COMMSCOPE®
an Amphenol company

Field testing guidelines for fiber-optic cabling systems

April, 2026

Contents

1. Introduction

The following guidelines describe CommScope's procedure for field testing multimode and single-mode cabling systems. CommScope only requires testing of link attenuation for Enterprise networks. While other fiber-optic cabling system parameters such as bandwidth are equally important, they are not normally adversely affected by the quality of the installation and therefore do not require field testing.

This document describes how and where attenuation testing should be performed for Enterprise Systems, using both simplex/duplex and MPO test equipment. This issue replaces the previous one dated May 2016. For more references, please refer to the standards below which specify field testing requirements:

- ISO/IEC 14763-3 covers "Implementation and Operation of Customer Premises Cabling: Testing of Optical Fiber Cabling" and references.
- ANSI/TIA-568.3 covers additional guidelines for field testing length, loss and polarity of optical fiber cabling systems.

2. Passive Link Segments

Attenuation testing should be performed on each passive link segment of the cabling system. A link segment consists of the cable, connectors, adapters and splices between two fiber-optic termination units (patch panels, information outlets, etc.). Each terminated fiber within a link segment should be tested. The link segment attenuation measurement includes the representative attenuation of connectors at the termination unit interface on both ends of the link but does not include the attenuation associated with the active equipment interface. This is illustrated in Figure 1.

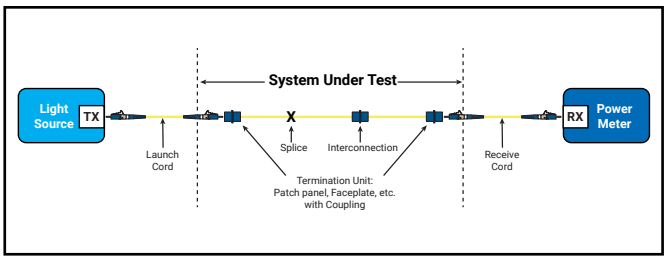


Figure 1: Link segment under test

3. General Testing Guidelines

SAFETY NOTE: Unterminated connectors may emit radiation if the far end is connected to a laser or LED. Do not view the end of a cable until absolutely sure that the fiber is disconnected from any laser or LED source. The best practice is to only view the end face of a connector through a videoscope, so that no direct eye contact to the laser light is possible. Inspection kits are available to view MPO connectors as well as single-fiber types.

- Multimode link segments (horizontal, backbone and composite) shall be tested in one direction[1,2] at 850 nm wavelength with an calibrated LSPM Tester (Light Source and Power Meter tester)
- Single-mode link segments (horizontal, backbone and composite) shall be tested in one direction[1,2] at BOTH 1310 nm and 1550 nm wavelengths with an calibrated LSPM Tester (Light Source and Power Meter tester)

Note 1: The minor attenuation differences due to test direction are on par with the accuracy and repeatability of the test method. Therefore, testing in only one direction normally suffices.

Note 2: CommScope requires only unidirectional Light Source and Power Meter (LSPM) testing, however many customers do request bidirectional results. Bidirectional test results are optional; if used, the direction with the higher loss measurement shall be used to determine pass/fail for the link.

CommScope requires all multimode launch cord verification and link attenuation measurements to be performed with the Encircled Flux launch condition as defined in IEC 61280-4-1 and ANSI/TIA-526-14. Defining a particular launch condition reduces measurement error and variability. This particular launch will produce field measurements that correlate well with component specifications. A mode conditioner device is recommended over the prior mandrel-wrapped cord method.

The following information shall be recorded during the test procedure:

1. Names of personnel conducting the test
2. Type of test equipment used (manufacturer, model, serial number and calibration date)
3. Date test is being performed
4. Optical source wavelength, spectral width
5. Fiber identification

6. End point locations

7. Test direction

8. Measured attenuation of the test cord connectors (reference, receive and extension cord). Include part serial numbers/ identification numbers if readily available.

9. Measured attenuation of the link segment

10. Acceptable link attenuation

3.1. Important inspection and cleaning procedure

CommScope strongly recommends that all fiber optic connectors are inspected with a microscope (per IEC 61300-3-35) to confirm the end face cleanliness. It's required for fault finding.

The contaminated connectors shall be cleaned per prior to mating and testing.

- 860376037: Fiber Optic Connector and Adapter Cleaning Procedures CommScope Fiber Optic Connector Cleaning and Inspection Kit Instructions
- TC-96288-IP: CommScope MPO Connector Cleaning and Inspection Recommendations prior to mating and testing

Contamination as small as 0.001 mm can block the fiber core generating strong back reflections (low return loss) and may affect attenuation (Insertion Loss). Mating a contaminated connector to a clean connector will result in poor performance and can transfer contamination and permanently damage the connector end face.

4. Acceptable attenuation values

LSPM testing is used to evaluate the overall loss of an entire optical link. Although individual component specifications can be reviewed on each component's specification sheet, simply adding these values together would likely overestimate the loss of that link. CommScope SYSTIMAX fiber link loss budget calculation tools shall be used to determine the maximum acceptable loss for each link evaluated. The link loss budget calculation tools are offered in several versions:

- the Excel Link Loss Calculator (LLC)for Standard and Low Loss Solutions
- the Fiber Performance Calculator (FPC) for ULL Solutions
- mobile applications cCalc Link Loss Calculator (cCalc)

Information to be selected or entered in the link loss calculation tools:

1. Select the fiber type and test wavelength combination

2. Select the unit of length in feet or meters

3. Enter the total link length under test

4. Select the number of connections of each type

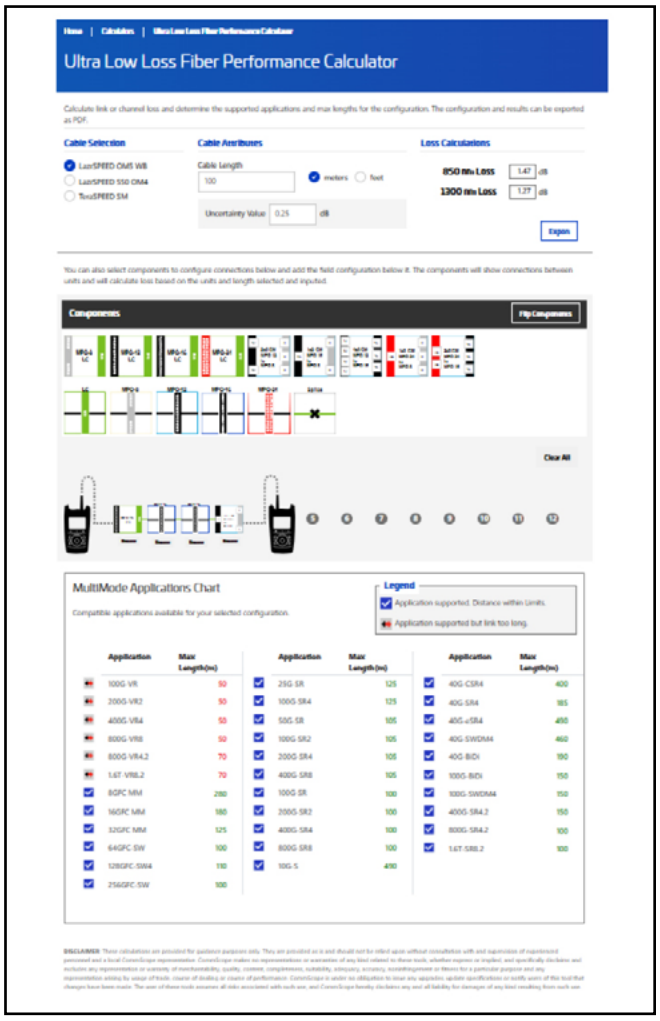


Figure 2: Fiber performance calculator

The link insertion loss budget calculated using these tools is the maximum acceptable loss allowable. Compliance to this limit will ensure that the installation will meet the performance as described in the CommScope SYSTIMAX Performance Specifications. Note that this loss will likely be LESS than would be defined by IEC and TIA standards. Additionally, this value will also likely be LESS than would be calculated by adding the potential maximum loss of all individual components together.

5. Test equipment

To ensure measurement accuracy and integrity, only CommScope approved field test equipment shall be used for link testing and certification of a SYSTIMAX® warranty. Please consult your local CommScope technical sales representative for more details. Test equipment shall be calibrated according to the test equipment manufacturer's specifications.

Important Note: Both light source and power meter must be stabilized prior to measurement. Stable reference power levels are critical to the accuracy of subsequent attenuation measurements. The amount of time required depends on the temperature difference between unit storage space and test operation space. Please refer to specific equipment operational guides for more details. As best practice, allow a minimum of 15 minutes of stabilization time before proceeding with test.

Caution: Instability may arise from at least two common causes: battery health and mechanical changes at the connection to the source. Ensure the battery is in good operating condition and fully charged in both the source and power meter. Avoid disturbing the connection in any way from the source to the launch cord after the reference measurement. Disturbances include disconnection, lateral side-loading, and axial tension. Any of these disturbances is cause for making a new reference measurement. The chances of encountering these disturbances may be minimized by securing the launch cord to the source test set by means of tape or cable tie applied at the launch conditioning device (described later). If the connection between the light source and launch cord is disturbed, a new reference power level must be established prior to any further testing.

6. Test cords

To minimize measurement variability and uncertainty, the use of reference-grade test cords is required for simplex/duplex testing.

MPO reference-grade test cords are currently not readily available, CommScope recommends the use of Ultra Low Loss (ULL) array cords as test cords. Appropriate test cords for different link types are discussed in the different sections.

Test cords shall be 2 - 5 meters long and have the same fiber construction (i.e. core diameter and numerical aperture) as the link segment being tested. Before carrying out any test, inspect and clean the test cord connectors and test adapter.

All test cords are measured by the manufacturer, with test data provided. CommScope requires verifying the quality of all test cords prior to link testing. All test cord attenuation shall adhere to the attenuation requirements in Table 1.

Table 1: Acceptable test cord connections attenuation (per mated connection)

Fiber type	Test cord connector type		
	SC[1]	LC[1]	MPO[2]
Multimode OM3/4/5	0.10dB max	0.10dB max	0.15dB max (8F/12F/16F/16F APC) 0.20dB max (24F)
Singlemode	0.20dB max	0.20dB max	0.35dB max (8F/12F/16F)

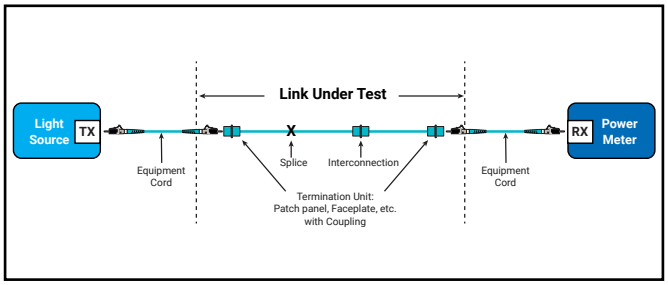
Notes:
1. Simplex or duplex test cords must be reference-grade performance, adhering to the maximum values in Table 1.

2. ULL MPO products can be used as test leads, testing SYSTIMAX LL & ULL parallel systems when no reference cords can be supplied by the tester manufacturer.

7. Test procedure for simplex/duplex links

7.1. Overview

Define the link or the link segments which are tested. This also can include interconnect, splices and crossconnects.



1. Review if the Tester calibration is still valid

2. Prepare your inspection & cleaning tools

3. Verify test cords on cleanliness, kinks, damages

4. Define your test plan including fiber type, connectors, inspection, labelling, max allowed insertion loss and the remediation

7.2. Simplex/duplex test cord verification

Procedure:

1. Follow the test equipment manufacturer's initial adjustment instructions (or maintain a minimum of 15-minute stabilization period).

2. Prepare the required test cords and adapters. For multimode measurements, prepare the necessary launch conditioner to meet the Encircled Flux launch conditions.
   a. OM3/4/5 LC Adapters—760248483
   b. SM LC Adapters—760248478
   c. SM APC LC Adapters—760248835

3. Inspect and clean all test cord connectors and the test adapter per IEC 61300-3-35, TC-96288-IP and 860376037.

4. Connect the launch test cord between the light source and the power meter (see Figure 3a).

5. Set the power meter to relative measurements in dB. Set the reference to 0.00dB

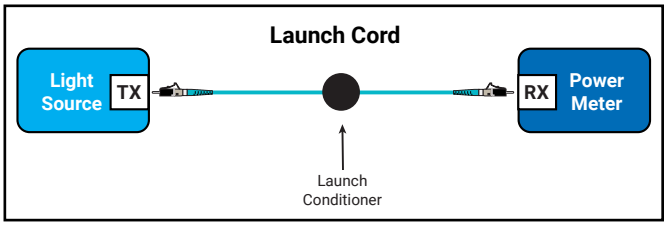


Figure 3a. Estabilish a reference

6. Do NOT disconnect or disturb the launch test cord cord from the light source. Disconnect the launch test cord from the power meter.

