



**Verizon NEBS™ Compliance: NEBS
Requirements for Customer Premises
Equipment (CPE) Device
Verizon Technical Purchasing Requirements
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CHANGE CONTROL RECORD:

Version	Date	Action*	Reason for Revision
1	2/19/2007	Reissue	SIT.NEBS.TM.NPI.2006.042 document reissued and updated into new format. Original issue date 7/20/06.
2	3/19/2007	Change	Correction made to text in Section 12.2
3	4/4/2007	Add	Added UL-1449 Surge Protective Device testing
4	4/10/2007	Add	Added specific sections required for UL-1449 testing
5	8/16/2007	Add	Added clarification to fire spread test set-up
6	10/5/2007	Change	Corrected referenced document number for NEBS Compliance Clarification Document

* New, Add, Delete, Change, Reissue

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1. **PURPOSE**

The purpose of this Verizon Technical Purchasing Requirement document is to provide the minimum required NEBS testing for Customer Premises Equipment (CPE) Devices.

As with other products that serve the network, CPE Devices shall be tested to determine their safety, performance, and reliability characteristics. The supplier shall provide a production sample to a Verizon-approved Independent Testing Laboratory (ITL) for testing and shall furnish the test results to Verizon’s NEBS Compliance and Quality Assurance team for review. In addition to NEBS testing, CPE devices shall comply with all applicable local, state and federal statutes and regulatory requirements prior to general deployment.

2. **SCOPE**

This document defines a subset of Verizon’s NEBS requirements that address environmental, safety, lightning and AC power fault, and electromagnetic compliance for network elements located at customers’ premises. For this purpose, these requirements are referred to as NEBS Compliance requirements for CPE devices. A complete listing of Verizon’s NEBS requirements for network equipment can be found in the Telecommunications Carrier Group NEBS Checklist at the following web page www.verizonnebs.com. The tests contained herein shall be used by equipment suppliers and the Verizon-approved Independent Test Laboratories as the baseline of tests to create the NEBS test plan. In all instances of test planning and test execution, the most recent and accepted versions of the GR standards shall be used.

3. **REFERENCES**

GR-63-CORE	NEBS™ Requirements: Physical Protection
GR-1089-CORE	Electromagnetic Compatibility and Electrical Safety – Generic Criteria for Network Telecommunications Equipment
GR-78-CORE	Generic Requirements for the Physical Design and Manufacture of Telecommunications Products and Equipment
UL-1449 2nd Edition	Transient Voltage Surge Suppressors
UL 60950-1	Information Technology Equipment – Safety – Part 1: General Requirements
CFR Title 47, Part 15	Radio Frequency Devices
CFR Title 47, Part 68	Connection of Terminal Equipment to the Telephone Network
SIT.NEBS.RQS.NPI.2004.019	Verizon NEBS Compliance Clarification Document
SIT.NEBS.TE.NPI.2004.015	Telecommunications Carrier Group NEBS Compliance Checklist



4. ACRONYMS

AC	Alternating Current
BOM	Bill of Materials
CFR	Code of Federal Regulations
CPE	Customer Premises Equipment
DC	Direct Current
EMI	Electromagnetic Interference
EUT	Equipment Under Test
FCC	Federal Communications Commission
ITL	Independent Test Laboratory
OEM	Original Equipment Manufacturer
SPD	Surge Protective Device

5. DEFINITIONS

A CPE device is any equipment supplied by Verizon or its representatives to a customer, either directly connected to the network or otherwise used to deliver Verizon services. CPE devices are typically placed inside a dwelling (home or business), and in a sheltered and environmentally controlled space. No distinction is made between AC or DC powered devices; both types of powering schemes shall comply with the requirements listed herein, and it is recommended that if a CPE device comes in both versions that each be tested separately to the NEBS requirements.

6. GENERAL REQUIREMENTS

Test configuration: The Equipment Under Test (EUT) shall be fully configured and performing its designated functions during the application of NEBS testing. The EUT and all associated documentation (installation and operating manuals), mounting and grounding schemes shall be provided to the test laboratory by the vendor prior to test commencement. All equipment interfaces shall be monitored for functionality and the test plan shall include the pass/fail criteria for each interface or service type.

Verizon requires that manufacturers submit their EUT and associated documentation to a Verizon-approved ITL for testing and verification of conformance to the qualification test requirements in this document. For a list of Verizon approved laboratories and locations, consult the Verizon web page at <http://www.verizonnebs.com/tcppage.html>.



In addition to the specific test requirements listed below, products must comply with GR-78-CORE, *Generic Requirements for the Physical Design and Manufacture of Telecommunications Products and Equipment*. Vendors may self-declare their product's compliance to GR-78-CORE by submitting a completed copy of Appendix C of the Telecommunication Carrier Group Checklist. Current versions of the TCG Compliance Checklist and the Verizon NEBS Clarification document can be found on the Verizon web page (<http://www.verizonnebs.com/index.html#chklist>).

Surge Protection: CPE products that contain surge protective devices shall be tested to UL-1449. Testing is to be performed on the fully assembled product and the test reports shall be provided to Verizon. The specific sections of UL-1449 to be covered by testing can be found in Section 15 of this document.

7. 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, so that proper risk analysis can be made. The product shall meet all defined requirement limits contained herein.

8. OPERATING TEMPERATURE, HUMIDITY AND ALTITUDE REQUIRMENTS

- 8.1 All CPE devices shall operate in the temperature and humidity environment described in GR-63-CORE – *NEBS Physical Protection*, section 4.1.2. The operating temperature ranges described in GR-63-CORE are:

Long Term Operation: 5⁰C to 40⁰C

Short Term Operation: -5⁰C to 50⁰C

- 8.2 All CPE devices shall operate within the altitude requirements specified in GR-63-CORE, Section 4.1.3.

