

## Low Temperature Testers

For rubber materials there are four 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. The values  $TR_{10}$  and  $TR_{30}$  are often used in material 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 are 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 %.

# TR Tester, ET 01

for determination of low temperature retraction



*Combined instrument*



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

# 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 computerised 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.



*The photos shows a combined instrument*

# Brittleness Tester, ET 05



*Combined instrument*



**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.

# Low Temperature Compression Set Rig, EV 09



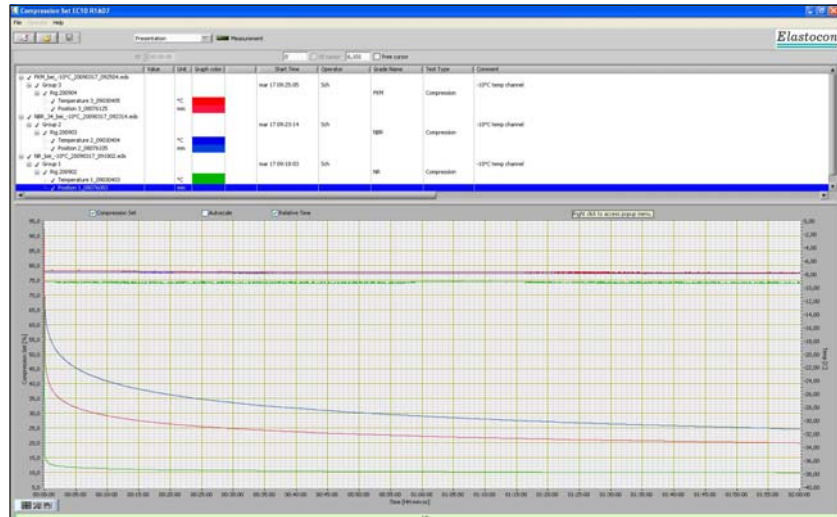
*The test rig in the Freezer ET 03 adapted for Low Temperature compression set.*

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.



*Lab Freezer ET 03 with ET03.01 Conversion kit*

# Technical Specifications, TR Tester, ET 01 and Gehman Tester, ET 02

## Temperature control

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

## ET 01

## ET 02

-80 to + 30  
 ± 0,5  
 ± 0,1  
 Pt 100 1/3 DIN

## Length measurement

Indicators, no: 6 pc digital encoders  
 Resolution, mm (ET 01) °(ET 02): 0,04  
 Measuring range, mm (ET 01) °(ET 02): 0-150

## Angle measurement

6 pc digital encoders  
 0,2  
 0-182 <sup>(1)</sup>

## Test rig

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

stainless steel and aluminium  
 1 x w x t, 40 <sup>±2,5</sup> x 3 <sup>±0,2</sup> x 2 <sup>±0,2</sup>  
 6

## Other specifications

Dimensions, external, w x h x d, mm: 630 x 1 100 (1 420)<sup>(2)</sup> 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: USB

630 x 1 010 (1 260)<sup>(2)</sup> x 710  
 46  
 about 8  
 220 - 240 VAC 50/60Hz (alt. 110-120 VAC)  
 600  
 4 - 6  
 USB

## Standards:

ISO 2921, ASTM D 1329

ISO 1432, ASTM D 1053

<sup>1)</sup> Testing range adjustable from 0-182 °. Adjusted at 0-180 °.

<sup>2)</sup> Test rig in raised position

## Common specifications:

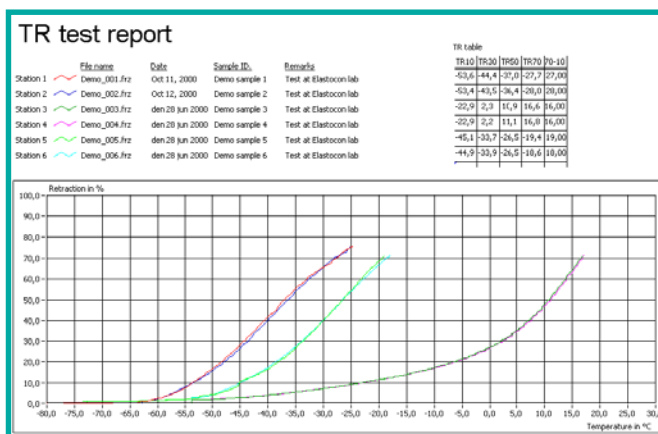
- The casing consists of steel, painted with epoxy paint.
- The rig is raised with the help of a pneumatic cylinder.
- Temperature controller with 0,1 °C setpoint and RS232 interface.
- Solid state relay for safe control.
- Temperature sensor close to the samples.
- Run-time meter.
- ET 01.01 Windows software for the TR-tester is included. Windows XP, Win 7 or Win 8 is required.
- Computer included

