



**Verizon NEBS™ Compliance:  
Single/Bundled Microducts and  
In-Living Unit (ILU) Cable Pathways  
Optical Cable Microducts and Accessories**

Verizon Technical Purchasing Requirements  
**VZ.TPR.9442**  
**Issue 4, February 2015**



**CHANGE CONTROL RECORD:**

<b>Version</b>	<b>Date</b>	<b>Action*</b>	<b>Reason for Revision</b>
1	08/21/2007	New	New Document
2	05/10/10	Change	Multiple changes - Updated and/or changed technical criteria
3	09/06/11	change	Added Test Slug to Ovality test.
		Added	Define coupler seal methods
		Change	Referenced GR-3155 Issue 1 as appropriate
4	01/15/15	Change	Referenced GR-3155 Issue 2 as appropriate
* New, Add, Delete, Change, Reissue			

Trademark Acknowledgement – NEBS is a trademark of Telcordia Technologies, Inc.



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## 1.0 PURPOSE

The purpose of this Verizon Technical Purchasing Requirement document is to provide FOC testing requirements for Optical Cable Single/Bundled Microducts and ILU Cable Pathways.

## 2.0 SCOPE

FOC Products

## 3.0 REFERENCES

<b>Verizon ITL Memo #42</b>	Microduct for Fiber Optic Cables Testing Requirements, August 16, 2006
<b>GR-49-CORE</b>	Generic Requirements for Outdoor Telephone Network Interface Devices
<b>GR-209-CORE</b>	Generic Requirements for Product Change Notices (PCN)
<b>GR-356-CORE</b>	Generic Requirements for Optical Cable Innerduct, Associated Conduit, and Accessories
<b>GR-771-CORE</b>	Generic Requirements <i>for Fiber Optic Splice Closures</i>
<b>GR-3108-CORE;</b>	Generic Requirements for Network Equipment in the Outside Plant (OSP)
<b>GR-3155-CORE,</b>	Generic Requirements for Single/Bundled Microducts and ILU Cable Pathways
<b>SR-NWT-2759;</b>	A View of Packaging, Palletizing and Marking Requirements
<b>TR-NWT-001334 Modular Connecting Block</b>	Generic Requirements for Modular Connecting Blocks Comment – this is an older document that is no longer in the current database so for the chemical testing section referenced from this TR is covered under GR-3155) - removed the reference in the spreadsheet so this reference is no longer needed
<b>UL 2024; rev 4</b>	Optical Fiber and Communication Cable Raceway
<b>ASQ TL 9000</b>	TL 9000 Quality System Requirements
<b>ASTM G-21; Rev 96</b>	Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
<b>ASTM G 154; Rev 6</b>	Standard Practice for Operating Fluorescent Lighting Apparatus for UV Exposure of Non-Metallic Materials
<b>ASTM G 155; Rev 05A</b>	Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
<b>ASTM B-117; Rev 07</b>	Standard Practice for Operating Salt Spray (Fog) Apparatus
<b>ASTM D-638; Rev 03</b>	Standard Test Method for Tensile Properties of Plastics
<b>NFPA 70</b>	National Electrical Code (NEC)



#### 4.0 ACRONYMS

<b>A</b>	After
<b>B</b>	Before
<b>D</b>	During
<b>FOC</b>	Fiber Optic Components
<b>IL</b>	Insertion Loss
<b>ITL</b>	Independent Testing Laboratory
<b>NEC</b>	National Electrical Code
<b>NRTL</b>	Nationally Recognized Test Lab

#### 5.0 TEST REQUIREMENTS FOR OPTICAL CABLE MICRODUCTS AND ACCESSORIES

Verizon is considering using Optical Cable Single/Bundled Microducts and ILU Cable Pathways for all applications as required. The following are the test requirements for qualifying Optical Single/Bundled Microducts and ILU Cable Pathways. All the testing must be completed by a Verizon approved ITL.

FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways			
Task Name	# Of Samples	Optical Monitoring	Test Conditions
<b>Introduction</b>			
1.1 Purpose and Scope			Verizon view of microduct requirements for optical cable Single/Bundled Microducts and ILU Cable Pathways for indoor and outdoor use. This specification covers microducts, microduct splice connectors and end-cap assemblies. The Punch list covers both air blown, pulled, and direct placement fiber
1.2 Target Audience			Users, purchasers, manufacturers and suppliers of optical cable microducts
1.3 Reason for Issuing GR-3155 Punch list			Provide adequate information to properly test the product
1.4 Structure and Use of This Document			This GR Punch list includes sections as noted below
1.5 Requirements Terminology			(R) - Requirement, (CR) - Conditional Requirement, (O) - Objective
1.6 Requirement Labeling Conventions			Discusses numbering system for the GR
1.7 Test, Sample and Retest	3 samples per group unless noted		All samples used for testing must be thermally aged first. One extra system will be used to simulate real life environments (age and run temperature & humidity cycle) with optical measurements.
<b>General Information</b>			
2.1 General Description			See product literature - includes requirements for product installations.
2.2 Operating Environment			Indoor controlled -5C (23F) to 50C (122F) to 85%RH, GR3108 section 1.3.2, Outdoor - 40C (-40F) to 75C (167F) 5 to 95%RH, section 1.3.3 GR-3108.
<b>General Requirements</b>			
3.1 Product Samples			Production Samples labeled with name, model number and date code.
3.2 Product Changes			Must follow PCN guidelines per GR-209-CORE
3.3 Safety and Reliability			No sharp objects or burrs from the production line samples.
3.4 Listing			Must meet NEC applicable and local codes. NRTL Listed covering Riser and Plenum applications. (See UL2024) Listing markings shall be R - every 5 ft, O - every 2 ft.
3.5 Materials			5% plastics regrind max for all microduct components and accessories. The manufacturer shall indicate if pre or permanently lubricated materials are used



**FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways**

<b>Task Name</b>	<b># Of Samples</b>	<b>Optical Monitoring</b>	<b>Test Conditions</b>
<b>Introduction</b>			
3.6 Craft Interaction			Ability to install fiber without special tools for pull string applications; need blower or other tool for air blown application; Air blown fiber and equipment must be capable of being interoperable. For pull string application use: Corning 3mm riser, AFL 200 ft, 6 bends, radius of bends in accordance with NEC criteria for 1.25" EMT conduit. The microduct products shall be able to be used for cable installations with pull lines or pull strings, without special tools. The supplier shall provide capabilities and capacities with a defined peak pull force for a given pull distance and meet the force requirements of GR3155 R3-16 [18].
3.7 Instructions and Labeling			Instructions shall be provided for installation and use. Marking shall include manufacturers name, model number, and length of duct on reel and date code. Shall include NRTL Listing. Instructions shall include all disclaimers required by the service provide.
3.8 Package Label			GR2759 for packaging labels. Suppliers name, product part number, material ID number (SSI, Item ID no.), product length and date code shall be on the outside box or reel. Lettering minimum 1/4 inch. Should include NRTL Listing.
3.9 Toxic Materials			There shall be no toxic materials as defined by OSHA or EPA
3.10 Tools			No special equipment or tools needed for installation of microducts. Exception - air blown installation would require special air blowers, which are not part of the crafts normal tool set.
3.11 Dimensions			GR-3155 Section 3.11
3.12 Ability to Cut			Ability to cut cleanly using standard tools
3.13 Quality			(TL9000); A recertification is needed every 3 years.
3.14 Documentation			GR-3155 Section 3.14 on <i>Documentation</i> - Proper documentation shall be provided for installation and operation. Provide specific instructions for indoor and outdoor usage.





FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways			
Task Name	# Of Samples	Optical Monitoring	Test Conditions
<b>Introduction</b>			
3.15, 3.16 and 17Packaging, Shipping, Marking			GR-3155 Section 3.15, 3.16 and 17Proper packaging shipping and marking requirements to reduce the risk of damage during shipping and to help assure that proper marking is provided on the product and its shipping container.
3.18 Color Coding			Color coding of microducts is very useful where multiple microducts are being deployed throughout a building or along a conduit run. The supplier shall provide the color coding that they employ. GR3155 section 3.18 provides suggested color coding
3.19 Product Compatibility			Innerducts shall be compatible with tools, equipment, and procedures used by the service provider.
<b>Mechanical Requirements:</b> All test samples for this section must be aged at 75°C ± 1°C (167°F ± 2°F) for 30 days prior to the application of the individual tests. (Per GR-3155 section 4 requirements.) For all test procedures described in this document the ambient lab conditions shall be 23°C ± 2°C and 20% ≤ RL ≤ 70%.			
4.1 Operational	3 Test samples		The connector and end cap must withstand 10 operations of assembly and disassembly. Following this conditioning the sealing arrangements shall operate at blowing pressure of (150 psi)
4.2 Ovality	3 Test samples		See GR3155 4.2 Max ovality 5% when tested at 50C for 15 days Ovality is verified on the delivered samples by performing the conduit “diameter slug” test on the test sample that have been aged at 75C for 30 days. The length of the test sample = $4x\pi \times 20 \times OD$ , where OD is the outside diameter of the micro-conduit. The microduct is bent 180 degrees around a mandrel (20 x OD of Microduct) and aged at 50C for 15 days. The cable test (slug or ball) is blown through the conduit when bent 180° around a mandrel. The air pressure = blowing pressure of the manufacturer’s cable/fiber blowing system.  The dimensions of the test (slug or ball) are show in the diagram below. GR3155 provides calculated values for sample length and mandrel diameter and well as slug diameter for various sizes of microducts
4.3 Coefficient of Friction	3 Test samples		See GR-356 4.2.5 Without lubricants 0.35, with lubricants/ pre-lubricated duct.0.30.



**FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways**

Task Name	# Of Samples	Optical Monitoring	Test Conditions
<b>Introduction</b>			
4.4 Tensile and Pull Strength	3 Test samples		<p>The min. pull strength/tensile strength should be as follows when tested with a rate of extension of 25mm (1 in.)/min.</p> <p>90 lbs. - For microducts designed to be deployed into and through conduits in underground plant            70 lbs. – For microducts designed to be deployed in spaces inside buildings            30 lbs. - For jetted innerduct products designed to be air-jetted through conduits</p> <p>For all other size samples record the lowest tensile load for which the first of any one of the 3 events defined below occurs</p> <p>Pull Strength Definitions – For any of the samples tested, the lowest tensile load at which one of the following occurs:</p> <ol style="list-style-type: none"> <li>1. Separation of the duct, complete separation or tears or holes or splits, etc</li> <li>2. Duct elongation exceeding 10% of the gauge length for non-corrugated duct, or 25% for corrugated designs</li> <li>3. A permanent reduction in the outside diameter of the duct of more than 5%</li> </ol> <p>For those products that are an assembly of “microducts inside of a duct” the method of attachment to the measuring device and the application of the pass/fail criteria may be product specific. In such cases the method of attachment and pass/fail criteria shall be determined by Verizon.</p>
4.5 Elongation	3 Test samples		<p>Max. 2.5%. - For microducts designed to be deployed into and through conduits in underground plant. Tested at 70 lbs. force at a pull rate of 25mm (1 in.)/min</p>



FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways			
Task Name	# Of Samples	Optical Monitoring	Test Conditions
<b>Introduction</b>			
			<p>Max 2.5 %– For microducts designed to be deployed in spaces inside buildings. Tested at 50 lbs. force at a pull rate of 25mm (1 in.)/min</p> <p>Max 2.5 %– For jetted innerduct products designed to be air-jetted through conduits. Tested at 24 lbs. force at a pull rate of 25mm (1 in.)/min</p>
4.6 Compression	3 Test samples		<p>Apply load between two (100mmx100mm) steel plates, at 50C no visual or physical evidence of wall cracking, crazing, delamination, or rupture. No more than 15% deformation immediately after the load is removed.</p> <ul style="list-style-type: none"> <li>• 75 lbs for microducts with OD less than or equal to 8 mm</li> <li>• 125 lbs for microducts with OD less than 13 mm and greater than 8 mm</li> <li>• 200 lbs for microducts with OD greater than 13 mm.</li> <li>• 30 lbs. for jetted microducts</li> </ul> <p>For those microduct products that are “microduct within an overall duct, the weight shall be applied to the total assembly, however, physical damage shall apply to both the inner and outer ducts, but the % deformation shall apply only to the inner ducts.)</p>
4.7 Impact	3 Test samples		<p>Test at -5°C (indoor), -40°C Outdoor, place on 0.5” steel plate</p> <p>Impact: 4ft-lbs, air jetted products 2ft-lbs per GR3155. Verizon requires data at 5 ft-lbs.</p>
4.8 Bending	3 Test samples		<p>Bend using the test procedure in GR3155 4.8.2. Tested at -5C (indoor), -40C Outdoor. The 5% ovality shall be met as well as the micro duct shall be able to be straighten without damage.</p> <p>Kink Resistance No kinking when bent to 15 times OD.</p>
4.9 Pressure Burst Strength	3 Test samples		<p>The product shall withstand. (150 PSI per GR3155for 5 minutes without loss of pressure (for blown fiber only). Verizon requires data at 200 PSI Post test - ≤ 5% Ovality when measured using the dimensional definitions of (4.2)</p>



**FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways**

<b>Task Name</b>	<b># Of Samples</b>	<b>Optical Monitoring</b>	<b>Test Conditions</b>
<b>Introduction</b>			
4.10 Cable Installation-Field Installation	3 Test samples	B/A IL	Fiber cable shall be able to be blown following the manufactures instructions over all anticipated installation without damaging the fiber cable. The cable manufacturer shall provide these pressures. Measure the attenuation coefficient at 1625 nm before and after fiber installation. Change $\leq 0.20$ dB/km. The test course is the one specified in Section 4.10 of GR-3155



**FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways**

<b>Task Name</b>	<b># Of Samples</b>	<b>Optical Monitoring</b>	<b>Test Conditions</b>
<b>Introduction</b>			
<b>Environmental Requirements</b>			
<p>A. Frozen duct testing to include all the parts,            B. Relative higher temperature testing includes all the parts as well.</p>			
5.1 Assembly- Craft Interaction	3 Test samples	B/A IL	Product shall be able to be assembled following manufacturer's instructions, with all parts shall be provided in kit. Test with different fiber sizes and manufactures of fiber cable and different blower equipment. Change in attenuation coefficient $\leq 0.20$ dB/km. See GR3155 Figure 5-1 for the test frame
5.2 Dimensions	3 Test samples		Measure dimensions (OD, ID, Thickness, Length) of all samples. Then subject to aging, 75C for 30 days. Measure dimensions after. Change in (OD, ID, Thickness) $\leq 5\%$ , Change in Length $\leq 2\%$
5.3 Aging - Mold Stress	3 Test samples		75C for 30 days
5.4 Temperature/Humidity Cycle	3 Test samples	B/D/A IL	Indoor: 60 -12 hours cycles (30 day test) -5C (23F) to 50C (122F);, 60 -12 hours cycles (30 day test) -40C (-40F) to 75C (167F). Mount as shown in the configurations. Pull the fiber and measure at 1625nm continuous. Temp Humidity D/A the average change in atten coeff $\leq 0.3$ dB/km. Max change in atten coeff $\leq 0.6$ dB/km.
5.5 Chemical Resistance	3 Test Bars/Group		Test per GR3155 Section 5.5: <b>Indoor</b> WD-40, Wasp Spray, 10% Igepal®, Oil and latex Based House Paint, 3.5% NaOH, <b>Outdoor:</b> GR 3120 3% H <sub>2</sub> SO <sub>4</sub> , 0.2N NaOH, NH <sub>3</sub> , 90% Alcohol, Kerosene, 10% Igepal®. Shall not craze or crack and must retain 75% of original strength. Chemical Immersion: 30 days at 22°C +/- 2°C Stress Cracking: 7 days at 22°C +/- 2°C
5.6 Fungus	3 Test samples		All ducts and accessories shall meet the zero rating per ASTM G21.
5.7 UV (outdoor only)	3 Test Bars/Group		See GR-3155 Section 5.7 - Per ASTM G 154 1,500 hours, or ASTM G 155 1,000 hours. Shall note craze or crack and must retain 75% of original tensile and elongation strength. Tensile Test before and after exposure. Tensile per ASTM D



FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways			
Task Name	# Of Samples	Optical Monitoring	Test Conditions
<b>Introduction</b>			
			638 Type 25mm (1 inch.)/min.
5.8 Flammability	3 Test samples		Shall be UL94V-0 for Riser Rated Microducts and UL94V-0 for Plenum Rated Microducts
5.9 Dielectric Withstand	3 Test samples		No dielectric breakdown with 1500V AC for one minute break down current is defined as current > 20ma.
5.10 Rodent Resistance - Hardness	3 Test samples		For Indoor and Outdoor applications, Rockwell hardness of R87.
5.11 Freeze Thaw (Buried Applications)	3 Test samples		The microduct shall show no evidence of water intrusion after it is immersed in water and subjected to 10 freeze/thaw cycles, as per the test procedure provided below that is based on GR-771-CORE, <i>Generic Requirements for Fiber Optic Splice Closures</i> , Section 5.4.4.1
<b>Microduct Accessory Requirements</b>			
6.1 Couplers <sup>1</sup>	3 Test samples		GR-3155 Section 6.1 (Supplier shall indicate whether couplers are reusable or not as well as providing adequate labeling instructions.)  Per 6.1 of GR-3155 R6-2 of GR-3155 R6-3 of GR-3155 CR6-4 of GR-3155 R6-5 of GR-3155 except that pressure (150 psi rating shall be used per the GR3155, Couplers can be tested when burst test is completed in Section 4.9 of this TPR document. Verizon requires data at 200 psi. R6-6 of GR-3155  R5-8 per GR356

