

DIAMOND
Test & Calibration Laboratory STS 0333 / SCS 0101

Product Specification Qualification Test Report



FC PC SM High Temperature

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1) Edition: This column states the date of the Qualification

2) Requalified: This column states the date of the Requalification

The present Qualification Test Report (QTR) summarizes the qualification measurements and tests performed to verify the design and the optical, mechanical and environmental performance of the FC PC SM High Temperature connector at the accredited test & calibration laboratory STS 0333 / SCS 0101 at Diamond SA, Losone. This current QTR is a summary of the internal qualification reports no. 3032, no. 3032a and no. 3242 performed at the test & calibration laboratory STS 0333 / SCS 0101 (www.sas.ch).

The qualification test program of the FC PC SM High Temperature connector is determined under the guideline of IEC 61753-1, which defines the minimum requirements and severities which a single-mode connector must satisfy in order to be considered as meeting category U (uncontrolled environment).

The qualified product is subject to periodic requalification with the purpose of guaranteeing the product compliance to the specifications measured in the present report over the years.

For requalification purposes the principle of similarity is applied, where the qualification data of similar products can be used if they meet the same technology platform and are manufactured using the same process.

For additional information, please contact Diamond or your Diamond Sales Representative.

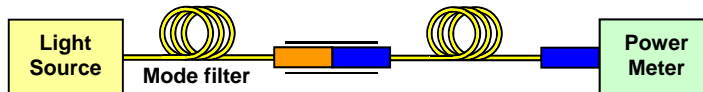
Insertion loss

Methods: Method B according to IEC 61300-3-4

a) Reference measurement:



b) DUT measurement:



Requirements: $IL_{Max} \leq 0.40$ dB

Samples:

- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μ m, Diamond art. no. 1079537
- Reference connectors: 1 Diamond FC PC SM High Temperature connector of same lot
- Mating adapters: 1 Diamond FC SM mating adapter

Parameters:

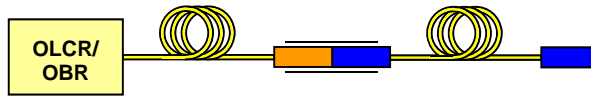
- Wavelengths: 1550 nm
- No. of measurements: 10

Results:

Statistics	Insertion loss IL at 1550 nm against reference connector [dB]
Mean value	0.10
Standard deviation	0.08
Maximum value	0.26
Minimum value	0.03

Return loss

Methods: OLCR/OBR method according to IEC 61300-3-6



Requirements: $RL_{Min} \geq 50$ dB

Samples:

- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μ m, Diamond art. no. 1079537
- Reference connectors: 1 Diamond FC PC SM High Temperature connector of same lot
- Mating adapters: 1 Diamond FC SM mating adapter

Parameters:

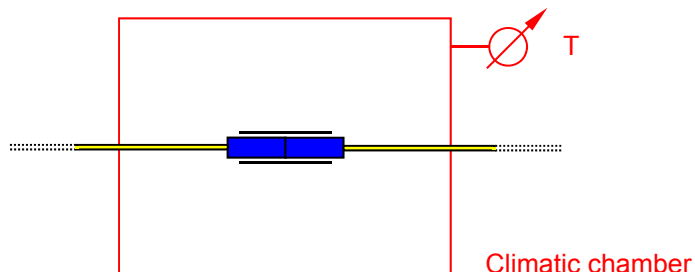
- Wavelengths: 1550 nm
- No. of measurements: 10

Results:

Statistics	Return loss IL at 1550 nm against reference connector [dB]
Mean value	64.7
Standard deviation	0.9
Maximum value	65.8
Minimum value	62.8

Temperature step stress

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation according to IEC 61300-3-3
 - Temperature step stress test according to IEC 61300-2-18



Requirements: $\Delta IL_{Max} \leq 0.20$ dB during test

Samples:

- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μ m, Diamond art. no. 1079537
- Mating adapters: 5 Diamond FC SM mating adapters

Parameters:

- Wavelengths: 1550 nm
- Monitored channels: 5
- Constant temperature: Stepwise from +80°C to +150°C
- Dwell time at each temperature step: 1 h
- Variation of temperature at slopes: 10°C/min.

