



Keystone Compliance, LLC  
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New Castle, PA 16101

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**Automated Drive and Design (ADandD)**

**2309-092N**



# Environmental Test Report 2309-092N Rev. B

Test Standards: ISO 20653

For

## Automated Drive and Design (ADandD)

6350 Inwood Drive  
Columbus IN 47201

On

## Enclosure


Model Number: SEPL-2; Part Number: N/A; Serial Number: N/A

**Performed By:** Keystone Compliance, LLC.

131 Columbus Inner Belt  
New Castle, PA 16101

Keystone Compliance, LLC. does hereby certify that all inspections and tests have been performed in accordance with the documents referenced herein with exceptions as noted in this report. The results in this report pertain to the specified equipment tested, as received. This report shall not be reproduced, except in full, without the written authorization of Keystone Compliance, LLC.

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**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**

<b>Document History</b>				
Revision	Issue Date	Description of Modifications	Revised By	Approved By
N/C	9/27/2023	Initial release	N/A	T.M.
A	9/27/2023	Updated company name and model number	TB	TM
B	TB	Updated company name	TB	TM

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**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**


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### Client Information

<b>Purchase Order</b>	<b>P1119847</b>
<b>Quote Number</b>	<b>2309-092N</b>
<b>EUT Arrival Date</b>	<b>9/20/2023 -- Received in good condition</b>
<b>Company Name</b>	<b>Automated Drive and Design (ADandD)</b>
<b>Address</b>	<b>6350 Inwood Drive</b>
<b>City, State Zip</b>	<b>Columbus IN 47201</b>
<b>Contact Name</b>	<b>Steve Ronsheim</b>
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### Test Facility Information

<b>Test Laboratory</b>	<b>Keystone Compliance, LLC.</b>
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### Test Program Information

<b>Test Personnel</b>	<b>Chad Christopher -- Environmental Test Technician</b>
<b>Test Title &amp; Test Dates</b>	<b>IPX9K High Pressure/Steam Jet Cleaning – September 21, 2023</b> <b>IP6X Dust Tight – September 21, 2023 to September 22, 2023</b>

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**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**

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**Introduction**

This report documents the results of the Environmental tests performed on the Enclosure, Model Number: SEPL-2; Part Number: N/A; Serial Number: N/A, submitted by Automated Drive and Design (ADandD)

The Environmental test programs described herein were performed in accordance with the applicable requirements of ISO 20653.

Statements of compliance are made in this report without taking measurement uncertainty into account, except for when specifically requested by the customer. Where statements of compliance are made in this report, the following decision rules are applied:

Complied/Met the criteria of the specification - Results are within the limits

Non-Compliant/Did not meet the criteria of the specification - Results exceed the limits

All test data is included in Section 3 of this document.

All tests performed at Keystone Compliance New Castle, PA Environmental test facility. All tests were performed using the test set-ups of the relevant standard for tests performed in laboratory conditions.

**Acronyms and Abbreviations**

**M/N** – Model Number

**P/N** – Part Number


**S/N** – Serial Number

**UUT** – Unit Under Testing

**EUT** – Equipment Under Testing

**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**
**Equipment Under Test(s)**

EUT		
Description		Manufacturer
Enclosure		Automated Drive and Design (ADandD)
Model Number	Part Number	Serial Number
SEPL-2	N/A	N/A

	EUT
	Enclosure

**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**
**Summary of Tests Performed & Results**
**Table 1 Tests Performed & Results**

Report Paragraph	Test Description	Specification	Results
3.3	IPX9K High Pressure/Steam Jet Cleaning	ISO 20653	Post Test Inspection revealed no visible damage, defects or any other abnormalities due to testing. The unit was opened and no water ingress was found. The Enclosure met the requirements of the specification.
3.4	IP6X Dust Tight	ISO 20653	Post Test Inspection revealed no visible damage, defects or any other abnormalities due to testing. The unit was opened and there was no sign of dust ingress. The Enclosure met the requirements of the specification.



