



**Verizon NEBS™ Compliance: General
Guidelines for FOC Testing and Reporting**
Verizon Technical Purchasing Requirements
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CHANGE CONTROL RECORD:

Version	Date	Action*	Reason for Revision
1	08/6/2007	New	New Document
2	10/04/2007	Add	Guidelines on subcontracted tests Guidelines for using references in Test Plans Guidelines for using Equipment List in Test Plans
3	10/15/2007	Change	Itemized the bullets in Section 5
4	06/10/2008	Change	Clarified item "I"
5	04/09/2010	Change	Added data reporting, Pass/Fail Determination and 5% channel monitoring
6	06/01/2010	Add	Added RCA requirements and clarified testing parameters
7	06/10/2010	Add	Added FQA section for reporting requirements in item "y"
* New, Add, Delete, Change, Reissue			

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1.0 **PURPOSE**

The purpose of this Verizon Technical Purchasing Requirement document is to provide general guidelines for FOC testing and reporting.

2.0 **SCOPE**

FOC Testing and Reporting

3.0 **REFERENCES**

PFOC Memo #40	Summary Notes
PFOC Memo #26	Notes and Information - Various GRs

4.0 **ACRONYMS**

FOC	Fiber Optic Components
ITL	Independent Testing Laboratory
SIT	System Integration & Testing
TPR	Technical Purchasing Requirement

5.0 **GENERAL GUIDELINES**

This TPR is issued to provide clear guidelines related to FOC component testing and reporting.

- a. If a test was audited and approved for one GR, and if the same test (same test set up, procedure and configuration) is in another GR, then demonstration or auditing of this test is not required. The test must be in the test plan.
- b. Data Reporting - Record and report the actual test data, then account for connector contribution by adding this to the criteria, GR specification and Verizon/Contracted Specification. Include correction factors on data charts via limit indicators and provide notation in data summaries indicating



- c. All products require all applicable tests required by the particular FOC Test Program. If a subset test program is possible due to previous testing, then a meeting is required with SIT, the supplier, and FOC ITL. The product must also be available for review. Verizon SIT will participate one time, subsequent meetings or subsequent inquires from a second, third, FOC ITL will not be possible. Therefore if a supplier wishes to bid a particular test program, they should have all interested FOC ITLs present for the review and agreement meeting.
- d. Full GR Test Programs require sample, configuration and test decisions by the FOC ITL. It is expected that all FOC ITLs make these decisions and proceed with testing following SIT requirements and specification referenced in the TPR's - no advance SIT approval is required.
- e. TPRs are to be used in conjunction with the GRs. If a conflict exists between the TPR and the GR, then the TPR is the default and must be followed. All of these TPRs must be part of the applicable test plans.
- f. For all GRs the pass/fail criteria will be the most stringent requirements of the following: Generic Requirement (GR), Verizon Specification or the Supplier's Specification. The specifications used must be defined in the test plan and report. The supplier's specification sheet is to be provided and inserted next to the product description in the Test Plan and Report.
- g. For all GRs Test Plans/Reports it is the Supplier's Responsibility to ensure that the worst-case test sample configuration (cable types and lengths, etc) is evaluated for product qualification and that this configuration thoroughly exercises all design variables and combinations that affect product performance.
- h. Photographic documentation of every test setup is required and must be included within the test report providing adequate resolution to ensure all aspect of the set up can be seen.
Reasoning: Accurate documentation of testing setup with photographs will ensure testing can be easily repeated if required either for retesting of the product or future testing of like products.
- i. Temperature charts and or data must be included within test reports for all environmental sequences. This information may be in the form of a temperature chart or data graphed data file representing the actual temperature data.
- j. All collected data (measured, temperature charts, etc.) must be included in excel with the soft copy of all reports. It may be necessary at times for Verizon to go back and look at the actual data and temperature charts during product evaluation to determine compliance to a specific test requirement.



