



**Verizon NEBS™ Compliance: Test  
Requirements for High Density Fiber  
Distributing Frames and Patch Panels**  
Verizon Technical Purchasing Requirements  
VZ.TPR.9464  
**Initial, April 2012**





**CHANGE CONTROL RECORD:**

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## 1.0 PURPOSE

The purpose of this Verizon Technical Purchasing Requirement (VZTPR) document is to provide the FOC testing requirements for Single-Mode/Multi-Mode Simplex/Duplex Fiber Distributing Frames and Fiber Patch Panels. These requirements are based on the requirements from GR-449-CORE, Issue 3, March 2012.

## 2.0 SCOPE

Single-Mode/Multimode Simplex/Duplex Fiber Distributing Frames and Fiber Patch Panels

## 3.0 REFERENCES

<b>GR-449-CORE, Issue 3, March 2012</b>	Generic Requirements for Design Considerations for Fiber Distributing Frames
<b>GR-326-CORE, Issue 4, February 2010</b>	Generic Requirements for Single Mode Optical Connectors and Jumper Assemblies
<b>VZ.TPR.9409</b>	Singlemode Optical Connectors and Jumper Assemblies
<b>VZ.TPR.9441</b>	Requirements for Improved Bend Performance Fibers
<b>VZ.TPR.9424</b>	Requirements for MDU Drop Cables
<b>VZ.TPR.9430</b>	Optical Fiber and Optical Fiber Cable
<b>VZ.TPR.9431</b>	Multi-Fiber Optical Connectors
<b>VZ.TPR.9437</b>	Premises Fiber Optic Cable
<b>VZ.TPR.9405</b>	Generic Reliability Assurance Requirements for Passive Optical Components
<b>VZ.TPR.9427</b>	Generic Requirements for Passive Optical Component
<b>VZ.TPR.9460</b>	Test Requirements for Multi-Mode Fiber
<b>VZ.TPR.9461</b>	Test Requirements for Multi-Mode Fiber Optic Connectors



#### 4.0 ACRONYMS

<b>A</b>	After
<b>B</b>	Before
<b>CIR</b>	Change in Reflectance
<b>CIT</b>	Change in Transmittance
<b>D</b>	During
<b>FOC</b>	Fiber Optic Components
<b>IL</b>	Insertion Loss
<b>ITL</b>	Independent Test Laboratory
<b>MM</b>	Multimode
<b>“O”</b>	Requirement
<b>“R”</b>	Objective
<b>RL</b>	Return Loss
<b>TPR</b>	Technical Purchasing Requirement

#### 5.0 TEST REQUIREMENTS FOR FIBER DISTRIBUTING FRAMES AND FIBER PATCH PANELS

Fiber Distributing Frames and Fiber Patch Panels shall meet the requirements specified in the following tables. All testing and evaluations must be completed by a Verizon approved ITL.



**Criteria for High Density Fiber Distributing Frames and Optical Patch Panels**

<b>FOC TPR.9464 (GR-449) Qualification Test Program</b>					
<b>Task Name</b>	<b>Sample Groups</b>	<b>Number of Samples</b>	<b>Optical Monitoring</b>	<b>Criteria</b>	<b>Test Conditions</b>
<b>3. General Requirements And Objectives</b>					
<b>3.1 “Connection Requirements”</b>					
3.1.1 Total connection Flexibility				R3-1	Per GR-449
3.1.2 Tracing				R3-2	Per GR-449
3.1.3 Connection Links				R3-3	Per GR-449
3.1.4 Splices				R3-4	Per GR-449
3.2 Test Access Requirements				R3-5, O3-6	Per GR-449
3.3 Auxiliary Apparatus Requirements				CR3-7, CR3-8	Per GR-449
3.3.2 Order Wire				CR3-9, CR3-10	Per GR-449
3.3.3 Maintenance Bays				O3-11	Per GR-449
<b>3.4 Planning and Engineering Requirements</b>					
3.4.1 Layout				---	---
3.4.2 Capacity				---	---
3.4.3 Inter-FDF Connections				---	---
3.4.4 Suppliers Records				---	---
3.4.5 Descriptive Information				---	---
3.5 Human Interface and				R3-13	Per GR-449



