

AMERICAN NATIONAL STANDARD

Standard Field Test Procedure For Determining The Withdrawal Resistance Of Roofing Fasteners

I. Purpose of the Test

Performance of the fastener/deck interface is a very important part of a successful roofing system. These guidelines were developed to standardize the procedures used in the field to test the pullout resistance of all types of fasteners. The data developed from these tests will provide the roof system manufacturer and design professional with pullout resistance values for the specific fastener installed into the load resisting material of the deck.

II. Definitions

Embedment: the length of a fastener that is within the deck after installation (applicable to structural and lightweight concretes, gypsum, cementitious wood fiber, and wood plank).

Penetration: the length of a fastener that is protruding from the underside of the deck after installation (applicable to steel, plywood, OSB, and fiberglass decks).

III. Equipment (See Commentary 1 & 2)

Use a portable pullout tester utilizing a hydraulic or electronic load cell. The gauge shall display values in lbf (or kN) and shall retain the maximum value achieved. The gauge shall allow the pullout values to fall within the working range of the gauge. The working range of the gauge is 10% to 90% of the full scale of the gauge. If the tester has a gauge that reads in psi (or ksi) and the values are converted to lbf (kN), so note on the pullout test report (Form B). The conversion chart shall be attached to the pullout tester.

The load gauge shall have a dated calibration certificate showing the calibrated values for the full range of the load gauge. The load gauge shall be calibrated every 12 months or sooner if it is expected that the gauge is out of tolerance. Calibration shall be performed to a standard that is traceable to a nationally recognized source. The gauge shall be accurate to $\pm 5\%$ of the reading.



IV. Procedure

A. Remove any roofing material (i.e. waterproofing membrane, existing insulation) that may influence the pullout values before the test is performed.

B. The fastener shall be installed using the same method as will be used during actual construction (i.e. depth of installation, pre-drilled hole diameter, installation tools).

C. The fasteners shall be pulled out in a direct line perpendicular to the deck. The load shall be applied at 2.0 ± 1.0 inches/minute. (See Commentary 3)

D. Perform a minimum of 10 pullouts for up to 50,000 square feet (4,650 square meters), and 5 additional pullouts for each additional 50,000 square feet (4,650 square meters) or portion thereof on each project. Perform the pullouts in various areas of the roof, including corners, perimeter, and field, to provide a representative sampling of performance. The location of pullouts shall allow for 50% more tests in the corners and perimeter than in the field. (See Commentary 4 & 5)

E. Each roof section with a different elevation or a different deck type shall be considered a different roof and shall be tested separately.

F. Include a roof plan to identify the location of each pullout (Form B). The roof plan shall be marked with the corresponding test number of each pullout. The plan need not be to scale.

G. Complete separate Forms A and B for each roof section. Record all pullouts.



Approved as an American National Standard by ANSI

V. Personnel

A technician who is skilled in the pullout test procedure shall perform the test. A representative of the building owner shall be present to witness the test and verify the values. A roofing professional shall be present to repair the roof in areas where the tests were performed to ensure that it is returned to a watertight condition.

VI. Cautions (See Commentary 6)

On decks that can be affected by free water when the deck is 32°F (0°C) or below (i.e. gypsum, cementitious wood fiber, lightweight structural concrete, and lightweight insulating concrete) the pullout values may be elevated and therefore unreliable.

Commentary

1. Examples of appropriate pullout testers are:

- COMTEN series 301, 302, 304, 341, and 381 testers.
- HYDRAJAWS PULLOUT METER 0095.

2. If equipment is suspected to be out of tolerance, recalibrate immediately. If results are outside of tolerances, pull test should be repeated.

3. Rates of withdrawal can be pre-set on motorized pullout testers. On testers where the load is applied via a threaded rod, an acceptable method to determine the rate of withdrawal is to calculate the number of seconds per 360° revolution.

Seconds per revolution =
 $60 \div (\text{number of threads per inch} \times \text{desired number of inches per minute})$

4. Tests should be performed in any area where the roof has been damaged or where water or other chemicals may have infiltrated the roof system. These elements may cause the roof deck to deteriorate and cause lower pullout values.

5. On certain projects, it may be necessary to perform additional pullout tests beyond the minimum number required in Section IV Part D. This includes, but is not limited to, occasions when:

- pullout values vary significantly
- tests are performed in decks that are inherently less consistent such as lightweight insulating concrete, tectum, and gypsum
- there exist multiple damaged or questionable areas
- local building codes require additional tests
- roofs with high wind loading should have pulls taken in all corners

If there are anomalies in pull values, the deck should be inspected to determine the cause.

