

शुद्धिपत्र CORRIGENDUM-6 दिनांकित DATED 02-08-2024

निविदा सूचना सं TENDER NOTICE NO: I-I/ET-TPT/24004/24-25
दिनांकित DATED 03-06-2024
(Tender ID: 2024_ITERI_809677_1)

काम / मद का विवरण Work / Item Description: Procurement of Radiometer (140-170 GHz) and
its essential accessories

बोलीदाताओं को सूचित किया जाता है कि उपर्युक्त निविदा के भाग-A (I), भाग-A (II) और भाग-B में संशोधन किया गया है। **संशोधन-2 दिनांकित 02.08.2024** के साथ समेकित बोली-पूर्व स्पष्टीकरण (**अनुलग्नक-1**) संलग्न है और इसे CPP पोर्टल <https://eprocure.gov.in/eprocure/app> के साथ-साथ संस्थान की वेबसाइट <https://www.iterindia.in/tenders> पर भी अपलोड किया गया है।

It is notified to the bidders that an **Amendment-2 dated 02.08.2024** is made to Part-A(I), Part-A(II) and Part-B of the above mentioned tender. The **Amendment-2** along with **consolidated Pre-bid Clarifications (Annexure-1)** are attached herewith and also uploaded on CPP Portal <https://eprocure.gov.in/eprocure/app> as well as on Institute's website <https://www.iterindia.in/tenders>.

इस शुद्धिपत्र और इससे पहले जारी शुद्धिपत्रों को छोड़कर, सभी आवश्यक पात्रता मानदंड, तकनीकी विनिर्देश, नियम और शर्तें और उपरोक्त निविदा के अन्य विवरण अपरिवर्तित रहेंगे।

Except this corrigendum and corrigendums made earlier, all Technical Specifications, Terms & Conditions and other details of the above mentioned tender shall remain unchanged.

Amendment-2 dated 2nd August, 2024

TENDER NOTICE NO: I-I/ET-TPT/24004/24-25 DATED 03-06-2024

1. Ref. Tender Part / Section No.	2. Ref. / Clause No.	3. In Place of	4. To be read as
Part-A(I)/ Section 4.5 Annexure-A5 Unpriced Bid Format	1.04	All Standard Accessories, required for the operation of the Radiometer (Break-up of all Standard Accessories considered in the quote needs to be submitted in Table-B as part of un-price bid format as per Annexure-A5 of Part-A(I))	All Standard Accessories, as per the defined interface table (refer Section 4A of Part-A(II) of this Amendment-2). (Break-up of all Standard Accessories considered in the quote needs to be submitted in Table-B as part of un-price bid format as per Annexure-A5 of Part-A(I))
Part A-	1.1	All Standard accessories	All Standard Accessories, as per the defined interface table (refer Tender Amendment-2).

1. Ref. Tender Part / Section No.	2. Ref. / Clause No.	3. In Place of	4. To be read as
II/Section 2		required for the operation of the Radiometer	<p>A separate section “Section 4A” on “Interfaces scope” is added below Table 2 in Section 4.</p> <p>Section 4A</p> <p>The diagram illustrates the Integrated Radiometer system (140-170 GHz) with the following components and interfaces:</p> <ul style="list-style-type: none"> Interface 2: Input RF connection Port WR06 Interface 5: Desirable interface: An additional front panel interface for (manual) power Switch ON with indicator is desirable to have Interface 1: Supply AC voltage, single Phase 230V ±10%, 50 Hz Along with required compatible connectors with cables Interface 3: Output of each channel, BNC connector Interface 4: Control Signal (input/output) interface such as RJ45 for Gain/attenuator control for each channel and tuning of YIG filter at particular frequency <p>The system includes an RF Input (140-170 GHz) with a SHM, Isolator, and LO. It features two parallel channels, each with an LNA (2-18 GHz), HPF/BPF (FC-15 GHz), Mixer, and another LNA (2-18 GHz). Each channel contains BPF, Attenuator, Detector, Video Amps, and LPF stages. The system also includes YIG Tunable Filter, Video Amps, and LPF stages for control signals. Necessary power supplies are integrated into the system.</p>

