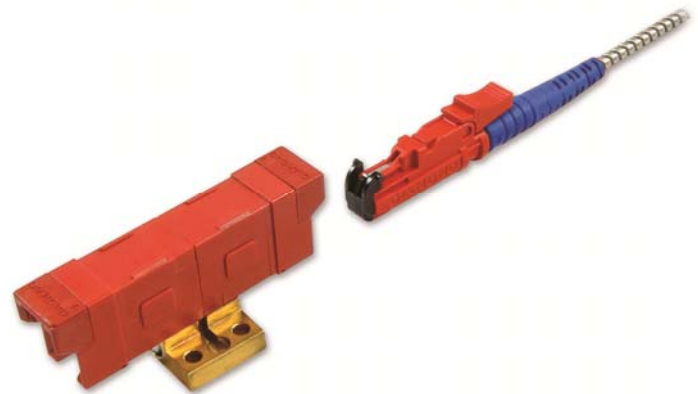


DIAMOND
Test & Calibration Laboratory STS 0333 / SCS 0101

Product Specification Qualification Test Report



E-2000™ PSm 100
(Tested at 100 W with 200/240µm MM fiber)

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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 E-2000™ PSm 100 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 report no. 3247 performed at the test & calibration laboratory STS 0333 / SCS 0101 (www.sas.ch).

The qualification test program of the E-2000™ PSm 100 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.

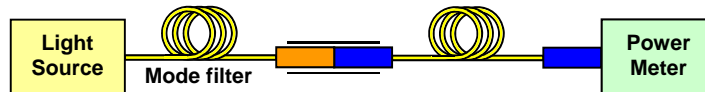
Insertion loss

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

a) Reference measurement:



b) DUT measurement:



Requirements: $IL_{Max} \leq 0.20$ dB

Samples:

- DUT: 9 MM cable patch cords terminated with Diamond E-2000TM PSm 100 connectors
- Fibre / cable type: 200/240/260/400 μ m, Diamond art. no. 1079305
PEEK tube, Diamond art. no. 1063044
- Reference connectors: 1 Diamond E-2000TM PSm 100 connector
- Mating adapters: 1 Diamond E-2000TM PSm mating adapter

Parameters:

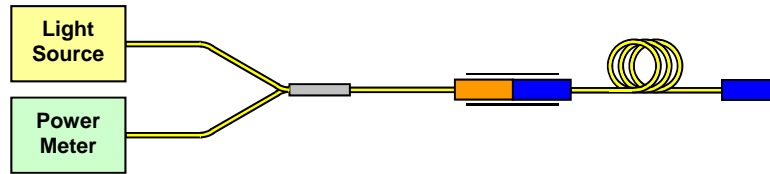
- Wavelengths: 850 nm
- No. of measurements: 18

Results:

Statistics	Insertion loss IL at 850 nm against reference connector [dB]
Mean value	0.06
Standard deviation	0.02
Maximum value	0.10
Minimum value	0.03

Return loss

Methods: OCWR method according to IEC 61300-3-6



Requirements: $RL_{Min} \geq 25$ dB

Samples:

- DUT: 9 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
- Fibre / cable type: 200/240/260/400 μ m, Diamond art. no. 1079305
PEEK tube, Diamond art. no. 1063044
- Reference connectors: 1 Diamond E-2000™ PSm 100 connector
- Mating adapters: 1 Diamond E-2000™ PSm mating adapter

Parameters:

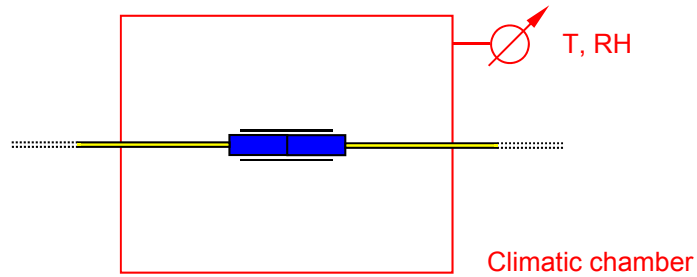
- Wavelengths: 850 nm
- No. of measurements: 18

Results:

Statistics	Return loss IL at 850 nm against reference connector [dB]
Mean value	34.3
Standard deviation	3.6
Maximum value	40.6
Minimum value	28.0