Results:

Temperature [°C]	Insertion loss IL at 1550 nm [dB]				
	Sample no. 1	Sample no. 2	Sample no. 3	Sample no. 4	Sample no. 5
23	0.03	0.05	0.05	0.13	0.10
80	0.03	0.04	0.02	0.13	0.10
90	0.03	0.05	0.02	0.14	0.10
100	0.03	0.05	0.02	0.14	0.10
110	0.03	0.05	0.02	0.14	0.10
120	0.03	0.05	0.02	0.14	0.10
130	0.03	0.05	0.02	0.14	0.10
140	0.03	0.05	0.02	0.14	0.10
150	0.03	0.04	0.02	0.14	0.10
23	0.03	0.04	0.06	0.15	0.11
Maximum value	0.03	0.05	0.06	0.15	0.11
Minimum value	0.03	0.04	0.02	0.13	0.10
Maximum variation	0.00	0.01	0.04	0.02	0.01

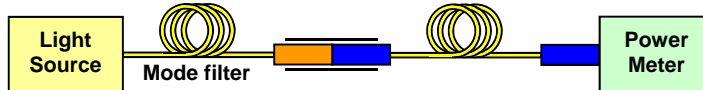
Insertion loss after temperature step stress

Methods: Method B according to IEC 61300-3-4

a) Reference measurement:



b) DUT measurement:



Requirements: $IL_{Max} \leq 0.40$ dB

Samples:

- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μ m, Diamond art. no. 1079537
- Reference connectors: 1 Diamond FC PC SM High Temperature connector of same lot
- Mating adapters: 1 Diamond FC SM mating adapter

Parameters:

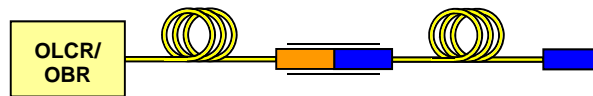
- Wavelengths: 1550 nm
- No. of measurements: 10

Results:

Statistics	Insertion loss IL at 1550 nm against reference connector [dB]
Mean value	0.09
Standard deviation	0.04
Maximum value	0.17
Minimum value	0.04

Return loss after temperature step stress

Methods: OLCR/OBR method according to IEC 61300-3-6



Requirements: $RL_{Min} \geq 50$ dB

Samples:

- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μ m, Diamond art. no. 1079537
- Reference connectors: 1 Diamond FC PC SM High Temperature connector of same lot
- Mating adapters: 1 Diamond FC SM mating adapter

Parameters:

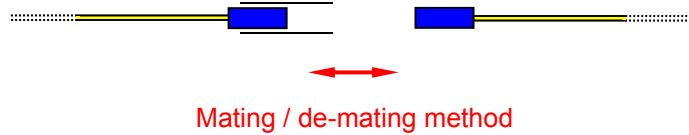
- Wavelengths: 1550 nm
- No. of measurements: 10

Results:

Statistics	Return loss IL at 1550 nm against reference connector [dB]
Mean value	66.1
Standard deviation	1.4
Maximum value	68.4
Minimum value	62.8

Mating durability after temperature step stress

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation according to IEC 61300-3-3
 - Mating durability test according to IEC 61300-2-2



Requirements: $\Delta IL_{Max} \leq 0.20$ dB during test

- Samples:**
- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
 - Fibre type: 9/125/245 μ m, Diamond art. no. 1079537
 - Mating adapters: 1 Diamond FC SM mating adapter

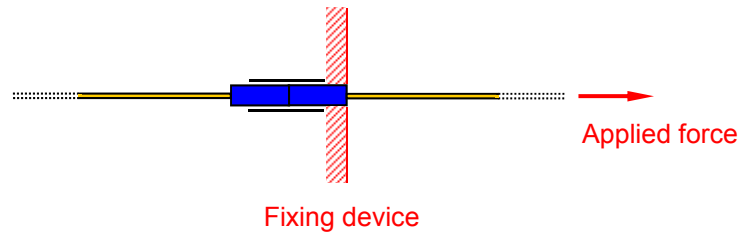
- Parameters:**
- Wavelengths: 1550 nm
 - Monitored channels: 1
 - Mating / de-mating cycles: 500

Results:

Sample no.	Insertion loss IL at 1550 nm [dB]		Variation of insertion loss ΔIL at 1550 nm [dB]
	maximum, during test	minimum, during test	
1	0.10	0.04	0.06

Fibre retention after temperature step stress

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation according to IEC 61300-3-3
 - Fibre retention test according to IEC 61300-2-4



Requirements: $\Delta IL_{Max} \leq 0.20$ dB during test

- Samples:**
- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
 - Fibre type: 9/125/245 μm , Diamond art. no. 1079537
 - Mating adapters: 1 Diamond FC SM mating adapter

