



**Verizon NEBS™ Compliance: Test
Requirements for Improved Bend
Performance Fibers**
Verizon Technical Purchasing Requirements
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CHANGE CONTROL RECORD:

Version	Date	Action*	Reason for Revision
1	12/10/2007	New	New Document
2	04/04/2008	Change Add	Updated High Power Included Definition of Samples
* New, Add, Delete, Change, Reissue			

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1.0 PURPOSE

The purpose of this Verizon Technical Purchasing Requirement document is to provide test requirements to evaluate any improved bend performance fiber type.

2.0 SCOPE

Optical Fiber

3.0 REFERENCES

FOC Memo # 41	Bend Optimized Fiber Testing Requirements
GR-20-CORE, Issue 2, July 1998	Generic Requirements for Optical Fiber and Optical Fiber Cables
GR-326-CORE, Issue 3, September 1999	Generic Requirements for Singlemode Optical Connectors and Jumper Assemblies
IEC 60793-2-50	Optical fibers - Part 2: Product specifications - General
TIA/EIA 492CAAB	Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak

4.0 ACRONYMS

A	After
B	Before
D	During
FOC	Fiber Optic Components
IL	Insertion Loss
nm	Nano Meter
Pin	Input Power
RL	Return Loss

5.0 TEST REQUIREMENTS FOR IMPROVED BEND PERFORMANCE FIBER

Verizon is considering using improved bend performance fibers for all applications as required. The following are test requirements for qualifying the new fiber. All of the tests must be conducted.



Table 1

Test Requirements for Qualifying Improved Bend Performance Fiber			
Description	Reference Specification	Test Condition	Sample Quantity
Glass Comp	GR-20. Section - 4.1.1	as specified	Cert of Compliance
Attenuation Coefficient	GR-20. Section - 4.2.1	as specified	≥ 4
Point Discontinuities	GR-20. Section - 4.2.2	as specified	≥ 4
Chromatic Dispersion	GR-20. Section - 4.2.3	as specified	≥ 4
Cutoff Wavelength	GR-20. Section - 4.2.4	as specified	14
Mode Field Diameter	GR-20. Section - 4.2.5	as specified	2 m
Macrobend Loss	GR-20. Section - 4.2.6, 10, 15, 20, 30 mm diameters	as specified	15
Geometrical Requirements	GR-20. Section - 4.3	as specified	14
Tensile Proof Strength	GR-20. Section - 4.4.1	as specified	Cert of Compliance
Coating Strip Force	GR-20. Section - 4.4.2	as specified	3, if no change to coating
Dynamic Tensile Strength	GR-20. Section - 4.4.3	as specified	30 samples/condition
Stress Corrosion Parameter	GR-20. Section - 4.4.4	as specified	30 samples/condition
Fiber Cleavability	GR-20. Section - 4.5.1	as specified	11
Fiber Fusibility - single fiber, homogeneous and heterogeneous	GR-20. Section - 4.5.2	as specified	5x5 for 25 splices per product pair, per splicer
Fiber Fusibility - 12f ribbon	to be specified by vendor	as specified	2 - twelve fiber count mixed fiber type ribbons, 12 ribbon splices
Temperature Dependence	IEC 60793-2-50	as specified	3
Temperature-Humidity Cycle	TIA/EIA 492CAAB	as specified	1
Dry Heat Soak	IEC 60793-2-50	as specified	3
Damp Heat Dynamic Tensile Strength	IEC 60793-2-50	as specified	30 samples each
Damp Heat	GR-20. Section - 4.4.3	as specified	3



Test Requirements for Qualifying Improved Bend Performance Fiber

Damp Heat Stress Corrosion Parameter	GR-20. Section - 4.4.4	as specified	30 samples each
Macrobend TD & aged fiber; five turns at minimum bend radius	Strength: 15% \geq 400 kpsi & 50% \geq 440 kpsi, No coating tears, splits or delaminations	Fiber Length = 15 meters, TD (-40C to +70C) 2 cycles 30 day Hot Humid (85C/85%RH) TD (-40C to +70C) 2 cycles 30 day Hot Humid (85C/85%RH) TD (-40C to +70C) 2 cycles	5
	Macrobend response: 1 turn x minimum bend @ 1550nm, \leq 0.1 dB		
Macrobend aged, minimum bend radius, 30 days	1) measure strength pre and post 2) provide typical one turn attenuation spectral, 1260 - 1625 nm	85C/ 85% RH, Fiber Length = 75 meters	2
High Power Two Point Bend Test, at minimum bend radius, 168 hours (7d)	No damage to coating/jacket, Perform infrared scan to verify power emitted from bend point	Pin = \geq 23 dBm,	1
Evidence of meeting fiber specification		Manufacturing data	N = 30
Evidence of meeting applicable ITU specification			
Connector Testing			
Interoperability - Endface Geometry Measurements	Per GR-326, section 4.4.5.2 (APC only)	IL/RL (B/D/A)	10 mated pairs with connectors made from every existing fiber type
Interoperability – Environmental	Per GR-326, section 4.4.2	IL/RL (B/D/A)	10 mated pairs with connectors made from every existing fiber type



Test Requirements for Qualifying Improved Bend Performance Fiber

4.4.2.1 Thermal Age Testing	85°C/168h	IL/RL (B/A)	15 pigtailed pair, 10 hot swap pigtailed pair and 5 cable assembly pair
4.4.2.2 Thermal Cycle Test	-40°C to +75°C; 7 days; Dwell Time: 1 hour (per GR-325, Figure 4-3) - see note1	IL/RL (B/D/A)	15 pigtailed pair, 10 hot swap pigtailed pair and 5 cable assembly pair
4.4.2.3 Humidity Aging Test	75° C / 90% RH, 7 days - Measurements every 6hrs min.	IL/RL (B/D/A)	15 pigtailed pair, 10 hot swap pigtailed pair and 5 cable assembly pair
4.4.2.4 Humidity/Condensation Cycling Test	-10°C to +65°C, 90% - 100% RH; 7 days; (per GR-326, Figure 4-4) - See note2	IL/RL (B/A)	15 pigtailed pair, 10 hot swap pigtailed pair and 5 cable assembly pair
4.4.2.5 Dry-Out Step	24 hrs @ 75°C, uncontrolled humidity		15 pigtailed pair, 10 hot swap pigtailed pair and 5 cable assembly pair
4.4.2.6 Post-Condensation Thermal Cycle Test	-10°C to +65°C, 90% - 100% RH; 7 days; (per GR-326, Figure 4-4) - see note2	IL/RL (B/A)	15 pigtailed pair, 10 hot swap pigtailed pair and 5 cable assembly pair
Interoperability - Durability	200 cycles durability, per GR-326, section 4.4.3.8	IL/RL (B/D/A)	10 mated pairs with connectors made from every existing fiber type

Sample Selection: Samples of bend insensitive fibers must be selected from multiple reels (lots) and from several locations along the length of a single reel. e.g., 5 samples from each of 5 reels = 25 samples or 5 samples from each of 3 reels = 15 samples