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Fibre labelling
Elastomultiester – DuPont

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P. Piccinini, C. Senaldi

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European Commission
Joint Research Centre
Institute for Health and Consumer Protection

Contact information
Address: Paola Piccinini, T.P. 260, via E. Fermi 2749, Ispra (VA), 21027, Italy
E-mail: paola.piccinini@jrc.ec.europa.eu
Tel.: 0039-0332-789124
Fax: 0039-0332-785707

http://ihcp.jrc.ec.europa.eu/
http://www.jrc.ec.europa.eu/

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1. Executive summary

In 2002 DuPont presented an application to the European Commission for the establishment of a new generic name for their new fibre in accordance with Directive 96/74/EC. The proposed name was multelastester and the suggested definition is reported in the following: "fibre formed by interaction of two or more chemically distinct macromolecules (of which none exceeds 85 % by mass) which contains ester groups as dominant functional unit (at least 66 %) and which, if stretched at least 100%, durably and rapidly reverts substantially to its unstretched length when the tension is removed".

The Commission therefore convened two meetings of the technical working group for Directive 96/74/EC on textile names, comprising governmental experts representing each Member State. The meetings were held in Brussels on 12th April and 25th September 2002. The application was considered justified by the group of experts, who recommended an amendment to the list of fibre names in Annex I of Directive 96/74/EC. As a result of several discussions with technical experts, the name proposed by the Commission for the new fibre is elastomultiester and it will be thus indicated for the purpose of this report.

In December 2003, the Directorate General Joint Research Centre (JRC) was asked to conduct experimental work to check the validity and suitability of the testing methods proposed by the applicant for the identification and quantification of elastomultiester in mixtures with other fibres and for the measurement of its elastic properties.

The results of this investigation were presented during the second technical meeting of national experts, held in Ispra on 1st October 2004. Based on these data, experts judged that the identification methods proposed by the petitioner (microscopy, DSC and FT-IR) were suitable for the purpose and that there was no need to organise a ring trial. It has to be noticed however that, using FT-IR spectroscopy, only the chemical composition of elastomultiester can be unequivocally identified and not the multicomponent nature of it.

A series of fabric samples, containing elastomultiester in mixture with wool, cotton, polyester, polyester/cotton, polyester/viscose and modal/viscose in various percentages, were quantified both using the manual method and the chemical ones described in Directive 96/73/EC. The chemical methods 1, 2, 4, 6, 7, 8, 9, 13 and 14 were applied and considered suitable for the quantification of elastomultiester in mixtures with other fibres. Methods repeatability was good, as demonstrated by the low values of the relative standard deviation (RSD), used to measure the dispersion of the distribution of test results in one laboratory. The same considerations are true for the manual separation method described in Directive 96/73/EC, which was applied to binary mixtures of elastomultiester with polyester, cotton and wool and to ternary mixtures with polyester/cotton, polyester/viscose and modal/viscose.

The correction factors *d* for chemical methods 1, 2, 4, 6, 7, 8, 9, and 13, that take into account the mass loss of the insoluble component, were calculated based on the analyses of samples of pure elastomultiester. Results confirmed that the same correction factors *d*, established for polyester, could be applied to the analysis of elastomultiester. As all the above-mentioned methods have already been validated at European level, experts considered a ring trial unnecessary and these methods may become the official ones to quantify elastomultiester in mixtures with other fibres.

In addition, a new quantitative method based on DSC was developed and successfully applied to the quantification of binary mixtures of elastomultiester with polyester and cotton and to ternary mixtures with polyester/cotton, polyester/viscose and modal/viscose. The method shows two important advantages, the first being the rapidity of the analysis and the second being the possibility to avoid manual separation in the case of mixtures polyester/elastomultiester. The method led to a good repeatability and results were generally as good as the ones obtained with chemical methods. The comparison with quantification based on the manual separation method showed differences usually lower than 1 %. The applicability of this method to other fibres could be further investigated and its validation could be carried out in view of a possible introduction as a new quantitative method in Directive 96/73/EC.

The JRC, based on the chemical composition of the new fibre, proposed an *agreed allowance* value of 1.50, equal to the one for polyester, and experts from Member States accepted this proposal.

The applicant proposed two methods to evaluate the elastic properties of elastomultiester (BISFA method for elastane and a modification of the ASTM D6720 skein method). These methods were checked by the JRC and applied to several yarns and single filaments extracted from fabric. The experimental results evidenced that the elongation at break can be as low as 60-70 %, thus demonstrating that the definition proposed by industry concerning elastic properties had to be revised. The

JRC, in agreement with Member States' national experts, considered these methods not appropriate to test the elastic properties of elastomultiester yarns and single filaments, as they could give information only on elongation at break of yarns and on recoverable stretch of skeins. As neither ISO nor CEN standard methods are available to measure the recoverable stretch of yarns, experts asked for new methods to be developed.

Following this request and in agreement with DG Enterprise, the JRC set up various methods, based on elongation and load, to measure the recoverable stretch and the permanent deformation of yarns and single filaments. The two elongation-based methods are simple and quick and they were used in the analysis of yarns and single filaments extracted from bobbin and fabrics at 50 % elongation. Experiments performed on single filaments showed that the fibre is intrinsically elastic, thus addressing one question aroused from experts if the fibre itself or yarns are elastic. Experiments proved that the elasticity is not due to the construction of yarns and to the fact that they contain several single filaments; on the contrary single filaments are as elastic as yarns.

Elastomultiester yarns and single filaments both from bobbin and fabrics were tested at 50 % elongation and results showed per cent permanent deformations usually lower than or equal to 10 %. For comparison purposes some tests were also performed on elastane yarns, both from bobbin and fabrics, at 200 % elongation as described in its definition. Elastane is, in fact, an elastic fibre already included in Directive 96/74/EC, whose definition, related to elastic properties, reads: "…when stretched to three times its original length and released, recovers rapidly and substantially to its original length". Also in the case of elastane permanent deformations were lower than or equal to 10 %, thus proving that, when stretched at 50 % elongation, elastomultiester shows elastic properties similar to those shown by elastane, when stretched at 200 % elongation.

On the basis of the experimental results and of discussions with representative experts from Member States (meetings on 4th March and 27th May 2005), the definition agreed and proposed for elastomultiester is: "*fibre formed by interaction of two or more chemically distinct linear macromolecules in two or more distinct phases (of which none exceeds 85 % by mass) which contains ester groups as dominant functional unit (at least 85 %) and which, after suitable treatment, when stretched to* *one and half times its original length and released, recovers rapidly and substantially to its original length*".

The name elastomultiester was chosen, in agreement with experts from Member States, as it fulfils the criteria set up in 2002 by the Commission and the technical experts working group on textile labelling. In fact, according to these criteria, a generic name should not link the fibre to a specific manufacturer, it should be free of rights and it should inform consumers about characteristics of the fibre. The name elastomultiester points out that the fibre is elastic and multicomponent, moreover it specifies that the fibre is polyester based.

2. Introduction

In 2002, the European Commission's Directorate General Enterprise received an application from DuPont (now Invista) for the establishment of a new generic fibre name under Directive 96/74/EC on textile names [1]. As a result of several discussions with technical experts, the name proposed by the Commission for the new fibre is elastomultiester and it will be thus indicated for the purpose of this report.[1]

Elastomultiester's main characteristic is that it is a multicomponent fibre; in fact it is made by a combination of different polymers and not by a single one. Nowadays the chemical composition of available commercial elastomultiester (T400), independently from its linear density, is 40 % polyester (3-GT type) and 60 % polyester (2-GT type). Two different polyesters are joined together within each fibre. When exposed to heat, each component shrinks to a different degree, producing a smooth and regular crimp that is the cause of the elastic properties shown by the fibre. The crimp is not mechanically induced and the yarn can be used directly, as no texturing or covering before weaving is needed.

Two meetings of the "Technical Expert Working Group on Textile Labelling", composed of Member States' governmental experts associated with the "Committee for Directives relating to Textile Names and Labelling", were held on 12th April 2002 and 25th September 2002 to evaluate the dossier presented by the applicant. The evaluation was based on the following agreed set of criteria:

- the new fibre should be radically different from other fibres by chemical composition and/or by manufacturing route and production process;
- fibre characteristics can be taken into account but need to be examined on a case by case basis;
- the new fibre should be detectable and distinguishable from other fibres by standardised test methods;
- consumer relevance should be shown by active commercial use of the fibre;
- a new name is justified only if the fibre cannot be classified into existing groups.

The group of experts was of the opinion that the petition was justified and that experimental work was needed to verify the applicability of the proposed analytical methods for identifying and quantifying elastomultiester in blends and for the evaluation of its elastic properties (see Annex I). An amendment to Directive

96/74/EC on textile names would subsequently be prepared. It was then decided that validated test methods, enabling market surveillance authorities in Member States to determine the composition of textile products containing the new fibre, should be established at European level.

Within the framework of the Commission's investigation on this fibre, the Joint Research Centre (JRC) was charged by DG Enterprise with the analytical work and, in particular, with the verification of the validity and suitability of the test methods proposed by the petitioner.

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[1] In the US the fibre was approved as a subclass of polyester and called elasterell-p.

3. Verification of the applicability of test methods proposed by the applicant

3.1 Background

The strategy of the experimental work was discussed and agreed with technical experts, representing Member States, during a meeting held in Ispra on 3th July 2003. It included an in-house verification of the applicability of test methods proposed by the petitioner.

The JRC, in collaboration with the applicant, selected relevant samples, taking into account the market for elastomultiester and the possible range of compositions in blends. Elastomultiester is mainly used in woven fabrics, usually on weft, in a quantity higher than 20 % by weight. It is used as an alternative to elastane to give elastic properties to the final product. It can be found in binary mixtures essentially with polyester, cotton and wool and in ternary mixtures primarily with polyester/cotton, polyester/viscose and modal/viscose. Based on this market analysis, fabric samples made by binary and ternary mixtures in various percentages and containing elastomultiester with various linear densities were analysed. Table 1 reports samples received from Invista (ex DuPont) and considered in the present study. Samples **090**, **021**, **091** and **092** are elastomultiester yarns from bobbin, samples **093**, **094** and **095** elastane yarns from bobbin and sample **096** elastane yarns extracted from fabric. All the other samples are woven fabrics.

JRC code	customer code	composition	dtex	filament number	sample type	color
090		100 T400	83	34	yarn from bobbin	white
021		100 T400	167	68	yarn from bobbin	white
091		100 T400	167	68	yarn from bobbin	white
092		100 T400	330	68	yarn from bobbin	white
043		50-52 T400 - 50-48 polyester	167	68	woven fabric	blue
044	2952	52 T400 - 48 polyester	167	68	woven fabric - Corti srl	black
048	7238-8	40 T400 - 60 polyester	167	68	woven fabric	beige
045	Superflex Etna 000583NN/00	34 T400 - 66 polyester	167	68	woven fabric - Mectex spa	black
049	7229-116	20 T400 - 80 polyester	167	68	woven fabric	black
054	CZ 10	62 T400 - 38 cotton	330	68	woven fabric for shoe lining	white
088	untik fabric	58 T400 - 42 cotton	167	68	woven fabric	white
056b	7238-9	42 T400 - 58 cotton	167	68	woven fabric	blue
024		32 T400 - 68 cotton	167	68	woven fabric	blue
053	CZ 9	25.9 T400 - 74.1 cotton	330	68	woven fabric for shoe lining	white
086b	stripes fabric	38 T400 - 62 cotton	83	34	woven fabric	white/black
087	myrtille fabric	27 T400 - 73 cotton	83	34	woven fabric	pink/violet
023		48 T400 - 52 wool	167	68	woven fabric	violet
022		17 T400 - 73 wool	167	68	woven fabric	blue
047	03RTW/11	27.4 T400 - 15.2 polyester - 57 cotton	167	68	woven fabric	milk and coffee
046	03RTW/19	20.5 T400 - 22.5 polyester - 57 cotton	167	68	woven fabric	light brown
055b	7238-22/5812	36 T400 - 64 polyester/viscose	167	68	woven fabric	beige
089	promotore fabric	38 T400 - 44 modal - 18 viscose	167	68	woven fabric	beige
093	T-136B	elastane	22	2	yarn from bobbin	white
094	T-162C	elastane	44	4	yarn from bobbin	white
095	T-162C	elastane	78	5	yarn from bobbin	white
096		elastane	44	4	yarn extracted from fabric	blue

Table 1: Samples received from Invista.

Note 1: Dtex is a unit to express linear density, numerically equal to the weight in grams of 10000 meters of yarn, filament, fibre or other textile strand.

Note 2: Samples **091**, **049**, **048**, **024**, **056b** and **055b** contain old, non-commercial elastomultiester yarns, made of polyester 2-GT and 3-GT type in ratios different from the one found in commercial elastomultiester (60/40).

3.2 Identification methods

The methods proposed by the applicant for identifying elastomultiester are three and are based on microscopy, differential scanning calorimetry (DSC) and Fourier transform infrared spectroscopy (FT-IR) respectively (see Annex I). In order to identify elastomultiester, both the multicomponent nature of the fibre and its chemical composition should be checked.

3.2.1 Microscopy

The multicomponent nature of elastomultiester can be identified based on microscopic analysis of fibre cross-section after dyeing process at 100 °C. In these conditions the two components can be easily differentiated as just one component, of the two present in commercial available yarns, is dyed. In case of dyed fibres, a pre-treatment using two-hour Soxhlet extraction with dichloromethane is necessary. Chemical composition can be checked by cross-section analysis together with longitudinal one.

The dyeing process was carried out for 30 minutes at 100 °C using an aqueous solution (pH 5.5 for acetic acid) containing a disperse dye (Foron blue RD-RLS), 1 % of fibre weight, and univadine as disperse agent, bath ratio 1/100. Actually any couple disperse dye/disperse agent normally used in the dyeing of polyester can be employed. The subsequent reductive washing was carried out for 20 min at 70 °C using an aqueous solution containing 2 g/l sodium hydrosulphite and 1 g/l sodium carbonate, with a bath ratio 1/50. Eventually the fibre was rinsed and dried and incorporated in a resin to prepare a cross-section.

Some photos of longitudinal and cross-section analysis of elastomultiester are reported in the following, as well as in Annex II. As they demonstrate, the multicomponent nature of elastomultiester is immediately evident and no ambiguity can arise. The method is quite rapid and did not show any problems or difficulties.

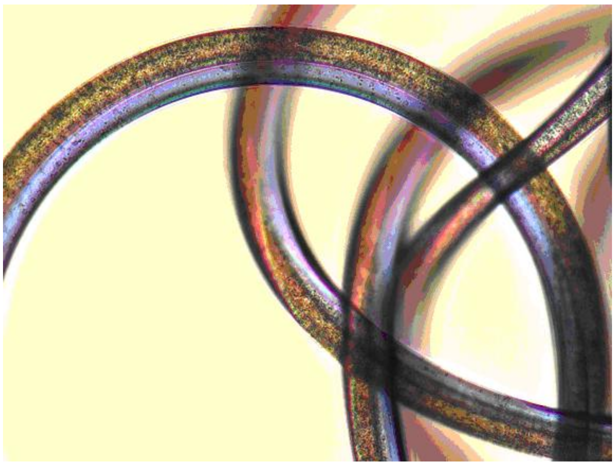


Fig. 1: Pure elastomultiester (sample **021**) after dyeing at 100 °C. 400X.
a) longitudinal analysis; **b)** cross-section analysis.

All samples received from Invista were analysed by microscopy for a preliminary characterisation and photos are reported in Annex II. A Zeiss microscope model Axioskop 2 Mat was used and analyses were performed using transmitted light. Glycerol triacetate was used as contrast reagent.

3.2.2 Differential scanning calorimetry

An alternative identification method that was successfully applied is based on Differential Scanning Calorimetry (DSC). Also in this case both the multicomponent nature of elastomultiester and its chemical composition can be checked, as the melting points of the different polymers in the fibre can be determined. The best conditions for this analysis require a temperature program of 5 °C/min, starting from 150 °C up to 300 °C, with a nitrogen gas flow of 50 ml/min. A sample weight of between 1 and 10 mg is optimal.

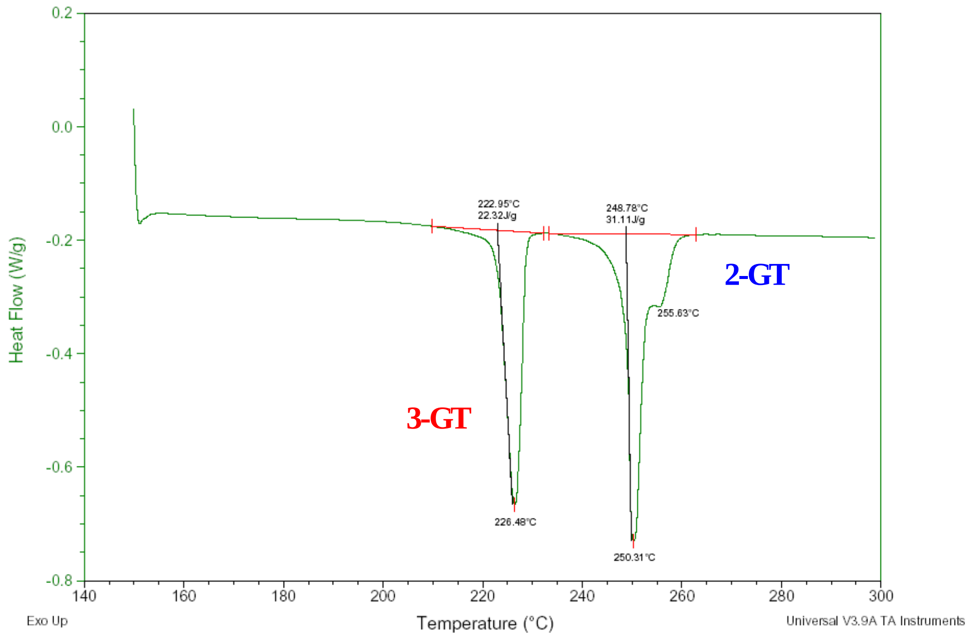


Fig. 2: DSC analysis of pure elastomultiester (sample **021**).

As reported in Fig. 2, the analysis of commercial elastomultiester shows one peak at 226 °C, corresponding to the melting point of polyester 3-GT type, one at 256 °C, due to the presence of polyester 2-GT type, and one peak at about 250 °C, most probably due to the copolymer formed at the interface between the previous two polymers.
The equipment used for the analyses was a DSC model Q100 by TA Instruments.

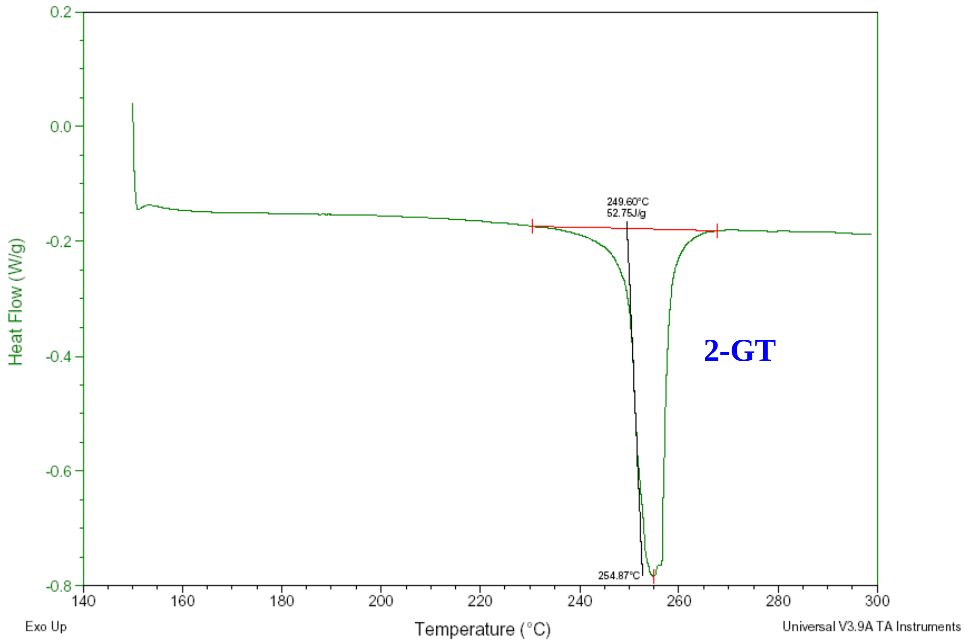


Fig. 3: DSC analysis of pure polyester 2-GT type (sample **082**).

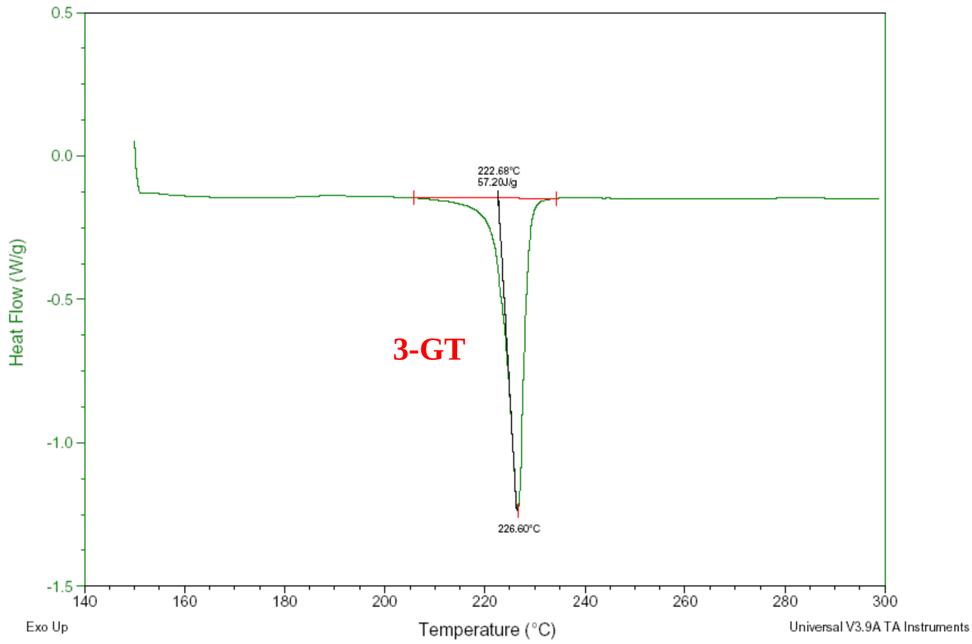


Fig. 4: DSC analysis of pure polyester 3-GT type (sample **059b**).

3.2.3 FT-IR

The chemical composition of elastomultiester can be determined also by means of Fourier transform infrared spectroscopy (FT-IR) by comparing the obtained reflectance spectrum with the spectrum of standard polyester. Recognition of polyester is easy due to the fingerprint of the molecule and to some characteristic peaks, such as the strong peak at 1712 cm^{-1}, caused by the stretching of carbonyl moiety being part of ester group, and the two strong peaks at 1241 and 1095 cm^{-1}, due to the stretching of the C-O bonds. A quality match of 75 % or greater is required, as a criterion of judgement, to confirm the presence of polyester in the sample. On the contrary, the multicomponent nature of elastomultiester cannot be easily assessed by this technique, as shown by the comparison between spectra of elastomultiester and polyester 2-GT and 3-GT type. In fact, even if some small differences are present in the region below 1000 cm^{-1}, such as the presence or absence of peaks at 933, 875 and 795 cm^{-1}, certain identification through this technique is hard to obtain.

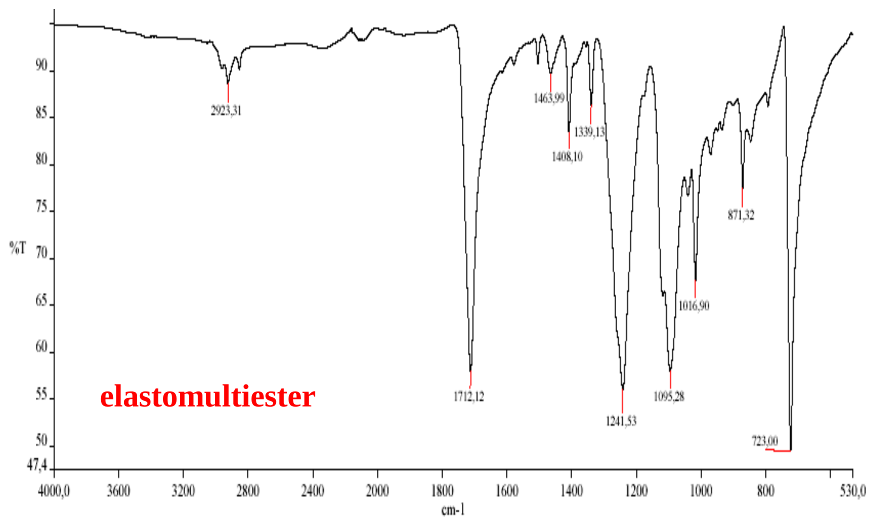


Fig. 5: FT-IT spectrum (ATR) of pure elastomultiester (sample **021**).

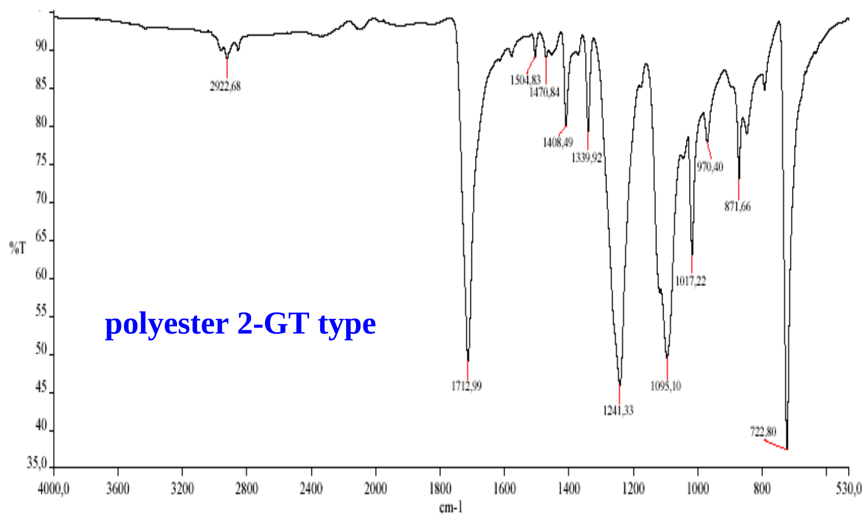


Fig. 6: FT-IT spectrum (ATR) of pure polyester 2-GT type (sample **060b**).

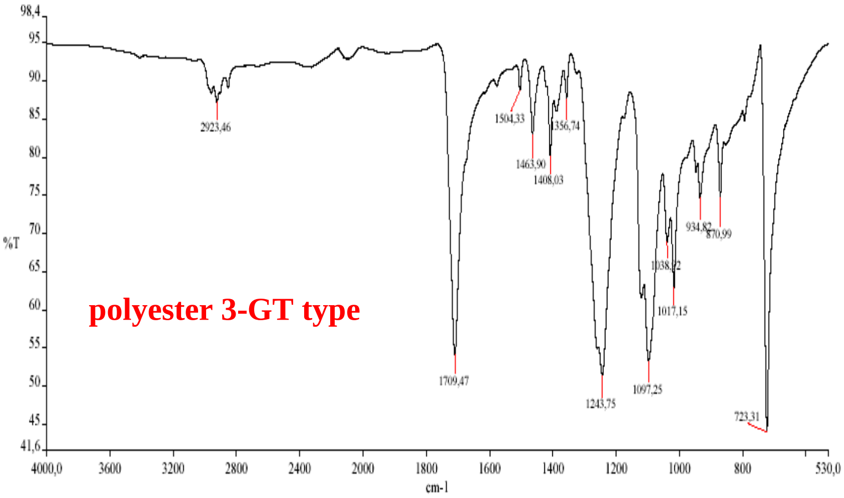


Fig. 7: FT-IT spectrum (ATR) of pure polyester 3-GT type (sample **059b**).

FT-IR spectra of all samples were acquired using ATR Attenuated Total Reflectance mode with a Perkin Elmer instrument (FT-IR spectrometer spectrum 2000). Yarns were analysed after extraction from fabric samples, without any preparation. The spectra of pure fibres are reported in Annex III.

3.3 Quantification methods

The JRC quantitatively analysed all the samples received from Invista (listed in Table 1) by manual separation and chemical analysis, as described in Directive 96/73/EC.

Samples were pre-treated, using the conditions reported in the previously mentioned Directive, in order to eliminate non-fibrous matter that can be extracted with light petroleum ether and water. The procedure foresees a one-hour extraction in Soxhlet with light petroleum ether, followed by a one-hour extraction in water at room temperature and a one-hour extraction in water at 65 ± 5 ºC, using a liquor/specimen ratio of 100/1. Samples were then air-dried.

3.3.1 Chemical methods

Pre-treated specimens of about 1 g were analysed by manual separation or chemical dissolution methods. Method 2 (hypochlorite) was used in the case of mixtures elastomultiester/wool, method 7 (sulphuric acid, 75 % m/m) in case of mixtures of elastomultiester with polyester, cotton, polyester/cotton, polyester/viscose and modal/viscose and method 14 (concentrated sulphuric acid) was used with samples made by mixtures elastomultiester/polyester.

In order to evaluate the correction factors *d*, for loss of mass of the new fibre (insoluble component) in the reagent during analysis, samples of pure elastomultiester were tested with all the chemical methods in which polyester represents the residue. In particular, method 1 (acetone), 2 (hypochlorite), 4 (formic acid, 80 % m/m), 6 (dichloromethane), 7 (sulphuric acid, 75 % m/m), 8 (dimethylformamide), 9 (carbon disulphide/acetone, 55.5/44.5 v/v) and 13 (xylene) were applied.

Ten to fifteen specimens were analysed using each method and the correction factors *d* were calculated using the following formula:

$$d = \frac{m}{r} \qquad 3.3.1$$

where:

m is the dry mass of the specimen after pre-treatment

r is the dry mass of the residue

All weighing operations were performed using an analytical balance with an uncertainty value of ± 0.0001 g.

In the case of compositional analysis of binary and ternary mixtures, after weighing, the residues were analysed by microscopy to verify the complete dissolution of the soluble component and photos are reported in Annex II. As an example, Fig. 5 in Annex II shows the photo of a blend of elastomultiester and wool and Fig. 6 the elastomultiester that remains as residue after the dissolution of wool.

The percentages of insoluble component on a clean, dry mass basis, disregarding loss of fibre mass during pre-treatment, were calculated using the following formula:

$$P_1\ \% = \frac{100\ r\ d}{m} \qquad 3.3.2$$

where:

P_1 is the percentage of clean, dry insoluble component

m is the dry mass of the specimen after pre-treatment

r is the dry mass of the residue

d is the correction factor for loss of mass of the insoluble component in the reagent during analysis

For methods 2 and 7 the values of *d* for elastomultiester were considered 1.00 on the basis of the experimental results obtained in the evaluation of the correction factors.

In the case of binary mixtures, calculations of percentage of insoluble component on clean, dry mass basis, with adjustment by conventional factors (*agreed allowances*) and, where appropriate, correction factors for loss of mass during pre-treatment, were performed using the following formula:

$$P_{1A}\ \% = \frac{100\ P_1\left(1+\frac{a_1+b_1}{100}\right)}{P_1\left(1+\frac{a_1+b_1}{100}\right)+\left(100-P_1\right)\left(1+\frac{a_2+b_2}{100}\right)} \qquad 3.3.3$$

where:

P_{1A} is the percentage of insoluble component, adjusted by *agreed allowances* and for loss of mass during pre-treatment

P_1 is the percentage of clean, dry insoluble component as calculated from equation 3.3.2

a_1 is the *agreed allowance* for the insoluble component (listed in Annex II to the Directive on textile names)

a_2 is the *agreed allowance* for the soluble component (listed in Annex II to the Directive on textile names)

b_1 is the percentage loss of insoluble component caused by the pre-treatment

b_2 is the percentage loss of soluble component caused by the pre-treatment

The percentage of the soluble component (P_{2A} %) was obtained by difference.
As specified in Directive 96/73/EC correction factors b_1 and b_2 could be ignored, as the normal pre-treatment by extraction with light petroleum ether and water was applied. The *agreed allowances* used in the calculations are reported in Table 2. For elastomultiester the *agreed allowance* proposed by the applicant (1.50), that is equal to the one established for polyester, was used.

	agreed allowance
cotton	8.50
wool	18.25
polyester	1.50
viscose	13.00
modal	13.00
elastomultiester	1.50

Table 2: *Agreed allowances* used in the calculations.

3.3.2 Manual separation

For the manual separation method, in the case of binary mixtures, the calculation of per cent mass of clean, dry fibre, disregarding loss of fibre mass during pre-treatment, was performed using equation 3.3.4:

$$P_1\ \% = \frac{100\ m_1}{m_1 + m_2} \qquad 3.3.4$$

where:

P_1 is the percentage of the first clean, dry component

m_1 is the clean, dry mass of the first component

m_2 is the clean, dry mass of the second component

For calculation of the percentage of each component with adjustment by *agreed allowances* and, where appropriate, by correction factors for loss of matter during pre-treatment, the formula 3.3.3 was used.

3.3.3 Results

For each sample the homogeneity was verified and ten replicate specimens were usually analysed.

The petitioner indicated samples composition approximately and, for this reason, they should not be regarded as true reference values. This is particularly evident in the case of sample **043**, for which the stated composition is 50-52 % elastomultiester – 50-48 % polyester.

The data were collected and subjected to statistical evaluation. The procedure followed guidelines ISO 5725 [3] and IUPAC harmonised protocol (1995) [4]. The results were examined for evidence of individual systematic error using Dixon's test, as laid down in ISO 5725, in order to determine the presence of outliers. Few outliers were found out of almost four hundreds measurements and they were eliminated after confirmation using some other statistical tests [5], summarised in Table 3.

	upper outlier	lower outlier	comments
"t-like" tests statistics	$T1 = \frac{x_n - \bar{x}}{s_x}$	$T1 = \frac{\bar{x} - x_1}{s_x}$	Test for single outlier, sometimes called T_n test
	$T2 = \frac{\sum (x_i - \bar{x})}{s_x}$	$T2 = \frac{\sum (\bar{x} - x_i)}{s_x}$	Block test for k upper or lower outliers
	$T3 = \frac{x_n - x_1}{s_x}$		Block test for one upper and one lower outlier
"Dixon-like" statistics	$T4 = \frac{x_n - x_{n-1}}{x_n - x_1}$	$T4 = \frac{x_2 - x_1}{x_n - x_1}$	Tests for a single outlier, sometimes called the Q test
	$T5 = \frac{x_n - x_{n-2}}{x_n - x_2}$	$T5 = \frac{x_3 - x_1}{x_{n-1} - x_1}$	Tests for a single outlier, a form of the Q-test that provides some protection from masking

Table 3: Statistical tests used to confirm the presence of outliers.

The valid results were then subjected to statistical evaluation. The average and standard deviation (SD) of each set of data were calculated, as well as the relative standard deviation (RSD). The RSD was used to measure the dispersion of the distribution of test results in one laboratory: the lower the value of RSD, the better the repeatability of the method. The confidence intervals (uncertainties) were calculated at 95 % of probability, using the following formula:

$$\mu = x_m \pm \frac{t\ s}{\sqrt{N}} \qquad 3.3.5$$

where:

t is the value listed in the Student's t-distribution for a certain number of degrees of freedom and level of probability

s is the estimated standard deviation

μ is the true value

x_m is the average of experimental results

N is the number of measurements

Annex III reports all the results regarding the evaluation of correction factors *d* and the composition analyses. All measurements were performed at the JRC. An overview of the relevant results, with uncertainties calculated for a confidence level of 95 %, is shown in Tables 4-6.

JRC code	stated composition	replicates	method	T400 %	RSD (T400)	d (T400)	d (PES)
021	100 T400	15	1	99.6 +/- 0.1	0.1	1.004 +/- 0.001	1.00
021	100 T400	10	2	99.7 +/- 0.1	0.2	1.003 +/- 0.001	1.00
021	100 T400	15	4	99.6 +/- 0.1	0.1	1.004 +/- 0.001	1.00
021	100 T400	15	6	97.8 +/- 0.1	0.3	1.022 +/- 0.002	1.01
021	100 T400	10	7	99.7 +/- 0.1	0.2	1.003 +/- 0.001	1.00
021	100 T400	15	8	98.0 +/- 0.2	0.4	1.021 +/- 0.002	1.01
021	100 T400	15	9	99.6 +/- 0.1	0.2	1.004 +/- 0.001	1.00
021	100 T400	15	13	98.1 +/- 0.1	0.2	1.020 +/- 0.001	1.00

Table 4: Evaluation of correction factors *d* for elastomultiester.

As commercial elastomultiester is composed of 100 % polyester, the correction factors *d* are expected to be equal to those reported in Directive 96/73/EC for polyester. Experimental results generally confirmed this hypothesis. Only in the case of methods 6 (dichloromethane), 8 (dimethylformamide) and 13 (xylene) slight differences were found, as reported in Table 4. This could be due to the fact that the values of d, that are in the Directive for polyester, were derived from an interlaboratory trial, whereas in this case the values of d for elastomultiester were determined in just one laboratory.

JRC code	stated composition	replicates	T400 + PES %	method	RSD (other fibre)	RSD (T400)
043	50-52 T400 - 50-48 polyester	10	99.9 +/- 0.1	7	-	0.2
043	50-52 T400 - 50-48 polyester	10	98.9 +/- 0.2	14	-	0.3
049	20 T400 - 80 polyester	10	100.1 +/- 0.1	7	-	0.2
049	20 T400 - 80 polyester	10	98.0 +/- 0.2	14	-	0.3
054	62 T400 - 38 cotton	10	62.6 +/- 0.2	7	0.6	0.3
088	58 T400 - 42 cotton	10	55.5 +/- 0.1	7	0.4	0.3
056b	42 T400 - 58 cotton	10	42.4 +/- 0.1	7	0.3	0.5
024	32 T400 - 68 cotton	20	36.2 +/- 0.2	7	0.5	0.9
053	25.9 T400 - 74.1 cotton	9	25.3 +/- 0.1	7	0.2	0.7
086b	38 T400 - 62 cotton	10	38.6 +/- 0.1	7	0.1	0.2
087	27 T400 - 73 cotton	9	27.8 +/- 0.04	7	0.1	0.2
023	48 T400 - 52 wool	10	47.8 +/- 0.1	2	0.4	0.4
022	27 T400 - 73 wool	10	26.0 +/- 0.2	2	0.3	0.9
047	27.4 T400 -15.2 polyester - 57 cotton	10	42.4 +/- 0.1	7	0.3	0.4
046	20.5 T400 - 22.5 polyester - 57 cotton	10	42.9 +/- 0.2	7	0.5	0.7
055b	36 T400 - 64 polyester/viscose	10	68.8 +/- 0.2	7	0.9	0.4
089	38 T400 - 44 modal - 18 viscose	10	37.4 +/- 0.2	7	0.4	0.6

Table 5: Analysis of composition performed by chemical methods.

JRC code	stated composition	replicates	T400 %	polyester %	cotton %	RSD (other fibre)	RSD (T400)
044	52 T400 - 48 PES	19	53.4 +/- 0.1			0.3	0.3
048	40 T400 - 60 PES	10	41.9 +/- 0.1			0.3	0.4
045	34 T400 - 66 PES	20	35.6 +/- 0.1			0.4	0.7
049	20 T400 - 80 PES	5	39.0 +/- 0.3			0.4	0.6
054	62 T400 - 38 cotton	10	61.8 +/- 0.2			0.6	0.3
088	58 T400 - 42 cotton	10	54.9 +/- 0.1			0.2	0.2
056b	42 T400 - 58 cotton	10	42.7 +/- 0.1			0.3	0.4
024	32 T400 - 68 cotton	10	36.5 +/- 0.1			0.3	0.5
053	25.9 T400 - 74.1 cotton	15	25.4 +/- 0.1			0.2	0.7
086b	38 T400 - 62 cotton	10	37.1 +/- 0.1			0.1	0.2
087	27 T400 - 73 cotton	10	28.1 +/- 0.1			0.2	0.4
023	48 T400 - 52 wool	10	45.1 +/- 0.2			0.6	0.7
022	27 T400 - 73 wool	5	24.9 +/- 0.3			0.3	1.0
047	27.4 T400 -15.2 PES - 57 cotton	10	27.1 +/- 0.1	15.0 +/- 0.1	57.9 +/- 0.1	0.7 - 0.2	0.6
046	20.5 T400 - 22.5 PES - 57 cotton	10	20.2 +/- 0.1	22.3 +/- 0.1	57.5 +/- 0.1	0.2 - 0.2	0.5
055b	36 T400 - 64 PES /viscose	10	35.8 +/- 0.1			0.3	0.6
089	38 T400 - 44 modal - 18 viscose	10	37.1 +/- 0.1			0.2	0.4

Table 6: Analysis of composition performed by manual separation.

The results on composition analysis showed that both chemical methods (2, 7 and 14) and manual separation method in Directive 96/73/EC led to a good repeatability, as proved by the low values of RSD and uncertainty. RSD was in the range 0.1 – 1.0 and uncertainty in the range 0.04 – 0.3, depending on samples and composition.

Results showed that the precision of the two chemical methods (7 and 2), applied for analysing binary mixtures containing elastomultiester, is at least as good as for analysing binary blends containing polyester, with which they were validated. In fact, Directive 96/73/EC states that on a homogeneous mixture of textile materials containing polyester, the confidence limits of results obtained by methods 7 and 2 are not greater than ± 1, for a confidence level of 95 %. Comparing results obtained by methods 7 and 2 with those obtained using manual separation method, this is generally true also in the case of elastomultiester, with just a few exceptions. This confirms that no systematic errors due to laboratory bias were present in the application of the previous chemical dissolution methods.

The results of analyses were usually in agreement with the composition indicated by the applicant, considering that a manufacturing tolerance of 3 % shall be permitted between the stated fibre percentages and the composition obtained from analysis, in relation to the total weight of fibres shown on the label (as foreseen by article 6, comma 4b in Directive 96/74/EC on textile names). Samples **024** and **049** are exceptions and this is probably due to wrong labelling. In fact, in the case of sample **024** for example, both manual separation and chemical method n. 7 gave very similar results that differ from the stated composition for more than 4 %.

In the case of samples **055b** and **089**, it was not possible to manually separate polyester from viscose and modal from viscose, as these fibres were joint together in a single yarn.

3.4 Testing methods to evaluate elastic properties

The applicant proposed two different methods to test the elastic properties of elastomultiester. The first one is described in chapter 6 (tensile properties) of the BISFA manual regarding test methods for bare elastane yarns [6], and the second one is a revision, under development, of the ASTM test method D6720-01.

3.4.1 BISFA method

The principle of this method foresees to mount a yarn specimen in the clamps of a tensile testing machine and to stretch it, at a constant rate of extension, until rupture. Breaking force, maximum load, per cent elongation at break, per cent elongation at maximum load and force at 300 % elongation, if attained, were measured per yarn end or single filament end.

An Instron dynamometer, model 5544, equipped with clamping assembly as described in option C of the method and shown in Fig. 8, was used to perform tests. One jaw had a flat surface and the opposite one a convex surface, so that the contact between them was a line and the specimen could not slip through. The convex jaw was made of steel and the flat one of steel covered with rubber, this was the only modification compared to the test method that described a flat jaw made of acrylic. It should be underlined that no negative influences on test results were noticed, as no slippage problems were experienced.

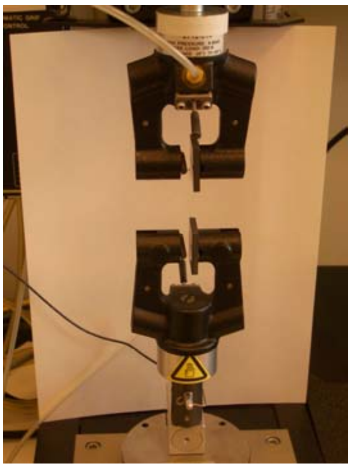


Fig. 8: Clamping assembly used for the BISFA method.

Load cells of 5 and 50 N were used depending on the maximum load of samples. The following test conditions were applied: speed of moving clamp 500 mm/min, pretension 0.001 ± 0.0001 cN/dtex, gauge length 50 ± 1.0 mm.

Both yarns and single filaments from bobbin and extracted from fabric were tested. Particular attention was paid in taking out yarns from fabrics and single filaments from yarns, in order to avoid any stress and damage in their elastic properties. Before sampling yarns from bobbins at least 100 meters from each package were removed and discarded.

As elastomultiester develops its elastic properties after heat treatment, specimens had to be plunged in boiling water for 15 minutes before testing, then dried and conditioned without any stress in standard atmosphere (21 ± 1 °C, 65 ± 2 % relative humidity) for at least 4 hours. For the purpose of comparison, in the case of yarns and single filaments extracted from fabrics, tests were performed also without the heat treatment step, because all final products (fabrics) had been already heated during the manufacturing process. Sample preparation appeared to be a critical procedure that influenced test results, so it had to be optimised. Eventually, yarns were plunged into boiling water singularly, to avoid them sticking together and to eliminate the chance of damage in separating them. On the contrary, single filaments were heat-treated packed in a piece of fabric to avoid the formation of knots, difficult to eliminate without damaging the elastic properties of samples.

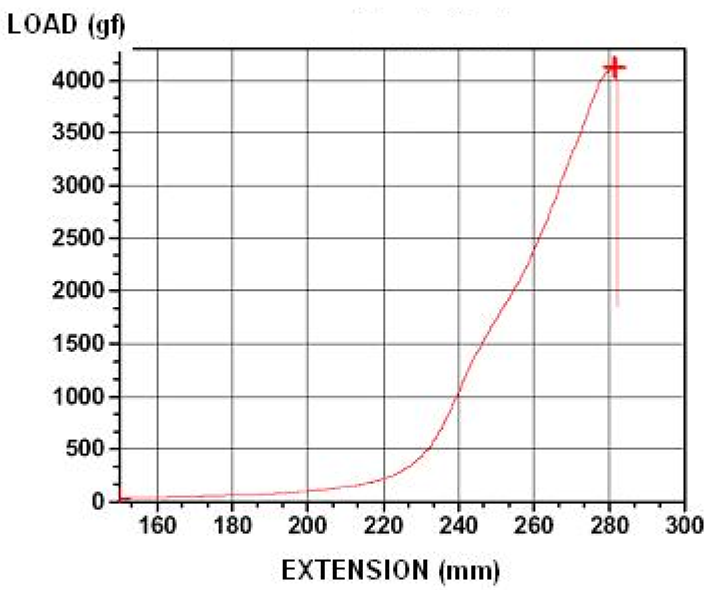


Fig. 9: Load versus extension curve (sample **021**, yarn).

Fig. 9 shows the trend of a typical curve load versus extension for elastomultiester yarn, where the load continuously increases with extension until rupture.
All results are presented in Annex V, whereas a summary is reported in Tables 7-10.

JRC code	stated composition	dtex	filament number	replicates	elongation at break %	elongation at max load %	sample boiled
090	100 elastomultiester	83	34	25	557.8 +/- 16.6	557.7 +/- 16.6	singularly
021	100 elastomultiester	167	68	110	471.6 +/- 10.5	465.3 +/- 9.9	NOT singularly
021	100 elastomultiester	167	68	20	504.4 +/- 23.3	499.3 +/- 21.7	singularly
091	100 elastomultiester	167	68	25	497.5 +/- 18.1	497.1 +/- 17.9	singularly
092	100 elastomultiester	330	68	17	400.5 +/- 8.7	400.6 +/- 8.3	singularly

Table 7: Analysis of pure elastomultiester yarns from bobbin.

JRC code	stated composition	dtex	replicates	elongation at break %	elongation at max load %	sample boiled
090	100 elastomultiester	2.4	15	314.8 +/- 25.8	310.5 +/- 29.4	packed
021	100 elastomultiester	2.5	29	215.4 +/- 28.9	195.7 +/- 22.1	NOT packed
021	100 elastomultiester	2.5	23	347.1 +/- 31.1	345.9 +/- 30.7	packed
091	100 elastomultiester	2.5	10	492.8 +/- 23.0	483.5 +/- 20.7	packed
092	100 elastomultiester	4.8	16	411.6 +/- 55.0	411.4 +/- 54.8	packed

Table 8: Analysis of pure elastomultiester single filaments taken out from yarns from bobbin.

Results suggested that the per cent elongation at break of yarns depends on their linear density. In fact, the elongation at break decreased from 558 to 400 % when the linear density increased from 83 to 330 dtex. When tests were performed on single filaments this dependence seemed to be less evident, moreover it went in the opposite direction as, the per cent elongation at break increased with the linear density of specimens. The only exceptions were the results for single filaments taken out from sample **091**, the reason for this behaviour could be due to the different chemical composition of this sample that is an old, non-commercial elastomultiester containing 60 % polyester (3-GT type) and 40 % polyester (2-GT type), instead of the usual 40 % polyester (3-GT type) and 60 % polyester (2-GT type) of sample **021**. It has to be noticed however, that yarns of sample **091** did not show differences in the elastic behaviour when compared with sample **021**. The per cent elongation at break for single filaments ranged between 315 and 493 %, thus proving that the fibre itself owns elastic properties.
The importance of sample preparation was highlighted by the difference in results obtained on yarns singularly boiled or not and on single filaments boiled packed or

not. In both cases a non-optimal sample preparation ended up with lower values of per cent elongation at break, showing that elastic properties were damaged in this step.

JRC code	stated composition	dtex	filament number	replicates	before boiling elongation at break %	before boiling elongation at max load %
044	52 elastomultiester - 48 polyester	167	68	10	70.1 +/- 3.6	67.8 +/- 2.4
048	40 elastomultiester - 60 polyester	167	68	20	101.1 +/- 2.2	81.6 +/- 1.9
045	34 elastomultiester - 66 polyester	167	68	20	87.5 +/- 3.2	72.7 +/- 1.6
023	48 elastomultiester - 52 wool	167	68	10	75.4 +/- 2.5	61.2 +/- 1.7
054	62 elastomultiester - 38 cotton	330	68	20	109.8 +/- 4.6	107.8 +/- 4.0
088	58 elastomultiester - 42 cotton	167	68	5	70.9 +/- 8.7	59.7 +/- 4.4
056b	42 elastomultiester - 58 cotton	167	68	5	78.2 +/- 4.6	68.8 +/- 1.9
024	32 elastomultiester - 68 cotton	167	68	10	75.1 +/- 3.9	58.3 +/- 2.5
053	25.9 elastomultiester - 74.1 cotton	330	68	10	78.6 +/- 2.4	77.8 +/- 1.6
086b	38 elastomultiester - 62 cotton	83	34	5	77.5 +/- 5.4	64.7 +/- 4.1
087	27 elastomultiester - 73 cotton	83	34	5	66.1 +/- 6.3	60.7 +/- 3.6
047	27.4 T400 -15.2 PES - 57 cotton	167	68	10	85.5 +/- 3.9	66.4 +/- 2.3
046	20.5 T400 - 22.5 PES - 57 cotton	167	68	10	70.8 +/- 3.3	57.3 +/- 2.2
055b	36 T400 - 64 polyester/viscose	167	68	5	77.0 +/- 0.8	77.0 +/- 0.8
089	38 T400 - 44 modal - 18 viscose	167	68	5	86.1 +/- 6.3	70.4 +/- 4.0

JRC code	stated composition	dtex	filament number	replicates	after boiling elongation at break %	after boiling elongation at max load %
044	52 elastomultiester - 48 polyester	167	68	10	85.5 +/- 4.9	80.4 +/- 1.7
048	40 elastomultiester - 60 polyester	167	68	10	117.5 +/- 7.5	97.9 +/- 8.3
045	34 elastomultiester - 66 polyester	167	68	10	108.3 +/- 9.0	94.4 +/- 7.0
023	48 elastomultiester - 52 wool	167	68	3	101.5 +/- 16.3	80.2 +/- 16.9
054	62 elastomultiester - 38 cotton	330	68	10	119.9 +/- 3.3	118.0 +/- 3.3
088	58 elastomultiester - 42 cotton	167	68	5	83.7 +/- 3.3	65.6 +/- 2.2
056b	42 elastomultiester - 58 cotton	167	68	5	104.1 +/- 16.6	81.0 +/- 8.7
053	25.9 elastomultiester - 74.1 cotton	330	68	10	98.8 +/- 4.5	96.4 +/- 3.0
086b	38 elastomultiester - 62 cotton	83	34	5	73.9 +/- 7.3	71.0 +/- 5.5
087	27 elastomultiester - 73 cotton	83	34	5	74.9 +/- 4.4	72.9 +/- 3.3
047	27.4 T400 -15.2 PES - 57 cotton	167	68	10	102.0 +/- 7.5	87.6 +/- 5.3
046	20.5 T400 - 22.5 PES - 57 cotton	167	68	10	93.5 +/- 7.4	74.8 +/- 3.9
055b	36 T400 - 64 polyester/viscose	167	68	5	90.4 +/- 6.8	90.2 +/- 6.9
089	38 T400 - 44 modal - 18 viscose	167	68	5	104.8 +/- 8.7	85.8 +/- 5.5

Table 9: Analysis of elastomultiester yarns taken out from fabrics, before and after boiling.

Specimens of yarns and single filaments extracted from various fabric samples were also analysed. The per cent elongation at break for elastomultiester yarns varied in the range 66.1 to 119.9 %, whereas in the case of single filaments it ranged between 65.5 and 129.9 %. These results proved that elastomultiester cannot be considered elastic at 100 % elongation, as it was claimed in the first draft of the application, because in many cases elastomultiester yarns and single filaments, that can be found on the market, break before reaching this extension. In addition, single filaments evidenced an elastic behaviour similar to that of yarns.

With very few exceptions, in general both yarns and single filaments showed higher values of per cent elongation after the boiling step, as if the extraction from fabric could damage a little the elastic properties of specimens and the heat treatment could restore them.

In the case of yarns and single filaments taken out from fabrics, a change in the linear density of specimens seemed not to have a clear influence on per cent elongation at break, as it was the case for yarns and single filaments from bobbin.

				before boiling	
JRC code	**stated composition**	**dtex**	**replicates**	**elongation at break %**	**elongation at max load %**
048	40 elastomultiester - 60 polyester	2.5	13	97.6 +/- 5.7	97.6 +/- 5.7
045	34 elastomultiester - 66 polyester	2.5	5	96.8 +/- 9.2	96.8 +/- 9.2
023	48 elastomultiester - 52 wool	2.5	10	76.7 +/- 4.3	76.7 +/- 4.3
054	62 elastomultiester - 38 cotton	4.8	21	120.9 +/- 6.1	120.9 +/- 6.1
088	58 elastomultiester - 42 cotton	2.5	6	77.1 +/- 5.7	77.1 +/- 5.7
053	25.9 elastomultiester - 74.1 cotton	4.8	13	79.8 +/- 3.9	79.8 +/- 3.9
087	27 elastomultiester - 73 cotton	2.4	8	74.6 +/- 5.6	74.6 +/- 5.6
047	27.4 elastomultiester -15.2 PES - 57 cotton	2.5	17	83.9 +/- 2.8	83.9 +/- 2.8
046	20.5 elastomultiester - 22.5 PES - 57 cotton	2.5	12	65.5 +/- 3.1	65.5 +/- 3.1
055b	36 elastomultiester - 64 polyester/viscose	2.5	3	83.9 +/- 45.8	78.6 +/- 60.9
089	38 elastomultiester - 44 modal - 18 viscose	2.5	8	86.4 +/- 4.6	86.4 +/- 4.6

				after boiling	
JRC code	**stated composition**	**dtex**	**replicates**	**elongation at break %**	**elongation at max load %**
045	34 elastomultiester - 66 polyester	2.5	5	85.3 +/- 12.2	85.3 +/- 12.2
023	48 elastomultiester - 52 wool	2.5	5	69.4 +/- 7.9	69.4 +/- 7.9
054	62 elastomultiester - 38 cotton	4.8	5	129.9 +/- 14.3	129.9 +/- 14.3
088	58 elastomultiester - 42 cotton	2.5	6	83.8 +/- 9.3	83.8 +/- 9.3
087	27 elastomultiester - 73 cotton	2.4	5	82.5 +/- 9.6	82.5 +/- 9.6
047	27.4 elastomultiester -15.2 PES - 57 cotton	2.5	5	80.3 +/- 10.6	80.3 +/- 10.6
055b	36 elastomultiester - 64 polyester/viscose	2.5	5	110.4 +/- 17.2	107.6 +/- 16.8
089	38 elastomultiester - 44 modal - 18 viscose	2.5	8	84.9 +/- 5.9	84.9 +/- 5.9

Table 10: Analysis of elastomultiester single filaments taken out from fabrics, before and after boiling.

3.4.2 Skein method

Recoverable stretch was measured using a revision, under development, of the ASTM test method D6720-01 (skein method), applicable only to yarns from bobbin. In fact, the method foresees the preparation of a 5000-denier skein, but the extraction of such an amount of yarn from fabric is not feasible.

The method can be performed manually, using a rank and measuring scales such as a meter stick and tension weights, or with the aid of a dynamometer. The results presented here were obtained using a tensile testing machine.

The principle of the method foresees that a yarn skein is prepared by winding a prescribed number of turns on a reel, in order to obtain a 5000-denier skein. The skein is immersed in boiling water for 15 minutes and air dried to allow the full development of the skein stretch (crimp) potential. The skein is exercised under a specified tension (1.030 kgf) for 10 seconds and released; its extended length is recorded. The cycle is repeated three times, but on the third unload cycle a lower tension (0.030 kgf) is applied for 30 seconds to the skein and then its recovery length is recorded. The recoverable stretch is calculated from the difference between the recorded length measurements and expressed as percentage of the recovery length.

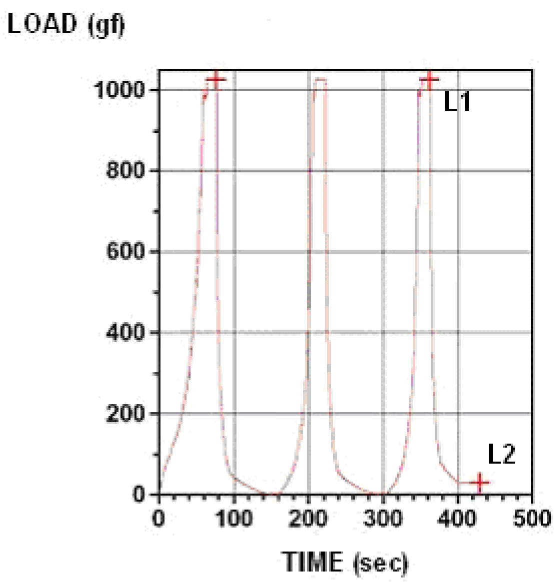


Fig. 10: Load versus time profile.

The skein total length was measured during the first and third cycle after 10 seconds under strain (1.030 kgf) and during the third cycle after 30 seconds under strain (0.030 kgf), as shown in Fig. 10. The recoverable stretch was then calculated using the following formula:

$$recoverable\ stretch = \frac{L_1 - L_2}{L_2} * 100 \qquad 3.4.1$$

where:

L_1 is the skein total length during the third cycle after 10 seconds under tension of 1.030 kgf

L_2 is the skein total length during the third cycle after 30 seconds under tension of 0.030 kgf

The 5000-denier skein was prepared using a reel, with one-meter diameter, and a winding tension of 0.1 gf/d. Before sampling yarns from bobbin, at least 100 meters from each package were removed and discarded. As elastomultiester develops its elastic properties only after heat treatment, each skein was plunged singularly in boiling water for 15 minutes, dried and conditioned without any stress in a standard atmosphere (21 ± 1 °C, 65 ± 2 % relative humidity) for at least 16 hours, before being tested. An Instron dynamometer, model 5544, equipped with clamping assembly as reported in Fig. 11 was used to perform analyses.

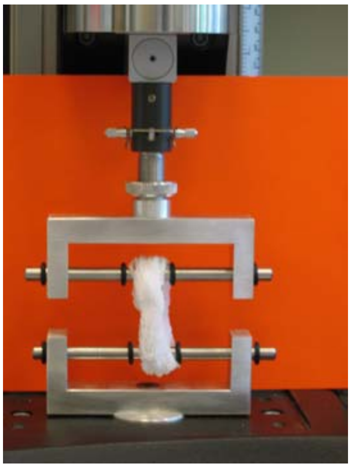


Fig. 11: Clamping assembly used for the skein method.

The speed of moving clamp was set at 360 mm/min.

Yarns from bobbin of various linear densities and number of single filaments were tested. The petitioner declared that the recoverable stretch for elastomultiester should be higher than 35 % and the series of tests carried out confirmed this statement (Table 11). An example of load versus extension curve is reported in Fig. 12.

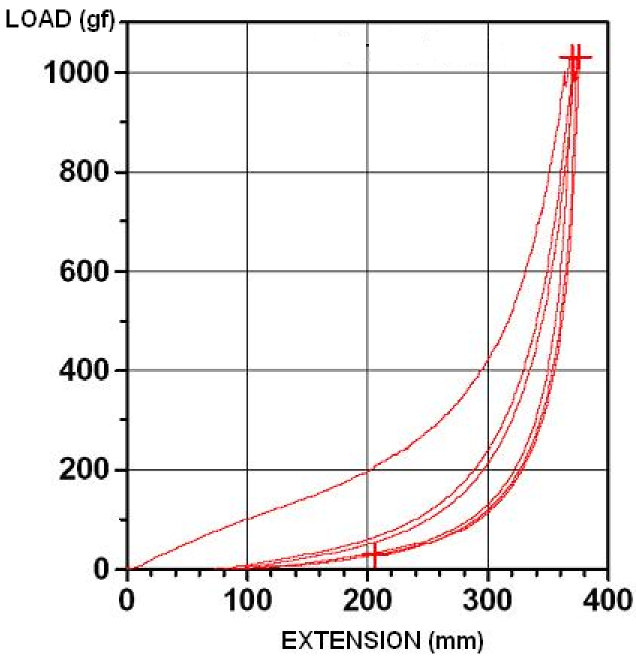


Fig. 12: Load versus extension curve (sample **021**).

JRC code	stated composition	dtex	filament number	replicates	recoverable stretch %
090	100 elastomultiester	83	34	10	54.3 +/- 0.7
021	100 elastomultiester	167	68	17	47.5 +/- 0.9
092	100 elastomultiester	330	68	10	51.3 +/- 0.5

Table 11: Analysis of elastomultiester skeins from bobbin.

4. Development of a quantification method based on DSC

As elastomultiester is made by 100 % polyester, binary mixtures with polyester cannot be quantified with the chemical methods described in Directive 96/73/EC and only the method based on manual separation is applicable. Manual separation however is time expensive and cannot be applied in the case of intimate mixtures or particular fabric constructions, which prevent yarn separation. For these reasons the JRC developed a quantitative method based on Differential Scanning Calorimetry (DSC), as this method can be in principle applied to mixtures of elastomultiester with normal polyester (independently from the type of polyester: 2-GT, 3-GT and 4-GT) and also to intimate mixtures. The method can be applied also to binary mixtures of elastomultiester with cotton, viscose and nylon, whereas it is not applicable to binary mixtures with wool and silk.

The method foresees DSC analysis of fabric specimens and quantification based on calibration curves built up using handmade mixtures containing various percentages of pure elastomultiester.

A DSC by TA Instruments, model Q100, was used. The following test conditions were applied: temperature program 150 °C – 5 °C/min – 300 °C, nitrogen gas flow 50 ml/min, sample weight 1-10 mg.

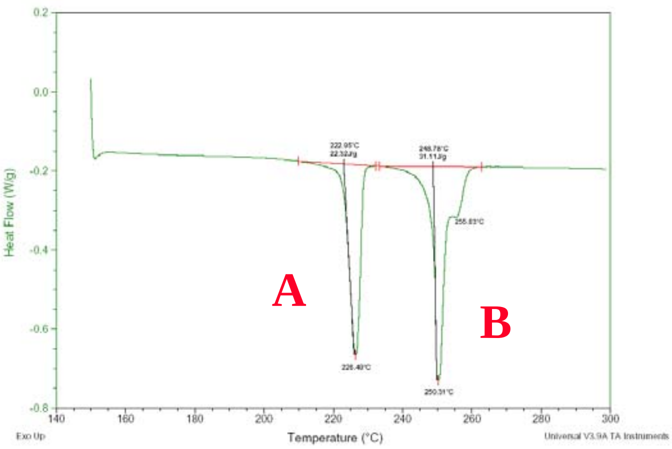


Fig. 13: DSC analysis of pure elastomultiester (sample **021**).

As reported in Fig. 13, with these experimental conditions, elastomultiester showed two peaks that could be easily integrated, the first one A at 226 °C, corresponding to the melting point of polyester 3-GT type, and the second one B due to two peaks not well separated: the one at 256 °C, due to the presence of polyester 2-GT type, and the one at about 250 °C, most probably due to the copolymer formed at the interface between polyester 3-GT and 2-GT.

As a first step, a number of analyses were performed on pure elastomultiester to verify that the areas of peaks A and B were constant and independent from sample size. Twenty-four specimens of sample **021**, with size in the range 1 to 10 mg, were analysed. As shown in Table 12, the reproducibility of measurements was very good for both peaks. Peak areas were 22.27 and 31.05 J/g for peak A and B respectively, with uncertainties lower than 0.20, calculated for a confidence level of 95 %. The same is true for specimens of sample **090** and **092** characterised by different linear densities. No influence of linear density and number of filaments was evident from these results, as expected on the basis of the same chemical composition. On the contrary, sample **091** showed differences in peak areas due to its different chemical composition, 60 % polyester (3-GT type) and 40 % polyester (2-GT type).

JRC code	stated composition	dtex	filament number	replicates	peak A Area, J/g	peak B Area, J/g
090	100 elastomultiester	83	34	13	22.40 +/- 0.05	31.22 +/- 0.10
021	100 elastomultiester	167	68	80	22.22 +/- 0.05	31.01 +/- 0.12
021	100 elastomultiester	167	68	24	22.27 +/- 0.08	31.05 +/- 0.18
091	100 elastomultiester	167	68	14	35.71 +/- 0.20	21.21 +/- 0.18
092	100 elastomultiester	330	68	14	22.27 +/- 0.06	31.49 +/- 0.13

Table 12: Analysis of pure elastomultiester by DSC.

The second step of the method development was the verification of the calibration curve linearity. A calibration curve with handmade mixtures of elastomultiester and polyester 2-GT type in various percentages was built up using the area of peak A. As evident from the results presented in Fig. 14, the linearity of the calibration curve was excellent, the correlation coefficient R^2 being 0.9999 with seven calibration points.

elastomultiester 021 %	polyester 2-GT 015 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	54.75
13.1	86.9	2.74	53.44
27.5	72.5	5.97	49.11
46.1	53.9	10.20	45.60
76.3	23.7	16.97	36.42
85.0	15.0	18.84	34.97
100.0	0.0	22.32	31.13

Table 13: Calibration curve of pure elastomultiester (sample **021**) with polyester 2-GT type (sample **015**) by DSC.

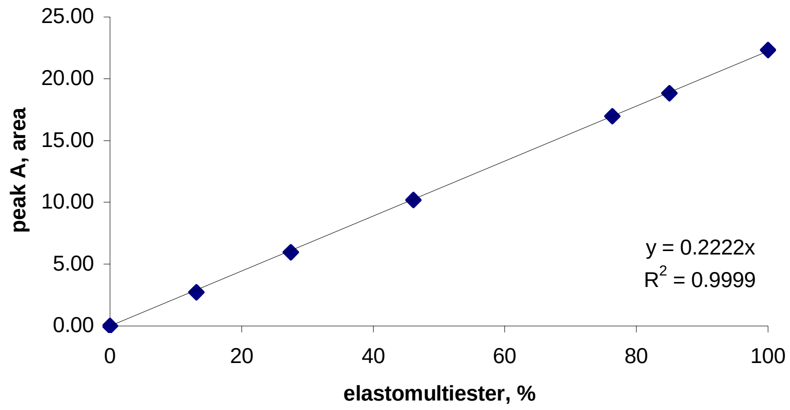


Fig. 14: Calibration curve of pure elastomultiester (sample **021**) with polyester 2-GT type (sample **015**) by DSC.

To verify that the calibration curve did not depend on differences in the manufacturing of polyester, several curves were established using various polyester 2-GT type found on the market. Results are extensively reported in Annex VII, whereas a summary is presented in Table 14. Results confirmed the hypothesis that calibration curves are independent from the source of polyester. For the purpose of quantification, the average value 0.2220 of the angular coefficient was used in the calculations.

JRC code	composition	JRC code	composition	m	R^2	points
O21	elastomultiester	**O15**	polyester 2-GT type	0.2222	0.9999	7
O21	elastomultiester	**O66**	polyester 2-GT type	0.2208	0.9994	7
O21	elastomultiester	**O81**	polyester 2-GT type	0.2214	0.9994	7
O21	elastomultiester	**O83**	polyester 2-GT type	0.2230	1.0000	5
O21	elastomultiester	**O84**	polyester 2-GT type	0.2241	0.9999	6
O21	elastomultiester	**O85**	polyester 2-GT type	0.2217	0.9987	7
O21	elastomultiester	**O82**	polyester 2-GT type	0.2203	0.9989	7
O60b	elastomultiester	**O61b**	polyester 2-GT type	0.2226	0.9993	7
average				**0.2220**		
SD				**0.0012**		
RSD				**0.5540**		

Table 14: Calibration curves of pure elastomultiester with various polyester 2-GT type by DSC.

In the development stage, the applicability of the method to mixtures of elastomultiester with other fibres was tested. The method is applicable to mixtures of elastomultiester with polyester 3-GT or 4-GT type, as shown by the calibration curves reported in Table 15. In fact, the unmodified peak B could be integrated instead of peak A and the quantification was successfully carried out on this basis. The method works also with mixtures of elastomultiester with cotton, viscose and nylon. As these fibres do not modify the DSC analysis of elastomultiester, the quantification could be carried out based on the area of peak A.

JRC code	composition	JRC code	composition	m	R2	points
O21	elastomultiester	**059b**	polyester 3-GT type	0.3033 (B)	0.9980	7
O21	elastomultiester	**86**	polyester 4-GT type	0.3130 (B)	0.9989	7
O21	elastomultiester	**O11**	cotton	0.2234	0.9991	7
O21	elastomultiester	**O34**	viscose	0.2195	0.9997	7
O21	elastomultiester	**O38**	nylon	0.2218	0.9985	7
O91	elastomultiester	**O15**	polyester 2-GT type	0.3707	0.9998	7
O55bA2	elastomultiester from sample 055b	**O15**	polyester 2-GT type	0.3606	0.9986	7
O48A2	elastomultiester from sample 048	**O15**	polyester 2-GT type	0.3497	0.9998	7
O48A2	elastomultiester from sample 048	**O82**	polyester 2-GT type	0.3491	0.9992	7
O49A2	elastomultiester from sample 049	**O15**	polyester 2-GT type	0.1835	0.9985	5
O49A2	elastomultiester from sample 049	**O82**	polyester 2-GT type	0.1846	0.9977	6
O91	elastomultiester	**O11**	cotton	0.3702	0.9996	7
O24A2	elastomultiester from sample 024	**O11**	cotton	0.3644	0.9989	7
O56bA2	elastomultiester from sample 056b	**O11**	cotton	0.3556	0.9997	7

Table 15: Calibration curves of pure elastomultiester with polyester, cotton, viscose and nylon by DSC.

Table 16 reports sample compositions obtained by DSC method. In the case of samples **048**, **049**, **056b**, **024** and **055b**, the quantification was based on calibration curves prepared using elastomultiester yarns extracted from the samples themselves. The reason is that these samples did not contain commercial elastomultiester, but elastomultiester characterised by different contents of polyester 2-GT and 3-GT type, which dated from the development stage of the new fibre. As the DSC method is sensitive to the composition of elastomultiester, new calibration curves were necessary to quantify correctly these samples.

In Table 17 the comparison between compositions obtained with manual separation, chemical and DSC methods is reported. The results obtained using these three methods were generally comparable and, only in two cases, the differences were higher than 1 %.

Nowadays there is just one commercial elastomultiester with a defined composition and there is no plan to change it in the future, as the properties of the fibre were optimised using the actual composition; however if in the future new compositions for elastomultiester should appear, before applying the DSC method to the quantification of unknown samples it would be recommended to analyse a yarn of pure elastomultiester taken from the samples themselves, in order to verify the composition of the fibre and to decide which calibration curve has to be used for quantification purposes.

JRC code	stated composition	replicates	T400 %	RSD (other fibre)	RSD (T400)	cal curve
043	50-52 T400 - 50-48 polyester	10	52.1 +/- 0.1	0.4	0.3	mean
044	52 T400 - 48 polyester	10	53.2 +/- 0.1	0.2	0.2	mean
048	40 T400 - 60 polyester	10	42.5 +/- 0.2	0.6	0.8	048/015
045	34 T400 - 66 polyester	11	35.5 +/- 0.2	0.4	0.8	mean
049	20 T400 - 80 polyester	10	39.6 +/- 0.2	0.6	0.9	049/015
054	62 T400 - 38 cotton	10	64.7 +/- 0.2	0.8	0.4	021/011
088	58 T400 - 42 cotton	10	55.1 +/- 0.5	1.4	1.2	021/011
056b	42 T400 - 58 cotton	5	40.5 +/- 1.0	1.3	1.9	056b/011
024	32 T400 - 68 cotton	10	36.7 +/- 0.2	0.5	0.8	024/011
053	25.9 T400 - 74.1 cotton	14	25.2 +/- 0.2	0.4	1.2	021/011
086b	38 T400 - 62 cotton	10	37.2 +/- 0.2	0.4	0.6	021/011
087	27 T400 - 73 cotton	10	28.3 +/- 0.3	0.6	1.6	021/011
047	27.4 T400 -15.2 polyester - 57 cotton	10	27.7 +/- 0.3	0.5	1.4	mean
046	20.5 T400 - 22.5 polyester - 57 cotton	10	20.3 +/- 0.2	0.3	1.2	mean
055b	36 T400 - 64 polyester/viscose	10	35.1 +/- 0.3	0.6	1.0	055b/015
089	38 T400 - 44 modal - 18 viscose	10	38.0 +/- 0.2	0.5	0.9	021/034

Table 16: Analysis of composition performed by DSC.

JRC code	Stated composition	MS - CM %	MS - DSC %	CM - DSC %
044	52 T400 - 48 polyester		0.2	
048	40 T400 - 60 polyester		-0.6	
045	34 T400 - 66 polyester		0.1	
049	20 T400 - 80 polyester		-0.6	
054	62 T400 - 38 cotton	-0.8	-2.9	-2.1
088	58 T400 - 42 cotton	-0.6	-0.2	0.4
056b	42 T400 - 58 cotton	0.3	2.2	1.9
024	32 T400 - 68 cotton	0.3	-0.2	-0.5
053	25.9 T400 - 74.1 cotton	0.1	0.2	0.1
086b	38 T400 - 62 cotton	-1.5	-0.1	1.4
087	27 T400 - 73 cotton	0.3	-0.2	-0.5
023	48 T400 - 52 wool	-2.7		
022	27 T400 - 73 wool	-1.1		
047	27.4 T400 -15.2 polyester - 57 cotton		-0.6	
046	20.5 T400 - 22.5 polyester - 57 cotton		-0.1	
055b	36 T400 - 64 polyester/viscose		0.7	
089	38 T400 - 44 modal - 18 viscose	-0.3	-0.9	-0.6

Table 17: Comparison between quantification performed by manual separation (MS), chemical (CM) and DSC methods.

5. Second technical meeting of national experts on textile labelling

The experimental work described in the first four chapters was presented to Member States during the second technical meeting of national experts on textile labelling, that was held at the JRC, Ispra (Italy), on 1st October 2004. The outcome of the discussion is summarised in the following paragraphs.

Experts agreed on the applicability of the method proposed by the applicant for the identification of the multicomponent nature of elastomultiester, which was based on a cross section microscopic analysis of dyed yarns. Regarding the chemical composition both microscopic and FT-IR analysis would be adequate to the scope. Participants were of the opinion that the DSC method would be suitable both for the identification of the chemical composition and for the multicomponent nature of the fibre. No ring trial was envisaged for qualitative methods and an agreement was reached on the fact that it would not be necessary to include them in the Directive 96/73/EC.

The applied chemical dissolution methods (1, 2, 4, 6, 7, 8, 9, 13 and 14) were considered suitable for quantification purposes as well as the manual separation method. The quantitative method based on DSC was judged promising but further experimentation was considered necessary, as at that time it had not been discovered yet that samples **048**, **049**, **056b**, **024** and **055b** contained different ratios between polyester 2-GT and 3-GT type and, consequently, difficulties in their quantification had been experienced.

Concerning chemical dissolution methods and manual separation, a ring trial was considered not necessary and experts agreed to adopt for elastomultiester the same correction factors *d* as for polyester. The JRC, based on the chemical composition of the new fibre, proposed an *agreed allowance* value of 1.50, equal to the one for polyester and experts agreed.

Regarding the BISFA method, some experts pointed out that, for the definition of elastic properties of yarns, the measurement of yarn recovery would be more important than the measurement of elongation at break. They judged it would be important to develop a method similar to the skein one, but applicable to yarns. In fact the results obtained with the skein method could be influenced by the fact that a skein is made by many loops and this could be similar to testing many yarns at the same time. Experts pointed out that neither ISO nor CEN standard methods are available to measure the recoverable stretch of yarns. They asked the European Commission to develop such a method to evaluate the elastic properties of elastomultiester. The evaluation of the influence of parameters, such as number of filaments and dtex, should be part of the work.

Experts agreed on the proposed name elastomultiester, which can be accepted also by BISFA and the applicant. This name fulfils the criteria set up in 2002 by the technical experts working group on textile labelling. The name should in fact not link the fibre with its manufacturer, it should be free of rights and it should inform consumers about characteristics of the fibre. In the name elastomultiester, elasto points out that the fibre is elastic, multi evidences that the fibre is multicomponent and ester stands for polyester.

It was noticed that the definition proposed by Invista allowed for elastomultiester compositions very different from the current commercial one. In fact, at least 66 % of the functional units should be ester groups, but other functional units could be present. This could have an influence on the suitability of chemical dissolution methods; therefore it was decided to change the definition from 66 % to 85 %. After discussion, participants agreed on the following definition.

“Elastomultiester: fibre formed by the interaction of two or more chemically distinct linear macromolecules in two or more distinct phases (of which none exceeds 85% by mass) which contains ester groups as dominant functional unit (at least 85%) and which, after a suitable treatment, when stretched to ……. times its original length and released, recovers rapidly and substantially to its initial length.”

The definition of the fibre, in the part related to its elastic properties, would be finalised based on the results of recoverable stretch of yarns, evaluated with the method to be developed at the JRC.

6. Development of testing methods to evaluate the recovery of fibres and yarns

Following the request of Member States' representatives of developing methods to evaluate the elastic properties of elastomultiester, the JRC carried out an extensive research work on this subject. As suggested by experts, a method based on elongation and similar to the skein one was developed for yarns and single filaments; moreover the method, based on elongation and described in chapter 7 (viscoelastic properties) of the BISFA manual regarding test methods for bare elastane yarns [6], was applied. Both methods were also set up based on an imposed load, instead of an imposed elongation, to verify that the results obtained were comparable. In developing the methods attention was paid to several parameters, among which the number of cycles, the moment of measuring, if immediately when yarn reaches the relaxed status or after a delay, and the gauge length. The influence of the number of dtex, the number of single filaments and the per cent elongation on recovery was also investigated.

6.1 Three-cycle method based on elongation

This method covers the determination of recoverable stretch, immediate recoverable stretch, permanent deformation and stress decay of elastic yarns. The test method is applicable to continuous filament yarns and is suitable for yarns that develop additional crimps upon exposure to hot, wet conditions.

An Instron dynamometer, model 5544, equipped with clamping assembly as that described in paragraph 3.4.1 (BISFA method), was used to perform tests. Both yarns and single filaments from bobbin and extracted from fabrics were tested. Particular attention was paid to taking out yarns from fabrics and single filaments from yarns, in order to avoid any stress and damage in their elastic properties. Before sampling yarns from bobbin, at least 100 meters from each package were removed and discarded. The same sample preparation for yarns and single filaments, optimised for the measurement of elongation at break, was applied in this case. Yarns were singularly plunged in boiling water and single filaments were singularly packed and plunged in boiling water, then specimens were air dried and conditioned without any stress in standard atmosphere (21 ± 1 °C, 65 ± 2 % relative humidity) for at least 16 hours. Load cells of 5 and 50 N were used depending on the maximum load reached at the imposed elongation. The following test conditions were applied: speed of moving clamp 300 mm/min, pretension 0.001 ± 0.0001 cN/dtex, gauge length 50 ± 1.0 mm. Load was set to zero after mounting specimens in the clamping assembly. Yarn extension was measured at zero gf for single filaments and at 0.01 gf for yarns, except if differently specified, as the instrument sometimes felt a very low force even with the relaxed yarn, so that it was impossible to measure at zero gf. Length was set to zero before starting the profile.

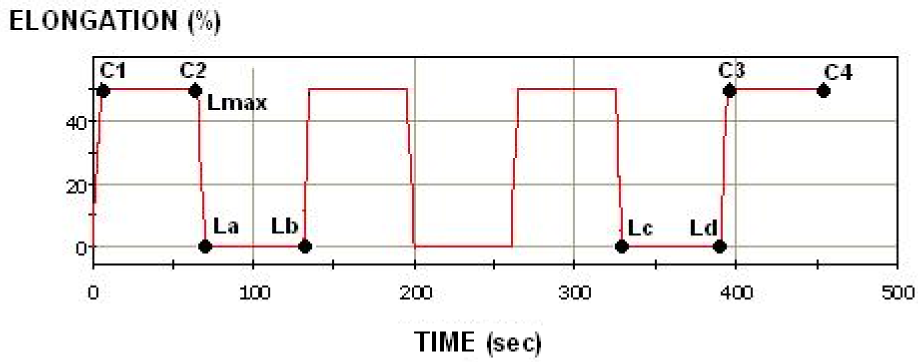


Fig. 15: Three-cycle method profile (based on elongation).

Fig. 15 reports the method profile and highlights where force and length measurements were performed. Specimens were extended to an imposed per cent elongation, generally 50 %, and were maintained at this elongation for one minute, then they were allowed to relax for one minute, after returning to the initial gauge length. The cycle was repeated two times more, finally specimens were extended again at the same per cent elongation and the maximum extension was maintained for one extra minute. Force was measured on the first and fourth cycle when yarns attained the maximum length and after one minute, C_1, C_2, C_3 and C_4 respectively. Based on these data, the per cent stress decay (SD) on first and fourth cycle was calculated (see equation 6.1.1). Specimen extension was measured at zero load on the first and third unload cycle and on the second and fourth load cycle, L_a, L_c, L_b and L_d respectively. Based on these measurements, the per cent immediate recovery (imm rec), recovery (rec) and permanent deformation (PD) of specimens on first and third cycle were calculated (see equations 6.1.2-6.1.4).

$$stress\ decay\ \% = \frac{C_{1,3} - C_{2,4}}{C_{1,3}} * 100 \qquad 6.1.1$$

where:

$C_{1,3}$ is the initial force at maximum elongation on the first or fourth cycle

$C_{2,4}$ is the force after 59 sec at maximum elongation on the first or fourth cycle

$$immediate\ recovery\ \% = \frac{L_{\max} - L_{a,c}}{L_{\max}} * 100 \qquad 6.1.2$$

where:

L_{max} is the imposed extension

$L_{a,c}$ is the extension at zero force on the first or third unload cycle

$$recovery\ \% = \frac{L_{\max} - L_{b,d}}{L_{\max}} * 100 \qquad 6.1.3$$

where:

L_{max} is the imposerd extension

$L_{b,d}$ is the extension at zero force on the second or fourth load cycle

In practise recovery is defined as how much a yarn can recover divided by the yarn extension.

$$permanent\ deformation\ \% = \frac{L_{b,d}}{L_{gl}} * 100 \qquad 6.1.4$$

where:

$L_{b,d}$ is the extension at zero force on the second or fourth load cycle

L_{gl} is the gauge length

As an example, the load versus extension curve obtained for a yarn is reported in Fig. 16.

