

Test methods for monofilament yarns

1 Test room conditions

The standard conditions are:

- temperature: $20 \pm 2^\circ\text{C}$
- relative humidity: $65 \pm 2\%$

All tests must be carried out in conditioned state.

2 Linear density

The linear density decitex [dtex] corresponds to the yarn weight in grams of 10'000 m length. In order to determine the linear density, a skein is wound on a standard reel under a pretension of (0.20 mm 0.1 cN/dtex)

The determined yarn length is then weighed on an analytical scale.

	PA	PET	length
Diameter	≤150mm	≤100mm	100m
	160–190mm	110–160mm	10m

3 Breaking force and elongation at break

The breaking force leads to the rupture of the thread or yarn. The corresponding value is Newton [N].

The elongation at break is the increase in length produced by stretching a test specimen to the breaking point, expressed as a percentage of the initial length. The test is carried out on a dynamometer with a constant increase in elongation, according to the following conditions:

- length between clamps 500 mm (or 250 mm)
- test velocity; if elongation at break:

≤8%	50 mm/min / (25 mm/min)
8-50%	500 mm/min / (250 mm/min)
≥50%	1000 mm/min / (500 mm/min)
- pretension: (≤0,20 mm 0.1cN/dtex)

4 Tenacity (yarn count tenacity)

This is calculated from the breaking strength and linear density and is expressed in centinewton per tex [cN/tex].

$$\text{Tenacity (cN/tex)} = \frac{\text{breaking strength [N]}}{\text{linear density [dtex]} \times 0,001}$$

5 Force at specified elongation (FASE)

This is the force resulting from a defined extension (usually at 2% and 5%).

6 Hot air shrinkage

This is the shrinkage in length in percent caused by treatment with hot air. We distinguish between free shrinkage and shrinkage under pretension.

a) Free shrinkage

This value defines the change of length after the influence of heat. Method: After the measurement of length (L1) under 1 cN/tex pretension the samples will be treated without pretension at the defined temperature (between 100-200°C) during 15 minutes. After a cooling time of 1 hour under standard atmospheric conditions the shrunken length (L2) will be determined again with 2 cN/tex pretension. The residual shrinkage is then calculated according to the following formula:

$$\frac{(L1 - L2) \times 100}{L1}$$

b) Shrinkage under pretension

This value defines the change of length during the influence of heat (10 min).

Method: The sample is introduced into the heating channel with a pretension of 0,2 cN/tex. The shrinkage will be read in percent directly from a scale.

Shrinkage curve

The shrinkage curve was obtained by continuous heating under pretension of 0.2 cN/tex. Due to this there can be differences to the indicated value in the table.

7 Hot water shrinkage 95°C

This is the shrinkage in length in percent which is caused by hot water. It is calculated as follows:

Diameters up to 0.30 mm:

- On a standard reel, skeins of 1 m circumference and 5'000 dtex approx. are prepared and measured at a pretension of 0.2 cN/dtex lengthwise (L1).