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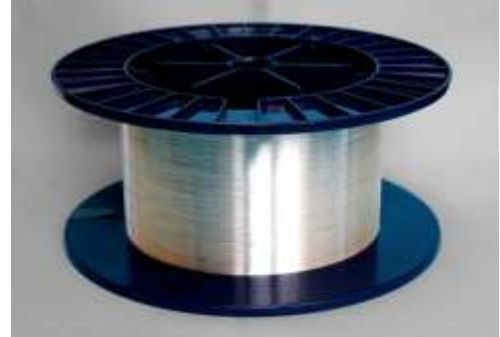
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# SPECIALTY FIBER ALUMINUM COATED FIBERS

SINGLE MODE

## ARTICLE OK-9/125AL

Aluminum-coated single mode optical fibers have all the benefits of optical fibers include increased mechanical strength and greater fatigue resistance compared to non-hermetic and polymer-clad fibers (PCS). Their transmittance covers a spectral range of 1500 to 1600 nm, and also remains stable in corrosive chemicals that normally react to silica glass.



### FEATURES:

- ❖ Excellent mechanical strength and flexibility compared to polymer coated fibers.
- ❖ The temperature range is from -196°C to +400°C.
- ❖ The metal coating can be soldered and will not outgas.

FIBER SPECIFICATIONS	OK-9/125AL
Fiber type	Single mode
Coating material	Aluminium
Core diameter, $\mu\text{m}$	$9.1 \pm 0,5$
Mode field diameter (Gauss), $\mu\text{m}$	$10.0 \pm 0,5$
Clad diameter, $\mu\text{m}$	$125 \pm 1$
Coating diameter, $\mu\text{m}$	$155 \pm 5$
Wavelength range, nm	1500 ÷ 1600
Cutoff wavelength, nm	< 1450
Attenuation at 1550nm, dB/km	< 7
Core material	Silica Ge-doped
Clad material	silica
Numerical Aperture (NA)	$0.126 \pm 0.01$
$\Delta n$	$0.005 \pm 0.0005$
Short-term bending radius, mm	> 10
Long-term bending radius, mm	> 25
Proof test, kpsi	> 100
Min operating temperature, °C	- 196
Max operating temperature, °C	400

Other parameters are available on the request

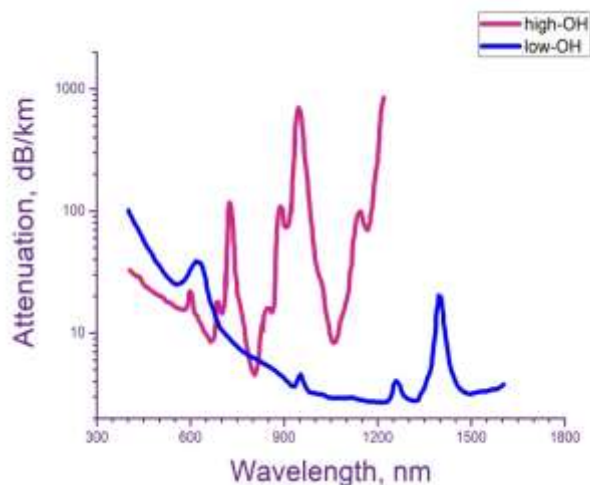
# SPECIALTY FIBER ALUMINUM COATED FIBERS

## LOW OH STEP INDEX MULTIMODE SILICA FIBERS

Aluminum-coated step index multimode optical fibers have all the benefits of silica-silica fibers. Additional significant improvements include increased mechanical strength and greater fatigue resistance compared to non-hermetic and polymer-clad fibers (PCS). Their transmittance covers a spectral range of 400 to 2200 nm, and also remains stable in corrosive chemicals that normally react to silica glass. The temperature range is from -196C to +400C .

### FEATURES:

- ❖ Greatly enhanced resistance to high power laser radiation.
- ❖ Higher core-to-clad ratio and enlarged NA optimized for coupling to high-energy lasers.
- ❖ Better fiber cooling due to the heat-conducting metal coating.
- ❖ Excellent mechanical strength and flexibility compared to polymer coated fibers.
- ❖ The metal coating can be soldered and will not outgas.