1. Ref. Tender Part / Section No.	2. Ref. / Clause No.	3. In Place of	4. To be read as												
			<table border="1"> <tr> <td data-bbox="779 448 1115 501">Interfaces</td> <td data-bbox="1115 448 1951 501">Specification (to be provided with Radiometer)</td> </tr> <tr> <td data-bbox="779 501 1115 608">Interface 1</td> <td data-bbox="1115 501 1951 608">Supply AC voltage, single Phase 230V $\pm 10\%$, 50 Hz Along with required compatible connectors with cables</td> </tr> <tr> <td data-bbox="779 608 1115 715">Interface 2</td> <td data-bbox="1115 608 1951 715">Input RF connection, Port WR06</td> </tr> <tr> <td data-bbox="779 715 1115 821">Interface 3</td> <td data-bbox="1115 715 1951 821">Output of each channel, BNC connector, to be provided for each channel</td> </tr> <tr> <td data-bbox="779 821 1115 951">Interface 4</td> <td data-bbox="1115 821 1951 951">Control Signal (input/output) interface such as RJ45/9 pin DB, for Gain/attenuator control for each channel and tuning of YIG filter at particular frequency</td> </tr> <tr> <td data-bbox="779 951 1115 1058">Interface 5</td> <td data-bbox="1115 951 1951 1058">Desirable interface: An additional front panel interface for (manual) power Switch ON with indicator is desirable to have.</td> </tr> </table> <p data-bbox="779 1082 2063 1189">Integrated Radiometer system (140-170 GHz) comprising of RF and IF sections including necessary power supplies, along with all the interfaces as specified above shall be provided by the supplier. Beyond this, any item/component needed, shall be the responsibility of ITER-India.</p>	Interfaces	Specification (to be provided with Radiometer)	Interface 1	Supply AC voltage, single Phase 230V $\pm 10\%$, 50 Hz Along with required compatible connectors with cables	Interface 2	Input RF connection, Port WR06	Interface 3	Output of each channel, BNC connector, to be provided for each channel	Interface 4	Control Signal (input/output) interface such as RJ45/9 pin DB, for Gain/attenuator control for each channel and tuning of YIG filter at particular frequency	Interface 5	Desirable interface: An additional front panel interface for (manual) power Switch ON with indicator is desirable to have.
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Interface 5	Desirable interface: An additional front panel interface for (manual) power Switch ON with indicator is desirable to have.														
Part-B (BOQ excel file)	1.04	All Standard Accessories,	All Standard Accessories, as per the defined interface table (refer Section 4A of Part-A(II) of												

1. Ref. Tender Part / Section No.	2. Ref. / Clause No.	3. In Place of	4. To be read as
		<p>required for the operation of the Radiometer (Break-up of all Standard Accessories considered in the quote needs to be submitted in Table-B as part of un-price bid format as per Annexure-A5 of Part-A(I))</p>	<p>this Amendment-2). (Break-up of all Standard Accessories considered in the quote needs to be submitted in Table-B as part of un-price bid format as per Annexure-A5 of Part-A(I))</p>

Annexure-1

Consolidated Pre-Bid Clarifications

TENDER NOTICE NO: I-/ET-TPT/24004/24-25 DATED 03-06-2024

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India
Pre-bid Clarifications-1 issued vide Corrigendum-3 dated 11-07-2024					
XYZ	1	Part A-II/Section 4	Figure 1	It's proposed by ITER-India to make radiometer using single down conversion for channels 1-8 and double downconversion for channels 9-16. We propose to allow to use double downconversion scheme for all the channels (actually, for channels 9-16 it will be even triple downconversion). Final downconversion converts frequency down to zero frequency. This proven and cost-effective scheme allows to obtain many advantages, for example – to make all the channels tunable by frequency.	There can be different configurations of radiometer based on the number of down-conversion stages, in order to meet the technical specifications. That is why we have clearly written that figure 1 is a “schematic representation of prototype radiometer”. We have not specified any fixed configuration of the radiometer in the tender document. It is on vendors to decide the best configuration which can meet the required technical specifications in a cost-effective manner.
XYZ	2	Part A-II/Section 4	Table 1, #1/ Table 2	Overall RF frequency range of the radiometer is 140-170 GHz, but tuning	Our requirement is 140-170 GHz, however, RF range extending beyond

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India
				range of the last 2 channels proposed to be 2-18 GHz. It will lead to extension of the RF range up to 172.75 GHz (138.5+16+18+0.25). We propose to extend RF range up to 171 GHz and decrease upper limit of tuning range of the last channels to 16 GHz.	170 GHz is better and hence acceptable. Regarding tuning range, it depends on the LO frequency being chosen and accordingly the IF frequency range. We leave this on vendors to decide the intermediate configuration. We must have a filter with a tunable frequency range such that it can be tuned from mid of RF band to the upper end of band ie. 170 GHz. Decreasing upper limit of tuning range of the last channels to 16 GHz is acceptable as long as this requirement is fulfilled.
XYZ	3	Part A-II/Section 4	Table 1, #2, #3a	We propose to make all 16 channels tunable in frequency (which is possible using double/triple frequency conversion). This will allow to exclude YIG-filters from the scheme. Frequency may be set as precise as 1 MHz with negligible temperature and other types of drift.	Technically this seems acceptable. YIG is a preferred solution. So far world-wide in our knowledge, only YIG filters have been used in this kind of application, that is measurement of temperature fluctuations. What you are proposing is an alternative approach and therefore request you to provide detailed configuration at this stage for better understanding.

