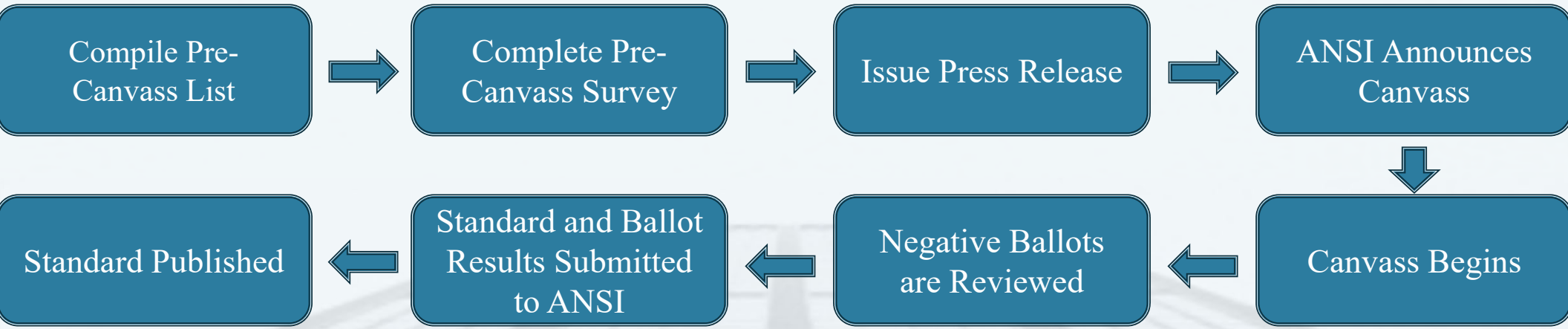
SPRI Wind Design Seminar
ANSI/SPRI FX-1 & IA-1
Standard Field Test Procedures

SPRI
SINGLE PLY ROOFING INDUSTRY

ANSI/SPRI Standards Development

- American National Standards Institute
  - Non-profit membership organization that provides the structure and guidelines by which voluntary national standards are developed.

The SPRI Process:



ANSI/SPRI FX-1 (2021)

Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners

Purpose:

This standard provides procedures used in the field to determine the withdrawal resistance of various roofing fasteners.

These values are used by system manufacturers, design professionals, and others within the roofing industry.

ANSI/SPRI FX-1 2021

Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners

Approved November 1, 2021

465 Waverley Oaks Road
Suite 421
Waltham, MA 02452
www.spri.org

Disclaimer
This standard is for use by architects, engineers, roofing contractors and owners of low slope roofing systems. SPRI, its members and employees do not warrant that this standard is proper and applicable under all conditions.

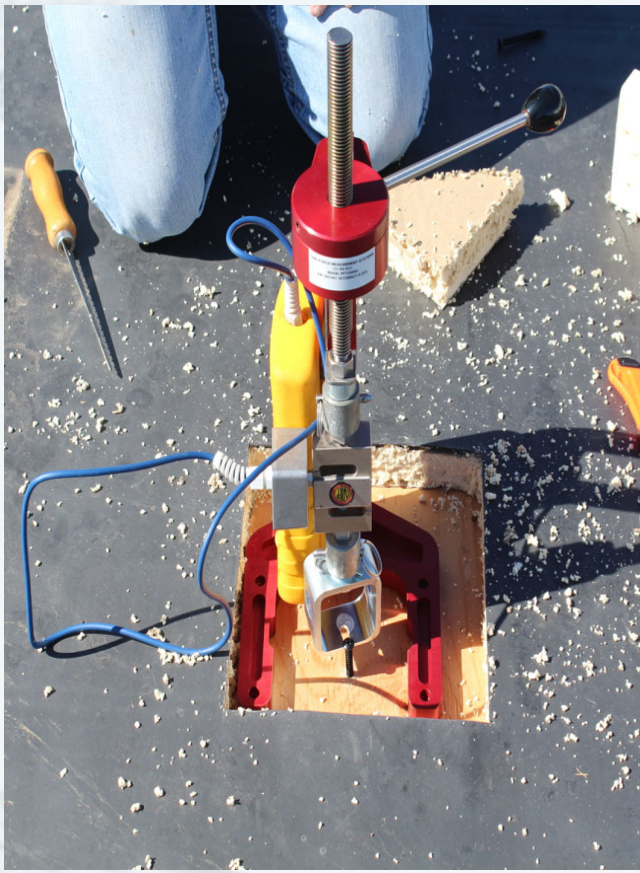
Equipment and Personnel

- A pullout tester with an electric or hydraulic load cell.
  - The gauge shall display values in pound-force (lbf).
  - The gauge shall be calibrated every 12 months to a nationally recognized standard.
  - The gauge shall be accurate to ±5% of the reading.
- The individual performing the test shall be trained in the proper use of the equipment.
  - A roofing professional shall be present to repair the roof in the areas that were tested.

