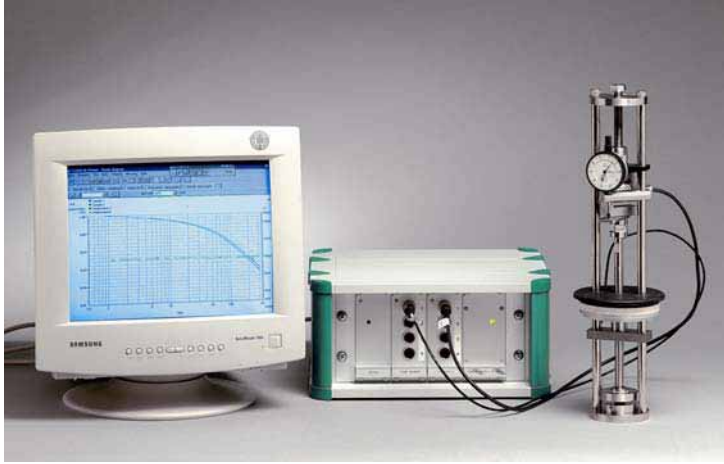


Elastocon

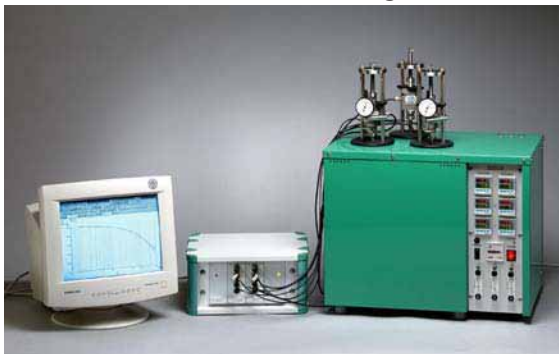
Stress Relaxation System, EB 02 for testing of stress relaxation



Relaxation system for continuous measurement in either compression or tension. Meets the requirements in ISO 3384 and ISO 6914.

The relaxation rigs are used in combination with the cell oven EB 01 or EB 07 when testing at elevated temperatures.

The room temperature box is used when testing at room temperature to avoid variation in the load curve caused by temperature variation in the laboratory.

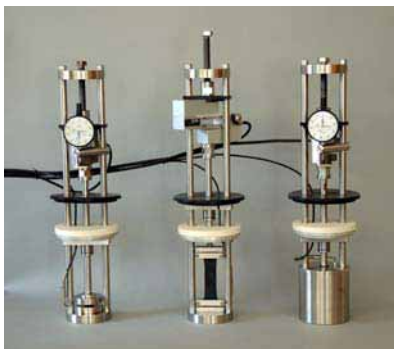


The relaxation rigs are placed in a cell oven for testing at elevated temperatures.

The cell oven EB 01 can accommodate four rigs at one temperature. In the cell oven EB 07, three rigs can be placed at three different temperatures.



Draught Hood, to eliminate variations in force measurement due to temperature and air effects.

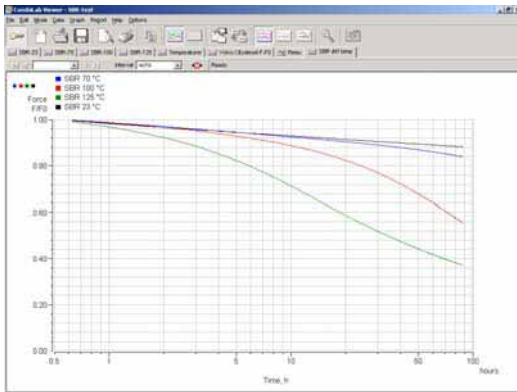


Relaxation rigs arranged for different test methods.

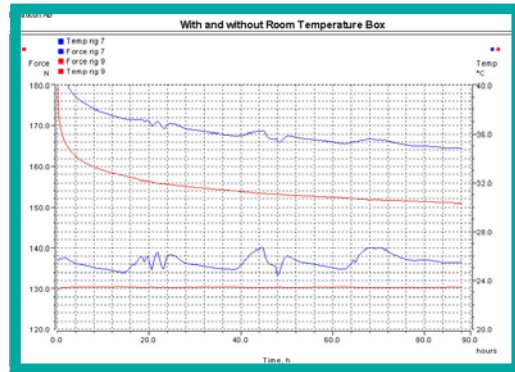
Rig 1 is arranged for testing in compression according to ISO 3384.

Rig 2 is arranged for testing in tension according to ISO 6914 method A.

