DIAMOND
Test & Calibration Laboratory STS 333 / SCS 101

Product Specification
Qualification Test Report

SC PC SM duplex

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Measurement / test	Method	Page	Edition [1)]	Requalified [2)]	Similarity [3)]
Insertion loss	IEC 61300-3-4	1	08.'95	-	-
Return loss	IEC 61300-3-6	2	08.'95	-	-
Mating durability	IEC 61300-2-2	3	08.'95	-	-
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1) Edition: This column states the date of the Qualification;
2) Requalified: This column states the date of the Requalification;
3) Similarity: This column lists the product for which similarity principle has been applied.

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 SC PC SM duplex connector at the accredited test & calibration laboratory STS 333 / SCS 101 at Diamond SA, Losone. This current QTR is a summary of the internal qualification report no. 255 performed at the test & calibration laboratory STS 333 / SCS 101 (www.sas.ch).

The qualification test program of the SC PC SM duplex connector is determined under the guideline of IEC 61753-2-1, 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) of IEC 61753-1.

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.

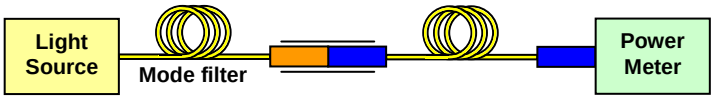
For additional information, please contact Diamond or your Diamond Sales Representative.

Insertion loss

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

a) Reference measurement:

b) DUT measurement:



Requirements: IL_{Max} d 0.40 dB

Samples:

- DUT: 5 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type: Cable with SM 9/125 µm fibre, Diamond art. no. -
- Reference connectors: 2 Diamond SC PC SM connectors
- Mating adapters: Diamond SC SM duplex

Parameters:

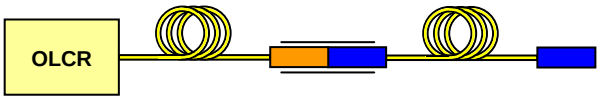
- Wavelengths: 1310 nm / 1550 nm
- No. of measurements: 40

Results:

Statistics	Insertion loss IL against reference connector [dB]	
	at 1310 nm	at 1550 nm
Mean value	0.15	0.20
Standard deviation	0.07	0.07

Return loss

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



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

Samples:

- DUT: 5 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type: Cable with SM 9/125 µm fibre, Diamond art. no. -
- Reference connectors: 2 Diamond SC PC SM connectors
- Mating adapters: Diamond SC SM duplex

Parameters:

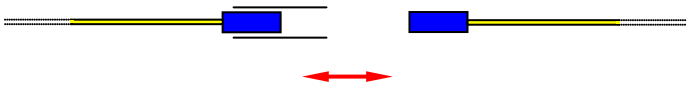
- Wavelengths: 1310 nm / 1550 nm
- No. of measurements: 40

Results:

Statistics	Return loss RL against reference connector [dB]	
	at 1310 nm	at 1550 nm
Mean value	54.1	53.3
Standard deviation	1.9	1.7

Mating durability

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



Mating / de-mating method

Requirements: ΔIL_{Max} d 0.20 dB during test

Samples:

- DUT:	2 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type:	Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters:	Diamond SC SM duplex

Parameters:

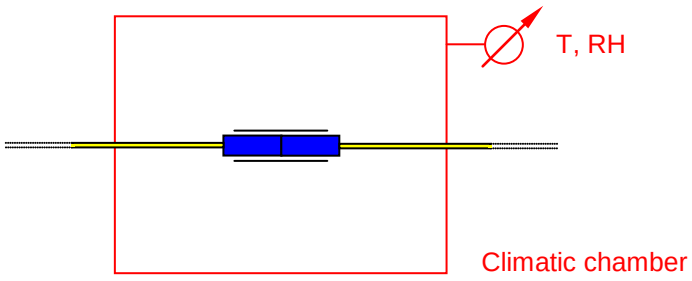
- Wavelengths:	1310 nm
- Monitored channels:	1
- Mating / de-mating cycles:	1000

Results: Variation of insertion loss during the test: $\Delta IL_{Max} < 0.10$ dB

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:

ΔIL_{Max} d 0.20 dB during test

Samples:

- DUT:	1 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type:	Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters:	Diamond SC SM duplex

Parameters:

- Wavelengths:	1310 nm
- Monitored channels:	2
- Upper cycling temperature:	+85°C
- Lower cycling temperature:	-40°C
- Relative humidity:	Not controlled
- Dwell time at extreme temperatures:	30 min
- Variation of temperature at slopes:	1°C/min
- Number of cycles:	5
- Duration:	26 h

