Engineering Report 40881-4

Water Intrusion (Immersion) Test

for

Mechatronics, Inc.
8152 - 304th Avenue S.E.
Preston, WA 98050

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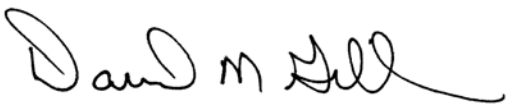
Approved By:	 David M. Gillen, Vice President
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Revision History

Revision	Total Number of Pages	Date	Description
--	10	October 27, 2009	Original

Prepared for:	Test Dates	
Mechatronics, Inc. 8152 - 304th Avenue S.E. Preston, WA 98050	**Start:**	10/5/2009
	Completion:	10/5/2009
	Environ Test Number:	**40881-4**
Attention: Mr. Shawn Psachos	**Purchase Order Number:**	**4772**
	Purchase Date:	9/8/2009

Water Intrusion (Immersion) Test

1.0 Abstract

1.1 Object

Subject four Fans to a Water Intrusion (Immersion) Test as specified in *IEC 60529*, Section 14.2.7, Category IPX7, as requested in Mechatronics, Inc. purchase order 4772, dated September 8, 2009.

1.2 Conclusions

Upon completion of the exposure there was no visible damage to any of the test units. All fans operated after the exposure with no significant change in current draw. Actual current readings are listed in Section 4.3 of this report and are recorded on Figure 1, the test data sheet.

2.0 Unit(s) Tested

Table 1: Units Tested

Manufacturer	Mechatronics, Inc.
Device	Four (4) Fans
Model/Part Number	F6025E12B, F8025H12B, G9225X12B, G1238L12B
Serial Number	N/A

The results of this test apply only to the units identified in this Engineering Report by device identifier and model / part number, or serial number.

3.0 Test Requested

Subject four Fans to a Water Intrusion (Immersion) Test as specified in *IEC 60529*, Section 14.2.7, Category IPX7.

Water Intrusion, Immersion Test

The test is made by completely immersing the enclosure in water in its service position as specified by the manufacturer so that the following conditions are satisfied:

a the lowest point of enclosures with a height less than 850 mm is located 1 meter below the surface of the water;

b the highest point of enclosures with a height equal to or greater than 850 mm is located 150 mm below the surface of the water;

c the duration of the test is 30 min;

d the water temperature does not differ from that of the equipment by more than 5K. However, a modified requirement may be specified in the relevant product standard if the tests are to be made when the equipment is energized and/or its parts in motion.

Acceptance conditions

After testing in accordance with the appropriate requirements of 14.2.7 the enclosure shall be inspected for ingress of water.

It is the responsibility of the relevant technical committee to specify the amount of water which may be allowed to enter the enclosure and the details of a dielectric strength test, if any.

In general, if any water has entered, it shall not:

- be sufficient to interfere with the correct operation of the equipment or impair safety;
- deposit on insulation parts where it could lead to tracking along the creepage distances;
- reach live parts or windings not designed to operate when wet;
- accumulate near the cable end or enter the cable if any.

If the enclosure is provided with drain holes, it should be proved by inspection that any water which enters does not accumulate and that it drains away without doing any harm to the equipment.

For enclosures without drain holes, the relevant product standard shall specify the acceptance conditions if water can accumulate to reach live parts.

4.0 **Instrumentation, Procedure, and Results**

4.1 Instrumentation

All instrumentation is calibrated regularly by instruments directly traceable to the National Institute of Standards and Technology, and in accordance with *MIL-I-45208A, ANSI/NCSL Z540.3-2006,* and *ISO/IEC 17025: 2005*.

Table 2: Instrumentation List

Equipment Number	Description	Manufacturer	Model Number	Last Calibration	Due Calibration	Range
200-232	Digital Thermometer	Fluke	51 II	3/26/2009	3/26/2010	-250° to +400°C
210-045	Digital Multimeter	Fluke	87 III	7/13/2009	7/13/2010	0 to 20 Amps
400-043	Stopwatch	Radio Shack	63-5017	9/17/2009	9/17/2010	0 to 24 hrs; .01 sec
770-029	Steel Rule	L.S. Starrett	404R	12/18/2008	12/18/2009	0 to 48 Inches

4.2 Procedure

The water temperature (17°C) was verified to not differ from the equipment temperature (21°C) by more than 5 Kelvin. The test units were immersed such that the units were 1 meter below the surface of the water. This condition was maintained for 30 minutes. At the end of the 30 minute period, the test units were removed from the water. The fans were immediately energized at 12 Vdc.

4.3 Results

Upon completion of the exposure there was no visible damage to any of the test units. All fans operated after the exposure with no significant change in current draw. Actual current readings are listed below and are recorded on Figure 1, the test data sheet. The test units were retained at Environ Laboratories for additional testing.

