



**Verizon NEBS™ Compliance: Data Center
Equipment NEBS Requirements
Verizon Technical Purchasing Requirements
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1.0 PURPOSE

The purpose of this document is to establish requirements for network equipment that may be installed in data center equipment space. These data centers have certain hardening features such as fire suppression systems and redundant equipment that are used to minimize infrastructure damage, personnel loss, service outages and service degradation. This document is necessary to ensure that all data center locations adhere to a common set of requirements for equipment installed within the equipment space.

2.0 SCOPE

The scope of this document addresses the establishment of NEBS requirements for equipment installed in data centers. This document is not meant to address every aspect of a data center, just those NEBS requirements that pertain to product safety, equipment reliability and service performance experienced during abnormal fault conditions. This document shall apply to equipment located in data centers located on Verizon property, which supports the real-time operation of the telecommunications network.

This document applies to computing equipment, which supports real time operation of the telecommunications network, that is installed in data centers and which are not located in a Verizon central office building. It provides specific guidelines for testing computing equipment for the purposes of verifying safety and reliability while under the influence of environmentally and electrically induced phenomena. The intended audience for this document is Verizon Information Processing Services, Network Planning, Network Engineering, Technology and Corporate Real Estate.

NOTE: Computing Equipment installed or under contract with Verizon before the issuance of this policy is considered widely deployed prior to the policy and no new testing is required to confirm compliance. Products installed after the issuance of this policy shall comply with the directive of this policy.



3.0 ASSUMPTIONS

The following assumptions apply to Data Centers:

- a) The Corporate Real Estate Group is responsible for all Verizon buildings,
- b) Smoke Detection Device(s) should be present with the ability to detect the presence of smoke or fire,
- c) An audible and visible fire alarm should be present with connection to the local fire department if required by authorities having jurisdiction,
- d) Data Centers shall have twenty-four hour surveillance or human presence,
- e) Data Centers shall provide a redundant path to centralized remote alarm monitoring systems for HVAC, UPS, generators, and environmental conditions, and
- f) The remote surveillance system shall have the capability to receive and reset alarms as well as actively monitor the status of key equipment.

4.0 REFERENCES

The following documents and publications were used as sources of information and test guidelines for this policy. Note: Refer to www.verizonnebs.com for the latest versions of the TCG Checklist and Verizon's Clarification documents.

GR-63-CORE	NEBS Requirements: Physical Protection
GR-78-CORE	Generic Requirements for the Physical Design and Manufacture of Telecommunications Products and Equipment
GR-1089-CORE	Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment
VZ.NEBS.TE.NPI.2004.015	Telecommunications Carrier Group Network Equipment-Building Systems (NEBS) Compliance Checklist
VZ.TPR.9305	NEBS Compliance Clarification Document

5.0 ACRONYMS

CLEC	Competitive Local Exchange Carrier
CO	Central Office
CPE	Customer Premises Equipment
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EUT	Equipment Under Test
FOC	Fiber Optic Component
GR	Generic Requirement
ITL	Independent test Laboratory
RFI	Radio Frequency Interference



6.0 DEFINITIONS

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7.0 GENERAL REQUIREMENTS

- a) **Flame Spread:** Tested products shall comply with all applicable requirements and objectives of GR-63-CORE, section 4.2. Additionally, products shall meet the pass/fail criteria defined in the Verizon NEBS Compliance Clarification Document (SIT.NEBS.RQS.NPI.2004.019) (i.e., flame and smoke cessation within 15 minutes).

Telecommunications service providers require that network equipment be tested to and meet the minimum fire resistance requirements of GR-63-CORE. The requirements apply to the primary supplier and Original Equipment Manufacturer (OEM) of subassemblies that constitute an equipment system when interconnected. The following criteria apply for Equipment Assemblies and Material Selection:

- **Equipment Assemblies:** Testing is required to demonstrate that an equipment assembly fire does not spread beyond the structural elements (horizontal and vertical confines) of the equipment, and to ensure that all smoke emitting from the equipment when under test ceases within 15 minutes after the start of test.
- **Material Selection:** Polymeric materials used in construction of electrical components, equipment cables and wires have differing degrees of flammability and shall be tested by the equipment manufacturer in accordance with GR-63-CORE Section 4.2.3 to help minimize ignition of fires in equipment.

The flame spread test methodology defined in ANSI T1.319 as well as Verizon's clarification document shall be used during testing.

- b) **Earthquake:** Tested products shall comply with all applicable requirements and objectives of GR-63-CORE, section 4.4.



Seismic activity can cause structural damage to buildings and the equipment housed within them. The displacement and torsion movements experienced during an earthquake event can over-stress equipment framework, circuit boards and connectors. The stresses on the equipment depend on the building's construction, the frame in which the equipment is mounted, and the severity of the earthquake.