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ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)

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**Section 1 – Test Conditions and Equipment**

**1.1 Ambient Environmental Conditions**

Unless otherwise specified herein, all tests were performed at an atmospheric pressure of 28  $\pm$ 2.5 inches of mercury absolute, a temperature of 75  $\pm$ 15°F, and a relative humidity of 50  $\pm$ 30%.

**1.2 Instrumentation and Equipment**

Measuring and test equipment, utilized in the performance of these tests, was calibrated in accordance with ANSI/NCSL Z540-3-2006, by Keystone Compliance, LLC. or a commercial facility, utilizing reference standards (or interim standards) whose calibrations have been certified as being traceable to the National Institute of Standards & Technology (NIST). All reference standards utilized in the above calibration system are supported by certificates, reports, or data sheets attesting to the date, accuracy, and conditions under which the results furnished were obtained. All subordinate standards, measuring and test equipment are supported by like data, when such information is essential to achieve the accuracy control required by the procedure.

Keystone Compliance, LLC. attests that the commercial sources providing calibration services on the above referenced equipment, other than the NIST Standards are in fact capable of performing the required services to the satisfaction of Keystone Compliance, LLC. Quality Assurance. Certifications of all calibrations performed are retained on file in the Keystone Compliance, LLC. Quality Assurance Department, and are available for inspection upon request by customer representatives.

The test equipment utilized during this test program is listed on individual Test Equipment Sheets located in Section 3 of this document.

**1.3 Tolerances**

All test conditions were maintained within all applicable specified tolerances.

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ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)

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**Section 2 – References**

**2.1 Applicable Specifications**

Reference Specification Title	<b>ISO 20653</b> <b>Road vehicles - Degrees of protection (IP code) - Protection of electrical equipment against foreign objects, water and access</b>
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Calibration Information	<b>ANSI/NCSL Z540-3-2006</b> <b>Calibration Laboratories and Measuring Test Equipment - General Requirements</b>
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**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**
**Section 3 – Test Logs, Test Equipment, Test Data, & Test Photographs**
**3.1 Test Log**

Test Log			
EUT:	Enclosure	Job Number:	2309-092N
Customer:	Automated Drive and Design (ADandD)	Model Number:	N/A
Date:	9/21/2023 – 9/22/2023	Part Number:	N/A
Test Engineer:	C. Christopher	Serial Number:	N/A

Date	Time	Description
<b>ISO 20653 IPX9K High Pressure/Steam Jet Cleaning</b>		
9/21/2023	11:53	Started the IPX9K High Pressure/Steam Jet Cleaning Test.
	11:56	Ended the test.
		Post Test Inspection revealed no visible damage, defects or any other abnormalities due to testing. The unit was opened and no water ingress was found. The Enclosure met the requirements of the specification.
<b>ISO 20653 IP6X Dust Tight</b>		
9/21/2023	2:30	The Enclosure was put into the dust chamber and pictures were taken. Started the IP6X Dust Tight Test.
	7:32	Ended the test.
9/22/2023	8:15	Post Test Inspection revealed no visible damage, defects or any other abnormalities due to testing. The unit was opened and there was no sign of dust ingress. The Enclosure met the requirements of the specification.

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**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**


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**3.2 Equipment List**

Equipment Log			
EUT:	Enclosure	Job Number:	2309-092N
Customer:	Automated Drive and Design (ADandD)	Model Number:	N/A
Date:	9/21/2023 – 9/22/2023	Part Number:	N/A
Test Engineer:	C. Christopher	Serial Number:	N/A

Test Equipment					
Asset No.	Description	Manufacturer	Model	Serial No.	Cal. Due
NC078	Dust Chamber	Central Pneumatic	UPC: 79236368893 2	367822243	UWCE
NG081	IPX9 Pressure Source	Realtree	EZ04035G-K- GP-12	1622315	UWCE
NG096	IPX9 Water Jet Fixture	Keystone Compliance	None	None	UWCE
NG106	Variable Speed Turntable	Keystone Compliance	KC-ENV	01	UWCE
NG188	Arizona Test Dust	PTI	None	None	IPU
NG276	Stopwatch	Control Company	1051,94460- 28	230285870	4/24/2025
NP028	Pressure Gauge	WIKA	23X.34	None	12/14/2023
OA085	Laptop	Samsung	GALAXY BOOK	4WPD9FGR9 00070	UWCE
OC033	Smart Phone	Google	PIXEL 2 XL	3580340897 68375	UWCE

