

सी एस आई आर- राष्ट्रीय धातुकर्म प्रयोगशाला

जमशेदपुर - 831007

संशोधन /CORRIGENDUM

REFERENCE NO. :- NML/PUR/32/17/21/VP
Tender ID : 2021_CSIR_99078_1

DATE: 31-12-2021

NAME OF EQUIPMENT: SUPPLY, INSTALLATION, COMMISSIONING AND USER TRAINING OF SLOW STRAIN RATE TESTING (SSRT) MACHINE FOR ENVIRONMENTAL ASSISTED CRACKING (EAC) STUDIES

NOTE: The Bids must be submitted in the Central Public Procurement Portal (URL:<https://etenders.gov.in/e procure/app>) only. Manual/Offline bids shall not be accepted under any circumstances. Bidders should quote in INR only.

CONSEQUENT TO THE PRE-BID MEETING HELD ON 28-12-2021, THE REVISED SPECIFICATION IS GIVEN BELOW:-

SPECIFICATIONS:-

Revised.
Annexure-1

Slow Strain Rate Testing (SSRT) Machine for Environmental Assisted Cracking (EAC) Studies

Preamble: Slow strain rate testing machine for conducting following type of tests in the corrosive environments.

- **Stress corrosion cracking (SCC) Tests at temperature up to 350 °C:**
 - Stress corrosion cracking (SCC) in corrosive environment, according to ASTM G 129 by slow strain rate test (SSRT) using tensile test specimen under constant load or constant strain/displacement modes.
 - SCC tests in corrosion environment using CT specimens for K_{ISCC} , $K_{th}(EAC)$, and crack growth rate and ΔK measurement according to the ASTM E1681 and ASTM E647 respectively using Direct Current Potential Drop (DCPD).
- **Corrosion fatigue tests:**
 - Corrosion fatigue tests in corrosive environment at temperature up to 350 °C.

SECTION 1: TECHNICAL SPECIFICATIONS

1. Load frame and Load train

- 1.1. Load capacity: 50kN
- 1.2. Load cell capacity: 50kN (fatigue rated load cell)
- 1.3. Load Measurement Accuracy: 0.15% or better on full scale
- 1.4. Displacement rate range: 6×10^{-7} mm/s to 0.1 mm/s or wider range
- 1.5. Displacement Range: 25 mm or higher.
- 1.6. Displacement Resolution: 0.0001mm or better
- 1.7. Accuracy of Extension Rate: less than 0.5% or lower

Type of loading:

- 1.8. Cyclic loading (cyclic load controlled and cyclic strain or displacement controlled)
- 1.9. Cyclic frequency range: 0.02 Hz or higher
- 1.10. Loading mode cyclic: sinusoidal/triangular, trapezoidal
- 1.11. Monotonic Loading: Constant load and constant displacement/strain rate tests

Strain measuring device

- 1.12. LVDT for measuring strain and for conducting constant cyclic strain controlled fatigue tests up to high temperature 350°C in corrosive environment with digital strain data acquisition.

2. Direct Current Potential Drop (DCPD) Controller:

- 2.1. DCPD (direct current potential drop) device and software for crack extension and crack growth rate measurements in corrosive environments.
- 2.2. Accuracy of DCPD crack size/crack growth rate measurement: 0.1mm or better.
- 2.3. Direct Current (DC) power source: minimum 20Amp
- 2.4. DCPD measurement for CT specimens (1T-CT and 0.5T-CT).
- 2.5. PC based Control and software with data acquisition of crack sizes, crack growth rates and K values (PC with latest Windows operating system) • Flat screen monitor, USB mouse and keyboard.
- 2.6. Should be compatible for temperatures from 25°C to 350°C in autoclaves
- 2.7. Should be fully synchronized with the loading system and SSRT testing software.
- 2.8. The DCPD system should be in accordance with the ASTM-E647
- 2.9. Spot welding system (one unit) to be provided for attaching the DCPD leads to specimen.

3. Corrosive environment chamber:

- 3.1. Autoclave for holding the aqueous corrosive media (acidic (ex:0.5M H₂SO₄), alkaline (3.5% NaCl) solutions), and high temperature water at temperature up to 350°C.
- 3.2. Autoclave operation pressure: up to 200-250 bar.
- 3.3. Construction material of all the wetted parts shall be Alloy C-276 or equivalent corrosion resistant nickel based alloy.
- 3.4. Computerized temperature control and pressure monitoring integrated with the SSRT software
- 3.5. Volume Capacity: 4-5 Litre
- 3.6. Should be fully integrated with the loading device system and DCPD and SSRT testing software.
- 3.7. Provision for external electrochemical potential/current application in addition to the DCPD system and feed through.
 - 3.7.1. Electrochemical accessories: Reference electrode and counter electrodes suitable for T and pressure mentioned.
- 3.8. A set of spares and accessories require for the autoclave operation
 - Pull rod seals and support rings (5 sets)
 - Isolation sleeves (3 sets per each specimen types)
 - Safety burst disks (6 Nos)
 - Vessel Seals (10 Nos)
 - Port plugs (5 Nos)
 - Vessel bolts and nuts (5 Nos)
 - Specimen holder pins (2 sets)

