





**EN09 Quartz Tube**

**Description:**

This standard quartz tube is a kind of clear electrically fused machine-drawn tube. It has excellent visual, thermal, mechanical properties and it is available with tight dimensional tolerances. This material is available in a range between 2 - 70 mm outside diameter. The hydroxyl (OH) content can be adjusted to different levels according to its application.

**Application:**

The spectral transmission at a wavelength between 180-220 nm usually reflects the material purity of clear fused quartz. Some metallic impurities decrease the transmission at a wavelength between 180-220 nm. According to the transmission curve, the transmission of EN09 standard quartz between wavelength 185-220 nm is much lower due to the higher content of some metallic impurities such as Fe etc. So this material cannot be used for making ozone generation lamps as this wavelength will be needed for the ozone generation.

However, EN09 quartz still has a transmission of over 90% at wavelength 253.7 nm which is ideal for making water purifying lamps and other UV germicidal lamps, because these UV lamps emit about 90% of their radiated energy at 253.7 nm which occur the peak germicidal effects.

If you have a look at the transmission curve again, you will see that the standard quartz has a very good transmission at the visible light range from wavelength 380-720 nm. So this low cost material is accepted globally for producing halogen lamps, high-pressure mercury vapour (HPMV) lamps and other lamps for general lighting systems.

The large diameter EN09 quartz tube can also be used in other lower temperature industrial fields due to its anti-alkali and anti-acid properties , for example in chemical industry and in the lower temperature semiconductor industry etc.

**The detailed Application of EN09 quartz in combination with its different hydroxyl (OH) content is as follows:**

Type	OH	Application
EN09 UB	OH ≤ 160 PPM	thermo couple, defrost lamps for refrigerator, halogen lamps for GLS and automobile, water purification and other UV lamps. The large diameter tube can also be used in Chemical and lower temperature semiconductor industry and so on
EN09 NB	OH ≤ 15 PPM	quality halogen lamps, low cost HPMV lamps, low cost MH lamps, quartz windows, washing tanks
EN09 EB	OH ≤ 5 PPM	top quality halogen lamps, quality HPMV lamps, MH lamps, lamps for stage lighting
EN09 SB	OH ≤ 2 PPM	MH lamps

**Remarks:**

1. UB=Unbaked; NB=Normal Baked; EB=Extra Baked; SB=Super Baked; GLS=General Lighting System; HPMV=High Pressure Mercury Vapor; MH=Metal Halide.

2. Wavelength: Vacuum UV=10-200nm, UV-C = 200-280nm, UV-B = 280-315nm, UV-A = 315-380nm, Visible Light =380-720nm

**EN09 Quartz Rod****Description:**

EN09 quartz rod is a kind of clear electrically fused quartz rod. Its chemical composition and hydroxyl (OH) content is same as EN09 quartz tube.

**Application:**

This low cost material is for example used as bridging rod for single ended halogen lamps. It is also used in other industries who work with a working temperature below 800°C.

**EN09Ti Ozone Free Tube****Description:**

EN09Ti ozone free tube is a clear fused quartz glass doped with Titanium Oxide (TiO<sub>2</sub>). The only difference to standard quartz tube EN09 is the difference in transmission. All other properties of EN09 quartz are the same. It is available in a outside diameter between 7mm-60mm. This item has a VUV cut off at 220nm. It transmits UV-A, UV-B and UV-C while blocking the high-energy deep wavelength that causes ozone generation.

**Application:**

Due to the wavelength cut off at 220nm this material is the best choice for all applications where ozone production is prohibited. With its good transmission at 253.7nm it's a good opportunity for all ozone producing, germicidal applications.