7. Connect the tail test cord between the power meter and launch cord using the test adapter (see Figure 3b).

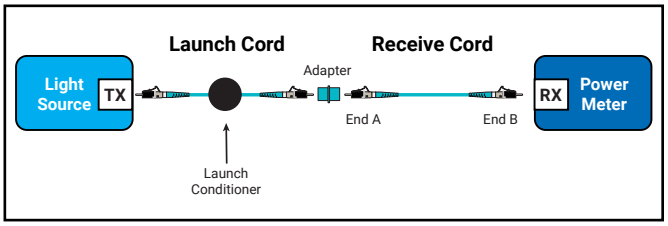


Figure 3b. Verify the received cord

8. Record (Store) the attenuation. This measurement provides the attenuation of the tail test cord cable (very minimal) plus the connection between the launch and receive test cords. The measured attenuation must be less than or equal to the corresponding value given in Table 1.

Higher values will lead to less accuracy. Negative Values (amplification) are not possible and shows a process error. Examine each cord with a portable video scope, and clean, or replace if necessary. Restart the Process!

9. Take the tail test cord out of the adapter and plug it in again. Retest and compare the two values. Both Attenuation values shall be lower than those given in Table 1.

7.3. Simplex/duplex link segment testing

7.3.1 LC/SC links and splices

To include all connections in the link measurement, the one-cord method shall be used to test each link segment. When performing the one-cord method, it is necessary that the receptacle on the power meter accepts the plug type used on the cabling. CommScope requires the use of optical power loss meters directly compatible with the plugs installed on the cabling plant. Hence the one-cord reference method is necessary for single-fiber testing (duplex-fiber).

Procedure:

1. Use verified test cords by following the procedure in Section 7.2.

2. Repeat procedure steps 1-9 from Section 7.2 to obtain a new reference level and ensure test cords meet requirements in Table 1 prior to link testing.

3. Do NOT disconnect or disturb the launch cord from the light source. Separate the launch cord from the receive cord.

4. Inspect the 2 end faces of the measured Link and clean them if it is necessary

5. Inspect regularly also the 2 end faces of the reference cord and clean them if it is necessary

6. Connect to the ends of the link under test as shown in Figure 4a.

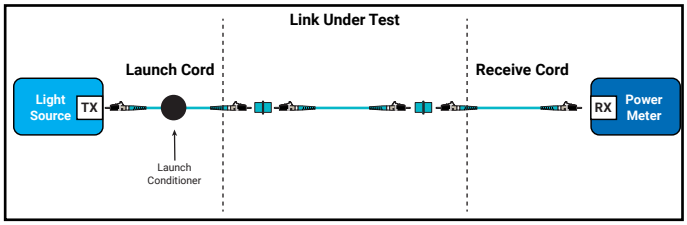


Figure 4a. Link segment testing

7. Record (Store) the attenuation of the link segment cable(s), splice(s) and connections, including the connections on its ends. If the measurement value is less than or equal to the value calculated using the Link Loss Calculation Tools (see Section 4), the link segment attenuation is acceptable

Figure 5 shows an example of 100m OM4 Link, with 2 LC ULL connection and 2 splices. The values for 850nm shall be lower than 1.22dB

8. If not acceptable see Section 10 for troubleshooting guidance.

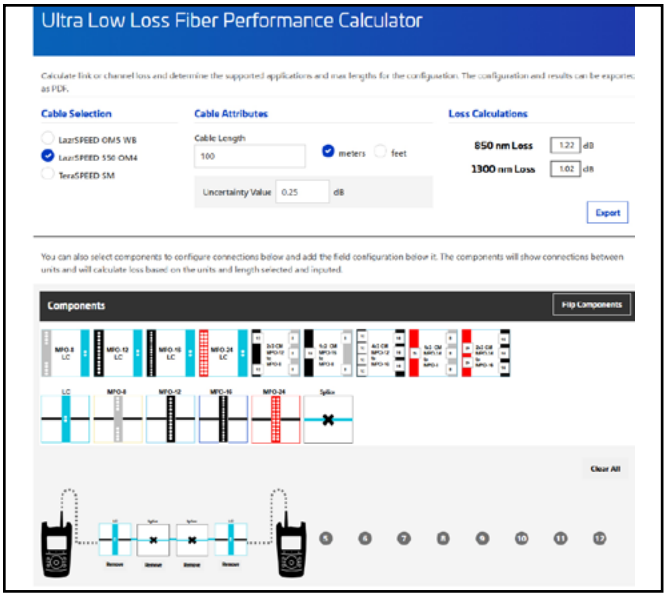


Figure 5: Link segment testing

7.3.2 Link with MPO trunk and MPO-LC (or SC) modules on each end

With the inevitable migration to applications using parallel optics technologies such as 40G/100G/200G/400G Ethernet, there is a need to test link segments consisting of MPO array cabling, as incorporated within the CommScope InstaPATCH 360 and ULL solutions. The MPO connector allows for the consolidation of many fibers within one connector. MPO with 8, 12, 16 and 24 fibers are included in SYSTIMAX solutions. The discussion and figures will focus on 12f MPO solutions, but the process is relevant to the others.

As illustrated in the example in Figure 6, the MPOs are at the rear of the module and not connected directly to the test cords. If testing 2 fibers at a time, the technician must test all 12 fibers of the MPO link with 6 individual tests. In this case, the link can be tested through the single-fiber connections and the testing process follows the procedures outlined previously in this section.

In the test shown in Figure 6, there are two MPO-LC modules. Examples of how each loss budget calculation tool is used to determine the maximum loss for this link is show in Figure 5 and 7.

Procedure:

1. Use verified test cords by following the procedure in Section 7.2.

2. Repeat procedure steps 1-9 from Section 7.2 to obtain a new reference level and ensure test cords meet requirements in Table 1 prior to link testing.

