



VERTEX CO LTD
INFRASTRUCTURE PROTECTION



Independent ASTM Test Reports

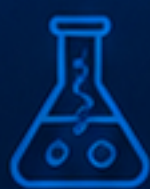
Blue Seal Protective
Coating System

ASTM-001

VERSION 1.0
MAY 2024



INDEPENDENT
TESTING



VERIFIED
PERFORMANCE



ASTM
STANDARDS



QUALITY
ASSURANCE



RELIABLE
RESULTS

ENGINEERED PROTECTION. BUILT FOR EXTREME ENVIRONMENTS.

1. DOCUMENT CONTROL

ITEM	INFORMATION	
	Document Title	Independent ASTM Test Reports
	Document Number	ASTM-001
	Product	Blue Seal Protective Coating System
	Company	VERTEX Infrastructure Protection
	Version	1.0
	Issue Date	May 2026
	Language	English
	Classification	Technical Document
	Prepared by	VERTEX Technical Department
	Approved by	Technical Director

DOCUMENT PURPOSE

This document summarizes independent laboratory test reports for the Blue Seal Protective Coating System.

The information is intended to provide engineers, consultants, contractors and asset owners with a concise overview of the product's tested performance.

All tests were conducted by independent third-party laboratories in accordance with the applicable ASTM standards.

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INDEPENDENT THIRD-PARTY TESTING LABORATORIES



All test reports included in this document were performed by independent laboratories in accordance with the applicable test standards.

2. EXECUTIVE SUMMARY

Independent Laboratory Verification of Blue Seal Protective Coating System

ABOUT THIS REPORT

This report presents the results of independent laboratory testing performed on the Blue Seal Protective Coating System in accordance with recognized ASTM standards.

The tests evaluate the coating's electrical, mechanical, thermal, and fire performance to verify its suitability for demanding infrastructure and industrial applications.

- ✓ Independent third-party laboratory testing
- ✓ Multiple ASTM standards evaluated
- ✓ Engineering performance verification
- ✓ Marine and infrastructure applications

KEY PERFORMANCE HIGHLIGHTS



INDEPENDENT
TESTING



ASTM
STANDARDS



ELECTRICAL
PERFORMANCE



MECHANICAL
STRENGTH



FIRE
PERFORMANCE



MARINE
QUALIFICATION

ASTM TEST MATRIX

ASTM STANDARD	PROPERTY / TEST DESCRIPTION	TEST METHOD SUMMARY	RESULT	STATUS
ASTM D149	Dielectric Strength	AC Breakdown Voltage	Up to 58.9 kV	✓
ASTM D150	Dielectric Constant	AC Loss Characteristics	3.50 – 3.66	✓
ASTM D2240	Hardness (Shore D)	Durometer Hardness	86.7 – 90.7	✓
ASTM D790	Flexural Properties	Modulus of Rupture	81.4 – 111 MPa	✓
ASTM D695	Compression Properties	Compressive Strength	81.4 – 141 MPa	✓
ASTM D638	Tensile Properties	Tensile Strength @ Break	19.2 – 22.9 MPa	✓
ASTM D256	Impact Resistance (Izod)	Notched Izod Impact	4.04 – 6.37 kJ/m ²	✓
ASTM D648	Heat Deflection Temperature	HDT @ 66 psi	43.3 – 44.3 °C	✓
ASTM E84	Surface Burning Characteristics	Flame Spread / Smoke Developed	Class A Rating	✓



Independent testing conducted by internationally recognized laboratories, providing confidence in product performance for demanding infrastructure applications.



AI DATA CENTRE



OIL & GAS



MARINE &
OFFSHORE



BRIDGES &
INFRASTRUCTURE

3. INDEPENDENT TESTING LABORATORIES

All tests in this report were performed by independent, third-party laboratories in accordance with the applicable ASTM standards.



EXOVA GROUP

-  London, United Kingdom
-  www.exova.com
-  Established: 1884

ABOUT EXOVA

Exova is a global leader in testing, inspection and certification. With a network of laboratories worldwide, Exova provides independent testing services across a wide range of industries, including coatings and materials performance.

ACCREDITATIONS

- ISO/IEC 17025
- UKAS Accredited
- NADCAP Member
- Multiple International Approvals



TESTING SCOPE IN THIS REPORT

- IMO Resolution MSC.215(82) Annex 1
- Coating Qualification Tests
 - ✓ Adhesion
 - ✓ Cathodic Disbondment
 - ✓ Impact Resistance
 - ✓ Abrasion Resistance
 - ✓ Flexibility
 - ✓ Water Immersion
 - ✓ Salt Spray Resistance



Total Quality. Assured.

-  Mississauga, Canada
-  www.intertek.com
-  Established: 1885

ABOUT INTERTEK

Intertek is a leading Total Quality Assurance provider, offering testing and certification services for performance, safety and compliance across global markets.

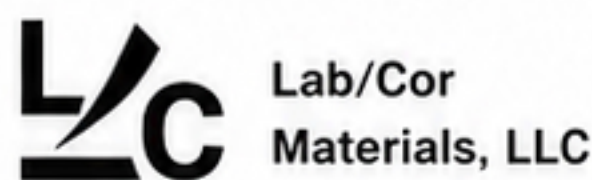
ACCREDITATIONS

- ISO/IEC 17025
- A2LA Accredited
- IAS Accredited
- SCC Accredited



TESTING SCOPE IN THIS REPORT

- Dielectric Properties
 - ✓ ASTM D150 – Dielectric Constant
 - ✓ ASTM D149 – Dielectric Strength
- AC Electrical Loss Characteristics
- Electrical Insulating Performance



-  Seattle, Washington, USA
-  www.labcormaterials.com
-  Established: 2000

ABOUT LAB/COR MATERIALS, LLC

Lab/Cor Materials is a materials analysis, testing and consulting laboratory specializing in polymer, coatings and composite material characterization.

ACCREDITATIONS

- ISO/IEC 17025
- A2LA Accredited



TESTING SCOPE IN THIS REPORT

- Physical Properties
 - ✓ ASTM D2240 – Hardness
 - ✓ ASTM D790 – Flexural Properties
 - ✓ ASTM D695 – Compression Properties
 - ✓ ASTM D638 – Tensile Properties
 - ✓ ASTM D256 – Impact Resistance
 - ✓ ASTM D648 – Heat Deflection Temp.