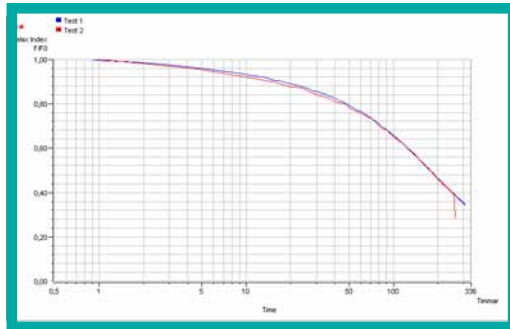
Rig 3 is arranged for testing in liquid according to ISO 3384.



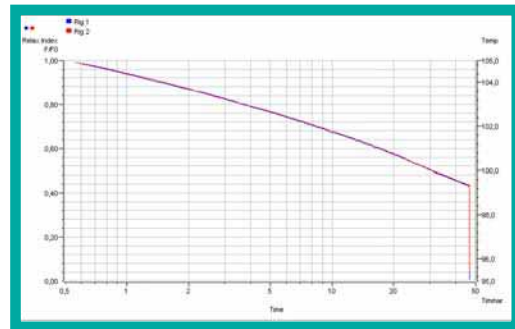
Graph 1
The graph shows F/F_0 curves for SBR tested at different temperatures.



Graph 2
The blue curves shows the influence of room temperature variations in the force curve. The red curves shows a rig placed in the room temperature box.

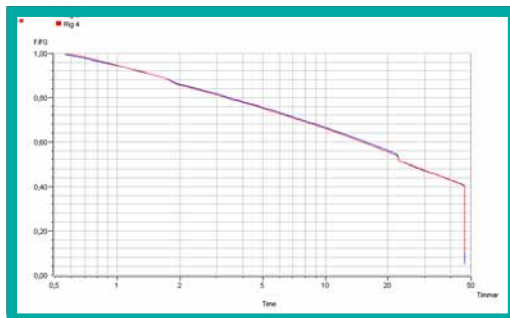


Graph 3

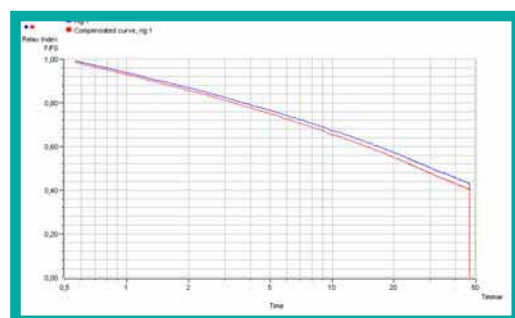


Graph 4

Graph 3 and 4 shows the repeatability of the relaxation rigs. Graph 3 is a graph from two tests of the same compound run at different times. Graph 4 is a graph from two samples of the same compound run at the same time in different rigs.

