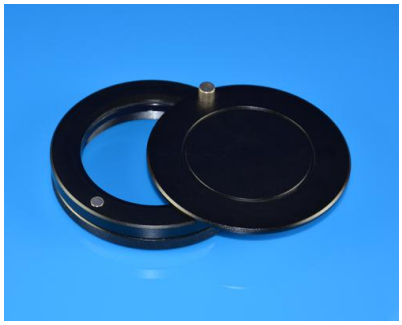
Infrared Windows Assemblies for Thermal Imaging Inspection



Applications:

- High power and high voltage electric installations, switch cabinet
- High temperature metallurgic oven
- Mineral and petroleum industry

Descriptions:

Inspection is necessary for high power and high voltage electric installations to avoid the possible accident, the thermal imagine is found to be the optimal and effective way for this application. In some countries, thermal imagine inspections is compulsory for accident insurance. And in some industrial equipment like the high temperature metallurgic oven, it is necessary to use the thermal imagine to watch its temperature inside. An infrared windows assembly is needed to be installed on the housing of the electric and industrial equipment as the viewport windows for thermal image camera.

Design and standard:

- The windows assembly consists of metal flange, crystals windows and metal protective cover
- The protective cover is fixed by two small magnet nubs
- The whole windows is fixed on the cabinet house by the flange, no screw is needed
- Various types of infrared crystals is available: CaF2; BaF2; Germanium; Sapphire; Silicon; ZnS; ZnSe
- Confirm to the dust tight standard IP67 of NF EN6052

Specifications (Materials Used):

Flange	Metal	Housing or Cover	Metal Materials
Optics	CaF2, BaF2, Ge, Sapphire, silicon, ZnSe, ZnS windows	Cover Fixing	Fixed by Magnet nub
Water and Dust Ingress	IP67 of NF EN60529		

Typical Dimensions:

Models	**Body Diameter**	**Crystals Diameter**	**Viewing Diameter**	**Assembly Thickness**
SHIRW-60	84 mm	60mm	55mm	22mm
SHIRW-75	99 mm	75mm	70mm	22mm
SHIRW-100	124 mm	100mm	95mm	22mm

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Specifications of Common Materials used in the Infrared Optics:

Material	Chemical Symbol	Transmission Wavelength (μm)	Reflection (Two Surfaces)	Knoop Hardness
Calcium Fluoride	CaF2	0.13-10	5%	158
Barium Fluoride	BaF2	0.15-12.5	7%	82
Germanium	Ge	1.8-23	53%	780
Zinc Selenide	ZnSe	0.5-22	29%	120
Sapphire	Al2O3	0.15-5.5	14%	2000
Silicon	Si	0.14-6	29%	850
IR Polymer	N/A	0.15-22	21%	N/A

Properties of materials:

Fluoride crystals (CaF2 and BaF2) were most common used infrared windows materials. They are both hydroscopic, the transmission would be deteriorated for the moisture absorption, but the protective coating on the windows surface is available in Hangzhou Shalom EO to improve its moisture property. CaF2 is good transmission from 0.2-8μm, covers the UV to LWIR range, it is often used at the viewport windows in the electric power switch cabinet. BaF2 is better in transmission (0.3-12μm), it is often used in the petroleum industry applications.

Germanium and ZnSe are among the best broadband infrared transmitters available. The BBAR coated Germanium is good transmission at 1.8-23μm, which covers the MWIR 3-5μm and LWIR 7-14μm range, for the hush environment application, a kind of diamond coating is available to improve its properties. The cost is relatively high for Germanium and ZnSe crystals, they are used in the military and other high demanding applications.

For the MWIR (3-5μm) or middle-wave applications, the sapphire is a good candidate for its good transmission at 0.2-5.5μm wavelength range and the incredible durability (large hardness), the Silicon crystals is also a good alternative for the MDIR applications, it has good transmission at 1.4-6μm and it is lower in cost than the sapphire.

Resources:

Application Notes:

Installation steps:

- Step 1: Calculate and decide the position where the windows would be installed according to the view angle of the thermal imagine camera;
- Step 2: Drill a hole according to the size of the windows assemblies;
- Step 3: Install the whole windows assemblies;
- Step 4: Open the protective cover and make the testing of the inspection.

Select the suitable crystals materials for your applications:

Several factors you should take into consideration during the selection of crystals materials:

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Wavelength range, environment (temperature, humidity and vibration ect.) and cost. Here is the specification of the materials for your reference.

Related products:

1) Infrared windows -> CaF2 windows
2) Infrared windows -> BaF2 windows
3) Infrared windows -> Ge windows

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