

SCHOTT® Fiber Optics for Dental Curing

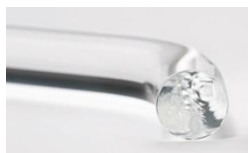
Lead-free Fiber Optic Rods



Excellent transmission and long lifetime make SCHOTT® lead-free rigid fiber rods the first choice for dental curing applications.

Single Core Rods: SCHOTT® SCR

- Consist out of a high index core with a low index cladding
- Feature high transmission
- Homogenization of light beam



Multi Core Rods: SCHOTT® MCR

- Light transmission for curing process
- Consist of multiple core/clad systems fused together
- Create custom shapes, while maintaining excellent transmission
- Increase of light flux in smaller spot size (as cone)
- Excellent forming properties
- Forming includes cone shaping as well as bending of cylindrical or cone shaped rods.



Technical Data			
Type of SCHOTT® Rod	SCR-3 (LST 3)	MCR-4 (FST 4)	MCR-7 (FST 7)
Core Type	single	multi	multi
Color Outer Clad	clear	brown black	clear
Numerical Aperture	0.6	0.6	0.6
Eff. Acceptance Angle according to DIN 58 141 Part 3 Theoretical value at $\lambda = 587.6 \text{ nm}$	73°	73°	73°
Lead-free Compliant to RoHS directive EU 2002/95/EC	yes	yes	yes
Biocompatibility According to DIN ISO 10993-5	yes	yes	yes
Temperature Operational (glass rod only) Storage/Transport	- 20°C/-4°F ... +350°C/662°F - 20°C/-4°F ... +70°C/158°F		
Shelf life According to IEC 60721 Part 3-1 (Class: 1K2, 1B1, 1C1, 1S2)	min. 2 years		

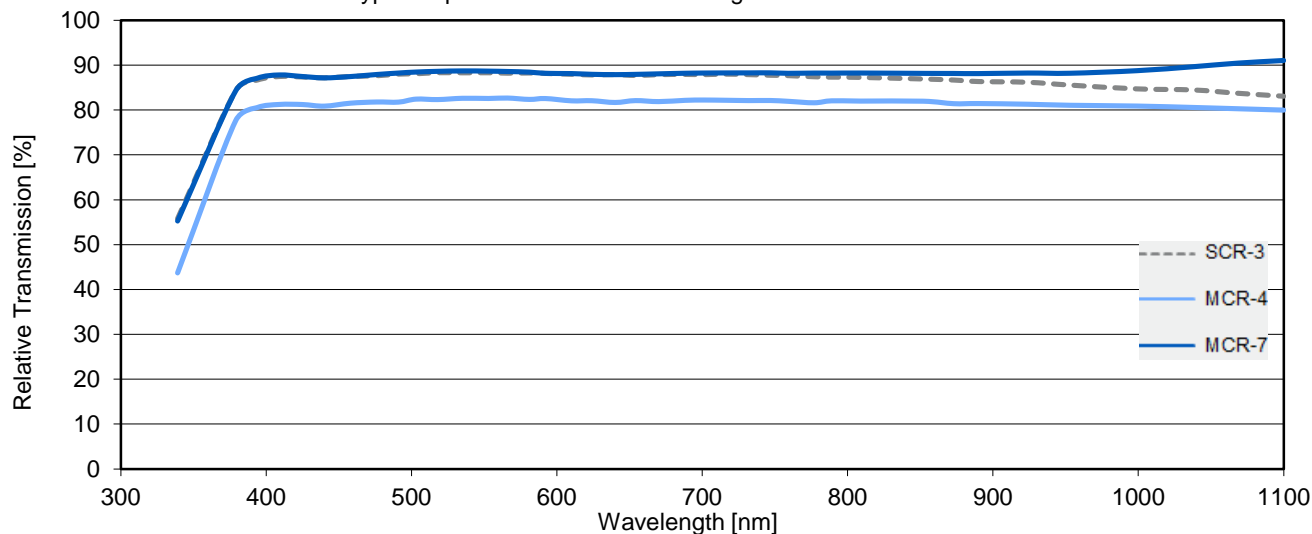
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Transmission (Measured in accordance with DIN 58 141 Part 2)

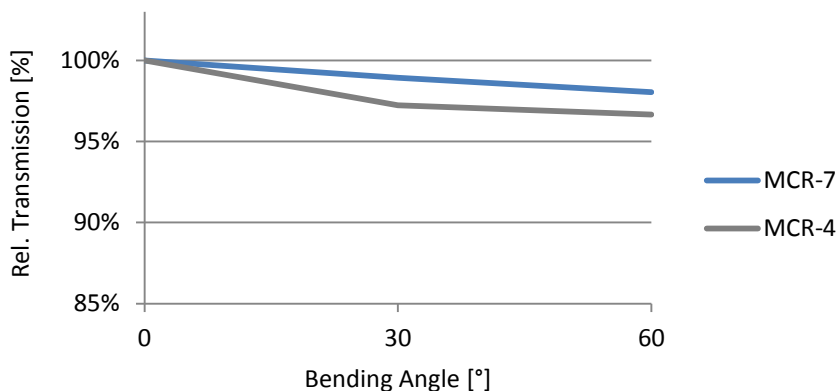
The transmission curves displayed below represent SCHOTT's typical manufacturing level for SCHOTT® MCR and SCR and is monitored in the wavelength range between 460 and 660 nm.