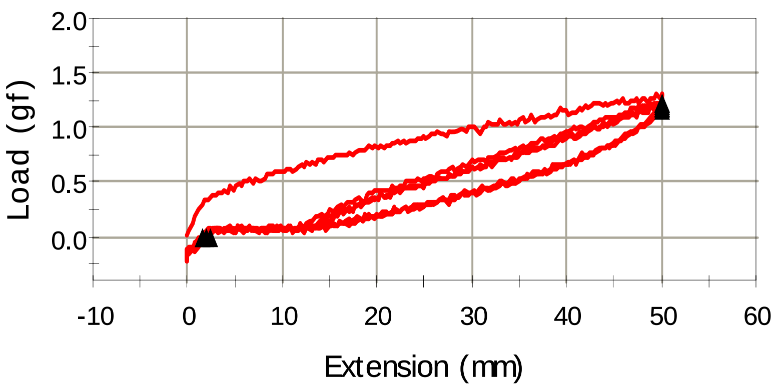


Fig. 16: Curve load versus extension for the three-cycle method based on elongation.

6.2 Five-cycle method based on elongation

The method is an adaptation of the one described in chapter 7 (viscoelastic properties) of the BISFA manual regarding test methods for bare elastane yarns [6]. It is applicable to continuous filament yarns and is suitable for yarns that develop additional crimps upon exposure to hot, wet conditions.

The same instrument, clamping assembly, sample preparation, load cells and test conditions, used for the three-cycle method based on elongation, were used in this case.

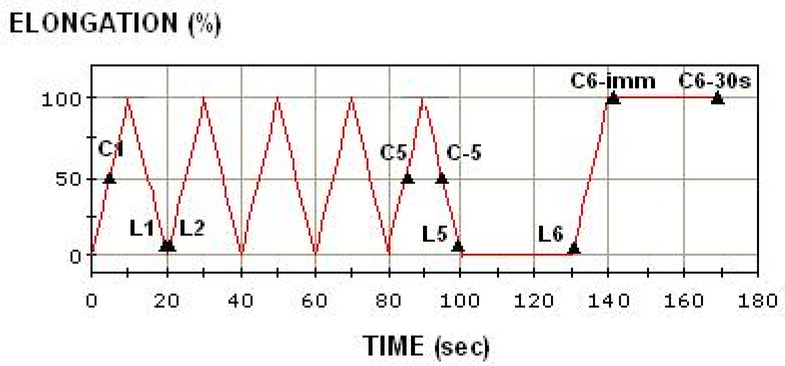


Fig. 17: Five-cycle method profile (based on elongation).

Fig. 17 reports the method profile and highlights where force and length measurements were performed. Specimens were extended to an imposed per cent elongation, generally 50 %, and reverted to the initial gauge length. The cycle was repeated four times more, finally specimens were maintained at the initial gauge length for 30 seconds and extended again at the same per cent elongation, the maximum extension was maintained for 30 extra seconds. Force was measured on the first and fifth load cycle, when yarns attained half the maximum extension, and on the fifth unload cycle, when yarns attained half the maximum extension (C_1, C_5 and C_{-5} respectively). Based on these data, the hysteresis index (H5) and the hysteresis ratio (HR) were calculated (see equations 6.2.1-6.2.2). Moreover, force was measured also on the sixth cycle, when yarns attained the maximum extension and after 30 seconds ($C_{6\text{-imm}}$ and $C_{6\text{-30 sec}}$ respectively). Based on these measurements, the per cent stress decay (SD) on sixth cycle was calculated (as previously described in equation 6.1.1). Specimen extension was measured at zero load on the first and fifth unload cycle and on the second and sixth load cycle, L_1, L_5, L_2 and L_6 respectively. Based on these data, the per cent immediate recovery (imm rec), recovery (rec), immediate permanent deformation (imm PD) and permanent deformation (PD) of specimens on first and fifth cycle were calculated (as previously described in equations 6.1.2-6.1.4). As an example, the load versus extension curve obtained for a yarn is reported in Fig. 18.

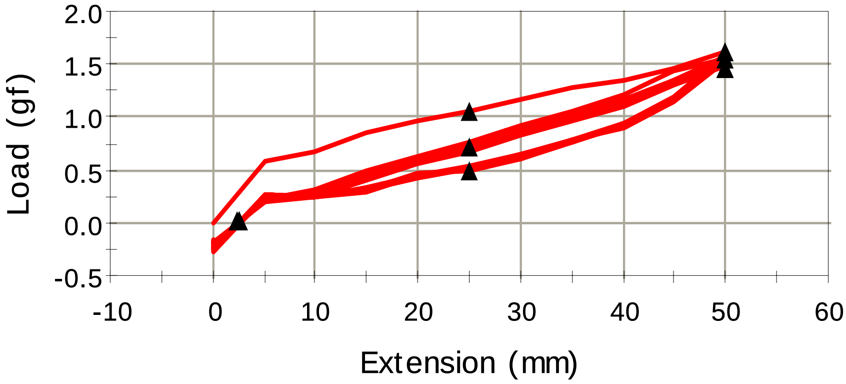


Fig. 18: Curve load versus extension for the five-cycle method based on elongation.

$$hysteresis\ index\ H5\ \% = \frac{C_{-5}}{C_5} * 100 \qquad 6.2.1$$

where:

C_{-5} is the force at half the maximum elongation on the fifth unload cycle

C_5 is the force at half the maximum elongation on the fifth load cycle

$$hysteresis\ ratio\ \% = \frac{C_{-5}}{C_1} * 100 \qquad 6.2.2$$

where:

C_{-5} is the force at half the maximum elongation on the fifth unload cycle

C_1 is the force at half the maximum elongation on the first load cycle

$$immediate\ permanent\ deformation\ \% = \frac{L_5}{L_{gl}} * 100 \qquad 6.2.3$$

where:

L_5 is the extension at zero force on the fifth unload cycle

L_{gl} is the gauge length

6.3 Three-cycle method based on load

The same method, set up with three cycles and based on elongation, was developed also based on load. As for the instrument it is not feasible or extremely difficult to maintain constant forces that are low, the maintenance step was replaced by a triangular function, during which the force was varied in the range x ± 0.02 gf, where x was the imposed force. Moreover, in order to avoid the overcoming of the imposed load two different rates were used to reach the maximum load. The per cent immediate recovery (imm rec) and recovery (rec) were calculated as specified in equations 6.1.2 and 6.1.3.

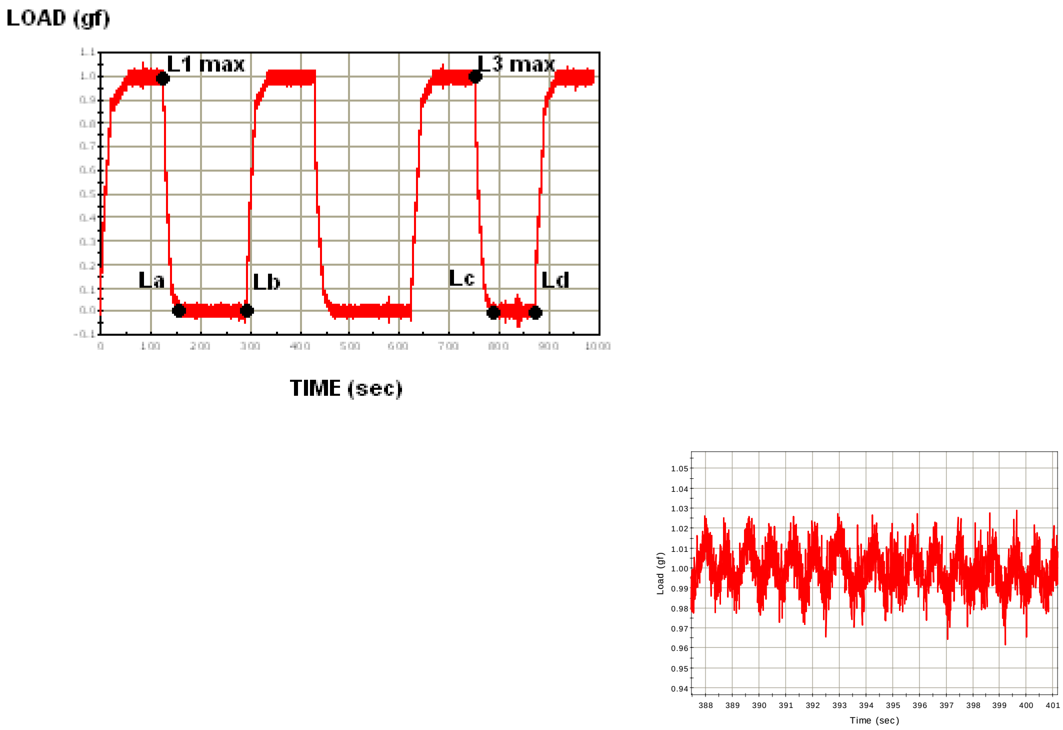


Fig. 19: Three-cycle method profile (based on load).

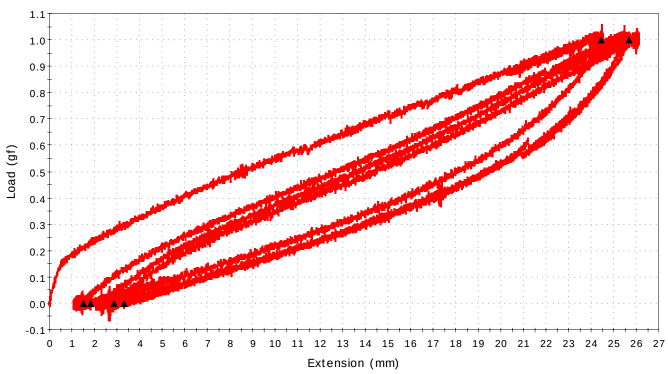


Fig. 20: Curve load versus extension for the three-cycle method based on load.

6.4 Five-cycle method based on load

Similarly the same method, set up with five cycles based on elongation, was developed also based on load. Also in this case the maintenance step was replaced by a triangular function, during which the force was varied in the range x ± 0.02 gf, where x was the imposed force. The per cent immediate recovery (imm rec) and recovery (rec) were calculated as specified in equations 6.1.2 and 6.1.3.

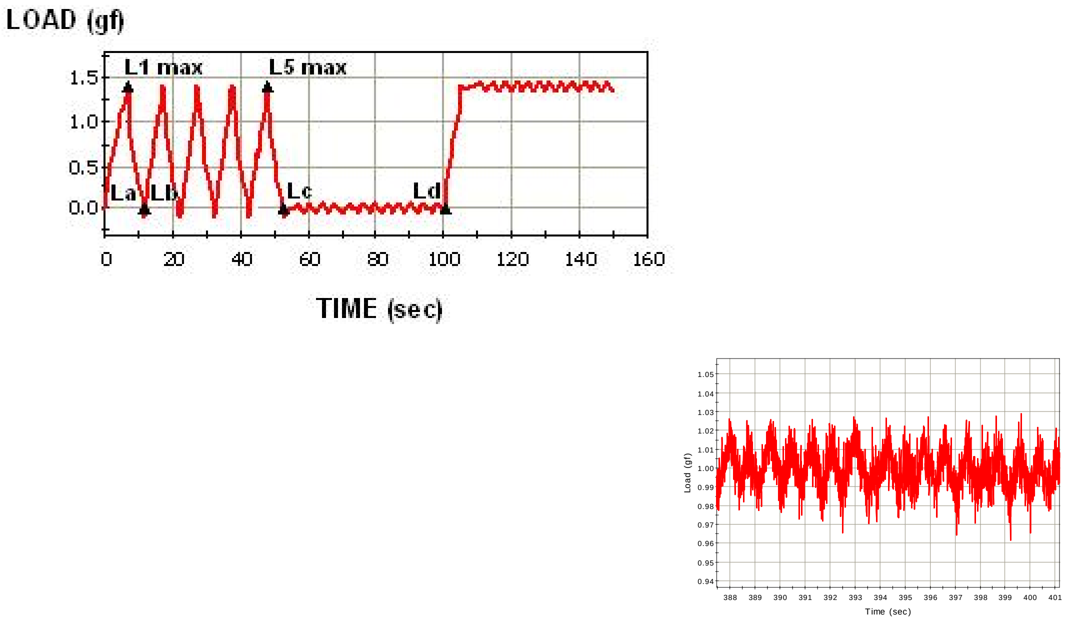


Fig. 21: Five-cycle method profile (based on load).

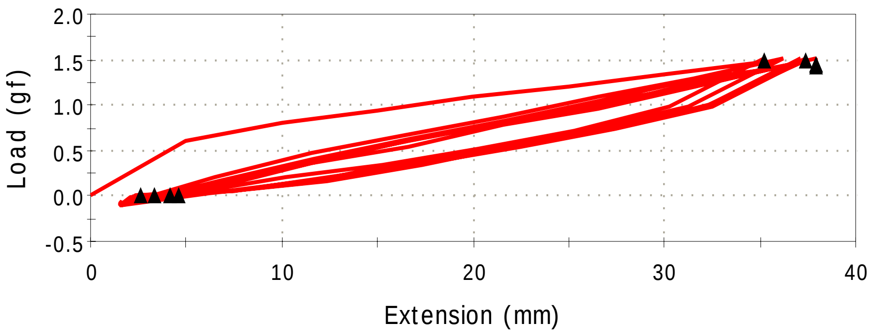


Fig. 22: Curve load versus extension for the five-cycle method based on load.

6.5 Manual methods

For comparison purposes the values of immediate recovery, recovery, immediate permanent deformation and permanent deformation of yarns and single filaments were also measured using the three-cycle and five-cycle methods based on elongation applied manually.

In this case specimens were fixed to the wall by means of a piece of sticky tape, in the presence of a pretension of 0.001 ± 0.0001 cN/dtex, and stretched with tweezers, applying the same test profiles as for the two methods based on elongation previously described. Specimen length was measured by means of a graduate scale with an accuracy of ± 0.5 mm.

Fig. 22: Manual methods.

6.6 Results

All the results regarding the elastic properties of yarns and single filaments, measured with the methods described in paragraphs 6.1-6.5, are extensively reported in Annex VIII. An overview of the relevant results, with uncertainties calculated for a confidence level of 95 %, is reported in the following. Results are expressed as average plus or minus uncertainty, the number of replicates is specified in parenthesis.

In the developing stage of the methods, the influence of several parameters was studied using yarns of elastomultiester from bobbin, as the preparation step is easier than for yarns extracted from fabric and for single filaments. The first parameter to be investigated was the gauge length, to verify that a change in it did not influence results. Tests were performed on pure elastomultiester yarns from bobbin using the three-cycle method based on elongation. As reported in Table 18, at 100 % elongation, immediate recovery, recovery and permanent deformation seemed not to be affected by a change in gauge length, at least in the range 25 to 75 mm. In any case, all the subsequent tests with the dynamometer were performed using a gauge length of 50 mm, which allowed an easier preparation and mounting step for specimens.

100% elongation							
JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3	g l
	%	%	%	%	%	%	mm
091	57.0 +/- 3.5 (5)	78.8 +/- 4.7 (5)	21.2 +/- 4.7 (5)	56.6 +/- 4.4 (5)	77.1+/- 3.7 (5)	22.9 +/- 3.7 (5)	25.0
091	64.8 +/- 5.5 (3)	75.5 +/- 3.2 (3)	24.5 +/- 3.2 (3)	62.8 +/- 5.4 (3)	71.7 +/- 2.2 (3)	28.3 +/- 2.2 (3)	50.0
091	68.2 +/- 2.8 (5)	73.5 +/- 0.9 (5)	26.5 +/- 0.9 (5)	69.5 +/- 4.0 (5)	72.3+/- 0.6 (5)	27.7 +/- 0.6 (5)	75.0

Table 18: Analysis of elastomultiester **yarns** from bobbin (**3-cycle method based on elongation**).

The influence on recovery of different dtex and number of single filaments was also investigated on pure elastomultiester from bobbin. Four different specimens, sample **090**, **021** (or **091**) and **092,** with 83/34, 167/68 and 330/68 dtex/filaments respectively, were analysed. As an example the results obtained with the three-cycle and the five-cycle methods based on elongation are reported in Tables 19 and 20.

Analyses were performed both using a dynamometer and manually for comparison purposes; in fact, due to the difficulty in defining zero force, to measure the extension at zero force reproducibly with a dynamometer is very difficult, even using a small load cell of just 5 N.

In the case of yarns from bobbin, recovery values measured by the manual method were always lower than those measured using the instrumental one, with only few exceptions. As far as the number of dtex and filaments is concerned, there was not a significant influence or a slight one on recovery and this was true independently from the method applied and the elongation imposed. Immediate recovery usually showed lower values than the correspondent recovery, even if the difference was small, thus confirming that yarns can retract during the relaxation time. Usually the values for recovery after the first and the third or the fifth cycle were similar or showed small differences, this pointed out that the number of cycles does not greatly affect the elastic properties of yarn for up at least five cycles.

50% elongation						
JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3
	%	%	%	%	%	%
090	95.2 +/- 4.4 (3)	96.3 +/- 4.0 (3)	1.9 +/- 2.0 (3)	95.4 +/- 5.7 (3)	95.3 +/- 4.8 (3)	2.4 +/- 2.4 (3)
021	87.8 +/- 9.4 (3)	91.4 +/- 7.0 (3)	4.3 +/- 3.5 (3)	88.2 +/- 10.1 (3)	91.4 +/- 8.0 (3)	4.3 +/- 4.0 (3)
092	88.3 +/- 2.7 (3)	92.5 +/- 4.1 (3)	3.8 +/- 2.1 (3)	87.2 +/- 1.8 (3)	90.4 +/- 5.4 (3)	4.8 +/- 2.7 (3)
100% elongation						
JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3
	%	%	%	%	%	%
090	67.8 +/- 2.7 (11)	80.5 +/- 3.1 (11)	19.5 +/- 3.1 (11)	67.8 +/- 3.2 (11)	85.0 +/- 6.2 (11)	15.0 +/- 6.2 (11)
021	62.7 +/- 1.9 (8)	75.9 +/- 1.2 (8)	24.1 +/- 1.2 (8)	61.4 +/- 2.3 (8)	72.7 +/- 1.1 (8)	27.3 +/- 1.1 (8)
091	64.8 +/- 5.5 (3)	75.5 +/- 3.2 (3)	24.5 +/- 3.2 (3)	62.8 +/- 5.4 (3)	71.7 +/- 2.2 (3)	28.3 +/- 2.2 (3)
092	68.8 +/- 3.7 (11)	80.3 +/- 2.5 (11)	19.7 +/- 2.5 (11)	66.6 +/- 3.6 (11)	77.9 +/- 3.8 (11)	22.1 +/- 3.8 (11)

50% elongation						
JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3
	%	%	%	%	%	%
090	79.9 +/- 1.8 (5)	84.2 +/- 0.8 (5)	7.9 +/- 0.4 (5)	74.2 +/- 1.4 (5)	79.4 +/- 0.8 (5)	10.3 +/- 0.4 (5)
091	78.6 +/- 2.5 (5)	82.6 +/- 2.3 (5)	8.7 +/- 1.2 (5)	75.5 +/- 2.5 (5)	79.1 +/- 2.3 (5)	10.5 +/- 1.1 (5)
092	80.0 +/- 1.8 (5)	84.8 +/- 2.8 (5)	7.6 +/- 1.4 (5)	75.0 +/- 2.9 (5)	79.5 +/- 3.2 (5)	10.2 +/- 1.6 (5)

Table 19: Analysis of elastomultiester **yarns** from bobbin.
Top: **3-cycle method based on elongation**; bottom: **3-cycle manual method**.

As expected, yarn per cent recovery, immediate recovery and permanent deformation depended very much on the imposed per cent elongation and, in particular, recoverable stretch decreased for increasing imposed elongation, whereas permanent deformation increased. In the case of sample **021** for example, immediate recovery 3 passed from 91.4 % to 72.7 % when the per cent elongation was changed from 50 to 100 %; correspondently, permanent deformation 3 changed from 4.3 to 27.3 %.

The results obtained for samples **021** and **091,** that have the same linear density (167 dtex) and number of filaments (68) but different ratios between polyester 3-GT and 2-

GT content, showed that elastic properties are not modified by this change in chemical composition.

The same experiments were performed using the five-cycle method based on elongation, to check that the results on recovery were not dependent on the type of method used to test specimens. In table 20 results at 50 % and 100 % elongation are reported. At 50 % elongation, recoveries calculated using the three or five-cycle methods were comparable, around 90 % and 80 %, if measured with dynamometer or manually respectively. The same was true for permanent deformations, which showed values around 4 % and 10 %, if measured with dynamometer or manually respectively. On the contrary, at 100 % elongation the three-cycle method seemed stricter than the five-cycle one, in fact permanent deformations passed from around 23 % to 5 %. These results suggested that the three-cycle method could represent a worst-case scenario.

50% elongation						
JRC code	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 %	imm PD 5 %	PD 5 %
090	90.7 +/- 0.7 (5)	91.9 +/- 1.0 (5)	91.0 +/- 1.2 (5)	92.8 +/- 1.6 (5)	4.5 +/- 0.6 (5)	3.6 +/- 0.8 (5)
021	88.4 +/- 1.4 (5)	90.0 +/- 1.4 (5)	86.9 +/- 1.3 (5)	90.4 +/- 1.8 (5)	6.5 +/- 0.6 (5)	4.8 +/- 0.9 (5)
092	85.3 +/- 1.8 (5)	89.5 +/- 1.7 (5)	84.0 +/- 1.7 (5)	88.9 +/- 2.5 (5)	8.0 +/- 0.8 (5)	5.6 +/- 1.2 (5)
100% elongation						
JRC code	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 %	imm PD 5 %	PD 5 %
090	96.0 +/- 0.2 (5)	96.2 +/- 0.4 (5)	96.6 +/- 0.3 (5)	98.3 +/- 1.3 (5)	3.4 +/- 0.3 (5)	1.7 +/- 1.3 (5)
021	94.7 +/- 1.2 (5)	94.9 +/- 0.9 (5)	95.0 +/- 1.2 (5)	95.5 +/- 1.0 (5)	5.0 +/- 1.2 (5)	4.6 +/- 1.0 (5)
092	90.5 +/- 3.5 (5)	91.5 +/- 1.7 (5)	91.6 +/- 1.0 (5)	91.3 +/- 2.6 (5)	8.4 +/- 1.0 (5)	8.7 +/- 2.6 (5)

50% elongation						
JRC code	imm rec 5 %	imm PD5 %	rec 5 30 sec %	PD5 30 sec %	rec 5 1 min %	PD 5 1 min %
090	78.3 +/- 1.5 (5)	10.9 +/- 0.7 (5)	81.4 +/- 2.3 (5)	9.3 +/- 1.1 (5)	81.4 +/- 2.3 (5)	9.3 +/- 1.1 (5)
091	77.0 +/- 1.9 (5)	11.5 +/- 1.0 (5)	80.0 +/- 1.0 (5)	10.0 +/- 0.5 (5)	80.0 +/- 1.0 (5)	10.0 +/- 0.5 (5)
092	77.6 +/- 4.2 (5)	11.2 +/- 2.1 (5)	80.5 +/- 3.6 (5)	9.8 +/- 1.8 (5)	80.5 +/- 3.6 (5)	9.8 +/- 1.8 (5)

Table 20: Analysis of elastomultiester **yarns** from bobbin.
Top: **5-cycle method based on elongation**; bottom: **5-cycle manual method**.

The comparison between the methods based on elongation and on load is more difficult. In fact, as recovery depends very much on per cent elongation, in order to compare them properly the same elongation should be reached. Some specimens were tested with the BISFA method in order to evaluate the tension at specified extension; nevertheless it was difficult to obtain exactly an elongation of 50 % or 100 %, because each specimen was different from the others and the load to be applied should have been changed accordingly. In any case, even if there were some difficulties, the comparison between the three-cycle methods based on elongation and load showed that recoveries did not depend on the method applied. This was true also when the imposed elongation was changed from 50 % to 100 %. More debatable were the results obtained for the five-cycle methods, as it seemed that the method based on load was more severe than the one based on elongation. The results are summarised in Table 21, where in the last two columns the actual attained per cent elongation and the imposed force are specified.

elongation about 50%						
JRC code	imm rec 1 %	rec 1 %	imm rec 3 %	rec 3 %	elongation %	load gf
090	98.5 +/- 1.5 (3)	98.5 +/- 1.5 (3)	98.5 +/- 0.6 (3)	98.5 +/- 1.5 (3)	57.1	0.6
091	90.6 +/- 13.1 (3)	95.4 +/- 3.8 (3)	87.4 +/- 5.7 (3)	92.0 +/- 11.4 (3)	55.4	1.0
092	76.6 +/- 2.8 (3)	78.1 +/- 2.1 (3)	72.6 +/- 14.0 (3)	74.4 +/- 16.9 (3)	57.3	1.4
elongation about 100%						
JRC code	imm rec 1 %	rec 1 %	imm rec 3 %	rec 3 %	elongation %	load gf
091	79.7 +/- 5.5 (3)	82.2 +/- 4.4 (3)	79.7 +/- 3.4 (3)	81.4 +/- 3.9 (3)	64.2	1.2
092	77.9 +/- 0.5 (3)	79.4 +/- 0.1 (2)	76.9 +/- 1.3 (3)	78.4 +/- 1.4 (3)	91.1	1.9

elongation about 50%						
JRC code	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 %	elongation %	load gf
90	73.0 +/- 6.1 (3)	83.6 +/- 2.3 (3)	68.5 +/- 0.8 (3)	80.3 +/- 1.9 (3)	76.7	0.6
91	61.3 +/- 10.8 (3)	69.1 +/- 12.7 (3)	57.9 +/- 13.8 (3)	64.1 +/- 12.8 (3)	74.6	1.0
92	70.2 +/- 7.5 (3)	73.4 +/- 9.3 (3)	65.2 +/- 6.2 (3)	69.6 +/- 8.7 (3)	65.8	1.4
elongation about 100%						
JRC code	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 %	elongation %	load gf
90	67.6 +/- 13.0 (3)	77.3 +/- 18.0 (3)	64.5 +/- 17.3 (3)	75.9 +/- 12.6 (3)	142.5	1.0
91	60.6 +/- 17.4 (3)	66.6 +/- 17.4 (3)	53.4 +/- 60.2 (2)	59.6 +/- 71.8 (2)	137.8	1.4
92	66.2 +/- 2.6 (3)	69.2 +/- 4.1 (3)	62.2 +/- 3.6 (3)	66.2 +/- 3.5 (3)	127.5	2.2

Table 21: Analysis of elastomultiester **yarns** from bobbin.
Top: **3-cycle method based on load**; bottom: **5-cycle method based on load**.

In general the methods based on extension and tension gave similar results, however the methods based on extension are much easier to set up and control, as they do not present the difficulties connected to the maintenance of constant low force. Moreover, comparing the methods from the point of view of the analysis time, the methods based on load are slower, due to the triangular function used to maintain almost constant the load. In fact, the testing time is around 9 and 17 minutes for the three-cycle methods based on elongation and load respectively, and around 3 and 6 minutes for the five-cycle methods based on elongation and load respectively. The quickest is the method with 5 cycles based on elongation, but this method is not the most severe as it showed greater recovery values at 100 % extension compared to three-cycle one. The three and five-cycle methods based on elongation were applied in the subsequent phase of the investigation, as they appeared to be the best methods and they were the easiest to set up and control.

50% elongation						
JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3
	%	%	%	%	%	%
090	100.0 +/- (1)	91.8 +/- (1)	4.1 +/- (1)	99.7 +/- 0.1 (3)	-	-
021	98.4 +/- 14.1 (2)	-	-	99.1 +/- 3.8 (3)	-	-
092	17.7 +/- 80.2 (2)	99.6 +/- 1.1 (2)	0.2 +/- 0.5 (2)	12.9 +/- 1.3 (2)	98.8 +/- (1)	0.6 +/- (1)
100% elongation						
JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3
	%	%	%	%	%	%
090	98.4 +/- 0.2 (3)	99.7 +/- 0.5 (3)	0.3 +/- 0.5 (3)	98.9 +/- 0.6 (3)	99.8 +/- 0.3 (3)	0.2 +/- 0.3 (3)
021	93.2 +/- 4.5 (3)	-	-	94.3 +/- 9.2 (3)	-	-
092	98.6 +/- 1.3 (3)	98.8 +/- (1)	1.2 +/- (1)	98.5 +/- 2.0 (3)	99.0 +/- 12.0 (2)	1.0 +/- 12.0 (2)

50% elongation						
JRC code	imm rec 1	rec 1	imm rec 5	rec 5	imm PD 5	PD 5
	%	%	%	%	%	%
090	100.0 +/- (1)	96.6 +/- (1)	100.0 +/- 0.2 (2)	91.4 +/- (1)	0.0 +/- (2)	4.3 +/- (1)
091	100.0 +/- (1)	98.1 +/- 3.1 (2)	100.0 +/- 0.1 (3)	-	-0.01 +/- 0.02 (3)	-
092	100.0 +/- (1)	96.8 +/- (1)	-	99.8 +/- 2.7 (2)	-	0.1 +/- 1.3 (2)
100% elongation						
JRC code	imm rec 1	rec 1	imm rec 5	rec 5	imm PD 5	PD 5
	%	%	%	%	%	%
090	97.5 +/- 1.6 (5)	97.7 +/- 1.6 (5)	97.9 +/- 2.0 (5)	99.3 +/- 1.8 (2)	2.1 +/- 2.0 (5)	0.7 +/- 1.8 (2)
091	97.5 +/- 2.5 (5)	96.8 +/- 1.8 (5)	96.8 +/- 2.8 (5)	97.0 +/- 10.3 (2)	3.2 +/- 2.8 (5)	3.0 +/- 10.3 (2)
092	97.8 +/- 1.7 (5)	97.8 +/- 1.1 (5)	98.6 +/- 2.1 (5)	99.0 +/- 1.2 (3)	1.4 +/- 2.1 (5)	1.1 +/- 1.2 (3)

Table 22: Analysis of elastomultiester **single filaments** from bobbin.
Top: **3-cycle method based on elongation**; bottom: **5-cycle method based on elongation**.

To answer the question aroused by experts from Member States, if elastomultiester yarns showed elastic properties because of the intrinsic properties of the fibre or because of the construction of the yarns themselves, some tests were performed also on single filaments extracted from yarns. The comparison was carried out using the two elongation-based methods at 100 % and 50 % of imposed extension. As reported in Table 22, results evidenced that single filaments are as elastic as yarns and in certain cases even slightly more elastic. Based on these measurements, it can be concluded that the elasticity of elastomultiester is due to intrinsic properties of the fibre and not to the construction of yarns.

Finally, tests were carried out on elastomultiester yarns and single filaments extracted from fabric samples, using the two elongation-based methods performed with dynamometer or manually. As the majority of yarns extracted from fabric showed an elongation at break lower than 100 % or close to it, analyses were carried out at 50 % extension and, only when possible, at 100 %. Tables 23 and 24 report the results obtained for yarns.

50% elongation						
JRC code	**imm rec 1 %**	**rec 1 %**	**PD 1 %**	**imm rec 3 %**	**rec 3 %**	**PD 3 %**
044	92.6 +/- 11.8 (4)	96.3 +/- 1.6 (4)	1.8 +/- 0.8 (4)	86.2 +/- 1.7 (2)	97.1 +/- 2.7 (4)	1.5 +/- 1.3 (4)
048	94.3 +/- 1.8 (3)	95.0 +/- 3.6 (3)	2.5 +/- 1.8 (3)	95.1 +/- 3.0 (3)	95.0 +/- 3.3 (3)	2.5 +/- 1.7 (3)
045	85.7 +/- 25.2 (2)	91.3 +/- 6.1 (4)	4.4 +/- 3.1 (4)	89.8 +/- 19.0 (3)	89.4 +/- 11.9 (4)	5.3 +/- 6.0 (4)
023	77.9 +/- 2.2 (3)	99.5 +/- 1.0 (3)	0.3 +/- 0.5 (3)	82.5 +/- 4.5 (3)	-	-
054	95.3 +/- 2.6 (3)	96.2 +/- 1.3 (3)	1.9 +/- 0.6 (3)	93.9 +/- 4.4 (3)	95.4 +/- 3.7 (3)	2.3 +/- 1.9 (3)
088	82.6 +/- 4.0 (3)	92.9 +/- 1.7 (3)	3.6 +/- 0.8 (3)	95.2 +/- 10.8 (3)	97.3 +/- 2.4 (3)	1.3 +/- 1.2 (3)
053	88.0 +/- 4.5 (3)	93.0 +/- 2.8 (3)	3.5 +/- 1.4 (3)	87.1 +/- 7.9 (3)	90.7 +/- 3.4 (3)	4.6 +/- 1.7 (3)
086b	-	97.5 +/- 4.6 (3)	1.3 +/- 2.3 (3)	-	98.4 +/- 4.3 (3)	0.8 +/- 2.2 (3)
087	84.6 +/- 20.7 (4)	80.3 +/- 15.7 (4)	9.8 +/- 7.9 (4)	88.6 +/- 26.5 (3)	82.0 +/- 22.5 (4)	9.0 +/- 11.2 (4)
047	70.3 +/- 35.4 (3)	68.5 +/- 0.9 (3)	15.8 +/- 0.4 (3)	71.3 +/- 42.7 (3)	61.7 +/- 3.3 (3)	19.2 +/- 1.6 (3)
055b	94.8 +/- 2.4 (3)	95.7 +/- 2.6 (3)	2.2 +/- 1.3 (3)	95.5 +/- 0.2 (3)	96.2+/- 1.0 (3)	1.9 +/- 0.5 (3)
089	98.2 +/- (1)	97.3 +/- 2.6 (3)	1.3 +/- 1.3 (3)	99.7 +/- (1)	97.2 +/- 12.8 (2)	1.4 +/- 6.4 (2)
100% elongation						
JRC code	**imm rec 1 %**	**rec 1 %**	**PD 1 %**	**imm rec 3 %**	**rec 3 %**	**PD 3 %**
054	76.9 +/- 15.9 (2)	85.6 +/- 6.3 (3)	14.4 +/- 6.3 (3)	81.8 +/- 86.7 (2)	84.0 +/- 25.4 (3)	16.0 +/- 25.4 (3)

50% elongation						
JRC code	**imm rec 1 %**	**rec 1 %**	**imm rec 5 %**	**rec 5 %**	**imm PD 5 %**	**PD 5 %**
045	75.9 +/- 1.9 (3)	81.8 +/- 2.2 (3)	66.9 +/- 0.8 (3)	77.8 +/- 2.1 (3)	16.5 +/- 0.4 (3)	11.1 +/- 1.1 (3)
023	88.5 +/- 16.6 (2)	94.0 +/- 17.4 (2)	93.1 +/- 27.0 (2)	98.7 +/- 12.4 (2)	3.5 +/- 13.5 (2)	0.6 +/- 6.2 (2)
054	91.8 +/- 2.6 (5)	94.6 +/- 2.3 (5)	89.5 +/- 2.5 (5)	93.8+/- 2.8 (5)	5.3 +/- 1.2 (5)	3.1 +/- 1.4 (5)
088	69.4 +/- 8.0 (5)	81.8 +/- 7.5 (5)	69.8 +/- 8.6 (5)	91.0+/- 8.3 (5)	15.1 +/- 4.3 (5)	4.5 +/- 4.2 (5)
087	81.6 +/- 4.0 (5)	79.5 +/- 8.8 (5)	67.4 +/- 6.6 (5)	83.4+/- 3.4 (5)	16.3 +/- 3.3 (5)	8.3 +/- 1.7 (5)
047	70.6 +/- 5.1 (5)	81.3 +/- 5.7 (5)	73.8 +/- 11.1 (5)	80.3 +/- 8.3 (5)	13.1 +/- 5.5 (5)	9.9 +/- 4.1 (5)
055b	83.9 +/- 4.0 (5)	87.7 +/- 2.1 (5)	76.5 +/- 3.3 (5)	86.2 +/- 1.6 (5)	11.8 +/- 1.6 (5)	6.9 +/- 0.8 (5)
089	85.0 +/- 2.7 (5)	87.4+/- 1.6 (5)	76.4 +/- 2.2 (5)	85.6 +/- 1.9 (5)	11.8 +/- 1.1 (5)	7.2 +/- 0.9 (5)
100% elongation						
JRC code	**imm rec 1 %**	**rec 1 %**	**imm rec 5 %**	**rec 5 %**	**imm PD 5 %**	**PD 5 %**
045	75.2 +/- 12.0 (4)	90.5 +/- 8.2 (4)	54.5 +/- 9.2 (4)	82.7 +/- 13.0 (4)	45.8 +/- 9.2 (4)	17.3 +/- 13.0 (4)
054	73.9 +/- 5.1 (5)	81.8 +/- 3.3 (5)	64.6 +/- 5.4 (5)	78.0 +/- 3.3 (5)	35.4 +/- 5.4 (5)	22.0 +/- 3.3 (5)
047	87.4 +/- 15.0 (4)	97.9 +/- 5.9 (4)	63.1 +/- 12.9 (4)	88.3 +/- 11.1 (4)	36.9 +/- 12.9 (4)	11.7 +/- 11.1 (4)

Table 23: Analysis of elastomultiester **yarns** extracted from fabrics.
Top: **3-cycle method based on elongation**; bottom: **5-cycle method based on elongation**.

In the case of yarns extracted from fabric, comparing the three and five-cycle manual methods it appeared evident that the first one stress more the specimens, as testified by lower recovery and higher permanent deformation values obtained on the same

samples. The five-cycle manual method gave results similar to those obtained with the analogous instrumental test, whereas the three-cycle manual and instrumental methods gave much more different results, being the manual test the more stringent.
Apart from few exceptions and independently from the method used to test the elastic properties, elastomultiester yarns extracted from fabric showed per cent recovery values after three or five cycles higher than 80 %, corresponding to per cent permanent deformations lower than 10 %. The elastic properties seemed to be uninfluenced by differences in linear densities.

50% elongation						
JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3
	%	%	%	%	%	%
045	64.7 +/- 2.9 (5)	69.6 +/- 3.1 (5)	15.2 +/- 1.6 (5)	56.5 +/- 2.7 (5)	61.8 +/- 1.7 (5)	19.1 +/- 0.8 (5)
087	70.2 +/- 2.5 (5)	74.3 +/- 2.2 (5)	12.8 +/- 1.1 (5)	60.5 +/- 4.8 (5)	63.9 +/- 4.0 (5)	18.0 +/- 2.0 (5)
047	78.4 +/- 1.2 (5)	82.0 +/- 3.3 (5)	9.0 +/- 1.6 (5)	72.6 +/- 1.4 (5)	78.3 +/- 3.1 (5)	10.8 +/- 1.5 (5)
055b	79.5 +/- 1.3 (5)	83.7 +/- 2.5 (5)	8.2 +/- 1.2 (5)	75.3 +/- 1.8 (5)	79.9 +/- 1.1 (5)	10.0 +/- 0.5 (5)
089	82.0 +/- 0.7 (5)	87.3 +/- 0.9 (5)	6.4 +/- 0.4 (5)	76.2 +/- 0.7 (5)	82.0 +/- 0.7 (5)	9.0 +/- 0.3 (5)

50% elongation						
JRC code	imm rec 5	imm PD5	rec 5 30 sec	PD5 30 sec	rec 5 1 min	PD 5 1 min
	%	%	%	%	%	%
045	77.6 +/- 1.8 (5)	11.2 +/- 0.9 (5)	81.8 +/- 1.9 (5)	9.1 +/- 1.0 (5)	85.5 +/- 1.8 (5)	7.2 +/- 0.9 (5)
087	79.0 +/- 2.6 (5)	10.5 +/- 1.3 (5)	83.2 +/- 2.7 (5)	8.4 +/- 1.3 (5)	85.2 +/- 2.7 (5)	7.4 +/- 1.4 (5)
047	84.0 +/- 1.9 (5)	8.0 +/- 1.0 (5)	90.1 +/- 4.2 (5)	6.0 +/- 1.4 (5)	90.5 +/- 2.9 (5)	4.5 +/- 1.5 (5)
055b	88.2 +/- 1.0 (5)	5.9 +/- 0.5 (5)	91.1 +/- 1.1 (5)	4.5 +/- 0.6 (5)	94.1 +/- 1.3 (5)	3.0 +/- 0.6 (5)
089	84.7 +/- 1.9 (5)	7.6 +/- 1.0 (5)	89.7 +/- 0.5 (5)	5.1 +/- 0.2 (5)	91.8 +/- 0.4 (5)	4.1 +/- 0.2 (5)

Table 24: Analysis of elastomultiester **yarns** extracted from fabrics.
Top: **3-cycle manual method**; bottom: **5-cycle manual method**.

In the case of single filaments extracted from fabric, similar results were obtained testing specimens with the three or five-cycle manual methods (Table 25). The manual tests always gave lower results, if compared to those obtained with the analogous instrumental methods (Table 26). In the case of single filaments the results obtained with the manual methods should be regarded as more accurate than the ones obtained with the instrumental methods due to the very low range of load. For all specimens and independently from the test method used, elastomultiester single filaments extracted from fabric showed per cent recovery values after three or five cycles higher than 80 %, corresponding to per cent permanent deformations lower than 10 %. Once more elastomultiester single filaments appeared to be as elastic as yarns, not only on specimens extracted from bobbin but also on samples taken out from fabric.

JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3
50% elongation						
	%	%	%	%	%	%
045	37.0 +/- 13.4 (3)	97.6 +/- 9.4 (3)	1.2 +/- 4.7 (3)	29.1 +/- 12.1 (3)	99.5 +/- 0.3 (3)	0.3 +/- 0.2 (3)
023	84.5 +/- 13.7 (3)	98.3 +/- 1.8 (2)	0.9 +/- 0.9 (2)	-	99.7 +/- (1)	0.2 +/- (1)
054	39.2 +/- 33.9 (3)	93.1 +/- 26.3 (3)	3.5 +/- 13.2 (3)	32.1 +/- 33.7 (3)	93.2 +/- 26.5 (3)	3.4 +/- 13.2 (3)
088	50.5 +/- 12.5 (3)	95.5 +/- 4.9 (3)	2.2 +/- 2.4 (3)	63.8 +/- 46.0 (3)	98.4 +/- 17.7 (2)	0.8 +/- 8.8 (2)
087	32.2 +/- 26.9 (3)	95.3+/- 2.3 (3)	2.3 +/- 1.1 (3)	39.2 +/- 5.8 (3)	94.2 +/- 12.5 (3)	2.9 +/- 6.2 (3)
047	38.3 +/- 10.5 (3)	96.0 +/- 7.2 (3)	2.0 +/- 3.6 (3)	39.3 +/- 43.7 (3)	98.7 +/- 1.0 (3)	0.7 +/- 0.5 (3)
055b	22.4 +/- 15.1 (3)	97.0 +/- 8.0 (3)	1.5 +/- 4.0 (3)	26.9 +/- 52.0 (3)	93.4+/- 3.0 (3)	3.3 +/- 1.5 (3)
089	27.2 +/- 5.9 (3)	95.6 +/- 1.8 (3)	2.2 +/- 0.9 (3)	27.1 +/- 5.1 (3)	96.5 +/- 7.4 (3)	1.8 +/- 3.7 (3)
100% elongation						
JRC code	**imm rec 1**	**rec 1**	**PD 1**	**imm rec 3**	**rec 3**	**PD 3**
	%	%	%	%	%	%
054	35.1 +/- 32.1 (3)	99.3 +/- 2.0 (3)	0.7 +/- 2.0 (3)	35.3 +/- 5.8 (3)	98.9 +/- 2.4 (3)	1.1 +/- 2.4 (3)

JRC code	imm rec 1	rec 1	imm rec 5	rec 5	imm PD 5	PD 5
50% elongation						
	%	%	%	%	%	%
045	93.5 +/- 8.7 (4)	97.7 +/- 2.2 (3)	94.2 +/- 9.2 (4)	99.2 +/- 8.1 (2)	2.9 +/- 4.6 (4)	0.4 +/- 4.0 (2)
023	91.5 +/- 2.7 (6)	95.5 +/- 5.2 (5)	89.8 +/- 8.0 (5)	99.1+/- 5.4 (2)	5.1 +/- 4.0 (5)	0.5 +/- 2.7 (2)
054	56.4 +/- 4.4 (3)	95.7 +/- 12.6 (3)	54.8 +/- 37.8 (3)	94.3 +/- 2.2 (3)	22.6 +/- 18.9 (3)	2.9 +/- 1.1 (3)
088	63.3 +/- 21.5 (3)	95.7 +/- 11.3 (3)	49.0 +/- 22.7 (3)	98.7 +/- 1.5 (3)	25.5 +/- 11.4 (3)	0.7 +/- 0.7 (3)
087	38.0 +/- 1.9 (3)	94.5 +/- 20.4 (3)	30.4 +/- 11.1 (3)	99.0 +/- 1.4 (3)	34.8 +/- 5.5 (3)	0.5 +/- 0.7 (3)
047	87.8 +/- 8.1 (4)	96.7 +/- 5.6 (3)	91.0 +/- 6.3 (4)	99.8 +/- 0.4 (3)	4.5 +/- 3.2 (4)	0.1 +/- 0.2 (3)
055b	6.9 +/- 18.9 (3)	96.0 +/- 16.1 (3)	0.7 +/- 0.2 (3)	97.8+/- 7.3 (3)	49.7 +/- 0.1 (3)	1.1 +/- 3.6 (3)
089	92.8 +/- 6.0 (4)	96.8 +/- 4.9 (4)	88.4+/- 7.0 (4)	99.1 +/- 0.9 (3)	5.8 +/- 3.5 (4)	0.4 +/- 0.5 (3)
100% elongation						
JRC code	**imm rec 1**	**rec 1**	**imm rec 5**	**rec 5**	**imm PD 5**	**PD 5**
	%	%	%	%	%	%
054	50.7 +/- 11.5 (4)	93.5 +/- 1.9 (4)	52.7 +/- 5.5 (4)	93.9 +/- 5.1 (4)	47.3 +/- 5.5 (4)	6.1 +/- 5.1 (4)

Table 25: Analysis of elastomultiester **single filaments** extracted from fabrics.
Top: **3-cycle method based on elongation**; bottom: **5-cycle method based on elongation**.

50% elongation						
JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3
	%	%	%	%	%	%
045	80.7 +/- 4.0 (5)	87.5 +/- 4.0 (5)	6.3 +/- 2.0 (5)	77.0 +/- 3.8 (5)	83.5 +/- 3.6 (5)	8.3 +/- 1.8 (5)
023	81.0 +/- 4.3 (5)	86.6 +/- 4.3 (5)	6.7 +/- 2.2 (5)	77.3 +/- 3.5 (5)	82.9 +/- 3.2 (5)	8.5 +/- 1.6 (5)
087	86.9 +/- 1.5 (5)	94.5 +/- 1.5 (5)	2.7 +/- 0.7 (5)	85.7 +/- 0.8 (5)	93.3 +/- 1.8 (5)	3.3 +/- 0.9 (5)
047	87.5 +/- 3.8 (5)	92.3 +/- 3.8 (5)	3.9 +/- 1.9 (5)	85.4 +/- 3.6 (5)	90.5 +/- 2.8 (5)	4.8 +/- 1.4 (5)
055b	82.7 +/- 3.0 (5)	88.2 +/- 3.0 (5)	5.9 +/- 1.5 (5)	76.3 +/- 2.0 (5)	84.6 +/- 3.3 (5)	7.7 +/- 1.7 (5)
089	78.7 +/- 7.8 (5)	84.4 +/- 7.8 (5)	7.8 +/- 3.9 (5)	75.0 +/- 8.0 (5)	79.6 +/- 8.3 (5)	10.2 +/- 4.1 (5)

50% elongation						
JRC code	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
			30 sec	30 sec	1 min	1 min
	%	%	%	%	%	%
044	89.3 +/- 2.5 (5)	5.4 +/- 1.3 (5)	92.4 +/- 2.4 (5)	3.8 +/- 1.2 (5)	94.7 +/- 2.5 (5)	2.7 +/- 1.2 (5)
048	86.4 +/- 2.2 (6)	6.8 +/- 1.1 (6)	90.1 +/- 1.8 (6)	4.9 +/- 0.9 (6)	91.9 +/- 2.5 (6)	4.1 +/- 1.2 (6)
045	81.7 +/- 4.7 (7)	9.2 +/- 2.4 (7)	85.1 +/- 5.2 (7)	7.4 +/- 2.6 (7)	86.5 +/- 6.0 (7)	6.7 +/- 3.0 (7)
023	84.9 +/- 1.4 (6)	7.6 +/- 0.7 (6)	89.2 +/- 1.4 (6)	5.4 +/- 0.7 (6)	90.9 +/- 2.1 (6)	4.6 +/- 1.0 (6)
054	92.6 +/- 2.6 (5)	3.7 +/- 1.3 (5)	96.0 +/- 2.4 (5)	2.0 +/- 1.2 (5)	97.4 +/- 1.3 (5)	1.3 +/- 0.7 (5)
056b	83.0 +/- 3.4 (6)	8.5 +/- 1.7 (6)	85.8 +/- 3.8 (6)	7.1 +/- 1.9 (6)	87.3 +/- 3.1 (6)	6.4 +/- 1.5 (6)
053	91.9 +/- 0.5 (5)	4.1 +/- 0.3 (5)	95.9 +/- 0.3 (5)	2.0 +/- 0.1 (5)	97.5 +/- 1.3 (5)	1.2 +/- 0.7 (5)
087	92.4 +/- 5.9 (5)	3.8 +/- 2.9 (5)	94.5 +/- 5.8 (5)	2.7 +/- 2.9 (5)	95.9 +/- 4.2 (5)	2.1 +/- 2.1 (5)
047	91.4 +/- 0.7 (5)	4.3 +/- 0.3 (5)	96.1 +/- 1.4 (5)	1.9 +/- 0.7 (5)	97.0 +/- 1.4 (5)	1.5 +/- 0.7 (5)
046	90.0 +/- 3.3 (5)	5.0 +/- 1.6 (5)	92.5 +/- 3.9 (5)	3.7 +/- 1.9 (5)	95.4 +/- 3.4 (5)	2.3 +/- 1.7 (5)
055b	86.4 +/- 2.2 (5)	6.8 +/- 1.1 (5)	89.7 +/- 1.2 (5)	5.2 +/- 0.6 (5)	91.2 +/- 1.8 (5)	4.4 +/- 0.9 (5)
089	84.9 +/- 2.9 (5)	7.6 +/- 1.4 (5)	86.9 +/- 2.5 (5)	6.5 +/- 1.3 (5)	89.5 +/- 3.0 (5)	5.3 +/- 1.5 (5)

Table 26: Analysis of elastomultiester **single filaments** extracted from fabrics.
Top: **3-cycle manual method**; bottom: **5-cycle manual method**.

In Directive 96/74/EC on textile names two elastofibres are already defined, elastane and elastodiene. The elastic properties of these fibres are in both cases described saying that when the fibre is stretched to three times its original length and released, it recovers rapidly and substantially to its initial length. In order to have a quantitative indication of the meaning of this definition, some analyses were performed on elastane yarns from bobbin and extracted from a fabric sample. These tests could also answer to the question raised by experts about elastane, during the second technical meeting of national experts on textile labelling held in Ispra, if just elastane from bobbin fulfils the definition or if also elastane extracted by real fabric does it.

Samples **093**, **094** and **095** are yarns from bobbin with the following linear density and number of filaments, 22/2, 44/4 and 78/5 respectively, whereas sample **096** is a yarn extracted by fabric with 44/4 dtex/number of filaments. In the case of elastane it was impossible to separate a single filament from the yarn, as single filaments appeared as they were stuck together; for this reason tests were performed only on yarns. Table 27 reports the results obtained with the three and five-cycle instrumental methods based on elongation, whereas Table 28 summaries the results obtained with the analogous manual methods. Various per cent imposed elongations were applied, 200 % being the one mentioned in the Directive.

JRC code	imm rec 1	rec 1	PD 1	imm rec 3	rec 3	PD 3
100% elongation						
	%	%	%	%	%	%
093	98.1 +/- 0.7 (3)	99.9 +/- (1)	0.1 +/- (1)	-	98.5 +/- (1)	1.5 +/- (1)
094	96.8 +/- 3.7 (3)	98.8 +/- 1.5 (3)	1.2 +/- 1.5 (3)	97.4 +/- 2.6 (3)	99.4 +/- 1.7 (3)	0.7 +/- 1.7 (3)
095	97.8 +/- 0.4 (3)	99.1 +/- 1.2 (3)	0.9 +/- 1.2 (3)	97.9 +/- 0.4 (3)	99.0 +/- 0.7 (3)	1.0 +/- 0.7 (3)
200% elongation						
JRC code	**imm rec 1**	**rec 1**	**PD 1**	**imm rec 3**	**rec 3**	**PD 3**
	%	%	%	%	%	%
093	94.0 +/- 2.0 (5)	97.9 +/- 2.0 (5)	4.3 +/- 4.0 (5)	93.8 +/- 2.1 (5)	96.9 +/- 3.3 (4)	6.2 +/- 6.7 (4)
094	95.0 +/- 0.9 (6)	98.6 +/- 1.3 (6)	2.8 +/- 2.6 (6)	95.2 +/- 0.7 (6)	96.9 +/- 1.5 (3)	6.1 +/- 2.9 (3)
095	95.5 +/- 0.5 (6)	98.3 +/- 1.0 (6)	3.4 +/- 2.1 (6)	95.2 +/- 0.6 (6)	98.2 +/- 1.7 (6)	3.7 +/- 3.4 (6)
096	98.3 +/- 5.3 (3)	96.6 +/- 16.5 (2)	6.8 +/- 33.0 (2)	98.7 +/- 4.6 (3)	97.8 +/- 14.6 (2)	4.5 +/- 29.1 (2)
300% elongation						
JRC code	**imm rec 1**	**rec 1**	**PD 1**	**imm rec 3**	**rec 3**	**PD 3**
	%	%	%	%	%	%
93	83.1 +/- 6.1 (3)	97.5 +/- 5.0 (3)	7.5 +/- 14.9 (3)	84.2 +/- 4.7 (3)	96.4 +/- 7.8 (3)	10.7 +/- 23.3 (3)
94	84.6 +/- 10.8 (3)	97.3 +/- 6.9 (3)	8.1 +/- 20.7 (3)	86.0 +/- 7.4 (3)	96.1 +/- 7.0 (3)	11.7 +/- 20.9 (3)
95	90.5 +/- (1)	96.1 +/- (1)	11.7 +/- (1)	88.2 +/- (1)	94.7 +/- (1)	16.0 +/- (1)
096	81.3 +/- 14.0 (3)	95.2 +/- 6.4 (3)	14.3 +/- 19.2 (3)	81.1 +/- 18.4 (3)	92.9 +/- 6.7 (3)	21.2 +/- 20.0 (3)

JRC code	imm rec 1	rec 1	imm rec 5	rec 5	imm PD 5	PD 5
200% elongation						
	%	%	%	%	%	%
093	96.5 +/- 2.3 (3)	97.2 +/- 4.0 (3)	96.7 +/- 4.2 (3)	97.0 +/- 3.0 (2)	6.5 +/- 8.3 (3)	5.9 +/- 5.9 (2)
094	96.6 +/- 0.6 (5)	96.7 +/- 0.4 (5)	95.8 +/- 0.7 (5)	97.7+/- 1.5 (5)	8.5 +/- 1.4 (5)	4.6 +/- 2.9 (5)
095	97.1 +/- 0.3 (5)	97.0 +/- 0.3 (5)	96.2 +/- 0.5 (5)	97.3 +/- 0.3 (5)	7.7 +/- 0.9 (5)	5.5 +/- 0.6 (5)
096	98.5 +/- 0.3 (5)	99.0 +/- 0.6 (5)	98.3 +/- 0.1 (5)	96.5 +/- 14.1 (2)	3.4 +/- 0.1 (5)	7.0 +/- 28.1 (2)
300% elongation						
JRC code	**imm rec 1**	**rec 1**	**imm rec 5**	**rec 5**	**imm PD 5**	**PD 5**
	%	%	%	%	%	%
093	91.5 +/- 2.7 (5)	93.5 +/- 2.5 (5)	88.8 +/- 5.0 (5)	92.2+/- 3.0 (5)	33.7 +/- 14.9 (5)	23.5 +/- 8.9 (5)
094	91.8 +/- 1.0 (5)	92.6 +/- 0.7 (5)	88.0 +/- 2.4 (5)	91.2+/- 2.2 (5)	35.9 +/- 7.2 (5)	26.3 +/- 6.5 (5)
095	93.1 +/- 1.6 (5)	94.2 +/- 1.3 (5)	90.3 +/- 1.5 (5)	93.1+/- 0.7 (5)	29.2 +/- 4.5 (5)	20.8 +/- 2.0 (5)
096	91.1 +/- 0.6 (5)	93.7 +/- 1.3 (5)	89.4 +/- 3.3 (5)	91.9+/- 3.4 (5)	31.9 +/- 9.9 (5)	24.4 +/- 10.2 (5)

Table 27: Analysis of elastane **yarns** extracted from bobbin or fabric.
Top: **3-cycle method based on elongation**; bottom: **5-cycle method based on elongation**.

At 200 % imposed elongation, elastane yarns both extracted from bobbin and from fabric always showed per cent recoveries, after three or five cycles, higher than 95 %, with correspondent permanent deformations lower than 10 %.

Comparing the elastic properties of elastane and elastomultiester in the conditions specified in their definition or proposed definition, that is to say at 200 % elongation for elastane and 50 % for elastomultiester, it can be noticed that both fibres showed similar values for permanent deformations. These values were in the range 0 % to 10 %.

200% elongation						
JRC code	**imm rec 1**	**rec 1**	**PD 1**	**imm rec 3**	**rec 3**	**PD 3**
	%	**%**	**%**	**%**	**%**	**%**
093	95.0 +/- 0.8 (5)	97.1 +/- 1.2 (5)	5.8 +/- 2.3 (5)	93.5 +/- 1.4 (5)	95.6 +/- 1.1 (5)	8.8 +/- 2.2 (5)
094	95.6 +/- 0.8 (5)	98.3 +/- 0.4 (5)	3.5 +/- 0.8 (5)	94.6 +/- 0.7 (5)	97.2 +/- 0.5 (5)	5.7 +/- 1.0 (5)
095	95.8 +/- 0.6 (5)	98.0 +/- 0.5 (5)	4.6 +/- 2.1 (5)	94.8 +/- 0.8 (5)	96.6 +/- 0.6 (5)	6.9+/- 1.1 (5)
096	94.6 +/- 1.0 (5)	96.4 +/- 1.2 (5)	7.3 +/- 2.5 (5)	92.4 +/- 1.3 (5)	94.2 +/- 1.0 (5)	11.5 +/- 2.1 (5)

200% elongation						
JRC code	**imm rec 5**	**imm PD5**	**rec 5**	**PD5**	**rec 5**	**PD 5**
			30 sec	**30 sec**	**1 min**	**1 min**
	%	**%**	**%**	**%**	**%**	**%**
093	96.0 +/- 0.6 (5)	8.0 +/- 1.3 (5)	97.5 +/- 0.2 (5)	5.0 +/- 0.3 (5)	98.7 +/- 0.6 (5)	2.7 +/- 1.1(5)
094	95.8 +/- 0.7 (5)	8.5 +/- 1.4 (5)	97.4 +/- 0.6 (5)	5.2 +/- 1.2 (5)	98.7 +/- 0.6 (5)	2.6 +/- 1.2(5)
095	95.8 +/- 0.2 (5)	8.4 +/- 0.5 (5)	97.5 +/- 0.1 (5)	5.0 +/- 0.3 (5)	98.3 +/- 0.1 (5)	3.4 +/- 0.2(5)
096	96.4 +/- 0.2 (5)	7.2 +/- 0.4 (5)	98.2 +/- 0.4 (5)	3.6 +/- 0.7 (5)	99.0 +/- 0.4 (5)	2.0 +/- 0.8 (5)

Table 28: Analysis of elastane **yarns** extracted from bobbin or fabric.
Top: **3-cycle manual method**; bottom: **5-cycle manual method**.

7. Conclusions

Concerning the identification methods, the tests performed at the JRC confirmed that the methods proposed by the petitioner are suitable for the identification of elastomultiester. In particular, microscopy and differential scanning calorimetry can identify both the multicomponent nature of the new fibre and its chemical composition, whereas FT-IR can confirm only the chemical composition. Experts, for qualitative methods, envisaged no ring trial and they agreed on the fact that it would not be necessary to include them in the Directive 96/73/EC.

Test results confirmed that methods 1, 2, 4, 6, 7, 8, 9, 13 and 14 in Directive 96/73/EC are suitable for the quantification of elastomultiester in relevant binary mixtures. The applicability of these methods was verified for binary mixtures of elastomultiester with wool and cotton and for pure elastomultiester. Results showed that the methods led to a good repeatability, calculated as relative standard deviations used to measure the dispersion of the distribution of test results in one laboratory, both for binary mixtures and for pure fibres. The same is true for the manual separation method described in Directive 96/73/EC, which was applied to binary mixtures of elastomultiester with polyester, cotton and wool and to ternary mixtures of elastomultiester with polyester/cotton, polyester/viscose and modal/viscose.

The correction factors *d* for chemical methods 1, 2, 4, 6, 7, 8, 9, and 13 in Directive 96/73/EC, were calculated based on the analyses of samples of pure elastomultiester. Results confirmed that the same correction factors *d*, established for polyester, could be applied to the analysis of elastomultiester. As all the above-mentioned methods have already been validated at European level, they may become the official methods to quantify elastomultiester in mixtures with other fibres.

A new quantitative method based on DSC was developed and successfully applied to the quantification of binary mixtures of elastomultiester with polyester and cotton and to ternary mixtures with polyester/cotton, polyester/viscose and modal/viscose. The method led to a good repeatability and results were generally as good as the ones obtained with chemical methods. The comparison with quantification based on the manual separation method showed differences usually lower than 1 %. The method is also applicable to mixtures of elastomultiester with nylon. The method shows two important advantages, the first being the rapidity of the analysis and the second being the possibility to avoid manual separation in the case of mixtures polyester/elastomultiester.

Due to the chemical composition of elastomultiester, that is 100 % polyester based, the same value of *agreed allowance* established for polyester (1.50) was proposed by the European Commission and accepted by experts during the second technical meeting of national experts on textile labelling.

Experts, in agreement with the JRC, judged that the two methods proposed by the applicant, the BISFA and the skein one, were not appropriate to test the elastic properties of elastomultiester and they asked for new methods to be developed.

The JRC, following this request and in agreement with DG Enterprise, set up various methods, based on elongation and load, to measure the recoverable stretch and the permanent deformation of yarns and single filaments. The two elongation-based methods were applied both using a tensile testing machine and manually. Results usually did not greatly depend on the method used for testing, even if the three-cycle method based on elongation seemed to be stricter than the correspondent five-cycle one, in particular when manually applied. The two elongation-based methods are simpler and quicker than the two load-based ones and they were used in the analysis of yarns and single filaments extracted from fabrics. Experiments performed on single filaments showed that the fibre is intrinsically elastic and the elasticity is not due to the construction of yarns. Moreover when tested at 50 % elongation, both elastomultiester yarns and single filaments evidenced per cent permanent deformations usually lower than 10 % as it was the case for elastane when tested at 200 % elongation, that is in the same conditions described in its definition.

On the basis of the experimental results and of discussions with representative experts from Member States (meetings on 4th March and 27th May 2005), the definition agreed and proposed for elastomultiester is: "*fibre formed by interaction of two or more chemically distinct linear macromolecules in two or more distinct phases (of which none exceeds 85 % by mass) which contains ester groups as dominant functional unit (at least 85 %) and which, after suitable treatment, when stretched to one and half times its original length and released, recovers rapidly and substantially to its original length*".

The name elastomultiester was chosen, in agreement with experts from Member States, as it fulfils the criteria set up in 2002 by the Commission and the technical experts working group on textile labelling. In fact, according to these criteria, a generic name should not link the fibre to a specific manufacturer, it should be free of rights and it should inform consumers about characteristics of the fibre. The name elastomultiester points out that the fibre is elastic and multicomponent, moreover it specifies that the fibre is polyester based.

8. References

[1] Directive 96/74/EC of the European Parliament and of the Council of 16 December 1996 on textile names *(Official Journal L032 of 3.2.1997 p. 0038-0055),* http://europa.eu.int/comm/enterprise/textile/intlmarket.htm.

[2] Directive 96/73/EC of the European Parliament and of the Council of 16 December 1996 on certain methods for the quantitative analysis of binary textile fibre mixtures *(Official Journal L032 of 3.2.1997 p. 0001-0037),* http://europa.eu.int/comm/enterprise/textile/intlmarket.htm.

[3] ISO 5725 (1994) Accuracy (trueness and precision) of measurement methods and results, Part 1-6.

[4] Horwitz, W. (1995) IUPAC: Protocol for the design, conduct and interpretation of method performance studies, *Pure & Applied Chem.*, **67**, 331-343.

[5] Stevenson, C.L., The statistic of measurements, University of Richmond, Chemistry 300 (2000)

[6] Test methods for bare elastane yarns, BISFA, 1998.

Annex I

Analytical methods proposed by the applicant

METHOD FOR

QUANTITATIVE ANALYSIS

OF TEXTILES CONTAINING

ELASTOMULTESTER*

Please refer to Annex I of the Directive 96/73/EC for the preparation of test samples and test specimens to determine the fiber composition of textile products

* Name submitted to EC for approval.

1.GENERAL

Introduction

Methods for the quantitative analysis of fiber mixtures are based on two main processes, the manual separation and the chemical separation of fibers.

The method of manual separation should be used whenever possible since it generally gives more accurate results than the chemical method. It can he used for all textiles whose component fibers do not form an intimate mixture, as for example in the case of yarns composed of several elements each of which is made up of only one type of fiber, or fabrics
in which the fiber of the warp is of a different kind to that of the weft, or knitted fabrics capable of being unraveled made up of yarns of different types.

In general, the methods of chemical quantitative analysis are based on the selective solution of the individual components. After the removal of a component the insoluble residue is weighed, and the proportion of the soluble component is calculated from the loss in mass. The residue is then manually separated to determine the nature and the quantity of the elastic component.

Mixtures of fibers during processing and, to a lesser extent, finished textiles may contain non-fibrous matter, such as fats, waxes or dressings, or water-soluble matter, either occurring naturally or added to facilitate processing. Non-fibrous matter must be removed before analysis. For this reason a method for removing oils, fats, waxes and water-soluble matter is also given.

In addition, textiles may contain resins or other matter added to confer special properties. Such matter, including dyestuffs in exceptional cases, may interfere with the action of the reagent on the soluble component and/or it may be partially or completely removed by the reagent. This type of added matter may thus cause errors and should be removed before the sample is analyzed. If it is impossible to remove such added matter the methods for quantitative chemical analysis given in this Annex are no longer applicable.

Dye in dyed fabrics is considered to be an integral part of the fiber and is not removed.

Analyses are conducted on the basis of dry mass and a procedure is given for determining dry mass.

The result is obtained by applying to the dry mass of each fiber the agreed allowances listed in Annex 11 to Directive 96/741EC of the European Parliament and of the Council of 16 December 1996 on textile names.

Before proceeding with any analysis, all the fibers present in the mixture should have been identified. In some methods, the insoluble component of a mixture may be partially dissolved in the reagent used to dissolve the soluble component. Where possible, reagents have been chosen that have little or no effect on the insoluble fibers. If loss in mass is known to occur during the analysis, the result should be corrected; correction factors for this purpose are given. These factors have been determined in several laboratories by treating, with the appropriate reagent as specified in the method of analysis, fibers cleaned by the pre-treatment. These correction factors apply only to undegraded fibers and different correction factors may he necessary if the fibers have been degraded before or during processing. The procedures given apply to single determinations. At least two determinations on separate test specimens should be made, both in the case of manual separation and in the case of chemical separation. For confirmation, unless technically impossible, it is recommended to use alternative procedures whereby the constituent that was the residue in the standard method is dissolved out first.

GENERAL INFORMATION ON METHODS FOR THE QUANTITATIVE CHEMICAL ANALYSIS OF TEXTILE FIBRE MIXTURES

Information common to the methods given in Directive 96/73/EC for the quantitative chemical analysis of fiber mixtures.

1.1. Scope and field of application

The field of application for each of these methods

in conjunction with Annex 1 specifies to which fibers the method is applicable.

1.2. Principle

After the identification of the components of a mixture, the non-fibrous material is removed by suitable pre-treatment and then one of the components, usually by selective solution (1). The insoluble residue is weighed and the proportion of soluble component calculated from the loss in mass. The elastic fiber present in the residue is then manually separated, weighted and identified. Except where this presents technical difficulties, it is preferable to dissolve the fiber present in the greater proportion, thus obtaining the fiber present in the smaller proportion as residue.

1.3. Materials and equipment

1.3.1. Apparatus

1.3.1.1 Filter crucibles and weighing bottles large enough to contain such crucibles, or any other apparatus giving identical results.

1.3.1.2 Vacuum flask.

13.1.3. Desiccator containing self-indicating silica gel.

1.3.1.4. Ventilated oven for drying specimens at 150°C +/-3°C.

1.3.1.5. Analytical balance, accurate to 0,0002 g.

1.3.1.6. Soxhlet extractor or other apparatus giving identical results.

1.3.2 Reagents

Light petroleum, re-distilled, boiling range 40 to 60°C.

Other reagents are specified in the appropriate sections of each method. All reagents used should be chemically pure.

Distilled or deionized water.

1.4. Conditioning and testing atmosphere

Because dry masses are determined, it is unnecessary to condition the specimen or to conduct analyses in a conditioned atmosphere.

1.5. Laboratory test sample

Take a laboratory test sample that is representative of the laboratory bulk sample and sufficient to provide all the specimens, each of at least 5 g, that are required.

1.6. Pre-treatment of laboratory test sample

Where a substance not to be taken into account in the percentage calculations (see Article 12 (3)), of Directive 96/74/EC of the European Parliament and of the Council of 16 December 1996 on textile names is present, it should first be removed by a suitable method that does not affect any of the fiber constituents.

For this purpose, non-fibrous matter which can be extracted with light petroleum and water is removed by treating the air-dry test sample in a Soxhlet extractor with light petroleum for one hour at a minimum rate of six cycles per hour. Allow the light petroleum to evaporate from the sample, which is then extracted by direct treatment consisting in soaking the specimen in water at room temperature for one hour and then soaking it in water at 65 +/-5°C for a further hour, agitating the liquor from time to time.

Use a liquor specimen ratio of 100:1. Remove the excess water from the sample by squeezing, suction, or centrifuging and then allow the sample to become air-dry.

Where non-fibrous matter cannot be extracted with light petroleum and water, it should be removed by substituting for the water method described above a suitable method that does not substantially alter any of the fiber constituents. However, for some unbleached, natural vegetable fibers (e.g. jute, coir) it is to be noted that normal pre-treatment with light petroleum and water does not remove all the natural non-fibrous substances; nevertheless additional pre-treatment is not applied unless the sample does contain finishes insoluble in both light petroleum and water.

Analysis reports should include full details of the methods of pre-treatment used.

1.7. Test procedure

1.7.1. General instructions

1.7.1.1. Drying

Conduct all drying operations for not less than four hours and not more than 16 hours at 105 +/-3°C in a ventilated oven with the oven door closed throughout. If the drying period is less than 14 hours, the specimen must be weighed to check that its mass has become constant. The mass may be considered to have become constant if, after a further drying period of 60 minutes, its variation is less than 0,05 %.

Avoid handling crucibles and weighing bottles, specimens or residues with bare hands during the drying, cooling and weighing operations.

Dry specimens in a weighing bottle with its cover beside it. After drying, stopper the weighing bottle before removing it from the oven, and transfer it quickly to the desiccator.

Dry the filter crucible in a weighing bottle with its cover beside it in the oven. After drying, close the weighing bottle and transfer it quickly to the desiccator.

Where apparatus other than a filter crucible is used, drying operations in the oven should be conducted in such a way as to enable the dry mass of the fibers to be determined without loss.

1.7.1.2. Cooling

Conduct all cooling operations in the desiccator the latter placed beside the balance, until complete cooling of the weighing bottles is attained, and in any case for not less than two hours.

1.7.1.3. Weighing

After cooling, complete the weighing of the weighing bottle within two minutes of its removal from the desiccator. Weigh to an accuracy of 0,0002 g.

1.7.2. Procedure

Take from the pre-treated laboratory test sample a test specimen weighing at least 1 g. Cut yarn or cloth into lengths of about 30 mm, dissected as much as possible. Dry the specimen in a weighing bottle, cool it in the desiccator and weigh it. Transfer the specimen to the glass vessel specified in the appropriate section of the relevant Community method, reweigh the weighing bottle immediately and obtain the dry mass of the specimen by difference. Complete the test as specified in the appropriate section of the applicable method. Examine the residue microscopically to check that the treatment has in fact completely removed the soluble fiber.

1.8. Calculation and expression of results

Express the mass of the insoluble component as a percentage of the total mass of fiber in the mixture. The percentage of soluble component is obtained by difference. Calculate the results on the basis of clean, dry mass, adjusted by (a) the agreed allowances and (b) the correction factors necessary to take account of loss of matter during pre-treatment and analysis. Calculations should be made by applying the formula given in 1.8.2.

1.8.1. Calculation of percentage of insoluble component on clean, dry mass basis, disregarding loss of fiber mass during pre-treatment.

$$P1\% = \frac{100 * r * d}{m}$$

where

P1 is the percentage of clean, dry insoluble component

m is the dry mass of the specimen after pre-treatment

r is the dry mass of the residue

d is the correction factor for loss of mass of the insoluble component in the reagent during the analysis. Suitable values of V are given in the appropriate section of each method.

Such values of V are of course the normal values applicable to chemically undegraded fibers.

1.8.2. Calculation of percentage of insoluble component on clean, dry mass basis, with adjustment by conventional factors and, where appropriate, correction factors for loss of mass during pre-treatment.

$$P_{1A}\,\% = \frac{100\,P_1\left(1 + \frac{a_1 + b_1}{100}\right)}{P_1\left(1 + \frac{a_1 + b_1}{100}\right) + (100 - P_1)\left(1 + \frac{a_2 + b_2}{100}\right)}$$

where

P_{1A} the percentage of insoluble component, adjusted by agreed allowances and for loss of mass during pre-treatment

P_1 is the percentage of clean, dry insoluble component as calculated from the formula shown in 1.8.1.

a_1 is the agreed allowance for the insoluble component (see Annex 11 to the Directive on textile names)

a_2 is the agreed allowance for the soluble component (see Annex 11 to the Directive on textile names)

b_1 is the percentage loss of insoluble component caused by the pre-treatment

b_2 is the percentage loss of soluble component caused by the pre-treatment

The percentage of the second component (P_{2A} %) is equal to 100 – P_{1A} %

Where a special pre-treatment has been used, the values of b, and b2 should be determined, if possible, by submitting each of the pure fiber constituents to the pre-treatment applied in the analysis. Pure fibers are those free from all non-fibrous material except that which they normally contain (either naturally or because of the manufacturing process), in the state (unbleached, bleached) in which they are found in the material to be analyzed.

Where no clean separate constituent fibers used in the manufacture of the material to be analyzed are available, average values of b, and b2 as obtained from tests performed on clean fibers similar to those in the mixture under examination, should be used.

If normal pre-treatment by extraction with light petroleum and water is applied, correction factors b, and b2 may generally be ignored, except in the case of unbleached cotton, unbleached flax and unbleached hemp, where the loss due to the pre-treatment is conventionally taken as 4 %, and in the case of polypropylene, where it is taken as 1 %.

In the case of other fibers, losses due to the pre-treatment are conventionally disregarded in calculations.

1.9 Analysis of the elastic content

The insoluble component is then manually separated to quantify the content of elastic and non elastic fibers according to the method II.

II. METHOD OF QUANTITATIVE ANALYSIS BY MANUAL SEPARATION

II.1. Field of application

This method is applicable to textile fibers of all types provided they do not form an intimate mixture and that it is possible to separate them by hand.

II.2. Principle

After identification of the constituents of the textile, the non-fibrous material is removed by suitable pre-treatment and then the fibers are separated by hand, dried and weighed in order to calculate the proportion of each fiber in the mixture.

II.3. Apparatus

II.3.1. Weighing bottle or any other apparatus giving identical results.

II.3.2 Desiccator containing self-indicating silica gel.

II.3.3. Ventilated oven for drying specimens at 105 +/- 3°C.

II.3.4 Analytical balance, accurate to 0,0002 g.

II.3.5. Soxhlet extractor, or other apparatus giving an identical result.

II.3.6 Needle.

II.3.7 Twist tester or similar apparatus.

II.4. Reagents

II.4.1. Light petroleum, re distilled, boiling range 40 to 60°C.

II.4.2 Distilled or de ionized water.

II.5. Conditioning and testing atmosphere

See 1.4.

II.6. Laboratory test sample

See 1.5.

II.7. Pre-treatment of laboratory test sample

See 1.6.

II.8. Procedure

II.8.1 Analysis of yarn
The fiber types obtained in 1.9 are placed in pre-weighed weighing bottles and dried at 105 ± 3°C until a constant mass is obtained, as described in 1.7.1 and 1.7.2

II.9. Calculation and expression of results
Express the mass of each fiber constituent as a percentage of the total mass of the fibers in the mixture. Calculate the results on the basis of clean, dry mass, adjusted by (a) the agreed allowances and (b) the correction factors necessary to take account of loss of matter during pre – treatment.

11.9.1. Calculation of percentage masses of clean, dry fiber, disregarding loss of fiber mass during pre-treatment:

$$P_1\,\% = \frac{100m_1}{m_1 + m_2} = \frac{100}{1 + m_1/m_2}$$

where

P_1 is the percentage of the first clean, dry component

m_1 is the clean, dry mass of the first component

m_2 is the clean, dry mass of the second component.

II.9.2. For calculation of the percentage of each component with adjustment by agreed allowances and, where appropriate, by correction factors for loss of matter during pre-treatment, see 1.8.2.

II.10 Identification of the elastic fiber

The fibers obtained in II.8.1 are dyed if they are white. If fibers are colored, they are stripped in a soxhlet with the following ingredients and conditions: about 150ml Dichloromethane into the flask

Bring the solution to the boil and maintain boiling moderate for at least 2 hours. Rinse and dry.

White and stripped fibers are then dyed as follows.

Dyeing:

1: 1% Terasil pink 4BN

pH 5,5

30 min. at the boil

Reductive washing:

2g/l Na-hydrosulphite

1g/l soda ash

20 min. at 70C

Rinse and dry, then the fiber is identified via cross- section, DSC or IR.

II.10.1 Cross-section analysis

A specimen of fiber yarn is fixed into a mould. Melted resin is poured over it and the whole is then cooled down. The hardened resin, with the yarn set in it, is then removed from the mould and cut into slivers with a microtone. The slivers are then mounted on glass slides which are then used to make microphotographs.

II.10.1.1 Equipment required

Reichert-Jung microtone or equivalent.

Leica microscope, DM LB or equivalent.

Analogic camera ICCA adapted for the microscope.

Laboratory tongs.

Laboratory tweezers.

Ordinary scissors.

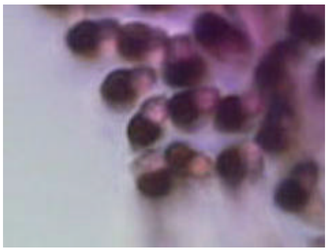
Stainless steel 50 ml evaporation recipient.

Hot plate

“EUROLON 950” resin in small cubes manufactured by Hans Rahnund Co., Zürich, Switzerland.

“Immersion Oil” - German standard DIN 58884 of refraction index 1,518.

Identify from the picture the presence of two or more polymers colored differently.



x 450

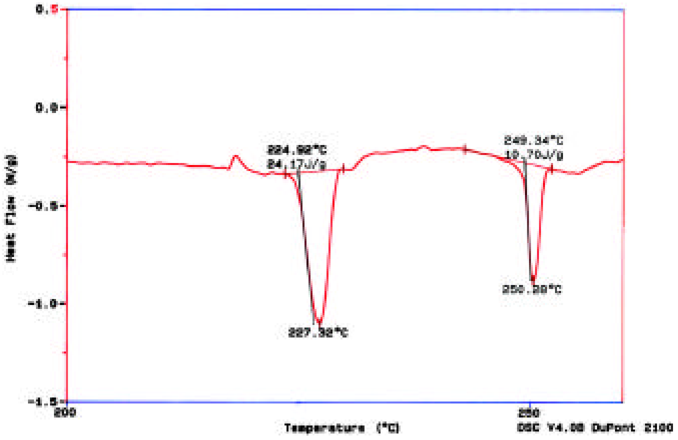
x 630

II.10.2 DSC analysis

Take 2 mg of the elastic fiber to be put on a vessel of a DSC instrument (TA Instrument 912). Run a DSC analysis under the following conditions:

5°C/min from 180 to 270°C – set flow meter to 15ml/min with Nitrogen gas.

Record the melting temperature (±2°C) of each component for polymer identification.
For our present product melting temperatures are between 224°C and 247°C



IR method can be also used in place of DSC analysis

II. 10. 3 Tensile properties

The breaking force and elongation at break of the elastic yarn obtained from I.9 will be measured according to the test method described in chapter 6: “Tensile properties” of the BISFA manual entitled “Test methods for bare elastane yarns” Ed 1978.

The sample yarn is prealably boiled during 15 min and then dried.

Mean values of breaking forces (cN), elongation at break (%), coefficient of variation, number of samples, the type of specimen holder or clamp, the gauge length, the speed of the moving clamp and the pretension are reported.

III.1. Precision of the methods

The precision indicated in individual methods relates to the reproducibility.

The reproducibility refers to the reliability, i.e. the closeness of agreement between experimental values obtained by operators in different laboratories or at different times using the same method and obtaining individual results on specimens of an identical consistent mixture.

The reproducibility is expressed by confidence limits of the results for a confidence level of 95%.

By this is meant that the difference between two results in a series of analyses made in different laboratories would, given a normal and correct application of the method to an identical and consistent mixture, he exceeded only in five cases out of a 100.

III.2. Test report

III.2.1 State that the analysis was conducted in accordance with this method.

III.2.2 Give details of any special pre-treatment (see 1.6)

III.2.3 Give the individual results and the arithmetic mean, each to an accuracy of 0,1. this method are not greater than :t 1 for a confidence level of 95 %.

