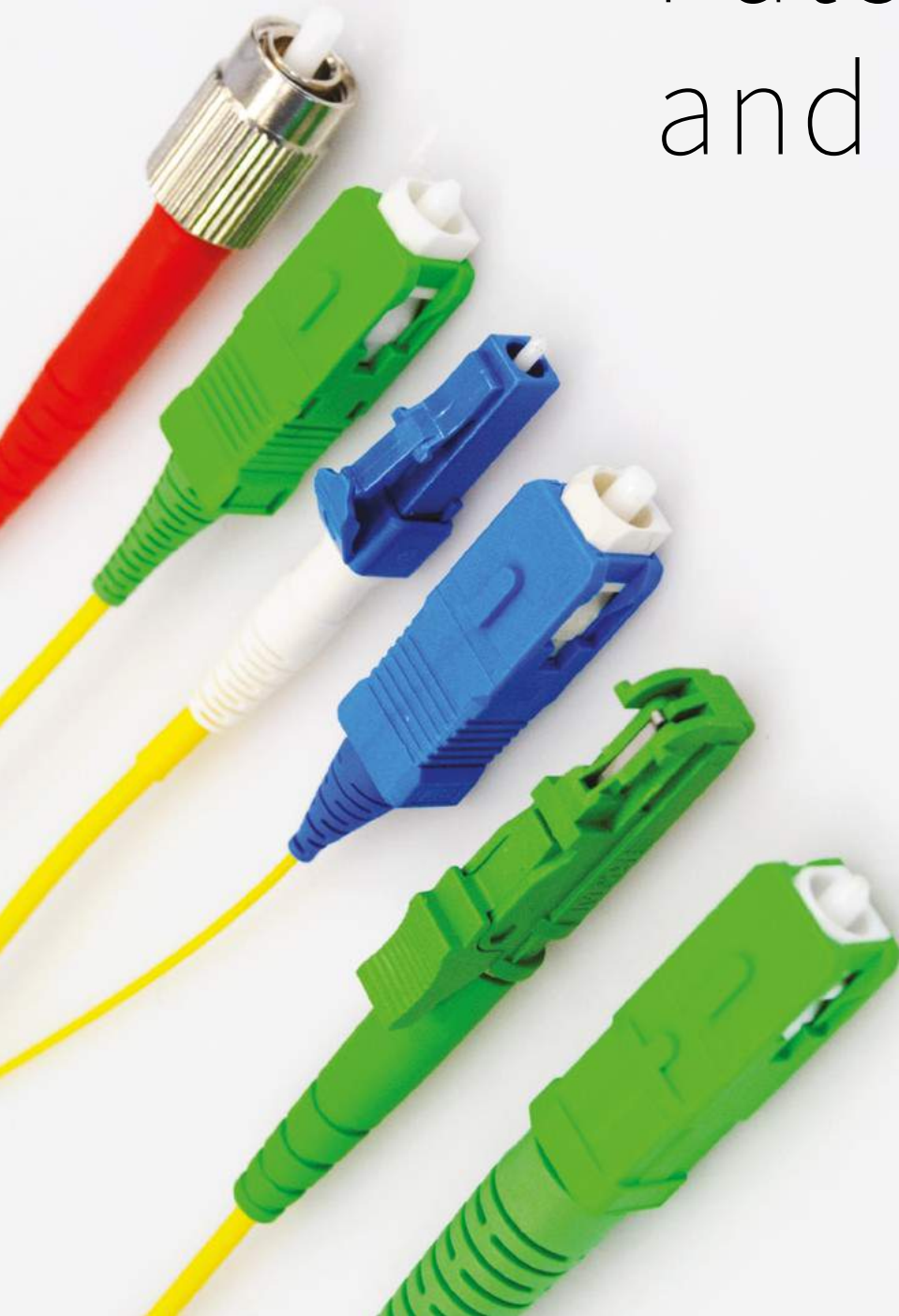











# Patchcords and pigtails



# SILVER GRADE PATCHCORDS & PIGTAILS

Fibrain optical connection components are specifically designed and based on connectors, which comply with IEC/ PN-EN 61754 and IEC/PN –EN 61755. Patchcords & Pigtailes of Silver Grade are available in a singlemode and multimode configuration with various types of connectors, cables and optical fibers. Fully automated preparation and polishing process ensure the highest quality and reliability. Therefore, detailed selection of the manufacturing components ensures the highest quality of the component.