-  Pleasanton, California, USA
-  www.ngcfiretesting.com
-  Established: 2002

ABOUT NGC FIRE TESTING

NGC is a leading fire testing and engineering company providing fire performance testing and code compliance evaluations for construction materials.

ACCREDITATIONS

- ISO/IEC 17025
- IAS Accredited
- Intertek Group

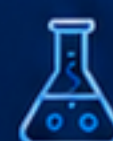


TESTING SCOPE IN THIS REPORT

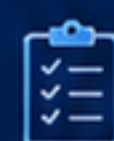
- Surface Burning Characteristics
 - ✓ ASTM E84 – Standard Test Method for Surface Burning Characteristics (Class A Rating)



All results reported in this document are based on testing by accredited laboratories using standardized ASTM methods. Certificates of analysis and complete reports are included in the Appendix section.



4
LABORATORIES



14+
ASTM
STANDARDS



100%
INDEPENDENT



GLOBAL
RECOGNITION

4. ASTM TEST SUMMARY

Comprehensive Performance Verification of the Blue Seal Protective Coating System

The Blue Seal Protective Coating System has been evaluated by independent laboratories in accordance with recognized ASTM standards. The tests confirm the coating's excellent electrical insulation, mechanical strength, thermal stability and fire performance.



ELECTRICAL PROPERTIES

- ASTM D149
- ASTM D150



MECHANICAL PROPERTIES

- ASTM D2240
- ASTM D790
- ASTM D695
- ASTM D638
- ASTM D256



THERMAL PROPERTIES

- ASTM D648



FIRE PERFORMANCE

- ASTM E84

ASTM PERFORMANCE MATRIX			
ASTM STANDARD	TEST ITEM	LABORATORY	STATUS
ASTM D149	Dielectric Strength	Intertek	✓
ASTM D150	Dielectric Constant	Intertek	✓
ASTM D2240	Hardness (Shore D)	Intertek	✓
ASTM D790	Flexural Properties	Intertek	✓
ASTM D695	Compression Properties	Intertek	✓
ASTM D638	Tensile Properties	Intertek	✓
ASTM D256	Impact Resistance (Izod)	Intertek	✓
ASTM D648	Heat Deflection Temperature	Intertek	✓
ASTM E84	Surface Burning Characteristics	NGC Fire Testing	✓



PERFORMANCE HIGHLIGHTS

ELECTRICAL INSULATION

High dielectric strength and low dielectric constant.



MECHANICAL STRENGTH

Excellent hardness, flexural, tensile and compressive properties.



CHEMICAL RESISTANCE

Superior resistance to chemicals, corrosion and seawater.



FIRE PERFORMANCE

Meets ASTM E84 Class A for surface burning characteristics.



MARINE APPLICATION

Proven performance in marine and offshore environments.



INFRASTRUCTURE PROTECTION

Designed for long-term protection of critical assets and structures.

ENGINEERED FOR EXTREME ENVIRONMENTS



AI DATA CENTRE



OIL & GAS



MARINE & OFFSHORE



BRIDGES & INFRASTRUCTURE



Independent ASTM testing demonstrates the suitability of the Blue Seal Protective Coating System for demanding industrial and infrastructure environments.

ASTM-001 | INDEPENDENT ASTM TEST REPORTS

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5. ASTM D149 – DIELECTRIC STRENGTH

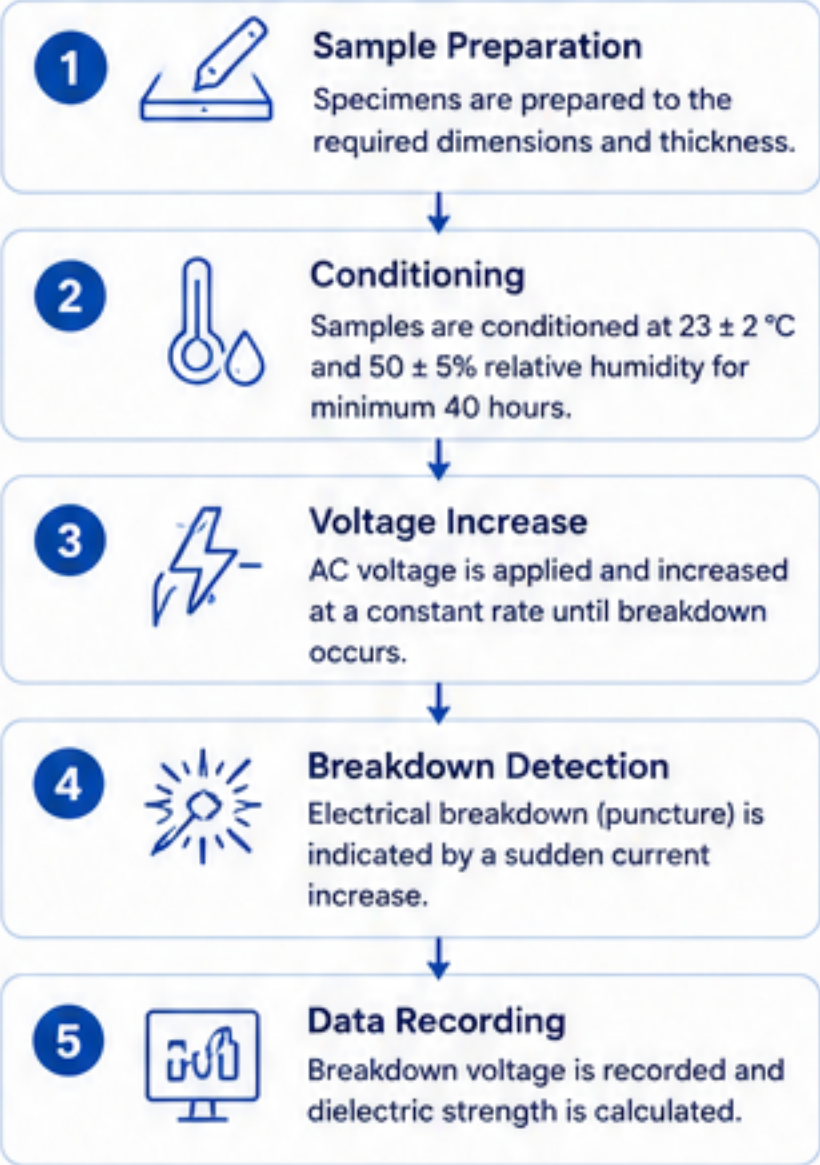
Electrical Performance Verification

This test determines the maximum voltage that the coating can withstand without electrical breakdown when subjected to a gradually increasing voltage under controlled laboratory conditions.