Annexe 1: Table of mixtures which may be analyzed using community methods of analysis of mixtures (source: Directives 96/73/EC and 73/44/EEC)

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Analysis of textile fibre mixtures

Mixture				Solvent 1	Solvent 2	Solvent 3	Residue 1	Residue 2	Residue 3	Soluble 1	Soluble 2	Soluble 3
acetate	acrylic		elastomultester	acetone	dimethylformamide		acrylic+elastomultester	elastomultester		acetate	acrylic	
acetate	polyamide	acrylic	elastomultester	acetone	formic acid 80%)	dimethylformamide	acrylic+polyamide+elastomultester	acrylic+elastomultester	elastomultester	acetate	polyamide	acrylic
acetate	silk	acrylic	elastomultester	acetone	Sodium hypochlorite	dimethylformamide	acrylic+silk+elastomultester	acrylic+elastomultester	elastomultester	acetate	silk	acrylic
acetate	wool	acrylic	elastomultester	acetone	Sodium hypochlorite	dimethylformamide	acrylic+wool+elastomultester	acrylic+elastomultester	elastomultester	acetate	wool	acrylic
acetate	acrylic	cotton	elastomultester	acetone	dimethylformamide	sulphuric acid 75%	cotton+acrylic+elastomultester	cotton+elastomultester	elastomultester	acetate	acrylic	cotton
acetate	cotton		elastomultester	acetone	sulphuric acid 75%		cotton+elastomultester	elastomultester		acetate	cotton	
acetate	modal	cotton	elastomultester	acetone	formic acid+zinc chloride	sulphuric acid 75%	cotton+modal+elastomultester	cotton+elastomultester	elastomultester	acetate	modal	cotton
acetate	polyamide	cotton	elastomultester	acetone	formic acid 80%)	sulphuric acid 75%	cotton+polyamide+elastomultester	cotton+elastomultester	elastomultester	acetate	polyamide	cotton
acetate	viscose	cotton	elastomultester	acetone	formic acid+zinc chloride	sulphuric acid 75%	cotton+viscose+elastomultester	cotton+elastomultester	elastomultester	acetate	viscose	cotton
acetate	silk	cotton	elastomultester	acetone	Sodium hypochlorite	sulphuric acid 75%	cotton+silk+elastomultester	cotton+elastomultester	elastomultester	acetate	silk	cotton
acetate	wool	cotton	elastomultester	acetone	Sodium hypochlorite	sulphuric acid 75%	cotton+wool+elastomultester	cotton+elastomultester	elastomultester	acetate	wool	cotton
acetate	flax		elastomultester	acetone	sulphuric acid 75%		flax+elastomultester	elastomultester		acetate	flax	
acetate	acrylic	modal	elastomultester	acetone	dimethylformamide	formic acid+zinc chloride	modal+acrylic+elastomultester	modal+elastomultester	elastomultester	acetate	acrylic	modal
acetate	polyamide	modal	elastomultester	acetone	formic acid 80%)	sulphuric acid 75%	modal+polyamide+elastomultester	modal+elastomultester	elastomultester	acetate	polyamide	modal
acetate	silk	modal	elastomultester	acetone	Sodium hypochlorite	sulphuric acid 75%	modal+wool+elastomultester	modal+elastomultester	elastomultester	acetate	silk	modal
acetate	wool	modal	elastomultester	acetone	Sodium hypochlorite	sulphuric acid 75%	modal+wool+elastomultester	modal+elastomultester	elastomultester	acetate	wool	modal
acetate	polyamide		elastomultester	acetone	formic acid 80%)		polyamide+elastomultester	elastomultester		acetate	polyamide	
acetate	silk	polyamide	elastomultester	acetone	Sodium hypochlorite	formic acid 80%	polyamide+silk+elastomultester	polyamide+elastomultester	elastomultester	acetate	silk	polyamide
acetate	wool	polyamide	elastomultester	acetone	Sodium hypochlorite	formic acid 80%	polyamide+wool+elastomultester	polyamide+elastomultester	elastomultester	acetate	wool	polyamide
acetate	acrylic	polyester	elastomultester	acetone	dimethylformamide	manual separation	polyester+acrylic+elastomultester	polyester+elastomultester	elastomultester	acetate	acrylic	
acetate	polyester		elastomultester	acetone	manual separation		polyester+elastomultester	elastomultester		acetate		
acetate	polyamide	polyester	elastomultester	acetone	formic acid 80%)	manual separation	polyester+polyamide+elastomultester	polyester+elastomultester	elastomultester	acetate	polyamide	
acetate	silk	polyester	elastomultester	acetone	Sodium hypochlorite	manual separation	polyester+wool+elastomultester	polyester+elastomultester	elastomultester	acetate	silk	
acetate	wool	polyester	elastomultester	acetone	Sodium hypochlorite	manual separation	polyester+wool+elastomultester	polyester+elastomultester	elastomultester	acetate	wool	
acetate	silk		elastomultester	acetone	Lithium hypochlorite		silk+elastomultester	elastomultester		acetate	silk	
acetate	viscose		elastomultester	acetone	sulfuric acid 75%		viscose+elastomultester	elastomultester		acetate	viscose	
acetate	polyamide	viscose	elastomultester	acetone	formic acid 80%)	sulfuric acid 75%	viscose+polyamide+elastomultester	viscose+elastomultester	elastomultester	acetate	polyamide	viscose
acetate	silk	viscose	elastomultester	acetone	Sodium hypochlorite	sulfuric acid 75%	viscose+wool+elastomultester	viscose+elastomultester	elastomultester	acetate	silk	viscose
acetate	wool	viscose	elastomultester	acetone	Sodium hypochlorite	sulfuric acid 75%	viscose+wool+elastomultester	viscose+elastomultester	elastomultester	acetate	wool	viscose
acetate	wool		elastomultester	acetone	Lithium hypochlorite		wool+elastomultester	elastomultester		acetate	wool	
acetate	silk	wool	elastomultester	acetone	sulfuric acid 75%	Lithium hypochlorite	wool+silk+elastomultester	wool+elastomultester	elastomultester	acetate	silk	wool
acetate	triacetate		elastomultester	benzyl alcohol	dichloromethane		triacetate+elastomultester	elastomultester		acetate	triacetate	
chlorofibre	polyamide	acrylic	elastomultester	carbon disulphide + acetone	formic acid 80%)	dimethylformamide	acrylic+polyamide+elastomultester	acrylic+elastomultester	elastomultester	chlorofibre	polyamide	acrylic
chlorofibre	cotton		elastomultester	carbon disulphide + acetone	sulphuric acid 75%		elastomultester+cotton	elastomultester		chlorofibre	cotton	
chlorofibre	modal		elastomultester	carbon disulphide + acetone	sulphuric acid conc		elastomultester+modal	elastomultester		chlorofibre	modal	
chlorofibre	polyamide		elastomultester	carbon disulphide + acetone	formic acid 80%)		elastomultester+polyamide	elastomultester		chlorofibre	polyamide	
chlorofibre	polyester		elastomultester	carbon disulphide + acetone			elastomultester+polyester			chlorofibre		
chlorofibre	viscose		elastomultester	carbon disulphide + acetone	sulphuric acid 75%		elastomultester			chlorofibre	viscose	

Annexe 1: Table of mixtures which may be analyzed using community methods of analysis of mixtures (source: Directives 96/73/EC and 73/44/EEC)

DTI, 2002

Analysis of textile fibre mixtures

Mixture				Solvent 1	Solvent 2	Solvent 3	Residue 1	Residue 2	Residue 3	Soluble 1	Soluble 2	Soluble 3
chlorofibre	wool		elastomultester	carbon disulphide + acetone	Sodium hypochlorite		wool+elastomultester	elastomultester		chlorofibre	wool	
chlorofibre	acrylic	polyamide	elastomultester	carbon disulphide + acetone	dimethylformamide	formic acid 80%)	polyamide+acrylic+elastomultester	polyamide+elastomultester	elastomultester	chlorofibre	acrylic	polyamide
PVC	polyester		elastomultester	carbon disulphide + acetone	manual separation		polyester+elastomultester	elastomultester		PVC		
modacrylic	acrylic		elastomultester	cyclohexanone	dimethylformamide		acrylic+elastomultester	elastomultester		modacrylic	acrylic	
modacrylic	cotton		elastomultester	cyclohexanone	sulphuric acid 75%		cotton+elastomultester	elastomultester		modacrylic	cotton	
acetate	modal		elastomultester	cyclohexanone	formic acid+zinc chloride		modal+elastomultester	elastomultester		acetate	modal	
modacrylic	modal		elastomultester	cyclohexanone	sulphuric acid 75%		modal+elastomultester	elastomultester		modacrylic	modal	
chlorofibre	polyamide		elastomultester	cyclohexanone	formic acid 80%)		polyamide+elastomultester	elastomultester		chlorofibre	polyamide	
triacetate	polyamide		elastomultester	cyclohexanone	formic acid 80%)		polyamide+elastomultester	elastomultester		triacetate	polyamide	
chlorofibre	silk		elastomultester	cyclohexanone	Lithium hypochlorite		silk+elastomultester	elastomultester		chlorofibre	silk	
triacetate	silk		elastomultester	cyclohexanone	Lithium hypochlorite		silk+elastomultester	elastomultester		triacetate	silk	
chlorofibre	viscose		elastomultester	cyclohexanone	sulfuric acid 75%		viscose+elastomultester	elastomultester		chlorofibre	viscose	
triacetate	viscose		elastomultester	cyclohexanone	sulfuric acid 75%		viscose+elastomultester	elastomultester		triacetate	viscose	
modacrylic	wool		elastomultester	cyclohexanone	Lithium hypochlorite		wool+elastomultester	elastomultester		modacrylic	wool	
triacetate	acrylic		elastomultester	dichloromethane	dimethylformamide		acrylic+elastomultester	elastomultester		triacetate	acrylic	
triacetate	silk	acrylic	elastomultester	dichloromethane	Sodium hypochlorite	dimethylformamide	acrylic+silk+elastomultester	acrylic+elastomultester	elastomultester	triacetate	silk	acrylic
triacetate	wool	acrylic	elastomultester	dichloromethane	Sodium hypochlorite	dimethylformamide	acrylic+wool+elastomultester	acrylic+elastomultester	elastomultester	triacetate	wool	acrylic
triacetate	acrylic	cotton	elastomultester	dichloromethane	dimethylformamide	sulphuric acid 75%	cotton+acrylic+elastomultester	cotton+elastomultester	elastomultester	triacetate	acrylic	cotton
triacetate	cotton		elastomultester	dichloromethane	sulphuric acid 75%		cotton+elastomultester	elastomultester		triacetate	cotton	
triacetate	modal	cotton	elastomultester	dichloromethane	formic acid+zinc chloride	sulphuric acid 75%	cotton+modal+elastomultester	cotton+elastomultester	elastomultester	triacetate	modal	cotton
triacetate	polyamide	cotton	elastomultester	dichloromethane	formic acid 80%)	sulphuric acid 75%	cotton+polyamide+elastomultester	cotton+elastomultester	elastomultester	triacetate	polyamide	cotton
triacetate	silk	cotton	elastomultester	dichloromethane	Sodium hypochlorite	sulphuric acid 75%	cotton+silk+elastoester	cotton+elastomultester	elastomultester	triacetate	silk	cotton
triacetate	viscose	cotton	elastomultester	dichloromethane	formic acid+zinc chloride	sulphuric acid 75%	cotton+viscose+elastomultester	cotton+elastomultester	elastomultester	triacetate	viscose	cotton
triacetate	wool	cotton	elastomultester	dichloromethane	Sodium hypochlorite	sulphuric acid 75%	cotton+wool+elastomultester	cotton+elastomultester	elastomultester	triacetate	wool	cotton
triacetate	acrylic	modal	elastomultester	dichloromethane	dimethylformamide	formic acid+zinc chloride	modal+acrylic+elastomultester	modal+elastomultester	elastomultester	triacetate	acrylic	modal
triacetate	modal		elastomultester	dichloromethane	sulphuric acid 75%		modal+elastomultester	elastomultester		triacetate	modal	
triacetate	polyamide	modal	elastomultester	dichloromethane	formic acid 80%)	sulphuric acid 75%	modal+polyamide+elastomultester	modal+elastomultester	elastomultester	triacetate	polyamide	modal
triacetate	silk	modal	elastomultester	dichloromethane	Sodium hypochlorite	sulphuric acid 75%	modal+silk+elastomultester	modal+elastomultester	elastomultester	triacetate	silk	modal
triacetate	wool	modal	elastomultester	dichloromethane	Sodium hypochlorite	sulphuric acid 75%	modal+wool+elastomultester	modal+elastomultester	elastomultester	triacetate	wool	modal
triacetate	polyamide		elastomultester	dichloromethane	formic acid 80%)		polyamide+elastomultester	elastomultester		triacetate	polyamide	
triacetate	silk	polyamide	elastomultester	dichloromethane	Sodium hypochlorite	formic acid 80%	polyamide+silk+elastomultester	polyamide+elastomultester	elastomultester	triacetate	silk	polyamide
triacetate	wool	polyamide	elastomultester	dichloromethane	Sodium hypochlorite		polyamide+wool+elastomultester	polyamide+elastomultester	elastomultester	triacetate	wool	polyamide
triacetate	cotton	polyester	elastomultester	dichloromethane	sulfuric acid 75%	manual separation	polyester+cotton+elastomultester	polyester+elastomultester	elastomultester	triacetate	cotton	
triacetate	polyester		elastomultester	dichloromethane	manual separation		polyester+elastomultester	elastomultester		triacetate		
triacetate	modal	polyester	elastomultester	dichloromethane	sulfuric acid 75%	manual separation	polyester+modal+elastomultester	polyester+elastomultester	elastomultester	triacetate	modal	
triacetate	silk	polyester	elastomultester	dichloromethane	Sodium hypochlorite	manual separation	polyester+silk+elastomultester	polyester+elastomultester	elastomultester	triacetate	silk	
triacetate	viscose	polyester	elastomultester	dichloromethane	sulfuric acid 75%	manual separation	polyester+viscose+elastomultester	polyester+elastomultester	elastomultester	triacetate	viscose	
triacetate	wool	polyester	elastomultester	dichloromethane	Sodium hypochlorite	manual separation	polyester+wool+elastomultester	polyester+elastomultester	elastomultester	triacetate	wool	

Annexe 1: Table of mixtures which may be analyzed using community methods of analysis of mixtures (source: Directives 96/73/EC and 73/44/EEC)

Analysis of textile fibre mixtures

Mixture				Solvent 1	Solvent 2	Solvent 3	Residue 1	Residue 2	Residue 3	Soluble 1	Soluble 2	Soluble 3
triacetate	silk		elastomultester	dichloromethane	Lithium hypochlorite		silk+elastomultester	elastomultester		triacetate	silk	
acetate	acrylic	viscose	elastomultester	dichloromethane	dimethylformamide	sulphuric acid 75%	viscose+acrylic+elastomultester	viscose+elastomultester	elastomultester	acetate	acrylic	viscose
triacetate	acrylic	viscose	elastomultester	dichloromethane	dimethylformamide	sulphuric acid 75%	viscose+acrylic+elastomultester	viscose+elastomultester	elastomultester	triacetate	acrylic	viscose
triacetate	viscose		elastomultester	dichloromethane	sulfuric acid 75%		viscose+elastomultester	elastomultester		triacetate	viscose	
triacetate	polyamide	viscose	elastomultester	dichloromethane	formic acid 80%)	sulfuric acid 75%	viscose+polyamide+elastomultester	viscose+elastomultester	elastomultester	triacetate	polyamide	viscose
triacetate	silk	viscose	elastomultester	dichloromethane	Sodium hypochlorite	sulfuric acid 75%	viscose+silk+elastomultester	viscose+elastomultester	elastomultester	triacetate	silk	viscose
triacetate	wool	viscose	elastomultester	dichloromethane	Sodium hypochlorite	sulfuric acid 75%	viscose+wool+elastomultester	viscose+elastomultester	elastomultester	triacetate	wool	viscose
triacetate	wool		elastomultester	dichloromethane	Lithium hypochlorite		wool+elastomultester	elastomultester		triacetate	wool	
triacetate	silk	wool	elastomultester	dichloromethane	sulfuric acid 75%	Lithium hypochlorite	wool+silk+elastomultester	wool+elastomultester	elastomultester	triacetate	silk	wool
acrylic	cotton		elastomultester	dimethylformamide	sulphuric acid 75%		cotton+elastomultester	elastomultester		acrylic	cotton	
chlorofibre	cotton		elastomultester	dimethylformamide	sulphuric acid 75%		cotton+elastomultester	elastomultester		chlorofibre	cotton	
acrylic	modal	cotton	elastomultester	dimethylformamide	formic acid+zinc chloride	sulphuric acid 75%	cotton+modal+elastomultester	cotton+elastomultester	elastomultester	acrylic	modal	cotton
chlorofibre	modal	cotton	elastomultester	dimethylformamide	formic acid+zinc chloride	sulphuric acid 75%	cotton+modal+elastomultester	cotton+elastomultester	elastomultester	chlorofibre	modal	cotton
chlorofibre	polyamide	cotton	elastomultester	dimethylformamide	formic acid 80%)	sulphuric acid 75%	cotton+polyamide+elastomultester	cotton+elastomultester	elastomultester	chlorofibre	polyamide	cotton
acrylic	silk	cotton	elastomultester	dimethylformamide	Sodium hypochlorite	sulphuric acid 75%	cotton+silk+elastoester	cotton+elastomultester	elastomultester	acrylic	silk	cotton
chlorofibre	viscose	cotton	elastomultester	dimethylformamide	formic acid+zinc chloride	sulphuric acid 75%	cotton+viscose+elastomultester	cotton+elastomultester	elastomultester	chlorofibre	viscose	cotton
acrylic	wool	cotton	elastomultester	dimethylformamide	Sodium hypochlorite	sulphuric acid 75%	cotton+wool+elastomultester	cotton+elastomultester	elastomultester	acrylic	wool	cotton
acrylic	modal		elastomultester	dimethylformamide	formic acid+zinc chloride		modal+elastomultester	elastomultester		acrylic	modal	
chlorofibre	modal		elastomultester	dimethylformamide	formic acid+zinc chloride		modal+elastomultester	elastomultester		chlorofibre	modal	
chlorofibre	polyamide	modal	elastomultester	dimethylformamide	formic acid 80%)	sulphuric acid 75%	modal+polyamide+elastomultester	modal+elastomultester	elastomultester	chlorofibre	polyamide	modal
acrylic	silk	modal	elastomultester	dimethylformamide	Sodium hypochlorite	sulphuric acid 75%	modal+silk+elastomultester	modal+elastomultester	elastomultester	acrylic	silk	modal
acrylic	wool	modal	elastomultester	dimethylformamide	Sodium hypochlorite	sulphuric acid 75%	modal+wool+elastomultester	modal+elastomultester	elastomultester	acrylic	wool	modal
acrylic	polyamide		elastomultester	dimethylformamide	formic acid 80%)		polyamide+elastomultester	elastomultester		acrylic	polyamide	
modacrylic	polyamide		elastomultester	dimethylformamide	formic acid 80%)		polyamide+elastomultester	elastomultester		modacrylic	polyamide	
acrylic	cotton	polyester	elastomultester	dimethylformamide	sulfuric acid 75%	manual separation	polyester+cotton+elastomultester	polyester+elastomultester	elastomultester	acrylic	cotton	
chlorofibre	cotton	polyester	elastomultester	dimethylformamide	sulfuric acid 75%	manual separation	polyester+cotton+elastomultester	polyester+elastomultester	elastomultester	chlorofibre	cotton	
acrylic	polyester		elastomultester	dimethylformamide	manual separation		polyester+elastomultester	elastomultester		acrylic		
modacrylic	polyester		elastomultester	dimethylformamide	manual separation		polyester+elastomultester	elastomultester		modacrylic		
acrylic	modal	polyester	elastomultester	dimethylformamide	sulfuric acid 75%	manual separation	polyester+modal+elastomultester	polyester+elastomultester	elastomultester	acrylic	modal	
chlorofibre	modal	polyester	elastomultester	dimethylformamide	sulfuric acid 75%	manual separation	polyester+modal+elastomultester	polyester+elastomultester	elastomultester	chlorofibre	modal	
acrylic	polyamide	polyester	elastomultester	dimethylformamide	formic acid 80%)	manual separation	polyester+polyamide+elastomultester	polyester+elastomultester	elastomultester	acrylic	polyamide	
acrylic	viscose	polyester	elastomultester	dimethylformamide	sulfuric acid 75%	manual separation	polyester+viscose+elastomultester	polyester+elastomultester	elastomultester	acrylic	viscose	
acrylic	silk	polyester	elastomultester	dimethylformamide	Sodium hypochlorite	manual separation	polyester+wool+elastomultester	polyester+elastomultester	elastomultester	acrylic	silk	
acrylic	wool	polyester	elastomultester	dimethylformamide	Sodium hypochlorite	manual separation	polyester+wool+elastomultester	polyester+elastomultester	elastomultester	acrylic	wool	
chlorofibre	viscose	polyester	elastomultester	dimethylformamide	sulfuric acid 75%	manual separation	polypropylene+elastomultester	polyester+elastomultester	elastomultester	chlorofibre	viscose	
PVC	acrylic		elastomultester	dimethylformamide	carbon disulphide+acetone		PVC+elastomultester	manual separation		acrylic	PVC	
acrylic	silk		elastomultester	dimethylformamide	Lithium hypochlorite		silk+elastomultester	elastomultester		acrylic	silk	
modacrylic	silk		elastomultester	dimethylformamide	Lithium hypochlorite		silk+elastomultester	elastomultester		modacrylic	silk	

Annexe 1: Table of mixtures which may be analyzed using community methods of analysis of mixtures (source: Directives 96/73/EC and 73/44/EEC)

Analysis of textile fibre mixtures

Mixture				Solvent 1	Solvent 2	Solvent 3	Residue 1	Residue 2	Residue 3	Soluble 1	Soluble 2	Soluble 3
acrylic	viscose	cotton	elastomultester	dimethylformamide	formic acid+zinc chloride	sulphuric acid 75%	viscose+cotton+elastomultester	cotton+elastomultester	elastomultester	acrylic	viscose	cotton
acrylic	viscose		elastomultester	dimethylformamide	sulfuric acid 75%		viscose+elastomultester	elastomultester		acrylic	viscose	
modacrylic	viscose		elastomultester	dimethylformamide	sulfuric acid 75%		viscose+elastomultester	elastomultester		modacrylic	viscose	
chlorofibre	polyamide	viscose	elastomultester	dimethylformamide	formic acid 80%)	sulfuric acid 75%	viscose+polyamide+elastomultester	viscose+elastomultester	elastomultester	chlorofibre	polyamide	viscose
acrylic	silk	viscose	elastomultester	dimethylformamide	Sodium hypochlorite	sulfuric acid 75%	viscose+silk+elastomultester	viscose+elastomultester	elastomultester	acrylic	silk	viscose
acrylic	wool	viscose	elastomultester	dimethylformamide	Sodium hypochlorite	sulfuric acid 75%	viscose+wool+elastomultester	viscose+elastomultester	elastomultester	acrylic	wool	viscose
acrylic	wool		elastomultester	dimethylformamide	Lithium hypochlorite		wool+elastomultester	elastomultester		acrylic	wool	
chlorofibre	wool		elastomultester	dimethylformamide	Lithium hypochlorite		wool+elastomultester	elastomultester		chlorofibre	wool	
acrylic	silk	wool	elastomultester	dimethylformamide	sulfuric acid 75%	Lithium hypochlorite	wool+silk+elastomultester	wool+elastomultester	elastomultester	acrylic	silk	wool
modal	cotton		elastomultester	formic acid + zinc chloride	sulphuric acid 75%		cotton+elastomultester	elastomultester		modal	cotton	
viscose	cotton		elastomultester	formic acid + zinc chloride	sulphuric acid 75%		cotton+elastomultester	elastomultester		viscose	cotton	
polyamide	acrylic		elastomultester	formic acid 80%	dimethylformamide		acrylic+elastomultester	elastomultester		polyamide	acrylic	
polyamide	chlorofibre		elastomultester	formic acid 80%	sulphuric acid conc		chlorofibre+elastomultester	elastomultester		polyamide	chlorofibre	
polyamide	acrylic	cotton	elastomultester	formic acid 80%	dimethylformamide	sulphuric acid 75%	cotton+acrylic+elastomultester	cotton+elastomultester	elastomultester	polyamide	acrylic	cotton
polyamide	cotton		elastomultester	formic acid 80%	sulphuric acid 75%		cotton+elastomultester	elastomultester		polyamide	cotton	
polyamide	acrylic	modal	elastomultester	formic acid 80%	dimethylformamide	formic acid+zinc chloride	modal+acrylic+elastomultester	modal+elastomultester	elastomultester	polyamide	acrylic	modal
polyamide	modal		elastomultester	formic acid 80%	sulphuric acid 75%		modal+elastomultester	elastomultester		polyamide	modal	
polyamide	cotton	polyester	elastomultester	formic acid 80%	sulfuric acid 75%	manual separation	polyester+cotton+elastomultester	polyester+elastomultester	elastomultester	polyamide	cotton	
polyamide	polyester		elastomultester	formic acid 80%	manual separation		polyester+elastomultester	elastomultester		polyamide		
polyamide	modal	polyester	elastomultester	formic acid 80%	sulfuric acid 75%	manual separation	polyester+modal+elastomultester	polyester+elastomultester	elastomultester	polyamide	modal	
polyamide	viscose	polyester	elastomultester	formic acid 80%	sulfuric acid 75%	manual separation	polyester+viscose+elastomultester	polyester+elastomultester	elastomultester	polyamide	viscose	
polyamide	polypropylene		elastomultester	formic acid 80%	xylene		polypropylene+elastomultester	elastomultester		polyamide	polypropylene	
PVC	polyamide		elastomultester	formic acid 80%	carbon disulphide+acetone		PVC+elastomultester	manual separation		polyamide	PVC	
polyamide	acrylic	viscose	elastomultester	formic acid 80%	dimethylformamide	sulphuric acid 75%	viscose+acrylic+elastomultester	viscose+elastomultester	elastomultester	polyamide	acrylic	viscose
polyamide	viscose		elastomultester	formic acid 80%	sulfuric acid 75%		viscose+elastomultester	elastomultester		polyamide	viscose	
polyamide	wool		elastomultester	formic acid 80%	Lithium hypochlorite		wool+elastomultester	elastomultester		polyamide	wool	
modacrylic	cotton	polyester	elastomultester	formic acid+zinc chloride	sulfuric acid 75%	manual separation	polyester+cotton+elastomultester	polyester+elastomultester	elastomultester	modacrylic	cotton	
viscose	cotton	polyester	elastomultester	formic acid+zinc chloride	sulfuric acid 75%	manual separation	polyester+cotton+elastomultester	polyester+elastomultester	elastomultester	viscose	cotton	
PVC	viscose		elastomultester	formic acid+zinc chloride	carbon disulphide+acetone		PVC+elastomultester	elastomultester		viscose	PVC	
silk	acrylic		elastomultester	Lithium hypochlorite	dimethylformamide		acrylic+elastomultester	elastomultester		silk	acrylic	
wool	acrylic		elastomultester	Lithium hypochlorite	dimethylformamide		acrylic+elastomultester	elastomultester		wool	acrylic	
silk	chlorofibre		elastomultester	Lithium hypochlorite	sulphuric acid conc		chlorofibre+elastomultester	elastomultester		silk	chlorofibre	
wool	chlorofibre		elastomultester	Lithium hypochlorite	sulphuric acid conc		chlorofibre+elastomultester	elastomultester		wool	chlorofibre	
silk	cotton		elastomultester	Lithium hypochlorite	sulphuric acid 75%		cotton+elastomultester	elastomultester		silk	cotton	
wool	cotton		elastomultester	Lithium hypochlorite	sulphuric acid 75%		cotton+elastomultester	elastomultester		wool	cotton	
silk	polyamide		elastomultester	Lithium hypochlorite	formic acid 80%)		polyamide+elastomultester	elastomultester		silk	polyamide	
wool	polyamide		elastomultester	Lithium hypochlorite	formic acid 80%)		polyamide+elastomultester	elastomultester		wool	polyamide	
silk	polyester		elastomultester	Lithium hypochlorite	manual separation		polyester+elastomultester	elastomultester		silk		

Annexe 1: Table of mixtures which may be analyzed using community methods of analysis of mixtures (source: Directives 96/73/EC and 73/44/EEC)

DTI, 2002

Analysis of textile fibre mixtures

Mixture				Solvent 1	Solvent 2	Solvent 3	Residue 1	Residue 2	Residue 3	Soluble 1	Soluble 2	Soluble 3
wool	polyester		elastomultester	Lithium hypochlorite	manual separation		polyester+elastomultester	elastomultester		wool		
silk	polypropylene		elastomultester	Lithium hypochlorite	xylene		polypropylene+elastomultester	elastomultester		silk	polypropylene	
wool	polypropylene		elastomultester	Lithium hypochlorite	xylene		polypropylene+elastomultester	elastomultester		wool	polypropylene	
PVC	silk		elastomultester	Lithium hypochlorite	carbon disulphide+acetone		PVC+elastomultester	elastomultester		silk	PVC	
PVC	wool		elastomultester	Lithium hypochlorite	carbon disulphide+acetone		PVC+elastomultester	elastomultester		wool	PVC	
silk	viscose		elastomultester	Lithium hypochlorite	sulfuric acid 75%		viscose+elastomultester	elastomultester		silk	viscose	
wool	viscose		elastomultester	Lithium hypochlorite	sulfuric acid 75%		viscose+elastomultester	elastomultester		wool	viscose	
silk	chlorofibre	acrylic	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	dimethylformamide	acrylic+chlorofibre+elastomultester	acrylic+elastomultester	elastomultester	silk	chlorofibre	acrylic
wool	chlorofibre	acrylic	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	dimethylformamide	acrylic+chlorofibre+elastomultester	acrylic+elastomultester	elastomultester	wool	chlorofibre	acrylic
wool	polyamide	acrylic	elastomultester	Sodium hypochlorite	formic acid 80%)	dimethylformamide	acrylic+polyamide+elastomultester	acrylic+elastomultester	elastomultester	wool	polyamide	acrylic
chlorofibre	silk		elastomultester	Sodium hypochlorite	carbon disulphide+acetone		chlorofibre+elastomultester	elastomultester		silk	chlorofibre	
silk	chlorofibre	cotton	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	sulphuric acid 75%	cotton+chlorofibre+elastomultester	cotton+elastomultester	elastomultester	silk	chlorofibre	cotton
wool	chlorofibre	cotton	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	sulphuric acid 75%	cotton+chlorofibre+elastomultester	cotton+elastomultester	elastomultester	wool	chlorofibre	cotton
wool	modal	cotton	elastomultester	Sodium hypochlorite	formic acid + zinc chloride	sulphuric acid 75%	cotton+modal+elastomultester	cotton+elastomultester	elastomultester	wool	modal	cotton
silk	chlorofibre	modal	elastomultester	Sodium hypochlorite	formic acid+zinc chloride	carbon disulphide+acetone	modal+chlorofibre+elastomultester	chlorofibre+elastomultester	elastomultester	silk	modal	chlorofibre
wool	chlorofibre	modal	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	formic acid+zinc chloride	modal+chlorofibre+elastomultester	modal+elastomultester	elastomultester	wool	chlorofibre	modal
silk	chlorofibre	polyamide	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	formic acid 80%)	polyamide +chlorofibre+elastomultester	polyamide+elastomultester	elastomultester	silk	chlorofibre	polyamide
wool	polyamide	cotton	elastomultester	Sodium hypochlorite	formic acid 80%)	sulphuric acid 75%	polyamide +cotton+elastomultester	cotton+elastomultester	elastomultester	wool	polyamide	cotton
wool	chlorofibre	polyamide	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	formic acid 80%)	polyamide+chlorofibre+elastomultester	polyamide+elastomultester	elastomultester	wool	chlorofibre	polyamide
wool	polyamide	modal	elastomultester	Sodium hypochlorite	formic acid 80%)	sulphuric acid 75%	polyamide+modal+elastomultester	modal+elastomultester	elastomultester	wool	polyamide	modal
wool	polyamide	viscose	elastomultester	Sodium hypochlorite	formic acid 80%)	sulphuric acid 75%	polyamide+viscose+elastomultester	viscose+elastomultester	elastomultester	wool	polyamide	viscose
silk	chlorofibre	polyester	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	manual separation	polyester+chlorofibre+elastomultester	polyester+elastomultester	elastomultester	silk	chlorofibre	
wool	chlorofibre	polyester	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	manual separation	polyester+chlorofibre+elastomultester	polyester+elastomultester	elastomultester	wool	chlorofibre	
silk	cotton	polyester	elastomultester	Sodium hypochlorite	sulfuric acid 75%	manual separation	polyester+cotton+elastomultester	polyester+elastomultester	elastomultester	silk	cotton	
wool	cotton	polyester	elastomultester	Sodium hypochlorite	sulfuric acid 75%	manual separation	polyester+cotton+elastomultester	polyester+elastomultester	elastomultester	wool	cotton	
silk	modal	polyester	elastomultester	Sodium hypochlorite	sulfuric acid 75%	manual separation	polyester+modal+elastomultester	polyester+elastomultester	elastomultester	silk	modal	
wool	modal	polyester	elastomultester	Sodium hypochlorite	sulfuric acid 75%	manual separation	polyester+modal+elastomultester	polyester+elastomultester	elastomultester	wool	modal	
wool	polyamide	polyester	elastomultester	Sodium hypochlorite	formic acid 80%)	manual separation	polyester+polyamide+elastomultester	polyester+elastomultester	elastomultester	wool	polyamide	
silk	viscose	polyester	elastomultester	Sodium hypochlorite	sulfuric acid 75%	manual separation	polyester+viscose+elastomultester	polyester+elastomultester	elastomultester	silk	viscose	
wool	viscose	polyester	elastomultester	Sodium hypochlorite	sulfuric acid 75%	manual separation	polyester+viscose+elastomultester	polyester+elastomultester	elastomultester	wool	viscose	
wool	polyamide	polypropylene	elastomultester	Sodium hypochlorite	formic acid 80%)	xylene	polypropylene+polyamide+elastomultester	polypropylene+elastomultester	elastomultester	wool	polyamide	polypropylene
silk	chlorofibre	viscose	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	sulphuric acid 75%	viscose+chlorofibre+elastomultester	viscose+elastomultester	elastomultester	silk	chlorofibre	viscose
wool	chlorofibre	viscose	elastomultester	Sodium hypochlorite	carbon disulphide+acetone	sulphuric acid 75%	viscose+chlorofibre+elastomultester	viscose+elastomultester	elastomultester	wool	chlorofibre	viscose
wool	viscose	cotton	elastomultester	Sodium hypochlorite	formic acid + zinc chloride	sulphuric acid 75%	viscose+cotton+elastomultester	cotton+elastomultester	elastomultester	wool	viscose	cotton
cotton	polyester		elastomultester	sulphuric acid 75%	manual separation		polyester+elastomultester	elastomultester		cotton		
flax	polyester		elastomultester	sulphuric acid 75%	manual separation		polyester+elastomultester	elastomultester		flax		
modal	polyester		elastomultester	sulphuric acid 75%	manual separation		polyester+elastomultester	elastomultester		modal		
viscose	polyester		elastomultester	sulphuric acid 75%	manual separation		polyester+elastomultester	elastomultester		viscose		

Annexe 1: Table of mixtures which may be analyzed using community methods of analysis of mixtures
(source: Directives 96/73/EC and 73/44/EEC)

Analysis of textile fibre mixtures

Mixture				Solvent 1	Solvent 2	Solvent 3	Residue 1	Residue 2	Residue 3	Soluble 1	Soluble 2	Soluble 3
silk	wool	polyester	elastomultester	sulphuric acid 75%	Sodium hypochlorite	manual separation	polyester+wool+elastomultester	polyester+elastomultester	elastomultester	silk	wool	
PVC	cotton		elastomultester	sulphuric acid 75%	carbon disulphide+acetone		PVC+elastomultester	manual separation		cotton	PVC	
PVC	modal		elastomultester	sulphuric acid 75%	carbon disulphide+acetone		PVC+elastomultester	manual separation		modal	PVC	
silk	wool		elastomultester	sulphuric acid 75%	Lithium hypochlorite		wool+elastomultester	elastomultester		silk	wool	
chlorofibre	acetate		elastomultester	sulphuric acid conc	acetone		acetate+elastomultester	elastomultester		chlorofibre	acetate	
chlorofibre	acrylic		elastomultester	sulphuric acid conc	dimethylformamide		acrylic+elastomultester	elastomultester		chlorofibre	acrylic	
acetate	chlorofibre		elastomultester	sulphuric acid conc	acetone		acetate+elastomultester	elastomultester		chlorofibre	acetate	
chlorofibre	cotton		elastomultester	sulphuric acid conc	sulphuric acid 75%		cotton+elastomultester	elastomultester		chlorofibre	cotton	
chlorofibre	modacrylic		elastomultester	sulphuric acid conc	dimethylformamide		modacrylic+elastomultester	elastomultester		chlorofibre	modacrylic	
chlorofibre	polyamide		elastomultester	sulphuric acid conc	formic acid 80%)		polyamide+elastomultester	elastomultester		chlorofibre	polyamide	
chlorofibre	polyester		elastomultester	sulphuric acid conc	manual separation		polyester+elastomultester	elastomultester		chlorofibre		
chlorofibre	triacetate		elastomultester	sulphuric acid conc	dichloromethane		triacetate+elastomultester	elastomultester		chlorofibre	triacetate	
chlorofibre	viscose		elastomultester	sulphuric acid conc	sulfuric acid 75%		viscose+elastomultester	elastomultester		chlorofibre	viscose	
polypropylene	acetate		elastomultester	xylene	acetone		acetate+elastomultester	elastomultester		polypropylene	acetate	
polypropylene	acrylic		elastomultester	xylene	dimethylformamide		acrylic+elastomultester	elastomultester		polypropylene	acrylic	
polypropylene	cotton		elastomultester	xylene	sulphuric acid 75%		cotton+elastomultester	elastomultester		polypropylene	cotton	
polypropylene	modal		elastomultester	xylene	sulphuric acid 75%		modal+elastomultester	elastomultester		polypropylene	modal	
polypropylene	polyamide		elastomultester	xylene	formic acid 80%)		polyamide+elastomultester	elastomultester		polypropylene	polyamide	
polypropylene	polyester		elastomultester	xylene	manual separation		polyester+elastomultester	elastomultester		polypropylene		
polypropylene	silk		elastomultester	xylene	Lithium hypochlorite		silk+elastomultester	elastomultester		polypropylene	silk	
polypropylene	triacetate		elastomultester	xylene	dichloromethane		triacetate+elastomultester	elastomultester		polypropylene	triacetate	
polypropylene	viscose		elastomultester	xylene	sulfuric acid 75%		viscose+elastomultester	elastomultester		polypropylene	viscose	
polypropylene	wool		elastomultester	xylene	Lithium hypochlorite		wool+elastomultester	elastomultester		polypropylene	wool	

Annex II

Microscopic analysis

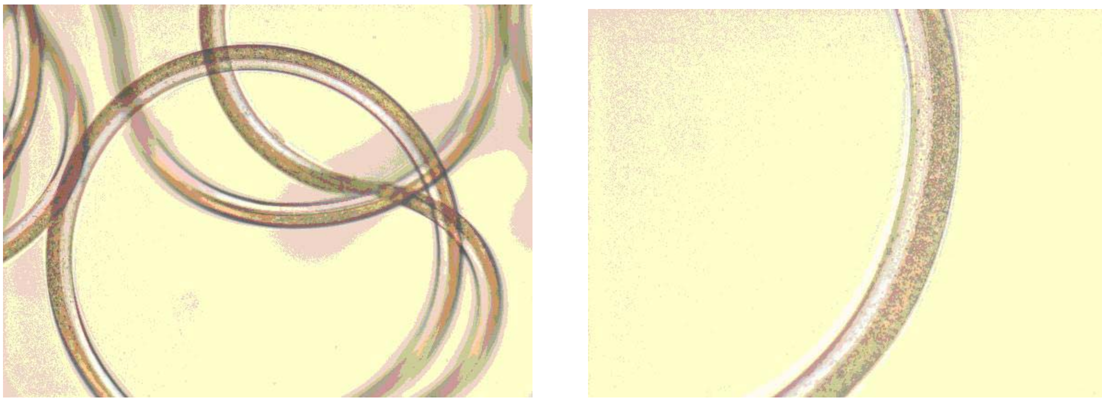


Fig. 1: Pure elastomultiester (sample **021**). 200X and 400X.

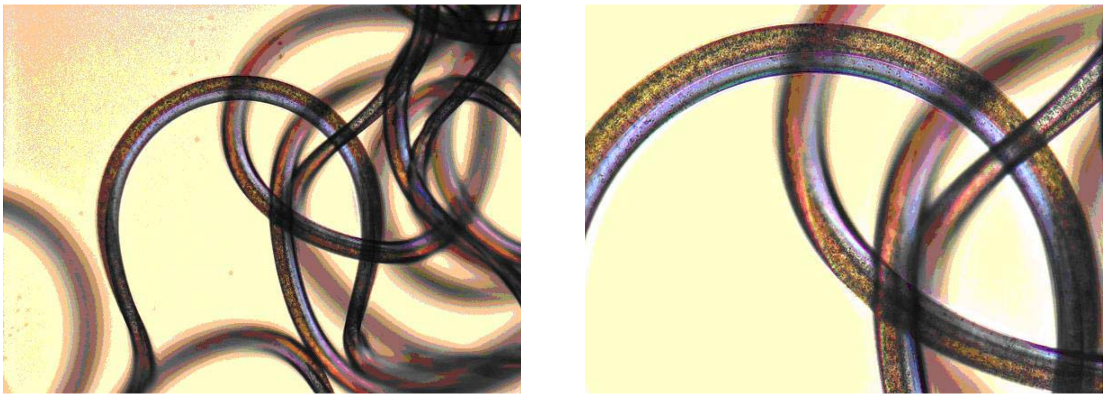


Fig. 2: Pure elastomultiester (sample **021**) after dyeing at 100 °C. 200X and 400X.

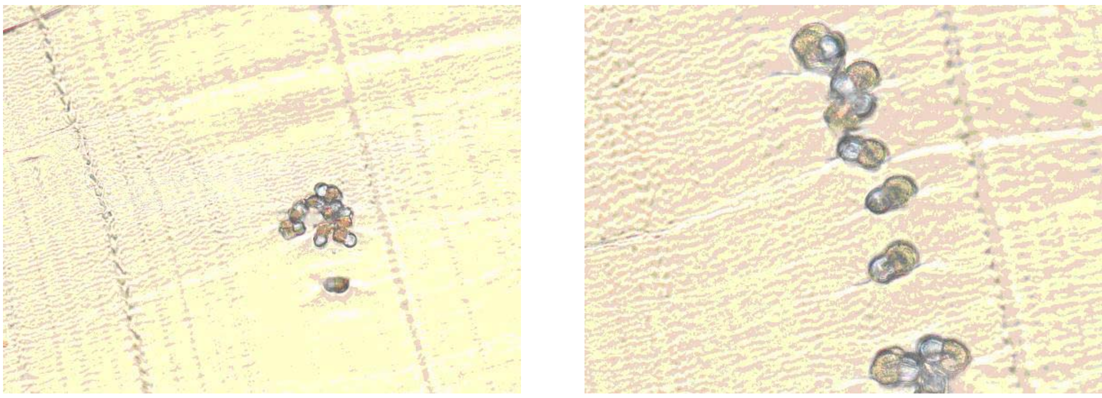


Fig. 3: Pure elastomultiester (sample **021**) after dyeing at 100 °C. 200X and 400X.

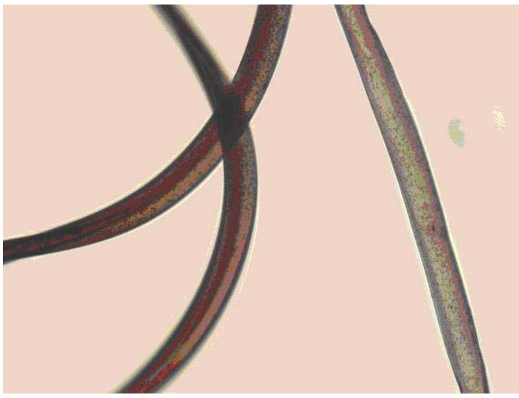


Fig. 4: 52% elastomultiester – 48% polyester (sample **044**). 400X.

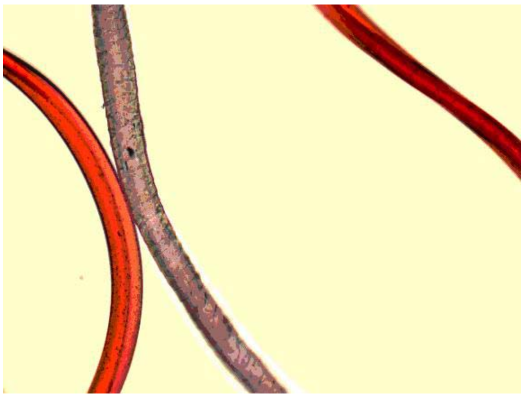


Fig. 5: 48% elastomultiester – 52% wool (sample **023**). 400X.

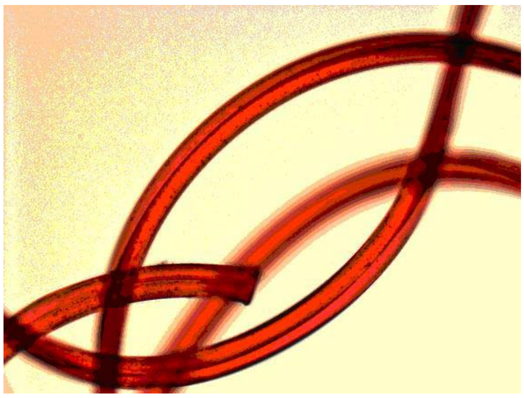


Fig. 6: Residue of elastomultiester after dissolution of wool (sample **023**). 200X.

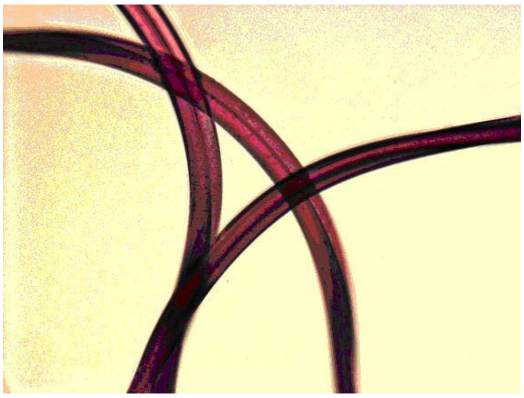


Fig. 7: Residue of elastomultiester after dissolution of wool (sample **022**). 200X.

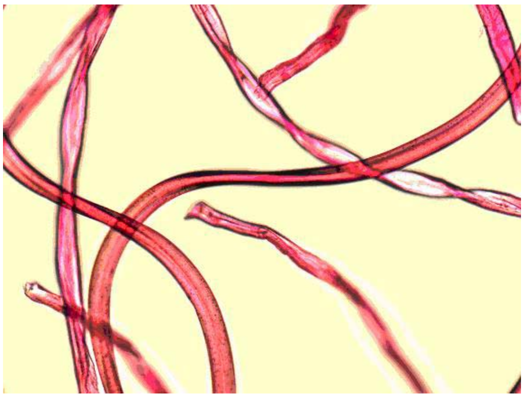


Fig. 8: 27% elastomultiester – 73% cotton (sample **087**). 200X.

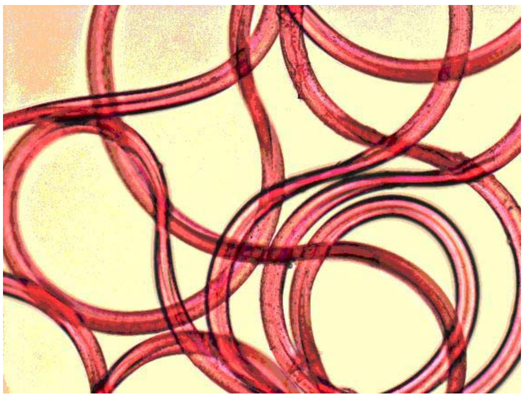


Fig. 9: Residue of elastomultiester after dissolution of cotton (sample **087**). 200X.

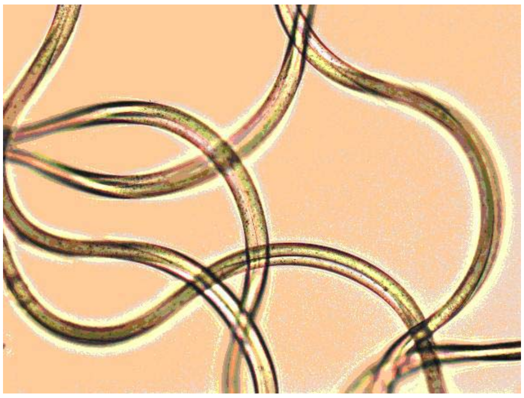


Fig. 10: Residue of elastomultiester after dissolution of cotton (sample **086b**). 200X.

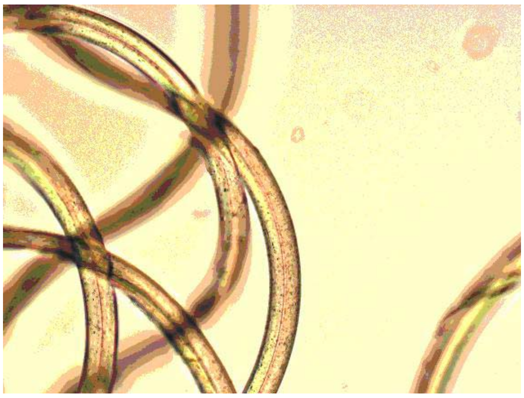


Fig. 11: Residue of elastomultiester after dissolution of cotton (sample **053**). 200X.

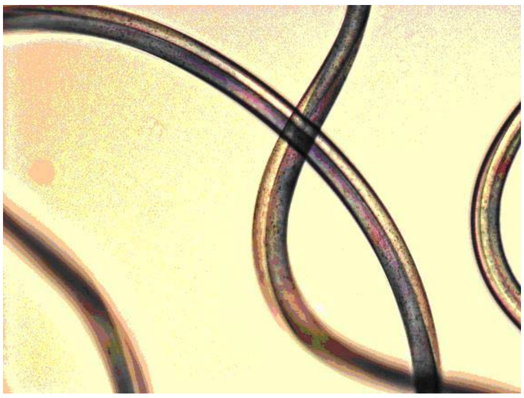


Fig. 12: Residue of elastomultiester after dissolution of cotton (sample **024**). 200X.

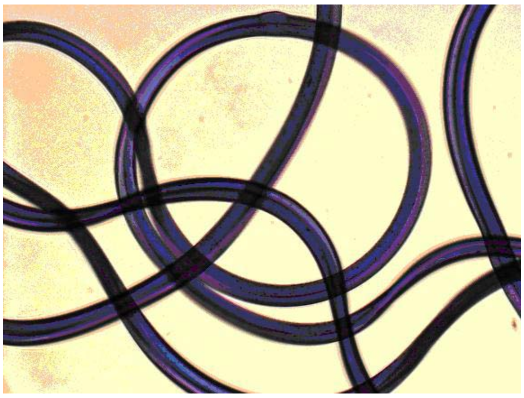


Fig. 13: Residue of elastomultiester after dissolution of cotton (sample **056b**). 200X.

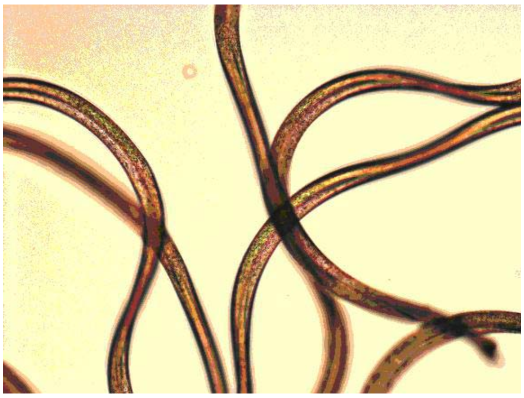


Fig. 14: Residue of elastomultiester after dissolution of cotton (sample **088**). 200X.

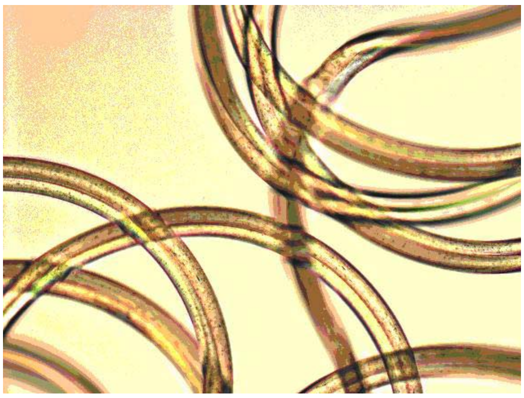


Fig. 15: Residue of elastomultiester after dissolution of cotton (sample **054**). 200X.

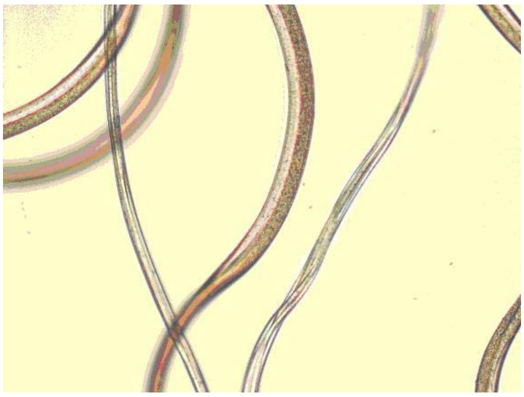


Fig. 16: 20.5% elastomultiester – 22.5% polyester - 57% cotton (sample **046**). 200X.

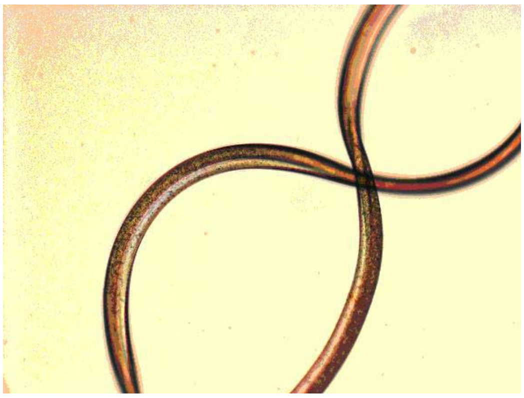


Fig. 17: Residue of elastomultiester and polyester after dissolution of cotton (sample **046**). 200X.

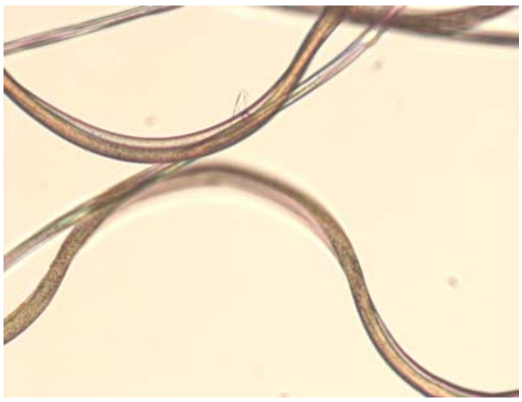


Fig. 18: Residue of elastomultiester and polyester after dissolution of cotton (sample **047**). 200X.

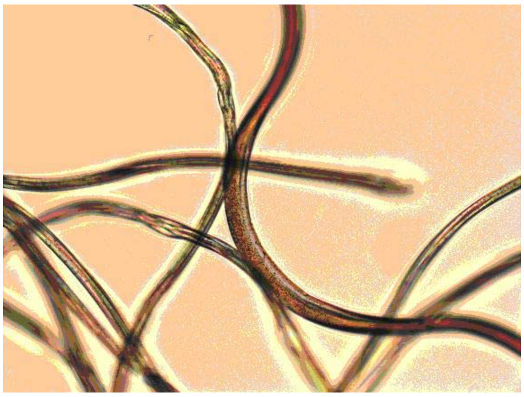


Fig. 19: 36% elastomultiester – 64% (polyester – viscose) (sample **055b**). 200X.

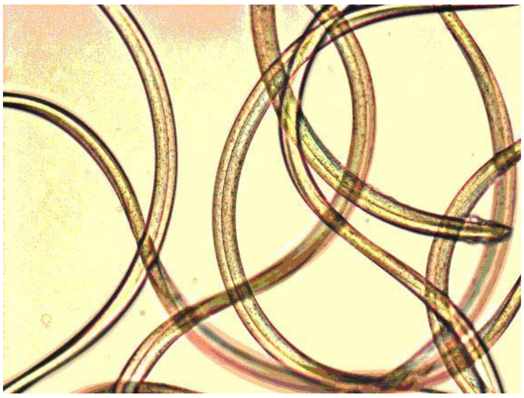


Fig. 20: Residue of elastomultiester and polyester after dissolution of viscose (sample **055b**). 200X.

Fig. 21: 38% elastomultiester – 44% modal – 18% viscose (sample **089**). 200X.

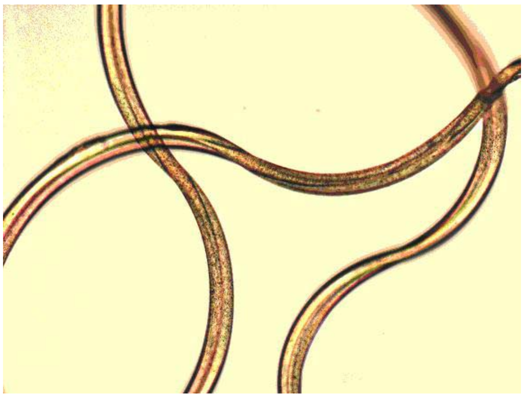


Fig. 22: Residue of elastomultiester after dissolution of modal and viscose (sample **089**). 200X.

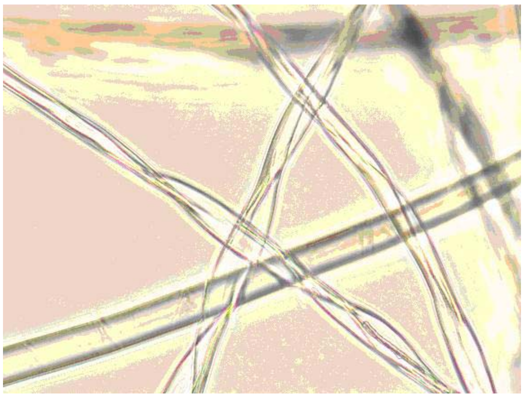
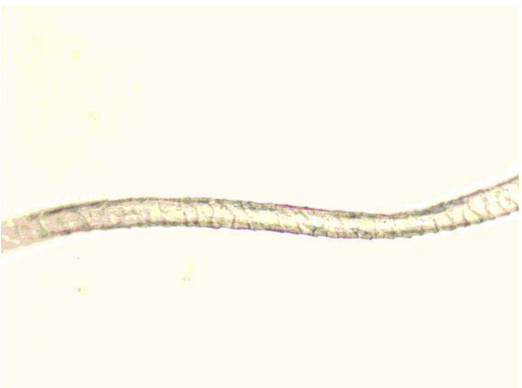


Fig. 23: Pure cotton extracted by sample **054**. 200X and 400X.



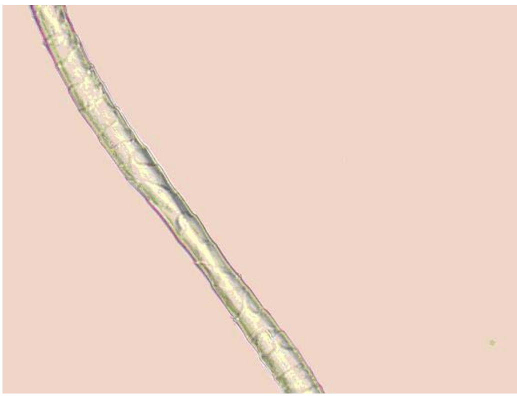


Fig. 24: Pure wool extracted by sample **023**. 200X and 400X.

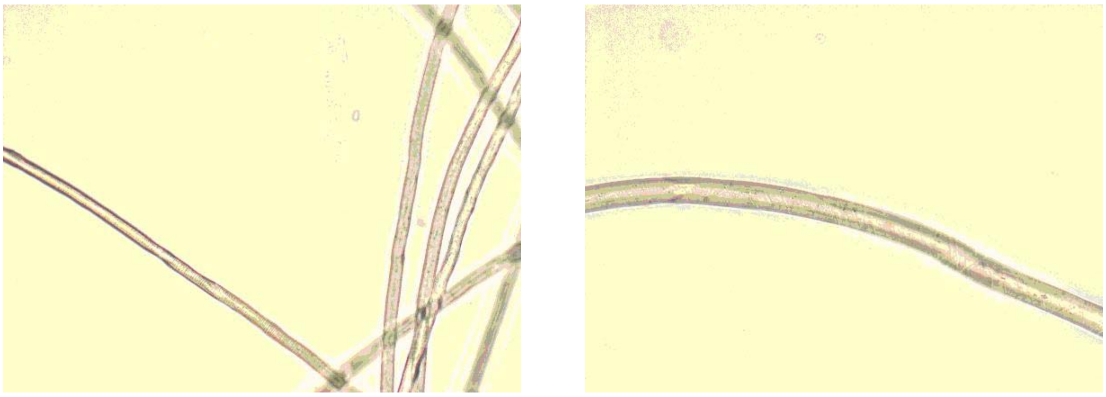


Fig. 25: Pure polyester extracted by sample **048**. 200X and 400X.

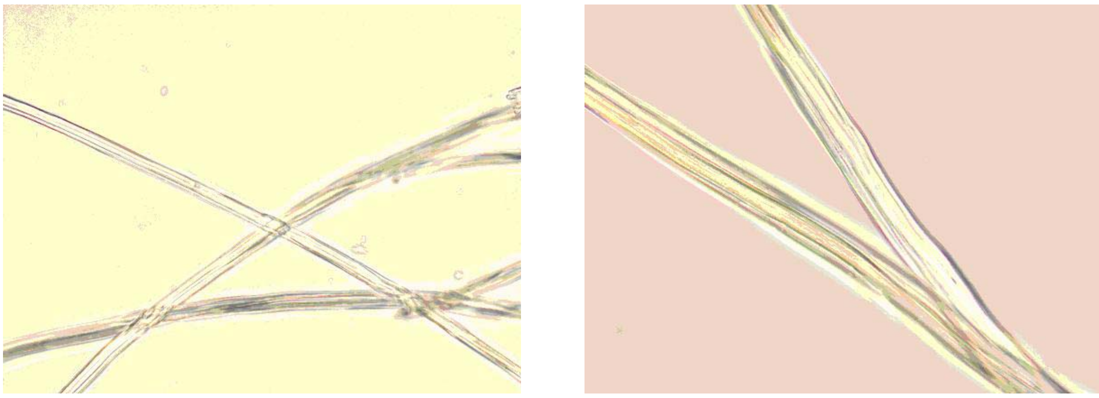


Fig. 26: Pure viscose extracted by sample **089**. 200X and 400X.

Annex III

Spectroscopic analysis

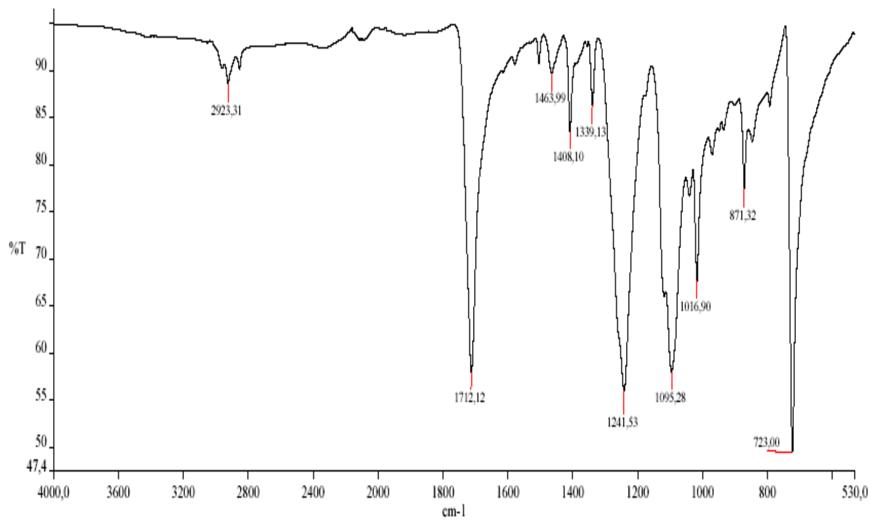


Fig 1: FT-IR spectrum (ATR) of pure elastomultiester (sample **021**).

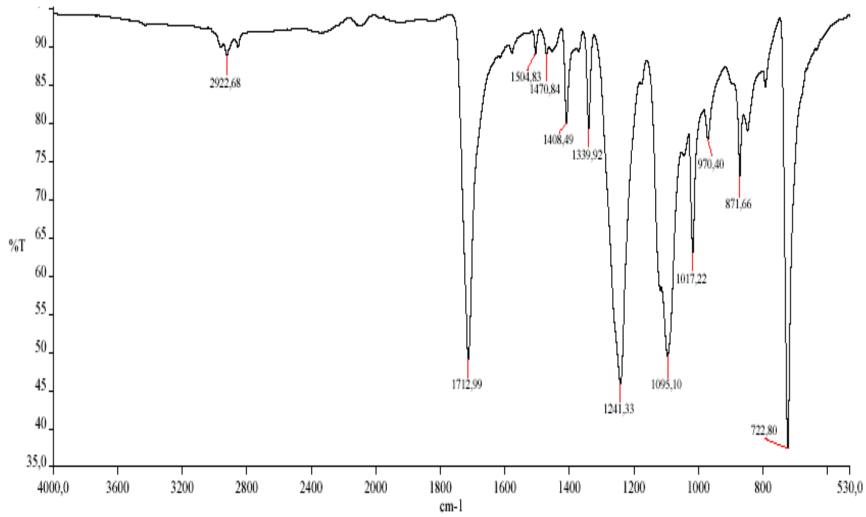


Fig 2: FT-IR spectrum (ATR) of pure polyester 2-GT type (sample **060b**).

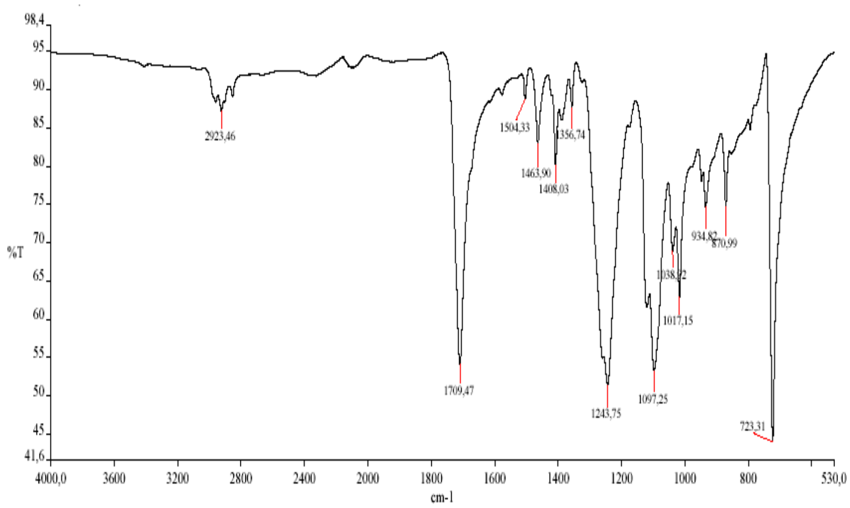


Fig 3: FT-IR spectrum (ATR) of pure polyester 3-GT type (sample **059b**).

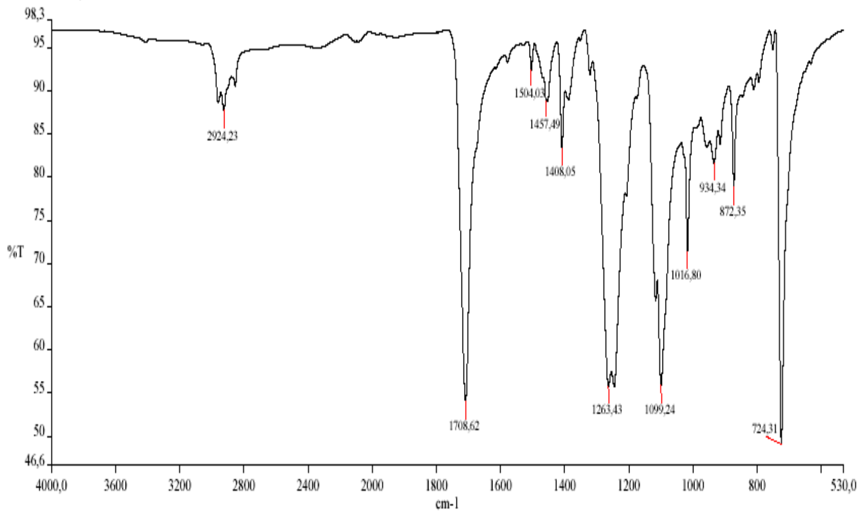


Fig 4: FT-IR spectrum (ATR) of pure polyester 4-GT type (sample **086**).

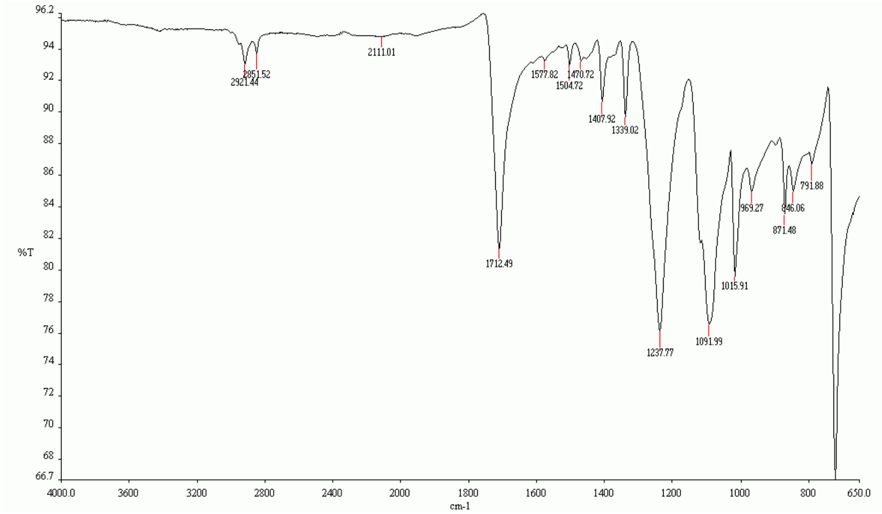


Fig 5: FT-IR spectrum (ATR) of pure polyester extracted from sample **044**.

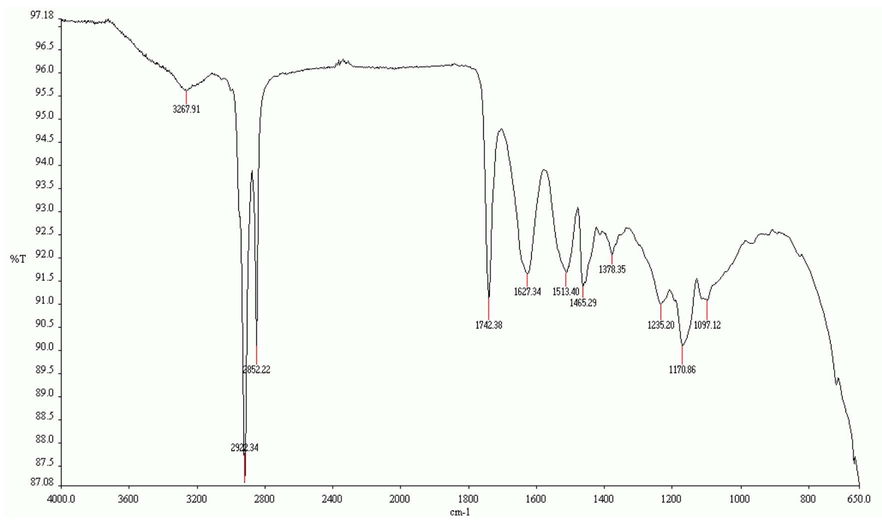


Fig 6: FT-IR spectrum (ATR) of pure wool extracted from sample **023**.

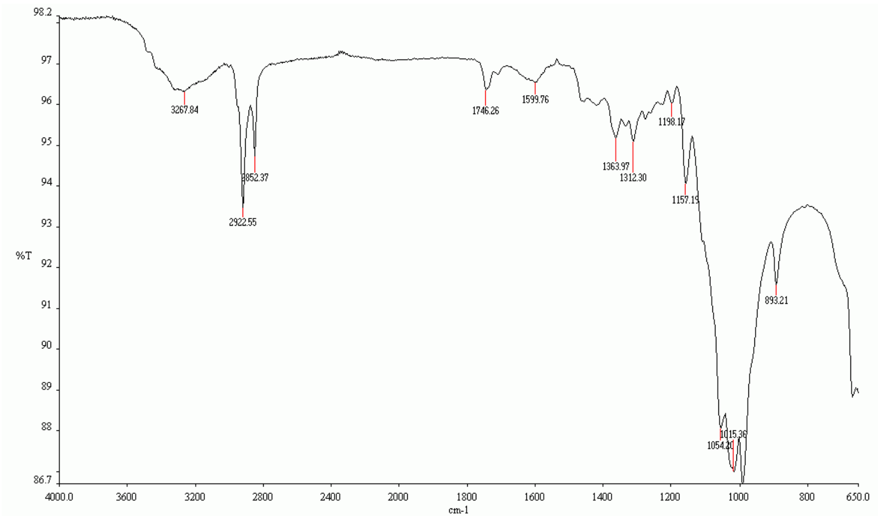


Fig 7: FT-IR spectrum (ATR) of pure cotton extracted from sample **088**.

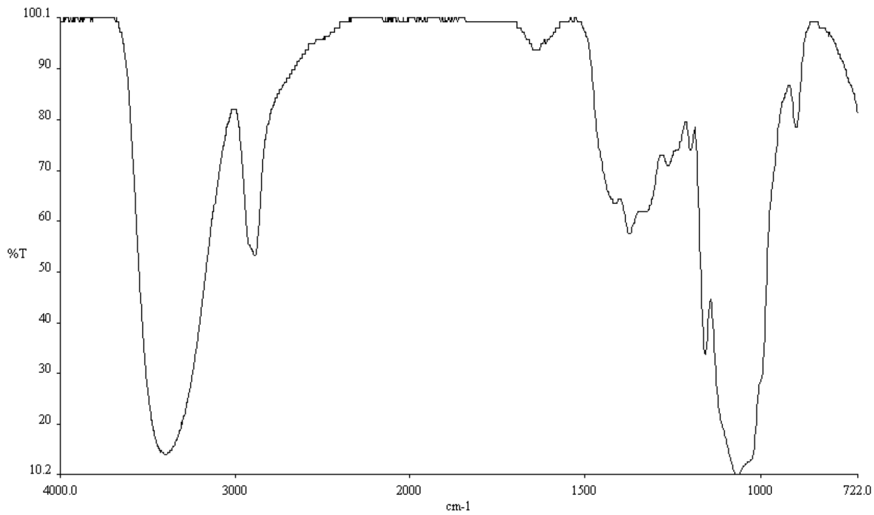


Fig 8: FT-IR spectrum (ATR) of pure viscose extracted from sample **055b**.

