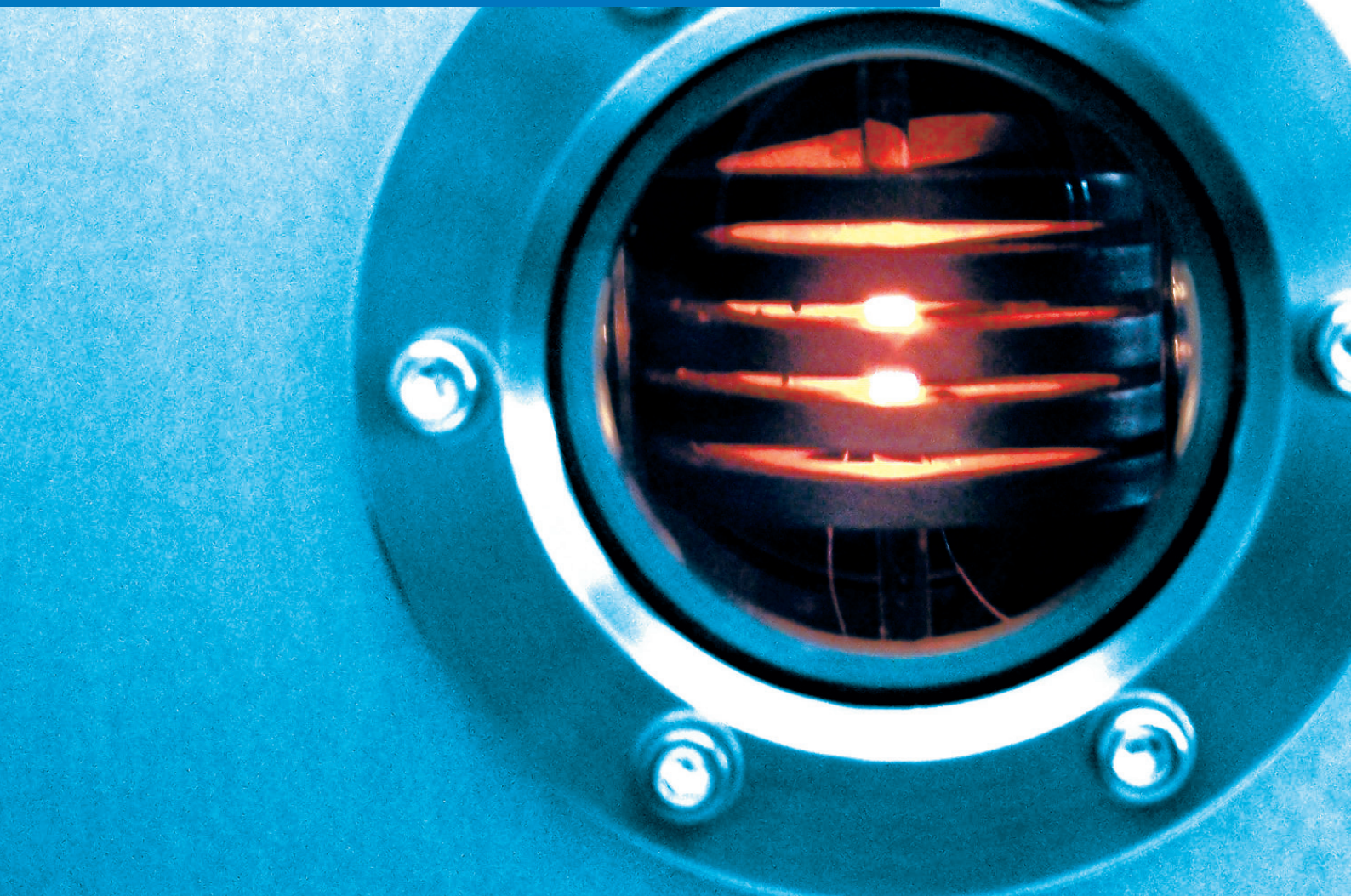


QUENCHING DILATOMETER

RITA L78



LINSEIS

General

This practice is based upon the principle that, during heating and cooling of steels, dimensional changes occur as a result of both thermal expansions associated with temperature change and phase transformation. In this practice, sensitive high-speed quenching dilatometer equipment is used to detect and measure the changes in dimension that occur as functions of both time and temperature during defined thermal cycles. The resulting data are converted to discrete values of strain for specific values of time and temperature during the thermal cycle. Strain as a function of time or temperature, or both, can then be used to determine the beginning and completion of one or more phase transformations.