Procedure

- Remove any roofing material in place above the structural deck.
- Install the fastener to be tested using the same method that will be used during actual construction.
- Pull the fastener perpendicular to the deck at a rate of 2.0 ± 1.0 in/min.
- Record the results of each test in a table.

FX-1 Test Set-up



Number of Tests

Perform a minimum of 10 pull tests for up to 50,000 ft^2 of roof area.

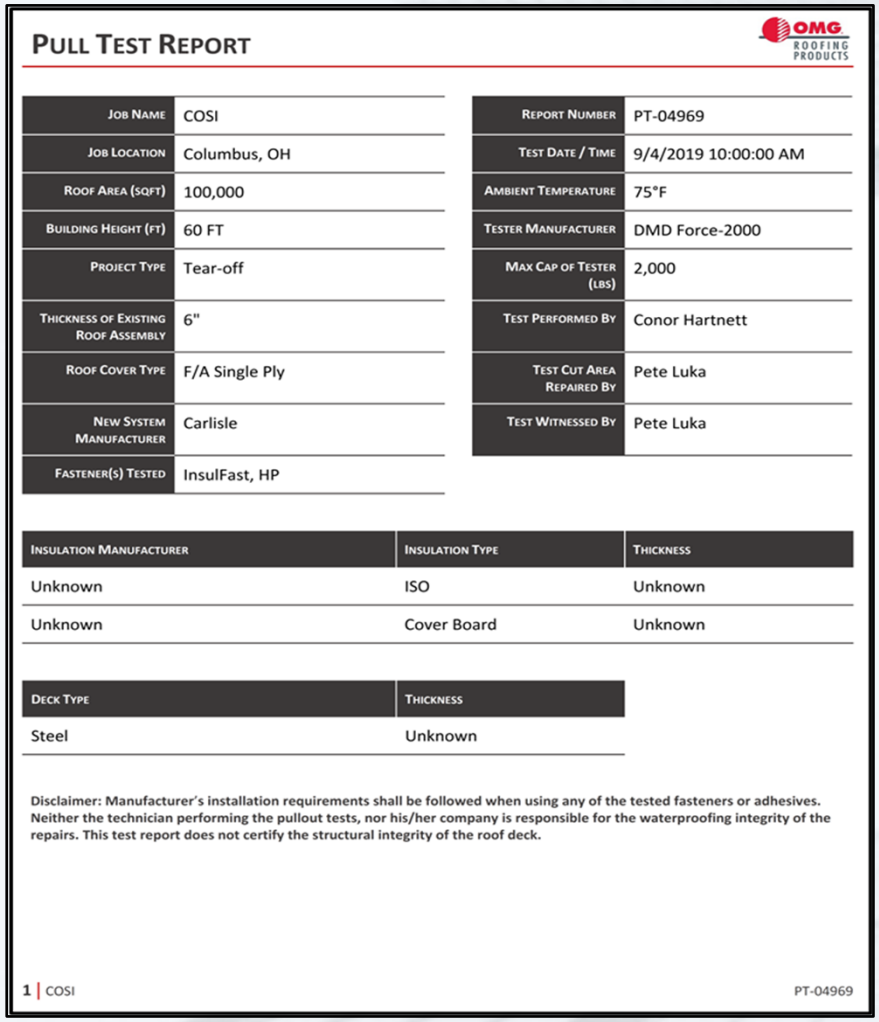
- Perform an additional five pull tests for each additional 50,000 ft^2 or portion thereof.

For a single building, each roof section with a different height or deck type shall be considered a separate test area.

Tests shall be conducted in the corners, perimeter, and field of the roof.

