



The product described in this document has not been fully tested to ensure conformance to the requirements outlined below. Therefore, TE Connectivity (TE) makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, TE may change these requirements based on the results of additional testing and evaluation. Contact TE Engineering for further details.

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## Title Qualification Plan for Naples

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### 1. SCOPE

#### 1.1. Content

This specification covers the performance, tests, and quality requirements for the Naples.

#### 1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

#### 1.3. Qualification Test Results

Successful qualification testing on the subject product line has not been completed. The Qualification Test Report number will be issued upon successful qualification testing.

### 2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, the latest edition of the document applies.

#### 2.1. TE Documents

- Production Drawing of Naples
- 501-160847: Qualification Test Report

#### 2.2. Industry Documents

- IEC 68-2-14
- IEC 60529
- MIL-STD-810G
- IEC 60068-2-64
- IEC 60068-2-27
- ASTM-G-155

### 3. REQUIREMENTS

#### 3.1. Design and Construction

Product shall be of the design, construction, materials, and physical dimensions specified on the applicable product drawing.

### 3.2. Test Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

Para.	TEST DESCRIPTION	REQUIREMENT	PROCEDURE
3.5.1.	Initial examination of product	Meets requirements of product drawing.	Visual, dimensional, and electrical function per applicable inspection plan.
3.5.2	Final examination of product	Meets visual requirements.	Visual, dimensional, and functional per applicable inspection.
<b>ELECTRICAL</b>			
3.5.3.	VSWR Data Collection	It should be in range of product drawing specification.	Measured VSWR with dedicated network analyzer.
<b>MECHANICAL</b>			
3.5.4.	Examination of product	Meets requirements of product drawings admit of appearances and their section to be not occurred the antennas performance damages as a special case	No physical damage to cause antenna performance degradation.
<b>ENVIRONMENTAL</b>			
3.5.6.	Temperature cycling	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Record VSWR pre-test. IEC 68-2-14.-40°C to 85°C, 2 hour soak, 2°/min ramp, 15 Cycles, ramp up from ambient at beginning of cycle.
3.5.7.	Water Ingress	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3) No water entry in main antenna cavity	Pre-Condition: Thermal cycle using operational temperature range limits, Test per IEC 60529, IPx6, Test duration: 1 minute per square meter for at least 3 minutes Water volume: 100 litres per minute (0.37 imp gal/s) Pressure:100 kPa (15 psi) at distance of 3 meters (9.8 ft).
3.5.8.	Dust Ingress	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3) No Talc Powder entry in main antenna cavity	Test per IEC 60529, IP6x, Talc Powder, Vacuum ***Provisions needed on antenna for vacuum inlet***
3.5.9.	Humidity	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	'Record VSWR pre-test. - 95%±4% relative humidity, 24 hour cycle, 5 cycles. ***1 Cycle: Ramp up from

