

PECORA CORPORATION TEST REPORT

SCOPE OF WORK

ASTM E2357 AIR LEAKAGE TESTING ON PECORA PROPERM-VP, FLUID-APPLIED, VAPOR RETARDING, WATER-RESISTIVE AIR BARRIER MEMBRANE ASSEMBLY

REPORT NUMBER

J5274.01-109-44

TEST DATE(S)

03/29/19 - 03/30/19

ISSUE DATE

04/26/19

RECORD RETENTION END DATE

03/30/23

PAGES

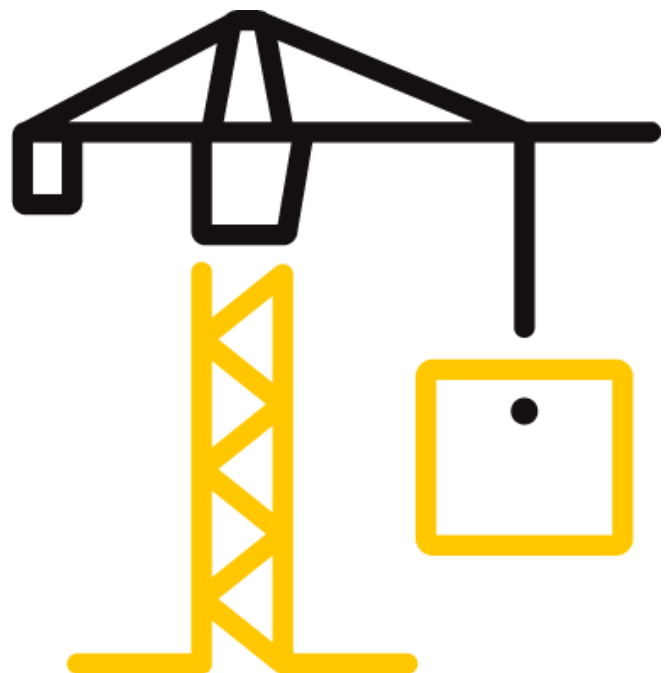
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TEST REPORT FOR PECORA CORPORATION

Report No.: J5274.01-109-44

Date: 04/26/19

REPORT ISSUED TO

PECORA CORPORATION

165 Wambold Road

Harleysville, Pennsylvania 19438

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Pecora Corporation to perform air leakage testing on their wall assemblies utilizing ProPerm-VP, fluid-applied, vapor-retarding, water-resistive air barrier membrane in accordance with ASTM E2357. The mock-ups tested were representative of target installation methods. Testing was performed on one controlled, opaque wall mock-up and one penetrated wall mock-up.

Results obtained are tested values and were determined by using the designated test method(s). Testing was conducted at Intertek B&C test facility in York, Pennsylvania. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

This report is not intended as a comprehensive evaluation of the system regarding performance and application to specific buildings.

For INTERTEK B&C:

| | | | |
|----------------------|--|---------------------|---|
| COMPLETED BY: | Richard E. Hartman III | REVIEWED BY: | Ken R. Stough |
| TITLE: | Technician – Product Testing | TITLE: | Lead Technician – Product Testing |
| SIGNATURE: |  <small>Digitally Signed by: Richard Hartman III</small> | SIGNATURE: |  <small>Digitally Signed by: Ken Stough</small> |
| DATE: | 04/26/19 | DATE: | 04/26/19 |

REH:wnl

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TEST METHOD(S)

The specimens were evaluated in accordance with the following:

ASTM E2357-11, *Standard Test Method for Determining Air Leakage of Air Barrier Assemblies*

ASTM E283-04(2012), *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*

ASTM E330/E330M-14, *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

SECTION 3

MATERIAL SOURCE/INSTALLATION

Air barrier coating and liquid flashing material test specimens were provided by the client. Representative samples of the test specimens will be retained by Intertek B&C for a minimum of four years from the test completion date.

Test Wall #1 Installation (Opaque Wall): Installation of the liquid-applied materials noted above was performed by the client. The seams of the *DensGlass*[®] sheathing were sealed with Pecora XL-Flash STPU liquid flashing at approximately 2" wide and 20 – 40 mils thick. The wall was then covered with Pecora ProPerm-VP, fluid-applied, vapor-retarding, water-resistive air barrier membrane. The air and vapor barrier material was grey in color and was rolled onto the wall at a thickness of 16 mils (wet). The perimeter of the wall was sealed to the wood test wrap with a fillet bead of silicone sealant.

Test Wall #2 Installation (Penetrated Wall): Installation of the liquid-applied materials noted above was performed by the client. The seams of the *DensGlass*[®] sheathing were sealed with Pecora XL-Flash STPU liquid flashing at approximately 2" wide and 20 – 40 mils thick. The wall was then covered with Pecora ProPerm-VP, fluid-applied, vapor-retarding, water-resistive air barrier membrane. The liquid air barrier material was grey in color and was rolled onto the wall at a thickness of 16 mils (wet). The perimeter of the wall was sealed to the wood test wrap with a fillet bead of silicone sealant. The window blank and other penetrations were sealed to the wall with Pecora XL-Flash STPU liquid flashing. Each brick tie utilized Pecora XL-Flash STPU liquid flashing over the screw heads.

SECTION 4

EQUIPMENT

Tape Measure Verification: 63788

Weather Station: 63316

Control Panel: 003921, 005406

Linear Transducers: 65990, 65989, INT00151, INT00147, INT00152

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LIST OF OFFICIAL OBSERVERS

| NAME | COMPANY |
|------------------------|--------------|
| Kyle W. Ruth | Intertek B&C |
| Ken R. Stough | Intertek B&C |
| Richard E. Hartman III | Intertek B&C |

SECTION 6

TEST PROCEDURE

A series of laboratory tests were performed to determine air leakage resistance, wind load performance, and durability of air barrier coating. The installations were tested for air leakage and structural performance using ASTM E2357, ASTM E283, and ASTM E330. The durability of the selected installations was evaluated and re-testing for air leakage was performed.

Tape and film were not used to seal against air leakage during structural testing.

SECTION 7

TEST SPECIMEN DESCRIPTION

Product Type: Fluid-Applied Weather Resistive Barrier

Series/Model: Pecora ProPerm-VP, Fluid Applied, Vapor-Retarding, Water Resistive Air Barrier Membrane Assembly

Product Size:

Wall #1 and #2:

| OVERALL AREA: | WIDTH | | HEIGHT | |
|--|-------------|--------|-------------|--------|
| | millimeters | inches | millimeters | inches |
| 5.9 m ² (64.0 ft ²) | | | | |
| Overall Size | 2438 | 96 | 2438 | 96 |

Opaque Test Wall Construction: The wall was constructed of 2x6, #2 Spruce-Pine-Fir wood studs, spaced 16" on center. The wall was sheathed with nominal 5/8" thick Georgia-Pacific *DensGlass*[®] fiberglass-matt-faced gypsum sheathing, secured with #6 x 1-5/8" bugle head steel screws, spaced 8" on center. The *DensGlass*[®] sheathing was applied with one 8' long horizontal seam and two 4' long vertical seams. The wall utilized a 2x10 Spruce-Pine-Fir wood wrap around the perimeter to facilitate testing.