FIBER SPECIFICATIONS	OK-100/110AL	OK-150/165AL	OK-200/220AL	OK-300/330AL	OK-400/440AL	OK-600/660AL	OK-800/880AL	OK-1000/1100AL
Core diameter, $\mu\text{m}$	100 $\pm$ 2	150 $\pm$ 3	200 $\pm$ 4	300 $\pm$ 6	400 $\pm$ 8	600 $\pm$ 12	800 $\pm$ 15	1000 $\pm$ 20
Clad diameter*, $\mu\text{m}$	110 $\pm$ 3	165 $\pm$ 4	220 $\pm$ 5	330 $\pm$ 10	440 $\pm$ 12	660 $\pm$ 15	880 $\pm$ 20	1100 $\pm$ 40
Coating diameter, $\mu\text{m}$	140 $\pm$ 8 (150 $\pm$ 8)	210 $\pm$ 12	300 $\pm$ 15	450 $\pm$ 25	565 $\pm$ 25	860 $\pm$ 30	1110 $\pm$ 40	1410 $\pm$ 60
Attenuation at 800/1300nm (see graph Low OH)	The loss spectrum in the long wavelength region (>1 $\mu\text{m}$ ) is higher than that of the material				The loss spectrum is close to the material loss spectrum			
Wavelength range, nm (see graph Low OH)	400 $\div$ 1100		400 $\div$ 1700			400 $\div$ 2200		
Fiber type	Multimode							
Index profile	Step							
Coating material	Aluminium							
Core material	Pure syntetic silica (low OH)							
Clad material	Doped silica							
Numerical Aperture (NA)	0.22 $\pm$ 0.02							
Short-term bending radius	60 times the fiber diameters							
Long-term bending radius	120 times the fiber diameters							
Proof test, kpsi	> 100							
Min operating temperature, $^{\circ}\text{C}$	-196							
Max operating temperature, $^{\circ}\text{C}$	+400							

\*The core/clad ratios 1.06/1.1 on the request  
Other parameters are available on the request

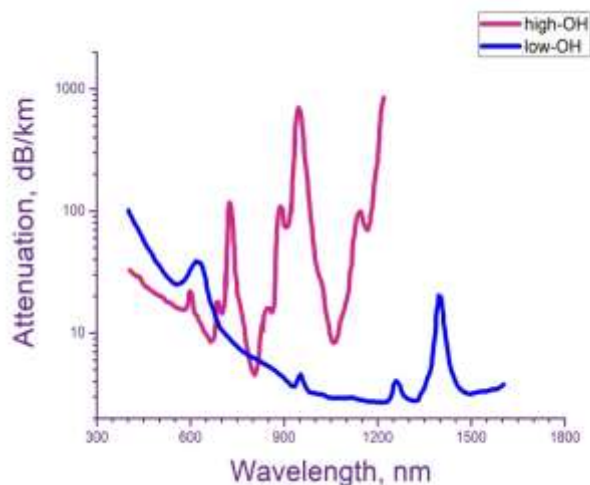
# SPECIALTY FIBER ALUMINUM COATED FIBERS

## HIGH OH STEP INDEX MULTIMODE SILICA FIBERS

Aluminum-coated step index multimode optical fibers have all the benefits of silica-silica fibers. Additional significant improvements include increased mechanical strength and greater fatigue resistance compared to non-hermetic and polymer-clad fibers (PCS). Their transmittance covers a spectral range of 250 to 1200 nm, and also remains stable in corrosive chemicals that normally react to silica glass. The temperature range is from -196C to +400C .

### FEATURES:

- ❖ Greatly enhanced resistance to high power laser radiation.
- ❖ Higher core-to-clad ratio and enlarged NA optimized for coupling to high-energy lasers.
- ❖ Better fiber cooling due to the heat-conducting metal coating.
- ❖ Excellent mechanical strength and flexibility compared to polymer coated fibers.
- ❖ The metal coating can be soldered and will not outgas.



