

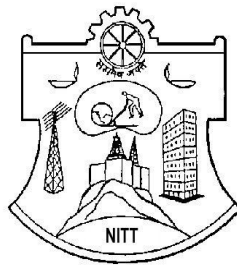
# NATIONAL INSTITUTE OF TECHNOLOGY

## TIRUCHIRAPPALLI – 15

### CENTRE FOR ADVANCED RESEARCH AND SCIENTIFIC SERVICES

Web: [www.nitt.edu](http://www.nitt.edu)

Phone: 0431 - 2503504



# TENDER DOCUMENT

Tender Notification No.: **NITT/Plan Fund/RN/2012-13/1**

Dated: **02.11.2012**

Name of the component : 250 kN Servo Hydraulic Machine  
Quantity required : 1 No.  
EMD Amount : Rs.10.00 Lakhs  
Delivery : 4 to 8 weeks from the date of purchase order  
Last Date of submission of Tender : **has been extended to 30.01.2013 upto 3.00 p.m.**  
Address for submission of Tender : The Director  
National Institute of Technology  
Tiruchirappalli – 620 015.

**With kind attention** : Dr. R. Narayanasamy  
Professor  
Department of Production Engineering  
National Institute of Technology  
Tiruchirappalli – 620015  
E-mail: [narayan@nitt.edu](mailto:narayan@nitt.edu)  
Mobile:

Date of opening of bid : **has been extended to 30.01.2013 at 3.30 p.m.**



**NATIONAL INSTITUTE OF TECHNOLOGY  
TIRUCHIRAPPALLI – 15**

**CENTRE FOR ADVANCED RESEARCH AND SCIENTIFIC SERVICES**

Tender Notification No.: **NITT/Plan Fund/RN/2012-13/1**

Dated: **02.11.2012**

**NOTICE INVITING TENDER**

The National Institute of Technology, Tiruchirappalli (NITT) is an autonomous body under MHRD, GOI, imparting Technical Education and engaged in Research Activities. It is proposed to procure the following EQUIPMENT for the departmental academic/research activities.

Sealed Quotations under **two cover system** are invited for the following EQUIPMENT subject to the following terms and conditions, from the reputed manufacturers or their authorized dealers so as to reach this office on or before scheduled date and time. The technical cover will be opened on the same day in the presence of bidders or their authorized agents who may choose to be present.

Name of the Equipment : 250 kN Servo Hydraulic Machine  
Quantity required : **1 No.**  
EMD : Rs.10.00 Lakhs  
Time for completion of supply after placing purchase order : 4 to 8 weeks  
Last Date of submission of Tender : **has been extended to 30.01.2013** upto 3.00 p.m.  
Tender to be submitted at the following address : **TAPAL SECTION  
ADMINISTRATIVE OFFICE  
NATIONAL INSTITUTE OF  
TECHNOLOGY**

**Place, Date and time of opening of bid** :

Date: **extended to 30.01.2013**

Time: **3.30 p.m**

Venue: REGISTRAR OFFICE

**Pre-bidding meeting will be conducted on 10.12.2012 at 3:00 p.m. at Senate Hall.**

**Note:** The Institute shall not be responsible for any postal delay about non-receipt/non delivery of the bids or due to wrong addressee.

## SECTION: 1 INSTRUCTION TO BIDDER

1. The bidder should give details of their technical soundness and provide list of customers of previous supply of similar items to Universities, Institutes or Government Departments/Undertakings/public sectors with contact details (namely E-mail id, Phone number and mobile number). The details of the agency/profile should be furnished along with the copy of all related documents.

### 1.1 Bids are to be submitted under two cover system.

#### Cover 1:

#### Cover 1 should contain the following:

- a. **EMD - Earnest Money Deposit (EMD) is to be remitted by way of Demand Draft drawn on any Nationalised bank in India by Demand Draft drawn on any scheduled bank in favour of "The Director, NIT, Trichy" payable at Trichy should be submitted. EMD shall bear no interest. Any bid not accompanying with EMD is liable to be treated as non-responsive and rejected.**
- b. **Technical pamphlets**
- c. **Detailed technical specification**
- d. **The agency should furnish copy of license certificate for manufacture/supply of the item.**
- e. **The agency should furnish Income Tax PAN number**
- f. **Warranty period offered for the tendered item to be specified. If the warranty period is not conforming with the schedule of requirements given in section 3 of the document, the bid is liable to be treated as non-responsive and rejected.**
- g. **Duly filled up technical questionnaire, if any**
- h. **Duly filled up deviation schedules to technical specification**
- i. **Copy of supply orders completed during the last three years ending 30.9.2012.**
- j. **If the prices are revealed in the cover 1, the offer will be summarily rejected**
- k. **Performance certificates of your similar or same machine from Govt. institutions like IITs, Govt. Research Laboratories like WRI, NAL, etc.. and Public sector industries like BHEL, HAL, etc.. with contact persons with E-mail id, Phone number and Mobile number.**

- 1.2 **The cover 1 shall be superscribed as 'Technical cover' duly indicating the Tender reference No. and the due date of opening.**

### 1.3 Cover 2:

#### Cover 2 should contain the following

**Cover 2 shall contain Price only and shall be superscribed as 'Price Cover' duly indicating the Tender Reference No. and the due date of opening.**