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Penetrated Test Wall Construction: The wall was constructed of 2x6, #2 Spruce-Pine-Fir wood studs, spaced 16" on center. The wall was sheathed with nominal 5/8" thick Georgia-Pacific *DensGlass*[®] fiberglass-matt-faced gypsum sheathing, secured with #6 x 1-5/8" bugle head steel screws, spaced 8" on center. The *DensGlass*[®] sheathing was applied with one 8' long horizontal seam and two 4' long vertical seams. The penetrations included a 625 mm by 1225 mm rough opening with a 600 mm by 1200 mm wood window blank, a 100 mm by 100 mm HVAC duct, a 38 mm PVC pipe, and two junction box penetrations; one square and one octagon-shaped per ASTM E2357. The wall utilized a 2x10 Spruce-Pine-Fir wood wrap around the perimeter to facilitate testing.

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SECTION 8
TEST RESULTS

The temperature during testing was 18 - 22°C (65 - 71°F). The results are tabulated as follows:

Wall #1: Opaque Wall

Test Date / Time: 3/29/19 / 8:30 AM

Air Infiltration (before structural loading sequence)

| PRESSURE | TOTAL LEAKAGE (cfm) | TARE (cfm) | SPECIMEN LEAKAGE (cfm) | LEAKAGE RATE | |
|-------------------|---------------------|------------|------------------------|-----------------------|------------------------|
| | | | | (L/s•m ²) | (cfm/ft ²) |
| 25 Pa (0.52 psf) | 0.36 | 0.35 | 0.01 | 0.01 | 0.0002 |
| 50 Pa (1.04 psf) | 0.64 | 0.63 | 0.01 | 0.01 | 0.0002 |
| 75 Pa (1.57 psf) | 0.89 | 0.88 | 0.01 | 0.01 | 0.0002 |
| 100 Pa (2.09 psf) | 1.13 | 1.12 | 0.01 | 0.01 | 0.0002 |
| 150 Pa (3.13 psf) | 1.53 | 1.52 | 0.01 | 0.01 | 0.0002 |
| 250 Pa (5.22 psf) | 2.27 | 2.26 | 0.01 | 0.01 | 0.0002 |
| 300 Pa (6.27 psf) | 2.56 | 2.55 | 0.01 | 0.01 | 0.0002 |

Air Exfiltration (before structural loading sequence)

| PRESSURE | TOTAL LEAKAGE (cfm) | TARE (cfm) | SPECIMEN LEAKAGE (cfm) | LEAKAGE RATE | |
|-------------------|---------------------|------------|------------------------|-----------------------|------------------------|
| | | | | (L/s•m ²) | (cfm/ft ²) |
| 25 Pa (0.52 psf) | 0.37 | 0.36 | 0.01 | 0.01 | 0.0002 |
| 50 Pa (1.04 psf) | 0.63 | 0.62 | 0.01 | 0.01 | 0.0002 |
| 75 Pa (1.57 psf) | 0.87 | 0.86 | 0.01 | 0.01 | 0.0002 |
| 100 Pa (2.09 psf) | 1.07 | 1.06 | 0.01 | 0.01 | 0.0002 |
| 150 Pa (3.13 psf) | 1.45 | 1.44 | 0.01 | 0.01 | 0.0002 |
| 250 Pa (5.22 psf) | 2.08 | 2.07 | 0.01 | 0.01 | 0.0002 |
| 300 Pa (6.27 psf) | 2.33 | 2.32 | 0.01 | 0.01 | 0.0002 |

Note: Reference Section 10 for Air Leakage Charts and 95% confidence Interval.

Sustained Loads, Cyclic Loads, and Gust Loads (structural (wind) loading sequence)

| TITLE OF TEST | PRESSURE | TEST RESULTS |
|------------------------------|-----------------------|-------------------|
| Deformation (10 second load) | ±100 Pa (±2.09 psf) | No visible damage |
| | ±200 Pa (±4.18 psf) | No visible damage |
| | ±300 Pa (±6.27 psf) | No visible damage |
| | ±400 Pa (±8.35 psf) | No visible damage |
| | ±500 Pa (±10.44 psf) | No visible damage |
| Deformation (60 minute load) | ±600 Pa (±12.53 psf) | No visible damage |
| Cyclic Loading (2000 cycles) | ±800 Pa (±16.71 psf) | No visible damage |
| Gust Loading (3 second load) | ±1200 Pa (±25.06 psf) | No visible damage |

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Wall #1: Opaque Wall

Test Date / Time: 3/30/19 / 11:00 AM

Air Infiltration (after structural loading sequence)

| PRESSURE | TOTAL LEAKAGE (cfm) | TARE (cfm) | SPECIMEN LEAKAGE (cfm) | LEAKAGE RATE | |
|-------------------|---------------------|------------|------------------------|-----------------------|------------------------|
| | | | | (L/s•m ²) | (cfm/ft ²) |
| 25 Pa (0.52 psf) | 0.34 | 0.33 | 0.01 | 0.01 | 0.0002 |
| 50 Pa (1.04 psf) | 0.57 | 0.56 | 0.01 | 0.01 | 0.0002 |
| 75 Pa (1.57 psf) | 0.76 | 0.75 | 0.01 | 0.01 | 0.0002 |
| 100 Pa (2.09 psf) | 0.94 | 0.93 | 0.01 | 0.01 | 0.0002 |
| 150 Pa (3.13 psf) | 1.30 | 1.29 | 0.01 | 0.01 | 0.0002 |
| 250 Pa (5.22 psf) | 1.92 | 1.91 | 0.01 | 0.01 | 0.0002 |
| 300 Pa (6.27 psf) | 2.19 | 2.18 | 0.01 | 0.01 | 0.0002 |

Air Exfiltration (after structural loading sequence)

| PRESSURE | TOTAL LEAKAGE (cfm) | TARE (cfm) | SPECIMEN LEAKAGE (cfm) | LEAKAGE RATE | |
|-------------------|---------------------|------------|------------------------|-----------------------|------------------------|
| | | | | (L/s•m ²) | (cfm/ft ²) |
| 25 Pa (0.52 psf) | 0.28 | 0.27 | 0.01 | 0.01 | 0.0002 |
| 50 Pa (1.04 psf) | 0.50 | 0.49 | 0.01 | 0.01 | 0.0002 |
| 75 Pa (1.57 psf) | 0.70 | 0.69 | 0.01 | 0.01 | 0.0002 |
| 100 Pa (2.09 psf) | 0.86 | 0.85 | 0.01 | 0.01 | 0.0002 |
| 150 Pa (3.13 psf) | 1.19 | 1.18 | 0.01 | 0.01 | 0.0002 |
| 250 Pa (5.22 psf) | 1.70 | 1.69 | 0.01 | 0.01 | 0.0002 |
| 300 Pa (6.27 psf) | 1.90 | 1.89 | 0.01 | 0.01 | 0.0002 |

Note: Reference Section 10 for Air Leakage Charts and 95% confidence Interval.