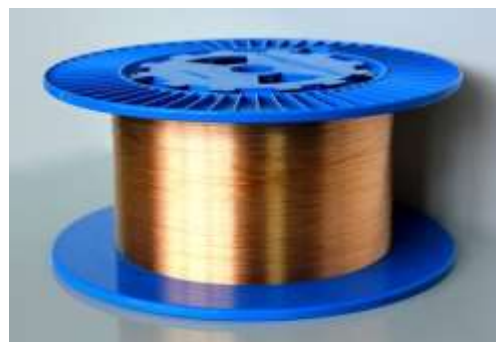
FIBER SPECIFICATIONS	OKM-100/110AL	OKM-150/165AL	OKM-200/220AL	OKM-300/330AL	OKM-400/440AL	OKM-600/660AL	OKM-800/880AL	OKM-1000/1100AL
Core diameter, $\mu\text{m}$	100 $\pm$ 2	150 $\pm$ 3	200 $\pm$ 4	300 $\pm$ 6	400 $\pm$ 8	600 $\pm$ 12	800 $\pm$ 15	1000 $\pm$ 20
Clad diameter*, $\mu\text{m}$	110 $\pm$ 3	165 $\pm$ 4	220 $\pm$ 5	330 $\pm$ 10	440 $\pm$ 12	660 $\pm$ 15	880 $\pm$ 20	1100 $\pm$ 40
Coating diameter, $\mu\text{m}$	150 $\pm$ 8	210 $\pm$ 12	300 $\pm$ 15	450 $\pm$ 25	565 $\pm$ 25	860 $\pm$ 30	1110 $\pm$ 40	1410 $\pm$ 60
Attenuation at 800/1300nm (see graph High OH)	The loss spectrum in the long wavelength region (>1 $\mu\text{m}$ ) is higher than that of the material				The loss spectrum is close to the material loss spectrum			
Wavelength range, nm (see graph High OH)	250 $\div$ 1100				250 $\div$ 1200			
Fiber type	Multimode							
Index profile	Step							
Coating material	Aluminium							
Core material	Pure syntetic silica (High OH)							
Clad material	Doped silica							
Numerical Aperture (NA)	0.22 $\pm$ 0.02							
Short-term bending radius	60 times the fiber diameters							
Long-term bending radius	120 times the fiber diameters							
Proof test, kpsi	> 100							
Min operating temperature, $^{\circ}\text{C}$	-196							
Max operating temperature, $^{\circ}\text{C}$	400							

\*The core/clad ratios 1.06/1.1 on the request  
Other parameters are available on the request

# SPECIALTY FIBER COPPER COATED FIBERS

SINGLE MODE

Copper-coated single mode fibers are high strength optical fibers that can be used for both high-temperature and cryogenic applications. Thin additional carbon underlayer is typically added to improve hermetic property of the coating and therefore provide improved mechanical strength. This fiber type is used in sensor systems for biomedicine, oil and gas industry, aircraft applications, high vacuum devices, etc.



## FEATURES:

- ❖ Solderable coating allows feeding the fibers into high vacuum systems and provides no outgassing.
- ❖ Radiation resistant construction.