Series	Connector		Boot type	Length	Cable	Fiber	Cable diameter	Color	
	A	B							
S-Silver	SC	SC	S-standard	001.0	SX patchcord simplex	A SMF G.652D	09 0.9 mm	OR*	
	SCA	SCA			DX patchcord duplex	B SMF G655	16 1.6 mm	Y*	
	LC	LC			P9 pigtail 900 µm	C SMF G656	18 1.8 mm	GR	
	LCA	LCA			PS pigtail simplex cable	D SMF G657A1	28 2.8 mm	GY	
	FC	FC			PD pigtail duplex cable	E SMF G657A2		BL	
	FCA	FCA				F SMF G657B2		BK	
	E2	E2				G SMF G657B3		V	
	E2A	E2A				H MMF OM1		R	
	ST	ST				I MMF OM2		W	
	MU	MU				J MMF OM2+		AQ	
	DIN	DIN				K MMF OM3		BR	
		XX				L MMF OM4		P	

\*Standard colors of external tube for 1.6-2.8mm cables, other colors can be ordered by a customer on request. Colors in the table concern 0.9mm tube.

**S-SCA-SCA-S-002.0-SX-A-18-Y** Fibrain Silver Grade Patchcord, with SC APC connectors at both side, simplex, 2m length, G.652D, 1.8 mm cable diameter, yellow coat.



## Features

- Comply with IEC, TIA/EIA requirements,
- High quality and repeatability of the transmission parameters,
- Connectors are constructed from high quality plastic, resistant to corrosion and high temperatures with UL94-V0 flammability index or the high quality metal resistant to corrosion,
- Good value for money,
- Wide range of available fibers and connectors.

## Applications

- Telecommunication networks,
- Local area network (LAN),
- FTTx, FTTD, FTTB, FTTH networks,
- CATV solutions,
- CWDM networks.

### Available connectors for Silver Grade patchcords and pigtailes:

- SC PC/APC,
- FC PC/APC,
- E2000 PC/APC,
- LC PC/APC,
- ST PC,
- DIN,
- MU.

### Available fibers:

- G652D,
- G655,
- G657A,
- G657B,
- 50/125 OM2,
- 50/125 OM2+,
- 50/125 OM3/OM4,
- 62.5/125 OM1

### Technical specifications

Parameter	Connectors		
	SM PC	SM APC	MM PC
Insertion Loss <b>IL<sub>MAX</sub> against MASTER</b> Acc. IEC 61300-3-4	≤ 0.35 dB	≤ 0.35 dB	≤ 0.35 dB
Insertion Loss <b>IL<sub>TYP</sub> against MASTER</b> Acc. IEC 61300-3-4	≤ 0.28 dB	≤ 0.28 dB	≤ 0.25 dB
Return Loss Acc. IEC 61300-3-6	≥ 50 dB	≥ 60 dB	≥ 30 dB

# GOLD GRADE PATCHCORDS & PIGTAILS

FibraIn optical components are specifically designed and based on connectors, which comply with IEC/PN-EN 61754 and IEC/PN –EN 61755 requirements. Patchcords & Pigtailes of Gold Grade are available in singlemode and multimode option with various type of connectors, cables and optical fibers. Fully automated preparation and polishing process ensure the highest quality and reliability. Therefore, detailed selection of the manufacturing components ensures the highest quality of the product. Patchcords & Pigtailes of Gold Grade are available with 3 different designs of boots, which protect the bend radius of the optical fibers. Apart from standard boots, there are mini and flexi-angle available. The boot in the mini option limits the total length of a connector and boot, whereas the flexi-angle boot is designed to bend in a 0-90° angle range. Available options of the boots are given in the table below. There is no possibility to mix various types of boots on a patchcord- as from the both sides a patchcord is terminated with the same type of boots.

Series	Connector		Boot type	Length	Cable	Fiber	Cable diameter	Color	
	A	B							
G-Gold	SC	SC	S-Standard	001.0	SX patchcord simplex	A SMF G.652D	09 0.9 mm	OR*	
	SCA	SCA	M-Mini		DX patchcord duplex	B SMF G655	16 1.6 mm	Y*	
	LC	LC	F-Flex-angled		P9 pigtail 900 µm	C SMF G656	18 1.8 mm	GR	
	LCA	LCA			PS pigtail simplex cable	D SMF G657A1	28 2.8 mm	GY	
	FC	FC			PD pigtail duplex cable	E SMF G657A2		BL	
	FCA	FCA				F SMF G657B2		BK	
	E2	E2				G SMF 657B3		V	
	E2A	E2A				H MMF OM1		R	
	ST	ST				I MMF OM2		W	
	MU	MU				J MMF OM2+		AQ	
	DIN	DIN				K MMF OM3		BR	
		XX				L MMF OM4		P	

\*Standard colors of external tube for 1.6-2.8mm cables, other colors can be ordered by a customer on request. Colors in the table concern 0.9mm tube.

