PHOSPHOR SCREENS
RUGGED and UHV P22 PHOSPHOR

FOR USE IN:

BEAM DETECTION
BEAM ALIGNMENT
LENS TESTING
UNIFORMITY TESTING
SURFACE PHYSICS
UHV EXPERIMENTS

FEATURES / OPTIONS:

HIGH LUMINOSITY P22 PHOSPHOR SENSITIVE TO ELECTRONS, STARTING AT 500 eV
EASY HANDLING / HIGH ABRASION RESISTANCE (RUGGED SCREENS)
UHV COMPATIBLE, BAKEABLE
METAL or GLASS BACKING
STANDARD SIZES MATCH eV Parts®
RAPID AVAILABILITY, LOW COST

Kimball Physics Phosphor Screens are made of high luminosity P22 phosphor (ZnS:Ag). The screens are sensitive to electrons starting at approximately 500 eV with a threshold of 1 x 10^{-7} A/cm^2 at 500 eV. The maximum recommended input beam power density is 1 Watt/cm^2. Two general types of phosphor screens are made by Kimball Physics: UHV screens and Rugged screens.

Rugged Phosphor Screens (designated by RP22) are easy to handle and unusually resistant to mechanical damage and rough handling. Ruggedized Screens are bonded to their metal or glass backings using a bonding agent which has a low but non-zero vapor pressure. Due to the binder, the rugged phosphor is only suitable for vacuum pressures down to 10^{-8} torr (at the lower end of this operating range, some outgassing may be observed). The rugged screens are particularly suited for use in experimental vacuum systems. Rugged screens have a phosphor thickness of approximately 75 μm.

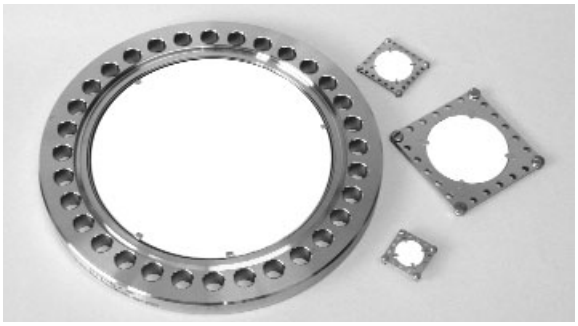
UHV Phosphor Screens (designated by UP22), with no binder, are compatible with vacuums better than 1 x 10^{-8} torr. Although these screens are better for ultra high vacuum, they are more fragile and require greater care when handling; since the phosphor coating is delicate and can be easily destroyed. Damage will result from touching a UHV Phosphor coating; shock from knocking or dropping the screen may cause the phosphor coating to flake off. Standard UHV screens are shipped with a stainless steel protective cover. The thickness of the UHV phosphor ranges from 50 μm to 70 μm.

The phosphor can be deposited either on a 0.012 or 0.025 inch thick 304 stainless steel plate (SS) or on 0.030 inch thick conductive glass (GL) fitted into a stainless plate for mounting. The screens deposited on metal must be viewed from the electron impact side (since the metal is opaque). The screens deposited on glass and held in a metal frame, can be viewed from either side (since the glass is transparent).

Custom Phosphor Screens can be deposited on almost any metal, glass, or ceramic surface on a special order basis. Round screen diameters can range from 10 mm diameters, up to more than 200 mm in diameter. Rugged phosphor screens can be made in a variety of custom sizes and shapes; rectangles, strips, and patterned shapes are possible; edge definition is better than 100 micrometers. Custom screen can be made up even in quantities of one. Contact Kimball Physics Engineering for more information.

PHOSPHOR:

PHOSPHOR TYPE:	ZnS:Ag Type 1330 (P-22 Blue)
SATURATION THRESHOLD:	3 x 10^{-2} Amps/cm^2
PEAK EMITTED WAVELENGTH:	450 nanometers
MAXIMUM INPUT POWER DENSITY:	1 Watt/cm^2
MINIMUM POWER DENSITY:	5 x 10^{-5} Watts/cm^2



6 inch CF thin flange-mounted UHV Phosphor Screen and three standard Phosphor Screens on 0.7, 1.4, and 2.0 inch squares

NOTES:

1) Using the phosphor screens at electron energies below the first unity-secondary-emission crossover point may cause the screen to charge up to electron cathode potential, at which point the screen temporarily goes out.