FIBER SPECIFICATIONS	OK-6/125-C/Cu	OK-9/125-C/Cu	OK-6/125F-C/Cu	OK-9/125F-C/Cu
Core diameter, $\mu\text{m}$	$6.8 \pm 0.5$	$9.1 \pm 0.5$	$6.8 \pm 0.5$	$9.1 \pm 0.5$
Mode field diameter (Gauss), $\mu\text{m}$	$7.5 \pm 0.5$	$10.0 \pm 0.5$	$7.5 \pm 0.5$	$10.0 \pm 0.5$
Clad diameter, $\mu\text{m}$	$125 \pm 1$	$125 \pm 1$	$125 \pm 1$	$125 \pm 1$
Coating diameter, $\mu\text{m}$	$160 \pm 5$	$160 \pm 5$	$160 \pm 5$	$160 \pm 5$
Fiber type	Single mode			
Coating material	Copper/ Copper alloy			
Additional inner layer	carbon	carbon	carbon	carbon
Attenuation at $1550\text{nm}^1$ , dB/km	< 7	< 7	< 7	< 7
Wavelength range, nm	1500 ÷ 1600	1500 ÷ 1600	1500 ÷ 1600	1500 ÷ 1600
Core material	Silica Ge-doped	Silica Ge-doped	Silica	Silica
Depressive clad	-	-	F-doped	F-doped
Clad material	silica	silica	silica	silica
Cutoff wavelength, nm	< 1450	< 1450	< 1450	< 1450
Numerical Aperture (NA)	$0.16 \pm 0.01$	$0.126 \pm 0.01$	$0.009 \pm 0.0009$	$0.005 \pm 0.0005$
$\Delta n$	$0.009 \pm 0.0005$	$0.005 \pm 0.0005$	$0.16 \pm 0.01$	$0.126 \pm 0.01$
Short-term bending radius, mm	> 10	> 10	> 10	> 10
Long-term bending radius, mm	> 25	> 25	> 25	> 25
Proof test, kpsi	> 100	> 100	> 100	> 100
Min operating temperature <sup>2</sup> , °C	- 196	- 196	- 196	- 196
Max operating temperature (short time < 60s) <sup>2</sup> , °C	600	600	600	600
Max operating temperature (long time > 60s) <sup>2</sup> , °C	< 400	< 400	< 400	< 400
Permissible rate of temperature change in the temperature range, °C/min	5	5	5	5

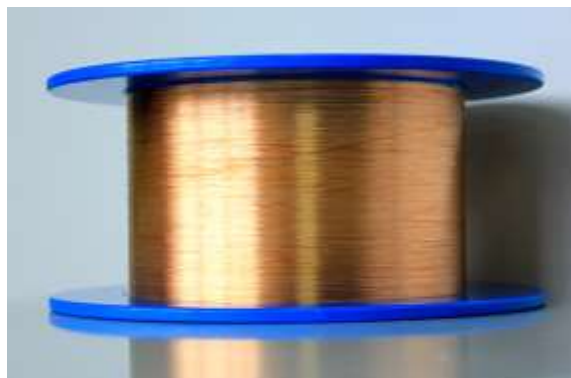
1- under normal climatic conditions

2- in inert environment

# SPECIALTY FIBER COPPER COATED FIBERS

## GRADED INDEX MULTY MODE SILICA FIBERS

Copper-coated gradient index multy mode optical fibers have increased mechanical strength and greater fatigue resistance compared to non-hermetic and polymer-clad fibers (PCS). Their transmittance covers a spectral range of 1000 to 1600 nm, and also remains stable in corrosive chemicals that normally react to silica glass. The temperature range is from -196°C to +600°C . Hermetically metal-coated optical fibers are the optimum candidate when used in high vacuum and harsh environmental conditions



### FEUTURES:

- ❖ Better fiber cooling due to the heat-conducting metal coating.
- ❖ Excellent mechanical strength and flexibility compared to polymer coated fibers.
- ❖ Capability to feed the fibers into a high vacuum: the metal coating can be soldered and will not outgas.

FIBER SPECIFICATIONS	OK-50/125Cu-Gr	OK-50/200Cu-Gr	OK-100/140Cu-Gr
Core diameter, $\mu\text{m}$	50 $\pm$ 2.5	50 $\pm$ 2.5	100 $\pm$ 2
Clad diameter, $\mu\text{m}$	125 $\pm$ 3	200 $\pm$ 3	140 $\pm$ 2
Coating diameter, $\mu\text{m}$	160 $\pm$ 10	250 $\pm$ 10	~ 210 $\pm$ 10
Cladding offset, %		< 2	
Coating offset, %		< 5	
Attenuation at 1550nm	~ 13	~ 5	~ 15
Wavelength range, nm		1000 $\div$ 1600	
Coating material		Copper 99,99%	
Core material		Silica Ge-doped	
Clad material		Pure silica	
Additional inner layer		carbon	
Numerical Aperture (NA)		0.2 $\pm$ 0.02	
Fiber type		Multimode	
Index profile		Gradient	
Short-term bending radius		60 times the fiber diameters	
Long-term bending radius		120 times the fiber diameters	
Proof test, kpsi		> 100	
Min operating temperature, °C		-196	
Max operating temperature (short time < 60s), °C		600	
Max operating temperature (long time > 60s), °C		< 400	