3. Do NOT disconnect or disturb the launch cord from the light source. Separate the launch cord from the receive cord.

4. Inspect the 2 end faces of the measured Link and clean them if it is necessary

5. Inspect regularly also the 2 end faces of the reference cord and clean them if it is necessary

6. Connect to the ends of the link under test as shown in Figure 6.

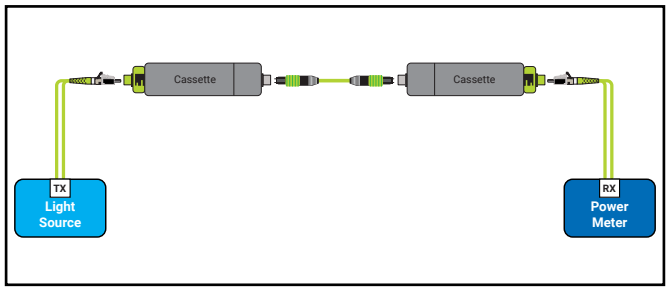


Figure 6: Link segment testing

7. Record (Store) the attentuation of the link segment cable(s) and connections, including the connections on its ends. If the measurement value is less than or equal to the value calculated using the Link Loss Calculation Tools (see Section 4), the link segment attenuation is acceptable.

Figure 7 shows an example of 170m OM5 Link, with 2 LC ULL connection and 2 MPO Connections. The values for 850nm shall be below 1.36dB

8. If not acceptable see Section 10 for troubleshooting guidance.

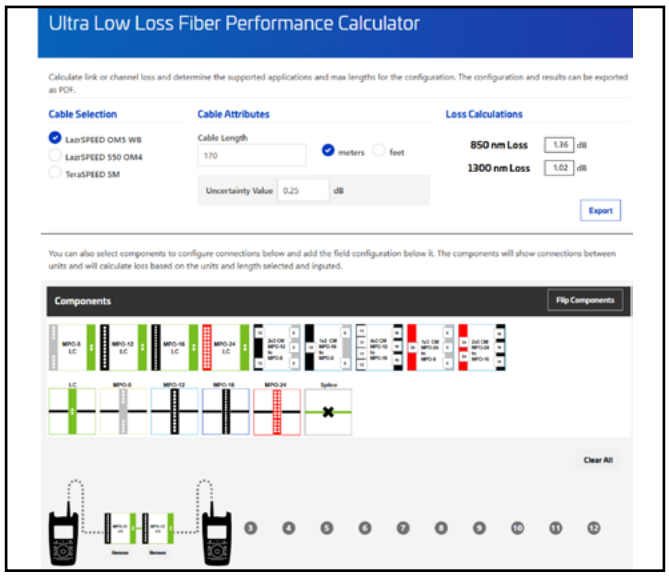


Figure 7: Link loss calculator example—2 MPO LC module and trunk

7.3.3 MPO trunk link

CommScope recommends testing MPO trunks with parallel test equipment that accepts MPO connectors, allowing it to test all 8/12 fibers in the MPO trunk simultaneously. Detailed procedure for such test will be outlined in Section 8.

8. Test procedure for multimode parallel links

This chapters explains, how to test Multimode 8/12 Fiber MPO Links with parallel test equipment. Special cases like the testing of MPO16/24 and the angled multimode versions will be discussed in chapter 9.3.

CommScope provide several MPO Solutions, which shall be tested accordingly their performance and pinning.

- Low Loss Method B Multimode—Chapter 8.2 Case 1
- Low Loss Method B Singlemode—Chapter 9.2.2
- ULL Multimode 8/12 Fiber—Chapter 8.2 Case 2
- ULL Singlemode 8/12 Fiber—Chapter 9.2.3
- ULL MPO16/24 Multimode—Chapter 9.3

The MPO Connection at the light source and power meter and their adapters are not standardized. Check first if the tester accepts pinned or unpinned MPO and which angle is needed for the SM Versions.

Review the tester manufacturing guidelines for MPO testing before start testing

8.1. Test cord qualification for multimode parallel link testing—MTP® Pro

The actual procedure is based on pinned MPO at the tester (tester has an unpinned MPO in their tester).

Procedure:

1. Follow the test equipment manufacturer's initial adjustment instructions (or maintain a minimum of 15-minute stabilization period).

2. Prepare the required MTP-Pro test cords and adapters. Ensure both connectors on the launch cord have the correct pin configuration that are compatible to the test equipment. For the receive cord, one connector should be compatible to the test equipment power meter (pinned), and the other should be mate-able to the launch cord (unpinned). For bookkeeping purposes, it is recommended to label all ends of test cords (i.e. A and B).

3. Inspect and clean all test cord connectors and the test adapter per IEC 61300-3-35, TC-96288-IP and 860376037.

4. Connect the launch cord between the light source and the power meter (see Figure 8a).

5. Set the power meter to relative measurements in dB. Set the reference to 0.00dB

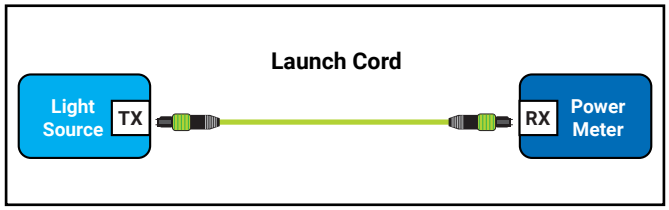


Figure 8a: Establish a reference

6. Do NOT disconnect or disturb the launch cord from the light source. Disconnect the launch cord from the power meter.

7. Connect the receive cord between the power meter and launch cord using the test adapter (see Figure 8b).

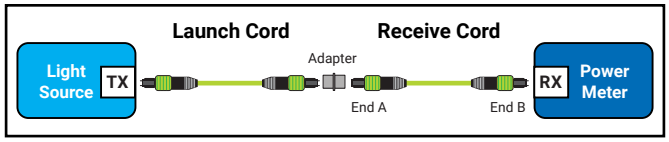


Figure 8b: Verify the receive cord

8. Record (Store) the attenuation. This measurement provides the attenuation of the receive cord cable (very minimal) plus the connection between the launch and receive cords. The measured attenuation must be less than or equal to the corresponding value given in Table 1. Unacceptable attenuation measurements may be attributable to either of the test cords. For troubleshooting step, please refer to Section 10.

9. Disconnect the receive cord from the adapter and power meter. Reverse the receive cord so that the end originally connected to the power meter (End B) is now connected to the adapter, and the end originally connected to the adapter (End A) is now connected to the power meter (see Figure 8c).