Annex IV

Analysis of composition by chemical and manual separation methods

50-52 % elastomultiester – 50-48 % polyester (sample 043)

Method 7

JRC code	sample mass g	T-400 + polyester mass g	T-400 + polyester %
043-1	0.8480	0.8480	100.0
043-2	0.8488	0.8503	100.2
043-3	0.8485	0.8478	99.9
043-4	0.7685	0.7688	100.0
043-5	1.1119	1.1107	99.9
043-6	0.8709	0.8688	99.8
043-7	0.8762	0.8775	100.1
043-8	1.0160	1.0138	99.8
043-9	0.8632	0.8612	99.8
043-10	1.0119	1.0103	99.8
average			**99.9**
uncertainty			**0.1**
SD			**0.2**
RSD			**0.2**
median			99.9
average + SD			100.1
average - SD			99.8
minimum			99.8
maximum			100.2
range			0.4

Method 14

JRC code	sample mass g	T-400 + polyester mass g	T-400 + polyester %
043-1	1.0688	1.0585	99.1
043-2	1.2674	1.2489	98.6
043-3	1.0484	1.0329	98.5
043-4	1.1702	1.1605	99.2
043-5	1.3094	1.2959	99.0
043-6	1.0019	0.9870	98.5
043-7	1.1793	1.1670	99.0
043-8	1.0788	1.0689	99.1
043-9	1.3109	1.3008	99.2
043-10	1.2317	1.2206	99.1
average			**98.9**
uncertainty			**0.2**
SD			**0.3**
RSD			**0.3**
median			99.0
average + SD			99.2
average - SD			98.7
minimum			98.5
maximum			99.2
range			0.7

52 % elastomultiester – 48 % polyester (sample 044)

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	polyester %
044-1	0.9507	0.5062	53.2	46.8
044-2	1.0741	0.5713	53.2	46.8
044-3	0.9507	0.5090	53.5	46.5
044-4	0.9875	0.5304	53.7	46.3
044-5	0.9613	0.5131	53.4	46.6
044-6	1.0262	0.5467	53.3	46.7
044-7	0.8988	0.4790	53.3	46.7
044-8	0.9731	0.5208	53.5	46.5
044-9	1.0080	0.5371	53.3	46.7
044-10	0.9829	0.5240	53.3	46.7
044-11	0.8612	0.4600	53.4	46.6
044-12	0.8788	0.4668	53.1	46.9
044-13	0.8475	0.4531	53.5	46.5
044-14	0.9173	0.4895	53.4	46.6
044-15	1.0951	0.5834	53.3	46.7
044-16	0.9911	0.5290	53.4	46.6
044-17	0.9318	0.4979	53.4	46.6
044-18	0.9149	0.4874	53.3	46.7
044-19	1.0847	0.5792	53.4	46.6
average			**53.4**	**46.6**
uncertainty			**0.1**	**0.1**
SD			**0.1**	**0.1**
RSD			**0.3**	**0.3**
median			53.4	46.6
average + SD			53.5	46.8
average - SD			53.2	46.5
minimum			53.1	46.3
maximum			53.7	46.9
range			0.6	0.6

40 % elastomultiester – 60 % polyester (sample 048)

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	polyester %
048-1	0.8410	0.3521	41.9	58.1
048-2	0.7916	0.3315	41.9	58.1
048-3	0.9641	0.4011	41.6	58.4
048-4	1.1563	0.4858	42.1	57.9
048-5	0.8808	0.3666	41.8	58.2
048-6	0.9856	0.4116	41.8	58.2
048-7	1.2089	0.5075	42.0	58.0
048-8	1.2679	0.5349	42.2	57.8
048-9	0.8977	0.3776	42.2	57.8
048-10	0.8113	0.3384	41.8	58.2
average			**41.9**	**58.1**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.4**	**0.3**
median			41.9	58.1
average + SD			42.1	58.3
average - SD			41.7	57.9
minimum			41.6	57.8
maximum			42.2	58.4
range			0.6	0.6

34 % elastomultiester – 66 % polyester (sample 045)

Manual separation

JRC code	sample mass	elastomultiester mass	elastomultiester	polyester
	g	g	%	%
045-1	1.0963	0.3884	35.5	64.5
045-2	0.8587	0.3047	35.5	64.5
045-3	0.9417	0.3361	35.7	64.3
045-4	0.8931	0.3229	36.2	63.8
045-5	0.9712	0.3444	35.5	64.5
045-6	1.0507	0.3739	35.6	64.4
045-7	0.9197	0.3292	35.9	64.1
045-8	0.8756	0.3137	35.9	64.1
045-9	1.1286	0.4043	35.9	64.1
045-10	1.3399	0.4833	36.1	63.9
045-11	0.9127	0.3230	35.6	64.4
045-12	0.8981	0.3155	35.2	64.8
045-13	0.9683	0.3443	35.6	64.4
045-14	0.9906	0.3518	35.6	64.4
045-15	0.9543	0.3382	35.4	64.6
045-16	0.9655	0.3432	35.6	64.4
045-17	0.8199	0.2892	35.4	64.6
045-18	0.8218	0.2896	35.4	64.6
045-19	0.8911	0.3149	35.6	64.4
045-20	0.8433	0.3001	35.6	64.4
average			**35.6**	**64.4**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.7**	**0.4**
median			35.6	64.4
average + SD			35.9	64.6
average - SD			35.4	64.1
minimum			35.2	63.8
maximum			36.2	64.8
range			0.9	0.9

20 % elastomultiester – 80 % polyester (sample 049)

Method 7

JRC code	sample mass g	T-400 + polyester mass g	T-400 + polyester %
049-1	0.9143	0.9137	99.9
049-2	0.9502	0.9531	100.3
049-3	0.8475	0.8479	100.0
049-4	0.7523	0.7547	100.3
049-5	0.7778	0.7771	99.9
049-6	0.9944	0.9938	99.9
049-7	0.6980	0.6996	100.2
049-8	0.8649	0.8659	100.1
049-9	0.9241	0.9238	100.0
049-10	0.7994	0.7993	100.0
average			100.1
uncertainty			0.1
SD			0.2
RSD			0.2
median			100.0
average + SD			100.2
average - SD			99.9
minimum			99.9
maximum			100.3
range			0.4

Method 14

JRC code	sample mass g	T-400 + polyester mass g	T-400 + polyester %
049-1	1.3043	1.2807	98.2
049-2	1.1224	1.0993	98.0
049-3	1.1794	1.1497	97.5
049-4	1.0564	1.0337	97.9
049-5	0.9890	0.9741	98.5
049-6	1.1626	1.1401	98.1
049-7	1.1386	1.1155	98.0
049-8	1.0803	1.0576	97.9
049-9	1.0138	0.9943	98.1
049-10	1.0032	0.9849	98.2
average			98.0
uncertainty			0.2
SD			0.3
RSD			0.3
median			98.0
average + SD			98.3
average - SD			97.8
minimum			97.5
maximum			98.5
range			1.0

Manual separation

JRC code	sample mass	elastomultiester mass	elastomultiester	polyester
	g	g	%	%
049A	1.0485	0.4106	39.3	60.7
049B	1.1203	0.4340	38.7	61.3
049C	1.1668	0.4512	38.9	61.1
049D	1.3030	0.5106	39.2	60.8
049E	1.1212	0.4362	39.0	61.0
average			**39.0**	**61.0**
uncertainty			**0.3**	**0.3**
SD			**0.2**	**0.2**
RSD			**0.6**	**0.4**
median			39.0	61.0
average + SD			39.3	61.2
average - SD			38.8	60.7
minimum			38.7	0.1
maximum			39.3	64.8
range			0.6	64.7

48 % elastomultiester – 52 % wool (sample 023)

Method 2

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	wool %
023-1	1.1594	0.6026	48.2	51.8
023-2	1.0241	0.5288	47.8	52.2
023-3	1.0977	0.5669	47.8	52.2
023-4	0.9431	0.4861	47.7	52.3
023-5	0.9512	0.4895	47.6	52.4
023-6	1.0524	0.5446	47.9	52.1
023-7	1.0513	0.5456	48.1	51.9
023-8	0.9392	0.4848	47.8	52.2
023-9	1.0911	0.5643	47.9	52.1
023-10	1.0722	0.5509	47.6	52.4
average			47.8	52.2
uncertainty			0.1	0.1
SD			0.2	0.2
RSD			0.4	0.4
median			47.8	52.2
average + SD			48.0	52.3
average - SD			47.7	52.0
minimum			47.6	51.8
maximum			48.2	52.4
range			0.6	0.6

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	wool %
023-1	0.3571	0.1727	44.6	55.4
023-2	0.3428	0.1673	45.1	54.9
023-3	0.3583	0.1755	45.2	54.8
023-4	0.4371	0.2136	45.2	54.8
023-5	0.3317	0.1606	44.8	55.2
023-6	0.4080	0.2009	45.7	54.3
023-7	0.3812	0.1855	45.0	55.0
023-8	0.3365	0.1639	45.0	55.0
023-9	0.3518	0.1727	45.4	54.6
023-10	0.3623	0.1771	45.2	54.8
average			45.1	54.9
uncertainty			0.2	0.2
SD			0.3	0.3
RSD			0.7	0.6
median			45.2	54.8
average + SD			45.4	55.2
average - SD			44.8	54.6
minimum			44.6	54.3
maximum			45.7	55.4
range			1.1	1.1

17 % elastomultiester – 73 % wool (sample 022)

Method 2

JRC code	sample mass	elastomultiester mass	elastomultiester	wool
	g	g	%	%
022-1	0.6770	0.1946	25.7	74.3
022-2	0.8157	0.2362	25.9	74.1
022-3	0.8123	0.2342	25.8	74.2
022-4	0.6793	0.1971	26.0	74.0
022-5	0.6942	0.2033	26.2	73.8
022-6	0.7205	0.2066	25.7	74.3
022-7	0.7167	0.2101	26.3	73.7
022-8	0.6734	0.1957	26.0	74.0
022-9	0.6560	0.1922	26.2	73.8
022-10	0.6087	0.1783	26.2	73.8
average			**26.0**	**74.0**
uncertainty			**0.2**	**0.2**
SD			**0.2**	**0.2**
RSD			**0.9**	**0.3**
median			26.0	74.0
average + SD			26.2	74.2
average - SD			25.8	73.8
minimum			25.7	73.7
maximum			26.3	74.3
range			0.6	0.6

Manual separation

JRC code	sample mass	elastomultiester mass	elastomultiester	wool
	g	g	%	%
022-1	0.1883	0.0524	25.2	74.8
022-2	0.1536	0.0426	25.1	74.9
022-3	0.2773	0.0776	25.0	75.0
022-4	0.2582	0.0711	24.8	75.2
022-5	0.2610	0.0695	24.6	75.4
average			**24.9**	**75.1**
uncertainty			**0.3**	**0.3**
SD			**0.2**	**0.2**
RSD			**1.0**	**0.3**
median			25.0	75.0
average + SD			25.2	75.3
average - SD			24.7	74.8
minimum			24.6	74.8
maximum			25.2	75.4
range			0.6	0.6

62 % elastomultiester – 38 % cotton (sample 054)

Method 7

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	cotton %
054-1	1.2781	0.8206	62.7	37.3
054-2	1.1256	0.7224	62.6	37.4
054-3	1.1449	0.7343	62.6	37.4
054-4	1.0748	0.6844	62.1	37.9
054-5	1.2606	0.8114	62.8	37.2
054-6	1.3977	0.8970	62.6	37.4
054-7	1.3072	0.8351	62.3	37.7
054-8	1.3289	0.8539	62.7	37.3
054-9	1.3687	0.8799	62.7	37.3
054-10	1.2657	0.8102	62.5	37.5
average			**62.6**	**37.4**
uncertainty			**0.2**	**0.2**
SD			**0.2**	**0.2**
RSD			**0.3**	**0.6**
median			62.6	37.4
average + SD			62.8	37.6
average - SD			62.4	37.2
minimum			62.1	37.2
maximum			62.8	37.9
range			0.7	0.7

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	cotton %
054-1	0.6152	0.3887	61.7	38.3
054-2	0.5657	0.3563	61.5	38.5
054-3	0.5359	0.3366	61.9	38.1
054-4	0.7749	0.4918	62.1	37.9
054-5	0.7102	0.4481	61.5	38.5
054-6	0.7039	0.4444	61.7	38.3
054-7	0.6883	0.4328	61.7	38.3
054-8	0.5404	0.3424	61.9	38.1
054-9	0.5383	0.3418	62.0	38.0
054-10	0.6098	0.3863	61.8	38.2
average			**61.8**	**38.2**
uncertainty			**0.2**	**0.2**
SD			**0.2**	**0.2**
RSD			**0.3**	**0.6**
median			61.8	38.2
average + SD			62.0	38.4
average - SD			61.6	38.0
minimum			61.5	37.9
maximum			62.1	38.5
range			0.7	0.7

58 % elastomultiester – 42 % cotton (sample 088)

Method 7

JRC code	sample mass	elastomultiester mass	elastomultiester	cotton
	g	g	%	%
088-1	0.9705	0.5522	55.3	44.7
088-2	0.9747	0.5567	55.5	44.5
088-3	0.9328	0.5326	55.5	44.5
088-4	0.9610	0.5488	55.5	44.5
088-5	1.0106	0.5779	55.5	44.5
088-6	0.8529	0.4888	55.7	44.3
088-7	0.9588	0.5486	55.6	44.4
088-8	0.9151	0.5246	55.7	44.3
088-9	0.8981	0.5093	55.1	44.9
088-10	1.0157	0.5810	55.6	44.4
average			**55.5**	**44.5**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.3**	**0.4**
median			55.5	44.5
average + SD			55.7	44.7
average - SD			55.3	44.3
minimum			55.1	44.3
maximum			55.7	44.9
range			0.6	0.6

Manual separation

JRC code	sample mass	elastomultiester mass	elastomultiester	cotton
	g	g	%	%
088-1	0.9590	0.5427	55.0	45.0
088-2	0.9270	0.5212	54.8	45.2
088-3	1.0076	0.5694	55.0	45.0
088-4	0.8500	0.4799	54.9	45.1
088-5	0.8492	0.4792	55.0	45.0
088-6	0.8974	0.5070	55.0	45.0
088-7	1.0085	0.5687	54.8	45.2
088-8	0.9037	0.5106	54.9	45.1
088-9	0.9717	0.5490	55.0	45.0
088-10	0.9207	0.5202	55.0	45.0
average			**54.9**	**45.1**
uncertainty			**0.1**	**0.1**
SD			**0.1**	**0.1**
RSD			**0.2**	**0.2**
median			55.0	45.0
average + SD			55.0	45.2
average - SD			54.8	45.0
minimum			54.8	45.0
maximum			55.0	45.2
range			0.3	0.3

42 % elastomultiester – 58 % cotton (sample 056b)

Method 7

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	cotton %
056b-1	0.7859	0.3468	42.5	57.5
056b-2	0.7171	0.3158	42.4	57.6
056b-3	0.8624	0.3799	42.4	57.6
056b-4	0.8015	0.3503	42.1	57.9
056b-5	0.8702	0.3808	42.1	57.9
056b-6	0.7117	0.3141	42.5	57.5
056b-7	0.7537	0.3342	42.7	57.3
056b-8	0.7325	0.3245	42.7	57.3
056b-9	0.6735	0.2968	42.4	57.6
056b-10	0.7857	0.3458	42.4	57.6
average			**42.4**	**57.6**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.5**	**0.3**
median			42.4	57.6
average + SD			42.6	57.8
average - SD			42.2	57.4
minimum			42.1	57.3
maximum			42.7	57.9
range			0.6	0.6

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	cotton %
056b-1	0.9536	0.4275	43.0	57.0
056b-2	0.8827	0.3897	42.5	57.5
056b-3	0.9315	0.4116	42.5	57.5
056b-4	0.9486	0.4195	42.6	57.4
056b-5	1.0659	0.4712	42.6	57.4
056b-6	0.9873	0.4374	42.6	57.4
056b-7	1.0479	0.4642	42.6	57.4
056b-8	1.1259	0.5010	42.8	57.2
056b-9	0.9754	0.4328	42.7	57.3
056b-10	1.0272	0.4530	42.5	57.5
average			**42.7**	**57.3**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.4**	**0.3**
median			42.6	57.4
average + SD			42.8	57.5
average - SD			42.5	57.2
minimum			42.5	57.0
maximum			43.0	57.5
range			0.5	0.5

32 % elastomultiester – 68 % cotton (sample 024)

Method 7

JRC code	sample mass	elastomultiester mass	elastomultiester	cotton
	g	g	%	%
024-1	0.9399	0.3565	36.4	63.6
024-2	0.9907	0.3718	36.0	64.0
024-3	0.9684	0.3705	36.7	63.3
024-4	0.9834	0.3715	36.2	63.8
024-5	1.0406	0.3948	36.4	63.6
024-6	1.1398	0.4267	35.9	64.1
024-7	1.0089	0.3789	36.0	64.0
024-8	1.1049	0.4143	35.9	64.1
024-9	1.2214	0.4708	37.0	63.0
024-10	0.9603	0.3666	36.6	63.4
024-11	1.2587	0.4699	35.8	64.2
024-12	1.1712	0.4400	36.0	64.0
024-13	0.9465	0.3619	36.7	63.3
024-14	0.9394	0.3562	36.4	63.6
024-15	1.1831	0.4429	35.9	64.1
024-16	0.9497	0.3579	36.1	63.9
024-17	1.0268	0.3865	36.1	63.9
024-18	1.1540	0.4330	36.0	64.0
024-19	1.0840	0.4112	36.4	63.6
024-20	0.9535	0.3583	36.0	64.0
average			**36.2**	**63.8**
uncertainty			**0.2**	**0.2**
SD			**0.3**	**0.3**
RSD			**0.9**	**0.5**
median			36.1	63.9
average + SD			36.5	64.1
average - SD			35.9	63.5
minimum			35.8	63.0
maximum			37.0	64.2
range			1.2	1.2

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	cotton %
024-1	1.0741	0.4034	36.0	64.0
024-2	1.1334	0.4303	36.5	63.5
024-3	1.0888	0.4145	36.6	63.4
024-4	1.2651	0.4809	36.5	63.5
024-5	1.0528	0.3997	36.5	63.5
024-6	1.1313	0.4283	36.3	63.7
024-7	1.3565	0.5176	36.6	63.4
024-8	1.0757	0.4118	36.8	63.2
024-9	1.1697	0.4442	36.4	63.6
024-10	1.1476	0.4351	36.4	63.6
average			**36.5**	**63.5**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.5**	**0.3**
median			36.5	63.5
average + SD			36.7	63.7
average - SD			36.3	63.3
minimum			36.0	63.2
maximum			36.8	64.0
range			0.8	0.8

25.9 % elastomultiester – 74.1 % cotton (sample 053)

Method 7

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	cotton %
053-1	1.0416	0.2739	25.0	75.0
053-2	0.9525	0.2528	25.3	74.7
053-3	0.9828	0.2627	25.4	74.6
053-4	0.9832	0.2638	25.5	74.5
053-5	0.9712	0.2576	25.2	74.8
053-6	1.0417	0.2781	25.4	74.6
053-7	1.0186	0.2679	25.0	75.0
053-8	0.9608	0.2549	25.3	74.7
053-9	0.9199	0.2434	25.2	74.8
average			**25.3**	**74.7**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.7**	**0.2**
median			25.3	74.7
average + SD			25.4	74.9
average - SD			25.1	74.6
minimum			25.0	74.5
maximum			25.5	75.0
range			0.5	0.5

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	cotton %
053-1	0.9545	0.2542	25.4	74.6
053-2	0.9716	0.2610	25.6	74.4
053-3	0.9260	0.2482	25.6	74.4
053-4	0.8904	0.2360	25.3	74.7
053-5	0.8857	0.2345	25.3	74.7
053-6	0.9044	0.2422	25.6	74.4
053-7	0.8386	0.2240	25.6	74.4
053-8	0.9807	0.2641	25.8	74.2
053-9	0.9318	0.2463	25.3	74.7
053-10	0.8962	0.2369	25.2	74.8
053-11	1.1547	0.3096	25.5	74.5
053-12	1.2162	0.3221	25.2	74.8
053-13	1.2492	0.3333	25.4	74.6
053-14	1.1789	0.3143	25.4	74.6
053-15	1.2431	0.3289	25.2	74.8
average			**25.4**	**74.6**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.7**	**0.2**
median			25.4	74.6
average + SD			25.6	74.7
average - SD			25.3	74.4
minimum			25.2	74.2
maximum			25.8	74.8
range			0.6	0.6

38 % elastomultiester – 62 % cotton (sample 086b)

Method 7

JRC code	sample mass	elastomultiester mass	elastomultiester	cotton
	g	g	%	%
086b-1	0.9379	0.3767	38.6	61.4
086b-2	0.6307	0.2531	38.5	61.5
086b-3	0.7444	0.2988	38.5	61.5
086b-4	0.9102	0.3663	38.7	61.3
086b-5	0.6922	0.2784	38.6	61.4
086b-6	0.7884	0.3179	38.7	61.3
086b-7	0.8512	0.3415	38.5	61.5
086b-8	0.8133	0.3259	38.5	61.5
086b-9	0.9600	0.3867	38.7	61.3
086b-10	0.7950	0.3186	38.5	61.5
average			**38.6**	**61.4**
uncertainty			**0.1**	**0.1**
SD			**0.1**	**0.1**
RSD			**0.2**	**0.1**
median			38.6	61.4
average + SD			38.7	61.5
average - SD			38.5	61.3
minimum			38.5	61.3
maximum			38.7	61.5
range			0.2	0.2

Manual separation

JRC code	sample mass	elastomultiester mass	elastomultiester	cotton
	g	g	%	%
086b-1	0.7014	0.2706	37.0	63.0
086b-2	0.6378	0.2454	37.0	63.0
086b-3	0.9166	0.3541	37.2	62.8
086b-4	0.7864	0.3016	37.0	63.0
086b-5	0.7386	0.2851	37.2	62.8
086b-6	0.7982	0.3081	37.2	62.8
086b-7	0.8307	0.3207	37.2	62.8
086b-8	0.7574	0.2924	37.1	62.9
086b-9	0.8701	0.3359	37.1	62.9
086b-10	0.7893	0.3047	37.1	62.9
average			**37.1**	**62.9**
uncertainty			**0.1**	**0.1**
SD			**0.1**	**0.1**
RSD			**0.2**	**0.1**
median			37.1	62.9
average + SD			37.2	63.0
average - SD			37.0	62.8
minimum			37.0	62.8
maximum			37.2	63.0
range			0.2	0.2

27 % elastomultiester – 73 % cotton (sample 087)

Method 7

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	cotton %
087-1	1.0632	0.3105	27.8	72.2
087-2	1.0465	0.3049	27.8	72.2
087-3	1.1629	0.3399	27.9	72.1
087-4	0.9989	0.2914	27.8	72.2
087-5	1.1690	0.3415	27.9	72.1
087-6	1.2014	0.3517	27.9	72.1
087-7	1.1459	0.3352	27.9	72.1
087-8	1.0642	0.3109	27.9	72.1
087-9	1.1480	0.3339	27.7	72.3
average			**27.8**	**72.2**
uncertainty			**0.04**	**0.04**
SD			**0.1**	**0.1**
RSD			**0.2**	**0.1**
median			27.9	72.1
average + SD			27.9	72.2
average - SD			27.8	72.1
minimum			27.7	72.1
maximum			27.9	72.3
range			0.2	0.2

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	cotton %
087-1	0.9282	0.2749	28.3	71.7
087-2	0.9099	0.2665	28.0	72.0
087-3	1.0348	0.3062	28.2	71.8
087-4	0.8787	0.2581	28.1	71.9
087-5	0.8560	0.2526	28.3	71.7
087-6	0.8518	0.2496	28.0	72.0
087-7	0.9324	0.2732	28.1	71.9
087-8	0.8799	0.2578	28.0	72.0
087-9	0.9544	0.2796	28.0	72.0
087-10	0.8959	0.2625	28.1	71.9
average			**28.1**	**71.9**
uncertainty			**0.1**	**0.1**
SD			**0.1**	**0.1**
RSD			**0.4**	**0.2**
median			28.1	71.9
average + SD			28.2	72.0
average - SD			28.0	71.8
minimum			28.0	71.7
maximum			28.3	72.0
range			0.3	0.3

27.4 % elastomultiester – 15.2 % polyester – 57 % cotton (sample 047)

Method 7

JRC code	sample mass g	T400 + polyester mass g	T400 + polyester %	cotton %
047-1	0.9898	0.4371	42.5	57.5
047-2	0.9018	0.3963	42.3	57.7
047-3	0.8940	0.3922	42.2	57.8
047-4	1.0077	0.4444	42.5	57.5
047-5	0.8631	0.3804	42.4	57.6
047-6	1.5329	0.6746	42.4	57.6
047-7	0.7981	0.3541	42.7	57.3
047-8	0.9170	0.4021	42.2	57.8
047-9	0.8674	0.3822	42.4	57.6
047-10	0.8821	0.3897	42.5	57.5
average			**42.4**	**57.6**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.4**	**0.3**
median			42.4	57.6
average + SD			42.6	57.7
average - SD			42.3	57.4
minimum			42.2	57.3
maximum			42.7	57.8
range			0.5	0.5

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	polyester %	cotton %
047-1	1.0329	0.2919	27.2	14.9	57.9
047-2	1.1298	0.3136	26.8	15.1	58.1
047-3	1.1571	0.3286	27.3	15.0	57.8
047-4	1.0663	0.2987	27.0	14.9	58.1
047-5	1.0086	0.2819	27.0	15.1	57.9
047-6	1.0238	0.2868	27.0	14.9	58.0
047-7	1.0065	0.2833	27.2	15.1	57.7
047-8	1.0163	0.2841	26.9	15.0	58.1
047-9	1.0651	0.3022	27.4	14.8	57.9
047-10	0.9974	0.2813	27.2	15.0	57.8
average			**27.1**	**15.0**	**57.9**
uncertainty			**0.1**	**0.1**	**0.1**
SD			**0.2**	**0.1**	**0.1**
RSD			**0.6**	**0.7**	**0.2**
median			27.1	15.0	57.9
average + SD			27.3	15.1	58.1
average - SD			26.9	14.9	57.8
minimum			26.8	14.8	57.7
maximum			27.4	15.1	58.1
range			0.5	0.4	0.4

20.5 % elastomultiester – 22.5 % polyester – 57 % cotton (sample 046)

Method 7

JRC code	sample mass g	T400 + polyester mass g	T400 + polyester %	cotton %
046-1	0.8505	0.3808	43.1	56.9
046-2	0.8986	0.4026	43.2	56.8
046-3	0.8968	0.4014	43.1	56.9
046-4	0.8649	0.3877	43.2	56.8
046-5	0.8970	0.3962	42.5	57.5
046-6	0.9385	0.4196	43.1	56.9
046-7	0.7736	0.3455	43.0	57.0
046-8	0.8908	0.3936	42.5	57.5
046-9	0.9556	0.4275	43.1	56.9
046-10	0.7926	0.3497	42.5	57.5
average			42.9	57.1
uncertainty			0.2	0.2
SD			0.3	0.3
RSD			0.7	0.5
median			43.1	56.9
average + SD			43.2	57.4
average - SD			42.6	56.8
minimum			42.5	56.8
maximum			43.2	57.5
range			0.7	0.7

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	polyester %	cotton %
046-1	1.0371	0.2161	20.1	22.3	57.6
046-2	1.0340	0.2151	20.1	22.4	57.6
046-3	0.9128	0.1913	20.2	22.3	57.5
046-4	0.8811	0.1844	20.2	22.4	57.4
046-5	1.0405	0.2193	20.3	22.3	57.4
046-6	1.0256	0.2141	20.1	22.4	57.5
046-7	0.9596	0.2015	20.2	22.5	57.3
046-8	1.0098	0.2097	20.0	22.3	57.7
046-9	1.0432	0.2196	20.3	22.3	57.4
046-10	1.0312	0.2159	20.2	22.4	57.4
average			20.2	22.3	57.5
uncertainty			0.1	0.1	0.1
SD			0.1	0.1	0.1
RSD			0.5	0.2	0.2
median			20.2	22.3	57.5
average + SD			20.3	22.4	57.6
average - SD			20.1	22.3	57.4
minimum			20.0	22.3	57.3
maximum			20.3	22.5	57.7
range			0.3	0.2	0.4

36 % elastomultiester – 64 % (polyester – viscose)

(sample 055b)

Method 7

JRC code	sample mass g	T-400 + polyester mass g	T-400 + polyester %	viscose %
055b-1	0.9008	0.6387	68.6	31.4
055b-2	0.8603	0.6088	68.5	31.5
055b-3	0.9113	0.6428	68.3	31.7
055b-4	1.0244	0.7260	68.6	31.4
055b-5	1.0112	0.7196	68.9	31.1
055b-6	1.0271	0.7314	69.0	31.0
055b-7	1.1657	0.8313	69.1	30.9
055b-8	1.0336	0.7358	68.9	31.1
055b-9	1.0008	0.7119	68.9	31.1
055b-10	1.1301	0.8056	69.0	31.0
average			**68.8**	**31.2**
uncertainty			**0.2**	**0.2**
SD			**0.3**	**0.3**
RSD			**0.4**	**0.9**
median			68.9	31.1
average + SD			69.0	31.5
average - SD			68.5	31.0
minimum			68.3	30.9
maximum			69.1	31.7
range			0.8	0.8

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	polyester + viscose %
055b-1	0.9506	0.3556	36.2	63.8
055b-2	1.0546	0.3914	35.9	64.1
055b-3	0.9725	0.3600	35.8	64.2
055b-4	1.0247	0.3816	36.0	64.0
055b-5	1.0407	0.3838	35.6	64.4
055b-6	1.0875	0.3976	35.5	64.5
055b-7	1.0504	0.3889	35.7	64.3
055b-8	0.9981	0.3673	35.7	64.3
055b-9	1.0205	0.3765	35.7	64.3
055b-10	0.9548	0.3532	35.8	64.2
average			**35.8**	**64.2**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.6**	**0.3**
median			35.7	64.3
average + SD			36.0	64.4
average - SD			35.6	64.0
minimum			35.5	63.8
maximum			36.2	64.5
range			0.7	0.7

38 % elastomultiester – 44 % modal – 18% viscose

(sample 089)

Method 7

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	modal + viscose %
089-1	0.7813	0.3124	37.4	62.6
089-2	1.0000	0.3985	37.3	62.7
089-3	0.8469	0.3368	37.2	62.8
089-4	0.9716	0.3841	37.0	63.0
089-5	0.7222	0.2861	37.1	62.9
089-6	0.7952	0.3196	37.6	62.4
089-7	0.8440	0.3365	37.3	62.7
089-8	0.9096	0.3636	37.4	62.6
089-9	0.9031	0.3625	37.6	62.4
089-10	0.8103	0.3263	37.7	62.3
average			**37.4**	**62.6**
uncertainty			**0.2**	**0.2**
SD			**0.2**	**0.2**
RSD			**0.6**	**0.4**
median			37.4	62.6
average + SD			37.6	62.9
average - SD			37.1	62.4
minimum			37.0	62.3
maximum			37.7	63.0
range			0.7	0.7

Manual separation

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	viscose + modal %
089-1	1.1082	0.4394	37.1	62.9
089-2	1.2724	0.5012	37.0	63.0
089-3	0.9335	0.3707	37.3	62.7
089-4	1.0344	0.4101	37.2	62.8
089-5	1.1812	0.4639	36.9	63.1
089-6	0.8573	0.3395	37.1	62.9
089-7	1.0345	0.4053	36.8	63.2
089-8	0.9886	0.3915	37.2	62.8
089-9	0.8746	0.3443	36.9	63.1
089-10	0.9327	0.3693	37.1	62.9
average			**37.1**	**62.9**
uncertainty			**0.1**	**0.1**
SD			**0.2**	**0.2**
RSD			**0.4**	**0.2**
median			37.1	62.9
average + SD			37.2	63.1
average - SD			36.9	62.8
minimum			36.8	62.7
maximum			37.3	63.2
range			0.5	0.5

100 % elastomultiester (sample 021)

Method 1

JRC code	sample mass	elastomultiester mass	elastomultiester	d
	g	g	%	
021-1	0.5858	0.5819	99.3	1.007
021-2	0.5925	0.5900	99.6	1.004
021-3	0.5856	0.5831	99.6	1.004
021-4	0.5734	0.5704	99.5	1.005
021-5	0.5867	0.5834	99.4	1.006
021-6	0.5704	0.5685	99.7	1.003
021-7	0.5703	0.5666	99.4	1.007
021-8	0.5717	0.5691	99.6	1.005
021-9	0.5684	0.5660	99.6	1.004
021-10	0.5738	0.5713	99.6	1.004
021-11	0.4737	0.4721	99.7	1.003
021-12	0.3913	0.3901	99.7	1.003
021-13	0.4080	0.4071	99.8	1.002
021-14	0.3927	0.3915	99.7	1.003
021-15	0.4357	0.4344	99.7	1.003
average			**99.6**	**1.004**
uncertainty			**0.1**	**0.001**
SD			**0.1**	**0.001**
RSD			**0.1**	**0.131**
median			99.6	1.004
average + SD			99.7	1.006
average - SD			99.5	1.003
minimum			99.3	1.002
maximum			99.8	1.007
range			0.4	0.004

Method 2

JRC code	sample mass	elastomultiester mass	elastomultiester	d
	g	g	%	
021-1	0.4781	0.4758	99.5	1.005
021-2	0.4536	0.4514	99.5	1.005
021-3	0.4043	0.4034	99.8	1.002
021-4	0.4839	0.4831	99.8	1.002
021-5	0.4151	0.4128	99.5	1.006
021-6	0.5549	0.5530	99.7	1.003
021-7	0.4525	0.4525	100.0	1.000
021-8	0.4651	0.4650	100.0	1.000
021-9	0.5113	0.5104	99.8	1.002
021-10	0.4065	0.4044	99.5	1.005
average			**99.7**	**1.003**
uncertainty			**0.1**	**0.001**
SD			**0.2**	**0.002**
RSD			**0.2**	**0.208**
median			99.7	1.003
average + SD			99.9	1.005
average - SD			99.5	1.001
minimum			99.5	1.000
maximum			100.0	1.006
range			0.5	0.006

Method 4

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	d
021-1	0.5744	0.5715	99.5	1.005
021-2	0.5763	0.5734	99.5	1.005
021-3	0.5654	0.5633	99.6	1.004
021-4	0.5655	0.5646	99.8	1.002
021-5	0.7267	0.7222	99.4	1.006
021-6	0.5909	0.5888	99.6	1.004
021-7	0.5872	0.5849	99.6	1.004
021-8	0.5721	0.5692	99.5	1.005
021-9	0.5936	0.5905	99.5	1.005
021-10	0.6067	0.6029	99.4	1.006
021-11	1.0726	1.0694	99.7	1.003
021-12	1.1008	1.0963	99.6	1.004
021-13	1.0071	1.0016	99.5	1.005
021-14	0.9787	0.9749	99.6	1.004
021-15	0.4742	0.4727	99.7	1.003
average			**99.6**	**1.004**
uncertainty			**0.1**	**0.001**
SD			**0.1**	**0.001**
RSD			**0.1**	**0.128**
median			99.6	1.004
average + SD			99.7	1.006
average - SD			99.4	1.003
minimum			99.4	1.002
maximum			99.8	1.006
range			0.5	0.005

Method 6

JRC code	sample mass	elastomultiester mass	elastomultiester	d
	g	g	%	
021-1	0.5711	0.5588	97.9	1.022
021-2	0.5943	0.5800	97.6	1.025
021-3	0.5824	0.5678	97.5	1.026
021-4	0.5694	0.5586	98.1	1.019
021-5	0.5829	0.5682	97.5	1.026
021-6	0.5766	0.5645	97.9	1.021
021-7	0.6127	0.6012	98.2	1.019
021-8	0.5880	0.5743	97.7	1.024
021-9	0.5870	0.5722	97.5	1.026
021-10	0.5933	0.5778	97.4	1.027
021-11	0.4719	0.4626	98.1	1.020
021-12	0.5761	0.5650	98.1	1.020
021-13	0.8410	0.8242	98.0	1.020
021-14	0.5247	0.5137	97.9	1.021
021-15	0.7490	0.7337	98.0	1.021
average			**97.8**	**1.022**
uncertainty			**0.1**	**0.002**
SD			**0.3**	**0.003**
RSD			**0.3**	**0.266**
median			97.9	1.021
average + SD			98.1	1.025
average - SD			97.6	1.020
minimum			97.4	1.019
maximum			98.2	1.027
range			0.7	0.008

Method 7

JRC code	sample mass	elastomultiester mass	elastomultiester	d
	g	g	%	
021-1	0.9693	0.9665	99.7	1.003
021-2	0.7188	0.7182	99.9	1.001
021-3	0.7690	0.7674	99.8	1.002
021-4	0.8314	0.8270	99.5	1.005
021-5	0.9046	0.9045	100.0	1.000
021-6	1.0328	1.0290	99.6	1.004
021-7	0.8056	0.8026	99.6	1.004
021-8	0.8754	0.8739	99.8	1.002
021-9	0.6619	0.6585	99.5	1.005
021-10	0.7549	0.7547	100.0	1.000
average			**99.7**	**1.003**
uncertainty			**0.1**	**0.001**
SD			**0.2**	**0.002**
RSD			**0.2**	**0.189**
median			99.8	1.002
average + SD			99.9	1.004
average - SD			99.6	1.001
minimum			99.5	1.000
maximum			100.0	1.005
range			0.5	0.005

Method 8

JRC code	sample mass	elastomultiester mass	elastomultiester	% other	d
	g	g	%	%	
021-1	0.7213	0.7044	97.7	2.3	1.024
021-2	0.4734	0.4624	97.7	2.3	1.024
021-3	0.7880	0.7700	97.7	2.3	1.023
021-4	0.6443	0.6288	97.6	2.4	1.025
021-5	0.5699	0.5568	97.7	2.3	1.024
021-6	0.7272	0.7111	97.8	2.2	1.023
021-7	0.6429	0.6278	97.7	2.3	1.024
021-8	0.6356	0.6212	97.8	2.2	1.023
021-9	0.4783	0.4661	97.5	2.5	1.026
021-10	0.6556	0.6413	97.9	2.1	1.022
021-11	0.5123	0.5043	98.4	1.6	1.016
021-12	0.6017	0.5934	98.6	1.4	1.014
021-13	0.4402	0.4345	98.7	1.3	1.013
021-14	0.4797	0.4726	98.5	1.5	1.015
021-15	0.6969	0.6843	98.2	1.8	1.018
average			**98.0**	**2.0**	**1.021**
uncertainty			**0.2**	**0.2**	**0.002**
SD			**0.4**	**0.4**	**0.004**
RSD			**0.4**	**20.0**	**0.428**
median			97.8	2.2	1.023
average + SD			98.4	2.4	1.025
average - SD			97.6	1.6	1.017
minimum			97.5	1.3	1.013
maximum			98.7	2.5	1.026
range			1.2	1.2	0.013

Method 9

JRC code	sample mass g	elastomultiester mass g	elastomultiester %	d
021-1	0.5155	0.5121	99.4	1.007
021-2	0.6189	0.6158	99.5	1.005
021-3	0.5983	0.5952	99.5	1.005
021-4	0.7551	0.7518	99.6	1.004
021-5	0.7702	0.7664	99.5	1.005
021-6	0.5221	0.5195	99.5	1.005
021-7	0.6283	0.6248	99.5	1.006
021-8	0.7965	0.7920	99.4	1.006
021-9	0.2307	0.2293	99.4	1.006
021-10	0.5321	0.5293	99.5	1.005
021-11	0.4847	0.4839	99.8	1.002
021-12	0.4379	0.4378	100.0	1.000
021-13	0.5614	0.5607	99.9	1.001
021-14	0.4187	0.4182	99.9	1.001
021-15	0.4745	0.4733	99.8	1.003
average			**99.6**	**1.004**
uncertainty			**0.1**	**0.001**
SD			**0.2**	**0.002**
RSD			**0.2**	**0.207**
median			99.5	1.005
average + SD			99.8	1.006
average - SD			99.4	1.002
minimum			99.4	1.000
maximum			100.0	1.007
range			0.6	0.006

Method 13

JRC code	sample mass	elastomultiester mass	elastomultiester	d
	g	g	%	
021-1	0.7281	0.7122	97.8	1.022
021-2	0.7852	0.7702	98.1	1.019
021-3	0.8862	0.8680	98.0	1.021
021-4	0.7862	0.7691	97.9	1.022
021-5	0.5255	0.5141	97.9	1.022
021-6	0.7725	0.7550	97.8	1.023
021-7	0.6509	0.6378	98.0	1.021
021-8	0.8524	0.8341	97.9	1.022
021-9	0.6485	0.6353	98.0	1.021
021-10	0.5021	0.4916	97.9	1.021
021-11	0.5071	0.4979	98.2	1.018
021-12	0.5309	0.5211	98.2	1.019
021-13	0.4746	0.4669	98.4	1.016
021-14	0.5057	0.4983	98.6	1.015
021-15	0.5238	0.5152	98.4	1.017
average			**98.1**	**1.020**
uncertainty			**0.1**	**0.001**
SD			**0.2**	**0.002**
RSD			**0.2**	**0.244**
median			98.0	1.021
average + SD			98.3	1.023
average - SD			97.8	1.018
minimum			97.8	1.015
maximum			98.6	1.023
range			0.8	0.008

Method 14

JRC code	sample mass	elastomultiester mass	elastomultiester
	g	g	%
021-1	0.4930	0.0003	99.9
021-2	0.4954	0.0023	99.5
021-3	0.4448	0.0006	99.9
021-4	0.4264	0.0023	99.5
021-5	0.4841	0.0002	100.0
021-6	0.4822	0.0012	99.7
021-7	0.4739	0.0008	99.8
021-8	0.4639	0.0004	99.9
021-9	0.4772	0.0002	100.0
021-10	0.5168	0.0001	100.0
average			**99.8**
uncertainty			**0.1**
SD			**0.2**
RSD			**0.2**
median			99.9
average + SD			100.0
average - SD			99.6
minimum			99.5
maximum			100.0
range			0.5

Annex V

Determination of elastic properties (BISFA method)

Pure elastomultiester from bobbin (sample 021)

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN	load at 300% elongation mN
021-1	3519.4	588.3	587.7	3607.7	1.1
021-2	3976.4	555.0	555.0	3976.4	51.4
021-3	3404.7	456.3	456.3	3404.7	81.5
021-4	3207.4	437.8	434.1	3594.2	96.5
021-5	3784.9	491.3	491.3	3784.9	65.2
021-6	3510.1	517.9	514.9	4129.2	68.5
021-7	3551.4	470.7	470.7	3551.4	75.3
021-8	3700.1	462.8	462.8	3700.1	79.6
021-9	3906.1	447.4	447.4	3906.1	96.9
021-10	3559.5	469.4	469.4	3559.5	73.6
021-11	3231.9	349.9	347.9	3272.0	909.5
021-12	3014.6	489.6	486.3	3089.8	64.5
021-13	3617.9	499.0	499.0	3617.9	62.4
021-14	2842.6	500.7	498.1	3142.0	57.6
021-15	3678.1	489.5	486.0	3727.0	69.4
021-16	3412.1	422.1	419.8	3415.8	124.9
021-17	3847.1	439.8	439.8	3847.1	91.3
021-18	3158.7	439.1	437.4	3484.8	96.9
021-19	2615.6	518.6	514.0	3199.0	52.1
021-20	1178.0	528.7	501.4	3580.6	68.4
021-21	2874.7	443.5	441.4	3304.1	91.2
021-22	3517.7	370.6	370.6	3517.7	409.1
021-23	2795.4	429.1	429.1	2795.4	86.5
021-24	3677.1	431.3	431.3	3677.1	108.1
021-25	3383.9	472.5	465.1	3571.4	77.8
021-26	3365.9	458.4	457.1	3411.9	84.1
021-27	136.5	371.5	371.5	136.5	60.2
021-28	3382.9	465.0	463.4	3826.2	80.3
021-29	2918.5	451.8	451.8	2918.5	77.3
021-30	3478.7	472.6	472.6	3478.7	76.4
021-31	4020.7	477.9	477.9	4020.7	73.2
021-32	3707.4	353.5	352.6	3741.5	1042.5
021-33	962.6	516.5	466.9	3755.8	75.3
021-34	3757.9	421.6	420.8	3860.3	125.4
021-35	3369.2	397.8	393.1	3483.1	202.2
021-36	3460.4	486.4	483.6	3522.4	65.1
021-37	3602.1	520.3	520.3	3602.1	56.7
021-38	3764.2	509.1	509.1	3764.2	70.0
021-39	3448.5	363.4	361.2	3448.8	504.0
021-40	3576.2	540.2	539.3	3613.8	52.7
021-41	3777.7	446.4	442.4	3854.7	111.4
021-42	3304.7	558.1	557.7	3328.1	49.3
021-43	3712.8	410.0	410.0	3712.8	152.6
021-44	3460.9	418.5	403.6	3909.9	156.3
021-45	3523.9	524.5	524.5	3523.9	52.6
021-46	1999.5	504.2	478.9	3905.1	78.0
021-47	3630.2	448.6	448.6	3630.2	93.8
021-48	3823.8	508.4	506.4	3862.7	61.1

021-49	2664.8	475.3	458.3	3709.2	83.5
021-50	3218.0	419.6	419.6	3218.0	114.3
021-51	2828.7	453.2	450.9	2871.8	74.6
021-52	2608.8	518.7	477.6	4121.7	81.6
021-53	3589.3	398.2	395.8	3904.9	177.5
021-54	3447.0	533.4	528.0	3748.2	55.4
021-55	3406.1	468.5	468.5	3406.1	81.6
021-56	3277.7	430.3	430.3	3277.7	95.7
021-57	3762.4	431.4	430.0	3796.9	112.5
021-58	3912.0	451.6	451.6	3912.0	97.3
021-59	2456.2	519.9	494.5	3841.7	75.3
021-60	2738.4	447.6	435.8	3816.2	119.8
021-61	3448.7	508.4	505.7	3515.4	58.8
021-62	2321.2	392.6	392.6	2321.2	121.4
021-63	3271.4	510.9	510.9	3271.4	59.6
021-64	2955.3	518.8	516.3	3424.9	56.9
021-65	3510.4	401.6	398.5	3924.1	213.9
021-66	3432.8	439.6	439.6	3432.8	103.4
021-67	2688.4	426.9	424.5	3347.2	124.0
021-68	2797.9	355.8	355.8	2797.9	395.6
021-69	2214.6	548.8	493.4	3410.5	65.4
021-70	3203.5	486.6	486.6	3203.5	68.4
021-71	1252.1	541.0	492.4	3464.8	69.9
021-72	3558.1	464.4	464.4	3558.1	78.4
021-73	3353.6	535.7	535.7	3353.6	63.1
021-74	3546.6	464.7	464.7	3546.6	85.1
021-75	2186.2	434.7	422.8	3525.4	136.5
021-76	2352.0	471.4	440.3	4124.0	108.5
021-77	3500.2	443.7	433.8	4197.1	116.1
021-78	4154.7	418.2	418.2	4154.7	138.2
021-79	2930.2	494.2	492.2	3323.2	66.2
021-80	1113.6	546.7	464.5	4096.7	86.4
021-81	3676.2	508.4	508.4	3676.2	62.0
021-82	3355.3	489.4	489.4	3355.3	63.6
021-83	2583.6	439.2	430.7	3406.3	106.9
021-84	3430.3	437.2	435.9	3435.5	98.6
021-85	3672.6	426.2	426.2	3672.6	123.9
021-86	3692.3	487.6	487.6	3692.3	63.9
021-87	3720.9	502.2	502.1	3721.8	61.3
021-88	3591.6	474.4	473.6	3704.2	70.7
021-89	3603.8	495.8	495.8	3603.8	61.0
021-90	3801.3	482.0	482.0	3801.3	68.9
021-91	2535.8	366.0	366.0	2535.8	223.8
021-92	511.0	566.1	455.3	3445.2	83.3
021-93	3887.1	430.5	430.5	3887.1	108.0
021-94	3766.2	488.1	485.9	3800.7	69.3
021-95	89.6	277.0	277.0	89.6	-
021-96	4209.9	524.7	524.7	4209.9	59.6
021-97	3679.9	519.1	519.1	3679.9	58.3
021-98	3197.5	433.8	431.4	3745.0	103.1
021-99	4087.6	528.6	527.4	4102.7	54.5
021-100	3806.2	459.5	459.5	3806.2	77.5
021-101	3608.7	594.8	591.9	4130.8	44.6
021-102	2802.2	571.8	565.9	3446.1	47.1
021-103	3694.8	483.9	483.6	3699.5	64.9
021-104	3609.2	527.3	520.3	3886.8	63.7
021-105	3488.0	534.3	534.3	3488.0	48.6
021-106	3931.1	465.2	465.1	3931.9	77.8

021-107	3557.1	527.5	525.9	3654.5	54.4
021-108	3353.6	537.4	537.4	3353.6	44.4
021-109	2939.2	503.5	495.2	3831.0	61.9
021-110	3927.6	499.3	496.4	3929.5	58.8
average	**3206.0**	**471.6**	**465.3**	**3537.3**	**110.4**
uncertainty		**10.5**	**9.9**		
SD	**794.2**	**56.0**	**53.2**	**574.7**	**137.1**
RSD	**24.8**	**11.9**	**11.4**	**16.2**	**124.3**
median	3454.5	472.5	466.0	3610.8	77.3
average + SD	4000.3	527.6	518.5	4112.0	247.5
average - SD	2411.8	415.6	412.2	2962.7	-26.8
minimum	89.6	277.0	277.0	89.6	1.1
maximum	4209.9	594.8	591.9	4209.9	1042.5
range	4120.3	317.9	314.9	4120.3	1041.4

Sample preparation: yarns NOT singularly boiled.

YARN
AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN	load at 300% elongation mN
021-1	4123.9	563.0	562.5	4127.5	33.3
021-2	3612.7	547.6	544.5	3907.1	42.0
021-3	3906.2	402.5	401.2	3915.4	157.4
021-4	3403.6	568.1	566.2	3768.2	42.9
021-5	3868.0	467.2	467.2	3868.0	68.6
021-6	3381.5	541.0	537.5	3523.4	44.3
021-7	3156.0	462.6	462.6	3156.0	62.1
021-8	3533.3	483.7	483.7	3533.3	46.3
021-9	3799.3	512.1	505.8	3933.7	46.1
021-10	3917.4	519.6	519.6	3917.4	46.0
021-11	2846.9	515.5	505.2	4057.9	45.2
021-12	3669.0	458.5	456.5	3777.0	70.8
021-13	3946.2	541.2	539.7	3950.8	37.6
021-14	3058.7	520.1	520.1	3058.7	31.7
021-15	3351.8	532.8	528.5	4120.1	40.0
021-16	3614.7	459.1	458.1	3661.2	58.3
021-17	4171.0	449.3	449.3	4171.0	65.8
021-18	1398.4	562.5	522.4	3720.1	42.6
021-19	3672.5	424.3	423.7	3683.5	98.6
021-20	3299.8	557.0	530.9	3612.3	39.9
average	**3486.5**	**504.4**	**499.3**	**3773.1**	**56.0**
uncertainty		**23.3**	**21.7**		
SD	**603.8**	**49.8**	**46.4**	**296.6**	**28.7**
RSD	**17.3**	**9.9**	**9.3**	**7.9**	**51.3**
median	3613.7	517.5	512.7	3822.5	45.6
average + SD	4090.3	554.2	545.7	4069.7	84.7
average - SD	2882.8	454.5	452.9	3476.6	27.3
minimum	1398.4	402.5	401.2	3058.7	31.7
maximum	4171.0	568.1	566.2	4171.0	157.4
range	2772.6	165.6	165.0	1112.3	125.6

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
021-1	70.9	251.8	251.8	70.9
021-2	79.0	233.0	233.0	79.0
021-3	58.6	141.5	141.5	58.6
021-4	9.3	355.1	124.8	43.1
021-5	55.9	193.9	193.9	55.9
021-6	52.7	182.6	182.6	52.7
021-7	115.3	124.5	124.5	115.3
021-8	93.5	293.0	292.7	93.8
021-9	70.2	129.6	129.6	70.2
021-10	79.4	113.6	113.6	79.4
021-11	66.1	206.6	206.6	66.1
021-12	87.8	208.5	208.5	87.8
021-13	51.6	145.6	145.6	51.6
021-14	88.3	273.6	273.1	88.6
021-15	79.5	146.5	146.5	79.5
021-16	51.9	175.2	175.2	51.9
021-17	67.8	141.3	141.3	67.8
021-18	81.7	140.7	140.7	81.7
021-19	12.5	326.3	188.9	26.1
021-20	70.1	295.8	295.8	70.1
021-21	9.7	364.2	204.0	32.5
021-22	102.3	288.2	285.7	102.5
021-23	10.0	361.7	321.8	19.7
021-24	51.8	191.8	191.8	51.8
021-25	80.7	187.2	187.2	80.7
021-26	60.3	197.5	197.5	60.3
021-27	78.3	138.6	138.6	78.3
021-28	83.3	211.5	211.5	83.3
021-29	71.5	228.5	228.5	71.5
average	**65.2**	**215.4**	**195.7**	**68.0**
uncertainty		**28.9**	**22.1**	
SD	**27.0**	**75.9**	**58.2**	**21.8**
RSD	**41.4**	**35.2**	**29.7**	**32.1**
median	70.2	197.5	191.8	70.2
average + SD	92.1	291.3	253.9	89.8
average - SD	38.2	139.5	137.6	46.2
minimum	9.3	113.6	113.6	19.7
maximum	115.3	364.2	321.8	115.3
range	106.0	250.7	208.2	95.7

Sample preparation: single filaments singularly boiled NOT packed.

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
021-1	82.6	274.2	274.2	82.6
021-2	86.0	268.1	268.1	86.0
021-3	70.8	277.8	277.8	70.8
021-4	79.1	344.8	344.8	79.1
021-5	91.7	325.4	325.4	91.7
021-6	53.7	378.7	378.7	53.7
021-7	82.4	382.2	382.2	82.4
021-8	69.3	272.4	272.4	69.3
021-9	87.4	312.2	312.2	87.4
021-10	0.6	383.9	370.6	45.0
021-11	61.9	270.2	270.2	61.9
021-12	58.1	229.3	229.3	58.1
021-13	83.4	438.7	438.7	83.4
021-14	86.4	438.2	424.4	87.6
021-15	79.6	395.7	395.7	79.6
021-16	64.4	314.1	314.1	64.4
021-17	79.4	432.3	432.3	79.4
021-18	88.0	476.5	476.5	88.0
021-19	85.9	478.1	478.1	85.9
021-20	90.9	302.8	302.8	90.9
021-21	90.3	346.4	346.4	90.3
021-22	85.2	354.9	354.9	85.2
021-23	82.4	285.7	285.7	82.4
average	**75.6**	**347.1**	**345.9**	**77.6**
uncertainty		**31.1**	**30.7**	
SD	**19.6**	**72.0**	**71.0**	**13.0**
RSD	**25.9**	**20.8**	**20.5**	**16.7**
median	82.4	344.8	344.8	82.4
average + SD	95.2	419.1	416.9	90.6
average - SD	56.0	275.0	274.9	64.6
minimum	0.6	229.3	229.3	45.0
maximum	91.7	478.1	478.1	91.7
range	91.0	248.8	248.8	46.6

Pure elastomultiester from bobbin (sample 091)

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN	load at 300% elongation mN
091-1	3752.9	532.0	532.0	3752.9	34.1
091-2	4040.2	495.9	495.9	4040.2	45.4
091-3	3112.5	464.9	461.3	3643.0	57.5
091-4	3797.7	470.7	470.7	3797.7	48.4
091-5	3422.1	502.1	502.1	3422.1	39.3
091-6	3642.9	513.9	513.9	3642.9	37.6
091-7	2970.5	481.2	481.2	2970.5	44.2
091-8	3387.2	499.6	499.3	3395.3	43.2
091-9	3139.2	452.9	452.9	3139.2	56.8
091-10	3735.7	467.7	467.7	3735.7	52.0
091-11	3534.9	464.6	464.6	3534.9	55.0
091-12	3086.3	444.6	444.6	3086.3	61.5
091-13	2662.1	463.2	463.2	2662.1	49.2
091-14	3981.7	488.4	488.4	3981.7	46.9
091-15	3305.3	490.6	490.6	3305.3	46.6
091-16	3304.2	475.0	475.0	3304.2	41.5
091-17	3395.9	512.8	512.8	3395.9	33.2
091-18	3367.0	452.0	452.0	3367.0	64.5
091-19	3598.0	500.3	500.3	3598.0	40.9
091-20	3631.6	524.7	524.7	3631.6	32.6
091-21	4186.0	603.1	603.1	4186.0	33.6
091-22	3486.0	636.0	631.5	4240.9	40.7
091-23	4062.4	481.9	481.7	4063.0	64.6
091-24	2902.8	520.3	520.3	2902.8	43.5
091-25	3832.3	500.0	497.5	3929.9	53.2
average	**3493.5**	**497.5**	**497.1**	**3549.2**	**46.6**
uncertainty		**18.1**	**17.9**		
SD	**386.8**	**43.9**	**43.4**	**409.5**	**9.6**
RSD	**11.1**	**8.8**	**8.7**	**11.5**	**20.5**
median	3486.0	490.6	490.6	3598.0	45.4
average + SD	3880.3	541.5	540.5	3958.6	56.2
average - SD	3106.7	453.6	453.7	3139.7	37.1
minimum	2662.1	444.6	444.6	2662.1	32.6
maximum	4186.0	636.0	631.5	4240.9	64.6
range	1524.0	191.5	186.9	1578.9	32.0

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN	load at 300% elongation mN
091-1	69.7	484.2	484.2	69.7	0.5
091-2	84.1	511.0	511.0	84.1	0.4
091-3	-0.3	523.2	482.7	13.4	0.2
091-4	-0.4	520.7	494.3	49.2	0.5
091-5	63.5	519.3	519.3	63.5	0.5
091-6	71.8	497.0	497.0	71.8	0.0
091-7	-1.1	478.2	462.6	49.1	0.1
091-8	67.5	482.8	482.8	67.5	0.2
091-9	0.3	496.8	486.8	43.8	0.9
091-10	70.7	414.3	414.3	70.7	0.9
average	**42.6**	**492.8**	**483.5**	**58.3**	**0.4**
uncertainty		**23.0**	**20.7**		
SD	**37.3**	**32.2**	**29.0**	**20.1**	**0.3**
RSD	**87.7**	**6.5**	**6.0**	**34.5**	**75.6**
median	65.5	496.9	485.5	65.5	0.4
average + SD	79.9	524.9	512.5	78.4	0.7
average - SD	5.2	460.6	454.5	38.2	0.1
minimum	-1.1	414.3	414.3	13.4	0.0
maximum	84.1	523.2	519.3	84.1	0.9
range	85.2	108.8	105.0	70.6	1.0

Pure elastomultiester from bobbin (sample 090)

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN	load at 300% elongation mN
090-1	1573.6	555.7	555.7	1573.6	16.8
090-2	1698.1	563.0	563.0	1698.1	15.1
090-3	1567.5	525.4	525.4	1567.5	16.7
090-4	1417.5	496.4	496.4	1417.5	21.1
090-5	1670.6	550.7	550.7	1670.6	13.5
090-6	1337.7	577.8	577.8	1337.7	12.5
090-7	1910.5	550.4	549.9	1914.7	15.1
090-8	1876.7	560.2	559.6	1894.5	13.6
090-9	1789.7	547.9	547.9	1789.7	13.8
090-10	1324.5	529.9	529.9	1324.5	12.3
090-11	1653.7	532.5	532.5	1653.7	17.0
090-12	1492.3	567.6	565.3	1538.6	19.0
090-13	1304.4	548.5	548.5	1304.4	20.9
090-14	1318.0	549.3	549.3	1318.0	19.1
090-15	1905.8	562.3	562.3	1905.8	21.2
090-16	1513.6	588.2	588.2	1513.6	18.6
090-17	1433.6	581.7	581.7	1433.6	18.3
090-18	1714.7	493.4	493.4	1714.7	27.8
090-19	1818.7	514.3	514.3	1818.7	23.7
090-20	1168.7	486.1	486.1	1168.7	24.5
090-21	1661.7	638.4	638.4	1661.7	19.2
090-22	1775.7	609.3	609.3	1775.7	18.9
090-23	1490.0	576.5	576.5	1490.0	20.8
090-24	1797.9	590.0	590.0	1797.9	18.7
090-25	1942.1	649.8	649.8	1942.1	16.1
average	**1606.3**	**557.8**	**557.7**	**1609.0**	**18.2**
uncertainty		**16.6**	**16.6**		
SD	**220.1**	**40.2**	**40.2**	**220.4**	**3.8**
RSD	**13.7**	**7.2**	**7.2**	**13.7**	**21.1**
median	1653.7	555.7	555.7	1653.7	18.6
average + SD	1826.4	598.0	597.9	1829.5	22.0
average - SD	1386.2	517.6	517.5	1388.6	14.3
minimum	1168.7	486.1	486.1	1168.7	12.3
maximum	1942.1	649.8	649.8	1942.1	27.8
range	773.4	163.7	163.7	773.4	15.4

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN	load at 300% elongation mN
090-1	71.1	351.4	351.4	71.1	53.7
090-2	78.0	351.9	351.9	78.0	61.0
090-3	76.3	360.2	360.2	76.3	57.5
090-4	79.5	326.5	326.5	79.5	73.1
090-5	68.4	296.8	296.8	68.4	-
090-6	85.5	372.2	372.2	85.5	57.0
090-7	73.4	325.4	325.4	73.4	58.2
090-8	91.1	378.4	378.4	91.1	64.9
090-9	77.6	276.5	276.5	77.6	-
090-10	81.1	303.9	303.9	81.1	79.6
090-11	81.0	233.5	233.5	81.0	-
090-12	5.5	241.8	194.5	46.7	-
090-13	6.8	272.2	254.8	15.9	-
090-14	82.5	296.9	296.9	82.5	-
090-15	88.0	335.2	335.2	88.0	77.5
average	**69.7**	**314.8**	**310.5**	**73.1**	**64.7**
uncertainty		**25.1**	**29.4**		
SD	**26.5**	**45.3**	**53.1**	**18.9**	**9.7**
RSD	**38.0**	**14.4**	**17.1**	**25.9**	**14.9**
median	78.0	325.4	325.4	78.0	61.0
average + SD	96.2	360.2	363.6	92.0	74.4
average - SD	43.2	269.5	257.5	54.2	55.1
minimum	5.5	233.5	194.5	15.9	53.7
maximum	91.1	378.4	378.4	91.1	79.6
range	85.6	144.9	184.0	75.2	26.0

Pure elastomultiester from bobbin (sample 092)

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN	load at 300% elongation mN
092-1	6638.7	417.6	417.6	6638.7	154.8
092-2	5657.5	378.7	378.7	5657.5	231.6
092-3	7036.4	438.9	438.9	7036.4	110.3
092-4	5562.0	416.6	410.4	5975.6	163.3
092-5	5444.6	372.6	372.6	5444.6	232.5
092-6	5138.3	401.7	401.5	5188.5	195.5
092-7	7026.3	413.0	413.0	7026.3	153.8
092-8	6953.2	400.7	400.7	6953.2	150.8
092-9	6201.6	393.0	393.0	6201.6	159.0
092-10	6897.9	391.9	391.9	6897.9	220.3
092-11	5251.9	413.6	413.6	5251.9	111.1
092-12	5250.5	409.9	409.9	5250.5	133.7
092-13	5029.2	398.2	398.2	5029.2	156.7
092-14	4053.3	383.3	404.7	4053.3	187.2
092-15	5253.8	404.7	392.7	5253.8	146.2
092-16	5254.1	392.7	381.5	5254.1	162.3
092-17	5252.4	381.5	392.1	5252.4	192.0
average	**5758.9**	**400.5**	**400.6**	**5786.2**	**168.3**
uncertainty		**8.7**	**8.3**		
SD	**872.8**	**16.9**	**16.2**	**870.5**	**36.9**
RSD	**15.2**	**4.2**	**4.0**	**15.0**	**21.9**
median	5444.6	400.7	400.7	5444.6	159.0
average + SD	6631.7	417.4	416.8	6656.7	205.2
average - SD	4886.1	383.6	384.5	4915.7	131.4
minimum	4053.3	372.6	372.6	4053.3	110.3
maximum	7036.4	438.9	438.9	7036.4	232.5
range	2983.1	66.2	66.2	2983.1	122.1

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN	load at 300% elongation mN
092-1	164.8	353.5	353.5	164.8	71.3
092-2	161.7	340.0	340.0	161.7	93.9
092-3	142.7	355.6	355.6	142.7	22.6
092-4	176.5	351.4	351.4	176.5	78.7
092-5	159.6	393.2	393.2	159.6	48.3
092-6	121.1	369.8	369.8	121.1	4.1
092-7	151.1	360.0	360.0	151.1	23.1
092-8	163.6	335.0	335.0	163.6	85.4
092-9	94.6	442.0	442.0	94.6	1.0
092-10	164.2	347.6	347.6	164.2	52.6
092-11	171.8	227.7	227.7	171.8	-
092-12	148.0	476.6	476.6	148.0	8.0
092-13	163.2	505.5	504.4	164.5	7.6
092-14	174.0	580.5	578.2	175.6	8.3
092-15	145.6	594.0	594.0	145.6	6.0
092-16	175.6	553.5	553.5	175.6	5.3
average	**154.9**	**411.6**	**411.4**	**155.1**	**34.4**
uncertainty		**55.0**	**54.8**		
SD	**21.6**	**103.2**	**102.9**	**21.8**	**33.8**
RSD	**14.0**	**25.1**	**25.0**	**14.0**	**98.4**
median	162.5	364.9	364.9	162.7	22.6
average + SD	176.5	514.8	514.3	176.8	68.3
average - SD	133.3	308.4	308.5	133.3	0.6
minimum	94.6	227.7	227.7	94.6	1.0
maximum	176.5	594.0	594.0	176.5	93.9
range	81.9	366.3	366.3	81.9	92.9

52 % elastomultiester – 48 % polyester (sample 044)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
044-1	2324.0	69.8	69.8	2324.0
044-2	2402.0	68.7	68.7	2402.0
044-3	2287.7	71.7	70.4	2322.4
044-4	2062.0	69.4	68.4	2243.9
044-5	2245.1	64.7	64.7	2245.1
044-6	2266.5	82.1	72.0	2425.6
044-7	2430.4	73.4	71.6	2502.3
044-8	1721.7	69.5	65.3	2363.6
044-9	1386.3	64.9	61.8	1657.6
044-10	1324.1	67.1	64.8	1667.4
average	**2045.0**	**70.1**	**67.8**	**2215.4**
uncertainty		**3.6**	**2.4**	
SD	**416.4**	**5.0**	**3.4**	**301.8**
RSD	**20.4**	**7.1**	**5.0**	**13.6**
median	2255.8	69.5	68.5	2323.2
average + SD	2461.3	75.2	71.2	2517.2
average - SD	1628.6	65.1	64.3	1913.6
minimum	1324.1	64.7	61.8	1657.6
maximum	2430.4	82.1	72.0	2502.3
range	1106.3	17.4	10.3	844.7

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
044-1	1829.2	82.6	79.9	2211.1
044-2	2282.1	77.5	77.5	2282.1
044-3	2007.1	93.0	84.3	2343.6
044-4	2092.6	80.5	78.5	2099.8
044-5	2369.7	81.8	81.3	2432.5
044-6	1911.4	84.1	79.9	2350.3
044-7	1113.5	101.0	82.9	2155.6
044-8	2060.7	85.9	76.7	2254.4
044-9	2102.9	84.7	81.4	2203.1
044-10	1981.9	83.5	81.4	2293.2
average	**1975.1**	**85.5**	**80.4**	**2262.6**
uncertainty		**4.9**	**1.7**	
SD	**342.6**	**6.8**	**2.4**	**99.2**
RSD	**17.3**	**7.9**	**2.9**	**4.4**
median	2033.9	83.8	80.6	2268.3
average + SD	2317.7	92.3	82.7	2361.8
average - SD	1632.5	78.7	78.0	2163.3
minimum	1113.5	77.5	76.7	2099.8
maximum	2369.7	101.0	84.3	2432.5
range	1256.2	23.5	7.6	332.7

40 % elastomultiester – 60 % polyester (sample 048)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
048-1	2493.3	105.9	83.7	4128.2
048-2	3049.0	102.8	87.9	4849.9
048-3	2187.2	104.5	82.4	4128.1
048-4	2291.8	103.6	85.8	4598.1
048-5	2614.5	101.9	81.2	4140.8
048-6	1946.5	105.1	79.8	3874.0
048-7	3681.4	96.1	83.7	4424.7
048-8	1817.4	104.4	84.7	4080.0
048-9	2561.2	101.6	86.4	4155.0
048-10	2731.9	96.9	83.2	4404.4
048-11	2745.8	99.6	76.9	4032.4
048-12	2394.5	99.1	78.1	4552.6
048-13	3148.9	96.5	78.3	4502.5
048-14	2306.3	103.3	80.7	4722.5
048-15	2794.9	99.0	77.0	4697.5
048-16	2163.5	103.7	82.8	4413.8
048-17	3764.4	87.7	71.5	4844.5
048-18	1975.7	108.6	85.7	4325.7
048-19	1789.4	104.0	78.7	4349.9
048-20	3467.9	98.3	83.5	5211.8
average	**2596.3**	**101.1**	**81.6**	**4421.8**
uncertainty		**2.2**	**1.9**	
SD	**586.8**	**4.6**	**4.0**	**333.5**
RSD	**22.6**	**4.6**	**4.9**	**7.5**
median	2527.2	102.4	82.6	4409.1
average + SD	3183.0	105.8	85.6	4755.3
average - SD	2009.5	96.5	77.6	4088.3
minimum	1789.4	87.7	71.5	3874.0
maximum	3764.4	108.6	87.9	5211.8
range	1975.1	20.9	16.3	1337.7

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
048-1	1668.7	115.5	91.8	3567.1
048-2	2068.1	131.8	115.3	3488.6
048-3	1738.2	131.1	105.8	4145.5
048-4	1845.7	104.8	78.6	4194.1
048-5	2965.5	113.8	93.7	4270.5
048-6	2698.3	126.8	113.3	4226.9
048-7	2072.2	119.2	95.6	3972.1
048-8	2563.3	103.6	90.2	4257.2
048-9	1767.7	106.5	89.4	3958.3
048-10	2318.5	122.0	105.1	4043.3
average	**2170.6**	**117.5**	**97.9**	**4012.4**
uncertainty		**7.5**	**8.3**	
SD	**448.9**	**10.5**	**11.6**	**279.2**
RSD	**20.7**	**8.9**	**11.9**	**7.0**
median	2070.2	117.3	94.6	4094.4
average + SD	2619.5	128.0	109.5	4291.6
average - SD	1721.8	107.0	86.2	3733.2
minimum	1668.7	103.6	78.6	3488.6
maximum	2965.5	131.8	115.3	4270.5
range	1296.8	28.2	36.7	782.0

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
048-1	73.3	86.5	86.5	73.3
048-2	92.7	104.0	104.0	92.7
048-3	83.9	110.7	110.7	83.9
048-5	84.9	109.3	109.3	84.9
048-6	87.1	110.6	110.6	87.1
048-7	92.7	99.9	99.9	92.7
048-8	73.5	91.8	91.8	73.5
048-9	86.2	88.6	88.6	86.2
048-10	87.0	90.2	90.2	87.0
048-11	71.6	84.1	84.1	71.6
048-12	94.6	104.0	104.0	94.6
048-14	83.9	91.4	91.4	83.9
048-15	93.0	97.8	97.8	93.0
average	**85.0**	**97.6**	**97.6**	**85.0**
uncertainty		**5.7**	**5.7**	
SD	**7.8**	**9.5**	**9.5**	**7.8**
RSD	**9.2**	**9.7**	**9.7**	**9.2**
median	86.2	97.8	97.8	86.2
average + SD	92.8	107.1	107.1	92.8
average - SD	77.1	88.1	88.1	77.1
minimum	71.6	84.1	84.1	71.6
maximum	94.6	110.7	110.7	94.6
range	23.0	26.6	26.6	23.0

34 % elastomultiester – 66 % polyester (sample 045)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
045-1	1708.2	94.2	70.2	4566.6
045-2	3278.8	89.9	69.5	4291.2
045-3	2905.3	89.9	66.9	4364.3
045-4	2131.6	92.1	67.9	4618.6
045-5	2110.3	94.4	74.4	4646.1
045-6	3233.4	86.2	68.9	4723.2
045-7	4314.8	80.7	79.2	4917.2
045-8	4568.9	73.3	72.4	4771.4
045-9	3689.8	76.6	67.1	4381.7
045-10	2723.7	91.2	74.4	4499.9
045-11	3447.2	92.7	72.2	4597.5
045-12	2890.3	93.4	74.0	5095.5
045-13	3066.7	94.7	76.2	4718.5
045-14	4667.0	84.2	76.9	5238.8
045-15	2832.0	85.9	77.5	4596.1
045-16	3615.0	84.7	72.0	4572.7
045-17	3842.1	79.0	73.2	4935.6
045-18	4336.7	77.8	73.1	4831.9
045-19	3303.3	92.8	73.5	4707.7
045-20	2322.7	95.8	73.6	4832.9
average	**3249.4**	**87.5**	**72.7**	**4695.4**
uncertainty		**3.2**	**1.6**	
SD	**836.7**	**6.9**	**3.4**	**238.0**
RSD	**25.8**	**7.9**	**4.7**	**5.1**
median	3256.1	89.9	73.2	4676.9
average + SD	4086.1	94.4	76.1	4933.4
average - SD	2412.6	80.6	69.2	4457.4
minimum	1708.2	73.3	66.9	4291.2
maximum	4667.0	95.8	79.2	5238.8
range	2958.8	22.6	12.2	947.6

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
045-1	4104.9	91.6	87.4	4254.2
045-2	2291.1	114.5	91.5	4367.9
045-3	1907.6	118.5	88.7	4127.6
045-4	2528.8	129.5	119.5	4133.6
045-5	3924.8	89.3	85.4	4435.0
045-6	3418.8	100.0	90.2	4431.2
045-7	3163.3	110.5	98.0	4301.1
045-8	3375.5	105.8	96.7	4170.6
045-9	2476.6	104.4	90.6	4315.2
045-10	1768.4	119.0	95.6	4305.0
average	**2896.0**	**108.3**	**94.4**	**4284.1**
uncertainty		**9.0**	**7.0**	
SD	**817.8**	**12.7**	**9.7**	**112.6**
RSD	**28.2**	**11.7**	**10.3**	**2.6**
median	2846.0	108.2	91.1	4303.1
average + SD	3713.8	121.0	104.1	4396.7
average - SD	2078.1	95.7	84.6	4171.6
minimum	1768.4	89.3	85.4	4127.6
maximum	4104.9	129.5	119.5	4435.0
range	2336.5	40.2	34.1	307.4

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
045-1	97.3	87.0	87.0	97.3
045-2	99.3	94.0	94.0	99.3
045-3	102.5	101.7	101.7	102.5
045-4	86.0	106.2	106.2	86.0
045-5	100.1	95.2	95.2	100.1
average	**97.0**	**96.8**	**96.8**	**97.0**
uncertainty		**9.2**	**9.2**	
SD	**6.4**	**7.4**	**7.4**	**6.4**
RSD	**6.6**	**7.6**	**7.6**	**6.6**
median	99.3	95.2	95.2	99.3
average + SD	103.5	104.2	104.2	103.5
average - SD	90.6	89.4	89.4	90.6
minimum	86.0	87.0	87.0	86.0
maximum	102.5	106.2	106.2	102.5
range	16.5	19.2	19.2	16.5

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
045-1	75.0	74.7	74.7	75.0
045-2	100.6	94.1	94.1	100.6
045-3	97.1	88.6	88.6	97.1
045-4	78.6	74.9	74.9	78.6
045-5	97.1	94.1	94.1	97.1
average	**89.7**	**85.3**	**85.3**	**89.7**
uncertainty		**12.2**	**12.2**	
SD	**11.9**	**9.8**	**9.8**	**11.9**
RSD	**13.3**	**11.5**	**11.5**	**13.3**
median	97.1	88.6	88.6	97.1
average + SD	101.6	95.1	95.1	101.6
average - SD	77.8	75.5	75.5	77.8
minimum	75.0	74.7	74.7	75.0
maximum	100.6	94.1	94.1	100.6
range	25.6	19.4	19.4	25.6

48 % elastomultiester – 52 % wool (sample 023)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
023-1	4124.5	76.7	61.7	8081.9
023-2	6234.9	70.3	66.0	7674.0
023-3	3007.8	82.3	62.7	7302.9
023-4	4286.8	73.3	57.8	7950.4
023-5	5767.9	73.3	58.6	8568.8
023-6	4809.6	71.3	59.1	7745.6
023-7	4329.6	76.3	60.4	8411.7
023-8	4274.2	78.0	63.0	8599.7
023-9	4597.1	75.2	61.6	8331.2
023-10	3175.8	77.1	61.4	7861.1
average	**4460.8**	**75.4**	**61.2**	**8052.7**
uncertainty		**2.5**	**1.7**	
SD	**997.4**	**3.5**	**2.4**	**424.3**
RSD	**22.4**	**4.7**	**3.9**	**5.3**
median	4308.2	75.7	61.5	8016.2
average + SD	5458.3	78.9	63.6	8477.0
average - SD	3463.4	71.9	58.8	7628.5
minimum	3007.8	70.3	57.8	7302.9
maximum	6234.9	82.3	66.0	8599.7
range	3227.1	12.0	8.2	1296.8

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
023-1	3076.6	94.0	72.4	7025.8
023-3	3486.2	104.8	84.7	6932.2
023-4	2891.5	105.8	83.6	7502.7
average	**3151.4**	**101.5**	**80.2**	**7153.5**
uncertainty		**16.3**	**16.9**	
SD	**304.3**	**6.5**	**6.8**	**305.9**
RSD	**9.7**	**6.4**	**8.5**	**4.3**
median	3076.6	104.8	83.6	7025.8
average + SD	3455.8	108.1	87.1	7459.5
average - SD	2847.1	95.0	73.4	6847.6
minimum	2891.5	94.0	72.4	6932.2
maximum	3486.2	105.8	84.7	7502.7
range	594.7	11.8	12.3	570.4

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
023-1	145.4	76.4	76.4	145.4
023-2	168.1	82.8	82.8	168.1
023-3	177.4	74.9	74.9	177.4
023-4	147.8	85.8	85.8	147.8
023-5	170.6	76.6	76.6	170.6
023-6	179.2	66.1	66.1	179.2
023-7	148.8	79.0	79.0	148.8
023-8	154.6	68.4	68.4	154.6
023-9	147.1	81.1	81.1	147.1
023-11	140.1	75.7	75.7	140.1
average	**157.9**	**76.7**	**76.7**	**157.9**
uncertainty		**4.3**	**4.3**	
SD	**14.5**	**6.0**	**6.0**	**14.5**
RSD	**9.2**	**7.9**	**7.9**	**9.2**
median	151.7	76.5	76.5	151.7
average + SD	172.4	82.7	82.7	172.4
average - SD	143.4	70.6	70.6	143.4
minimum	140.1	66.1	66.1	140.1
maximum	179.2	85.8	85.8	179.2
range	39.1	19.7	19.7	39.1

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
023-1	157.6	65.2	65.2	157.6
023-2	169.4	77.1	77.1	169.4
023-3	142.9	61.1	61.1	142.9
023-4	160.6	73.3	73.3	160.6
023-5	157.7	70.2	70.2	157.7
average	**157.6**	**69.4**	**69.4**	**157.6**
uncertainty		**7.9**	**7.9**	
SD	**9.5**	**6.4**	**6.4**	**9.5**
RSD	**6.1**	**9.2**	**9.2**	**6.1**
median	157.7	70.2	70.2	157.7
average + SD	167.2	75.8	75.8	167.2
average - SD	148.1	63.0	63.0	148.1
minimum	142.9	61.1	61.1	142.9
maximum	169.4	77.1	77.1	169.4
range	26.5	16.0	16.0	26.5

62 % elastomultiester – 38 % cotton (sample 054)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
054-1	8651.1	110.5	110.5	8651.1
054-2	7928.5	110.8	108.8	8136.4
054-3	8023.9	108.1	108.1	8023.9
054-4	6232.8	111.0	106.2	8011.4
054-5	8350.3	110.8	110.8	8350.3
054-6	4600.9	120.4	112.6	7411.3
054-7	8446.2	73.5	73.5	8446.2
054-8	7593.6	106.8	106.8	7593.6
054-9	7938.7	111.5	111.5	7938.7
054-10	3676.8	120.8	111.4	7492.3
054-11	7375.2	115.3	113.5	7737.6
054-12	8343.8	109.9	109.9	8343.8
054-13	6082.4	113.8	112.2	6426.5
054-14	7924.4	106.9	106.9	7924.4
054-15	5652.8	124.2	114.9	7589.4
054-16	7995.3	106.6	106.6	7995.3
054-17	7781.4	108.1	108.1	7781.4
054-18	7560.4	109.8	108.3	7771.1
054-19	8212.8	109.0	108.8	8226.3
054-20	7092.0	108.2	106.5	7358.7
average	**7273.2**	**109.8**	**107.8**	**7860.5**
uncertainty		**4.6**	**4.0**	
SD	**1348.1**	**9.9**	**8.5**	**489.3**
RSD	**18.5**	**9.0**	**7.8**	**6.2**
median	7852.9	110.2	108.8	7931.5
average + SD	8621.3	119.6	116.2	8349.8
average - SD	5925.0	99.9	99.3	7371.2
minimum	3676.8	73.5	73.5	6426.5
maximum	8651.1	124.2	114.9	8651.1
range	4974.3	50.7	41.4	2224.6

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
054-1	8522.4	121.9	121.9	8522.4
054-2	7460.1	125.6	121.4	7746.5
054-3	7596.7	111.0	111.0	7596.7
054-4	7416.3	117.4	117.4	7416.3
054-5	5755.7	122.5	113.6	7060.7
054-6	6754.7	114.3	112.9	7375.5
054-7	7909.9	121.1	121.1	7909.9
054-8	6343.8	118.0	115.0	7675.0
054-9	7392.9	124.2	123.3	7446.2
054-10	7054.3	122.7	122.7	7054.3
average	**7220.7**	**119.9**	**118.0**	**7580.4**
uncertainty		**3.3**	**3.3**	
SD	**788.5**	**4.6**	**4.6**	**430.3**
RSD	**10.9**	**3.9**	**3.9**	**5.7**
median	7404.6	121.5	119.3	7521.4
average + SD	8009.2	124.5	122.6	8010.7
average - SD	6432.1	115.3	113.5	7150.0
minimum	5755.7	111.0	111.0	7054.3
maximum	8522.4	125.6	123.3	8522.4
range	2766.7	14.6	12.3	1468.1

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
054-1	146.9	125.0	125.0	146.9
054-3	175.7	129.0	129.0	175.7
054-4	170.2	127.4	127.4	170.2
054-5	150.3	116.0	116.0	150.3
054-6	177.9	127.5	127.5	177.9
054-7	145.3	147.8	147.8	145.3
054-9	177.7	120.3	120.3	177.7
054-10	145.4	105.3	105.3	145.4
054-11	155.6	118.1	118.1	155.6
054-12	154.1	111.5	111.5	154.1
054-13	134.0	146.2	146.2	134.0
054-14	88.3	144.8	144.8	88.3
054-15	166.0	103.3	103.3	166.0
054-16	150.6	113.1	113.1	150.6
054-17	121.3	110.1	110.1	121.3
054-18	161.1	111.0	111.0	161.1
054-19	158.8	125.9	125.9	158.8
054-20	154.5	105.7	105.7	154.5
054-21	162.9	110.1	110.1	162.9
054-22	163.0	129.9	129.9	163.0
054-23	153.0	111.7	111.7	153.0
average	**153.0**	**120.9**	**120.9**	**153.0**
uncertainty		**6.1**	**6.1**	
SD	**20.3**	**13.4**	**13.4**	**20.3**
RSD	**13.3**	**11.1**	**11.1**	**13.3**
median	154.5	118.1	118.1	154.5
average + SD	173.3	134.3	134.3	173.3
average - SD	132.7	107.5	107.5	132.7
minimum	88.3	103.3	103.3	88.3
maximum	177.9	147.8	147.8	177.9
range	89.6	44.5	44.5	89.6

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
054-1	152.0	120.3	120.3	152.0
054-2	179.4	145.2	145.2	179.4
054-3	170.9	136.4	136.4	170.9
054-4	159.6	130.6	130.6	159.6
054-5	172.7	117.1	117.1	172.7
average	**166.9**	**129.9**	**129.9**	**166.9**
uncertainty		**14.3**	**14.3**	
SD	**11.0**	**11.6**	**11.6**	**11.0**
RSD	**6.6**	**8.9**	**8.9**	**6.6**
median	170.9	130.6	130.6	170.9
average + SD	177.9	141.5	141.5	177.9
average - SD	156.0	118.4	118.4	156.0
minimum	152.0	117.1	117.1	152.0
maximum	179.4	145.2	145.2	179.4
range	27.3	28.1	28.1	27.3

58 % elastomultiester – 42 % cotton (sample 088)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
088-1	3001.3	75.2	65.6	4944.0
088-2	3606.2	71.0	56.6	4878.5
088-3	2025.3	78.1	58.4	3499.5
088-4	5251.8	59.7	59.7	5251.8
088-5	3451.2	70.4	57.9	4456.3
average	**3467.1**	**70.9**	**59.7**	**4606.0**
uncertainty		**8.7**	**4.4**	
SD	**1172.7**	**7.0**	**3.5**	**680.5**
RSD	**33.8**	**9.9**	**5.9**	**14.8**
median	3451.2	71.0	58.4	4878.5
average + SD	4639.8	77.9	63.2	5286.5
average - SD	2294.5	63.9	56.1	3925.5
minimum	2025.3	59.7	56.6	3499.5
maximum	5251.8	78.1	65.6	5251.8
range	3226.6	18.4	9.0	1752.3

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
088-1	2531.4	82.9	64.2	4936.5
088-2	3186.6	85.5	68.6	5132.1
088-3	2802.0	80.9	64.9	4982.5
088-4	2107.6	87.2	64.8	4455.0
088-5	3284.4	81.7	65.6	5015.9
average	**2782.4**	**83.7**	**65.6**	**4904.4**
uncertainty		**3.3**	**2.2**	
SD	**483.2**	**2.7**	**1.7**	**261.4**
RSD	**17.4**	**3.2**	**2.7**	**5.3**
median	2802.0	82.9	64.9	4982.5
average + SD	3265.6	86.3	67.4	5165.8
average - SD	2299.2	81.0	63.9	4643.0
minimum	2107.6	80.9	64.2	4455.0
maximum	3284.4	87.2	68.6	5132.1
range	1176.8	6.3	4.4	677.1

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
088-1	101.7	72.9	72.9	101.7
088-2	104.0	85.0	85.0	104.0
088-3	104.3	82.7	82.7	104.3
088-4	98.7	72.6	72.6	98.7
088-5	103.4	74.5	74.5	103.4
088-6	100.7	74.5	74.5	100.7
average	**102.1**	**77.1**	**77.1**	**102.1**
uncertainty		**5.7**	**5.7**	
SD	**2.2**	**5.4**	**5.4**	**2.2**
RSD	**2.2**	**7.0**	**7.0**	**2.2**
median	102.6	74.5	74.5	102.6
average + SD	104.3	82.5	82.5	104.3
average - SD	99.9	71.7	71.7	99.9
minimum	98.7	72.6	72.6	98.7
maximum	104.3	85.0	85.0	104.3
range	5.7	12.4	12.4	5.7

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
088-1	92.0	96.9	96.9	92.0
088-2	88.6	83.3	83.3	88.6
088-3	86.1	70.7	70.7	86.1
088-4	97.3	78.9	78.9	97.3
088-5	99.6	88.2	88.2	99.6
088-6	98.5	84.8	84.8	98.5
average	**93.7**	**83.8**	**83.8**	**93.7**
uncertainty		**9.3**	**9.3**	
SD	**5.6**	**8.8**	**8.8**	**5.6**
RSD	**6.0**	**10.5**	**10.5**	**6.0**
median	94.7	84.1	84.1	94.7
average + SD	99.3	92.6	92.6	99.3
average - SD	88.1	75.0	75.0	88.1
minimum	86.1	70.7	70.7	86.1
maximum	99.6	96.9	96.9	99.6
range	13.5	26.2	26.2	13.5

42 % elastomultiester – 58 % cotton (sample 056b)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
056b-1	3029.5	76.9	67.1	4197.8
056b-2	2991.2	78.3	68.0	4678.6
056b-3	3207.3	80.8	70.5	4825.7
056b-4	2503.2	82.3	70.4	4900.0
056b-5	3875.4	72.6	67.9	4329.4
average	**3121.3**	**78.2**	**68.8**	**4586.3**
uncertainty		**4.6**	**1.9**	
SD	**495.9**	**3.7**	**1.6**	**308.7**
RSD	**15.9**	**4.8**	**2.3**	**6.7**
median	3029.5	78.3	68.0	4678.6
average + SD	3617.2	81.9	70.3	4895.0
average - SD	2625.5	74.4	67.2	4277.6
minimum	2503.2	72.6	67.1	4197.8
maximum	3875.4	82.3	70.5	4900.0
range	1372.2	9.7	3.3	702.2

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
056b-1	462.1	91.2	73.9	4454.9
056b-2	173.6	122.5	81.4	4260.4
056b-3	1572.7	90.6	77.4	4634.1
056b-4	397.9	108.5	79.6	4517.2
056b-5	1243.6	107.6	92.5	4170.2
average	**770.0**	**104.1**	**81.0**	**4407.4**
uncertainty		**16.6**	**8.7**	
SD	**603.6**	**13.4**	**7.0**	**189.4**
RSD	**78.4**	**12.9**	**8.7**	**4.3**
median	462.1	107.6	79.6	4454.9
average + SD	1373.6	117.5	88.0	4596.8
average - SD	166.3	90.7	73.9	4217.9
minimum	173.6	90.6	73.9	4170.2
maximum	1572.7	122.5	92.5	4634.1
range	1399.1	31.9	18.6	463.8

32 % elastomultiester – 68 % cotton (sample 024)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
024-1	3214.6	77.8	55.3	8032.5
024-2	4042.7	76.2	63.0	7974.3
024-3	3406.6	73.6	62.5	7786.4
024-4	3782.6	79.0	58.1	7929.0
024-5	6589.0	71.5	61.4	7852.7
024-6	4489.3	77.8	55.8	7639.9
024-7	3609.0	83.9	60.1	8192.2
024-8	5800.1	71.4	55.9	8297.1
024-9	6760.7	63.7	52.4	8148.5
024-10	4222.6	76.6	58.4	8734.4
average	**4591.7**	**75.1**	**58.3**	**8058.7**
uncertainty		**3.9**	**2.5**	
SD	**1313.3**	**5.5**	**3.5**	**308.4**
RSD	**28.6**	**7.3**	**6.0**	**3.8**
median	4132.6	76.4	58.3	8003.4
average + SD	5905.0	80.6	61.8	8367.1
average - SD	3278.4	69.7	54.8	7750.3
minimum	3214.6	63.7	52.4	7639.9
maximum	6760.7	83.9	63.0	8734.4
range	3546.1	20.2	10.6	1094.5

25.9 % elastomultiester – 74.1 % cotton (sample 053)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
053-1	8671.9	77.3	77.3	8671.9
053-2	8519.7	75.6	75.6	8519.7
053-3	7358.4	77.8	76.5	8376.5
053-4	8210.4	77.6	77.2	8228.1
053-5	8107.7	74.3	74.3	8107.7
053-6	9116.5	76.7	76.7	9116.5
053-7	8616.2	79.5	78.9	8691.0
053-8	8432.8	80.6	80.0	8464.0
053-9	5449.6	86.3	80.9	7428.8
053-10	7758.0	80.7	80.7	7758.0
average	**8024.1**	**78.6**	**77.8**	**8336.2**
uncertainty		**2.4**	**1.6**	
SD	**1030.6**	**3.4**	**2.2**	**485.4**
RSD	**12.8**	**4.3**	**2.9**	**5.8**
median	8321.6	77.7	77.2	8420.2
average + SD	9054.8	82.0	80.0	8821.6
average - SD	6993.5	75.3	75.6	7850.8
minimum	5449.6	74.3	74.3	7428.8
maximum	9116.5	86.3	80.9	9116.5
range	3666.8	12.0	6.6	1687.7

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
053-1	7012.5	98.1	96.1	7938.8
053-2	8118.3	93.9	93.9	8118.3
053-3	3384.7	88.3	88.3	3384.7
053-4	7719.9	100.2	95.4	8515.4
053-5	8873.3	101.3	101.3	8873.3
053-6	8136.6	97.3	97.2	8146.2
053-7	8699.8	99.2	98.1	8710.7
053-8	8002.9	93.0	92.6	8088.1
053-9	7404.7	106.3	102.9	8014.4
053-10	5248.0	110.0	97.8	7707.7
average	**7260.1**	**98.8**	**96.4**	**7749.8**
uncertainty		**4.5**	**3.0**	
SD	**1702.7**	**6.3**	**4.2**	**1575.5**
RSD	**23.5**	**6.4**	**4.4**	**20.3**
median	7861.4	98.6	96.6	8103.2
average + SD	8962.8	105.1	100.6	9325.3
average - SD	5557.4	92.4	92.2	6174.2
minimum	3384.7	88.3	88.3	3384.7
maximum	8873.3	110.0	102.9	8873.3
range	5488.5	21.7	14.6	5488.5