Fastener Tests	
Square Footage	Pull Tests
< 50,000	10
50,000 - 100,000	15
100,000 - 150,000	20
150,000 - 200,000	25
200,000 - 250,000	30
250,000 - 300,000	35
300,000 - 350,000	40
350,000 - 400,000	45
400,000 - 450,000	50
450,000 - 500,000	55
500,000 - 550,000	60
550,000 - 600,000	65
600,000 - 650,000	70
650,000 - 700,000	75
700,000 - 750,000	80

Pull Test Report – Cover Page



Pull Test Report

OMG ROOFING PRODUCTS

Job Name	COSI	Report Number	PT-04969
Job Location	Columbus, OH	Test Date / Time	9/4/2019 10:00:00 AM
Roof Area (sqft)	100,000	Ambient Temperature	75°F
Building Height (ft)	60 FT	Tester Manufacturer	DMD Force-2000
Project Type	Tear-off	Max Cap of Tester (lbs)	2,000
Thickness of Existing Roof Assembly	6"	Test Performed By	Conor Hartnett
Roof Cover Type	F/A Single Ply	Test Cut Area Repaired By	Pete Luka
New System Manufacturer	Carlisle	Test Witnessed By	Pete Luka
Fastener(s) Tested	InsulFast, HP		

Insulation Manufacturer	Insulation Type	Thickness
Unknown	ISO	Unknown
Unknown	Cover Board	Unknown

Deck Type	Thickness
Steel	Unknown

Disclaimer: Manufacturer's installation requirements shall be followed when using any of the tested fasteners or adhesives. Neither the technician performing the pullout tests, nor his/her company is responsible for the waterproofing integrity of the repairs. This test report does not certify the structural integrity of the roof deck.

- Job name and basic details
- Existing and proposed assembly details
- Personnel present for test
- System manufacturer
- Fasteners tested
- Deck Type

Pull Test Report – Results Table

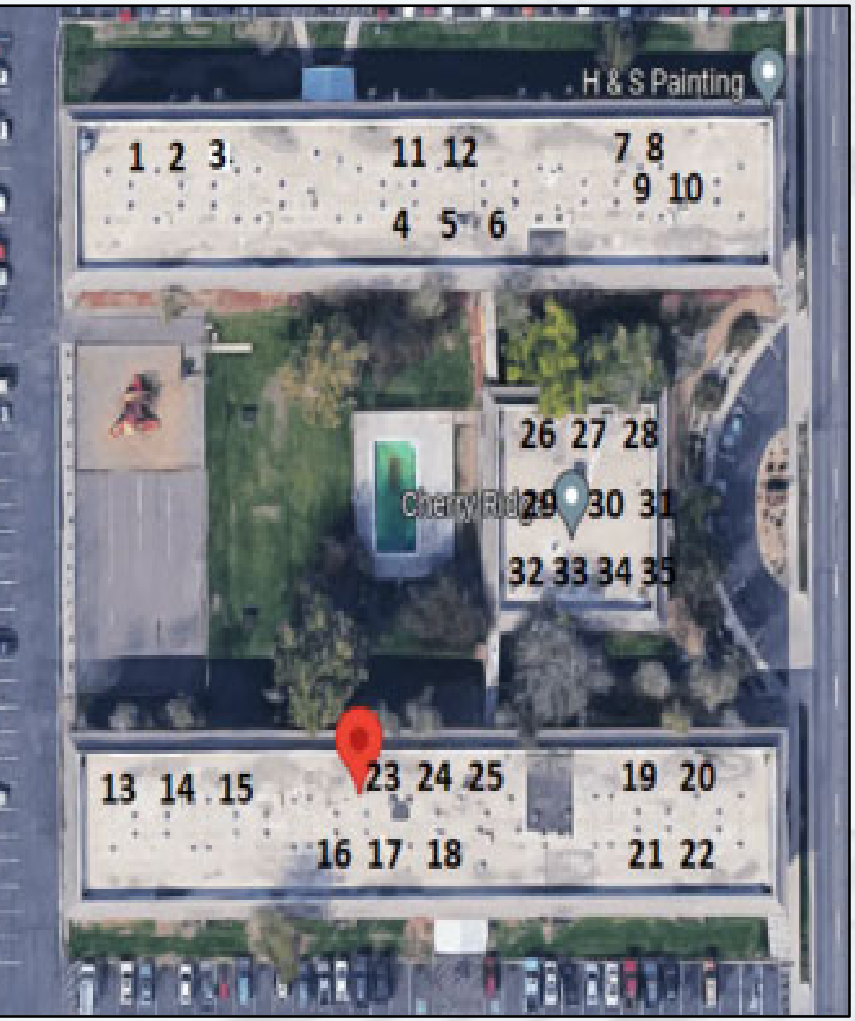
- Test location numbers corresponding with roof map
- Pull values in lbf
- Fasteners tested
- Depth of penetration
- Pre-drill diameter (if applicable)
- Comments
  - Joists
  - Laps in steel decking
  - Other unusual conditions