**Each Cover shall be sent in a double sealed cover. The inner covers (Cover 1 and Cover 2) should be sealed individually with the seller's distinctive seal and superscribed with the tender reference no. and due date of opening. Both the inner covers shall be placed in a common outer cover which shall also be sealed with seller's distinctive seal and superscribed with the tender reference no. and due date of opening.**

**Mention "Kind Attention:Dr.R.NARAYANASAMY and submit at the address given in the Notice Inviting Tender.**

**Cover 1 - will be opened on the scheduled date and time mentioned in the tender enquiry.**  
**Cover 2 - technically suitable offers alone will be opened on a date which will be intimated to the qualified bidders.**

2. The agencies should submit their rate as per the format given in Section 4 of the Notice Inviting Tender in this cover. Rate should be quoted in Indian Rupee. The rate should be quoted both in words and figures. All the pages of the bid should be signed affixing the seal. All corrections and overwriting should be initialed.
3. The tender will be acceptable only from the manufacturers or its authorized supplier.
4. The bid shall be in the format of price schedule given in Section 4. The contract form as per format given in section 5 shall be submitted. Incomplete or conditional tender will be rejected.
5. Details of quantity and the specifications are mentioned in Section 3 appended to this Notice Inviting Tender.
6. The item to be used is strictly according to the specification and subject to test by the Institute/concerned authorities. It must be delivered and installed in good working condition.
7. The Institute reserves the right to cancel or reduce the quantity included in the schedule of requirements at any time after acceptance of the tender with a notice. The Contractor/Supplier shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the work/supply in full but he did not derive in consequence of the foreclosure of the whole or part of the works.
8. Performance Security of 5% of the contract value in terms of Bank guarantee by scheduled banks shall be given by the successful bidder for the total period of warranty.
9. **Release of EMD:** The EMD shall be released after receipt of performance security from successful bidder.
10. **Validity of bids:** The rate quoted should be valid for a minimum of 90 days. No claim for escalation of rate will be considered after opening the Tender.
11. **Imports:** In case, goods are to be imported, the Indian agent should furnish authorization certificate by the principles abroad for submission of the bid in response to this Notice Inviting Tender.
12. **Clarification of Tender Document:** A prospective bidder requiring any clarification of the Tender document may communicate to the contact person given in this notice inviting tender.
13. **Amendment of tender document:** At any time prior to the last date of receipt of bids, Institute may for any reason, whether at its own initiative or in response to a clarification requested by prospective bidder, modify the Tender document by an amendment.
14. ***The Institute may at its own discretion extend the last date for the receipt of bids.***
15. The bids shall be written in English language and any information printed in other language shall be accompanied by an English translation, in which case for the purpose of interpretation of the bid, the

English translation shall govern.

- 16. The Institute reserves the right of accepting any bid other than the lowest or even rejecting all the bids without assigning any reasons therefore. The decision of the Institute Purchase Committee is final in all matters of tender and purchase.
- 17. The bidder should give the following declaration while submitting the Tender.

**DECLARATION**

I/we have not tampered/modified the tender forms in any manner. In case, if the same is found to be tampered/modified, I/we understand that my/our tender will be summarily rejected and full Earnest Money Deposit (EMD) will be forfeited and I/we am/are liable to be banned from doing business with NIT, Trichy and /or prosecuted.

**Signature of the Bidder** : .....

**Name and Designation** : .....

**Business Address** : .....  
.....  
.....

**Place :**

**Date :**

**Seal of the Bidder's Firm**

- 18. Any other details required may be obtained from the contact person given in the notice inviting tender during the office hours.

## SECTION: 2 CONDITIONS OF CONTRACT

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1. The rates should be quoted in Indian Rupee F.O.R. NIT, Trichy for supply within India.
2. In case of import both CIF and / or FOB rate should be quoted. All components of expenditure to arrive at Chennai need to be explicitly specified. Marine Insurance Coverage from Suppliers door to buyers door to be specified.
3. The bidder shall indicate the excise duty exemption for the goods if applicable
4. The Institute is eligible for customs duty and excise duty exemption.
5. The rate quoted should be on unit basis. Taxes and other charges should be quoted separately, considering exemptions if any.
6. Rate quoted should be inclusive of Testing, commissioning and installation of equipment and training.
7. **Payment:** No advance payment will be made. Payment will be made only after the supply of the item in good and satisfactory condition and receipt of performance security by supplier. In case of imports, the payment will be made through LC after installation and performance security need to be submitted at the time of LC commitment.
8. Guarantee and Warrantee period should be specified for the complete period conforming to the section 3 of this tender document.
9. Period required for the supply and installation of item should be specified conforming to the section 3 of this tender document.
10. In case of dispute, the matter will be subject to Tiruchirappalli, Tamil Nadu Jurisdiction only.
11. **Liquidity Damages:** If the bidder/supplier, after accepting the Purchase order for the supply of Goods/Services, fails to deliver any or all of the Goods or to perform Services within the period(s) specified in the order. National Institute of Technology, Tiruchirappalli shall, without prejudice to its other remedies under the Rules of Purchase, proceed to cancel the order or agree to accept a delayed delivery on the condition of payment of liquidated damages by the bidder/supplier a sum equivalent to 0.50% of the total cost as indicated in the Purchase order (which will be deemed as agreed price) for each week or part thereof of delay until actual delivery or performance is completed and such penal charges shall be limited to a maximum of 5% of the agreed price. Once the maximum is reached National Institute of Technology, Tiruchirappalli may proceed on its own to consider the termination/cancellation of the order and may inform the bidder about the cancellation of the said purchase order.