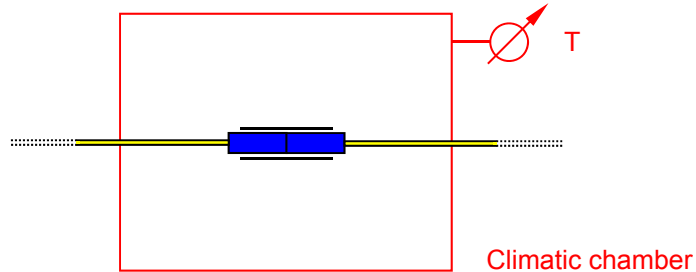
- Parameters:**
- Wavelengths: 1550 nm
 - Monitored channels: 10
 - Applied force: 2 N
 - Force direction: Longitudinal connector axis
 - Duration of applied force: 1 min.
 - Force application distance: 30 cm

Results:

Sample no.	Insertion loss IL at 1550 nm [dB]			Variation of insertion loss ΔIL at 1550 nm [dB]
	before test	during test	after test	
1	0.04	0.04	0.03	0.01
2	0.05	0.04	0.05	0.01
3	0.08	0.08	0.08	0.00
4	0.06	0.04	0.05	0.02
5	0.06	0.06	0.05	0.01
6	0.07	0.11	0.08	0.04
7	0.08	0.08	0.08	0.00
8	0.12	0.11	0.12	0.01
9	0.06	0.06	0.06	0.00
10	0.05	0.05	0.05	0.00
Maximum value				0.04
Minimum value				0.00

High temperature endurance

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation according to IEC 61300-3-3
 - High temperature endurance test according to IEC 61300-2-18



Requirements: $\Delta IL_{Max} \leq 0.20$ dB during test

Samples:

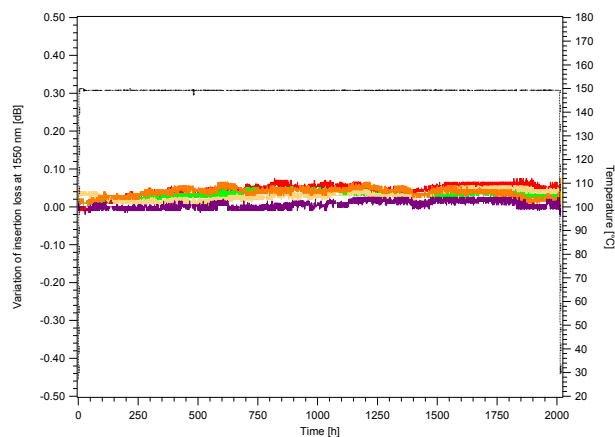
- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μm , Diamond art. no. 1079537
- Mating adapters: 5 Diamond FC SM mating adapters

Parameters:

- Wavelengths: 1550 nm
- Monitored channels: 5
- Constant temperature: +150°C
- Duration: 2'000 h

Results:

Statistics	Variation of insertion loss ΔIL at 1550 nm during test [dB]
Maximum value	0.09
Minimum value	0.05



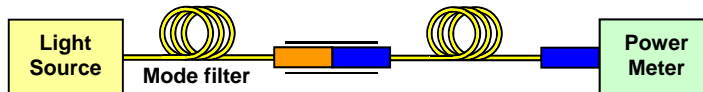
Insertion loss after high temperature endurance

Methods: Method B according to IEC 61300-3-4

a) Reference measurement:



b) DUT measurement:



Requirements: n.a.

Samples:

- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μm , Diamond art. no. 1079537
- Reference connectors: 1 Diamond FC PC SM High Temperature connector of same lot
- Mating adapters: 1 Diamond FC SM mating adapter

Parameters:

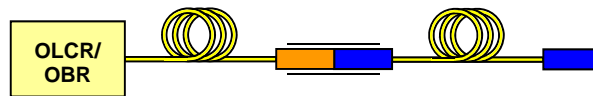
- Wavelengths: 1550 nm
- No. of measurements: 10

Results:

Statistics	Insertion loss IL at 1550 nm against reference connector [dB]
Mean value	0.10
Standard deviation	0.09
Maximum value	0.28
Minimum value	0.03

Return loss after high temperature endurance

Methods: OLCR/OBR method according to IEC 61300-3-6



Requirements: n.a.

