

A modified Quenching & Deformation Dilatometer (TA instruments DIL 805A/D/T) is operational at the Heinz Maier-Leibnitz Zentrum (MLZ) for running *in-situ* neutron scattering measurements during high temperature measurements (up to 1500 °C) with change in length registration and the possibility of applying compression and tension forces (up to 20/8 kN, respectively). It allows very fast heating and cooling rates (quenching).



In particular it can be operated during neutron diffraction (phase, texture, stress/strain) at STRESS-SPEC and neutron small-angle scattering (nanostructure) at SANS-1. It provides a high-precision in-situ measurement of the length changes of samples, even while heating/cooling or deforming the sample, adding an information sensitive to the transformations of the sample. The combination of the neutron scattering and dilatometry measurements yields a unique view on the microstructural evolution under thermomechanical treatment.

The sample is inductively heated and gas cooled according to a user-defined parameters (linear or exponential cooling rates...). The temperature range goes from room temperature up to 1500°C, the heating rate can be up to 100°C/s and deformation rates range between 0.01 and 200 mm/s (although the limits are slightly dependent on the sample). Especial holders for powders are in preparation. Depending on users demand, the temperature range can be extended down to -160°C with an additional configuration.



Different configurations of the DIL 805A/D/T

	T (°C)	Resolut. (nm / °C)	Heating rate (°C/s)	Cooling rate (°C/s)	Def. Force (kN)	Def. rate (mm/s)	Strain rate (1/s)	Pause btw. def. steps (ms)
Alpha DIL802	20-1500	10 / 0.05	Max. 100	150				
Quenching DIL805A	20-1500	10 / 0.05	Max. 4000	2500				
Deformation DIL805D	20-1500	50 / 0.05	Max. 60	150	20	0.01-200	0.001-20	40
Tension DIL805T	20-1500	50 / 0.05	Max. 40	100	8	0.01-20	0.001-20	40

Contact:

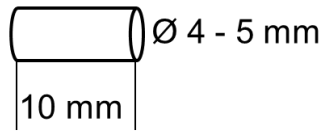
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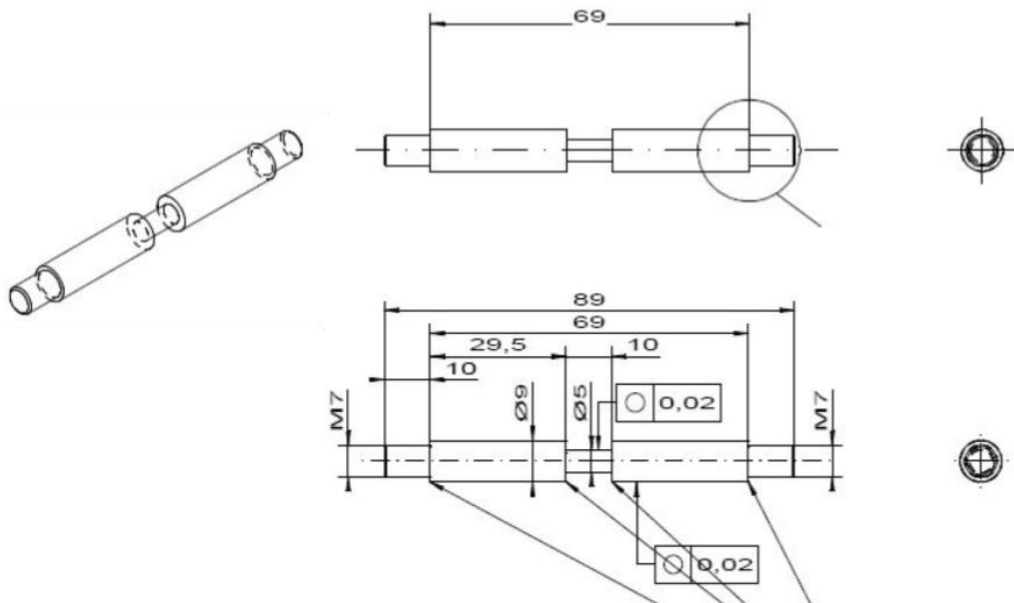
Different types of samples for the different dilatometer configurations:

1) Alpha (DIL802) + Quenching (DIL805A) + Deformation (DIL805D) systems: for thermal expansion coefficient determination + heating/quenching + deformation (compression) experiments



2) Tension (DIL805T): Tension experiments of cylindrical and flat samples:

- Cylindrical samples



- Flat samples