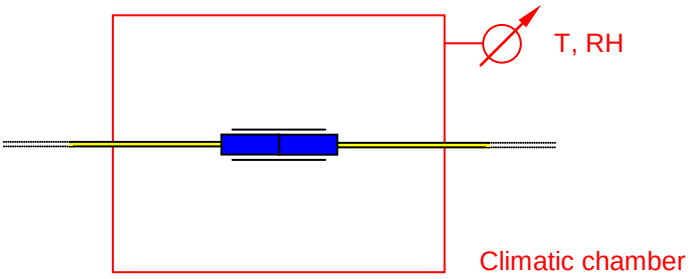
Results:

Variation of insertion loss during the test: $\Delta IL_{Max} < 0.15$ dB

Cold

Methods:

- Insertion loss measurement method B according to IEC 61300-3-4
- Active monitoring of attenuation according to IEC 61300-3-3
- Cold test according to IEC 61300-2-17



Requirements: ΔIL_{Max} d 0.20 dB during test

Samples:

- DUT: 4 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type: Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters: Diamond SC SM duplex

Parameters:

- Wavelengths: 1310 nm
- Monitored channels: 8
- Constant temperature: -40°C
- Relative humidity: Not controlled
- Duration: 16 h

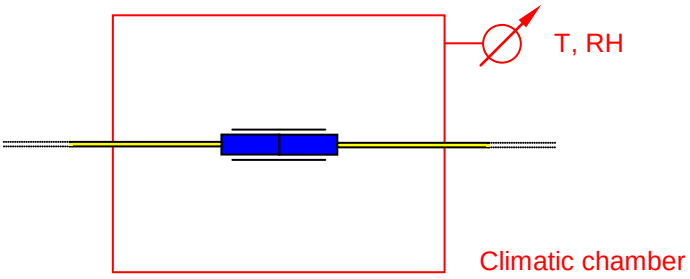
Results:

Samples no.	Insertion loss IL[dB]		Variation of insertion loss ΔIL [dB]
	before test at 1310 nm	after test at 1310 nm	at 1310 nm
1	0.11	0.15	0.04
2	0.16	0.20	0.04
3	0.22	0.26	0.04
4	0.08	0.11	0.03
5	0.13	0.19	0.06
6	0.18	0.21	0.03
7	0.07	0.09	0.02
8	0.27	0.34	0.07
Maximum value			**0.07**
Minimum value			**0.02**

Dry heat

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



Requirements: ΔIL_{Max} d 0.20 dB during test

Samples:

- DUT: 4 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type: Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters: Diamond SC SM duplex

Parameters:

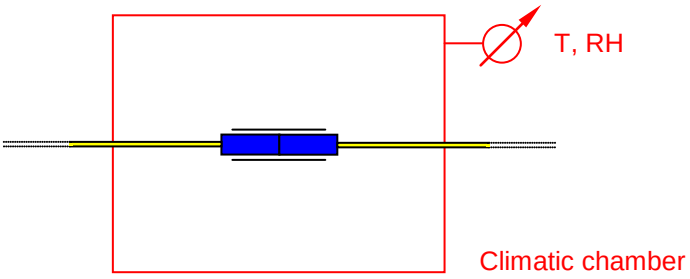
- Wavelengths: 1310 nm
- Monitored channels: 8
- Constant temperature: +85°C
- Relative humidity: Not controlled
- Duration: 16 h

Results:

Samples no.	Insertion loss IL[dB]		Variation of insertion loss ΔIL [dB]
	before test at 1310 nm	after test at 1310 nm	at 1310 nm
1	0.11	0.19	0.08
2	0.17	0.23	0.06
3	0.06	0.12	0.03
4	0.18	0.27	0.09
5	0.09	0.15	0.06
6	0.14	0.16	0.02
7	0.14	0.19	0.05
8	0.07	0.12	0.05
Maximum value			**0.09**
Minimum value			**0.02**

Thermal age

Methods:
- Insertion loss measurement method B according to IEC 61300-3-4
- Active monitoring of attenuation according to IEC 61300-3-3
- Thermal age test according to Telcordia GR-326



Requirements: ΔIL_{Max} d 0.20 dB during test

Samples:
- DUT: 4 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type: Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters: Diamond SC SM duplex

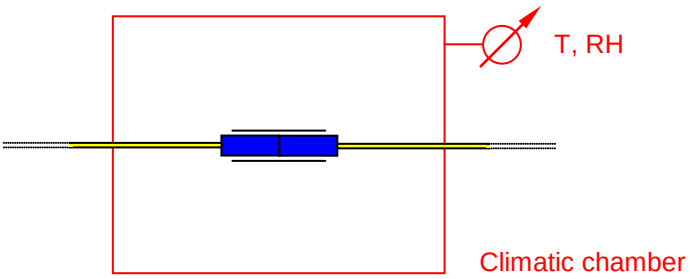
Parameters:
- Wavelengths: 1310 nm
- Monitored channels: 8
- Constant temperature: +85°C
- Relative humidity: Not controlled
- Duration: 336 h