### SECTION: 3 SCHEDULE OF REQUIREMENTS, SPECIFICATIONS AND ALLIED DETAILS

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Name of the Equipment to be procured : 250 kN Servo Hydraulic Machine

Specifications : PLEASE SEE ANNEXURE - I

Quantity : ONE

Any other details/requirement : -

Warranty period required : **Compulsory for 5 years.**

Delivery schedule expected after  
release of purchase order (in weeks) : 4 to 8 weeks

EMD (in Rupees) : Rs.10.00 Lakhs

Performance Security to be given by  
Successful bidder after release of  
purchase order (in Rupees) : 5% of the equipment cost

**SECTION : 4 PRICE SCHEDULE**

[ To be used by the bidder for submission of the bid ]

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- 1. Component Name :
- 2. Specifications (confirming to Section 3 of Tender document-enclose additional sheets if necessary) :
- 3. Currency and Unit Price :
- 4. Quantity :
- 5. Item cost (Sl.No.3 & Sl.No.4) (in Indian Rupee) :
- 6. Taxes and other charges :
  - (i) Specify the type of taxes and duties in percentages and also in figures
  - (ii) Specify other charges in figures :
- 7. Warranty period (confirming to the Section 3 of Tender document. This should be mentioned in Technical bid also in order to get qualified for Financial bid) :
- 8. Delivery Schedule (confirming to the Section 3 of Tender document) :
- 9. Name and address of the firm for placing purchase order :
- 10. Name and address of Indian authorized agent (in case of imports only) :

**Signature of the Bidder** : .....

**Name and Designation** : .....

**Business Address** : .....

.....

.....

**Place :**

**Date :**

**Seal of the Bidder's Firm**



**SECTION : 5 CONTRACT FORM**

[ To be provided by the bidder in the business letter head ]

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1. (Name of the Supplier's Firm) hereby abide to deliver the .....by the delivery schedule mentioned in the Section 3 tender document for supply of the items if the purchase order is awarded.
2. The item will be supplied conforming to the specifications stated in the tender document without any defect and deviations.
3. Warranty will be given for the period mentioned in the tender document and service will be rendered to the satisfaction of NIT, Trichy during this period.

**Signature of the Bidder** : .....

**Name and Designation** : .....

**Business Address** : .....  
.....  
.....

**Place :**

**Date :**

**Seal of the Bidder's Firm**

Annexure – I  
Technical Specifications

<u>Item No.</u>	<u>Qty</u>	<u>Description</u>
1	1	<p><b><u>250kN Capacity Servo Hydraulic Machine</u></b></p> <p>Axial Servohydraulic Dynamic Two Column Load Frame.</p> <p>Maximum Fatigue-rated Capacity +/-250 kN (56250 lbf). High stiffness, precision aligned loading frame with a fixed lower platen and adjustable upper crosshead.</p> <p>To Include Control Electronics Tower &amp; Console Software Tower configuration designed to fit under a table or desk. controller and signal conditioning modules for the control of position and load. With spare slots for additional channels of signal conditioning, data acquisition and control through the use of optional strain channels.</p> <p>Basic Software to provide full system control from the PC. Including waveform generation, calibration, and limit set up; status monitoring. Should be able to add an optional Operator Panel to provide a supplementary manual user interface to the controller.</p> <p>Control features to include:</p> <ul style="list-style-type: none"><li>- Adaptive Control System, allowing continuous update of PID terms at 1 kHz, eliminating the need for operator set-up and automatically compensating for specimen stiffness changes.</li><li>- 5 kHz control loop update per axis, and continuous synchronous data acquisition at 5 kHz on all channels</li><li>- Advanced sensor technology to provide 19 bit data resolution across the complete span of the sensor</li><li>- Unique mixed-mode control technology allowing advanced bi-modal and tri-modal control techniques to be used.</li></ul> <p>Hydraulic Crosshead Clamps And Hydraulic Lifts to enable the user to adjust the upper crosshead position by means of the hydraulic crosshead lifting cylinders and to clamp the crosshead with the hydraulic clamps.</p> <p>Maximum Daylight, Crosshead To Platen: 1515mm Width between columns 664mm. Actuator to be mounted In Platen.</p>

### Control Electronics Tower With Basic Software

To Include one Integrated Axis Controller board configured with position and load sensor conditioners . The Tower configuration should fit under a table and to include five free slots, which may be used for additional Controller boards or 8 channel data acquisition boards. Each Controller board should be able to accommodate up to 4 sensor conditioners. Basic Software to provide full system control from the PC via a built-in GPIB computer interface, including waveform, calibration, and limit setups, status monitoring with digital displays, data acquisition to disk in ASCII format, a real time graph, and many more features.

