

Advertisement for Incubation of Technology

Title of the technology	Radiation Shielding Lead Glass Slab Manufacturing
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Current state of Technology

Manufacturing technology is available for processing, cutting and polishing lead glass at 20 kg scale with laboratory facilities in house at BARC. Technology transfer EG42TDD detailing the components involved in production has been published on BARC website.

General Information

Radiation shielding window requires varying thickness and varying density glass slabs that are combined to provide sufficient shielding in a radioactive containment facility. It is sought through the incubation that industrial scale glass products with specifications detailed in deliverables be provided by incubatee.

Features/Specification of system

Parameters	<i>For Current System</i>	<i>For Target System</i>
Size	200 mm × 200 mm × 100 mm	750 mm × 750mm × 200 mm
Weight	20 kg scale	800-1000 kg scale
Composition	Formulation < 5 g/cc	Formulation > 5 g/cc

Working of the System (with schematic block diagram)

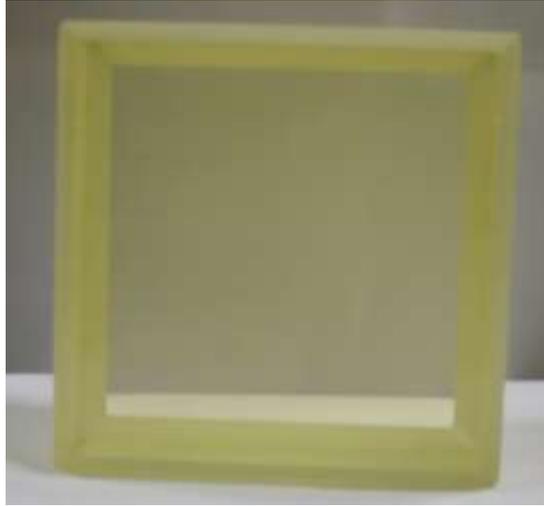
The specifications in Deliverables describes workability requirement of glass slab

Applications of the System

A shielded containment is required for handling radioactive isotopes to avoid exposure due to associated hazards. This containment is called as hot cell. RSWs are used as a viewing gadget in radioactivity containment application areas called hot cell applications. It aids to address the viewing requirements as well as shielding aspects. The high-density glass slab is an important component of a composite RSW, since it aids cutting down the radiation with minimum thickness. The radiation shielding glass slab serves as barrier material requiring visibility for

- X-ray facilities
- Radioactive Laboratories
- Nuclear Facilities
- Irradiation Facilities

Picture/Photo of the System –



Lead Glass Slab Photograph suggesting visibility through glass

Whether the parent product/ technology/ process is patented: Yes/No No

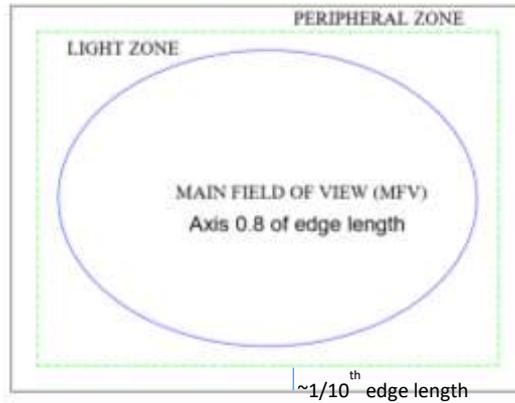
If yes, provide the details –

Deliverables –

Physical Properties

- The product density required is >5 g/cc
- The size of glass slab required is 750 mm x 750 mm x 200 mm
- The refractive index of glass slab is ~ 1.8
- The Dispersion of light from slab is $\sim 25\%$
- Reflection Loss from surface plane is $\sim 8\%$ or lower
- Internal Transmission should be better than 0.9 for wavelengths 546 nm, 589 nm & 632.8 nm
- Tolerances for overall dimensions a) Length/ width: ± 6 mm
b) Thickness: ± 2 mm. c) Flatness: Maximum 10 Newton Rings when controlled with a 30 mm test glass
- Chamfer at any edge 6 mm to 8 mm
- Internal Quality
 - a) Bubbles/ Inclusions: Maximum projected area of all inclusions with respect to total area for 10 mm thickness of the glass shall be within 0.001 % of the viewing area of the glass.
 - b) Permitted maximum size of inclusions is 2 mm for < 200 cm²
Not more than 2 % of the total inclusions shall have maximum size mentioned.
 - c) Striae: The viewing zone of the glass slabs shall have no appreciable striae, which are visible to naked eyes with day light/ normal hot cell illumination. Sensitive shadow method shall be used for testing striae. Striae appearing in the light zone and inside peripheral zone shall not visibly distort the object.

Glass slab observation Zones



Radiation Tolerance

- Optical Density for Radiation Exposure of 1000 R/h ⁶⁰Co should be better than 0.001 for 10 mm thick sampled piece from slab (Total 20 sampled points from slab should show consistency)

Justification for Incubation –

For processing large scale radiation shielding glass slab it is required to outsource the product development to an incubatee that has the infrastructure for processing 800 to 1000 kg glass slab at a time. Manpower needs to be spared for the production of this scale product.

Facility and Infrastructure requirements:

Facility and Infrastructure to be provided by Incubatee/BARC:

Process Technology would be provided by BARC.
Manpower of incubatee would engage is product development
Machinery and Equipment All equipments and infrastructure for radiation shielding glass slab production shall be under the purview of incubatee.
Irradiation and Qualification of product would be by BARC personnel
Transportation from site of incubatee to BARC would be covered by incubatee.

Note: As per in-house technology incubation policy, the incubatee should be a licensee of the existing technology. Alternatively, the applicant will be required to take the license of the existing technology before entering incubation agreement.

If interested in Incubation, kindly **download -> fill -> scan -> send and mail** the application form to -

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