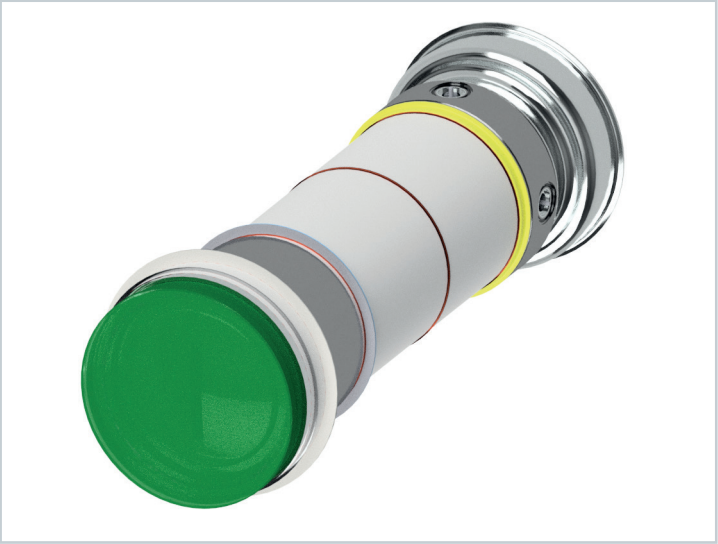
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# ST-HDR Streak Tube

## Optimised high dynamic range and improved time resolution



**ST-HDR is a version of ST-Y optimised for high dynamic range and improved time resolution.**

This is achieved by reducing slit-photocathode separation and increasing the field between these components. This results in higher image magnification in the spatial dimension than the temporal axis, which enables a wider entrance slit to be used without a corresponding loss of time resolution.

The tube is an all-metal-ceramic construction which is robust for extreme environments.

### Key Attributes

- Timing resolution to 10 ps
- 35 mm photocathode size
- UV, solar blind, visible and NIR response
- Can be supplied with a mu-metal shield for high magnetic field environments

### Applications

- Streak cameras
- Fusion Research
- VISAR Diagnostics
- Detonics and Ballistics

### Product Overview

| | |
|---|---|
| Equivalent to | Photonis P510 |
| Cathode Size | 35 x 4 mm |
| Useful Image Input | 30 x 0.4 mm |
| Time Resolution (typical)* | 10 ps |
| Spatial Resolution (typical) | 20 lp/mm |
| Magnification (spatial) | 1.3 |
| Magnification (temporal) | 0.4 |
| Deflection Sensitivity @ 15 kV | 500 V/cm |

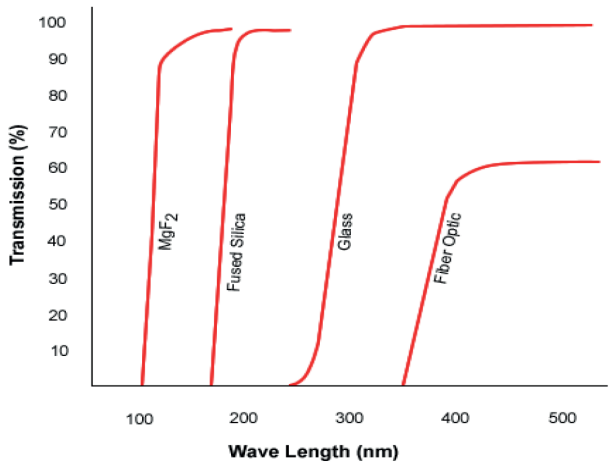
*Time resolution stated is applicable when using the streak tube with increased operating voltages. Under this mode spatial resolution will decrease.

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## Options Available

### INPUT WINDOW

Photek streak tubes are available with a choice of input window materials. These include $MgF_2$, fused silica, glass and fibre optic, among others.




### PHOSPHOR SCREENS

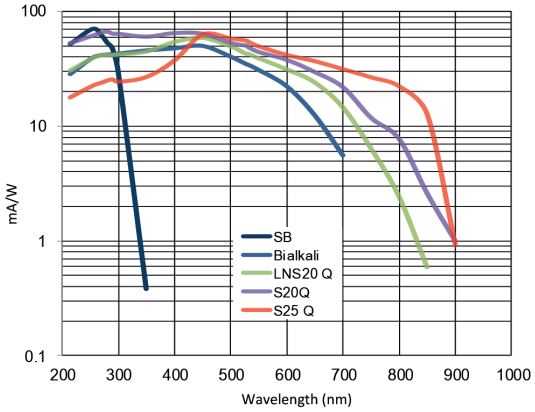
The Phosphor screen is 64 mm OD, and has an active diameter of 50 mm. The internal surface can be flat to retrofit the Photonis P510, or concave on the inner surface to reduce distortion, and improve spatial resolution. Photek can offer two types of phosphor screen substrates; glass or fibre optic. Our standard phosphors include P20, P43, P46, P47, & FS depending on the brightness and decay time required. Other phosphors are available on request.