FOC TPR.9464 (GR-449) Qualification Test Program					
Task Name	Sample Groups	Number of Samples	Optical Monitoring	Criteria	Test Conditions
Safety Requirements					
3.5.1 General Safety Requirements				R3-14, R3-15, R3-16	Per GR-449
3.5.2 Laser Safety				R3-17 thru R3-24	Per GR-449
3.5.3 Fire Safety				---	---
<b>3.6 Documentation and Training Requirements</b>					
3.6.1 Required Documentation				R3-27 thru CR3-32	Per GR-449
3.6.2 Training				R3-33, R3-34, R3-35	Per GR-449
3.6.3 Documentation Format				R3-36	Per GR-449
3.6.4 Documentation Media				R3-37, R3-38	Per GR-449
3.6.5 Documentation Updates				R3-39, O3-40	Per GR-449
3.6.6 Job Aids				R3-41, R3-42	Per GR-449
3.6.7 Expansion				R3-43, R3-44, R3-45 R3-46	Per GR-449
3.6.8 Tools				R3-47	Per GR-449
3.6.9 Common Language Coding				R3-48	Per GR-449
<b>3.7 Transmission Requirements</b>					





FOC TPR.9464 (GR-449) Qualification Test Program					
Task Name	Sample Groups	Number of Samples	Optical Monitoring	Criteria	Test Conditions
3.7.1 Optical Performance				R3-49	Per GR-449
3.7.2 Intermodal Noise				R3-51	Per GR-449
<b>3.8 Physical Issues</b>					
3.8.1 Package Requirements				CR3-54	Per GR-449
3.8.2 Modularity				CR3-56, O3-57, R3-58	Per GR-449
3.8.3 Framework Requirements				CR3-59 thru R3-69	Per GR-449
<b>3.8.4 FDF Maintenance</b>					
3.8.4.1 Apparatus Design				R3-70, R3-71	Per GR-449
3.8.4.2 Plug-In-Boards				CR3-72	Per GR-449
3.8.5 Optical Fibers				CR3-73	Per TPR.9437, TPR.9441, TPR.9424 as applicable
				CR3-74 thru R3-80	Per GR-449
3.8.6 Optical Fiber Connectors				R3-81 CR3-82	Per TPR.9409, TPR-9431, TPR.9461
				R3-83	Per GR-449
				CR3-84	Per TPR.9447
				O3-85	Per GR-449
3.8.8 Abrasion Resistance				R3-86	Per GR-449
3.8.9 Grounding				R3-87,	Per GR-449



FOC TPR.9464 (GR-449) Qualification Test Program					
Task Name	Sample Groups	Number of Samples	Optical Monitoring	Criteria	Test Conditions
				R3-88	
3.8.10 AC Receptacles and Circuits				R3-89, R3-90, R3-91	Per GR-449
3.8.11 Electromagnetic Compatibility				CR3-92	Per GR-449
3.8.19 Input Fiber Cables					
3.8.12.1 Input Fiber Cable Routing				R3-93 thru R3-101	Per GR-449
3.8.12.2 Input Fiber Spaces				CR3-102 thru O3-106	Per GR-449
3.8.12.3 Input Fiber Connections				R3-107	Per GR-449
3.8.13 Fiber Jumper Apparatus					
3.8.13.1 Fiber Jumper Pathways				R3-108 thru R3-110	Per GR-449
3.8.13.2 Fiber Jumper Routing				R3-112, R3-113	Per GR-449
3.8.13.3 Fiber Jumper Pathway Bends				R3-115	Per GR-449
3.8.13.4 Number of Pathways				R3-116 thru CR3-123	Per GR-449
3.8.13.5 Fiber Jumper Pathway Location				R3-124 thru R3-127	Per GR-449
3.8.13.6 Fiber				R3-128	Per GR-449



FOC TPR.9464 (GR-449) Qualification Test Program					
Task Name	Sample Groups	Number of Samples	Optical Monitoring	Criteria	Test Conditions
Jumper Pathway Depth				thru R3-131	
3.8.13.7 Fiber Jumper Installation and Removal				R3-132 thru CR3-134	Per GR-449
3.8.14 Use of Bifurcated Jumper Cable Assemblies				R3-135	Per GR-449
3.8.15 Labels				R3-136 thru CR-144	Per GR-449
3.9 Preferential Assignment Method				---	---
3.10 Compatibility with Existing FDFs				---	---
3.11 Reliability and Quality Requirements				R3-147, R3-148	Per GR-449
<b>4.0 FDF Generation III and IV Framework Requirements</b>					
4.1 Standard Generation III and IV Framework				R4-1, CR4-2	Per GR-449
4.2 Footprint of Frame				R4-3, CO4-4	Per GR-449
4.3 Frame Materials				R4-5 thru R4-8	Per GR-449
4.4 Frame Layout				R4-9 thru R4-21	Per GR-449
4.4.1 Shippable Units (NEBS Tests)				CR4-23	Per GR-449
4.4.2 Jumper Cable Pathways				R4-24, R4-26	Per GR-449
4.4.3 FDF Jumper Capacity Issues				R4-27	Per GR-449