Advanced control features to be included are:

- Adaptive Control System, allowing continuous update of PID terms at 1kHz, eliminating the need for operator set-up and automatically compensating for specimen stiffness.
- 5 kHz control loop update per axis and continuous synchronous data acquisition at 5 kHz on all channels
- Advanced sensor technology to provide 19 bit data resolution across the complete span of the sensor.
- Unique mixed-mode control technology allowing advanced bi-modal and tri-modal control techniques to be used.

### Load Cell

- 2 1 Dynamic Load Cell +/- 250 kN.

The fatigue life of the unit should be 10E9 full stress reversed cycles at the capacity of the cell. Overload capability should be 300% of the capacity before mechanical failure of the cell.

Side load resistance should be 40% of the capacity.

The load cell should have load measurement device which automatically compensates for load errors induced through inertia of the load string components. A method of dynamic inertia compensation is essential for all forms of dynamic testing.

### Actuator, manifold and servo-valves

- 3 1 Hydrostatic Bearing Actuator +/-250 kN Force +/-75mm Stroke.

The actuator to be supplied with an internally mounted LVDT for precise measurement of position. Hydrostatic bearing actuator to provide a high side load resistance and accurate axial alignment of the actuator piston rod.

- 4 1 126 l/min Dual Valve Actuator Mounted Manifold For Two Servovalves This manifold should serve as the hydraulic interface between the pump and the test machine. It should include pressure filter, pressure accumulator, and provisions for a return accumulator and two 761 series servovalves to reduce hydraulic noise. The manifold to include a standard low-pressure start-up circuit, and a high-speed load release valve to provide immediate load dissipation of the actuator on power failure or electrical shutdown.

- 5 1 Isolation Valve. This valve is used to shut-off the larger of the two servovalves mounted on the manifold. It is required when dual valves are to be used independently.

- 6 1 5 l/min Servovalve

- 7 1 40 l/min Servo-valve.

### Hydraulic Power Unit

### Hydraulic Power Unit

- 48 l/min nominal flow at 207 Bar (3000 psi) on 50 Hz
- 230 bar (3336psi) maximum output pressure
- 18.5 kW (24.8 hp) nominal power rating
- Variable displacement pump
- PLC operator interface with digital display of pressure and oil temperature
- Protection devices for oil temperature, oil pressure, oil level, oil filter condition and motor temperature
- 2 micron pressure and return line filtration
- Local or remote Start/Stop functionality
- 250 litre reservoir capacity
- Star-delta starting

400V, 50Hz, 3 phase operation (suitable for 380V and 415V operation)

Water cooled via high efficiency plate heat exchanger for water inlet temperatures of up to 25 °C (77 °F). The environmental temperature range is 7 °C (45 °F) to 40 °C (104 °

Noise level not to exceed 75 dB (A) (fully compensated, free field conditions).

1 Pressure accumulator, bladder type, 1 litre capacity.

9 1 Oil for Hydraulic Power Unit

This includes a single fill of oil for the Hydraulic Power Unit.

10 1 Up to 48 l/min hose set, 207bar (3000 psi), 12m long

11 1 15 metre long Remote Control Cable Set for Hydraulic Power Units

- Allows Hydraulic Power Unit to be started and stopped from control system.
- Cable length 15 metres

### Strain Channel

12 1

Strain Channel For Controller

To support closed-loop control and data acquisition for one transducer (strain gage bridge, LVDT, or +/-10V BNC input).

To Include:

- Transducer excitation.
- Data resolution of 19 bits across the entire span of the transducer.
- Automatic transducer recognition and calibration for transducers.
- 32 bit waveform generation.
- Data acquisition rates up to 5kHz.
- User selectable signal filters from 100Hz to 1kHz in increments of 1/1000Hz.

### Operator Panel

13 1 Hardware Operator Panel.

To provide convenient manual control and system status for one axis of control.

Functions to include the ability to run fatigue tests in position, load, or strain control without a computer; setting of limits; setting of test waveforms; and data displays. To provide system status information when using computer control. To be fully compatible with basic software.

