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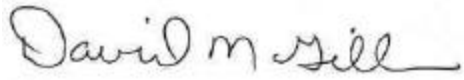
9725 GIRARD AVENUE SOUTH  
MINNEAPOLIS, MINNESOTA 55431-2621

## ENGINEERING REPORT NO. 29448-2

### “WATER INTRUSION TEST”

for

**MECHATRONICS, INC.  
8152 - 304<sup>th</sup> AVENUE S.E.  
PRESTON, WA 98050**

|                     |                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>PREPARED BY:</b> | <br>Daniel J. Larson<br>Senior Test Technician |
| <b>APPROVED BY:</b> | <br>David M. Gillen<br>Vice President          |

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## REVISION HISTORY

| Revision | Total Number<br>of Pages | Date        | Description |
|----------|--------------------------|-------------|-------------|
| -        | 5                        | 28 Mar 2003 | Original    |
|          |                          |             |             |

|                                                                                                                                            |                            |                |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------|
| <b>PREPARED FOR:</b><br><br>MECHATRONICS, INC.<br>8152 - 304 <sup>th</sup> AVENUE S.E.<br>PRESTON, WA 98050<br><br>ATTN: Mr. David Hazlett | <b>TEST DATES:</b>         |                |
|                                                                                                                                            | <b>Start:</b>              | 3/13/2003      |
|                                                                                                                                            | <b>Completion:</b>         | 3/13/2003      |
|                                                                                                                                            | <b>ENVIRON TEST NO.:</b>   | <b>29448-2</b> |
|                                                                                                                                            | <b>PURCHASE ORDER NO.:</b> | <b>6947</b>    |
|                                                                                                                                            | <b>PURCHASE DATE:</b>      | 3/7/2003       |

## WATER INTRUSION TEST

### 1.0 ABSTRACT

#### 1.1 Object

Subject two (2) Fans to a Water Intrusion Test per Mechatronics, Inc. Purchase Order No. 6947, dated March 7, 2003, in accordance with IEC 60529, IPX5 Requirements.

#### 1.2 Conclusions

Both test units remained operational throughout the test. A visual inspection conducted upon completion of the exposure period found no visible evidence of damage or degradation. The test units met the passing requirements for IEC 60529, IPX5.

### 2.0 UNIT(S) TESTED

|                        |                    |         |
|------------------------|--------------------|---------|
| <b>MANUFACTURER:</b>   | MECHATRONICS, INC. |         |
| <b>DEVICE:</b>         | Fans               |         |
| <b>MODEL/PART NO.:</b> | UF15P23            | UF12A23 |
| <b>SERIAL NO.:</b>     | -----              |         |

*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 the test units to a Water Intrusion Test per IEC 60529 for second characteristic numeral 5 as described in Paragraph 14.2.5. The test is to be made by spraying the enclosure from all practicable directions with a stream of water from a standard test nozzle such that the following conditions are met:

1. The internal diameter of the nozzle is to be 6.3mm.
2. The delivery rate is to be 12.5 liters/min  $\pm 5\%$  at whatever water pressure is necessary to achieve this flow.
3. The core of the substantial stream is to be a circle of approximately 40mm diameter at a distance of 2.5m from the nozzle.
4. Test duration per square meter of the enclosure surface likely to be sprayed is to be 1 minute.
5. The minimum duration is 3 minutes.
6. The distance from the nozzle to the enclosure surface is to be  $2.75 \pm .25$ m.

### 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 Z540-1-1994 and ISO/IEC 17025:1999.

| Equipment Number | Description | Manufacturer      | Model No. | Last Calibration | Due Calibration | Range         |
|------------------|-------------|-------------------|-----------|------------------|-----------------|---------------|
| 400-030          | Stopwatch   | Radio Shack       | 63-5014   | 3/29/2002        | 3/29/2003       | 0 to 10 Hours |
| 717-053          | Flowmeter   | Omega Instruments | FL-75B    | 1/21/2003        | 1/21/2004       | 1 to 10.3 GPM |

## 4.2 Procedure

The test units were placed onto the test stand and connected to the appropriate voltage source. Each test unit was sprayed with a stream of water from a 6.3mm diameter nozzle for a period of 1 minute and 30 seconds. The test units were then rotated 180° and opposite face of the test units were sprayed for an additional 1 minute and 30 seconds for a total of 3 minutes of exposure.

## 4.3 Results

Both test units remained operational throughout the test. A visual inspection conducted upon completion of the exposure period found no visible evidence of damage or degradation. The test units met the passing requirements for IEC 60529, IPX5.