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
053-1	162.1	80.5	80.5	162.1
053-2	174.2	80.4	80.4	174.2
053-4	128.4	73.0	73.0	128.4
053-5	173.0	84.8	84.8	173.0
053-6	106.7	69.5	69.5	106.7
053-7	175.4	87.3	87.3	175.4
053-8	167.7	77.0	77.0	167.7
053-9	156.2	87.7	87.7	156.2
053-10	138.9	69.8	69.8	138.9
053-11	157.5	81.3	81.3	157.5
053-12	174.5	89.0	89.0	174.5
053-13	150.9	79.2	79.2	150.9
053-15	173.1	77.9	77.9	173.1
average	**156.8**	**79.8**	**79.8**	**156.8**
uncertainty		**3.9**	**3.9**	
SD	**21.0**	**6.4**	**6.4**	**21.0**
RSD	**13.4**	**8.1**	**8.1**	**13.4**
median	162.1	80.4	80.4	162.1
average + SD	177.8	86.2	86.2	177.8
average - SD	135.8	73.4	73.4	135.8
minimum	106.7	69.5	69.5	106.7
maximum	175.4	89.0	89.0	175.4
range	68.7	19.5	19.5	68.7

38 % elastomultiester – 62 % cotton (sample 086b)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
086b-1	1303.6	81.1	62.5	2368.4
086b-2	1511.6	79.8	60.2	2282.5
086b-3	1340.9	77.4	67.2	2497.4
086b-4	2331.2	70.1	68.0	2364.5
086b-5	1292.7	79.1	65.4	2139.4
average	**1556.0**	**77.5**	**64.7**	**2330.4**
uncertainty		**5.4**	**4.1**	
SD	**442.2**	**4.3**	**3.3**	**131.6**
RSD	**28.4**	**5.6**	**5.1**	**5.7**
median	1340.9	79.1	65.4	2364.5
average + SD	1998.2	81.9	67.9	2462.0
average - SD	1113.8	73.2	61.4	2198.8
minimum	1292.7	70.1	60.2	2139.4
maximum	2331.2	81.1	68.0	2497.4
range	1038.4	11.0	7.8	358.0

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
086b-1	2080.5	69.0	66.3	2326.0
086b-2	2032.3	71.2	67.0	2242.2
086b-3	1574.1	83.8	76.3	2266.8
086b-4	2384.2	74.5	74.5	2384.2
086b-5	2215.3	70.7	70.6	2216.0
average	**2057.3**	**73.9**	**71.0**	**2287.0**
uncertainty		**7.3**	**5.5**	
SD	**302.7**	**5.9**	**4.4**	**67.9**
RSD	**14.7**	**8.0**	**6.3**	**3.0**
median	2080.5	71.2	70.6	2266.8
average + SD	2360.0	79.8	75.4	2354.9
average - SD	1754.6	68.0	66.5	2219.1
minimum	1574.1	69.0	66.3	2216.0
maximum	2384.2	83.8	76.3	2384.2
range	810.1	14.8	10.0	168.3

27 % elastomultiester – 73 % cotton (sample 087)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
087-1	2190.5	62.0	59.8	2455.6
087-2	2410.8	60.5	59.6	2436.9
087-3	2358.7	65.6	64.5	2526.2
087-4	2260.8	72.0	62.4	2563.7
087-5	1327.8	70.4	57.0	2177.6
average	**2109.7**	**66.1**	**60.7**	**2432.0**
uncertainty		**6.3**	**3.6**	
SD	**445.4**	**5.0**	**2.9**	**151.3**
RSD	**21.1**	**7.6**	**4.8**	**6.2**
median	2260.8	65.6	59.8	2455.6
average + SD	2555.1	71.2	63.5	2583.2
average - SD	1664.4	61.1	57.8	2280.7
minimum	1327.8	60.5	57.0	2177.6
maximum	2410.8	72.0	64.5	2563.7
range	1083.0	11.5	7.5	386.1

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
087-1	2287.7	70.9	70.4	2294.4
087-2	2509.9	74.3	74.3	2509.9
087-3	2506.1	72.6	72.6	2506.1
087-4	2240.7	76.8	76.8	2240.7
087-5	2028.9	80.0	70.6	2479.1
average	**2314.7**	**74.9**	**72.9**	**2406.0**
uncertainty		**4.4**	**3.3**	
SD	**201.6**	**3.6**	**2.7**	**128.4**
RSD	**8.7**	**4.8**	**3.7**	**5.3**
median	2287.7	74.3	72.6	2479.1
average + SD	2516.3	78.5	75.6	2534.4
average - SD	2113.0	71.4	70.3	2277.7
minimum	2028.9	70.9	70.4	2240.7
maximum	2509.9	80.0	76.8	2509.9
range	481.0	9.1	6.4	269.2

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
087-1	87.9	73.9	73.9	87.9
087-2	90.3	78.4	78.4	90.3
087-3	84.2	66.2	66.2	84.2
087-4	92.1	75.6	75.6	92.1
087-5	92.6	83.5	83.5	92.6
087-6	81.0	67.7	67.7	81.0
087-7	81.9	68.8	68.8	81.9
087-8	78.3	82.7	82.7	78.3
average	**86.0**	**74.6**	**74.6**	**86.0**
uncertainty		**5.6**	**5.6**	
SD	**5.5**	**6.7**	**6.7**	**5.5**
RSD	**6.3**	**9.0**	**9.0**	**6.3**
median	86.1	74.7	74.7	86.1
average + SD	91.5	81.3	81.3	91.5
average - SD	80.6	67.9	67.9	80.6
minimum	78.3	66.2	66.2	78.3
maximum	92.6	83.5	83.5	92.6
range	14.3	17.4	17.4	14.3

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
087-1	89.5	94.4	94.4	89.5
087-2	83.5	79.8	79.8	83.5
087-3	80.3	85.0	85.0	80.3
087-4	76.5	73.9	73.9	76.5
087-5	87.7	79.4	79.4	87.7
average	**83.5**	**82.5**	**82.5**	**83.5**
uncertainty		**9.6**	**9.6**	
SD	**5.3**	**7.7**	**7.7**	**5.3**
RSD	**6.3**	**9.4**	**9.4**	**6.3**
median	83.5	79.8	79.8	83.5
average + SD	88.8	90.2	90.2	88.8
average - SD	78.2	74.8	74.8	78.2
minimum	76.5	73.9	73.9	76.5
maximum	89.5	94.4	94.4	89.5
range	13.0	20.5	20.5	13.0

27.4 % elastomultiester – 15.2 % polyester – 57 % cotton (sample 047)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
047-1	3922.8	73.5	68.5	4595.5
047-2	2566.8	80.7	65.2	4741.5
047-3	1494.0	91.5	66.1	4736.5
047-4	3611.3	81.8	64.4	4487.1
047-5	1597.3	91.2	63.6	4229.3
047-6	2393.9	87.5	71.7	4408.0
047-7	1511.6	86.3	62.8	4522.4
047-8	2107.2	85.9	71.4	4472.4
047-9	2404.4	88.4	66.7	4595.2
047-10	2064.7	88.2	63.3	5012.2
average	**2367.4**	**85.5**	**66.4**	**4580.0**
uncertainty		**3.9**	**2.3**	
SD	**833.7**	**5.5**	**3.2**	**214.5**
RSD	**35.2**	**6.4**	**4.9**	**4.7**
median	2250.5	86.9	65.7	4558.8
average + SD	3201.1	91.0	69.6	4794.5
average - SD	1533.7	80.0	63.1	4365.5
minimum	1494.0	73.5	62.8	4229.3
maximum	3922.8	91.5	71.7	5012.2
range	2428.8	18.0	8.9	782.9

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
047-1	1432.8	103.3	76.5	4388.8
047-2	3197.2	111.0	93.1	4007.2
047-3	2346.9	113.2	88.7	4593.7
047-4	3883.7	96.5	87.5	4367.0
047-5	2553.8	90.1	76.5	4052.2
047-6	4760.7	88.8	88.8	4760.7
047-7	2265.2	109.3	83.6	4180.3
047-8	4113.1	92.1	86.3	4693.1
047-9	2826.4	117.8	97.5	4614.3
047-10	3205.2	97.4	97.4	3205.2
average	**3058.5**	**102.0**	**87.6**	**4286.3**
uncertainty		**7.5**	**5.3**	
SD	**989.9**	**10.4**	**7.4**	**462.2**
RSD	**32.4**	**10.2**	**8.4**	**10.8**
median	3011.8	100.3	88.1	4377.9
average + SD	4048.4	112.4	95.0	4748.4
average - SD	2068.6	91.5	80.2	3824.1
minimum	1432.8	88.8	76.5	3205.2
maximum	4760.7	117.8	97.5	4760.7
range	3327.9	29.0	21.1	1555.5

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
047-1	93.73	88.2	88.2	93.7
047-2	94.94	84.9	84.9	94.9
047-3	89.82	83.7	83.7	89.8
047-4	106.57	91.4	91.4	106.6
047-5	94	78.6	78.6	94.0
047-6	99.86	86.2	86.2	99.9
047-7	96.17	92.2	92.2	96.2
047-8	94.82	86.9	86.9	94.8
047-9	99.17	88.2	88.2	99.2
047-12	93.42	89.0	89.0	93.4
047-13	96.7	73.5	73.5	96.7
047-14	100.1	86.3	86.3	100.1
047-15	89.0	80.5	80.5	89.0
047-16	82.5	75.6	75.6	82.5
047-17	75.1	81.6	81.6	75.1
047-18	88.3	79.3	79.3	88.3
047-19	87.9	80.1	80.1	87.9
average	**93.1**	**83.9**	**83.9**	**93.1**
uncertainty		**2.8**	**2.8**	
SD	**7.3**	**5.4**	**5.4**	**7.3**
RSD	**7.9**	**6.4**	**6.4**	**7.9**
median	94.0	84.9	84.9	94.0
average + SD	100.4	89.3	89.3	100.4
average - SD	85.8	78.5	78.5	85.8
minimum	75.1	73.5	73.5	75.1
maximum	106.6	92.2	92.2	106.6
range	31.4	18.7	18.7	31.4

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
047-1	80.3	80.1	80.1	80.3
047-2	90.6	74.6	74.6	90.6
047-3	96.5	85.9	85.9	96.5
047-4	97.1	91.2	91.2	97.1
047-5	81.9	69.8	69.8	81.9
average	**89.3**	**80.3**	**80.3**	**89.3**
uncertainty		**10.6**	**10.6**	
SD	**7.9**	**8.5**	**8.5**	**7.9**
RSD	**8.8**	**10.6**	**10.6**	**8.8**
median	90.6	80.1	80.1	90.6
average + SD	97.2	88.8	88.8	97.2
average - SD	81.4	71.8	71.8	81.4
minimum	80.3	69.8	69.8	80.3
maximum	97.1	91.2	91.2	97.1
range	16.8	21.3	21.3	16.8

20.5 % elastomultiester – 22.5 % polyester – 57 % cotton (sample 046)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
046-1	3671.6	68.3	56.5	4688.0
046-2	1988.0	68.0	50.1	4839.5
046-3	2241.4	73.6	60.4	4942.4
046-4	3917.3	71.2	59.9	5468.9
046-5	1836.1	77.4	60.4	4783.9
046-6	4181.9	66.0	58.1	5033.0
046-7	2984.8	70.2	56.6	4973.2
046-8	3462.5	70.5	57.9	5182.0
046-9	4444.8	64.3	55.5	4970.9
046-10	2186.6	78.5	57.7	5041.7
average	**3091.5**	**70.8**	**57.3**	**4992.3**
uncertainty		**3.3**	**2.2**	
SD	**973.1**	**4.6**	**3.1**	**218.6**
RSD	**31.5**	**6.5**	**5.3**	**4.4**
median	3223.7	70.4	57.8	4972.0
average + SD	4064.7	75.4	60.4	5210.9
average - SD	2118.4	66.2	54.3	4773.8
minimum	1836.1	64.3	50.1	4688.0
maximum	4444.8	78.5	60.4	5468.9
range	2608.7	14.2	10.3	780.9

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
046-1	1611.2	98.3	76.1	4758.3
046-2	2110.9	100.5	75.6	4475.4
046-3	3249.2	79.2	64.1	4711.5
046-4	2625.7	91.7	72.8	4683.4
046-5	3042.5	101.3	82.6	4734.1
046-6	2425.3	84.3	73.6	3618.5
046-7	2094.2	100.8	73.3	4600.4
046-8	3805.5	75.1	70.1	4511.6
046-10	1825.6	103.1	78.0	4711.8
046-11	2368.6	100.2	81.9	4217.2
average	**2515.9**	**93.5**	**74.8**	**4502.2**
uncertainty		**7.4**	**3.9**	
SD	**679.6**	**10.3**	**5.5**	**351.6**
RSD	**27.0**	**11.0**	**7.3**	**7.8**
median	2396.9	99.3	74.6	4641.9
average + SD	3195.5	103.7	80.3	4853.8
average - SD	1836.3	83.2	69.3	4150.6
minimum	1611.2	75.1	64.1	3618.5
maximum	3805.5	103.1	82.6	4758.3
range	2194.3	27.9	18.5	1139.9

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
046-1	84.7	60.6	60.6	84.7
046-2	82.4	64.4	64.4	82.4
046-3	90.77	69.5	69.5	90.8
046-4	84.91	68.7	68.7	84.9
046-5	93.71	66.8	66.8	93.7
046-7	91.47	55.2	55.2	91.5
046-10	93.61	62.1	62.1	93.6
046-11	93.08	61.0	61.0	93.1
046-12	100.86	71.2	71.2	100.9
046-13	96.15	69.0	69.0	96.2
046-14	99.09	70.6	70.6	99.1
046-15	95.41	66.8	66.8	95.4
average	**92.2**	**65.5**	**65.5**	**92.2**
uncertainty		**3.1**	**3.1**	
SD	**5.7**	**4.9**	**4.9**	**5.7**
RSD	**6.2**	**7.5**	**7.5**	**6.2**
median	93.3	66.8	66.8	93.3
average + SD	97.9	70.4	70.4	97.9
average - SD	86.4	60.6	60.6	86.4
minimum	82.4	55.2	55.2	82.4
maximum	100.9	71.2	71.2	100.9
range	18.5	16.0	16.0	18.5

36 % elastomultiester – 64 % (polyester – viscose) (sample 055b)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
055b-1	4486.2	77.3	77.3	4486.2
055b-2	4958.4	76.8	76.8	4958.4
055b-3	4868.2	77.0	77.0	4868.2
055b-4	4665.9	76.0	76.0	4665.9
055b-5	4715.5	77.8	77.8	4715.5
average	**4738.9**	**77.0**	**77.0**	**4738.9**
uncertainty		**0.8**	**0.8**	
SD	**183.5**	**0.7**	**0.7**	**183.5**
RSD	**3.9**	**0.9**	**0.9**	**3.9**
median	4715.5	77.0	77.0	4715.5
average + SD	4922.3	77.6	77.6	4922.3
average - SD	4555.4	76.3	76.3	4555.4
minimum	4486.2	76.0	76.0	4486.2
maximum	4958.4	77.8	77.8	4958.4
range	472.2	1.8	1.8	472.2

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
055b-1	4875.8	88.3	88.3	4875.8
055b-2	4323.1	99.0	99.0	4323.1
055b-3	4745.2	84.4	84.4	4745.2
055b-4	4740.2	91.5	91.5	4740.2
055b-5	3203.0	88.9	87.8	3274.9
average	**4377.5**	**90.4**	**90.2**	**4391.8**
uncertainty		**6.8**	**6.9**	
SD	**688.7**	**5.5**	**5.6**	**658.2**
RSD	**15.7**	**6.0**	**6.2**	**15.0**
median	4740.2	88.9	88.3	4740.2
average + SD	5066.2	95.9	95.8	5050.0
average - SD	3688.7	85.0	84.7	3733.6
minimum	3203.0	84.4	84.4	3274.9
maximum	4875.8	99.0	99.0	4875.8
range	1672.8	14.7	14.7	1601.0

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
055b-1	62.3	73.8	73.8	62.3
055b-2	89.1	105.1	105.1	89.1
055b-3	0.3	72.6	56.8	29.0
average	**50.6**	**83.9**	**78.6**	**60.1**
uncertainty		**45.8**	**60.9**	
SD	**45.6**	**18.4**	**24.5**	**30.1**
RSD	**90.1**	**22.0**	**31.2**	**50.1**
median	62.3	73.8	73.8	62.3
average + SD	96.1	102.3	103.1	90.2
average - SD	5.0	65.4	54.1	30.0
minimum	0.3	72.6	56.8	29.0
maximum	89.1	105.1	105.1	89.1
range	88.8	32.5	48.4	60.1

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
055b-1	107.7	104.0	104.0	107.7
055b-2	62.0	121.7	121.7	62.0
055b-3	83.2	89.0	89.0	83.2
055b-4	1.0	117.1	103.3	32.9
055b-5	75.5	120.1	120.1	75.5
average	**65.9**	**110.4**	**107.6**	**72.3**
uncertainty		**17.2**	**16.8**	
SD	**39.9**	**13.8**	**13.5**	**27.6**
RSD	**60.6**	**12.5**	**12.6**	**38.1**
median	75.5	117.1	104.0	75.5
average + SD	105.8	124.2	121.2	99.9
average - SD	26.0	96.6	94.1	44.7
minimum	1.0	89.0	89.0	32.9
maximum	107.7	121.7	121.7	107.7
range	106.8	32.7	32.7	74.8

38 % elastomultiester – 44 % modal – 18% viscose (sample 089)

YARN

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
089-1	2766.2	91.8	70.7	4928.9
089-2	3587.8	88.4	73.0	5014.6
089-3	3269.9	88.8	73.9	4733.1
089-4	3470.9	80.6	68.3	4737.7
089-5	3566.2	80.8	66.2	4600.4
average	**3332.2**	**86.1**	**70.4**	**4802.9**
uncertainty		**6.3**	**4.0**	
SD	**340.4**	**5.1**	**3.2**	**166.5**
RSD	**10.2**	**5.9**	**4.6**	**3.5**
median	3470.9	88.4	70.7	4737.7
average + SD	3672.6	91.1	73.6	4969.4
average - SD	2991.8	81.0	67.2	4636.4
minimum	2766.2	80.6	66.2	4600.4
maximum	3587.8	91.8	73.9	5014.6
range	821.7	11.2	7.7	414.3

YARN

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
089-1	3759.0	99.9	87.4	4906.3
089-2	2258.1	105.8	85.9	4432.8
089-3	2372.5	111.7	90.7	4684.2
089-4	2551.5	110.9	86.2	4461.8
089-5	2859.4	95.6	78.6	4614.5
average	**2760.1**	**104.8**	**85.8**	**4619.9**
uncertainty		**8.7**	**5.5**	
SD	**602.8**	**7.0**	**4.4**	**191.2**
RSD	**21.8**	**6.7**	**5.2**	**4.1**
median	2551.5	105.8	86.2	4614.5
average + SD	3362.9	111.8	90.2	4811.1
average - SD	2157.3	97.8	81.3	4428.8
minimum	2258.1	95.6	78.6	4432.8
maximum	3759.0	111.7	90.7	4906.3
range	1501.0	16.1	12.1	473.5

SINGLE FILAMENT

BEFORE boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
089-1	86.1	81.8	81.8	86.1
089-2	93.0	96.0	96.0	93.0
089-3	80.7	87.1	87.1	80.7
089-4	93.6	91.6	91.6	93.6
089-5	93.3	84.6	84.6	93.3
089-6	85.6	78.6	78.6	85.6
089-7	111.9	87.6	87.6	111.9
089-8	112.6	83.9	83.9	112.6
average	**94.6**	**86.4**	**86.4**	**94.6**
uncertainty		**4.6**	**4.6**	
SD	**11.8**	**5.5**	**5.5**	**11.8**
RSD	**12.5**	**6.4**	**6.4**	**12.5**
median	93.2	85.9	85.9	93.2
average + SD	106.4	91.9	91.9	106.4
average - SD	82.8	80.9	80.9	82.8
minimum	80.7	78.6	78.6	80.7
maximum	112.6	96.0	96.0	112.6
range	31.9	17.4	17.4	31.9

SINGLE FILAMENT

AFTER boiling

JRC code	load at break mN	elongation at break %	elongation at max load %	max load mN
089-1	89.9	91.0	91.0	89.9
089-2	92.3	73.5	73.5	92.3
089-3	89.8	89.7	89.7	89.8
089-4	85.7	91.2	91.2	85.7
089-5	81.4	83.6	83.6	81.4
089-6	106.7	77.1	77.1	106.7
089-7	92.6	81.4	81.4	92.6
089-8	93.6	91.4	91.4	93.6
average	**91.5**	**84.9**	**84.9**	**91.5**
uncertainty		**5.9**	**5.9**	
SD	**7.3**	**7.0**	**7.0**	**7.3**
RSD	**8.0**	**8.3**	**8.3**	**8.0**
median	91.1	86.6	86.6	91.1
average + SD	98.8	91.9	91.9	98.8
average - SD	84.2	77.8	77.8	84.2
minimum	81.4	73.5	73.5	81.4
maximum	106.7	91.4	91.4	106.7
range	25.2	17.9	17.9	25.2

Annex VI

Determination of elastic properties (skein method)

Pure elastomultiester from bobbin (sample 021)

SKEIN

JRC code	L0 1st cycle mm	L1 3rd cycle mm	L2 3rd cycle mm	recoverable stretch %
021-1	360.8	367.1	208.4	47.8
021-2	363.8	370.4	216.7	45.2
021-3	358.6	365.5	207.3	47.9
021-4	361.5	366.7	207.8	48.0
021-5	374.5	381.6	226.4	44.4
021-6	367.5	373.7	214.1	47.3
021-7	362.7	370.0	207.3	49.2
021-8	359.2	366.3	204.0	49.6
021-9	366.9	372.2	213.3	47.2
021-10	363.1	368.5	207.6	48.6
021-11	367.2	371.9	209.8	48.7
021-12	373.1	374.6	218.3	45.8
021-13	350.0	357.6	206.4	45.9
021-14	361.3	368.2	205.2	49.6
021-15	374.8	376.2	217.1	46.7
021-16	376.9	377.5	221.6	45.2
021-17	372.7	378.7	211.9	49.8
average	**365.6**	**371.0**	**211.9**	**47.5**
uncertainty				**0.9**
SD	**7.1**	**5.8**	**6.3**	**1.7**
RSD	**2.0**	**1.6**	**3.0**	**3.6**
median	363.8	370.4	209.8	47.8
average + SD	372.7	376.8	218.2	49.2
average - SD	358.4	365.1	205.7	45.7
minimum	350.0	357.6	204.0	44.4
maximum	376.9	381.6	226.4	49.8
range	26.9	24.0	22.4	5.4

Pure elastomultiester from bobbin (sample 090)

SKEIN

JRC code	L0 1st cycle mm	L1 3rd cycle mm	L2 3rd cycle mm	recoverable stretch %
090-1	399.2	403.6	220.9	55.5
090-2	399.9	403.9	221.0	55.6
090-3	401.5	405.6	225.0	54.2
090-4	398.9	403.4	225.4	53.3
090-5	403.1	406.3	227.4	53.3
090-6	405.9	409.3	226.2	54.7
090-7	400.0	403.9	223.4	54.4
090-8	404.4	408.3	226.3	54.4
090-9	405.6	410.9	226.5	55.1
090-10	403.1	406.8	228.3	53.0
average	**402.2**	**406.2**	**225.1**	**54.3**
uncertainty				**0.7**
SD	**2.6**	**2.6**	**2.5**	**0.9**
RSD	**0.6**	**0.6**	**1.1**	**1.7**
median	402.3	405.9	225.8	54.4
average + SD	404.8	408.8	227.6	55.3
average - SD	399.5	403.6	222.5	53.4
minimum	398.9	403.4	220.9	53.0
maximum	405.9	410.9	228.3	55.6
range	6.9	7.4	7.4	2.6

Pure elastomultiester from bobbin (sample 092)

SKEIN

JRC code	L0 1st cycle mm	L1 3rd cycle mm	L2 3rd cycle mm	recoverable stretch %
092-1	386.8	390.3	216.9	51.0
092-2	397.0	400.4	227.1	49.5
092-3	395.7	398.7	221.2	51.5
092-4	388.3	392.3	215.9	52.0
092-5	399.2	402.3	223.7	51.5
092-6	395.0	398.1	220.7	51.6
092-7	385.8	388.8	214.4	51.7
092-8	394.8	397.7	220.0	51.8
092-9	397.4	400.7	221.9	51.8
092-10	395.0	397.8	222.7	50.6
average	**393.5**	**396.7**	**220.5**	**51.3**
uncertainty				**0.5**
SD	**4.7**	**4.6**	**3.8**	**0.8**
RSD	**1.2**	**1.2**	**1.7**	**1.5**
median	395.0	398.0	220.9	51.6
average + SD	398.2	401.3	224.3	52.0
average - SD	388.7	392.1	216.6	50.5
minimum	385.8	388.8	214.4	49.5
maximum	399.2	402.3	227.1	52.0
range	13.4	13.6	12.8	2.5

Annex VII

Analysis of composition by the new developed DSC method

Pure elastomultiester from bobbin (sample 021)

YARN

JRC code	size mg	peak A area	peak B area
021-1	7.60	21.91	30.82
021-2	7.42	22.59	31.72
021-3	6.95	22.32	31.13
021-4	6.38	21.78	30.44
021-5	7.40	21.86	30.66
021-6	6.69	21.22	27.92
021-7	7.03	22.33	31.14
021-8	6.66	22.34	31.21
021-9	6.91	22.35	31.20
021-10	7.25	22.36	31.14
021-11	6.94	22.20	31.26
021-12	7.54	22.31	31.16
021-13	7.60	22.31	31.13
021-14	7.63	22.31	31.14
021-15	7.64	22.33	31.18
021-16	7.76	22.28	31.16
021-17	7.79	22.32	31.16
021-18	7.80	22.29	31.15
021-19	7.87	22.31	31.15
021-20	7.94	22.30	31.18
021-21	2.69	22.32	31.13
021-22	2.78	22.28	31.08
021-23	2.97	22.21	30.72
021-24	2.98	21.41	29.14
021-25	3.16	22.34	31.16
021-26	4.70	22.35	31.20
021-27	4.91	22.31	31.13
021-28	4.96	22.31	31.19
021-29	5.02	22.34	31.19
021-30	5.05	22.33	31.14
021-31	9.60	22.32	31.12
021-32	9.72	22.31	31.17
021-33	9.95	22.34	31.12
021-34	9.96	22.32	31.17
021-35	10.22	22.29	31.13
021-36	6.79	22.01	30.02
021-37	5.53	21.33	29.30
021-38	6.29	22.23	31.08
021-39	6.74	22.21	31.13
021-40	6.85	22.24	31.14
021-41	8.20	21.93	31.08
021-42	7.00	22.19	31.21
021-43	5.77	21.82	30.10
021-44	4.93	21.89	29.56
021-45	7.39	22.23	31.06
021-46	7.20	22.36	31.07
021-47	7.69	22.34	31.06
021-48	6.44	22.34	31.15
021-49	6.57	22.23	30.94
021-50	7.20	22.30	31.16
021-51	7.09	22.26	31.22
021-52	6.42	22.35	31.13
021-53	6.68	22.29	31.11
021-54	6.29	22.32	31.20

021-55	5.11	22.30	31.19
021-56	5.04	22.34	31.17
021-57	5.35	22.31	31.14
021-58	4.37	22.30	31.05
021-59	5.76	22.31	31.07
021-60	4.95	22.21	31.03
021-61	6.88	22.38	31.20
021-62	6.93	22.39	31.04
021-63	4.56	22.33	31.08
021-64	5.14	22.28	31.31
021-65	5.12	22.17	31.14
021-66	4.77	22.36	31.35
021-67	7.58	22.23	31.15
021-68	4.56	22.33	31.08
021-69	5.98	22.13	31.11
021-70	5.03	22.19	31.34
021-71	5.22	22.14	31.32
021-72	6.94	22.20	31.26
021-73	5.21	22.00	30.83
021-74	5.22	22.16	31.35
021-75	4.62	22.19	31.15
021-76	7.02	22.20	31.29
021-77	6.86	22.16	31.34
021-78	6.57	22.41	31.38
021-79	4.75	22.45	31.45
021-80	5.10	22.57	31.20
average		**22.22**	**31.01**
uncertainty		**0.05**	**0.12**
SD		**0.23**	**0.54**
RSD		**1.04**	**1.75**
median		22.30	31.14
average + SD		22.45	31.55
average - SD		21.99	30.47
minimum		21.22	27.92
maximum		22.59	31.72
range		1.37	3.80

YARN

JRC code	size mg	peak A area	peak B area
021-1	2.69	22.32	31.13
021-2	2.78	22.28	31.08
021-3	2.97	22.21	30.72
021-4	2.98	21.41	29.14
021-5	3.16	22.34	31.16
021-6	4.70	22.35	31.2
021-7	4.91	22.31	31.13
021-8	4.96	22.31	31.19
021-9	5.02	22.34	31.19
021-10	5.05	22.33	31.14
021-11	7.54	22.31	31.16
021-12	7.60	22.31	31.13
021-13	7.63	22.31	31.14
021-14	7.64	22.33	31.18
021-15	7.76	22.28	31.16
021-16	7.79	22.32	31.16
021-17	7.80	22.29	31.15
021-18	7.87	22.31	31.15
021-19	7.94	22.30	31.18
021-20	9.60	22.32	31.12
021-21	9.72	22.31	31.17
021-22	9.95	22.34	31.12
021-23	9.96	22.32	31.17
021-24	10.22	22.29	31.13
average		**22.27**	**31.05**
uncertainty		**0.08**	**0.18**
SD		**0.19**	**0.42**
RSD		**0.83**	**1.34**
median		22.31	31.15
average + SD		22.46	31.47
average - SD		22.09	30.63
minimum		21.41	29.14
maximum		22.35	31.20
range		0.94	2.06

Pure elastomultiester from bobbin (sample 091)

YARN

JRC code	size mg	peak A area	peak B area
091-1	5.25	36.08	20.83
091-2	5.30	36.10	21.79
091-3	5.40	35.74	21.22
091-4	5.46	35.16	21.12
091-5	5.69	35.67	20.96
091-6	5.73	35.92	21.57
091-7	6.03	35.85	20.62
091-8	6.06	36.42	21.65
091-9	6.52	35.65	21.30
091-10	6.58	35.34	21.20
091-11	6.96	35.54	21.22
091-12	6.68	35.40	21.18
091-13	4.47	35.68	21.16
091-14	4.46	35.45	21.14
average		**35.71**	**21.21**
uncertainty		**0.20**	**0.18**
SD		**0.34**	**0.31**
RSD		**0.95**	**1.46**
median		35.68	21.19
average + SD		36.05	21.52
average - SD		35.38	20.90
minimum		20.62	20.62
maximum		36.42	21.79
range		15.80	1.17

Pure elastomultiester from bobbin (sample 090)

YARN

JRC code	size mg	peak A area	peak B area
090-1	6.86	22.40	31.22
090-2	6.57	22.47	31.30
090-3	5.87	22.41	31.30
090-4	5.86	22.43	31.12
090-5	5.85	22.23	30.79
090-6	5.04	22.42	31.17
090-7	5.20	22.37	31.51
090-8	5.22	22.48	31.20
090-9	5.51	22.26	31.28
090-10	5.72	22.56	31.32
090-11	4.71	22.44	31.23
090-12	4.84	22.43	31.21
090-13	5.18	22.36	31.15
average		**22.40**	**31.22**
uncertainty		**0.05**	**0.10**
SD		**0.09**	**0.16**
RSD		**0.39**	**0.52**
median		22.42	31.22
average + SD		22.49	31.38
average - SD		22.32	31.05
minimum		22.23	30.79
maximum		22.56	31.51
range		0.33	0.72

Pure elastomultiester from bobbin (sample 092)

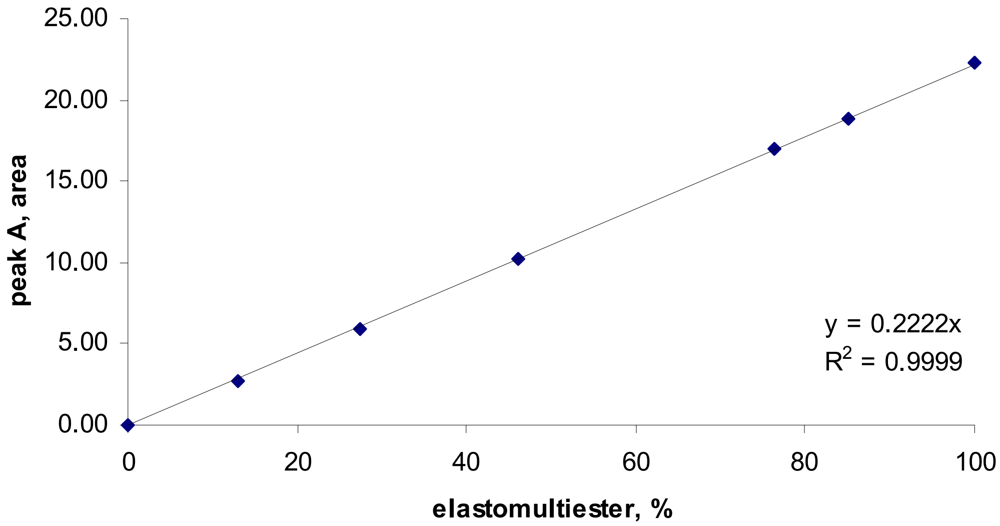
YARN

JRC code	size mg	peak A area	peak B area
092-1	6.22	22.22	31.31
092-2	6.35	22.34	31.36
092-3	6.10	22.35	31.72
092-4	5.96	22.32	31.74
092-5	5.87	22.39	31.60
092-6	5.60	22.38	31.55
092-7	5.38	22.28	31.55
092-8	7.02	22.35	31.51
092-9	7.58	22.21	31.64
092-10	7.32	22.34	31.96
092-11	4.86	22.12	31.27
092-12	6.74	22.08	31.11
092-13	5.75	22.26	31.35
092-14	5.69	22.13	31.23
average		**22.27**	**31.49**
uncertainty		**0.06**	**0.13**
SD		**0.10**	**0.23**
RSD		**0.46**	**0.74**
median		22.30	31.53
average + SD		22.37	31.73
average - SD		22.17	31.26
minimum		22.08	31.11
maximum		22.39	31.96
range		0.31	0.85

Calibration curve

elastomultiester (sample 021) – polyester 2-GT type (sample 015)

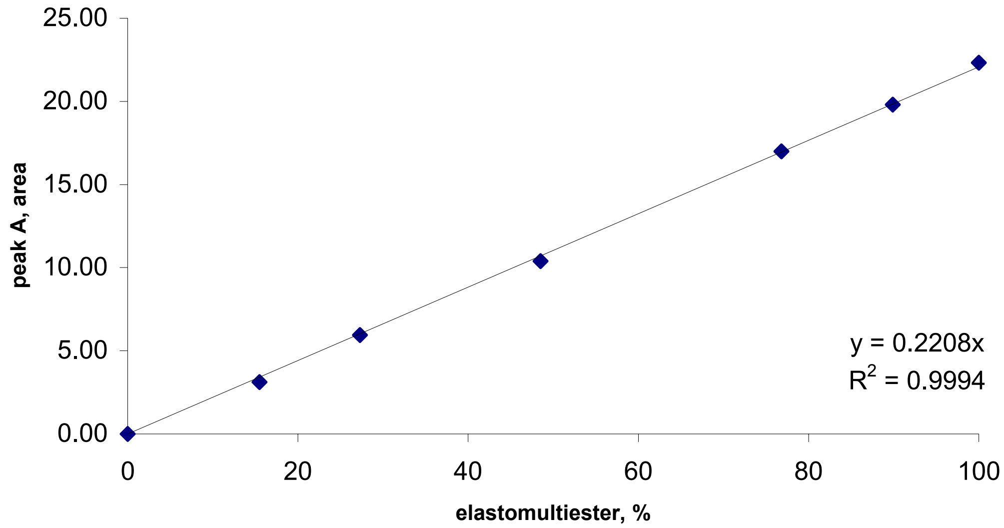
elastomultiester 021 %	polyester 2-GT 015 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	54.75
13.1	86.9	2.74	53.44
27.5	72.5	5.97	49.11
46.1	53.9	10.20	45.60
76.3	23.7	16.97	36.42
85.0	15.0	18.84	34.97
100.0	0.0	22.32	31.13



Calibration curve

elastomultiester (sample 021) – polyester 2-GT type (sample 066)

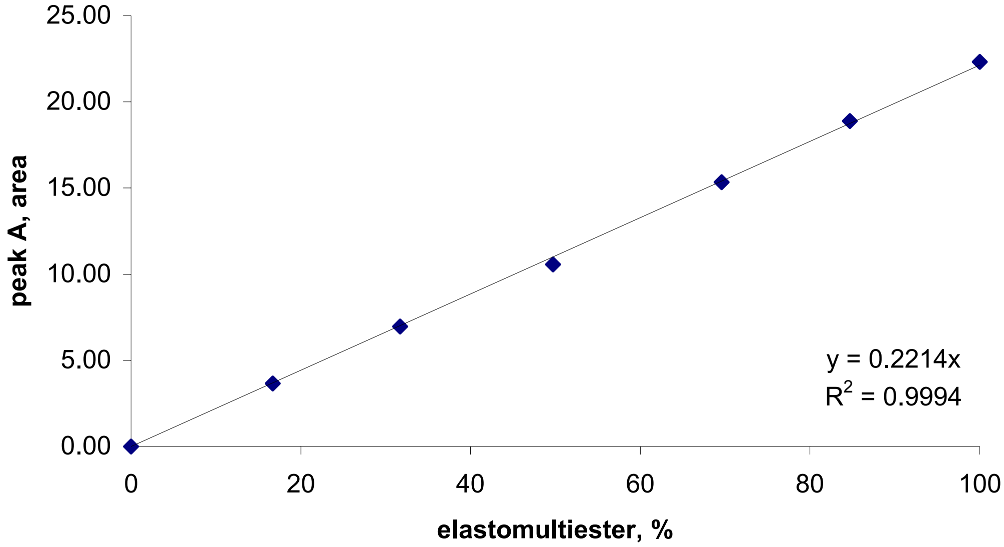
elastomultiester 021 %	polyester 2-GT 066 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	52.18
15.5	84.5	3.12	49.68
27.3	72.7	5.94	47.62
48.5	51.5	10.40	41.38
76.8	23.2	16.99	36.12
89.9	10.1	19.80	32.22
100.0	0.0	22.32	31.13



Calibration curve

elastomultiester (sample 021) – polyester 2-GT type (sample 081)

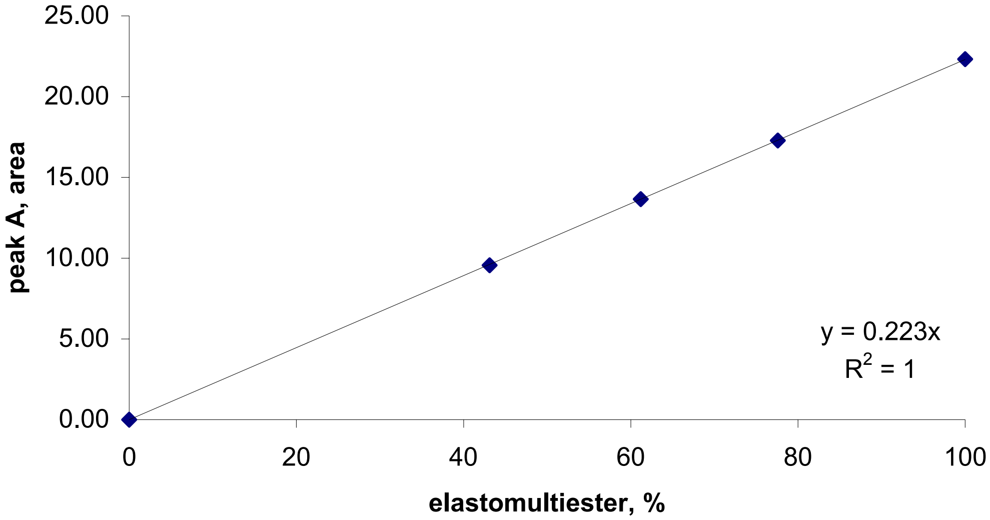
elastomultiester 021 %	polyester 2-GT 081 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	52.18
16.7	83.3	3.65	47.92
31.7	68.3	6.96	46.52
49.7	50.3	10.56	40.59
69.6	30.4	15.34	36.78
84.7	15.3	18.89	34.68
100.0	0.0	22.32	31.13



Calibration curve

elastomultiester (sample 021) – polyester 2-GT type (sample 083)

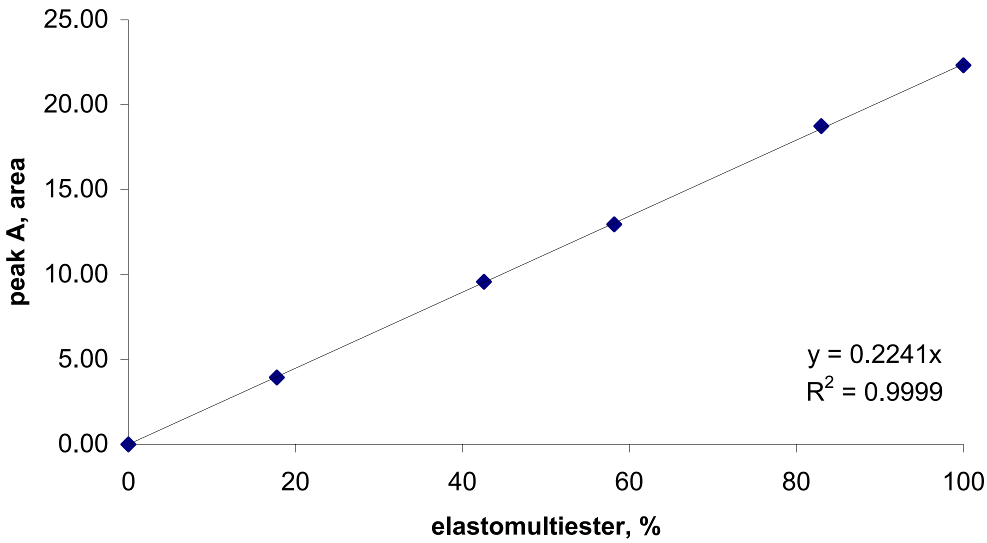
elastomultiester 021 %	polyester 2-GT 083 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	53.77
43.1	56.9	9.56	44.75
61.2	38.8	13.66	39.68
77.6	22.4	17.29	38.23
100.0	0.0	22.32	31.13



Calibration curve

elastomultiester (sample 021) – polyester 2-GT type (sample 084)

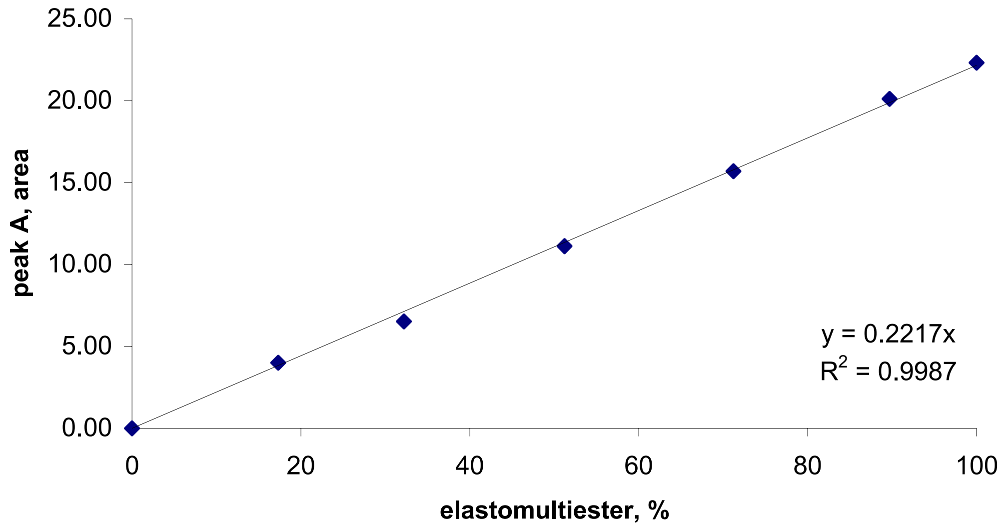
elastomultiester 021 %	polyester 2-GT 084 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	54.38
17.8	82.2	3.93	51.18
42.6	57.4	9.58	45.31
58.2	41.8	12.96	41.86
83.0	17.0	18.75	35.69
100.0	0.0	22.32	31.13



Calibration curve

elastomultiester (sample 021) – polyester 2-GT type (sample 085)

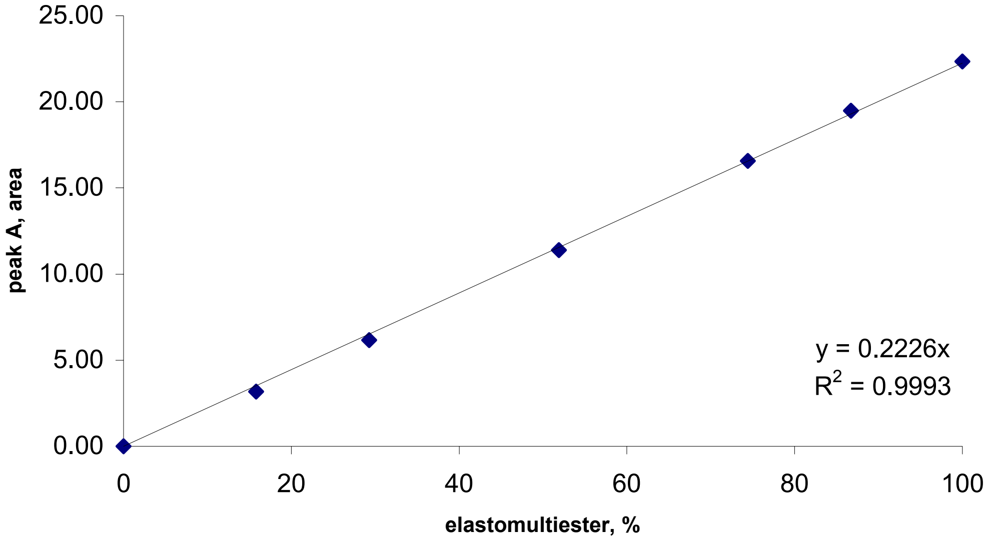
elastomultiester 021 %	polyester 2-GT 085 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	56.91
17.3	82.7	4.00	50.90
32.2	67.8	6.53	44.58
51.2	48.8	11.12	42.89
71.2	28.8	15.69	38.62
89.7	10.3	20.11	33.80
100.0	0.0	22.32	31.13



Calibration curve

elastomultiester (sample 060b) – polyester 2-GT type (sample 061b)

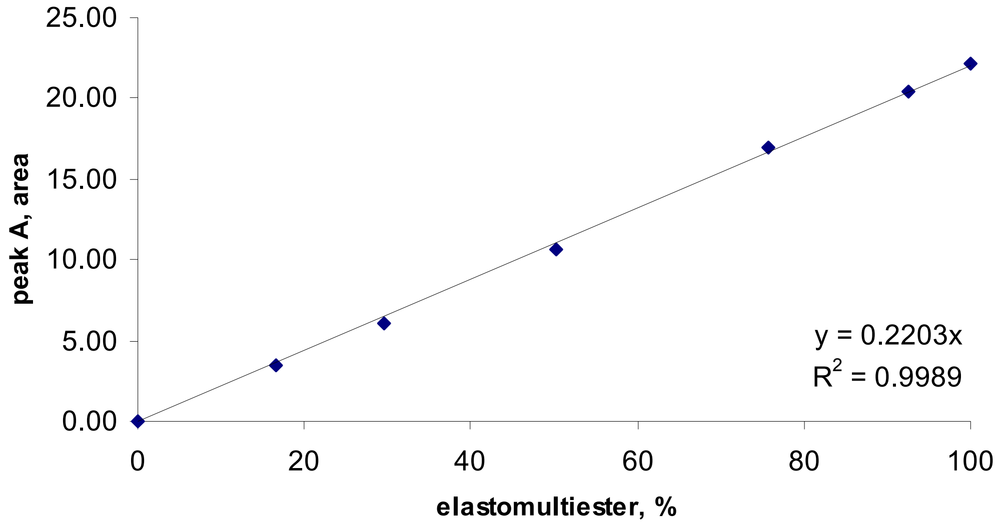
elastomultiester 060b %	polyester 2-GT 061b %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	52.92
15.8	84.2	3.17	49.33
29.3	70.7	6.16	47.05
51.9	48.1	11.39	40.88
74.4	25.6	16.57	36.91
86.7	13.3	19.48	34.29
100.0	0.0	22.34	31.21



Calibration curve

elastomultiester (sample 021) – polyester 2-GT type (sample 082)

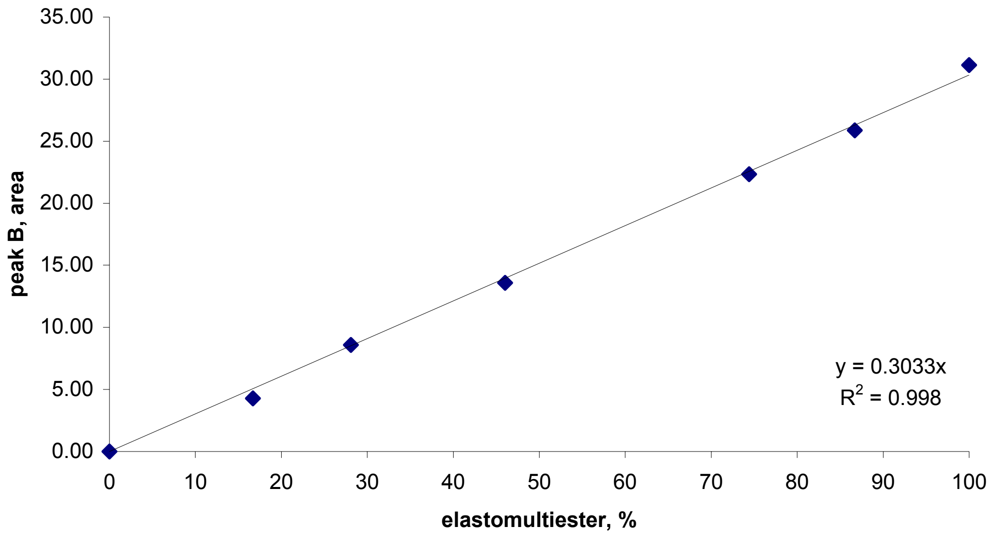
elastomultiester 021 %	polyester 2-GT 082 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	51.09
16.6	83.4	3.44	47.20
29.6	70.4	6.04	45.93
50.3	49.7	10.70	41.17
75.8	24.2	16.90	36.76
92.6	7.4	20.44	33.10
100.0	0.0	22.20	31.26



Calibration curve

elastomultiester (sample 021) – polyester 3-GT type (sample 059b)

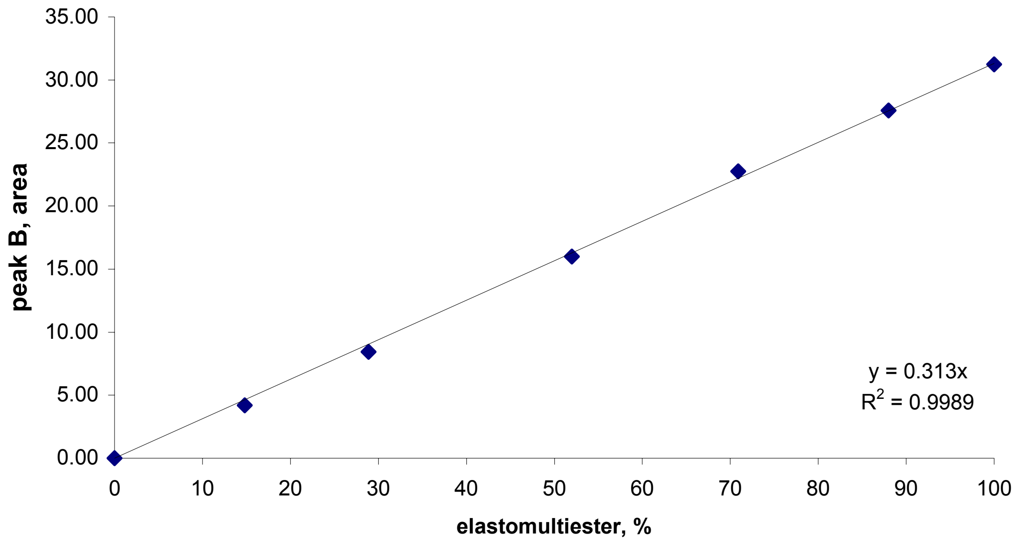
elastomultiester 021 %	polyester 3-GT 059b %	peak A area J/g	peak B area J/g
0.0	100.0	57.20	0.00
16.7	83.3	52.62	4.28
28.1	71.9	49.67	8.58
46.0	54.0	42.72	13.58
74.4	25.6	31.11	22.34
86.7	13.3	26.92	25.87
100.0	0.0	22.36	31.14



Calibration curve

elastomultiester (sample 021) – polyester 4-GT type (sample 086)

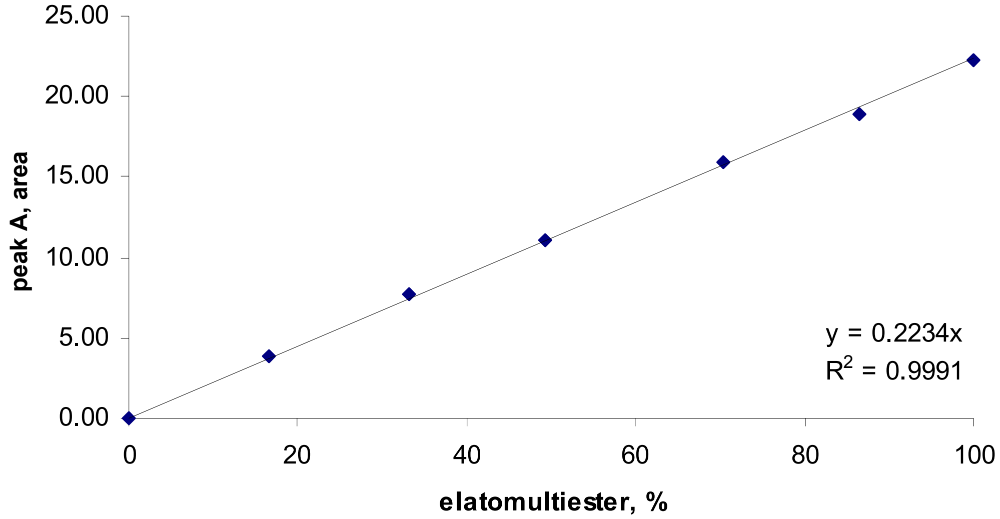
elastomultiester 021 %	polyester 4-GT 086 %	peak A area J/g	peak B area J/g
0.0	100.0	57.62	0.00
14.8	85.2	52.83	4.20
28.9	71.1	47.14	8.45
52.0	48.0	40.18	16.00
70.9	29.10	33.72	22.76
88.0	12.0	26.41	27.59
100.0	0.0	22.04	31.25



Calibration curve

elastomultiester (sample 021) – cotton (sample 011)

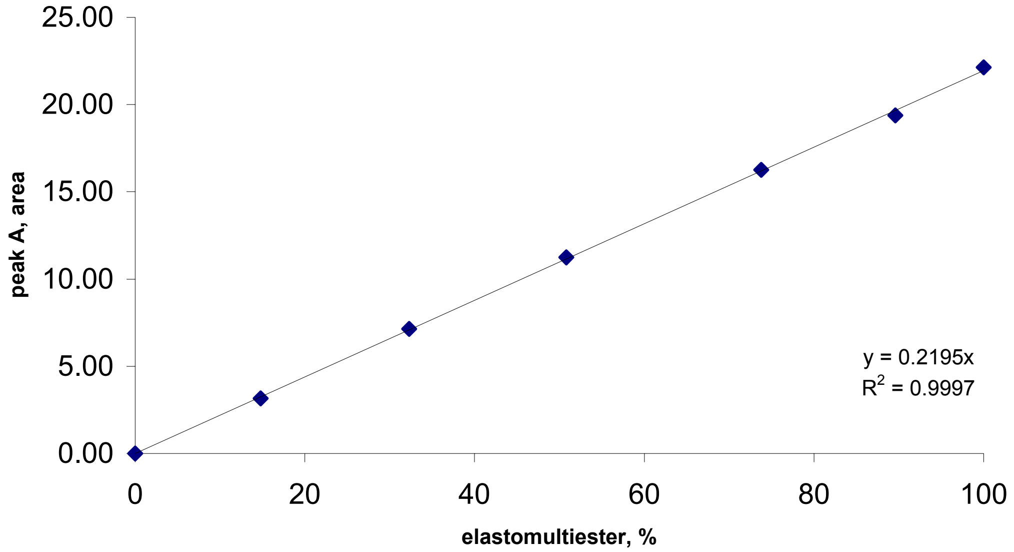
elastomultiester 021 %	cotton 011 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	0.00
16.5	83.5	3.90	5.39
33.2	66.8	7.77	10.88
49.4	50.6	11.03	15.17
70.4	29.6	15.97	21.74
86.4	13.6	18.96	26.12
100.0	0.0	22.32	31.13



Calibration curve

elastomultiester (sample 021) – viscose (sample 034)

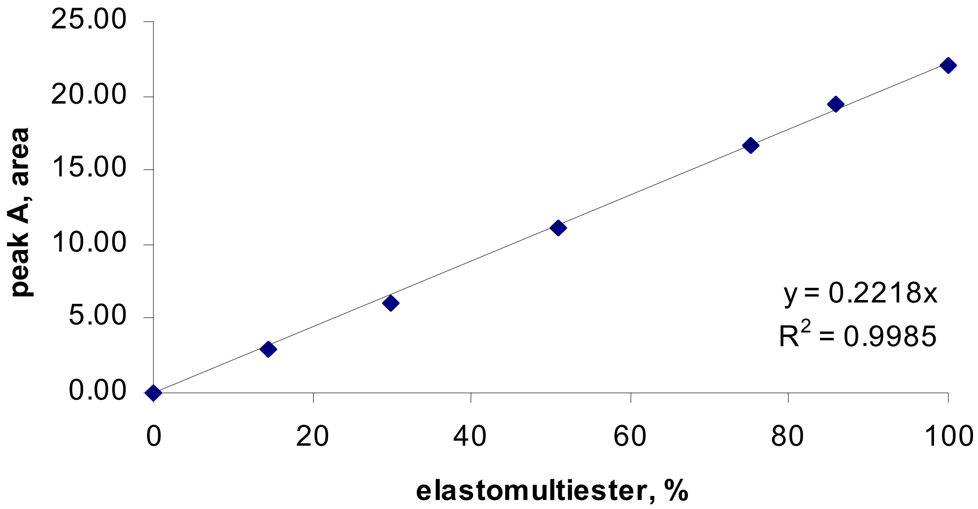
elastomultiester 021 %	viscose 034 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	0.00
14.8	85.2	3.16	4.95
32.3	67.7	7.14	10.79
50.8	49.2	11.24	16.24
73.8	26.2	16.25	23.01
89.6	10.4	19.38	28.26
100.0	0.0	22.13	31.11



Calibration curve

elastomultiester (sample 021) – nylon (sample 038)

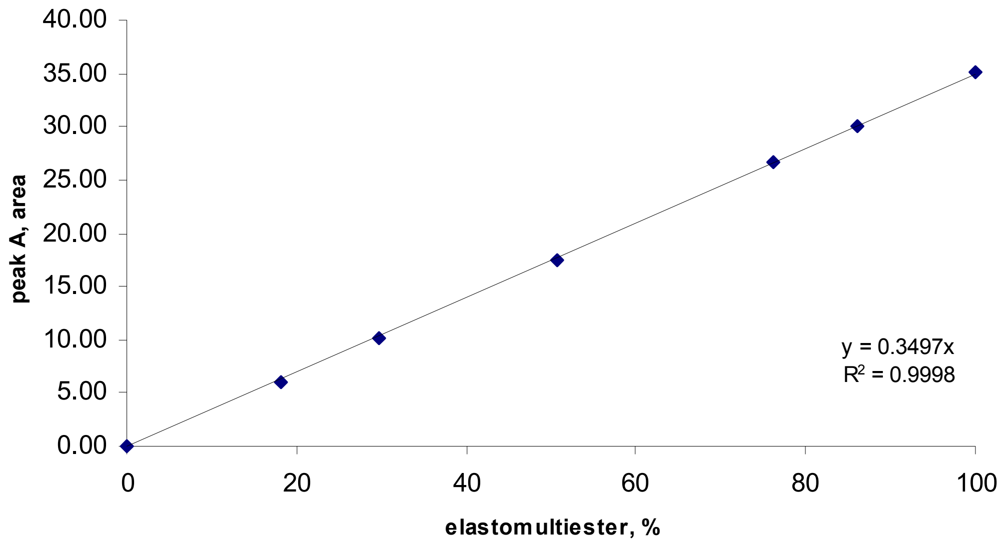
elastomultiester 021 %	nylon 038 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	73.68
14.6	85.4	2.97	71.49
30.0	70.0	6.12	65.74
51.0	49.0	11.04	55.01
75.0	25.0	16.59	43.88
85.8	14.2	19.52	37.58
100.0	0.0	22.14	31.32



Calibration curve

elastomultiester (sample 048A2) – polyester 2-GT type (sample 015)

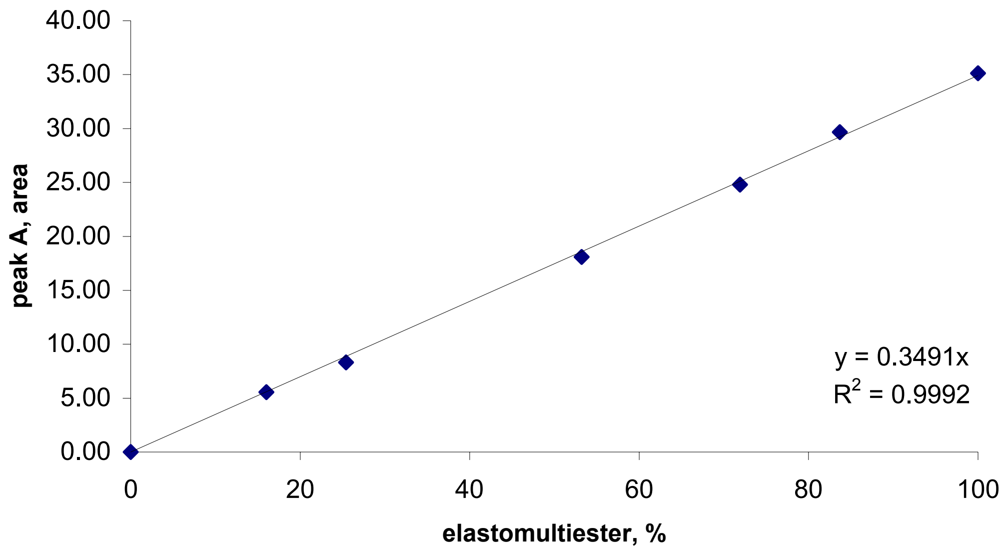
elastomultiester 048A2 %	polyester 2-GT 015 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	54.75
18.2	81.8	6.01	49.38
29.6	70.4	10.18	45.06
50.6	49.4	17.46	38.51
76.1	23.9	26.68	29.30
86.0	14.0	30.08	25.57
100.0	0.0	35.14	21.18



Calibration curve

elastomultiester (sample 048A2) – polyester 2-GT type (sample 082)

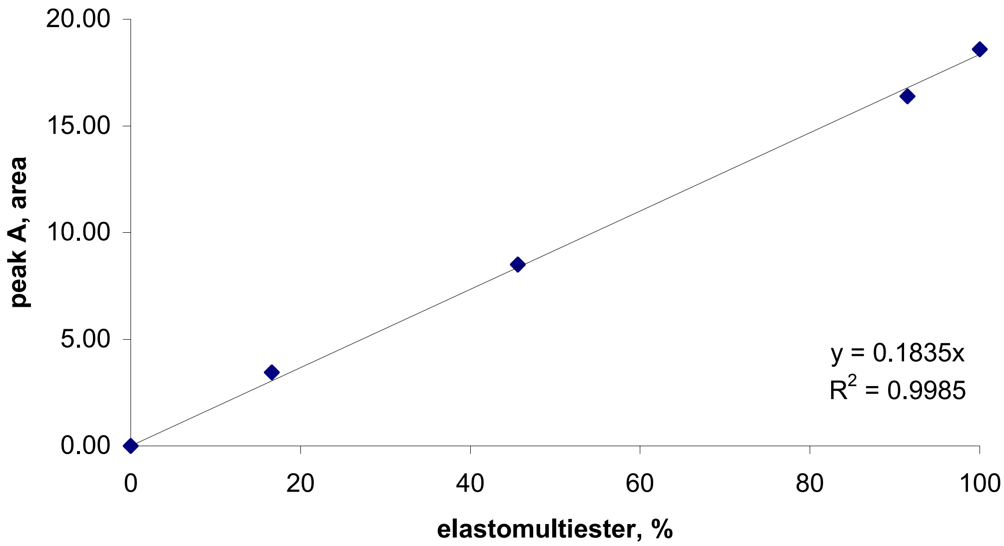
elastomultiester 048A2 %	polyester 2-GT 082 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	51.10
16.0	84.0	5.56	49.28
25.4	74.6	8.33	42.58
53.2	46.8	18.09	34.78
71.9	28.1	24.81	29.97
83.7	16.3	29.67	26.29
100.0	0.0	35.14	21.18



Calibration curve

elastomultiester (sample 049A2) – polyester 2-GT type (sample 015)

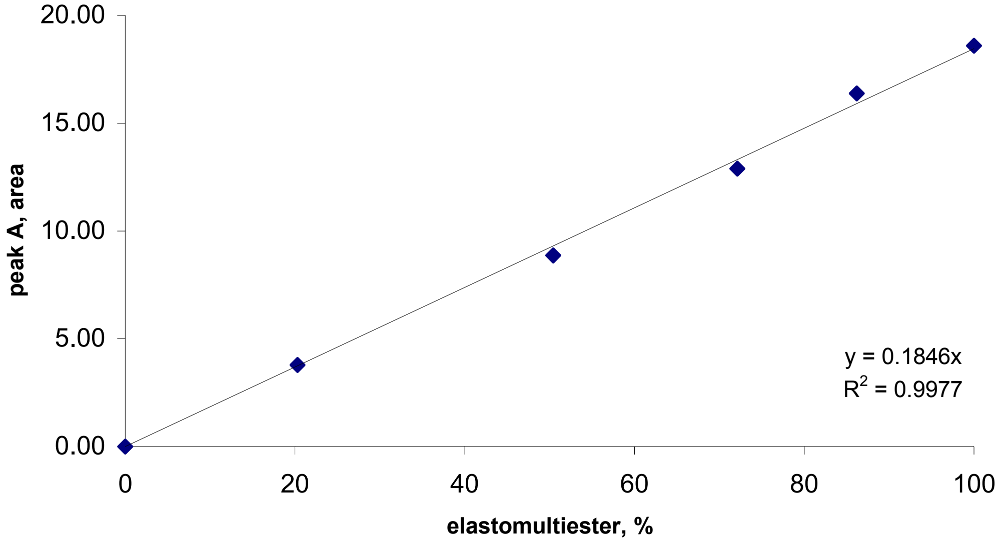
elastomultiester 049A2 %	polyester 2-GT 015 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	54.75
16.6	83.4	3.45	50.73
45.6	54.4	8.50	44.62
91.5	36.1	16.39	36.12
100.0	0.0	18.59	36.54



Calibration curve

elastomultiester (sample 049A2) – polyester 2-GT type (sample 082)

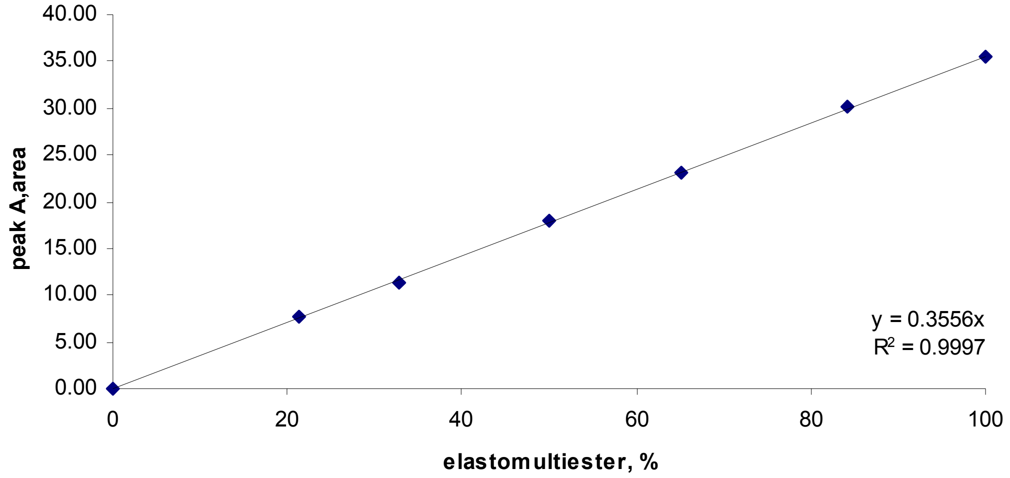
elastomultiester 049A2 %	polyester 2-GT 082 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	51.10
20.3	79.7	3.79	47.62
50.4	49.6	8.86	43.27
72.1	27.9	12.89	40.46
86.2	16.4	16.37	36.42
100.0	0.0	18.59	36.54



Calibration curve

elastomultiester (sample 056bA2) – cotton (sample 011)

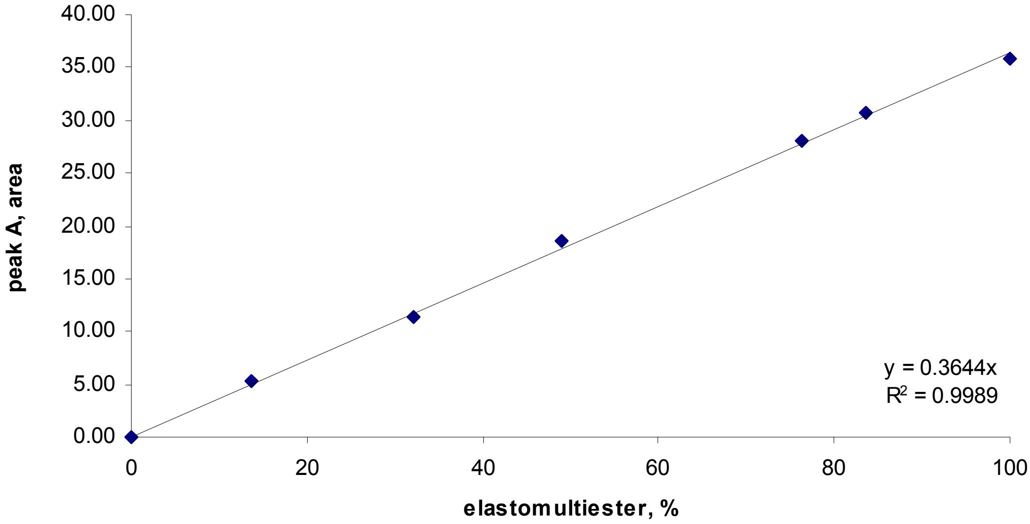
elastomultiester 056b %	cotton 011 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	0.00
21.4	78.6	7.70	5.01
32.8	67.2	11.30	6.87
50.0	50.0	18.06	11.01
65.2	34.8	23.11	13.94
84.2	15.8	30.06	18.10
100.0	0.0	35.46	21.44



Calibration curve

elastomultiester (sample 024A2) – cotton (sample 011)

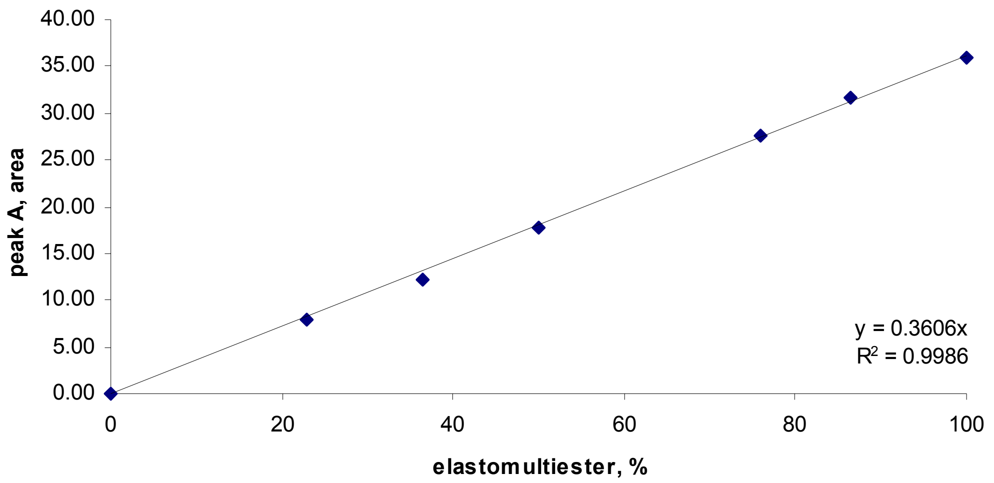
elastomultiester 024 %	cotton 011 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	0.00
13.7	86.3	5.32	3.37
32.1	67.9	11.42	6.85
49.0	51.0	18.54	10.86
76.3	23.7	28.04	16.06
83.5	16.5	30.64	17.56
100.0	0.0	35.79	21.13



Calibration curve

elastomultiester (sample 055bA2) – cotton (sample 015)

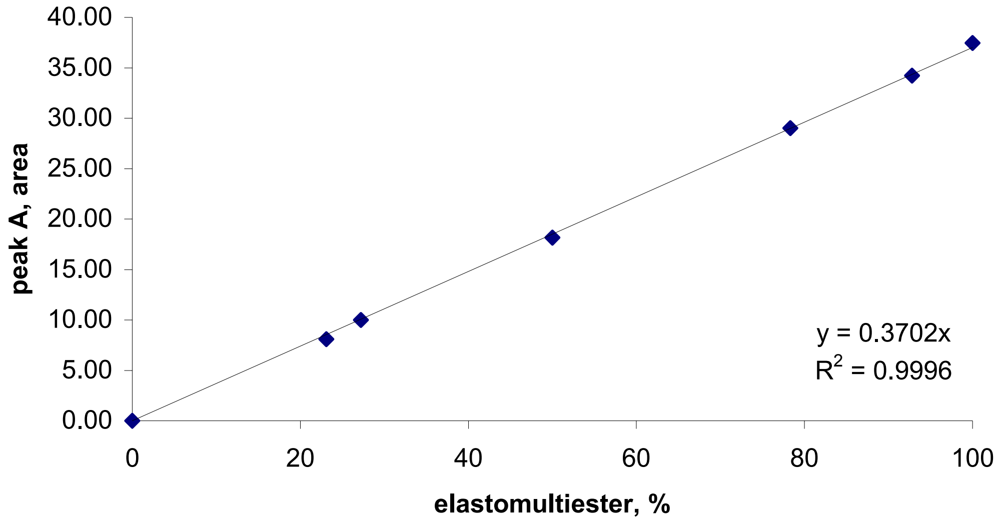
elastomultiester 055b %	polyester 2-GT 015 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	54.75
22.9	77.1	7.82	48.07
36.5	63.5	12.26	42.71
50.0	50.0	17.84	39.25
75.9	24.1	27.58	30.14
86.4	13.6	31.74	19.21
100.0	0.0	35.93	21.23



Calibration curve

elastomultiester (sample 091) – cotton (sample 011)

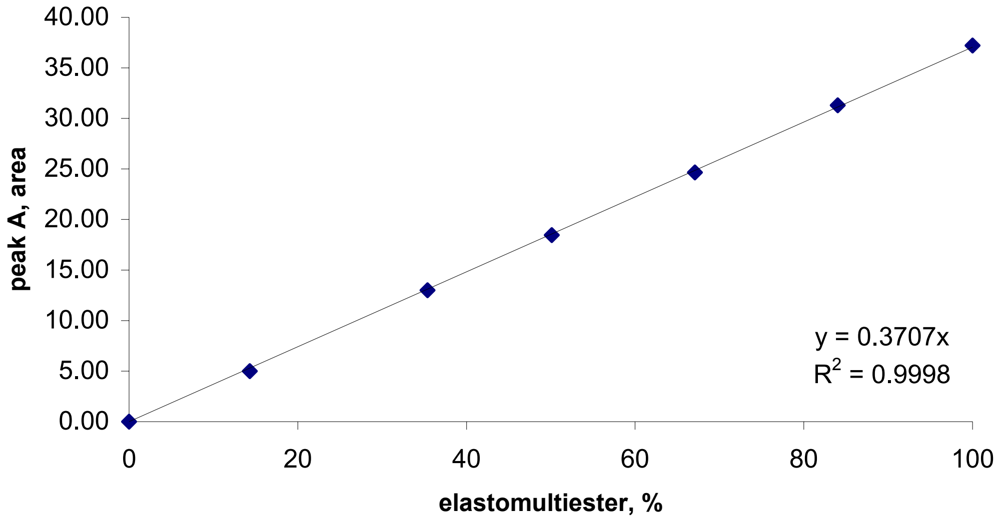
elastomultiester 091 %	cotton 011 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	0.00
23.1	76.9	8.10	5.02
27.2	72.8	10.00	5.99
50.0	50.0	18.15	10.99
78.3	21.7	29.01	17.27
92.8	7.2	34.21	20.49
100.0	0.0	37.45	22.74



Calibration curve

elastomultiester (sample 091) – polyester 2-GT type (sample 015)

elastomultiester 091 %	polyester 2-GT 015 %	peak A area J/g	peak B area J/g
0.0	100.0	0.00	58.32
14.3	85.7	5.01	52.06
35.4	64.6	13.02	44.37
50.1	49.9	18.46	39.84
67.1	32.9	24.64	34.43
84.0	16.0	31.30	28.01
100.0	0.0	37.22	22.48



50-52 % elastomultiester – 50-48 % polyester (sample 043)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	polyester %
043-1	7.48	11.59	41.00	52.2	47.8
043-2	7.53	11.59	41.08	52.2	47.8
043-3	7.68	11.63	41.04	52.4	47.6
043-4	8.04	11.58	41.14	52.2	47.8
043-5	8.10	11.56	41.01	52.1	47.9
043-6	6.49	11.58	40.96	52.2	47.8
043-7	7.16	11.49	41.12	51.8	48.2
043-8	7.86	11.56	41.17	52.1	47.9
043-9	7.87	11.52	41.01	51.9	48.1
043-10	8.20	11.56	41.12	52.1	47.9
average				**52.1**	**47.9**
uncertainty				**0.1**	**0.1**
SD				**0.2**	**0.2**
RSD				**0.3**	**0.4**
median				52.2	47.9
average + SD				52.3	48.1
average - SD				51.9	47.7
minimum				51.8	47.6
maximum				52.4	48.2
range				0.6	0.6

52 % elastomultiester – 48 % polyester (sample 044)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	polyester %
044-1	7.85	11.79	42.66	53.1	46.9
044-2	7.70	11.80	42.70	53.2	46.8
044-3	7.33	11.79	42.64	53.1	46.9
044-4	7.44	11.86	42.72	53.4	46.6
044-5	7.19	11.82	42.48	53.2	46.8
044-6	7.78	11.83	43.00	53.3	46.7
044-7	7.74	11.86	42.66	53.4	46.6
044-8	7.79	11.81	44.12	53.2	46.8
044-9	7.16	11.81	44.67	53.2	46.8
044-10	7.77	11.83	44.42	53.3	46.7
average				**53.2**	**46.8**
uncertainty				**0.1**	**0.1**
SD				**0.1**	**0.1**
RSD				**0.2**	**0.2**
median				53.2	46.8
average + SD				53.3	46.9
average - SD				53.1	46.7
minimum				53.1	46.6
maximum				53.4	46.9
range				0.3	0.3

40 % elastomultiester – 60 % polyester (sample 048)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	polyester %
048-1	7.78	14.89	41.58	42.6	57.4
048-2	7.37	14.78	41.59	42.3	57.7
048-3	7.47	14.88	41.44	42.6	57.4
048-4	7.33	14.79	39.54	42.3	57.7
048-5	7.83	14.83	41.55	42.4	57.6
048-6	6.80	14.94	41.36	42.7	57.3
048-7	7.30	15.09	40.29	43.2	56.8
048-8	7.39	14.65	41.01	41.9	58.1
048-9	7.65	14.98	41.37	42.8	57.2
048-10	7.95	14.91	40.37	42.6	57.4
average				**42.5**	**57.5**
uncertainty				**0.2**	**0.2**
SD				**0.3**	**0.3**
RSD				**0.8**	**0.6**
median				42.6	57.4
average + SD				42.8	57.8
average - SD				42.2	57.2
minimum				41.9	56.8
maximum				43.2	58.1
range				1.3	1.3

34 % elastomultiester – 66 % polyester (sample 045)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	polyester %
045-1	7.63	7.77	46.04	35.0	65.0
045-2	7.45	7.86	47.02	35.4	64.6
045-3	7.54	7.94	47.49	35.8	64.2
045-4	7.75	7.94	47.67	35.8	64.2
045-5	7.65	7.79	46.87	35.1	64.9
045-6	7.83	7.93	47.98	35.7	64.3
045-7	7.33	7.91	47.00	35.6	64.4
045-8	7.60	7.93	47.30	35.7	64.3
045-9	7.65	7.90	47.37	35.6	64.4
045-10	7.56	7.86	47.78	35.4	64.6
045-11	7.23	7.81	46.83	35.2	64.8
average				**35.5**	**64.5**
uncertainty				**0.2**	**0.2**
SD				**0.3**	**0.3**
RSD				**0.8**	**0.4**
median				35.6	64.4
average + SD				35.8	64.8
average - SD				35.2	64.2
minimum				35.0	64.2
maximum				35.8	65.0
range				0.8	0.8

20 % elastomultiester – 80 % polyester (sample 049)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	polyester %
049-1	7.83	6.77	46.72	39.4	60.6
049-2	7.70	6.75	45.93	39.3	60.8
049-3	7.47	6.82	46.05	39.7	60.3
049-4	7.39	6.75	46.30	39.3	60.7
049-5	6.47	6.90	46.26	40.1	59.9
049-6	7.70	6.78	46.10	39.4	60.6
049-7	7.44	6.73	46.69	39.1	60.9
049-8	7.75	6.88	46.75	40.0	60.0
049-9	7.22	6.86	46.89	39.9	60.1
049-10	7.87	6.84	46.58	39.8	60.2
average				**39.6**	**60.4**
uncertainty				**0.2**	**0.2**
SD				**0.3**	**0.3**
RSD				**0.9**	**0.6**
median				39.6	60.5
average + SD				39.9	60.7
average - SD				39.3	60.1
minimum				39.1	59.9
maximum				40.1	60.9
range				1.0	1.0

62 % elastomultiester – 38 % cotton (sample 054)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	cotton %
054-1	6.72	14.45	20.11	64.7	35.3
054-2	7.14	14.41	20.25	64.5	35.5
054-3	7.46	14.51	20.34	65.0	35.0
054-4	8.24	14.42	20.42	64.5	35.5
054-5	8.41	14.52	19.70	65.0	35.0
054-6	6.98	14.38	20.22	64.4	35.6
054-7	7.59	14.41	20.05	64.5	35.5
054-8	7.62	14.39	20.12	64.4	35.6
054-9	7.76	14.46	20.16	64.7	35.3
054-10	7.84	14.58	20.27	65.3	34.7
average				**64.7**	**35.3**
uncertainty				**0.2**	**0.2**
SD				**0.3**	**0.3**
RSD				**0.4**	**0.8**
median				64.6	35.4
average + SD				65.0	35.6
average - SD				64.4	35.0
minimum				64.4	34.7
maximum				65.3	35.6
range				0.9	0.9