Table 3: Pre, and post-test current draw

Model	Pre-test current	Post-test current
F6025E12B	145 mA	141 mA
F8025H12B	130 mA	129 mA
G9225X12B	480 mA	474 mA
G1238L12B	230 mA	230 mA

Figure 1, herein, is the test data sheet. Photographs 1 and 2 show test units under test. Photographs 3 through 5 show test unit identification.

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DATA SHEET

Page (s)	1 of 1		
Test Date (s)	10/5/09		
Job Number	40881-4		
COMPANY: Mechatronics	DCAS ☐	Anomaly / Interruption ☐	
DEVICE: Fans	Witness ☐	Nonconformity / Deviation ☐	
MODEL NO.: See Below	Certified Witness ☐	Customer Present ☐	
SERIAL NO.: N/A	Specification Approved by Client (initial):_____		

TEST DESCRIPTION: Immersion SPEC: IEC 60529 SECTION: IPX7

Equipment List

400-043	200-232	210-045	770-029		

Conditions / Summary

Models F6025E12B
F8025H12B
G9225X12B
G1238L12B

Operational Check @ 12Vdc	Pre-Test Current	Post Test Current
F6025E12B	145mA	141mA
F8025H12B	130mA	129mA
G9225X12B	480mA	474mA
G1238L12B	230mA	230mA

Unit temperature = 21°C
water temperature = 17°C

Submerged sample for 30 minutes in 1 meter of water
Removed samples from water and immediately energized fans at 12Vdc

Results:
No visible damage
All fans operated after exposure with no significant change in current draw

Disposition: ☒ Retained at Environ ☐ Returned to Client ☐ Other

QAF 5.3.1 REV B: 5-1-2008

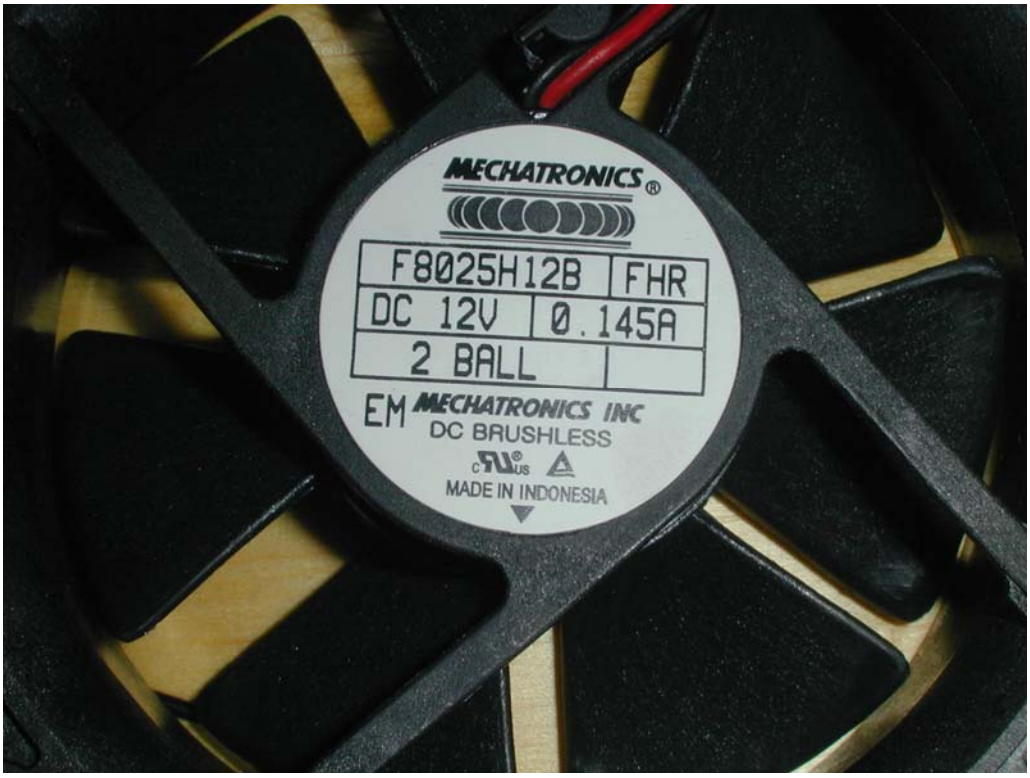
Test Performed By:

Figure 1: Water Intrusion (Immersion) Test Data Sheet

Photograph 1: Test unit under test

Photograph 2: Test unit under test

Photograph 3: Test unit identification



Photograph 4: Test unit identification

Photograph 5: Test unit identification