| Type Wavelength (nm) | Anode Efficiency % * | Photons/ Electron @ 5kV | Decay Characteristic |
|---|---|---|---|
| P20 (540) | 12 | 320 | Fast initial decay with long decay at low level. 1ms to 1% |
| P43 (548) | 8.7 | 240 | 1.2 ms/decade, true exponential |
| P46 (530) | 1.8 | 55 | 300 ns |
| P47 (410) | 3 | 64 | 80 ns |
| FS (513, 668, 768) | 4.2 | 96 | 12 µs to 10% |

* Optical Watts / Electrical Watt

### SPECTRAL RESPONSE

Photek offer a full range of Gen II photocathodes, these include CsI, Solar Blind, Bialkali, Low Noise S20, S20 and S25.




Above is the broad spectral response that you would expect to achieve with Photek's range of Gen II photocathodes. Please note that input window material will affect overall sensitivity.

## Deflection Sensitivity

The deflection sensitivity is proportional to overall voltage. Exact deflection sensitivity is part of the test data provided with each tube.

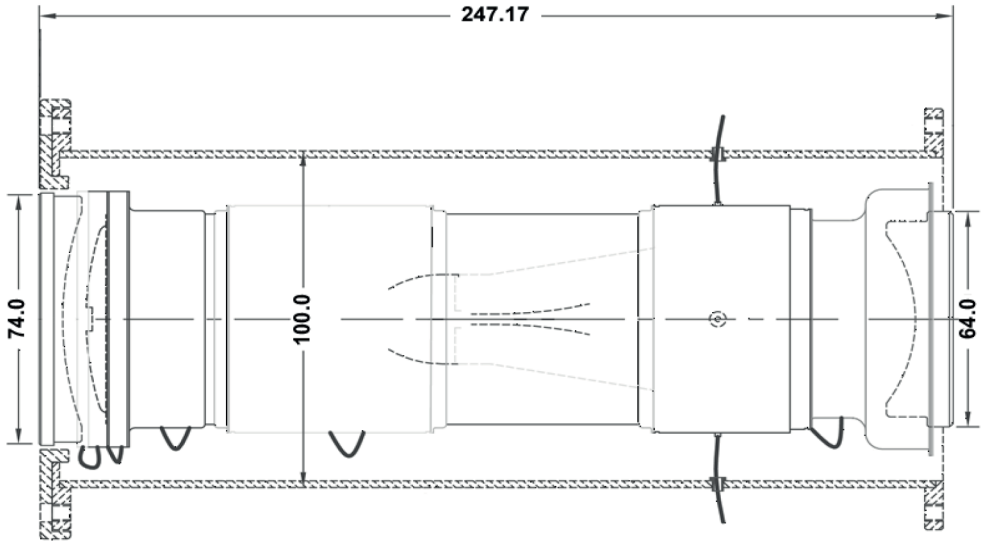
## Environmental

Operational Limits: -40°C to +45°C
Storage: -40°C to +60°C

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## Mechanical




Dimensions (mm) are indicative and may vary depending on the optics and housing required.

## Optimisation and Operating Voltage

Below are Photek's suggested operating voltages to run the streak tube in 'Test mode' for high resolution, or in 'HDR mode'.

These voltages should only be used as a guide when operating the streak tube as fine tuning of these values is required specific to each tube.

| Mode | Voltages (V) | | | | Magnification | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cathode | Grid | Focus 1 | Focus 2 | Time | Spatial | Resolution Spatial Micron | Working Area (mm) 20x | Time Resolution (ps) |
| Test Mode | 10,113 | 9,904 | 9,050 | 8,860 | 0.61 | 0.61 | 45 | 0.5 | 10 |
| HDR Mode | 15,000 | 12,500 | 12,500 | 14,538 | 0.61 | 0.61 | 25 | 0.5 | 10 |

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## About Photek

**Photek is a specialist manufacturer of vacuum based tubes and camera systems for photon detection.**

Our product range includes; Camera Systems, Image Intensifiers, Photomultiplier Tubes, Streak Tubes plus a range of associated electronics.

We are experts in large area and ultra-high speed imaging and advanced photon counting camera systems.

Our continuing success is built upon continuous innovation and product development, and by harnessing and applying knowledge to find solutions for all of our customers' applications.

**Photek is accredited to ISO 9001 and ISO 14001.**

## Contact Us

**Our team of specialist engineers and scientists are ready to discuss your application requirements in depth.**

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**Photek Ltd** reserves the right to update and improve this document without prior notice.