During heating, steel phase transformation of the crystallographic transformation from ferrite, pearlite, bainite, martensite or combinations of these constituents to austenite take place. During cooling, the crystallographic transformations from austenite to ferrite, pearlite, bainite, or martensite or a combination thereof occur.

The LINSEIS L78 Quenching Dilatometer is especially designed to perform these demanding rapid expansion measurements. The high speed data acquisition and controlling unit, unique gas quenching setup and precise temperature measurement arrangement are only some of the outstanding features of this instrument.

Features

- High Speed Quenching Dilatometer (L78/RITA)
- As per ASTM A 1033 - 04
- Induction furnace
- Expansion measurement with LVDT
- Heating Rate up to 2500 K/sec
- Cooling Rate up to 2500 K/sec
- controlled heating and cooling rates
- Temperature -150 up to 1600°C (different models)
- Maximum vacuum $10E^{-5}$ mbar
- Ultra fast data acquisition 1000 samples / second
- Creation of CHT, TTT and CCT diagrams with Software
- Horizontal or vertical mode of operation



RITA L78 Quenching Dilatometer

Operation Method

Advantages

Operation Method of Quenching Dilatometer

A solid or hollow sample is continuously heated to a certain temperature plateau. At this plateau a continuous cooling is started. The cooling is repeated at different (linear or exponential) cooling rates.

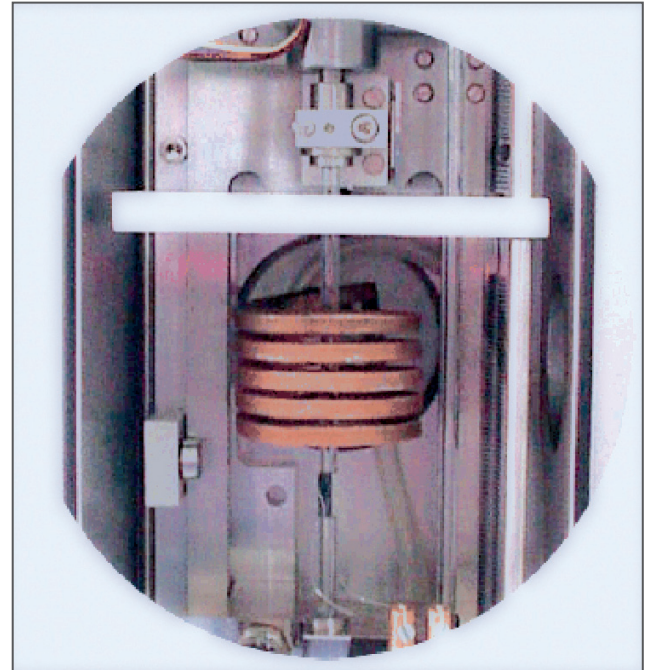
The phase transformations occurring in the different cooling cycles are indicated by the measured change of length. An array of cooling curves with different cool down cycles represents a continuous or isothermal TTT diagram (Time Temperature Transformation diagram). Start and stop of the transformation define the fields of e.g. ferrite, pearlite, martensite or other eutectoid phase batches.

There are two main types of transformation diagram that are helpful in selecting the optimum steel and processing route to achieve a given set of properties. These are time-temperature transformation TTT and continuous cooling transformation CCT diagrams.

Time-temperature transformation TTT diagrams measure the rate of transformation at a constant temperature. In other words a sample is austenitised and then cooled rapidly to a lower temperature and held at that temperature whilst the rate of transformation is measured, for example by dilatometry.

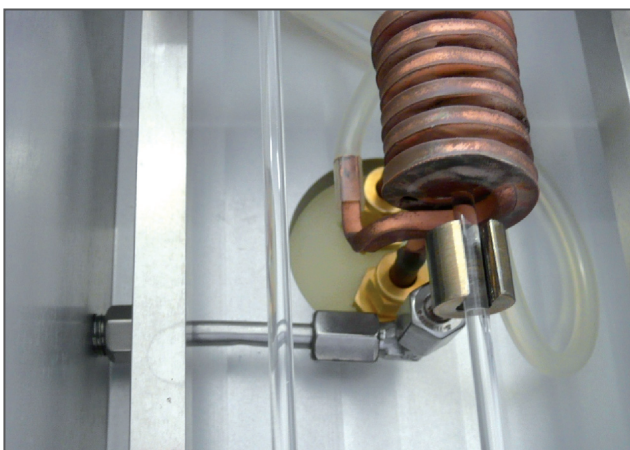
Continuous cooling transformation CCT diagrams measure the extent of transformation as a function of time for a continuously decreasing temperature. In other words a sample is austenitised and then cooled at a predetermined rate and the degree of transformation is measured, for example by dilatometry.

