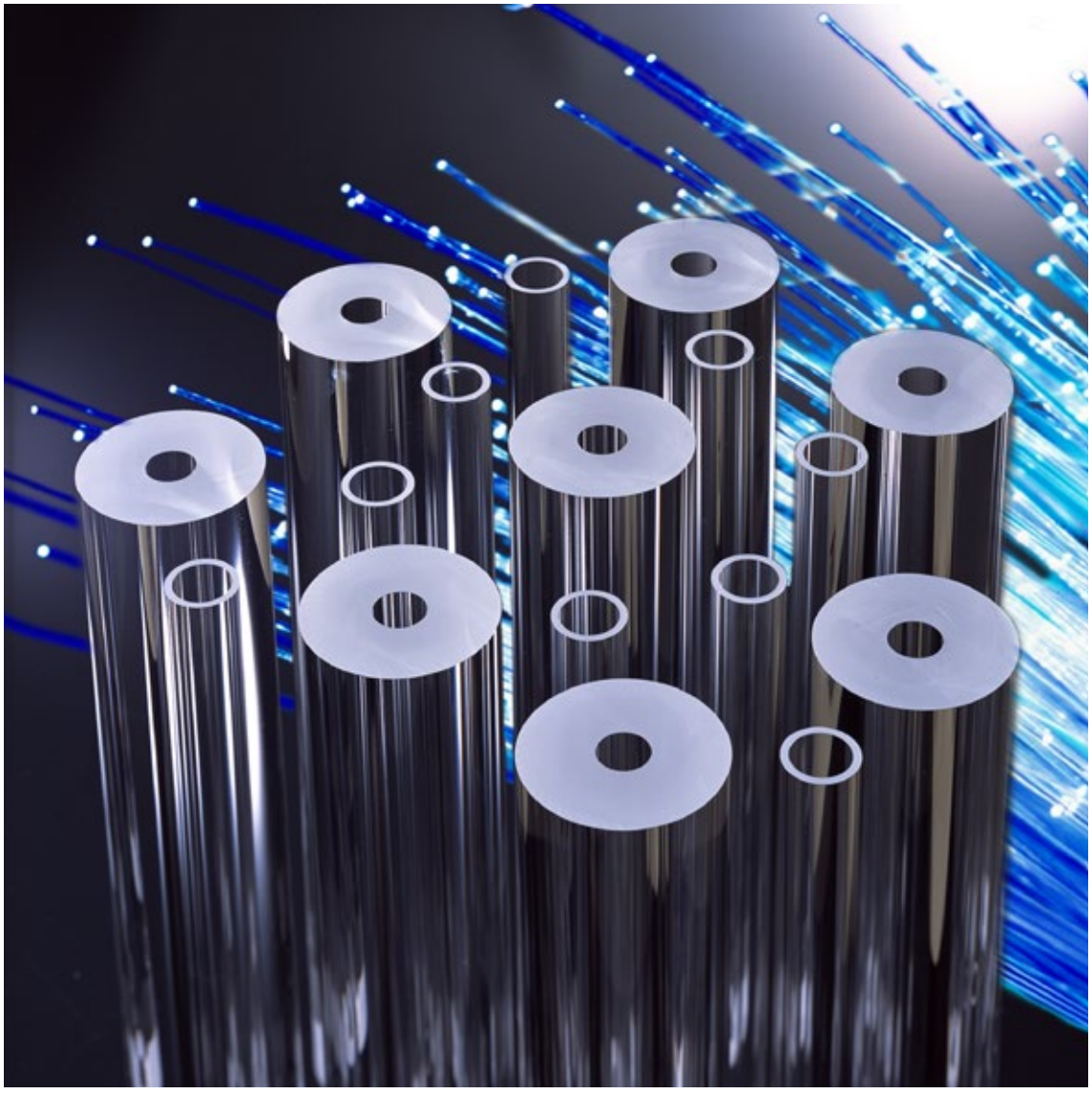
ShinEtsu QUARTZ
A JOINT VENTURE WITH Heraeus

Shin-Etsu Quartz Products Co., Ltd.