Typical Spectral Transmission for Rigid Fiber Rods



Dependence of Transmission on Bending Angle

The transmission of a straight SCHOTT® MCR changes after bending. The effect depends on the bending angle as displayed in the graph to the right.



Lead-free fiber optic rods



Long Term Stability of SCHOTT® MCR

SCHOTT® MCR feature high chemical stability. Core and cladding glasses have high chemical resistance, which ensure long-term stability over lifetime under repeated autoclave cycles.

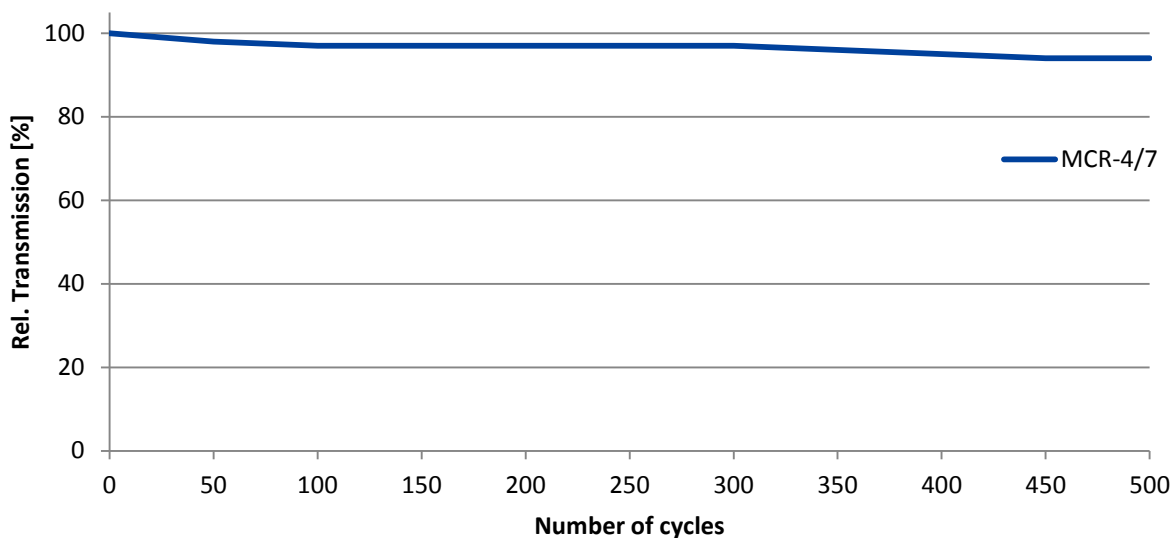
Validation of long-term Stability by Optical Measurement

- Relative Transmission measured in accordance with DIN 58 141 Part 2
- Aperture of light beam: 0.1
- Measurement wavelength: $\lambda = 535 \text{ nm}$
- Prior to each measurement: Cleaning of end surface with ethanol

Sample preparation:

- SCHOTT® MCR-7 rods
- Diameter: 10 mm
- Length: 85.6 mm (Straight)

Long Term Stability of SCHOTT® MCR



Test Conditions

Autoclave

- Lautenschläger Protocert 839

Autoclaving program

- Temperature/pressure: 134 °C at 3 bar
- Sterilization time: 10 min
- Cycle time: 17 min

Design Options for SCHOTT® MCR

Straight Rods

- Length: 2.5 mm 1000 mm
- Diameter: 1 14 mm

Fiber Optic Cones

Straight SCHOTT® MCR can be drawn into a cone shape to increase intensity in a smaller spot diameter.

Please note: Changing the diameter from input to output changes the original acceptance angle of the rod material.

- Examples of curing rods: 13 to 8 mm, 8 to 4 mm, 6 to 2 mm diameter

Bent Rods

Straight or conical-shaped SCHOTT® MCR can be bent into angled shapes. Most common are bends of up to 60°. Depending on the diameter of the raw rod radii of the bent rods range from 5 to 12 mm.

- Common rod diameters: 4, 6, 8, 10, 13 mm
- Design recommendation for minimum length of short leg "A":

Bending Angle \ Diameter	B = 50°	B = 60°	B = 70°
4 to 6 mm	13 ± 2	13 ± 2	13 ± 2
8 mm	14 ± 2	14 ± 2	15 ± 2
10 mm	16 ± 2	16 ± 2	17 ± 2
13 mm	19 ± 2	20 ± 2	20 ± 2

Ferrules

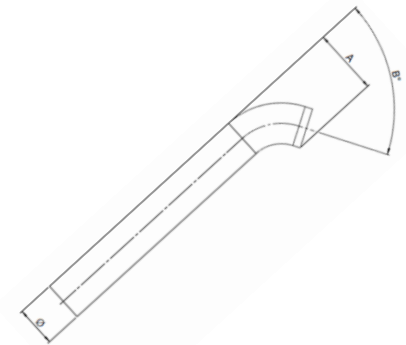
- Customer specified ferrules, made from stainless steel, German silver or polymers, can be glued onto the rod.
- Polymer ferrules can be added directly onto the rod with an injection molding process.

Printing

Customer specific information can be printed onto the rods. Different colors are available, i.e. black and white.

Coating

Anti-reflective coatings on end surfaces are available upon request.



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