COHESION - METER R-2020

Instrument for dynamic measurements of cohesion forces.

for - sliver and roving
    - Fiber length 35 - 200 mm
    - Sliver weights 3 - 33 grms/meter
    - Cohesion - forces 50 - 10 000 cN

analizes crimp and finish influence on drafting.
Dynamic Measurement of Cohesion Lengths
by the COHESION-METER R-2020

I. General remarks regarding cohesion lengths measurement of synthetic staple fibers and tows

Some very rare exceptions apart, the natural fiber, such as cotton, wool, etc., has the outstanding quality of possessing all the conditions necessary for perfect processing.

These optimal conditions which form an integral part of the natural fiber are usually just wishful thinking in the production of synthetic fibers. Even if they were once attained, they can hardly ever be reproduced. When producing synthetic fibers it is therefore most important to record all data and to compare them again with each other during a reproduction, so that any deviation may be promptly noted.

One of the most important facts relating to the processibility of a synthetic fiber is the level of fiber/fiber friction. This figure - called cohesion length - imparts important information on surface conditions, crimping and lubricant deposit on the fiber. The entire processibility of a synthetic fiber can be controlled by these three facts. If there are difficulties during the spinning process, then doubtlessly, among other things, the cohesion length of the roving deviates somehow from perfect material.

The fiber/fiber friction - or cohesion - represents the force which has to be overcome in every working process where drawing frames are used or wherever other kinds of refining of the roving take place.

This means that many drafting problems during spinning can be eliminated, if the fiber/fiber friction of a material is kept under control.

II. Comparison of known methods of cohesion measurement

The following proceedings for measuring the fiber/fiber friction and ascertaining the cohesion length are known:

a. The static method
b. The dynamic method

The static measurement of the cohesion length is almost identical with the testing of yarn as to breaking length. A card silver or roving is fixed between two clamps (3 times staple length) and then extended till it is torn apart, while the force required for the extension of the roving is recorded. This process is repeated about ten times, whereupon the average value of the cohesion force...
can be calculated. This cohesion force divided by the weight per meter of the test piece results in the cohesion length in meters.

For the dynamic measurement of the cohesion length the test piece is passed through a drawing-frame-like device where the test piece is exposed to a draft and its resistance is electronically measured and recorded. The average value of the resistance of the roving— which must be measured for a certain time (the same for every test)—is then divided by the average weight per meter of the test piece and results in the cohesion length in meters.

A comparison of the two measuring methods shows:

1. Compared with the static method the dynamic requires less work, since neither measuring nor clamping and unclamping of the test pieces are necessary.

2. The dynamic method tests considerably more material in the same length of time than the static method. Besides, not only more material is tested, but also every section of it.

3. The dynamic method corresponds much more to practice, as the test pieces are submitted to a drawing operation very similar to the spinning process.

4. Due to the much more thorough testing of the test pieces the dynamic method renders possible a considerably better reproduction of the obtained measured values of the same material.

III. Characteristics of the COHESION-METER R-2020

a. Design, mode of operation and evaluation

Since up to now there is no model of a dynamic measuring instrument for cohesion lengths on sale which would meet to some extent the practical requirements, the COHESION-METER R-2020 has been developed. The following aspects were taken into consideration:

1. High measuring precision

2. Greatest possible applicability to ensure the cohesion testing of all occurring kinds of rovings

3. Easy handling to enable also unskilled staff to carry out measurements

General design: Two drawing cylinders are mounted side by side in a steel frame with two superposed rubber pressure cylinders. The chain gear driving this pair of cylinders allows to set drafts from 1.05 times to 2.5 times. Another steel frame with two horizontal guide rails is in front of the pair of cylinders. On these guide rails is the sliding electronic measuring head of the ROTHSCCHILD ELECTRONIC-TENSIOMETER. A guide roll is fixed to the measuring rod of the measuring head. The test
piece, e.g. a card band, enters the instrument at the speed $X$ through the pair of cylinders at the right, passes round the guide roll on the measuring head and leaves the instrument at the speed $Y$ through the pair of cylinders at the left. The difference of speed between the two pairs of cylinders is the draft to which the test piece is exposed. The force resulting from the draft process is fully effective on the guide roll and thus on the measuring head. It can be read in ponds (grams) on the ELECTRONIC-TENSIOMETER and continuously registered by a recorder.

The following data are needed to calculate the cohesion length:

- Average cohesion in ponds
- Advance time of test piece in minutes
- Speed of test piece in meter per minute
- Weight of measured test piece in grams

The calculation formula consequently reads:

$$\text{Cohesion length in m} = \frac{\text{Cohesion force in p} \times \text{tested material in m} \times \text{advance time in min}}{\text{weight of test piece in gm}}$$

b. Which materials can be tested as to cohesion?

The COHESION-METER was designed especially for the testing of rovings (flyer or finisseur). Cards and card bands can be tested as well without any faulty drafts. By modifying the instrument very heavy material, longstapled rovings and tops can be tested up to a weight of 10 g/m.

To sum up: Almost all intermediate products in the spinning of cotton, semiworsted, worsted and woolen yarn can be tested as to their cohesion. These cohesion measurements are especially important and informative for production control, tests with new lubricants and customers' complaints, in which latter case the customer has to supply relating material.
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Technical Data

Setting of draft in 6 steps in the ratio of
   1 : 1.05 : 1.1 : 1.25 : 1.5 : 2 : 2.5
Measurement of draft forces from 25 - 10,000 p
Material to be tested off spinning cans or Casablanca bolts for
- tops
- slivers
- rovings
- flyers
- finisseurs
Measuring speed adjustable in 10 steps
   1 - 2 - 5 - 10 - 15 - 20 - 30 - 40 - 50 - 60 m/min
Measuring time adjustable 1 - 10 min
Staple length adjustable 40 - 300 mm
Built-in tool compartment with tools and gears
The following measuring heads are available by choice:
1. Measuring Head 1,000 p with the measuring ranges 0 - 1,000 p
   0 - 500 p
   0 - 250 p
2. Measuring Head 4,000 p with the measuring ranges 0 - 4,000 p
   0 - 2,000 p
   0 - 1,000 p
3. Measuring Head 10,000 p with the measuring ranges 0 - 10,000 p
   0 - 5,000 p
   0 - 2,500 p
Dimensions: 500 x 450 x 250 mm
Weight: 25 kg  Power supply: 110 or 220 V, 50/60 Hz, 150 W
The COHESION-METER is designed for the connection to a ROTHSCCHILD
ELECTRONIC-TENSIOMETER with recorder.
COHESION-METER
R-2020

Vorder-Ansicht
Front-view

Seiten-Ansicht
Side-view

Sicht von oben
Top-view