

## GENERIC SPECIFICATION

### HPGE0001

### Gamma Spectrometer with high purity Germanium Detector

#### 1. Scope

- 1.1. This Specification describes the standard requirements for a high-resolution gamma spectrometry system for the verification and determination of gamma emitting radionuclides (hereinafter referred to as 'the System').
- 1.2. Requests to vary from this Specification must be supplied with supporting evidence and are subject to approval of the IAEA technical officer.

#### 2. Applicable Documents

The following documents shall be applicable to this specification:

- 2.1. DOE/ER-0457T (1990) Standard NIM Instrumentation System
- 2.2. IEEE Std 325-1996 - IEEE Standard Test Procedures for Germanium Gamma-Ray Detectors

except as modified by IAEA requirements.

#### 3. Requirements

The System shall include the following equipment and functionality:

- 3.1. Cooling system to be liquid nitrogen with cryostat, and automatic shutdown of detector high voltage in case of detector warm-up.
- 3.2. Detector shielding to be graded lead, thickness 10cm, with Sn and Cu liner to prevent interference by lead X-rays.
- 3.3. Integrated desktop MCA, preamplifier and high voltage power supply, pole zero adjustment option, and communication interface to the computer.
- 3.4. Desktop computer and monitor, compatible with the equipment software with the following minimum specifications: Intel Core 2.30 GHz CPU, 4 GB RAM, 500 GB Hard Disk, DVD +/- RW Drive, Ethernet and USB Interfaces, 20inch display, and the latest Windows operating system.
- 3.5. Gamma Spectrometry Software with all needed components to control the System, including the MCA, spectrum acquisition and analysis, and for reporting results. The software interface and operation manual shall be in the English language.
- 3.6. Dewar flask of at least 20 litre capacity, suitable to refill liquid nitrogen in the detector Dewar, with all required tubes and fittings.



- 3.7. All required connecting cables and adapters.
- 3.8. The minimum System performance shall be as shown in Table 1 below.

#### **4. Marking and Packing**

- 4.1. The System shall have all safety markings in the English language.
- 4.2. The System, for the shipment to the Counterpart, shall be packed in accordance with international standards that are applicable for the shipment by air of this kind of equipment.

#### **5. Quality Requirements**

- 5.1. The System shall be manufactured and installed in accordance with the Supplier's ISO quality assurance system or an equivalent quality assurance system. The Supplier shall retain documents demonstrating compliance and provide them on request.
- 5.2. The System, prior to shipment, shall be tested for conformance of the System with manufacturer's performance specifications and the minimum requirements specified herein.
- 5.3. The System, after installation, shall be tested by the Supplier together with the Counterpart to demonstrate that the performance meets the manufacturer's performance specifications and the minimum requirements specified herein.

#### **6. Installation and Training**

- 6.1. The Supplier shall install the System at the Counterpart location. Prior to installation, the Supplier shall confirm with the Counterpart that all required facilities and materials are available.
- 6.2. The Supplier shall provide three (3) days training for three (3) staff of the Counterpart in the operation and maintenance of the System at the Counterpart's location, immediately after the installation of the System.
- 6.3. On completion of installation, testing, and training the Supplier shall obtain a certificate of completion from the Counterpart and forward it to the IAEA.

#### **7. Deliverable Data Items**

- 7.1. The Supplier shall provide two (2) complete sets of operation and servicing manuals and technical drawings in the English language.
- 7.2. The Supplier shall provide diagrammatic evidence of System performance based on Monte Carlo simulations, or equivalent.

## 8. Support

- 8.1. The System shall be supplied with a comprehensive warranty, valid for one (1) year from the date of the certificate of completion.
- 8.2. The Supplier shall identify a support plan appropriate for the Counterpart, with full contact details. In-country or regional support is preferred.
- 8.3. The Supplier shall list required consumables, any routine or preventative maintenance that is recommended, and components where replacement is expected within a typical ten-year life span.

Table 1: Minimum System Performance

Parameter	Performance	Notes
Relative efficiency	30%	
Detector	P-type	
Resolution	1.8 keV	Full width half maximum, at 1.33 MeV photon energy
P:C ratio	57:1	Peak to Compton, at the detector
Spectral memory	16 000 channels	