**UWCE:** Used with Calibrated Equipment

**REF:** Reference Only

**IPU:** Inspect Prior to Use

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**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**

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**3.3 IPX9K High Pressure/Steam Jet Cleaning Test**

- a) The IPX9K High Pressure/Steam Jet Cleaning test requirements for the Enclosure are specified in ISO 20653.
- b) The IPX9K High Pressure/Steam Jet Cleaning test log for the Enclosure is located in Paragraph 3.1 of this document.
- c) The IPX9K High Pressure/Steam Jet Cleaning test equipment used to test the Enclosure is located in Paragraph 3.2 of this document.
- d) All recorded test data for the IPX9K High Pressure/Steam Jet Cleaning test on the Enclosure is located in Paragraph 3.3.1 of this document.
- e) The IPX9K High Pressure/Steam Jet Cleaning test photographs for the Enclosure are located in Paragraph 3.3.2 of this document.

**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**
**3.3.1 IPX9K High Pressure/Steam Jet Cleaning Test Data**

IPX9K Powerful High Temp Water Jet Data Sheet			
EUT:	Enclosure	Job Number:	2309-092N
Customer:	Automated Drive and Design (ADandD)	Model Number:	N/A
Date:	9/21/2023	Part Number:	N/A
Test Engineer:	C. Christopher	Serial Number:	N/A

**Test Data**

Second Char. numeral	Degree of protection	
	Brief description	Definition
9K	Protected against the effects of water with high pressure/steam jet cleaning.	Water directed at a high pressure against the enclosure from any direction shall have no harmful effects.

**Test Procedure (before beginning test):**

The test is made by spraying the equipment under test with high temperature, high pressure water so that the following conditions are satisfied:

- a. The equipment under test is positioned at a distance of 100 mm to 150 mm from the spray nozzle at 0°, 30°, 60°, and 90° angles.
- b. The equipment under test has a rotation speed of 5 +/- 1 revolution per minute.
- c. The test duration at each test position is 30 seconds.
- d. The water temperature is 80°C +/-5.
- e. The water flow rate is 14 to 16 liters per minute.
- f. The water pressure is about 8000 to 10000 kPa.
- g. The angle of the fan jet nozzle is 30 +/-5.
- h. The jet distribution is between 8 +/-2 mm at a distance of 100 mm and 10 +/-2 mm at a distance of 150 mm.

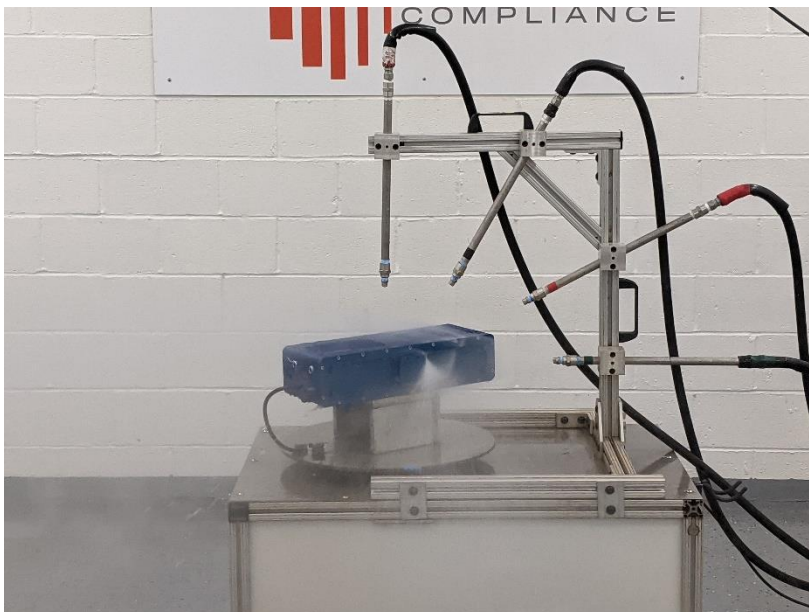
ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)

