Textechno
textile testing technology

TEXTURMAT ME+

Automatic Crimp Contraction and Shrinkage Tester

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For testing of textured yarns, the **crimp contraction** test procedure according to German standard DIN 53 840 or the European standard EN 14 621 is nowadays finding worldwide application in industrial quality control as well as for R&D purposes. This test procedure has been designed for yarns up to 500 dtex. It uses yarn hanks with an overall count of approx. 2500 dtex, the hanks being subjected to various loads during testing and their length measured at each stage.

Crimp contraction, crimp modulus and crimp stability are calculated from the measured lengths using the following formulas:

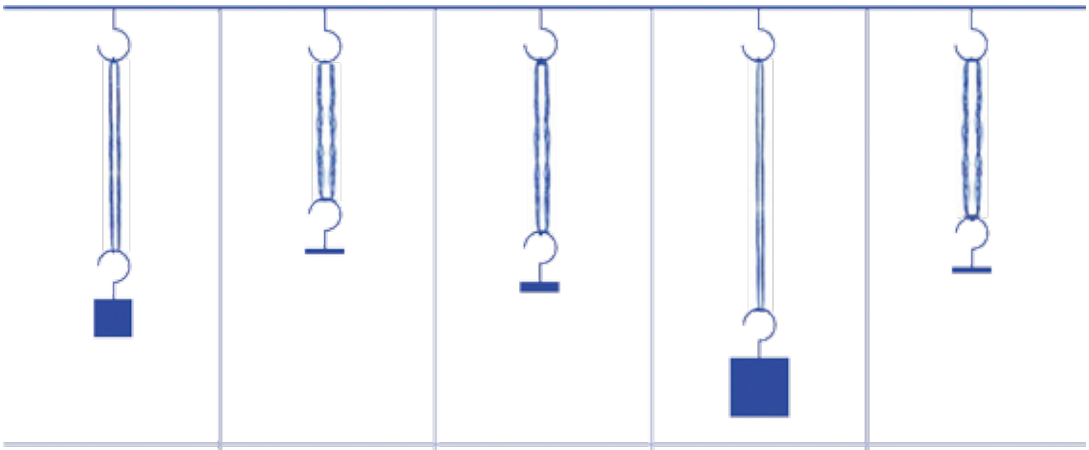
$$\text{Crimp contraction} = \frac{lg - lz}{lg} \times 100\ (\%)$$

$$\text{Crimp modulus}^* = \frac{lg - lf}{lg} \times 100\ (\%)$$

$$\text{Crimp stability}^* = \frac{lg - lb}{lg - lz} \times 100\ (\%)$$

* DIN 53 840 only

Schematic representation of the methods



load cN/tex	2	0,01	0,1	10 or 20	0,01
duration of load	10 secs	10 mins	10 secs	10 secs	10 mins
length of hank	lg	lz	lf		lb

Schematic representation of the crimp contraction test

For optimum development of the yarn crimp, the yarn hanks are subjected to a **thermal treatment** prior to test start.

A similar method is used to determine crimp parameters according to ASTM D 4031.

The crimp contraction testing of textured carpet yarns (BCF), which characteristically have relatively high yarn counts, is a special case. For this application, yarn hanks with only one wrap, i.e. a yarn loop, can be used for testing in a special magazine for testing carpet yarns.

The determination of the **yarn shrinkage**, due to thermal or hydrothermal treatment, is a further test method for textured yarns and other yarn types, e.g. according to DIN 53 866, EN 14 621 or ASTM D 2259. In this instance, testing is usually also carried out on yarn hanks by determining an initial length (lg1), followed by a thermal treatment and a second length measurement (lg2). Shrinkage is calculated by applying the following formula:

$$\text{Shrinkage} = \frac{lg1 - lg2}{lg1} \times 100\ (\%)$$

Likewise, the texturing quality of air-textured yarns is also determined by carrying out tests on yarn hanks. In this case, the proportional length increase of the hank after being subjected to a high tensile force is the measured variable and criterion for the stability of the yarn structure.

