Test Certification Letter

55842-1 Icing Test

Certification prepared for	**FT Technologies Ltd**		
Attention	Robin Strachan		
Test start	6/6/2017	**Test completion**	6/8/2017
Purchase order number	**P39126**	**Purchase date**	5/23/2017

Manufacturer	FT Technologies Ltd			
Device	Four (4) Wind Sensors			
Model/part number	FT742-D-DM	FT742-D-FF	FT742-D-PM	FT742-D-PM
Serial number	9000-280	9000-053	9000-353	9000-355
Sample identifier	1	2	3	4

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.

Element Minneapolis certifies that four Wind Sensors were subjected to an Icing Test as specified in FT Technologies Ltd *Technical Specification Drawing Number A9310*, Issue 4, dated April 26, 2017, Section 4, which references *MIL-STD-810G*, dated October 31, 2008, Method 521.3, Section 4.5.2, Procedure—Ice Accretion, as requested in FT Technologies Ltd purchase order P39126, dated May 23, 2017.

Randy J. Taklo, Environmental Test Technician

David M. Gillen, Senior Program Manager

Procedure

A blower with a laminar straightener and two spray nozzles were utilized for the test.

All test unit operation and monitoring was performed by a FT Technologies Ltd representative, who was present during the test.

The first test unit was subjected to the anti-icing portion of the test. The test unit was mounted to a pipe and placed vertically for testing. A 1-inch metal bar was placed in the test area to verify ice buildup. The anti-icing heater was turned on. Wind was verified at 15 m/sec. The wind and water were turned on. Once the chamber reached -15°C, the spray continued until 37 mm of ice had built up on the test bar.
The chamber was returned to ambient conditions.

The procedure outlined above was repeated with each of the remaining test units.

The first test unit was then subjected to the de-icing portion of the test. The test unit was mounted to a pipe and placed vertically for testing. The non-operating test unit was placed in a temperature chamber. The blower was turned on and verified to produce a wind speed of 15 m/sec. Water spray was turned on. The chamber was set to -15°C. Once the chamber reached -15°C, the water spray was continued until 37 mm of ice had built up on the test unit.

The wind and water were turned off and the test unit heater was turned on. The chamber was returned to ambient conditions.

Results

NOTE. Initially, it was difficult to build ice on the sensor without ice buildup on the on the support pipe. For this reason, a heater pad was attached to the support pipe; the heater pad did not transfer additional heat into the wind sensor.

Under the power conditions of 35 V and 6 A, the FT742-D-DM test unit successfully remained ice free while 37 mm of ice was built on an unheated bar behind the item under test. Under the power conditions of 35 V and 6 A, the FT742-D-DM test unit successfully melted free 37 mm of ice within 5 minutes of the heater being turned on.

Under the power conditions of 35 V and 6 A, the FT742-D-FF test unit successfully remained ice free while 37 mm of ice was built on an unheated bar behind the item under test. Under the power conditions of 35 V and 6 A, the FT742-D-FF test unit successfully melted free 37 mm of ice within 5 minutes of the heater being turned on.

Under the power conditions of 35 V and 8 A, the FT742-D-PM test unit successfully remained ice free while 37 mm of ice was built on an unheated bar behind the item under test. Under the power conditions of 35 V and 8 A, the FT742-D-PM test unit successfully melted free 37 mm of ice within 5 minutes of the heater being turned on.

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*.

Equipment Number	Description	Manufacturer	Model Number	Last Calibration	Due Calibration	Range
200-268	Controller / Programmer	Thermotron	7800	3/1/2017	3/1/2018	-125ºF to 350ºF
210-045	Digital Multimeter	Fluke	87 III	3/28/2017	3/28/2018	0 to 1000 Vac/Vdc; 0 to 10 Adc; 0 to 100 kHz; 0 to 40 MΩ
210-509	Digital Multimeter	Fluke	89 IV	12/6/2016	12/6/2017	0 to 1000 Vac/Vdc; 0 to 10 Adc; 0 to 100 kHz; 0 to 30 MΩ
380-557	DC Power Supply	Sorensen	DCS 60-18E	N/A	N/A	0 to 60 Vdc; 0 to 18A
400-076	Stopwatch	Control Company	94460-06	1/21/2016	1/21/2018	24 hrs
500-067	Temperature Chamber	Thermotron	WS-960-CH-50C-30SS	N/A	N/A	-73ºC to 177ºC
765-005	Multi-Function Ventilation Meter	TSI	9565	8/31/2016	8/31/2017	0 to 9999 ft/min (0 to 50 m/s)
765-005B	4 Inch Rotating Vane Probe	TSI	995	10/17/2016	10/17/2017	50 to 6000 ft/min (0.25 to 30 m/sec); 32°F to 140°F
770-050	Dial Caliper	Mitutoyo	505-626-50	6/14/2016	6/14/2017	0 to 6 inches
950-021	NetDAQ	Fluke	2640A	11/8/2016	11/8/2017	0 to 300 Vac/Vdc; -100°C to 1372°C; 15 Hz to 1 MHz; 0 to 3 MΩ
t950-058	Data Logging System	Fluke	2686A	3/13/2017	3/13/2018	0 to 30 Vac; 0 to 50 Vdc; -100°C to 1372°C