INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

MATERIALS MANAGEMENT DIVISION

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Technical Specification of Tensile stage

A tensile stage is required, to impose uniaxial extension or compression on small scale samples, as defined in the detailed specifications. This stage should have variable temperature capabilities and should allow easy integration with an optical microscope for in situ sample visualization during the stress-strain experiment. The stage must be provided with a data acquisition computer, with software that can capture the stress-strain data. The software should also allow integration with a camera to capture sample visualization data, in sync with the mechanical data.

1) The tensile stage must comprise sample grips with the following specifications:

Distance resolution	At least 2 µm
Maximum travel	At least 8 cm, with minimal backlash
Positional resolution	< 10 µm
Speed range	1 - 5000 µm/s
Sample width	At least ranging from 0.001 - 20 mm
Sample thickness	At least ranging from 0.001 - 2 mm
Minimum sample length	Not more than 2 cm (CHECK!)
Movement modes	Step Constant velocity (RANGE REQUIRED?) Tensile/Compressive Cycling Controlled Force

A variety of grips should be provided, that are easy to change and that allow 3-point bending in addition to tensile/compressive deformation.

2) For tensile/compressive force measurements, the load cells should have:

Tensile and compressive force	0 N – 20N
Force resolution	0.001 N

Other load cells that go up to 200 N must also be quoted and it should be possible for the load cells to be exchanged in the laboratory, without the need to send it back to the manufacturer.

3) Stage should be capable of imposing variable temperature on sample with:

Temperature range	-150°C to 350°C
Temperature control rate	0.1 - 50°C/min
Temperature stability	+/-0.1°C

The stage must be compatible with an optical microscope, viz. the centre of the sample must have an optical window that allows for in-situ sample visualization during sample deformation in variable temperature operation.

A data acquisition computer must be provided with the stage that is capable of controlling the instrument and acquiring real-time stress-strain data.

Software	Should have, 1. Live display of current status for easy monitoring, 2. Full control of heating and cooling rates, limit and hold time of up to 100 ramps, 3. Row by row control of vacuum, humidity, tensile force and shear modes controllable and synchronised with temperature, 4. Real time chart of temperature and other measured parameters, 5. Capable of synchronisation with other equipment [Microscope] and third-party imaging applications,

4) Additionally, warranty and AMC according to the following:

Warranty	Instrument warranty should be covered for 1 year and additionally 2 years of AMC