

15. Fachgruppentreffen der ITG-FG 5.4.1

„Optische Polymerfasern“

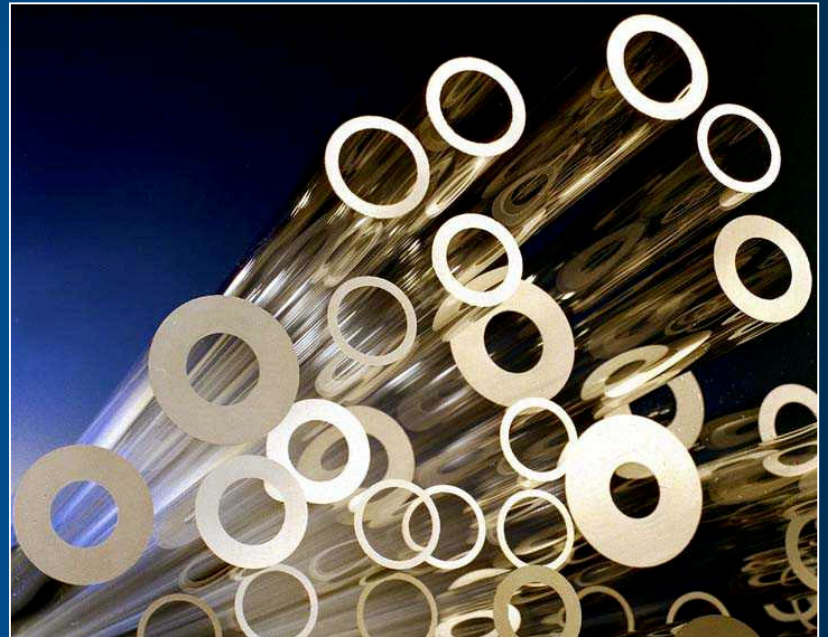
FH Offenburg 25./26. März, 2003

Quarzglas-Dickkernfasern

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HERAEUS TENEVO AG

Jeffrey Miller
OFS Specialty Photonics
Group

26.03.2003



Gliederung

☐ Lichtführung in Quarzglas-Dickkernfasern

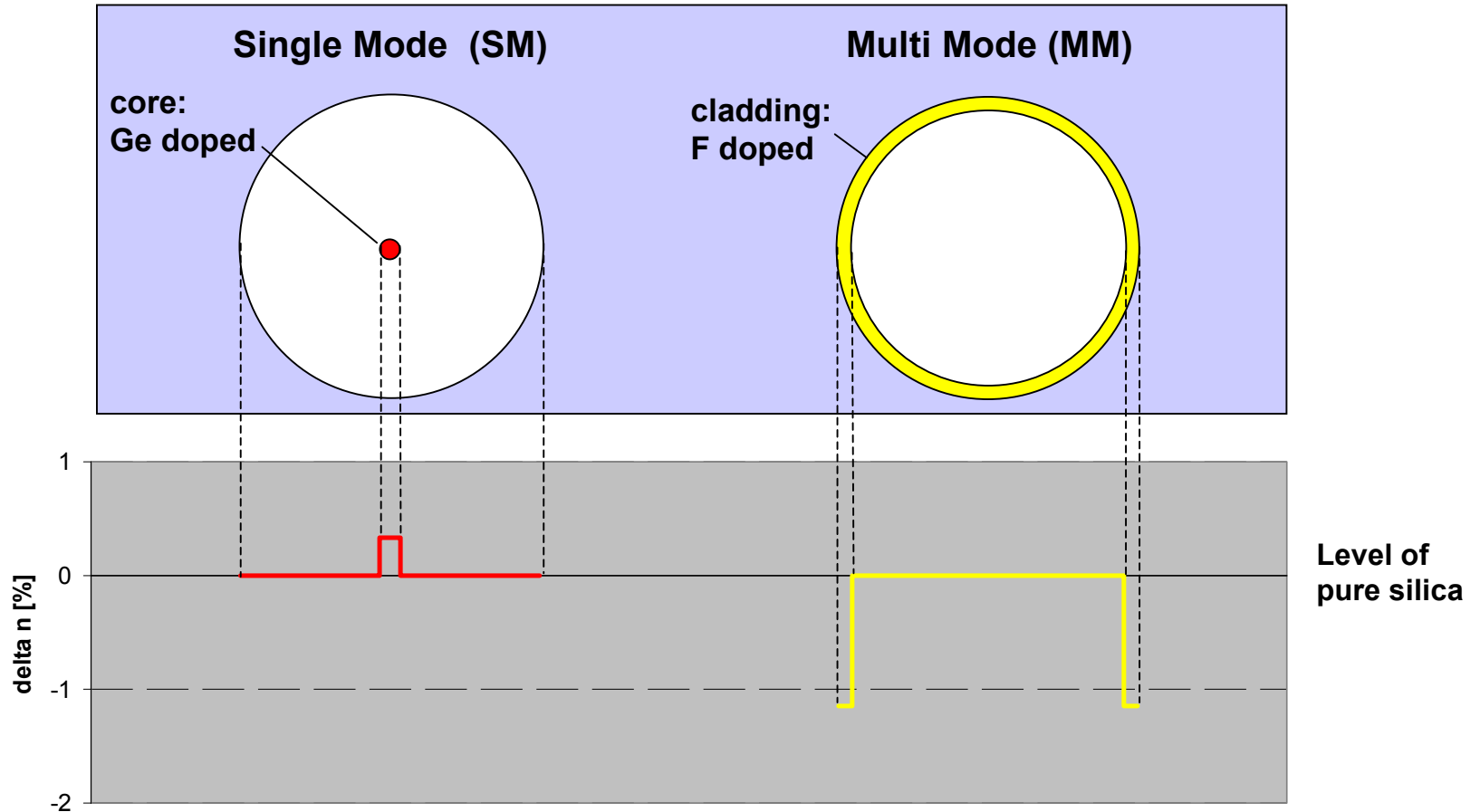
- Brechungsindexprofile
- Kernmaterialeigenschaften