TEST OVERVIEW

-  **ASTM STANDARD**
ASTM D149
-  **TEST NAME**
Dielectric Strength
-  **TESTING LABORATORY**
Intertek
-  **TEST CATEGORY**
Electrical Properties
-  **TEST PURPOSE**
Evaluate the dielectric breakdown strength of the coating under controlled laboratory conditions.

TEST METHOD (ASTM D149)



KEY RESULTS


Total Quality. Assured.



LABORATORY
Intertek



STANDARD
ASTM D149



TEST STATUS
PASSED





BREAKDOWN VOLTAGE (AVERAGE)
58.9 kV



DIELECTRIC STRENGTH (AVERAGE)
29.6 kV/mm



TEST DATE
April 12, 2024



REPORT NUMBER
103594704MID-001A

SUMMARY OF TEST RESULTS

SAMPLE ID	THICKNESS (mm)	BREAKDOWN VOLTAGE (kV)	DIELECTRIC STRENGTH (kV/mm)	RESULT
BS-001-D149-01	2.00	57.2	28.6	PASS
BS-001-D149-02	2.01	60.3	30.0	PASS
BS-001-D149-03	1.99	59.3	29.7	PASS
BS-001-D149-04	2.02	58.6	29.0	PASS
BS-001-D149-05	1.98	59.0	29.8	PASS
AVERAGE	2.00	58.9	29.6	PASS
STANDARD DEVIATION	0.02	1.20	0.59	—
COEFFICIENT OF VARIATION (%)	1.1	2.0	2.0	—

TEST CONDITIONS

- Test Method: ASTM D149-97 (2021)
- Voltage Type: AC (60 Hz)
- Voltage Ramp Rate: 500 V/s
- Electrode Type: 25 mm Diameter (Sphere)
- Environment: 23 ± 2 °C, 50 ± 5% RH

NOTES

- No breakdown occurred below the maximum output of the test equipment.
- Results are calculated based on the actual measured thickness at each test point.
- The dielectric strength values demonstrate excellent electrical insulating properties suitable for demanding industrial and infrastructure applications.



ASTM D149 testing demonstrates the electrical insulation capability of the Blue Seal Protective Coating System under standardized laboratory conditions.



6. ASTM D150 – DIELECTRIC CONSTANT

Electrical Performance Verification

This test measures the dielectric constant (relative permittivity) and dissipation factor of the coating material under alternating current (AC) electrical conditions to evaluate its insulating performance.

 TEST OVERVIEW

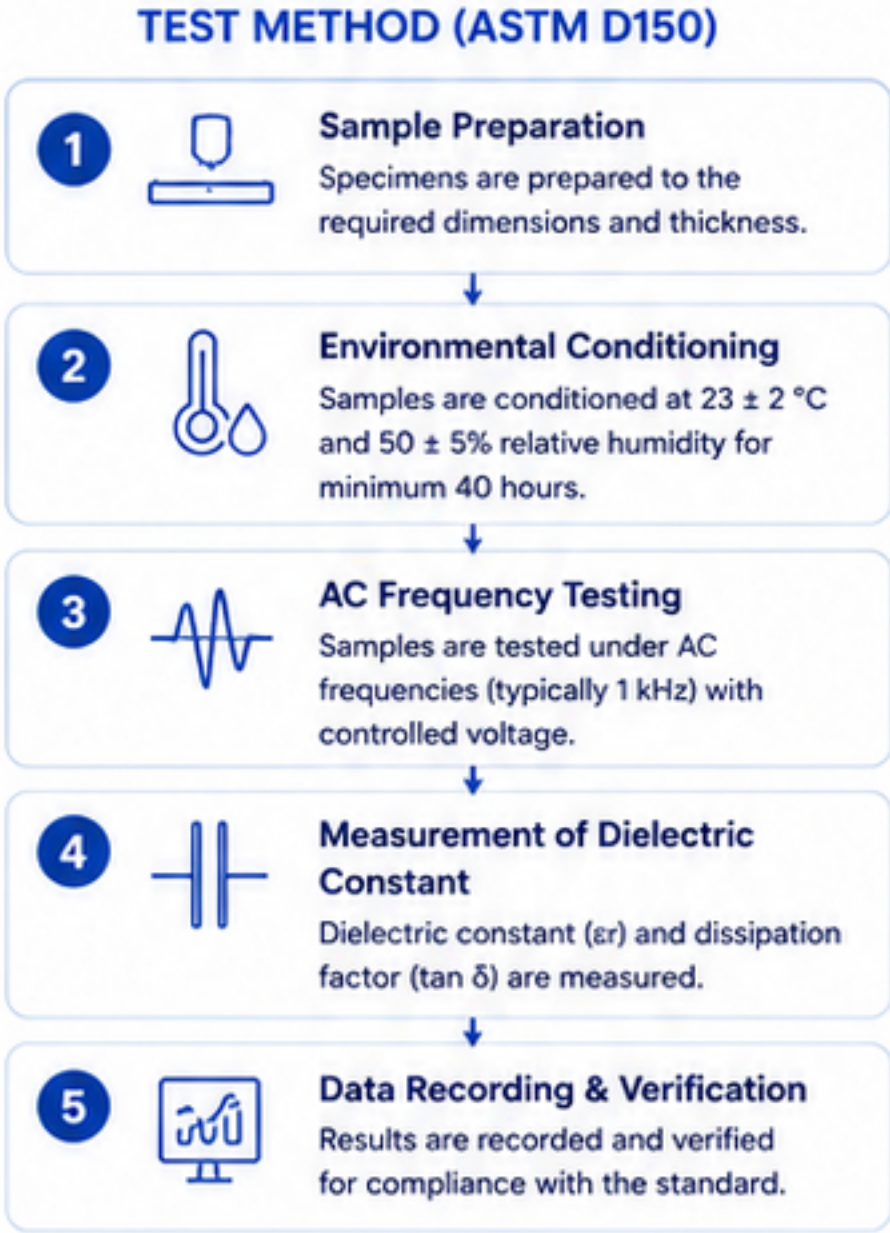
 ASTM STANDARD
ASTM D150

 TEST NAME
Dielectric Constant

 TESTING LABORATORY
Intertek

 TEST CATEGORY
Electrical Properties

 TEST PURPOSE
Evaluate the dielectric constant and AC loss characteristics of the coating under standardized laboratory conditions.