FOC TPR.9464 (GR-449) Qualification Test Program					
Task Name	Sample Groups	Number of Samples	Optical Monitoring	Criteria	Test Conditions
4.4.3.1 Equipment Cabling Capacity					Per GR-449
4.4.3.2 Horizontal Trough Capacity				R4-28	Per GR-449
4.4.3.3 Vertical Trough Capacity				R4-29, O4-30	Per GR-449
4.4.3.4 Maximum Frame Line-Up Capacity				R4-31	Per GR-449
4.5 NEBS Compliance				R4-32	Per GR-449
4.6 Framework Strength				R4-33	Per GR-449
<b>5.0 Performance Requirements and Objectives</b>				---	---
<b>5.1 Objectives of the FDF Test Program</b>				---	---
<b>5.2 FDF Test Samples, Facilities, and Configuration</b>				---	---
<b>5.2.1 FDF Test Samples</b>				---	---
<b>5.2.2 2-Bay FDF Test Facility (GR-449-CORE Tests)</b>				---	Used for the identification of jumper termination, and the jumper/cable tracing and removal tests of Section 5.4.1, Section 5.4.2 and Section 5.4.5.
<b>5.2.3 Partially Configured Single-Bay FDF Test Facility (GR-449-CORE Tests)</b>				--	Used for the jumper disconnect and re-connect tests of Section 5.4.3 and Section 5.4.4.
<b>5.2.4 Full Single-Bay Configuration (NEBS Tests)</b>				---	---
<b>5.3 Test Equipment, Optical Performance,</b>				---	---



FOC TPR.9464 (GR-449) Qualification Test Program					
Task Name	Sample Groups	Number of Samples	Optical Monitoring	Criteria	Test Conditions
<b>and Setup Criteria</b>					
5.3.1 Test Equipment				---	Per GR-449
5.3.2 Optical Performance Pass/Fail Criteria				---	Optical performance is covered in Section 5.3.4, "FDF Optical Test Criteria."
5.3.3 FDF Jumper Assembly Characteristics				---	<p>Unless otherwise specified by Verizon, the jumpers shall be simplex 2-mm SC-UPC or LC-UPC, as appropriate, optical jumper assemblies meeting the applicable criteria of (VZ.TPR.9409, VZ.TPR.9361).</p> <p>The SM jumper assemblies shall use matched-clad dispersion unshifted fiber compliant with ITU-T G.652 (TIA Class IVa). If bend-insensitive fiber is specified for the FDF, the fiber shall be compliant with ITU-T G.657A and TPR.9441. MM fiber shall meet the criteria of TPR.9460.</p> <p><b>NOTE:</b> Only one type of fiber shall be used within the test facility configurations specified in Section 5.2.</p>
5.3.4 FDF Optical Test Criteria				R5-5  R5-6 thru R5-10	MM Measurements – 1300 nm  Per GR-449
5.3.4.1 Wavelength-Dependent Loss				R5-11	Per GR-449
5.3.5 Laboratory Results Reporting				---	Per GR-449
5.3.6 Product Facilitators and Testers				---	The facilitators and testers shall be provided by the testing organization. The facilitator administers the test and records results, and the testers perform the



FOC TPR.9464 (GR-449) Qualification Test Program					
Task Name	Sample Groups	Number of Samples	Optical Monitoring	Criteria	Test Conditions
					test details.
<b>5.3.7 FDF Optical Measurements</b>					
5.3.7.1 Monitored Optical Network				---	Per GR-449
5.3.7.2 Test Jumper Optical Network				---	Per GR-449
5.4.1 Identification of Connector Assemblies Installed in an FDF Shelf	---	2-bay FDF test facility described in Section 5.2.2.	---	R5-13 thru R5-15	Per GR-449
5.4.2 Front Plane Jumper Tracing, Removal, and Reinstallation Test	---	2-bay FDF test facility described in Section 5.2.2.	---	R5-15 thru R5-23	Per GR-449
5.4.3 Front Plane Connector Disconnect and Re-Connect Test	---	Partially Configured Single-Bay FDF. See 5.2.3	B/D/A	R5-24 thru R5-26	Per GR-449
5.4.3.1 Modified Test Procedure Using Build out-Type Attenuators	---	Partially Configured Single-Bay FDF. See 5.2.3	B/D/A	---	Per GR-449
5.4.4 Rear-Plane Fiber Optic Terminal Jumper Disconnect, Adapter Replacement, and Re-Connect Test	---	Partially Configured Single-Bay FDF. See 5.2.3	B/D/A	R5-27	Per GR-449
5.4.5 Rear-Plane Intra-Facility Fiber Optic Cables (IFC) Assembly Removal and Reinstallation Test	---	Partially Configured Single-Bay FDF. See 5.2.3	B/D/A	R5-29, R5-30	Per GR-449