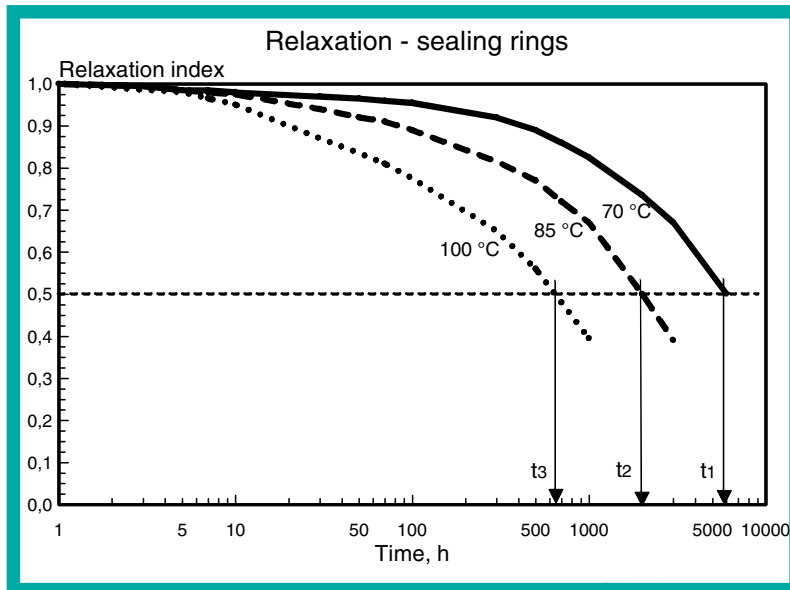


Graph 5

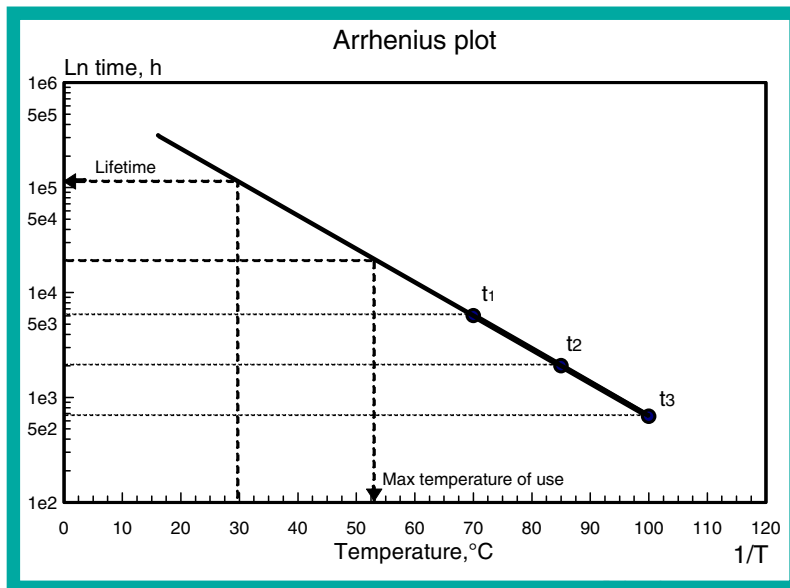


Graph 6

Graph 5 and 6 shows how to correlate for the spring effect in the load cell and rig, when doing very accurate tests. The spring effect is caused by the expansion of the load cell and rig when the force decreases with time. Graph 5 shows a manual correction done twice during the test, by manual adjustment of the compression. Graph 6 shows a correction done by the software by a mathematical calculation. The correction is not necessary when doing comparative tests.



Graph 6



Graph 7

Graph 6 and 7 shows how to use relaxation data to estimate the life time of a rubber compound for sealing rings, according to the procedure in ISO 11346.

Data from relaxation tests done at three temperatures are plotted in a graph and the "end of life" is determined for each temperature. This data is then plotted in an Arrhenius graph with \ln time against $1/T$, where T is the temperature in Kelvin.

A linear extrapolation can be done for lower temperatures to establish the estimated life time of the tested compound.

Technical Specification, Relaxation Tester, EB 02

Range, in compression, N:	800 or 1800
tension, N:	70
Accuracy, %	± 0,1 of full range
Resolution, compression, N:	0,1 or 0,2
tension, N:	0,01
Dimensions, dia x h; mm	120 x 450
Weight;kg	approx 4,5
Material:	stainless steel
Temperature sensor:	PT 100, 1/3 DIN

The Equipment works with continuous stress relaxation measurements in both compression and tension. The basic version can do tests according to ISO 3384 in air.

The rig works together with the cell ovens EB 01, EB 07 and the programmable temperature cabinet, EB 02.09.

- EB 02.01** Container and pressure plate (with a hole in the center) for measurement in liquids, according to ISO 3384.
- EB 02.01P** Sealed container for testing of stress relaxation in volatile liquids and coolants up to 3 Bar pressure.
- EB 02.02** Grips for testing relaxation in tension, according to ISO 6914.
- EB 02.03** Load Cell 70 N for tests in tension, including adapters.
- EB 02.04** Expansion Sleeve for good heat transfer in the cell oven.
- EB 02.05-4** Amplifier box with inputs for 4 load cells and 4 PT 100 sensors. (4 rigs)
- EB 02.05-8** Amplifier box with inputs for 8 load cells and 8 PT 100 sensors. (8 rigs)
- EB 02.06** Multitasking software for PC-computer with data logging and analysis. Up to 20 EB 02 rigs and 5 EB 025 amplifier boxes can be connected in a network. The results can be presented as a graph with F/F_0 against log time.
- Programme versions with up to 128 rigs are available.
- EB 02.08** Room Temperature Box, 23 °C, for testing at standard laboratory temperature. Keeps the temperature constant within ±0,2 °C. The box can take 4 rigs.
- EB 02.09** Programmable temperature cabinet, -50 °C to +180 °C, a modified Thermotron temperature cabinet that can accommodate 8 EB 02 relaxation rigs.
- EB 02.10** Draught Hood, to eliminate variations in force measurement due to temperature and air effects. This hood is made of Plexiglass and has a temperature controlled system with a Peltier cooling element, capable of keeping the temperature within ± 0,2 °C. The hood fits both EB 01 and EB 07.
- EB 02.11** Draught Hood for temperature cabinet EB 02.09
- EB 02.12** Container for testing in liquids in tension.
- EC 05** Basic software for stress relaxation testing



ELASTOCON reserve the right to modify this specification in part or in whole.



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