☐ Fasern für Datenübertragung

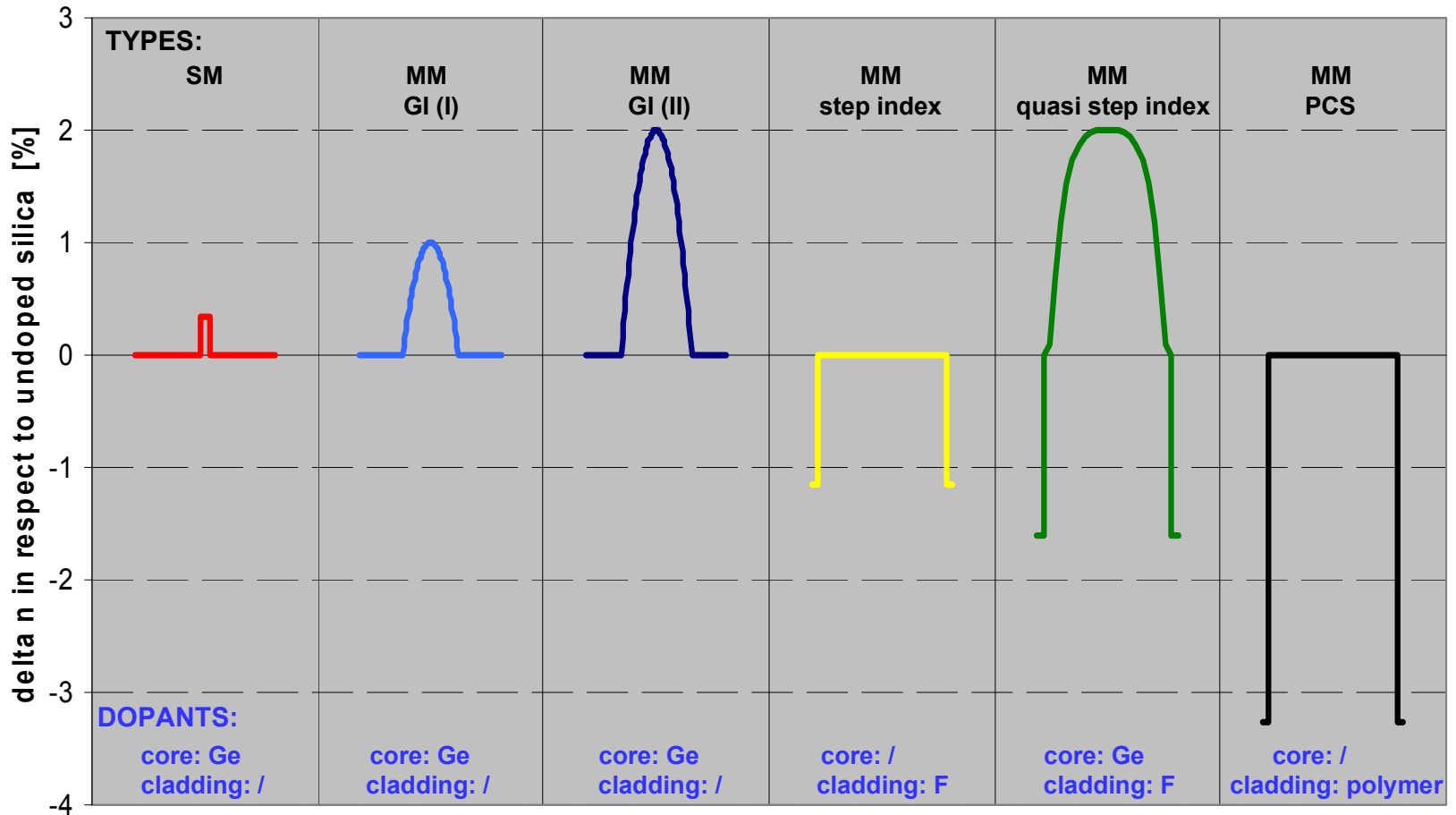
- „All silica“ Fasern
- „Polymer Clad Silica“ (PCS) Fasern
- Vergleich mit POF

