Number: ________________________________

Tested By: ______________________________ Witnessed By: ______________________________
### Table 5. Beam and Column Clamp Test Data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Load Rating of the Clamp</td>
<td>_____ pounds</td>
</tr>
<tr>
<td>2 times Load Rating</td>
<td>_____ pounds (Multiply the figure above by 2)</td>
</tr>
<tr>
<td>Test Load</td>
<td>_____ pounds (Multiply the load rating by at least 4)</td>
</tr>
<tr>
<td>Test Date</td>
<td></td>
</tr>
<tr>
<td>Test Part Number:</td>
<td></td>
</tr>
<tr>
<td>Test Number:</td>
<td></td>
</tr>
<tr>
<td>Tested By</td>
<td></td>
</tr>
<tr>
<td>Witnessed By</td>
<td></td>
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</tbody>
</table>

### Table 6. Trolley Test Data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Load Rating of the Trolley</td>
<td>_____ pounds</td>
</tr>
<tr>
<td>2 times Load Rating</td>
<td>_____ pounds (Multiply the figure above by 2)</td>
</tr>
<tr>
<td>Test Load</td>
<td>_____ pounds (Multiply the load rating by at least 4)</td>
</tr>
<tr>
<td>Test Date</td>
<td></td>
</tr>
<tr>
<td>Test Part Number:</td>
<td></td>
</tr>
<tr>
<td>Test Number:</td>
<td></td>
</tr>
<tr>
<td>Tested By</td>
<td></td>
</tr>
<tr>
<td>Witnessed By</td>
<td></td>
</tr>
</tbody>
</table>

### Table 7. Tank Top Roller Test Data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Load Rating of the Tank Top Roller</td>
<td>_____ pounds</td>
</tr>
<tr>
<td>2 times Load Rating</td>
<td>_____ pounds (Multiply the figure above by 2)</td>
</tr>
<tr>
<td>Test Load</td>
<td>_____ pounds (Multiply the load rating by at least 4)</td>
</tr>
<tr>
<td>Initial Reach (at 100 lbs.)</td>
<td>_____ inches</td>
</tr>
<tr>
<td>Test Date</td>
<td></td>
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<td>Test Part Number:</td>
<td></td>
</tr>
<tr>
<td>Test Number:</td>
<td></td>
</tr>
<tr>
<td>Tested By</td>
<td></td>
</tr>
<tr>
<td>Witnessed By</td>
<td></td>
</tr>
</tbody>
</table>
Table 8. Outrigger Carriage Test Data

Load Rating of the Outrigger Carriage  ______ pounds

2 times Load Rating  ______ pounds (Multiply the figure above by 2)

Test Load  ______ pounds (Multiply the load rating by at least 4)

<table>
<thead>
<tr>
<th>Measure “D”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load 100 pounds</td>
</tr>
<tr>
<td>½ Rated Load</td>
</tr>
<tr>
<td>______ pounds</td>
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<tr>
<td>______ pounds</td>
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<td>______ pounds</td>
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<tr>
<td>______ pounds</td>
</tr>
</tbody>
</table>

A Initial Reading  ______ inches

B Reading at 2 times Rated Load  ______ inches

C Reading at 4 times Rated Load  ______ inches

Test Date: ________________________________

Test Part Number: __________________________ Test Number: ________________________________

Tested By: ____________________________ Witnessed By: ________________________________
FIGURE 1. CORNICE HOOK TEST SETUP
"X" = Maximum Parapet Thickness for hook being tested.

Figure 2. Parapet Hook Test Setup
"X" = MINIMUM PARAPET THICKNESS FOR CLAMP BEING TESTED

FIGURE 3. PARAPET CLAMP TEST SETUP
FIGURE 4. OUTRIGGER BEAM TEST SETUP
FIGURE 5 TROLLEY OR CLAMP TEST SETUP
FIGURE 6 TANK TOP ROLLER TEST SETUP
FIGURE 7 OUTRIGGER CARRIAGE TEST SETUP