**Typical Application as follows:**

Type	OH	Application
EN09Ti NB	OH < 15 PPM	sun tanning lamps, ozone free reprographic lamps ozone free UV germicidal lamps
EN09Ti EB	OH < 5 PPM	high pressure xenon discharge lamps, UV lamps for hardening of lacquers and inks etc



## EN09Ce UV Blocking Tube

### **Description:**

EN09Ce tube is clear fused quartz glass doped with cerium to block ultraviolet. This glass blocks nearly all UV-C, UV-B and emits minimum UV-A. It is an ideal material for lamps requiring maximum visible light and to avoid UV exposure to people and materials.

This glass can be supplied in a range between 6mm-60mm outer diameter.

### **Application:**

Nowadays, more and more cars are using plastic front windows. The plastic front windows may be discoloured under the exposure of deep ultraviolet. The automotive lamps made by UV block quartz glass tubes can stop deep UV exposure to plastic windows. They keep out the windows of becoming "yellow" and EN09Ce lamps emit super "white" visible light at the same time. So UV block quartz is ideal for automotive lamps.

As for light "the shorter the wavelength, the higher the energy". The wavelength of VUV, UV-C and UV-B is shorter, so they have higher energy. UV-C can do great damage to exposed cells. UV-B is hazardous and it is largely responsible for sunburn. UV-B is also largely blamed for a kind of deadliest skin cancer "malignant melanomas". UV block quartz tubes nearly block all short UV wavelengths.

### **Application is as follows:**

Type	OH	Application
EN09Ce NB	OH < 50 PPM	automotive lamps, halogen lamps for GLS, MH lamps, sleeve tube for MH lamps

### **Properties**

#### **Dimensional Tolerances of Tube:**

Range of OD	OD	WT	Siding	Out of Round	Bow/1000mm
≤ 6.0 mm	±2.0%	±10%	12%	2.0%	2.0 mm
6.0-15.0 mm	±1.25%	± 8%	10%	1.5%	2.0 mm
15.0-30.0 mm	±1.35%	±12%	15%	1.5%	2.0 mm
30.0-45.0 mm	±1.5%	±15%	15%	1.5%	2.0 mm
45.0-60.0 mm	±1.8%	±15%	15%	1.5%	2.0 mm

#### **Chemical Composition (ppm):**

	AL	Li	K	Na	Ca	Fe	Ti	Mg	Cu	B	SiO2
EN09	16.5	0.6	2.0	2.3	1.8	1.8	4.6	0.4	0.3	0.5	>99.98%
UV blocking tube	16.5	0.6	2.0	2.3	1.8	1.8	500	0.4	0.3	0.5	
Ozone free tube	16.5	0.6	2.0	2.3	1.8	1.8	100	0.4	0.3	0.5	



## Hydroxyl (OH) content (ppm):

	UB	NB	EB	SB
EN09	150	15	5	2
UV blocking tube		70	30	10
Ozone free tube		15	5	2

## Thermal properties:

Coefficient of expansion	25-300°C	cm/cm°C	$5.5 \times 10^{-7}$
Thermal Conductivity	20°C	W/m °C	1.4
Specific heat	20°C	°J/Kh°C	670
Viscosity data			
Softening point		°C	1670
Strain point		°C	1100
Annealing point		°C	1110
Max. working temperature		°C	
Continuous			800
Short-term			1100

## Mechanical properties:

Young's modulus		Pa	$7.2 \times 10^{10}$
Density		Kg/m <sup>3</sup>	$2.2 \times 10^{-3}$
Poisson's ratio		Pa	0.17
Tensile Strength		Pa	$4.8 \times 10^7$
Compressive Strength		Pa	$>1.1 \times 10^9$

## Electrical properties:

Loss tangent	At 20°C and 1MHz		$<2 \times 10^{-4}$
Dielectric constant	At 20°C and 1MHz		3.75
Resistivity	350°C	Ω·cm	$7.0 \times 10^9$
Insulation strength		V/m	$5.0 \times 10^7$

## Optical Properties

Index of refraction			1.459
Transmittance	please see below		



## Spectral Transmission (nm):

