



## QUALIFICATION TEST REPORT

CONNECTOR, OPTIMATE\*, MULTIMODE, STAINLESS STEEL  
2.5mm BAYONET, FIBER OPTIC

501-277

Rev. 0

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Corporate Test Laboratory Harrisburg, Pennsylvania

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(R7006TS3)

#### 1.4 Product Description

The OPTIMATE Stainless Steel 2.5mm Bayonet Fiber Optic Connector is a multimode connector used in communication networks and equipment.

#### 1.5 Test Samples

The test samples were taken from current production. The fiber used in the following tests was multimode graded index optical fiber. The following sample quantities were used for each test group.

Test Group	1	2	3	4
Fiber size (microns/microns)	62.5/125	62.5/125	50/125	100/140
Cable type	LDS(a)	LDS(a)	LDS(a)	LDS(a)
Cable part number	502083-1	502083-1	502082-1	502084-1
Connector kit part number	504008-3	504008-3	504008-3	504008-7
Test cable length (m)	10	10	5	5
Test samples required	5	5	5	5
Control cables required	1	0	0	0

(a) Light Duty Single, 3.0mm diameter

#### 1.6 Qualification Test Sequence

Test or Examination	Test Groups			
	1	2	3	4
Examination of product	1	1	1	1
Insertion loss	2	2	2	2
Temperature cycling	3			
Humidity, steady state	4			
Coupling mechanism strength		3		
Cable retention		4		
Cable flexing		5		
Twist		6		
Durability		7		
# Change in optical transmittance	5	8		

The numbers indicate sequence in which tests were performed.

# Change in Transmittance measured before, during and after Temperature Cycling, Humidity, and Durability. Change in Transmittance measured before, and after Coupling Mechanism Strength, Cable Retention, Flex, and Twist.

## 2. Summary of Testing

### 2.1 Examination of Product - All Groups

All samples submitted for testing were selected from normal current production lots. They were inspected and accepted by the Product Assurance Department of the Optical Connectors and Assemblies Division.

### 2.2 Insertion Loss - All Groups

The insertion loss of the test samples measured met the maximum allowed specification requirements. Insertion loss was measured at 1300nm for groups 1 & 2, and at 850nm for group 3 & 4.

Insertion Loss - Requirements (dB)

Fiber size (microns/microns)	50/125	62.5/125	100/140
Maximum allowed average of all values per test group	0.6	0.4	0.3
Maximum allowed individual value for any single sample	1.0	0.8	0.6

Insertion Loss - Actual (dB)

Group	Fiber size (microns/microns)	Group average	Single sample
1	62.5/125	0.3	0.7
2	62.5/125	0.2	0.6
3	50/125	0.5	0.7
4	100/140	0.2	0.5

### 2.3 Change in Optical Transmittance - Groups 1 & 2

All change in optical transmittance measurements met the maximum allowed specification requirements. Change in optical transmittance was measured at 1300nm for groups 1 & 2.

Change in Optical Transmittance

Group	Condition	Limits (during)	Limits (after)	Change (during)	Change (after)
1	Temperature cycling	-0.3 dB group average -0.5 dB single sample	-0.2 dB group average -0.3 dB single sample	0.0 group average -0.4 single sample	0.0 group average -0.1 single sample
1	Humidity	-0.3 dB group average -0.5 dB single sample	-0.2 dB group average -0.3 dB single sample	0.0 group average -0.1 single sample	0.1 group average 0.0 single sample
1	Change in optical transmittance (completion of sequence)	Not required	-0.3 dB group average -0.5 dB single sample	Not required	0.0 group average -0.3 single sample
2	Coupling mechanism strength	Not required	-0.2 dB group average -0.3 dB single sample	Not required	0.0 group average -0.1 single sample
2	Cable retention	Not required	-0.2 dB group average -0.3 dB single sample	Not required	0.0 group average -0.1 single sample
2	Cable flex	Not required	-0.2 dB group average -0.3 dB single sample	Not required	0.0 group average -0.1 single sample
2	Twist	Not required	-0.2 dB group average -0.3 dB single sample	Not required	0.0 group average 0.0 single sample
2	Durability	-0.2 dB group average -0.3 dB single sample	-0.2 dB group average -0.3 dB single sample	0.0 group average -0.2 single sample	-0.1 group average -0.2 single sample
2	Change in optical transmittance (completion of sequence)	Not required	-0.3 dB group average -0.5 dB single sample	Not required	-0.1 group average -0.1 single sample

2.4 Temperature Cycling - Group 1

There was no evidence of physical damage to the connector or attached cable and no change in optical performance beyond the specified limits after temperature cycling. Change in optical transmittance was measured at 1300nm.

2.5 Humidity, Steady State - Group 1

There was no evidence of physical damage to the connector or attached cable and no change in optical performance beyond the specified limits after humidity. Change in optical transmittance was measured at 1300nm.

2.6 Coupling Mechanism Strength - Group 2

There was no evidence of physical damage to the connector and no change in optical performance beyond the specified limits after coupling mechanism strength. Change in optical transmittance was measured at 1300nm.