58 % elastomultiester – 42 % cotton (sample 088)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	cotton %
088-1	7.15	12.25	17.66	54.8	45.2
088-2	7.34	12.19	17.97	54.6	45.4
088-3	5.54	12.40	17.65	55.5	44.5
088-4	5.08	12.36	17.80	55.3	44.7
088-5	4.73	12.37	18.50	55.4	44.6
088-6	4.64	12.49	18.66	55.9	44.1
088-7	4.49	12.48	18.64	55.9	44.1
088-8	5.32	12.43	18.48	55.6	44.4
088-9	4.30	12.12	17.59	54.3	45.7
088-10	4.29	12.11	17.54	54.2	45.8
average				**55.1**	**44.9**
uncertainty				**0.5**	**0.5**
SD				**0.6**	**0.6**
RSD				**1.2**	**1.4**
median				55.4	44.7
average + SD				55.7	45.5
average - SD				54.5	44.3
minimum				54.2	44.1
maximum				55.9	45.8
range				1.7	1.7

42 % elastomultiester – 58 % cotton (sample 056b)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	cotton %
056b-1	6.67	14.71	9.03	41.37	58.63
056b-2	6.94	14.12	8.43	39.71	60.29
056b-3	6.59	14.33	8.86	40.30	59.70
056b-4	6.84	14.16	8.49	39.82	60.18
056b-5	7.03	14.66	8.79	41.23	58.77
average				**40.5**	**59.5**
uncertainty				**1.0**	**1.0**
SD				**0.8**	**0.8**
RSD				**1.9**	**1.3**
median				40.3	59.7
average + SD				41.3	60.3
average - SD				39.7	58.7
minimum				39.7	58.6
maximum				41.4	60.3
range				1.7	1.7

32 % elastomultiester – 68 % cotton (sample 024)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	cotton %
024-1	7.13	13.29	7.57	36.5	63.5
024-2	6.55	13.24	7.23	36.3	63.7
024-3	8.15	13.35	7.56	36.6	63.4
024-4	8.27	13.40	7.66	36.8	63.2
024-5	7.58	13.34	7.50	36.6	63.4
024-6	8.09	13.62	7.58	37.4	62.6
024-7	6.86	13.39	7.51	36.7	63.3
024-8	7.96	13.27	7.51	36.4	63.6
024-9	8.54	13.35	7.55	36.6	63.4
024-10	7.99	13.29	7.50	36.5	63.5
average				**36.7**	**63.3**
uncertainty				**0.2**	**0.2**
SD				**0.3**	**0.3**
RSD				**0.8**	**0.5**
median				36.6	63.4
average + SD				37.0	63.6
average - SD				36.4	63.0
minimum				36.3	62.6
maximum				37.4	63.7
range				1.0	1.0

25.9 % elastomultiester – 74.1 % cotton (sample 053)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	cotton %
053-1	5.85	5.58	8.12	25.0	75.0
053-2	7.13	5.61	7.99	25.1	74.9
053-3	6.27	5.56	8.18	24.9	75.1
053-4	6.36	5.52	7.89	24.7	75.3
053-5	7.64	5.62	8.42	25.1	74.9
053-6	6.77	5.68	8.38	25.4	74.6
053-7	6.96	5.79	8.50	25.9	74.1
053-8	7.15	5.67	8.39	25.4	74.6
053-9	7.17	5.60	8.25	25.1	74.9
053-10	7.25	5.66	8.44	25.3	74.7
053-11	7.27	5.59	8.26	25.0	75.0
053-12	7.30	5.57	8.36	24.9	75.1
053-13	7.49	5.71	8.43	25.5	74.5
053-14	7.64	5.62	8.38	25.2	74.8
average				**25.2**	**74.8**
uncertainty				**0.2**	**0.2**
SD				**0.3**	**0.3**
RSD				**1.2**	**0.4**
median				25.1	74.9
average + SD				25.5	75.1
average - SD				24.9	74.5
minimum				24.7	74.1
maximum				25.9	75.3
range				1.2	1.2

38 % elastomultiester – 62 % cotton (sample 086b)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	cotton %
086b-1	5.35	8.34	11.69	37.3	62.7
086b-2	6.75	8.27	11.48	37.0	63.0
086b-3	5.76	8.36	11.70	37.4	62.6
086b-4	5.79	8.30	11.59	37.1	62.9
086b-5	5.69	8.37	11.58	37.4	62.6
086b-6	4.67	8.33	11.55	37.3	62.7
086b-7	5.19	8.35	11.82	37.4	62.6
086b-8	4.97	8.21	11.41	36.7	63.3
086b-9	5.68	8.33	11.68	37.3	62.7
average				**37.2**	**62.8**
uncertainty				**0.2**	**0.2**
SD				**0.2**	**0.2**
RSD				**0.6**	**0.4**
median				37.3	62.7
average + SD				37.4	63.0
average - SD				37.0	62.6
minimum				36.7	62.6
maximum				37.4	63.3
range				0.7	0.7

27 % elastomultiester – 73 % cotton (sample 087)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	cotton %
087-1	7.58	6.36	9.32	28.5	71.5
087-2	7.60	6.48	9.21	29.0	71.0
087-3	8.34	6.14	8.80	27.5	72.5
087-4	4.69	6.31	9.28	28.2	71.8
087-5	4.91	6.16	8.74	27.6	72.4
087-6	5.16	6.30	9.11	28.2	71.8
087-7	5.31	6.36	9.31	28.5	71.5
087-8	5.41	6.39	9.39	28.6	71.4
087-9	5.73	6.33	9.35	28.3	71.7
087-10	6.45	6.33	9.31	28.3	71.7
average				**28.3**	**71.7**
uncertainty				**0.3**	**0.3**
SD				**0.5**	**0.5**
RSD				**1.6**	**0.6**
median				28.3	71.7
average + SD				28.8	72.2
average - SD				27.8	71.2
minimum				27.5	71.0
maximum				29.0	72.5
range				1.5	1.5

27.4 % elastomultiester – 15.2 % polyester – 57 % cotton (sample 047)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	polyester + cotton %
047-1	6.95	6.19	17.31	27.9	72.1
047-2	7.04	6.20	17.15	27.9	72.1
047-3	7.19	6.19	16.43	27.9	72.1
047-4	7.24	6.20	17.24	27.9	72.1
047-5	7.91	6.21	17.31	28.0	72.0
047-6	6.51	6.18	16.10	27.8	72.2
047-7	6.57	5.98	16.39	26.9	73.1
047-8	6.70	6.00	16.19	27.0	73.0
047-9	6.90	6.10	16.72	27.5	72.5
047-10	7.95	6.19	16.03	27.9	72.1
average				**27.7**	**72.3**
uncertainty				**0.3**	**0.3**
SD				**0.4**	**0.4**
RSD				**1.4**	**0.5**
median				27.9	72.1
average + SD				28.1	72.7
average - SD				27.3	71.9
minimum				26.9	72.0
maximum				28.0	73.1
range				1.1	1.1

20.5 % elastomultiester – 22.5 % polyester – 57 % cotton (sample 046)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	polyester + cotton %
046-1	6.78	4.57	19.40	20.6	79.4
046-2	6.99	4.54	19.20	20.5	79.5
046-3	7.14	4.45	17.94	20.0	80.0
046-4	7.77	4.57	19.12	20.6	79.4
046-5	5.99	4.48	18.86	20.2	79.8
046-6	6.04	4.39	17.99	19.8	80.2
046-7	6.77	4.52	18.94	20.3	79.7
046-8	6.84	4.51	19.05	20.3	79.7
046-9	6.85	4.47	18.68	20.1	79.9
046-10	7.27	4.51	17.68	20.3	79.7
average				**20.3**	**79.7**
uncertainty				**0.2**	**0.2**
SD				**0.2**	**0.2**
RSD				**1.2**	**0.3**
median				20.3	79.7
average + SD				20.5	79.9
average - SD				20.1	79.5
minimum				19.8	79.4
maximum				20.6	80.2
range				0.8	0.8

36 % elastomultiester – 64 % (polyester – viscose)

(sample 055b)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	polyester + viscose %
055b-1	7.26	12.53	26.77	34.7	65.3
055b-2	7.94	12.71	26.48	35.2	64.8
055b-3	6.89	12.69	26.85	35.2	64.8
055b-4	6.16	12.49	25.96	34.6	65.4
055b-5	7.61	12.68	26.58	35.2	64.8
055b-6	6.52	12.75	26.66	35.4	64.6
055b-7	6.23	12.72	26.55	35.3	64.7
055b-8	6.64	12.77	26.83	35.4	64.6
055b-9	7.00	12.42	26.71	34.4	65.6
055b-10	6.28	12.79	26.72	35.5	64.5
average				**35.1**	**64.9**
uncertainty				**0.3**	**0.3**
SD				**0.4**	**0.4**
RSD				**1.0**	**0.6**
median				35.2	64.8
average + SD				35.5	65.3
average - SD				34.7	64.5
minimum				34.4	64.5
maximum				35.5	65.6
range				1.0	1.0

38 % elastomultiester – 44 % modal – 18% viscose (sample 089)

DSC method

JRC code	size mg	peak A area, J/g	peak B area, J/g	elastomultiester %	modal + viscose %
089-1	7.23	8.34	24.56	38.0	62.0
089-2	7.49	8.25	22.68	37.6	62.4
089-3	8.87	8.23	23.49	37.5	62.5
089-4	8.42	8.38	25.57	38.2	61.8
089-5	8.34	8.30	23.96	37.8	62.2
089-6	8.06	8.38	21.77	38.2	61.8
089-7	7.66	8.38	21.96	38.2	61.8
089-8	7.25	8.41	18.70	38.3	61.7
089-9	6.98	8.47	22.91	38.6	61.4
089-10	7.97	8.31	24.65	37.8	62.2
average				**38.0**	**62.0**
uncertainty				**0.2**	**0.2**
SD				**0.3**	**0.3**
RSD				**0.9**	**0.5**
median				38.1	61.9
average + SD				38.3	62.3
average - SD				37.7	61.7
minimum				37.5	61.4
maximum				38.6	62.5
range				1.1	1.1

Annex VIII

Determination of elastic properties by the new developed methods

Pure elastomultiester from bobbin (sample 021)

YARN

Elongation based – 3 cycles

100%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
021-1	1.07	1.04	2.8	18.89	12.58	62.2	74.8	25.2
021-2	1.44	1.35	6.2	17.99	11.28	64.0	77.4	22.6
021-3	1.23	1.20	2.4	17.19	11.28	65.6	77.5	22.6
021-4	1.01	1.01	0.0	20.10	12.62	59.8	74.8	25.2
021-5	1.12	1.09	2.7	19.11	12.57	61.8	74.9	25.1
021-6	1.49	1.42	4.7	16.03	11.19	67.9	77.6	22.4
021-7	1.19	1.15	3.4	17.20	12.75	65.6	74.5	25.5
021-8	0.93	0.91	2.2	19.84	12.79	60.3	74.4	25.6
average	**1.16**	**1.14**	**2.8**	**18.66**	**12.07**	**62.7**	**75.9**	**24.1**
uncertainty			**1.9**			**1.9**	**1.2**	**1.2**
SD	**0.15**	**0.14**	**2.2**	**1.11**	**0.72**	**2.2**	**1.4**	**1.4**
RSD	**13.21**	**12.12**	**78.7**	**5.96**	**5.96**	**3.6**	**1.9**	**6.0**
median	1.11	1.09	2.7	18.89	12.57	62.2	74.9	25.1
average + SD	1.32	1.28	5.1	19.77	12.78	64.9	77.3	25.6
average - SD	1.01	1.00	0.6	17.55	11.35	60.5	74.4	22.7
minimum	1.01	1.01	0.0	17.19	11.28	59.8	74.8	22.6
maximum	1.44	1.35	6.2	20.10	12.62	65.6	77.5	25.2
range	0.43	0.34	6.2	2.91	1.34	5.8	2.7	2.7

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
021-1	1.02	1.00	2.0	18.86	13.82	62.3	72.4	27.7
021-2	1.27	1.22	3.9	19.81	13.70	60.4	72.6	27.4
021-3	1.15	1.12	2.6	18.59	12.71	62.8	74.6	25.4
021-4	0.97	0.95	2.1	20.67	14.46	58.7	71.1	28.9
021-5	1.06	1.03	2.8	19.91	14.01	60.2	72.0	28.0
021-6	1.39	1.35	2.9	17.09	12.56	65.8	74.9	25.1
021-7	1.12	1.09	2.7	18.07	14.05	63.9	71.9	28.1
021-8	0.89	0.86	3.4	21.26	14.02	57.5	72.0	28.0
average	**1.11**	**1.08**	**2.8**	**19.28**	**13.67**	**61.4**	**72.7**	**27.3**
uncertainty			**0.5**			**2.3**	**1.1**	**1.1**
SD	**0.16**	**0.16**	**0.6**	**1.39**	**0.67**	**2.8**	**1.4**	**1.4**
RSD	**14.63**	**14.39**	**23.2**	**7.19**	**4.93**	**4.5**	**1.9**	**5.0**
median	1.09	1.06	2.8	19.34	13.92	61.3	72.2	27.8
average + SD	1.27	1.23	3.4	20.67	14.34	64.2	74.0	28.7
average - SD	0.95	0.92	2.1	17.90	12.99	58.7	71.3	26.0
minimum	0.89	0.86	2.0	17.09	12.56	57.5	71.1	25.1
maximum	1.39	1.35	3.9	21.26	14.46	65.8	74.9	28.9
range	0.50	0.49	2.0	4.17	1.90	8.3	3.8	3.8

YARN

Elongation based – 3 cycles

50%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
021-1	0.97	0.94	2.9	3.12	2.26	87.5	90.9	4.5
021-2	0.97	0.99	-2.3	2.06	1.41	91.7	94.4	2.8
021-3	1.14	1.08	5.0	3.94	2.81	84.2	88.8	5.6
average	**1.03**	**1.01**	**1.9**	**3.04**	**2.16**	**87.8**	**91.4**	**4.3**
uncertainty			**9.3**			**9.4**	**7.0**	**3.5**
SD	**0.10**	**0.07**	**3.8**	**0.94**	**0.71**	**3.8**	**2.8**	**1.4**
RSD	**9.61**	**7.11**	**199.7**	**30.97**	**32.68**	**4.3**	**3.1**	**32.7**
median	0.97	0.99	2.9	3.12	2.26	87.5	90.9	4.5
average + SD	1.13	1.08	5.6	3.99	2.86	91.6	94.2	5.7
average - SD	0.93	0.94	-1.9	2.10	1.45	84.1	88.5	2.9
minimum	0.97	0.94	-2.3	2.06	1.41	84.2	88.8	2.8
maximum	1.14	1.08	5.0	3.94	2.81	91.7	94.4	5.6
range	0.17	0.14	7.3	1.88	1.40	7.5	5.6	2.8

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
021-1	0.94	0.92	1.8	2.60	2.01	89.6	91.9	4.0
021-2	0.92	0.92	0.2	2.15	1.44	91.4	94.3	2.9
021-3	1.04	1.02	1.5	4.08	3.02	83.7	87.9	6.1
average	**0.96**	**0.95**	**1.2**	**2.94**	**2.16**	**88.2**	**91.4**	**4.3**
uncertainty			**2.1**			**10.1**	**8.0**	**4.0**
SD	**0.06**	**0.06**	**0.9**	**1.01**	**0.80**	**4.1**	**3.2**	**1.6**
RSD	**6.45**	**6.08**	**72.1**	**34.42**	**37.22**	**4.6**	**3.5**	**37.2**
median	0.94	0.92	1.5	2.60	2.01	89.6	91.9	4.0
average + SD	1.03	1.01	2.0	3.96	2.96	92.3	94.6	5.9
average - SD	0.90	0.89	0.3	1.93	1.36	84.2	88.2	2.7
minimum	0.92	0.92	0.2	2.15	1.44	83.7	87.9	2.9
maximum	1.04	1.02	1.8	4.08	3.02	91.4	94.3	6.1
range	0.11	0.10	1.6	1.93	1.59	7.7	6.4	3.2

YARN

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
021-1	0.86	2.61	2.24	0.65	0.53	1.91	1.86
021-2	1.03	2.76	2.67	0.68	0.53	2.74	2.72
021-3	1.10	2.02	2.19	0.73	0.53	2.12	1.82
021-4	1.06	2.59	2.62	0.71	0.50	2.60	2.45
021-5	1.17	3.37	3.09	0.58	0.37	3.06	2.52
average	**1.04**	**2.67**	**2.56**	**0.67**	**0.49**	**2.49**	**2.27**
SD	**0.11**	**0.48**	**0.36**	**0.06**	**0.07**	**0.47**	**0.41**
RSD	**10.91**	**18.13**	**14.22**	**8.91**	**14.16**	**18.80**	**17.99**
median	1.06	2.61	2.62	0.68	0.53	2.60	2.45
average + SD	1.15	3.15	2.92	0.73	0.56	2.95	2.68
average - SD	0.93	2.18	2.20	0.61	0.42	2.02	1.87
minimum	0.86	2.02	2.19	0.58	0.37	1.91	1.82
maximum	1.17	3.37	3.09	0.73	0.53	3.06	2.72
range	0.31	1.35	0.90	0.15	0.16	1.15	0.90

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
021-1	1.31	1.35	3.8	3.7	-2.5	81.4	61.1	94.8	95.5	96.2	96.3
021-2	1.44	1.44	5.5	5.4	0.0	78.3	51.9	94.5	94.7	94.5	94.6
021-3	1.52	1.44	4.2	3.7	5.1	73.0	48.7	96.0	95.6	95.8	96.4
021-4	1.47	1.46	5.2	4.9	0.2	70.9	47.3	94.8	94.8	94.8	95.1
021-5	1.30	1.31	6.1	5.0	-0.8	64.1	31.8	93.3	93.8	93.9	95.0
average	**1.41**	**1.40**	**5.0**	**4.6**	**0.4**	**73.5**	**48.2**	**94.7**	**94.9**	**95.0**	**95.5**
uncertainty			**1.2**	**1.0**	**3.5**	**8.3**	**13.2**	**1.2**	**0.9**	**1.2**	**1.0**
SD	**0.10**	**0.07**	**0.9**	**0.8**	**2.8**	**6.7**	**10.6**	**1.0**	**0.7**	**0.9**	**0.8**
RSD	**7.00**	**4.95**	**18.8**	**18.0**	**700.2**	**9.2**	**22.1**	**1.0**	**0.8**	**1.0**	**0.9**
median	1.44	1.44	5.2	4.9	0.0	73.0	48.7	94.8	94.8	94.8	95.1
average + SD	1.51	1.47	5.9	5.4	3.3	80.3	58.8	95.6	95.6	96.0	96.3
average - SD	1.31	1.33	4.0	3.7	-2.4	66.8	37.5	93.7	94.2	94.1	94.6
minimum	1.30	1.31	3.8	3.7	-2.5	64.1	31.8	93.3	93.8	93.9	94.6
maximum	1.52	1.46	6.1	5.4	5.1	81.4	61.1	96.0	95.6	96.2	96.4
range	0.23	0.16	2.3	1.8	7.6	17.3	29.4	2.7	1.8	2.3	1.8

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
021-1	0.63	3.36	2.92	0.44	0.25	3.48	2.74
021-2	0.75	2.92	2.59	0.52	0.32	3.59	2.73
021-3	0.66	2.94	2.36	0.48	0.32	3.20	1.98
021-4	0.65	2.65	2.16	0.52	0.35	3.02	2.04
021-5	0.72	2.66	2.44	0.49	0.32	3.05	2.58
average	**0.68**	**2.90**	**2.50**	**0.49**	**0.31**	**3.27**	**2.41**
SD	**0.05**	**0.29**	**0.28**	**0.04**	**0.04**	**0.25**	**0.37**
RSD	**7.39**	**9.94**	**11.40**	**7.20**	**11.67**	**7.79**	**15.47**
median	0.66	2.92	2.44	0.49	0.32	3.20	2.58
average + SD	0.73	3.19	2.78	0.52	0.35	3.52	2.79
average - SD	0.63	2.62	2.21	0.45	0.28	3.01	2.04
minimum	0.63	2.65	2.16	0.44	0.25	3.02	1.98
maximum	0.75	3.36	2.92	0.52	0.35	3.59	2.74
range	0.12	0.71	0.76	0.08	0.10	0.57	0.76

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
021-1	0.83	0.80	7.0	5.5	3.1	57.7	40.1	86.6	88.3	86.1	89.0
021-2	0.91	0.91	7.2	5.5	0.8	61.0	42.3	88.3	89.6	85.7	89.1
021-3	0.84	0.82	6.4	4.0	1.7	67.5	48.6	88.2	90.5	87.2	92.1
021-4	0.90	0.88	6.0	4.1	2.4	67.4	53.8	89.4	91.4	87.9	91.9
021-5	0.89	0.86	6.1	5.2	3.1	66.6	45.3	89.4	90.2	87.8	89.7
average	**0.87**	**0.85**	**6.5**	**4.8**	**2.2**	**64.1**	**46.0**	**88.4**	**90.0**	**86.9**	**90.4**
uncertainty			**0.6**	**0.9**	**1.2**	**5.5**	**6.7**	**1.4**	**1.4**	**1.3**	**1.8**
SD	**0.04**	**0.04**	**0.5**	**0.8**	**1.0**	**4.4**	**5.4**	**1.2**	**1.1**	**1.0**	**1.5**
RSD	**4.34**	**4.79**	**7.8**	**15.5**	**43.6**	**6.9**	**11.8**	**1.3**	**1.3**	**1.2**	**1.7**
median	0.89	0.86	6.4	5.2	2.4	66.6	45.3	88.3	90.2	87.2	89.7
average + SD	0.91	0.90	7.0	5.6	3.2	68.5	51.4	89.5	91.2	88.0	91.8
average - SD	0.84	0.81	6.0	4.1	1.2	59.6	40.6	87.2	88.9	85.9	88.9
minimum	0.83	0.80	6.0	4.0	0.8	57.7	40.1	86.6	88.3	85.7	89.0
maximum	0.91	0.91	7.2	5.5	3.1	67.5	53.8	89.4	91.4	87.9	92.1
range	0.08	0.10	1.1	1.5	2.3	9.8	13.7	2.8	3.1	2.3	3.0

SINGLE FILAMENT

Elongation based – 3 cycles

100%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
021-1	0.36	0.41	-13.9	0.71	0.10	98.6	99.8	0.2
021-2	0.38	0.43	-13.2	0.84	-	98.3	-	-
021-3	0.37	0.41	-10.8	1.19	0.11	97.6	99.8	0.2
average	**0.37**	**0.42**	**-12.6**	**0.91**	**0.11**	**98.2**	**99.8**	**0.2**
uncertainty			**4.0**			**1.2**	**0.1**	**0.1**
SD	**0.01**	**0.02**	**1.6**	**0.24**	**0.00**	**0.5**	**0.0**	**0.0**
RSD	**3.72**	**3.84**	**-12.7**	**26.68**	**3.12**	**0.5**	**0.0**	**3.1**
median	0.37	0.41	-13.2	0.84	0.11	98.3	99.8	0.2
average + SD	0.38	0.43	-11.0	1.16	0.11	98.7	99.8	0.2
average - SD	0.35	0.40	-14.2	0.67	0.10	97.7	99.8	0.2
minimum	0.36	0.41	-13.9	0.71	0.10	97.6	99.8	0.2
maximum	0.38	0.43	-10.8	1.19	0.11	98.6	99.8	0.2
range	0.03	0.03	3.1	0.47	0.00	0.9	0.0	0.0

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
021-1	0.38	0.43	-13.2	0.82	0.11	98.4	99.8	0.2
021-2	0.42	0.45	-7.1	0.61	0.10	98.8	99.8	0.2
021-3	0.39	0.39	0.0	0.67	0.34	98.7	99.3	0.7
average	**0.39**	**0.42**	**-6.8**	**0.70**	**0.18**	**98.6**	**99.6**	**0.4**
uncertainty			**16.4**			**0.5**	**0.6**	**0.6**
SD	**0.02**	**0.03**	**6.6**	**0.11**	**0.13**	**0.2**	**0.3**	**0.3**
RSD	**5.18**	**6.66**	**-97.3**	**15.47**	**71.96**	**0.2**	**0.3**	**72.0**
median	0.39	0.43	-7.1	0.67	0.11	98.7	99.8	0.2
average + SD	0.42	0.45	-0.2	0.81	0.32	98.8	99.9	0.6
average - SD	0.37	0.39	-13.4	0.59	0.05	98.4	99.4	0.1
minimum	0.38	0.39	-13.2	0.61	0.10	98.4	99.3	0.2
maximum	0.42	0.45	0.0	0.82	0.34	98.8	99.8	0.7
range	0.04	0.06	13.2	0.21	0.23	0.4	0.5	0.5

Without pretension

SINGLE FILAMENT

Elongation based – 3 cycles

100%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
021-1	0.22	0.27	-22.7	3.85	-	92.3	-	-
021-2	0.32	0.35	-9.4	4.01	-	92.0	-	-
021-3	0.27	0.29	-7.4	2.36	-	95.3	-	-
average	**0.27**	**0.30**	**-13.2**	**3.41**	**-**	**93.2**	**-**	**-**
uncertainty			**20.7**			**4.5**		
SD	**0.05**	**0.04**	**8.3**	**0.91**	**-**	**1.8**	**-**	**-**
RSD	**19.18**	**12.84**	**-63.3**	**26.75**	**-**	**2.0**	**-**	**-**
median	0.27	0.29	-9.4	3.85	-	92.3	-	-
average + SD	0.32	0.34	-4.8	4.32	-	95.0	-	-
average - SD	0.22	0.26	-21.5	2.50	-	91.4	-	-
minimum	0.22	0.27	-22.7	2.36	-	92.0	-	-
maximum	0.32	0.35	-7.4	4.01	-	95.3	-	-
range	0.10	0.07	15.3	1.65	-	3.3	-	-

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
021-1	0.25	0.29	-16.0	3.99	-	92.0	-	-
021-2	0.33	0.37	-12.1	3.85	-	92.3	-	-
021-3	0.27	0.30	-11.1	0.73	-	98.5	-	-
average	**0.28**	**0.32**	**-13.1**	**2.86**	**-**	**94.3**	**-**	**-**
uncertainty			**6.4**			**9.2**		
SD	**0.04**	**0.04**	**2.6**	**1.84**	**-**	**3.7**	**-**	**-**
RSD	**15.48**	**12.48**	**-19.7**	**64.48**	**-**	**3.9**	**-**	**-**
median	0.27	0.30	-12.1	3.85	-	92.3	-	-
average + SD	0.33	0.36	-10.5	4.70	-	98.0	-	-
average - SD	0.24	0.28	-15.7	1.02	-	90.6	-	-
minimum	0.25	0.29	-16.0	0.73	-	92.0	-	-
maximum	0.33	0.37	-11.1	3.99	-	98.5	-	-
range	0.08	0.07	4.9	3.26	-	6.5	-	-

Pretension 2 mg

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
021-1	0.25	0.21	15.5	0.91	0.69	96.4	97.2	1.4
021-2	0.25	0.27	-5.1	0.26	-	99.0	-	-
021-3	0.25	0.26	-0.5	0.68	-	97.3	-	-
average	**0.25**	**0.24**	**3.3**	**0.61**	**0.69**	**97.5**	**97.2**	**1.4**
uncertainty			**26.9**			**3.3**		
SD	**0.01**	**0.03**	**10.8**	**0.3**	**-**	**1.3**	**-**	**-**
RSD	**2.16**	**13.14**	**325.6**	**53.6**	**-**	**1.4**	**-**	**-**
median	0.25	0.26	-0.5	0.7	-	97.3	-	-
average + SD	0.26	0.28	14.1	0.9	-	98.9	-	-
average - SD	0.25	0.21	-7.5	0.3	-	96.2	-	-
minimum	0.25	0.21	-5.1	0.3	-	96.4	-	-
maximum	0.25	0.27	15.5	0.9	-	99.0	-	-
range	0.01	0.06	20.6	0.7	-	2.6	-	-

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
021-1	0.21	0.20	3.0	1.41	0.51	94.4	98.0	1.0
021-2	0.29	0.28	1.9	0.66	-	97.4	-	-
021-3	0.30	0.27	8.8	0.08	-	99.7	-	-
average	**0.26**	**0.25**	**4.6**	**0.71**	**0.51**	**97.1**	**97.96**	**1.02**
uncertainty			**9.3**			**6.6**		
SD	**0.05**	**0.04**	**3.7**	**0.67**	**-**	**2.7**	**-**	**-**
RSD	**18.26**	**17.00**	**81.8**	**93.20**	**-**	**2.7**	**-**	**-**
median	0.29	0.27	3.0	0.66	-	97.4	-	-
average + SD	0.31	0.30	8.3	1.38	-	99.8	-	-
average - SD	0.22	0.21	0.8	0.05	-	94.5	-	-
minimum	0.21	0.20	1.9	0.08	-	94.4	-	-
maximum	0.30	0.28	8.8	1.41	-	99.7	-	-
range	0.09	0.08	7.0	1.33	-	5.3	-	-

Without pretension

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
021-1	0.14	0.17	-19.1	0.13	-	99.5	-	-
021-2	0.16	0.16	-0.4	0.69	-	97.3	-	-
021-3	0.18	0.18	-2.0	-	-	-	-	-
average	0.16	0.17	-7.2	0.41	-	98.4	-	-
uncertainty			25.7			14.1		
SD	0.02	0.01	10.4	0.4	-	1.6	-	-
RSD	11.61	6.03	-144.8	95.5	-	1.6	-	-
median	0.16	0.17	-2.0	0.4	-	98.4	-	-
average + SD	0.18	0.18	3.2	0.8	-	99.9	-	-
average - SD	0.14	0.16	-17.5	0.0	-	96.8	-	-
minimum	0.14	0.16	-19.1	0.1	-	97.3	-	-
maximum	0.18	0.18	-0.4	0.7	-	99.5	-	-
range	0.04	0.02	18.6	0.6	-	2.2	-	-

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
021-1	0.16	0.15	7.4	0.67	-	97.3	-	-
021-2	0.20	0.20	-1.3	0.00	-	100.0	-	-
021-3	0.18	0.19	-7.0	0.02	-	99.9	-	-
average	0.18	0.18	-0.3	0.23	-	99.1	-	-
uncertainty			17.9			3.8		
SD	0.02	0.02	7.2	0.38	-	1.5	-	-
RSD	8.81	13.39	-2327.2	164.47	-	1.5	-	-
median	0.18	0.19	-1.3	0.02	-	99.9	-	-
average + SD	0.19	0.20	6.9	0.61	-	100.6	-	-
average - SD	0.16	0.16	-7.5	-0.15	-	97.6	-	-
minimum	0.16	0.15	-7.0	0.00	-	97.3	-	-
maximum	0.20	0.20	7.4	0.67	-	100.0	-	-
range	0.03	0.05	14.3	0.67	-	2.7	-	-

Pretension 2 mg

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
021-1	0.38	0.41	-6.6	0.38	-	98.5	-	-
021-2	0.40	0.34	15.9	0.77	0.56	96.9	97.7	1.1
021-3	0.27	0.29	-9.7	0.07	0.18	99.7	99.3	0.4
average	**0.35**	**0.35**	**-0.1**	**0.41**	**0.37**	**98.4**	**98.5**	**0.7**
uncertainty			**34.8**			**3.4**	**9.8**	**4.9**
SD	**0.07**	**0.06**	**14.0**	**0.35**	**0.27**	**1.4**	**1.1**	**0.5**
RSD	**20.00**	**17.39**	**-10002.6**	**86.25**	**72.62**	**1.4**	**1.1**	**73.1**
median	0.38	0.34	-6.6	0.38	0.37	98.5	98.5	0.7
average + SD	0.42	0.41	13.9	0.76	0.64	99.8	99.6	1.3
average - SD	0.28	0.29	-14.1	0.06	0.10	97.0	97.4	0.2
minimum	0.27	0.29	-9.7	0.07	0.18	96.9	97.7	0.4
maximum	0.40	0.41	15.9	0.77	0.56	99.7	99.3	1.1
range	0.13	0.12	25.7	0.70	0.38	2.8	1.5	0.8

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
021-1	0.43	0.33	24.2	0.42	-	98.3	-	-
021-2	0.29	0.34	-16.0	0.76	0.38	97.0	98.5	0.8
021-3	0.29	0.28	3.2	0.04	0.04	99.8	99.8	0.1
average	**0.34**	**0.32**	**3.8**	**0.41**	**0.21**	**98.4**	**99.2**	**0.4**
uncertainty			**50.0**			**3.6**	**8.5**	**4.2**
SD	**0.08**	**0.03**	**20.1**	**0.36**	**0.24**	**1.4**	**0.9**	**0.5**
RSD	**24.01**	**10.15**	**526.9**	**88.57**	**114.48**	**1.5**	**0.9**	**111.1**
median	0.29	0.33	3.2	0.42	0.21	98.3	99.2	0.4
average + SD	0.42	0.35	23.9	0.77	0.45	99.8	100.1	0.9
average - SD	0.26	0.28	-16.3	0.05	-0.03	96.9	98.2	0.0
minimum	0.29	0.28	-16.0	0.04	0.04	97.0	98.5	0.1
maximum	0.43	0.34	24.2	0.76	0.38	99.8	99.8	0.8
range	0.14	0.06	40.2	0.72	0.34	2.9	1.3	0.7

Pretension 20 mg

Pure elastomultiester from bobbin (sample 091)

YARN

Elongation based – 3 cycles

100%

25 mm gauge length

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
091-1	1.44	1.41	2.0	10.06	3.89	59.8	84.4	15.6
091-2	1.46	1.42	2.8	9.96	4.80	60.2	80.8	19.2
091-3	1.21	1.20	0.8	11.04	5.78	55.9	76.9	23.1
091-4	1.10	1.07	2.6	11.41	6.23	54.3	75.1	24.9
091-5	1.19	1.20	-0.4	11.32	5.86	54.7	76.6	23.4
average	**1.28**	**1.26**	**1.6**	**10.76**	**5.31**	**57.0**	**78.8**	**21.2**
uncertainty			**1.7**			**3.5**	**4.7**	**4.7**
SD	**0.16**	**0.15**	**1.3**	**0.70**	**0.95**	**2.8**	**3.8**	**3.8**
RSD	**12.44**	**11.90**	**85.4**	**6.49**	**17.96**	**4.9**	**4.9**	**18.0**
median	1.21	1.20	2.0	11.04	5.78	55.9	76.9	23.1
average + SD	1.44	1.41	2.9	11.46	6.27	59.8	82.6	25.1
average - SD	1.12	1.11	0.2	10.06	4.36	54.2	74.9	17.4
minimum	1.10	1.07	-0.4	9.96	3.89	54.3	75.1	15.6
maximum	1.46	1.42	2.8	11.41	6.23	60.2	84.4	24.9
range	0.35	0.34	3.2	1.46	2.34	5.8	9.4	9.4

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
091-1	1.40	1.39	0.5	9.63	4.73	61.5	81.1	18.9
091-2	1.39	1.32	5.5	10.19	5.17	59.2	79.3	20.7
091-3	1.20	1.15	4.4	11.23	6.00	55.1	76.0	24.0
091-4	1.10	1.04	5.3	11.46	6.39	54.2	74.4	25.6
091-5	1.16	1.12	3.1	11.72	6.33	53.1	74.7	25.3
average	**1.25**	**1.20**	**3.7**	**10.85**	**5.73**	**56.6**	**77.1**	**22.9**
uncertainty			**2.6**			**4.4**	**3.7**	**3.7**
SD	**0.14**	**0.15**	**2.1**	**0.89**	**0.74**	**3.6**	**3.0**	**3.0**
RSD	**11.01**	**12.08**	**55.3**	**8.23**	**12.91**	**6.3**	**3.8**	**12.9**
median	1.20	1.15	4.4	11.23	6.00	55.1	76.0	24.0
average + SD	1.39	1.35	5.8	11.74	6.46	60.2	80.1	25.9
average - SD	1.11	1.06	1.7	9.95	4.99	53.0	74.1	19.9
minimum	1.10	1.04	0.5	9.63	4.73	53.1	74.4	18.9
maximum	1.40	1.39	5.5	11.72	6.39	61.5	81.1	25.6
range	0.30	0.35	5.0	2.09	1.66	8.4	6.7	6.6

YARN

Elongation based – 3 cycles

100%

50 mm gauge length

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
091-1	0.85	0.87	-1.9	16.47	12.37	67.1	75.3	24.7
091-2	0.85	0.85	0.1	17.62	11.58	64.8	76.9	23.2
091-3	0.73	0.75	-2.1	18.68	12.84	62.7	74.3	25.7
average	**0.81**	**0.82**	**-1.3**	**17.59**	**12.26**	**64.8**	**75.5**	**24.5**
uncertainty			**3.0**			**5.5**	**3.2**	**3.2**
SD	**0.07**	**0.07**	**1.2**	**1.11**	**0.64**	**2.2**	**1.3**	**1.3**
RSD	**8.51**	**7.92**	**-92.0**	**6.29**	**5.22**	**3.4**	**1.7**	**5.2**
median	0.85	0.85	-1.9	17.62	12.37	64.8	75.3	24.7
average + SD	0.88	0.89	-0.1	18.69	12.90	67.0	76.8	25.8
average - SD	0.74	0.76	-2.5	16.48	11.62	62.6	74.2	23.2
minimum	0.73	0.75	-2.1	16.47	11.58	62.7	74.3	23.2
maximum	0.85	0.87	0.1	18.68	12.84	67.1	76.9	25.7
range	0.12	0.12	2.2	2.21	1.27	4.4	2.5	2.5

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
091-1	0.89	0.84	5.2	18.60	13.78	62.8	72.4	27.6
091-2	0.82	0.81	1.3	19.71	14.06	60.6	71.9	28.1
091-3	0.70	0.72	-2.5	17.55	14.66	64.9	70.7	29.3
average	**0.80**	**0.79**	**1.4**	**18.62**	**14.17**	**62.8**	**71.7**	**28.3**
uncertainty			**9.5**			**5.4**	**2.2**	**2.2**
SD	**0.10**	**0.07**	**3.8**	**1.08**	**0.45**	**2.2**	**0.9**	**0.9**
RSD	**11.93**	**8.26**	**284.7**	**5.82**	**3.18**	**3.5**	**1.3**	**3.2**
median	0.82	0.81	1.3	18.60	14.06	62.8	71.9	28.1
average + SD	0.90	0.85	5.2	19.70	14.62	64.9	72.6	29.2
average - SD	0.71	0.72	-2.5	17.54	13.72	60.6	70.8	27.4
minimum	0.70	0.72	-2.5	17.55	13.78	60.6	70.7	27.6
maximum	0.89	0.84	5.2	19.71	14.66	64.9	72.4	29.3
range	0.19	0.13	7.7	2.17	0.88	4.3	1.8	1.8

YARN

Elongation based – 3 cycles

100%

75 mm gauge length

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
091-1	0.87	0.83	4.6	25.01	20.69	66.7	72.4	27.6
091-2	1.09	1.06	2.4	22.53	19.65	70.0	73.8	26.2
091-3	1.04	1.03	1.0	21.58	19.30	71.2	74.3	25.7
091-4	0.95	0.90	6.0	24.99	19.90	66.7	73.5	26.5
091-5	1.02	0.98	3.9	25.21	20.02	66.4	73.3	26.7
average	**1.00**	**0.96**	**3.6**	**23.86**	**19.91**	**68.2**	**73.5**	**26.5**
uncertainty			**2.4**			**2.8**	**0.9**	**0.9**
SD	**0.08**	**0.09**	**1.9**	**1.69**	**0.52**	**2.3**	**0.7**	**0.7**
RSD	**8.40**	**9.83**	**54.5**	**7.07**	**2.59**	**3.3**	**0.9**	**2.6**
median	1.02	0.98	3.9	24.99	19.90	66.7	73.5	26.5
average + SD	1.08	1.06	5.5	25.55	20.43	70.4	74.1	27.2
average - SD	0.91	0.87	1.6	22.18	19.40	65.9	72.8	25.9
minimum	0.87	0.83	1.0	21.58	19.30	66.4	72.4	25.7
maximum	1.09	1.06	6.0	25.21	20.69	71.2	74.3	27.6
range	0.22	0.23	5.0	3.63	1.39	4.8	1.9	1.9

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
091-1	0.91	0.89	2.0	18.81	21.03	74.9	72.0	28.0
091-2	1.05	1.04	0.7	23.56	20.72	68.6	72.4	27.6
091-3	1.00	0.97	3.0	22.86	20.68	69.5	72.4	27.6
091-4	0.91	0.90	1.7	25.22	20.27	66.4	73.0	27.0
091-5	0.94	0.95	-0.9	24.01	21.19	68.0	71.7	28.3
average	**0.96**	**0.95**	**1.3**	**22.89**	**20.78**	**69.5**	**72.3**	**27.7**
uncertainty			**1.8**			**4.0**	**0.6**	**0.6**
SD	**0.06**	**0.06**	**1.5**	**2.44**	**0.36**	**3.3**	**0.5**	**0.5**
RSD	**6.34**	**6.53**	**114.3**	**10.65**	**1.71**	**4.7**	**0.7**	**1.7**
median	0.94	0.95	1.7	23.56	20.72	68.6	72.4	27.6
average + SD	1.02	1.01	2.8	25.33	21.14	72.7	72.8	28.2
average - SD	0.90	0.89	-0.2	20.45	20.42	66.2	71.8	27.2
minimum	0.91	0.89	-0.9	18.81	20.27	66.4	71.7	27.0
maximum	1.05	1.04	3.0	25.22	21.19	74.9	73.0	28.3
range	0.14	0.15	3.9	6.41	0.92	8.5	1.2	1.2

YARN

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
091-1	51.0	56.0	55.0	80.4	84.3	7.8	56.5	56.0	78.4	80.4	9.8
091-2	53.0	58.0	57.0	81.1	84.9	7.5	58.5	58.0	79.2	81.1	9.4
091-3	52.0	58.0	57.0	76.9	80.8	9.6	59.0	58.0	73.1	76.9	11.5
091-4	49.0	54.5	53.5	77.6	81.6	9.2	55.0	54.0	75.5	79.6	10.2
091-5	48.0	53.5	52.5	77.1	81.3	9.4	53.0	52.0	79.2	83.3	8.3
average				**78.6**	**82.6**	**8.7**			**77.1**	**80.3**	**9.9**
uncertainty				**2.5**	**2.4**	**1.2**			**3.4**	**2.9**	**1.4**
SD				**2.0**	**1.9**	**0.9**			**2.7**	**2.3**	**1.2**
RSD				**2.5**	**2.3**	**10.9**			**3.5**	**2.9**	**11.8**
median				77.6	81.6	9.2			78.4	80.4	9.8
average + SD				80.6	84.5	9.7			79.8	82.6	11.0
average - SD				76.6	80.7	7.8			74.4	77.9	8.7
minimum				76.9	80.8	7.5			73.1	76.9	8.3
maximum				81.1	84.9	9.6			79.2	83.3	11.5
range				4.2	4.1	2.1			6.2	6.4	3.2

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
091-1	57.0	56.0	76.5	80.4	9.8
091-2	59.0	58.5	77.3	79.2	10.4
091-3	59.0	58.0	73.1	76.9	11.5
091-4	55.5	54.5	73.5	77.6	11.2
091-5	53.5	52.5	77.1	81.3	9.4
average			**75.5**	**79.1**	**10.5**
uncertainty			**2.5**	**2.3**	**1.1**
SD			**2.0**	**1.8**	**0.9**
RSD			**2.7**	**2.3**	**8.8**
median			76.5	79.2	10.4
average + SD			77.5	80.9	11.4
average - SD			73.4	77.2	9.5
minimum			73.1	76.9	9.4
maximum			77.3	81.3	11.5
range			4.3	4.3	2.2

YARN

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
091-1	43.0	48.0	47.5	47.5	76.7	11.6	79.1	10.5	79.1	10.5
091-2	48.0	54.0	53.0	53.0	75.0	12.5	79.2	10.4	79.2	10.4
091-3	46.0	51.0	50.5	50.5	78.3	10.9	80.4	9.8	80.4	9.8
091-4	47.0	52.0	51.5	51.5	78.7	10.6	80.9	9.6	80.9	9.6
091-5	46.0	51.5	50.5	50.5	76.1	12.0	80.4	9.8	80.4	9.8
average					**77.0**	**11.5**	**80.0**	**10.0**	**80.0**	**10.0**
uncertainty					**1.9**	**1.0**	**1.0**	**0.5**	**1.0**	**0.5**
SD					**1.5**	**0.8**	**0.8**	**0.4**	**0.8**	**0.4**
RSD					**2.0**	**6.7**	**1.0**	**4.1**	**1.0**	**4.1**
median					76.7	11.6	80.4	9.8	80.4	9.8
average + SD					78.5	12.3	80.8	10.4	80.8	10.4
average - SD					75.4	10.7	79.2	9.6	79.2	9.6
minimum					75.0	10.6	79.1	9.6	79.1	9.6
maximum					78.7	12.5	80.9	10.5	80.9	10.5
range					3.7	1.9	1.8	0.9	1.8	0.9

YARN

Load based – 3 cycles

1.2 gf

JRC code	L1 max	La	Lb	L3 max	Lc	Ld	imm rec 1	rec 1	imm rec 3	rec 3
	mm	mm	mm	mm	mm	mm	%	%	%	%
091-1	32.65	6.47	5.85	34.10	6.79	6.49	80.2	82.1	80.1	81.0
091-2	31.43	7.14	6.12	32.80	7.17	6.50	77.3	80.5	78.2	80.2
091-3	32.22	5.92	5.14	33.76	6.47	5.68	81.6	84.1	80.8	83.2
average	**32.10**	**6.51**	**5.70**	**33.55**	**6.81**	**6.22**	**79.7**	**82.2**	**79.7**	**81.4**
uncertainty							**5.5**	**4.4**	**3.4**	**3.9**
SD	**0.62**	**0.61**	**0.51**	**0.67**	**0.35**	**0.47**	**2.2**	**1.8**	**1.4**	**1.6**
RSD	**1.93**	**9.40**	**8.91**	**2.01**	**5.09**	**7.60**	**2.8**	**2.2**	**1.7**	**1.9**
median	32.22	6.47	5.85	33.76	6.79	6.49	80.2	82.1	80.1	81.0
average + SD	32.72	7.12	6.21	34.22	7.16	6.70	81.9	84.0	81.1	83.0
average - SD	31.48	5.90	5.19	32.88	6.46	5.75	77.5	80.5	78.3	79.9
minimum	31.43	5.92	5.14	32.80	6.47	5.68	77.3	80.5	78.2	80.2
maximum	32.65	7.14	6.12	34.10	7.17	6.50	81.6	84.1	80.8	83.2
range	1.22	1.22	0.99	1.30	0.69	0.82	4.4	3.5	2.7	3.0

YARN

Load based – 3 cycles

1.0 gf

JRC code	L1 max	La	Lb	L3 max	Lc	Ld	imm rec 1	rec 1	imm rec 3	rec 3
	mm	mm	mm	mm	mm	mm	%	%	%	%
091-1	24.46	1.84	1.51	25.68	3.30	2.88	92.5	93.8	87.2	88.8
091-2	28.86	4.44	0.91	29.86	4.43	3.00	84.6	96.9	85.2	90.0
091-3	29.83	1.61	1.34	31.48	3.23	0.87	94.6	95.5	89.7	97.3
average	**27.72**	**2.63**	**1.25**	**29.01**	**3.65**	**2.25**	**90.6**	**95.4**	**87.4**	**92.0**
uncertainty							**13.1**	**3.8**	**5.7**	**11.4**
SD	**2.86**	**1.57**	**0.31**	**2.99**	**0.67**	**1.20**	**5.3**	**1.5**	**2.3**	**4.6**
RSD	**10.33**	**59.70**	**24.72**	**10.31**	**18.36**	**53.29**	**5.8**	**1.6**	**2.6**	**5.0**
median	28.86	1.84	1.34	29.86	3.30	2.88	92.5	95.5	87.2	90.0
average + SD	30.58	4.20	1.56	32.00	4.32	3.45	95.8	96.9	89.6	96.6
average - SD	24.85	1.06	0.94	26.02	2.98	1.05	85.3	93.9	85.1	87.4
minimum	24.46	1.61	0.91	25.68	3.23	0.87	84.6	93.8	85.2	88.8
maximum	29.83	4.44	1.51	31.48	4.43	3.00	94.6	96.9	89.7	97.3
range	5.37	2.83	0.60	5.79	1.19	2.13	10.0	3.0	4.6	8.5

YARN

Load based – 5 cycles

1.4 gf

JRC code	L1 max	La	Lb	L5 max	Lc	Ld	imm rec 1	rec 1	imm rec 5	rec 5
	mm	mm	mm	mm	mm	mm	%	%	%	%
091-1	73.58	26.52	22.55	78.12	32.68	27.11	64.0	69.4	58.2	65.3
091-2	73.19	34.72	30.11	79.32	40.69	36.49	52.6	58.9	48.7	54.0
091-3	59.89	20.80	16.96	-	-	20.27	65.3	71.7	-	-
average	**68.89**	**27.35**	**23.21**	**78.72**	**36.69**	**27.96**	**60.6**	**66.6**	**53.4**	**59.6**
uncertainty							**17.4**	**17.0**	**60.2**	**71.8**
SD	**7.79**	**7.00**	**6.60**	**0.85**	**5.67**	**8.14**	**7.0**	**6.8**	**6.7**	**8.0**
RSD	**11.31**	**25.60**	**28.44**	**1.08**	**15.44**	**29.13**	**11.5**	**10.3**	**12.5**	**13.4**
median	73.19	26.52	22.55	78.72	36.69	27.11	64.0	69.4	53.4	59.6
average + SD	76.68	34.35	29.81	79.57	42.35	36.10	67.6	73.5	60.1	67.6
average - SD	61.10	20.35	16.61	77.87	31.02	19.81	53.6	59.8	46.7	51.7
minimum	59.89	20.80	16.96	78.12	32.68	20.27	52.6	58.9	48.7	54.0
maximum	73.58	34.72	30.11	79.32	40.69	36.49	65.3	71.7	58.2	65.3
range	13.68	13.93	13.15	1.20	8.01	16.22	12.7	12.8	9.5	11.3

YARN

Load based – 5 cycles

1.0 gf

JRC code	L1 max	La	Lb	L5 max	Lc	Ld	imm rec 1	rec 1	imm rec 5	rec 5
	mm	mm	mm	mm	mm	mm	%	%	%	%
091-1	38.63	13.33	9.69	41.93	15.02	12.61	65.5	74.9	64.2	69.9
091-2	39.89	15.35	13.18	45.02	19.95	16.89	61.5	67.0	55.7	62.5
091-3	33.31	14.39	11.55	37.19	17.21	14.88	56.8	65.3	53.7	60.0
average	**37.28**	**14.35**	**11.47**	**41.38**	**17.39**	**14.79**	**61.3**	**69.1**	**57.9**	**64.1**
uncertainty							**10.8**	**12.7**	**13.8**	**12.8**
SD	**3.49**	**1.01**	**1.74**	**3.94**	**2.47**	**2.14**	**4.4**	**5.1**	**5.6**	**5.2**
RSD	**9.37**	**7.04**	**15.20**	**9.53**	**14.19**	**14.48**	**7.1**	**7.4**	**9.6**	**8.1**
median	38.63	14.39	11.55	41.93	17.21	14.88	61.5	67.0	55.7	62.5
average + SD	40.77	15.37	13.22	45.32	19.86	16.93	65.6	74.2	63.4	69.3
average - SD	33.78	13.34	9.73	37.44	14.92	12.65	56.9	63.9	52.3	59.0
minimum	33.31	13.33	9.69	37.19	15.02	12.61	56.8	65.3	53.7	60.0
maximum	39.89	15.35	13.18	45.02	19.95	16.89	65.5	74.9	64.2	69.9
range	6.58	2.02	3.49	7.83	4.93	4.28	8.7	9.6	10.5	9.9

SINGLE FILAMENT

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
091-1	0.04	1.04	1.83	0.06	0.07	2.83	-
091-2	0.07	1.72	1.97	0.05	0.09	1.96	1.89
091-3	0.10	0.70	1.47	0.11	0.13	0.98	-
091-4	0.13	0.12	0.43	0.14	0.13	0.01	-
091-5	0.07	2.77	2.30	0.04	0.09	2.22	1.08
average	**0.08**	**1.27**	**1.60**	**0.08**	**0.10**	**1.60**	**1.48**
SD	**0.03**	**1.02**	**0.72**	**0.04**	**0.03**	**1.11**	**0.57**
RSD	**38.98**	**80.31**	**44.91**	**52.95**	**28.26**	**69.51**	**38.72**
median	0.07	1.04	1.83	0.06	0.09	1.96	1.48
average + SD	0.11	2.29	2.32	0.12	0.13	2.71	2.05
average - SD	0.05	0.25	0.88	0.04	0.07	0.49	0.91
minimum	0.04	0.12	0.43	0.04	0.07	0.01	1.08
maximum	0.13	2.77	2.30	0.14	0.13	2.83	1.89
range	0.08	2.65	1.87	0.10	0.06	2.82	0.81

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
091-1	0.07	0.11	5.7	-	-53.1	116.3	163.7	97.9	96.3	94.4	-
091-2	0.07	0.10	3.9	3.8	-43.2	165.4	119.9	96.6	96.1	96.1	96.2
091-3	0.37	0.37	2.0	-	0.7	122.3	132.8	98.6	97.1	98.0	-
091-4	0.13	0.16	0.0	-	-25.6	93.3	101.4	99.8	99.1	100.0	-
091-5	0.09	0.14	4.4	2.2	-49.5	227.2	124.0	94.5	95.4	95.6	97.9
average	**0.15**	**0.18**	**3.2**	**3.0**	**-34.1**	**144.9**	**128.4**	**97.5**	**96.8**	**96.8**	**97.0**
uncertainty			**2.8**	**10.3**	**27.5**	**65.6**	**28.4**	**2.5**	**1.8**	**2.8**	**10.3**
SD	**0.13**	**0.11**	**2.2**	**1.2**	**22.2**	**52.9**	**22.9**	**2.0**	**1.4**	**2.2**	**1.2**
RSD	**85.69**	**61.56**	**69.5**	**38.7**	**-65.0**	**36.5**	**17.8**	**2.1**	**1.5**	**2.3**	**1.2**
median	0.09	0.14	3.9	3.0	-43.2	122.3	124.0	97.9	96.3	96.1	97.0
average + SD	0.27	0.28	5.4	4.1	-12.0	197.8	151.2	99.5	98.2	99.0	98.2
average - SD	0.02	0.07	1.0	1.8	-56.3	92.0	105.5	95.4	95.4	94.6	95.9
minimum	0.07	0.10	0.0	2.2	-53.1	93.3	101.4	94.5	95.4	94.4	96.2
maximum	0.37	0.37	5.7	3.8	0.7	227.2	163.7	99.8	99.1	100.0	97.9
range	0.30	0.26	5.6	1.6	53.9	133.8	62.4	5.3	3.7	5.6	1.6

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
091-1	0.08	-0.01	0.53	0.09	0.08	-0.02	-
091-2	0.08	-	0.41	0.08	0.08	0.00	-
091-3	0.06	-	-	0.09	0.07	0.00	-
average	**0.07**	**-0.01**	**0.47**	**0.09**	**0.08**	**-0.01**	**-**
SD	**0.01**	**-**	**0.08**	**0.01**	**0.00**	**0.01**	**-**
RSD	**13.03**	**-**	**17.92**	**7.71**	**3.67**	**-98.19**	**-**
median	0.08	-	0.47	0.09	0.08	0.00	-
average + SD	0.08	-	0.56	0.09	0.08	0.00	-
average - SD	0.06	-	0.39	0.08	0.07	-0.01	-
minimum	0.06	-	0.41	0.08	0.07	-0.02	-
maximum	0.08	-	0.53	0.09	0.08	0.00	-
range	0.02	-	0.12	0.01	0.01	0.01	-

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
091-1	0.08	0.11	-0.03	-	-36.4	82.5	97.7	100.0	97.9	100.1	-
091-2	0.09	0.07	0.00	-	19.6	100.1	101.9	-	98.4	100.0	-
091-3	0.08	0.07	-0.01	-	14.8	83.9	119.7	-	-	100.0	-
average	**0.09**	**0.09**	**-0.01**	**-**	**-0.7**	**88.8**	**106.4**	**100.0**	**98.1**	**100.0**	**-**
uncertainty			**0.02**		**77.1**	**24.2**	**29.0**		**3.1**	**0.1**	
SD	**0.01**	**0.02**	**0.01**	**-**	**31.0**	**9.8**	**11.7**	**-**	**0.3**	**0.0**	**-**
RSD	**6.21**	**25.97**	**-98.19**	**-**	**-4458.0**	**11.0**	**11.0**	**-**	**0.4**	**0.0**	**-**
median	0.08	0.07	-0.01	-	14.8	83.9	101.9	-	98.1	100.0	-
average + SD	0.09	0.11	0.00	-	30.3	98.6	118.1	-	98.5	100.1	-
average - SD	0.08	0.06	-0.03	-	-31.7	79.1	94.7	-	97.8	100.0	-
minimum	0.08	0.07	-0.03	-	-36.4	82.5	97.7	-	97.9	100.0	-
maximum	0.09	0.11	0.00	-	19.6	100.1	119.7	-	98.4	100.1	-
range	0.01	0.04	0.03	-	56.0	17.5	22.0	-	0.5	0.1	-

Pure elastomultiester from bobbin (sample 090)

YARN

Elongation based – 3 cycles

100%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
090-1	0.63	0.60	4.8	16.41	9.28	67.2	81.4	18.6
090-2	0.56	0.56	0.0	14.92	10.49	70.2	79.0	21.0
090-3	0.53	0.53	0.0	19.95	11.94	60.1	76.1	23.9
090-4	0.54	0.53	1.9	16.06	10.16	67.9	79.7	20.3
090-5	0.52	0.52	0.0	19.12	12.53	61.8	74.9	25.1
090-6	0.61	0.60	1.6	14.13	7.17	71.7	85.7	14.3
090-7	0.59	0.60	-1.7	15.82	10.07	68.4	79.9	20.2
090-8	0.53	0.53	0.0	17.11	5.04	65.8	89.9	10.1
090-9	0.55	0.52	5.5	15.96	12.75	68.1	74.5	25.5
090-10	0.54	0.54	0.0	14.66	8.66	70.7	82.7	17.3
090-11	0.58	0.56	3.4	13.23	9.21	73.5	81.6	18.4
average	**0.56**	**0.55**	**1.4**	**16.12**	**9.75**	**67.8**	**80.5**	**19.5**
uncertainty			**1.5**			**2.7**	**3.1**	**3.1**
SD	**0.04**	**0.03**	**2.3**	**2.02**	**2.30**	**4.0**	**4.6**	**4.6**
RSD	**6.41**	**5.90**	**161.6**	**12.52**	**23.58**	**6.0**	**5.7**	**23.6**
median	0.55	0.54	0.0	15.96	10.07	68.1	79.9	20.2
average + SD	0.60	0.59	3.7	18.14	12.05	71.8	85.1	24.1
average - SD	0.53	0.52	-0.9	14.11	7.45	63.7	75.9	14.9
minimum	0.52	0.52	-1.7	13.23	5.04	60.1	74.5	10.1
maximum	0.63	0.60	5.5	19.95	12.75	73.5	89.9	25.5
range	0.11	0.08	7.1	6.72	7.71	13.5	15.4	15.4

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
090-1	0.60	0.58	3.3	17.07	12.15	65.9	75.7	24.3
090-2	0.57	0.55	3.5	14.68	4.44	70.7	91.1	8.9
090-3	0.55	0.53	3.6	20.18	12.52	59.6	75.0	25.0
090-4	0.51	0.48	5.9	17.84	5.39	64.3	89.2	10.8
090-5	0.53	0.54	-1.9	17.69	4.39	64.6	91.2	8.8
090-6	0.60	0.59	1.7	17.02	2.38	66.0	95.2	4.8
090-7	0.60	0.57	5.0	14.96	6.29	70.1	87.4	12.6
090-8	0.52	0.50	3.8	14.35	10.78	71.3	78.4	21.6
090-9	0.53	0.52	1.9	18.03	13.83	63.9	72.3	27.7
090-10	0.54	0.56	-3.7	12.24	0.20	75.5	99.6	0.4
090-11	0.58	0.55	5.2	13.28	10.36	73.4	79.3	20.7
average	**0.56**	**0.54**	**2.6**	**16.12**	**7.52**	**67.8**	**85.0**	**15.0**
uncertainty			**2.0**			**3.2**	**6.2**	**6.2**
SD	**0.03**	**0.03**	**3.0**	**2.39**	**4.59**	**4.8**	**9.2**	**9.2**
RSD	**6.12**	**6.17**	**115.4**	**14.80**	**60.97**	**7.0**	**10.8**	**60.9**
median	0.55	0.55	3.5	17.02	6.29	66.0	87.4	12.6
average + SD	0.59	0.58	5.5	18.51	12.11	72.5	94.1	24.2
average - SD	0.52	0.51	-0.4	13.74	2.94	63.0	75.8	5.9
minimum	0.51	0.48	-3.7	12.24	0.20	59.6	72.3	0.4
maximum	0.60	0.59	5.9	20.18	13.83	75.5	99.6	27.7
range	0.09	0.11	9.6	7.94	13.63	15.9	27.3	27.3

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
090-1	0.51	0.51	0.6	0.97	0.70	96.1	97.2	1.4
090-2	0.48	0.44	7.6	1.73	1.40	93.1	94.4	2.8
090-3	0.52	0.53	-2.1	0.94	0.70	96.3	97.2	1.4
average	**0.50**	**0.49**	**2.0**	**1.21**	**0.93**	**95.2**	**96.3**	**1.9**
uncertainty			**12.5**			**4.4**	**4.0**	**2.0**
SD	**0.02**	**0.05**	**5.0**	**0.45**	**0.40**	**1.8**	**1.6**	**0.8**
RSD	**4.48**	**9.47**	**245.6**	**36.81**	**43.36**	**1.9**	**1.7**	**43.4**
median	0.51	0.51	0.6	0.97	0.70	96.1	97.2	1.4
average + SD	0.53	0.54	7.1	1.66	1.34	96.9	97.9	2.7
average - SD	0.48	0.45	-3.0	0.77	0.53	93.4	94.7	1.1
minimum	0.48	0.44	-2.1	0.94	0.70	93.1	94.4	1.4
maximum	0.52	0.53	7.6	1.73	1.40	96.3	97.2	2.8
range	0.04	0.09	9.7	0.79	0.70	3.2	2.8	1.4

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
090-1	0.52	0.51	1.8	0.72	0.91	97.1	96.4	1.8
090-2	0.42	0.41	3.2	1.80	1.74	92.8	93.1	3.5
090-3	0.53	0.51	4.1	0.93	0.89	96.3	96.4	1.8
average	**0.49**	**0.48**	**3.0**	**1.15**	**1.18**	**95.4**	**95.3**	**2.4**
uncertainty			**2.9**			**5.7**	**4.8**	**2.4**
SD	**0.06**	**0.06**	**1.2**	**0.57**	**0.48**	**2.3**	**1.9**	**1.0**
RSD	**12.28**	**12.33**	**38.4**	**49.88**	**40.99**	**2.4**	**2.0**	**41.0**
median	0.52	0.51	3.2	0.93	0.91	96.3	96.4	1.8
average + SD	0.55	0.53	4.2	1.72	1.66	97.7	97.2	3.3
average - SD	0.43	0.42	1.9	0.58	0.70	93.1	93.4	1.4
minimum	0.42	0.41	1.8	0.72	0.89	92.8	93.1	1.8
maximum	0.53	0.51	4.1	1.80	1.74	97.1	96.4	3.5
range	0.11	0.10	2.3	1.08	0.85	4.3	3.4	1.7

YARN

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
090-1	45.0	49.0	48.5	82.2	84.4	7.8	50.0	49.0	77.8	82.2	8.9
090-2	38.0	42.0	41.0	79.0	84.2	7.9	42.5	41.5	76.3	81.6	9.2
090-3	42.0	46.5	45.5	78.6	83.3	8.3	47.0	46.5	76.2	78.6	10.7
090-4	40.0	44.0	43.0	80.0	85.0	7.5	44.5	45.0	77.5	82.5	12.5
090-5	44.0	48.5	47.5	79.5	84.1	8.0	49.5	50.0	75.0	81.8	13.6
average				**79.9**	**84.2**	**7.9**			**76.6**	**81.3**	**11.0**
uncertainty				**1.8**	**0.8**	**0.4**			**1.4**	**2.0**	**2.6**
SD				**1.4**	**0.6**	**0.3**			**1.1**	**1.6**	**2.1**
RSD				**1.8**	**0.7**	**3.8**			**1.5**	**2.0**	**18.7**
median				79.5	84.2	7.9			76.3	81.8	10.7
average + SD				81.3	84.8	8.2			77.7	82.9	13.0
average - SD				78.4	83.6	7.6			75.4	79.8	8.9
minimum				78.6	83.3	7.5			75.0	78.6	8.9
maximum				82.2	85.0	8.3			77.8	82.5	13.6
range				3.7	1.7	0.8			2.8	3.9	4.7

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
090-1	50.5	49.5	75.6	80.0	10.0
090-2	43.0	42.0	73.7	79.0	10.5
090-3	47.5	46.5	73.9	78.6	10.7
090-4	45.0	44.0	75.0	80.0	10.0
090-5	50.0	48.5	72.7	79.5	10.2
average			**74.2**	**79.4**	**10.3**
uncertainty			**1.4**	**0.8**	**0.4**
SD			**1.1**	**0.6**	**0.3**
RSD			**1.5**	**0.8**	**3.1**
median			73.9	79.5	10.2
average + SD			75.3	80.1	10.6
average - SD			73.1	78.8	10.0
minimum			72.7	78.6	10.0
maximum			75.6	80.0	10.7
range			2.8	1.4	0.7

YARN

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
090-1	0.59	2.09	1.87	0.47	0.41	1.81	0.00
090-2	0.58	1.89	2.21	0.49	0.40	1.72	1.28
090-3	0.62	2.03	1.81	0.51	0.42	1.51	0.76
090-4	0.62	1.97	1.86	0.51	0.41	1.79	1.09
090-5	0.61	1.92	1.87	0.50	0.41	1.61	1.04
average	**0.60**	**1.98**	**1.92**	**0.50**	**0.41**	**1.69**	**0.84**
SD	**0.02**	**0.08**	**0.16**	**0.02**	**0.01**	**0.13**	**0.50**
RSD	**2.97**	**4.11**	**8.50**	**3.45**	**1.86**	**7.60**	**60.30**
median	0.61	1.97	1.87	0.50	0.41	1.72	1.04
average + SD	0.62	2.06	2.09	0.51	0.42	1.82	1.34
average - SD	0.59	1.90	1.76	0.48	0.40	1.56	0.33
minimum	0.58	1.89	1.81	0.47	0.40	1.51	0.00
maximum	0.62	2.09	2.21	0.51	0.42	1.81	1.28
range	0.04	0.20	0.40	0.04	0.02	0.31	1.28

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
090-1	0.81	0.86	3.6	0.0	-5.9	87.2	69.5	95.8	96.3	96.4	100.0
090-2	0.83	0.86	3.4	2.6	-3.9	82.9	69.6	96.2	95.6	96.6	97.4
090-3	0.85	0.88	3.0	1.5	-4.1	83.1	68.6	96.0	96.4	97.0	98.5
090-4	0.91	0.93	3.6	2.2	-1.4	79.2	65.6	96.1	96.3	96.4	97.8
090-5	0.87	0.90	3.2	2.1	-3.7	83.0	67.4	96.2	96.3	96.8	97.9
average	**0.85**	**0.89**	**3.4**	**1.7**	**-3.8**	**83.1**	**68.1**	**96.0**	**96.2**	**96.6**	**98.3**
uncertainty			**0.3**	**1.3**	**2.0**	**3.5**	**2.0**	**0.2**	**0.4**	**0.3**	**1.3**
SD	**0.04**	**0.03**	**0.3**	**1.0**	**1.6**	**2.8**	**1.7**	**0.2**	**0.3**	**0.3**	**1.0**
RSD	**4.60**	**3.20**	**7.6**	**60.3**	**-41.6**	**3.4**	**2.4**	**0.2**	**0.3**	**0.3**	**1.0**
median	0.85	0.88	3.4	2.1	-3.9	83.0	68.6	96.1	96.3	96.6	97.9
average + SD	0.89	0.91	3.6	2.7	-2.2	85.9	69.8	96.2	96.5	96.9	99.3
average - SD	0.81	0.86	3.1	0.7	-5.4	80.2	66.5	95.9	95.8	96.4	97.3
minimum	0.81	0.86	3.0	0.0	-5.9	79.2	65.6	95.8	95.6	96.4	97.4
maximum	0.91	0.93	3.6	2.6	-1.4	87.2	69.6	96.2	96.4	97.0	100.0
range	0.10	0.07	0.6	2.6	4.4	8.0	4.0	0.4	0.8	0.6	2.6

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
090-1	0.51	2.27	1.83	0.42	0.34	1.86	1.31
090-2	0.48	2.30	1.89	0.37	0.28	2.31	1.64
090-3	0.46	2.30	2.26	0.40	0.31	2.29	2.05
090-4	0.53	2.19	1.91	0.43	0.33	2.24	1.84
090-5	0.49	2.58	2.24	0.38	0.29	2.52	2.12
average	**0.49**	**2.33**	**2.03**	**0.40**	**0.31**	**2.25**	**1.79**
SD	**0.02**	**0.15**	**0.21**	**0.03**	**0.02**	**0.24**	**0.33**
RSD	**4.90**	**6.40**	**10.18**	**6.58**	**7.55**	**10.73**	**18.17**
median	0.49	2.30	1.91	0.40	0.31	2.29	1.84
average + SD	0.52	2.48	2.23	0.43	0.33	2.49	2.12
average - SD	0.47	2.18	1.82	0.37	0.29	2.00	1.47
minimum	0.46	2.19	1.83	0.37	0.28	1.86	1.31
maximum	0.53	2.58	2.26	0.43	0.34	2.52	2.12
range	0.06	0.39	0.43	0.06	0.06	0.66	0.81

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
090-1	0.62	0.61	3.7	2.6	2.0	80.6	66.5	90.9	92.7	92.6	94.7
090-2	0.57	0.56	4.6	3.3	1.6	75.2	57.9	90.8	92.5	90.8	93.4
090-3	0.57	0.56	4.6	4.1	1.1	77.4	66.6	90.8	91.0	90.8	91.8
090-4	0.61	0.63	4.5	3.7	-2.3	75.7	62.0	91.2	92.4	91.0	92.6
090-5	0.56	0.55	5.0	4.2	2.3	78.4	60.2	89.7	91.0	89.9	91.5
average	**0.59**	**0.58**	**4.5**	**3.6**	**0.9**	**77.5**	**62.7**	**90.7**	**91.9**	**91.0**	**92.8**
uncertainty			**0.6**	**0.8**	**2.3**	**2.7**	**4.8**	**0.7**	**1.0**	**1.2**	**1.6**
SD	**0.03**	**0.04**	**0.5**	**0.7**	**1.9**	**2.2**	**3.9**	**0.6**	**0.8**	**1.0**	**1.3**
RSD	**4.97**	**6.12**	**10.7**	**18.2**	**202.6**	**2.8**	**6.2**	**0.7**	**0.9**	**1.1**	**1.4**
median	0.57	0.56	4.6	3.7	1.6	77.4	62.0	90.8	92.4	90.8	92.6
average + SD	0.62	0.62	5.0	4.2	2.8	79.6	66.5	91.3	92.7	92.0	94.1
average - SD	0.56	0.55	4.0	2.9	-1.0	75.3	58.8	90.1	91.1	90.1	91.5
minimum	0.56	0.55	3.7	2.6	-2.3	75.2	57.9	89.7	91.0	89.9	91.5
maximum	0.62	0.63	5.0	4.2	2.3	80.6	66.6	91.2	92.7	92.6	94.7
range	0.06	0.08	1.3	1.6	4.6	5.4	8.7	1.6	1.7	2.7	3.2

YARN

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
090-1	37.0	41.0	40.0	40.0	78.4	10.8	83.8	8.1	83.8	8.1
090-2	38.0	42.5	42.0	42.0	76.3	11.8	79.0	10.5	79.0	10.5
090-3	46.0	51.0	50.5	50.5	78.3	10.9	80.4	9.8	80.4	9.8
090-4	38.0	42.0	41.5	41.5	79.0	10.5	81.6	9.2	81.6	9.2
090-5	34.0	37.5	37.0	37.0	79.4	10.3	82.4	8.8	82.4	8.8
average					**78.3**	**10.9**	**81.4**	**9.3**	**81.4**	**9.3**
uncertainty					**1.5**	**0.7**	**2.3**	**1.1**	**2.3**	**1.1**
SD					**1.2**	**0.6**	**1.8**	**0.9**	**1.8**	**0.9**
RSD					**1.5**	**5.4**	**2.3**	**9.9**	**2.3**	**9.9**
median					78.4	10.8	81.6	9.2	81.6	9.2
average + SD					79.4	11.5	83.3	10.2	83.3	10.2
average - SD					77.1	10.3	79.6	8.4	79.6	8.4
minimum					76.3	10.3	79.0	8.1	79.0	8.1
maximum					79.4	11.8	83.8	10.5	83.8	10.5
range					3.1	1.5	4.8	2.4	4.8	2.4

YARN

Load based – 3 cycles

0.55 gf

JRC code	L1 max	La	Lb	L3 max	Lc	Ld	imm rec 1	rec 1	imm rec 3	rec 3
	mm	mm	mm	mm	mm	mm	%	%	%	%
090-1	24.20	0.20	0.20	25.33	0.36	0.21	99.2	99.2	98.6	99.2
090-2	29.52	0.57	0.58	31.78	0.57	0.65	98.1	98.0	98.2	98.0
090-3	31.95	0.59	0.57	32.46	0.43	0.51	98.1	98.2	98.7	98.4
average	**28.56**	**0.46**	**0.45**	**29.86**	**0.45**	**0.45**	**98.5**	**98.5**	**98.5**	**98.5**
uncertainty							**1.5**	**1.5**	**0.6**	**1.5**
SD	**3.97**	**0.22**	**0.22**	**3.93**	**0.10**	**0.22**	**0.6**	**0.6**	**0.2**	**0.6**
RSD	**13.89**	**48.14**	**47.61**	**13.18**	**22.75**	**48.81**	**0.6**	**0.6**	**0.2**	**0.6**
median	29.52	0.57	0.57	31.78	0.43	0.51	98.1	98.2	98.6	98.4
average + SD	32.52	0.68	0.67	33.79	0.56	0.68	99.1	99.1	98.7	99.1
average - SD	24.59	0.24	0.24	25.92	0.35	0.23	97.8	97.9	98.3	97.9
minimum	24.20	0.20	0.20	25.33	0.36	0.21	98.1	98.0	98.2	98.0
maximum	31.95	0.59	0.58	32.46	0.57	0.65	99.2	99.2	98.7	99.2
range	7.75	0.39	0.38	7.13	0.20	0.43	1.1	1.1	0.5	1.2

YARN

Load based – 5 cycles

1.0 gf

JRC code	L1 max	La	Lb	L5 max	Lc	Ld	imm rec 1	rec 1	imm rec 5	rec 5
	mm	mm	mm	mm	mm	mm	%	%	%	%
090-1	61.03	16.12	8.76	67.33	18.60	12.31	73.6	85.7	72.4	81.7
090-2	71.04	24.93	18.44	75.08	28.63	19.69	64.9	74.0	61.9	73.8
090-3	81.72	29.27	22.64	89.00	36.28	24.73	64.2	72.3	59.2	72.2
average	**71.26**	**23.44**	**16.62**	**77.14**	**27.84**	**18.91**	**67.6**	**77.3**	**64.5**	**75.9**
uncertainty							**13.0**	**18.0**	**17.3**	**12.6**
SD	**10.35**	**6.70**	**7.12**	**10.98**	**8.87**	**6.25**	**5.2**	**7.3**	**7.0**	**5.1**
RSD	**14.52**	**28.59**	**42.85**	**14.24**	**31.86**	**33.03**	**7.8**	**9.4**	**10.8**	**6.7**
median	71.04	24.93	18.44	75.08	28.63	19.69	64.9	74.0	61.9	73.8
average + SD	81.61	30.14	23.74	88.12	36.70	25.16	72.8	84.6	71.5	81.0
average - SD	60.91	16.74	9.50	66.16	18.97	12.67	62.3	70.1	57.5	70.8
minimum	61.03	16.12	8.76	67.33	18.60	12.31	64.2	72.3	59.2	72.2
maximum	81.72	29.27	22.64	89.00	36.28	24.73	73.6	85.7	72.4	81.7
range	20.69	13.15	13.88	21.67	17.68	12.42	9.4	13.4	13.1	9.5

YARN

Load based – 5 cycles

0.6 gf

JRC code	L1 max	La	Lb	L5 max	Lc	Ld	imm rec 1	rec 1	imm rec 5	rec 5
	mm	mm	mm	mm	mm	mm	%	%	%	%
090-1	36.86	9.59	5.67	39.11	12.19	7.64	74.0	84.6	68.8	80.5
090-2	45.41	13.52	7.78	47.88	15.21	-	70.2	82.9	68.2	-
090-3	32.76	8.25	5.48	35.75	11.34	7.09	74.8	83.3	68.3	80.2
average	**38.34**	**10.45**	**6.31**	**40.91**	**12.91**	**7.36**	**73.0**	**83.6**	**68.5**	**80.3**
uncertainty							**6.1**	**2.3**	**0.8**	**1.9**
SD	**6.46**	**2.74**	**1.28**	**6.26**	**2.03**	**0.39**	**2.5**	**0.9**	**0.3**	**0.2**
RSD	**16.84**	**26.25**	**20.23**	**15.31**	**15.75**	**5.28**	**3.4**	**1.1**	**0.5**	**0.3**
median	36.86	9.59	5.67	39.11	12.19	7.36	74.0	83.3	68.3	80.3
average + SD	44.80	13.20	7.59	47.18	14.94	7.75	75.5	84.5	68.8	80.5
average - SD	31.88	7.71	5.03	34.65	10.88	6.98	70.6	82.7	68.1	80.1
minimum	32.76	8.25	5.48	35.75	11.34	7.09	70.2	82.9	68.2	80.2
maximum	45.41	13.52	7.78	47.88	15.21	7.64	74.8	84.6	68.8	80.5
range	12.66	5.28	2.30	12.13	3.87	0.55	4.6	1.8	0.6	0.3

SINGLE FILAMENT

Elongation based – 3 cycles

100%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
090-1	0.15	0.17	-13.3	0.80	0.02	98.4	100.0	0.0
090-2	0.17	0.19	-11.8	0.85	0.17	98.3	99.7	0.3
090-3	0.16	0.20	-25.0	0.71	0.25	98.6	99.5	0.5
average	**0.16**	**0.19**	**-16.7**	**0.79**	**0.15**	**98.4**	**99.7**	**0.3**
uncertainty			**18.0**			**0.2**	**0.5**	**0.5**
SD	**0.01**	**0.01**	**7.2**	**0.07**	**0.12**	**0.1**	**0.2**	**0.2**
RSD	**6.12**	**5.85**	**-43.3**	**8.61**	**78.54**	**0.1**	**0.2**	**78.5**
median	0.16	0.19	-13.3	0.80	0.17	98.4	99.7	0.3
average + SD	0.17	0.20	-9.5	0.85	0.27	98.6	99.9	0.5
average - SD	0.15	0.18	-23.9	0.72	0.03	98.3	99.5	0.1
minimum	0.15	0.17	-25.0	0.71	0.02	98.3	99.5	0.0
maximum	0.17	0.20	-11.8	0.85	0.25	98.6	100.0	0.5
range	0.02	0.02	13.2	0.13	0.23	0.3	0.5	0.5

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
090-1	0.14	0.14	0.0	0.70	0.15	98.6	99.7	0.3
090-2	0.20	0.20	0.0	0.47	0.10	99.1	99.8	0.2
090-3	0.19	0.20	-5.3	0.50	0.01	99.0	100.0	0.0
average	**0.17**	**0.18**	**-1.8**	**0.55**	**0.09**	**98.9**	**99.8**	**0.2**
uncertainty			**7.5**			**0.6**	**0.3**	**0.3**
SD	**0.03**	**0.03**	**3.0**	**0.13**	**0.07**	**0.3**	**0.1**	**0.1**
RSD	**18.71**	**17.90**	**-173.2**	**22.94**	**82.74**	**0.3**	**0.1**	**82.7**
median	0.19	0.20	0.0	0.50	0.10	99.0	99.8	0.2
average + SD	0.21	0.21	1.3	0.68	0.16	99.1	100.0	0.3
average - SD	0.14	0.15	-4.8	0.43	0.02	98.6	99.7	0.0
minimum	0.14	0.14	-5.3	0.47	0.01	98.6	99.7	0.0
maximum	0.20	0.20	0.0	0.70	0.15	99.1	100.0	0.3
range	0.06	0.06	5.3	0.23	0.14	0.5	0.3	0.3

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
090-1	0.05	0.07	-33.6	-0.01	2.05	100.0	91.8	4.1
090-2	0.12	0.11	9.4	-	-	-	-	-
090-3	0.09	0.10	-7.8	-	-	-	-	-
average	0.09	0.09	-10.7	-0.01	2.05	100.0	91.8	4.1
uncertainty			53.9					
SD	0.04	0.02	21.7	-	-	-	-	-
RSD	39.03	21.71	-203.6	-	-	-	-	-
median	0.09	0.10	-7.8	-	-	-	-	-
average + SD	0.13	0.12	11.0	-	-	-	-	-
average - SD	0.05	0.07	-32.3	-	-	-	-	-
minimum	0.05	0.07	-33.6	-	-	-	-	-
maximum	0.12	0.11	9.4	-	-	-	-	-
range	0.07	0.04	43.1	-	-	-	-	-

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
090-1	0.07	0.10	-34.9	0.08	-	99.7	-	-
090-2	0.12	0.15	-23.0	0.06	-	99.8	-	-
090-3	0.09	0.11	-18.7	0.07	-	99.7	-	-
average	0.09	0.12	-25.6	0.07	-	99.7	-	-
uncertainty			20.8			0.1		
SD	0.03	0.03	8.4	0.01	-	0.0	-	-
RSD	27.60	24.61	-32.8	13.57	-	0.0	-	-
median	0.09	0.11	-23.0	0.07	-	99.7	-	-
average + SD	0.12	0.15	-17.2	0.08	-	99.8	-	-
average - SD	0.07	0.09	-34.0	0.06	-	99.7	-	-
minimum	0.07	0.10	-34.9	0.06	-	99.7	-	-
maximum	0.12	0.15	-18.7	0.08	-	99.8	-	-
range	0.05	0.06	16.2	0.02	-	0.1	-	-

SINGLE FILAMENT

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
090-1	0.10	2.37	2.20	0.10	0.13	2.08	0.43
090-2	0.11	0.84	1.19	0.12	0.13	0.39	-
090-3	0.12	1.18	0.76	0.11	0.15	1.75	-
090-4	0.11	0.82	0.56	0.13	0.13	0.77	0.29
090-5	0.12	1.00	1.05	0.14	0.11	0.29	-
average	**0.11**	**1.24**	**1.15**	**0.12**	**0.13**	**1.06**	**0.36**
SD	**0.01**	**0.65**	**0.64**	**0.01**	**0.01**	**0.81**	**0.10**
RSD	**5.96**	**52.10**	**55.24**	**10.73**	**10.91**	**77.18**	**27.92**
median	0.11	1.00	1.05	0.12	0.13	0.77	0.36
average + SD	0.12	1.89	1.79	0.13	0.14	1.87	0.46
average - SD	0.11	0.60	0.52	0.11	0.12	0.24	0.26
minimum	0.10	0.82	0.56	0.10	0.11	0.29	0.29
maximum	0.12	2.37	2.20	0.14	0.15	2.08	0.43
range	0.02	1.55	1.64	0.03	0.04	1.80	0.14