Change of temperature

Methods: Change of temperature test according to IEC 61300-2-22



Requirements: no damages/defects at end of test

Samples:

- DUT: 5 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
- Fibre / cable type: 200/240/260/400 μm, Diamond art. no. 1079305 PEEK tube, Diamond art. no. 1063044
- Mating adapters: 5 Diamond E-2000^{IM} PSm mating adapters

Parameters:

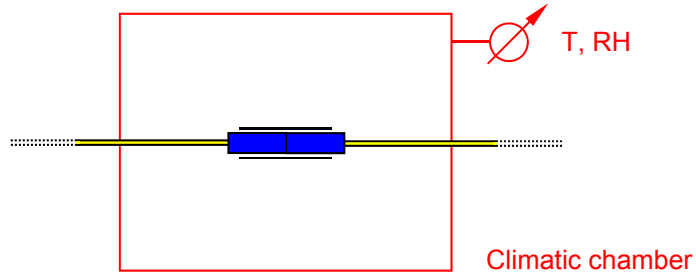
- Mated pairs of connectors: 5
- Upper cycling temperature: +85°C
- Lower cycling temperature: -40°C
- Relative humidity: Not controlled
- Dwell time at extreme temperatures: 1 h
- Variation of temperature at slopes: 1°C/min
- Number of cycles: 12
- Duration: 74 h

Results:

Sample no.	Status	Remarks
1 - 2	performed	no damages/defects observed
3 - 4	performed	no damages/defects observed
5 - 6	performed	no damages/defects observed
7 - 8	performed	no damages/defects observed
9 - 10	performed	no damages/defects observed

Cold

Methods: Cold test according to IEC 61300-2-17



Requirements: no damages/defects at end of test

Samples:

- DUT: 5 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
- Fibre / cable type: 200/240/260/400 μm, Diamond art. no. 1079305
PEEK tube, Diamond art. no. 1063044
- Mating adapters: 5 Diamond E-2000™ PSm mating adapters

Parameters:

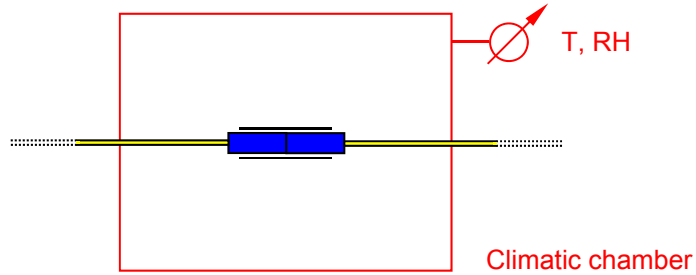
- Mated pairs of connectors: 5
- Constant temperature: -40°C
- Relative humidity: Not controlled
- Duration: 96 h

Results:

Sample no.	Status	Remarks
1 - 2	performed	no damages/defects observed
3 - 4	performed	no damages/defects observed
5 - 6	performed	no damages/defects observed
7 - 8	performed	no damages/defects observed
9 - 10	performed	no damages/defects observed

Dry heat

Methods: Dry heat test according to IEC 61300-2-18



Requirements: no damages/defects at end of test

Samples:

- DUT: 5 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
- Fibre / cable type: 200/240/260/400 μm, Diamond art. no. 1079305 PEEK tube, Diamond art. no. 1063044
- Mating adapters: 5 Diamond E-2000™ PSm mating adapters

Parameters:

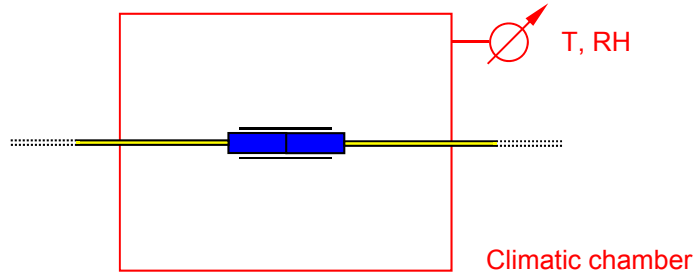
- Mated pairs of connectors: 5
- Constant temperature: +85°C
- Relative humidity: Not controlled
- Duration: 96 h

Results:

Sample no.	Status	Remarks
1 - 2	performed	no damages/defects observed
3 - 4	performed	no damages/defects observed
5 - 6	performed	no damages/defects observed
7 - 8	performed	no damages/defects observed
9 - 10	performed	no damages/defects observed

Damp heat, cyclic

Methods: Damp heat, cyclic, test according to IEC 61300-2-46



Requirements: no damages/defects at end of test

Samples:

- DUT: 5 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
- Fibre / cable type: 200/240/260/400 μm, Diamond art. no. 1079305
PEEK tube, Diamond art. no. 1063044
- Mating adapters: 5 Diamond E-2000™ PSm mating adapters

Parameters:

- Mated pairs of connectors: 5
- Upper cycling temperature: +55°C
- Lower cycling temperature: +25°C
- Relative humidity: 95% r.h.
- Dwell time at extreme temperatures: 9 h
- Variation of temperature at slopes: 10°C/h
- Number of cycles: 6
- Duration: 144 h

Results:

Sample no.	Status	Remarks
1 - 2	performed	no damages/defects observed
3 - 4	performed	no damages/defects observed
5 - 6	performed	no damages/defects observed
7 - 8	performed	no damages/defects observed
9 - 10	performed	no damages/defects observed

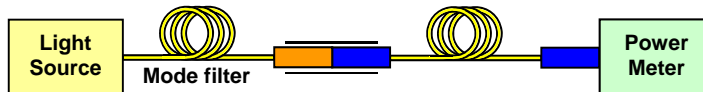
Insertion loss after climatic tests

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

a) Reference measurement:



b) DUT measurement:



Requirements: $IL_{Max} \leq 0.20$ dB

Samples:

- DUT: 5 MM cable patch cords terminated with Diamond E-2000TM PSm 100 connectors
- Fibre / cable type: 200/240/260/400 μ m, Diamond art. no. 1079305
PEEK tube, Diamond art. no. 1063044
- Reference connectors: 1 Diamond E-2000TM PSm 100 connector
- Mating adapters: 1 Diamond E-2000TM PSm mating adapter

Parameters:

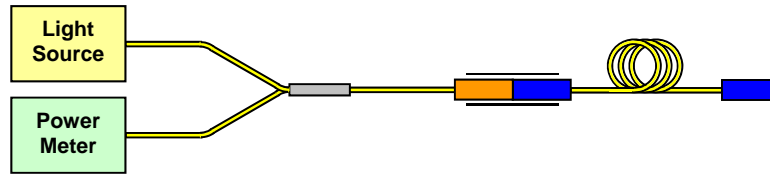
- Wavelengths: 850 nm
- No. of measurements: 10

Results:

Statistics	Insertion loss IL at 850 nm against reference connector [dB]
Mean value	0.07
Standard deviation	0.01
Maximum value	0.09
Minimum value	0.05

Return loss after climatic tests

Methods: OCWR method according to IEC 61300-3-6



Requirements: $RL_{Min} \geq 25$ dB

Samples:

- DUT: 5 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
- Fibre / cable type: 200/240/260/400 μ m, Diamond art. no. 1079305
PEEK tube, Diamond art. no. 1063044
- Reference connectors: 1 Diamond E-2000™ PSm 100 connector
- Mating adapters: 1 Diamond E-2000™ PSm mating adapter

Parameters:

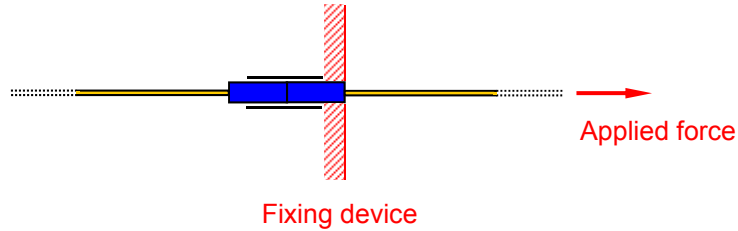
- Wavelengths: 850 nm
- No. of measurements: 10

Results:

Statistics	Return loss IL at 850 nm against reference connector [dB]
Mean value	34.3
Standard deviation	4.8
Maximum value	37.0
Minimum value	25.2

