Verizon NEBS™ Compliance: Test Requirements for MDU Drop Cables

Verizon Technical Purchasing Requirements

VZ.TPR.9424

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CHANGE CONTROL RECORD:

Version	Date	Action*	Reason for Revision
1	*04/04/2008*	New	New Document
2	*8/11/08*	Add	Clarified Compact & rugged drops definition
3	*02/22/11*	Change	Added Compact Indoor/Outdoor Criteria to table.
			Clarified Rugged Drop and Compact Drop Cable Definitions
			Established (corner bend and mandrel wrap criteria) for compact drop cables using BIF fiber
			Remove weights during 85C cable aging during MDU Simulation
			Clarified the operational temperatures for cable types, plenum, riser, indoor/outdoor.
*** 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 MDU Drop Cables.

2.0 SCOPE

Optical Cables

3.0 REFERENCES

GR-20-CORE, Issue 2, July 1998	Generic Requirements for Optical Fiber and Optical Fiber Cables
GR-409-CORE, Issue 1, June 1994	Generic Requirements for Premises Fiber Optic Cable
VZ.TPR.9430	Optical Fiber and Optical Fiber Cable

4.0 ACRONYMS

A	After
B	Before
D	During
FOC	Fiber Optic Components
IL	Insertion Loss
ITL	Independent Test Laboratory
MDU	Multi-Dwelling Unit
nm	Nano Meter
RL	Return Loss

5.0 TEST REQUIREMENTS FOR MDU DROP CABLES

Verizon is considering using drop cables for MDU application. The following are test requirements for qualifying the MDU drop cables. All of the tests must be conducted at an ITL. It is assumed that fiber used in these cables is already qualified and Verizon approved.

Compact Drop Cable: Any single or multi fiber cable that will be used inside a premise. The cable must be handled with care and stapling is prohibited. .

Rugged Drop Cable: Any single or multi fiber cable that will be used inside a premise and can be stapled and handled with no deployment restrictions.

MDU Drop Cable Testing								
Description	**Reference Specification**	**Test Condition**	**Compact Drop**	**Rugged Drop**		**Indoor/Outdoor Rugged Drop**		**Indoor/Outdoor Compact Drop**
				2.9mm	4.8mm	2.9mm	4.8mm	
Cable Construction								
Cable Core	GR-409, Section 6.1.1.		X	X	X	X	X	X
Number of Fibers per Cable	GR-409, Section 6.1.2.		X	X	X	X	X	X
Number of Fibers per Unit	GR-409, Section 6.1.3.		X	X	X	X	X	X
Sheath Removal	GR-409, Section 6.1.4.		X	X	X	X	X	X
Cable Marking, Packaging, and Shipping								
Cable Marking	GR-409, Section 6.2.1.		X	X	X	X	X	X
Cable Re-marking	GR-409, Section 6.2.2.		X	X	X	X	X	X
Identification Marking	GR-409, Section 6.2.3.		X	X	X	X	X	X
Cable Length and Length Markings	GR-409, Section 6.2.4.		X	X	X	X	X	X
Fiber and Unit Identification	GR-409, Section 6.2.5.		X	X	X	X	X	X
Packaging	GR-409, Section 6.2.6.		X	X	X	X	X	X
Shipping	GR-409, Section 6.2.7.		X	X	X	X	X	X

MDU Drop Cable Testing								
Description	**Reference Specification**	**Test Condition**	**Compact Drop**	**Rugged Drop**		**Indoor/Outdoor Rugged Drop**		**Indoor/Outdoor Compact Drop**
				2.9mm	4.8mm	2.9mm	4.8mm	
Mechanical Requirements								
Tensile Strength of Cable	GR-409, Section 6.3.6.	Rated tensile load specified by cable design	220 N	440 N	440 N	440 N	440 N	220 N
Low and High Temperature Cable Bend	GR-409, Section 6.3.3.	Use Riser test criteria for Rugged cable designs and General Purpose Interconnect criteria for Compact cable designs	X	X	X	X	X	X
Impact Resistance	GR-409, Section 6.3.4.		X	X	X	X	X	X
Compressive Strength	GR-409, Section 6.3.5.		X	X	X	X	X	X
Cable Twist	GR-409, Section 6.3.7.		X	X	X	X	X	X
Cable Cyclic Flexing	GR-409, Section 6.3.8.		X	X	X	X	X	X
Cable Materials	GR-409, Section 6.4.		X	X	X	X	X	X
Jacket Requirements								
Outside Jacket Material	GR-409, Section 6.5.1.		X	X	X	X	X	X
Cable Jacket Yield Strength and Ultimate Elongation	GR-409, Section 6.5.2.		X	X	X	X	X	X
Cable Outer Jacket Shrinkage	GR-409, Section 6.5.3.		X	X	X	X	X	X
Cable Jacket Thickness	GR-409, Section 6.4.4.		X	X	X	X	X	X
Environmental Requirements								
Temperature Cycling	GR-409, Section 6.6.1.	Use Interconnect/ Outside Plant test criteria	X					
Cable Aging	GR-409, Section 6.6.2.		X					

