



ITER-India
(Institute For Plasma Research)

Global Tender Notice No.
I-ITN19006 dated 11.10.2019

Title	Supply, Installation, Commissioning and Final Acceptance Testing of 2 units of High Resolution Spectrometer System with Accessories
Sub Title	PART-A (II): Scope of Supply, Work and Technical Specifications

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Supply of two number of High resolution Spectrometer system with accessories, CCD detector, imaging fiber adapter, fiber array, system integration, control and data acquisition

Scope of work

The Scope under this Tender Notice is the following.

- Supply of two number of High resolution Spectrometer system with accessories, CCD detector, imaging fiber adapter, fiber array, system integration, control and data acquisition.
- Installation, Testing and acceptance test as per Appendix-2. At Factory
- Installation and commissioning, testing and acceptance at ITER India lab, IPR Gandhinagar
- Packaging and transport is also included in the scope of supplier

Technical Specifications

ITER-India intends to procure two integrated systems comprising of spectrograph, CCD detector, imaging fiber adapter, fiber bundle with a coupling ferrule and external shutter. Accordingly, the technical specifications are grouped into five categories: 1) Imaging spectrograph 2) Imaging fiber adapter and fiber array 3) CCD detector 4) System Integration, Control and Data acquisition and 5) Acceptance test

I.A) Technical specifications of Imaging Spectrograph

Sr No	Item	Specification	Description
1	Type Mount	Visible imaging spectrograph Preferably Czerny-Turner Usable wavelength range 300 – 1000 nm	Any modified Czerny Turner complying with ITER-India technical specifications can also be quoted as an option.
2	F#(F-number)	5 to 7	Vendor may choose to quote the appropriate focal length of the instrument which yields the desired F# in the specified range.



3	Image distortion# at the exit focal plane	Less than 22% image distortion across the focal plane.	# <i>Image distortion means the size of the image at the focal plane after correcting all the aberrations such as spherical aberrations, astigmatism etc.</i>
4	Required no of gratings Grating groove density Grating no .1 Grating no .2 Grating no. 3 Grating configuration/mount :	Three 1800 1/mm Plane reflecting holographic 1200 1/mm Plane reflecting holographic 600 1/mm (Ruled) Turret	
5	Linear dispersion (nm/mm)	1.0 to 0.8 nm/mm for Grating no.1 1.5 to 1.3 nm/mm for Grating no .2 3.5 to 2.8 nm/mm for Grating no.3	
6	Wavelength resolution with CCD detector	≤ 0.06nm across the focal plane for Grating no.1 ≤ 0.08nm across the focal plane for Grating no.2 ≤ 0.15 nm across the focal plane for Grating no.3	This is to be achieved, when the input slit width is nearly equal to the pixel size of the CCD detector.
7	Wavelength coverage with CCD detector	13-10 nm for Grating no.1 20-17 nm for Grating no.2 45-35nm for Grating no.3	

I.B) Entrance and exit ports with slit assembly

1	No of entrance ports	One motorized slit assembly One manual bilateral slit	Externally controlled motorized micrometers to vary the slit width.
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2	No of exit ports	One for mounting CCD detector One manual bilateral slit assembly	The additional exit port should be similar to the manual slit assembly used at the entrance port.
3	Diverter mirrors	One at Entrance One at Exit	To select entrance and exit ports.

I.C) External shutter

1	Shutter	Shutter for entire CCD exposure	Shutter to be mounted at the entrance port of the spectrograph.
2	Shutter Open time	$\leq 20\text{ms}$	
3	Delay in close and opening	$\leq 20\text{ms}$	

II) Technical specifications of Imaging fiber adapter and fiber array

Sr no	Item	Specification	Description
1	Optical fiber array terminated with a common ferrule.	A vertical array of 16 to 18 optical fibers. At one end, the array has to be terminated with a common ferrule. At the other end, each fiber has to be separately terminated with a SMA connector.	<i>Vendor can also suggest the maximum no of fibers in the fiber array based on the quoted height of CCD. This should be clearly mentioned in the quotation.</i> A Compatible ferrule with the quoted imaging fiber adapter. (A schematic for fiber alignment drawing is given in Appendix-1).
2	Optical fiber	Type : Multimode Single core Silica Core diameter : 400 micron Length: 2 meters with standard SMA terminations.	



3	Imaging fiber adapter	To couple light to the input of the spectrograph Should have provisions for transverse and longitudinal adjustments.	Vendor can suggest alternative coupling mechanisms, if any, for coupling the fiber array to the input of the spectrograph and quote for the same.
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III) Technical specifications of CCD detector

Sr no	Item	Specification	Description
1	Grade	Scientific grade ,Grade 1	
2	Type	Back Illuminated	
3	Dimension	>12 mmX12mm	The chip vertical dimensions has to accommodate the image of fiber array as mentioned in item. II, Sr.no.1.
4	Sealing	Hermetically sealed /All metallic vacuum sealing	Permanent vacuum and Maintenance free
5	Head Cooling	TE cooled up to -50 C or better	
6	Read out rate	≥ 1 MHz	

IV) System Integration, Control and Data Acquisition

Sr no	Item	Specification	Description
1	CCD integration with Spectrograph	CCD coupling flange to spectrograph	



2	Wavelength calibration	To be provided in instrument's operation software.	
3	Data acquisition and Control	Windows based software to operate and control the integrated system including shutter. The integrated system should be operable in synchronization with an external trigger.	
4	Interface	USB port option apart from other options is provided if any	
5	Data export option	file export option to ascii / csv/ excel etc.	

Additional requirements:

All the cables, tools and power supplies (~220 V and 50Hz) have to be provided by vendor.
All the technical manuals and along with the operation manual for hard ware and software have to be provided by the vendor during commissioning at ITER-India.

V. Acceptance criteria

The final acceptance of the integrated systems will be given after the following two tests:

1. Pre-dispatch test at factory site by the vendor. (ITER-India reserves the right to carryout Pre-dispatch Inspection (PDI) of the ordered item/s. by ITER-India personnel at factory site)
2. Final acceptance test at ITER-India by the vendor

Part I: Pre-dispatch test at factory site by the vendor:

Vendor will carry out detailed test and evaluation of the instruments as per mutually agreeable procedures. In Appendix -2, details of the relevant acceptance test procedures are described. If further modifications are necessary, vendor can suggest the same to ITER-India. The test criteria will be mutually agreed between both the parties with in 1 month of placing the purchase order. The vendor will send a detailed test report to ITER-India before the dispatch of the equipment. The test report will be evaluated by ITER-India and if found satisfactory, ITER-India will send the dispatch clearance certificate.



Part II: Acceptance Test at ITER-India:

At ITER-India, installation, testing and demonstration of the instruments and its performance should be carried out either by the principal or by their Indian representative. After successful commissioning at ITER-India, acceptance will be given only when it complies with all the technical specifications and reproduces the same results that were obtained during the pre-dispatch test by the vendor at their factory site.

Note: Vendor should arrange the items required for testing @ their own cost during Factory Acceptance Test(FAT). During Site Acceptance Test (SAT) arrangement of items required for testing would be finalized based on mutual agreement.

VI. List of Appendices

1. Appendix-1: Schematic for fiber alignment drawing
2. Appendix-2: Performance Criteria for the Acceptance of the Spectrograph with CCD detector
3. Appendix-3: Technical Compliance sheet