10. Change the pin configuration on both connectors of the receive cord. Be sure to inspect and clean the connectors before reconnecting to the adapter and power meter.

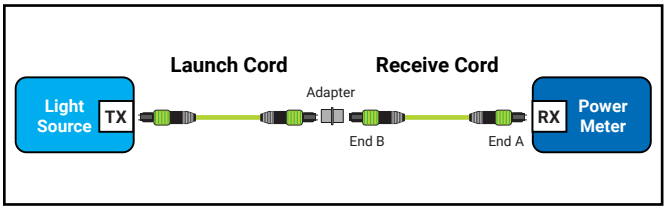


Figure 8c: Reverse receive cord to verify both ends

11. Record (Store) the attenuation. The attenuation must be less than or equal to the corresponding value found in Table 1. If both measurements are found to be less than or equal to the values found in Table 1, the receive cord is acceptable for testing purposes.

8.2. Multimode link segment testing

For illustration purposes, all following link configurations contain Ultra Low Loss (ULL) multimode solutions. Similar process applies to other links with the same pin configuration component at end of Link Under Test.

Note: MPO adapter type may vary on other parallel test equipment.

MTP® Pro test cords provide the flexibility of pin configuration and key change on the MPO connectors. This minimizes the number of test cords required and simplifies the reference and test configuration. Identical reference method is applied to unpinned-unpinned, pinned-pinned and unpinned-pinned link configuration. Modify the MPO connectors mating to the Link Under Test accordingly.

Procedure:

Common Procedure: Follow steps 1 – 8 for all link configuration types to establish a reference power level and verify receive cord quality. Remaining steps deviates according to the MPO connector pin configuration of the Link Under Test.

1. Follow the test equipment manufacturer's initial adjustment instructions (or maintain a minimum of 15-minute stabilization period).

2. Prepare the required test cords that have been verified from section 6.2 and adapters. For bookkeeping purposes, it is recommended to label all ends of test cords (i.e. A and B).

- MTP® Pro MM test cords, minimum qty: 2
- Type-B (aligned-key, Key-Up/Key Up) adapter, minimum qty: 2

3. Inspect and clean all test cord connectors and the test adapter per the manufacturer and CommScope instructions.

4. Connect the launch cord between the light source and the power meter (see Figure 9a).

5. Set the power meter to relative measurements in dB. Set the reference to 0.00dB.

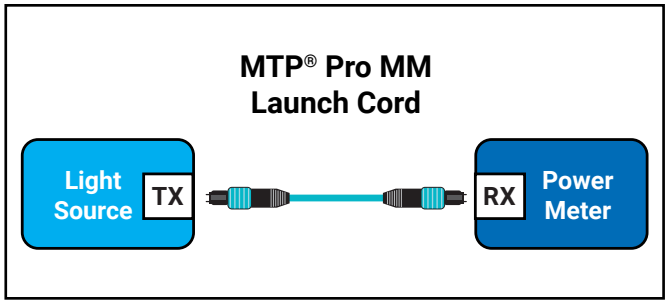


Figure 9a: Establish a reference

6. Do NOT disconnect or disturb the launch cord from the light source. Disconnect the launch cord from the power meter.

7. Connect the receive cord between the power meter and launch cord using the test adapter (see Figure 9b).

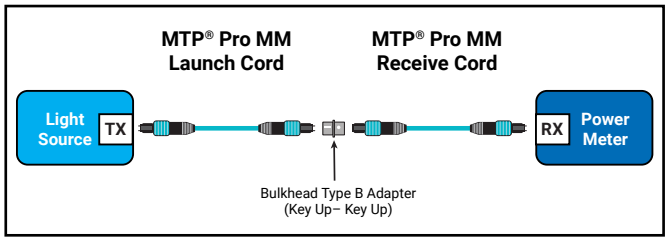


Figure 9b: Verify the receive cord

8. Record (Store) the attenuation. This measurement provides the attenuation of the receive cord cable (very minimal) plus the connection between the launch and receive cords. The measured attenuation must be less than or equal to the corresponding value given in Table 1. Unacceptable attenuation measurements may be attributable to either of the test cords. For troubleshooting step, please refer to Section 10.

9. MTP® Pro test cord pin configuration change and link set up. Do NOT disconnect or disturb the light source and launch cord.

Case 1: Unpinned-unpinned Link Testing

10a. Disconnect the receive cord from the launch cord. On the receive cord, change the pin configuration of the connector originally connected to the launch cord – from unpinned to pinned. Be sure to clean the connector prior to reconnecting.

10b. Connector the Link Under Test between the launch cord and receive cord using the test adapters (see Figure 9c). Proceed to step 11.

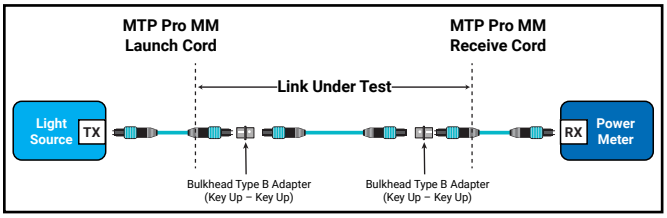


Figure 9c: Unpinned-unpinned link testing configuration

Case 2: Pinned-pinned Link Testing

10c. Disconnect the receive cord from the launch cord. On the launch cord, change the pin configuration of the connector originally connected to the receive cord – from pinned to unpinned. Be sure to clean the connector prior to reconnecting.

10d. Connector the Link Under Test between the launch cord and receive cord using the test adapters (see Figure 9d). Proceed to step 11.

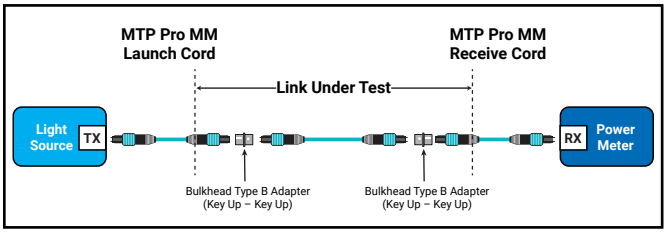


Figure 9d: Pinned-pinned link testing configuration

11. Record (Store) the attenuation.

This measurement provides the attenuation of the link segment cable(s), splice(s) and connections, including the connections on its ends. If the measurement value is less than or equal to the value calculated using the Link Loss Calculation tools, the link segment attenuation is acceptable. If not acceptable see Section 10 for troubleshooting guidance.