<sup>1</sup> Please note that couplers may be slipped on, screwed on, use rubber seals or heat shrink type materials to provide holding strength. Any of these methods is acceptable as long as the coupler and conduit meet the requirements of this TPR.



<b>FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways</b>			
<b>Task Name</b>	<b># Of Samples</b>	<b>Optical Monitoring</b>	<b>Test Conditions</b>
<b>Introduction</b>			
			R5-10 per GR-356: Coupler maximum OD shall be $\leq 1.414$ times the duct OD.
6.2 End Caps	3 Test samples		Meet GR-3155 Section 6.2 GR-356 - 5-3 End caps shall be connected to the duct and withstand 10-foot water head for 7 days. Applicable for blown fiber applications only.  R6-10 of GR-3155 R6-7 of GR-3155



FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways			
Task Name	# Of Samples	Optical Monitoring	Test Conditions
<b>Introduction</b>			
6.3 Pull Line/String Requirements	3 Test samples		<p>Comment – the pull line requirements of GR-3155 are more appropriate for smaller microducts and pull lines than those in GR-356 designed for larger cables and pull lines.</p> <p>GR-3155 – 6.3 (Supplier to provide specific information for verification)</p> <p>GR-3155 – 6.3 (Supplier to provide specific information for verification)</p> <p>Meet GR-3155 - R6-13 → Pull Line Duct Cutting</p> <p>Meet GR-3155 - R6-14 and R6-15 → Pull Line Tensile Strength</p> <p>Meet GR-3155 - R6-17 → Pull Line Stretch</p> <p>Meet GR-3155 - R6-18 → Pull Line Length</p> <p>Meet GR-3155 - R6-16 → Pull Line Splice – not allowed</p>
6.4 Mounting Hardware	3 Test samples		<p>Any Metallic mounting hardware shall be ASTM B-117 compliant (salt fog 7 days) as per R6-19 of GR-3155</p>





FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways			
Task Name	# Of Samples	Optical Monitoring	Test Conditions
<b>Introduction</b>			
6.5 Breakout Boxes			Meet GR3155 Section 6.5
<b>Bundled Microduct Accessory Requirements</b>			
7.1 Introduction			Bundled microduct assemblies have several (i.e., 2 and greater) microducts are usually combined together under a single sheath.
7.2 Microduct Assembly Configurations			GR3155 Table 7-1 Microduct Assembly - Thin-Walled Microduct Config defines the Individual Microduct Components of Bundle
7.3 General Requirements			As outlined in GR3155 Section 7.3 the bundled product shall meet the appropriate general requirements
7.4 Mechanical Requirements			As outlined in GR3155 Section 7.4 the bundled product shall meet the appropriate mechanical requirements
7.5 Environmental Requirements			As outlined in GR3155 Section 7.5 the bundled product shall meet the appropriate environmental requirements
7.6 Accessory Requirements			As outlined in GR3155 Section 7.6 the bundled product shall meet the appropriate accessory requirements
<b>In-Living Unit (ILU) Cable Pathways</b>			
8.1 Product Description			In-Living Unit (ILU) cable pathways cover products that provide a cable pathway with an integral adhesive backing designed for use in occupied living and public spaces. In another ILU product, optical fiber is encased in a soft adhesive material and adhered to the wall.
8.2 Application			ILU cable pathway products are primarily designed for use inside living units (apartments, houses, and condominiums) and public occupied spaces applications. For this document, the ILU products are assumed to be deployed in homes,



<b>FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways</b>			
<b>Task Name</b>	<b># Of Samples</b>	<b>Optical Monitoring</b>	<b>Test Conditions</b>
<b>Introduction</b>			
			schools, hospitals, hotels, and small business spaces.
8.3 Environmental and Mechanical Caveats			See GR3155 section 8.3 for a discussion of application and requirements for ILU Products



**FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways**

Task Name		Test Conditions
<b>Introduction</b>		
8.4 General Information and Design Considerations		ILU products shall be able to be deployed and operational at conditions between -5°C (23°F) and 50°C (122°F), and between 10 and 85% Relative Humidity (RH). For detailed test information see GR3155 section 8.4. ILs shall have adequate fire resistance ratings for the occupied space environments as per NEC code and local fire/building code requirements
8.5 General Requirements and Objectives		See GR3155 section 8.5 for a discussion of requirements and objectives for ILU Products
8.6 Dimensions		The characteristic dimensions of the ILU products shall be measured and reported. These dimensions shall be consistent (i.e., the average value shall not vary more than ± 0.2 mm along the ILU product). ILU products should have (a) thin cross-section to provide a flat profile when surface mounted, and (b) uniform dimensions along the cable pathway to help ensure cable placement is smooth and damage free.
8.7 Quality		(TL9000); A recertification is needed every 3 years.
8.8 Documentation		ILU suppliers shall meet the objectives and requirements of <a href="#">Section 3.14</a> , “ <a href="#">Documentation</a> .”
8.9 Packaging and Shipping		The ILU supplier shall meet the objectives and requirements of <a href="#">Section 3.15</a> , “ <a href="#">Packaging</a> ,” with particular attention paid to their intended storage
8.10 Marking and Color Coding		ILU product markings; that is,



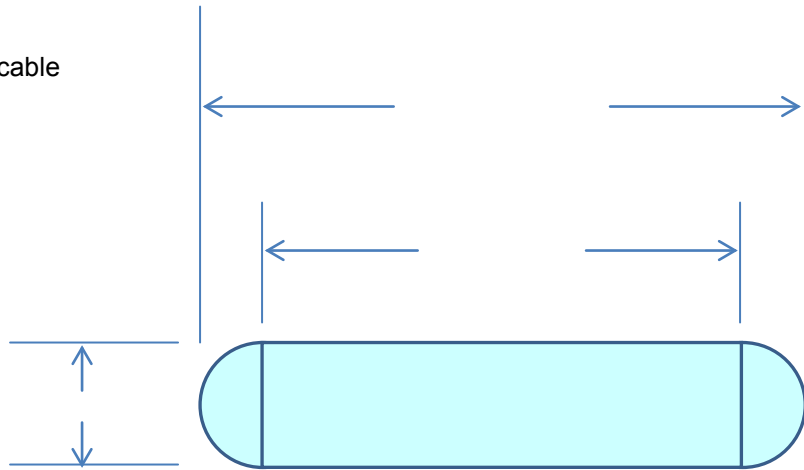
**FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways**

Task Name		Test Conditions
<b>Introduction</b>		
		they are primarily required to (a) enable traceability from the deployed product in the field back to the manufacturer, plant, and batch/lot, and (b) permit easy identification during inspections associated with quality audits, and fire and building code inspections. See GR-3155 Section 8.10 for additional information
8.11 Product Compatibility		During the craft simulation and test simulation tests of <a href="#">Section 4.10</a> , the product compatibility of the ILU products with all types of surfaces, tool, and application methods to place the ILU securely around corners shall be evaluated.
8.12 Mechanical Requirements		ILU products shall meet the mechanical requirements of <a href="#">Section 4</a> ; modified and updated for the specific ILU product designs, characteristics, and applications.
8.13 Environmental Requirements		ILU products shall meet the environmental requirements of <a href="#">Section 5</a> ; modified and updated for the specific ILU product designs, characteristics, and applications.
8.14 ILU Hardware Accessory Requirements		ILU accessories shall meet the requirements of <a href="#">Section 6</a> ; modified and updated for the specific ILU product designs, characteristics, and applications.
8.15 Adhesion		The ILU product shall not slip under a load of 250 grams when tested with Wood or sheetrock (dry-wall) coated with a latex-based paint <ul style="list-style-type: none"> <li>• Wood or sheetrock (dry-wall) coated with an oil-based</li> </ul>



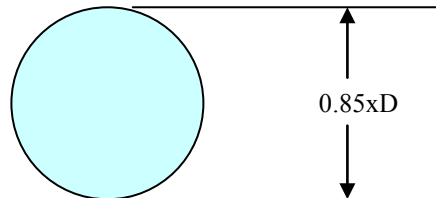
FOC Test Plan For GR-3155 Optical Cable Single/Bundled Microducts and ILU Cable Pathways		
Task Name		Test Conditions
<b>Introduction</b>		
		paint <ul style="list-style-type: none"><li>• Textured wallpapered over sheetrock (dry-wall)</li><li>• Wood paneling.</li></ul>