- k. For all GRs and on all tracking documentation the fiber supplier and type of fiber used must be indicated for each product. Product tested with special bend optimized or insensitive type fiber is not necessarily approved for use with standard type fiber, i.e.: SMF28-E.
- l. VWDM modules utilizing electrical support circuitry will never be used in Outside Plant environments, and will only be used in Central Office environments. Testing to GR-63 Central Office temperatures (-5 C to +50 C) is accepted for these modules. This is due to the reliability of electrical components. VWDM devices and modules that are not utilizing electrical support circuitry must be tested as per GR-1209/1221 and associated TPRs.
- m. Network Creation has eliminated the need to use 1625 nm for VWDM devices this change allowed for improvement in the devices provided (Performance improved significantly at the other three wavelengths). Since the device will not be used or designed for performance at the 1625 nm wavelength, testing is not required. This applies only to VWDM devices.
- n. The usage of bend radius limiters during any testing is expressly prohibited unless specifically referenced within the TPR.
Reasoning: The intent of a test is to simulate actual stress, which may be exerted on product either in transportation, handling, installation or deployment. Since these products will not be deployed utilizing bend radius limiters, any usage during testing would skew and invalidate the results of the testing.
- o. It is the Labs (Supplier and or ITL as applicable) responsibility to safely perform testing at temperature extremes, by using appropriate attire, restrictions and procedures.
- p. Reference to Work Instructions or SOPs in a Generic Test Plan:
Follow either A or B:
 - A - Point to a Work Instruction from the test plan. The local procedures must have issue or rev number and associated date in the body of the test plan and in the summary table of reference docs in the front of the test plan.
 - B - Include the entire test method and only point to ASTM or FOTP like documents as references.
- q. Labs do not need to list all equipment - only enough to perform each test setup.
- r. Subcontracting Tests for Witnessed Lab:



Case-1: Witnessed Lab CAN perform the test but the Primary ITL CANNOT do the test: Witnessed Lab tests must be witnessed by an ITL that is approved to perform the specific test in their own lab. If the Primary FOC ITL cannot perform a test in their own lab then the particular test will need to be subcontracted to a Secondary ITL who is approved to perform the test. The Primary ITL will need to have a contractual relationship with another ITL to cover the tests that they do not perform. Witnessed Lab can, therefore, still use one lab who will act as the general contractor. The witness from the second ITL will need to be at Witnessed Lab during testing. The second ITL will submit a separate test report that is added to the addendum of the master test report - results are culled and inserted into the master report. The credentials of the Secondary ITL witness will need to be submitted to Verizon for approval.

Case-2: Both Witnessed AND the Primary ITL CANNOT do the test: Tests that Witnessed Lab will outsource to the Primary ITL will need to be performed by the ITL in their lab facility. If the FOC - ITL cannot perform a test in their own facility they must have a contractual relationship with a second FOC - ITL to cover tests that they themselves outsource. The second ITL will perform the test and submit a test report to the Primary ITL. Test results will be included in the master test report and also as a separate report in the addendum. Witnessed Lab can, therefore, still use one lab that will act as the general contractor and incorporate the Secondary ITL's report into the master report. Witnessed Lab can also go direct to a second ITL.

Case-3: FOC Tests with no Optical Monitoring: Tests that are part of the FOC Program but do not require optical monitoring may also be performed by an approved NEBS ITL, for example: Wind Driven Rain (WDR). A separate report will be prepared and submitted to the Primary ITL for inclusion in the addendum of the master test report. Results will be inserted into the master report. Witnessed Lab can elect to contract directly with an approved ITL for such tests. If Witnessed Lab has test facilities for a test such as WDR, that are approved by Verizon, then an ITL FOC or NEBS witness can be present during testing. Credentials of the witness will need to be submitted to Verizon for approval.

- s. All labs must use 5% of the optical channels as the reference channels in an optical switching system test setup. These channels shall be uniformly selected over the switching system. For example in a 100 channels optical switching system channels 1, 21, 41, 61 and 81 can be selected as the reference channels.
- t. Data Reporting Guidelines:
 - o Product is not under contract by VZ or is not being considered for deployment (field trial) or under evaluation in a RFI/RFP/RRP
 - Complete the FOC testing and provide complete test report
 - o Product is not under contract by VZ but is being considered for deployment (field trial) or under evaluation in a RFI/RFP/RRP
 - Provide status of testing including all failures till that date from the ITL to FOC team