TEXTURMAT ME+

The TEXTURMAT ME+ is a test instrument for fully automatic length measurements on yarn hanks, characterised by its high flexibility in terms of test sequence configuration, choice of measuring loads and time-intervals for the loading- and unloading periods. As a result, it is possible to carry out different testing methods according to different standards, e.g. crimp contraction or shrinkage tests not only on (textured) filament yarns but also on fibre tow.

The TEXTURMAT ME+ is equipped with a removable 30-position **magazine**, within which the suspended yarn hanks are pre-loaded with weights. Special magazines are also available for testing BCF yarns.

The application of tensile forces and the measurement of yarn lengths for predetermined load times are programme-controlled and are brought about by a loading carriage in combination with a high-resolution force measuring system. The loading force can be freely selected.

The measured values, e.g. crimp contraction, crimp modulus and crimp stability, are automatically determined and are, together with the statistical characteristics, evaluated by a the TESTCONTROL PC system.

In general, it is recommended to operate the TEXTURMAT ME+ with several magazines. In addition to the magazine already in use in the test instrument, others can be prepared, i.e. loaded with hanks or heat treated to ensure a continuous test cycle.

Pre-tension weights and loading carriage

A **heating cabinet** with the appropriate inner dimensions to accommodate the TEXTURMAT magazine loaded with hanks is available as a TEXTURMAT ME+ accessory. The control range of the heating cabinet enables a full range of temperature settings necessary for crimp development and the inducement of shrinkage.

Especially for hot-air shrinkage tests with relatively high temperatures it is essential that, after opening the heating cabinet and inserting the TEXTURMAT magazine, the selected temperature is achieved within 30 sec. For this application a special version of the heating cabinet with a computer controlled heating system is available.

Heating cabinet

Should crimp development or the inducement of shrinkage in hot water be required instead of hot-air treatment, a **hot water container** can be fitted that can also accommodate one magazine. The container is equipped with a jib crane, incorporating an electrically operated chain hoist, with which the magazine can be lowered and raised in and out of the water bath.

Testing methods

– Crimp contraction testing of textured filament yarns and fibre tow, e.g. according to DIN 53 840, EN 14621, ASTM D 4031;
– Shrinkage testing of all yarn types and fibre tow;
– Testing of air textured yarns.

System components

TEXTURMAT ME+, basic equipment
Sample holder:
– Magazine with 30 positions, pre-tensioning weight of 2.5 cN for each individual position.

Loading equipment:
– Vertically moving carriage with loading fork, programme-controlled rate of load application, max. loading speed 8000 mm / min, electronic travel measurement of the loading carriage via resolver, resolution 1 µm, max. load 55 N (higher loads on request).

Force measuring instrument:
– Modified electronic precision scale, resolution 0.1 cN.

Hot water container

TESTCONTROL

– PC system for controlling the test processes and heating cabinet temperature, and for the evaluation of the measured data, connected via USB interface;
– Input of all parameters for testing and measured data evaluation, saving of selected parameter sets under code words;
– PC easily integrated into any network type.

Additional equipment

Heating cabinet:

– Model TKL, cabinet shaped, for accommodating one TEXTURMAT magazine, temperature range 30 – 300 °C;
– Optional: Model TKL CC with computer controlled heating.

Hot water container:

– Model WKH 2, cabinet shaped, for accommodating one TEXTURMAT magazine, loading from above using a crane and electrically operated chain hoist, temperature range 40 – 100 °C.

Further technical data

Mains supply:

230 V, 50 (60) Hz, current requirement approx. 1 A (basic equipment);
380 – 400 V three phase current, 50 (60) Hz; current requirement approx. 18 A (heating cabinet), approx. 30 A (hot water container).

Compressed air supply:

5 bar, 10 l / min.

Lacquer finish:

RAL 9006/5002.

Dimensions, weight:

Height 1670, width 600, depth 600 mm, approx. 200 kg (TEXTURMAT ME+);
Height 1373, width 856, depth 732 mm, approx. 120 kg (heating cabinet);
Height 1085 / 2455, width 890, depth 750 mm, approx. 180 kg (hot water container).

Technical contents can be subject to changes by Textechno.

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