Synthetic Quartz Glass for Fiber Optics

SUPRASIL-F300

Suprasil-F300 is the brand name of OH free synthetic quartz glass from Shin-Etsu Quartz Products Co., Ltd. Suprasil-F300 assures your success in the preform production of optical fibers. Suprasil-F300 material is used in the world with an excellent reputation for its use as substrate tubes used in the preform core production process within the MCVD and PCVD methods, as well as for its use as jacket tubes used in the jacketing ("sleeving") process used in the production of cladded portions.



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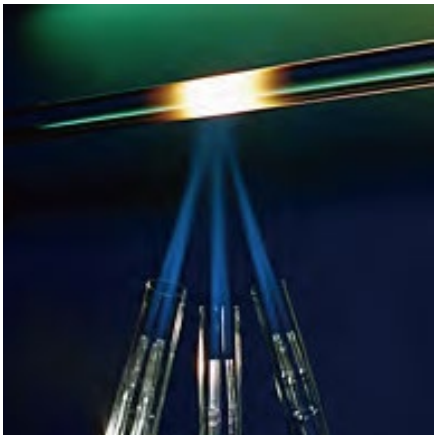
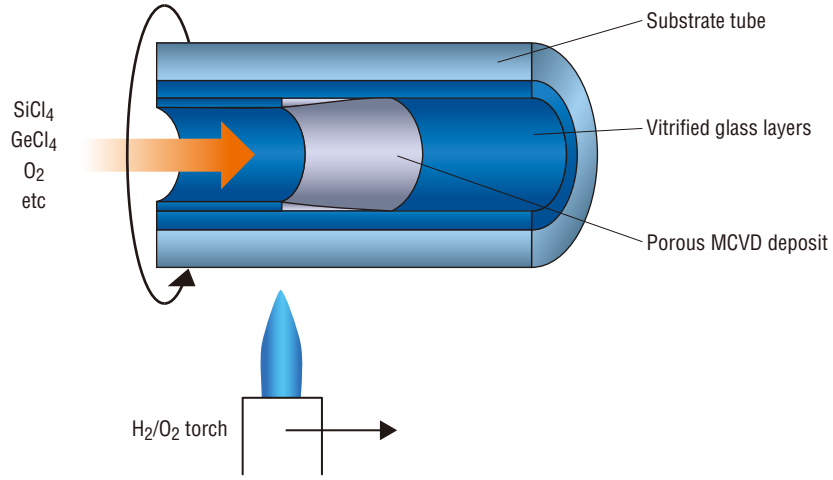
SUPRASIL-F300 Substrate Tube

Suprasil-F300 substrate tubes from Shin-Etsu Quartz Products Co., Ltd. (here after "SQP") are used in MCVD (Modified Chemical Vapor Deposition) and PCVD (Plasma Chemical Vapor Depostion) processes.



Quartz deposition by the MCVD process

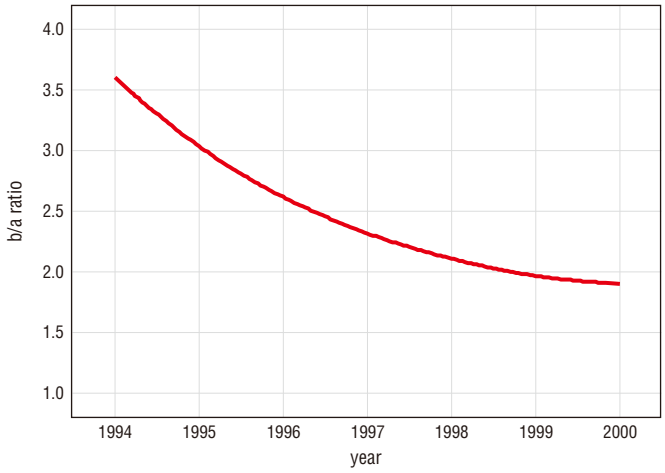
Fig.1 Quartz deposition by the MCVD process



The optical fiber core and some cladding material are deposited on the inside of substrate tubes. In order to assure excellent fiber performance, the properties of Suprasil-F300 substrate tubes meet the highest quality requirements for purity, homogeneity and geometry.

