

Technical Specifications

1. Instrument: Dilatometer

(Qty: 01 No.)

- **Design:** Pushrod dilatometer
- **Displacement system:** Opto-electronic displacement system with perfect linearity and resolution
- **Furnace type:** Silicon Carbide furnace with motorized operation
- **Cooling mechanism:** Liquid Nitrogen
- **Temperature range :** RT to 1600°C
- **Heating rates:** 0.001 ... 50 K/min
- **Temperature (Accuracy / Precision / Resolution):** 1 K / 0.1 K / 0.001 K
- **Thermal stability (isothermal):** ± 0.02 K
- **Measuring range:** ± 25 mm
- **ΔL Resolution:** 0.1 nm
- **$\Delta L/L_0$ Repeatability:** 0.001 %, absolute value
- **$\Delta L/L_0$ Accuracy:** 0.002 %, absolute value
- **Force range (load at the sample):** 10 mN ... 3 N
- **Force resolution:** 0.001 mN
- **Gas atmosphere:** Inert, oxidizing, reducing, vacuum
- **Gas control:** 3 MFC: 1 x protective gas, 2 x purge gas
- **Oxygen Trap System:** Included, for single and for dual sample holder systems
- **Sample holder systems:** Single and Dual Interchangeable sample holder system (SiO_2 and Al_2O_3)
- **Sample dimensions:** Diameter (single): standard 12 mm - 19 mm; Diameter (dual): 8 mm
- **Automatic sample length determination:** Yes, in expansion mode
- **Softening Point detection:** Included
- **Density determination:** Included
- **Calibration Kit:** Included
- **Installation and Operational Manuals:** English
- **Power requirement:** 220 volts/ 50-60 Hz
- **Note:**
- **Proposed Model:** NETZSCH DIL 402 Expedit Supreme, Germany or Equivalent

2. Software:

The instrument must be equipped with a Windows OS compatible software that can perform multi-tasking i.e., measurement and evaluation. It can also control experimental factors like force adjustment and determine the following characteristics of materials especially glasses;

▪ Coefficient of thermal expansion (CTE)	▪ temperature calibration or determination of caloric effects
▪ Volumetric expansion	▪ Peak Separation
▪ Shrinkage steps	▪ Simultaneous analysis of length changes and endothermic/exothermic effects
▪ Softening point determination	▪ Influence of additives and raw materials

▪ Glass transition temperature	▪ Decomposition temperature of e.g., organic binders
▪ Phase transitions	▪ Anisotropic behavior
▪ Sintering temperature and step	▪ Rate-Controlled Sintering (RCS)
▪ Density change with temperature	▪ Thermo kinetics

- **Proposed Software:** Proteus Software by NETZSCH Germany or equivalent.

3. Accessories (must be compatible with the instrument)

- **Spare Furnaces:**
 - Fused Silica (RT to 1100 °C) Qty: 01
 - SiC (RT to 1600 °C) Qty: 01
- Automatic Evacuation System Qty: 01
- Oxygen trap system (OTS) Qty: 01
- Accessories kit of Length and Force calibration Qty: 01
- **Tube sample holder kits**
 - Complete Tube sample holder kit for single measuring system along with sample supports, slide, push rod and thermocouple (S type)
 - Material: Alumina (sample length 52mm, sample dia:12 & 19mm) Qty: 02 each
 - Material: Fused Silica (sample length 52mm, sample dia: 12 & 19 mm) Qty: 02 each
 - Complete Tube sample holder kit for double measuring system along with sample supports, slide, push rod and thermocouple (S type)
 - Material: Alumina (sample length 52mm, sample dia:8 mm) Qty: 02
 - Material: Fused Silica (sample length 52mm, sample dia:8 mm) Qty: 02
- **Sample supports**
 - Sample supports for single measuring system
 - Alumina (sample diameter: 4mm,6mm,8mm,12.7 mm and 15 mm) Qty: 04 each
 - Fused silica (sample diameter: 4mm,6mm,8mm,12.7 mm and 15 mm) Qty: 04 each
 - Sample supports for double measuring system
 - Alumina (sample diameter: 4mm, 6mm, 8mm) Qty: 04 each
 - Fused silica (sample diameter: 4mm, 6mm, 8mm) Qty: 04 each
- **Slides for tube sample holder**
 - Alumina (Dia: 12 mm and 19 mm) Qty: 04 each
 - Fused silica (Dia: 12 mm and 19 mm) Qty: 04 each
- **Protective tubes for furnaces**
 - Material: Alumina and fused silica Qty: 02 each
- **Push Rods:** Alumina and Fused Silica (single & dual mode) Qty: 02 each
- **Thermocouples:** S type (RT to 1600 °C) Qty: 04
- Complete sample holder kit for tension measurement Qty: 01
- **Computer & Printer:** Core i7 (8th gen) computer system along with laser printer (Qty: 01)

Proposed Model: Dilatometer "DIL 402 Expedis Supreme" by NETZSCH, Germany or Equivalent.

Note: Supplier may please be asked for installation and operational training of two relevant officials. Chinese make is not acceptable.