

Low Temperature Testers

For rubber materials there are three important standardised test methods for Low Temperatures.



TR and Gehman combined

1. TR test according to ISO 2921. This method determines the low temperature characteristics by the temperature retraction procedure. TR10 and TR 30 is often used in materials specifications. The software can present a curve with the elastic retraction up to 70%.

2. Gehman test according to ISO 1432. This method measures the relative stiffness as a function of the temperature. The result is presented as the relative stiffness where the stiffness in RT is 1. If the test piece dimension is put into the software it can also calculate the modulus as a function of temperature.

3. Brittleness test according to ISO 812. This method determines the lowest temperature at which rubber materials do not exhibit brittle failure when impacted under specified conditions.

4. Low Temperature Compression Set according to ISO 815-2.

This test measures the elastic recovery after a test piece has been held compressed at low temperature for some time.



Brittleness and TR combined

Combinations

The TR-Tester, Gehman Tester and Brittleness Tester can be combined using the same base unit and a rig changing system.

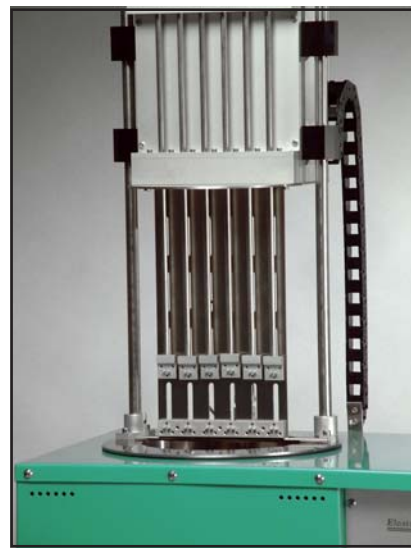
The combined instrument consists of a base unit with a cooling bath and the electronics. The three different test rigs are then mounted on a carousel. No lifting is necessary when switching from one method to another.

An automatic computerised Low Temperature Tester increases the precision up to 5 times. The capacity will also increase with about 50 % and not least the labour time will decrease about 75 %.

Elastocon

TR Tester, ET 01

for determination of low temperature retraction



TR Tester, ET 01, for determination of low temperature characteristics by the temperature retraction procedure according to ISO 2921 and ASTM D-1329.

The Elastocon TR Tester, has 6 test stations, is computerized and performs the test automatically after the cooling media has been cooled down and the samples have been mounted. An automatic release of the samples, after the precooling period, is included.

The computer controls both the temperature rise and measures the length change of the samples. The results are displayed in a graph and TR_{10} , TR_{30} , TR_{50} and TR_{70} values are calculated. The result can also be presented as a table with length change versus temperature. The TR-values and the table values can be exported to other software such as spreadsheets.

As an extra option, an automatic cooling system with liquid Nitrogen can be supplied.



Technical Specification, TR Tester, ET 01

Temperature control

Temperature range, °C: -80 to + 30
Accuracy, °C: ± 0,5
Resolution, °C: ± 0,1
Sensor: PT 100, 1/3 DIN

Length measurement

Indicators 6 pc digital encoders
Resolution, mm: 0,04
Measuring range, mm: 0-150

Test rig

Rig material: stainless steel and aluminium
Specimen sizes, mm: 25 to 100
Max extension%: 250 (with 50 mm test piece)
Test stations: 6

Other specifications

Dimensions, external, w x h x d, mm: 630 x 1 100 (1 420)*x 710
Weight, kg: approx 40
Cooling liquid volume, l: about 8
Voltage, V: 220-240 VAC 50/60 Hz (alt 110-120 VAC)
Power, W: 600
Air supply, Bar: 4 - 6
Computer connection: COM-port (serial, RS 232C)