9. Test procedure for singlemode parallel links

9.1. Test cord qualification for singlemode parallel link testing

To preserve the integrity of the source bulkhead, a stationary launch cord is recommended to reduce connects and disconnects to minimize damage. A launch extension cord may be used for the purpose of pin conversion without the need of replacing the launch cord to properly mate with the test link. The quantity and pin configuration type of test cords vary depending on the link configuration.

For illustration purposes, all following testing configurations contain Ultra Low Loss (ULL) single-mode solutions. Similar process applies to other single-mode solutions however the direction of the angle may be reversed with respect to the connector key. It is essential to verify the angle of all the test cords to the test equipment bulkheads align.

9.1.1 Unpinned-unpinned test cord verification

1. Follow the test equipment manufacturer's initial adjustment instructions (or maintain a minimum of 15-minute stabilization period).

2. Prepare the required test cords and adapters.

- Pinned-pinned cord, minimum qty: 2
- Unpinned-unpinned cord, minimum qty: 2
- Type-B (aligned-key,Key-Up/Key Up) adapter, minimum qty: 2

3. Inspect and clean all test cord connectors per the manufacturer's instructions.

4. Connect the launch cord between the light source and the power meter (see Figure 10a).

5. Set the power meter to relative measurements in dB. Set the reference to 0.00dB.

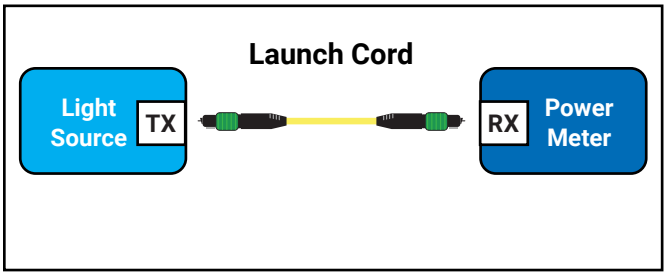


Figure 10a: Establish a reference

6. Do NOT disconnect the launch cord from the light source. Disconnect the launch cord from the power meter.

7. Connect the receive cord to the power meter, and connect the Cord Under Test between the launch cord and receive cord as shown in Figure 10b.

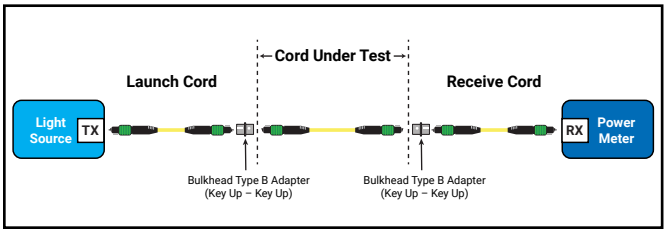


Figure 10b: Unpinned-unpinned test cord verification configuration

8. Record (Store) the attenuation (Psum).

This measurement provides the attenuation of both connections of the Cord Under Test. 1/2 Psum must be less than or equal to the corresponding value given in Table 1. If 1/2 Psum is less than or equal to the value given in Table 1, this Cord Under Test is acceptable testing purposes. If not acceptable, see Section 10 for troubleshooting guidance.

9.1.2 Pinned-pinned test cord verification

1. Follow the test equipment manufacturer's initial adjustment instructions (or maintain a minimum of 15-minute stabilization period).

2. Prepare the required test cords and adapters.

- Pinned-Pinned cord, minimum qty: 2
- Pinned-Unpinned cord, minimum qty: 1
- Unpinned-Unpinned cord, minimum qty: 1
- Type-B (aligned-key) adapter, minimum qty: 3

3. Inspect and clean all test cord connectors per the manufacturer's instructions.

4. Connect the launch cord between the light source and the power meter (see Figure 10c).

5. Set the power meter to relative measurements in dB. Set the reference to 0.00dB.

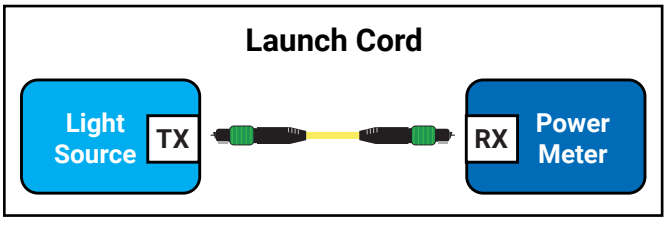


Figure 10c: Establish a reference

6. Do NOT disconnect the launch cord from the light source. Disconnect the launch cord from the power meter.

7. Connect the launch cord and receive cord between the light source and the power meter (see Figure 10d).

8. Record (Store) the attenuation (Psum). The attenuation must be less than or equal to the corresponding value found in Table 1. If the measurement is less than or equal to the values found in Table 1, the receive cord is acceptable for testing purposes.

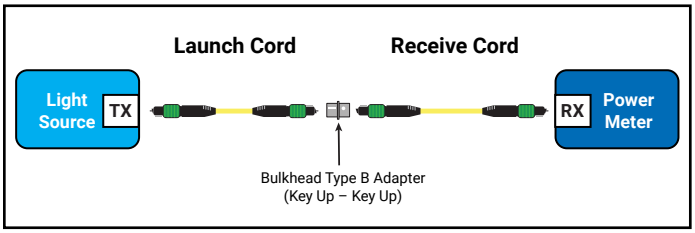


Figure 10d: Verify receive cord performance

9. Do NOT disturb the set up shown in Figure 10d. Reset the reference to 0.0 dB.

10. Do NOT disconnect the launch cord from the light source. Disconnect the launch cord from the receive cord.

11. Connect the extension cord and Cord Under Test per diagram in Figure 10e.

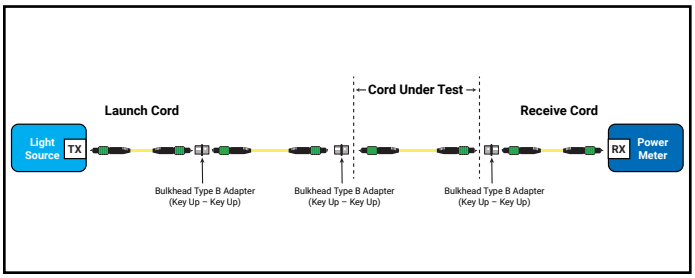


Figure 10e: Pinned-pinned test cord verification configuration

12. Record (Store) the attenuation (Psum).

This measurement provides the attenuation of both connections of the Cord Under Test. Psum must be less than or equal to the corresponding value given in Table 1. If 1/2 Psum is less than or equal to the value given in Table 1, this Cord Under Test is acceptable testing purposes. If not acceptable, see Section 10 for troubleshooting guidance.

