

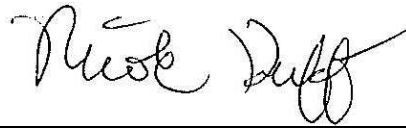
Engineering Report 58687-4

Water Intrusion (Immersion) Test

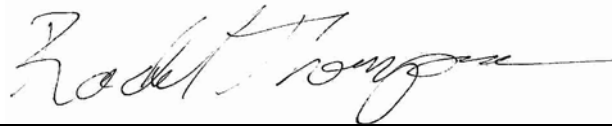
for

Seahorse Protective Equipment Cases

Prepared by

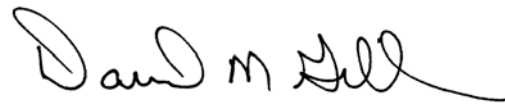


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Revision history

Revision	Total pages	Date	Description
--	9	June 4, 2019	Original

Prepared for	Seahorse Protective Equipment Cases		
Attention	Flavio Valencia	Test number	58687-4
Test start	2/7/2019	Test completion	2/15/2019
PO number	22660	Purchase date	2/12/2019

Water Intrusion (Immersion) Test

1.0 Abstract

1.1 Object

Subject two Seahorse Cases to a Water Intrusion (Immersion) Test as specified in *IEC 60529*, Edition 2.2, dated August 2013, Paragraph 14.2.7, IPX7, as requested in Seahorse Protective Equipment Cases purchase order 22660, dated February 12, 2019.

1.2 Conclusions

No water intrusion inside either test unit was observed upon completion of the test.

2.0 Unit(s) tested

Table 2-1: Units tested

Manufacturer	Seahorse Protective Equipment Cases	
Device	Two (2) Seahorse Cases	
Model/part number	230	530
Serial number	N/A	N/A
Sample identifier	UUT-58687-2	UUT-58687-3

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 two Seahorse Cases to a Water Intrusion (Immersion) Test as specified in *IEC 60529*, Edition 2.2, dated August 2013, Paragraph 14.2.7, IPX7.

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 5 kelvin (K). 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 performed, 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 *ANSI/NCSL Z540.3-2006*, and *ISO/IEC 17025: 2005*.

Table 4-1: Instrumentation list

Equipment Number	Description	Manufacturer	Model Number	Last Calibration	Due Calibration	Range
200-322	Digital Thermometer	Fluke	52 II	1/14/2019	1/14/2020	-200°C to 1372°C Type K; -250°C to 400°C Type T
400-062	Stopwatch	Extech	365510	1/11/2019	1/11/2021	0 to 23 hrs, 59 mins, 59 sec
770-068	Measuring Tape	Starrett	530-100	5/22/2018	5/22/2019	0 to 100 feet

4.2 Procedure

Each test unit was tested individually.

Test unit UUT-58687-2 was immersed such that the highest point of the enclosure was 1 meter below the surface of the water. The immersion was maintained for 30 minutes. The water temperature was verified to not differ from the equipment temperature by more than 5 K.

At the end of the 30 minute period, the test units were removed from the water, and the exterior was dried. The test unit was examined for evidence of water intrusion.

The procedure outlined above was repeated with test unit UUT-58687-3.

4.3 Results

No water intrusion inside either test unit was observed upon completion of the test.

The test units were retained at Element Minneapolis.

Test data and photographs are included in the following pages.

Data sheet [Immersion]

Company name	Seahorse Protective Equipment Cases	Performed by	Rachel Thompson	Page	1	of	1
Project number	58687-4	Specification	IEC 60529, IPX7				
DUT description	Seahorse Cases	Test date(s)	2/7/2019 through 2/15/2019				

Device under test information			
Description	Model / part number	Serial number	Sample identifier
Seahorse Cases	230	N/A	UUT-58687-2
	530	N/A	UUT-58687-3

Equipment list					
770-068	400-062	200-322			

Test conditions and summary
<p>Conditions</p> <ul style="list-style-type: none"> - Temperature of unit within 5°C of water - Time: 30 minutes - Immersion level: 1 meter <p>Summary</p> <p>2/7/2019 Unit UUT-58687-2 Temp unit: 18.8°C Temp Water: 18.4°C Start time: 11:27 am End time: 11:57 am</p> <p>2/7/2019 Unit UUT-58687-3 Temp unit: 18.0°C Temp Water: 18.2 °C Start time: 12:12 pm End time: 12:42 pm</p> <p>Results</p> <p>Unit UUT-58687-2 No water intrusion Unit UUT-58687-3 No water intrusion</p>

DUT disposition Retained at Element Minneapolis Returned to customer Other (describe):

Figure 4-1: Water Intrusion (Immersion) Test data sheet



Photograph 4-1: Test unit identification



Photograph 4-2: Water Intrusion (Immersion) Test setup for test unit UUT-58687-2



Photograph 4-3: Test unit UUT-58687-2 post-test



Photograph 4-4: Water Intrusion (Immersion) Test setup for test unit UUT-58687-3



Photograph 4-5: Test unit UUT-58687-3 post-test



Photograph 4-6: Test unit UUT-58687-3 post-test