NTPC LTD CORPORATE OPERATION SERVICES, EOC, NOIDA VENDOR ENLISTMENT FOR O&M WORKS PACKAGE ON PAN NTPC BASIS		
1	CEG No.	BMD-21
2	Brief description of CEG	Phased Array Ultrasonic Testing (PAUT) of Weld Joints of Boiler Tubes
3	Responsibility Centre	CPC
4	Brief scope of work	Phased Array Ultrasonic Testing (PAUT) of Weld Joints of Boiler Tubes: 1. Phased Array Ultrasonic testing for circumferential old weld joint inspection of boiler tubes (Waterwall, Superheater, Reheater, Economiser & other tubes, as identified by EIC) is to be carried out for assessment of the weld joints. For water wall tubes, covered by insulation, only portion of weld on fireside will be tested with probes/wedges dismantled from the scanner. 2. Agency to quote for each weld joint to be inspected. For mobilisation during overhaul, there would be minimum payment for inspection of 500 joints and additional payment would be made for inspection of additional weld joints beyond 500 joints. 3. No extra payment will be made for tube sample calibration, testing of reference tubes or inspection on any other tube pieces (on sample basis) with known defects for verification of reliability of test set up 4. For reliability of calibration, 2% of the test results of PAUT in each type of tube dimension and thickness will be cross checked by NTPC thru radiography. If any defect is observed in radiography and same is not observed in PAUT M/C, calibration & test set up of PAUT M/C are needed to be rechecked and PAUT to be repeated. However, defect noticed in PAUT but not detected in radiography will be treated as defect. 5. **Test System**: For PAUT inspection of boiler tubes, service provider agency will bring the PAUT equipment & accessories with following or higher capability: (i) PAUT equipment: 16:68 or higher configuration, having (a) Weld inspection features including setting up of weld profile (b) Multi grouping capability (c) Capability of using two UTPA probes simultaneously. Necessary adapter/splitter (if required) for attaching two probes for simultaneously working should be available for inspection. (e) Operation with battery (f) A-scan, B-Scan, C-scan, S-Scan, Linear scan, Sectorial scan (g) Calibration: Velocity, Wedge Delay, Sensitivity, TCG, DAC, Encoder calibration features (h) Data analysis and report building (i) Encoder recognition Probes: At least two numbers of low profile suitable PAUT probes for (MS and Alloy Steel) of 7.5-10 MHz frequency, 16-32 element with more than 2 meters of cable length. The probes shall have couplant supply mechanism for

		passage of couplant (water to be used in this case) to test surface. A water irrigation channel along with water storage container & pressure mechanism for providing continuous couplant (water) to the probe during testing. Suitable probe for SS will be required for inspection of SS Joints. (ii) Wedges: Specially designed wedges to fit in the above probes and having refractive angle of 50 to 60-degree shear wave in steel. Wedges should have suitable contour to fit with around 25-100 mm outer diameter tubes. (iii) Scanner: A manual/automated scanner capable for scanning of around 25-100 mm outer diameters tubes. The scanner shall have encoder with it for precise data acquisition. The scanner shall be able to hold two low profile phased array probes and wedges, as mentioned above, for complete inspection of the weld in one rotation of the scanner. The design of scanner, probe & wedges shall allow complete inspection of circumferential weld on tube having gap of more than 15 mm with any adjacent tubes, supports and structures etc. 6. **Manpower/Machine:** Inspection/service provider agency shall depute two persons with minimum UT Level-2 qualification/certification from PCN, CSWIP, ASNT, ISNT. Also at least one person should have sufficient training (at least 7 days) in PAUT for operation, data analysis and interpretation of signal/data acquired. The necessary document/certificate for above to be produced to station. Also, vendor must have two sets of PAUT equipment & accessories of minimum 16:64 configuration PAUT equipment with encoder assisted scanner, curved wedges (as per OD of tube) and focused probes and analysis software. 7**. Test plan:** (a) The agency shall submit the written inspection procedure for PAUT of boiler tube weld joints. Scan plan (linear/sectorial) shall cover the entire volume of the weld for inspection and should mention parameters, like thickness, OD, Index offset, weld profile, probe, wedge, scan angles etc. There shall be minimum one sectorial scan for one probe. Total minimum two groups for two probes, positioned at 90 & 270 degree. Angle step shall be 0.5 degree. (b**) Calibration**: velocity, wedge delay, sensitivity, TCG, encoder calibration shall be performed before inspection. Reference block: Tubes with similar diameter & wall thickness (within 10%) and circumferential notches/grooves (detailed below) shall be used as reference block. The Reference block should have length not less than 200 mm. It should have two circumferential grooves/notches (one each on ID & OD) having depth of 10% wall thickness, 1 to 1.5 mm width and length between 25 to 50 mm. These two grooves should be located at opposite ends of the tube. The notches should be separated from adjacent tube edge by about

