

Sensors as well as various systems on their base are widely used and discover new and new areas for applications on almost all aspects of human activity. Optical IR-sensors and detectors belong to a special niche since are allowed to control and manage the processes which take place at room and much low temperatures. Majority of the devices here are remote-acting and non-contact.

Application of Wien's law to human body emission results in a peak wavelength of

$$\lambda_{\max} = \frac{0,0028999}{T}$$

For this reason, thermal imaging devices for human subjects are most sensitive in the 7-14 μm range. For monitoring and temperature measurements of higher heated environments the wavelength range 3-5 μm is used. Practically all organic and inorganic compounds have the unique feature that they more or less good absorb at the diapason of 2-15 μm . This cause the wide products line of IR-sensors and IR-detectors.

Tydex introduces various passive optics for the discussed topic.

Hereunder are some examples of the optical elements demonstrating the range of our products. Additional information is available in the following chapter - Frontal optics for ultimate applications.

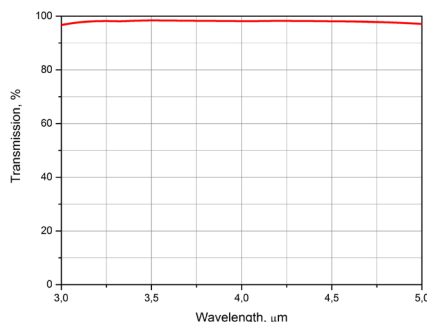
1. Silicon meniscus lenses for 3-5 μm IR detectors (pyrometers)

Application: production of concrete, steel, glasses, etc.

Specification:



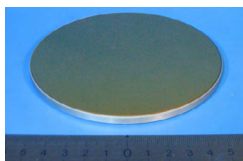
Type of a part	Meniscus lens, plano-convex lens
Material	Si
Diameter, mm	29 (+0/-0.2)
Central thickness, mm	4.0 (+/-0.2)
EFL tolerance, %	+/- 2
Surfaces quality, scr/dig	60/40
Surface figure, fringes	N<=5, deltaN<=1 @ 633 nm
AR coating (BBAR/BBAR type), R @ 3-5 μm , %	< 1 (see the curve attached)



2. Germanium windows for 8-12 μm IR imager

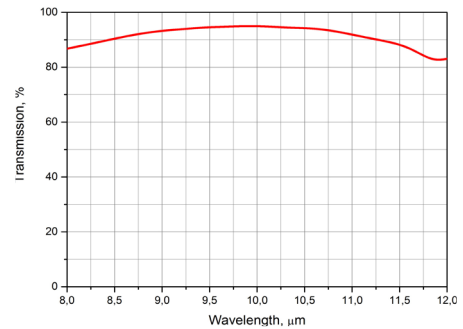
Application: to be installed at helicopter for long-distance monitoring of forest fire.

Specification:



Type of a part	Plano-plano window
Material	Ge

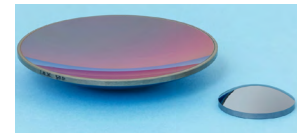
Diameter, mm	120 (+0/-0.2)
Thickness, mm	4.0 (+/-0.2)
Surfaces quality, scr/dig	60/40
Surface figure, fringes	N<=5, deltaN<=1 @ 633 nm
AR coating (DLC/BBAR type), R @ 8-12 μm , %	< 5 (see the curve attached)



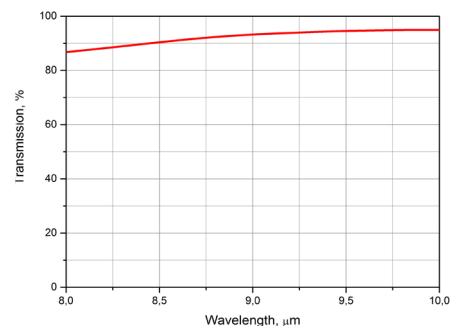
3. Germanium meniscus lenses for 8-10 μm IR imager

Application: sea-based system of 360 deg.-panoramic view (Vigiscan 05).

Specification:



Type of a part	Meniscus lenses
Material	Ge
Diameter, mm	105 (+0/-0.2)
Central thickness, mm	8.0 (+/-0.2)
EFL tolerance, %	+/-2
Surfaces quality, scr/dig	60/40
Surface figure, fringes	N<=5, deltaN<=1 @ 633 nm
AR coating (DLC/BBAR type), R @ 8-10 μm , %	< 5 (see the curve attached)



4. Protective domes for pyranometers

Application: meteorology, environmental monitoring at greenhouses and open fields.