### Hydraulic Grips

- 14 1 207 Bar (3000psi) Hydraulic Grip Controller And Manifold. Suitable for use on 250kN machine. To provide opening and closing control of the grips with adjustable gripping pressure and handset controls. To include hoses for connection to the grips and to the system's hydraulic supply. Designed to be bolted to the table of the testing machine.
- 15 1 ±250kN Fatigue Rated Hydraulic Wedge Grips.
- Suitable for gripping flat or round specimens
  - Features side-entry design with full access for easy specimen insertion from the side without actuator movement
  - Adjustable specimen stops on flat faces provide accurate specimen centering
  - Suitable for tension and compression including full reverse-stress dynamic testing capability
  - Temperature Range: +4 to +65 °C
  - Static Load Capacity ±312kN
- Quantity: 2 grips
- 16 1 Flat serrated jaw faces 100mm wide for gripping flat specimens 1-12mm thick (set of 4 faces)
- 17 1 Vee jaw faces for gripping round specimens 5-10mm diameter (set of 4 faces)
- 18 1 Vee jaw faces for gripping round specimens 5-10mm diameter (set of 4 faces)
- 19 4 Necessary fatigue rated kits to connect grips and other accessories to the load cell and actuator piston
- 20 1 Accessory mounting block for use with 250kN hydraulic wedge grips with central female thread for mounting fixtures for static or dynamic testing applications, between the grips without the need to remove the grips . Set of 2 blocks.
- Dynamic Extensometer**
- 21 1 Dynamic Extensometer for direct strain measurement and closed loop strain control. Suitable for tensile, compressive & fatigue testing, the extensometer should have a 25mm gauge length with a travel of +12.5mm to -2.5mm giving +50% to -10% strains. It should include an extender to give a gauge length of 50mm and strain of +25% to -5% strain. Temperature range: -80C to +200C.
- 22 **Static Extensometer**  
Strain Gauge Extensometer, 50 mm gauge length, +100% -10% maximum strain. Static-rated with cross-braced design and cone-latch gauge length setting. Metric Calibration. Self-identifying with the control system. Operating temperature range -100 °C to +200 °C.
- High Temperature Furnace**
- 23 1 1000°C Three-Zone Split Furnace for Low Cycle Fatigue Testing
- Compatible with leaf-sprung or self-supporting extensometers.
- Features:
- 90mm bore diameter, 358mm overall height (furnace only)
  - Three-zone split furnace configuration with durable embedded heating elements
  - 1000 °C (1832 °F) nominal maximum specimen temperature (dependent on load string configuration)
  - 300 - 600 °C (572 - 1112 °F) nominal minimum specimen temperature (dependent on load string configuration and test conditions)
  - High efficiency insulation (refractory ceramic fibre free)
  - Extensometer cut-out, full width, 76 mm high (Quartz)
  - Extensometer slot 40 mm high x 15 mm wide (Quartz)
  - Nominal power rating 3kW
- To Include side port insulation plug for blanking extensometer slot

24 1 Master Slave Temperature Control System

Temperature control system featuring three Eurotherm controllers in a master-slave configuration capable of following a single ramp to set-point. To include Eurotherm indicator configured as an over-temperature alarm. This should be possible to be reconfigured for use with customer-supplied specimen thermocouple to indicate specimen temperature. Both centre-zone controller and alarm indicators should feature an RS232 interface (Modbus protocol) for temperature control/logging via fatigue or LCF software. Also to include an auxiliary interlock to enable connection of an external device (such as customer-supplied water flow switch) to switch off furnace.

Configured to suit type N control/alarm thermocouples.

All instrumentation to be mounted in a desk-top console and furnace to controller cable loom length should be 3 metres. To include 5 metre RS232 cable for connection to PC serial port.

220-230 volts 50/60Hz single phase operation.

- 25 1 Set of Furnace Support Bracketry comprising pivoting arms, rear support pillar and machine attachments. To allow for precise adjustment of the furnace in relation to the machine axis.
- 26 1 Set of 2 insulating refractory top/bottom insulating port plugs (refractory ceramic fibre free) to suit pullrods.

**Accessories for LCF, hot tensile and hot compression**

27 1

Reverse Stress Pullrods 1000 C (1800 F) Capability.

To include specimen holders for specimens with M20 threaded ends.

28 1

Water Cooled Adaptor.

29 1

Water Cooled Adaptor and alignment rings

30 1

Clevis Grips for CT 12.5 compact tension specimens for use up to 1000 deg. C. To be fitted directly to ends of pullrods.

Load ratings:

Temperature (deg C): 20, 800, 850, 900, 950, 1000

Load (kN): 13, 13, 10.5, 7, 4.5, 3

31 1

Tension-Only Holders, Metric: M12 for Pullrods.

Maximum Capacity 22.5kN at 300 deg. C.

Maximum Capacity 22.5kN at 800 deg. C.

Maximum Capacity 15kN at 850 deg. C.

Maximum Capacity 10kN at 900 deg. C.

Maximum Capacity 7.5kN at 950 deg. C.

Maximum Capacity 5kN at 1000 deg. C.

32 1

Compression platens with 50mm diameter for use with reverse-stress pullrods.

Platens to incorporate Silicon Nitride inserts and suitable for use at temperatures up to 1000°C. Platens to attach to pullrods using specimen adaptors supplied with the pullrods.

The load v's temperature rating will be as follows:

Temperature °C: 20, 800, 900, 950, 1000.

Compressive load kN: 30, 30, 22.5, 15, 10.

**High temperature Extensometer**

33 1

High temperature strain gauge extensometer suitable for use up to 1000C in resistance furnace. 25mm gauge length +10% -5%. Fitted with alumina chisel end rods. Attaches to specimen using ceramic wrap-around cord (to be supplied) or using spring type attachment.

34 1

Leaf Spring Mounting for Extensometers.

To allow these extensometers to be mounted on a furnace with an extensometer cut out to normal specifications.

35 1

Spare Alumina Rods for extensometers.

Vee-Chisel point to suit round specimens.

Quantity: 2 pairs.

36 1

Spare ceramic cord for extensometer. 500 metres. Includes 10 pairs of spring assemblies.

**Alignment Fixture and accessories for LCF**

250 kN Alignment Fixture.

37 1

Mounts between the load cell and crosshead. To provide full angularity and concentricity adjustment with load cell fully pre-loaded. Allows adjustment while load is applied to the specimen. Fixture thickness not to exceed 65mm. To include draw bar.