4. Test software modules:

- 4.1. Slow Strain Rate Test /Constant Extension Rate Test (ASTM G129)
- 4.2. Constant Load Test

- 4.3. Constant cyclic load controlled fatigue and constant cyclic strain controlled fatigue test with computer based data acquisition of plastic/total strain and stress/load corresponding to each fatigue cycles
- 4.4. Software for crack growth and crack growth rate measurements and K values with data acquisition as per ASTM E647 and as per ASTM E1681 using DCPD.
- 4.5. User programmable general purpose software for user defined tests
- 4.6. A user defined programmable multipurpose software for performing static and dynamic tests employing pre-defined waveforms such as ramp, sine and triangular, trapezoidal or user defined waveforms in sequential or block loading mode.

5. Sample types:

- 5.1. Tension tests: cylindrical- M10 and M12, and flat geometry (ASTM E8)
- 5.2. Fracture mechanics tests: 1T- CT and 0.5T-CT specimens (ASTM E399)

6. Standard grips:

- 6.1. Electrical and chemical insulated grips (clevises) for CT specimens (ASTM E399) for DCPD crack growth measurements in corrosive environments.
- 6.2. Insulated grips for tensile samples to enables for application of external potential/current.
- 6.3. Should enable conducting SCC and corrosion fatigue tests by applying external potential/current using potentiostat/galvanostat.

7. SUITABILITY FOR FUTURE ATTACHMENT

- 7.1. Equipment should have provision to setup a controlled water chemistry recirculation loop in future for conducting SCC tests and cyclic load/strain controlled fatigue tests under high temperature and pressure water environment upto the temperature and pressure as given in section 3.1 and 3.2.

Section II: The following requirements has to be met by the vendors.

Essential Requirements	<ul style="list-style-type: none"> — Manufacturer has to certify/guarantee the availability of accessories/spares for minimum 10 years after the installation — A complete list of spares and consumables required should be provided separately with cost. The cost will not be considered for cost comparison for selection. — Past purchase order copies and contact details of the users of the similar type of system should be provided along with the offer.
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	<ul style="list-style-type: none"> — Vendor must ensure the availability of service center in India with qualified engineers — Certificate from Indian users about equipment performance and services
Eligibility criteria	<ul style="list-style-type: none"> — Quotations only from the original manufacturer of the equipment or their authorized agents will be accepted. — The bidder should have supplied minimum 1 or more similar equipment in last 5 years of time in India or abroad in government or private industries. — If the bidder has not supplied similar system anywhere, but claim to have the capability then they should demonstrate one complete testing system with all the test types at their site and at their cost before raising the PO. Willingness in this regard should be indicated in the Technical Bid. The offer is otherwise not acceptable — Relaxation in case of MSME and Start-Ups will be given as per the Government rules. <p><i>Note: i. Relaxation of prior turnover and prior experience is applicable to only to all Start-ups recognized by Department for promotion of industry and internal trade(DPIIT) subject to meeting of quality and technical specifications. Start-ups may be MSME or otherwise.</i></p> <p><i>ii. Relaxation of prior turnover and prior experience is applicable only to all MSMEs recognized by the Department of Promotion of Industry & internal trade (DPIT) subject to meeting of quality and technical specifications.</i></p>
Scope of Vendor	<ul style="list-style-type: none"> — Supply, installation, commissioning of SSRT at CSIR-NML. — Equipment handling, experimental demonstration and necessary training shall be given to personnel for 4 people by the Supplier at CSIR-NML. — Detailed pre-installation requirements must be furnished along with the offer such as power, space, water etc.

Scope of CSIR-NML	— CSIR-NML will provide Electrical Power, space, water. All other additional and necessary requirements needed to be provided by the supplier.
Calibration	— Fully calibrated system and software along with all standards for future calibration & standardization of the equipment.
Manuals	— Operational and maintenance manuals in hard as well as soft copies in English.
Warranty	— Minimum 3-years of comprehensive warranty.
AMC after expiry of the warranty	— AMC, after expiry of the standard and comprehensive warranty, should be quoted separately for minimum three years, and this will not be considered for the cost comparison.
Acceptance criteria	— The vendor should successfully demonstrate SCC, FCGR and corrosion fatigue tests with the standard specimen geometries as per the ASTM G129, ASTM 647, ASTM 1681 at CSIR-NML.


NOTE :

1. The delivery and installation may be kept 9 months due to present situation of pandemic.
2. Relaxation of prior turnover and prior experience is applicable only to all startups recognized by Department for Promotion of Industry & Internal Trade (DPIIT) subject to meeting of quality and technical specifications. Startups may be MSMEs or otherwise.

Relaxation of prior turnover and prior experience is applicable only to all MSMEs recognized by Department for Promotion of Industry & Internal Trade (DPIIT) subject to meeting of quality and technical specifications.

The above amendments shall amount to amendments of the relevant terms of our Bid Document for CSIR-NML Tender No. **NML/PUR/32/17/21/VP**.

All the other Tender terms and conditions remain unchanged.


 31.12.21
 (R. Raju)
 Section Officer (S&P)