

**Central Glass & Ceramic Research Institute
KOLKATA (WEST BENGAL) INDIA**

CORRIGENDUM

REFERENCE NO. :- P/NC/29/AT/DR/GTE/21-22

DATE: 09/12/2021

**NAME OF EQUIPMENT: HEATING MICROSCOPE ALONG WITH OPTICAL
DILATOMETER TO MEASURE CHARACTERISTIC TEMPERATURES**

CONSEQUENT TO THE PRE-BID MEETING HELD ON 07/12/2021, THE REVISED SPECIFICATION OF "HEATING MICROSCOPE ALONG WITH OPTICAL DILATOMETER TO MEASURE CHARACTERISTIC TEMPERATURES :

Revised Technical Specification of Heating Microscope along with the Optical Dilatometer

The equipment should comprise of Heating Microscope with Optical Dilatometry which frames the entire sample and records the sequence of the characteristic shape changes and the temperature throughout the experiment. This is required for acquiring all key characteristic temperatures along with visual images of material change events including sintering, softening, full sphere, half-sphere and melting. The instrument should strictly meet the following detailed technical specifications:

Detail Technical Specifications:

Sl. No.	Specifications	CGCRI Specifications
1	Mode of Operations	(i) Heating Microscope: To be used for measuring characteristic temperatures such as softening, sphere, half sphere and melting. (ii) Optical Dilatometer: To be used for measuring shrinkage/expansions
2	Furnace	
2.1	Temperature:	1650°C or more
2.2	Working temperature range:	RT- 1650°C or more
2.3	Temperature resolution:	± 1°C or better
2.4	Temperature stability:	≥ 2°C or better
2.5	Heating Rate	5-50°C
2.6	Sample Environment control:	Air and inert/quasi-inert
2.7	Heating/cooling program	Unlimited number of heat / cool / isothermal steps in any combination
2.8	Cooling system	Closed loop water cooling using suitable chiller
3	Optics	Suitable optics for capturing better images

3.1	Light Source	440 to 460 nm, Blue LED
4	Samples	
4.1	Samples to be measured	Glass, ceramics, metals, slag, etc.
4.2	Sample dimension	Heating Microscope: Height: 3 mm (minimum) Dia.: 2 mm (minimum) Optical Dilatometer: Bar-shaped: 13 mm or more L x (5± 1) mm B x (5± 1) mm W
4.3	Resolution of dimensional changes	Heating Microscope: 3 µm or better Optical Dilatometer: 300 nm or better
4.4	CTE Accuracy	1 x 10 ⁻⁵ /K or better
4.5	Dimensional changes detection system	Optical non-contact with high resolution CMOS camera with fully automated focus. Heating Microscope: 2 MP or better Optical Dilatometer: 2 x 1MP or better
4.6	Temperature sensor	B-type thermocouple or any other suitable thermocouple for the mentioned temperature range.
4.7	Camera positioning control	Software controlled and operated by stepper motor
4.8	Frame acquisition rate	1-10 f/s or better
4.9	Standard materials	Certified standard materials for CTE
5	Software	Latest version with features of up-date/up-grade support from vendor. Software should be capable of temperature control, data acquisition and data evaluation. It should have the following features: <ul style="list-style-type: none"> • Detection of characteristic temperatures and evaluation • Unlimited number of heating/cooling/isothermal segments • Material viscosity calculation • Contact angle curve, sample area variation curve, ratio curve between width and height, cohesion, roundness, relative potential energy, flattening curve, etc. • Evaluation of dilatometric parameters

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		<ul style="list-style-type: none"> • Data storage and export capability both in the form of image and ASCII • Capable of generating reports
6.	PC	Minimum configuration Intel i5, Windows 10 Operating System with 64 bit 8GB RAM, 2 TB Hard Drive, CD/DVD ROM Drive Starting video resolution 1920 X 1080 pixels or more With proper communication ports
7.	Power supply	Single phase 220-240V, 15 Amp, 50±1Hz
8.	Documents	Manuals for Operation and Maintenance in English
9.	Installation and Commissioning	At CSIR-CGRI by the Vendor
10.	Training	3 days onsite training after successful installation
11.	Warranty	1 year