38

Alignment Software And Electronics

Software and electronics for measurement of specimen bending. Software to perform graphical display and test report generation for validation of testing system alignment. Convenient real time graphs to indicate appropriate adjustments for systems equipped with the Alignment Fixture. Electronics to perform strain gage conditioning, bridge completion, and data acquisition. To be compatible with specimens using an eight or twelve gage (350 Ohm) configuration. Computer must be equipped with USB interface.

39

1

Strain-gaged specimen NOT included - these may be purchased individually or manufactured by customer.

**Softwares**

1

Basic software to use with the controller To provide complete computer control of the dynamic testing for up to six axis systems (or a combination of IAC boards and data acquisition boards). Should be compatible with Fatigue, LCF, Static and Fracture Mechanics (da/dN, K1C & J1C) softwares To include:- All controller set up functions such as Specimen Protect, transducer calibration, limits, control loop settings (PID's) and calculated ("Modal") control channels- System status displays indicating current control mode, limits, waveform generator, transducer calibration and hydraulics/power- Auto Tuning Wizard to perform automatic set up of control loop PID values- Loop tuning tool with fast-refresh digital scope to facilitate manual setting and adjustment of control loop PID values- Multiple digital Live Displays of transducer values and cycle/time counters that can be rearranged and resized, with setup save/recall from computer disk.- Waveform control (start/pause/stop at specified cycle count) to run simple fatigue tests- Scope software package for real time graph showing the output of up to four transducers and basic data capturing facilities- Comprehensive on-line help system- Save software for saving and restoring of test system parameters to and from disk- Data acquisition software for one axis and up to four transducers- Latest firmware update for machine controller and Data Acquisition Boards- Set of Electronic Manuals in PDF Format



### Low Cycle Fatigue Testing Software

To provide system control, data acquisition, real-time graphs, calculation of results, storage of data to disk, and post test graphs and reports in accordance with the relevant sections of ASTM E606-04, BS 7270 (2006), and ISO 12106 (2003).

Features to include :

- Tests can be run in axial strain, plastic strain or stress control
  - Ability to select from a range of SI and US Customary units
  - Test method editor allowing for simple test method creation and recall
  - Support of rectangular, cylindrical and tubular specimens
  - Automatic calculation of Modulus within user specified limits
  - Temperature control and/or monitoring for Eurotherm instruments
  - Automatic adjustment of gauge length when at test temperature
  - Support of Sine, Triangular and Trapezoidal waveforms
  - Ability to perform stress controlled run-out tests at up to 50Hz
  - Selectable specimen break criteria to accurately pinpoint specimen failure
  - Combined linear, logarithmic and peak interval data logging
  - Review of summary data
  - User configurable run-time screen capable of displaying results fields and up to 3 graphs.
  - Ability to stop and re-start test at any point, with modulus checking as required.
  - Off-line analysis with user configurable trend and hysteresis plots.
  - Export of graphs and test data.
  - Comprehensive on-line help system
  - Set of Electronic Manuals in PDF format
- Executable version only.

Requires PC meeting compatibility specification, Windows XP Professional SP2, GPIB card, 2495-901 Console Software, 8800 controller running 8.07 firmware or higher, software maintenance and training options.

Supplied on CD ROM.

- 1 Dynamic Testing Software Dynamic Testing Software to provide users the ability to define and run tests, and to acquire data for a wide range of dynamic and quasi-static applications. Tests can range from simple single-axis ramps and repetitive waveforms, to more complex multi-axis and multi-step tests. Test methods are to quickly and easily constructed using a series of steps within a matrix structure, allowing the user full control over waveform shape, control mode, data logging and test progress. Completely independent waveforms to be performed on each axis for systems with multiple axes of control. During the test method construction the user is presented with a clear graphical preview of how the test will run. During the test a range of comprehensive data logging and data reduction tools enable the user to acquire the required data and at the same time minimise data file size through intelligent data reduction features. The user should be able to configure the Live Test Workspace to show up to four real time graphs and add progress or status indicators. Test results are to be automatically grouped together within a logical project structure allowing quick access to the data files and batch transfer of results. To aid results tracking a read-only copy of the test method is always stored with the test results. Features to include:- Support for up to six Integrated Axis Cards (or a combination of IAC cards and data acquisition boards) - Up to a maximum of 24 channels of control or acquisition- Control or acquisition of temperature from a Eurotherm device- Capable of 1ms interblock transfer time from one step in the sequence to the next- Trend monitoring function - a change in max, min, mean or amplitude from a user defined reference cycle can be used to control test flow or end test- Amplitude control to correct for peak errors in a cyclic waveform- Supported waveform types; sine, triangle, square, holds, ramps, trapezoidal, user defined turn points files, and sample data playback- Mixed mode control on cyclic waveforms- User defined events to control test progress- The ability to automatically balance extensometers and derived position channels at any stage of the test- Up to four real time graphs; X-Y, Double Y, Trend, Multi channel, chart recorder- Single and nested looping of steps- Advanced Data Reduction; either on time basis or change in channel value.- Extensive data logging; per cycle data (max /min /amplitude /mean level), full hysteresis data, or both combined; at linear, logarithmic, change in value or user defined intervals- Data storage to computer disk in ASCII format at rates up to 5kHz synchronous on up to 24 channels- Ability to pause and resume a test, either immediately or at some point in the future- Control of digital and analogue outputs- Waveform start and stop enveloping- Tracking and Peak & Trend Live Displays- Set of Electronic Manuals in PDF Format

### Monotonic (Static) Materials Testing Software

Static Materials Testing Software to feature a Window's based graphical user interface designed for ease of use, power, and flexibility. The software should provides up to four real time numerical displays (digital or analog) for test data as well as facilities for generating graphs and tables of processed test results. The use of simple memorable icons to represent system functions and features ensure rapid learning and makes the system ideal for both infrequent and experienced users.