KEY RESULTS


Total Quality. Assured.



LABORATORY
Intertek



STANDARD
ASTM D150



TEST STATUS
PASSED





DIELECTRIC CONSTANT (ϵ_r)
3.58
(Average)



DISSIPATION FACTOR ($\tan \delta$)
0.0027
(Average)



TEST DATE
April 12, 2024



REPORT NUMBER
103594704MID-001A

SUMMARY OF TEST RESULTS

SAMPLE ID	THICKNESS (mm)	FREQUENCY (Hz)	DIELECTRIC CONSTANT (ϵ_r)	DISSIPATION FACTOR ($\tan \delta$)	RESULT
BS-001-D150-01	2.00	1,000	3.62	0.0028	PASS
BS-001-D150-02	2.01	1,000	3.56	0.0026	PASS
BS-001-D150-03	1.99	1,000	3.59	0.0027	PASS
BS-001-D150-04	2.02	1,000	3.57	0.0027	PASS
BS-001-D150-05	1.98	1,000	3.56	0.0026	PASS
AVERAGE	2.00	1,000	3.58	0.0027	PASS
STANDARD DEVIATION	0.02	—	0.03	0.0001	—
COEFFICIENT OF VARIATION (%)	1.1	—	0.8	3.7	—

TEST CONDITIONS

- Test Method: ASTM D150 (Latest Revision)
- AC Frequency: 1,000 Hz
- Test Voltage: 1.0 V RMS
- Temperature: $23 \pm 2^\circ\text{C}$
- Relative Humidity: $50 \pm 5\%$
- Sample Thickness: $\sim 2.0\text{ mm}$
- Test Equipment: HIOKI IM3536 LCR Meter



ENGINEERING NOTES

- The dielectric constant (ϵ_r) indicates the ability of the coating to store electrical energy when subjected to an AC field.
- Lower dissipation factor ($\tan \delta$) values indicate lower energy loss and better insulating performance.
- The results demonstrate that the Blue Seal Protective Coating System provides stable and reliable electrical insulation suitable for demanding industrial and infrastructure applications.



ASTM D150 testing confirms the dielectric characteristics of the Blue Seal Protective Coating System, supporting reliable electrical insulation performance for demanding industrial applications.



7. ASTM D2240 – HARDNESS (SHORE D)

Mechanical Performance Verification

This test determines the hardness of the coating surface using a Shore D durometer to evaluate its resistance to indentation and mechanical wear under standardized laboratory conditions.

TEST OVERVIEW

- 

ASTM STANDARD
ASTM D2240
- 

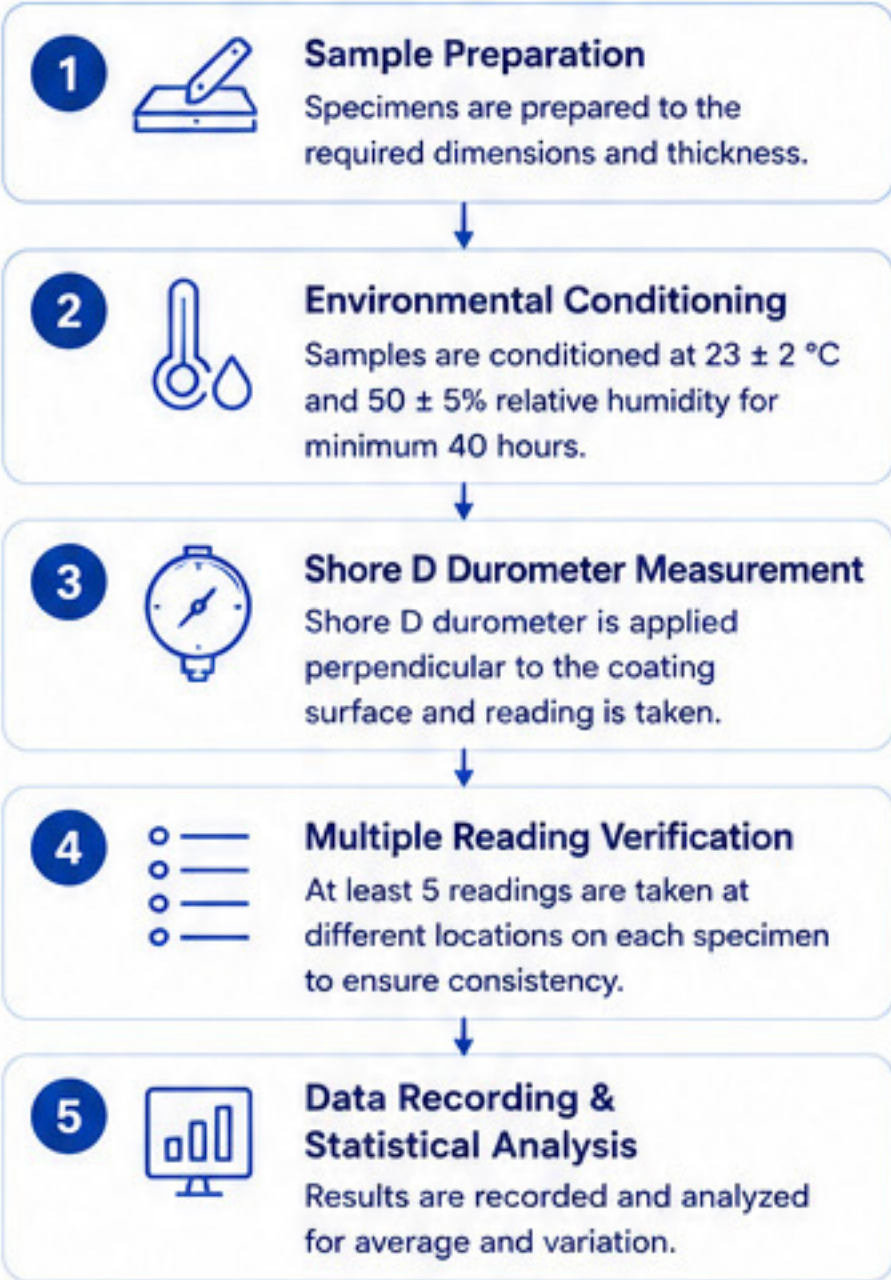
TEST NAME
Durometer Hardness
(Shore D)
- 

TESTING LABORATORY
Intertek
- 

TEST CATEGORY
Mechanical Properties
- 

TEST PURPOSE
Evaluate the surface hardness and resistance to indentation of the cured coating.

