



**ITER-India**  
(Institute For Plasma Research)



<b>Title</b>	<b>Tender No. I-I/TN/ET-TPT/22005/22-23 dated 20-02-2023 for Silicon Drift Detector System with Vacuum Accessories</b>
<b>Sub Title</b>	<b>PART-A (II): Scope of Supply &amp; Work and Technical Specifications</b>

**ITER-India, Institute for Plasma Research**  
**Block A, Sangath Skyz, Bhat-Motera Road, Koteswar,**  
**Ahmedabad 380005, Gujarat, India**





**Title: Silicon Drift Detector System with Vacuum Accessories**

Tender Notice No.

I-I/TN/ET-TPT/22005/22-23

**I. Scope of supply and scope of work**

<b>S. No</b>	<b>Description</b>	<b>Quantity</b>
1.	Supply of Silicon Drift Detector System as per specification in section II.	02 sets
2.	The system should be appropriately packaged and supplied on a free door delivery basis at the purchaser site (Iter-India, lab)	
3.	Site inspection and acceptance test as per APPENDIX 1	



## II. Technical specifications of Silicon Drift Detector System (Qty. 2)

#	Parameter	Unit	ITER-India specifications
<b>A. Detector</b>			
1.	Sensor type	-	Silicon Drift Detector (SDD)
2.	Sensor active area	mm <sup>2</sup>	25 to 30
3.	Energy resolution @5.9keV	eV	120 - 150
4.	Range of energy measurement	eV	Lower energy threshold: 120 ± 4
			Higher Energy threshold: 50000 or higher
5.	Detector window	-	Si <sub>3</sub> N <sub>4</sub> or equivalent for low energy photons
6.	Linearity of response	-	Up to nearly million counts
7.	Preamplifier	-	Built-in the sensor
8.	Peltier cooler	-	2 stage, Built-in the sensor
9.	Temperature sensor	-	Built-in the sensor
Additional Information to be provided by the bidder			
10.	Sensor thickness		To be provided by Bidder
11.	Internal Collimator	-	Information to be provided by Bidder
12.	Peak-to-background ratio	-	Information to be provided by Bidder
13.	Quantum efficiency	%	Information to be provided by Bidder
14.	Gain stability	-	To be provided by Bidder
15.	Maximum Radiation level on the sensor	Gray	To be provided by Bidder
16.	Radiation hardness level	Gray	To be provided by Bidder
<b>B. Vacuum Feedthrough for the extender</b>			
17.	Length of sensor extension	mm	~120, Suitable for High vacuum feedthrough
<b>C. Vacuum Feedthrough for in-vacuum mounting of detector</b>			
18.	Feedthrough on flange		Suitable for High vacuum operations ~ 10 <sup>-7</sup> mbar
19.	Cables and connectors		Both air and vacuum side cables are to be supplied with the unit.



**Title: Silicon Drift Detector System with Vacuum Accessories**

Tender Notice No.  
I-I/TN/ET-TPT/22005/22-23

<b>D. Variable external Collimator Kit</b>			
20.	Complete Collimator kit usable in air and vacuum		Complete collimator kit including housing, extender, collimator disks etc.
<b>E. Fixed external Collimator</b>			
21.	External collimator for X-rays energy < 40 keV		Should be compatible with internal collimator of SDD detector
<b>F. Data Processor Unit (DPU)</b>			
22.	Digital pulse processor	-	Built in DPU
23.	Multichannel analyser	-	with max 8192 channels and built in DPU
24.	Regulated Power supply	-	Built in DPU
<b>G. Others</b>			
25.	Softwares	-	<ul style="list-style-type: none"><li>- All applications for detector control, data acquisition and display.</li><li>- The software should be compatible with MS Windows 10 operating system.</li><li>- All supplied software should be made available with a perpetual license.</li></ul>
26.	Data Communication port	-	USB or Ethernet – details of all interfaces to be provided by Bidder
27.	Cables and connectors	-	All cables and connectors to be supplied — details to be provided by Bidder
28.	Standard accessories	-	All standard accessories including mounting hardware, vacuum feedthrough, electrical feedthrough and cables, external collimator – details to be provided by Bidder
29.	Input electrical power	-	230 V AC, 50 Hz, Single phase
30.	Power consumption (unit wise)	W	To be provided by Bidder
31.	Working (and storing) temperature range	0C	To be provided by Bidder
32.	Working (and storing) humidity range	%	To be provided by Bidder
33.	Overall dimensions	mm	To be provided by Bidder



**Title: Silicon Drift Detector System with Vacuum Accessories**

Tender Notice No.

I-I/TN/ET-TPT/22005/22-23

	(LxWxH) of each unit		
34.	Overall weight of each unit	Kg	To be provided by Bidder
35.	Device lifetime	year	To be provided by Bidder
36.	Warranty	year	1 year

**Additional Requirements:**

1. The bidder should quote for the complete Silicon Drift Detector system including the detector head, data processor unit (DPU), cables and connector, and all other standard accessories.
2. The Bidder must fill out the last two columns of the Appendix -2 with the specification/ remark.
3. The quote should include a detailed data sheet supporting the offered product and technical specifications, diagrams, and outline drawings.
4. The complete manuals including the operation manual, and maintenance manual need to be supplied at the time of delivery of the detector system
5. As the detector system is fragile the bidder is responsible and liable for appropriate packaging.

**III. Acceptance test criterion**

The acceptance test criterion is as follows:

**A: Pre-dispatch tests/Factory acceptance tests**

For shipment clearance of the detector, the Bidder needs to send a complete test report (details of the tests are attached in Appendix 1).