The basic software should provide the following functionality and features:

- Set-up and configuration of 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
- Prompted Test Sequence Creator
- Live runtime test plots with automatic scaling and zoom-in/out
- Report generation with basic report templates included
- Monitoring of system and system service histories
- On-line help and reference guide
- API (Advanced Programming Interface) for data access or automation
- Automatic grip control
- Saving and retrieval of test methods and data
- Example test methods included for easy test creation
- Interactive User Learning CD

Software to include:

- Tension, Compression, Flexure, Peel/Tear/Friction, and Metals Applications Packages
- Enhanced Control
- TestProfiler
- Reports and Graphs Pack

### **Computer System**

Personal Computer with Intel Dual Core Processor Minimum Specification that to be supplied as follows: - Intel Processor (2.4 GHz, 4.8 GT/s, 4 MB, DC) - Vertical Chassis Orientation (Minitower, W: 172 x H: 447 x D: 468 mm) - 2GB DDR3 1066 ECC - 250GB (7,200rpm) SATA Hard Drive - 16X DVD+/-RW - 256 MB PCI-e x16 ATI FirePro 2260 - 2 DP (2 DP-DVI adapters) (ULGA9B), Dual Monitor - Internal Speaker - 1 x Integrated Ethernet Port and 1 x Ethernet PCI-E Network Card (for use with Ethernet Frame Interface) - 3 PCI Slots (2 full length)- 1 free PCI Express Slots - 2 Button USB Scroll Optical Mouse  
22 in Wide Screen Flat Panel Monitor  
220/240V

To be supplied with Microsoft Windows 7 Professional operating system

**Necessary Computer Interface Card**

**ADDITIONAL ITEMS TO THE MAIN SCOPE ABOVE**

**Additional jaw faces for hydraulic grips**

- 45 1 Flat serrated jaw faces 100mm wide for gripping flat specimens 11-22mm thick (set of 4 faces)
- 46 1 Flat serrated jaw faces 100mm wide for gripping flat specimens 21-32mm thick (set of 4 faces)
- 47 1 Flat serrated jaw faces 100mm wide for gripping flat specimens 31-42mm thick (set of 4 faces)
- 48 1 Vee jaw faces for gripping round specimens 10-16mm diameter (set of 4 faces)
- 49 1 Vee jaw faces for gripping round specimens 16-22mm diameter (set of 4 faces)
- 50 1 Vee jaw faces for gripping round specimens 22-28mm diameter (set of 4 faces)
- 51 1 Vee jaw faces for gripping round specimens 28-34mm diameter (set of 4 faces)

**Compression anvils**

- 52 1 50 mm (2 in) Diameter Fatigue Rated Compression Platens.

- Capacity: 200 kN Static / 100kN Dynamic

- To include adapters to fit frame

Quantity: 2 platens

- 53 1 150 mm (6 in) Diameter Fatigue Rated Compression Platens.

- Capacity: 500 kN Static / 250kN Dynamic

- To include adapters to fit frame

Optional spherical seat

Quantity: 2 platens

- 54 1 Fatigue Rated Spherical Seat, Capacity 500kN Static / 250kN Dynamic.

To Include adaptor to compression platen and to fit frame

Quantity: 1 seat

**Bend Fixture**

- 55 1 Fatigue Rated 3 Point Bend Fixture, 100 kN Dynamic Capacity, With 25mm Diameter Rollers.

- Adjustable lower span from 30 to 250mm

- Maximum specimen width is 50mm

- Anti-rotation feature to be incorporated in the design.

- 56 1 Bend Fixture Conversion Kit, 3 Point To 4 Point.

- Upper span adjustable from 25 to 90mm

**Fracture Mechanics Grips**

- 57 1 Fracture Mechanics Grips for 6.5 mm and 13 mm thick specimen.  
Rated capacity: ±10kN Dynamic, 20 kN Static.  
Temperature Range: 0 to 100°C  
(1 pair)

58 1

Fracture Mechanics Grips for 25 mm wide compact tension specimen. Rated capacity: ±50kN Dynamic, 100 kN static Temperature Range: 0 to 100°C (1 Pair)

60 1

Fracture Mechanics Grips for 50 mm wide compact tension specimen. Rated capacity: ±250kN Dynamic, 500 kN Static (1 Pair)

**COD gauge and software for Fracture Mechanics**

61 1

Crack Opening Displacement (COD) Gauge, 10mm gauge length, 4mm travel. Temperature range: 0 °C to 80 °C (32 °F to 176 °F)

62 1

Fracture Mechanics Combination Package.

To includes:

- Crack Propagation (da/dN) software to provide machine control and data acquisition for tests to ASTM E647-08. Crack length is measured using compliance, ACPD or DCPD techniques.