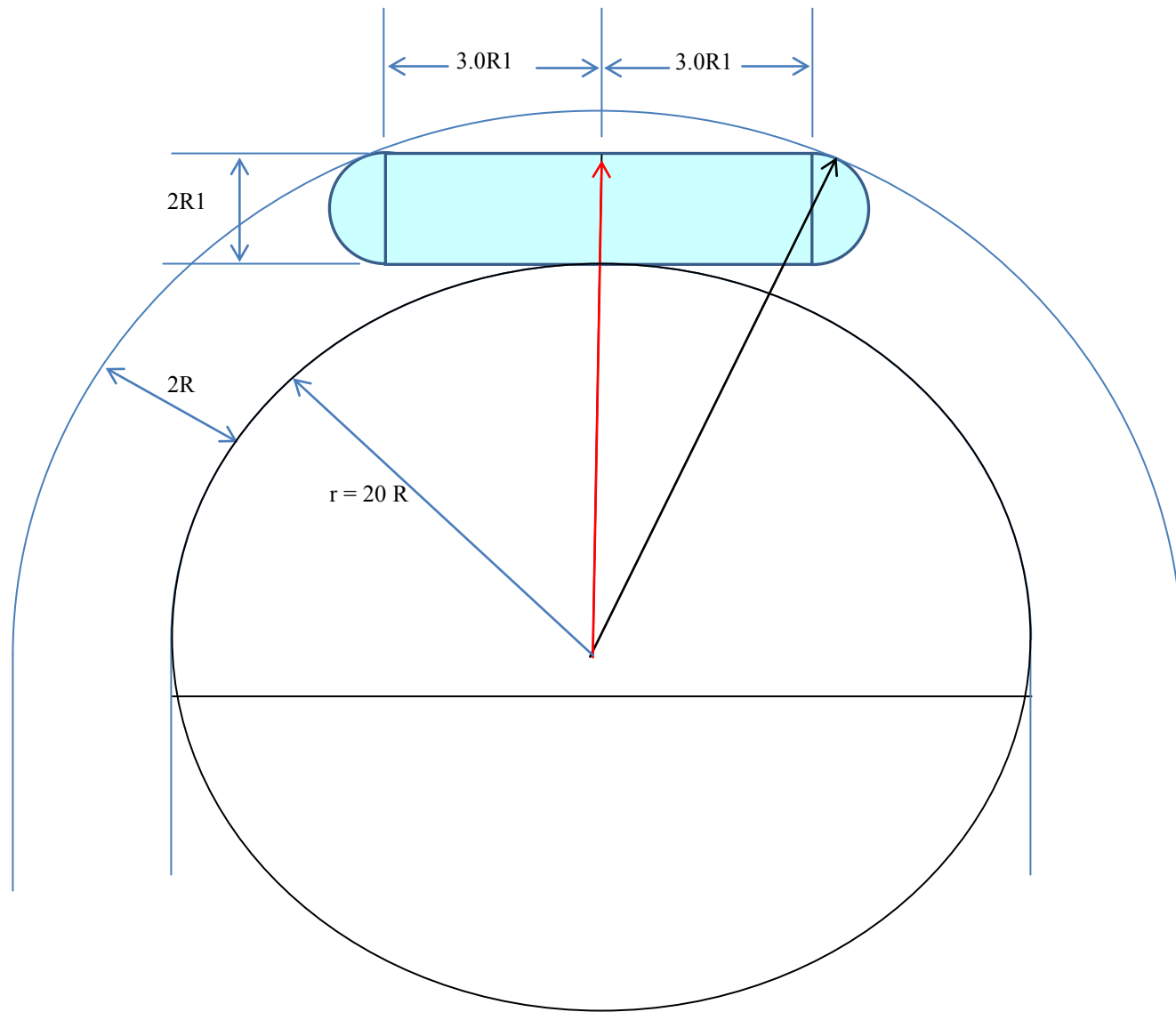
Notes: Test without and with pre-installed cable



OR

Test Ball, stainless steel, diameter =  
0.85X nominal inside diameter (D) of micro-duct.





Test Setup for Micro-conduit "Slug" test.