

# 1. <u>General:</u>

This product specification applies to optical and geometric properties of NOVOSIL<sup>®</sup> tubes of Raesch Quarz (Germany) GmbH. NOVOSIL<sup>®</sup> are direct drawn tubes which are produced in a single step drawing process.

### 2. <u>Chemical composition</u>:

SiO<sub>2</sub> [%] 99.8

**NOVOSIL** contains the following typical impurities in ppm:

	NOVOSIL
Elements	Typical
Al	<175
В	0.03
Ca	30
Cl	0.5
Cr	<0.1
Cu	<0.15
Fe	40
К	20
Li	7
Mg	15
Na	3
Ni	<0.4
Ti	63
Zr	1
As	<0.01
Au	<0.03
table 1	

**NOVOSIL** is inert and resistant to acids except hydrofluoric acid. The material reacts with phosphoric acid above 150°C.

#### 3. <u>Physical properties:</u>

Linear thermal expansion coefficient Modulus of elasticity	(20-320)°C	[10 <sup>-6</sup> K <sup>-1</sup> ] [10 <sup>4</sup> N/mm <sup>2</sup> ]	0.54 7.4
Density	[g cm <sup>-3</sup> ]		2.10
Max. working temperature			[°C]
	permanent		1050
	intermittent		1300
	metal sampling		1650

RAESCH	Produ NOVOSIL	Product specification NOVOSIL Satin quartz tubes			SPEC_Z_84 (Rev.0) page 2 of 3		
Electrical resistance		[°C]		[	$\Omega$ cm]		
	at	20		3	8.2x10 <sup>15</sup>		
	at	400		2	2.0x10 <sup>9</sup>		
	at	800		e	5.3x10⁵		
	at	1200		1	0x10 <sup>4</sup>		
Dielectric constant	at	20°C	01 MHz		3.7		
	at	23°C	9 x 10² N	1Hz	3.77		
	at	23°C	3 x 10 <sup>4</sup> N	1Hz	3.81		
Thermal conductivity					N.A.		

## 4. Optical Characteristics:

Defects are just specified if they are detected with the unaided eye. The measuring instruments are scale magnifiers and caliper gauges.

#### 4.1 Inclusions

Inclusions are foreign particles partially or completely enclosed in the tube. Foreign material enclosed into the tube wall with a size up to 1mm is allowed. Tactile inclusions are allowed if their size does not exceed 0.5mm. Inclusion clusters are allowed if the single inclusion diameter is smaller than 0.25mm.

#### 5. <u>Geometrical Characteristics:</u>

A tube is defined according to its outer (OD) or inner (ID) diameter as well as its wall thickness (WT) and its total length (L). The respective tolerances can be found in table 2. The used measuring equipment are caliper gauges and dial gauges.

#### 3.1 Ovality

Ovality defines the roundness of a tube and is calculated as follows: Ovality in % = (max OD - min OD) / nominal OD x 100%

#### 3.2 Siding (eccentric wall thickness distribution)

Siding describes the wall thickness differences of a tube and is calculated as follows: Siding in % = (max WT – min WT) / nominal WT x 100%

#### 3.3 Bow

Bow describes the maximum deviation from a horizontal measuring axis. It is measured centrally over a length of 1.000mm. The maximum bow is 3mm.

#### 3.4 Length

The tubes are available as FC (Furnace Cut) and TC (Trim Cut). The length tolerances can be found in table 2.

#### **Dimensional Characteristics:**



		standard tolerances				ciding	ovality
OD [mm] WT [mm]		OD [%]	WT [%]	length FC [mm]	length TC [mm]	[%]	[%]
6 - 10	0.6 - 1.0	±5	±25	±10	±1	20	3
> 10 - 20	0.9 - 2.0	±3	±20	±10	±1	20	3

table 1

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## Applicable documents:

General specification for cutting

Revision History			
Rev.	Date	Description of Change	
0	01.06.2019	new document	