

Standard Geophysical Detectors Ruggedized Assemblies

As the industry leader in ruggedized radiation detector solutions, Saint-Gobain Crystals builds into each detector the expertise and experience required to meet both present and future industry demands for reliable performance under extreme environments.

Design Considerations -

Complex sets of dynamic engineering principles are used in the design of our geophysical detectors to assure that they meet both mechanical survivability and performance specifications demanded by the Logging Service Industry. Each gamma ray tool requires a custom detector design. The fundamental elements of a downhole device must take into account the following considerations:

- Space Constraints
- Environmental Considerations (Temperature, Shock, Vibration)
- Nuclear Performance Demands
- Energy of Interest (Gross Counting vs. Spectral)
- Photomultiplier Tube Performance

Reasons for high performance of Saint-Gobain product:

- Patented Polyscin® NaI(Tl) provides enhanced resistance to thermal / mechanical shock
- All-welded package ensures hermiticity in harsh environments
- Unique glass-to-metal sealing technology for high temperature reliability
- Photomultiplier tube integration options for turnkey detection solutions



Survivability and Performance -

Two different packaging design technologies are offered for ruggedized detectors. The glass-to-metal or soldered eyelet seal, combined with the all-welded package construction, constitutes the basis for Geophysical survivability. Both designs provide detectors with the strongest, most reliable hermetic seals possible.

Our seals withstand temperature extremes and cycling stresses that eventually cause both epoxy and other seals to fail. Sodium iodide (the principal scintillator in Wireline and MWD applications) is a brittle, reactive material sensitive to thermal shock. By placing the crystal in the Geophysical package under substantial compression, we assure the survival of the sodium iodide crystal at the limits of Wireline and MWD shock and vibration. [Note: We also provide CsI(Na), BGO and other scintillation materials to the industry. Plus, we have LaBr₃:Ce¹ scintillators for unprecedented light output and PHR in your legacy design.]

Our MWD detector technology incorporates all the dynamic design considerations of our ruggedized detectors with the advantages of an integrated photomultiplier tube and engineered design, thus allowing for unmatched survivability and performance of a fully functioning gamma ray detector system.

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Standard Product Definitions, General Specifications -

G - Styles Crystal Package - Standard with glass to metal seals

Operating Temperature	+25°C to +175°C
Survival Temperature	-20°C to +200°C
Gradient	3°C per minute maximum
Mechanical Survival Shock	100g @ 11ms - 3 shocks per axis; 2 axis total. (X & Z)
Vibration	Random 5g _{RMS} 50-500Hz 15 minute duration per axis; 2 axis total

SG & SG-XR - Styles Crystal Package - Standard with glass to metal seals

Operating Temperature	+25°C to +175°C
Survival Temperature	-20°C to +200°C
Gradient	3°C per minute maximum
Mechanical Survival Shock	1000g @ 1ms - 3 shocks per axis; 2 axis total. (X & Z)
Vibration	Random 20g _{RMS} 30-1000Hz 30 minute duration per axis; 2 axis total

Mechanical Performance * (-XR Type Only)

Vibration	Random 20g _{RMS} 30-1000Hz 2.5 minute duration per axis; 2 axis total per the following power spectral density profile: 30-80Hz. @ 6db/octav 80-1000Hz .43g ² /Hz
Acceptance Criteria	Vibration induced counts per second not to exceed base + 2 X SQRT(BASE)

MG Style Integrated Detector Assemblies for Wireline Applications

Operating Temperature	+25°C to +150°C
Survival Temperature	-20°C to +175°C
Gradient	3°C per minute maximum
Mechanical Survival Shock	100g @ 11ms - 3 shocks per axis; 2 axis total. (X & Z)
Vibration	Random 5g _{RMS} 50-500Hz; 2 axis total

MWD and MWD-XR Style Integrated Detector Assemblies for MWD Applications

Operating Temperature	+25°C to +150°C
Survival Temperature	-20°C to +175°C
Gradient	3°C per minute maximum
Mechanical Survival Shock	1000g @ 1ms - 3 shocks per axis; 2 axis total. (X & Z)
Vibration	Random 20g _{RMS} 30-1000Hz 30 minute duration per axis; 2 axis total

Mechanical Performance * (-XR Type Only)

Vibration	Random 20g _{RMS} 30-1000Hz 2.5 minute duration per axis; 2 axis total per the following power spectral density profile: 30-80Hz. @ 6db/octav 80-1000Hz .43g ² /Hz
Acceptance Criteria	Vibration induced counts per second not to exceed base + 2 X SQRT(BASE)

Custom Temperature, Shock, and Vibration Specifications available upon request.



Saint-Gobain Crystals

www.crystals.saint-gobain.com

¹ Protected under patents US7,067,816B2, US7250609B2, EP1257612B1*, EP1516078B1, ZL03813659.7, UA75066C2, US7067815B2, US7233006B2, EP1255796B1*, EP1516078B1, ZL01805267.3, ZL03813659.7, EP1516078B1, UA75591C2, UA75066C2
*These original patents were granted to Stichting Voor de Technische Wetenschappen. Inventors are P. Dorenbos, C.W.E. van Eijk, H.U. Gudel, K.W. Kraemer, E.V.D. van Loef.
Technology is licensed to Saint-Gobain Cristaux & Detecteurs.

Manufacturer reserves the right to alter specifications.

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