9.1.3 Unpinned-pinned test cord verification

1. Follow the test equipment manufacturer's initial adjustment instructions (or maintain a minimum of 15-minute stabilization period).

2. Prepare the required test cords and adapters.

- Pinned-Pinned cord, minimum qty: 1
- Pinned-Unpinned cord, minimum qty: 2
- Type-B (aligned-key) adapter, minimum qty: 2

3. Inspect and clean all test cord connectors per the manufacturer's instructions.

4. Connect the launch cord and receive cord between the light source and the power meter (see Figure 10f).

5. Set the power meter to relative measurements in dB. Set the reference to 0.00dB.

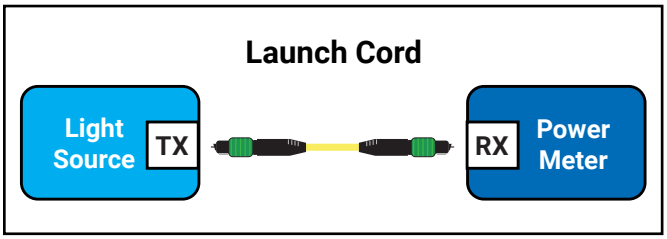


Figure 10f: Establish reference power

6. Do NOT disconnect the launch cord from the light source. Disconnect the launch cord from the power meter.

7. Connect the receive cord to the power meter, and connect the Cord Under Test between the launch cord and receive cord as shown in Figure 10g.

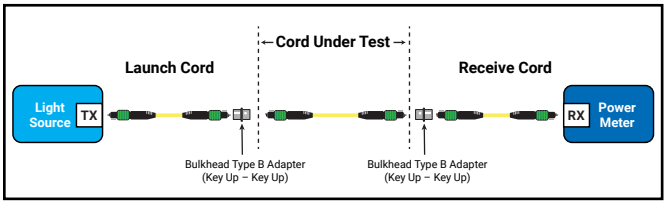


Figure 10g: Unpinned-pinned test cord verification configuration

8. Record (Store) the attenuation (Psum).

This measurement provides the attenuation of both connections of the Cord Under Test. 1/2 Psum must be less than or equal to the corresponding value given in Table 1. If 1/2 Psum is less than or equal to the value given in Table 1, this Cord Under Test is acceptable testing purposes. If not acceptable, see Section 10 for troubleshooting guidance.

9.2 Singlemode link segment testing

For illustration purposes, all following link configurations contain Ultra Low Loss (ULL) singlemode solutions. Similar process applies to other links with the same pin configuration component at end of Link Under Test. Note that other solutions may contain different key-angle orientation comparing to the ULL solutions. It is essential to verify the mateability of the Link Under Test to the test equipment bulkheads.

Note: MPO adapter type may vary on other parallel test equipment.

9.2.1 Case 1: Unpinned-unpinned link testing

Procedure:

1. Follow the test equipment manufacturer's initial adjustment instructions (or maintain a minimum of 15-minute stabilization period).

2. Prepare the required test cords (verified per 6.3) and adapters.

- Pinned-pinned cord, minimum qty: 2
- Type-B (aligned-key) adapter, minimum qty: 2

3. Inspect and clean all test cord connectors and the Link Under Test connectors per the manufacturer's instructions.

4. Connect the launch cord between the light source and the power meter (see Figure 11a).

5. Set the power meter to relative measurements in dB. Set the reference to 0.00dB.

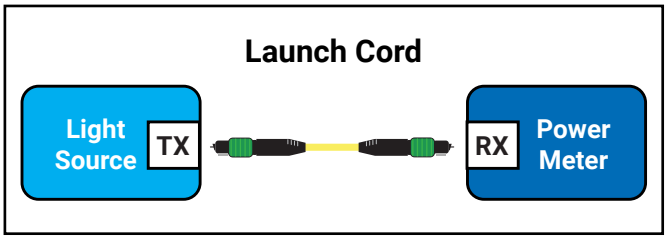


Figure 11a: Establish a reference

6. Do NOT disconnect the launch cord from the light source. Disconnect the launch cord from the power meter.

7. Connect the receive cord to the power meter, and connect the Link Under Test between the launch cord and receive cord as shown in Figure 11b

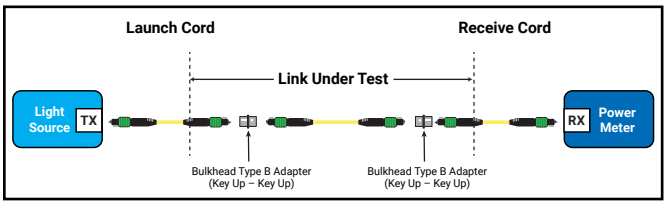


Figure 11b: Unpinned-unpinned link testing configuration

8. Record (Store) the attenuation.

This measurement provides the attenuation of the link segment cable(s), splice(s) and connections, including the connections on its ends. If the measurement value is less than or equal to the value calculated using the Link Loss Calculation tools, the link segment attenuation is acceptable. If not acceptable see Section 10 for troubleshooting guidance.

9.2.2 Case 2: Pinned-pinned link testing

Procedure:

1. Follow the test equipment manufacturer's initial adjustment instructions (or maintain a minimum of 15-minute stabilization period).