Results:

Samples no.	Insertion loss IL[dB]		Variation of insertion loss ΔIL [dB]
	before test at 1310 nm	after test at 1310 nm	at 1310 nm
1	0.31	0.33	0.02
2	0.14	0.17	0.03
3	0.09	0.15	0.06
4	0.06	0.12	0.06
5	0.22	0.24	0.02
6	0.26	0.32	0.06
7	0.06	0.11	0.05
8	0.09	0.13	0.04
Maximum value			**0.06**
Minimum value			**0.02**

Damp heat

Methods:
- Insertion loss measurement method B according to IEC 61300-3-4
- Active monitoring of attenuation according to IEC 61300-3-3
- Damp heat test according to IEC 61300-2-19



Requirements: ΔIL_{Max} d 0.20 dB during test

Samples:
- DUT: 4 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type: Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters: Diamond SC SM duplex

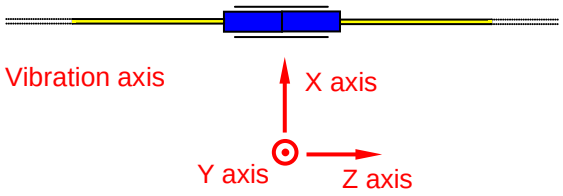
Parameters:
- Wavelengths: 1310 nm
- Monitored channels: 8
- Constant temperature: +60°C
- Relative humidity: 95% r.h.
- Duration: 336 h

Results:

Samples no.	Insertion loss IL[dB]		Variation of insertion loss ΔIL [dB]
	before test at 1310 nm	after test at 1310 nm	at 1310 nm
1	0.07	0.11	0.04
2	0.23	0.29	0.06
3	0.25	0.30	0.05
4	0.21	0.24	0.03
5	0.08	0.15	0.07
6	0.08	0.12	0.04
7	0.06	0.14	0.08
8	0.19	0.22	0.03
Maximum value			**0.08**
Minimum value			**0.03**

Vibration, sinusoidal

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



Requirements: ΔIL_{Max} d 0.20 dB during test

Samples:

- DUT:	2 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type:	Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters:	Diamond SC SM duplex

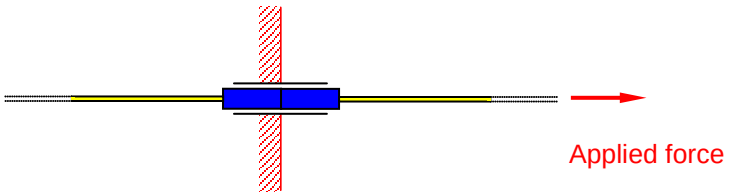
Parameters:

- Wavelengths:	1310 nm
- Monitored channels:	2
- Upper vibration frequency:	60 Hz
- Lower vibration frequency:	10 Hz
- Vibration amplitude:	0.75 mm (peak-to-peak)
- Sweep rate:	1 Oct/min
- Sweep cycles:	4
- Duration per axis:	30 min

Results: Variation of insertion loss during the test: $\Delta IL_{Max} < 0.10$ dB

Tensile strength of coupling mechanism

Methods:
- Insertion loss measurement method B according to IEC 61300-3-4
- Active monitoring of attenuation according to IEC 61300-3-3
- Tensile strength of coupling mechanism test according to IEC 61300-2-6



Requirements: ΔIL_{Max} d 0.20 dB during test

Samples:
- DUT: 4 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type: Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters: Diamond SC SM duplex

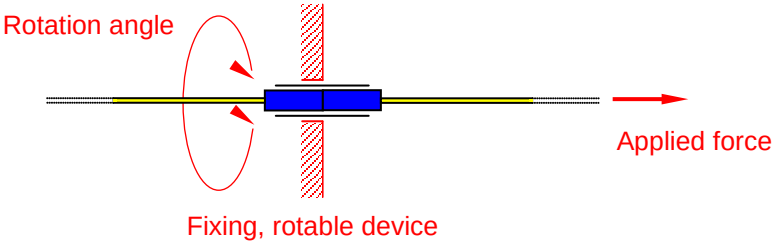
Parameters:
- Wavelengths: 1310 nm
- Monitored channels: 8
- Applied force: 70 N
- Force direction: Longitudinal connector axis
- Duration of applied force: 1 min
- Force application distance: 30 cm

Results:

Sample no.	Insertion loss IL[dB]			Variation of insertion loss ΔIL [dB]
	before test at 1310 nm	during test at 1310 nm	after test at 1310 nm	at 1310 nm
1	0.29	0.31	0.30	0.02
2	0.21	0.21	0.20	0.01
3	0.18	0.21	0.19	0.03
4	0.13	0.16	0.14	0.03
5	0.15	0.15	0.13	0.02
6	0.12	0.13	0.12	0.01
7	0.18	0.19	0.18	0.01
8	0.22	0.24	0.21	0.03
Maximum value				**0.03**
Minimum value				**0.01**

Cable torsion

Methods:
- Insertion loss measurement method B according to IEC 61300-3-4
- Active monitoring of attenuation according to IEC 61300-3-3
- Cable torsion test according to IEC 61300-2-5



Requirements: ΔIL_{Max} d 0.20 dB during test

Samples:
- DUT: 2 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type: Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters: Diamond SC SM duplex

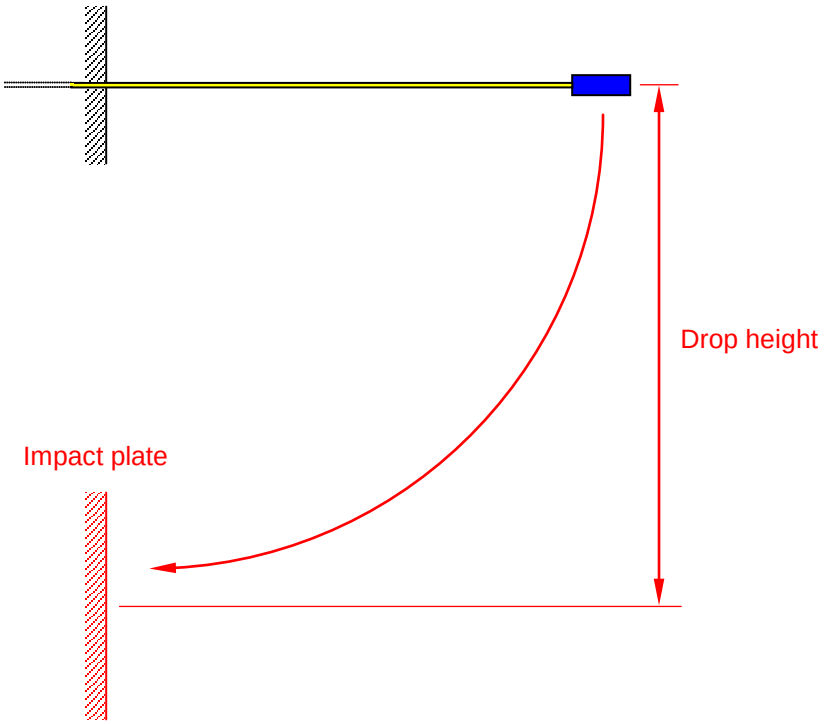
Parameters:
- Wavelengths: 1310 nm
- Monitored channels: 4
- Applied force: 15 N
- Force direction: Longitudinal connector axis
- Rotation angle: +180° to -180° and back
- Number of cycles: 25
- Force application distance: 30 cm

Results:

Sample no.	Insertion loss IL[dB]			Variation of insertion loss ΔIL [dB]
	before test at 1310 nm	during test at 1310 nm	after test at 1310 nm	at 1310 nm
1	0.15	0.18	0.14	**0.04**
2	0.23	0.28	0.24	**0.05**
3	0.27	0.34	0.29	**0.07**
4	0.10	0.13	0.10	**0.03**
Maximum value				**0.07**
Minimum value				**0.03**

Impact

Methods:
- Insertion loss measurement method B according to IEC 61300-3-4
- Impact test method A according to IEC 61300-2-12



Requirements: ΔIL_{Max} d 0.20 dB before/after test

Samples:
- DUT: 4 SM duplex cable patch cords terminated with Diamond SC PC SM duplex connectors
- Fibre / cable type: Cable with SM 9/125 µm fibre, Diamond art. no. -
- Mating adapters: Diamond SC SM duplex

Parameters:
- Wavelengths: 1310 nm
- Drop height: 1.5 m
- Number of drops: 5

Results:

Sample no.	Insertion loss IL[dB]		Variation of insertion loss ΔIL [dB]
	before test at 1310 nm	after test at 1310 nm	at 1310 nm
1	0.19	0.21	0.01
2	0.28	0.31	0.03
3	0.09	0.14	0.05
4	0.11	0.14	0.03
5	0.06	0.08	0.02
6	0.11	0.13	0.02
7	0.21	0.25	0.04
8	0.14	0.17	0.03
Maximum value			**0.05**
Minimum value			**0.01**