☐ Steckverbindungen

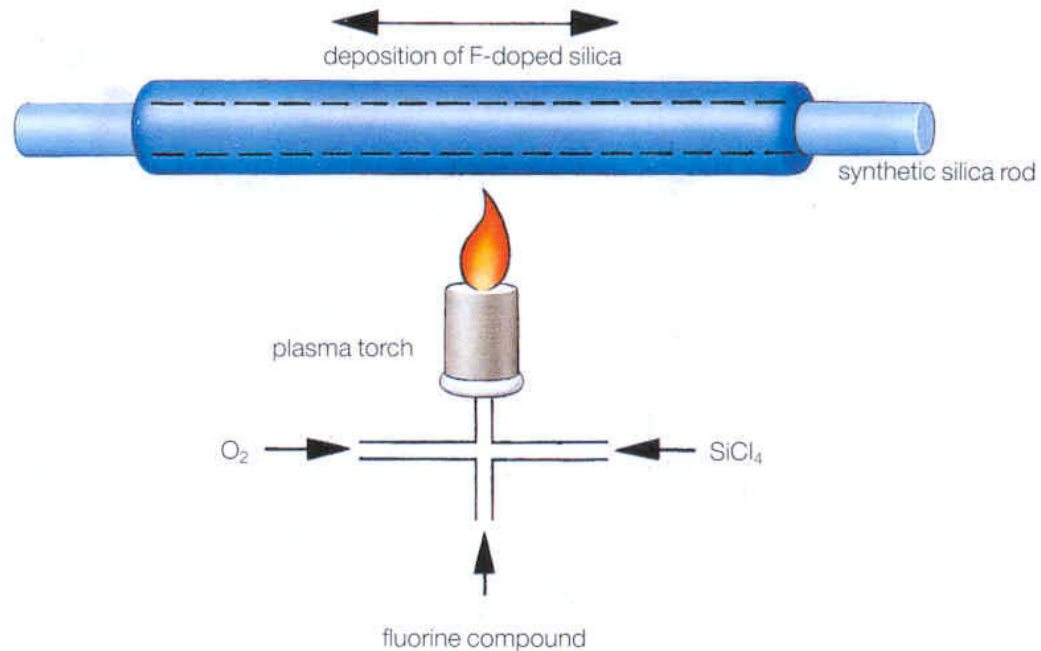
Step index fibers: cross section / profile