Fibre retention

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation and return loss 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: 2 MM cable patch cords terminated with Diamond E-2000™ PSm PC connectors
 - Fibre / cable type: 200/240/260/400 μ m, Diamond art. no. 1079305
PEEK tube, Diamond art. no. 1063044
 - Mating adapters: 1 Diamond E-2000™ PSm mating adapter

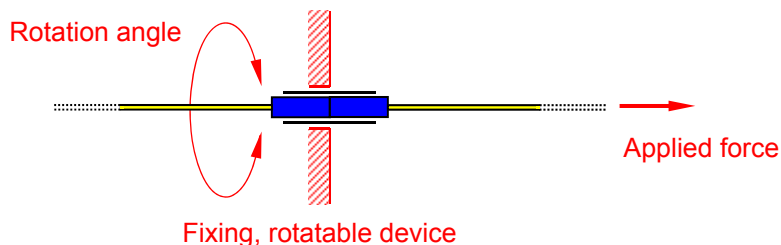
- Parameters:**
- Wavelengths: 850 nm
 - Monitored channels: 4
 - Applied force: 5 N
 - Force direction: Longitudinal connector axis
 - Duration of applied force: 1 min
 - Force application distance: 30 cm

Results:

Sample no.	Insertion loss IL at 850 nm [dB]			Variation of insertion loss ΔIL at 850 nm [dB]
	before test	during test	after test	
1	0.09	0.09	0.09	0.00
2	0.08	0.08	0.08	0.00
3	0.08	0.08	0.08	0.00
4	0.05	0.06	0.05	0.01
Maximum value				0.01
Minimum value				0.00

Torsion

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation and return loss according to IEC 61300-3-3
 - Torsion test according to IEC 61300-2-5



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

- Samples:**
- DUT: 2 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
 - Fibre / cable type: 200/240/260/400 μ m, Diamond art. no. 1079305
PEEK tube, Diamond art. no. 1063044
 - Mating adapters: 1 Diamond E-2000™ PSm mating adapter

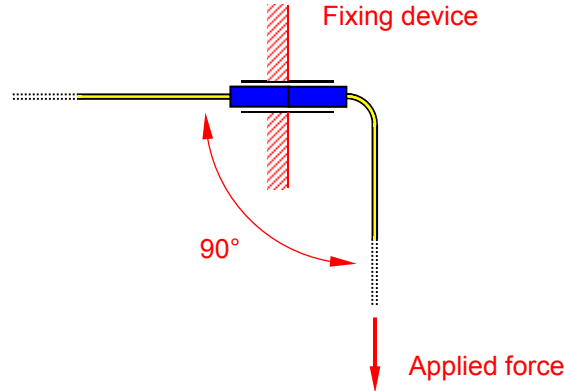
- Parameters:**
- Wavelengths: 850 nm
 - Monitored channels: 4
 - Applied force: 2 N
 - Force direction: Longitudinal connector axis
 - Rotation angle: +180° to -180° and back
 - Number of cycles: 25
 - Force application distance: 30 cm

Results:

Sample no.	Insertion loss IL at 850 nm [dB]			Variation of insertion loss ΔIL at 850 nm [dB]
	before test	during test	after test	
1	0.12	0.12	0.12	0.00
2	0.08	0.08	0.08	0.00
3	0.09	0.09	0.08	0.01
4	0.08	0.10	0.10	0.02
Maximum value				0.02
Minimum value				0.00

Static side load

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation and return loss according to IEC 61300-3-3
 - Static side load test according to IEC 61300-2-42



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

- Samples:**
- DUT: 2 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
 - Fibre / cable type: 200/240/260/400 μ m, Diamond art. no. 1079305
PEEK tube, Diamond art. no. 1063044
 - Mating adapters: 1 Diamond E-2000™ PSm mating adapter

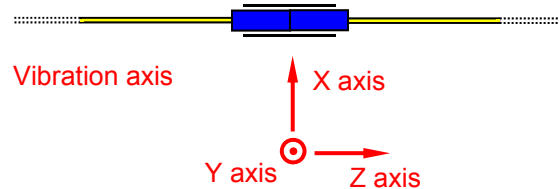
- Parameters:**
- Wavelengths: 850 nm
 - Monitored channels: 4
 - Applied force: 0.2 N
 - Force direction: 90° respect to the longitudinal connector axis
 - Duration of applied force: 5 min
 - Force application distance: 20 cm