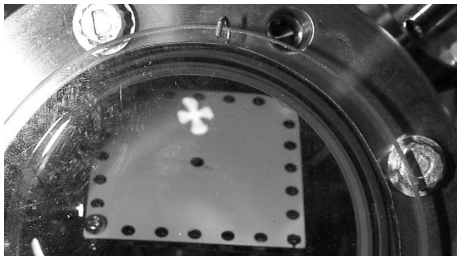
2) When using the phosphor screen, input power density should not exceed 1 Watt/cm^2, or the phosphor coating may be damaged To preserve screen brightness, it is advisable to use the lowest beam power density that provides a clear spot. Normal usage will result in gradual browning of the screen.

3) Ruggedized screens are bakeable up to 200°C; UHV screens are bakeable up to 350°C.

4) Larger screens, mounted in either six or eight inch viewports are also available. The diameter of a screen for a six inch viewport would be 4.2 inch and the diameter of a screen for a eight inch viewport would be 6.2 inch. These larger phosphor screens can be deposited on leaded glass if required.

5) Rugged screens on stainless steel are deposited directly on the square plate. UHV screens on stainless steel are deposited on a round stainless steel plate that is affixed to the square mounting plate by four equally-spaced tabs spot-welded to the square mounting plate and to the underside of the round (phosphor-coated) plate.

6) Standard phosphor screens deposited on conductive glass (both Rugged and UHV) are held between two stainless steel plates, within a center hole, by four equally-spaced tabs on both sides of the screen. The tabs, which are spot-welded to the stainless steel plates, also serve to bleed off charge from the screens.



Maltese-cross shaped spot from an unfocused LaB_6 cathode seen on a custom phosphor screen inside the vacuum chamber

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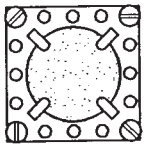
PHOSPHOR SCREEN PART NUMBERS AND DESCRIPTIONS:

PHOS-RP22SS-B5x5-R500 (Rugged)
PHOS-UP22SS-B5x5-R500 (UHV)
0.50 inch phosphor on 0.700 inch square,
0.012 inch thick stainless steel B5x5 plate

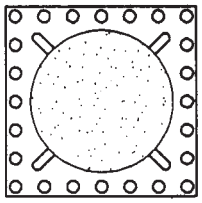
PHOS-RP22GL-B5x5-R500 (Rugged)
PHOS-UP22GL-B5x5-R500 (UHV)
0.50 inch phosphor on 0.030 inch thick
conductive glass fitting in a 0.700 inch square,
0.012 inch thick stainless steel B5x5 plate



PHOS-RP22GL-B5x5-R500

PHOS-RP22SS-B7x7-R750 (Rugged)
PHOS-UP22SS-B7x7-R750 (UHV)
0.75 inch phosphor on 1.000 inch square,
0.012 inch thick stainless steel B7x7 plate

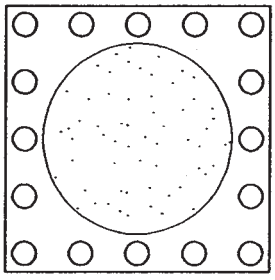
PHOS-RP22GL-B7x7-R750 (Rugged)
PHOS-UP22GL-B7x7-R750 (UHV)
0.75 inch phosphor on 0.030 inch thick
conductive glass fitting in a 1.000 inch square,
0.012 inch thick stainless steel B7x7 plate



PHOS-UP22SS-B7x7-R750

PHOS-RP22SS-C5x5-R1000 (Rugged)
PHOS-UP22SS-C5x5-R1000 (UHV)
1.00 inch phosphor on 1.400 inch square,
0.025 inch thick stainless steel C5x5 plate

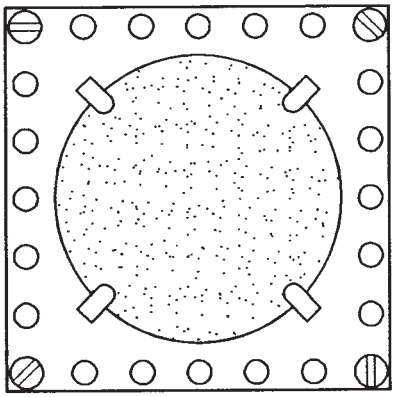
PHOS-RP22GL-C5x5-R1000 (Rugged)
PHOS-UP22GL-C5x5-R1000 (UHV)
1.00 inch phosphor on 0.030 inch thick
conductive glass fitting in a 1.400 inch square,
0.025 inch thick stainless steel C5x5 plate