**G-SCA-SCA-S-002.0-SX-A-18-Y** FibraIn Gold Grade Patchcord, with SC APC connectors at both side, simplex, 2m length, G.652D, 1.8 mm cable diameter, yellow coat.

## Available boots

Parameter	Boot type**		
	Standard boots 0.9/2.0/3.0 mm	Mini boots 0.9/2.0/3.0 mm	Flex-Angled boots 2.0/3.0 mm
SC PC	☑	☑	☑
SC APC	☑	☑	☑
LC PC	☑	☑	☑
LC APC	☑	☑	☑
FC PC	☑	☑	-
FC APC	☑	☑	-
ST PC	☑	☑	-
E2000 PC	☑	-	-
E2000 APC	☑	-	-
DIN	☑	-	-
MU	☑	-	-

\*\*There is no possibility to mix various type of boots on a patchcord- as from the both sides a patchcord is terminated with the same type of boots.



## Features

- Comply with IEC, TIA/EIA requirements,
- High quality and repeatability of the transmission parameters,
- Connectors are constructed from high quality plastic, resistant to corrosion and high temperatures with UL94-V0 flammability index or the high quality metal resistant to corrosion,
- Good value for money,
- Wide range of available connectors and optical fibers.

## Applications

- Telecommunication networks,
- Local area network (LAN),
- FTTx, FTTD, FTTB, FTTH networks,
- CATV solutions,
- CWDM networks.










## Technical specifications

Parameter	Connectors		
	SM PC	SM APC	MM PC
Insertion Loss IL <sub>MAX</sub> against MASTER Acc. IEC 61300-3-4	≤ 0.17 dB	≤ 0.20 dB	≤ 0.20 dB
Insertion Loss IL <sub>TYP</sub> against MASTER Acc. IEC 61300-3-4	≤ 0.15 dB	≤ 0.16 dB	≤ 0.12 dB
Return Loss Acc. IEC 61300-3-6	≥ 55 dB	≥ 65 dB	≥ 35 dB

# TITANIUM GRADE PATCHCORDS & PIGTAILS

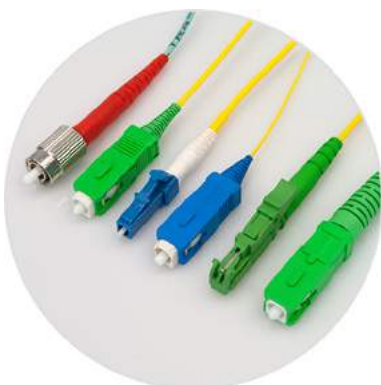
Fibrain Titanium series of patchcords and pigtails is intended for the most demanding customers. High optical parameters, premium quality and precise selection of the components are the characteristic features of the Titanium Grade. Fibrain optical components are specifically designed and based on connectors, which comply with IEC/ PN-EN 61754 and IEC/PN –EN 61755 requirements. Patchcords and pigtails of Titanium Grade are available in singlemode option with various type of connectors, cables and optical fibers. Fully automated preparation and polishing process ensure the highest quality and reliability. Therefore, detailed selection of the manufacturing components ensures the highest quality of the final component.

Patchcords and pigtails of Titanium Grade are available 3 different designs of boots, which protect a bend radius of the optical fibers. Apart from standard boots there are mini and flexi-angles available. The boot in the mini option limits the total length of a connector and boot, whereas the flexi-angle boot is designed to bend in a 0-90° angle range. Available options of the boots are given in the table below. There is no possibility to mix various type of boots on a patchcord- as from the both sides a patchcord is terminated with the same type of boots.

Series	Connector		Boot type	Length	Cable	Fiber	Cable diameter	Color	
	A	B							
T-Titanium	SC	SC	S-Standard	001.0	SX patchcord simplex	A SMF G.652D	09 0.9 mm	OR*	
	SCA	SCA	M-Mini		DX patchcord duplex	B SMF G655	16 1.6 mm	Y*	
	LC	LC	F-Flex-angled		P9 pigtail 900 μm	C SMF G656	18 1.8 mm	GR	
	LCA	LCA			PS pigtail simplex cable	D SMF G657A1	24 2.4 mm	GY	
	FC	FC			PD pigtail duplex cable	E SMF G657A2	28 2.8 mm	BL	
	FCA	FCA				F SMF G657B2		BK	
	E2	E2				G SMF 657B3		V	
	E2A	E2A						R	
		XX						W	
								AQ	
							BR		
							P		

\*Standard colors of a tube for 1.6-2.8 mm cables, other colors available on customer's request. The rest of colors concern a 0.9 mm tube.