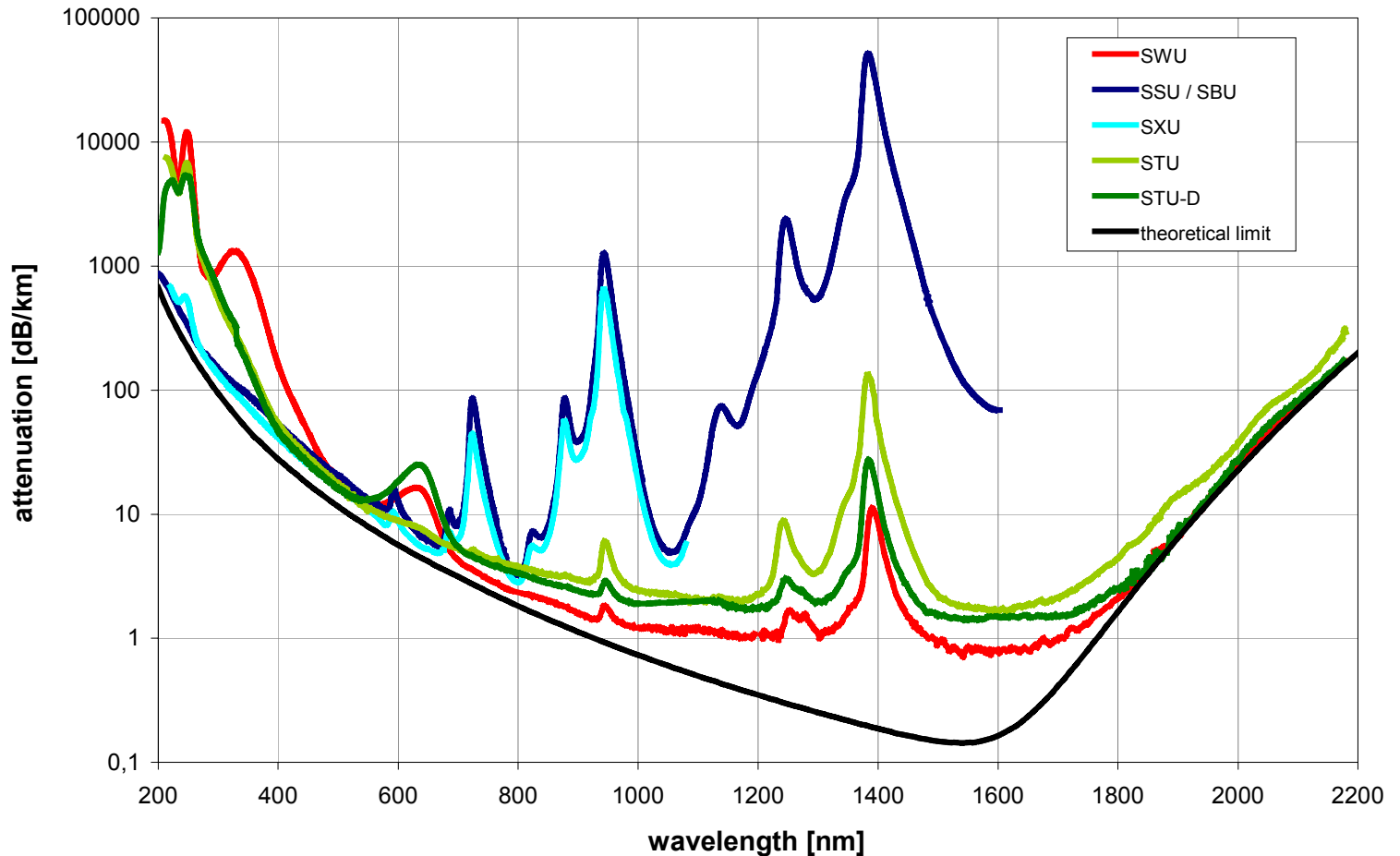
Profile types of silica fibers



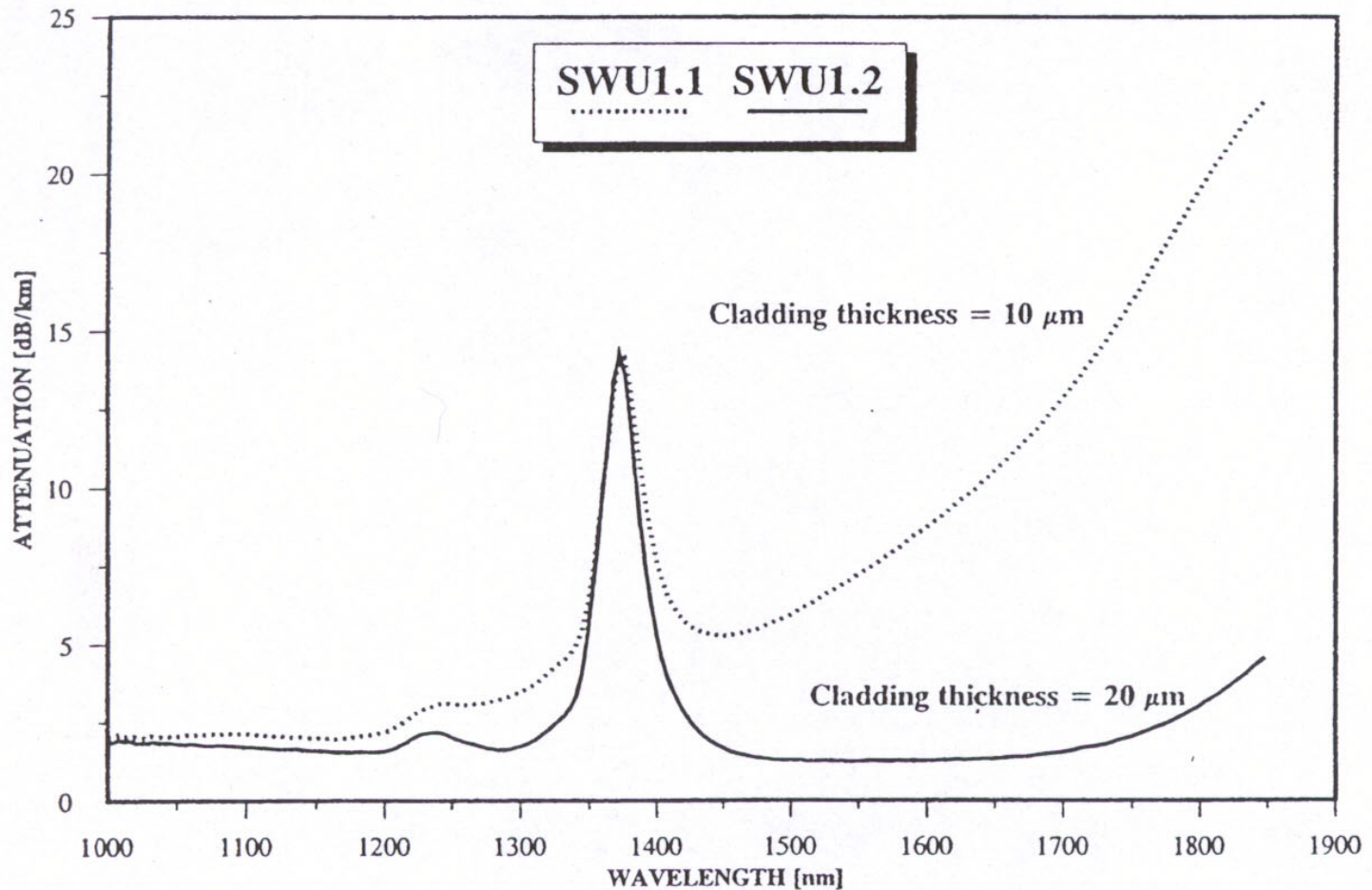
Production Process of Fluosil[®] preforms