## Options

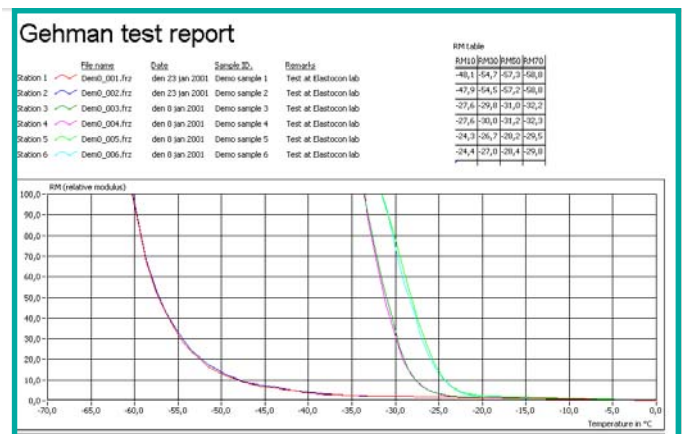
ET 01.02 Automatic cooling by liquid Nitrogen  
 ET 02.03 Grips for O-rings (both whole and cut)

## Options

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



Result from three materials with double test pieces



Result from three materials with double test pieces

# 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

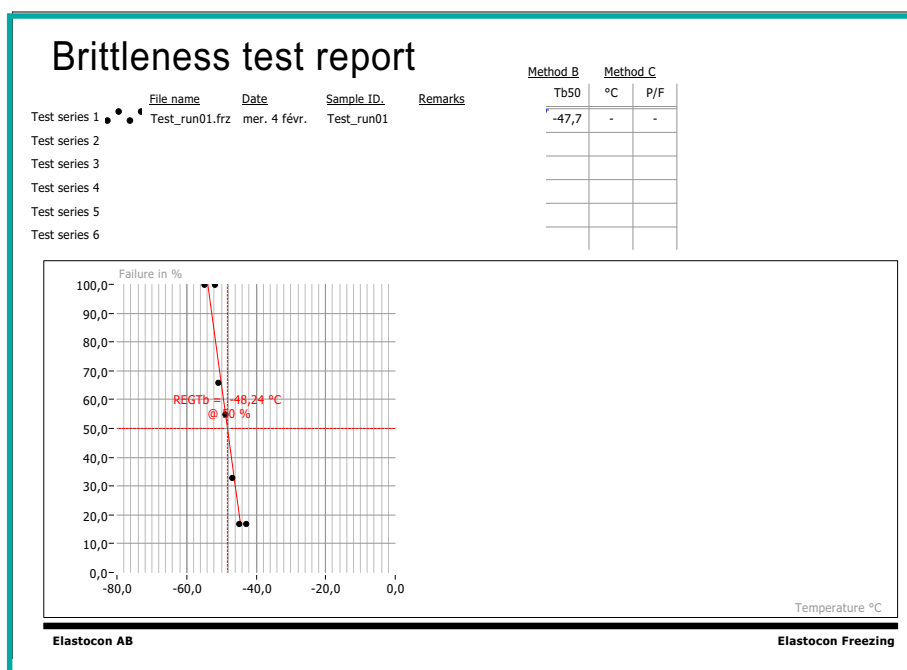
Dimensions, external, w x h x d, mm: 630 x 1 100 (1 420)<sup>1)</sup>x 710  
 Weight, kg: approx 40  
 Cooling liquid volume, l: about 8  
 Voltage, V: 220-240 VAC 50/60 Hz (alt 110-120 VAC)  
 Power, W: 600  
 Air supply, Bar: 4 - 6  
 Computer connection: USB

**Standards:** ISO 812 , ISO 974, ASTM D 746, ASTM D 2137

<sup>1)</sup> Test rig in raised position

## Common specifications:

- 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 XP, Win 7 or Win 8 is required.
- Computer included.



## 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
Standard:	ISO 812-2

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

### Lab Freezer ET 03 with ET03.01 Conversion kit

#### ET 03 Low temperature freezer -45°C

<b>Model</b>	<b>ET 03</b>
Net volume, l:	130
Insulation thickness, mm:	100
Outer dimensions:	
Height, mm:	850
Width, mm:	725
Depth, mm:	655
Inside dimensions:	
Height, mm:	650
Width, mm:	520
Depth, mm:	450
Weight, kg:	43
Temperature, °C:	-10 to - 45
Ambient temperature, °C:	+10 to +30
Time to reach minimum temp, h:	3
Noise level, dBA:	< 48
Energy consumption, W:	500

#### Common specifications:

- Acoustic alarm.
- Large temperature display.
- Digital temperature controller 0,1 °C.
- Handle with key lock.
- Defrost water drain hole.
- One stage compressor ensures high level of reliability.
- Environmental friendly HC refrigerant.
- 100 mm high performance insulation.
- CE -marked.

*ELASTOCON reserve the right to modify these specifications in part or in whole.*