



भारतीय प्रौद्योगिकी संस्थान भिलाई
जी.ई.सी. कैम्पस, सेजबहार, रायपुर - ४९२०१५
छत्तीसगढ़, भारत

Indian Institute of Technology Bhilai
G.E.C. Campus, Sejbahar, Raipur - 492015
Chhattisgarh, India

IITBh/Goods/Mech/2021-22/220

Date: 01.02.2022

CORRIGENDUM-1

It is notified to all concerned parties that with reference to our Tender No. IITBh/Goods/Mech/2021-22/220 Dated: 13/01/2022 for the “Supply and Installation of High Temperature Tribometer at IIT Bhilai”, the following changes are made in the tender document:

S.No.	Particular	Specifications Initially Floated	Modified Specifications
1.	Type of Machine	<p>The assembly is expected to be constituted by the following modules (i) mechanical components for providing motion and support, (ii) electrical components, (iii) a furnace, and (iv) cooling system.</p> <p>The instrument should be able to perform wear and friction testing of solid materials in lubricated or dry conditions with operating temperature up to 1000 °C as per ASTM G99 or similar international standard. The instrument should be supported by a software that is built to operate, make measurements, display real time data, store the data and aid in analysis of the results. The tribometer should be designed to use water as coolant to protect the mechanical parts during high temperatures.</p> <p>It should be able to operate in both rotational and reciprocating mode.</p>	<p>The assembly is expected to be constituted by the following modules (i) mechanical components for providing motion and support, (ii) electrical components, (iii) a furnace, and (iv) cooling system.</p> <p>The instrument should be able to perform wear and friction testing of solid materials in lubricated or dry conditions with operating temperature up to 1000 °C as per ASTM G99 or similar international standard. The instrument should be supported by a software that is built to operate, make measurements, display real time data, store the data and aid in analysis of the results. The tribometer should be designed to use air/water as coolant to protect the mechanical parts during high temperatures.</p> <p>It should be able to operate in both rotational and reciprocating mode.</p>
2.	Design and Construction	<ul style="list-style-type: none">• A tabletop model, compact, robust, made of high-quality parts and materials.• Fully conform to standards ASTM G99 or DIN 50324.• Must include both rotary and linear/angular reciprocation module of tribo-testing, both possible to operate in high temperature conditions.• Having safety features built-in to protect the furnace, electronics, mechanical system, load cell etc.	<ul style="list-style-type: none">• A tabletop/ floor-mounted model, compact, robust, made of high-quality parts and materials. It should not require any foundation to be made for installation.• Loading system may be either automatic or dead-weight based.• Fully conform to standards ASTM G99 or DIN 50324.• Must include both rotary and linear/angular reciprocation module of tribo-testing, both possible to operate in high temperature conditions.

		<ul style="list-style-type: none"> • The layout should be such that the electronics are well separated from water lines and heat produced from the furnace. • The environment in the chamber should not affect the electronics and mechanical systems • The environment in the test chamber must not be contaminated by the air and/or water circulation • It should be easily serviceable 	<ul style="list-style-type: none"> • Having safety features built-in to protect the furnace, electronics, mechanical system, load cell etc. • The layout should be such that the electronics are well separated from water lines and heat produced from the furnace. • The environment in the chamber should not affect the electronics and mechanical systems • The environment in the test chamber must not be contaminated by the air and/or water circulation • It should be easily serviceable
3.	Motor	<ul style="list-style-type: none"> • Torque: not less than 400 mN-m • Speed: 0.2 RPM or less to 1500 RPM or more • Capable of rotating in both directions • Capable of angular reciprocation with a frequency 0.01-5 Hz • Angular resolution of 0.1 degrees • Stroke length for linear reciprocation module: 1–25mm or better. 	<ul style="list-style-type: none"> • Torque: not less than 400 mN-m • Speed: 0.2 RPM or less to 1500 RPM or more • Capable of rotating in both directions • Capable of angular reciprocation with a frequency 0.01-5 Hz or higher • Angular resolution of 0.1 degrees • Stroke length for linear reciprocation module: 1–25mm or better. Frequency in 0.1 - 5 Hz range or higher.
4.	Mechanical system	<ul style="list-style-type: none"> • The mechanical system (shaft, bearings, and the furnace linings etc.) should use superior high temperature materials • It should be robust • Easy to operate • Controllable using software. • Withstands high temperatures without oxidation and wear. 	<ul style="list-style-type: none"> • The mechanical system (shaft, bearings, and the furnace linings etc.) should use superior high temperature materials • It should be robust • Easy to operate • Controllable using software. • Withstands high temperatures without considerable oxidation and wear and significant loss of functionality.
6.	Heating system	<ul style="list-style-type: none"> • Precise and homogeneous sample temperature control up to 1000 °C • Max. Oven Temperature: At least 1000 °C • Max. Sample Temperature: At least 1000 °C • Uniform heating of the sample from all sides must be achievable. 	<ul style="list-style-type: none"> • Precise and homogeneous sample temperature control up to 1000 °C • Max. Oven Temperature: At least 1000 °C • Max. Sample Temperature: At least 1000 °C • Uniform heating of the sample from all sides must be achievable. • In case of linear reciprocation, a maximum temperature of 400 °C or more should be achievable.