			ambient temperature (23°C) to 60°C in 2 hrs period. Remain at 60°C for 6 hours. Ramp down to 30°C in a 8 hour time period. Remain at 30°C for 8 hours. 24 hours total
3.5.10.	Corrosive Atmosphere (Salt Fog / Mist)	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3) No Salt entry in main antenna cavity.	'Record VSWR pre-test. 5% Salt Solution, alternating 24 wet/24 dry for 2 cycles (total 96 hours), 35±2°C Temperature. VSWR to be recorded before and after test, summarize any discrepancies.
3.5.11	Vibration	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Record VSWR pre-test. Test to IEC 60068-2-64, Stationary Installation, Category 3 (externally induced) 10-500Hz, Breaks 10, 30, 200, 500Hz Acceleration Grms 7.0m/s <sup>2</sup> , 1hr per axis, 3 axis total
3.5.12	Mechanical Shock	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Record VSWR pre-test. IEC 60068-2-27, 30g, 18ms, 1/2 sine, 3 pulses in positive, 3 pulses in negative, 3 axis total, 18 pulses total.
3.5.13	Wind Operational	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3) Antenna must return to its original position one loading is removed.	Record VSWR pre-test. Simulated 100MPH <b>Panel/Sector:</b> Physical loading of front, rear, and one side surface, 1 minutes, based on flat plate load Calculation
3.5.14	Wind Survival	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3) Antenna must return to its original position one loading is removed.	Record VSWR pre-test. Simulated 136MPH <b>Panel/Sector:</b> Physical loading of front, rear, and one side surface, 15 seconds, based on flat plate load Calculation
3.5.15	Unpackaged Drop	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	'Record VSWR pre-test. Drop freely from a height of 1 meter to tile floor <b>Panel/Sector:</b> 1 drop per surface, excluding port/cable side, 5 drops total.
3.5.16	Pull test	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Record VSWR pre-test. Fix antenna and apply axial force (pull) of 20lbs on connector/cable (no cable for fixed connector versions) for a duration of 30 seconds.
3.5.17	Thermal Shock	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3)	Record VSWR pre-test. -40°C to +85°C, 1 hour soak, 5°/min minimum ramp, 3

			Cycles, ramp up from ambient at beginning of cycle. VSWR to be recorded before and after test, summarize any discrepancies.
3.5.18	UV	No physical damage allowed. (Meet 3.5.2) Meet VSWR (item 3.5.3) No color change or abnormality.	Record VSWR pre-test. Test exposed antenna housing/surfaces to ASTM-G-155, Xenon Arc Light Source, Irradiance: 0.35W/m <sup>2</sup> @ 340nm, Daylight-Q Filters, 120 hours



**NOTE**

Must meet visual inspection requirements, show no physical damage, and meet any of additional test requirements per specified in the Product Qualification and Requalification Test Sequence order shown in Figure 2.

## 3.3. Product Qualification and Requalification Test Sequence order

TEST OR EXAMINATION	TEST (a)						
	1	2	3	4	5	6	7
	SEQUENCE ORDER OF TEST PROCESS (b)						
Initial Examination of Product	1	1	1	1	1	1	1
VSWR Data Collection	2,4	3	2,4	2,4	2,4	2,4	2,4
Temperature cycling	3						
Water Ingress		2					
Dust Ingress			3				
Humidity				3			
Corrosive Atmosphere (Salt Fog / Mist)					3		
Vibration						3	
Mechanical Shock							3
Final Examination of Product	5	5	5	5	5	5	5
Test Sample Qty L000306-01: w/o GNSS	1pc	0 (Reuse test 1)	1pc	0	0	0	0
Test Sample Qty L000306-02: with GNSS	2pcs	0 (Reuse test 1)	2pcs	3pcs	3pcs	3pcs	3pcs

TEST OR EXAMINATION	8	9	10	11	12	13	
	Initial Examination of Product	1	1	1	1	1	1
VSWR Data Collection	2,4	2,4	2,4	2,4	3	2,4	
Wind Operational	3						
Wind Survival		3					
Unpackaged Drop			3				
Pull test				3			
Thermal Shock					2		
UV						3	
Final Examination of Product	5	5	5	5	5	5	
Test Sample Qty L000306-01: w/o GNSS	0	0	0	0	0	0	
Test Sample Qty L000306-02: with GNSS	3pcs	3pcs	3pcs	0 (Reuse test 8)	3pcs	3pcs	

**NOTE**  
 (b) Number in table indicates the tentative sequence order of the test process. Actual may subject to chamber/facilities availability

**4. HISTORY**

LTR	REVISION RECORD	PREPARED BY	APPROVED BY	DATE
1	Initial release	Arfan	Ng, Wei Tat	29-11-2022
2	Samples Quantity revision	Arfan	Ng, Wei Tat	05-04-2023
3	Water Ingress update to IPx6	Arfan	Ng, Wei Tat	27-07-2023