Obviously a certain number of experiments are required to build up a complete TTT or CCT diagram.



Main advantages of the L78 RITA Quenching Dilatometer system

- The instrument can perform measurements under vacuum, inert, oxidized, reduced atmospheres from 150 (low temperature option) up to 1000°C and room temperature up to 1600°C in one run.
- The unique heating and cooling arrangement enable very fast controlled heat up and cool down speeds of up to 2500°C/s.
- With the optional susceptor non metallic samples can be analyzed.
- This special Quenching dilatometer is especially designed for the determination of continuous cooling / heat up CHT, CCT and isotherm TTT- diagrams.



Software

All LINSEIS thermo analytical instruments are PC controlled. The individual software modules exclusively run under Microsoft® Windows® operating systems. The complete software consists of 3 modules: temperature control, data acquisition and data evaluation. The 32 bit software incorporates all essential features for measurement preparation, execution, and evaluation of a Dilatometer run. Thanks to our specialists and application experts, LINSEIS was able to develop comprehensive easy to understand user friendly application software.

TA – WIN Quenching Software Module

LINSEIS has created a unique software package to enable the automatic construction of CHT, CCT and TTT diagrams.

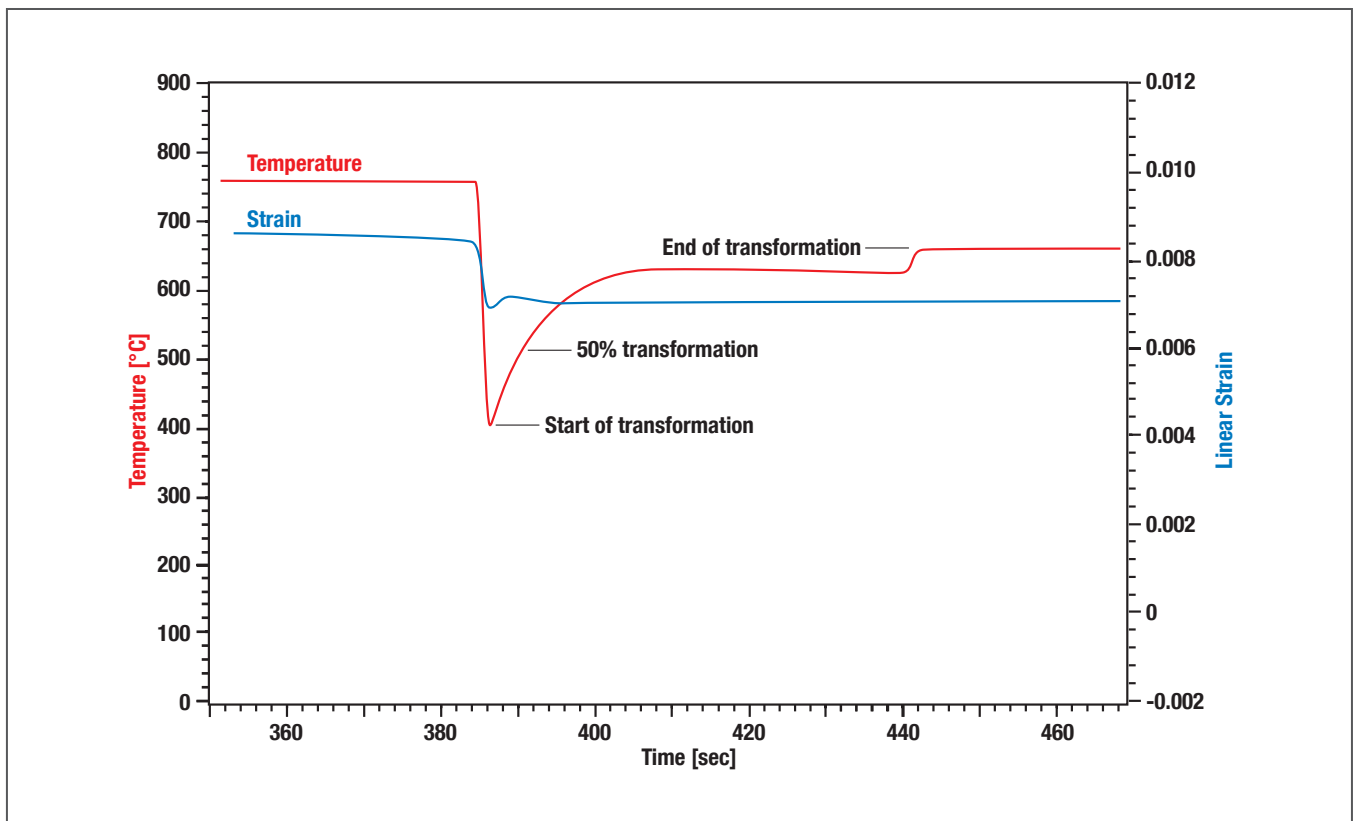
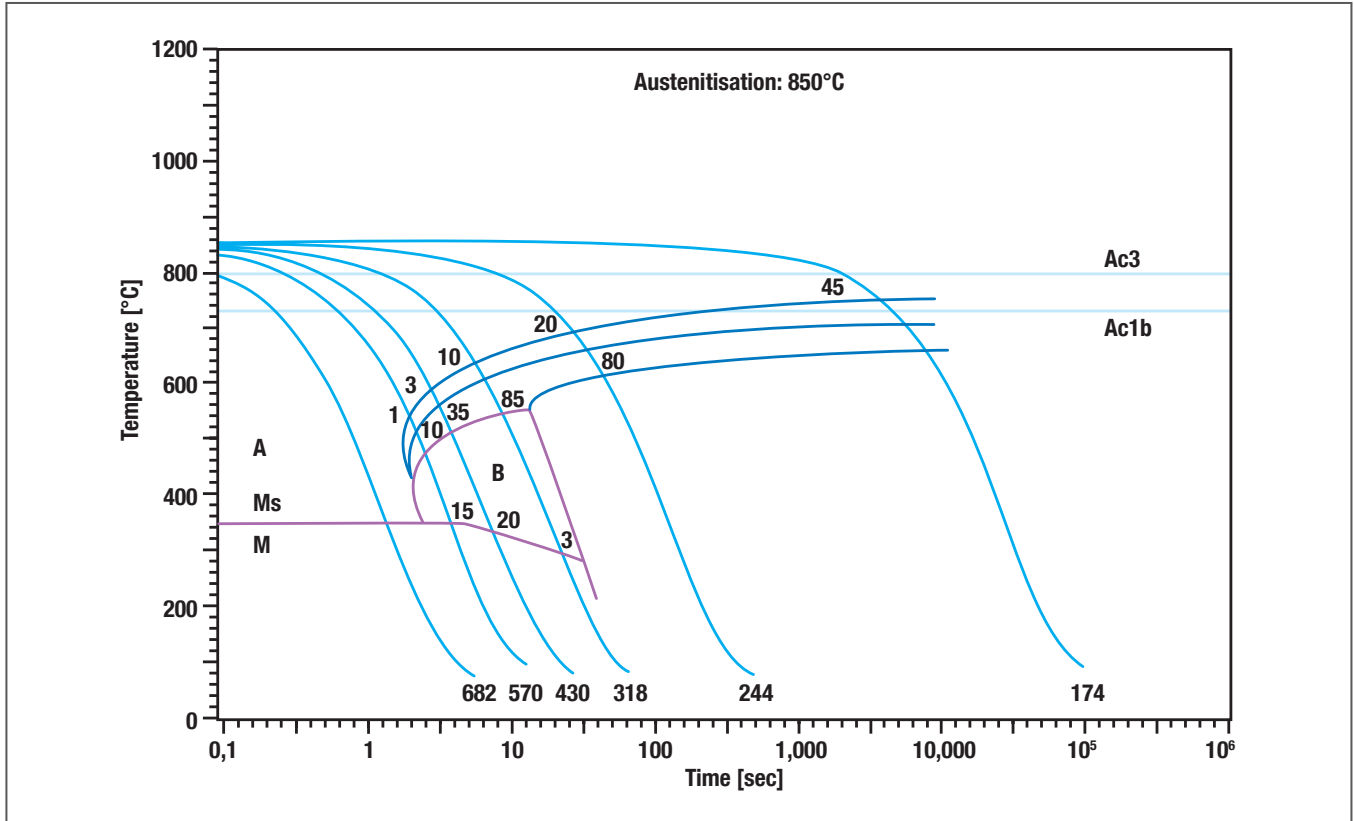
Features -Software