Specification:



Type of a part	Dome
Material	Glass, quartz
Diameter, mm	32 (+0/-0.2)
Central thickness, mm	3.7 (+/-0.2)
Surfaces quality, scr/dig	80/50

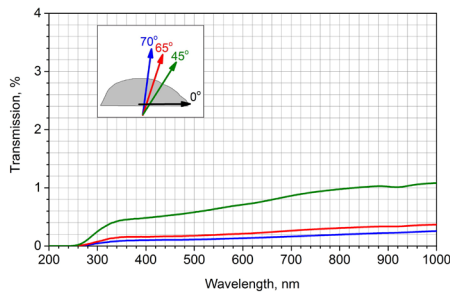
5. Domes with a Neutral Density Filter

For proper working of a sky camera the solar radiation should be correctly dosed. Otherwise superfluous heating of the covering dome may increase humidity which result in water drops on the inner surface of the dome. To solve this task Tydex offers special coating which allows to attenuate the incoming solar flux - neutral density filter. Such coating allows to reach a transmittance of around 1% (OD 2.0) across the visible spectrum.



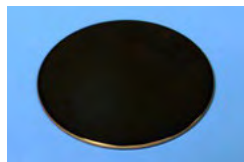
Specification:

Type of a part	Dome
Material	glass / quartz
Diameter, mm	76 (+0/-0.2)
Central thickness, mm	3.0 (±0.2)
Surfaces quality, scr/dig	80/50
Coatings	neutral density filter



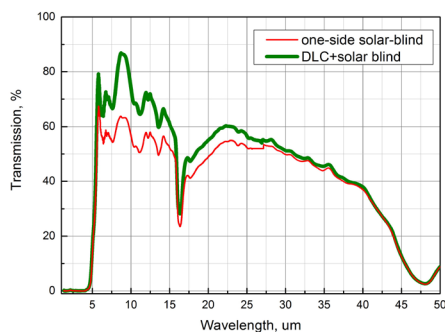
6. Filter for pyrgeometers

Application: measuring an effective atmospheric IR radiation spectrum over wide spectral range (4.5 - 45 μm).



Specification:

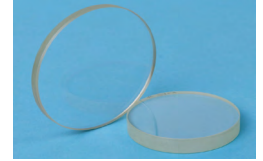
Type of a part	Plano-plano window, meniscus lens
Material	FZ-Si
Type	plano-plano window, meniscus lens
Diameter, mm	31.8 (+0/-0.2)
Thickness, mm	1.0 (+/-0.1)
Surfaces quality, scr/dig	40/20
Operating temperature range	-40 C ...+80 C
Humidity	up to 90-95%
Coating (DLC/solar blind type)	see the curves attached



7. Sapphire window for underwater sensors

Application: to be installed at bathyscaphe to monitor continental shelf, ship's bottom, etc.

Specification:

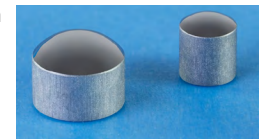


Type of a part	Plano-plano window
Material	Sapphire
Diameter, mm	77.0 (+0/-0.2)
Thickness, mm	6.0 (+/-0.2)
Surfaces quality, scr/dig	40/20
Surface figure, fringes	N<=5, deltaN<=1 @ 633 nm

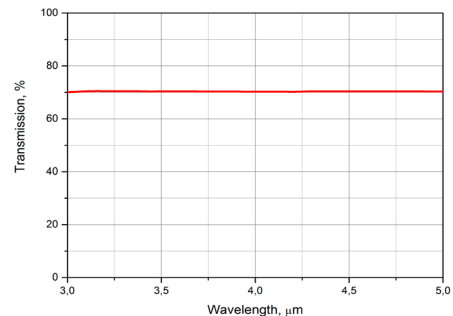
8. Si bullet-lens for 3-5μm IR immersion ED's and photodiodes

Application: to be used as light emitter.

Specification:



Type of a part	Bullet-lens
Material	Si
Diameter, mm	3.5 (+/-0.04)
Central thickness, mm	3.21 (+/-0.05)
Surfaces quality, scr/dig	40/20
Surface figure, fringes	N<=5, deltaN<=1 @ 633 nm
AR coating (one-side BBAR @ 3-5um)	see the curves attached



9. CaF₂ bullet-lens for 3-5 um IR immersion LED's and photodiode

Application: environmental monitoring.