8.	Cooling	<ul style="list-style-type: none"> • Chillers shall be provided with water cooling to the furnace walls and the mechanical system wherever necessary. • The water lines must be sealed and far away from the electronics. • There must be an in-built safety system to protect the furnace wall and linings during heating if the water flow rates are low. • The water conduits should be capable of easy cleaning and maintenance. 	<p>In case of water based cooling system,</p> <ul style="list-style-type: none"> • Chillers shall be provided with water cooling to the furnace walls and the mechanical system wherever necessary. • The water lines must be sealed and far away from the electronics. • There must be an in-built safety system to protect the furnace wall and linings during heating if the water flow rates are low. • The water conduits should be capable of easy cleaning and maintenance. <p>In case of air based cooling system,</p> <ul style="list-style-type: none"> • The cooling air supply should not contaminate the chamber environment with dust and other air-carried particles. • Adequate arrangement for dehumidification of the cooling air stream should be present.
15.	Sensors and standards	<ul style="list-style-type: none"> • Adjustable data acquisition rate up to 400 Hz for recording frictional phenomena with high fidelity. • Fully conform to ASTM G99, ASTM G133 and DIN 50324 standards . • Differential arm with two LVDT/piezoelectric sensors for precise temperature drift compensation . • Radius sensor allows an automatic display of the arm on the sample. • Motorized and software controlled tribometer arm used for normal loading. • Carriage with graduated guide and adjustment knob . • Online wear depth sensor. • 2 Independent thermo -couples for sample and oven; 1 additional thermocouple for TOP Heating Cover in case of temperature up to 1000 °C. • Electrical contact resistance • Cell for lubricants. • Plastic Cover: For low temperature measurement. 	<ul style="list-style-type: none"> • Differential arm with two LVDT / piezoelectric / equivalent position sensors for precise temperature drift compensation . • Adjustable data acquisition rate at least up to 400 Hz for recording frictional phenomena with high fidelity. • Fully conform to ASTM G99 and DIN 50324 standards . • Differential arm with two LVDT/piezoelectric sensors for precise temperature drift compensation . • Radius sensor allows an automatic display of the arm on the sample. • Motorized and software controlled tribometer arm used for normal loading. • Carriage with graduated guide and adjustment knob . • Online wear depth sensor. • 2 Independent thermo -couples for sample and oven; 1 additional thermocouple for TOP Heating Cover in case of temperature up to 1000 °C. • Electrical contact resistance . • Cell for lubricants. • Plastic Cover: For low temperature measurement.

All other terms and conditions of the tender remain unchanged.


 Administrative Advisor
 प्रशासनिक सलाहकार
 Administrative Advisor
 भारतीय प्रौद्योगिक संस्थान भिलाई
 Indian Institute of Technology Bhilai