Expression of Interest (EOI)
for

Supply, Installation, Commissioning and Training of Computer Controlled Servo Hydraulic Universal Testing Machine (UTM) of Capacity 1500 kn for High Accuracy Testing

	Specifications
S. l. No.	
01	**Detail Requirement with respect to Application**
	- This UTM equipment needs to be fully computer controlled, servo hydraulic universal testing type and shall be used for carrying out tensile tests, compression tests,180° bend tests, etc. of steel and other metallic samples collected from products like TMT bars, rails, bars, wire rods, beams, angles and other heavy section products etc. - The equipment needs to be used for determination of proof stress, young's modulus, modulus of elasticity, etc. of rolled steel samples and other metallic samples. - The test needs to be carried out in accordance to the latest revisions of various International and national standards like ASTM E 8 and ISO 6892-1 and other relevant Compression, bending, and material based standards. - It needs to be consisted of 4 column and 2 lead screw based load frame, cross heads, load cell, digital controller and closed loop controlled data acquisition, manual control panel, windows based software, computer system with colour monitor and all essential accessories. - It needs to be provided with facility for determination of 0.2% proof stress and facility for printing stress – strain curve using load cell, extensometer and position transducer like LVDT or Encoder. - The supplier needs to provide details of foundation of pits. The working height needs to be ergonomic. - Compression testing of Building materials as per IS/ASTM/ISO standards etc.
02	**Detail Requirement with respect to Load Frame**
	- The load frame needs to have a capacity sufficient to carry out safe test load upto 1500 kN with rated overloading. - It needs to have a double test space system with separate space for tension & compression for use with safety. - The horizontal distance between the load frame's columns shall be at least 650 mm or better. - The vertical tension opening needs to be freely adjustable up to 750 mm or better. - The vertical compression opening needs to be adjustable through a crosshead mount motor up to 750 mm or better. - The load frame height options need not reduce the machine capacity load rating. - The load frame needs to provide a test stroke of at least 250 mm or more. - The loading rate of the actuator needs to be adjustable and be capable of speeds between .01mm/min to 80 mm/min or more. To be demonstrated during installation at a testing speed upto 80mm/min. - The position measuring digital encoder resolution needs to be at least 0.0005 mm or better. Needs To be certified by OEM. - The displacement accuracy needs to be equal to or better than 2 micron. Displacement accuracy needs to be certified by OEM. - The load frame needs to be equipped with open front Hydraulic Wedge gripping to allow for quick, and easy loading, and unloading of tensile specimens.

03	Detail Requirement with respect to Crossheads
	• The load frame needs to include with a motorized adjustable lower crosshead for pre-test and post-test height adjustment of the tension and compression space. • The machine should have motorized adjustable crosshead rate. • The columns supporting the upper-most tension crosshead should allow the operator to easily change the dimensional limits of the tension test space. • Over-travel Limit Switches needs to be provided to ensure the crosshead does not travel beyond designated limits. Limit switch functions needs to be demonstrated during installation.
04	Detail Requirement with respect to Computer based data acquisition system with digital control:
	• The data acquisition needs to be provided with load and displacement/position measurement channels with facility to add two additional channels for strain. • Needs to have automatic recognition and calibration of transducers with high data acquisition rate of Speed 14kHz or more on all channels and with resolution 24bit or higher. • Accuracy of load measurement shall be ± 0.5% of reading between 2% to 100% of machine capacity. To be demonstrated from OEM during installation. • Accuracy of strain measurement shall be ± 0.5% of reading down in entire travel range in line with ASTM E -83, Class B-1, B-2. To be demonstrated with respect to calibration certificate from OEM during installation • Provision for PID gain adjustment for Load, Strain, Position channel.
05	Detail Requirement with respect to Load cell:
	• The load frame needs to include strain gauge load cell of capacity1500kN for measurement of load. • It needs to measure both tensile and compressive forces and controlling the machine in closed loop load/stress control manner. • The load measuring system must be traceable to international standards and must meet or surpass the verification standards ISO 7500-1 Class 0.5. • Calibration Certificate needs to be provided by OEM.
06	Detail Requirement with respect to Control Interface
	• The user control panel shall be handheld/ frame mounted touch screen type along with push bottom type. • The panel needs to include functions like manual control of system load and unload, crosshead up/down, hydraulic grip open/close, zeroing of load, position and auxiliary channels, etc. • The panel needs to include live displays that are user definable for displaying live measurements or calculation results.