3.3.2 IPX9K High Pressure/Steam Jet Cleaning Test Photographs



IPX9K High Pressure/Steam Jet Cleaning

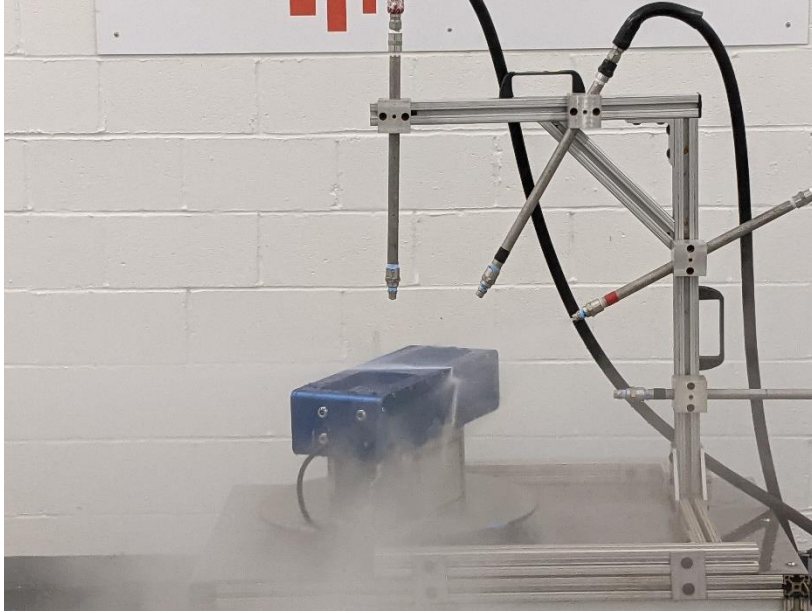
Test Setup



IPX9K High Pressure/Steam Jet Cleaning

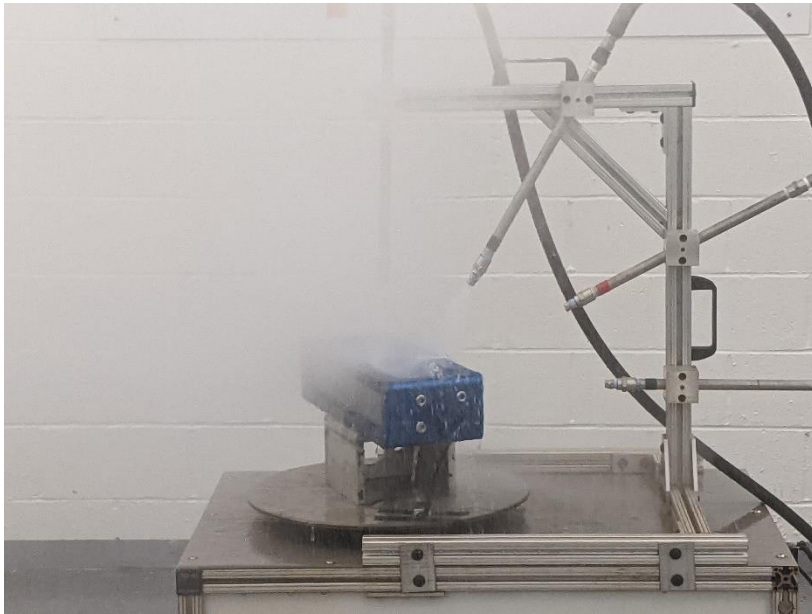
Typical 0° Spray

**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**



**IPX9K High Pressure/Steam Jet  
Cleaning**

**Typical 30° Spray**



**IPX9K High Pressure/Steam Jet  
Cleaning**

**Typical 60° Spray**

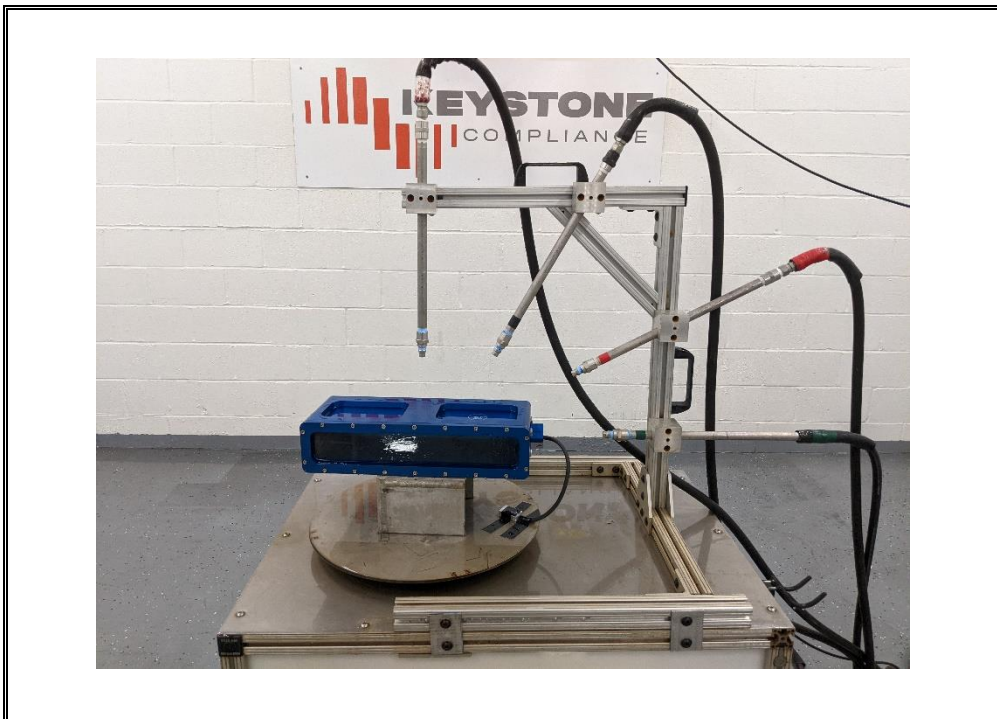


**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**



**IPX9K High Pressure/Steam Jet Cleaning**

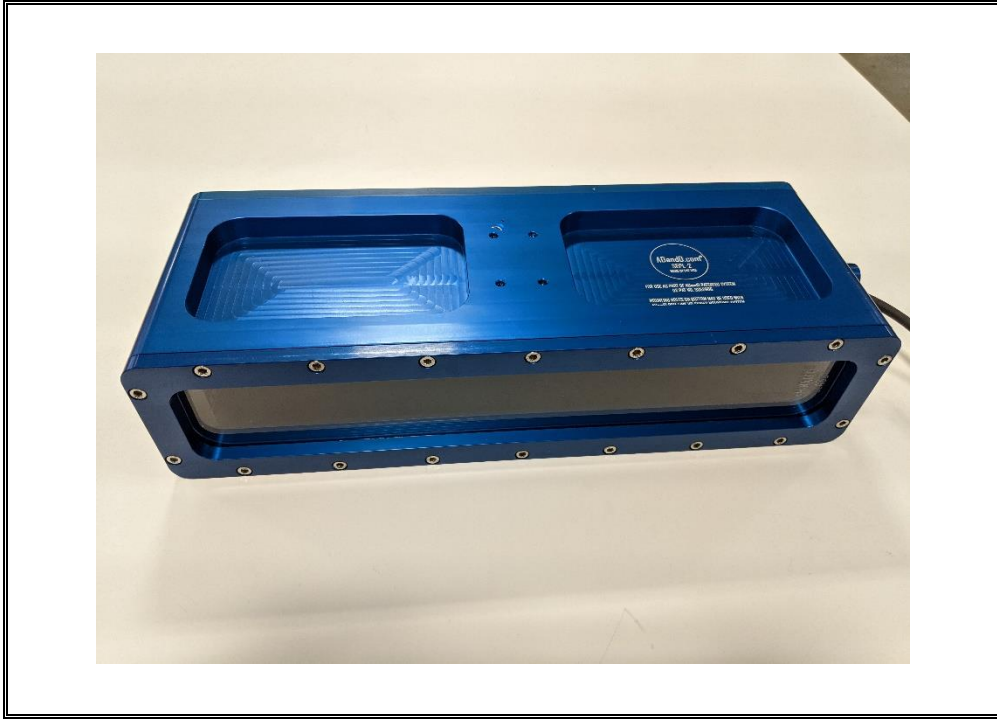
**Typical 90° Spray**



**IPX9K High Pressure/Steam Jet Cleaning**

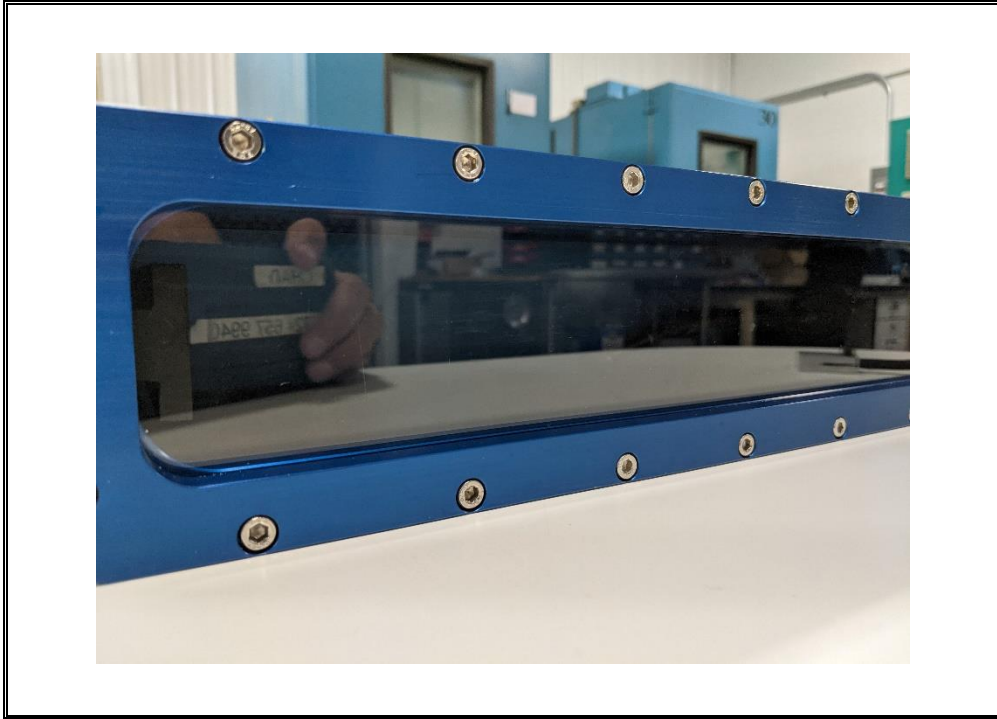
**Post Test**

**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**



**IPX9K High Pressure/Steam Jet Cleaning**

**Post Test Inspection**



**IPX9K High Pressure/Steam Jet Cleaning**

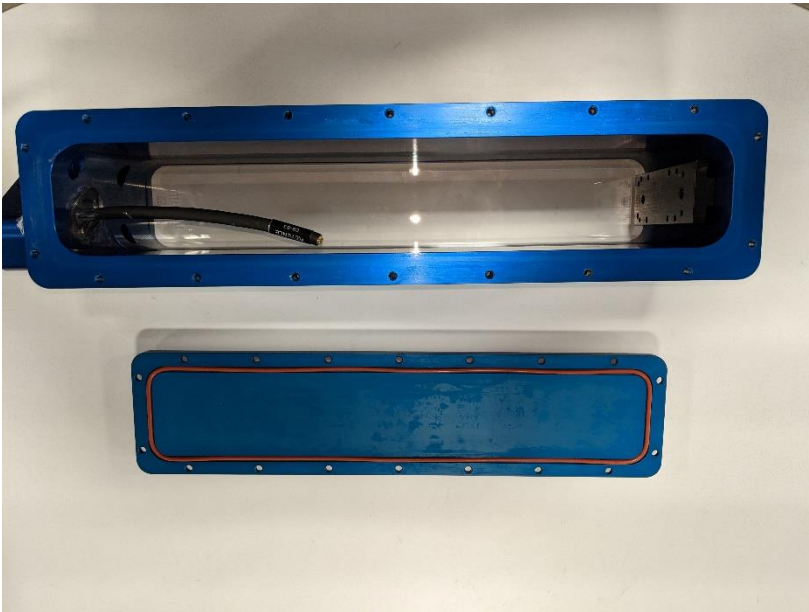