		50 mm. The length of reference block and location of reflectors (notches/grooves) should comply the requirement of calibration for angle beams. Agency to take tube samples in advance so that M/C Calibration work can be completed before start of overhauling work. Samples to be returned back to NTPC and to be kept in safe custody by NTPC for future reference. (c**) Data storage**: The calibration data and inspection data should be stored in the equipment and should be available for verification to NTPC Personnel. Inspection data file is to be stored by giving identifiable marking for reporting & interpretation. Soft copy of all the data to be provided to NTPC. (d) **Test Results**: The test results for each tested tube should provide information on type of defects (like Lack of penetration, porosity, Lack of Fusion etc.), their location, length, height, depth etc. The final report with above information to be given in an excel sheet along with PAUT inspection data file & images for all the tested tubes. 8. Surface preparation & access to test area: NTPC will provide suitable arrangement (scaffolding etc.) for safe access to test locations. Also surface cleaning /buffing on weld regions of tube, lighting (hand lamps etc. as required) would be within the scope of NTPC. 9. Representatives of NTPC will be allowed to check the test set-up, examine the test procedure and the results. 10. Agency will have to abide all the safety regulations of NTPC without any exception and any noncompliance stipulated damage will be deducted as per safety rules and regulations of NTPC. **Other details of works shall be given in tender document.**
2.	Technical Qualifying requirements	The Applicant must have executed the job of Phased Array Ultrasonic Testing (PAUT) of at least 500 number of boiler tube welds in Single Work Order in thermal power plant during last five years from the date of application.
	Document to be submitted by Vendor in support of meeting QR	Relevant PO copy and Client's Completion Certificate/RA bill/Final Deviation Statement and other certificate/documents as mentioned elsewhere

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6	Additional Documents to be submitted	In addition to the documents required in support of meeting Technical Qualifying Requirements as stated above, following documents are required to be submitted by the Applicants applying for enlistment:- i. Three POs with BOQ of the highest executed values of similar work during previous five years from the date of application and Copy of Completion Certificate /RA Bill/Final Deviation Statement from the concerned client in support of successful execution of work against each of the POs to besubmitted. ii. Audited balance sheet including Profit & Loss statement for the previous three completed financial years reckoned from the date of application. Incase, the audited documents are not ready/available, then certified copy of financial statement by a registered practicing chartered accountant may be submitted. iii. NSIC / SSI / MSME registration certificate iv. PF and GST/Service Tax registration certificate v. Any other documents in addition to the above which the applicant wants tosubmit.
7	NOTES:	1.0 Similar work means: Phased Array Ultrasonic Testing (PAUT) of BOILER TUBES in thermal power plant 2.0 Value means basic value of the PO. Where PO value is composite (i.e. including Service taxes etc.), the applicant has to give break-up of composite PO value mentioning basic value, taxes etc. Executed value of contracts shall include escalation amount because of price adjustment, if any, in thecontract.