MDU Drop Cable Testing								
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				2.9mm	4.8mm	2.9mm	4.8mm	
Color Performance	GR-409, Section 6.6.3.		X					
Temperature Cycling	GR-20, Section 6.6.3.			X	X	X	X	X
Cable Aging	GR-20, Section 6.6.4.			X	X	X	X	X
Color Performance	GR-20, Section 6.6.6.			X	X	X	X	X
Flammability Listing of Premises Cables								
Plenum Cable	GR-409, Section 6.7.1.		X	X	X	X	X	X
Riser Cable	GR-409, Section 6.7.2.		X	X	X	X	X	X
General Purpose Cable	GR-409, Section 6.7.3.		X	X	X	X	X	X
Water Penetration	GR-20, Section 6.6.7.					X	X	X
Ionic Water Penetration	VZ.TPR.9430					X	X	X
MDU Application Tests								
Corner Bend with radius < 1 mm for UBIF = min bend radius of cable for BIF	n/a	Apply 2 kg load to cable to secure cable against fixture. Attenuation at 1550 nm should be ≤ 0.05 dB.	X	X	X	X	X	X
Corner Bend with radius < 1 mm for UBIF	n/a	Apply load equal to the long term rated tensile load of	X	X	X	X	X	X

MDU Drop Cable Testing								
Description	Reference Specification	Test Condition	Compact Drop	Rugged Drop		Indoor/Outdoor Rugged Drop		Indoor/Outdoor Compact Drop
				2.9mm	4.8mm	2.9mm	4.8mm	
= min bend radius of cable for BIF		the cable. Attenuation at 1550 nm should be ≤ 0.1 dB.						
Mandrel wrap	n/a	5 wraps around a mandrel equal to the rated minimum bend radius of the cable. Attenuation at 1550 nm should be ≤ 0.1 dB/turn for UBIF cable. For BIF cabled fiber use G.657 macrobend IL criteria for minimum bend radius.	X	X	X	X	X	X
T25 Staple	n/a	Secure 1 m of cable with 20 staples onto un-aged construction grade wood so that each staple is in full contact with the top of the cable. Attenuation at 1550 nm should be ≤ 0.1 dB. Perform test three times with	N/A	X	X	X	X	N/A

MDU Drop Cable Testing								
Description	**Reference Specification**	**Test Condition**	**Compact Drop**	**Rugged Drop**		**Indoor/Outdoor Rugged Drop**		**Indoor/Outdoor Compact Drop**
				2.9mm	4.8mm	2.9mm	4.8mm	
		three different operators for a total of 60 staples.						
MDU Application Simulation	n/a	The attenuation at 1550 nm should be ≤ 0.4 dB after the following conditions are applied:	X	X	X	X	X	X
		-Ten 90º corner bends unloaded	Min bend radius of cable	Ten 90º corner	Ten 90º corner	Ten 90º corner	Ten 90º corner	Min bend radius of cable
		-One 90º corner bend w/ 2 kg load	Two bends Min bend radius of cable 2 kg load	One 90º corner 2 kg	One 90º corner 2 kg	One 90º corner 2 kg	One 90º corner 2 kg	Two bends Min bend radius of cable 2 kg load
		-One 90º corner bend w/ weight as specified	N/A	One 90º corner 5 kG	One 90º corner 7 kG	One 90º corner 5 kG	One 90º corner 7 kG	N/A
		-Two 10 mm mandrel wraps	Two min bend radius	Two 10 mm mandrel wraps	Two 10 mm mandrel wraps	Two 10 mm mandrel wraps	Two 10 mm mandrel wraps	Two min bend radius
		-Thirty T25 staples	N/A	X	X	X	X	N/A

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				2.9mm	4.8mm	2.9mm	4.8mm	
MDU Application Simulation	GR-20, Section 6.5.9[1]	Perform temperature cycling and aging[2] of the MDU simulation to the cable's rated temperature extremes.	X	X	X	X	X	X

[1] The reference to this section of GR-20 is to specify the Environmental sequence only. Please see the following applicable criteria from this section : (The increase in attenuation is measured with respect to the baseline attenuation values at ambient before sample conditioning, consistent with FOTP-8 and a modified aging cycle (refer to Section 6.6.4 for the basic cycle). In the aging cycle at the end of the 85°C conditioning period, repeat steps two and three from the temperature cycle only once and continue conditioning by decreasing the temperature to -40°C for a minimum of 4 hours. Attenuation measurements shall be performed at completion of the -40°C conditioning.) Please note that the actual temperature high and low limits shall be the limits of the specific cable under test, e.g., indoor/outdoor, plenum rated, riser rated, general purpose.

[2] Please note that for the cable aging portion of the environmental tests the weights are removed prior to the 85 C aging test and are reattached after the aging portion of the environmental test sequence.