**Post Test Inspection**

**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**



**IPX9K High Pressure/Steam Jet Cleaning**

**Post Test Inspection**



**IPX9K High Pressure/Steam Jet Cleaning**

**Post Test Inspection**



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**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**

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**3.4 IP6X Dust Tight Test**

- a) The IP6X Dust Tight requirement for the Enclosure is specified in ISO 20653.
- b) The IP6X Dust Tight test log for the Enclosure is located in Paragraph 3.1 of this document.
- c) The IP6X Dust Tight test equipment used to test the Enclosure is located in Paragraph 3.2 of this document.
- d) All recorded test data for the IP6X Dust Tight test on the Enclosure is located in Paragraph 3.4.1 of this document.
- e) The IP6X Dust Tight test photograph for the Enclosure is located in Paragraph 3.4.2 of this document.



**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**
**3.4.1 IP6X Dust Tight Test Data**

IP6X Data Sheet			
EUT:	Enclosure	Job Number:	2309-092N
Customer:	Automated Drive and Design (ADandD)	Model Number:	N/A
Date:	9/21/2023 – 9/22/2023	Part Number:	N/A
Test Engineer:	C. Christopher	Serial Number:	N/A
Test Specifications			
Test Spec:	ISO	Para./Sec.:	20653

**Test Data**

First Char. numeral	Degree of protection	
	Brief description	Definition
6k	Dust-tight	Dust Shall Not Penetrate

**Test Procedure (before beginning test):**

Determine Atmospheric conditions prior to testing. Temperature range: 15°C to 35°C  
 Relative humidity: 25 % to 75 % Air pressure: 86 kPa to 106 kPa. Unless otherwise agreed, test dust A2 (Arizona dust) according to ISO 12103-1 shall be used. Where a dust chamber in accordance with [Figure 1](#) is used, approximately 2 kg of test dust per m<sup>3</sup> chamber volume shall be filled in and kept in suspension during the test. Where dust chambers according to [Figure 2](#) are used, the density of the air–dust mixture shall be (5 ± 2) g/m<sup>3</sup> and a flow rate of 1,5 m/s shall be maintained in accordance with IEC 60068-2-68 (unless otherwise agreed). The enclosure to be tested shall be placed in the test chamber in its normal operating position, with all its shrouds, covers and open drain holes, and exposed to the following conditions:

- a) Test chamber according to [Figure 1](#):
- 6 s movement of the air–dust mixture,
  - 15 min break.

Unless otherwise agreed, 20 such cycles shall be performed.

- b) Test chamber according to [Figure 2](#):

Subject to agreement: exposure time 0,5 h to 24 h and speed (0 to 3) min–1.