PHOS-RP22SS-C5x5-R1000

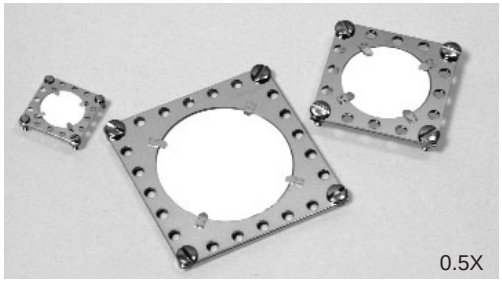
PHOS-RP22SS-C7x7-R1500 (Rugged)
PHOS-UP22SS-C7x7-R1500 (UHV)
1.50 inch phosphor on 2.000 inch square,
0.025 inch thick stainless steel C7x7 plate

PHOS-RP22GL-C7x7-R1500 (Rugged)
PHOS-UP22GL-C7x7-R1500 (UHV)
1.50 inch phosphor on 0.030 inch thick
conductive glass fitting in a 2.000 inch square,
0.025 inch thick stainless steel C7x7 plate



PHOS-UP22GL-C7x7-R1500

Drawings shown actual size



Phosphor Screens on conductive glass
on 0.7, 1.4, and 2.0 inch diameter stainless steel plates

Thin Flange Mounted Phosphor Screens
2¾ CF, 4½ CF, 6 CF and 8 CF sizes
RHEED Applications
Sandwiches between existing viewport and system CF flange

NEW DETECTORS

HIGH LUMINOSITY P22 PHOSPHOR
SENSITIVE TO ELECTRONS, STARTING AT 500 eV
AVAILABLE WITH UHV AND RUGGED PHOSPHOR
UHV COMPATIBLE, BAKEABLE
CONDUCTIVE GLASS BACKING
THIN FLANGE - MOUNTED FOR EASY INSTALLATION BETWEEN TWO STANDARD CF FLANGES

PHOSPHOR SPECIFICATIONS:
Phosphor type: ZnS: Ag Type 1330 (P-22 Blue)
Saturation threshold: $3x10^{-2}$ A/cm^2
Peak emitted wavelength: 450 nm
Max. input power density: 1 W/cm^2
Min. power density for screen response: $5x10^{-5}$ W/cm^2

Careful handling is required with UHV phosphor screens as the coating is extremely delicate.

UHV Phosphor Screen on conductive glass, mounted in a 6 inch CF double-sided Thin Flange
The Thin Flange is 0.4" thick and must be sandwiched between a window flange and the corresponding system CF flange.

The Thin Flange Mounted Phosphor Screen

The Thin Flange-Mounted Phosphor Screen is designed for in-vacuum mounting and must be must be used in conjunction with a separate conflat viewport. The Thin Flange is inserted between an existing conflat window and its mating system flange. The gasket crushing bolts pass through the Thin Flange without putting any force on it.

The Thin Flange-Mounted Phosphor Screens come in 2¾ CF, 4½ CF, 6 CF and 8 CF flange sizes. All Thin Flanges are 0.4 inch thick, double-sided, and have double-density clear bolt holes. Please refer to the "Thin Flange" specifications in the Multi-CF Fittings section of the website.

Separate standard CF flange glass viewports are available as a option.

The smaller CF size flanges are available with either UHV or rugged style phosphor screens. UHV phosphor screens are compatible with vacuums better than 1 x 10^{-8} torr. Careful handling is required with UHV phosphor screens as the coating is extremely delicate. Rugged phosphor screens are easy to handle and unusually resistant to mechanical damage and rough handling. However, due to the binder, the rugged phosphor is only suitable for vacuum pressures down to 10^{-8} torr, where some outgassing may be observed. Ruggedized screens are bakeable up to 200°C, while UHV screens are bakeable up to 350°C.

Please refer to the first page of "Phosphor Screens" for more information.

PART NUMBER	TYPE	PHOSPHOR SIZE	FLANGE SIZE	MOUNTING
PHOS-UP22GL-CF2.75 P22	UHV	1.43 inch dia. on conductive glass	2¾ inch CF	0.4 inch thick double-sided Multi-CF Thin Flange The Thin Flange must be sandwiched between a viewport and corresponding system CF flange.
PHOS-RP22GL-CF2.75 P22	Rugged			
PHOS-UP22GL-CF4.5 P22	UHV	2.83 inch dia. on conductive glass	4½ inch CF	
PHOS-RP22GL-CF4.5 P22	Rugged			
PHOS-UP22GL-CF6 P22	UHV	4.20 inch dia. on conductive glass	6 inch CF	
PHOS-UP22GL-CF8 P22	UHV	6.20 inch dia. on conductive glass	8 inch CF	