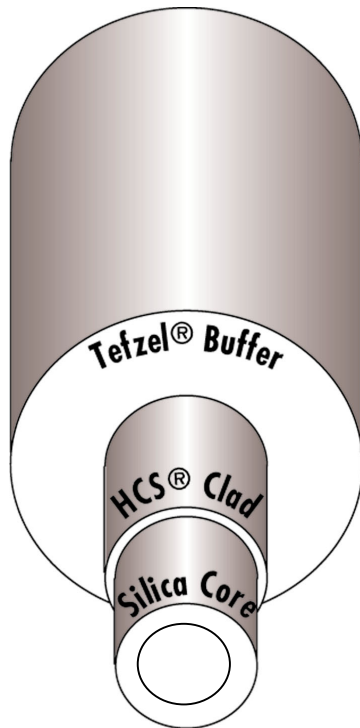
Fiber attenuation: influence of core



Fiber attenuation: influence of cladding



Typical Silica/Silica (HCS®) Fibers



Silica Clad

Core Diameter: 200 μ m

Cladding Diameter: 240 μ m

HCS® Protective 260 μ m

Tefzel® Buffer Diameter: 375 μ m

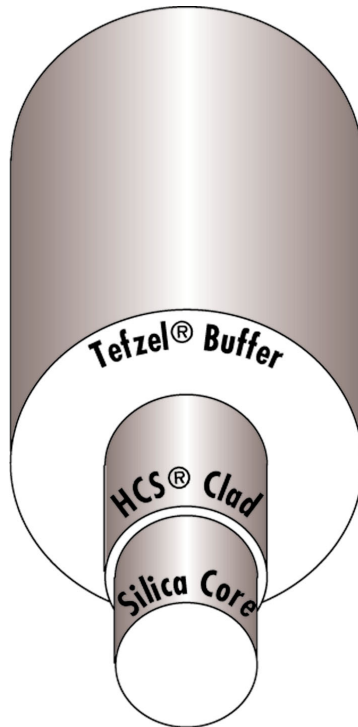
Attenuation: \leq 10 dB/kM @ 850nm

Numerical Aperture: 0.22

Application: High Powered Laser delivery

Spectroscopy, Industrial Sensing, Laser welding

Typical Hard Clad Silica (HCS®) 200µm Fibers



Core Diameter: 200µm

HCS® Cladding Diameter: 230µm

Tefzel® Buffer Diameter: 500µm

Attenuation: ≤ 6 dB/kM @ 850nm

Numerical Aperture: 0.37

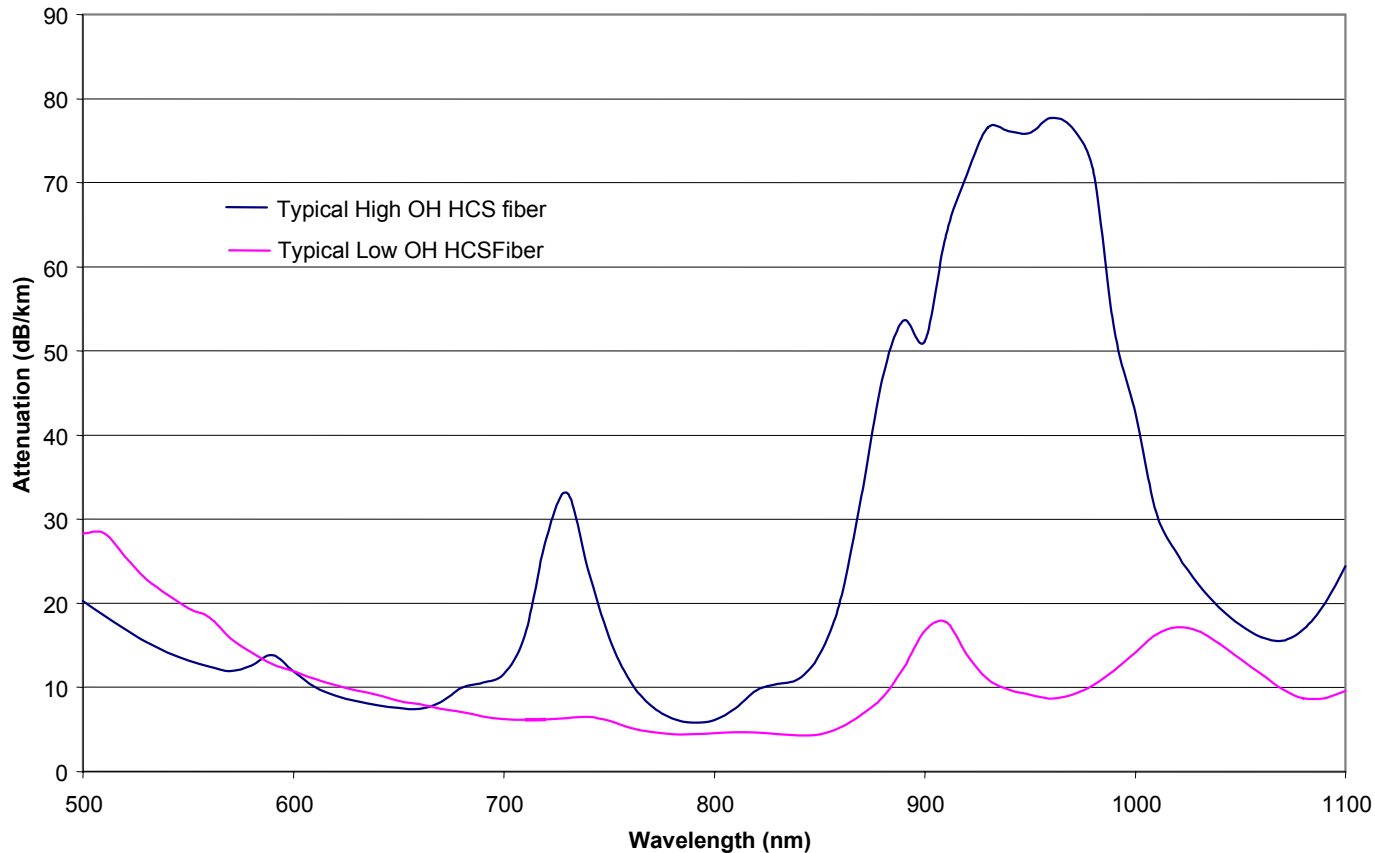
Applications: Automotive, Factory Automation

Medical, Utilities, POF Extension 100M to 1000M