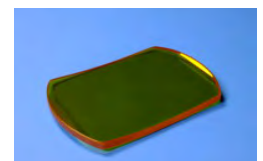
Specification:



Type of a part	Bi-convex lens
Material	CaF ₂
Diameter, mm	11.0 (+0/-0.1)
Central thickness, mm	5.3 (+/-0.2)
EFL @ 4.25um, mm	12.5
Surfaces quality, scr/dig	80/50
Surface figure, fringes	N<=2, deltaN<=1 @ 633 nm

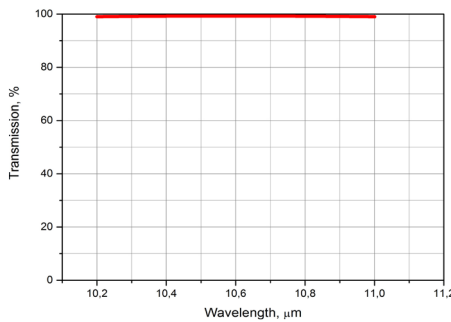
10. ZnSe Lens for 10.6 μm laser

Application: laser industry, CO₂ - and CO-detectors, medicine.



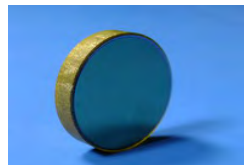
Specification:

Type of a part	Plano-convex lens
Material	CVD-ZnSe
Diameter, mm	12.7 (+0/-0.2)
Central thickness, mm	2.0 (+/-0.2)
EFL tolerance, %	+/-2
Surfaces quality, scr/dig	40/20
Surface figure, fringes	N<=1, deltaN<=0.5 @ 633 nm
AR coating (AR/AR type), R @ 10.6 μm, %	< 0.5 (see the curve attached)



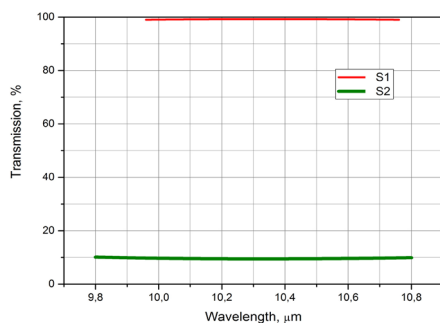
11. ZnSe Beamsplitter

Application: monitoring of air quality, nitrogen fixation, fruit storage, mycology, medicine.



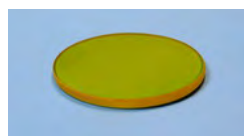
Specification:

Type of a part	Plano-plano window
Material	CVD-ZnSe
Diameter, mm	25.0 (+0/-0.2)
Thickness, mm	4.0 (+/-0.2)
Surfaces quality, scr/dig	40/20
Surface figure, fringes	N<=5, deltaN<=1 @ 633 nm
Coating	see the curve attached
	- S1: AR@ 10.3um
	- S2: R=90%±5%@10.3um



12. ZnSe Window for IR detectors, etc.

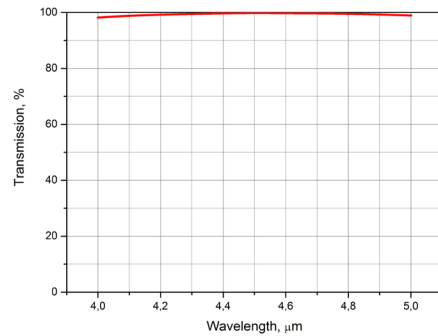
Application: laser industry, CO - and CO-detectors, medicine



Specification:

Type of a part	Plano-plano window
Material	CVD-ZnSe

Diameter, mm	12.7 (+0/-0.2)
Thickness, mm	3.0 (+/-0.2)
Surfaces quality, scr/dig	60/40
Surface figure, fringes	N<=1, deltaN<=0.5 @ 633 nm
AR coating (AR/AR type), R @ 4.5μm, %	see the curve attached



13. Teflon IR polarizer

Application: methane leak detectors



Specification:

Material	Teflon
Diameter, mm	12.7 (+0/-0.2)
Transmission curve	see the chapter – IR polarizers

14. Quartz Diffuser

Optical diffusers are used to control the diffuse area of illumination by evenly diffusing the light source as it passes through the diffuser. These diffusers can be used to achieve a near Lambertian distribution. The level of diffusion causes a large amount of scattering loss.



Specification:

Type of a part	plane-plane window / meniscus lens
Material	special quartz
Diameter, mm	19 (+0/-0.1)
Central thickness, mm	1.5 (±0.1)
Surfaces quality, scr/dig	80/50