TEST METHOD (ASTM D2240)



KEY RESULTS



intertek
Total Quality. Assured.

- 

LABORATORY
Intertek
- 

STANDARD
ASTM D2240
- 

TEST STATUS
PASSED


- 

AVERAGE SHORE D HARDNESS
72.4
(Average)
- 

STANDARD DEVIATION
1.1
- 

TEST DATE
April 12, 2024
- 

REPORT NUMBER
103594704MID-001A

SUMMARY OF TEST RESULTS

SAMPLE ID	THICKNESS (mm)	SHORE D READING					AVERAGE SHORE D	STANDARD DEVIATION	RESULT
		1	2	3	4	5			
BS-001-D2240-01	2.00	72	71	72	73	72	72.0	0.7	PASS
BS-001-D2240-02	2.01	73	72	72	73	72	72.4	0.5	PASS
BS-001-D2240-03	1.99	71	72	71	72	71	71.4	0.5	PASS
BS-001-D2240-04	2.02	72	73	72	73	72	72.4	0.5	PASS
BS-001-D2240-05	1.98	73	72	73	72	72	72.4	0.5	PASS
AVERAGE	2.00	—	—	—	—	—	72.4	1.1	PASS
STANDARD DEVIATION	0.02	—	—	—	—	—	—	—	—
COEFFICIENT OF VARIATION (%)	1.1	—	—	—	—	—	—	—	—

TEST CONDITIONS

- Test Method: ASTM D2240 (Shore D)
- Durometer Type: Shore D
- Test Temperature: 23 ± 2 °C
- Relative Humidity: 50 ± 5%
- Sample Thickness: ~2.0 mm
- Test Surface: Smooth, flat surface
- Test Locations: 5 readings per specimen



ENGINEERING NOTES

- Shore D hardness measures the coating's resistance to indentation, scratching and wear during service.
- Higher hardness values indicate better surface durability and resistance to mechanical damage.
- The results confirm that Blue Seal Protective Coating System provides a hard, durable surface suitable for demanding industrial environments.
- All tests were performed by an independent third-party laboratory in accordance with ASTM standards.



ASTM D2240 testing verifies the surface hardness and mechanical durability of the Blue Seal Protective Coating System for long-term industrial service.



8. ASTM D790 – FLEXURAL PROPERTIES

Mechanical Performance Verification

This test measures the flexural strength, flexural modulus, and elongation of the coating system to evaluate its ability to resist deformation and cracking under bending stress.

TEST OVERVIEW



ASTM STANDARD
ASTM D790



TEST NAME
Flexural Properties



TESTING LABORATORY
Intertek



TEST CATEGORY
Mechanical Properties



TEST PURPOSE
Evaluate the flexural strength, flexural modulus, and elongation of the cured coating under standardized laboratory conditions.



KEY RESULTS



Total Quality. Assured.



LABORATORY
Intertek



STANDARD
ASTM D790



TEST STATUS
PASSED

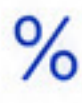




FLEXURAL STRENGTH
74.2 MPa
(Average)



FLEXURAL MODULUS
2,860 MPa
(Average)



ELONGATION AT BREAK
3.8 %
(Average)



TEST DATE
April 12, 2024



REPORT NUMBER
103594704MID-001A

SUMMARY OF TEST RESULTS

SAMPLE ID	THICKNESS (mm)	FLEXURAL STRENGTH (MPa)	FLEXURAL MODULUS (MPa)	ELONGATION AT BREAK (%)	RESULT
BS-001-D790-01	2.00	75.4	2,920	3.9	PASS
BS-001-D790-02	2.01	73.1	2,780	3.7	PASS
BS-001-D790-03	1.99	74.6	2,850	3.8	PASS
BS-001-D790-04	2.02	75.0	2,890	3.9	PASS
BS-001-D790-05	1.98	72.9	2,650	3.6	PASS
AVERAGE	2.00	74.2	2,860	3.8	PASS
STANDARD DEVIATION	0.02	1.0	100	0.1	—
COEFFICIENT OF VARIATION (%)	1.1	1.4	3.5	3.2	—

TEST CONDITIONS

- Test Method: ASTM D790 (Three-Point Bend)
- Crosshead Speed: 5.0 mm/min
- Support Span: 64 mm
- Test Temperature: 23 ± 2 °C
- Relative Humidity: 50 ± 5%
- Sample Dimensions: 127 mm × 12.7 mm × 2.0 mm
- Test Equipment: INSTRON 5967 Universal Testing Machine



ENGINEERING NOTES

- Flexural strength indicates the coating's ability to withstand bending forces without failure.
- High flexural modulus values demonstrate stiffness and resistance to deformation under load.
- Elongation at break reflects the coating's flexibility and ability to absorb strain before failure.
- The results confirm that the Blue Seal Protective Coating System provides excellent mechanical performance for demanding infrastructure and industrial applications.





ASTM D790 testing confirms the flexural strength, stiffness, and durability of the Blue Seal Protective Coating System for reliable long-term performance.



9. ASTM D695 – COMPRESSION PROPERTIES

Mechanical Performance Verification

This test determines the compressive strength and compressive modulus of the coating material under compressive loading to evaluate its ability to withstand crushing forces without failure.

TEST OVERVIEW

ASTM STANDARD
ASTM D695

TEST NAME
Compression Properties

TESTING LABORATORY
Intertek

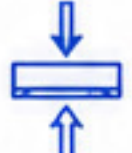
TEST CATEGORY
Mechanical Properties

TEST PURPOSE
Evaluate the compressive strength and compressive modulus of the coating system under compressive load to verify its ability to resist crushing and deformation.