Samples:

- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μm , Diamond art. no. 1079537
- Reference connectors: 1 Diamond FC PC SM High Temperature connector of same lot
- Mating adapters: 1 Diamond FC SM mating adapter

Parameters:

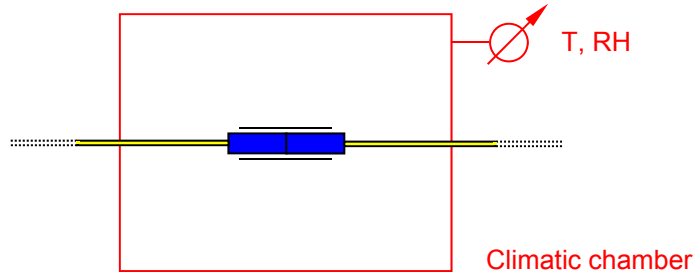
- Wavelengths: 1550 nm
- No. of measurements: 10

Results:

Statistics	Return loss IL at 1550 nm against reference connector [dB]
Mean value	65.5
Standard deviation	10.5
Maximum value	71.9
Minimum value	46.8

Change of temperature

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation according to IEC 61300-3-3
 - Change of temperature test according to IEC 61300-2-22



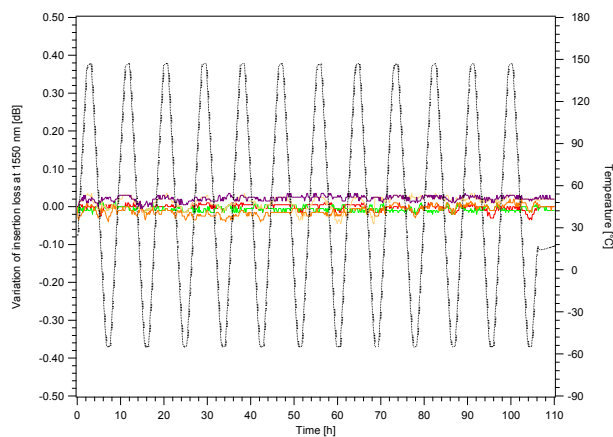
Requirements: $\Delta IL_{Max} \leq 0.20$ dB at 1550 nm during test

- Samples:**
- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
 - Fibre type: 9/125/245 μm , Diamond art. no. 1079537
 - Mating adapters: 5 Diamond FC SM mating adapters

- Parameters:**
- Wavelengths: 1550 nm
 - Monitored channels: 5
 - Upper cycling temperature: +150°C
 - Lower cycling temperature: -55°C
 - Relative humidity: Not controlled
 - Dwell time at extreme temperatures: 1 h
 - Variation of temperature at slopes: 1°C/min
 - Number of cycles: 12
 - Duration: 103 h

Results:

Statistics	Variation of insertion loss ΔIL during test [dB]
	at 1550 nm
Maximum value	0.08
Minimum value	0.04



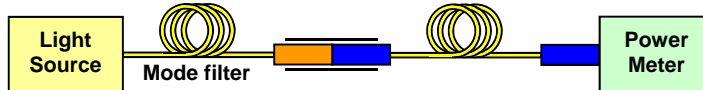
Insertion loss after change of temperature

Methods: Method B according to IEC 61300-3-4

a) Reference measurement:



b) DUT measurement:



Requirements: $IL_{Max} \leq 0.40$ dB

Samples:

- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μ m, Diamond art. no. 1079537
- Reference connectors: 1 Diamond FC PC SM High Temperature connector of same lot
- Mating adapters: 1 Diamond FC SM mating adapter

Parameters:

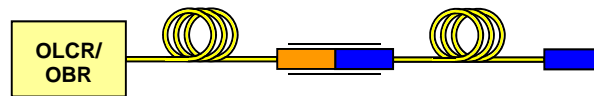
- Wavelengths: 1550 nm
- No. of measurements: 10

Results:

Statistics	Insertion loss IL at 1550 nm against reference connector [dB]
Mean value	0.13
Standard deviation	0.08
Maximum value	0.27
Minimum value	0.04

Return loss after change of temperature

Methods: OLCR/OBR method according to IEC 61300-3-6



Requirements: $RL_{Min} \geq 50$ dB

Samples:

- DUT: 10 fibre patch cords terminated with Diamond FC PC SM High Temperature connectors
- Fibre type: 9/125/245 μ m, Diamond art. no. 1079537
- Reference connectors: 1 Diamond FC PC SM High Temperature connector of same lot
- Mating adapters: 1 Diamond FC SM mating adapter

Parameters:

- Wavelengths: 1550 nm
- No. of measurements: 10

Results:

Statistics	Return loss IL at 1550 nm against reference connector [dB]
Mean value	59.4
Standard deviation	3.4
Maximum value	65.0
Minimum value	53.1