The physical performance criterion of the Earthquake Requirements addresses the equipment shelves, framework and fastening hardware and allows for no deformation to any load bearing element of the equipment being tested or any connection failure. The functional performance criterion addresses the equipment's ability to function immediately before and after each axis of waveform testing without manual rebooting or human intervention.

- c) **Electromagnetic and Radio Frequency Interference:** Tested products shall comply with all applicable requirements and objectives of GR-1089-CORE, section 3.

Electro-mechanical devices cause EMI emissions that may interfere with nearby equipment or licensed transmitters. To minimize these emissions, products shall be designed, manufactured and tested to pass the FCC's Part 15 emissions criteria which address operating frequencies between 9 kHz to 1 GHz. In addition to the FCC criteria, Verizon requires that products deployed in the network shall meet the EMI criteria defined in Telcordia's GR-1089-CORE. This standard addresses frequencies beyond the FCC's frequency limit (up to 10 GHz). Products shall be tested for radiated (electric and magnetic) and conducted emissions by a test laboratory whose test site is approved by the FCC.

Electronic equipment is also susceptible to excessive radiated and conducted emissions. To increase EMI immunity, Verizon requires products be designed, manufactured and tested to validate susceptibility thresholds. Metallic interfaces – power, and signal leads – are tested for radiated and conducted susceptibility in a shielded anechoic chamber. Immunity requirements are not addressed by the FCC but are required by Verizon and other telecommunications service providers.

- d) **Lightning and AC Power Fault:** Tested products shall comply with all applicable requirements and objectives of GR-1089-CORE, section 4.



Exposed telecommunications conductors (power and signal) are considered susceptible to direct or indirect energy coupling from lightning and AC Power Fault disturbances. Despite the presence of protective devices in the telecommunications network that limit the effects of lightning surge and power surges, a portion of these disturbances is impressed on equipment. Testing is required to verify if products can withstand the 1st and 2nd Level criteria. Equipment that conforms to the 1st Level criteria shall continue to operate as intended during the short-term fault. Equipment that conforms to the 2nd Level criteria can fail to operate but the equipment cannot fail in an unsafe manner, that is, it cannot become a fire, fragmentation, or electrical safety hazard.

- e) **Electrical Safety:** Tested products shall comply with all applicable requirements and objectives of GR-1089-CORE, section 7.

Electrical safety criteria are intended to protect persons from harm by limiting the voltages and currents that are intentionally applied to communication circuits and to energized parts of network equipment. Energy sources are categorized on the basis of classifications of voltages. Based on the voltage classification, power sources are further categorized as exposed, restricted or inaccessible to finger contact through the use of an accessibility test finger probe. Listing requirements for AC-powered devices and control of leakage currents that may be conducted from exposed ungrounded surfaces of the equipment are also addressed.

- f) **Bonding and Grounding:** Tested products shall comply with all applicable requirements and objectives of GR-1089-CORE, section 9.

Network equipment shall comply with the test requirements of GR-1089-CORE, section 9, which address bonding and grounding of network equipment and guidance for their usage. The main goals of bonding and grounding are as follows:

- Provide potential equalization to reduce voltage differences that might harm people or damage equipment or the facility,
- Provide a reliable low-impedance return-path for fault currents to enable rapid operation of over-current devices,
- Help avert equipment damage from unwanted energy resulting from lightning stroke, lightning-caused surges on metallic communications conductors, or surges on metallic communications conductors caused by commercial AC power, and
- Help avoid interference and malfunction of equipment.



Computing equipment installed and operating in Verizon’s data centers, which are not part of the Central Office (CO) equipment space, shall meet the following safety, performance, and reliability requirements:

GR-63-CORE: Network Equipment Building System (NEBS) Requirements: Physical Protection	GR-1089-CORE: Electromagnetic Compatibility and Electrical Safety – Generic Criteria for Network Telecommunications Equipment
Section 4.2, Fire Resistance	Section 3.0, EMI
Section 4.4, Earthquake	Section 4.0, Lightning and AC Power Fault
	Section 7.0, Electrical Safety
	Section 9.0, Bonding and Grounding

8.0 PASS/FAIL REQUIREMENTS

The EUT shall be configurable as documented in the manufacturer’s installation procedures and shall operate reliably over its intended life cycle. The product shall operate as intended during immunity and susceptibility testing (EMI, Operational Temperature and Relative Humidity, Altitude, etc.,) and the test report shall include failure thresholds, if any, for the purpose of risk assessment. The product shall meet all defined limits in the NEBS standards and the references listed above. All products installed in data center facilities shall be tested by a Verizon-approved Independent Testing Laboratory (ITL) using the latest acceptable version of the NEBS test standard.