TEST RESULTS

OMG ROOFING PRODUCTS

TEST LOCATION NUMBER	PULL VALUE (LBF)	FASTENER TESTED	PENETRATION (IN)	BIT DIAMETER (IN)	COMMENTS
1	499	Carlisle InsulFast	1"		
2	607	Carlisle InsulFast	1"		
3	512	Carlisle InsulFast	1"		
4	570	Carlisle InsulFast	1"		
5	671	Carlisle InsulFast	1"		
6	565	Carlisle HP	1"		
7	362	Carlisle HP	1"		
8	450	Carlisle HP	1"		
9	638	Carlisle HP	1"		
10	900	Carlisle HP	1"		
11	463	Carlisle InsulFast	1"		
12	546	Carlisle InsulFast	1"		
13	544	Carlisle InsulFast	1"		
14	507	Carlisle InsulFast	1"		
15	553	Carlisle InsulFast	1"		
16	681	Carlisle HP	1"		
17	567	Carlisle HP	1"		
18	609	Carlisle HP	1"		
19	594	Carlisle HP	1"		
20	712	Carlisle HP	1"		

Pull Test Report – Roof Plan



- Each pull test report shall include a roof plan.
- The roof plan shall be marked with the corresponding number of each test performed.
- The roof plan does not need to be t scale.
- Additional photos can be added to the report at the discretion of the personnel completing the test.

Safety Considerations

- Personnel should be familiar with all safety requirements.
  - OSHA
  - Company Policies
  - Project Specific Requirements
- Plan ahead to avoid safety hazards
  - Safe rooftop access
  - Fall protection (where necessary)
  - Severe weather

ANSI/SPRI IA-1 (2021)

Standard Field Test Procedure for Verifying the Suitability of Roof Substrates and Adhesives

Purpose:

This standard provides field test procedures to verify the suitability of an existing roof substrate and adhesive combination

The results are used by system manufacturers and design professionals to determine if a substrate is compatible with the proposed adhesive.

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Equipment and Personnel

A pullout tester with an electric or hydraulic load cell.

- The pull tester and gauge used for FX-1 can also be used for IA-1.

An attachment plate to connect the test sample to the pullout tester

A “quadpod” or similar stand to provide clearance

The individual performing the test shall be trained in the proper use of the equipment.

Procedure

- The test sample shall include the following components of the proposed new roof assembly:
  - Substrate (bare deck or existing roof system)
  - Vapor barrier
  - First layer of insulation or coverboard
  - Attachment plate
- Sample size shall be either 24in x 24 in OR 12in x 12in.
  - The insulation adhesive shall be applied according to the manufacturer's specifications.
  - Application of ribbon applied adhesive shall be applied symmetrical to the centerline

