LYSO/LSO SCINTILLATION CRYSTAL BLANK SPECIFICATIONS

LSO, Lutetium Orthosilicate, when activated with small molar percentage of Cerium is an efficient High Z, Fast scintillator. The crystal is brittle and to ensure machinability and better scintillation performance, Yttrium is added in various percentages to enhance the overall properties of this scintillation crystal phosphor. Yttrium Silicate, YSO, has the same structure as LSO and the content of either Lu or Y can be adjusted from 15%-18% as a mixed crystal system. Yttrium content addition can vary dependent on the application. An optimum concentration is $\leq$ 5%

Physio-Chemical Properties

Chemical Name:	LUTETIUM OXYORTHOSILICATE
Chemical Formula:	Lu_2SiO_5:Ce
Density (g/cm^3)	7.4
Effective Atomic No.	75.1
Type	Single Crystal
Structure	C2/c
Optical Quality	Clear
Index of Refraction	1.82
Mechanical Behavior at Room Temp.	Brittle
Cleavage	None
Hardness (Mho)	5.8
Rugged	Yes
Hygroscopic	No
Melting Point (^{0}C)	2050

Radiation-Scintillation Properties

Relative light yield, PH (%)-PMT	>45 usually 45-75 (compared to NaI(Tl))
Photon Yield/Mev (PMT Sensor)	27,300
Photon Yield/Mev (Si-PD Sensor)	19,500
Is/Id(amps)PMT-Relative to NaI(Tl)	75
ΔE/E-% FWHM for **Dia. = Ø60" x 10mm L**	**10.4 BEST MEASURED(7.9% smaller size)**
Emission Peak Wavelength (nm)	420
Decay Constant At Room Temp. (ns)	35-47
Afterglow at 3 msec (%)	
Rise Times-ns (10%-90%)	
Linear Attenuation Coeff. (cm^{-1})	0.888 (for 500 Kev)
Radiation Length (cm)	1.14
Radiation Hardness To γ Ray (rad)	>10^6
Background	**300 c/s/cm^3**

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Dimensions: **Length**_____ **Width**_____**Height**_____

OR

Diameter_____ **Length**_____

OR **For Other Geometries Attach a Drawing or Sketch**

Tolerances: All dimensions +.25/-.00mm (+.010"/-.000")

Resolution: For **Dia.** = **Ø10mm x 10mm Length ≤** to 10% FWHM @ 662Kev for Cs137*

Appearance: Crystal blanks are to be water white with NO visual imperfections. Such imperfections typically include flock & inclusions, striae, edge cracks due to heat fractures, etc. - The crystal blank should be free from these defects.

*As measured with a catalog spec. Hamamatsu R-1306 2" PMT or equivalent

It is not necessary to measure each and every blank. A representative sample cut from the same boule or ingot-section should meet this performance criteria.

All surfaces supplied be at minimum industry-standard scintillation polish, unless otherwise specified.

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