- Fracture toughness software performs K1C tests in accordance with the relevant sections of ASTM E399-09, ASTM B645-07, ISO 12737:2005, ASTM E1290-08 (CTOD) and BS7448-1991 part 1 (K, CTOD and J).

- Unloading Compliance (J1C) software performs J1C testing to ASTM E813-89.

**Enhanced performance option (in lieu of item nos. 7 to 10 above)**

64 1

65 l/min Servovalve, Type 761 Standard Response.

65 1

Hydraulic Power Unit

- 78 l/min nominal flow at 207 Bar (3000 psi) on 50 Hz
- 230 bar (3336 psi) maximum output pressure
- 30 kW (40.2 hp) nominal power rating
- Variable displacement pump
- PLC operator interface with digital display of pressure and oil temperature
- Protection devices for oil temperature, oil pressure, oil level, oil filter condition and motor temperature
- 2 micron pressure and return line filtration
- Local or remote Start/Stop functionality
- 600 litre reservoir capacity
- Star-delta starting

400V, 50Hz, 3 phase operation (suitable for 380V and 415V operation)

Water cooled via high efficiency plate heat exchanger for water inlet temperatures of up to 25 °C (77 °F). The environmental temperature range is 7 °C (45 °F) to 40 °C (104 °F).

Noise level not to exceed 77 dB (A) (fully compensated, free field conditions).

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Pressure accumulator, bladder type, 4 litre capacity.

66 1

Oil for Hydraulic Power Units

This includes a single fill of oil for the Hydraulic Power Unit.

67 1

Up to 118 l/min hose set, 207bar (3000 psi), 12m long

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**Installation training and support services**

System Installation Installation to be performed by a factory trained Service Engineer / Representative. Depending on the system configuration, some or all of the following activities will be performed.-Set up of load frame.-Make all physical and electrical connections (except 3 phase power and water). -Mount and test all peripheral fixtures and transducers.-Install environmental chambers, advanced extensometers, etc-Check correct operation of all hydraulic, pneumatic, mechanical assemblies.-Check correct operation of all electrical components and transducers (calibration quoted separately). - Configure controller and test for correct operation including all adjustments and tuning.

#### First Year System Warranty

The first-year service and support agreement for this system under warranty includes the following services during the first year of ownership :

Technical Support: Includes the following:

- Unlimited priority telephone support during normal business
- All software updates, but not upgrades, during the agreement period

On-site Support: Includes:

- Parts, labor and travel for repair and replacement for items that are covered under the Warranty as defined by the NITT Terms and Conditions.

## Basic System and Software Introduction

This Introduction provides a brief overview for up to 3 operators on the supplied system. Included in this item are:

- Safety Awareness
- General materials testing safety precautions and system safety features
- Test instrument overview including:
  - Integration and set-up of load frame and computer
  - Mounting and testing of all peripheral fixtures and transducers
  - Setup of hardware to the users immediate requirement
  - Review of the major system components
  - Powering on/off of instrument and software (if appropriate)
  - Console and software console controls
  - Calibration procedures
  - Review basic operation manual and related documentation
  - Creation if necessary, of 1 user test method to the user's requirement
  - Testing of specimens to confirm or verify test method.
  - Review of test method results
  - Review of default/standard report format

Monotonic (Static) Software Introduction This introduction includes Test Method development and training for up to 3 operators on the customers supplied equipment and to pre-defined customer methods. Included in this item are:- Review user's application needs- Creation, if necessary, and the running of up to 5 user test methods- Set-up of Sample and Specimen Parameters- Set-up of Test Control Parameters- Results Calculations setup for applications- Review and set-up of report templates- Testing customer supplied specimens to validate/verify developed test methods- Instruction on simple modifications to Test Methods and Report Templates (if applicable)

1

## System and Basic Software Introduction

Training for up to 2 operators on the supplied equipment including:

- Safety Awareness - General materials testing safety precautions and system protection features.
- Test instrument overview including:
  - Review of the major system components.
  - Integration and set-up of load frame and computer.
  - Mounting and testing of all peripheral fixtures and transducers.
  - Setup of hardware to the users immediate requirement.
  - Powering on/off of instrument and software.
  - Frame and software console controls.
  - Auto Calibration and Tuning procedures
  - Review user's application needs
- Creation, if necessary, and the running of up to 2 pre defined user tests.
- Sample and Specimen Parameter Inputs
- Control parameter Inputs
- Results / Calculations / Output Options
- Demonstrate Test to verify developed test using customer supplied specimen.
- Instruction on simple modifications to Test Parameters (if applicable)

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## Software Application Introduction for Fatigue, LCF and Fracture Mechanics Softwares

Review of Software Application package and user's application needs

- Creation and the running of up to 2 pre defined user tests.
- Sample and Specimen Parameter Inputs
- Control parameter Inputs
- Results / Calculations / Output Options
- Demonstrate test to verify developed test using customer supplied specimen.
- Instruction on simple modifications to Test Parameters (if applicable)

1 Force Verification up to 250 kN, Tension & Compression at Installation. This verification will be performed to 0.5% accuracy down to 1/100th (1%) of capacity.

2 Strain verification, Static, Dynamic or X-L Extensometer

1 Actuator Stroke Verification

Standard verification includes five data points in each direction of actuator travel. Stroke to be verified to an accuracy of 1.0% of full scale.