07	Detail Requirement with respect to Software

The software needs to include functions
- To set up and configure the display screen and control panel, set up of limits and gain controls. security with user passwords automatic calibration and balancing of transducers.
- User calculation creator for defining custom calculations, report generation with basic report templates.
- Monitoring of system and system service histories, on– line help and reference guide.
- Test sequence creator, example test methods including for easy test creation.
- Software of stress strain graph shall have the facility of selection of 0.2 % proof-stress line at the option of the user by the selection of first and last point of parallel portion of the stress-strain curve.
- Software needs to have the facility of testing without extensometer i.e. with the help of encoder and in the result Force-displacement curve, Stress – Strain Curve.
- Needs to have option of selection of yield stress load by the user. This means the software should provide the user the option to change the yield load offered by software to take care of any slippage of the sample and to calculate Modulus of Elasticity / yield load / Yield stress by different methods as per ASTM / ISO/IS standards.

Following results need to be made available by software after test:

- Standard tensile tests with the determination of yield stress, proof stress, UTS, modulus of elasticity, tensile strength Rm, upper yield strength Reh, lower yield strength ReL , non-proportional elongation Rpx, 0.2% elongation strength, non-proportional Rp0.2, x% elongation strength, elongation, final length Lo, % plastic elongation, elongation at rupture A, total elongation at rupture. At, elongation at max. load Agt, highest load Fm, , total elongation Rtx, %0.5 elongation, total elongation Rt0.5, x% elongation strength Rtx, 0.2 elongation strength Rt0.2, stress-%elongation diagram, etc.
- The software should support with pre-defined templates according to –
  ISO 6892-1 Tension Test, •ISO 6892-2 Tension Test, •ASTM E8-Tension Test, •ASTM E21 Tension Test, ASTM A370 Tension Test, •ISO 10275 Strain Hardening Exponent, •ASTM E111 Young Modulus, •ISO 7438 Bend Test, •ISO 37 Tension Test, •ISO 178 Flexural Test, •ISO 527-1/2 Tension Test, •ASTM D695 Compression Test, •ASTM D790 Flexural Test, •ASTM C1273 Tension Test, •ASTM D3039 Tension Test, •ASTM D3410Compression Test, •ASTM D6641 Compression Test,• ISO 14126 Compression Test, •ASTM D7078 Shear Method , •Fastener Tensile Test as per ASTM methods A194
- With pre-defined template, routine and statistical calculations needs to be done.
- The software needs to allow the user to develop any other template according to any static testing standard.
- Software needs to be provided with future upgradation as applicable without any extra cost for at least 10 years from the date of completion of installation.