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
090-1	0.13	0.17	4.2	0.9	-30.0	123.4	122.7	95.3	95.6	95.8	99.1
090-2	0.16	0.18	0.8	-	-18.6	107.4	112.2	98.3	97.6	99.2	-
090-3	0.19	0.21	3.5	-	-15.1	132.7	122.3	97.6	98.5	96.5	-
090-4	0.13	0.14	1.6	0.6	-7.5	102.5	117.8	98.4	98.9	98.5	99.4
090-5	0.15	0.17	0.6	-	-12.9	80.3	92.7	98.0	97.9	99.4	-
average	**0.15**	**0.18**	**2.1**	**0.7**	**-16.8**	**109.2**	**113.6**	**97.5**	**97.7**	**97.9**	**99.3**
uncertainty			**2.0**	**1.8**	**10.4**	**25.1**	**15.4**	**1.6**	**1.6**	**2.0**	**1.8**
SD	**0.02**	**0.03**	**1.6**	**0.2**	**8.4**	**20.2**	**12.4**	**1.3**	**1.3**	**1.6**	**0.2**
RSD	**14.91**	**15.49**	**77.2**	**27.9**	**-49.9**	**18.5**	**10.9**	**1.3**	**1.3**	**1.7**	**0.2**
median	0.15	0.17	1.6	0.7	-15.1	107.4	117.8	98.0	97.9	98.5	99.3
average + SD	0.17	0.20	3.7	0.9	-8.4	129.5	126.0	98.8	99.0	99.5	99.5
average - SD	0.13	0.15	0.5	0.5	-25.2	89.0	101.1	96.2	96.4	96.3	99.1
minimum	0.13	0.14	0.6	0.6	-30.0	80.3	92.7	95.3	95.6	95.8	99.1
maximum	0.19	0.21	4.2	0.9	-7.5	132.7	122.7	98.4	98.9	99.4	99.4
range	0.06	0.08	3.6	0.3	22.5	52.4	30.0	3.1	3.3	3.6	0.3

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
090-1	0.04	0.00	0.86	0.05	0.02	0.00	2.16
090-2	0.07	-	-	0.11	0.11	-	-
090-3	0.03	-	-	0.05	0.05	-0.01	-
average	**0.05**	**0.00**	**0.86**	**0.07**	**0.06**	**0.00**	**2.16**
SD	**0.02**	**-**	**-**	**0.04**	**0.05**	**0.00**	**-**
RSD	**38.77**	**-**	**-**	**54.40**	**77.92**	**-91.32**	**-**
median	0.04	-	-	0.05	0.05	0.00	-
average + SD	0.07	-	-	0.11	0.11	0.00	-
average - SD	0.03	-	-	0.03	0.01	-0.01	-
minimum	0.03	-	-	0.05	0.02	-0.01	-
maximum	0.07	-	-	0.11	0.11	0.00	-
range	0.04	-	-	0.07	0.09	0.01	-

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
090-1	0.03	0.03	0.0	4.3	-8.8	47.3	49.3	100.0	96.6	100.0	91.4
090-2	0.10	0.11	-	-	-8.7	100.7	165.8	-	-	-	-
090-3	0.05	0.06	0.0	-	-19.3	96.0	148.6	-	-	100.0	-
average	**0.06**	**0.07**	**0.0**	**4.3**	**-12.3**	**81.3**	**121.2**	**100.0**	**96.6**	**100.0**	**91.4**
uncertainty					**15.1**	**73.5**	**156.2**			**0.2**	
SD	**0.04**	**0.04**	**0.0**	**-**	**6.1**	**29.6**	**62.9**	**-**	**-**	**0.0**	**-**
RSD	**62.17**	**59.56**	**-91.3**	**-**	**-49.6**	**36.4**	**51.9**	**-**	**-**	**0.0**	**-**
median	0.05	0.06	0.0	-	-8.8	96.0	148.6	-	-	100.0	-
average + SD	0.10	0.11	0.0	-	-6.2	110.9	184.1	-	-	100.0	-
average - SD	0.02	0.03	0.0	-	-18.4	51.7	58.4	-	-	100.0	-
minimum	0.03	0.03	0.0	-	-19.3	47.3	49.3	-	-	100.0	-
maximum	0.10	0.11	0.0	-	-8.7	100.7	165.8	-	-	100.0	-
range	0.07	0.08	0.0	-	10.6	53.4	116.5	-	-	0.0	-

Pure elastomultiester from bobbin (sample 092)

YARN

Elongation based – 3 cycles

100%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
092-1	1.94	1.85	4.6	18.32	10.31	63.4	79.4	20.6
092-2	1.72	1.67	2.9	17.17	11.42	65.7	77.2	22.8
092-3	1.72	1.66	3.5	14.09	8.65	71.8	82.7	17.3
092-4	1.89	1.82	3.7	14.73	8.56	70.6	82.9	17.1
092-5	2.06	1.94	5.8	16.63	9.28	66.8	81.4	18.6
092-6	1.97	1.89	4.1	16.80	10.76	66.4	78.5	21.5
092-7	1.73	1.65	4.6	18.69	12.15	62.6	75.7	24.3
092-8	1.68	1.62	3.6	18.34	11.75	63.3	76.5	23.5
092-9	1.91	1.86	2.6	9.62	5.61	80.8	88.8	11.2
092-10	1.71	1.64	4.1	13.49	9.81	73.0	80.4	19.6
092-11	1.87	1.80	3.7	13.71	9.81	72.6	80.4	19.6
average	1.84	1.76	3.9	15.60	9.83	68.8	80.3	19.7
uncertainty			0.6			3.7	2.5	2.5
SD	0.13	0.12	0.9	2.76	1.84	5.5	3.7	3.7
RSD	7.03	6.63	22.4	17.70	18.71	8.0	4.6	18.7
median	1.87	1.80	3.7	16.63	9.81	66.8	80.4	19.6
average + SD	1.97	1.88	4.8	18.36	11.67	74.3	84.0	23.3
average - SD	1.71	1.65	3.1	12.84	7.99	63.3	76.7	16.0
minimum	1.68	1.62	2.6	9.62	5.61	62.6	75.7	11.2
maximum	2.06	1.94	5.8	18.69	12.15	80.8	88.8	24.3
range	0.38	0.32	3.2	9.07	6.54	18.1	13.1	13.1

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
092-1	1.82	1.76	3.3	19.16	11.41	61.7	77.2	22.8
092-2	1.58	1.55	1.9	18.25	13.01	63.5	74.0	26.0
092-3	1.65	1.61	2.4	14.99	10.26	70.0	79.5	20.5
092-4	1.78	1.71	3.9	17.08	10.68	65.8	78.6	21.4
092-5	1.93	1.85	4.1	17.72	10.67	64.6	78.7	21.3
092-6	1.90	1.83	3.7	17.09	11.87	65.8	76.3	23.8
092-7	1.64	1.59	3.0	19.20	13.63	61.6	72.7	27.3
092-8	1.60	1.55	3.1	19.06	13.32	61.9	73.4	26.6
092-9	1.88	1.84	2.1	10.20	3.12	79.6	93.8	6.2
092-10	1.62	1.57	3.1	15.91	11.59	68.2	76.8	23.2
092-11	1.73	1.69	2.3	14.96	11.78	70.1	76.4	23.6
average	1.74	1.69	3.0	16.69	11.03	66.6	77.9	22.1
uncertainty			0.5			3.6	3.8	3.8
SD	0.13	0.12	0.7	2.65	2.85	5.3	5.7	5.7
RSD	7.43	7.09	24.8	15.90	25.81	8.0	7.3	25.8
median	1.73	1.69	3.1	17.09	11.59	65.8	76.8	23.2
average + SD	1.87	1.81	3.8	19.35	13.88	71.9	83.6	27.8
average - SD	1.61	1.57	2.3	14.04	8.18	61.3	72.2	16.4
minimum	1.58	1.55	1.9	10.20	3.12	61.6	72.7	6.2
maximum	1.93	1.85	4.1	19.20	13.63	79.6	93.8	27.3
range	0.35	0.30	2.2	9.00	10.51	18.0	21.0	21.0

YARN

Elongation based – 3 cycles

50%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
092-1	1.45	1.45	0.1	3.19	2.13	87.2	91.5	4.3
092-2	1.38	1.40	-1.0	2.65	1.40	89.4	94.4	2.8
092-3	1.30	1.33	-2.1	2.92	2.12	88.3	91.5	4.2
average	**1.38**	**1.39**	**-1.0**	**2.92**	**1.89**	**88.3**	**92.5**	**3.8**
uncertainty			**2.7**			**2.7**	**4.1**	**2.1**
SD	**0.07**	**0.06**	**1.1**	**0.27**	**0.42**	**1.1**	**1.7**	**0.8**
RSD	**5.42**	**4.36**	**-108.8**	**9.24**	**22.17**	**1.2**	**1.8**	**22.2**
median	1.38	1.40	-1.0	2.92	2.12	88.3	91.5	4.2
average + SD	1.46	1.45	0.1	3.19	2.30	89.4	94.1	4.6
average - SD	1.31	1.33	-2.1	2.65	1.47	87.2	90.8	2.9
minimum	1.30	1.33	-2.1	2.65	1.40	87.2	91.5	2.8
maximum	1.45	1.45	0.1	3.19	2.13	89.4	94.4	4.3
range	0.15	0.12	2.2	0.54	0.73	2.2	2.9	1.5

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
092-1	1.37	1.39	-1.3	3.41	3.01	86.4	88.0	6.0
092-2	1.40	1.41	-0.8	3.13	1.94	87.5	92.2	3.9
092-3	1.31	1.28	2.2	3.08	2.29	87.7	90.9	4.6
average	**1.36**	**1.36**	**0.1**	**3.20**	**2.41**	**87.2**	**90.4**	**4.8**
uncertainty			**4.7**			**1.8**	**5.4**	**2.7**
SD	**0.05**	**0.07**	**1.9**	**0.18**	**0.55**	**0.7**	**2.2**	**1.1**
RSD	**3.46**	**5.22**	**4028.8**	**5.56**	**22.69**	**0.8**	**2.4**	**22.7**
median	1.37	1.39	-0.8	3.13	2.29	87.5	90.9	4.6
average + SD	1.41	1.43	2.0	3.38	2.96	87.9	92.5	5.9
average - SD	1.31	1.29	-1.9	3.03	1.86	86.5	88.2	3.7
minimum	1.31	1.28	-1.3	3.08	1.94	86.4	88.0	3.9
maximum	1.40	1.41	2.2	3.41	3.01	87.7	92.2	6.0
range	0.09	0.13	3.5	0.33	1.07	1.3	4.3	2.1

YARN

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
092-1	47.0	52.0	51.0	78.7	83.0	8.5	53.0	52.0	74.5	78.7	10.6
092-2	50.0	55.0	53.5	80.0	86.0	7.0	55.5	54.0	78.0	84.0	8.0
092-3	51.0	55.5	54.0	82.4	88.2	5.9	55.5	54.5	82.4	86.3	6.9
092-4	48.0	53.0	52.0	79.2	83.3	8.3	53.5	52.0	77.1	83.3	8.3
092-5	49.0	54.0	53.0	79.6	83.7	8.2	54.5	53.5	77.6	81.6	9.2
average				**80.0**	**84.8**	**7.6**			**77.9**	**82.8**	**8.6**
uncertainty				**1.8**	**2.8**	**1.4**			**3.5**	**3.5**	**1.8**
SD				**1.4**	**2.2**	**1.1**			**2.8**	**2.8**	**1.4**
RSD				**1.8**	**2.6**	**14.7**			**3.7**	**3.4**	**16.4**
median				79.6	83.7	8.2			77.6	83.3	8.3
average + SD				81.4	87.1	8.7			80.7	85.6	10.0
average - SD				78.5	82.6	6.5			75.0	80.0	7.2
minimum				78.7	83.0	5.9			74.5	78.7	6.9
maximum				82.4	88.2	8.5			82.4	86.3	10.6
range				3.6	5.3	2.6			7.9	7.6	3.8

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
092-1	53.5	52.5	72.3	76.6	11.7
092-2	56.0	54.5	76.0	82.0	9.0
092-3	56.5	55.5	78.4	82.4	8.8
092-4	54.0	53.0	75.0	79.2	10.4
092-5	55.5	54.5	73.5	77.6	11.2
average			**75.0**	**79.5**	**10.2**
uncertainty			**2.9**	**3.2**	**1.6**
SD			**2.4**	**2.6**	**1.3**
RSD			**3.1**	**3.3**	**12.6**
median			75.0	79.2	10.4
average + SD			77.4	82.1	11.5
average - SD			72.7	76.9	8.9
minimum			72.3	76.6	8.8
maximum			78.4	82.4	11.7
range			6.1	5.8	2.9

YARN

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
092-1	1.38	7.24	5.37	0.86	0.51	4.86	6.18
092-2	1.24	3.95	3.99	0.86	0.58	3.92	3.68
092-3	1.28	4.22	4.36	0.87	0.62	4.15	4.06
092-4	1.40	4.29	3.70	0.92	0.62	4.25	4.13
092-5	1.53	4.03	3.78	1.01	0.65	3.76	3.70
average	**1.37**	**4.74**	**4.24**	**0.90**	**0.60**	**4.19**	**4.35**
SD	**0.11**	**1.40**	**0.68**	**0.07**	**0.05**	**0.42**	**1.04**
RSD	**8.18**	**29.53**	**16.08**	**7.32**	**8.87**	**10.03**	**23.98**
median	1.38	4.22	3.99	0.87	0.62	4.15	4.06
average + SD	1.48	6.15	4.92	0.97	0.65	4.61	5.39
average - SD	1.25	3.34	3.56	0.84	0.54	3.77	3.31
minimum	1.24	3.95	3.70	0.86	0.51	3.76	3.68
maximum	1.53	7.24	5.37	1.01	0.65	4.86	6.18
range	0.29	3.29	1.67	0.15	0.14	1.09	2.50

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
092-1	2.11	2.10	9.7	12.4	0.7	59.8	37.3	85.5	89.3	90.3	87.6
092-2	1.94	1.95	7.8	7.4	-0.6	67.9	46.7	92.1	92.0	92.2	92.6
092-3	2.08	2.10	8.3	8.1	-1.1	71.5	48.3	91.6	91.3	91.7	91.9
092-4	2.11	2.10	8.5	8.3	0.1	66.9	44.2	91.4	92.6	91.5	91.7
092-5	2.28	2.23	7.5	7.4	2.2	64.8	42.8	91.9	92.4	92.5	92.6
average	**2.10**	**2.10**	**8.4**	**8.7**	**0.3**	**66.2**	**43.9**	**90.5**	**91.5**	**91.6**	**91.3**
uncertainty			**1.0**	**2.6**	**1.6**	**5.4**	**5.2**	**3.5**	**1.7**	**1.0**	**2.6**
SD	**0.12**	**0.10**	**0.8**	**2.1**	**1.3**	**4.3**	**4.2**	**2.8**	**1.4**	**0.8**	**2.1**
RSD	**5.76**	**4.73**	**10.0**	**24.0**	**510.4**	**6.5**	**9.6**	**3.1**	**1.5**	**0.9**	**2.3**
median	2.11	2.10	8.3	8.1	0.1	66.9	44.2	91.6	92.0	91.7	91.9
average + SD	2.22	2.19	9.2	10.8	1.5	70.5	48.1	93.3	92.9	92.5	93.4
average - SD	1.98	2.00	7.5	6.6	-1.0	61.9	39.6	87.7	90.2	90.8	89.2
minimum	1.94	1.95	7.5	7.4	-1.1	59.8	37.3	85.5	89.3	90.3	87.6
maximum	2.28	2.23	9.7	12.4	2.2	71.5	48.3	92.1	92.6	92.5	92.6
range	0.34	0.28	2.2	5.0	3.3	11.7	10.9	6.6	3.3	2.2	5.0

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
092-1	0.84	4.10	2.85	0.62	0.36	4.21	2.97
092-2	1.05	3.80	3.04	0.72	0.40	4.09	3.38
092-3	0.99	3.54	2.52	0.69	0.41	3.80	2.42
092-4	0.95	3.80	2.60	0.68	0.39	4.41	3.00
092-5	1.01	3.12	2.13	0.75	0.46	3.55	2.14
average	**0.97**	**3.68**	**2.63**	**0.69**	**0.41**	**4.01**	**2.78**
SD	**0.08**	**0.37**	**0.35**	**0.05**	**0.03**	**0.34**	**0.49**
RSD	**8.20**	**9.97**	**13.29**	**7.09**	**8.52**	**8.45**	**17.77**
median	0.99	3.80	2.60	0.69	0.40	4.09	2.97
average + SD	1.05	4.04	2.98	0.74	0.44	4.35	3.28
average - SD	0.89	3.31	2.28	0.65	0.37	3.67	2.29
minimum	0.84	3.12	2.13	0.62	0.36	3.55	2.14
maximum	1.05	4.10	3.04	0.75	0.46	4.41	3.38
range	0.21	0.98	0.92	0.13	0.10	0.86	1.23

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
092-1	1.15	1.14	8.4	6.0	0.6	58.6	43.3	83.6	88.6	83.2	88.1
092-2	1.36	1.40	8.2	6.8	-2.6	55.8	38.3	84.8	87.8	83.6	86.5
092-3	1.25	1.25	7.6	4.8	-0.3	59.4	41.7	85.8	89.9	84.8	90.3
092-4	1.26	1.23	8.8	6.0	1.8	57.9	41.3	84.8	89.6	82.4	88.0
092-5	1.34	1.32	7.1	4.3	1.5	61.1	45.7	87.5	91.5	85.8	91.4
average	**1.27**	**1.27**	**8.0**	**5.6**	**0.2**	**58.5**	**42.1**	**85.3**	**89.5**	**84.0**	**88.9**
uncertainty			**0.8**	**1.2**	**2.2**	**2.4**	**3.4**	**1.8**	**1.7**	**1.7**	**2.5**
SD	**0.08**	**0.10**	**0.7**	**1.0**	**1.8**	**2.0**	**2.7**	**1.5**	**1.4**	**1.4**	**2.0**
RSD	**6.66**	**7.51**	**8.5**	**17.8**	**798.6**	**3.3**	**6.5**	**1.7**	**1.6**	**1.6**	**2.2**
median	1.26	1.25	8.2	6.0	0.6	58.6	41.7	84.8	89.6	83.6	88.1
average + SD	1.36	1.37	8.7	6.6	2.0	60.5	44.8	86.8	90.9	85.3	90.8
average - SD	1.19	1.17	7.3	4.6	-1.5	56.6	39.3	83.8	88.1	82.6	86.9
minimum	1.15	1.14	7.1	4.3	-2.6	55.8	38.3	83.6	87.8	82.4	86.5
maximum	1.36	1.40	8.8	6.8	1.8	61.1	45.7	87.5	91.5	85.8	91.4
range	0.21	0.25	1.7	2.5	4.4	5.3	7.4	3.9	3.7	3.4	4.9

YARN

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
092-1	50.0	57.0	56.0	56.0	72.0	14.0	76.0	12.0	76.0	12.0
092-2	48.0	53.5	53.0	53.0	77.1	11.5	79.2	10.4	79.2	10.4
092-3	46.0	51.0	50.0	50.0	78.3	10.9	82.6	8.7	82.6	8.7
092-4	49.0	54.0	53.5	53.5	79.6	10.2	81.6	9.2	81.6	9.2
092-5	47.0	51.5	51.0	51.0	80.9	9.6	83.0	8.5	83.0	8.5
average					**77.6**	**11.2**	**80.5**	**9.8**	**80.5**	**9.8**
uncertainty					**4.2**	**2.1**	**3.6**	**1.8**	**3.6**	**1.8**
SD					**3.4**	**1.7**	**2.9**	**1.5**	**2.9**	**1.5**
RSD					**4.4**	**15.2**	**3.6**	**14.9**	**3.6**	**14.9**
median					78.3	10.9	81.6	9.2	81.6	9.2
average + SD					81.0	12.9	83.4	11.2	83.4	11.2
average - SD					74.1	9.5	77.6	8.3	77.6	8.3
minimum					72.0	9.6	76.0	8.5	76.0	8.5
maximum					80.9	14.0	83.0	12.0	83.0	12.0
range					8.8	4.4	7.0	3.5	7.0	3.5

YARN

Load based – 3 cycles

1.9 gf

JRC code	L1 max	La	Lb	L3 max	Lc	Ld	imm rec 1	rec 1	imm rec 3	rec 3
	mm	mm	mm	mm	mm	mm	%	%	%	%
092-1	46.96	10.37	9.69	47.97	10.94	10.35	77.9	79.4	77.2	78.4
092-2	44.04	9.67	-	45.31	10.29	9.56	78.0	-	77.3	78.9
092-3	45.66	10.20	9.41	48.03	11.36	10.68	77.7	79.4	76.3	77.8
average	**45.55**	**10.08**	**9.55**	**47.10**	**10.87**	**10.20**	**77.9**	**79.4**	**76.9**	**78.4**
uncertainty							**0.5**	**0.1**	**1.3**	**1.4**
SD	**1.46**	**0.36**	**0.19**	**1.55**	**0.54**	**0.58**	**0.2**	**0.01**	**0.5**	**0.6**
RSD	**3.21**	**3.60**	**2.02**	**3.29**	**4.97**	**5.64**	**0.2**	**0.01**	**0.7**	**0.7**
median	45.66	10.20	9.55	47.97	10.94	10.35	77.9	79.4	77.2	78.4
average + SD	47.01	10.44	9.74	48.65	11.41	10.77	78.1	79.4	77.5	78.9
average - SD	44.09	9.72	9.36	45.55	10.32	9.62	77.7	79.4	76.4	77.8
minimum	44.04	9.67	9.41	45.31	10.29	9.56	77.7	79.4	76.3	77.8
maximum	46.96	10.37	9.69	48.03	11.36	10.68	78.0	79.4	77.3	78.9
range	2.92	0.70	0.27	2.72	1.07	1.12	0.4	0.0	1.0	1.1

YARN

Load based – 3 cycles

1.4 gf

JRC code	L1 max	La	Lb	L3 max	Lc	Ld	imm rec 1	rec 1	imm rec 3	rec 3
	mm	mm	mm	mm	mm	mm	%	%	%	%
092-1	26.57	5.87	5.65	28.40	7.47	6.89	77.9	78.7	73.7	75.8
092-2	27.79	6.66	6.02	29.95	8.53	8.06	76.1	78.3	71.5	73.1
092-3	31.58	7.62	7.23	-	-	-	75.9	77.1	-	-
average	**28.65**	**6.71**	**6.30**	**29.17**	**8.00**	**7.47**	**76.6**	**78.1**	**72.6**	**74.4**
uncertainty							**2.8**	**2.1**	**14.0**	**16.9**
SD	**2.62**	**0.88**	**0.83**	**1.09**	**0.75**	**0.83**	**1.1**	**0.9**	**1.6**	**1.9**
RSD	**9.13**	**13.10**	**13.12**	**3.75**	**9.42**	**11.10**	**1.5**	**1.1**	**2.1**	**2.5**
median	27.79	6.66	6.02	29.17	8.00	7.47	76.1	78.3	72.6	74.4
average + SD	31.26	7.59	7.13	30.27	8.75	8.30	77.8	78.9	74.2	76.3
average - SD	26.03	5.83	5.48	28.08	7.25	6.64	75.5	77.2	71.1	72.5
minimum	26.57	5.87	5.65	28.40	7.47	6.89	75.9	77.1	71.5	73.1
maximum	31.58	7.62	7.23	29.95	8.53	8.06	77.9	78.7	73.7	75.8
range	5.02	1.76	1.58	1.55	1.07	1.17	2.1	1.6	2.2	2.7

YARN

Load based – 5 cycles

2.2 gf

JRC code	L1 max	La	Lb	L5 max	Lc	Ld	imm rec 1	rec 1	imm rec 5	rec 5
	mm	mm	mm	mm	mm	mm	%	%	%	%
092-1	63.52	22.23	20.78	65.79	25.39	22.94	65.0	67.3	61.4	65.1
092-2	68.04	22.90	20.55	71.48	27.59	24.51	66.4	69.8	61.4	65.7
092-3	59.73	19.64	17.68	61.64	22.24	19.82	67.1	70.4	63.9	67.8
average	**63.76**	**21.59**	**19.67**	**66.30**	**25.07**	**22.42**	**66.2**	**69.2**	**62.2**	**66.2**
uncertainty							**2.6**	**4.1**	**3.6**	**3.5**
SD	**4.16**	**1.72**	**1.73**	**4.94**	**2.69**	**2.38**	**1.1**	**1.7**	**1.5**	**1.4**
RSD	**6.52**	**7.96**	**8.78**	**7.45**	**10.73**	**10.63**	**1.6**	**2.4**	**2.3**	**2.2**
median	63.52	22.23	20.55	65.79	25.39	22.94	66.4	69.8	61.4	65.7
average + SD	67.92	23.31	21.40	71.24	27.77	24.81	67.2	70.8	63.7	67.7
average - SD	59.60	19.87	17.95	61.36	22.38	20.04	65.1	67.5	60.8	64.8
minimum	59.73	19.64	17.68	61.64	22.24	19.82	65.0	67.3	61.4	65.1
maximum	68.04	22.90	20.78	71.48	27.59	24.51	67.1	70.4	63.9	67.8
range	8.31	3.25	3.10	9.84	5.35	4.68	2.1	3.1	2.5	2.7

YARN

Load based – 5 cycles

1.4 gf

JRC code	L1 max	La	Lb	L5 max	Lc	Ld	imm rec 1	rec 1	imm rec 5	rec 5
	mm	mm	mm	mm	mm	mm	%	%	%	%
092-1	29.55	7.77	6.57	31.36	10.01	8.28	73.7	77.8	68.1	73.6
092-2	35.15	11.15	10.03	37.53	13.68	12.30	68.3	71.5	63.6	67.2
092-3	34.00	10.66	9.85	36.32	13.10	11.66	68.6	71.0	64.0	67.9
average	**32.90**	**9.86**	**8.82**	**35.07**	**12.26**	**10.75**	**70.2**	**73.4**	**65.2**	**69.6**
uncertainty							**7.5**	**9.3**	**6.2**	**8.7**
SD	**2.96**	**1.83**	**1.95**	**3.27**	**1.97**	**2.16**	**3.0**	**3.8**	**2.5**	**3.5**
RSD	**8.99**	**18.52**	**22.09**	**9.32**	**16.09**	**20.10**	**4.3**	**5.1**	**3.9**	**5.0**
median	34.00	10.66	9.85	36.32	13.10	11.66	68.6	71.5	64.0	67.9
average + SD	35.86	11.69	10.76	38.34	14.24	12.91	73.2	77.2	67.7	73.1
average - SD	29.94	8.03	6.87	31.80	10.29	8.59	67.2	69.7	62.7	66.1
minimum	29.55	7.77	6.57	31.36	10.01	8.28	68.3	71.0	63.6	67.2
maximum	35.15	11.15	10.03	37.53	13.68	12.30	73.7	77.8	68.1	73.6
range	5.60	3.38	3.46	6.17	3.67	4.02	5.4	6.7	4.5	6.4

SINGLE FILAMENT

Elongation based – 3 cycles

100%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
092-1	0.11	0.16	-45.5	0.97	0.60	98.1	98.8	1.2
092-2	0.19	0.24	-26.3	0.43	-	99.1	-	-
092-3	0.19	0.21	-10.5	0.68	-	98.6	-	-
average	**0.16**	**0.20**	**-27.4**	**0.69**	**0.60**	**98.6**	**98.8**	**1.2**
uncertainty			**43.5**			**1.3**		
SD	**0.04**	**0.04**	**17.5**	**0.27**	**0.00**	**0.5**	**0.0**	**0.0**
RSD	**26.35**	**17.74**	**-63.8**	**38.84**	**0.00**	**0.6**	**0.0**	**0.0**
median	0.19	0.21	-26.3	0.68	0.60	98.6	98.8	1.2
average + SD	0.21	0.24	-9.9	0.96	0.00	99.2	0.0	0.0
average - SD	0.12	0.17	-44.9	0.43	0.00	98.1	0.0	0.0
minimum	0.11	0.16	-45.5	0.43	0.60	98.1	98.8	1.2
maximum	0.19	0.24	-10.5	0.97	0.60	99.1	98.8	1.2
range	0.08	0.07	34.9	0.54	0.00	1.1	0.0	0.0

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
092-1	0.08	0.09	-12.5	1.18	0.97	97.6	98.1	1.9
092-2	0.20	0.23	-15.0	0.37	-	99.3	-	-
092-3	0.18	0.19	-5.6	0.75	0.03	98.5	100.0	0.1
average	**0.15**	**0.17**	**-11.0**	**0.76**	**0.50**	**98.5**	**99.0**	**1.0**
uncertainty			**12.2**			**2.0**	**12.0**	**12.0**
SD	**0.06**	**0.07**	**4.9**	**0.41**	**0.67**	**0.8**	**1.3**	**1.3**
RSD	**39.67**	**42.07**	**-44.4**	**53.26**	**133.99**	**0.8**	**1.4**	**134.0**
median	0.18	0.19	-12.5	0.75	0.50	98.5	99.0	1.0
average + SD	0.21	0.24	-6.1	1.17	1.17	99.3	100.3	2.3
average - SD	0.09	0.10	-15.9	0.36	-0.17	97.7	97.7	-0.3
minimum	0.08	0.09	-15.0	0.37	0.03	97.6	98.1	0.1
maximum	0.20	0.23	-5.6	1.18	0.97	99.3	100.0	1.9
range	0.11	0.14	9.4	0.81	0.95	1.6	1.9	1.9

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
092-1	0.05	0.05	7.3	19.01	0.07	24.0	99.7	0.1
092-2	0.05	0.08	-65.4	-	-	-	-	-
092-3	0.05	0.01	80.0	22.17	0.11	11.3	99.5	0.2
average	**0.05**	**0.05**	**7.3**	**20.59**	**0.09**	**17.7**	**99.6**	**0.2**
uncertainty			**180.6**			**80.2**	**1.1**	**0.5**
SD	**0.00**	**0.04**	**72.7**	**2.23**	**0.03**	**8.9**	**0.1**	**0.1**
RSD	**5.63**	**74.98**	**997.6**	**10.84**	**32.67**	**50.6**	**0.1**	**32.7**
median	0.05	0.05	7.3	20.59	0.09	17.7	99.6	0.2
average + SD	0.05	0.08	80.0	22.82	0.12	26.6	99.8	0.3
average - SD	0.05	0.01	-65.4	18.36	0.06	8.7	99.5	0.1
minimum	0.05	0.01	-65.4	19.01	0.07	11.3	99.5	0.1
maximum	0.05	0.08	80.0	22.17	0.11	24.0	99.7	0.2
range	0.01	0.07	145.4	3.16	0.04	12.6	0.2	0.1

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
092-1	0.05	0.06	-16.0	21.80	-	12.8	-	-
092-2	0.10	0.12	-20.1	-	-	-	-	-
092-3	0.01	0.02	-73.8	21.76	0.30	13.0	98.8	0.6
average	**0.05**	**0.07**	**-36.6**	**21.78**	**0.30**	**12.9**	**98.8**	**0.6**
uncertainty			**80.2**			**1.3**		
SD	**0.04**	**0.05**	**32.3**	**0.03**	**-**	**0.1**	**-**	**-**
RSD	**78.95**	**72.96**	**-88.1**	**0.16**	**-**	**1.1**	**-**	**-**
median	0.05	0.06	-20.1	21.78	-	12.9	-	-
average + SD	0.10	0.11	-4.4	21.81	-	13.0	-	-
average - SD	0.01	0.02	-68.9	21.75	-	12.7	-	-
minimum	0.01	0.02	-73.8	21.76	-	12.8	-	-
maximum	0.10	0.12	-16.0	21.80	-	13.0	-	-
range	0.08	0.10	57.8	0.05	-	0.2	-	-

SINGLE FILAMENT

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
092-1	0.09	0.98	1.34	0.11	0.11	1.30	0.77
092-2	0.11	1.81	0.87	0.13	0.13	0.23	-
092-3	0.11	1.20	0.50	0.13	0.14	0.00	0.29
092-4	0.14	1.44	1.61	0.10	0.10	1.91	0.51
092-5	0.11	0.01	1.18	0.13	0.12	0.01	-
average	**0.11**	**1.09**	**1.10**	**0.12**	**0.12**	**0.69**	**0.52**
SD	**0.02**	**0.68**	**0.43**	**0.02**	**0.02**	**0.87**	**0.24**
RSD	**16.33**	**62.43**	**39.12**	**12.87**	**12.85**	**125.42**	**45.27**
median	0.11	1.20	1.18	0.13	0.12	0.23	0.51
average + SD	0.13	1.77	1.53	0.14	0.14	1.56	0.76
average - SD	0.09	0.41	0.67	0.10	0.11	-0.18	0.29
minimum	0.09	0.01	0.50	0.10	0.10	0.00	0.29
maximum	0.14	1.81	1.61	0.13	0.14	1.91	0.77
range	0.05	1.81	1.12	0.04	0.04	1.90	0.47

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
092-1	0.13	0.15	2.6	1.5	-17.3	103.2	130.4	98.1	97.3	97.4	98.5
092-2	0.17	0.19	0.5	-	-9.4	97.9	110.6	96.4	98.3	99.5	-
092-3	0.14	0.18	0.0	0.6	-28.3	108.2	130.3	97.6	99.0	100.0	99.4
092-4	0.13	0.15	3.8	1.0	-18.5	101.5	71.9	97.1	96.8	96.2	99.0
092-5	0.13	0.16	0.0	-	-18.7	92.9	118.5	100.0	97.6	100.0	-
average	**0.14**	**0.17**	**1.4**	**1.1**	**-18.4**	**100.7**	**112.3**	**97.8**	**97.8**	**98.6**	**99.0**
uncertainty			**2.1**	**1.2**	**8.4**	**7.1**	**29.9**	**1.7**	**1.1**	**2.1**	**1.2**
SD	**0.02**	**0.02**	**1.7**	**0.5**	**6.7**	**5.7**	**24.1**	**1.4**	**0.9**	**1.7**	**0.5**
RSD	**14.03**	**11.82**	**125.4**	**45.3**	**-36.6**	**5.7**	**21.5**	**1.4**	**0.9**	**1.8**	**0.5**
median	0.13	0.16	0.5	1.0	-18.5	101.5	118.5	97.6	97.6	99.5	99.0
average + SD	0.16	0.18	3.1	1.5	-11.7	106.5	136.4	99.2	98.7	100.4	99.4
average - SD	0.12	0.15	-0.4	0.6	-25.2	95.0	88.2	96.5	96.9	96.9	98.5
minimum	0.13	0.15	0.0	0.6	-28.3	92.9	71.9	96.4	96.8	96.2	98.5
maximum	0.17	0.19	3.8	1.5	-9.4	108.2	130.4	100.0	99.0	100.0	99.4
range	0.05	0.04	3.8	1.0	19.0	15.3	58.5	3.6	2.2	3.8	1.0

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
092-1	0.06	-	-	0.07	0.07	-	-
092-2	0.06	0.00	0.81	0.06	0.05	-	0.00
092-3	0.05	-	-	0.04	0.04	-	0.10
average	**0.06**	**0.00**	**0.81**	**0.06**	**0.05**	**-**	**0.05**
SD	**0.01**	**-**	**-**	**0.01**	**0.01**	**-**	**0.08**
RSD	**11.35**	**-**	**-**	**22.41**	**26.25**	**-**	**147.01**
median	0.06	-	-	0.06	0.05	-	0.05
average + SD	0.06	-	-	0.07	0.07	-	0.13
average - SD	0.05	-	-	0.04	0.04	-	-0.02
minimum	0.05	-	-	0.04	0.04	-	0.00
maximum	0.06	-	-	0.07	0.07	-	0.10
range	0.01	-	-	0.02	0.03	-	0.11

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
092-1	0.07	0.05	-	-	23.3	102.1	110.8	-	-	-	-
092-2	0.08	0.08	-	0.0	-3.6	85.4	87.9	100.0	96.8	-	100.0
092-3	0.05	0.05	-	0.2	-2.5	94.3	80.9	-	-	-	99.6
average	**0.07**	**0.06**	**-**	**0.1**	**5.7**	**94.0**	**93.2**	**100.0**	**96.8**	**-**	**99.8**
uncertainty				**1.3**	**37.9**	**20.8**	**38.8**				**2.7**
SD	**0.01**	**0.02**	**-**	**0.2**	**15.3**	**8.4**	**15.6**	**-**	**-**	**-**	**0.3**
RSD	**21.36**	**25.05**	**-**	**147.0**	**265.7**	**8.9**	**16.8**	**-**	**-**	**-**	**0.3**
median	0.07	0.05	-	0.1	-2.5	94.3	87.9	-	-	-	99.8
average + SD	0.08	0.08	-	0.3	21.0	102.3	108.8	-	-	-	100.1
average - SD	0.05	0.05	-	-0.1	-9.5	85.6	77.6	-	-	-	99.5
minimum	0.05	0.05	-	0.0	-3.6	85.4	80.9	-	-	-	99.6
maximum	0.08	0.08	-	0.2	23.3	102.1	110.8	-	-	-	100.0
range	0.03	0.03	-	0.2	26.9	16.7	29.9	-	-	-	0.4

52 % elastomultiester – 48 % polyester (sample 044)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
044-1	73.18	64.82	11.4	0.04	0.57	99.8	97.7	1.1
044-2	8.64	7.56	12.5	3.55	1.11	85.8	95.6	2.2
044-3	66.79	59.09	11.5	0.48	0.87	98.1	96.5	1.8
044-4	14.40	12.59	12.6	3.36	1.11	86.6	95.6	2.2
average	**40.75**	**36.01**	**12.0**	**1.86**	**0.92**	**92.6**	**96.3**	**1.8**
uncertainty			**1.0**			**11.8**	**1.6**	**0.8**
SD	**33.94**	**30.11**	**0.6**	**1.85**	**0.26**	**7.4**	**1.0**	**0.5**
RSD	**83.28**	**83.61**	**5.0**	**99.86**	**27.86**	**8.0**	**1.1**	**27.9**
median	40.59	35.84	12.0	1.92	0.99	92.3	96.0	2.0
average + SD	74.69	66.13	12.6	3.71	1.17	100.0	97.4	2.3
average - SD	6.81	5.90	11.4	0.00	0.66	85.2	95.3	1.3
minimum	8.64	7.56	11.4	0.04	0.57	85.8	95.6	1.1
maximum	73.18	64.82	12.6	3.55	1.11	99.8	97.7	2.2
range	64.54	57.26	1.1	3.50	0.54	14.0	2.2	1.1

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
044-1	66.30	60.94	8.1	-	0.31	-	98.8	0.6
044-2	7.29	6.69	8.2	3.48	1.12	86.1	95.5	2.2
044-3	60.73	55.74	8.2	-	0.44	-	98.2	0.9
044-4	12.27	11.26	8.2	3.41	1.07	86.4	95.7	2.1
average	**36.65**	**33.66**	**8.2**	**3.44**	**0.73**	**86.2**	**97.1**	**1.5**
uncertainty			**0.1**			**1.7**	**2.7**	**1.3**
SD	**31.17**	**28.64**	**0.1**	**0.05**	**0.42**	**0.2**	**1.7**	**0.8**
RSD	**85.06**	**85.09**	**0.9**	**1.38**	**56.92**	**0.2**	**1.7**	**56.9**
median	36.50	33.50	8.2	3.44	0.76	86.2	97.0	1.5
average + SD	67.82	62.30	8.3	3.49	1.15	86.4	98.7	2.3
average - SD	5.47	5.02	8.1	3.40	0.32	86.0	95.4	0.6
minimum	7.29	6.69	8.1	3.41	0.31	86.1	95.5	0.6
maximum	66.30	60.94	8.2	3.48	1.12	86.4	98.8	2.2
range	59.01	54.25	0.2	0.07	0.81	0.3	3.2	1.6

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
044-1	40.0	42.0	41.0	40.5	90.0	5.0	95.0	2.5	97.5	1.3
044-2	51.0	53.0	52.5	52.0	92.2	3.9	94.1	2.9	96.1	2.0
044-3	46.0	48.5	48.0	47.5	89.1	5.4	91.3	4.3	93.5	3.3
044-4	45.0	48.0	47.0	46.5	86.7	6.7	91.1	4.4	93.3	3.3
044-5	43.0	45.5	45.0	44.5	88.4	5.8	90.7	4.7	93.0	3.5
average					**89.3**	**5.4**	**92.4**	**3.8**	**94.7**	**2.7**
uncertainty					**2.5**	**1.3**	**2.4**	**1.2**	**2.5**	**1.2**
SD					**2.0**	**1.0**	**2.0**	**1.0**	**2.0**	**1.0**
RSD					**2.3**	**18.9**	**2.1**	**26.0**	**2.1**	**37.5**
median					89.1	5.4	91.3	4.3	93.5	3.3
average + SD					91.3	6.4	94.4	4.8	96.7	3.7
average - SD					87.2	4.4	90.5	2.8	92.7	1.7
minimum					86.7	3.9	90.7	2.5	93.0	1.3
maximum					92.2	6.7	95.0	4.7	97.5	3.5
range					5.5	2.7	4.3	2.2	4.5	2.2

40 % elastomultiester – 60 % polyester (sample 048)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
048-1	29.55	25.83	12.6	1.27	1.37	94.9	94.5	2.8
048-2	18.01	15.80	12.3	1.63	0.83	93.5	96.7	1.7
048-3	10.64	9.47	11.0	1.42	1.52	94.3	93.9	3.0
average	**19.40**	**17.03**	**12.0**	**1.44**	**1.24**	**94.3**	**95.0**	**2.5**
uncertainty			**2.1**			**1.8**	**3.6**	**1.8**
SD	**9.53**	**8.25**	**0.8**	**0.18**	**0.36**	**0.7**	**1.5**	**0.7**
RSD	**49.12**	**48.45**	**6.9**	**12.69**	**29.42**	**0.8**	**1.5**	**29.4**
median	18.01	15.80	12.3	1.42	1.37	94.3	94.5	2.8
average + SD	28.93	25.28	12.8	1.62	1.60	95.0	96.5	3.2
average - SD	9.87	8.78	11.1	1.26	0.87	93.5	93.6	1.8
minimum	10.64	9.47	11.0	1.27	0.83	93.5	93.9	1.7
maximum	29.55	25.83	12.6	1.63	1.52	94.9	96.7	3.0
range	18.91	16.36	1.6	0.36	0.69	1.5	2.8	1.4

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
048-1	26.10	24.07	7.8	1.08	1.37	95.7	94.5	2.8
048-2	15.71	14.42	8.2	1.04	0.88	95.8	96.5	1.8
048-3	9.25	8.56	7.5	1.59	1.51	93.7	93.9	3.0
average	**17.02**	**15.68**	**7.8**	**1.24**	**1.26**	**95.1**	**95.0**	**2.5**
uncertainty			**0.9**			**3.0**	**3.3**	**1.7**
SD	**8.50**	**7.83**	**0.4**	**0.30**	**0.33**	**1.2**	**1.3**	**0.7**
RSD	**49.94**	**49.93**	**4.8**	**24.65**	**26.67**	**1.3**	**1.4**	**26.7**
median	15.71	14.42	7.8	1.08	1.37	95.7	94.5	2.8
average + SD	25.52	23.51	8.2	1.54	1.59	96.3	96.3	3.2
average - SD	8.52	7.85	7.4	0.93	0.92	93.8	93.6	1.8
minimum	9.25	8.56	7.5	1.04	0.88	93.7	93.9	1.8
maximum	26.10	24.07	8.2	1.59	1.51	95.8	96.5	3.0
range	16.84	15.51	0.8	0.55	0.64	2.2	2.6	1.3

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		Imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
048-1	50.0	54.0	53.0	53.0	84.0	8.0	88.0	6.0	88.0	6.0
048-2	49.0	52.0	51.0	50.5	87.8	6.1	91.8	4.1	93.9	3.1
048-3	50.0	54.0	53.0	52.5	84.0	8.0	88.0	6.0	90.0	5.0
048-4	46.0	48.5	48.0	47.5	89.1	5.4	91.3	4.3	93.5	3.3
048-5	47.0	50.0	49.0	48.5	87.2	6.4	91.5	4.3	93.6	3.2
048-6	51.0	54.5	53.5	53.0	86.3	6.9	90.2	4.9	92.2	3.9
average					**86.4**	**6.8**	**90.1**	**4.9**	**91.9**	**4.1**
uncertainty					**2.2**	**1.1**	**1.8**	**0.9**	**2.5**	**1.2**
SD					**2.1**	**1.0**	**1.7**	**0.9**	**2.4**	**1.2**
RSD					**2.4**	**15.3**	**1.9**	**17.7**	**2.6**	**29.2**
median					86.8	6.6	90.8	4.6	92.8	3.6
average + SD					88.5	7.8	91.9	5.8	94.2	5.3
average - SD					84.3	5.8	88.4	4.1	89.5	2.9
minimum					84.0	5.4	88.0	4.1	88.0	3.1
maximum					89.1	8.0	91.8	6.0	93.9	6.0
range					5.1	2.6	3.8	1.9	5.9	2.9

34 % elastomultiester – 66 % polyester (sample 045)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
045-1	121.21	104.95	13.4	-	0.95	-	96.2	1.9
045-2	43.33	37.14	14.3	4.06	3.29	83.8	86.9	6.6
045-3	68.37	58.50	14.4	-	2.24	-	91.0	4.5
045-4	30.86	26.85	13.0	3.07	2.26	87.7	91.0	4.5
average	**65.94**	**56.86**	**13.8**	**3.56**	**2.18**	**85.7**	**91.3**	**4.4**
uncertainty			**1.1**			**25.2**	**6.1**	**3.1**
SD	**40.01**	**34.66**	**0.7**	**0.70**	**0.96**	**2.8**	**3.8**	**1.9**
RSD	**60.67**	**60.96**	**5.0**	**19.67**	**43.85**	**3.3**	**4.2**	**43.9**
median	55.85	47.82	13.9	3.56	2.25	85.7	91.0	4.5
average + SD	105.95	91.53	14.5	4.26	3.14	88.6	95.1	6.3
average - SD	25.94	22.20	13.1	2.86	1.23	82.9	87.4	2.5
minimum	30.86	26.85	13.0	3.07	0.95	83.8	86.9	1.9
maximum	121.21	104.95	14.4	4.06	3.29	87.7	96.2	6.6
range	90.35	78.10	1.4	0.99	2.34	4.0	9.4	4.7

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
045-1	108.17	98.26	9.2	-	0.02	-	99.9	0.0
045-2	37.45	34.02	9.2	4.13	4.45	83.5	82.2	8.9
045-3	59.29	53.92	9.1	0.44	3.24	98.3	87.0	6.5
045-4	27.16	24.87	8.4	3.11	2.88	87.6	88.5	5.8
average	**58.02**	**52.77**	**9.0**	**2.56**	**2.65**	**89.8**	**89.4**	**5.3**
uncertainty			**0.6**			**19.0**	**11.9**	**6.0**
SD	**36.02**	**32.66**	**0.4**	**1.91**	**1.88**	**7.6**	**7.5**	**3.8**
RSD	**62.08**	**61.90**	**4.0**	**74.57**	**70.87**	**8.5**	**8.4**	**70.9**
median	48.37	43.97	9.1	3.11	3.06	87.6	87.8	6.1
average + SD	94.04	85.43	9.3	4.46	4.53	97.4	96.9	9.1
average - SD	22.00	20.10	8.6	0.65	0.77	82.1	81.9	1.5
minimum	27.16	24.87	8.4	0.44	0.02	83.5	82.2	0.0
maximum	108.17	98.26	9.2	4.13	4.45	98.3	99.9	8.9
range	81.01	73.39	0.8	3.69	4.44	14.8	17.7	8.9

YARN

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
045-1	53.0	63.0	61.0	62.3	69.8	15.1	64.0	62.0	58.5	66.0	17.0
045-2	57.0	66.0	64.5	68.4	73.7	13.2	67.0	66.0	64.9	68.4	15.8
045-3	52.0	61.5	60.5	63.5	67.3	16.3	62.5	62.0	59.6	61.5	19.2
045-4	53.0	62.5	61.5	64.2	67.9	16.0	64.0	62.5	58.5	64.2	17.9
045-5	52.0	61.0	60.0	65.4	69.2	15.4	62.5	61.5	59.6	63.5	18.3
average				**64.7**	**69.6**	**15.2**			**60.2**	**64.7**	**17.6**
uncertainty				**2.9**	**3.1**	**1.6**			**3.3**	**3.3**	**1.6**
SD				**2.3**	**2.5**	**1.2**			**2.7**	**2.6**	**1.3**
RSD				**3.6**	**3.6**	**8.2**			**4.4**	**4.0**	**7.4**
median				64.2	69.2	15.4			59.6	64.2	17.9
average + SD				67.1	72.1	16.5			62.9	67.3	18.9
average - SD				62.4	67.1	14.0			57.5	62.1	16.3
minimum				62.3	67.3	13.2			58.5	61.5	15.8
maximum				68.4	73.7	16.3			64.9	68.4	19.2
range				6.2	6.4	3.2			6.4	6.9	3.4

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
045-1	65.0	63.0	54.7	62.3	18.9
045-2	68.5	67.5	59.7	63.2	18.4
045-3	63.5	62.5	55.8	59.6	20.2
045-4	65.0	63.0	54.7	62.3	18.9
045-5	63.0	62.0	57.7	61.5	19.2
average			**56.5**	**61.8**	**19.1**
uncertainty			**2.7**	**1.7**	**0.8**
SD			**2.1**	**1.3**	**0.7**
RSD			**3.8**	**2.2**	**3.5**
median			55.8	62.3	18.9
average + SD			58.6	63.1	19.8
average - SD			54.4	60.4	18.4
minimum			54.7	59.6	18.4
maximum			59.7	63.2	20.2
range			4.9	3.6	1.8

YARN

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
045-1	205.99	11.17	4.26	0.34	0.05	23.04	6.95
045-2	217.85	17.55	8.42	0.33	-0.04	26.89	14.65
045-3	225.00	12.31	3.80	0.66	0.12	21.25	5.44
045-4	54.64	8.61	2.46	0.64	0.13	20.34	7.52
average	**175.87**	**12.41**	**4.74**	**0.49**	**0.06**	**22.88**	**8.64**
SD	**81.20**	**3.76**	**2.57**	**0.18**	**0.08**	**2.90**	**4.10**
RSD	**46.17**	**30.30**	**54.31**	**36.76**	**121.21**	**12.68**	**47.49**
median	211.92	11.74	4.03	0.49	0.08	22.15	7.23
average + SD	257.07	16.17	7.31	0.67	0.14	25.78	12.74
average - SD	94.67	8.65	2.16	0.31	-0.01	19.98	4.54
minimum	54.64	8.61	2.46	0.33	-0.04	20.34	5.44
maximum	225.00	17.55	8.42	0.66	0.13	26.89	14.65
range	170.36	8.94	5.96	0.32	0.16	6.55	9.21

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
045-1	55.83	52.33	46.1	13.9	6.3	13.6	0.0	77.7	91.5	53.9	86.1
045-2	67.70	63.79	53.8	29.3	5.8	-11.4	0.0	64.9	83.2	46.2	70.7
045-3	89.78	84.57	42.5	10.9	5.8	18.0	0.1	75.4	92.4	57.5	89.1
045-4	74.41	69.78	40.7	15.0	6.2	19.9	0.2	82.8	95.1	59.3	85.0
average	**71.93**	**67.62**	**45.8**	**17.3**	**6.0**	**10.0**	**0.1**	**75.2**	**90.5**	**54.2**	**82.7**
uncertainty			**9.2**	**13.0**	**0.4**	**23.1**	**0.2**	**12.0**	**8.2**	**9.2**	**13.0**
SD	**14.16**	**13.42**	**5.8**	**8.2**	**0.3**	**14.5**	**0.1**	**7.5**	**5.2**	**5.8**	**8.2**
RSD	**19.69**	**19.85**	**12.7**	**47.5**	**4.4**	**145.0**	**152.3**	**10.0**	**5.7**	**10.7**	**9.9**
median	71.05	66.79	44.3	14.5	6.0	15.8	0.0	76.5	91.9	55.7	85.5
average + SD	86.09	81.04	51.6	25.5	6.3	24.6	0.2	82.7	95.7	60.0	90.9
average - SD	57.77	54.20	40.0	9.1	5.8	-4.5	0.0	67.7	85.4	48.4	74.5
minimum	55.83	52.33	40.7	10.9	5.8	-11.4	0.0	64.9	83.2	46.2	70.7
maximum	89.78	84.57	53.8	29.3	6.3	19.9	0.2	82.8	95.1	59.3	89.1
range	33.95	32.24	13.1	18.4	0.5	31.3	0.3	17.9	11.9	13.1	18.4

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
045-1	5.20	6.17	4.80	2.42	23.93	8.17	5.74
045-2	5.29	5.80	4.36	2.38	30.52	8.33	5.61
045-3	6.93	6.08	4.48	2.51	33.69	8.29	5.32
average	**5.81**	**6.02**	**4.55**	**2.44**	**29.38**	**8.27**	**5.56**
SD	**0.97**	**0.19**	**0.23**	**0.07**	**4.98**	**0.08**	**0.22**
RSD	**16.77**	**3.15**	**4.97**	**2.81**	**16.94**	**1.00**	**3.88**
median	5.29	6.08	4.48	2.42	30.52	8.29	5.61
average + SD	6.78	6.20	4.77	2.51	34.36	8.35	5.77
average - SD	4.83	5.83	4.32	2.37	24.40	8.18	5.34
minimum	5.20	5.80	4.36	2.38	23.93	8.17	5.32
maximum	6.93	6.17	4.80	2.51	33.69	8.33	5.74
range	1.73	0.36	0.44	0.13	9.75	0.16	0.42

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
045-1	22.63	20.36	16.4	11.5	10.1	987.7	460.6	75.3	80.8	67.3	77.0
045-2	27.68	24.67	16.7	11.2	10.9	1283.0	576.7	76.8	82.5	66.7	77.6
045-3	30.11	27.30	16.6	10.6	9.3	1340.3	486.2	75.7	82.1	66.8	78.7
average	**26.81**	**24.11**	**16.5**	**11.1**	**10.1**	**1203.7**	**507.9**	**75.9**	**81.8**	**66.9**	**77.8**
uncertainty			**0.4**	**1.1**	**1.9**	**470.1**	**151.5**	**1.9**	**2.2**	**0.8**	**2.1**
SD	**3.81**	**3.51**	**0.2**	**0.4**	**0.8**	**189.2**	**61.0**	**0.8**	**0.9**	**0.3**	**0.9**
RSD	**14.22**	**14.55**	**1.0**	**3.9**	**7.7**	**15.7**	**12.0**	**1.0**	**1.1**	**0.5**	**1.1**
median	27.68	24.67	16.6	11.2	10.1	1283.0	486.2	75.7	82.1	66.8	77.6
average + SD	30.62	27.62	16.7	11.5	10.9	1392.9	568.8	76.7	82.7	67.3	78.6
average - SD	23.00	20.60	16.4	10.7	9.3	1014.5	446.9	75.2	80.9	66.6	76.9
minimum	22.63	20.36	16.4	10.6	9.3	987.7	460.6	75.3	80.8	66.7	77.0
maximum	30.11	27.30	16.7	11.5	10.9	1340.3	576.7	76.8	82.5	67.3	78.7
range	7.47	6.95	0.3	0.8	1.6	352.6	116.1	1.5	1.7	0.6	1.7

YARN

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
045-1	49.0	55.0	54.0	53.0	75.5	12.2	79.6	10.2	83.7	8.2
045-2	52.0	58.0	57.0	56.0	76.9	11.5	80.8	9.6	84.6	7.7
045-3	45.0	50.0	49.0	48.0	77.8	11.1	82.2	8.9	86.7	6.7
045-4	48.0	53.0	52.0	51.5	79.2	10.4	83.3	8.3	85.4	7.3
045-5	47.0	52.0	51.0	50.0	78.7	10.6	83.0	8.5	87.2	6.4
average					**77.6**	**11.2**	**81.8**	**9.1**	**85.5**	**7.2**
uncertainty					**1.8**	**0.9**	**1.9**	**1.0**	**1.8**	**0.9**
SD					**1.5**	**0.7**	**1.6**	**0.8**	**1.5**	**0.7**
RSD					**1.9**	**6.5**	**1.9**	**8.6**	**1.7**	**10.1**
median					77.8	11.1	82.2	8.9	85.4	7.3
average + SD					79.1	11.9	83.3	9.9	87.0	8.0
average - SD					76.2	10.5	80.2	8.3	84.1	6.5
minimum					75.5	10.4	79.6	8.3	83.7	6.4
maximum					79.2	12.2	83.3	10.2	87.2	8.2
range					3.7	1.8	3.7	1.9	3.6	1.8

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
045-1	2.90	2.58	11.1	17.30	0.05	30.8	99.8	0.1
045-2	4.64	4.26	8.3	14.84	1.70	40.6	93.2	3.4
045-3	3.68	3.40	7.7	15.12	0.07	39.5	99.7	0.1
average	**3.74**	**3.41**	**9.0**	**15.75**	**0.61**	**37.0**	**97.6**	**1.2**
uncertainty			**4.5**			**13.4**	**9.4**	**4.7**
SD	**0.87**	**0.84**	**1.8**	**1.4**	**1.0**	**5.4**	**3.8**	**1.9**
RSD	**23.22**	**24.51**	**20.2**	**8.5**	**155.5**	**14.6**	**3.9**	**155.5**
median	3.68	3.40	8.3	15.1	0.1	39.5	99.7	0.1
average + SD	4.61	4.25	10.8	17.1	1.6	42.4	101.4	3.1
average - SD	2.87	2.58	7.2	14.4	-0.3	31.6	93.8	-0.7
minimum	2.90	2.58	7.7	14.8	0.1	30.8	93.2	0.1
maximum	4.64	4.26	11.1	17.3	1.7	40.6	99.8	3.4
range	1.73	1.67	3.4	2.5	1.7	9.8	6.6	3.3

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
045-1	2.65	2.48	6.7	18.40	0.16	26.4	99.3	0.3
045-2	4.38	4.14	5.6	18.44	0.09	26.2	99.6	0.2
045-3	3.49	3.25	7.1	16.32	0.12	34.7	99.5	0.2
average	**3.51**	**3.29**	**6.4**	**17.72**	**0.13**	**29.1**	**99.5**	**0.3**
uncertainty			**1.8**			**12.1**	**0.3**	**0.2**
SD	**0.86**	**0.83**	**0.7**	**1.22**	**0.0**	**4.9**	**0.1**	**0.1**
RSD	**24.60**	**25.24**	**11.6**	**6.86**	**28.0**	**16.7**	**0.1**	**28.0**
median	3.49	3.25	6.7	18.40	0.1	26.4	99.5	0.2
average + SD	4.37	4.12	7.2	18.93	0.2	34.0	99.6	0.3
average - SD	2.65	2.46	5.7	16.50	0.1	24.3	99.4	0.2
minimum	2.65	2.48	5.6	16.32	0.1	26.2	99.3	0.2
maximum	4.38	4.14	7.1	18.44	0.2	34.7	99.6	0.3
range	1.73	1.66	1.4	2.12	0.1	8.5	0.3	0.1

SINGLE FILAMENT

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
045-1	50.0	55.0	53.0	80.0	88.0	6.0	55.5	53.5	78.0	86.0	7.0
045-2	48.0	53.5	52.0	77.1	83.3	8.3	54.0	52.5	75.0	81.3	9.4
045-3	52.0	56.0	54.0	84.6	92.3	3.8	56.5	54.5	82.7	90.4	4.8
045-4	51.0	56.0	54.5	80.4	86.3	6.9	56.5	55.0	78.4	84.3	7.8
045-5	48.0	52.5	51.0	81.3	87.5	6.3	53.5	52.0	77.1	83.3	8.3
average				**80.7**	**87.5**	**6.3**			**78.2**	**85.1**	**7.5**
uncertainty				**4.0**	**4.0**	**2.0**			**3.5**	**4.3**	**2.1**
SD				**2.7**	**3.3**	**1.6**			**2.8**	**3.4**	**1.7**
RSD				**3.4**	**3.7**	**26.0**			**3.6**	**4.0**	**23.0**
median				80.4	87.5	6.3			78.0	84.3	7.8
average + SD				83.4	90.7	7.9			81.1	88.5	9.2
average - SD				78.0	84.2	4.6			75.4	81.6	5.8
minimum				77.1	83.3	3.8			75.0	81.3	4.8
maximum				84.6	92.3	8.3			82.7	90.4	9.4
range				7.5	9.0	4.5			7.7	9.1	4.6

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
045-1	55.5	54.5	78.0	82.0	9.0
045-2	54.5	52.5	72.9	81.3	9.4
045-3	57.0	55.0	80.8	88.5	5.8
045-4	56.5	55.5	78.4	82.4	8.8
045-5	54.0	52.0	75.0	83.3	8.3
average			**77.0**	**83.5**	**8.3**
uncertainty			**3.8**	**3.6**	**1.8**
SD			**3.1**	**2.9**	**1.4**
RSD			**4.0**	**3.5**	**17.5**
median			78.0	82.4	8.8
average + SD			80.1	86.4	9.7
average - SD			73.9	80.6	6.8
minimum			72.9	81.3	5.8
maximum			80.8	88.5	9.4
range			7.8	7.2	3.6

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
045-1	0.25	1.11	0.69	0.12	3.56	0.66	-
045-2	0.32	3.64	0.70	0.10	4.04	1.13	0.36
045-3	0.24	0.58	-	0.13	3.37	0.43	-
045-4	0.23	1.16	0.30	0.11	3.34	3.58	0.05
average	**0.26**	**1.62**	**0.56**	**0.11**	**3.58**	**1.45**	**0.20**
SD	**0.04**	**1.4**	**0.2**	**0.01**	**0.32**	**1.45**	**0.2**
RSD	**15.38**	**84.2**	**40.1**	**9.58**	**9.01**	**100.20**	**110.3**
median	0.24	1.1	0.7	0.11	3.46	0.89	0.2
average + SD	0.30	3.0	0.8	0.13	3.90	2.90	0.4
average - SD	0.22	0.3	0.3	0.10	3.26	0.00	0.0
minimum	0.23	0.6	0.3	0.10	3.34	0.43	0.1
maximum	0.32	3.6	0.7	0.13	4.04	3.58	0.4
range	0.09	3.1	0.4	0.03	0.69	3.16	0.3

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
045-1	3.09	2.87	1.3	-	7.3	3045.7	1445.5	95.5	97.2	97.4	-
045-2	3.53	3.29	2.3	0.7	6.6	3938.7	1281.1	85.4	97.2	95.5	98.5
045-3	2.91	2.70	0.9	-	7.1	2616.8	1407.5	97.7	-	98.3	-
045-4	2.88	2.66	7.2	0.1	7.5	3019.5	1470.2	95.3	98.8	85.7	99.8
average	**3.10**	**2.88**	**2.9**	**0.4**	**7.1**	**3155.2**	**1401.1**	**93.5**	**97.7**	**94.2**	**99.2**
uncertainty			**4.6**	**4.0**	**0.6**	**887.8**	**133.7**	**8.7**	**2.2**	**9.2**	**8.1**
SD	**0.30**	**0.29**	**2.9**	**0.5**	**0.4**	**558.0**	**84.0**	**5.5**	**0.9**	**5.8**	**0.9**
RSD	**9.61**	**9.98**	**100.2**	**110.3**	**5.3**	**17.7**	**6.0**	**5.9**	**0.9**	**6.2**	**0.9**
median	3.00	2.78	1.8	0.4	7.2	3032.6	1426.5	95.4	97.2	96.4	99.2
average + SD	3.40	3.17	5.8	0.9	7.5	3713.2	1485.1	99.0	98.6	100.0	100.1
average - SD	2.80	2.59	0.0	0.0	6.8	2597.1	1317.0	88.0	96.8	88.4	98.3
minimum	2.88	2.66	0.9	0.1	6.6	2616.8	1281.1	85.4	97.2	85.7	98.5
maximum	3.53	3.29	7.2	0.7	7.5	3938.7	1470.2	97.7	98.8	98.3	99.8
range	0.65	0.63	6.3	0.6	0.9	1321.9	189.1	12.2	1.6	12.6	1.3

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
045-1	48.0	52.0	52.0	52.0	83.3	8.3	83.3	8.3	83.3	8.3
045-2	47.0	51.5	51.0	51.0	80.9	9.6	83.0	8.5	83.0	8.5
045-3	49.0	51.0	50.0	49.5	91.8	4.1	95.9	2.0	97.9	1.0
045-4	48.0	54.0	53.5	53.5	75.0	12.5	77.1	11.5	77.1	11.5
045-5	50.0	55.0	54.0	53.0	80.0	10.0	84.0	8.0	88.0	6.0
045-6	50.0	55.0	53.5	53.0	80.0	10.0	86.0	7.0	88.0	6.0
045-7	52.0	57.0	55.5	55.0	80.8	9.6	86.5	6.7	88.5	5.8
average					**81.7**	**9.2**	**85.1**	**7.4**	**86.5**	**6.7**
uncertainty					**4.7**	**2.4**	**5.2**	**2.6**	**6.0**	**3.0**
SD					**5.1**	**2.6**	**5.7**	**2.8**	**6.4**	**3.2**
RSD					**6.3**	**28.0**	**6.7**	**38.1**	**7.4**	**48.0**
median					80.8	9.6	84.0	8.0	88.0	6.0
average + SD					86.8	11.7	90.8	10.3	93.0	10.0
average - SD					76.6	6.6	79.5	4.6	80.1	3.5
minimum					75.0	4.1	77.1	2.0	77.1	1.0
maximum					91.8	12.5	95.9	11.5	97.9	11.5
range					16.8	8.4	18.8	9.4	20.8	10.4

48 % elastomultiester – 52 % wool (sample 023)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
023-1	538.36	492.35	8.6	5.36	0.12	78.6	99.5	0.2
023-2	508.07	462.44	9.0	5.46	0.03	78.2	99.9	0.1
023-3	489.05	445.74	8.9	5.79	0.23	76.9	99.1	0.5
average	**501.67**	**457.13**	**8.9**	**5.5**	**0.13**	**77.9**	**99.5**	**0.3**
uncertainty			**0.6**			**2.2**	**1.0**	**0.5**
SD	**28.72**	**27.37**	**0.3**	**0.2**	**0.10**	**0.9**	**0.4**	**0.2**
RSD	**5.72**	**5.99**	**3.0**	**4.0**	**77.49**	**1.1**	**0.4**	**77.5**
median	498.56	454.09	8.9	5.5	0.12	78.2	99.5	0.2
average + SD	530.39	484.50	9.2	5.8	0.22	78.7	99.9	0.5
average - SD	472.96	429.75	8.6	5.3	0.03	77.0	99.1	0.1
minimum	471.21	427.98	8.6	5.4	0.03	76.9	99.1	0.1
maximum	538.36	492.35	9.2	5.8	0.23	78.6	99.9	0.5
range	67.15	64.36	0.6	0.4	0.19	1.7	0.8	0.4

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
023-1	505.57	473.17	6.4	4.43	-	82.3	-	-
023-2	476.69	445.21	6.6	4.79	-	80.8	-	-
023-3	457.26	427.41	6.5	3.88	-	84.5	-	-
average	**479.84**	**448.60**	**6.5**	**4.4**	**-**	**82.5**	**-**	**-**
uncertainty			**0.2**			**4.5**		
SD	**24.31**	**23.07**	**0.1**	**0.5**	**-**	**1.8**	**-**	**-**
RSD	**5.07**	**5.14**	**1.5**	**10.5**	**-**	**2.2**	**-**	**-**
median	476.69	445.21	6.5	4.4	-	82.3	-	-
average + SD	504.15	471.66	6.6	4.8	-	84.4	-	-
average - SD	455.53	425.53	6.4	3.9	-	80.7	-	-
minimum	457.26	427.41	6.4	3.9	-	80.8	-	-
maximum	505.57	473.17	6.6	4.8	-	84.5	-	-
range	48.31	45.76	0.2	0.9	-	3.6	-	-

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
023-1	20.31	-	-	9.98	611.80	-	-
023-2	43.47	3.20	1.84	7.67	515.84	2.27	0.56
023-3	38.87	2.55	1.16	8.22	550.26	1.20	0.07
average	**34.22**	**2.88**	**1.50**	**8.62**	**559.30**	**1.73**	**0.31**
SD	**12.26**	**0.46**	**0.48**	**1.20**	**48.61**	**0.75**	**0.35**
RSD	**35.84**	**16.00**	**32.20**	**13.95**	**8.69**	**43.28**	**109.56**
median	38.87	2.88	1.50	8.22	550.26	1.73	0.31
average + SD	46.48	3.34	1.98	9.83	607.92	2.49	0.66
average - SD	21.95	2.42	1.02	7.42	510.69	0.98	-0.03
minimum	20.31	2.55	1.16	7.67	515.84	1.20	0.07
maximum	43.47	3.20	1.84	9.98	611.80	2.27	0.56
range	23.16	0.65	0.68	2.30	95.96	1.06	0.49

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
023-1	546.26	513.09	-	-	6.1	6131.9	3012.7	-	-	-	-
023-2	456.17	427.37	4.5	1.1	6.3	6721.6	1186.7	87.2	92.6	90.9	97.8
023-3	487.89	457.00	2.4	0.1	6.3	6691.7	1415.5	89.8	95.4	95.2	99.7
average	**496.77**	**465.82**	**3.5**	**0.6**	**6.2**	**6515.1**	**1871.6**	**88.5**	**94.0**	**93.1**	**98.7**
uncertainty			**13.5**	**6.2**	**0.3**	**825.2**	**2471.5**	**16.6**	**17.4**	**27.0**	**12.4**
SD	**45.70**	**43.53**	**1.5**	**0.7**	**0.1**	**332.2**	**994.8**	**1.8**	**1.9**	**3.0**	**1.4**
RSD	**9.20**	**9.35**	**43.2**	**110.0**	**2.3**	**5.1**	**53.2**	**2.1**	**2.1**	**3.2**	**1.4**
median	487.89	457.00	3.5	0.6	6.3	6691.7	1415.5	88.5	94.0	93.1	98.7
average + SD	542.47	509.35	5.0	1.3	6.4	6847.2	2866.4	90.3	95.9	96.1	100.1
average - SD	451.08	422.28	2.0	-0.1	6.1	6182.9	876.9	86.6	92.1	90.1	97.4
minimum	456.17	427.37	2.4	0.1	6.1	6131.9	1186.7	87.2	92.6	90.9	97.8
maximum	546.26	513.09	4.5	1.1	6.3	6721.6	3012.7	89.8	95.4	95.2	99.7
range	90.09	85.72	2.1	1.0	0.3	589.7	1826.0	2.6	2.7	4.2	2.0

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
023-1	8.79	8.04	8.5	4.41	0.40	82.4	98.4	0.8
023-2	10.97	10.11	7.9	4.89	0.47	80.4	98.1	1.0
023-3	7.89	7.18	9.0	2.30	-	90.8	-	-
average	**9.22**	**8.44**	**8.5**	**3.87**	**0.44**	**84.5**	**98.3**	**0.9**
uncertainty			**1.3**			**13.7**	**1.8**	**0.9**
SD	**1.59**	**1.51**	**0.5**	**1.4**	**0.1**	**5.5**	**0.2**	**0.1**
RSD	**17.23**	**17.84**	**6.4**	**35.7**	**11.5**	**6.5**	**0.2**	**11.5**
median	8.79	8.04	8.5	4.4	0.4	82.4	98.3	0.9
average + SD	10.80	9.95	9.0	5.3	0.5	90.0	98.5	1.0
average - SD	7.63	6.94	7.9	2.5	0.4	79.0	98.1	0.8
minimum	7.89	7.18	7.9	2.3	0.4	80.4	98.1	0.8
maximum	10.97	10.11	9.0	4.9	0.5	90.8	98.4	1.0
range	3.09	2.93	1.1	2.6	0.1	10.4	0.3	0.1

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
023-1	8.28	7.71	6.9	-	0.07	-	99.7	0.2
023-2	10.32	9.77	5.3	-	-	-	-	-
023-3	7.40	6.95	6.1	-	-	-	-	-
average	**8.67**	**8.14**	**6.1**	**-**	**0.07**	**-**	**99.7**	**0.2**
uncertainty			**2.0**					
SD	**1.50**	**1.46**	**0.8**	**-**	**-**	**-**	**-**	**-**
RSD	**17.30**	**17.95**	**13.3**	**-**	**-**	**-**	**-**	**-**
median	8.28	7.71	6.1	-	-	-	-	-
average + SD	10.17	9.60	6.9	-	-	-	-	-
average - SD	7.17	6.68	5.3	-	-	-	-	-
minimum	7.40	6.95	5.3	-	-	-	-	-
maximum	10.32	9.77	6.9	-	-	-	-	-
range	2.92	2.83	1.6	-	-	-	-	-

SINGLE FILAMENT

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
023-1	55.0	60.0	58.0	81.8	89.1	5.5	61.0	59.5	78.2	83.6	8.2
023-2	46.0	50.5	49.5	80.4	84.8	7.6	50.0	49.5	82.6	84.8	7.6
023-3	52.0	56.5	54.5	82.7	90.4	4.8	57.0	54.0	80.8	92.3	3.8
023-4	46.0	50.0	49.0	82.6	87.0	6.5	51.0	49.5	78.3	84.8	7.6
023-5	49.0	54.5	53.5	77.6	81.6	9.2	54.5	53.5	77.6	81.6	9.2
average				**81.0**	**86.6**	**6.7**			**79.5**	**85.4**	**7.3**
uncertainty				**4.3**	**4.3**	**2.2**			**2.7**	**5.0**	**2.5**
SD				**2.1**	**3.5**	**1.7**			**2.1**	**4.1**	**2.0**
RSD				**2.6**	**4.0**	**26.0**			**2.7**	**4.7**	**27.8**
median				81.8	87.0	6.5			78.3	84.8	7.6
average + SD				83.2	90.1	8.5			81.6	89.5	9.3
average - SD				78.9	83.1	5.0			77.3	81.4	5.3
minimum				77.6	81.6	4.8			77.6	81.6	3.8
maximum				82.7	90.4	9.2			82.6	92.3	9.2
range				5.1	8.8	4.4			5.1	10.7	5.3

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
023-1	61.5	59.5	76.4	83.6	8.2
023-2	52.0	50.5	73.9	80.4	9.8
023-3	57.0	55.5	80.8	86.5	6.7
023-4	51.5	50.5	76.1	80.4	9.8
023-5	54.0	53.0	79.6	83.7	8.2
average			**77.3**	**82.9**	**8.5**
uncertainty			**3.5**	**3.2**	**1.6**
SD			**2.8**	**2.6**	**1.3**
RSD			**3.6**	**3.1**	**15.1**
median			76.4	83.6	8.2
average + SD			80.1	85.5	9.8
average - SD			74.6	80.4	7.2
minimum			73.9	80.4	6.7
maximum			80.8	86.5	9.8
range			6.9	6.1	3.1

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
023-1	1.36	1.72	-	0.23	9.13	1.26	-
023-2	1.36	1.95	0.74	0.23	9.41	0.42	-
023-3	2.09	1.46	1.85	0.24	9.61	3.36	-
023-4	0.50	2.10	0.42	0.19	7.65	-	-
023-5	1.29	3.34	2.57	0.22	9.01	4.08	0.33
023-6	3.14	2.13	0.04	0.26	9.81	3.60	0.12
average	**1.62**	**2.12**	**1.12**	**0.23**	**9.10**	**2.54**	**0.23**
SD	**0.90**	**0.7**	**1.1**	**0.02**	**0.77**	**1.61**	**0.2**
RSD	**55.30**	**30.7**	**93.7**	**9.74**	**8.49**	**63.13**	**66.8**
median	1.36	2.0	0.7	0.23	9.27	3.36	0.2
average + SD	2.52	2.8	2.2	0.25	9.88	4.15	0.4
average - SD	0.73	1.5	0.1	0.21	8.33	0.94	0.1
minimum	0.50	1.5	0.0	0.19	7.65	0.42	0.1
maximum	3.14	3.3	2.6	0.26	9.81	4.08	0.3
range	2.64	1.9	2.5	0.07	2.17	3.67	0.2

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
023-1	8.23	7.76	2.5	-	5.8	3995.2	670.5	93.1	-	95.0	-
023-2	8.49	7.98	0.8	-	6.0	4047.3	693.5	92.2	97.0	98.3	-
023-3	8.66	8.19	6.7	-	5.5	4080.2	459.5	94.1	92.6	86.6	-
023-4	6.80	6.37	-	-	6.3	3925.8	1529.5	91.6	98.3	-	-
023-5	8.09	7.61	8.2	0.7	5.9	4158.0	699.3	86.6	89.7	83.7	98.7
023-6	8.86	8.36	7.2	0.2	5.7	3744.0	312.7	91.5	99.8	85.6	99.5
average	**8.19**	**7.71**	**5.1**	**0.5**	**5.9**	**3991.7**	**727.5**	**91.5**	**95.5**	**89.8**	**99.1**
uncertainty			**4.0**	**2.7**	**0.3**	**151.6**	**443.5**	**2.7**	**5.2**	**8.0**	**5.4**
SD	**0.74**	**0.71**	**3.2**	**0.3**	**0.3**	**144.4**	**422.5**	**2.6**	**4.2**	**6.4**	**0.6**
RSD	**9.01**	**9.24**	**63.1**	**66.8**	**5.0**	**3.6**	**58.1**	**2.8**	**4.4**	**7.2**	**0.6**
median	8.36	7.87	6.7	0.5	5.8	4021.3	682.0	91.9	97.0	86.6	99.1
average + SD	8.93	8.42	8.3	0.8	6.2	4136.2	1150.0	94.1	99.7	96.2	99.7
average - SD	7.45	7.00	1.9	0.2	5.6	3847.3	305.0	88.9	91.3	83.4	98.5
minimum	6.80	6.37	0.8	0.2	5.5	3744.0	312.7	86.6	89.7	83.7	98.7
maximum	8.86	8.36	8.2	0.7	6.3	4158.0	1529.5	94.1	99.8	98.3	99.5
range	2.06	1.99	7.3	0.4	0.8	414.1	1216.9	7.5	10.1	14.7	0.9

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
023-1	47.0	51.0	50.0	50.0	83.0	8.5	87.2	6.4	87.2	6.4
023-2	51.0	55.0	53.5	53.0	84.3	7.8	90.2	4.9	92.2	3.9
023-3	47.0	50.5	49.5	49.0	85.1	7.4	89.4	5.3	91.5	4.3
023-4	51.0	54.5	53.5	53.0	86.3	6.9	90.2	4.9	92.2	3.9
023-5	50.0	54.0	53.0	52.5	84.0	8.0	88.0	6.0	90.0	5.0
023-6	52.0	55.5	54.5	54.0	86.5	6.7	90.4	4.8	92.3	3.8
average					**84.9**	**7.6**	**89.2**	**5.4**	**90.9**	**4.6**
uncertainty					**1.4**	**0.7**	**1.4**	**0.7**	**2.1**	**1.0**
SD					**1.4**	**0.7**	**1.3**	**0.7**	**2.0**	**1.0**
RSD					**1.6**	**9.1**	**1.5**	**12.3**	**2.2**	**21.8**
median					84.7	7.6	89.8	5.1	91.8	4.1
average + SD					86.2	8.3	90.6	6.0	92.9	5.5
average - SD					83.5	6.9	87.9	4.7	88.9	3.6
minimum					83.0	6.7	87.2	4.8	87.2	3.8
maximum					86.5	8.5	90.4	6.4	92.3	6.4
range					3.5	1.8	3.2	1.6	5.1	2.5

62 % elastomultiester – 38 % cotton (sample 054)

YARN

Elongation based – 3 cycles

100%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
054-1	289.57	252.31	12.9	-	5.84	-	88.3	11.7
054-2	188.44	161.72	14.2	10.93	7.44	78.1	85.1	14.9
054-3	227.44	196.68	13.5	12.18	8.33	75.6	83.3	16.7
average	**235.15**	**203.57**	**13.5**	**11.56**	**7.21**	**76.9**	**85.6**	**14.4**
uncertainty			**1.6**			**15.9**	**6.3**	**6.3**
SD	**51.00**	**45.69**	**0.7**	**0.89**	**1.26**	**1.8**	**2.5**	**2.5**
RSD	**21.69**	**22.44**	**4.9**	**7.66**	**17.53**	**2.3**	**3.0**	**17.5**
median	227.44	196.68	13.5	11.56	7.44	76.9	85.1	14.9
average + SD	286.15	249.26	14.2	12.44	8.47	78.7	88.1	16.9
average - SD	184.15	157.89	12.9	10.67	5.94	75.1	83.1	11.9
minimum	188.44	161.72	12.9	10.93	5.84	75.6	83.3	11.7
maximum	289.57	252.31	14.2	12.18	8.33	78.1	88.3	16.7
range	101.13	90.59	1.3	1.25	2.49	2.5	5.0	5.0

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
054-1	262.77	237.60	9.6	-	2.08	-	95.8	4.2
054-2	167.83	151.09	10.0	12.51	11.19	75.0	77.6	22.4
054-3	205.81	185.61	9.8	5.68	10.68	88.6	78.6	21.4
average	**212.14**	**191.43**	**9.8**	**9.09**	**7.99**	**81.8**	**84.0**	**16.0**
uncertainty			**0.5**			**86.7**	**25.4**	**25.4**
SD	**47.78**	**43.55**	**0.2**	**4.83**	**5.12**	**9.7**	**10.2**	**10.2**
RSD	**22.52**	**22.75**	**2.0**	**53.08**	**64.07**	**11.8**	**12.2**	**64.1**
median	205.81	185.61	9.8	9.09	10.68	81.8	78.6	21.4
average + SD	259.92	234.98	10.0	13.92	13.10	91.5	94.3	26.2
average - SD	164.35	147.88	9.6	4.27	2.87	72.2	73.8	5.7
minimum	167.83	151.09	9.6	5.68	2.08	75.0	77.6	4.2
maximum	262.77	237.60	10.0	12.51	11.19	88.6	95.8	22.4
range	94.93	86.51	0.4	6.83	9.10	13.7	18.2	18.2

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
054-1	6.73	6.18	8.1	1.47	1.11	94.1	95.6	2.2
054-2	6.33	5.88	7.2	0.96	0.89	96.2	96.5	1.8
054-3	6.01	5.63	6.4	1.08	0.88	95.7	96.5	1.8
average	**6.36**	**5.90**	**7.2**	**1.17**	**0.96**	**95.3**	**96.2**	**1.9**
uncertainty			**2.0**			**2.6**	**1.3**	**0.6**
SD	**0.36**	**0.28**	**0.8**	**0.27**	**0.13**	**1.1**	**0.5**	**0.3**
RSD	**5.63**	**4.74**	**11.4**	**22.70**	**13.73**	**1.1**	**0.6**	**13.7**
median	6.33	5.88	7.2	1.08	0.89	95.7	96.5	1.8
average + SD	6.71	6.18	8.0	1.43	1.09	96.4	96.7	2.2
average - SD	6.00	5.62	6.4	0.90	0.83	94.3	95.6	1.7
minimum	6.01	5.63	6.4	0.96	0.88	94.1	95.6	1.8
maximum	6.73	6.18	8.1	1.47	1.11	96.2	96.5	2.2
range	0.71	0.56	1.6	0.51	0.23	2.0	0.9	0.5

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
054-1	6.29	5.97	5.1	2.02	1.58	91.9	93.7	3.2
054-2	6.00	5.71	4.9	1.15	0.89	95.4	96.4	1.8
054-3	5.72	5.43	5.1	1.39	0.98	94.4	96.1	2.0
average	**6.00**	**5.70**	**5.0**	**1.52**	**1.15**	**93.9**	**95.4**	**2.3**
uncertainty			**0.3**			**4.4**	**3.7**	**1.9**
SD	**0.28**	**0.27**	**0.1**	**0.45**	**0.37**	**1.8**	**1.5**	**0.8**
RSD	**4.72**	**4.69**	**2.7**	**29.38**	**32.47**	**1.9**	**1.6**	**32.5**
median	6.00	5.71	5.1	1.39	0.98	94.4	96.1	2.0
average + SD	6.29	5.97	5.1	1.97	1.53	95.7	96.9	3.1
average - SD	5.72	5.43	4.9	1.07	0.78	92.1	93.9	1.6
minimum	5.72	5.43	4.9	1.15	0.89	91.9	93.7	1.8
maximum	6.29	5.97	5.1	2.02	1.58	95.4	96.4	3.2
range	0.57	0.53	0.3	0.87	0.69	3.5	2.8	1.4