Other parameters are available on the request

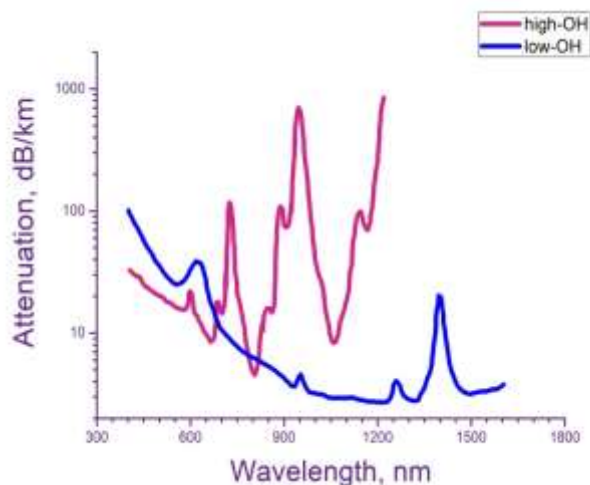
# SPECIALTY FIBER COPPER COATED FIBERS

## LOW OH STEP INDEX MULTIMODE SILICA FIBERS

Copper-coated step index multimode optical fibers have significant improvements include increased mechanical strength and greater fatigue resistance compared to non-hermetic and polymer-clad fibers (PCS). Their transmittance covers a spectral range of 400 to 2200 nm, and also remains stable in corrosive chemicals that normally react to silica glass. The working temperature range is from -196C to +600C. Hermetically metal-coated optical fibers are the optimum candidate when used in high vacuum and harsh environmental conditions

### FEATURES:

- ❖ Greatly enhanced resistance to high power laser radiation.
- ❖ Higher core-to-clad ratio and enlarged NA optimized for coupling to high-energy lasers.
- ❖ Better fiber cooling due to the heat-conducting metal coating.
- ❖ Excellent mechanical strength compared to polymer coated fibers.
- ❖ Solderable coating allows feeding the fibers into high vacuum systems and provides no outgassing.



FIBER SPECIFICATIONS	OK-50/125Cu	OK-110/125Cu	OK-200/220Cu	OK-300/330Cu	OK-400/440Cu	OK-600/660Cu	OK-800/880Cu
Core diameter, $\mu\text{m}$	50 $\pm$ 3	113 $\pm$ 2	200 $\pm$ 2	300 $\pm$ 4	400 $\pm$ 5	600 $\pm$ 8	800 $\pm$ 10
Clad diameter*, $\mu\text{m}$	125 $\pm$ 3	125 $\pm$ 2	220 $\pm$ 2	330 $\pm$ 4	440 $\pm$ 5	660 $\pm$ 8	880 $\pm$ 10
Coating diameter, $\mu\text{m}$	160 $\pm$ 10	160 $\pm$ 10	280 $\pm$ 10	420 $\pm$ 10	545 $\pm$ 10	775 $\pm$ 10	980 $\pm$ 10
Attenuation at 800/1300nm (see graph Low OH)	14	The loss spectrum in the long wavelength region (>1 $\mu\text{m}$ ) is higher than that of the material			The loss spectrum is close to the material loss spectrum		
Wavelength range, nm (see graph Low OH)	1000 $\div$ 1600	400 $\div$ 1100	400 $\div$ 1700		400 $\div$ 2200		
Fiber type	Multimode						
Index profile	Step						
Coating material	Copper 99,99%						
Core material	Pure syntetic silica (low OH)						
Clad material	Doped silica (F-doped)						
Numerical Aperture (NA)	0.16 $\pm$ 0.02			0.22 $\pm$ 0.02			
Short-term bending radius	60 times the fiber diameters						
Long-term bending radius	120 times the fiber diameters						
Proof test, kpsi	> 100						
Min operating temperature, $^{\circ}\text{C}$	-196						
Max operating temperature (short time < 60s), $^{\circ}\text{C}$	600						
Max operating temperature (long time > 60s), $^{\circ}\text{C}$	< 400						