Results:

Sample no.	Insertion loss IL at 850 nm [dB]			Variation of insertion loss ΔIL at 850 nm [dB]
	before test	during test	after test	
1	0.10	0.10	0.10	0.00
2	0.06	0.06	0.06	0.00
3	0.13	0.13	0.13	0.00
4	0.05	0.05	0.05	0.00
Maximum value				0.00
Minimum value				0.00

Vibration, sinusoidal

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation and return loss according to IEC 61300-3-3
 - Sinusoidal vibration test according to IEC 61300-2-1



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

- Samples:**
- DUT: 4 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
 - Fibre / cable type: 200/240/260/400 μ m, Diamond art. no. 1079305 PEEK tube, Diamond art. no. 1063044
 - Mating adapters: 2 Diamond E-2000™ PSm mating adapters

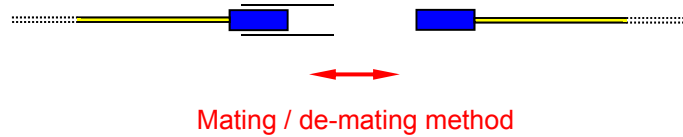
- Parameters:**
- Wavelengths: 850 nm
 - Monitored channels: 8
 - Upper vibration frequency: 55 Hz
 - Lower vibration frequency: 10 Hz
 - Vibration amplitude: 0.75 mm (peak-to-peak)
 - Sweep rate: 1 Oct/min
 - Sweep cycles: 15
 - Duration per axis: 30 min

Results:

Sample no.	Vibration axis	Insertion loss IL at 850 nm [dB]		Variation of insertion loss ΔIL at 850 nm [dB]
		maximum, during test	minimum, during test	
1-2 / 3-4	X	0.05	0.05	0.00
	Y	0.05	0.05	0.00
	Z	0.06	0.05	0.01
5-6 / 7-8	X	0.09	0.06	0.03
	Y	0.14	0.12	0.02
	Z	0.12	0.10	0.02
Maximum value				0.03
Minimum value				0.00

Mating durability

- Methods:**
- Insertion loss measurement method B according to IEC 61300-3-4
 - Active monitoring of attenuation and return loss 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: 4 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
 - Fibre / cable type: 200/240/260/400 μ m, Diamond art. no. 1079305 PEEK tube, Diamond art. no. 1063044
 - Mating adapters: 2 Diamond E-2000™ PSm mating adapters

Parameters:

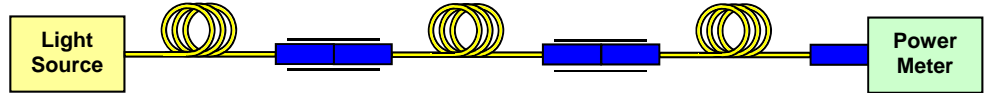
- Wavelengths: 850 nm
- Monitored channels: 2
- Mating / de-mating cycles: 100

Results:

Sample no.	Insertion loss IL at 850 nm [dB]		Variation of insertion loss ΔIL at 850 nm [dB]
	maximum value	minimum value	
1	0.07	0.03	0.04
2	0.03	0.01	0.02
Maximum value			0.04
Minimum value			0.02

Optical power handling

- Methods:**
- Active monitoring of changes in output power according to IEC 61300-3-3
 - Optical power handling test according to IEC 61300-2-14



Requirements: no damages/defects at end of test

- Samples:**
- DUT: 15 MM cable patch cords terminated with Diamond E-2000™ PSm 100 connectors
 - Fibre / cable type: 200/240/260/400 μm, Diamond art. no. 1079305 PEEK tube, Diamond art. no. 1063044
 - Mating adapters: Diamond E-2000™ PSm mating adapters

- Parameters:**
- Wavelength: 808 nm
 - Tested mated pairs of connectors per run: 5 to 6 concatenated pairs
 - Nominal power level: 100 W
 - Exposure time at given power level: 1 h

Remarks: Test performed at Research & Development Department at Diamond SA, Losone (Switzerland)

Results:

Test	Status	Remarks
Optical power handling	performed	no damages/defects observed