08	**Computer System**
	• Compatible computer with latest configuration and compatible with lifetime licensed software of latest version needs to be provided during supply. However, the minimum configuration shall be as follows- • Minimum Specification for Computer : • CPU Intel Core i7 • RAM 8 GB, DDR3 • SSD 256 GB • 10/100/1000 Mbps Ethernet LAN port – 1 no. • Hard Disk 1TB SATA hard disk • Monitor 23" wide screen TFT Monitor • 4 USB ports, 1 VGA/HDMI/DP port for Monitor, • OS Windows 10 pro • Any other feature as compatible with the system
09	**Essential Fixtures with tools and tackles**
	• Front open Hydraulic Wedge Tensile grips with Jaw Faces (for flat sample 0-60mm x 150mm ; for round sample 6-60mm diameter) • Compression Platen 300x300 mm hardened steel • 3 point Bend Fixture to fulfill the requirement of bend test upto 60 mm dia bar sample. Adjustable span 250-500mm , lower support roller diameter 45mm , upper bending mandrels with diameter(mm) 125,128,135,140,144,150, 160,165,168,180,192,200,216,225,240,270 • Shear Test attachment for Fixtures: Single or double shear testing tool with precision notches in all four sides of shearing blade to be used for rod sample diameter 3/8" , 1/2" ,3/4" and 1" • Tensile Test attachments for Fasteners of Nominal diameter 6mm, 8mm, 10mm, 12 mm, 16mm & 20mm should be quoted as accessories mentioning separate pricing for each Set of Adapter for performing Nut-Bolt testing.
10	**Extensometer (Electronic)**
	• One High resolution contact type fully automatic (to set gauge length, attached to specimen and detach after specimen break all by itself) extensometer needs to be provided to be capable of measuring elongation up to specimen break for tensile tests with automatic gauge length (GL) setting from 25 mm to 250 mm. It is to be used for both flat & round specimen. • It shall meet closed-loop strain control that complies with ISO 6892-1 Method A and ASTM E8 Method B, among other standards like ISO 9513, ASTM E83, and ISO 527-1. • It shall meet measurement resolution of 0.1 µm, needs to be provided with calibration certificate with proper traceability as per NABL or international equivalent of NABL.

11	**Hydraulic Power Pack**
	• Hydraulic Power Pack should be integrated with the console, to furnish the necessary pressurised oil for servo hydraulic testing machine.
	Essential features required:
	• Oil tank, pump, safety controls, pressure limited, filters, oil/air cooler (external) etc.
	• Integrated servovalve.
	• Oil Cooling system required
	• Oil tank with low noise internal gear pump with constant oil delivery
	• Damping ring between motor and pump top should separate off structure-borne noise between drive unit and tank
	• Pressure relief valve, filler neck, oil level indicator, oil temperature indicator, manometers etc.
	• Air fan on the rear side of the power pack to avoid high air temperature inside the power pack
	• 3micron oil filter in the pressure line with clogged filter indication should be provided
	• Electric pressure indicator for safety mode in case of failure of a hose, pipe etc.
	• Max. oil temp. protection through shut down of the system.
	• Including hydraulic oil filling with specified grade by the OEM.
	• Oil pressure manometer on front panel
	• Hour meter
	• Remote turn on/off control of hydraulic through testing software
12	**The following certificates shall be furnished with the equipment:**
	• Extensometers with their calibration certificates needs to be provided. The above certificates shall be as per the relevant IS/ISO/ASTM and shall be traceable to international accredited agency or NABL.
	• Calibration certificates for Force (ISO 7500-1), Piston Stroke (ISO EN 9513), Extensometers (ISO EN 9513)
	• Certificates should include determination of measurement uncertainties.
13	**Warranty:** 2 Years Onsite comprehensive warranty
14	**Acceptance Criteria**
	• Installation, commissioning and three days training should be provided at CSIR-CMERI site.
	• Demonstration of all type of testing and machine operation including all software features, report generation, graphs etc as in tensile, compression, bending, shear and fasteners.
	• Demonstration of Load accuracy within 0.5% in tensile and compression mode by measurement of repeatability error using Force proving Instrument both in tensile and compression mode and as per calibration certificate.
	• The load measuring & Strain Measuring system must be traceable to international standards and must meet or surpass the verification standard ISO 7500-1 Class 0.5.

15	**Essential Qualification Criteria for Suppliers/Vendors**
	• Previous Purchase order for supply and installation of similar machines to at least 2 Government PSU / Govt Educational Institutions / Govt R & D Institutions in India. • Calibration certificate of load in full load range needs to be provided
	• Vendors should have Local Service Support Facility in India and should submit address and contact details
	• Firms should give an undertaking to supply the Software upgrades if any at no additional costs for a period of 10 years.
	• All submitted product brochures should be available for download from the manufacturer's website • Mere agreeing with the indented specification will not be sufficient, proper documentation and catalogue should be supplied with the Technical Bid.
16	**Delivery period:** 35 weeks from issue of Purchase Order.