**T-SCA-SCA-S-002.0-SX-D-28-Y** Fibrain Titanium Grade Patchcord, with SC APC connectors at both side, simplex, 2m length, G.657A1, 2.8 mm cable diameter, yellow coat.



## Features

- Comply with IEC, TIA/EIA requirements,
- High quality and repeatability of the transmission parameters,
- Connectors are constructed from high quality plastic, resistant to corrosion and high temperatures with flammability index UL94-V0 or the high quality metal resistant to corrosion,
- Good value for money,
- High quality ceramic ferrules,
- Low attenuation and high reflectance,
- Wide range of available connectors and optical fibers.

## Applications

- Telecommunication networks,
- Local area network (LAN),
- FTTx, FTTD, FTTB, FTTN networks,
- CATV solutions,
- CWDM networks,
- Low voltage networks,
- Measuring devices.

## Technical specifications

Parameter	SM PC Connectors	SM APC Connectors
Insertion Loss <b>IL<sub>MAX</sub></b> against <b>MASTER</b> Acc. IEC 61300-3-4	≤ 0.12 dB	≤ 0.15 dB
Insertion Loss <b>IL<sub>TYP</sub></b> against <b>MASTER</b> Acc. IEC 61300-3-4	≤ 0.10 dB	≤ 0.12 dB
Return Loss Acc. IEC 61300-3-6	≥ 55 dB	≥ 65 dB

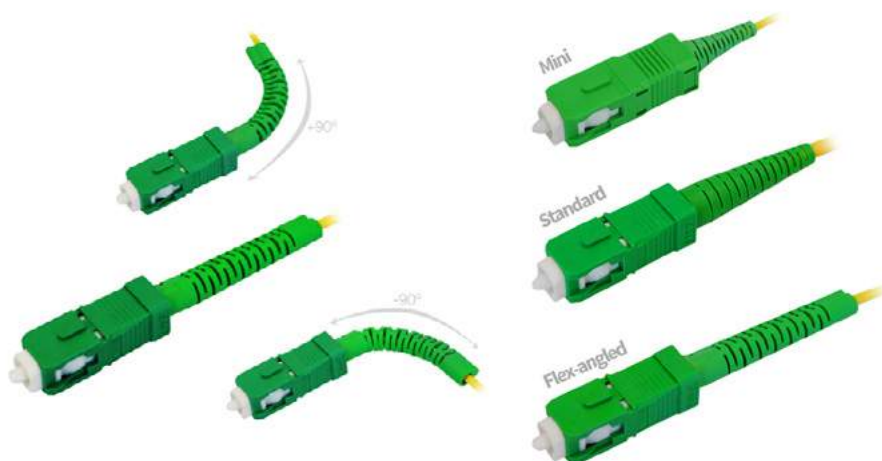
# TITANIUM GRADE PATCHCORDS & PIGTAILS

## Available boots

Parameter	Boot type**		
	Standard boots 0.9/2.0/3.0 mm	Mini boots 0.9/2.0/3.0 mm	Flex-Angled boots 2.0/3.0 mm
SC PC	☑	☑	☑
SC APC	☑	☑	☑
LC PC	☑	☑	☑
LC APC	☑	☑	☑
FC PC	☑	☑	-
FC APC	☑	☑	-
ST PC	☑	☑	-
E2000 PC	☑	-	-
E2000 APC	☑	-	-
DIN	☑	-	-
MU	☑	-	-

\*\* There is no possibility to mix various type of boots on a patchcord- as from the both sides a patchcord is terminated with the same type of boots.

## Available boots types



### Available connectors for Titanium Grade patchcords and pigtails:

- SC PC/APC,
- FC PC/APC,
- E2000 PC/APC,
- LC PC/APC,

### Available fibers:

- G652D,
- G655,
- G657A,
- G657B.

Detailed interferometric reports containing ferrule end face geometry parameters can be obtained by customer on request.