Deflection Measurements (under positive and negative pressures)

| TITLE OF TEST | PRESSURE | TEST RESULTS mm (inches) | | | | | |
|--|-----------------------|--------------------------|------------|------------|------------|------------|------------|
| | | #1 | #2 | #3 | #4 | #5 | #6 |
| Wind Pressure Loading (10 second load) | +1440 Pa (+30.08 psf) | 3.3 (0.13) | 3.0 (0.12) | 3.0 (0.12) | 3.0 (0.12) | 3.0 (0.12) | 3.0 (0.12) |
| | -1440 Pa (-30.08 psf) | 5.8 (0.23) | 5.6 (0.22) | 5.6 (0.22) | 5.6 (0.22) | 5.6 (0.22) | 5.6 (0.22) |

Note: See Section 11, Sketch #1, for indicator locations.

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Wall #2: Penetrated Wall

Test Date / Time: 3/29/19 / 9:20 AM

Air Infiltration (before structural loading sequence)

| PRESSURE | TOTAL LEAKAGE (cfm) | TARE (cfm) | SPECIMEN LEAKAGE (cfm) | LEAKAGE RATE | |
|-------------------|---------------------|------------|------------------------|-----------------------|------------------------|
| | | | | (L/s•m ²) | (cfm/ft ²) |
| 25 Pa (0.52 psf) | 1.09 | 1.08 | 0.01 | 0.01 | 0.0002 |
| 50 Pa (1.04 psf) | 1.89 | 1.88 | 0.01 | 0.01 | 0.0002 |
| 75 Pa (1.57 psf) | 2.59 | 2.58 | 0.01 | 0.01 | 0.0002 |
| 100 Pa (2.09 psf) | 3.25 | 3.24 | 0.01 | 0.01 | 0.0002 |
| 150 Pa (3.13 psf) | 4.43 | 4.42 | 0.01 | 0.01 | 0.0002 |
| 250 Pa (5.22 psf) | 6.48 | 6.47 | 0.01 | 0.01 | 0.0002 |
| 300 Pa (6.27 psf) | 7.40 | 7.39 | 0.01 | 0.01 | 0.0002 |

Air Exfiltration (before structural loading sequence)

| PRESSURE | TOTAL LEAKAGE (cfm) | TARE (cfm) | SPECIMEN LEAKAGE (cfm) | LEAKAGE RATE | |
|-------------------|---------------------|------------|------------------------|-----------------------|------------------------|
| | | | | (L/s•m ²) | (cfm/ft ²) |
| 25 Pa (0.52 psf) | 1.04 | 1.03 | 0.01 | 0.01 | 0.0002 |
| 50 Pa (1.04 psf) | 1.80 | 1.79 | 0.01 | 0.01 | 0.0002 |
| 75 Pa (1.57 psf) | 2.45 | 2.44 | 0.01 | 0.01 | 0.0002 |
| 100 Pa (2.09 psf) | 3.03 | 3.02 | 0.01 | 0.01 | 0.0002 |
| 150 Pa (3.13 psf) | 4.09 | 4.08 | 0.01 | 0.01 | 0.0002 |
| 250 Pa (5.22 psf) | 5.94 | 5.93 | 0.01 | 0.01 | 0.0002 |
| 300 Pa (6.27 psf) | 6.76 | 6.75 | 0.01 | 0.01 | 0.0002 |

Note: Reference Section 10 for Air Leakage Charts and 95% confidence Interval.

Sustained Loads, Cyclic Loads, and Gust Loads (structural (wind) loading sequence)

| TITLE OF TEST | PRESSURE | TEST RESULTS |
|------------------------------|-----------------------|-------------------|
| Deformation (10 second load) | ±100 Pa (±2.09 psf) | No visible damage |
| | ±200 Pa (±4.18 psf) | No visible damage |
| | ±300 Pa (±6.27 psf) | No visible damage |
| | ±400 Pa (±8.35 psf) | No visible damage |
| | ±500 Pa (±10.44 psf) | No visible damage |
| Deformation (60 minute load) | ±600 Pa (±12.53 psf) | No visible damage |
| Cyclic Loading (2000 cycles) | ±800 Pa (±16.71 psf) | No visible damage |
| Gust Loading (3 second load) | ±1200 Pa (±25.06 psf) | No visible damage |

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Wall #2: Penetrated Wall

Test Date / Time: 03/30/2019 / 1:55 PM

Air Infiltration (after structural loading sequence)

| PRESSURE | TOTAL LEAKAGE (cfm) | TARE (cfm) | SPECIMEN LEAKAGE (cfm) | LEAKAGE RATE | |
|-------------------|---------------------|------------|------------------------|-----------------------|------------------------|
| | | | | (L/s•m ²) | (cfm/ft ²) |
| 25 Pa (0.52 psf) | 1.28 | 1.27 | 0.01 | 0.01 | 0.0002 |
| 50 Pa (1.04 psf) | 2.17 | 2.16 | 0.01 | 0.01 | 0.0002 |
| 75 Pa (1.57 psf) | 2.95 | 2.94 | 0.01 | 0.01 | 0.0002 |
| 100 Pa (2.09 psf) | 3.65 | 3.64 | 0.01 | 0.01 | 0.0002 |
| 150 Pa (3.13 psf) | 4.95 | 4.94 | 0.01 | 0.01 | 0.0002 |
| 250 Pa (5.22 psf) | 6.12 | 6.11 | 0.01 | 0.01 | 0.0002 |
| 300 Pa (6.27 psf) | 8.18 | 8.17 | 0.01 | 0.01 | 0.0002 |

Air Exfiltration (after structural loading sequence)

| PRESSURE | TOTAL LEAKAGE (cfm) | TARE (cfm) | SPECIMEN LEAKAGE (cfm) | LEAKAGE RATE | |
|-------------------|---------------------|------------|------------------------|-----------------------|------------------------|
| | | | | (L/s•m ²) | (cfm/ft ²) |
| 25 Pa (0.52 psf) | 1.16 | 1.15 | 0.01 | 0.01 | 0.0002 |
| 50 Pa (1.04 psf) | 2.02 | 2.01 | 0.01 | 0.01 | 0.0002 |
| 75 Pa (1.57 psf) | 2.76 | 2.75 | 0.01 | 0.01 | 0.0002 |
| 100 Pa (2.09 psf) | 3.40 | 3.39 | 0.01 | 0.01 | 0.0002 |
| 150 Pa (3.13 psf) | 4.60 | 4.59 | 0.01 | 0.01 | 0.0002 |
| 250 Pa (5.22 psf) | 5.68 | 5.67 | 0.01 | 0.01 | 0.0002 |
| 300 Pa (6.27 psf) | 7.59 | 7.58 | 0.01 | 0.01 | 0.0002 |

Note: Reference Section 10 for Air Leakage Charts and 95% confidence Interval.

Deflection Measurements (under positive and negative pressures)

| TITLE OF TEST | PRESSURE | TEST RESULTS mm (inches) | | | | | |
|--|-----------------------|--------------------------|------------|------------|------------|------------|------------|
| | | #1 | #2 | #3 | #4 | #5 | #6 |
| Wind Pressure Loading (10 second load) | +1440 Pa (+30.08 psf) | 3.3 (0.13) | 2.8 (0.11) | 3.0 (0.12) | 3.0 (0.12) | 3.0 (0.12) | 2.3 (0.09) |
| | -1440 Pa (-30.08 psf) | 4.6 (0.18) | 4.8 (0.19) | 5.1 (0.20) | 5.1 (0.20) | 4.3 (0.17) | 4.1 (0.16) |

Note: See Section 11, Sketch #1, for indicator locations.

