

Classification name*	Short description of item specified: SiliconDriftDetector	 IAEA International Atomic Energy Agency	IAEA Specification Dated 2024-05-17
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SPECIFICATION

A Silicon Drift Detector and readout units

1. Scope

- 1.1. This specification describes the requirements for the following equipment : A Silicon Drift Detector with Charge Sensitive Preamplifier and its accessories including power supply, cables, controller, signal processing unit and software (hereinafter referred to as the “System”). The System shall be installed at the end-station of the Tandem Accelerator Facility as a X-ray detector system.
- 1.2. The equipment shall be supplied as a single delivery to the Plasma and Beam Physics Research Facility, Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, Thailand (hereinafter referred to as the “End-User”) under TC project TH1016.

2. Requirements

2.1. Functional and Performance Requirements

The System shall:

- 2.1.1. consist of one or more SDD X-ray detectors, Charge Sensitive Preamplifier, signal processing unit, associated electronics and software to determine and display the intensity of X-rays;
- 2.1.2. be able to detect and collect X-rays with energies in the range 1.5 to 40 keV with a high count rate capability;
- 2.1.3. have energy resolution equal to or better than 130 eV at FWHM at 5.9 keV;
- 2.1.4. have a peak to background ratio of 15000 or better (peak count at 5.9 keV divided by average counts between 1.6 keV and 3.2 keV background using Fe-55) at 1 μ s peaking time;
- 2.1.5. include all ancillary equipment that is necessary to ensure the performance stated;
- 2.1.6. include all necessary interfaces, cabling, and licensed software(s) for installation, configuration and operation with perpetual licences;
- 2.1.7. be compatible with LabView programming;
- 2.1.8. operate under atmosphere and an Ultra High Vacuum (UHV) environment; and
- 2.1.9. be optimized for an input count rate of at least 0.9 million counts per second;
- 2.1.10. have an adjustable detector arm length (manual) with a CF40 bellows sealed adapter with adjustable length of detector snout between 100 and 300 mm from the face of the CF40 flange

1.1. Technical Requirements

The System shall:

- 1.1.1. have total active area equal to or larger than 50 mm²;

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- 1.1.2. have sensor thickness in the range of 0.4 to 0.5 mm;
- 1.1.3. have an X-ray window with a transmission equivalent to that through 25 micrometres or less of beryllium.
- 1.1.4. be suitable for operation in in a laboratory environment, +5°C to +40°C and 20 to 80% humidity (no condensation)
- 1.1.5. have a cooling system for the detector (e.g. Peltier, pulse tube or similar technology); and
- 1.1.6. operate with single-phase 210-230 volts AC power at 50 Hz.;

2. Marking

The System shall have all safety markings in English language.

3. Packing

The System, for the shipment by air to the End-User, shall be packed in accordance with international standards that are applicable for the shipment by air of this kind of equipment.

4. Quality Requirements

- 4.1. The System shall be manufactured and packed in accordance with the Contractor's ISO quality assurance system or an equivalent quality assurance system.
- 4.2. The Contractor shall document the compliance with this quality assurance system.

5. Testing and Acceptance

The System, prior to shipment, shall be tested for conformance of the System with manufacturer's performance specifications and the minimum requirements specified herein;

The results of the testing of the System shall be documented by the Contractor and submitted to the End-User.

6. Deliverable Data Items

The Contractor shall provide:

- 6.1. Two (2) complete sets of operation and servicing manuals and technical drawings in English; and
- 6.2. A copy of the test report for the system in English.