- Provide any internal testing data including all failures till that date to FOC team
- Product is under contract and is assigned Low Risk for deployment after Red Flag Testing
 - This scenario is very well documented in GR-1221 R3-16, O3-17; provisional use of devices
 - Verizon requires that any failure observed during the testing must be reported by ITL to FOC team within 24 hours
 - The information must include:
 - Product name
 - ITL and/or witnessed lab name and location
 - Test Failed
 - Number of samples failed
 - Criteria Failed (GR/TPR/VZ/Supplier)
 - ITL Project Number
 - A detailed RCA must follow the failure within 5 working days of the failure.
 - FAQ:
 - Q: Should we wait for all the samples to complete that particular test before reporting failures?
 - A: No, report as failure happens. It can take several weeks for the test to complete.
 - Q: Environmental test failures cannot be reported until testing is complete and data is analyzed. How the data should be reported?
 - A:
 - Environmental Tests: Report failures when intermediate measurements are made
 - Mechanical Tests: Report failures as they happen
 - It is supplier's responsibility to conduct RCA not ITL's
 - ITL = Independent Test Lab
 - VZ's CFT makes the determination on whether to accept a failure or not
 - Risk analysis is performed by VZ and not by supplier or ITL
 - It is ITL's responsibility to ensure that data is reported to Verizon correctly and in timely manner
- u. Pass/Fail Determination:
 - Setup and/or test equipment accuracy cannot be used to pass failing samples
 - Example:
 - IL max = 0.45dB
 - Equipment Accuracy = ± 0.05 dB
 - Pass Criteria = 0.4dB
 - Result Reported = Pass; WHY?
 - It can be = 0.5dB as well (worst case)



- Number of samples are defined in TPR and are taken from international standards
- Number of failures allowed on samples during testing is based on well established methodologies and cannot be changed
- Example: Long term Environmental Reliability test on 12 fiber Multi fiber connectors
 - ITL/Supplier reported 3 out of 264 (12 fibers x 22 samples) fibers failed IL criteria
 - Supplier states that no RCA and CA is needed as failures are so few
 - Investigation reveals these 3 fibers are on three different connectors
 - Reliability test has a requirement of “0” failure on 22 samples per LTPD of 10%
 - So instead of 3/264 failures these are 3/22 failures
 - This can equate to a very high failure rate
- If a single fiber goes non conforming in a 12 fiber connector; VZ field technician will have to bring down service of 11 customers to repair
- Example: During a 72 fiber loose tube cable testing, 3 cable samples are used.
 - ITL/Supplier reported 3 out of 216 (72 fibers x 3 samples) fibers failed IL criteria
 - Supplier states that no RCA and CA is needed as failures are so few
 - Investigation reveals these 3 fibers are on three different samples
 - This equates to 3/3 = 100% failure
 - In the case of cables where rule of 90% and 10% is allowed; this rule is applicable for each sample and not for combination of all samples together
- v. Audit findings from ITL and supplier audits shall be closed within 60 days or as listed in the audit report.
- w. Requirements vs Objectives:
 - All Requirements listed in TPRs and GRs require compliance.
 - All Objectives listed in TPRs shall be tested and shall be reported. The test results from Objectives are for information purposes only.
- x. Root Cause Analysis (RCA):
 - Suppliers no longer need to provide an RCA to Verizon on failures while testing is in progress.
 - For any failure, suppliers shall conduct an RCA, implement the Corrective Action, test the Corrective Action (may require a separate test program or restarting the program) and include this information in the final report.
 - For products under Verizon contract or under RFP review, any change in testing schedule shall be communicated to the Single Point of Contact (SPOC) on the FOC team.
 - It is the responsibility of the ITLs to ensure that final test report includes all of the information listed in second bullet of item “x” above.



y. Following are answers to some Frequently Asked Questions:

- Question: Unless there is a RFP or other specific reason for identifying a different SIT contact, Supplier will send or direct the ITL to send test reports and all other FOC related information to SPOC.
Answer: This is Correct
- Question: Any request for supplier lab audits should be sent to Chuck Graff by the ITL.
Answer: This is correct.
- Question: Test Failures in FOC Programs when product has not been shipped to Verizon: Neither supplier nor ITL are required to report failures to Verizon. The supplier will conduct internal RCA, determine corrective action, and retest as required and determined by the ITL – the results and corrective action will be incorporated into the final test report. The ITL is authorized by Verizon to determine the retest requirements for a failure correction – no approval from Verizon is required.
Answer: Verizon reserves the right to review the ITL test requirements and require retests if necessary.
- Question: In the case where the test program is for a new product that is also under a RFP or under a contract (BUT not yet shipped) then any change in test schedule must be communicated to the Verizon-SIT contact.
Answer: This is correct
- Question: In the event that a test report is provided to Verizon for a product with status as defined in previous question with test failures that were not corrected during the test program, then Verizon will not accept the product.
Answer: This is correct
- Question: Can products be shipped to Verizon before FOC testing is complete?
- Answer: Products shall not be shipped to Verizon until successful completion of FOC has been achieved.