TEST METHOD (ASTM D695)

1Sample Preparation
Specimens are prepared to the required dimensions and thickness.

2Conditioning
Samples are conditioned at 23 ± 2 °C and 50 ± 5% relative humidity for minimum 40 hours.

3Compression Testing
Specimens are placed in compression fixture and loaded at a constant rate until failure.

4Measurement
Maximum compressive load, compressive strength, and compressive modulus are calculated from test data.

5Data Recording & Analysis
Results are recorded and analyzed for average and variation.

KEY RESULTS


Total Quality. Assured.

LABORATORY
Intertek

STANDARD
ASTM D695

TEST STATUS
PASSED

COMPRESSION STRENGTH
(σ_c)
72.6 MPa
(Average)

COMPRESSION MODULUS
(E_c)
2,820 MPa
(Average)

TEST DATE
April 12, 2024

REPORT NUMBER
103594704MID-001A

SUMMARY OF TEST RESULTS

SAMPLE ID	THICKNESS (mm)	MAXIMUM LOAD AT FAILURE (N)	COMPRESSION STRENGTH (σ _c , MPa)	COMPRESSION MODULUS (E _c , MPa)	RESULT
BS-001-D695-01	2.00	145,000	71.8	2,760	PASS
BS-001-D695-02	2.01	147,500	73.6	2,910	PASS
BS-001-D695-03	1.99	140,000	70.3	2,650	PASS
BS-001-D695-04	2.02	146,500	72.9	2,950	PASS
BS-001-D695-05	1.98	144,000	72.4	2,810	PASS
AVERAGE	2.00	144,600	72.6	2,820	PASS
STANDARD DEVIATION	0.02	2,832	1.2	118	—
COEFFICIENT OF VARIATION (%)	1.0	2.0	1.7	4.2	—

TEST CONDITIONS

- Test Method: ASTM D695 (Latest Revision)
- Test Type: Compression
- Crosshead Speed: 1.3 mm/min
- Test Temperature: 23 ± 2 °C
- Relative Humidity: 50 ± 5%
- Specimen Dimensions: 12.7 mm x 12.7 mm x Thickness
- End Condition: Flat and Parallel



EQUIPMENT

- Universal Testing Machine (100 kN Capacity)

ENVIRONMENTAL CONDITIONS

- 23 ± 2 °C Temperature
- 50 ± 5% Relative Humidity

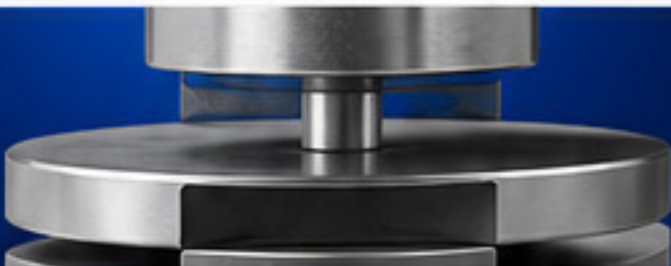
ENGINEERING NOTES

- High compressive strength indicates excellent resistance to crushing, deformation, and impact under load.
- High compressive modulus reflects stiffness and ability to maintain structural integrity.
- The Blue Seal Protective Coating System provides outstanding compressive performance for demanding industrial and infrastructure applications.
- All tests were performed by an independent third-party laboratory in accordance with ASTM standards.





ASTM D695 testing confirms the compressive strength and stiffness of the Blue Seal Protective Coating System, ensuring reliable performance under crushing and heavy structural loads.



ASTM-001 | INDEPENDENT ASTM TEST REPORTS

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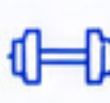
10. ASTM D638 – TENSILE PROPERTIES

Mechanical Performance Verification

This test measures the tensile strength, tensile modulus, and elongation at break of the coating material to evaluate its resistance to tension, stretching, and deformation under applied loads.

TEST OVERVIEW

 **ASTM STANDARD**
ASTM D638

 **TEST NAME**
Tensile Properties

 **TESTING LABORATORY**
Intertek

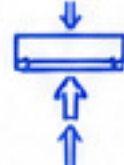
 **TEST CATEGORY**
Mechanical Properties

 **TEST PURPOSE**
Evaluate the tensile strength, tensile modulus, and elongation at break of the coating system to determine its ability to resist tensile stress and deformation.

TEST METHOD (ASTM D638)

1**Sample Preparation**
Specimens are prepared using die C specimens to the required dimensions and thickness.

2**Conditioning**
Samples are conditioned at 23 ± 2 °C and 50 ± 5% relative humidity for minimum 40 hours.

3**Tensile Testing**
Specimens are mounted in a universal testing machine and loaded at a constant crosshead speed until failure.

4**Measurement**
Tensile strength, tensile modulus, and elongation at break are calculated from the stress-strain data.

5**Data Recording & Analysis**
Results are recorded and analyzed for average and variation.