9. SURFACE TEMPERATURE REQUIREMENTS

- 9.1 All CPE devices shall utilize materials (metallic and polymeric) that meet the surface temperature contact exposure requirements defined in GR-63-CORE section 4.1.7 - Temperature Limits of Touchable Surfaces - when the equipment is operating in a room with an ambient air temperature of 23°C (73°F).



10. FIRE RESISTANCE REQUIREMENTS

10.1 All CPE devices shall be manufactured using fire resistant materials and components as described in GR-63-CORE section 4.2.3 and GR-78-CORE. All items listed in the product's Bill of Materials (BOM) shall be tested to and comply with the aforementioned standards.

10.2 **Firespread and Propagation Hazard Characterization**

10.2.1 Fire Resistance Requirements - All CPE devices shall comply with the fire resistance requirements defined in GR-63-CORE.

10.2.2 Material Selection - Materials, electrical components, and equipment cables and wires (provided by the equipment manufacturer) shall meet the fire resistance requirements in GR-63-CORE section 4.2.3 – *Use of Fire-Resistant Materials, Components, Wiring, and Cable* – to minimize the ignition of fires in equipment.

10.2.3 Equipment Assemblies - Equipment assembly fire tests are performed in accordance with GR-63-CORE section 4.2.2 – *Equipment Assembly Fire Test* – and the procedures noted in section 5.2 - *Fire Test Methods*. These tests are used to characterize the fire propagation hazard, and to demonstrate that an equipment assembly fire does not spread beyond the confines of the equipment under test.

10.2.3.1 Conformance is based on a test sample that (a) represents a potential worst-case condition for firespread, considering fuel load, air flow, and physical structure, (b) provides a physical configuration of the assembly constituents, including OEM units, and all interconnect wire and cable, within the test assembly that represents the generic equipment being analyzed for fire resistance, and (c) is configured as it would be for use in the network.

10.2.3.2 Equipment that contains multiple compartments should be analyzed by performing tests in each individual compartment type. An example of this type of equipment would be a chassis containing power supplies, disk drives, and vertically oriented circuit boards. The equipment under test is not required to operate functionally. However, all internal equipment fans must be operational and powered. If the fans are variable speed, fans shall be powered via the normal powering path, including any fan speed control



circuitry, from the point where power is applied to the assembly during normal operation.

10.2.3.3 The acceptance criterion of GR-63-CORE is modified here so that no flames (other than flames from the methane line burner as described in section 4.2.2) may exit the enclosure for any duration during the test. There shall be no evidence of melting or burning of the enclosure or components inside the enclosure that would allow fire to leave the enclosure in the event of a thermal event.

10.2.3.4 The test procedure of GR-63-CORE is modified here so that the PCB inside the CPE device shall remain in place during testing.

10.2.4 Test Methods

10.2.4.1 Fan-Cooled devices shall be tested to and comply with GR-63-CORE, section 4.2, which references ANSI T1.319-2002, *Equipment Assemblies – Fire Propagation Risk Assessment Criteria*.

10.2.4.2 Natural Convection devices shall be tested to and comply with GR-63-CORE, section 4.2, which references ANSI T1.319-2002, *Equipment Assemblies – Fire Propagation Risk Assessment Criteria*. Where the flame spread test results demonstrate that the equipment cannot sustain combustion inside the enclosure, including combustion of the methane line burner or combustion of the product's components because of the its design and manufacturing characteristics, the product shall be deemed compliant with the fire propagation criteria and to have met this policy's fire resistance and propagation requirements.

11. ELECTROMAGNETIC COMPATIBILITY REQUIREMENTS

11.1 All CPE devices shall comply with the FCC requirements CFR Title 47 Part 15 - *Radio Frequency Devices* and CFR Title 47 Part 68 - *Connection of Terminal Equipment to The Telephone Network* (if they are connected to the network) and the Immunity requirements defined in GR-1089-CORE, section 3.3.



12. LIGHTNING SURGE AND AC POWER FAULT REQUIREMENTS

12.1 All CPE devices shall comply with the Lightning Surge and AC Power Fault requirements defined in GR-1089-CORE, Section 4.

12.2 CPE devices require additional levels of lightning protection. The CPE device shall be designed to withstand first-level lightning surges up to $\pm 5000V$ amplitude on the telecom ports. The test level defined for telecom ports under Table 4-5 shall be increased to a minimum peak voltage of $\pm 5000V$. First-level acceptance criterion that the equipment is capable of operating properly after a $\pm 5000V$ simulated lightning strike without manual intervention or power cycling following the application of the ± 5000 lightning surge shall be applied.

13. ELECTRICAL SAFETY REQUIREMENTS

13.1 All CPE devices shall comply with the listing requirements of UL-60950 and shall comply with the Electrical Safety requirements defined in GR-1089-CORE, Section 7.

14. GR-78-CORE REQUIREMENTS

14.1 All CPE devices shall meet the intent of the design and manufacturing requirements described in GR-78-CORE – Physical Design and Manufacture of Telecommunications Products and Equipment.

15. GENERAL SAFETY REQUIREMENTS

15.1. CPE products that contain surge protective devices shall be tested to and comply with the UL-1449 sections listed below. Testing is to be performed on the fully assembled product and the test reports shall be provided to Verizon.

Section 31 – Leakage Current Test
Section 32 – Dielectric Voltage-Withstand Test
Section 34 – Measured Limiting Voltage Test
Section 35 – Surge Current Test
Section 36 – Overvoltage Test
Section 37 – Abnormal Overvoltage Test