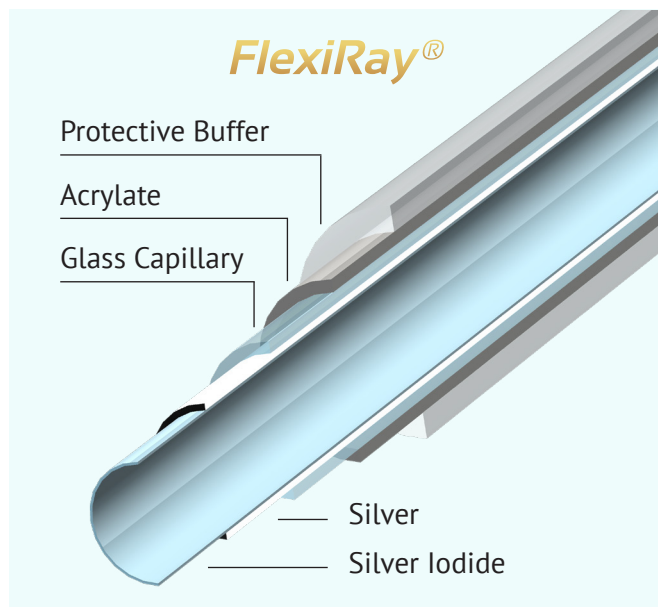


# Hollow Glass Waveguides

Hollow Silica glass WaveGuides (HWG) enable flexible delivery of InfraRed radiation in Mid IR-range 2-18 $\mu\text{m}$  for low divergent beams. HWG cables are free from Fresnel reflection losses at their ends due to the hollow core structure – in contrast to any solid core IR-fibers. This advantage and smaller divergence of the output beam compared to multimode IR-fibers make HWG preferable for laser power delivery. Standard HWG cables with core diameters span in 500-1000 $\mu\text{m}$  range are coated with the double polymer jacket providing high flexibility required for a broad variety of applications.

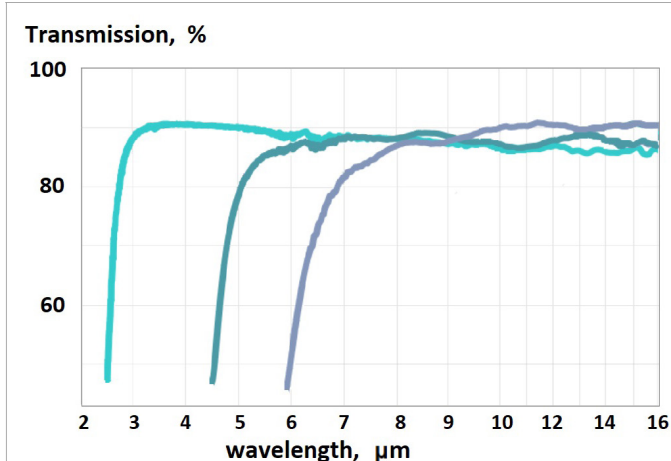


## Applications:

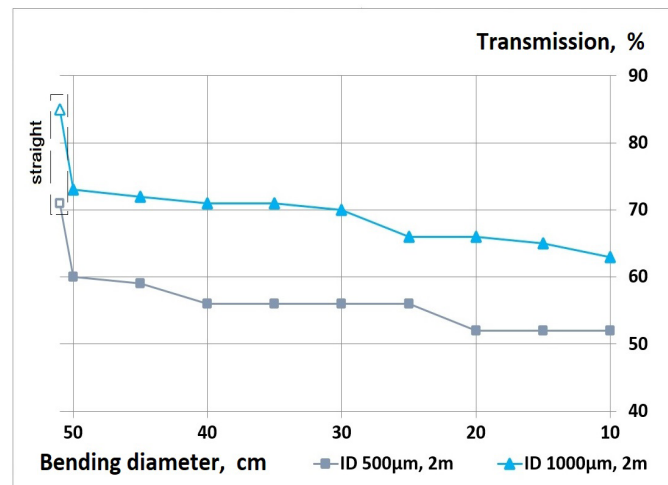
- ✓ Laser Power Delivery for Er:YAG, OPO, CO- & CO<sub>2</sub>-lasers
- ✓ Flexible cables for Quantum Cascade Lasers and Spectral Systems
- ✓ Spectral analysis of gas mixtures

## Features:

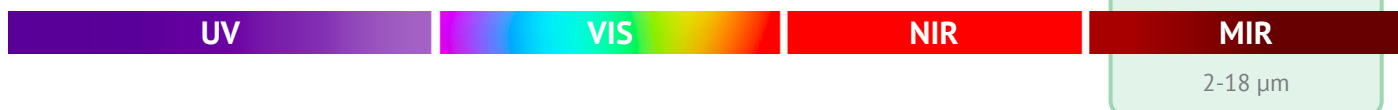
- ✓ High transmittance in selected parts of 2 - 18 $\mu\text{m}$  range for custom applications
- ✓ No Fresnel reflection at the end faces
- ✓ Inner diameter spans from 500 to 1000 $\mu\text{m}$
- ✓ Double polymer coating for high flexibility



Average transmission spectra of Hollow Waveguides designed for 3 different spectral ranges



Transmission of Hollow Waveguides vs bending diameter, full 360° loop



## Specifications

Silica glass capillary	SiO <sub>2</sub>
Fresnel Reflection Losses	0%
Attenuation at designated wavelength	see table below
Recommended max power level for CO <sub>2</sub> -laser	10W for HWG-500 20W for HWG-750 30W for HWG-1000
Effective Numerical Aperture (output NA)	0.05+/-0.01* *depends on input NA
Bending losses, for 360° loop of $\varnothing=400\text{mm}$	1dB
Protective Jacket	Acrylate + Fluoro polymer
Operating Temperature	-50°C to +90°C
Minimum Elastic Bending Radius	150 x [Inner HWG Diameter]

## Parameters of Hollow Glass Waveguides

Code	Inner diameter, $\mu\text{m}$	Outer diameter, $\mu\text{m}$	Protective Jacket OD, $\mu\text{m}$	Optical losses at 10.6 $\mu\text{m}$ wavelength, dB/m	Min. bending Radius, mm
HWG 500	500 $\pm$ 25	650 $\pm$ 20	1000 $\pm$ 30	0.7	75
HWG 750	750 $\pm$ 30	950 $\pm$ 25	1300 $\pm$ 50	0.5	100
HWG 1000	1000 $\pm$ 30	1300 $\pm$ 25	1600 $\pm$ 50	0.3	150