2. Prepare the required test cords and adapters.

- Pinned-Pinned cord, minimum qty: 1
- Pinned-Unpinned cord, minimum qty: 1
- Unpinned-Unpinned cord, minimum qty: 1
- Type-B (aligned-key) adapter, minimum qty: 3

3. Inspect and clean all test cord connectors and the Link Under Test connectors per the manufacturer's instructions.

4. Connect the launch cord and receive cord between the light source and the power meter (see Figure 11c).

5. Set the power meter to relative measurements in dB. Set the reference to 0.00dB.

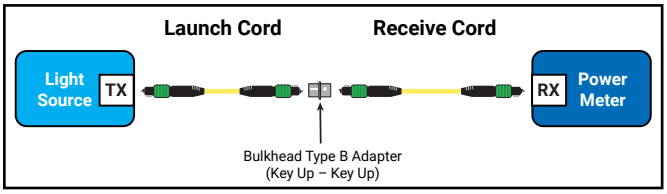


Figure 11c: Establish a reference

6. Do NOT disconnect the launch cord from the light source. Disconnect the launch cord from the receive cord.

7. Connect the extension cord and Link Under Test per diagram below (Figure 11d).

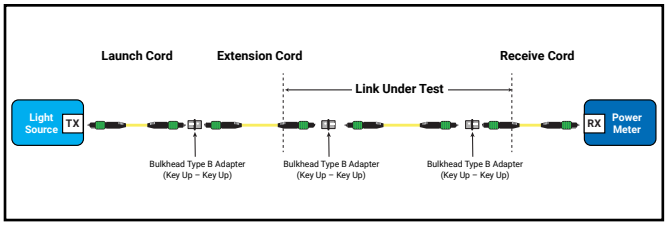


Figure 11d: Pinned-pinned link testing configuration

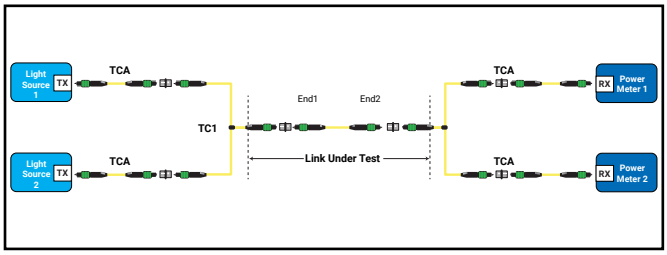
8. Record (Store) the attenuation.

This measurement provides the attenuation of the link segment cable(s), splice(s) and connections, including the connections on its ends. If the measurement value is less than or equal to the value calculated using the Link Loss Calculation tools, the link segment attenuation is acceptable. If not acceptable see Section 10 for troubleshooting guidance.

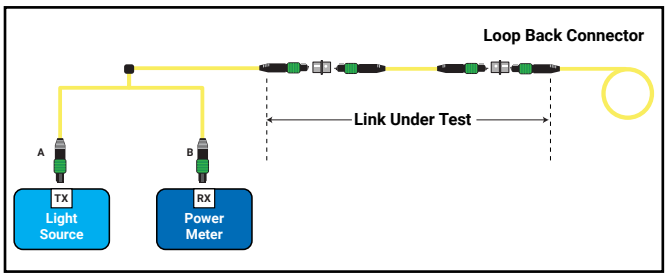
9.3. ULL MPO16/24 link segment testing

For MPO 16/24 there are actually April 2026 no available testers on the market. You can test the Multimode MPO16/24 in 2 different variants: If there are MPO 16/24 on the market and approved by commscope you can use the Process described from Chapter 8 onwards.

Variant 1: with 2 sets of testers:



Variant 2: using one tester and a loop back connector:



With a loop back connector you will need to divide the received measurement by 2.

In order to be able to test your Link you need to know the following points:

- Is it multimode or singlemode
- Is it Method A (black Adapters) or Method B/ Method B enhanced (grey Adapters)
- Are the trunks pinned or unpinned
- Are the tester inputs pinned or unpinned

All tester manufacturers have different approaches to set the reference and doing the trunk measurement. Please refer to the installation instruction of the tester you are using and the amount of different testcords you need.

With those parameters CommScope can provide you the right cord ordering codes for your testing.

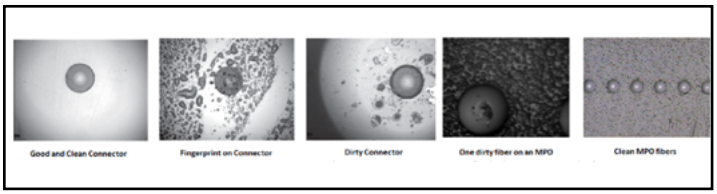


Figure 12a: Dirty connectors (Pictures courtesy of Fluke Networks)

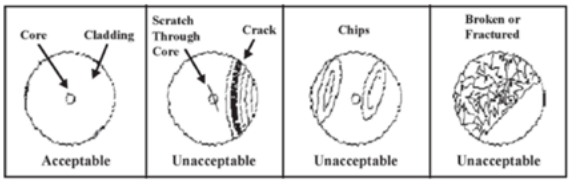


Figure 12b

10. Troubleshooting

Link attenuation exceeding expectations may arise from several reasons. These include contamination, defects in the cable plant, or improper test equipment usage. MPO solutions are particularly susceptible to contamination because of the number of fibers, number of connections, and tight loss budgets. Maintaining clean connectors is essential.

10.1. Cable plant defect detection and resolution

Contamination is the most common cause of optical loss within connections. For multimode and Singlemode cabling the test cords and the ports under test should be clean and free of damage in accordance with IEC-61300-3-35, CommScope Fiber Optic Connector and Adapter Cleaning Procedures CommScope Fiber Optic Connector Cleaning and Inspection Kit Instructions (MID 860376037), and the MPO Connector Cleaning and Inspection Recommendation (TC-96288-IP. Check connector end-faces for dirt and defects (see Table 3, Figure 12a & 12b, and check link segment for broken fiber, poor splices and tight bends.

Possible cause	Resolution
Hand-polishing - adhesives left on the tip of a connector	Examine connectors with a portable microscope and re-polish if necessary
Poorly hand-polished connectors (see Figure9a)	Examine connectors with a portable microscope and re-polish if necessary
Dirty connectors and/or adapters (see Figure 9b)	Examine connections and clean per CommScope instructions
Broken fiber	Identify break with a Visible Fault Locator or OTDR and splice fiber or replace cable
Poor mechanical or fusion splices	Identify poor splices with a Visible Fault Locator or OTDR and re-splice if necessary
Excessively tight bends in the cabling	Identify tight bends by inspection or with a Visible Fault Locator or OTDR and increase the bend radius above minimum specifications
Patch cord does not match the fiber type (compare jacket color, print statement and part number) of the link cabling	Replace test cords and ensure all fibers in the link match. Reset the reference and retest.

Table 3

CommScope pushes the boundaries of communications technology with game-changing ideas and ground-breaking discoveries that spark profound human achievement. We collaborate with our customers and partners to design, create and build the world's most advanced networks. It is our passion and commitment to identify the next opportunity and realize a better tomorrow.
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