*Raised test rig

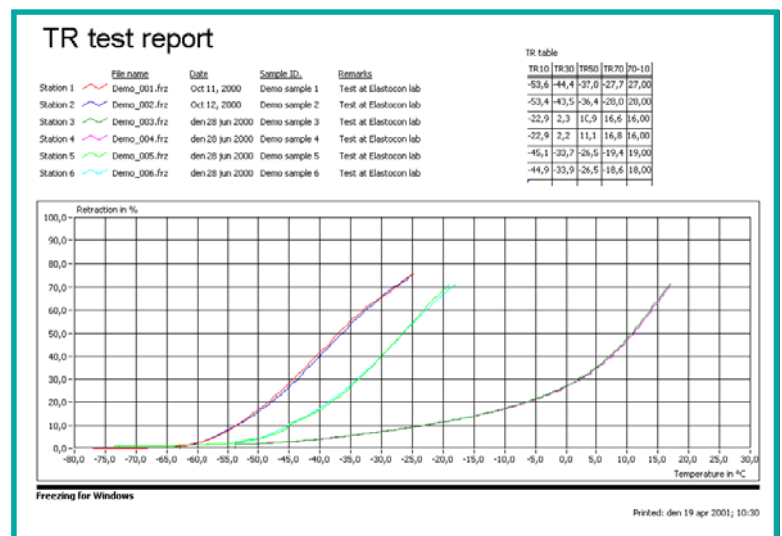
- The casing consists of steel, painted with epoxy paint.
- The rig is raised with the help of a pneumatic cylinder.
- Temperature controller with 0,1 °C setpoint and RS232 interface.
- Solid state relay for safe control.
- Temperature sensor close to the samples.
- Run-time meter.
- ET 01.01 Windows software for the TR-tester is included.
Windows 2 000 or XP is required.

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

Options

ET 01.02 Automatic cooling by liquid Nitrogen

ET 01.03 Grips for O-rings (both whole and cut)



Elastocon

Gehman Tester, ET 02

for determination of the relative stiffness characteristics



Gehman Tester, ET 02 for determination of the relative stiffness characteristics of vulcanized or thermoplastic rubbers, also called the Gehman procedure. The test is done according to ISO 1432, ASTM D1053, or technical equivalent standards.

The Elastocon Gehman Tester, has 6 test stations, is computerized and performs the test automatically.

The computer controls both the temperature rise and measures the torsion angle of the samples. The results are displayed in a graph and RM_2 , RM_5 , RM_{10} and RM_{100} values are calculated. The result can also be presented as a table.

As an option, an automatic cooling system with liquid Nitrogen can be supplied.



Technical specification, ET 02

Temperature control

Temperature range, °C:	-80 to +30
Accuracy, °C:	± 0,5
Resolution, °C:	± 0,1
Sensor:	PT 100 1/3 DIN

Angle measurement

Indicators, no:	6 pc digital encoders
Resolution, °:	0,2
Measuring range, °:	0-182 ¹⁾

Test rig

Material:	Stainless steel and aluminium
Test stations:	6
Min/max test samples, mm:	1 x w x t, 40 ^{±2,5} x 3 ^{±0,2} x 2 ^{±0,2}

Other specifications

External size, w x h x d,mm:	630 x 1 010 (1 260) ²⁾ x 710
Weight, kg:	46
Cooling liquid volume, l:	about 8
Voltage, V:	220 - 240 VAC 50/60Hz (alt. 110-120 VAC)
Power, W:	600
Air supply, Bar:	4 - 6
Computer connection:	COM-port (serial, RS 232C)

¹⁾ Testing range adjustable from 0-182 °. Adjusted at 0-180 °.

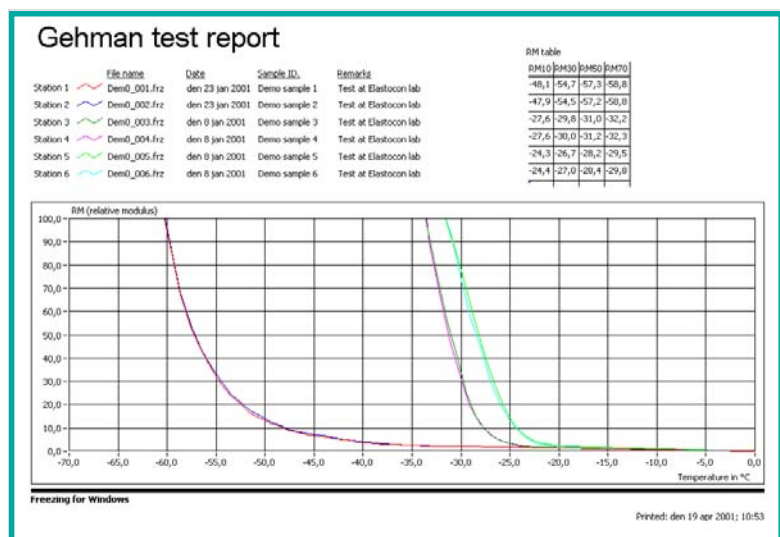
²⁾ Test rig in raised position

- The casing consists of steel, painted with epoxy paint.
- The rig is raised with the help of a pneumatic cylinder.
- Temperature controller with 0,1 °C setpoint and RS232 interface.
- Solid state relay for safe control.
- Temperature sensor close to the samples.
- Run-time meter.
- ET 02.01 Windows software for the Gehman Tester is included, Windows 2 000 or XP is required.

