

## Anisothermal stress relaxation test for characterizing elastomers and polymers

Brabender Messtechnik® GmbH & Co. KG has extended its product line by taking over the well-known TSSR-Meter from Brabender® GmbH & Co. KG.

Temperature Scanning Stress Relaxation (TSSR) is an anisothermal stress relaxation test method which also enables conventional isothermal relaxation measurements.

### The method

The non-isothermal relaxation measurement is a new method of characterizing thermo-mechanical behavior of TPE's, elastomers and polymers.

A specimen is stretched by a constant value and then heated up by a constant heating rate. The instrument records the tensile stress during non-isothermal relaxation as a basis for the evaluation. On the basis of this new measuring method, the **TSSR-Meter** is suitable for material development and because of time saving for quality assurance parallel to production as well.



Determination of the cross-linking density by improved evaluation of the relaxation spectrum and the normalization of the curve are innovations which make the application of the **TSSR-Meter** more flexible - according to our principle

**It's easy ... it's simply better.**

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## Test procedure

The instrument is suited for two different test procedures - the conventional, isothermal relaxation test and the **TSSR** method. The procedure consists of two steps: In the first step, a type 5A standard bar is fixed in the test chamber and stretched (e.g. 50 % of its original length) at a constant temperature (e.g. 23 °C) over a flexible period (e.g. 2 h). During this preconditioning phase, a decay of most of the short-term relaxation processes stimulated by the deformation of the specimen occurs. In the second, non-isothermal step, the specimen is heated at a constant rate of 2 °C/min up to a defined temperature which may be up to 300 °C. During both test phases, the instrument records the tensile stress as a basis for the evaluation.

The comfortable measuring and evaluation software under Windows® allows an automatic test procedure, records the data, represents them on-line as a clear color diagram, and evaluates them fully automatically immediately after the test.

## Application

It has proven particularly successful in the fields of development and characterization of TPEs and carbon black filled elastomers. The instrument shows the service temperature range of commercial thermoplastic elastomers.

By means of relaxation spectra, different TPE blends can be characterized and distinguished.

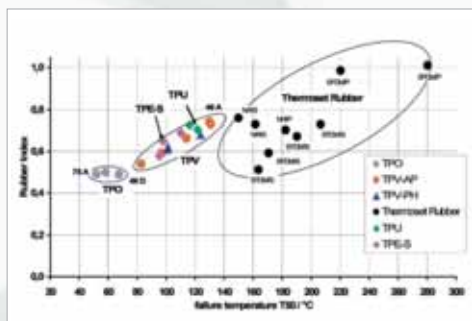
Apart from that, the **TSSR-Meter** can be applied for investigating the effect of different concentrations of cross-linking agent onto

the degree of cross-linking, by predicting the compression set value from the temperature limit by means of a linear correlation, the applications of TPEs can clearly be differentiated from those of carbon black filled elastomers.

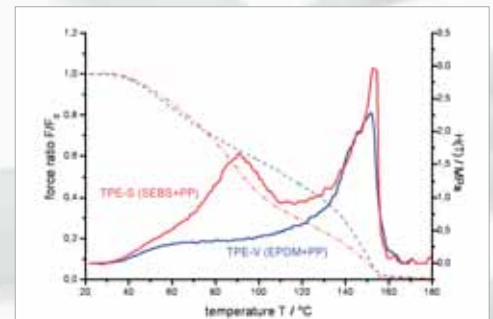
In case of carbon black filled EPDM compounds, non-isothermal stress relaxation curves supply additional information characterizing the interaction between the carbon black and polymer components.

## Technical Data

Measuring system:	<ul style="list-style-type: none"> <li>♦ Heating/cooling chamber with electric heating and air cooling</li> <li>♦ Heating rate 2 x 220 W</li> <li>♦ Temperature range 20 - 300°C</li> <li>♦ Heating rate 2°C/min (standard),</li> <li>♦ Running traverse parallel and without play</li> <li>♦ Tensile stress: 50% (standard)</li> <li>♦ Load cell 0 - 200 N</li> </ul>
Test specimen:	Type 5 A standard bar acc. to DIN 53 504
Connections:	PC via USB compressed air 5 ... 6 bar mains
Mains connection:	1 x 230 V, 50/60 Hz, 16 A, +N +PE
Dimensions (B x T x H):	490 x 450 x 610 mm
Weight:	approx. 20 kg



application areas



illustrative curve

**Brabender  
Messtechnik®  
GmbH & Co. KG**

Kulturstraße 51-55  
D- 47055 Duisburg

Tel.: +49 203 99819-0  
Fax: +49 203 9981922

[www.brabender-mt.de](http://www.brabender-mt.de)  
[sales@brabender-mt.de](mailto:sales@brabender-mt.de)

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