**B: Acceptance tests at ITER-India laboratory/Site acceptance tests**

The final acceptance of the detector will be given after visual inspection, BOM and appropriate test conforming to the technical specification and performance of the detector system by the purchaser at Iter-India, lab in the presence of the bidder's representative.

## **Appendix-1**

### **Proposed Acceptance tests**

Tests to be carried out for confirming the performance of the Solid-state drift detector (SDD) system and test results need to be supplied for shipment clearance by ITER-India, IPR.

Acceptance test report/certificate containing the following information:

1. Energy spectra measured with Fe-55+ radioactive source.
2. Energy resolution test
3. Vacuum test for operation in High vacuum  $\sim 10^{-7}$  mbar, and leak rate  $1 \times 10^{-9}$  mbar l/s or better for feedthrough.



**Appendix-2**  
**Technical Compliance Matrix**

#	Parameter	Unit	ITER-India specifications	Bidder's specifications	Compliance Yes/No to be filled by the bidder
<b>A. Detector</b>					
	Sensor type	-	Silicon Drift Detector (SDD)	To be filled by Bidder	
2.	Sensor active area	mm <sup>2</sup>	25 to 30	To be filled by Bidder	
3.	Energy resolution @5.9keV	eV	120 - 150	To be filled by Bidder	
4.	Range of energy measurement	eV	Lower energy threshold: 120 ± 4 Higher Energy threshold: 50000 or higher	To be filled by Bidder	
5.	Detector window	-	Si <sub>3</sub> N <sub>4</sub> or equivalent for low energy photons	To be filled by Bidder	
6.	Linearity of response	-	Up to nearly million counts	To be filled by Bidder	
7.	Preamplifier	-	Built-in the sensor	To be filled by Bidder	
8.	Peltier cooler	-	2 stage, Built-in the sensor	To be filled by Bidder	
9.	Temperature sensor	-	Built-in the sensor	To be filled by Bidder	
Additional Information to be provided by the bidder					
10.	Sensor thickness		To be provided by Bidder	To be filled by Bidder	
11.	Internal Collimator	-	Information to be provided by Bidder	To be filled by Bidder	
12.	Peak-to-background ratio	-	Information to be provided by Bidder	To be filled by Bidder	



**Title: Silicon Drift Detector System with Vacuum Accessories**

Tender Notice No.

I-I/TN/ET-TPT/22005/22-23

13.	Quantum efficiency	%	Information to be provided by Bidder	To be filled by Bidder
14.	Gain stability	-	To be provided by Bidder	To be filled by Bidder
15.	Maximum Radiation level on the sensor	Gray	To be provided by Bidder	To be filled by Bidder
16.	Radiation hardness level	Gray	To be provided by Bidder	To be filled by Bidder
<b>B. Vacuum Feedthrough for the extender</b>				
17.	Length of sensor extension	mm	~120, Suitable for High vacuum feedthrough	To be filled by Bidder
<b>C. Vacuum Feedthrough for in-vacuum mounting of detector</b>				
18.	Feedthrough on flange		Suitable for High vacuum operations  ~ 10 <sup>-7</sup> mbar	To be filled by Bidder
19.	Cables and connectors		Both air and vacuum side cables are to be supplied with the unit.	To be filled by Bidder
<b>D. Variable external Collimator Kit</b>				
20.	Complete Collimator kit usable in air and vacuum		Complete collimator kit including housing, extender, collimator disks etc.	To be filled by Bidder
<b>E. Fixed external Collimator</b>				





**Title: Silicon Drift Detector System with Vacuum Accessories**

Tender Notice No.

I-I/TN/ET-TPT/22005/22-23

21.	External collimator for X-rays energy < 40 keV		Should be compatible with internal collimator of SDD detector	To be filled by Bidder	
<b>F. Data Processor Unit (DPU)</b>					
22.	Digital pulse processor	-	Built in DPU	To be filled by Bidder	
23.	Multichannel analyser	-	with max 8192 channels and built in DPU	To be filled by Bidder	
24.	Regulated Power supply	-	Built in DPU	To be filled by Bidder	
<b>G. Others</b>					
25.	Softwares	-	<ul style="list-style-type: none"><li>- All applications for detector control, data acquisition and display.</li><li>- The software should be compatible with MS Windows 10 operating system.</li><li>- All supplied software should be made available with a perpetual license.</li></ul>	To be filled by Bidder	
26.	Data Communication port	-	USB or Ethernet <ul style="list-style-type: none"><li>— details of all interfaces to be provided by Bidder</li></ul>	To be filled by Bidder	
27.	Cables and connectors	-	<ul style="list-style-type: none"><li>All cables and connectors to be supplied</li><li>— details to be provided by Bidder</li></ul>	To be filled by Bidder	



**Title: Silicon Drift Detector System with Vacuum Accessories**

Tender Notice No.

I-I/TN/ET-TPT/22005/22-23

28.	Standard accessories	-	All standard accessories including mounting hardware, vacuum feedthrough, electrical feedthrough and cables, external collimator  – details to be provided by Bidder	To be filled by Bidder	
29.	Input electrical power	-	230 V AC, 50 Hz, Single phase	To be filled by Bidder	
30.	Power consumption (unit wise)	W	To be provided by Bidder	To be filled by Bidder	
31.	Working (and storing) temperature range	0C	To be provided by Bidder	To be filled by Bidder	
32.	Working (and storing) humidity range	%	To be provided by Bidder	To be filled by Bidder	
33.	Overall dimensions (LxWxH) of each unit	mm	To be provided by Bidder	To be filled by Bidder	
34.	Overall weight of each unit	Kg	To be provided by Bidder	To be filled by Bidder	
35.	Device lifetime	year	To be provided by Bidder	To be filled by Bidder	
36.	Warranty	year	1 year	To be filled by Bidder	