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SECTION 9

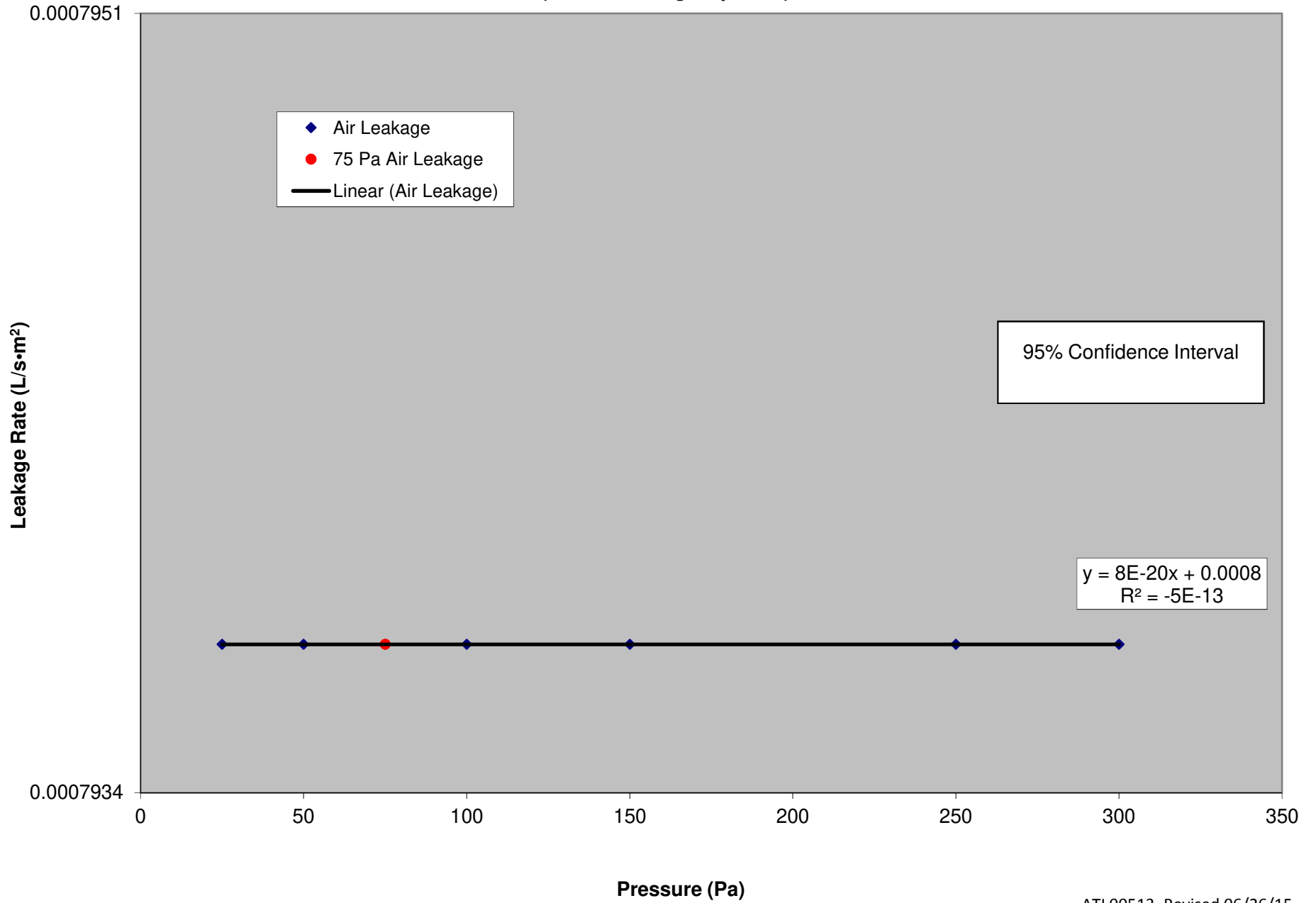
CONCLUSION

The Test Wall #1 and Test Wall #2 mock-ups met the specified performance requirements. After being subjected to structural (sustained, cyclic, and gust) loading sequences, the test wall mock-ups exhibited no visible damage. At a reference pressure differential of 75 Pa (1.57 psf), the air leakage rate of the test wall mock-ups was determined to be 0.01 L/s•m² (0.0002 cfm/ft²).

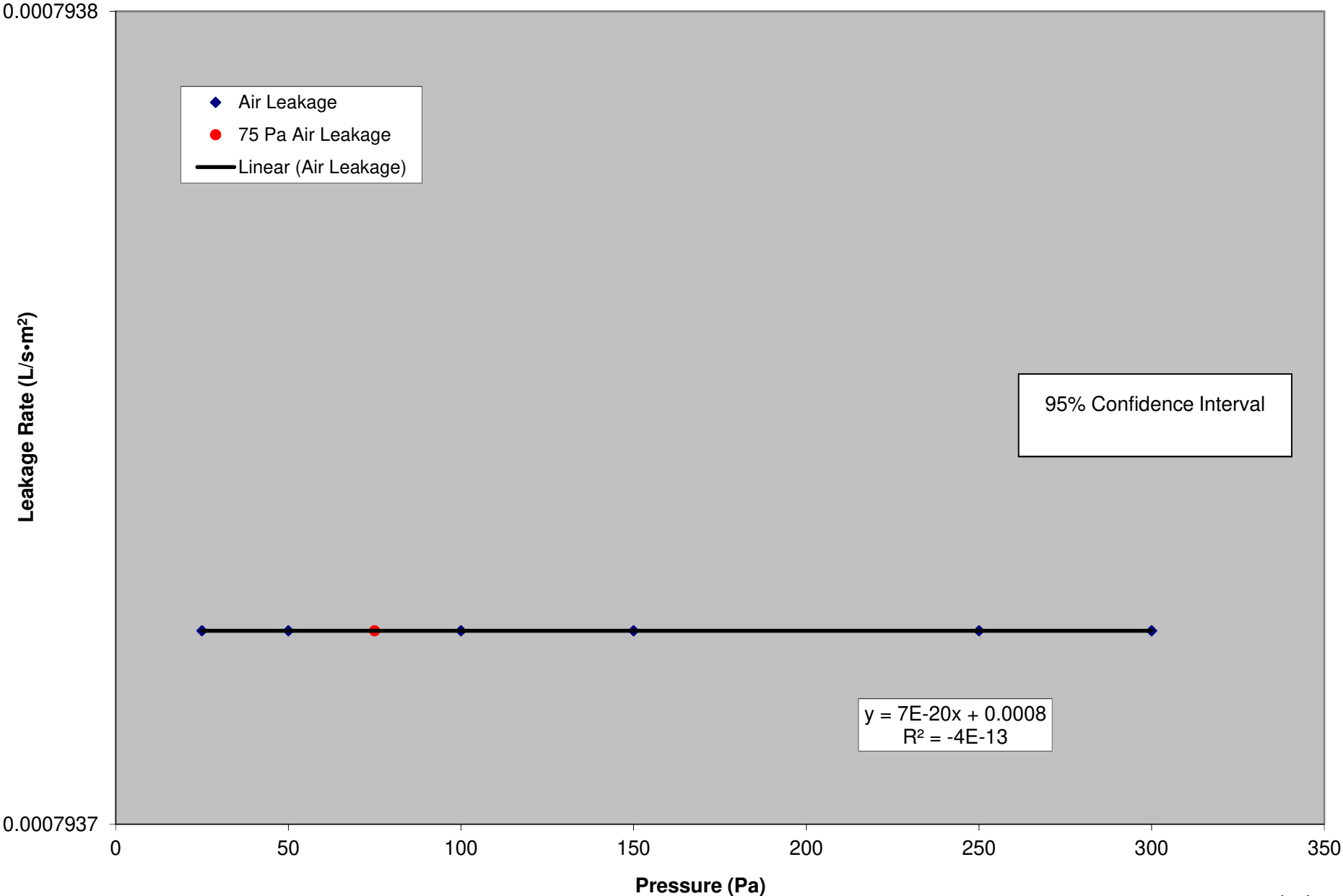
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CHART(S)

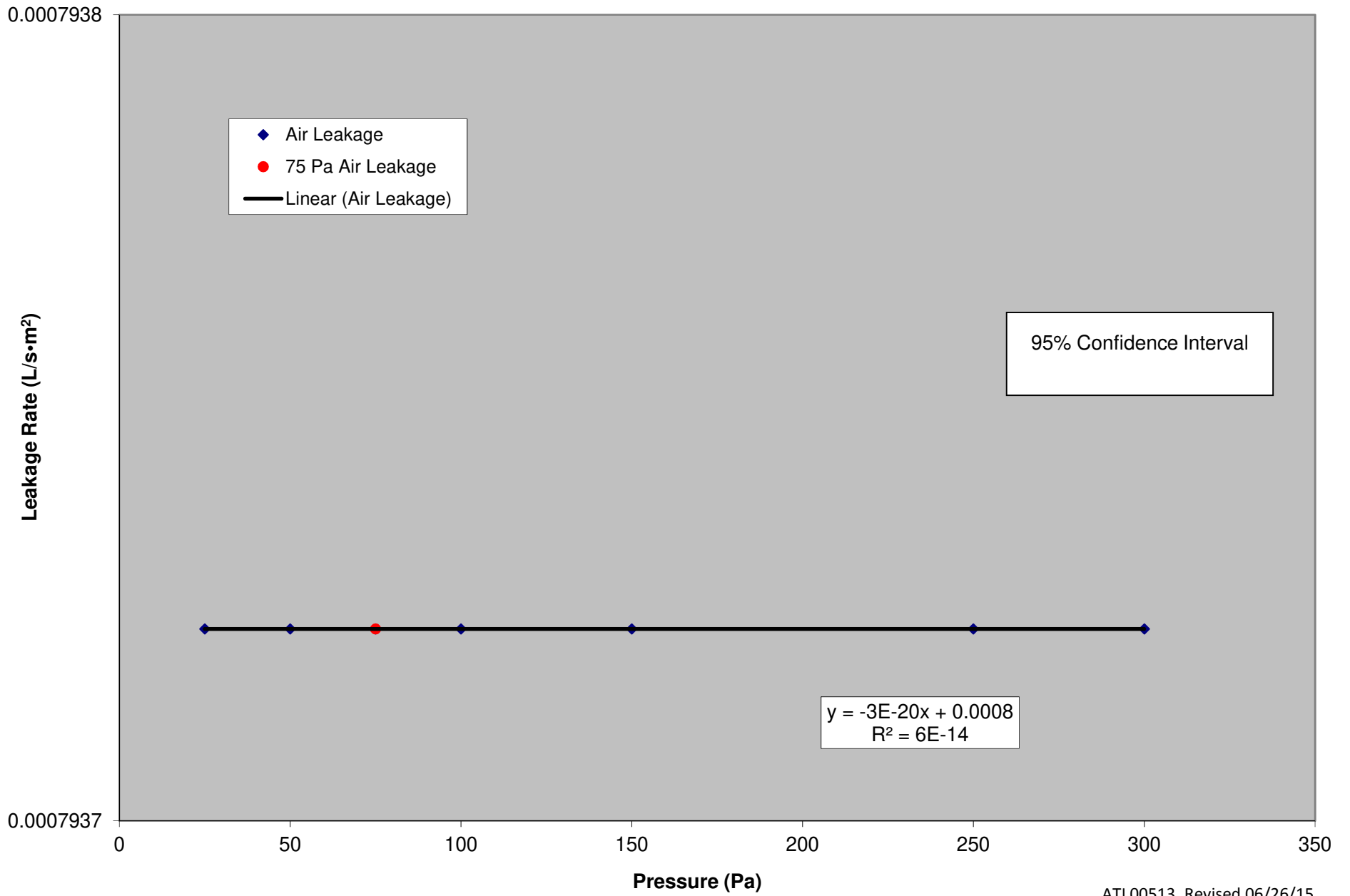
**Specimen #1 - Air Infiltration
(Before loading sequence)**



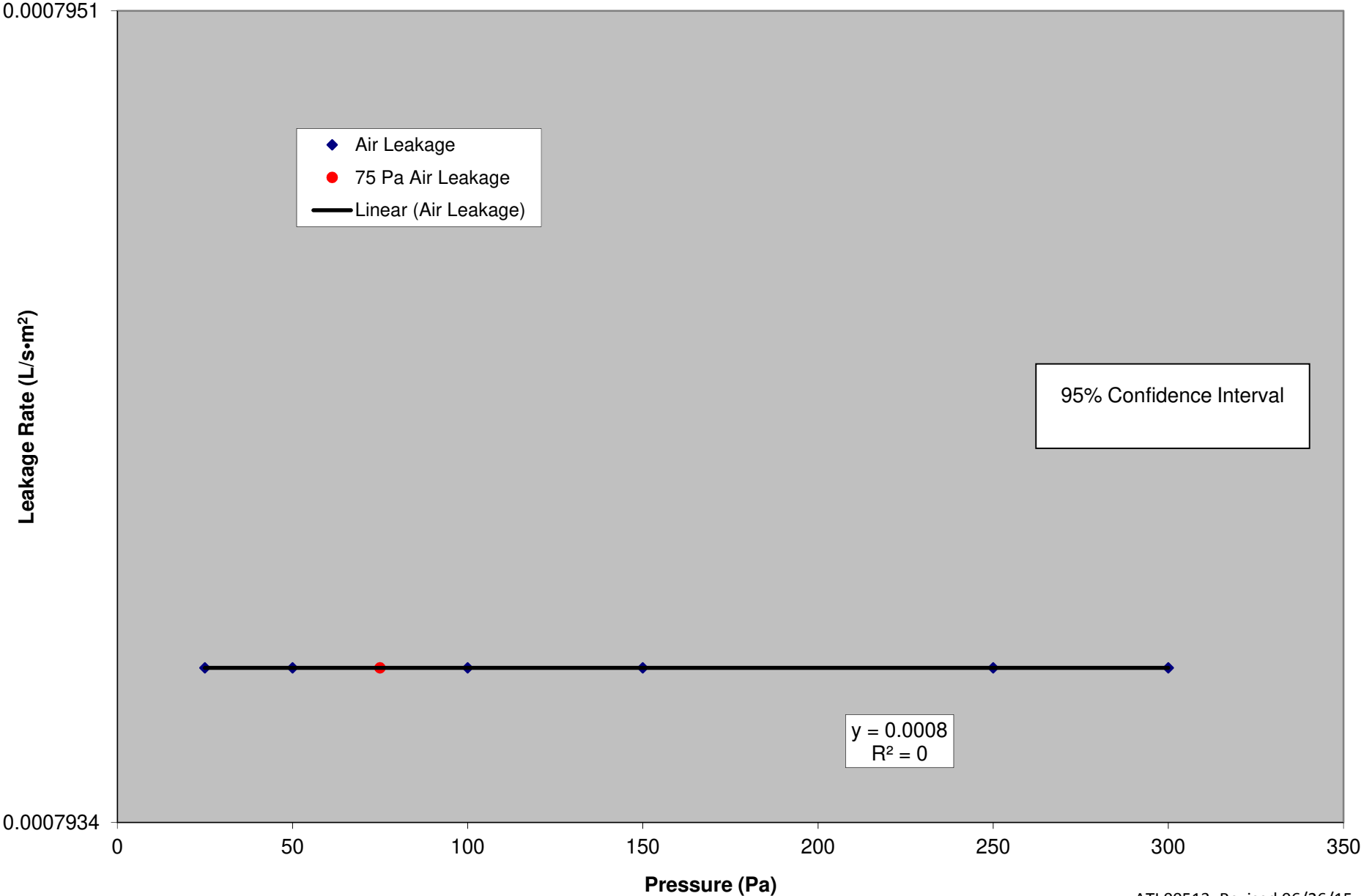
**Specimen #1 - Air Exfiltration
(Before loading sequence)**



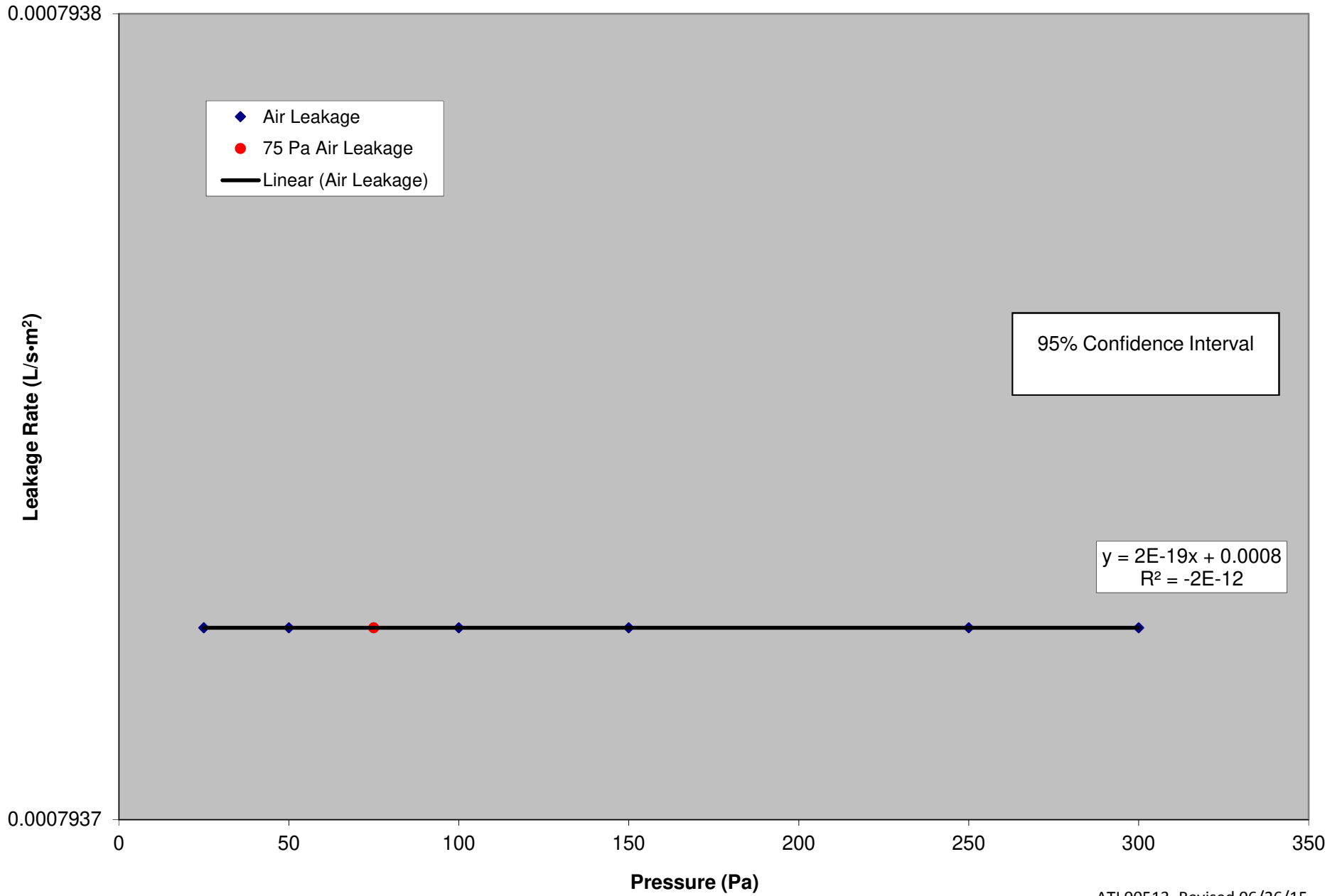
**Specimen #1 - Air Infiltration
(After loading sequence)**



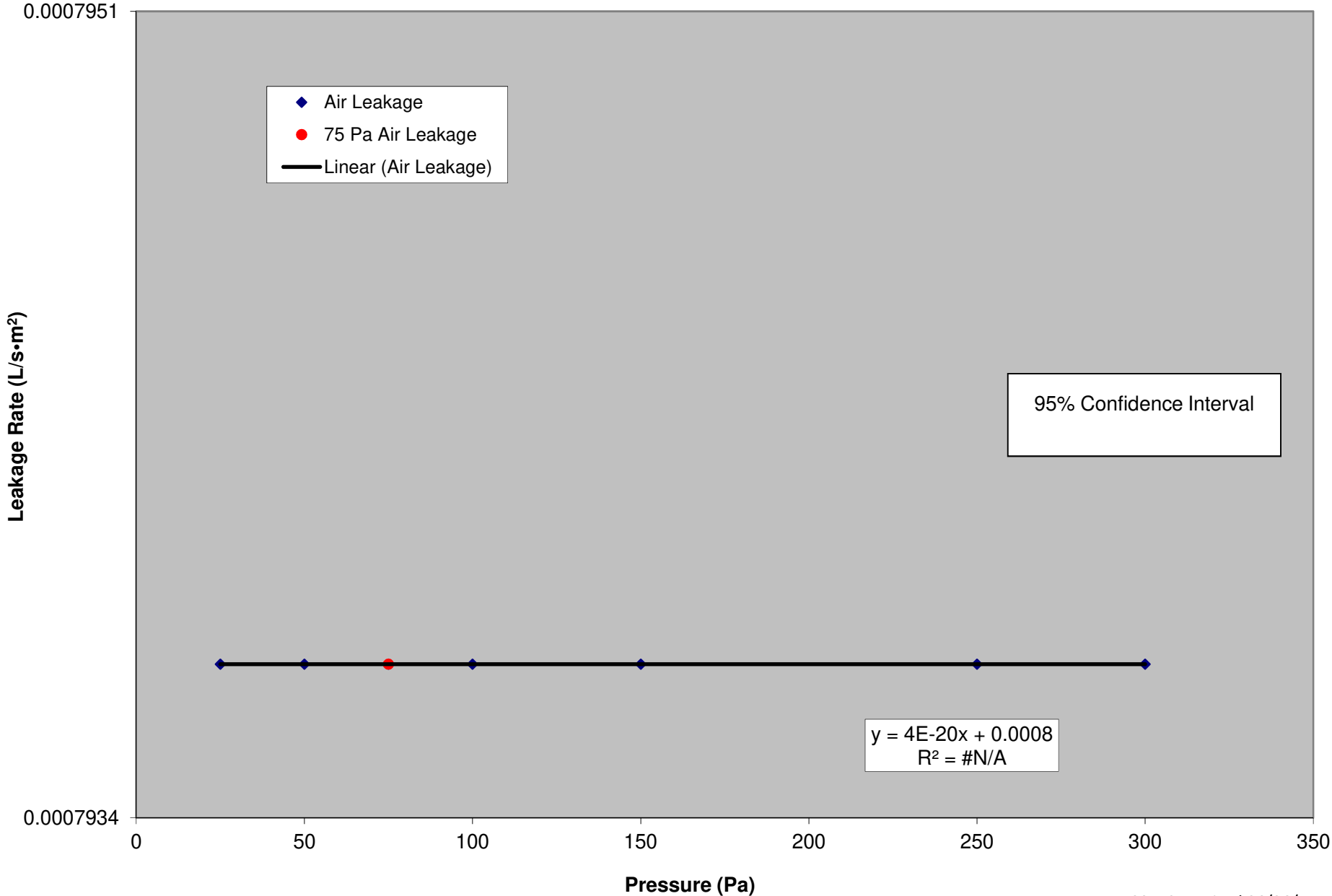
**Specimen #1 - Air Exfiltration
(After loading sequence)**



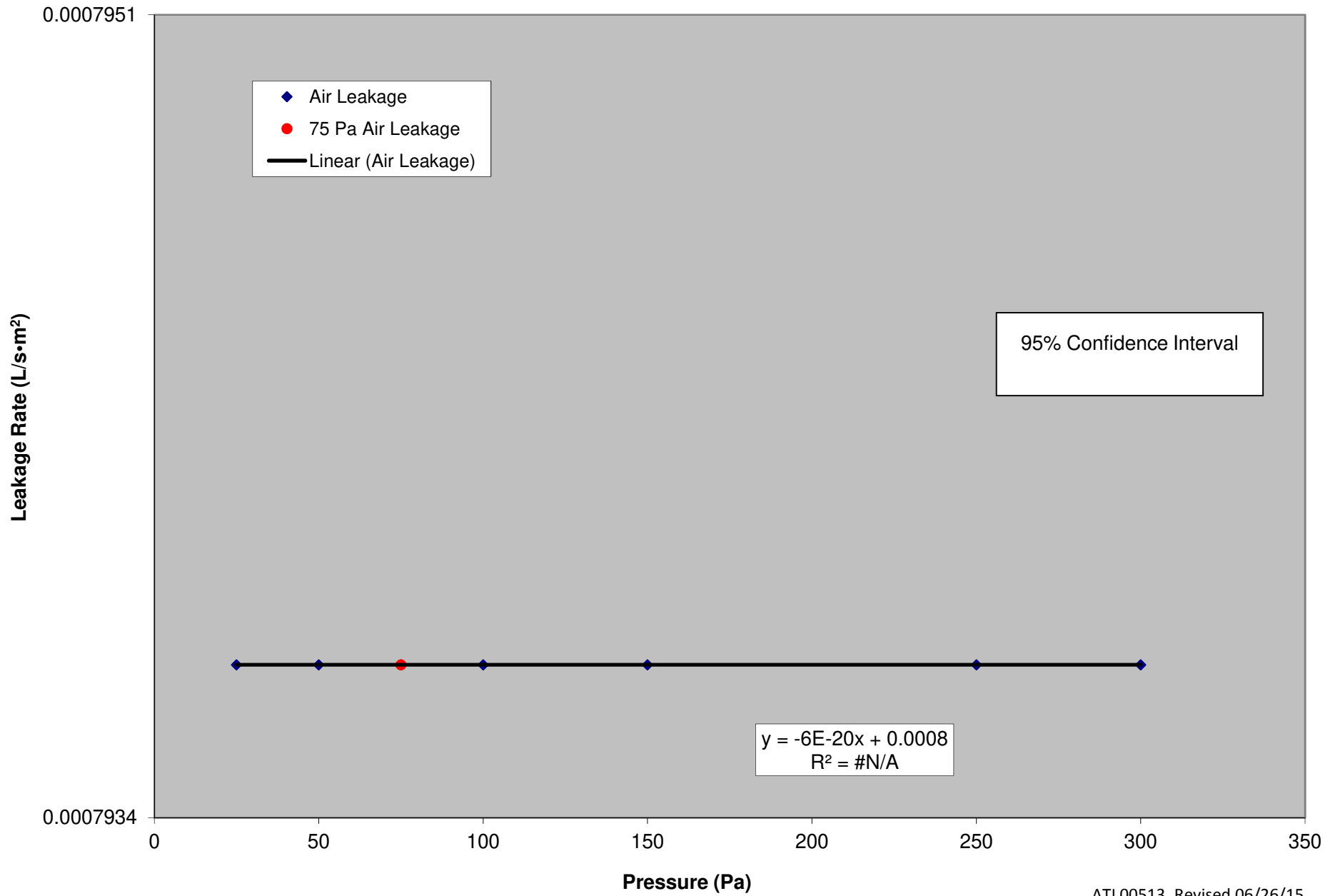
**Specimen #1 - Air Infiltration
(Before loading sequence)**