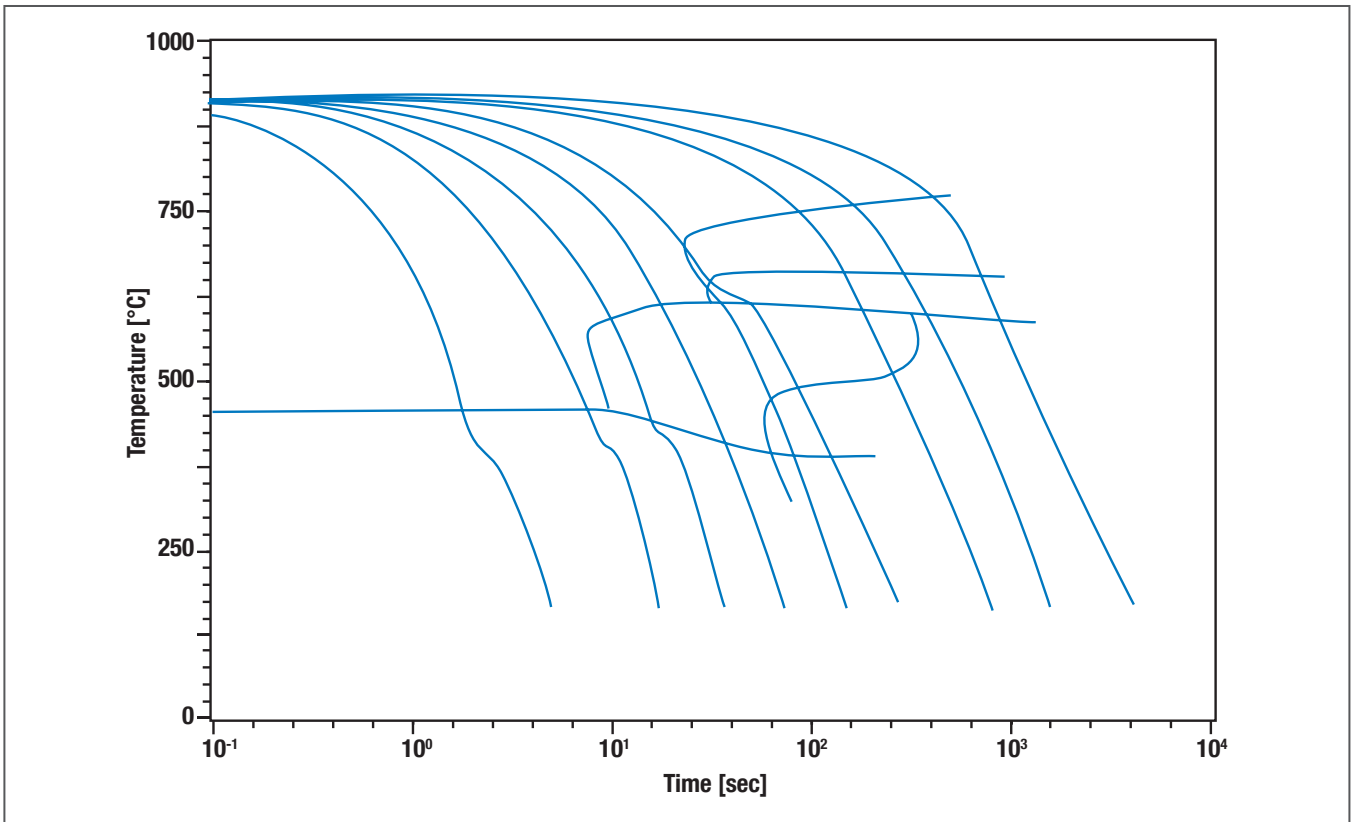
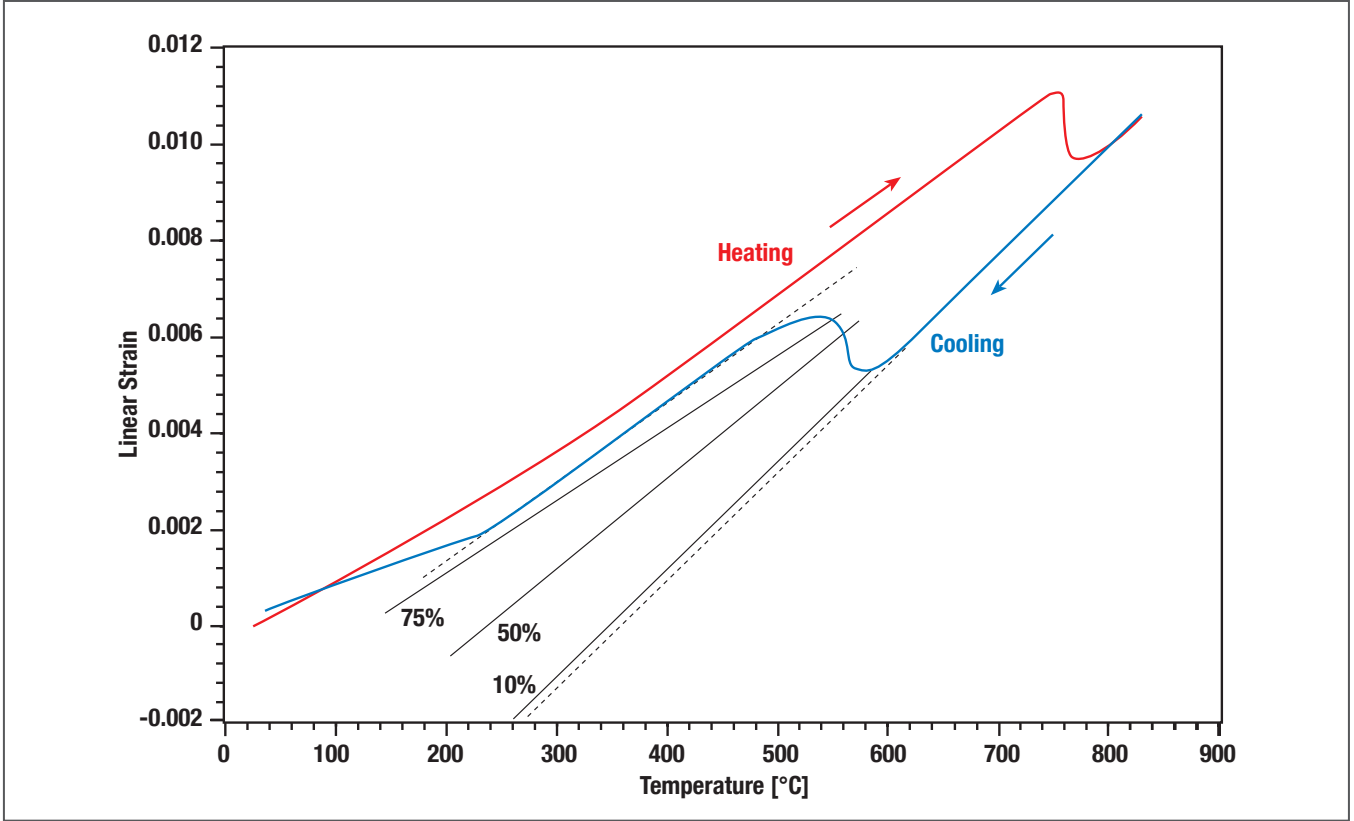
- Program capable of text editing
- Data security in case of power failure
- Thermocouple break protection
- Repetition measurements with minimum parameter input
- Evaluation of current measurement
- Curve comparison up to 32 curves
- Storage and export of evaluations
- Export and import of data ASCII
- Data export to MS Excel
- Multi-methods analysis (DSC TG, TMA, DIL, etc.)
- Zoom function
- 1st and 2nd derivation
- Programmable gas control
- Statistical evaluation package
- Automatic axis re-scaling
- Full quenching evaluation software module

Technical Specifications

RITA L78	
Sample Holder	Fused silica, Al2O3
Diameter	4 – 5mm (solid/hollow sample)
Length	10mm
Temperature range	RT up to 1100°C RT up to 1600°C LT attachment down to -150°C
Atmosphere	inert, oxid., red., vac.
Heating	Inductive
Sample/cooling gas	Helium gas recommended, other gases possible
Acquisition rate: max.	1000 readings per second
Power requirements	230VAC, 16A, 50 – 60 Hz

Applications







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Services: Service Lab, Calibration Service

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