**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**



**IP6X Dust Tight**

**Post Test Inspection**



**IP6X Dust Tight**

**Post Test Inspection**



**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**

IP6X Dust Tight



Post Test Inspection

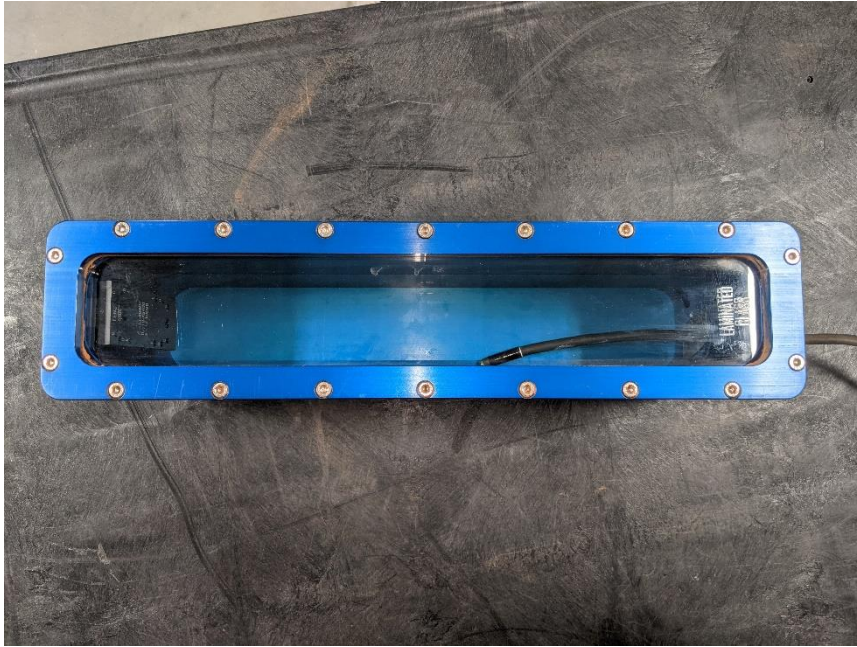
IP6X Dust Tight



Post Test Inspection

**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**

IP6X Dust Tight



Post Test Inspection

IP6X Dust Tight



Post Test Inspection



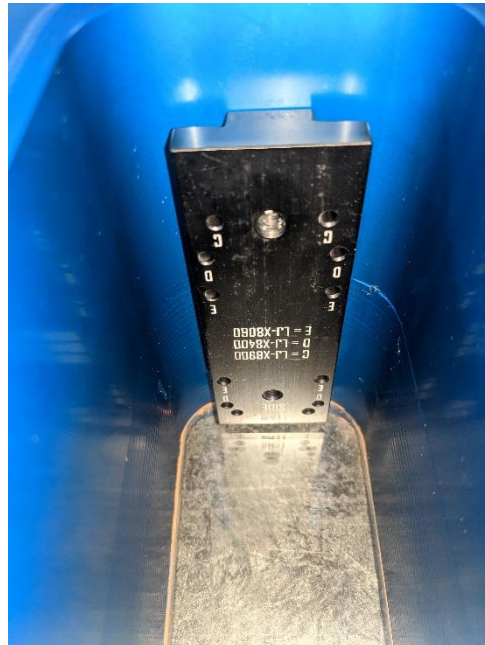
**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**

IP6X Dust Tight



Post Test Inspection

IP6X Dust Tight



Post Test Inspection

**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**

IP6X Dust Tight



Post Test Inspection

**ENVIRONMENTAL TEST REPORT FOR AUTOMATED DRIVE AND DESIGN (ADANDD)**
**Section 4 – Conclusion**

- a) The Enclosure, Model Number: SEPL-2; Part Number: N/A; Serial Number: N/A, was subjected to the following Environmental Tests in accordance with ISO 20653 and the specifications as shown in Table 2:

**Table 2 Tests Performed & Results**

Test Description	Specification	Results
IPX9K High Pressure/Steam Jet Cleaning	ISO 20653	Post Test Inspection revealed no visible damage, defects or any other abnormalities due to testing. The unit was opened and no water ingress was found. The Enclosure met the requirements of the specification.
IP6X Dust Tight	ISO 20653	Post Test Inspection revealed no visible damage, defects or any other abnormalities due to testing. The unit was opened and there was no sign of dust ingress. The Enclosure met the requirements of the specification.

- b) The Enclosure was returned to Automated Drive and Design (ADandD) after completion of the Environmental Test.