High-Density Fiber Infrastructure Application Note: Corrosive Atmosphere Resistance Test Specifications for Coastal Deployed OEM Gear

TECHNOLOGY OVERVIEW

The proliferation of carrier-grade telecommunications infrastructure in coastal and offshore environments introduces a unique set of environmental stressors that can severely degrade the reliability and operational lifespan of electronic hardware. While standard enterprise networking equipment is designed for controlled, climate-regulated data centers, OEM gear deployed at coastal cell sites, submarine cable landing stations, and offshore platforms is continuously exposed to high humidity, airborne chloride ions, sulfur compounds, and temperature fluctuations. These elements accelerate electrochemical migration, corrosion of metallic interconnects, and the degradation of printed circuit board assemblies (PCBAs). To ensure carrier-grade availability, it is imperative to implement rigorous, standardized testing protocols that validate hardware resilience against these corrosive atmospheres.

This application note details the comprehensive testing specifications and qualification processes for Corrosive Atmosphere Resistance applicable to our OEM networking platforms. It outlines a multi-tiered validation strategy that mimics accelerated real-world environmental conditions, ensuring that switching, routing, and optical transport hardware maintains line-rate

performance and physical integrity throughout its designed service life.



SFP+/QSFP INTERFACE MAPPING

Optical and copper interfaces are the most vulnerable points of ingress for corrosive elements. The test specifications for our OEM gear mandate a multi-layered defense strategy. The physical interface cages are constructed from corrosion-resistant metals and plated with a minimum of 30 micro-inches of gold over nickel. The connector interfaces are subjected to mixed flowing gas (MFG) testing per IEC 60512-11-7, simulating a harsh industrial environment with elevated levels of H2S, SO2, NO2, and Cl2. Furthermore, the optical transceiver modules are tested for their ability to maintain optical power budgets and signal integrity after prolonged exposure to salt spray. This ensures that the physical layer remains reliable even when the equipment is

located within 500 meters of a saline body.

REDUNDANT POWER SYSTEM

Power delivery components, including power supply units (PSUs) and fan trays, are subjected to cyclical temperature and humidity testing. The specification requires that all exposed metallic components on the chassis, including mounting brackets and screws, undergo a 720-hour neutral salt spray test (ASTM B117) with no evidence of base metal corrosion. Internal power conversion circuitry is conformally coated to protect against moisture and particulate ingress. The dual hot-swappable PSUs are tested under load while being subjected to a corrosive atmosphere to validate failover mechanisms and electrical integrity. The system is designed to sustain full operation on a single PSU while the secondary unit is being serviced in a coastal environment.

CAPABILITY METRICS

The following metrics define the baseline performance requirements for hardware qualified for coastal deployment. These metrics ensure that the equipment can withstand the rigors of the environment without compromising on networking throughput or reliability.

- Salt Spray Test Duration: 720 hours continuous (ASTM B117) with no functional degradation.

- Mixed Flowing Gas (MFG) Exposure: 14 days per IEC 60512-11-7, Severity Level 3.

- Humidity Resistance: 95% relative humidity at 40°C for 96 hours.

- Temperature Cycling: -40°C to +65°C, 100 cycles, with operational checks at extremes.

- Conformal Coating: Type AR (Acrylic Resin) or UR (Polyurethane Resin) applied to all PCBAs per IPC-CC-830.

- Enclosure Protection: IP51 minimum (dust protected, dripping water) for outdoor cabinet installations.

Parameter	**Specification**
Salt Spray Resistance	720 hours, ASTM B117, no base metal corrosion
Mixed Flowing Gas	IEC 60512-11-7, Severity 3, 14 days
Humidity	95% RH at 40 ° C, 96 hours, IEC 60068-2-78
Temperature Cycling	-40 ° C to +65 ° C, 100 cycles, operational
Conformal Coating	IPC-CC-830 Type AR or UR, all PCBAs
Enclosure Rating	IP51 minimum for outdoor cabinets

Connector Plating	30 µin gold over nickel, IEC 60512-11-7
Compliance Standards	IEC 60068-2-52, ETSI EN 300 019-2-4, Telcordia GR-63-CORE

COMPLIANCE AUDIT

Our OEM hardware is designed and tested to meet or exceed the following international standards for environmental and corrosive resistance. Compliance is verified through third-party accredited testing laboratories to ensure unbiased validation of results.

- IEC 60068-2-52: Environmental testing - Part 2-52: Tests - Test Kb: Salt mist, cyclic (sodium chloride solution).
- IEC 60068-2-60: Environmental testing - Part 2-60: Tests - Test Ke: Flowing mixed gas corrosion test.
- ETSI EN 300 019-2-4: Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 2-4: Specification of environmental tests; Stationary use at non-weatherprotected locations.
- Telcordia GR-63-CORE: Network Equipment Building System (NEBS)

Requirements: Physical Protection.

- Telcordia GR-1089-CORE: Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment.
- ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus.

SCALING STRATEGY

Deploying networking hardware in corrosive environments requires a holistic approach that extends beyond the initial product qualification. Our scaling strategy includes detailed site surveys to classify the corrosivity category according to ISO 9223, followed by the selection of appropriate enclosure and cooling solutions. For sites with extreme chloride deposition rates, we recommend positive pressure ventilation with chemical filtration or sealed heat exchanger cabinets. Furthermore, our hardware supports remote diagnostics and telemetry that can monitor internal environmental sensors, triggering alerts if humidity or temperature thresholds are exceeded. This proactive monitoring enables predictive maintenance and ensures that the network infrastructure scales reliably across the entire coastal footprint, from the shoreline to the deep-water platforms.


10G SFP+
10/100/1000Base-T
10G SFP+
10G SFP+
SFP+