Procedure

Figure B
Bead Placement Examples for 24" × 24" sample size

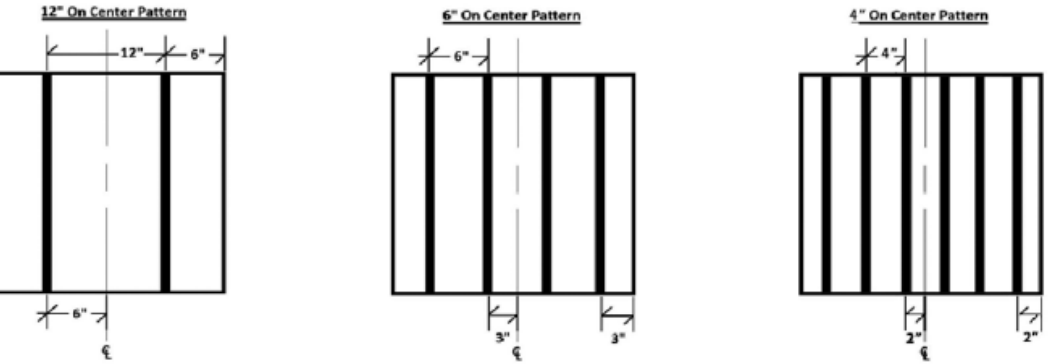
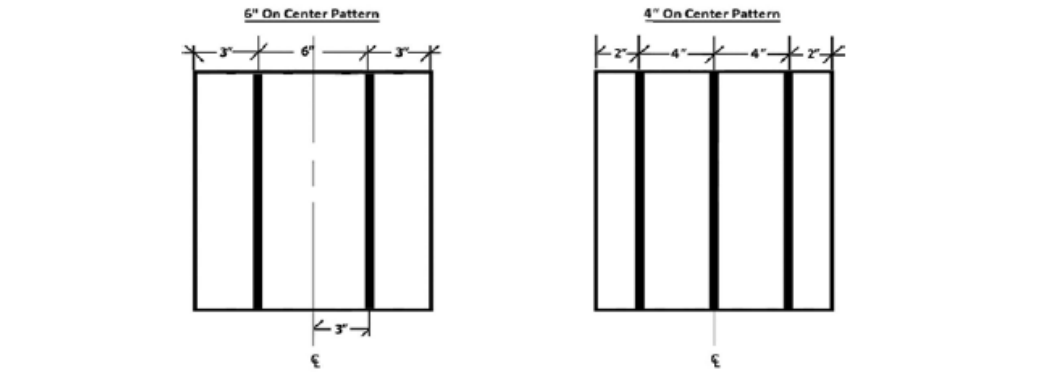
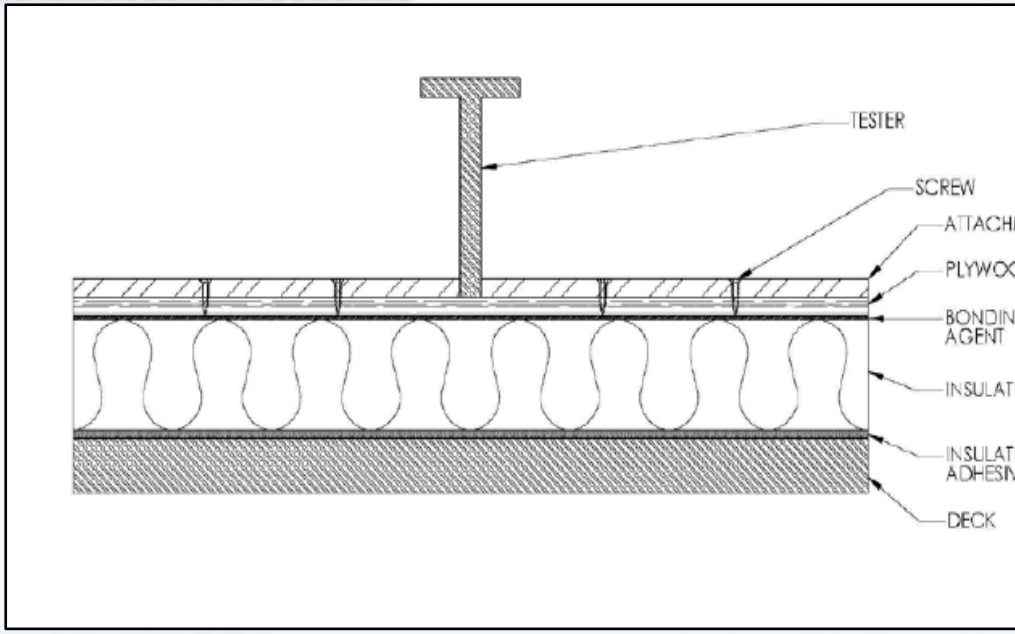


Figure C
Bead Placement Examples for 12" × 12" sample size





Procedure

4) If the roofing project requires a tear-off, the existing roofing materials shall be removed.