6. The temperature of the deck may be taken to determine if it is subject to freezing conditions. Examples of appropriate temperature measuring devices are: TAYLOR 9850 and COOPER DP300

7. Additional data on the pullout form (Form A) exist for informational purposes for the roof designer. These areas have been marked optional, and are to be completed at the discretion of the personnel completing the Pullout Test Report.

Equipment Contact Information

Comten Industries
 1124 19th Street North
 St. Petersburg, FL 33713
 Telephone: (813) 822-3508
 Website: www.com-ten.com

Cooper
 (available through www.grainger.com)

Taylor
 (available through www.grainger.com)

Hydrajaws Limited
 Tile Cross Trading Estate
 Tile Cross Road
 Birmingham B33 0NW, UK
 Telephone: +44 (0) 121 779 6856/7
 Website: www.hydrajaws.co.uk

Form A Pull Out Test Report

(Refer To The "Standard Field Test Procedure For Determining The Withdrawal Resistance Of Roofing Fasteners" For Full Documentation)
REPORT RESULTS ON REVERSE SIDE.

Job Name: _____

Location: _____

Test Date: _____ Ambient Temperature: _____ Roof Area: _____ Sq. Ft.

Tester Mfg.: _____ Max. Cap. Of Tester _____ Circle One: lb_f kN

Date Of Last Calibration: _____ Number Of Pulls Recorded on Form B _____

Fastener Tested: _____ Fastener Manufacturer: ES Products, Inc.

Test Performed By: _____

Witnessed By: _____

Test Cut Areas Repaired By: _____

Project Type: New Construction Tear Off Retrofit

DECK TYPE

- | | | |
|--|-----------------|---|
| <input type="checkbox"/> Steel: | Gauge _____ | |
| <input type="checkbox"/> Structural Concrete: | _____ Thickness | Check One: <input type="checkbox"/> Poured in Place <input type="checkbox"/> Precast |
| <input type="checkbox"/> Lightweight Concrete | _____ Thickness | |
| <input type="checkbox"/> Insulating Concrete | _____ Thickness | |
| <input type="checkbox"/> Cementitious Wood Fiber | _____ Thickness | |
| <input type="checkbox"/> Gypsum: | _____ Thickness | Check One: <input type="checkbox"/> Poured in Place <input type="checkbox"/> Precast |
| <input type="checkbox"/> Wood: | _____ Thickness | Check One: <input type="checkbox"/> OSB <input type="checkbox"/> Plywood <input type="checkbox"/> Plank |
| <input type="checkbox"/> Fiberglass: | _____ Thickness | |
| <input type="checkbox"/> Other: | _____ Thickness | |

Depth Of Fastener Embedment or Penetration: _____

Drill Bit Diameter, Where Applicable: _____

Optional Information (See Commentary 7)

Test Time: _____ Building Height: _____

Thickness Of Existing Roof Assembly: _____

New System Manufacturer: _____ Roof Cover Type (Check One):

- | | |
|---|---|
| <input type="checkbox"/> Mechanically Attached Single-Ply | <input type="checkbox"/> Modified Bitumen |
| <input type="checkbox"/> Ballasted Single-Ply | <input type="checkbox"/> Built-up Roofing |
| <input type="checkbox"/> Fully Adhered Single-Ply | <input type="checkbox"/> Other: _____ |

New Insulation: Type _____ Thickness _____

DISCLAIMER: MANUFACTURER'S INSTALLATION REQUIREMENTS SHALL BE FOLLOWED WHEN USING ANY OF THE TESTED FASTENERS. NEITHER THE TECHNICIAN PERFORMING THE PULLOUT TESTS NOR HIS COMPANY IS RESPONSIBLE FOR THE WATERPROOFING INTEGRITY OF THE REPAIRS. THIS TEST REPORT DOES NOT CERTIFY THE STRUCTURAL INTEGRITY OF THE ROOF DECK.

Form B

Pull Out Test Results (Report all test results and units of measure.)

- | | | | |
|----------|-----------|-----------|-----------|
| 1. _____ | 6. _____ | 11. _____ | 16. _____ |
| 2. _____ | 7. _____ | 12. _____ | 17. _____ |
| 3. _____ | 8. _____ | 13. _____ | 18. _____ |
| 4. _____ | 9. _____ | 14. _____ | 19. _____ |
| 5. _____ | 10. _____ | 15. _____ | 20. _____ |

ROOF PLAN NOT TO SCALE Identify where the pullouts were performed with corresponding test number

COMMENTS:
