

## TEST REPORT

ASTM E 2357-11

ASTM E 331-00(16)

REPORT No.: 27141.01-106-11

RENDERED TO: ALTENLOH, BRINCK & CO. US, INC. (TRUFAST)  
Grand Rapids, Michigan

PRODUCT TYPE: ProChannel Ci Cladding Support with Grip-Deck TubeSeal®  
Technology through Mineral Wool Insulation

AIR BARRIER TYPES: Henry BlueSkin SA, Henry BlueSkin VP160, Tremco Securock  
EXOAir 430, Georgia Pacific DensElement Barrier System,  
DuPont Tyvek CommercialWrap, DuPont Tyvek DrainWrap,  
VaproShield PanelShield SA, VaproShield WrapShield SA

**Test Date:** 8/7/2023  
**Through:** 10/10/2023  
**Report Date:** 4/2/2024  
**Retention End Date:** 10/10/2027

**CLIENT INFORMATION:** ALTENLOH, BRINCK & CO. US, INC. (TRUFAST)  
 130 Graham Street SW  
 Grand Rapids, Michigan 49503

**TEST LABORATORY:** Molimo, LLC  
 1410 Eden Road  
 York, Pennsylvania 17402  
 717-900-6034

**PROJECT SUMMARY:**

**PRODUCT TYPE:** ProChannel Ci Cladding Support with Grip-Deck TubeSeal® Technology through Mineral Wool Insulation

**AIR BARRIER TYPES:** Henry BlueSkin SA, Henry BlueSkin VP160, Tremco Securock EXOAir 430, Georgia Pacific DensElement Barrier System, DuPont Tyvek CommercialWrap, DuPont Tyvek DrainWrap, VaproShield PanelShield SA, VaproShield WrapShield SA

**PROJECT SUMMARY:**

Molimo, LLC was contracted to perform testing on the above referenced product. The results are tested values and were secured by using the designated test method. The specimens tested successfully completed the ASTM E 2357 test sequence. The Air Leakage test results for each specimen is shown in the table below.

Test Specimen	Air Leakage Rate @ 75 Pa	Water Penetration			
		2 hours @ 300 Pa (6.27 psf)	15 min. @ 570 Pa (11.90 psf)	15 min. @ 860 Pa (17.96 psf)	15 min. @ 1200 Pa (25.06 psf)
<u>Specimen #1:</u> Henry BlueSkinSA and BlueSkin VP160	0.048 L/s/m <sup>2</sup> (0.0095 cfm/ft <sup>2</sup> )	PASS	PASS	PASS	PASS
<u>Specimen #2:</u> Tremco EXOAir and GP DensElement	0.017 L/s/m <sup>2</sup> (0.0033 cfm/ft <sup>2</sup> )	PASS	PASS	PASS	PASS
<u>Specimen #3:</u> DuPont Tyvek DrainWrap and CommercialWrap	0.014 L/s/m <sup>2</sup> (0.0027 cfm/ft <sup>2</sup> )	PASS	PASS	PASS	PASS
<u>Specimen #4:</u> VaproShield PanelShield SA and WrapShield SA	0.024 L/s/m <sup>2</sup> (0.0047 cfm/ft <sup>2</sup> )	PASS	PASS	PASS	PASS

**PROJECT SUMMARY:** (Continued)

**PROJECT DETAILS:**

**Test Dates:** 8/7/2023 – 10/10/2023

**Test Record Retention End Date:** 10/10/2027

**Test Location:** Molimo test facility in York, Pennsylvania.

**Test Specimen Source:** The test specimens were provided by the client.

**Drawing Reference:** The test specimen drawings were supplied by the client. The test specimen construction was verified by Molimo and was found to be representative of the product tested.

**WITNESSES:**

The following representatives witnessed all or part of the testing.

<b>Name</b>	<b>Company</b>
Matthew Smith	Altenloh, Brinck & Co.
Jim Grippo	Molimo, LLC
Justin Bupp	Molimo, LLC
Michael D. Stremmel, P.E.	Molimo, LLC

**TEST METHODS:**

ASTM E2357-11 – *Standard Test Method for Determining Air Leakage of Air Barrier Assemblies (Modified)*

- Specimens were not tested in conjunction of an opaque specimen
- The ASTM E331-00(16) was conducted within the testing sequence

ASTM E331-00(16) – *Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference (Modified)*

- Test time was modified as noted in the test results

## TEST SPECIMEN DESCRIPTION:

### PRODUCT SIZES:

Test Specimens #1, #2, #3, and #4:

Overall Size: 2438 mm x 2438 mm (96" x 96")

Overall Area: 5.9 m<sup>2</sup> (64 ft<sup>2</sup>)

### TEST SPECIMEN #1: (Henry WRB)

**Base Wall Construction:** The wall was constructed of nominal 3-5/8", 18 gauge steel studs spaced 16" on center (ClarkDietrich 362S162-43 (33ksi, CP60) punched & 362T162-43 (33ksi, CP60)). The wall was sheathed with 5/8" GP DensGlass sheathing. The sheathing was secured to the wall with #8 x 1" flat head screws, spaced 8" on center at each stud location.

**Air Barrier Installation:** The left half of the base wall utilized Henry BlueSkinSA, self-adhered WRB and the right half of the base wall utilized Henry BlueSkin VP160 self-adhered WRB. 2" thick Mineral Wool insulation was utilized on the base wall (top row) and was secured to the steel stud base wall with Thermal-Grip TubeSeal<sup>™</sup>. Two rows of steel hat channels (ClarkDietrich ProChannel Ci) were then secured to the steel stud base wall using pairs of #10 SDS Grip-Deck TubeSeal<sup>®</sup> fasteners at each stud location (12 fasteners per WRB type).

### TEST SPECIMEN #2: (Tremco EXOAir and GP DensElement)

**Base Wall Construction:** The wall was constructed of nominal 3-5/8", 18 gauge steel studs spaced 16" on center (ClarkDietrich 362S162-43 (33ksi, CP60) punched & 362T162-43 (33ksi, CP60)). The left half of the wall was sheathed with 5/8" Tremco Securock EXOAir 430. The right half of the wall was sheathed with 5/8" GP DensElement Barrier System sheathing. The sheathing was secured to the wall with #8 x 1" flat head screws, spaced 8" on center at each stud location.

**Air Barrier Installation:** The left half of the base wall utilized Tremco EXO 430 recommended liquid flashing sealant (Dymonic 100) at the gypsum sheathing attachment locations and the right half of the base wall utilized GP DensElement recommended liquid flashing sealant (DensDefy) at all gypsum sheathing attachment locations. The vertical joint between the two sheathing pieces was sealed with GP DensElement liquid flashing sealant (DensDefy). 2" thick Mineral Wool insulation was utilized on the base wall (top row) and was secured to the steel stud base wall with Thermal-Grip TubeSeal<sup>™</sup>. Two rows of steel hat channels (ClarkDietrich ProChannel Ci) were then secured to the steel stud base wall using pairs of #10 SDS Grip-Deck TubeSeal<sup>®</sup> fasteners at each stud location (12 fasteners per WRB type).

**TEST SPECIMEN DESCRIPTION:** (Continued)**TEST SPECIMEN #3: (DuPont Tyvek)**

**Base Wall Construction:** The wall was constructed of nominal 3-5/8", 18 gauge steel studs spaced 16" on center (ClarkDietrich 362S162-43 (33ksi, CP60) punched & 362T162-43 (33ksi, CP60)). The wall was sheathed with 5/8" GP DensGlass sheathing. The sheathing was secured to the wall with #8 x 1" flat head screws, spaced 8" on center at each stud location.

**Air Barrier Installation:** The left half of the base wall utilized DuPont Tyvek CommercialWrap and the right half of the base wall utilized DuPont Tyvek DrainWrap. The vertical joint between the two Air Barrier was sealed with DuPont Tyvek Flashing tape. 2" thick Mineral Wool insulation was utilized on the base wall (top row) and was secured to the steel stud base wall with Thermal-Grip TubeSeal<sup>™</sup>. Two rows of steel hat channels (ClarkDietrich ProChannel Ci) were then secured to the steel stud base wall using pairs of #10 SDS Grip-Deck TubeSeal<sup>®</sup> fasteners at each stud location (12 fasteners per WRB type).

**TEST SPECIMEN #4: (VaproShield)**

**Base Wall Construction:** The wall was constructed of nominal 3-5/8", 18 gauge steel studs spaced 16" on center (ClarkDietrich 362S162-43 (33ksi, CP60) punched & 362T162-43 (33ksi, CP60)). The wall was sheathed with 5/8" GP DensGlass sheathing. The sheathing was secured to the wall with #8 x 1" flat head screws, spaced 8" on center at each stud location.

**Air Barrier Installation:** The left half of the base wall utilized VaproShield PanelShield SA, self-adhered WRB and the right half of the base wall utilized VaproShield Wrapshield SA self-adhered WRB. 2" thick Mineral Wool insulation was utilized on the base wall (top row) and was secured to the steel stud base wall with Thermal-Grip TubeSeal<sup>™</sup>. Two rows of steel hat channels (ClarkDietrich ProChannel Ci) were then secured to the steel stud base wall using pairs of #10 SDS Grip-Deck TubeSeal<sup>®</sup> fasteners at each stud location (12 fasteners per WRB type).

**TEST RESULTS:** The temperature during testing was 27.8 °C (82 °F).

**TEST SPECIMEN #1:** Henry WRB with Mineral Wool Insulation

**Air Infiltration (before loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.91	0.91	0.00	0.000	0.0000
50 Pa (1.04 psf)	1.45	1.45	0.00	0.000	0.0000
75 Pa (1.57 psf)	1.85	1.84	0.01	0.001	0.0002
100 Pa (2.09 psf)	2.30	2.29	0.01	0.001	0.0002
150 Pa (3.13 psf)	2.92	2.90	0.02	0.002	0.0003
250 Pa (5.22 psf)	4.14	4.12	0.02	0.002	0.0003
300 Pa (6.27 psf)	4.54	4.51	0.03	0.002	0.0005

**Air Exfiltration (before loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.96	0.94	0.02	0.002	0.0003
50 Pa (1.04 psf)	1.49	1.46	0.03	0.002	0.0005
75 Pa (1.57 psf)	2.06	1.98	0.08	0.006	0.0013
100 Pa (2.09 psf)	2.43	2.31	0.12	0.010	0.0019
150 Pa (3.13 psf)	3.08	2.98	0.10	0.008	0.0016
250 Pa (5.22 psf)	4.14	4.10	0.04	0.003	0.0006
300 Pa (6.27 psf)	4.58	4.53	0.05	0.004	0.0008

*Note 1: Reference Appendix A for Air Leakage Charts including 95% Confidence Interval.*

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #1:** Henry WRB with Mineral Wool Insulation (Continued)

**Water Penetration Testing:** (per ASTM E 331)

Test	Results	Allowable
2 hours @ 300 Pa (6.27 psf)	Pass	No Leakage
15 minutes @ 570 Pa (11.90 psf)	Pass	No Leakage
15 minutes @ 860 Pa (17.96 psf)	Pass	No Leakage
15 minutes @ 1200 Pa (25.06 psf)	Pass	No Leakage

**Pressure Loading Sequence:**

Test	Pressure	Observations
Deformation Load (10 second load)	±100 Pa (±2.09 psf)	No Damage
	±200 Pa (±4.18 psf)	No Damage
	±300 Pa (±6.27 psf)	No Damage
	±400 Pa (±8.36 psf)	No Damage
	±500 Pa (±10.45 psf)	No Damage
Deformation Load (60 minute load)	±600 Pa (±12.54 psf)	No Damage
Cyclic Loading (2000 cycles)	±800 Pa (±16.72 psf)	No Damage
Gust Loading (3 second load)	±1200 Pa (±25.06 psf)	No Damage

**Thermal Cycle Testing:** (per AAMA 501.5)

Test	Results	Allowable
3 cycles from 0 F to 180 F	No Visible Damage	No Damage

**Air Infiltration (after loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	1.97	1.96	0.01	0.001	0.0002
50 Pa (1.04 psf)	2.70	2.70	0.00	0.000	0.0000
75 Pa (1.57 psf)	3.94	3.92	0.02	0.002	0.0003
100 Pa (2.09 psf)	4.60	4.58	0.02	0.002	0.0003
150 Pa (3.13 psf)	5.85	5.84	0.01	0.001	0.0002
250 Pa (5.22 psf)	7.86	7.80	0.06	0.005	0.0009
300 Pa (6.27 psf)	8.61	8.55	0.06	0.005	0.0009

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #1:** Henry WRB with Mineral Wool Insulation (Continued)

**Air Exfiltration (after loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	1.96	1.96	0.00	0.000	0.0000
50 Pa (1.04 psf)	3.35	2.80	0.55	0.044	0.0086
75 Pa (1.57 psf)	4.60	3.99	0.61	0.048	0.0095
100 Pa (2.09 psf)	5.67	5.21	0.46	0.037	0.0072
150 Pa (3.13 psf)	7.46	7.19	0.27	0.021	0.0042
250 Pa (5.22 psf)	10.88	10.14	0.74	0.059	0.0116
300 Pa (6.27 psf)	12.37	11.86	0.51	0.040	0.0080

*Note 1: Reference Appendix A for Air Leakage Charts including 95% Confidence Interval.*

**Water Penetration Testing:** (per ASTM E 331)

Test	Results	Allowable
2 hours @ 300 Pa (6.27 psf)	Pass	No Leakage
15 minutes @ 570 Pa (11.90 psf)	Pass	No Leakage
15 minutes @ 860 Pa (17.96 psf)	Pass	No Leakage
15 minutes @ 1200 Pa (25.06 psf)	Pass	No Leakage

**Deflection Load Test:**

Pressure	Results	Allowable
+1440 Pa (+30.09 psf)	No Damage	No Damage
-1440 Pa (-30.09 psf)	No Damage	No Damage

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #2:** Tremco EXOAir & GP DensElement with Mineral Wool Insulation

**Air Infiltration (before loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	1.05	0.96	0.09	0.007	0.0014
50 Pa (1.04 psf)	1.68	1.57	0.11	0.009	0.0017
75 Pa (1.57 psf)	2.19	1.98	0.21	0.017	0.0033
100 Pa (2.09 psf)	2.65	2.43	0.22	0.017	0.0034
150 Pa (3.13 psf)	3.38	3.09	0.29	0.023	0.0045
250 Pa (5.22 psf)	4.60	4.29	0.31	0.025	0.0048
300 Pa (6.27 psf)	5.15	4.79	0.36	0.029	0.0056

**Air Exfiltration (before loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	1.06	0.98	0.08	0.006	0.0013
50 Pa (1.04 psf)	1.65	1.55	0.10	0.008	0.0016
75 Pa (1.57 psf)	2.21	2.13	0.08	0.006	0.0013
100 Pa (2.09 psf)	2.63	2.52	0.11	0.009	0.0017
150 Pa (3.13 psf)	3.42	3.16	0.26	0.021	0.0041
250 Pa (5.22 psf)	4.56	4.35	0.21	0.017	0.0033
300 Pa (6.27 psf)	5.17	4.88	0.29	0.023	0.0045

*Note 1: Reference Appendix A for Air Leakage Charts including 95% Confidence Interval.*

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #2:** Tremco EXOAir & GP DensElement with Mineral Wool Insulation

**Water Penetration Testing (before loading sequence):** (per ASTM E 331)

Test	Results	Allowable
2 hours @ 300 Pa (6.27 psf)	Pass	No Leakage
15 minutes @ 570 Pa (11.90 psf)	Pass	No Leakage
15 minutes @ 860 Pa (17.96 psf)	Pass	No Leakage
15 minutes @ 1200 Pa (25.06 psf)	Pass	No Leakage

**Pressure Loading Sequence:**

Test	Pressure	Observations
Deformation Load (10 second load)	±100 Pa (±2.09 psf)	No Damage
	±200 Pa (±4.18 psf)	No Damage
	±300 Pa (±6.27 psf)	No Damage
	±400 Pa (±8.36 psf)	No Damage
	±500 Pa (±10.45 psf)	No Damage
Deformation Load (60 minute load)	±600 Pa (±12.54 psf)	No Damage
Cyclic Loading (2000 cycles)	±800 Pa (±16.72 psf)	No Damage
Gust Loading (3 second load)	±1200 Pa (±25.06 psf)	No Damage

**Thermal Cycle Testing:** (per AAMA 501.5)

Test	Results	Allowable
3 cycles from 0 F to 180 F	No Visible Damage	No Damage

**Air Infiltration (after loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.51	0.48	0.03	0.002	0.0005
50 Pa (1.04 psf)	1.25	1.10	0.15	0.012	0.0023
75 Pa (1.57 psf)	1.74	1.59	0.15	0.012	0.0023
100 Pa (2.09 psf)	2.25	2.16	0.09	0.007	0.0014
150 Pa (3.13 psf)	2.97	2.79	0.18	0.014	0.0028
250 Pa (5.22 psf)	4.17	4.01	0.16	0.013	0.0025
300 Pa (6.27 psf)	4.83	4.26	0.57	0.045	0.0089

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #2:** Tremco EXOAir & GP DensElement with Mineral Wool Insulation

**Air Exfiltration (after loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.80	0.48	0.32	0.025	0.0050
50 Pa (1.04 psf)	1.17	1.10	0.07	0.006	0.0011
75 Pa (1.57 psf)	1.60	1.59	0.01	0.001	0.0002
100 Pa (2.09 psf)	2.19	2.16	0.03	0.002	0.0005
150 Pa (3.13 psf)	2.80	2.79	0.01	0.001	0.0002
250 Pa (5.22 psf)	4.03	4.01	0.02	0.002	0.0003
300 Pa (6.27 psf)	4.67	4.26	0.41	0.033	0.0064

Note 1: Reference Appendix A for Air Leakage Charts including 95% Confidence Interval.

**Water Penetration Testing (after loading sequence):** (per ASTM E 331)

Test	Results	Allowable
2 hours @ 300 Pa (6.27 psf)	Pass	No Leakage
15 minutes @ 570 Pa (11.90 psf)	Pass	No Leakage
15 minutes @ 860 Pa (17.96 psf)	Pass	No Leakage
15 minutes @ 1200 Pa (25.06 psf)	Pass	No Leakage

**Deflection Load Test:**

Pressure	Results	Allowable
+1440 Pa (+30.09 psf)	No Damage	No Damage
-1440 Pa (-30.09 psf)	No Damage	No Damage

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #3:** DuPont WRB with Mineral Wool Insulation

**Air Infiltration (before loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.98	0.95	0.03	0.002	0.0005
50 Pa (1.04 psf)	1.40	1.36	0.04	0.003	0.0006
75 Pa (1.57 psf)	1.81	1.68	0.13	0.010	0.0020
100 Pa (2.09 psf)	2.20	2.11	0.09	0.007	0.0014
150 Pa (3.13 psf)	2.79	2.66	0.13	0.010	0.0020
250 Pa (5.22 psf)	3.76	3.62	0.14	0.011	0.0022
300 Pa (6.27 psf)	4.21	4.12	0.09	0.007	0.0014

**Air Exfiltration (before loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.86	0.81	0.05	0.004	0.0008
50 Pa (1.04 psf)	1.47	1.42	0.05	0.004	0.0008
75 Pa (1.57 psf)	1.76	1.63	0.13	0.010	0.0020
100 Pa (2.09 psf)	2.22	2.07	0.15	0.012	0.0023
150 Pa (3.13 psf)	2.82	2.64	0.18	0.014	0.0028
250 Pa (5.22 psf)	3.93	3.67	0.26	0.021	0.0041
300 Pa (6.27 psf)	4.57	4.18	0.39	0.031	0.0061

*Note 1: Reference Appendix A for Air Leakage Charts including 95% Confidence Interval.*

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #3:** DuPont WRB with Mineral Wool Insulation

**Water Penetration Testing (before loading sequence):** (per ASTM E 331)

Test	Results	Allowable
2 hours @ 300 Pa (6.27 psf)	Pass	No Leakage
15 minutes @ 570 Pa (11.90 psf)	Pass	No Leakage
15 minutes @ 860 Pa (17.96 psf)	Pass	No Leakage
15 minutes @ 1200 Pa (25.06 psf)	Pass	No Leakage

**Pressure Loading Sequence:**

Test	Pressure	Observations
Deformation Load (10 second load)	±100 Pa (±2.09 psf)	No Damage
	±200 Pa (±4.18 psf)	No Damage
	±300 Pa (±6.27 psf)	No Damage
	±400 Pa (±8.36 psf)	No Damage
	±500 Pa (±10.45 psf)	No Damage
Deformation Load (60 minute load)	±600 Pa (±12.54 psf)	No Damage
Cyclic Loading (2000 cycles)	±800 Pa (±16.72 psf)	No Damage
Gust Loading (3 second load)	±1200 Pa (±25.06 psf)	No Damage

**Thermal Cycle Testing:** (per AAMA 501.5)

Test	Results	Allowable
3 cycles from 0 F to 180 F	No Visible Damage	No Damage

**Air Infiltration (after loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.72	0.72	0.00	0.000	0.0000
50 Pa (1.04 psf)	1.11	1.09	0.02	0.002	0.0003
75 Pa (1.57 psf)	1.63	1.60	0.03	0.002	0.0005
100 Pa (2.09 psf)	2.13	2.10	0.03	0.002	0.0005
150 Pa (3.13 psf)	2.80	2.66	0.14	0.011	0.0022
250 Pa (5.22 psf)	4.11	4.00	0.11	0.009	0.0017
300 Pa (6.27 psf)	4.66	4.15	0.51	0.040	0.0080

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #3:** DuPont WRB with Mineral Wool Insulation

**Air Exfiltration (after loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.86	0.72	0.14	0.011	0.0022
50 Pa (1.04 psf)	1.38	1.09	0.29	0.023	0.0045
75 Pa (1.57 psf)	1.77	1.60	0.17	0.013	0.0027
100 Pa (2.09 psf)	2.22	2.10	0.12	0.010	0.0019
150 Pa (3.13 psf)	2.89	2.66	0.23	0.018	0.0036
250 Pa (5.22 psf)	4.30	4.00	0.30	0.024	0.0047
300 Pa (6.27 psf)	4.88	4.15	0.73	0.058	0.0114

*Note 1: Reference Appendix A for Air Leakage Charts including 95% Confidence Interval.*

**Water Penetration Testing (after loading sequence):** (per ASTM E 331)

Test	Results	Allowable
2 hours @ 300 Pa (6.27 psf)	Pass	No Leakage
15 minutes @ 570 Pa (11.90 psf)	Pass	No Leakage
15 minutes @ 860 Pa (17.96 psf)	Pass	No Leakage
15 minutes @ 1200 Pa (25.06 psf)	Pass	No Leakage

**Deflection Load Test:**

Pressure	Results	Allowable
+1440 Pa (+30.09 psf)	No Damage	No Damage
-1440 Pa (-30.09 psf)	No Damage	No Damage

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #4:** VaproShield with Mineral Wool Insulation

**Air Infiltration (before loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.80	0.79	0.01	0.001	0.0002
50 Pa (1.04 psf)	1.19	1.14	0.05	0.004	0.0008
75 Pa (1.57 psf)	1.58	1.50	0.08	0.006	0.0013
100 Pa (2.09 psf)	1.90	1.82	0.08	0.006	0.0013
150 Pa (3.13 psf)	2.53	2.44	0.09	0.007	0.0014
250 Pa (5.22 psf)	3.56	3.42	0.14	0.011	0.0022
300 Pa (6.27 psf)	4.05	3.83	0.22	0.017	0.0034

**Air Exfiltration (before loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.84	0.80	0.04	0.003	0.0006
50 Pa (1.04 psf)	1.01	0.96	0.05	0.004	0.0008
75 Pa (1.57 psf)	1.48	1.38	0.10	0.008	0.0016
100 Pa (2.09 psf)	1.76	1.63	0.13	0.010	0.0020
150 Pa (3.13 psf)	2.45	2.36	0.09	0.007	0.0014
250 Pa (5.22 psf)	3.86	3.52	0.34	0.027	0.0053
300 Pa (6.27 psf)	4.24	3.91	0.33	0.026	0.0052

*Note 1: Reference Appendix A for Air Leakage Charts including 95% Confidence Interval.*

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #4:** VaproShield with Mineral Wool Insulation

**Water Penetration Testing (before loading sequence):** (per ASTM E 331)

Test	Results	Allowable
2 hours @ 300 Pa (6.27 psf)	Pass	No Leakage
15 minutes @ 570 Pa (11.90 psf)	Pass	No Leakage
15 minutes @ 860 Pa (17.96 psf)	Pass	No Leakage
15 minutes @ 1200 Pa (25.06 psf)	Pass	No Leakage

**Pressure Loading Sequence:**

Test	Pressure	Observations
Deformation Load (10 second load)	±100 Pa (±2.09 psf)	No Damage
	±200 Pa (±4.18 psf)	No Damage
	±300 Pa (±6.27 psf)	No Damage
	±400 Pa (±8.36 psf)	No Damage
	±500 Pa (±10.45 psf)	No Damage
Deformation Load (60 minute load)	±600 Pa (±12.54 psf)	No Damage
Cyclic Loading (2000 cycles)	±800 Pa (±16.72 psf)	No Damage
Gust Loading (3 second load)	±1200 Pa (±25.06 psf)	No Damage

**Thermal Cycle Testing:** (per AAMA 501.5)

Test	Results	Allowable
3 cycles from 0 F to 180 F	No Visible Damage	No Damage

**Air Infiltration (after loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	1.11	0.86	0.25	0.020	0.0039
50 Pa (1.04 psf)	1.61	1.51	0.10	0.008	0.0016
75 Pa (1.57 psf)	2.18	2.03	0.15	0.012	0.0023
100 Pa (2.09 psf)	2.83	2.26	0.57	0.045	0.0089
150 Pa (3.13 psf)	3.94	3.41	0.53	0.042	0.0083
250 Pa (5.22 psf)	5.57	5.01	0.56	0.044	0.0088
300 Pa (6.27 psf)	6.35	5.89	0.46	0.037	0.0072

**TEST RESULTS:** (Continued)

**TEST SPECIMEN #4:** VaproShield with Mineral Wool Insulation

**Air Exfiltration (after loading sequence):** (per ASTM E 283)

Pressure	Total Leakage (cfm)	Tare (cfm)	Specimen Leakage (cfm)	Leakage Rate	
				(L/s·m <sup>2</sup> )	(cfm/ft <sup>2</sup> )
25 Pa (0.52 psf)	0.91	0.86	0.05	0.004	0.0008
50 Pa (1.04 psf)	1.67	1.51	0.16	0.013	0.0025
75 Pa (1.57 psf)	2.33	2.03	0.30	0.024	0.0047
100 Pa (2.09 psf)	2.97	2.26	0.71	0.056	0.0111
150 Pa (3.13 psf)	3.80	3.41	0.39	0.031	0.0061
250 Pa (5.22 psf)	5.64	5.01	0.63	0.050	0.0098
300 Pa (6.27 psf)	6.21	5.89	0.32	0.025	0.0050

*Note 1: Reference Appendix A for Air Leakage Charts including 95% Confidence Interval.*

**Water Penetration Testing (after loading sequence):** (per ASTM E 331)

Test	Results	Allowable
2 hours @ 300 Pa (6.27 psf)	Pass	No Leakage
15 minutes @ 570 Pa (11.90 psf)	Pass	No Leakage
15 minutes @ 860 Pa (17.96 psf)	Pass	No Leakage
15 minutes @ 1200 Pa (25.06 psf)	Pass	No Leakage

**Deflection Load Test:**

Pressure	Results	Allowable
+1440 Pa (+30.09 psf)	No Damage	No Damage
-1440 Pa (-30.09 psf)	No Damage	No Damage

**General Note:** All testing was performed in accordance with reference test method.

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

A copy of this report, detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Molimo, LLC for the entire test record retention period. At the end of this retention period, the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. This test report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen(s) tested. This report may not be reproduced, except in full, without the written permission of Molimo, LLC.

For MOLIMO, LLC:

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Justin Bupp  
Manager – Product Testing

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Michael D. Stremmel, P.E.  
Senior Project Engineer

MDS:bnr

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix-A: Photographs (6)

Appendix-B: Leakage Charts (16)

## Appendix A

### Photographs



Photo 1  
Test Specimen #1 – Henry BlueSkin Test Wall



Photo 2

Test Specimen #2 – Tremco EXO Air430 and GP DensElement Test Wall



Photo 3  
Test Specimen #3 – DuPont Tyvek Test Wall



Photo 4  
Test Specimen #4 – VaproShield Test Wall



Photo 5  
Interior view of steel stud wall (typical)

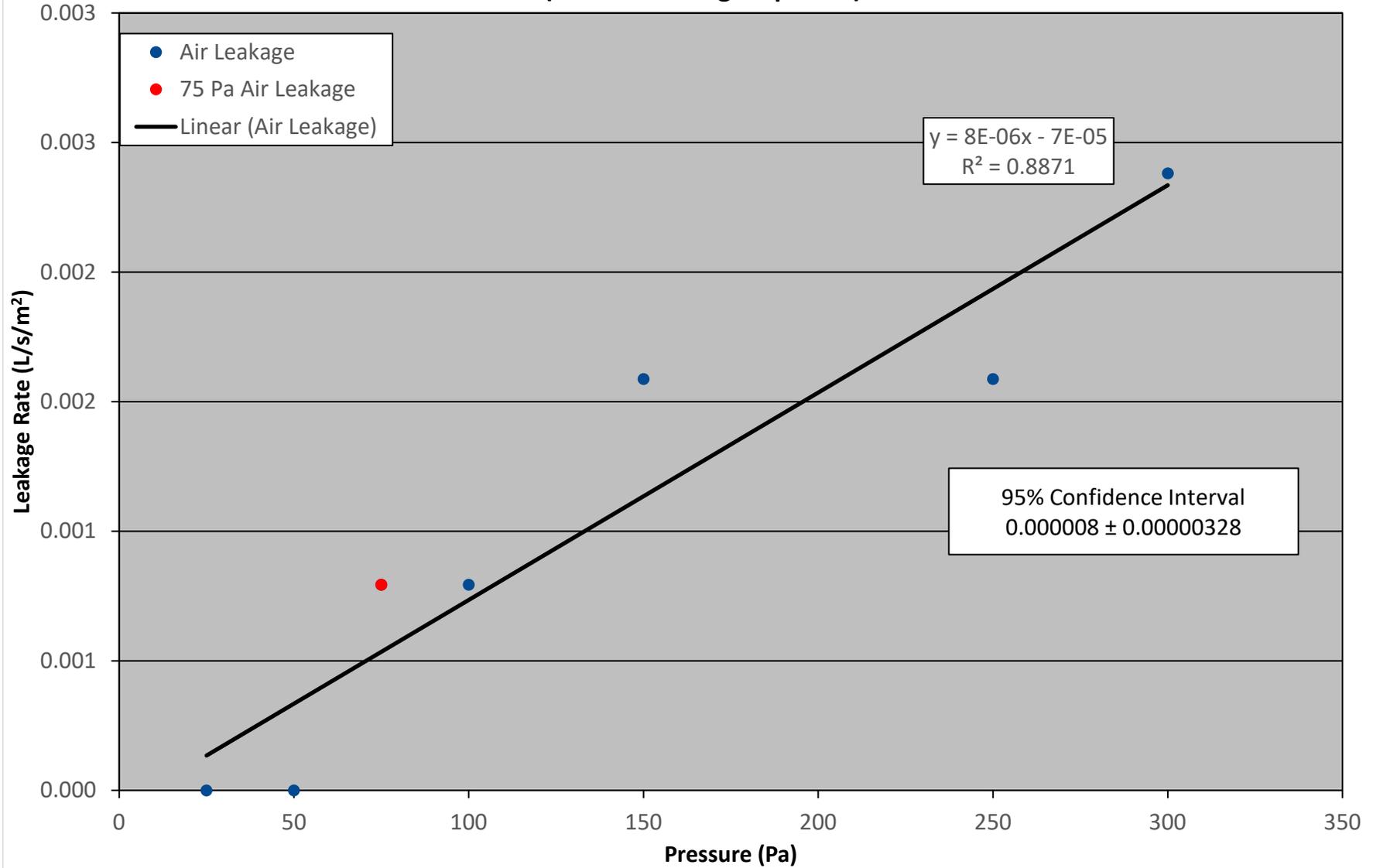


Photo 6  
Grip-Deck TubeSeal<sup>®</sup> fastener

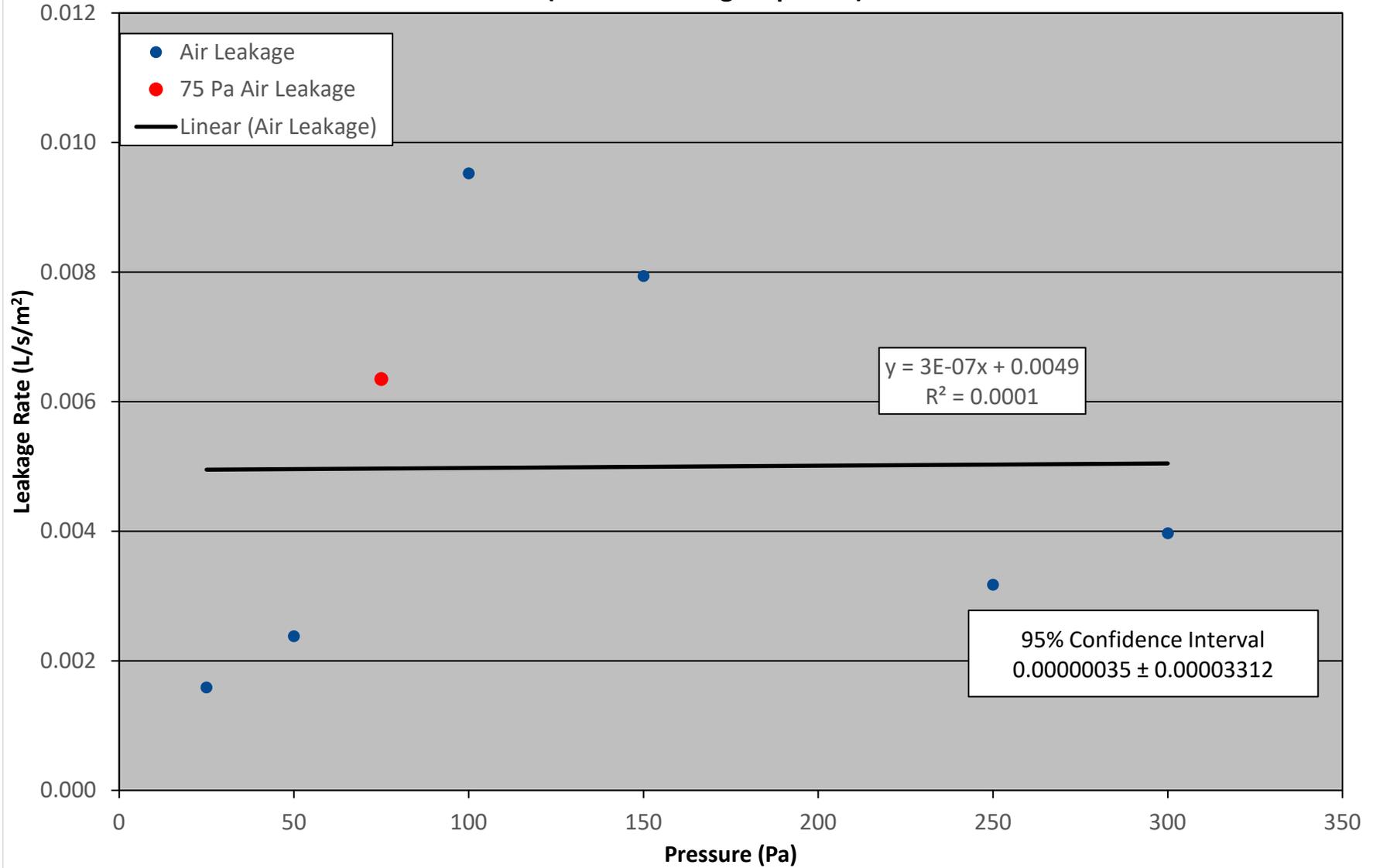
## **Appendix B**

### **Air Leakage Charts**

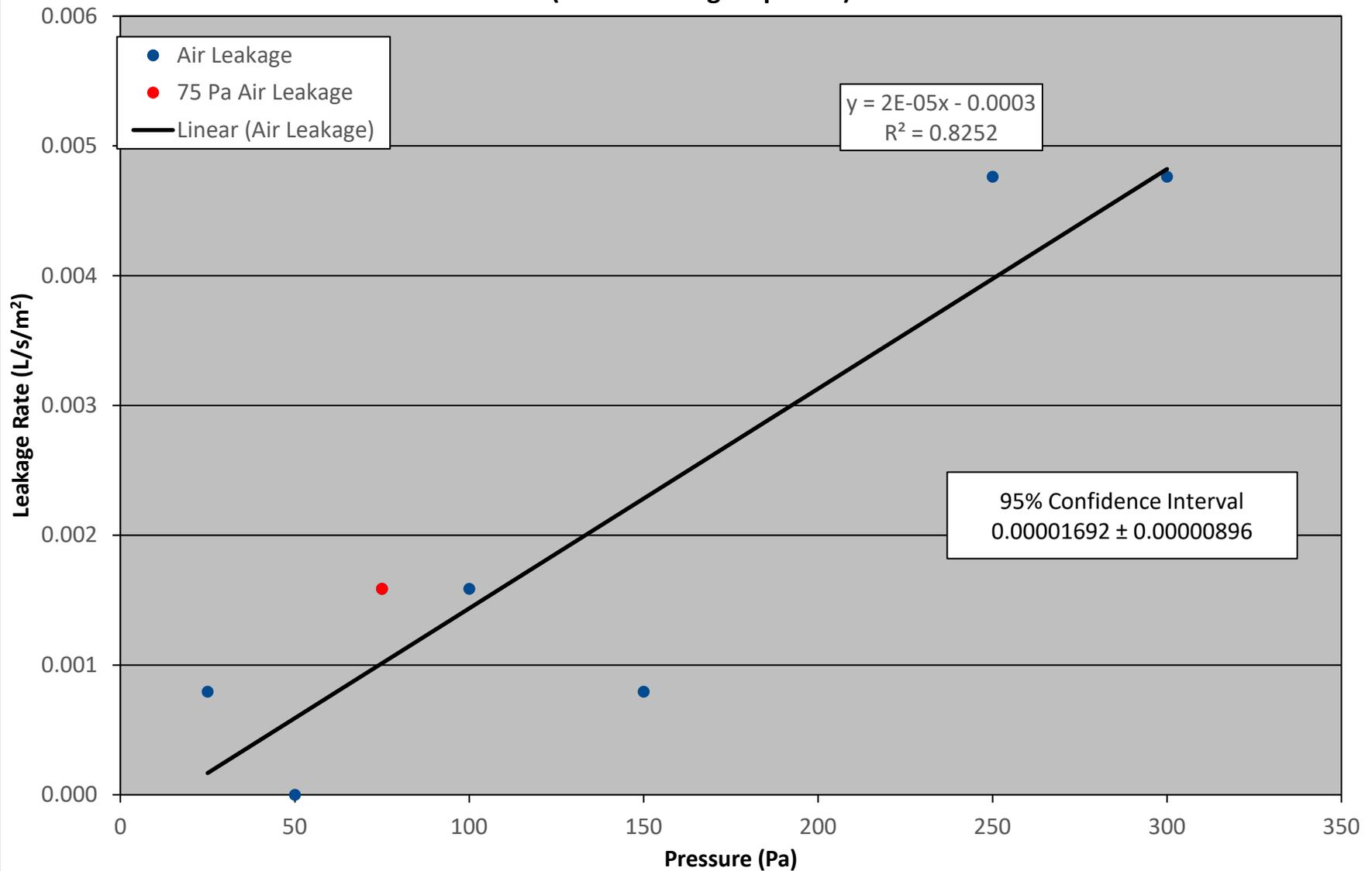
**Chart #1**  
**Specimen #1 - Air Infiltration**  
**(Before Loading Sequence)**



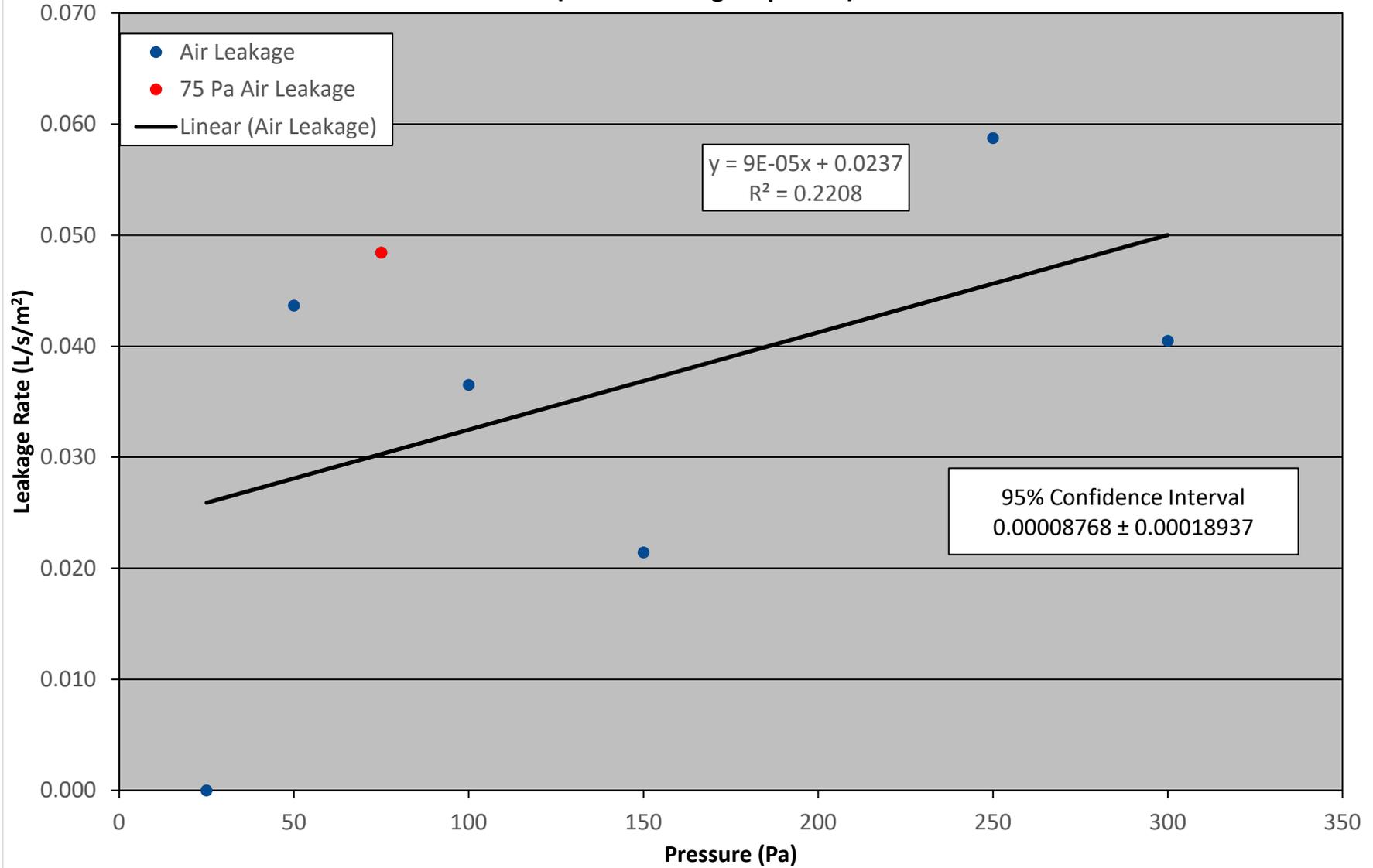
**Chart #2**  
**Specimen #1 - Air Exfiltration**  
**(Before Loading Sequence)**



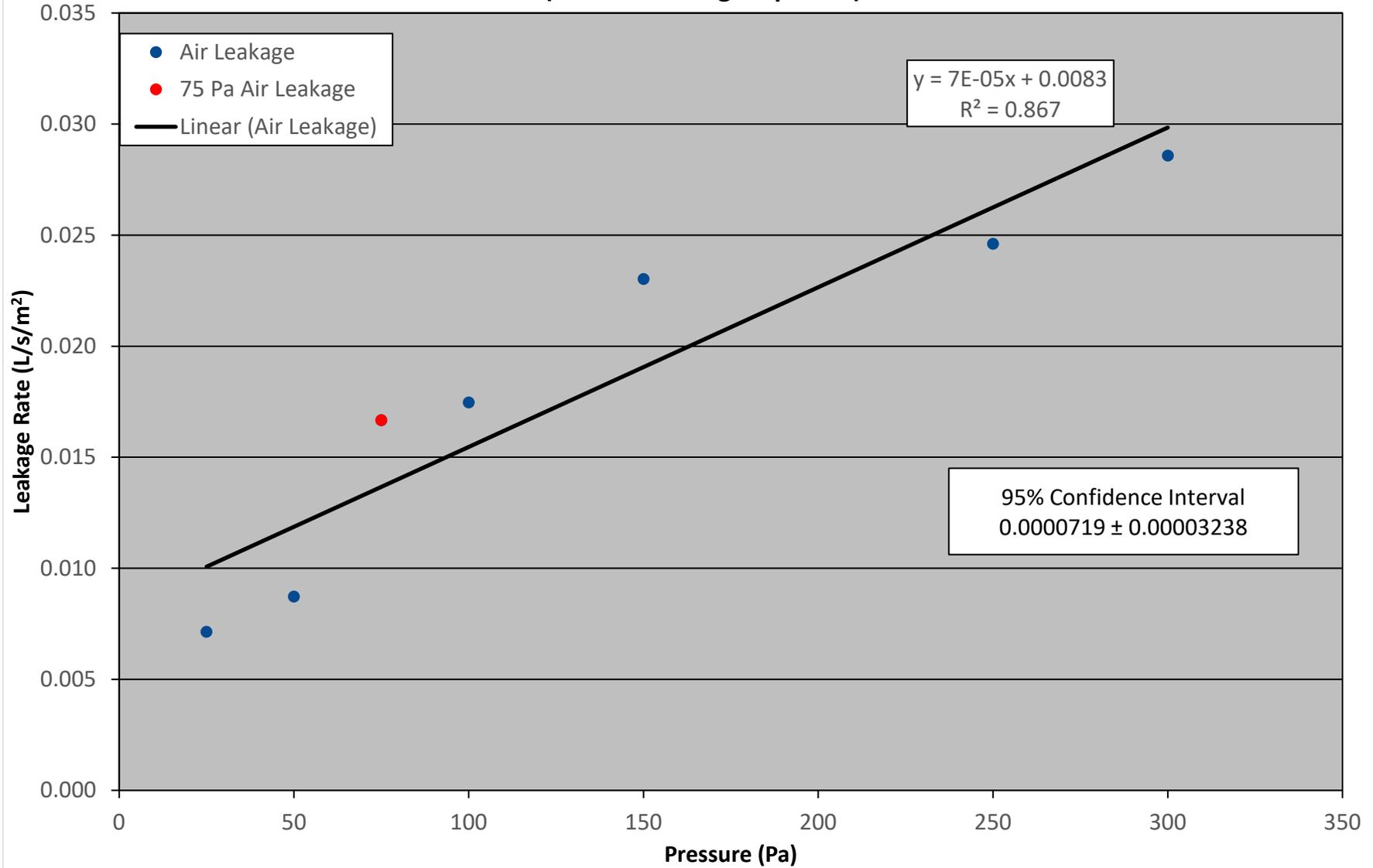
**Chart #3**  
**Specimen #1 - Air Infiltration**  
**(After Loading Sequence)**



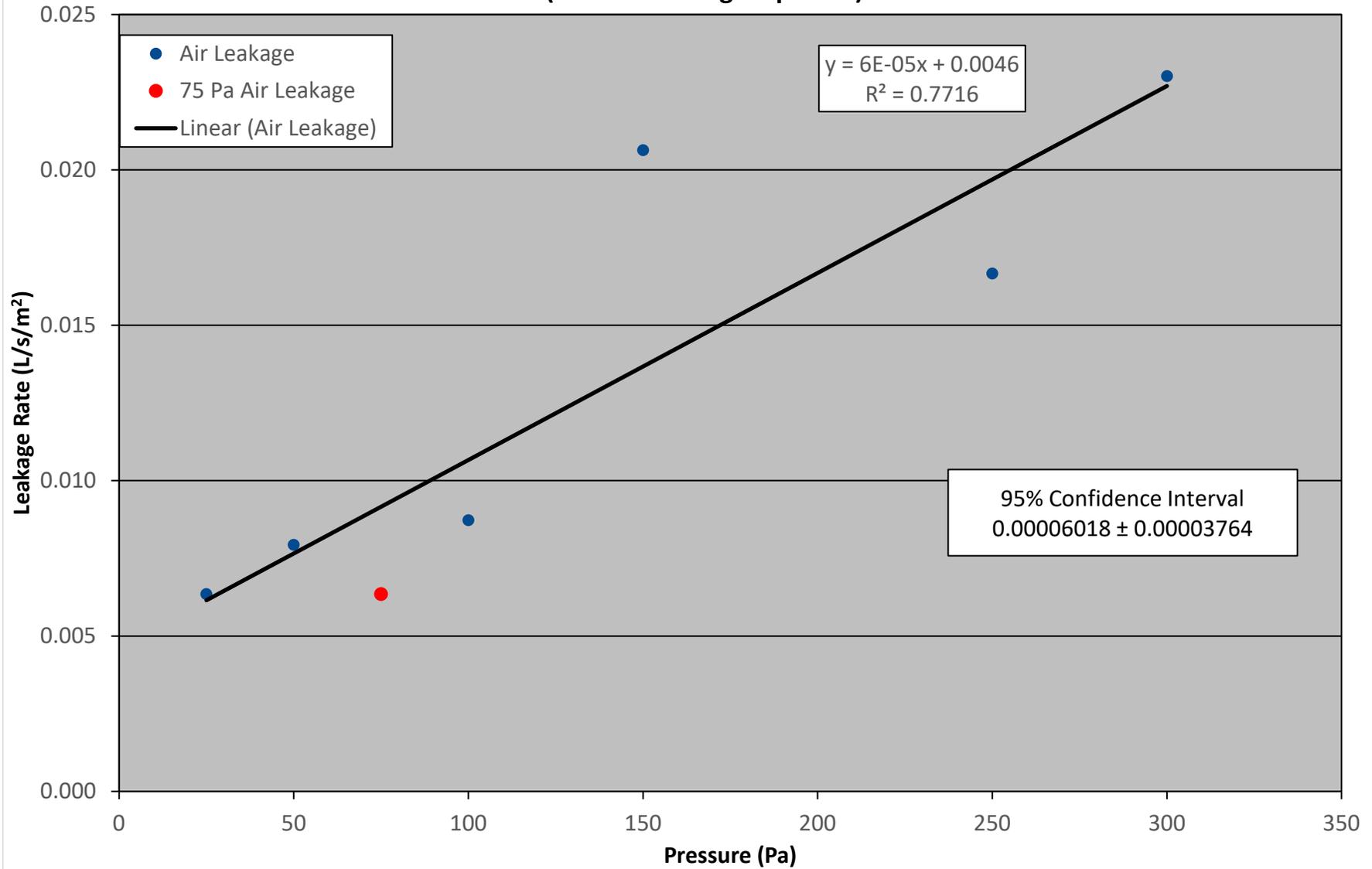
**Chart #4**  
**Specimen #1 - Air Exfiltration**  
**(After Loading Sequence)**



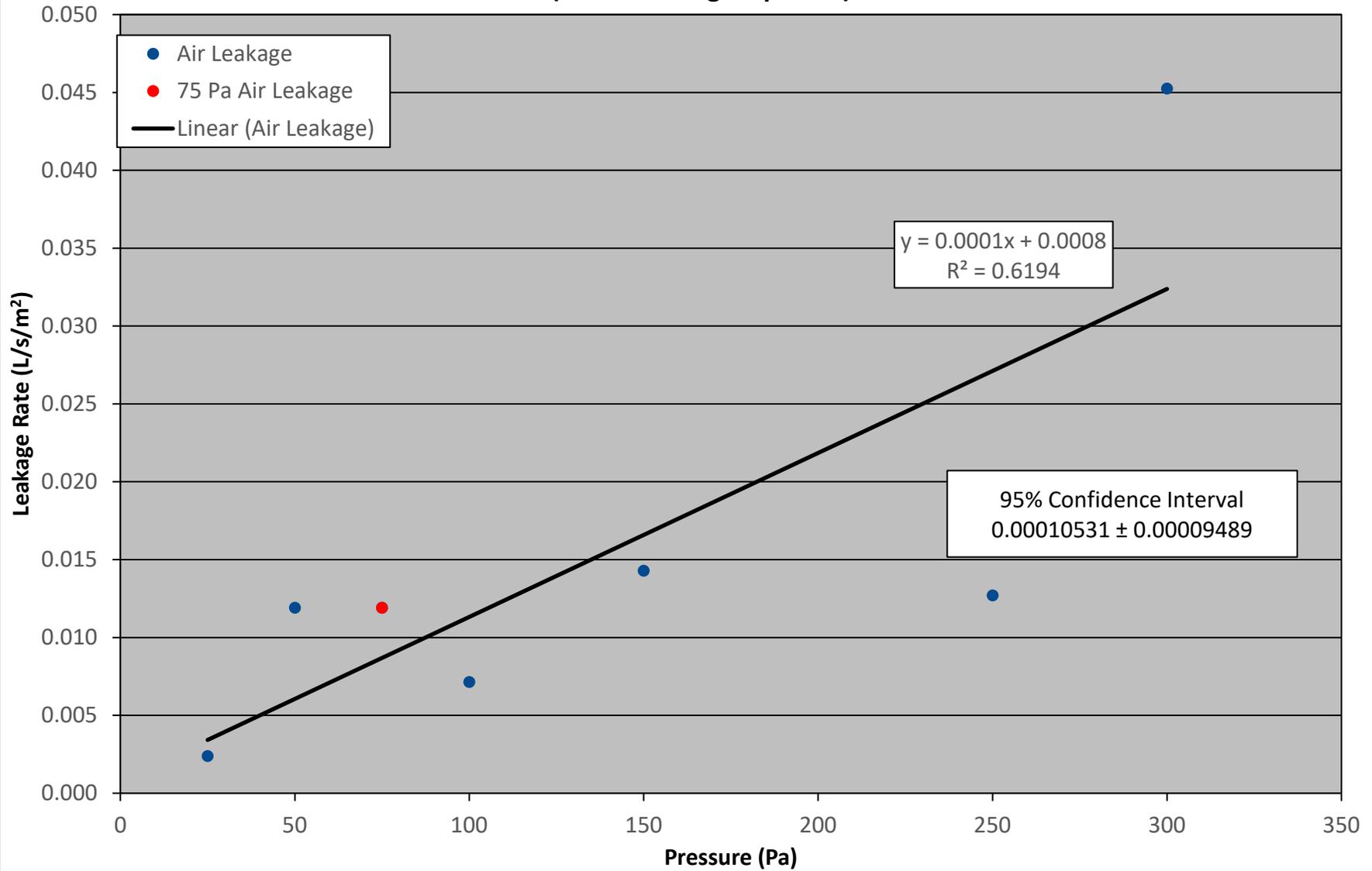
**Chart #1**  
**Specimen #2 - Air Infiltration**  
**(Before Loading Sequence)**



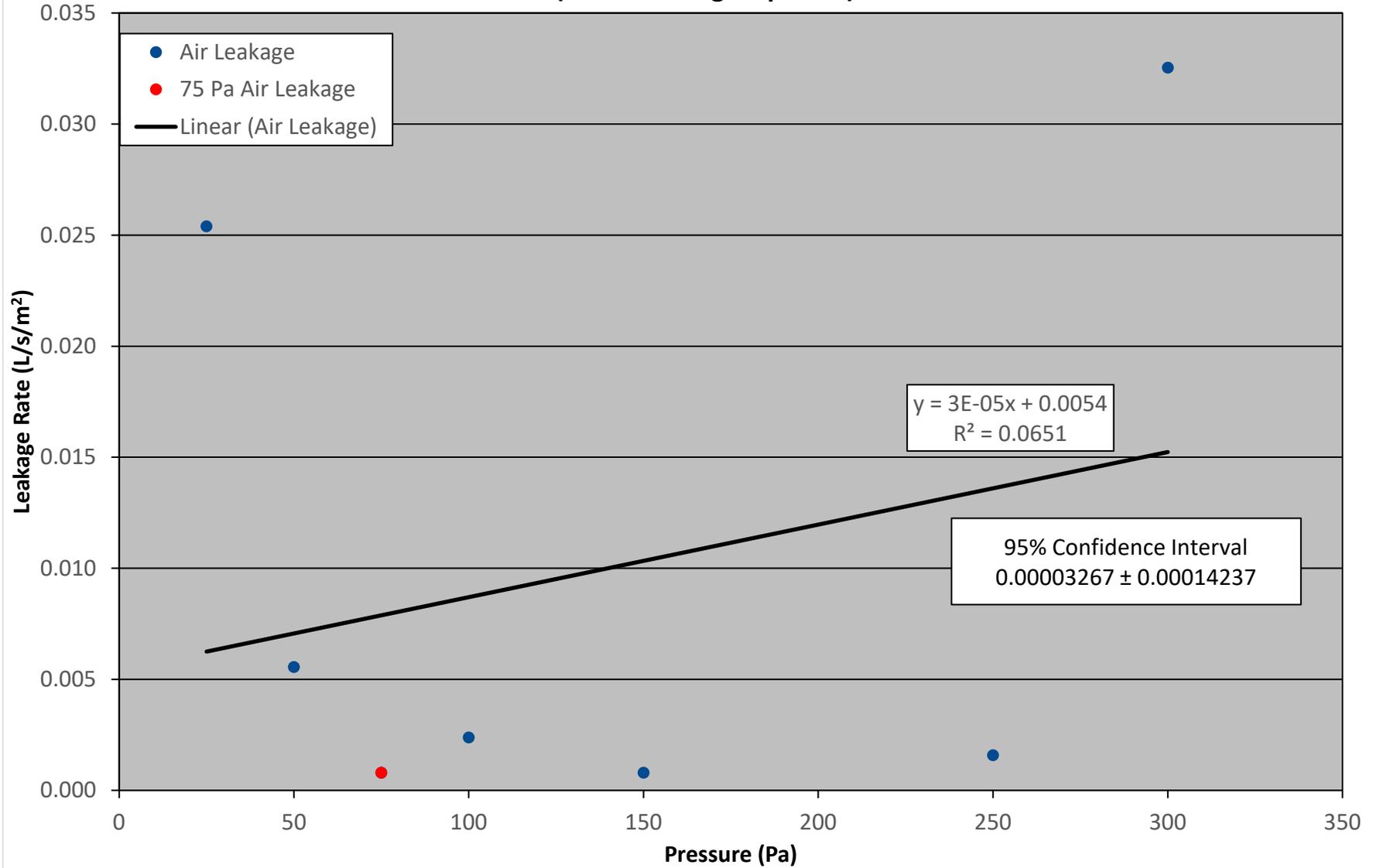
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**Specimen #2 - Air Exfiltration**  
**(Before Loading Sequence)**



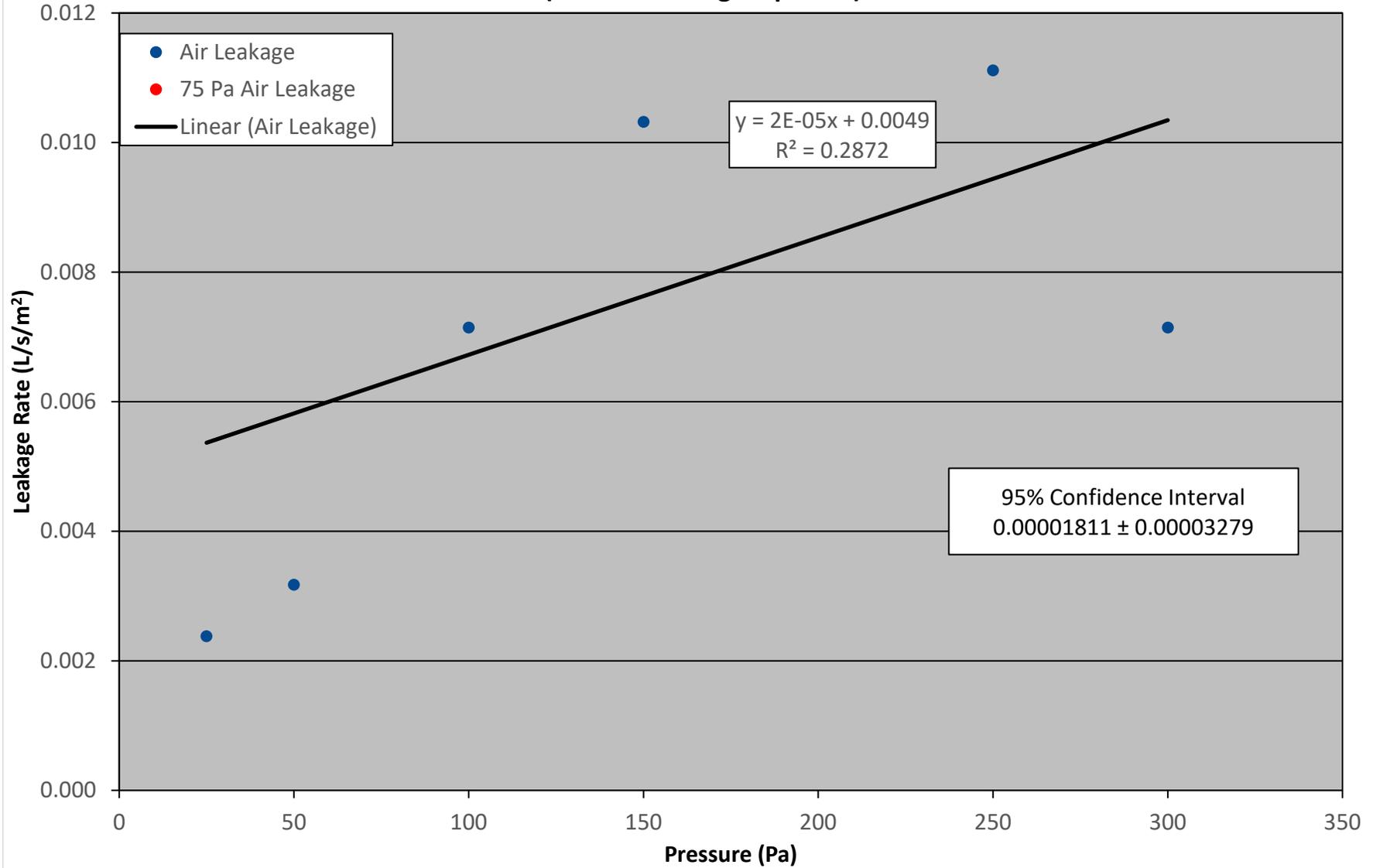
**Chart #3**  
**Specimen #2 - Air Infiltration**  
**(After Loading Sequence)**



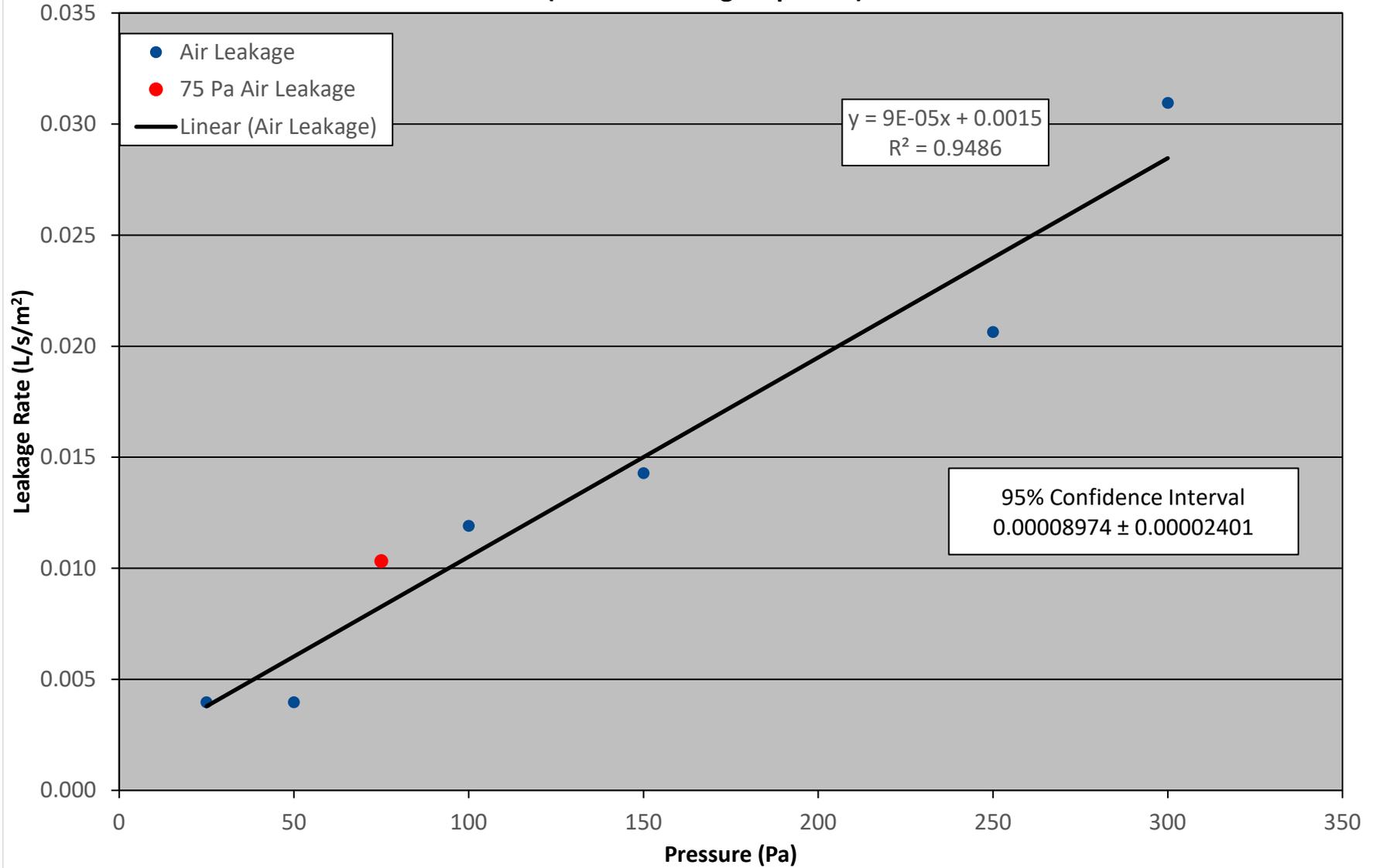
**Chart #4**  
**Specimen #2 - Air Exfiltration**  
**(After Loading Sequence)**



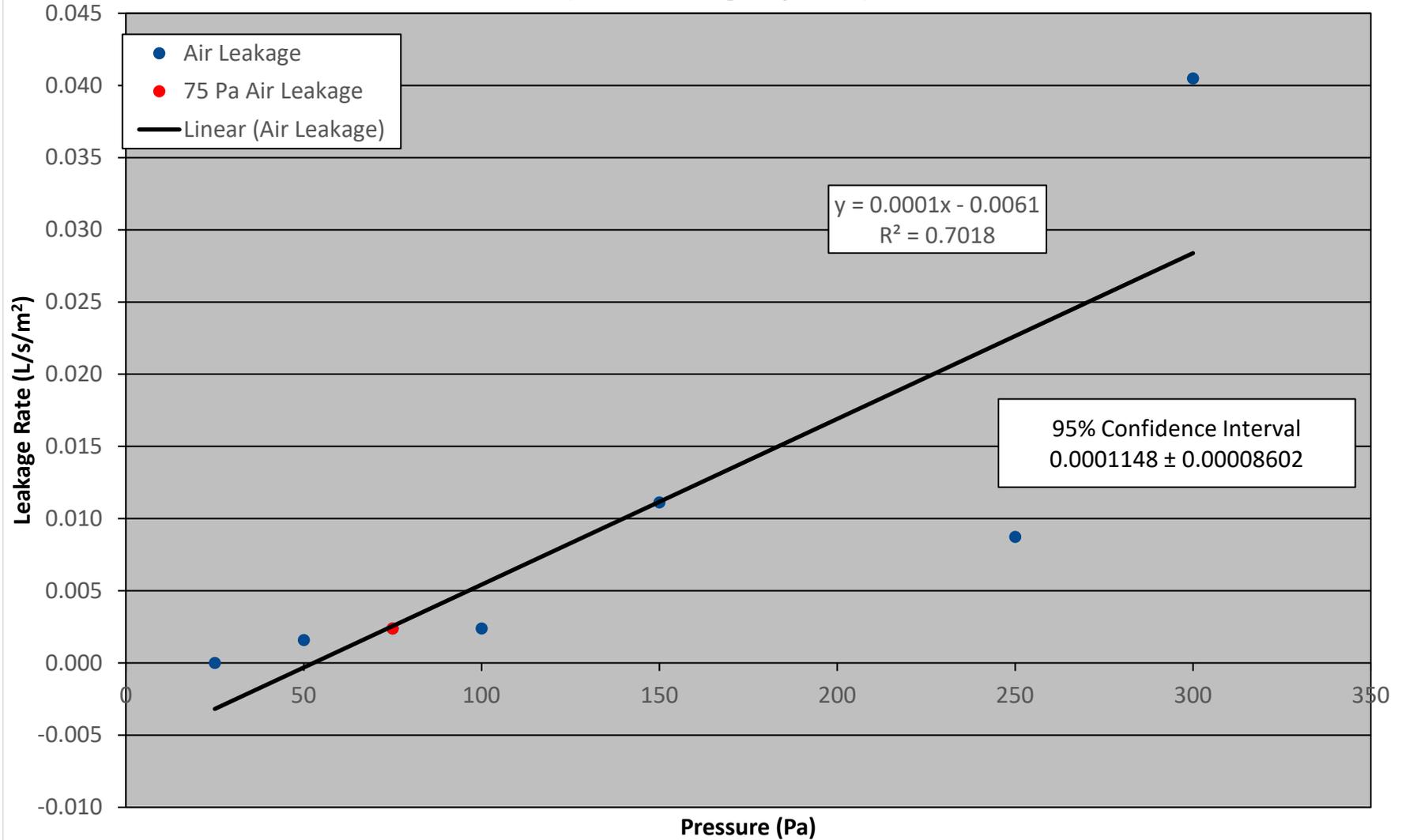
**Chart #1**  
**Specimen #3 - Air Infiltration**  
**(Before Loading Sequence)**



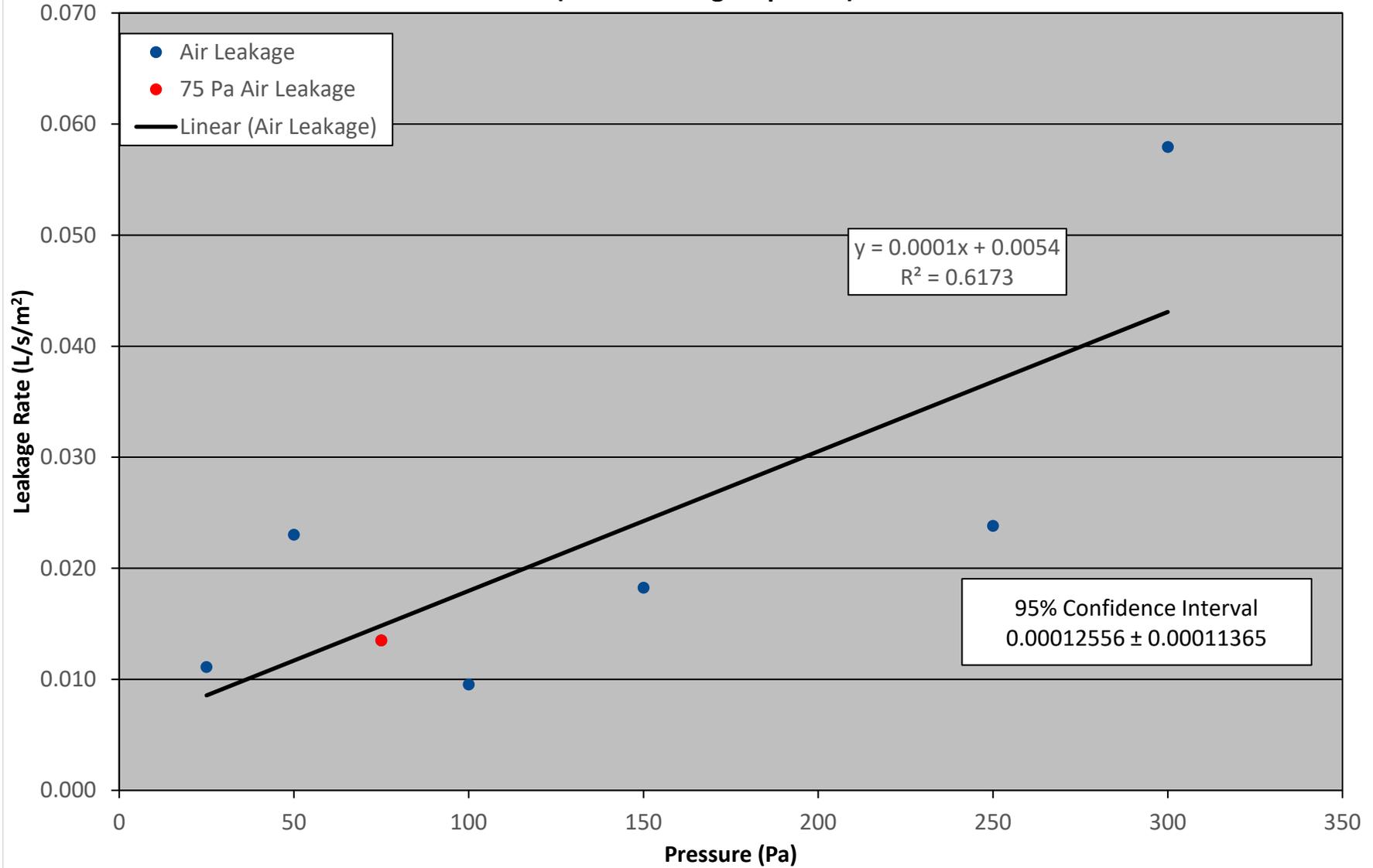
**Chart #2**  
**Specimen #3 - Air Exfiltration**  
**(Before Loading Sequence)**



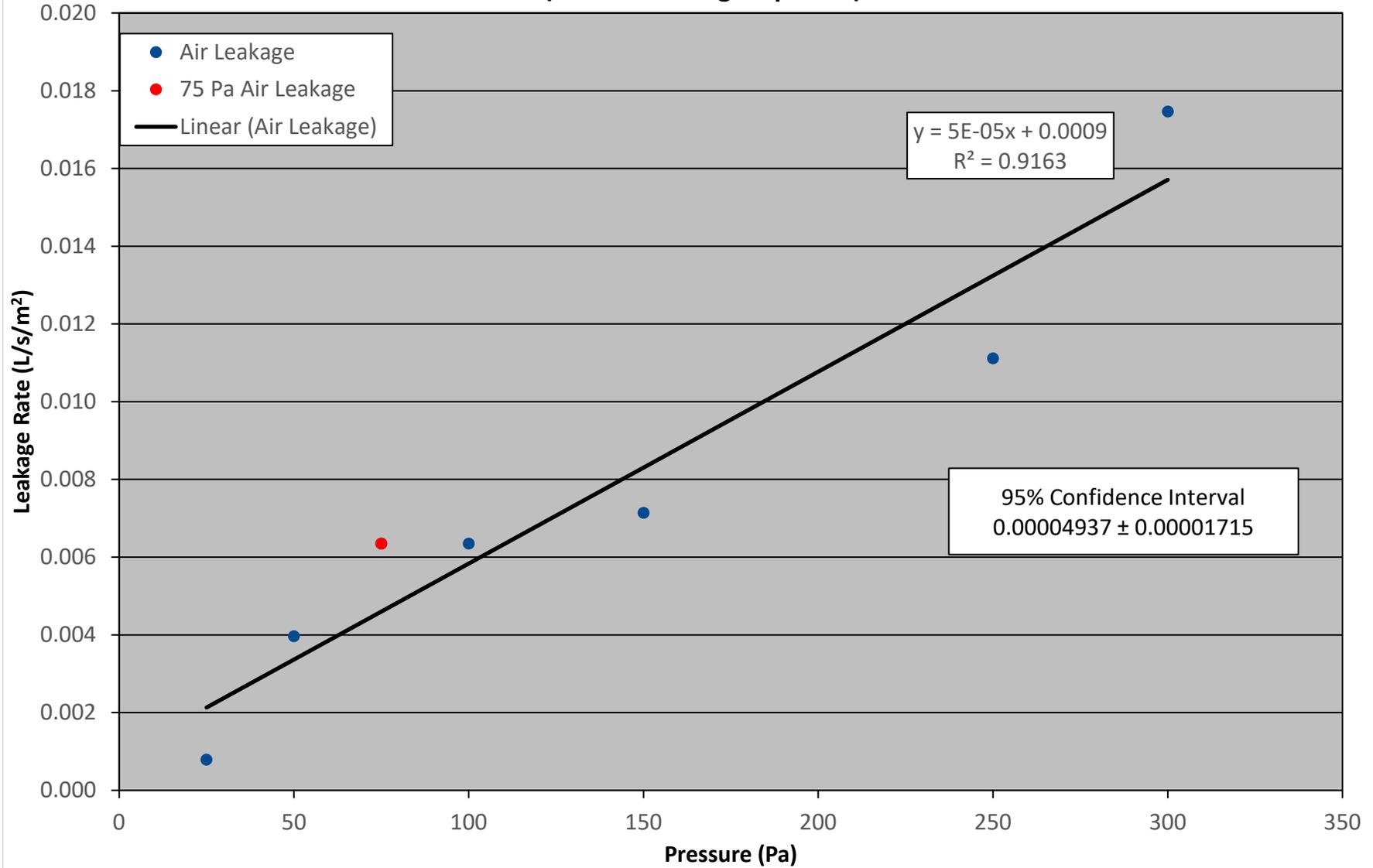
**Chart #3**  
**Specimen #3 - Air Infiltration**  
**(After Loading Sequence)**



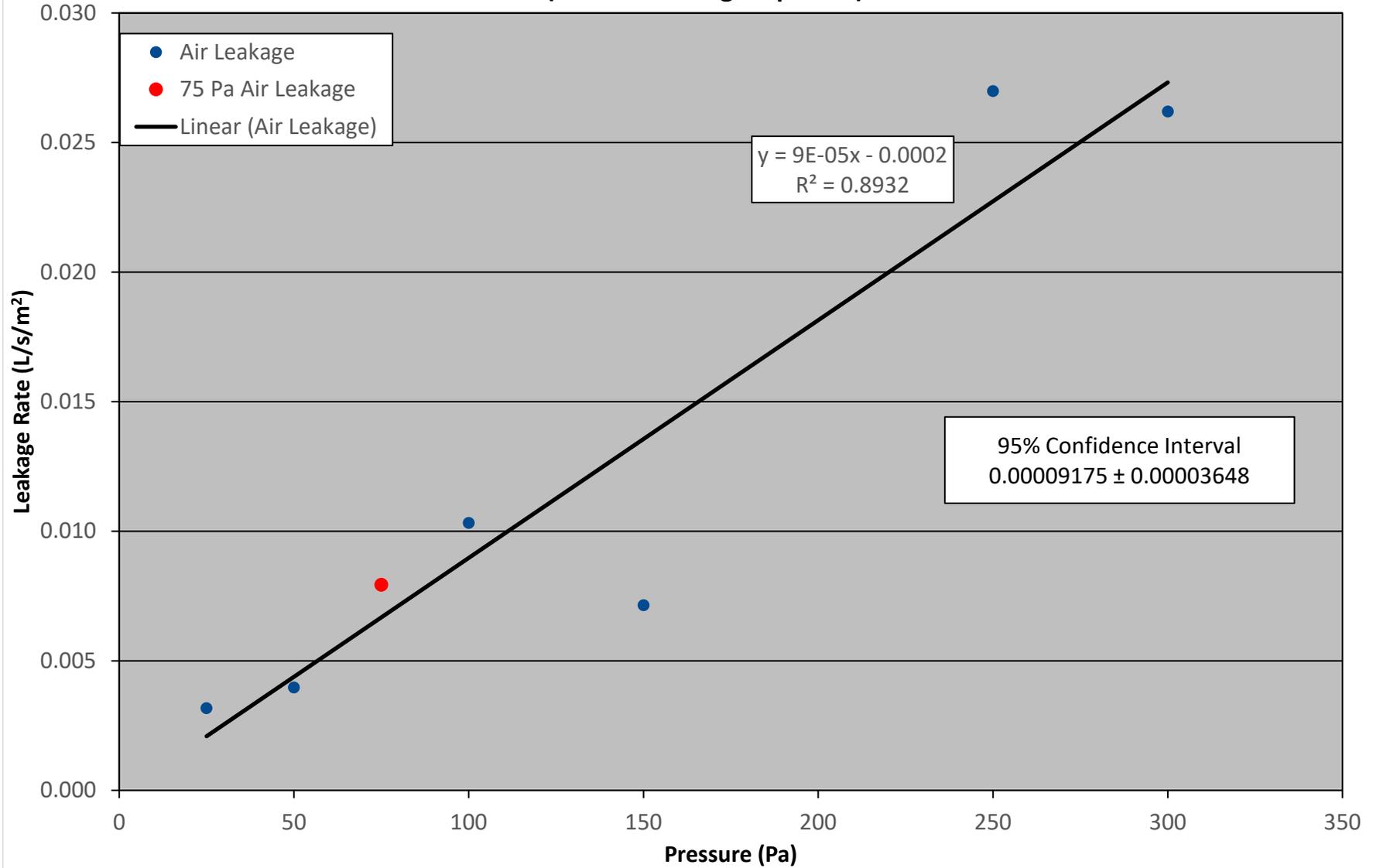
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**Specimen #3 - Air Exfiltration**  
**(After Loading Sequence)**



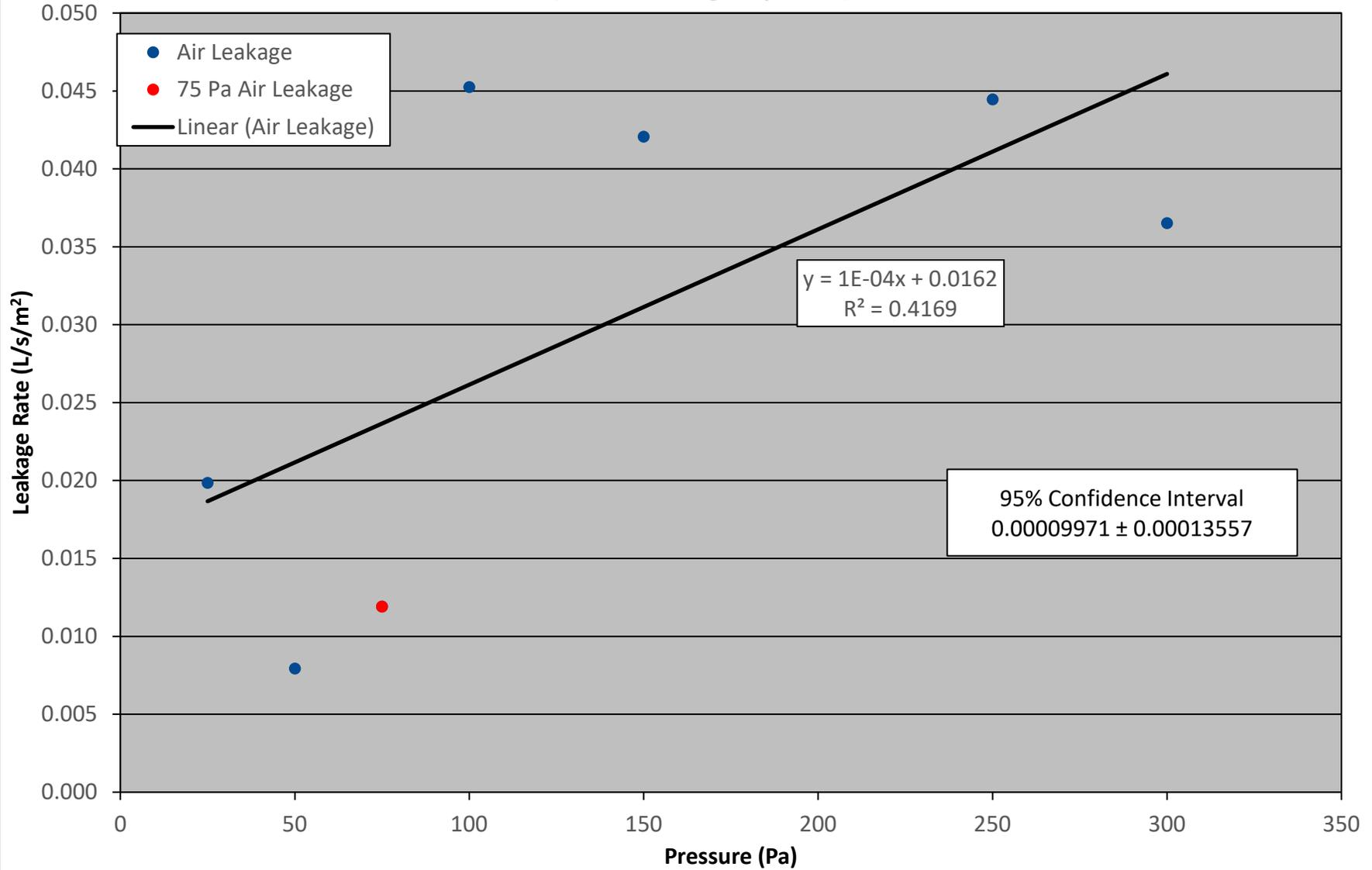
**Chart #1**  
**Specimen #4 - Air Infiltration**  
**(Before Loading Sequence)**



**Chart #2**  
**Specimen #4 - Air Exfiltration**  
**(Before Loading Sequence)**



**Chart #3**  
**Specimen #4 - Air Infiltration**  
**(After Loading Sequence)**



**Chart #4**  
**Specimen #4 - Air Exfiltration**  
**(After Loading Sequence)**