Price: Comparable to PMMA 1000um POF

Fiber attenuation of HCS® Optical Fibers

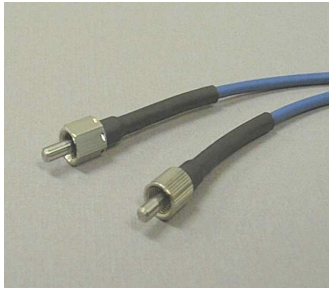
Typical 200um LOW OH & HIGH OH HCS Attenuation Curves



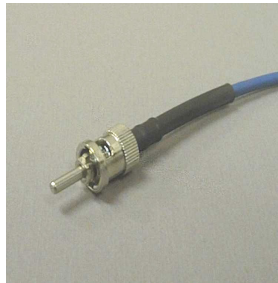
Comparison of fiber properties

Properties	Standard POF PMMA	HCS (200 μm core)	All silica (200 μm core)
NA	0.46	0.37	0.22
Bandwith @ 850 nm	4 MHz-km	≥ 20 MHz-km	≥ 20 MHz-km
Attenuation @ 850 nm	150 dB/km	≤ 6 dB/km typ. 4.2db/km	≤ 6 dB/km typ. 2.5dB/km
Operating temperature	≤ 85 °C	-65 to + 125°C	-65 to + 135°C
Short-term bend radius	n/a	≥ 10 mm	≥ 9 mm
Long-term bend radius	25 mm	≥ 16 mm	≥ 14 mm
Proof test level	n/a	≥ 150 kpsi (1.033 GPA)	≥ 200 kpsi (1.378 GPA)
Tensile Strength	≥ 12kpsi Yield Point	typ. 750 kpsi	typ. 750kpsi
Optical degradation	?	None	None

