CSIR - NATIONAL METALLURGICAL LABORATORY
(Council of Scientific & Industrial Research)
BURMAMINES, JAMSHEDPUR - 831 007
Tel: 0657 2345129/132, Fax: 0657 2345131
Email: spo@nmlindia.org Website: www.nmlindia.org

ISO 9001:2008

No. NML-FG/MTE-STR/39-19 **Date: 15.11.2019**

CORRIGENDUM – 1

Sub: Tender for Supply of "Automated Quenching Dilatometer".

Ref: 1) Enquiry No. NML-FG/MTE-STR/39-19 Date:05/11/2019
2) CPPP Tender ID No. 2019_CSIR_489713_1

With reference to the above procurement, it is informed that **technical specification has been revised after Pre-Bid Meeting held on 13.11.2019.** The bid may be submitted as per the revised technical specifications. **All other terms and conditions will remain unaltered.**

15.11.19
(N.K. Singh)
Stores & Purchase Officer

No. NML-FG/MTE-STR/39-19 Date: 15.11.2019

Technical Specifications of Automated Quenching Dilatometer

A fully automated quenching dilatometer capable of measuring dimensional changes during programmable heating/cooling or quenching of metallic samples with the following specifications (mandatory):

1. Types of samples which can be handled in the dilatometer:
   a) Solid round samples of length in the range of 9 – 11 mm and outer diameter in the range of 4 – 5 mm;
   b) Hollow round samples of length in the range of 9 – 11 mm, outer diameter in the range of 4 – 5 mm and inner diameter in the range of 2 – 3.75 mm;
   c) flat samples of
      length: 7.5mm – 10mm
      width: 3 – 5 mm
      thickness: 1.5 – 2 mm

2. A specimen heating module comprising of:

   a) a closed chamber with induction type heating system for heating of metallic samples upto 1500°C under vacuum/inert atmosphere (of Ar and N_2);

   b) an attainable vacuum level of 10^{-4} mbar or better in the specimen chamber (preferably through a turbo-molecular pump);

   c) a specimen holder made of fused silica for experiments at temperature upto 1100°C (which can also sustain sub-zero quenching till –150°C);

   d) a specimen holder made of Aluminum Oxide (Al_2O_3) for experiments at temperature in the range of 1100 °C - 1500°C (which can also sustain sub-zero quenching –150°C);

   e) induction coil with provision for automatic adjustment of heating power, serving the purpose of controlled heating of the specimen;

   f) induction coil system capable of providing heating rates in the range of 0.1 – 1500°C/s or better in the temperature range of RT – 1100°C;

g) provision for handling non – standard flat specimens of minimum 1.5 mm thickness;

h) provision for spot welding at least two thermocouples or more on a single specimen and their respective data acquisition for monitoring the temperature across the length of the specimen;

i) provision for quench gas inlet (for Ar, N_2 and He) serving the purpose of controlled quenching of the specimen;

j) provision for sub-zero cooling of specimen till – 150°C;

k) a gas supply module as an auxiliary component wherein automatic adjustment of gas flow rate (for Ar, N_2, He etc.) can be obtained by closed loop gas flow controlled system with temperature feedback to control the gas servo valves;

l) provision for attaining a maximum controlled quenching rate of 700°C/s or better in the temperature range of 1500°C to 1000°C, 400°C/s or better in the temperature range of 1000°C to 550°C, 200°C/s or better in the temperature range of 550°C to 250°C and 120°C/s or better in the temperature range of 250°C to 100°C;

m) provision for attaining a minimum cooling rate of 0.05°C/s or lower;

n) provision for simulating an exponential (Newtonian cooling) cooling of specimen in the temperature range of 800 – 500°C within a user specified total time period, by automatic control.

3. A dilation measurement system comprising of :

a) Linear Variable Displacement Transducer for measuring the dimensional change in axial direction with a measuring range of ±2mm or more, linearity of 0.2% or lesser and resolution of 0.05μm or better;

b) Dilation data acquisition/recording system.

4. The dilatometer unit should have a provision to attach the requisite hardware for non-contact diameter change measurement simultaneous to LVDT measurement.

5. An appropriate cooling system for the instrument to function properly must be supplied by the bidder.

6. A computer/workstation for equipment programing and data acquisition/analysis software installation purpose with:

    a) Windows based operating system;
    b) minimum 4 GB RAM;
    c) minimum 1 TB internal storage capacity;
    d) provision for transferring data through CD/DVD.

7. A Graphical user Interface based software for operation of dilatometer, with:

    a) programmable temperature time schedule by setting PID parameters for each segment;
    b) provision for minimum 99 temperature-time segments in one dilatometer run;
    c) provision for data security in case of power failure;
    d) provision for thermocouple break detection and protection;
    e) capability to evaluate the current evaluation along with storage and export of evaluations;
    f) provision for repetition of measurement using minimum parameter input;
    g) capability to export and import of data in ASCII and Excel format;
    h) provision of software upgradation via internet;
    i) provision of Remote Diagnostic System.

8. A data analysis software with:
   a) capability to calculate change in length of specimen from acquired data;
   b) capability to automatically construct CHT, CCT and TTT diagrams from dilatometry measurements;
   c) capability to calculate heating and cooling rates from dilatometry measurements;
   d) capability to calculate rate of transformation from dilatometry measurements.

9. Spot welding system for round and flat samples with reproducible contact force and protective gas support.

10. Bidder must provide at least one standard sample for assessment and calibration of the accuracy of LVDT.

11. On-site installation and training on the equipment at no extra cost wherein:

    a) the arrangement of space/site with single point 3 phase, 415V ± 10%, 50Hz ± 5% power supply, water supply and gas cylinders required for operation of equipment will be provided by CSIR NML and

    b) all other hardware or other accessories including systems (computers, UPS of suitable capacity), gas regulators, connectors, thermocouples etc. required for successful installation and proper functioning of equipment must be provided by the supplier.

    c) a comprehensive training on the hardware, software, operation, maintenance and any other requisite item for the satisfactory performance of the equipment must be provided by the personnel from the principal to at least 5 CSIR NML staffs after successful installation of the equipment at NML site.

12. One-year comprehensive warranty of the equipment from the date of installation must be provided by the bidder.

13. Bidder must provide the quote of non-comprehensive AMC that will be applicable after the expiry of warranty for one year.

    The AMC must include two Preventive Maintenance visits and one Breakdown visit of service engineers.

14. Bidder must mandatorily provide all kinds of supporting documents like brochures, manuals, experimental simulation data, previous purchase/sale orders with all annexures etc. pertaining to the specific unit which they are intending to supply or any other technical document in order to validate the claim of all the specifications, especially the extreme limits of all the specified ranges.

15. Provision for after sales service must be indicated by the bidder in the offer.

16. Proven record of supplying at least 5 number of similar equipment must be provided by the bidder.

15.11.19

(N.K. Singh)
Stores & Purchase Officer