One key parameter for fiber manufacturers is the b/a ratio which describes the diameter ratio between deposited cladding and core diameter. Over the last decades, enhancements in Suprasil-F300 substrate tube purity have enabled fiber manufacturers to significantly reduce the b/a ratio and to achieve corresponding enhancements in MCVD productivity.

Fig.2 Development of b/a ratio in MCVD preforms



● Purity

The high purity of Suprasil-F300 materials is assured through continuous process control combined with advanced analytical techniques. These include UV and IR spectroscopic measurements are performed at different process steps. The OH level can typically be reduced into the 100 ppb range. The k_{200} value (absorbance at 200 nm) is used as an indicator for trace metal impurities. Highly sensitive analytical methods such as ICP-MS are used confirm that the purity of Suprasil-F300 tubes is in the sub-ppb range.

■A summary of substrate tube properties

	Na	K	Ca	Mg	Al	Fe	Ti	OH*	Cl*
Sup.F300	<20	<5	<5	<5	<50	<5	<10	<1	2000
							(Unit ppb)		(* Unit ppm)

Na~Ti: ICP-AES
OH: IR Absorption Spectrum
Cl: Nephelometric Analysis

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● Geometry

A wide variety of different tube sizes can be offered to match specific customer needs and preform designs. High precision substrate tubes are drawn with typical tolerances in the 100 µm range. The geometry of all substrate tubes is finally measured by laser scanning measurements.

● Visual Inspection and Cleaning

All tubes are visually inspected according to precise specifications for bubbles, inclusions, etc. The tubes are finally cleaned in a multistep cleaning procedure.

Typical geometrical properties (Example)					
OD (mm)	WT (mm)	Length (mm)	Siding (mm)	Ovality (mm)	Bow (mm/m)
20-50	1.5-4.0	1000-2000	0.1	0.08	0.3

SUPRASIL-F300 Jacket Tubes

High purity jacket tubes (also known as over clad tubes) from SQP can be used as high-strength jacketing material for all current fiber production technologies. In the jacketing process, core rods are over cladded with jacket tubes either offline on a separate lathe or online during fiber drawing.

Over the past years, a remarkable increase of preform sizes has been achieved. SQP is supporting this trend with the continuous development of larger jacket tubes.
Jacket tubes are produced from Suprasil-F300 material. Our jacket tubes offer the highest levels of purity, homogeneity and geometry to assure excellent fiber performance.

