Fiber-optic Probe Properties

Avantes offers a broad standardized product range of fiber optics as described in this catalogue. For special cases Avantes also offers modification to this fiber-optic cables and probes to customers request. Most materials we use in our fiber-optic assemblies can be replaced with others to improve specific chemical or thermal resistance or to enhance vacuum or pressure properties. Please contact our fiber design engineers with your specific request.

In the following paragraphs some of the most essential technical parameters are listed for the materials we use.

Thermal Resistance

The thermal resistance of a fiber-optic assembly depends on some of the materials used:

1. Fiber: the standard fiber design has a polyimide buffer, covering a wide thermal range –190 to 400 °C.
2. Jacketing: the standard jacketing is PVC based and has a small temperature range (-20°C to 65°C), for higher temperatures a flexible metal jacketing (-BX/ME) with silicone inner tubing (up to 250°C) or stainless steel tubing (not flexible, to 750°C) is recommended.
3. Probe ends: connectors and ferrules are standard made of metal and have a wide temperature range. For special plastics, like PVC, PEEK and Teflon a limited temperature range is applicable.
4. Bonding epoxy: the standard epoxy used is a heat curing bonding epoxy with a temperature range of –60°C to 175°C. The curing temperature is standard 100 °C, for high temperature ranges (order code -HT), the curing temperature is 200°C. For the HTX (extreme high temperature) fibers and probes ceramic solution are available to realize a process that can withstand temperatures up to 500°C.

Technical Data

Temperature range	Fiber	Jacketing	Probe end	Bonding
–20°C to +65°C	Standard Polyimide	Standard PVC	Standard metal/ PVC/PEEK	Standard Epoxy
-30°C to +100°C	Standard Polyimide	Metal (-BX/ME) or silicone (-MS)	Standard metal/ PEEK	Standard Epoxy
-60°C to +200°C (HT)	Standard Polyimide	Metal (-BX/ME) or silicone (-MS)	Standard metal/ PEEK	High temperature curing epoxy

Ordering Information

-HT	• High Temperature version (up to 200°C)

All fibers
are available with SMA,
ST and/or FC/PC connectors

Chemical resistance

The chemical resistance of a fiber-optic assembly depends on some of the materials used:

1. Fiber, the standard fiber design has a polyimide buffer, which normally will not be in contact with the sample; the quartz core provides good resistance against most solvents.
2. Jacketing, the standard jacketing is PVC based and has a relative good chemical resistance. The –BX stainless steel and –ME chrome plated brass jacketing also have a good chemical resistance, but are not waterproof. The Silicone metal jacketing (-MS) is recommended for waterproof environment, biomedical applications, etc. The PEEK and PTFE jacketing have the best chemical resistance.
3. Probe ends, connectors and ferrules are standard made of stainless steel (316) and are not very well suitable in corrosive environment. For most corrosive environments PEEK or Hastelloy® C276 are recommended.
4. Bonding, the standard heat-curing two-component epoxy used is resistant to water, inorganic acids and salts, alkalis and many aggressive organic solvents and most petrochemical products, and an extended range of organic and inorganic environments.

The table below gives a summary for the chemical resistance for most materials used. It has been drawn up on the basis of relevant sources in accordance with the state of the art; no claim to completeness. The data constitutes recommendations only, for which no liability can be accepted. Please contact us if you have any doubt about the materials to use for your application.

Technical Data

Chemical environment	Fiber		Jacketing		Probe end		Epoxy
Acids weak	Standard Polyimide	±	-BX/ME -MS -PEEK -PVC	± + + +	St. steel 316 PEEK Hastelloy® C276	- + + +	+
Acids strong	Standard Polyimide	-	-BX/ME -MS -PEEK -PVC	- ± + ±	St. steel 316 PEEK Hastelloy® C276	- + + +	±
Bases weak	Standard Polyimide	±	-BX/ME -MS -PEEK -PVC	+ + + +	St. steel 316 PEEK Hastelloy® C276	+ + + +	+
Bases strong	Standard Polyimide	-	-BX/ME -MS -PEEK -PVC	+ + + +	St. steel 316 PEEK Hastelloy® C276	+ + + +	+
Aromatic carbons	Standard Polyimide	+	-BX/ME -MS -PEEK -PVC	+ + + +	St. steel 316 PEEK Hastelloy® C276	+ + + +	+
Alcohols	Standard Polyimide	±	-BX/ME -MS -PEEK -PVC	+ ± + +	St. steel 316 PEEK Hastelloy® C276	+ + + +	+
Ketons/Ethers	Standard Polyimide	+	-BX/ME -MS -PEEK -PVC	+ - + -	St. steel 316 PEEK Hastelloy® C276	+ + + ±	±

+ = good resistance
± = conditional resistant
- = not resistant

Options

-PK	• PEEK Probe material replaces Stainless Steel
-HY	• Hastelloy® C276 Probe material replaces Stainless Steel