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India
XYZ	4	Part A-II/Section 4	Table 1, #4b	It's unclear if filter bandwidth really should be tunable and how many steps should be used. We propose to specify steps of the bandwidth, for instance 100, 200, 500 and 1000 MHz for all the channels.	Center frequency is tunable, not the bandwidth. The step resolution for the center frequency shall be less than the bandwidth ie. less than 200 MHz (if bandwidth is 200 MHz). Refer to tender amendment-1.
XYZ	5	Part A-II/Section 4	Table 1, #6	We propose to make the sensitivity tunable (otherwise it will be hardly possible to make measurements in plasma and perform the calibration with built-in noise source and/or with hot body method). We propose to revise this clause as follows: «The upper limit of the dynamic range of the input radiation temperature at the radiometer input for a bandwidth of 0.5 GHz (resulting in an output of 10V) ranges from 1000 K to 100E6 K with a step of no more than 10 dB». Upper limit of 100E6 K presumably should be enough considering the attenuation of the waveguide line.	Yes, this should be okay.

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India
XYZ	6	Part A-II/Section 4	Table 1, #8	<p>To ensure that the radiometer can handle input powers as high as +5 dBm, especially within the linear regime of the mixer (the best available mixer allows a maximum of 0 dBm at the input and -10 dBm for linear operation), an attenuator should be used in front of the radiometer. However, the attenuator increases the system's noise figure (NF) by the value of the attenuation.</p> <p>It should be clarified if the +5 dBm power is in the 140-170 GHz range. This corresponds to a temperature of 7.6E9 K, which is not realistic. However, if such high power in the 140-170 GHz range is possible due to short impulses, an active protection system with a regulated attenuator could be used instead of a constant attenuator. If most of the power comes from frequencies outside the 140-170</p>	<p>The maximum power is already taken care of by the minimum detectable power and the dynamic range. Hence max power specification is removed.</p> <p>Refer to tender amendment-1.</p>

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India
				GHz range, filtration can be used (which is necessary for image rejection anyway).	
XYZ	7	Part A-II/Section 4	Table 1, #12	We suggest adding a condition that all output signals, apart from the analog mode, should be duplicated as a 16-bit digital stream with a sampling frequency of at least 2 MSamples/s. This will help exclude interferences from other systems, which is a common issue based on real experience working with TOKAMAKs. The Ethernet channel can be used to transmit the digital data, as it is already necessary for controlling the frequencies of the tunable channels and sensitivity.	It is not mandatory to duplicate all analog signals for monitoring into 16-bit digital stream. However the bidders may propose such digital streaming for controlling parameters of the radiometer such as gain, tunable frequency etc.
XYZ	8	Part A-II/Section 4	Table 1, #12	We suggest to make video bandwidth selectable: for measurements DC – 1 MHz, for calibration – DC – 20 Hz.	Added in the table. Refer tender amendment-1.

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India
XYZ	9	Part A-II/Section 5.1 and 5.2	Table 3, Table 4	<p>We suggest incorporating a built-in controllable noise source, connected internally via a directional coupler and controlled by the radiometer software, to ensure automatic recalibration when necessary. This scheme is much more reliable than using a waveguide switch and allows for faster and more frequent recalibration.</p> <p>If this is acceptable, a separate noise source is not necessary, as it will be built into the radiometer, and an electromechanical switch will not be needed at all.</p>	Both configurations either built-in or external noise source with a waveguide switch are acceptable. If offered configuration is built in, then price for line item #1.02 and 1.03 will be zero. Line item #1.01 should include price of radiometer with built in configurations (noise source with full band isolator, waveguide switch & power supply for both).
XYZ	10	Part A-III/1.4.2	1.4.2.1 and 1.4.2.3	In section 1.4.2.1, it is stated that the "Delivery of Radiometer and its essential accessories, Test Reports, Software, Documents/Operating manuals should be completed in 12 months," whereas in section 1.4.2.3, the deadline is 8 months (delivery) + 2 months (acceptance). The actual deadlines remain unclear.	The typo error is corrected. Pl refer tender amendment-1.