## Features

- Comply with IEC, TIA/EIA requirements,
- High quality and repeatability of the transmission parameters,
- Connectors are constructed from high quality plastics, resistant to corrosion and high temperatures with flammability index UL94-V0 or the high quality metal resistant to corrosion,
- Good value for money,
- High quality ceramic ferrules,
- Low attenuation and high reflectance,
- Wide range of available connectors and optical fibers.

## Applications

- Telecommunication networks,
- Local area network (LAN),
- FTTx, FTTD, FTTB, FTTH networks,
- CATV solutions,
- CWDM networks,
- Low voltage networks,
- Measuring devices.

## Technical specifications

Parameter	SM PC Connectors	SM APC Connectors
Insertion Loss $IL_{MAX}$ against MASTER Acc. IEC 61300-3-4	≤ 0.12 dB	≤ 0.15 dB
Insertion Loss $IL_{TYP}$ against MASTER Acc. IEC 61300-3-4	≤ 0.10 dB	≤ 0.12 dB
Return Loss Acc. IEC 61300-3-6	≥ 55 dB	≥ 65 dB

# MASTER CLASS PATCHCORDS

Master Class fiber optic patchcords are specifically designed to measure and test telecommunication networks and optical elements. The Master Patchcord is equipped with the highest quality master connector of tightly controlled concentricity and bore angle as well as the end face geometric parameters, which determine very low Insertion Loss and high connection repeatability.

Optical measurements, in accordance with PN-EN 61280-4-2/-4-1, PN-ISO/IEC 14763-3, ITU-T G.650.3 require the use of the Master Class patchcord. Patchcords can be terminated with two connectors of Master Class or a mixed option: a connector of the Master Class - a standard connector, polished of the Gold Grade. Fibrain Master Class of fiber optic connectors can be characterized by very low Insertion Loss and increased control of the ferrule's and face geometry. The control over the end face geometry after polishing process of a fiber optic termination provides the following benefits: guarantees optical performance, minimizes IL, and minimizes back reflection.

Series	Connector A		Connector B		Length [m]	Cable	Fiber	Diameter	Color		
	Class	Type	Class	Type							
MP	M Master	SC	M Master*	SC	001.0	SX patchcord simplex	A SMF G.652D	18 1.8mm	Y	■	
		SCA	G Gold	SCA							D G657A1
		LC		LC							
		LCA		LCA							
		FC		FC							
		FCA		FCA							
				E2							
				E2A							
				ST							
				MU							
		DIN									

\* Master Connectors in accordance with the table of availability

**MP-MSCA-MSCA-002.0-SX-A-18-Y** Fibrain Master Class Patchcord, with SC APC Master class Connectors at both side, simplex, 2m length, G.652D, cable diameter 1.8mm, yellow coat.



## Features

- Comply with IEC, TIA/EIA requirements,
- High quality and repeatability of the transmission parameters,
- High quality ceramic ferrules with tightly controlled concentricity and bore angle,
- Very low IL value,  $IL_{typ} \leq 0.05$  dB,
- Connectors are constructed from high quality plastic, resistant to corrosion and high temperatures with UL94-V0 flammability index.

## Applications

- Measurements concerning telecommunication networks,
- Testing optical devices,
- Measuring equipment,
- CWDM networks
- Local area network (LAN),
- FTtx, FTTD, FTTB, FTTH networks,
- CATV solutions.

## Technical specifications

Parameter	SM PC Connectors	SM APC Connectors
Insertion Loss <sup>MAX</sup> Acc. IEC 61300-3-34	$\leq 0.10$ dB	$\leq 0.10$ dB
Insertion Loss <sup>97%</sup> Acc. IEC 61300-3-34	$\leq 0.07$ dB	$\leq 0.07$ dB
Insertion Loss <sup>MEAN</sup> Acc. IEC 61300-3-34	$\leq 0.05$ dB	$\leq 0.05$ dB
Return Loss Acc. IEC 61300-3-6	$\geq 55$ dB	$\geq 65$ dB