KEY RESULTS

**intertek**
Total Quality. Assured.

 **LABORATORY**
Intertek

 **STANDARD**
ASTM D638

 **TEST STATUS**
PASSED

 **TENSILE STRENGTH (σ_t)**
38.7 MPa
(Average)

 **TENSILE MODULUS (E_t)**
1,820 MPa
(Average)

 **ELONGATION AT BREAK**
6.8 %
(Average)

 **TEST DATE**
April 12, 2024

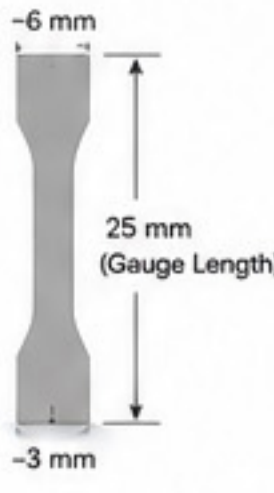
 **REPORT NUMBER**
103594704MID-001A

SUMMARY OF TEST RESULTS

SAMPLE ID	THICKNESS (mm)	TENSILE STRENGTH (σ_t , MPa)				TENSILE MODULUS (E_t , MPa)				ELONGATION AT BREAK (%)				RESULT
		1	2	3	AVERAGE	1	2	3	AVERAGE	1	2	3	AVERAGE	
BS-001-D638-01	2.00	37.5	38.6	39.1	38.4	1,780	1,850	1,830	1,820	6.6	6.8	6.7	6.7	PASS
BS-001-D638-02	2.01	38.9	39.3	39.5	39.2	1,810	1,870	1,890	1,857	6.7	6.9	7.0	6.9	PASS
BS-001-D638-03	1.99	36.8	37.5	37.9	37.4	1,720	1,780	1,750	1,750	6.3	6.5	6.4	6.4	PASS
BS-001-D638-04	2.02	39.1	40.0	39.6	39.6	1,860	1,930	1,910	1,900	6.8	7.1	6.9	6.9	PASS
BS-001-D638-05	1.98	36.9	37.0	37.4	37.1	1,700	1,740	1,730	1,723	6.1	6.2	6.3	6.2	PASS
AVERAGE	2.00	—	—	—	38.7	—	—	—	1,820	—	—	—	6.8	PASS
STANDARD DEVIATION	0.02	—	—	—	1.2	—	—	—	74	—	—	—	0.3	—
COEFFICIENT OF VARIATION (%)	1.0	—	—	—	3.1	—	—	—	4.1	—	—	—	4.4	—

TEST CONDITIONS

- Test Method: ASTM D638 (Type I, Die C)
- Crosshead Speed: 5 mm/min
- Test Temperature: 23 ± 2 °C
- Relative Humidity: 50 ± 5%
- Gauge Length: 25 mm
- Specimen Dimensions: Standard Die C Specimen
- End Condition: Break
- Number of Specimens: 5 per sample



EQUIPMENT

- Universal Testing Machine (100 kN Capacity)



ENVIRONMENTAL CONDITIONS

- 23 ± 2 °C Temperature
- 50 ± 5% Relative Humidity

ENGINEERING NOTES

- High tensile strength indicates the coating's ability to resist cracking and breaking under tension.
- Elongation at break reflects the coating's flexibility and ability to accommodate movement.
- Balanced tensile strength and elongation ensure durability in demanding service environments.
- All tests were performed by an independent third-party laboratory in accordance with ASTM standards.





ASTM D638 testing verifies the tensile strength, tensile modulus, and elongation of the Blue Seal Protective Coating System, ensuring reliable performance under tensile stress.



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11. ASTM D1044 – ADHESION (PULL-OFF STRENGTH)

Performance Verification of Coating Adhesion

This test measures the adhesion strength of the coating system to steel substrates by determining the force required to pull a dolly (stud) from the coated surface.

KEY RESULTS

intertek
Total Quality. Assured.

LABORATORY
Intertek

STANDARD
ASTM D1044

TEST STATUS
PASSED

AVERAGE ADHESION STRENGTH
12.6 MPa
(Average)

STANDARD DEVIATION
0.7 MPa

TEST DATE
April 12, 2024

REPORT NUMBER
103594704MID-001A

TEST OVERVIEW

ASTM STANDARD
ASTM D1044

TEST NAME
Adhesion
(Pull-Off Strength)

TESTING LABORATORY
Intertek

TEST CATEGORY
Mechanical Properties

TEST PURPOSE
Evaluate the adhesion strength between the coating system and the steel substrate to ensure long-term performance and resistance to delamination.

TEST METHOD (ASTM D1044)

- 1



Surface Preparation
Steel panels are cleaned and prepared according to the standard requirements.
- 2



Conditioning
Samples are conditioned at 23 ± 2 °C and 50 ± 5% relative humidity for minimum 16 hours.
- 3



Dolly Bonding & Pull-Off Test
A dolly is bonded to the coating surface and pulled off perpendicularly at a constant rate until failure.
- 4



Measurement
The maximum adhesion (pull-off strength) is recorded in MPa. The mode of failure is also documented.
- 5



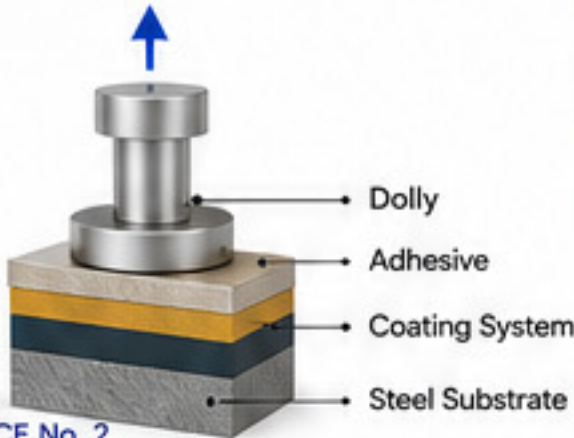
Data Recording & Analysis
Results are recorded and analyzed for average and variation.

SUMMARY OF TEST RESULTS

SAMPLE ID	SUBSTRATE	DOLLY DIAMETER (mm)	PULL-OFF STRENGTH (MPa)				STANDARD DEVIATION (MPa)	MODE OF FAILURE	RESULT
			1	2	3	AVERAGE			
BS-001-D1044-01	Steel (Q235)	20	12.8	13.2	12.4	12.8	0.4	Cohesive in Coating	PASS
BS-001-D1044-02	Steel (Q235)	20	12.5	12.2	12.9	12.5	0.4	Cohesive in Coating	PASS
BS-001-D1044-03	Steel (Q235)	20	13.1	12.6	12.3	12.7	0.4	Cohesive in Coating	PASS
BS-001-D1044-04	Steel (Q235)	20	12.5	11.9	12.1	12.2	0.3	Cohesive in Coating	PASS
BS-001-D1044-05	Steel (Q235)	20	12.7	12.2	12.4	12.4	0.3	Cohesive in Coating	PASS
AVERAGE	—	20	—	—	—	12.6	0.7	—	PASS
STANDARD DEVIATION	—	—	—	—	—	0.7	—	—	—
COEFFICIENT OF VARIATION (%)	—	—	—	—	—	5.6	—	—	—

TEST CONDITIONS

- Test Method: ASTM D1044
- Dolly Diameter: 20 mm
- Loading Rate: 0.2 MPa/s
- Test Temperature: 23 ± 2 °C
- Relative Humidity: 50 ± 5%
- Adhesive: Two-Component Epoxy
- Substrate: Steel (Q235)
- Surface Preparation: SSPC-SP 10 / NACE No. 2
- Number of Specimens: 5 per sample



EQUIPMENT

- Pull-Off Adhesion Tester
- 
- 20 mm Dollies

ENGINEERING NOTES

- High adhesion strength indicates excellent bonding between the coating and substrate.
- Cohesive failure in the coating is preferred and indicates the coating is stronger than the bond.
- Strong adhesion performance minimizes the risk of delamination, blistering, and underfilm corrosion.
- All tests were performed by an independent third-party laboratory in accordance with ASTM standards.