Fig.3 Jacketing process

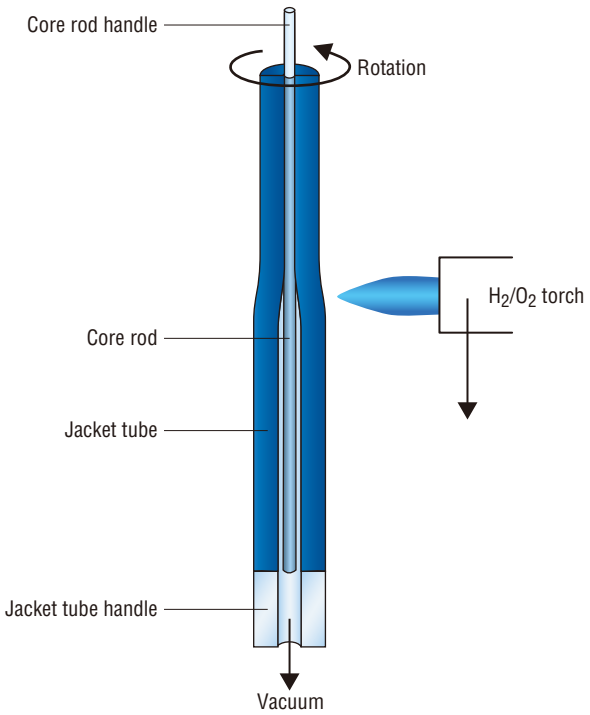
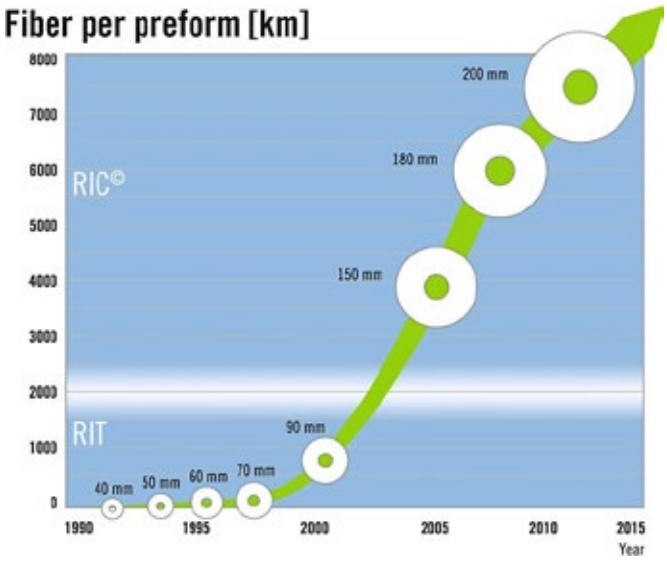


Fig.4 Preform size trend (source: Heraeus Website)



● Purity
The purity of Suprasil-F300 jacket material is comparable with that of the substrate material.

● Geometry
A wide variety of jacket tube sizes can be provided to match specific customer needs and preform designs. High precision jacket tubes are drawn with typical tolerances in the sub mm range. The geometry of all jacket tubes is measured by laser scanning measurements.

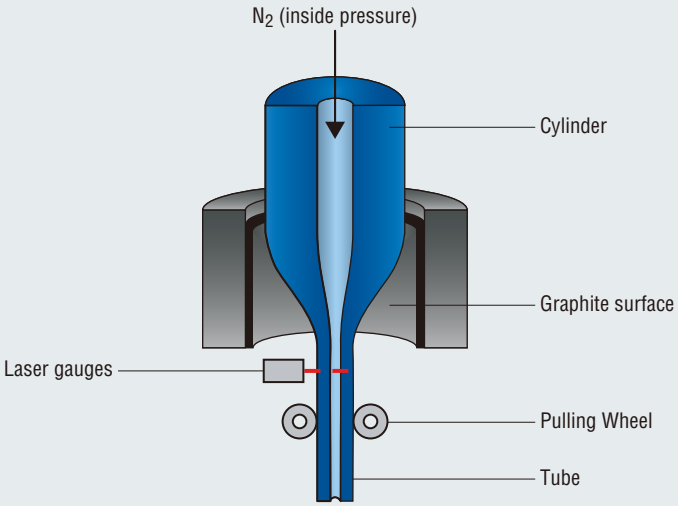
● Visual Inspection and Cleaning
All tubes are visually inspected according to precise specifications for bubbles, inclusions, etc. The tubes are finally cleaned in a multistep cleaning procedure.

Typical geometrical properties (Example)

OD (mm)	WT (mm)	Length (mm)	Siding (mm)	Ovality (mm)	Bow (mm/m)
40-100	4.0-40	800-2300	0.18	0.12	0.3

Production Process
Synthetic fused silica is produced by the flame hydrolysis of $SiCl_4$ under class 100 clean room conditions. SQP assures the high purity of Suprasil-F300 materials by using high purity chemical starting materials, and processing these materials under clean room conditions. After deposition the SiO_2 boule is dehydrated with chlorine and vitrified to a glass cylinder. All processes are fully automated and computer controlled.

Fig.5 Tube Drawing



Tube Drawing

Geometries are measured by laser gauges and drawing parameters are computer controlled to achieve tight geometrical tolerances.

■Product inquiries

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https://www.sqp.co.jp/e/

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