Connectors for HCS[®] Fibers



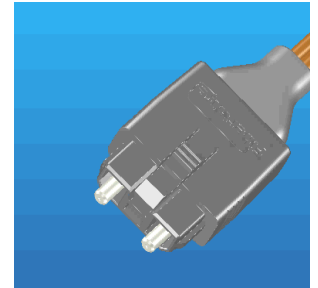
SMA: Crimp/Cleave
Epoxy Polish
Insertion Loss: 1.1dB typ.
Cable Retention: 40lbs.



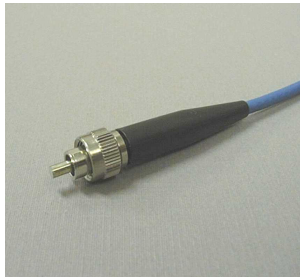
ST: Crimp/Cleave
Epoxy Polish
Insertion Loss: 0.6dB Typ.
Cable retention: 40lbs



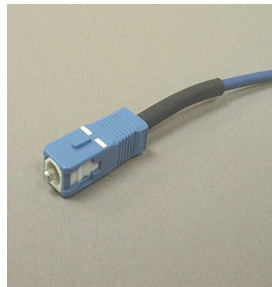
V Pin: Crimp/Cleave
Assy. Time: 45 seconds
Insertion Loss: 2dB Typ.
Cable Retention: 10 lbs



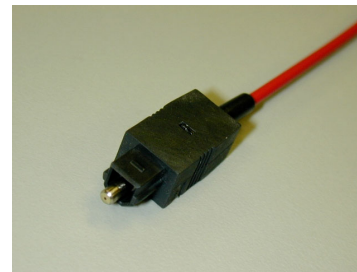
FO7: Crimp/Cleave
Insertion Loss: 1.5dB
Cable Retention: 15lbs



FC/PC: Epoxy Polish
Insertion Loss: .6dB Typ.
Cable Retention: 40 Lbs.



SC/PC: Epoxy Polish
Insertion Loss: 0.6dB Typ.
Cable Retention: 20 lbs



FO5: Crimp/Cleave
Insertion Loss: 1.5dB
Cable Retention: 8 lbs

Custom Connectors

V System for HCS[®] 200 μ m Fibers Termination Process

45 Seconds for total termination



Defining Features:

Ferrule Length: ~ 0.730" (18.5mm)

Ferrule Diameter: 0.150" (3.8mm)

Coupling Mechanism: non-contact, snap-in, chamfer aligned.

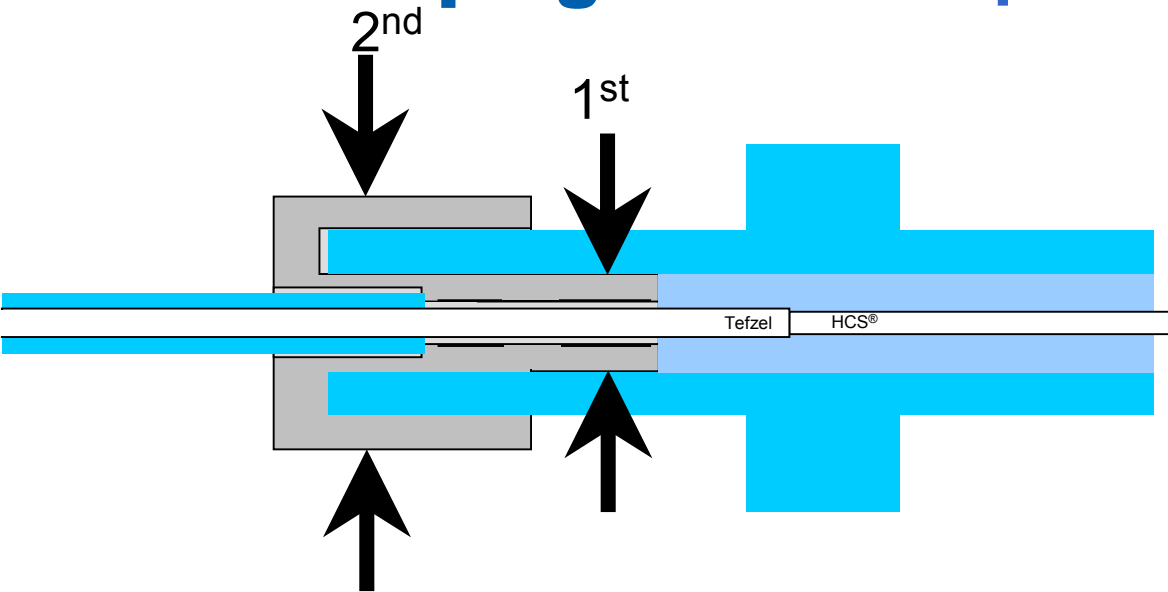
Insertion Loss: 2.0 dB Specification / 1.5 dB Typical