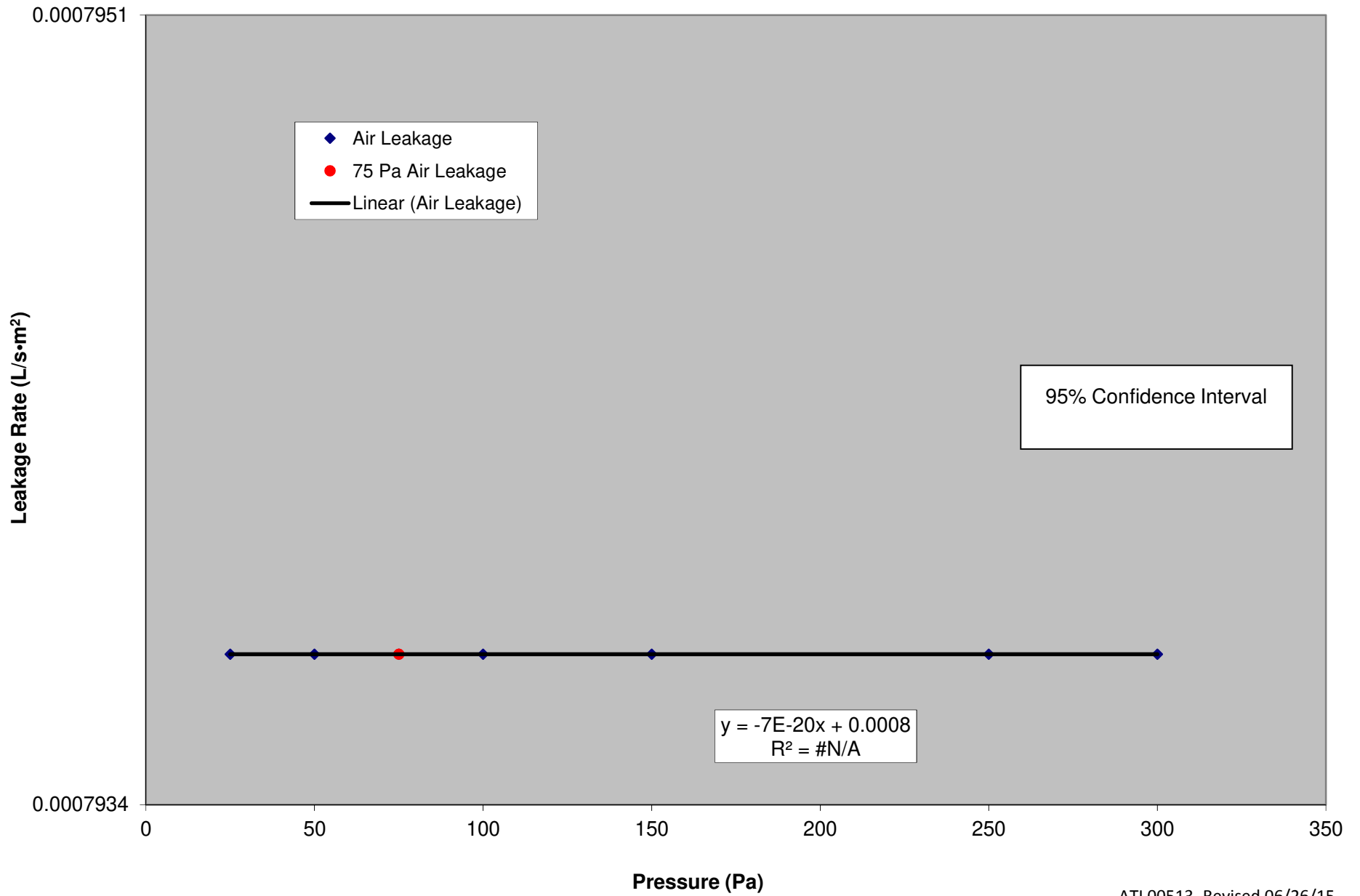
**Specimen #1 - Air Exfiltration
(Before loading sequence)**



**Specimen #1 - Air Infiltration
(After loading sequence)**



Specimen #1 - Air Exfiltration (After loading sequence)

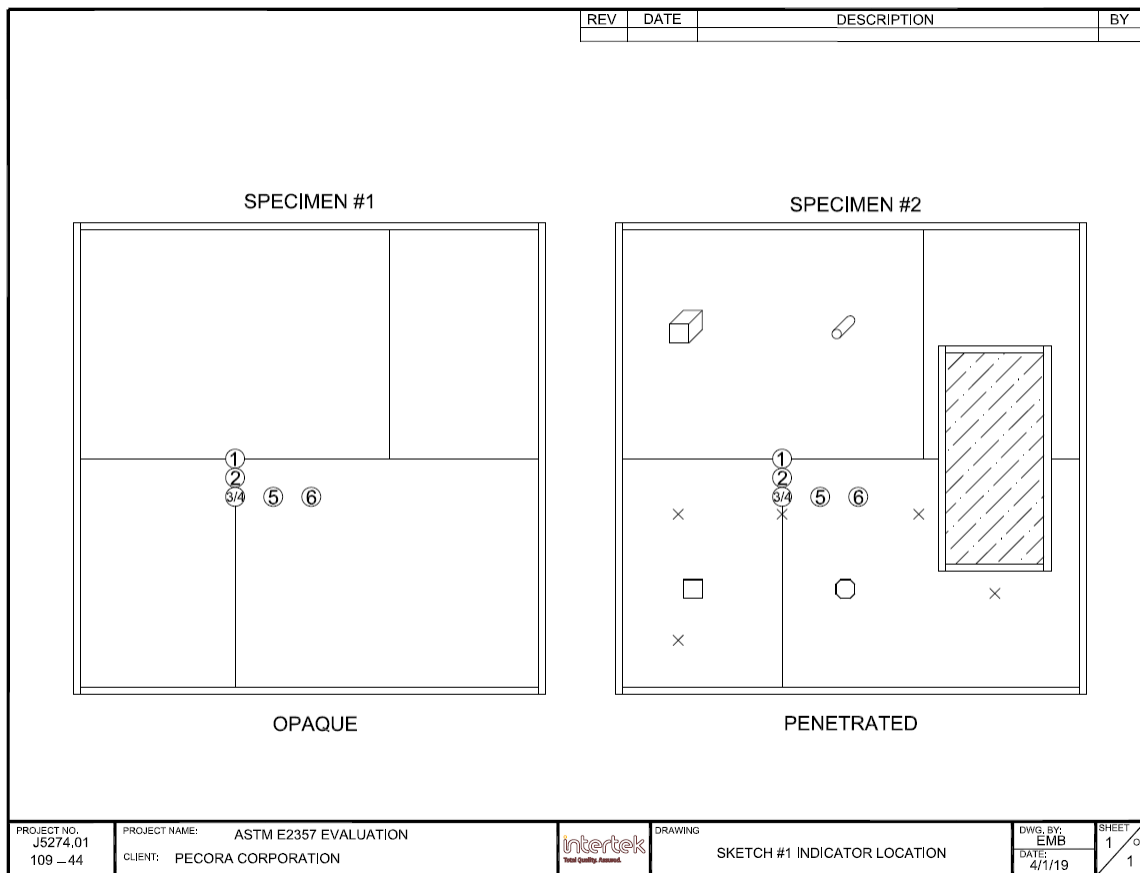


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SECTION 11 SKETCH(ES)



**Sketch No. 1
Indicator Locations**

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SECTION 12

PHOTOGRAPHS



Photo No. 1
Test Wall #1 Opaque

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Photo No. 2
Test Wall #2 Penetrated



Total Quality. Assured.

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SECTION 13

REVISION LOG

| REVISION # | DATE | PAGES | REVISION |
|------------|----------|-------|-----------------------|
| 0 | 04/26/19 | N/A | Original Report Issue |