

GAMMA RAY SHIELDING GLASS

Pro-GR lead shielding glass was developed to protect against high radiation gamma rays used in PET scan facilities. An observation window of a PET scan facility requires higher radiation shielding performance than that of a conventional X-ray or CT room (0.511 MeV). Pro-GR is made of glass materials having a lead oxide content rate of roughly 70% that is equivalent to ultra-high lead content block glass for nuclear power facilities. Pro-GR has a radiation shielding capability higher than that of conventional LX-57B, X-ray shielding glass.

APPLICATIONS

- PET treatment facilities



GENERAL CHARACTERISTICS

	PRO-GR 14.7	PRO-GR 21.8
THICKNESS (MM)	14.7	21.8
EFFECTIVE DOSE TRANSMISSION FACTOR* (%)	52.6	36.0
LEAD EQUIVALENT (MMPB)	5.0	7.5
MAXIMUM SIZE (MM)	1,000 x 1,500	1,000 x 1,500
SPECIFIC GRAVITY	Min. 5.20	Min. 5.20
KNOOP HARDNESS	320	320
VISIBLE LIGHT TRANSMISSION	83%	83%

*Values for effective dose transmission factor and lead equivalent are for gamma rays (0.511 MeV)

NOTE: "Seeds" or minute air bubbles exist inside Pro-GR as it is made of special glass materials. This, however, does not adversely affect its radiation shielding performance.

SHIELDING PERFORMANCE AGAINST GAMMA RAYS

In calculating the shielding performance of Pro-GR against 0.511 MeV gamma rays, the Monte Carlo simulation is used to calculate the build-up factor of Pro-GR glass, and calculates the effective dose transmission factor in accordance with the Manual for Shielding Calculation of Radiation Facilities, 2000 (issued by the Nuclear Safety Technology Center). In calculating the lead equivalent of Pro-GR, the thickness of Pro-GR was designed so that the effective dose transmission factor is equivalent to the effective dose transmission factor of lead calculated by taking the build-up factor into account as shown in the following table.

EFFECTIVE DOSE TRANSMISSION FACTOR OF LEAD FOR 0.511 MEV GAMMA RAYS AND THICKNESS OF PRO-GR CORRESPONDING TO EACH THICKNESS OF LEAD

LEAD		PRO-GR	
THICKNESS	EFFECTIVE DOSE TRANSMISSION FACTOR	PRO-GR THICKNESS RECOMMENDED (CORRESPONDS TO LEAD EFFECTIVE DOSE TRANSMISSION)	RECOMMENDED PRODUCT
5.0 mm [1.21]	52.6	14.2 mm [1.33]	Pro-GR 14.7 mm
7.5 mm [1.25]	36.0	21.3 mm [1.45]	Pro-GR 21.8 mm

Note: Numbers in brackets [] are reference values and are the build-up factors of Lead and Pro-GR.

In the case of 0.2 MeV X-Rays, the effective dose transmission factor of lead at 5mm thickness is 0.48% and 7.5mm is .0033%.