## Master Connector End Face Geometry

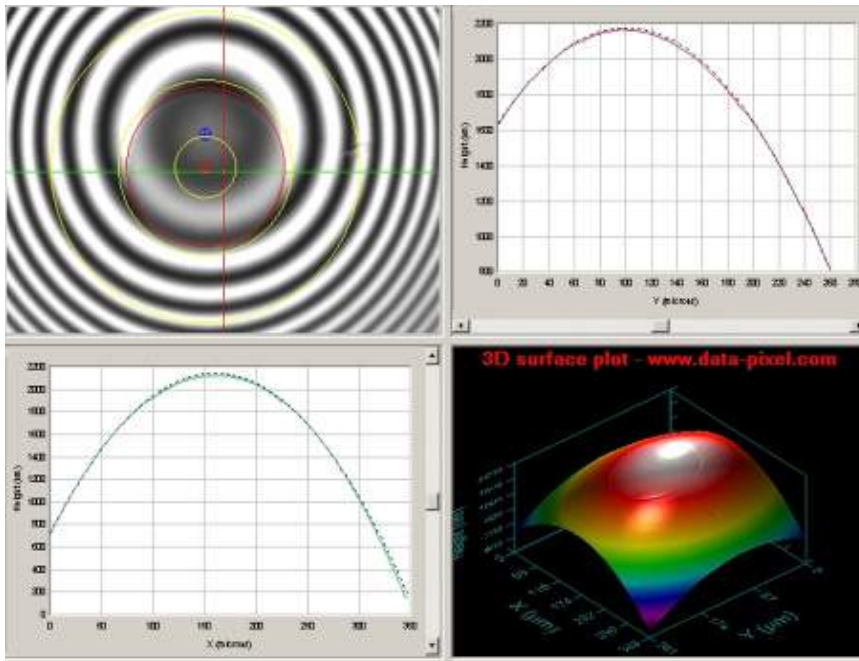
Parameter	SM PC Connectors	SM APC Connectors
Concentricity	$\leq 0.30$ $\mu$ m	$\leq 0.30$ $\mu$ m
Bore angle	$\leq 0.20$ degree	$\leq 0.20$ degree
Apex Offset (AO)	$\leq 30$ $\mu$ m	$\leq 30$ $\mu$ m
Radius of Curvature (ROC)	$10 \leq ROC \leq 20$ mm @ SC	$7 \leq ROC \leq 12$ mm
	$7 \leq ROC \leq 25$ mm @ LC	
Fiber Height (FH)	$-30.0 \leq FH \leq +30.0$ nm	$-30.0 \leq FH \leq +30.0$ nm
Angle (AN)	-	$7.7 \leq AN \leq 8.3$ degree

# MASTER CLASS PATCHCORDS & PIGTAILS

## Available connectors

Connector type	Master Class	Gold Grade
SC PC	☑	☑
SC APC	☑	☑
LC PC	☑	☑
LC APC	☑	☑
FC PC	☑	☑
FC APC	☑	☑
ST PC	-	☑
E2000 PC	-	☑
E2000 APC	-	☑
DIN	-	☑
MU	-	☑

Detailed reports containing test results with individual measurements of Insertion Loss (IL) and Return Loss (RL) as well as end face geometry are attached with Master Class Patchcords.



## Features

- Comply with IEC, TIA/EIA requirements,
- High quality and repeatability of the transmission parameters,
- High quality ceramic ferrules with tightly controlled concentricity and bore angle,
- Very low IL value,  $IL_{TP} \leq 0.05$  dB,
- Connectors are constructed from high quality plastic, resistant to corrosion and high temperatures with UL94-V0 flammability index.

## Applications

- Measurements concerning telecommunication networks,
- Testing optical devices,
- Measuring equipment,
- CWDM networks
- Local area network (LAN),
- FTTx, FTTD, FTTB, FTTH networks,
- CATV solutions.

## Technical specifications

Parameter	SM PC Connectors	SM APC Connectors
Insertion Loss <sup>MAX</sup> Acc. IEC 61300-3-34	≤ 0.10 dB	≤ 0.10 dB
Insertion Loss <sup>97%</sup> Acc. IEC 61300-3-34	≤ 0.07 dB	≤ 0.07 dB
Insertion Loss <sup>MEAN</sup> Acc. IEC 61300-3-34	≤ 0.05 dB	≤ 0.05 dB
Return Loss Acc. IEC 61300-3-6	≥ 55 dB	≥ 65 dB

## Master Connector End Face Geometry

Parameter	SM PC Connectors	SM APC Connectors
Concentricity	≤ 0.30 μm	≤ 0.30 μm
Bore angle	≤ 0.20 degree	≤ 0.20 degree
Apex Offset (AO)	≤ 30 μm	≤ 30 μm
Radius of Curvature (ROC)	10 ≤ ROC ≤ 20 mm @ SC 7 ≤ ROC ≤ 25 mm @ LC	7 ≤ ROC ≤ 12 mm
Fiber Height (FH)	-30.0 ≤ FH ≤ +30.0 nm	-30.0 ≤ FH ≤ +30.0 nm
Angle (AN)	-	7.7 ≤ AN ≤ 8.3 degree

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