\*The core/clad ratios 1.06/1.1 on the request  
Other parameters are available on the request

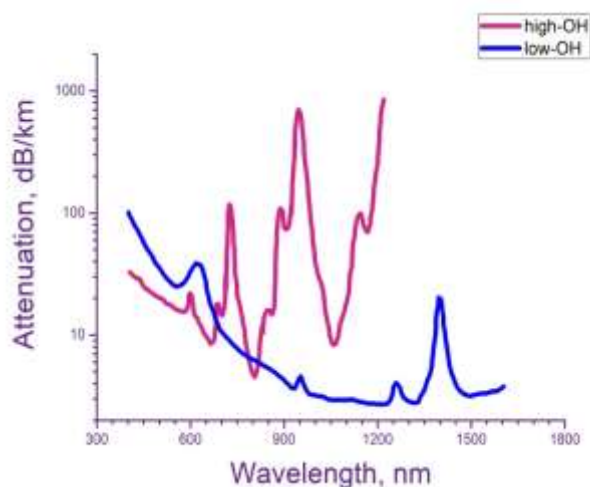
# SPECIALTY FIBER COPPER COATED FIBERS

## HIGH OH STEP INDEX MULTIMODE SILICA FIBERS

Copper-coated step index multimode optical fibers have significant improvements include increased mechanical strength and greater fatigue resistance compared to non-hermetic and polymer-clad fibers (PCS). Their transmittance covers a spectral range of 250 to 1200 nm, and also remains stable in corrosive chemicals that normally react to silica glass. The working temperature range is from -196C to +600C. Hermetically metal-coated optical fibers are the optimum candidate when used in high vacuum and harsh environmental conditions

### FEATURES:

- ❖ Greatly enhanced resistance to high power laser radiation.
- ❖ Higher core-to-clad ratio and enlarged NA optimized for coupling to high-energy lasers.
- ❖ Better fiber cooling due to the heat-conducting metal coating.
- ❖ Excellent mechanical strength compared to polymer coated fibers.
- ❖ Solderable coating allows feeding the fibers into high vacuum systems and provides no outgassing.



FIBER SPECIFICATIONS	OKM-110/125Cu	OKM-200/220Cu	OKM-300/330Cu	OKM-400/440Cu	OKM-600/660Cu	OKM-800/880Cu
Core diameter, $\mu\text{m}$	113 $\pm$ 2	200 $\pm$ 2	300 $\pm$ 4	400 $\pm$ 5	600 $\pm$ 8	800 $\pm$ 10
Clad diameter*, $\mu\text{m}$	125 $\pm$ 2	220 $\pm$ 2	330 $\pm$ 4	440 $\pm$ 5	660 $\pm$ 8	880 $\pm$ 10
Coating diameter, $\mu\text{m}$	160 $\pm$ 10	280 $\pm$ 10	420 $\pm$ 10	545 $\pm$ 10	775 $\pm$ 10	980 $\pm$ 10
Attenuation at 800/1300nm (see graph High OH)	The loss spectrum in the long wavelength region (>1 $\mu\text{m}$ ) is higher than that of the material			The loss spectrum is close to the material loss spectrum		
Wavelength range, nm (see graph High OH)	250 $\div$ 1100			250 $\div$ 1200		
Fiber type	Multimode					
Index profile	Step					
Coating material	Copper 99,99%					
Core material	Pure syntetic silica (High OH)					
Clad material	Doped silica (F-doped)					
Numerical Aperture (NA)	0.22 $\pm$ 0.02					
Short-term bending radius	60 times the fiber diameters					
Long-term bending radius	120 times the fiber diameters					
Proof test, kpsi	> 100					
Min operating temperature, $^{\circ}\text{C}$	-196					
Max operating temperature (short time < 60s), $^{\circ}\text{C}$	600					
Max operating temperature (long time > 60s), $^{\circ}\text{C}$	< 400					

\*The core/clad ratios 1.06/1.1 on the request  
Other parameters are available on the request