Operating Temp: - 40°C to +85°C

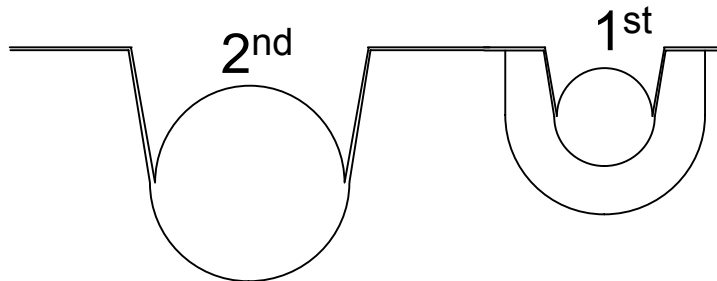
Cable Crimp Retention: \geq 10 lbs.



V Pin Crimping HCS[®] 200 μ m Fibers



Crimp locations



Crimp Die Design

HCS[®] 200 μ m Fiber/Cable Preparation

1. Cut cable to length

2. Strip Outer Jacket



Tefzel[®]

3. Assemble Unibody Crimp Ferrule



Tefzel[®]

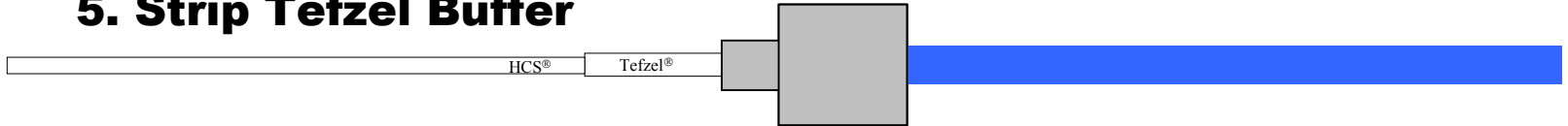
4. Crimp small Diameter



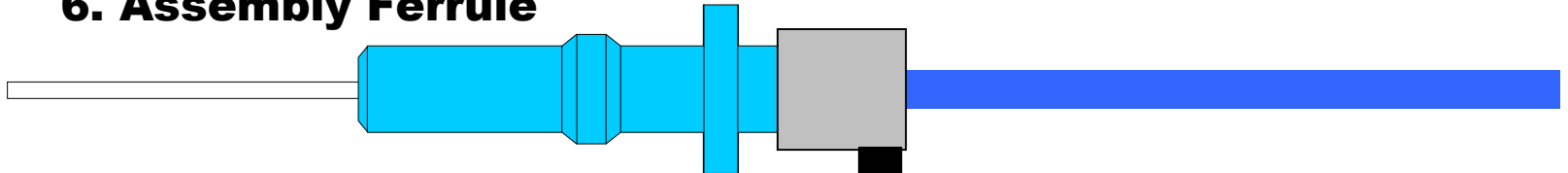
Tefzel[®]

V Pin Termination con't

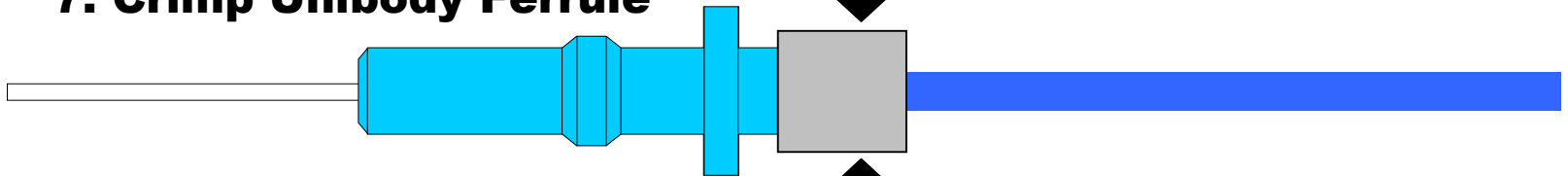
5. Strip Tefzel Buffer



6. Assembly Ferrule



7. Crimp Unibody Ferrule



8. Cleave