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India		
Pre-bid Clarifications-2 issued vide Corrigendum-6 dated 02-08-2024							
XYZ	1	Part-A(II)/ 2 Scope of Supply	Sr. No. 1.1.	Supplier will not be responsible for delivering anything that is not included in the proposal. Any accessories that customer's lab/setup may need to be indicated in this RFQ, or to be requested by ITER and will be sold separately.	<p>All Standard accessories as per the defined interface table (refer Tender Amendment-2) required for the operation of the Radiometer have to be supplied by the supplier. Please refer price bid format Sr. No. 1.04, Section 4.5 Annexure-A5 of Part – A(I)_EEC_Instructions.</p> <table border="1"> <tr> <td>1.04</td> <td>All Standard Accessories, as per the defined interface table (refer Tender Amendment-2). (Break-up of all Standard Accessories considered in the quote needs to be submitted in Table-B as part of un-price bid format as per Annexure-A5 of Part-A(I))</td> </tr> </table>	1.04	All Standard Accessories, as per the defined interface table (refer Tender Amendment-2). (Break-up of all Standard Accessories considered in the quote needs to be submitted in Table-B as part of un-price bid format as per Annexure-A5 of Part-A(I))
1.04	All Standard Accessories, as per the defined interface table (refer Tender Amendment-2). (Break-up of all Standard Accessories considered in the quote needs to be submitted in Table-B as part of un-price bid format as per Annexure-A5 of Part-A(I))						
XYZ	2	Part-A(II)/ 2 Scope of Supply	Sr. No. 2 & 3	Supplier do not manufacture or sell power supplies. Arranging appropriate power supply based on specification	The supplier must arrange and provide all the power supplies as specified in the tender.		

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India
				provided in product datasheet is ITER's responsibility.	
XYZ	3	Part-A(II)/ 3 Scope of Work	Sr. No. 7	In case assistance is needed, Supplier can provide technical support online during regular business hours. We communicated this at earlier stages that we don't have capability to provide onsite support.	Refer #7, Section 3 of Part-A(II)_ Scope of Supply, Scope of Work and Technical Specifications, supplier needs to arrange technical support as stated. 7 Provide necessary technical support for the Assembly, Installation, Testing and demonstration of system's performance at ITER-India lab (Site Acceptance Test) either by in person participation or by participating remotely (by the supplier or by their representative).
XYZ	4	Part-A(II)/ 4 Technical Specifications of Prototype Radiometer (140 GHz-170 GHz)	Table 1, 4b Tunable Filter bandwidth	We couldn't find a supplier who can support 2-18 GHz tunable filter with 100-200 MHz bandwidth. Bandwidths up to only 50 MHz is available off-the-shelf.	The specified bandwidth of 100-200 MHz and tunability are required as per #4b in Table 1, Section 4 of Part-A(II)_ Scope of Supply, Scope of Work and Technical Specifications

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India
XYZ	5	Part-A(II)/ Technical Specifications of Prototype Radiometer (140 GHz-170 GHz)	4 Table 1, 5 Noise Figure	<p>Compliant under following conditions:</p> <ul style="list-style-type: none"> -Noise figure will be measured & specified before IF module. It will not be measured for the full system because end channels has DC voltage output. See block diagram below that shows noise figure measurement path. -To meet NF criteria, we have to add 30 dB gain LNA at the input, which will reduce input compression level to -35 dBm. Operating input power will be -40 dBm or lower to prevent IMD products caused by operating near compression. -This doesn't change requirement #8. It will still meet max input power handling of 5 dBm. ITER can add attenuator (at cost of making noise figure worse!) if high input power is anticipated. 	<p>We understand that Noise figure will be measured & specified before IF module. This is acceptable.</p> <p>For other two points, please see the Amendment-1 dated 11th July 2024. The specification of Max RF Input Power 5 dBm (#8) is now removed. The mixer and LNA need be chosen such that NF requirement (#5) along with Min detectable power/dynamic range requirement (# 7, # 9) are met.</p>
XYZ	6	Part-A(II)/ Technical Specifications of	4 Table 1, 11	There is no variable gain amplifier in any of the channels. Each channel will have a 30 dB step attenuator with 1 dB	This is acceptable provided that the overall system specifications are met as per #7, #9 in Table 1, Section 4 of Part-

1. Name of Bidder	2. Query No.	3. Ref. Tender Part / Section No.	4. Ref. Clause No.	5. Description of the query	6. Response of ITER-India
		Prototype Radiometer (140 GHz-170 GHz)		step size that can be controlled remotely.	A(II)_ Scope of Supply, Scope of Work and Technical Specifications.