TECHNICAL SPECIFICATIONS FOR

VIBRATION CONTROLLED IN-SITU MICRO MECHANICAL TESTING PLATFORM

The module must be able to:

A. Perform tensile as well as compression tests while being imaged using Electron Backscattered Detector under high temperature (800 °C) as well as cryogenic conditions (20 K).
B. Cyclic load testing both at ambient conditions as well as elevated temperature upto 800 °C should be a possibility.
C. Precise determination of elongation with a minimum resolution of 100 nm.

The detailed specifications for the "Vibration Controlled In-situ Micro Mechanical Testing Platform" are given in 2 parts A and B below,

PART A - DETAILED SPECIFICATIONS (Mechanical testing platform)

S.No.	Item	Description
1.	Micromechanical platform	• Load Cell: Ranging between 10-15 kN • Resolution: <100 nm • Deformation speed: Better than 1 to 50 µm/sec with uniform extension on all directions. • Compatible to be functioning under 10^{-5} Pa or better vacuum conditions.
2.	EBSD and SEM compatibility	• SEM compatible module especially for APREO S, INSPECT F, QUANTA, HELIOS G4. • Motor Controller Electronics and software package for data acquisition, analysis. • Suitable for wide field of view observation (10 mm length × 5 mm width) in SEM. • Correlative SEM imaging – Elongation/Force step.
3.	Tensile Clamps for Flat Specimens	• Suitable for tension and compression along with cyclic loading. • Maximum specimen dimension (mm): 60 × 10 × 5 • Minimum specimen dimension (mm): 10 × 1 × 1 • Suitable holders for testing without the requirement for holes in the gripping region
4.	Facility for mounting the stage outside the SEM	• Under ambient conditions and for coupled experiments under the observation of optical microscope. • Possibility for vertical mounting
5.	In-situ Heating function	• Temperature range: Upto 800 °C • Capability for performing cyclic load experiments at elevated temperatures.

PART B - DETAILED SPECIFICATIONS (Cryo-assembly)

S.No.	Item	Description
1.	Cryostage	• Temperature range: 10 to 300 K • Vibration control: < 10 nm after 10 min of reaching set temperature. • Suitability: For working in Ultra High Vacuum conditions of 10^{-10} torr.
2.	Cryostat system	• Leak rate: Better than 10^{-9} mbar × l/s (for He system) at 300K • Temperature range: 10 – 300 K • Maximum baking temperature: > 80 ºC
3.	Cryo-cooling medium	• Medium: Liquid He • Expected Cooling time: 20 to 30 mins • Liquid He consumption for cooling to Set temperature: < 2 litres • Lowest temperature: ≤ 10 K
4.	Connecting cables	• Provision to transfer liquid He to the cryostage should be provided. • Appropriate temperature measurement controller should be included in the system.

Additional Requirements:

1. Supplier should be able to provide complete solution including high temperature testing module as well as the compatible cryogenic stage.

2. Mandatory 1 year Warranty period for all parts, accessories, and components.

3. AMC cost for 3 years may be quoted.

4. Installation, commissioning, after-sales supply are on the part of supply.

5. 3-day advanced training program should be included.