2.7 Cable Retention - Group 2

There was no evidence of cable clamp or strain relief failure, pullout, or other damage to the connector or attached cable and no change in optical performance beyond the specified limits after cable retention. Change in optical transmittance was measured at 1300nm.

## 2.8 Cable Flexing - Group 2

There was no evidence of cable clamp or strain relief failure, pullout, or other damage to the connector or attached cable and no change in optical performance beyond the specified limits after cable flexing. Change in optical transmittance was measured at 1300nm.

## 2.9 Twist - Group 2

There was no evidence of cable clamp or strain relief failure, pullout, or other damage to the connector or attached cable and no change in optical performance beyond the specified limits after twist. Change in optical transmittance was measured at 1300nm.

## 2.10 Durability - Group 2

There was no evidence of physical damage to the connector and no change in optical performance beyond the specified limits after durability. Change in optical transmittance was measured at 1300nm.

## 3. Test Methods

### 3.1 Examination of Product

Product drawings and inspection plans were used to examine the samples. They were examined visually and functionally.

### 3.2 Insertion Loss

A restricted launch condition was created by wrapping the test cables around a mandrel of prescribed size for the fiber used. The initial optical power through the cable was measured and recorded. The cable was then cut in the middle and the test sample terminated in accordance with AMP Instruction Sheet 408-9861. The sample was mated and unmated a total of ten times, cleaning each time, and the optical power was measured after each cycle. Optical power readings were compensated for by the changes in source monitor cables. In cases where a control cable was also used, these changes were also factored into the loss calculations.

### 3.3 Change in Optical Transmittance

The initial optical power (dBm) through the fiber was recorded before the test. Relative optical power (dB) through the fiber was measured during and after each test. Change in optical transmittance was calculated by taking the difference between the initial measurement and the during/after measurements. Source output power variations were compensated for by subtracting any changes in the control or source monitor cable. Optical power was measured during and/or after the following tests: temperature cycling, humidity, coupling mechanism strength, cable retention, cable flex, twist, and durability.

### 3.4 Temperature Cycling

Samples were subjected to 5 cycles of temperature extremes, each cycle consisting of 8 hours, for a total of 40 hours exposure to temperature cycling. One cycle consisted of a 1.5 hour ramp down to, and a 0.5 hour dwell at  $-40^{\circ}\text{C}$ , then a 1.5 hour ramp up to and a 0.5 hour dwell at  $25^{\circ}\text{C}$ , then a 1.5 hour ramp up to, and a 0.5 hour dwell at  $85^{\circ}\text{C}$ , and finally, a 1.5 hour ramp back down to, and 0.5 hour dwell at  $25^{\circ}\text{C}$ . The maximum transition time between temperatures was  $40^{\circ}\text{C}$  per hour. Optical transmittance was recorded before and after exposure with the samples in place in the test chamber and 5 minutes before the end of each dwell during exposure. Final optical transmittance was recorded at least two hours after temperature cycling exposure, after the samples were unmated, inspected, cleaned and remated.

### 3.5 Humidity, Steady State

Samples were preconditioned at  $50^{\circ}\text{C}$  for a period of 24 hours, then subjected to  $60^{\circ}\text{C}$  at 95% RH for a period of 96 hours. Initial optical transmittance was recorded 1 hour after preconditioning and once every 24 hours during exposure. Final optical transmittance was recorded at least two hours after humidity exposure after samples were unmated, inspected, cleaned and remated.

### 3.6 Coupling Mechanism Strength

The connector on the detector side of the samples was mated to the coupling bushing in a fixed position then subjected to a sustained load of 111N (25 lbf) for 1 minute. Loading was applied at a rate of 2.54mm/min and released at a rate of 25.4mm/min. Final optical transmittance was recorded after samples were inspected, cleaned and remated.

### 3.7 Cable Retention

The connector on the detector side of the samples was supported from behind the coupling nut in a fixed position and subjected to a sustained load of 178N (40 lbf) for 1 minute. Loading was applied and released at a rate of 25.4mm/min. Final optical transmittance was recorded after the samples were inspected, cleaned, and remated.

### 3.8 Cable Flex

Samples were subjected to 500 cycles of cable flexing. Samples were tested at a rate of 15 cycles per minute. A tensile load of 0.5kg (1.10 lbs) was applied to the cable on the detector side of the unmated samples. The flex arc was  $\pm 90^{\circ}$  from a vertical position. Optical transmittance was measured before and after test with load removed.

### 3.9 Twist

Samples were subjected to 10 cycles of twist. Samples were tested at a rate of 15 cycles per minute. A tensile load of 2.5kg (5.50 lbs) was applied to the cable on the detector side of the mated samples. The twist direction was  $\pm 90^\circ$  about the axis of the cable. Optical transmittance was measured before and after test with load removed.

### 3.10 Durability

The connector on the detector side of the mated samples was subjected to 500 cycles of durability. Samples were manually cycled at a rate not in excess of 300 cycles per hour. Optical transmittance was measured before test and after every 50 cycles. Samples were unmated, cleaned, inspected, and remated before each measurement.



4. Validation

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