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

Options

ET 01.02 Automatic cooling by liquid Nitrogen
ET 02.02 Grips for ASTM D1053 method B



Elastocon

Brittleness Tester, ET 05



Elastocon Brittleness Tester, ET 05, for automatic determination of Brittleness point according to ISO 812, ISO 974, ASTM D746 and ASTM D2137.

The price includes the instrument and software, but not the computer. The test rig is raised by pneumatic cylinders, which require an air supply of 6 Bar.

The brittleness tester is designed as a falling weight tester, where the speed is set by the height and the energy by the attached weights.

The computer controls the temperature rise and measures the temperature at impact. The result from each stroke is entered by typing the result in the software.

The speed is measured after the impact, to verify the speed loss during impact.

Technical Specification, Low Temperature Brittleness Tester, ET 05

Temperature control

Temperature range, °C:	-80 to + 30
Accuracy, °C:	± 0,5
Resolution, °C:	± 0,1
Sensor:	PT 100, 1/3 DIN

Speed measurement

Indicators	digital encoder
Resolution, m/s:	0,01

Test rig

Rig material:	stainless steel and aluminium
Specimen types:	A and B (ISO 812)
Test pieces , no:	6

Other specifications

Dimensions, external, w x h x d, mm:	630 x 1 100 (1 420)*x 710
Weight, kg:	approx 40
Cooling liquid volume, l:	about 8
Voltage, V:	220-240 VAC 50/60 Hz (alt 110-120 VAC)
Power, W:	600
Air supply, Bar:	4 - 6
Computer connection:	COM-port (serial, RS 232C)

**Raised test rig*

- The casing consists of steel, painted with epoxy paint.
- The rig is raised with the help of a pneumatic cylinder.
- Temperature controller with 0,1 °C setpoint and RS232 interface.
- Solid state relay for safe control.
- Temperature sensor close to the samples.
- Run-time meter.
- ET 05.01 Windows software for the Brittleness-tester is included.
Windows 2 000 or XP is required.

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

Elastocon

Low Temperature Compression Set Rig, EV 09



Technical Specification Low Temperature Compression* Set Rig, EV 09

Range, mm:	12,7
Accuracy, mm:	± 0,003
Resolution, mm:	0,001
Dimensions, dia x h, mm	120 x 450
Weight: kg	approx 6
Material:	stainless steel
Temperature sensor:	PT 100, 1/3 DIN

The test rig is equipped with a digital gauge which can be connected to a PC for recording of the creep.

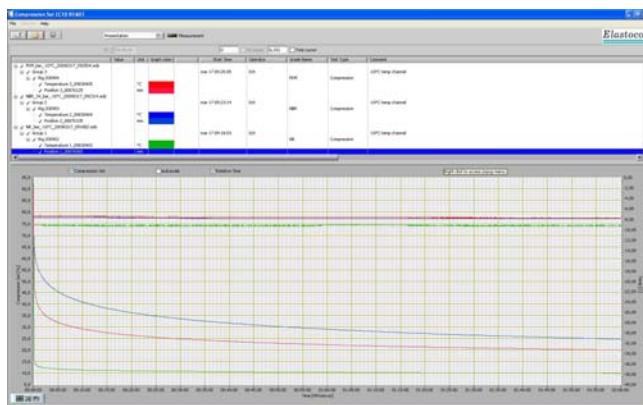
The test rig in the Freezer ET 03 adapted for Low Temperature compression set.

Performing compression set at low temperatures without having to open the deep-freezer and influence the compression set result has always been a problem.

By using our EV 09 compression rig in combination with a deep-freezer with a special lid the test can be performed without touching the test piece. All adjustments of height and releasing the compression are made outside the freezer thus improving the accuracy of the test results.

The EV 09 rig has a digital gauge (0,001 mm), the piston is made of titanium and the test weight is simply mounted on to the titanium piston. The sample can remain in the test rig for the whole test period and during the recovery time.

The system is a complete system with rigs, a special adapted deep-freezer and logging software. The values can also be recorded manually.



Low Temperatures Compression Set (LTCS), EC 10

This software can monitor the temperature during the test time and records the recovery when the test piece is released.

By setting evaluation points, the results at 30 s, 30 min etc can be presented as well as a graph of the compression set as a function of time.