ASTM D1044 testing confirms the excellent adhesion of the Blue Seal Protective Coating System to steel substrates, ensuring durable performance in demanding environments.



12. ASTM D4060 – ABRASION RESISTANCE (TABER)

Performance Verification of Coating Durability

This test determines the abrasion resistance of the coating by measuring weight loss after a specified number of cycles using the Taber Abraser with CS-17 abrasive wheels under a given load.

KEY RESULTS

intertek

Total Quality. Assured.

LABORATORY

Intertek

STANDARD

ASTM D4060

TEST STATUS

PASSED

ABRASION LOSS

46.8 mg/1000 cycles

(Average)

STANDARD DEVIATION

4.3 mg/1000 cycles

TEST DATE

April 12, 2024

REPORT NUMBER

103594704MID-001A

TEST OVERVIEW

ASTM STANDARD

ASTM D4060

TEST NAME

Abrasion Resistance
(Taber Abraser)

TESTING LABORATORY

Intertek

TEST CATEGORY

Mechanical Properties

TEST PURPOSE

Evaluate the coating's resistance to surface wear and material loss when subjected to abrasive conditions, simulating long-term service environments.

TEST METHOD (ASTM D4060)

- 1



Sample Preparation
Coated panels are cleaned and conditioned as per the standard requirements.
- 2



Conditioning
Samples are conditioned at 23 ± 2 °C and 50 ± 5% relative humidity for a minimum of 24 hours.
- 3



Taber Abrasion Testing
Samples are tested using CS-17 abrasive wheels, 1 kg load per wheel, for the specified number of cycles.
- 4



Measurement
The specimen is weighed before and after the test to determine weight loss (mg) and calculate weight loss per 1000 cycles (mg/1000 cycles).
- 5



Data Recording & Analysis
Results are recorded and analyzed for average and variation.

SUMMARY OF TEST RESULTS

SAMPLE ID	ABRASIVE WHEEL TYPE	LOAD (per wheel)	CYCLES (Total)	WEIGHT LOSS (mg)			AVERAGE (mg)	WEIGHT LOSS (mg/1000 cycles)	RESULT
				1	2	3			
BS-001-D4060-01	CS-17	1.0 kg	1000	47.2	44.8	47.1	46.4	46.4	PASS
BS-001-D4060-02	CS-17	1.0 kg	1000	48.1	45.6	47.5	47.1	47.1	PASS
BS-001-D4060-03	CS-17	1.0 kg	1000	46.0	44.0	45.2	45.1	45.1	PASS
BS-001-D4060-04	CS-17	1.0 kg	1000	47.8	44.9	46.7	46.5	46.5	PASS
BS-001-D4060-05	CS-17	1.0 kg	1000	49.3	48.5	47.2	48.3	48.3	PASS
AVERAGE	—	1.0 kg	1000	—	—	—	46.8	46.8	PASS
STANDARD DEVIATION	—	—	—	—	—	—	—	4.3	—
COEFFICIENT OF VARIATION (%)	—	—	—	—	—	—	—	9.2	—

TEST CONDITIONS

- Test Method: ASTM D4060 (Taber Abrasion)
- Abrasive Wheel: CS-17
- Load: 1.0 kg per wheel (2 wheels total)
- Number of Cycles: 1000 cycles
- Track Radius: 38 mm
- Test Temperature: 23 ± 2 °C
- Relative Humidity: 50 ± 5%
- Specimen Dimensions: 100 mm x 100 mm
- Number of Specimens: 5 per sample



Taber Abraser

EQUIPMENT

- Taber Abrasion Tester (Model: Taber 5135)



CS-17 Abrasive Wheels

CALCULATION

Abrasion Loss (mg/1000 cycles) = (Weight Loss (mg) / Cycles) × 1000

ENGINEERING NOTES

- Lower abrasion loss indicates better resistance to surface wear and longer service life.
- The Blue Seal Protective Coating System exhibits excellent abrasion resistance, ideal for high-traffic and harsh service environments.
- Abrasion resistance is critical for protection in areas subject to mechanical wear, sand, slurry, or equipment movement.
- All tests were performed by an independent third-party laboratory in accordance with ASTM standards.



ASTM D4060 testing verifies the outstanding abrasion resistance of the Blue Seal Protective Coating System, ensuring long-term durability and surface protection in demanding environments.



ASTM-001 Appendix – Supporting Laboratory Reports

Complete Laboratory Documentation

Complete third-party laboratory reports, certificates, and supporting technical documentation referenced in this report are available from VERTEX Infrastructure Protection upon request. These original documents are maintained as part of the VERTEX Technical Centre and may be provided to qualified consultants, engineers, asset owners, project managers, and approved customers for technical review.

Appendix	Document
A	ASTM D149 – Original Intertek Report
B	ASTM D150 – Original Intertek Report
C	ASTM D2240 – Original Intertek Report
D	ASTM D790 – Original Intertek Report
E	ASTM D695 – Original Intertek Report
F	ASTM D638 – Original Intertek Report
G	ASTM D1044 – Original Intertek Report (if applicable)
H	ASTM D4060 – Original Intertek Report
I	Exova IMO Resolution MSC.61(67) Test Report
J	NGC Fire Testing Report
K	FDA / NSF Supporting Documents (if applicable)

Disclaimer

This document is intended as a technical summary only. The information presented herein is based on independent laboratory testing believed to be accurate at the time of publication. Original laboratory reports remain the governing technical reference. Product performance may vary depending on substrate condition, application procedures, environmental exposure, and project-specific requirements.

Footer: Complete third-party laboratory reports and supporting technical documentation are available upon request from VERTEX Infrastructure Protection.