Applications Engineering Notes

Document Title	MTP® Insertion Loss and Backreflection Testing
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1.0 Purpose

The purpose of this document is to provide a general procedure for insertion loss and backreflection testing of MTP®/MPO or other multifiber optical connectors.

2.0 Required Materials

- Optical test equipment capable of measuring insertion loss and backreflection of MTP®/MPO or other multifiber optical connectors
- Optipop® cleaner(s) suitable for connector(s) being tested
  (see US Conec document # AEN-1902, section 2.0, for proper cleaner type)
- Fiber optic microscope with 200X lens and tooling for the connector type(s) being used
- 98% isopropyl alcohol pot or index matching gel for fiber type being tested
- Fiber optic "reference" jumper with one end terminated with the same connector type as the multifiber fan-out attached to the optical test equipment and the other end terminated with a good quality connector (to be used as launch/reference connector) of the same connector type to be tested
- Mating sleeves/adapters for the connector types being used

3.0 Notifications

Multimode testing requires the reference jumper be wrapped five (5) times around a proper size mandrel for mode filtering. Recommended mandrel sizes are found in Table 1. See TIA/EIA-455-171A (FOTP-171) for more information.

Single-mode testing requires no mandrel for mode filtering.

Fiber Core Size	Mandrel Diameter Cabled Ribbon	Mandrel Diameter Bare Ribbon
50 µm	22.5 mm	25 mm
62.5 µm	17.5 mm	20 mm
100 µm	22.5 mm	25 mm

Table 1 – Recommended Mandrel Sizes

Referencing of initial power readings or insertion loss values should be performed periodically during testing to ensure accuracy.

Resetting of initial backreflection values should be performed periodically during testing to ensure accuracy.

4.0 Insertion Loss Set-up and Testing

4.1 Insertion Loss Set-Up

4.1.1 Install a fiber optic "reference" jumper with a good quality connector to be used as launch/reference connector to the multifiber fan-out attached to the optical test equipment.

4.1.1.1 Clean and microscopically inspect the fan-out connector. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.

4.1.1.2 Clean and microscopically inspect the non-launch/reference connector of the fiber optic reference jumper. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions

NOTE: *If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.*

4.1.1.3 Mate the fan-out connector to the non-launch/reference connector of the fiber optic reference jumper using the proper mating sleeve/adapter for the connector type.

4.1.2 Clean and microscopically inspect the launch/reference connector of the fiber optic reference jumper. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: *If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.*

4.1.3 Place the launch/reference connector into the detector of the optical test equipment.

4.1.4 Measure the initial power readings or insertion loss values. (See the equipment owners/operation manual for instructions.)

4.1.5 Store/record the initial power readings or insertion loss values.

4.1.6 Remove the reference connector from the detector of the optical test equipment.

4.2 Insertion Loss Testing

4.2.1 Clean and microscopically inspect the launch/reference connector of the fiber optic reference jumper. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: *If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.*

4.2.2 Clean and microscopically inspect the connector to be measured of the jumper under test. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.

4.2.3 Mate the connector to be measured (input connector) of the jumper under test to the reference connector using the proper mating sleeve/adapter for the connector type.

4.2.4 Clean and microscopically inspect the remaining connector (output connector) of the jumper under test. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.

4.2.5 Place the output connector of the jumper under test into the detector of the optical test equipment.

4.2.6 Measure the final power readings or insertion loss values. (See the equipment owners/operation manual for instructions.)

4.2.7 Store/record the final power readings or insertion loss values.

4.2.7.1 If final power readings or insertion loss values are unacceptable, repeat steps 4.2.1 – 4.2.6. The connector under test may be measured a maximum of three (3) times. If after three measurements the readings or values are unacceptable, the connector is determined to have failed optical testing.

4.2.7.2 If final power readings or insertion loss values are acceptable, proceed to step 4.2.8.

4.2.8 Remove the output connector of the jumper under test from the detector of the test equipment.

4.2.9 Repeat section 4.2 until both (all) connectors of the jumper under test have been measured.

5.0 Backreflection Set-Up and Testing

5.1 Backreflection Set-Up

5.1.1 Install a fiber optic "reference" jumper with a good quality connector to be used as launch/reference connector to the multifiber fan-out attached to the optical test equipment.

5.1.1.1 Clean and microscopically inspect the fan-out connector. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.

5.1.1.2 Clean and microscopically inspect the non-launch/reference connector of the fiber optic reference jumper. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions

NOTE: If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.

5.1.1.3 Mate the fan-out connector to the non-launch/reference connector of the fiber optic reference jumper using the proper mating sleeve/adapter for the connector type.

5.1.2 Clean and microscopically inspect the launch/reference connector of the fiber optic reference jumper. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: *If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.*

5.1.3 Terminate the reference connector by either potting it in 98% isopropyl alcohol or placing the proper index matching gel for the fiber type being tested along the fiber tips of the connector endface.

5.1.4 Measure the initial backreflection values.
(See the equipment owners/operation manual for instructions.)

5.1.5 Store/record the initial backreflection values.

5.2 Backreflection Testing

5.2.1 Clean and microscopically inspect the launch/reference connector of the fiber optic reference jumper. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: *If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.*

5.2.2 Clean and microscopically inspect the connector to be measured of the jumper under test. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: *If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.*

5.2.3 Mate the connector to be measured (input connector) of the jumper under test to the reference connector using the proper mating sleeve/adapter for the connector type.

5.2.4 Clean and microscopically inspect the remaining connector (output connector) of the jumper under test. See US Conec document # AEN-1902, section 3.0, for proper cleaning instructions.

NOTE: *If dust, oil, or other contamination is still present on the ferrule endface or fiber tips, repeat this step until the connector is clean.*

5.2.5 Terminate the output connector of the jumper under test by either potting it in 98% isopropyl alcohol or placing the proper index matching gel for the fiber type being tested along the fiber tips of the connector endface.

5.2.6 Measure the final backreflection values.
(See the equipment owners/operation manual for instructions.)

5.2.7 Store/record the final backreflection values.

5.2.7.1 If final backreflection values are unacceptable, repeat steps 5.2.1 – 5.2.6. The connector under test may be measured a maximum of three (3) times. If after three measurements the values are unacceptable, the connector is determined to have failed optical testing.

5.2.7.2 If final backreflection values are acceptable, proceed to step 5.2.8.

5.2.8 Repeat section 5.2 until both (all) connectors of the jumper under test have been measured.

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