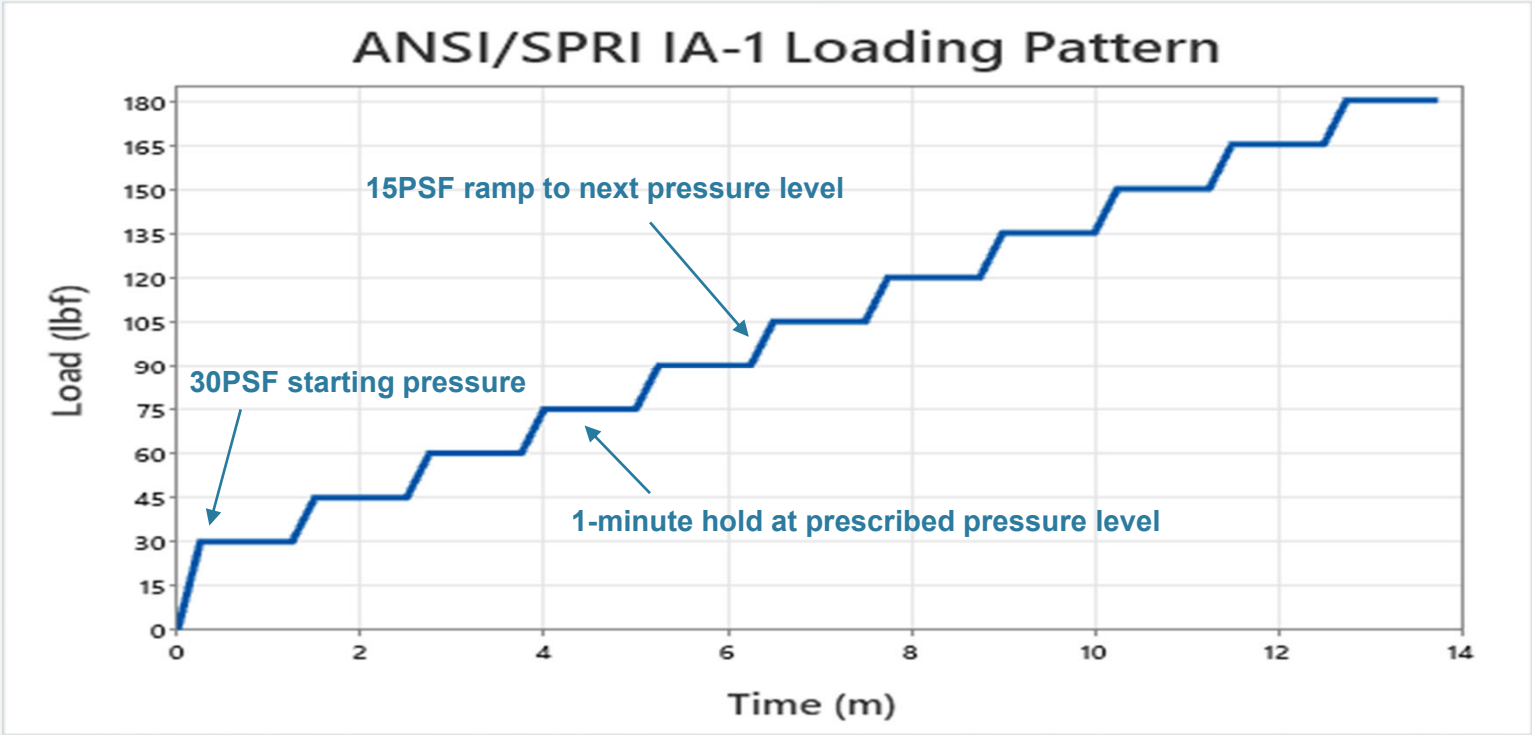
5) A sample sized piece of plywood shall be adhered to the top of the insulation or coverboard with an adhesive

6) The attachment plate shall be secured to the plywood using fasteners appropriate for the anticipated load.

7) For re-roof application, the specimen shall be isolated by cutting around the perimeter of the sample down to the structural deck

Procedure

3) Connect attachment plate to the pullout tester and apply load perpendicular to the roof deck.



Mode of Failure

- Adhesive From Substrate
- Cohesive
- Insulation Delamination
- Insulation Facer Delamination
- Insulation Core Fracture
- Deck Failure
- Vapor Barrier Failure
- Existing Roof Delamination

Number of Tests

- Perform a minimum of four pull tests for up to 50,000 ft^2 of roof area.
  - Perform an additional two pull tests for each additional 50,000 ft^2 or portion thereof.
- For a single building, each roof section with a different height or deck type shall be considered a separate test area.
- Tests shall be conducted in the corners, perimeter, and field of the roof.

Adhesive Tests	
Square Footage	Pull Tests
< 50,000	4
50,000 - 100,000	6
100,000 - 150,000	8
150,000 - 200,000	10
200,000 - 250,000	12
250,000 - 300,000	14
300,000 - 350,000	16
350,000 - 400,000	18
400,000 - 450,000	20
450,000 - 500,000	22
500,000 - 550,000	24
550,000 - 600,000	26
600,000 - 650,000	28
650,000 - 700,000	30
700,000 - 750,000	32

Pull Test Report - Results

Test Results

Test Location Number	Pull Value (psf)	Failure Mode	Pattern	Comments
1	150	Facer Delamination	6”	Steel
2	165	Facer Delamination	6”	Existing Roof
3	225	Facer Delamination	12”	Existing Roof
4	240	Adhesive Failure	4”	Steel
5	510	Deck Failure	6”	Gypsum
6	1005+	Stopped Test At Maximum	6”	Gypsum

Pull Test Comments

The number of tests performed does not meet ANSI/SPRI IA-1 requirements. A signed deviation form is on file.

Mode of Failure Images

Test Location # 5