YARN

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
054-1	7.20	14.65	10.36	2.23	0.59	18.98	11.71
054-2	6.50	12.43	8.63	2.34	0.83	17.22	11.15
054-3	7.18	13.94	9.59	2.13	0.60	18.05	10.89
054-4	7.37	14.56	9.89	2.02	0.51	19.95	12.33
054-5	6.36	9.73	7.06	3.18	1.55	14.29	8.82
average	**6.92**	**13.06**	**9.11**	**2.38**	**0.82**	**17.70**	**10.98**
SD	**0.46**	**2.06**	**1.31**	**0.46**	**0.43**	**2.16**	**1.33**
RSD	**6.61**	**15.81**	**14.38**	**19.46**	**52.38**	**12.20**	**12.08**
median	7.18	13.94	9.59	2.23	0.60	18.05	11.15
average + SD	7.38	15.13	10.42	2.84	1.24	19.86	12.31
average - SD	6.47	11.00	7.80	1.92	0.39	15.54	9.65
minimum	6.36	9.73	7.06	2.02	0.51	14.29	8.82
maximum	7.37	14.65	10.36	3.18	1.55	19.95	12.33
range	1.01	4.92	3.31	1.16	1.04	5.66	3.51

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
054-1	244.50	220.32	38.0	23.4	9.9	26.4	8.2	70.7	79.3	62.0	76.6
054-2	205.52	184.37	34.4	22.3	10.3	35.4	12.7	75.1	82.7	65.6	77.7
054-3	250.67	226.09	36.1	21.8	9.8	28.2	8.4	72.1	80.8	63.9	78.2
054-4	262.25	236.41	39.9	24.7	9.9	25.4	7.0	70.9	80.2	60.1	75.3
054-5	99.30	89.18	28.6	17.7	10.2	48.8	24.4	80.5	85.9	71.4	82.4
average	**212.45**	**191.27**	**35.4**	**22.0**	**10.0**	**32.8**	**12.1**	**73.9**	**81.8**	**64.6**	**78.0**
uncertainty			**5.4**	**3.3**	**0.3**	**12.1**	**8.9**	**5.1**	**3.3**	**5.4**	**3.3**
SD	**66.75**	**60.34**	**4.3**	**2.7**	**0.2**	**9.7**	**7.2**	**4.1**	**2.6**	**4.3**	**2.7**
RSD	**31.42**	**31.55**	**12.2**	**12.1**	**2.2**	**29.7**	**59.4**	**5.6**	**3.2**	**6.7**	**3.4**
median	244.50	220.32	36.1	22.3	9.9	28.2	8.4	72.1	80.8	63.9	77.7
average + SD	279.19	251.61	39.7	24.6	10.2	42.6	19.3	78.0	84.4	68.9	80.7
average - SD	145.70	130.93	31.1	19.3	9.8	23.1	4.9	69.8	79.2	60.3	75.4
minimum	99.30	89.18	28.6	17.7	9.8	25.4	7.0	70.7	79.3	60.1	75.3
maximum	262.25	236.41	39.9	24.7	10.3	48.8	24.4	80.5	85.9	71.4	82.4
range	162.96	147.23	11.3	7.0	0.5	23.4	17.4	9.9	6.6	11.3	7.0

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
054-1	3.20	1.55	0.87	2.75	7.40	2.24	0.98
054-2	2.83	1.69	1.02	2.47	6.60	2.25	1.18
054-3	3.15	2.44	1.56	2.48	7.46	2.75	1.88
054-4	2.91	2.78	2.04	2.28	7.04	3.44	2.34
054-5	3.31	1.79	1.31	2.87	8.02	2.50	1.40
average	**3.08**	**2.05**	**1.36**	**2.57**	**7.31**	**2.64**	**1.56**
SD	**0.20**	**0.53**	**0.46**	**0.23**	**0.53**	**0.50**	**0.55**
RSD	**6.58**	**25.87**	**34.12**	**9.14**	**7.19**	**18.78**	**35.60**
median	3.15	1.79	1.31	2.48	7.40	2.50	1.40
average + SD	3.28	2.58	1.83	2.80	7.83	3.13	2.11
average - SD	2.88	1.52	0.90	2.33	6.78	2.14	1.00
minimum	2.83	1.55	0.87	2.28	6.60	2.24	0.98
maximum	3.31	2.78	2.04	2.87	8.02	3.44	2.34
range	0.48	1.23	1.17	0.59	1.42	1.20	1.37

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
054-1	7.26	6.76	4.5	2.0	6.9	269.4	231.3	93.8	96.5	91.1	96.1
054-2	6.50	6.09	4.5	2.4	6.3	267.1	233.6	93.2	95.9	91.0	95.3
054-3	7.28	6.82	5.5	3.8	6.4	300.5	236.6	90.2	93.7	89.0	92.5
054-4	6.89	6.45	6.9	4.7	6.3	309.1	242.0	88.9	91.8	86.2	90.6
054-5	7.86	7.31	5.0	2.8	7.0	279.8	242.4	92.8	94.7	90.0	94.4
average	**7.16**	**6.68**	**5.3**	**3.1**	**6.6**	**285.2**	**237.2**	**91.8**	**94.6**	**89.5**	**93.8**
uncertainty			**1.2**	**1.4**	**0.4**	**23.3**	**6.2**	**2.6**	**2.3**	**2.5**	**2.8**
SD	**0.51**	**0.45**	**1.0**	**1.1**	**0.3**	**18.8**	**5.0**	**2.1**	**1.9**	**2.0**	**2.2**
RSD	**7.09**	**6.80**	**18.8**	**35.6**	**5.0**	**6.6**	**2.1**	**2.3**	**2.0**	**2.2**	**2.4**
median	7.26	6.76	5.0	2.8	6.4	279.8	236.6	92.8	94.7	90.0	94.4
average + SD	7.67	7.14	6.3	4.2	6.9	304.0	242.1	93.9	96.4	91.4	96.0
average - SD	6.65	6.23	4.3	2.0	6.3	266.4	232.2	89.7	92.7	87.5	91.6
minimum	6.50	6.09	4.5	2.0	6.3	267.1	231.3	88.9	91.8	86.2	90.6
maximum	7.86	7.31	6.9	4.7	7.0	309.1	242.4	93.8	96.5	91.1	96.1
range	1.36	1.22	2.4	2.7	0.7	42.0	11.2	4.9	4.7	4.8	5.5

SINGLE FILAMENT

Elongation based – 3 cycles

100%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
054-1	5.63	4.96	12.0	38.66	0.12	22.7	99.8	0.2
054-2	2.58	2.21	14.3	25.75	0.13	48.5	99.8	0.3
054-3	0.45	0.37	17.9	32.94	0.81	34.1	98.4	1.6
average	**2.89**	**2.51**	**14.8**	**32.45**	**0.35**	**35.1**	**99.3**	**0.7**
uncertainty			**7.5**			**32.1**	**2.0**	**2.0**
SD	**2.61**	**2.31**	**3.0**	**6.47**	**0.39**	**12.9**	**0.8**	**0.8**
RSD	**90.25**	**91.92**	**20.3**	**19.93**	**112.31**	**36.9**	**0.8**	**112.3**
median	2.58	2.21	14.3	32.94	0.13	34.1	99.8	0.3
average + SD	5.49	4.82	17.7	38.92	0.75	48.0	100.1	1.5
average - SD	0.28	0.20	11.8	25.98	-0.04	22.2	98.5	-0.1
minimum	0.45	0.37	12.0	25.75	0.12	22.7	98.4	0.2
maximum	5.63	4.96	17.9	38.66	0.81	48.5	99.8	1.6
range	5.19	4.59	5.9	12.91	0.69	25.8	1.4	1.4

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
054-1	5.24	4.74	9.6	33.56	0.01	32.9	100.0	0.0
054-2	2.31	2.09	9.5	31.24	0.84	37.5	98.3	1.7
054-3	0.41	0.37	10.8	32.33	0.85	35.4	98.3	1.7
average	**2.65**	**2.40**	**10.0**	**32.38**	**0.57**	**35.3**	**98.9**	**1.1**
uncertainty			**1.8**			**5.8**	**2.4**	**2.4**
SD	**2.43**	**2.20**	**0.7**	**1.16**	**0.48**	**2.3**	**1.0**	**1.0**
RSD	**91.74**	**91.90**	**7.3**	**3.58**	**84.38**	**6.6**	**1.0**	**84.4**
median	2.31	2.09	9.6	32.33	0.84	35.4	98.3	1.7
average + SD	5.09	4.60	10.7	33.54	1.05	37.6	99.8	2.1
average - SD	0.22	0.19	9.2	31.22	0.09	32.9	97.9	0.2
minimum	0.41	0.37	9.5	31.24	0.01	32.9	98.3	0.0
maximum	5.24	4.74	10.8	33.56	0.85	37.5	100.0	1.7
range	4.83	4.37	1.3	2.32	0.84	4.6	1.7	1.7

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
054-1	0.08	0.06	28.1	16.66	0.31	33.4	98.8	0.6
054-2	0.10	0.10	0.0	11.30	0.09	54.8	99.7	0.2
054-3	0.08	0.07	7.0	17.64	4.78	29.4	80.9	9.6
average	**0.09**	**0.08**	**11.7**	**15.20**	**1.72**	**39.2**	**93.1**	**3.5**
uncertainty			**36.3**			**33.9**	**26.3**	**13.2**
SD	**0.01**	**0.02**	**14.6**	**3.4**	**2.7**	**13.7**	**10.6**	**5.3**
RSD	**15.81**	**29.03**	**124.9**	**22.5**	**153.6**	**34.9**	**11.4**	**153.6**
median	0.08	0.07	7.0	16.7	0.3	33.4	98.8	0.6
average + SD	0.10	0.10	26.3	18.6	4.4	52.9	103.7	8.8
average - SD	0.07	0.05	-2.9	11.8	-0.9	25.5	82.5	-1.9
minimum	0.08	0.06	0.0	11.3	0.1	29.4	80.9	0.2
maximum	0.10	0.10	28.1	17.6	4.8	54.8	99.7	9.6
range	0.03	0.04	28.1	6.4	4.7	25.4	18.8	9.4

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
054-1	0.08	0.08	6.6	15.47	0.32	38.1	98.7	0.6
054-2	0.11	0.11	-7.5	14.60	0.03	41.6	99.9	0.1
054-3	0.09	0.09	0.9	20.85	4.78	16.6	80.9	9.6
average	**0.09**	**0.09**	**-0.01**	**16.97**	**1.71**	**32.1**	**93.2**	**3.4**
uncertainty			**17.7**			**33.7**	**26.5**	**13.2**
SD	**0.01**	**0.02**	**7.1**	**3.39**	**2.7**	**13.6**	**10.7**	**5.3**
RSD	**13.69**	**20.93**	**-104259.7**	**19.97**	**156.1**	**42.2**	**11.4**	**156.1**
median	0.09	0.09	0.9	15.47	0.3	38.1	98.7	0.6
average + SD	0.10	0.11	7.1	20.36	4.4	45.7	103.8	8.7
average - SD	0.08	0.07	-7.1	13.58	-1.0	18.6	82.5	-1.9
minimum	0.08	0.08	-7.5	14.60	0.0	16.6	80.9	0.1
maximum	0.11	0.11	6.6	20.85	4.8	41.6	99.9	9.6
range	0.02	0.04	14.2	6.26	4.8	25.0	19.0	9.5

SINGLE FILAMENT

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
054-1	0.13	23.15	4.10	0.04	0.02	26.21	2.10
054-2	0.10	23.21	2.93	0.06	0.04	22.84	3.28
054-3	0.09	22.17	2.78	0.05	0.02	22.83	5.22
054-4	0.03	29.98	3.19	0.08	0.03	22.64	1.57
average	**0.09**	**24.63**	**3.25**	**0.06**	**0.03**	**23.63**	**3.04**
SD	**0.04**	**3.60**	**0.59**	**0.02**	**0.01**	**1.72**	**1.61**
RSD	**46.73**	**14.61**	**18.25**	**32.85**	**38.51**	**7.30**	**53.05**
median	0.10	23.18	3.06	0.05	0.02	22.83	2.69
average + SD	0.13	28.23	3.84	0.08	0.04	25.35	4.66
average - SD	0.05	21.03	2.66	0.04	0.02	21.91	1.43
minimum	0.03	22.17	2.78	0.04	0.02	22.64	1.57
maximum	0.13	29.98	4.10	0.08	0.04	26.21	5.22
range	0.10	7.81	1.32	0.04	0.02	3.58	3.64

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
054-1	4.03	3.59	52.4	4.2	10.9	54.1	15.4	53.7	91.8	47.6	95.8
054-2	1.08	0.98	45.7	6.6	9.8	68.6	38.1	53.6	94.1	54.3	93.5
054-3	0.25	0.19	45.7	10.4	21.7	33.5	18.2	55.7	94.4	54.3	89.6
054-4	0.13	0.14	45.3	3.2	-8.7	30.6	78.6	40.0	93.6	54.7	96.9
average	**1.37**	**1.23**	**47.3**	**6.1**	**8.4**	**46.7**	**37.6**	**50.7**	**93.5**	**52.7**	**93.9**
uncertainty			**5.5**	**5.1**	**20.1**	**28.6**	**46.4**	**11.5**	**1.9**	**5.5**	**5.1**
SD	**1.82**	**1.62**	**3.5**	**3.2**	**12.6**	**18.0**	**29.2**	**7.2**	**1.2**	**3.5**	**3.2**
RSD	**132.82**	**132.45**	**7.3**	**53.1**	**150.0**	**38.5**	**77.7**	**14.2**	**1.3**	**6.5**	**3.4**
median	0.66	0.59	45.7	5.4	10.3	43.8	28.1	53.6	93.9	54.3	94.6
average + SD	3.20	2.85	50.7	9.3	21.0	64.7	66.8	57.9	94.7	56.2	97.1
average - SD	-0.45	-0.40	43.8	2.9	-4.2	28.7	8.4	43.6	92.3	49.3	90.7
minimum	0.13	0.14	45.3	3.2	-8.7	30.6	15.4	40.0	91.8	47.6	89.6
maximum	4.03	3.59	52.4	10.4	21.7	68.6	78.6	55.7	94.4	54.7	96.9
range	3.90	3.45	7.2	7.3	30.4	38.0	63.3	15.6	2.7	7.2	7.3

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
054-1	0.08	11.24	0.53	0.06	0.13	7.57	1.67
054-2	0.05	10.40	0.18	0.04	0.07	15.17	1.24
054-3	0.05	11.05	2.53	0.03	0.08	11.13	1.37
average	**0.06**	**10.89**	**1.08**	**0.04**	**0.10**	**11.29**	**1.43**
SD	**0.01**	**0.4**	**1.3**	**0.02**	**0.03**	**3.80**	**0.2**
RSD	**24.86**	**4.1**	**117.3**	**43.82**	**33.74**	**33.68**	**15.5**
median	0.05	11.1	0.5	0.04	0.08	11.13	1.4
average + SD	0.07	11.3	2.3	0.06	0.13	15.09	1.7
average - SD	0.04	10.5	-0.2	0.02	0.06	7.49	1.2
minimum	0.05	10.4	0.2	0.03	0.07	7.57	1.2
maximum	0.08	11.2	2.5	0.06	0.13	15.17	1.7
range	0.03	0.8	2.4	0.04	0.06	7.60	0.4

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
054-1	0.16	0.17	15.1	3.4	-5.5	218.4	175.7	55.0	97.9	69.7	93.3
054-2	0.09	0.06	30.3	2.5	35.7	195.9	150.2	58.4	99.3	39.3	95.0
054-3	0.10	0.09	22.3	2.7	16.8	322.2	156.1	55.8	89.9	55.5	94.5
average	**0.12**	**0.10**	**22.6**	**2.9**	**15.7**	**245.5**	**160.7**	**56.4**	**95.7**	**54.8**	**94.3**
uncertainty			**18.9**	**1.1**	**51.3**	**167.4**	**33.2**	**4.4**	**12.6**	**37.8**	**2.2**
SD	**0.04**	**0.06**	**7.6**	**0.4**	**20.6**	**67.4**	**13.4**	**1.8**	**5.1**	**15.2**	**0.9**
RSD	**33.67**	**57.32**	**33.7**	**15.5**	**131.7**	**27.5**	**8.3**	**3.1**	**5.3**	**27.7**	**0.9**
median	0.10	0.09	22.3	2.7	16.8	218.4	156.1	55.8	97.9	55.5	94.5
average + SD	0.16	0.16	30.2	3.3	36.3	312.9	174.0	58.2	100.7	70.1	95.2
average - SD	0.08	0.04	15.0	2.4	-5.0	178.1	147.3	54.7	90.6	39.6	93.4
minimum	0.09	0.06	15.1	2.5	-5.5	195.9	150.2	55.0	89.9	39.3	93.3
maximum	0.16	0.17	30.3	3.4	35.7	322.2	175.7	58.4	99.3	69.7	95.0
range	0.07	0.12	15.2	0.9	41.2	126.3	25.6	3.4	9.4	30.4	1.7

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
054-1	43.0	44.0	43.5	43.5	95.3	2.3	97.7	1.2	97.7	1.2
054-2	51.0	52.5	51.5	51.5	94.1	2.9	98.0	1.0	98.0	1.0
054-3	50.0	52.0	51.0	50.5	92.0	4.0	96.0	2.0	98.0	1.0
054-4	42.0	44.0	43.0	42.5	90.5	4.8	95.2	2.4	97.6	1.2
054-5	44.0	46.0	45.5	45.0	90.9	4.5	93.2	3.4	95.5	2.3
average					**92.6**	**3.7**	**96.0**	**2.0**	**97.4**	**1.3**
uncertainty					**2.6**	**1.3**	**2.4**	**1.2**	**1.3**	**0.7**
SD					**2.1**	**1.0**	**2.0**	**1.0**	**1.1**	**0.5**
RSD					**2.2**	**28.2**	**2.0**	**49.5**	**1.1**	**40.9**
median					92.0	4.0	96.0	2.0	97.7	1.2
average + SD					94.6	4.8	98.0	3.0	98.4	1.9
average - SD					90.5	2.7	94.1	1.0	96.3	0.8
minimum					90.5	2.3	93.2	1.0	95.5	1.0
maximum					95.3	4.8	98.0	3.4	98.0	2.3
range					4.8	2.4	4.8	2.4	2.5	1.3

58 % elastomultiester – 42 % cotton (sample 088)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
088-1	197.34	174.68	11.5	4.36	1.81	82.6	92.7	3.6
088-2	201.27	179.09	11.0	4.75	1.94	81.0	92.2	3.9
088-3	207.95	184.58	11.2	3.95	1.61	84.2	93.6	3.2
average	202.19	179.45	11.3	4.36	1.79	82.6	92.9	3.6
uncertainty			0.6			4.0	1.7	0.8
SD	5.36	4.96	0.2	0.40	0.17	1.6	0.7	0.3
RSD	2.65	2.76	2.1	9.16	9.30	1.9	0.7	9.3
median	201.27	179.09	11.2	4.36	1.81	82.6	92.7	3.6
average + SD	207.55	184.41	11.5	4.75	1.95	84.2	93.5	3.9
average - SD	196.83	174.49	11.0	3.96	1.62	81.0	92.2	3.2
minimum	197.34	174.68	11.0	3.95	1.61	81.0	92.2	3.2
maximum	207.95	184.58	11.5	4.75	1.94	84.2	93.6	3.9
range	10.60	9.90	0.5	0.80	0.33	3.2	1.3	0.7

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
088-1	180.93	165.74	8.4	0.04	0.38	99.8	98.5	0.8
088-2	185.52	170.21	8.3	2.19	0.83	91.2	96.7	1.7
088-3	192.35	176.18	8.4	1.41	0.78	94.4	96.9	1.6
average	186.27	170.71	8.4	1.21	0.67	95.2	97.3	1.3
uncertainty			0.2			10.8	2.4	1.2
SD	5.75	5.24	0.1	1.09	0.25	4.4	1.0	0.5
RSD	3.08	3.07	1.0	89.79	36.87	4.6	1.0	36.9
median	185.52	170.21	8.4	1.41	0.78	94.4	96.9	1.6
average + SD	192.01	175.95	8.4	2.30	0.91	99.5	98.3	1.8
average - SD	180.52	165.47	8.3	0.12	0.42	90.8	96.4	0.8
minimum	180.93	165.74	8.3	0.04	0.38	91.2	96.7	0.8
maximum	192.35	176.18	8.4	2.19	0.83	99.8	98.5	1.7
range	11.42	10.45	0.2	2.15	0.45	8.6	1.8	0.9

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
088-1	7.80	10.17	7.05	1.22	208.76	10.10	4.74
088-2	74.03	8.24	4.80	4.17	442.73	8.59	3.26
088-3	18.45	6.32	3.32	2.64	288.52	6.16	1.05
088-4	15.75	7.16	3.91	2.35	274.77	6.76	1.08
088-5	22.75	6.38	3.63	2.93	319.02	6.20	1.17
average	**27.76**	**7.65**	**4.55**	**2.66**	**306.76**	**7.56**	**2.26**
SD	**26.44**	**1.61**	**1.51**	**1.06**	**86.02**	**1.73**	**1.67**
RSD	**95.24**	**20.99**	**33.17**	**39.97**	**28.04**	**22.85**	**74.09**
median	18.45	7.16	3.91	2.64	288.52	6.76	1.17
average + SD	54.19	9.26	6.05	3.73	392.78	9.29	3.93
average - SD	1.32	6.05	3.04	1.60	220.74	5.83	0.59
minimum	7.80	6.32	3.32	1.22	208.76	6.16	1.05
maximum	74.03	10.17	7.05	4.17	442.73	10.10	4.74
range	66.23	3.85	3.73	2.95	233.97	3.94	3.69

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
088-1	175.70	159.84	20.2	9.5	9.0	17076.0	2677.3	59.3	71.8	59.6	81.0
088-2	385.09	363.73	17.2	6.5	5.6	10605.2	598.0	67.0	80.8	65.6	87.0
088-3	248.07	230.87	12.3	2.1	6.9	10931.1	1563.8	74.7	86.7	75.4	95.8
088-4	235.55	218.71	13.5	2.2	7.2	11700.7	1744.7	71.3	84.3	72.9	95.7
088-5	276.75	258.75	12.4	2.3	6.5	10902.2	1402.0	74.5	85.5	75.2	95.3
average	**264.23**	**246.38**	**15.1**	**4.5**	**7.0**	**12243.0**	**1597.2**	**69.4**	**81.8**	**69.8**	**91.0**
uncertainty			**4.3**	**4.2**	**1.6**	**3391.7**	**926.1**	**8.0**	**7.5**	**8.6**	**8.3**
SD	**76.95**	**74.87**	**3.5**	**3.4**	**1.3**	**2731.9**	**746.0**	**6.4**	**6.0**	**6.9**	**6.7**
RSD	**29.12**	**30.39**	**22.9**	**74.1**	**18.1**	**22.3**	**46.7**	**9.3**	**7.4**	**9.9**	**7.4**
median	248.07	230.87	13.5	2.3	6.9	10931.1	1563.8	71.3	84.3	72.9	95.3
average + SD	341.18	321.25	18.6	7.9	8.3	14974.9	2343.2	75.8	87.8	76.7	97.7
average - SD	187.28	171.51	11.7	1.2	5.8	9511.1	851.2	63.0	75.8	62.8	84.3
minimum	175.70	159.84	12.3	2.1	5.6	10605.2	598.0	59.3	71.8	59.6	81.0
maximum	385.09	363.73	20.2	9.5	9.0	17076.0	2677.3	74.7	86.7	75.4	95.8
range	209.39	203.90	7.9	7.4	3.5	6470.8	2079.3	15.4	14.9	15.7	14.8

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
088-1	4.23	3.83	9.5	11.26	0.65	55.0	97.4	1.3
088-2	3.59	3.23	10.0	13.74	1.09	45.1	95.6	2.2
088-3	3.26	2.92	10.2	12.11	1.62	51.6	93.5	3.2
average	**3.69**	**3.33**	**9.9**	**12.37**	**1.12**	**50.5**	**95.5**	**2.2**
uncertainty			**0.9**			**12.5**	**4.9**	**2.4**
SD	**0.50**	**0.46**	**0.4**	**1.3**	**0.5**	**5.0**	**2.0**	**1.0**
RSD	**13.42**	**13.82**	**3.6**	**10.2**	**43.7**	**10.0**	**2.1**	**43.7**
median	3.59	3.23	10.0	12.1	1.1	51.6	95.6	2.2
average + SD	4.19	3.79	10.2	13.6	1.6	55.6	97.5	3.2
average - SD	3.20	2.87	9.5	11.1	0.6	45.5	93.6	1.3
minimum	3.26	2.92	9.5	11.3	0.7	45.1	93.5	1.3
maximum	4.23	3.83	10.2	13.7	1.6	55.0	97.4	3.2
range	0.97	0.90	0.7	2.5	1.0	9.9	3.9	2.0

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
088-1	3.96	3.70	6.6	3.77	-	84.9	-	-
088-2	3.36	3.12	7.0	10.97	0.75	56.1	97.0	1.5
088-3	3.02	2.81	7.2	12.42	0.05	50.3	99.8	0.1
average	**3.45**	**3.21**	**6.9**	**9.05**	**0.40**	**63.8**	**98.4**	**0.8**
uncertainty			**0.7**			**46.0**	**17.7**	**8.8**
SD	**0.47**	**0.45**	**0.3**	**4.63**	**0.5**	**18.5**	**2.0**	**1.0**
RSD	**13.76**	**14.09**	**4.3**	**51.19**	**122.7**	**29.1**	**2.0**	**122.7**
median	3.36	3.12	7.0	10.97	0.4	56.1	98.4	0.8
average + SD	3.92	3.66	7.2	13.68	0.9	82.3	100.4	1.8
average - SD	2.97	2.76	6.6	4.42	-0.1	45.3	96.4	-0.2
minimum	3.02	2.81	6.6	3.77	0.1	50.3	97.0	0.1
maximum	3.96	3.70	7.2	12.42	0.8	84.9	99.8	1.5
range	0.94	0.89	0.6	8.65	0.7	34.6	2.8	1.4

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
088-1	0.19	11.67	2.35	0.06	3.68	15.26	0.45
088-2	0.24	7.82	0.67	0.05	4.05	10.79	0.16
088-3	0.86	8.06	0.19	0.08	6.34	12.19	0.37
average	**0.43**	**9.18**	**1.07**	**0.06**	**4.69**	**12.75**	**0.32**
SD	**0.37**	**2.2**	**1.1**	**0.01**	**1.44**	**2.29**	**0.2**
RSD	**86.52**	**23.5**	**106.4**	**23.61**	**30.70**	**17.95**	**46.5**
median	0.24	8.1	0.7	0.06	4.05	12.19	0.4
average + SD	0.80	11.3	2.2	0.08	6.13	15.03	0.5
average - SD	0.06	7.0	-0.1	0.05	3.25	10.46	0.2
minimum	0.19	7.8	0.2	0.05	3.68	10.79	0.2
maximum	0.86	11.7	2.4	0.08	6.34	15.26	0.5
range	0.67	3.9	2.2	0.03	2.66	4.47	0.3

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
088-1	3.19	2.96	30.5	0.9	7.2	5960.2	1898.3	53.3	90.6	38.9	98.2
088-2	3.55	3.32	21.6	0.3	6.5	8327.8	1707.3	68.7	97.3	56.8	99.4
088-3	5.75	5.39	24.4	0.7	6.3	8093.9	737.9	67.8	99.3	51.3	98.5
average	**4.16**	**3.89**	**25.5**	**0.7**	**6.7**	**7460.6**	**1447.8**	**63.3**	**95.7**	**49.0**	**98.7**
uncertainty			**11.4**	**0.7**	**1.2**	**3241.3**	**1545.8**	**21.5**	**11.3**	**22.7**	**1.5**
SD	**1.38**	**1.31**	**4.6**	**0.3**	**0.5**	**1304.7**	**622.2**	**8.6**	**4.5**	**9.2**	**0.6**
RSD	**33.26**	**33.70**	**18.0**	**46.5**	**7.1**	**17.5**	**43.0**	**13.7**	**4.7**	**18.7**	**0.6**
median	3.55	3.32	24.4	0.7	6.5	8093.9	1707.3	67.8	97.3	51.3	98.5
average + SD	5.55	5.20	30.1	1.0	7.1	8765.3	2070.0	71.9	100.3	58.2	99.3
average - SD	2.78	2.58	20.9	0.4	6.2	6156.0	825.6	54.6	91.2	39.9	98.1
minimum	3.19	2.96	21.6	0.3	6.3	5960.2	737.9	53.3	90.6	38.9	98.2
maximum	5.75	5.39	30.5	0.9	7.2	8327.8	1898.3	68.7	99.3	56.8	99.4
range	2.56	2.43	8.9	0.6	0.9	2367.6	1160.4	15.4	8.7	17.9	1.2

42 % elastomultiester – 58 % cotton (sample 056b)

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
056b-1	48.0	52.5	52.0	51.5	81.3	9.4	83.3	8.3	85.4	7.3
056b-2	45.0	50.0	49.5	49.0	77.8	11.1	80.0	10.0	82.2	8.9
056b-3	50.0	53.5	52.5	52.5	86.0	7.0	90.0	5.0	90.0	5.0
056b-4	46.0	50.0	49.0	48.5	82.6	8.7	87.0	6.5	89.1	5.4
056b-5	44.0	47.5	47.0	46.5	84.1	8.0	86.4	6.8	88.6	5.7
056b-6	51.0	54.5	54.0	54.0	86.3	6.9	88.2	5.9	88.2	5.9
average					**83.0**	**8.5**	**85.8**	**7.1**	**87.3**	**6.4**
uncertainty					**3.4**	**1.7**	**3.8**	**1.9**	**3.1**	**1.5**
SD					**3.2**	**1.6**	**3.6**	**1.8**	**2.9**	**1.5**
RSD					**3.9**	**18.9**	**4.2**	**25.4**	**3.3**	**22.9**
median					83.4	8.3	86.7	6.7	88.4	5.8
average + SD					86.2	10.1	89.4	8.9	90.2	7.8
average - SD					79.8	6.9	82.2	5.3	84.4	4.9
minimum					77.8	6.9	80.0	5.0	82.2	5.0
maximum					86.3	11.1	90.0	10.0	90.0	8.9
range					8.5	4.2	10.0	5.0	7.8	3.9

25.9 % elastomultiester – 74.1 % cotton (sample 053)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
053-1	10.18	8.86	13.0	3.52	2.05	85.9	91.8	4.1
053-2	12.03	10.63	11.6	2.70	1.67	89.2	93.3	3.3
053-3	7.59	6.78	10.7	2.76	1.51	89.0	94.0	3.0
average	**9.94**	**8.76**	**11.8**	**2.99**	**1.74**	**88.0**	**93.0**	**3.5**
uncertainty			**2.8**			**4.5**	**2.8**	**1.4**
SD	**2.23**	**1.93**	**1.1**	**0.46**	**0.28**	**1.8**	**1.1**	**0.6**
RSD	**22.43**	**21.99**	**9.7**	**15.32**	**16.21**	**2.1**	**1.2**	**16.2**
median	10.18	8.86	11.6	2.76	1.67	89.0	93.3	3.3
average + SD	12.16	10.69	12.9	3.45	2.02	89.9	94.2	4.1
average - SD	7.71	6.83	10.6	2.53	1.46	86.2	91.9	2.9
minimum	7.59	6.78	10.7	2.70	1.51	85.9	91.8	3.0
maximum	12.03	10.63	13.0	3.52	2.05	89.2	94.0	4.1
range	4.44	3.85	2.3	0.82	0.55	3.3	2.2	1.1

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
053-1	9.20	8.52	7.4	4.02	2.71	83.9	89.2	5.4
053-2	11.00	10.14	7.8	2.43	2.20	90.3	91.2	4.4
053-3	6.98	6.53	6.4	3.20	2.05	87.2	91.8	4.1
average	**9.06**	**8.40**	**7.2**	**3.22**	**2.32**	**87.1**	**90.7**	**4.6**
uncertainty			**1.8**			**7.9**	**3.4**	**1.7**
SD	**2.01**	**1.81**	**0.7**	**0.79**	**0.34**	**3.2**	**1.4**	**0.7**
RSD	**22.23**	**21.52**	**10.1**	**24.68**	**14.83**	**3.7**	**1.5**	**14.8**
median	9.20	8.52	7.4	3.20	2.20	87.2	91.2	4.4
average + SD	11.07	10.21	7.9	4.01	2.66	90.3	92.1	5.3
average - SD	7.05	6.59	6.5	2.42	1.98	84.0	89.4	4.0
minimum	6.98	6.53	6.4	2.43	2.05	83.9	89.2	4.1
maximum	11.00	10.14	7.8	4.02	2.71	90.3	91.8	5.4
range	4.02	3.61	1.4	1.59	0.66	6.4	2.6	1.3

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
053-1	53.0	55.0	54.0	53.5	92.5	3.8	96.2	1.9	98.1	0.9
053-2	50.0	52.0	51.0	50.5	92.0	4.0	96.0	2.0	98.0	1.0
053-3	46.0	48.0	47.0	47.0	91.3	4.3	95.7	2.2	95.7	2.2
053-4	49.0	51.0	50.0	49.5	91.8	4.1	95.9	2.0	98.0	1.0
053-5	49.0	51.0	50.0	49.5	91.8	4.1	95.9	2.0	98.0	1.0
average					**91.9**	**4.1**	**95.9**	**2.0**	**97.5**	**1.2**
uncertainty					**0.5**	**0.3**	**0.3**	**0.1**	**1.3**	**0.7**
SD					**0.4**	**0.2**	**0.2**	**0.1**	**1.1**	**0.5**
RSD					**0.4**	**5.1**	**0.2**	**5.1**	**1.1**	**42.8**
median					91.8	4.1	95.9	2.0	98.0	1.0
average + SD					92.3	4.3	96.2	2.1	98.6	1.8
average - SD					91.5	3.9	95.7	1.9	96.5	0.7
minimum					91.3	3.8	95.7	1.9	95.7	0.9
maximum					92.5	4.3	96.2	2.2	98.1	2.2
range					1.2	0.6	0.6	0.3	2.5	1.2

38 % elastomultiester – 62 % cotton (sample 086b)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
086b-1	108.79	97.55	10.3	-	0.10	-	99.6	0.2
086b-2	100.74	89.79	10.9	-	0.91	-	96.4	1.8
086b-3	103.54	92.38	10.8	-	0.89	-	96.5	1.8
average	**104.36**	**93.24**	**10.7**	**-**	**0.63**	**-**	**97.5**	**1.3**
uncertainty			**0.7**				**4.6**	**2.3**
SD	**4.09**	**3.95**	**0.3**	**-**	**0.46**	**-**	**1.8**	**0.9**
RSD	**3.92**	**4.24**	**2.7**	**-**	**72.83**	**-**	**1.9**	**72.8**
median	103.54	92.38	10.8	-	0.89	-	96.5	1.8
average + SD	108.44	97.19	11.0	-	1.09	-	99.3	2.2
average - SD	100.27	89.29	10.4	-	0.17	-	95.6	0.3
minimum	100.74	89.79	10.3	-	0.10	-	96.4	0.2
maximum	108.79	97.55	10.9	-	0.91	-	99.6	1.8
range	8.05	7.76	0.5	-	0.81	-	3.2	1.6

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
086b-1	100.62	92.99	7.6	-	0.03	-	99.9	0.1
086b-2	92.56	85.13	8.0	-	0.88	-	96.5	1.8
086b-3	95.74	88.11	8.0	-	0.30	-	98.8	0.6
average	**96.31**	**88.74**	**7.9**	**-**	**0.40**	**-**	**98.4**	**0.8**
uncertainty			**0.6**				**4.3**	**2.2**
SD	**4.06**	**3.97**	**0.2**	**-**	**0.43**	**-**	**1.7**	**0.9**
RSD	**4.21**	**4.47**	**3.1**	**-**	**108.34**	**-**	**1.8**	**108.3**
median	95.74	88.11	8.0	-	0.30	-	98.8	0.6
average + SD	100.36	92.71	8.1	-	0.84	-	100.1	1.7
average - SD	92.25	84.78	7.6	-	-0.03	-	96.7	-0.1
minimum	92.56	85.13	7.6	-	0.03	-	96.5	0.1
maximum	100.62	92.99	8.0	-	0.88	-	99.9	1.8
range	8.05	7.86	0.5	-	0.85	-	3.4	1.7

27 % elastomultiester – 73 % cotton (sample 087)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
087-1	82.92	73.29	11.6	-	-	-	-	-
087-2	97.16	86.51	11.0	1.74	4.08	93.1	83.7	8.2
087-3	84.73	75.03	11.5	8.04	7.24	67.9	71.1	14.5
087-4	80.66	71.16	11.8	4.75	6.55	81.0	73.8	13.1
087-5	87.02	76.94	11.6	0.86	1.82	96.6	92.7	3.6
average	**86.50**	**76.59**	**11.5**	**3.8**	**4.92**	**84.6**	**80.3**	**9.8**
uncertainty			**0.4**			**20.7**	**15.7**	**7.9**
SD	**6.40**	**5.94**	**0.3**	**3.3**	**2.47**	**13.0**	**9.9**	**4.9**
RSD	**7.40**	**7.76**	**2.7**	**84.6**	**50.25**	**15.4**	**12.3**	**50.3**
median	84.73	75.03	11.6	3.2	5.32	87.0	78.7	10.6
average + SD	92.90	82.53	11.8	7.1	7.40	97.6	90.2	14.8
average - SD	80.10	70.64	11.2	0.6	2.45	71.6	70.4	4.9
minimum	80.66	71.16	11.0	0.9	1.82	67.9	71.1	3.6
maximum	97.16	86.51	11.8	8.0	7.24	96.6	92.7	14.5
range	16.50	15.35	0.8	7.2	5.42	28.7	21.7	10.8

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
087-1	75.34	69.06	8.3	-	-	-	-	-
087-2	88.96	81.64	8.2	-	2.05	-	91.8	4.1
087-3	77.40	70.82	8.5	5.34	7.80	78.7	68.8	15.6
087-4	73.09	66.86	8.5	3.18	7.25	87.3	71.0	14.5
087-5	79.59	72.88	8.4	0.04	0.91	99.8	96.4	1.8
average	**78.88**	**72.25**	**8.4**	**2.9**	**4.50**	**88.6**	**82.0**	**9.0**
uncertainty			**0.2**			**26.5**	**22.5**	**11.2**
SD	**6.13**	**5.70**	**0.1**	**2.7**	**3.53**	**10.7**	**14.1**	**7.1**
RSD	**7.77**	**7.89**	**1.5**	**93.4**	**78.36**	**12.0**	**17.2**	**78.4**
median	77.40	70.82	8.4	3.2	4.65	87.3	81.4	9.3
average + SD	85.01	77.95	8.5	5.5	8.03	99.2	96.1	16.1
average - SD	72.75	66.55	8.3	0.2	0.97	77.9	67.9	1.9
minimum	73.09	66.86	8.2	0.0	0.91	78.7	68.8	1.8
maximum	88.96	81.64	8.5	5.3	7.80	99.8	96.4	15.6
range	15.87	14.78	0.3	5.3	6.89	21.2	27.6	13.8

YARN

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
087-1	47.0	54.0	53.0	70.2	74.5	12.8	56.0	55.0	61.7	66.0	17.0
087-2	43.0	50.0	49.0	67.4	72.1	14.0	51.5	50.5	60.5	65.5	17.4
087-3	52.0	60.0	59.0	69.2	73.1	13.5	61.5	60.5	63.5	67.3	16.3
087-4	51.0	58.0	57.0	72.6	76.5	11.8	59.0	57.5	68.6	74.5	12.7
087-5	49.0	56.0	55.0	71.4	75.5	12.2	57.0	56.0	67.4	71.4	14.3
average				**70.2**	**74.3**	**12.8**			**64.3**	**68.9**	**15.6**
uncertainty				**2.5**	**2.2**	**1.1**			**4.4**	**4.8**	**2.5**
SD				**2.0**	**1.8**	**0.9**			**3.5**	**3.9**	**2.0**
RSD				**2.8**	**2.4**	**6.9**			**5.5**	**5.6**	**12.8**
median				70.2	74.5	12.8			63.5	67.3	16.3
average + SD				72.1	76.1	13.7			67.9	72.8	17.6
average - SD				68.2	72.6	12.0			60.8	65.1	13.6
minimum				67.4	72.1	11.8			60.5	65.5	12.7
maximum				72.6	76.5	14.0			68.6	74.5	17.4
range				5.1	4.4	2.2			8.2	9.0	4.7

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
087-1	57.0	56.0	57.5	61.7	19.1
087-2	52.5	51.5	55.6	60.5	19.8
087-3	62.5	61.5	61.5	63.5	18.3
087-4	60.0	59.0	64.7	68.6	15.7
087-5	58.0	57.5	63.3	65.3	17.3
average			**60.5**	**63.9**	**18.0**
uncertainty			**4.8**	**4.0**	**2.0**
SD			**3.9**	**3.2**	**1.6**
RSD			**6.4**	**5.0**	**8.9**
median			61.5	63.5	18.3
average + SD			64.4	67.1	19.6
average - SD			56.6	60.7	16.4
minimum			55.6	60.5	15.7
maximum			64.7	68.6	19.8
range			9.1	8.2	4.1

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
087-1	4.99	4.96	4.18	0.99	116.52	7.06	3.34
087-2	4.68	3.51	6.71	0.74	111.51	10.42	5.23
087-3	5.34	5.00	2.77	1.12	121.49	7.84	3.98
087-4	4.61	5.49	7.04	0.81	108.67	8.04	4.01
087-5	5.38	4.06	4.92	1.11	120.45	7.32	4.19
average	**5.00**	**4.61**	**5.12**	**0.95**	**115.73**	**8.14**	**4.15**
SD	**0.36**	**0.80**	**1.78**	**0.17**	**5.56**	**1.34**	**0.69**
RSD	**7.18**	**17.34**	**34.70**	**18.29**	**4.81**	**16.42**	**16.56**
median	4.99	4.96	4.92	0.99	116.52	7.84	4.01
average + SD	5.36	5.40	6.90	1.13	121.29	9.47	4.84
average - SD	4.64	3.81	3.35	0.78	110.17	6.80	3.46
minimum	4.61	3.51	2.77	0.74	108.67	7.06	3.34
maximum	5.38	5.49	7.04	1.12	121.49	10.42	5.23
range	0.77	1.98	4.27	0.39	12.82	3.36	1.90

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
087-1	99.72	92.11	14.1	6.7	7.6	11819.0	2336.3	80.2	83.3	71.7	86.7
087-2	94.56	87.22	20.9	10.5	7.8	15097.7	2385.2	85.9	73.2	58.3	79.1
087-3	103.56	95.89	15.7	8.0	7.4	10807.2	2276.0	80.0	88.9	68.7	84.1
087-4	92.61	85.44	16.1	8.0	7.8	13489.3	2356.2	78.0	71.8	67.8	83.9
087-5	102.55	94.88	14.7	8.4	7.5	10898.8	2238.2	83.7	80.3	70.7	83.2
average	**98.60**	**91.11**	**16.3**	**8.3**	**7.6**	**12422.4**	**2318.4**	**81.6**	**79.5**	**67.4**	**83.4**
uncertainty			**3.3**	**1.7**	**0.2**	**2288.4**	**74.6**	**4.0**	**8.8**	**6.6**	**3.4**
SD	**4.84**	**4.62**	**2.7**	**1.4**	**0.2**	**1843.3**	**60.1**	**3.2**	**7.1**	**5.3**	**2.7**
RSD	**4.91**	**5.07**	**16.4**	**16.6**	**2.1**	**14.8**	**2.6**	**3.9**	**8.9**	**7.9**	**3.3**
median	99.72	92.11	15.7	8.0	7.6	11819.0	2336.3	80.2	80.3	68.7	83.9
average + SD	103.44	95.73	19.0	9.7	7.8	14265.6	2378.5	84.8	86.6	72.8	86.1
average - SD	93.76	86.49	13.6	6.9	7.5	10579.1	2258.3	78.4	72.4	62.1	80.6
minimum	92.61	85.44	14.1	6.7	7.4	10807.2	2238.2	78.0	71.8	58.3	79.1
maximum	103.56	95.89	20.9	10.5	7.8	15097.7	2385.2	85.9	88.9	71.7	86.7
range	10.96	10.45	6.7	3.8	0.4	4290.5	147.0	7.9	17.1	13.4	7.6

YARN

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
087-1	47.0	52.5	51.5	51.0	76.6	11.7	80.9	9.6	83.0	8.5
087-2	48.0	53.0	52.0	51.5	79.2	10.4	83.3	8.3	85.4	7.3
087-3	49.0	53.5	52.5	52.0	81.6	9.2	85.7	7.1	87.8	6.1
087-4	53.0	59.0	58.0	57.5	77.4	11.3	81.1	9.4	83.0	8.5
087-5	46.0	50.5	49.5	49.0	80.4	9.8	84.8	7.6	87.0	6.5
average					**79.0**	**10.5**	**83.2**	**8.4**	**85.2**	**7.4**
uncertainty					**2.6**	**1.3**	**2.7**	**1.3**	**2.7**	**1.4**
SD					**2.1**	**1.0**	**2.2**	**1.1**	**2.2**	**1.1**
RSD					**2.6**	**10.0**	**2.6**	**12.8**	**2.6**	**14.9**
median					79.2	10.4	83.3	8.3	85.4	7.3
average + SD					81.1	11.5	85.3	9.5	87.4	8.5
average - SD					77.0	9.4	81.0	7.3	83.0	6.3
minimum					76.6	9.2	80.9	7.1	83.0	6.1
maximum					81.6	11.7	85.7	9.6	87.8	8.5
range					5.0	2.5	4.9	2.4	4.8	2.4

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
087-1	2.83	2.52	10.7	16.56	1.04	33.8	95.9	2.1
087-2	2.79	2.50	10.2	14.47	1.03	42.1	95.9	2.1
087-3	2.68	2.33	13.3	19.83	1.43	20.7	94.3	2.9
average	**2.77**	**2.45**	**11.4**	**16.95**	**1.17**	**32.2**	**95.3**	**2.3**
uncertainty			**4.1**			**26.9**	**2.3**	**1.1**
SD	**0.08**	**0.11**	**1.7**	**2.7**	**0.2**	**10.8**	**0.9**	**0.5**
RSD	**2.73**	**4.46**	**14.5**	**15.9**	**19.6**	**33.6**	**1.0**	**19.6**
median	2.79	2.50	10.7	16.6	1.0	33.8	95.9	2.1
average + SD	2.84	2.56	13.1	19.7	1.4	43.0	96.3	2.8
average - SD	2.69	2.34	9.8	14.3	0.9	21.4	94.4	1.9
minimum	2.68	2.33	10.2	14.5	1.0	20.7	94.3	2.1
maximum	2.83	2.52	13.3	19.8	1.4	42.1	95.9	2.9
range	0.15	0.20	3.1	5.4	0.4	21.4	1.6	0.8

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
087-1	2.69	2.42	9.9	14.80	1.57	40.8	93.7	3.2
087-2	2.60	2.38	8.5	14.92	0.15	40.3	99.4	0.3
087-3	2.32	2.27	1.8	15.87	2.65	36.5	89.4	5.3
average	**2.54**	**2.36**	**6.7**	**15.20**	**1.46**	**39.2**	**94.2**	**2.9**
uncertainty			**10.7**			**5.8**	**12.5**	**6.2**
SD	**0.19**	**0.08**	**4.3**	**0.58**	**1.3**	**2.3**	**5.0**	**2.5**
RSD	**7.64**	**3.22**	**63.9**	**3.84**	**86.2**	**6.0**	**5.3**	**86.2**
median	2.60	2.38	8.5	14.92	1.6	40.3	93.7	3.2
average + SD	2.73	2.44	11.0	15.78	2.7	41.5	99.2	5.4
average - SD	2.34	2.28	2.4	14.61	0.2	36.9	89.2	0.4
minimum	2.32	2.27	1.8	14.80	0.2	36.5	89.4	0.3
maximum	2.69	2.42	9.9	15.87	2.7	40.8	99.4	5.3
range	0.37	0.15	8.0	1.06	2.5	4.3	10.0	5.0

SINGLE FILAMENT

Elongation based – 3 cycles

50%

Manual method

JRC code	L0 mm	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %	Lc mm	Ld mm	imm rec 2 %	rec 2 %	PD 2 %
087-1	44.0	47.0	45.5	86.4	93.2	3.4	47.0	45.0	86.4	95.5	2.3
087-2	47.0	50.5	48.0	85.1	95.7	2.1	51.0	48.5	83.0	93.6	3.2
087-3	51.0	54.0	52.5	88.2	94.1	2.9	54.0	53.0	88.2	92.2	3.9
087-4	48.0	51.0	49.5	87.5	93.8	3.1	51.5	50.0	85.4	91.7	4.2
087-5	47.0	50.0	48.0	87.2	95.7	2.1	50.5	48.0	85.1	95.7	2.1
average				**86.9**	**94.5**	**2.7**			**85.6**	**93.7**	**3.1**
uncertainty				**1.5**	**1.5**	**0.7**			**2.4**	**2.3**	**1.2**
SD				**1.2**	**1.2**	**0.6**			**1.9**	**1.9**	**0.9**
RSD				**1.4**	**1.2**	**21.4**			**2.2**	**2.0**	**29.6**
median				87.2	94.1	2.9			85.4	93.6	3.2
average + SD				88.1	95.7	3.3			87.5	95.6	4.1
average - SD				85.7	93.3	2.2			83.7	91.9	2.2
minimum				85.1	93.2	2.1			83.0	91.7	2.1
maximum				88.2	95.7	3.4			88.2	95.7	4.2
range				3.1	2.6	1.3			5.3	4.1	2.0

JRC code	Le mm	Lf mm	imm rec 3 %	rec 3 %	PD 3 %
087-1	47.0	45.0	86.4	95.5	2.3
087-2	50.5	48.5	85.1	93.6	3.2
087-3	54.5	53.0	86.3	92.2	3.9
087-4	51.5	50.0	85.4	91.7	4.2
087-5	50.5	48.5	85.1	93.6	3.2
average			**85.7**	**93.3**	**3.3**
uncertainty			**0.8**	**1.8**	**0.9**
SD			**0.6**	**1.5**	**0.7**
RSD			**0.7**	**1.6**	**22.2**
median			85.4	93.6	3.2
average + SD			86.3	94.8	4.1
average - SD			85.0	91.8	2.6
minimum			85.1	91.7	2.3
maximum			86.4	95.5	4.2
range			1.3	3.8	1.9

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
087-1	0.14	15.37	0.15	0.02	3.17	18.03	0.09
087-2	0.10	15.39	3.74	0.03	2.39	16.10	0.26
087-3	0.13	15.71	0.21	0.03	3.09	18.04	0.36
average	**0.12**	**15.49**	**1.37**	**0.03**	**2.88**	**17.39**	**0.24**
SD	**0.03**	**0.2**	**2.1**	**0.00**	**0.43**	**1.12**	**0.1**
RSD	**20.33**	**1.2**	**150.1**	**11.11**	**14.98**	**6.42**	**57.6**
median	0.13	15.4	0.2	0.03	3.09	18.03	0.3
average + SD	0.15	15.7	3.4	0.03	3.31	18.51	0.4
average - SD	0.10	15.3	-0.7	0.02	2.45	16.28	0.1
minimum	0.10	15.4	0.2	0.02	2.39	16.10	0.1
maximum	0.14	15.7	3.7	0.03	3.17	18.04	0.4
range	0.05	0.3	3.6	0.01	0.79	1.94	0.3

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
087-1	2.75	2.55	36.1	0.2	7.4	13714.7	2195.8	38.5	99.4	27.9	99.6
087-2	2.07	1.88	32.2	0.5	8.9	9423.2	2486.4	38.4	85.0	35.6	98.9
087-3	2.64	2.46	36.1	0.7	6.7	10718.8	2331.1	37.2	99.2	27.8	98.5
average	**2.49**	**2.30**	**34.8**	**0.5**	**7.7**	**11285.6**	**2337.8**	**38.0**	**94.5**	**30.4**	**99.0**
uncertainty			**5.5**	**0.7**	**2.8**	**5468.6**	**361.2**	**1.9**	**20.4**	**11.1**	**1.4**
SD	**0.37**	**0.36**	**2.2**	**0.3**	**1.1**	**2201.2**	**145.4**	**0.8**	**8.2**	**4.5**	**0.6**
RSD	**14.71**	**15.66**	**6.4**	**57.6**	**14.4**	**19.5**	**6.2**	**2.0**	**8.7**	**14.7**	**0.6**
median	2.64	2.46	36.1	0.5	7.4	10718.8	2331.1	38.4	99.2	27.9	98.9
average + SD	2.85	2.66	37.0	0.8	8.8	13486.7	2483.2	38.8	102.7	34.9	99.6
average - SD	2.12	1.94	32.6	0.2	6.6	9084.4	2192.4	37.3	86.3	26.0	98.5
minimum	2.07	1.88	32.2	0.2	6.7	9423.2	2195.8	37.2	85.0	27.8	98.5
maximum	2.75	2.55	36.1	0.7	8.9	13714.7	2486.4	38.5	99.4	35.6	99.6
range	0.68	0.66	3.9	0.6	2.2	4291.5	290.6	1.4	14.3	7.8	1.1

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
087-1	50.5	54.0	53.5	53.0	86.1	6.9	88.1	5.9	90.1	5.0
087-2	53.0	54.0	53.5	53.5	96.2	1.9	98.1	0.9	98.1	0.9
087-3	50.0	51.0	50.5	50.5	96.0	2.0	98.0	1.0	98.0	1.0
087-4	44.0	46.5	46.0	45.0	88.6	5.7	90.9	4.5	95.5	2.3
087-5	42.0	43.0	42.5	42.5	95.2	2.4	97.6	1.2	97.6	1.2
average					**92.4**	**3.8**	**94.5**	**2.7**	**95.9**	**2.1**
uncertainty					**5.9**	**2.9**	**5.8**	**2.9**	**4.2**	**2.1**
SD					**4.7**	**2.4**	**4.7**	**2.4**	**3.4**	**1.7**
RSD					**5.1**	**62.5**	**5.0**	**86.4**	**3.5**	**81.9**
median					95.2	2.4	97.6	1.2	97.6	1.2
average + SD					97.1	6.1	99.2	5.1	99.2	3.8
average - SD					87.7	1.4	89.8	0.4	92.5	0.4
minimum					86.1	1.9	88.1	0.9	90.1	0.9
maximum					96.2	6.9	98.1	5.9	98.1	5.0
range					10.1	5.0	10.0	5.0	8.0	4.0

27.4 % elastomultiester – 15.2 % polyester – 57 % cotton (sample 047)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
047-1	114.86	100.58	12.4	6.20	7.89	75.2	68.4	15.8
047-2	70.28	61.47	12.5	11.45	7.95	54.2	68.2	15.9
047-3	129.25	113.59	12.1	4.65	7.78	81.4	68.9	15.6
average	104.79	91.88	12.4	7.4	7.88	70.3	68.5	15.8
uncertainty			0.5			35.4	0.9	0.4
SD	30.75	27.13	0.2	3.6	0.09	14.3	0.4	0.2
RSD	29.34	29.52	1.8	47.9	1.10	20.3	0.5	1.1
median	114.86	100.58	12.4	6.2	7.89	75.2	68.4	15.8
average + SD	135.54	119.01	12.6	11.0	7.96	84.5	68.8	15.9
average - SD	74.05	64.75	12.1	3.9	7.79	56.0	68.2	15.6
minimum	70.28	61.47	12.1	4.7	7.78	54.2	68.2	15.6
maximum	129.25	113.59	12.5	11.5	7.95	81.4	68.9	15.9
range	58.97	52.12	0.4	6.8	0.17	27.2	0.7	0.3

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
047-1	103.75	94.73	8.7	5.35	9.45	78.6	62.2	18.9
047-2	60.73	55.53	8.6	12.08	9.96	51.7	60.2	19.9
047-3	117.42	107.11	8.8	4.08	9.34	83.7	62.7	18.7
average	93.96	85.79	8.7	7.2	9.58	71.3	61.7	19.2
uncertainty			0.3			42.7	3.3	1.6
SD	29.58	26.93	0.1	4.3	0.33	17.2	1.3	0.7
RSD	31.48	31.39	1.2	59.9	3.46	24.1	2.2	3.5
median	103.75	94.73	8.7	5.4	9.45	78.6	62.2	18.9
average + SD	123.55	112.71	8.8	11.5	9.91	88.5	63.0	19.8
average - SD	64.38	58.86	8.6	2.9	9.25	54.1	60.4	18.5
minimum	60.73	55.53	8.6	4.1	9.34	51.7	60.2	18.7
maximum	117.42	107.11	8.8	12.1	9.96	83.7	62.7	19.9
range	56.69	51.58	0.2	8.0	0.62	32.0	2.5	1.2

YARN

Elongation based – 3 cycles

50%

Manual method

JRC code	L0 mm	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %	Lc mm	Ld mm	imm rec 2 %	rec 2 %	PD 2 %
047-1	50.0	55.0	53.5	80.0	86.0	7.0	56.0	54.5	76.0	82.0	9.0
047-2	46.0	51.0	50.0	78.3	82.6	8.7	52.0	51.5	73.9	76.1	12.0
047-3	51.0	56.5	55.5	78.4	82.4	8.8	57.5	56.5	74.5	78.4	10.8
047-4	49.0	54.5	54.0	77.6	79.6	10.2	55.5	54.5	73.5	77.6	11.2
047-5	49.0	54.5	54.0	77.6	79.6	10.2	55.0	54.0	75.5	79.6	10.2
average				**78.4**	**82.0**	**9.0**			**74.7**	**78.7**	**10.6**
uncertainty				**1.2**	**3.3**	**1.6**			**1.3**	**2.8**	**1.4**
SD				**1.0**	**2.7**	**1.3**			**1.1**	**2.2**	**1.1**
RSD				**1.3**	**3.2**	**14.7**			**1.4**	**2.8**	**10.5**
median				78.3	82.4	8.8			74.5	78.4	10.8
average + SD				79.4	84.7	10.3			75.7	81.0	11.7
average - SD				77.4	79.4	7.7			73.6	76.5	9.5
minimum				77.6	79.6	7.0			73.5	76.1	9.0
maximum				80.0	86.0	10.2			76.0	82.0	12.0
range				2.5	6.4	3.2			2.5	5.9	3.0

JRC code	Le mm	Lf mm	imm rec 3 %	rec 3 %	PD 3 %
047-1	56.5	54.5	74.0	82.0	9.0
047-2	52.5	51.5	71.7	76.1	12.0
047-3	58.0	57.0	72.6	76.5	11.8
047-4	56.0	54.5	71.4	77.6	11.2
047-5	55.5	54.0	73.5	79.6	10.2
average			**72.6**	**78.3**	**10.8**
uncertainty			**1.4**	**3.1**	**1.5**
SD			**1.1**	**2.5**	**1.2**
RSD			**1.5**	**3.1**	**11.3**
median			72.6	77.6	11.2
average + SD			73.7	80.8	12.1
average - SD			71.5	75.9	9.6
minimum			71.4	76.1	9.0
maximum			74.0	82.0	12.0
range			2.6	5.9	3.0

YARN

Elongation based – 5 cycles

100%

JRC code	load C1 at 50% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 50% elong gf	load C-5 at 50% elong gf	L5 5th unload mm	L6 6th load mm
047-1	204.52	5.84	0.03	0.87	0.27	15.45	2.29
047-2	232.77	0.05	0.00	0.37	0.05	23.31	10.68
047-3	95.40	11.28	3.84	1.68	0.39	14.79	5.18
047-4	179.81	8.00	0.42	0.75	0.26	20.29	5.34
average	**178.13**	**6.29**	**1.07**	**0.92**	**0.24**	**18.46**	**5.87**
SD	**59.24**	**4.72**	**1.86**	**0.55**	**0.14**	**4.06**	**3.50**
RSD	**33.26**	**75.10**	**173.14**	**60.40**	**58.20**	**21.98**	**59.60**
median	192.16	6.92	0.22	0.81	0.26	17.87	5.26
average + SD	237.37	11.01	2.93	1.47	0.38	22.52	9.37
average - SD	118.88	1.57	-0.78	0.36	0.10	14.40	2.37
minimum	95.40	0.05	0.00	0.37	0.05	14.79	2.29
maximum	232.77	11.28	3.84	1.68	0.39	23.31	10.68
range	137.37	11.23	3.84	1.32	0.34	8.52	8.39

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
047-1	141.04	131.98	30.9	4.6	6.4	30.7	0.1	88.3	100.0	69.1	95.4
047-2	69.71	64.37	46.6	21.4	7.7	14.0	0.0	99.9	100.0	53.4	78.6
047-3	228.94	214.50	29.6	10.4	6.3	23.1	0.4	77.5	92.3	70.4	89.6
047-4	123.17	115.09	40.6	10.7	6.6	34.1	0.1	84.0	99.2	59.4	89.3
average	**140.71**	**131.49**	**36.9**	**11.7**	**6.7**	**25.5**	**0.2**	**87.4**	**97.9**	**63.1**	**88.3**
uncertainty			**12.9**	**11.1**	**1.0**	**14.3**	**0.3**	**15.0**	**5.9**	**12.9**	**11.1**
SD	**66.17**	**62.36**	**8.1**	**7.0**	**0.6**	**9.0**	**0.2**	**9.5**	**3.7**	**8.1**	**7.0**
RSD	**47.02**	**47.42**	**22.0**	**59.6**	**9.2**	**35.2**	**93.3**	**10.8**	**3.8**	**12.9**	**7.9**
median	132.11	123.54	35.7	10.5	6.5	26.9	0.1	86.2	99.6	64.3	89.5
average + SD	206.88	193.84	45.0	18.7	7.4	34.4	0.3	96.9	101.6	71.2	95.3
average - SD	74.55	69.13	28.8	4.7	6.1	16.5	0.0	78.0	94.1	55.0	81.3
minimum	69.71	64.37	29.6	4.6	6.3	14.0	0.0	77.5	92.3	53.4	78.6
maximum	228.94	214.50	46.6	21.4	7.7	34.1	0.4	99.9	100.0	70.4	95.4
range	159.23	150.13	17.0	16.8	1.4	20.2	0.4	22.5	7.7	17.0	16.8

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
047-1	7.71	7.50	5.25	0.72	172.97	7.94	6.90
047-2	8.67	6.48	4.19	0.88	188.58	4.65	2.83
047-3	7.93	6.40	3.73	0.78	181.64	4.35	4.33
047-4	9.58	7.47	3.81	0.84	202.94	6.19	4.24
047-5	9.16	8.93	6.41	0.68	196.31	9.62	6.35
average	**8.61**	**7.36**	**4.68**	**0.78**	**188.49**	**6.55**	**4.93**
SD	**0.80**	**1.02**	**1.14**	**0.08**	**11.81**	**2.23**	**1.67**
RSD	**9.24**	**13.93**	**24.37**	**10.38**	**6.26**	**34.11**	**33.91**
median	8.67	7.47	4.19	0.78	188.58	6.19	4.33
average + SD	9.41	8.38	5.82	0.86	200.30	8.78	6.60
average - SD	7.82	6.33	3.54	0.70	176.68	4.32	3.26
minimum	7.71	6.40	3.73	0.68	172.97	4.35	2.83
maximum	9.58	8.93	6.41	0.88	202.94	9.62	6.90
range	1.87	2.53	2.67	0.20	29.96	5.27	4.08

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
047-1	145.49	132.86	15.9	13.8	8.7	23944.8	2243.1	70.0	79.0	68.2	72.4
047-2	158.58	145.16	9.3	5.7	8.5	21382.8	2174.7	74.1	83.3	81.4	88.7
047-3	152.98	139.86	8.7	8.7	8.6	23248.8	2291.4	74.4	85.1	82.6	82.7
047-4	170.68	156.43	12.4	8.5	8.4	24153.6	2117.8	70.1	84.8	75.3	83.1
047-5	165.18	150.98	19.2	12.7	8.6	28660.9	2142.2	64.3	74.4	61.5	74.6
average	**158.58**	**145.06**	**13.1**	**9.9**	**8.5**	**24278.2**	**2193.8**	**70.6**	**81.3**	**73.8**	**80.3**
uncertainty			**5.5**	**4.1**	**0.2**	**3330.0**	**89.5**	**5.1**	**5.7**	**11.1**	**8.3**
SD	**9.91**	**9.22**	**4.5**	**3.3**	**0.1**	**2682.3**	**72.1**	**4.1**	**4.6**	**8.9**	**6.7**
RSD	**6.25**	**6.36**	**34.1**	**33.9**	**1.5**	**11.1**	**3.3**	**5.8**	**5.6**	**12.1**	**8.3**
median	158.58	145.16	12.4	8.7	8.6	23944.8	2174.7	70.1	83.3	75.3	82.7
average + SD	168.49	154.28	17.6	13.2	8.7	26960.4	2265.9	74.7	85.9	82.7	87.0
average - SD	148.68	135.84	8.6	6.5	8.4	21595.9	2121.8	66.5	76.7	64.9	73.6
minimum	145.49	132.86	8.7	5.7	8.4	21382.8	2117.8	64.3	74.4	61.5	72.4
maximum	170.68	156.43	19.2	13.8	8.7	28660.9	2291.4	74.4	85.1	82.6	88.7
range	25.19	23.57	10.6	8.2	0.3	7278.1	173.6	10.1	10.7	21.1	16.3

YARN

Elongation based – 5 cycles

50%

Manual method

JRC code	L0 mm	La imm mm	Lb 30 sec mm	Lc 1 min mm	imm rec 5 %	imm PD5 %	rec 5 30 sec %	PD5 30 sec %	rec 5 1 min %	PD 5 1 min %
047-1	47.0	50.5	49.0	48.5	85.1	7.4	91.5	4.3	93.6	3.2
047-2	48.0	51.5	51.0	50.5	85.4	7.3	87.5	6.3	89.6	5.2
047-3	51.0	55.0	54.0	53.0	84.3	7.8	88.2	5.9	90.2	3.9
047-4	48.0	52.0	51.5	51.0	83.3	8.3	95.4	7.3	87.5	6.3
047-5	49.0	53.5	52.0	51.0	81.6	9.2	87.8	6.1	91.8	4.1
average					**84.0**	**8.0**	**90.1**	**6.0**	**90.5**	**4.5**
uncertainty					**1.9**	**1.0**	**4.2**	**1.4**	**2.9**	**1.5**
SD					**1.5**	**0.8**	**3.4**	**1.1**	**2.3**	**1.2**
RSD					**1.8**	**9.5**	**3.8**	**18.4**	**2.6**	**26.5**
median					84.3	7.8	88.2	6.1	90.2	4.1
average + SD					85.5	8.8	93.5	7.1	92.9	5.7
average - SD					82.4	7.3	86.7	4.9	88.2	3.3
minimum					81.6	7.3	87.5	4.3	87.5	3.2
maximum					85.4	9.2	95.4	7.3	93.6	6.3
range					3.8	1.9	7.9	3.0	6.1	3.1

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
047-1	3.29	2.80	14.8	14.25	1.07	43.0	95.7	2.2
047-2	2.77	2.48	10.6	15.70	0.26	37.2	99.0	0.5
047-3	2.81	2.54	9.5	16.30	1.69	34.8	93.2	3.4
average	**2.96**	**2.61**	**11.7**	**15.42**	**1.01**	**38.3**	**96.0**	**2.0**
uncertainty			**6.9**			**10.5**	**7.2**	**3.6**
SD	**0.29**	**0.17**	**2.8**	**1.1**	**0.7**	**4.2**	**2.9**	**1.4**
RSD	**9.78**	**6.60**	**24.0**	**6.9**	**71.4**	**11.0**	**3.0**	**71.4**
median	2.81	2.54	10.6	15.7	1.1	37.2	95.7	2.2
average + SD	3.25	2.78	14.5	16.5	1.7	42.6	98.9	3.5
average - SD	2.67	2.43	8.9	14.4	0.3	34.1	93.1	0.6
minimum	2.77	2.48	9.5	14.3	0.3	34.8	93.2	0.5
maximum	3.29	2.80	14.8	16.3	1.7	43.0	99.0	3.4
range	0.52	0.32	5.3	2.1	1.4	8.2	5.7	2.9

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
047-1	2.91	2.69	7.5	10.31	0.44	58.8	98.2	0.9
047-2	2.56	2.33	8.7	18.84	0.29	24.6	98.8	0.6
047-3	2.55	2.43	4.7	16.38	0.26	34.5	99.0	0.5
average	**2.67**	**2.49**	**7.0**	**15.18**	**0.33**	**39.3**	**98.7**	**0.7**
uncertainty			**5.0**			**43.7**	**1.0**	**0.5**
SD	**0.20**	**0.18**	**2.0**	**4.39**	**0.1**	**17.6**	**0.4**	**0.2**
RSD	**7.61**	**7.39**	**28.8**	**28.94**	**30.2**	**44.7**	**0.4**	**30.2**
median	2.56	2.43	7.5	16.38	0.3	34.5	98.8	0.6
average + SD	2.88	2.67	9.0	19.57	0.4	56.9	99.1	0.9
average - SD	2.47	2.30	5.0	10.79	0.2	21.7	98.3	0.5
minimum	2.55	2.33	4.7	10.31	0.3	24.6	98.2	0.5
maximum	2.91	2.69	8.7	18.84	0.4	58.8	99.0	0.9
range	0.35	0.36	3.9	8.54	0.2	34.1	0.8	0.4

SINGLE FILAMENT

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
047-1	42.0	44.0	43.0	90.5	95.2	2.4	44.0	43.0	90.5	95.2	2.4
047-2	48.0	51.0	50.0	87.5	91.7	4.2	51.0	49.5	87.5	93.8	3.1
047-3	55.0	59.5	58.5	83.6	87.3	6.4	59.5	58.5	83.6	87.3	6.4
047-4	42.0	45.0	43.5	85.7	92.9	3.6	45.0	44.0	85.7	90.5	4.8
047-5	52.0	54.5	53.5	90.4	94.2	2.9	55.0	54.0	88.5	92.3	3.8
average				**87.5**	**92.3**	**3.9**			**87.2**	**91.8**	**4.1**
uncertainty				**3.8**	**3.8**	**1.9**			**3.2**	**3.8**	**1.9**
SD				**3.0**	**3.1**	**1.5**			**2.6**	**3.1**	**1.5**
RSD				**3.4**	**3.4**	**40.0**			**3.0**	**3.4**	**37.7**
median				87.5	92.9	3.6			87.5	92.3	3.8
average + SD				90.5	95.4	5.4			89.8	94.9	5.6
average - SD				84.6	89.2	2.3			84.5	88.7	2.6
minimum				83.6	87.3	2.4			83.6	87.3	2.4
maximum				90.5	95.2	6.4			90.5	95.2	6.4
range				6.8	8.0	4.0			6.8	8.0	4.0

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
047-1	44.5	43.5	88.1	92.9	3.6
047-2	51.5	50.5	85.4	89.6	5.2
047-3	60.0	58.5	81.8	87.3	6.4
047-4	45.5	44.0	83.3	90.5	4.8
047-5	55.0	54.0	88.5	92.3	3.8
average			**85.4**	**90.5**	**4.8**
uncertainty			**3.6**	**2.8**	**1.4**
SD			**2.9**	**2.2**	**1.1**
RSD			**3.4**	**2.5**	**23.6**
median			85.4	90.5	4.8
average + SD			88.3	92.7	5.9
average - SD			82.5	88.3	3.6
minimum			81.8	87.3	3.6
maximum			88.5	92.9	6.4
range			6.6	5.6	2.8

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
047-1	0.30	1.28	-	0.10	3.45	1.42	0.09
047-2	0.22	4.13	0.19	0.12	3.29	2.81	0.01
047-3	0.33	3.76	1.10	0.11	3.86	3.38	-
047-4	0.19	3.06	1.22	0.09	2.83	1.42	0.02
average	**0.26**	**3.06**	**0.84**	**0.11**	**3.36**	**2.26**	**0.04**
SD	**0.07**	**1.3**	**0.6**	**0.01**	**0.43**	**1.00**	**0.0**
RSD	**26.53**	**41.4**	**67.0**	**11.66**	**12.70**	**44.14**	**117.8**
median	0.26	3.4	1.1	0.11	3.37	2.12	0.0
average + SD	0.33	4.3	1.4	0.12	3.78	3.25	0.1
average - SD	0.19	1.8	0.3	0.09	2.93	1.26	0.0
minimum	0.19	1.3	0.2	0.09	2.83	1.42	0.0
maximum	0.33	4.1	1.2	0.12	3.86	3.38	0.1
range	0.15	2.9	1.0	0.03	1.03	1.96	0.1

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
047-1	2.98	2.77	2.8	0.2	6.8	3395.4	1156.2	94.9	-	94.3	99.6
047-2	2.87	2.63	5.6	0.0	8.1	2797.0	1497.5	83.5	99.2	88.7	100.0
047-3	3.38	3.12	6.8	-	7.6	3374.4	1153.7	85.0	95.6	86.5	-
047-4	2.41	2.19	2.8	0.0	9.0	3118.7	1525.8	87.8	95.1	94.3	99.9
average	**2.91**	**2.68**	**4.5**	**0.1**	**7.9**	**3171.4**	**1333.3**	**87.8**	**96.7**	**91.0**	**99.8**
uncertainty			**3.2**	**0.2**	**1.5**	**444.7**	**328.2**	**8.1**	**5.6**	**6.3**	**0.4**
SD	**0.40**	**0.39**	**2.0**	**0.1**	**0.9**	**279.5**	**206.3**	**5.1**	**2.2**	**4.0**	**0.2**
RSD	**13.75**	**14.41**	**44.1**	**117.8**	**12.0**	**8.8**	**15.5**	**5.8**	**2.3**	**4.4**	**0.2**
median	2.92	2.70	4.2	0.0	7.8	3246.5	1326.8	86.4	95.6	91.5	99.9
average + SD	3.31	3.07	6.5	0.2	8.8	3450.8	1539.5	92.8	98.9	95.0	100.0
average - SD	2.51	2.29	2.5	0.0	6.9	2891.9	1127.0	82.7	94.4	87.0	99.7
minimum	2.41	2.19	2.8	0.0	6.8	2797.0	1153.7	83.5	95.1	86.5	99.6
maximum	3.38	3.12	6.8	0.2	9.0	3395.4	1525.8	94.9	99.2	94.3	100.0
range	0.97	0.93	3.9	0.2	2.2	598.4	372.1	11.4	4.1	7.9	0.3

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0 mm	La imm mm	Lb 30 sec mm	Lc 1 min mm	imm rec 5 %	imm PD5 %	rec 5 30 sec %	PD5 30 sec %	rec 5 1 min %	PD 5 1 min %
047-1	49.0	51.0	50.0	50.0	91.8	4.1	95.9	2.0	95.9	2.0
047-2	47.0	49.0	48.0	47.5	91.5	4.3	95.7	2.1	97.9	1.1
047-3	42.0	44.0	43.0	42.5	90.5	4.8	95.2	2.4	97.6	1.2
047-4	49.0	51.0	49.5	49.5	91.8	4.1	98.0	1.0	98.0	1.0
047-5	47.0	49.0	48.0	48.0	91.5	4.3	95.7	2.1	95.7	2.1
average					**91.4**	**4.3**	**96.1**	**1.9**	**97.0**	**1.5**
uncertainty					**0.7**	**0.3**	**1.4**	**0.7**	**1.4**	**0.7**
SD					**0.5**	**0.3**	**1.1**	**0.5**	**1.1**	**0.5**
RSD					**0.6**	**6.5**	**1.1**	**27.3**	**1.2**	**36.8**
median					91.5	4.3	95.7	2.1	97.6	1.2
average + SD					92.0	4.6	97.2	2.5	98.1	2.0
average - SD					90.9	4.0	95.0	1.4	95.9	0.9
minimum					90.5	4.1	95.2	1.0	95.7	1.0
maximum					91.8	4.8	98.0	2.4	98.0	2.1
range					1.3	0.7	2.8	1.4	2.3	1.1

20.5 % elastomultiester – 22.5 % polyester – 57 % cotton (sample 046)

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
046-1	51.0	53.0	52.5	51.5	92.2	3.9	94.1	2.9	98.0	1.0
046-2	44.0	46.5	46.0	45.5	88.6	5.7	90.9	4.5	93.2	3.4
046-3	50.0	53.5	53.0	52.0	86.0	7.0	88.0	6.0	92.0	4.0
046-4	46.0	48.0	47.5	47.0	91.3	4.3	93.5	3.3	95.7	2.2
046-5	50.0	52.0	51.0	50.5	92.0	4.0	96.0	2.0	98.0	1.0
average					**90.0**	**5.0**	**92.5**	**3.7**	**95.4**	**2.3**
uncertainty					**3.3**	**1.6**	**3.9**	**1.9**	**3.4**	**1.7**
SD					**2.7**	**1.3**	**3.1**	**1.6**	**2.8**	**1.4**
RSD					**2.9**	**26.6**	**3.4**	**41.4**	**2.9**	**59.5**
median					91.3	4.3	93.5	3.3	95.7	2.2
average + SD					92.7	6.3	95.6	5.3	98.1	3.7
average - SD					87.4	3.7	89.4	2.2	92.6	0.9
minimum					86.0	3.9	88.0	2.0	92.0	1.0
maximum					92.2	7.0	96.0	6.0	98.0	4.0
range					6.2	3.1	8.0	4.0	6.0	3.0

36 % elastomultiester – 64 % (polyester – viscose) (sample 055b)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
055b-1	14.70	12.88	12.4	1.20	0.96	95.2	96.2	1.9
055b-2	8.20	7.24	11.7	1.13	0.91	95.5	96.4	1.8
055b-3	17.91	15.64	12.7	1.59	1.39	93.6	94.4	2.8
average	13.60	11.92	12.3	1.3	1.09	94.8	95.7	2.2
uncertainty			1.2			2.5	2.6	1.3
SD	4.95	4.28	0.5	0.3	0.26	1.0	1.1	0.5
RSD	36.38	35.93	4.0	18.9	24.33	1.0	1.1	24.3
median	14.70	12.88	12.4	1.2	0.96	95.2	96.2	1.9
average + SD	18.55	16.20	12.8	1.6	1.35	95.8	96.7	2.7
average - SD	8.65	7.64	11.8	1.1	0.82	93.8	94.6	1.7
minimum	8.20	7.24	11.7	1.1	0.91	93.6	94.4	1.8
maximum	17.91	15.64	12.7	1.6	1.39	95.5	96.4	2.8
range	9.71	8.40	1.0	0.5	0.48	1.8	1.9	1.0

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
055b-1	12.81	11.73	8.4	1.11	0.98	95.6	96.1	2.0
055b-2	7.33	6.74	8.1	1.14	0.84	95.4	96.6	1.7
055b-3	15.93	14.62	8.3	1.11	1.05	95.6	95.8	2.1
average	12.02	11.03	8.3	1.1	0.96	95.5	96.2	1.9
uncertainty			0.4			0.2	1.0	0.5
SD	4.35	3.99	0.2	0.0	0.11	0.1	0.4	0.2
RSD	36.22	36.14	2.1	1.7	10.98	0.1	0.4	11.0
median	12.81	11.73	8.3	1.1	0.98	95.6	96.1	2.0
average + SD	16.38	15.01	8.4	1.1	1.06	95.6	96.6	2.1
average - SD	7.67	7.04	8.1	1.1	0.85	95.5	95.8	1.7
minimum	7.33	6.74	8.1	1.1	0.84	95.4	95.8	1.7
maximum	15.93	14.62	8.4	1.1	1.05	95.6	96.6	2.1
range	8.60	7.88	0.3	0.0	0.21	0.1	0.8	0.4

YARN

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
055b-1	46.0	51.0	50.0	78.3	82.6	8.7	51.5	51.0	76.1	78.3	10.9
055b-2	47.0	51.5	50.0	80.9	87.2	6.4	52.5	51.0	76.6	83.0	8.5
055b-3	52.0	57.0	56.5	80.8	82.7	8.7	58.0	57.5	76.9	78.9	10.6
055b-4	46.0	51.0	50.0	78.3	82.6	8.7	51.5	51.0	76.1	78.3	10.9
055b-5	48.0	53.0	52.0	79.2	83.3	8.3	54.0	53.5	75.0	77.1	11.5
average				**79.5**	**83.7**	**8.2**			**76.1**	**79.1**	**10.5**
uncertainty				**1.6**	**2.5**	**1.2**			**0.9**	**2.8**	**1.4**
SD				**1.3**	**2.0**	**1.0**			**0.7**	**2.3**	**1.1**
RSD				**1.6**	**2.4**	**12.3**			**1.0**	**2.9**	**10.8**
median				79.2	82.7	8.7			76.1	78.3	10.9
average + SD				80.7	85.7	9.2			76.9	81.4	11.6
average - SD				78.2	81.7	7.2			75.4	76.8	9.3
minimum				78.3	82.6	6.4			75.0	77.1	8.5
maximum				80.9	87.2	8.7			76.9	83.0	11.5
range				2.6	4.6	2.3			1.9	5.9	2.9

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
055b-1	51.5	50.5	76.1	80.4	9.8
055b-2	52.5	51.5	76.6	80.9	9.6
055b-3	58.5	57.5	75.0	78.9	10.6
055b-4	51.5	50.5	76.1	80.4	9.8
055b-5	54.5	53.0	72.9	79.2	10.4
average			**75.3**	**79.9**	**10.0**
uncertainty			**1.8**	**1.1**	**0.5**
SD			**1.5**	**0.9**	**0.4**
RSD			**2.0**	**1.1**	**4.4**
median			76.1	80.4	9.8
average + SD			76.8	80.8	10.5
average - SD			73.9	79.1	9.6
minimum			72.9	78.9	9.6
maximum			76.6	80.9	10.6
range			3.7	2.0	1.0

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
055b-1	2.61	4.28	3.08	1.53	15.94	5.63	3.52
055b-2	2.70	3.90	2.96	1.61	26.00	5.97	3.34
055b-3	3.17	3.13	2.56	1.99	34.70	5.10	3.25
055b-4	2.40	5.26	3.71	1.42	16.01	6.90	4.00
055b-5	3.11	3.55	3.06	1.77	37.18	5.82	3.19
average	**2.80**	**4.03**	**3.07**	**1.66**	**25.97**	**5.89**	**3.46**
SD	**0.33**	**0.81**	**0.41**	**0.23**	**10.02**	**0.66**	**0.33**
RSD	**11.88**	**20.12**	**13.45**	**13.57**	**38.60**	**11.15**	**9.47**
median	2.70	3.90	3.06	1.61	26.00	5.82	3.34
average + SD	3.13	4.84	3.49	1.89	35.99	6.54	3.79
average - SD	2.47	3.22	2.66	1.44	15.94	5.23	3.13
minimum	2.40	3.13	2.56	1.42	15.94	5.10	3.19
maximum	3.17	5.26	3.71	1.99	37.18	6.90	4.00
range	0.77	2.13	1.15	0.58	21.24	1.80	0.81

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
055b-1	15.20	13.79	11.3	7.1	9.3	1043.7	610.3	82.9	87.7	77.5	85.9
055b-2	23.69	21.51	12.0	6.7	9.2	1619.5	963.5	84.4	88.2	76.1	86.6
055b-3	30.69	28.02	10.2	6.5	8.7	1742.0	1093.6	87.5	89.8	79.6	87.0
055b-4	15.20	13.77	13.8	8.0	9.4	1131.2	667.4	79.0	85.2	72.4	84.0
055b-5	32.79	29.71	11.7	6.4	9.4	2097.1	1195.8	85.8	87.8	76.7	87.2
average	**23.51**	**21.36**	**11.8**	**6.9**	**9.2**	**1526.7**	**906.1**	**83.9**	**87.7**	**76.5**	**86.2**
uncertainty			**1.6**	**0.8**	**0.4**	**544.7**	**320.7**	**4.0**	**2.1**	**3.3**	**1.6**
SD	**8.30**	**7.57**	**1.3**	**0.7**	**0.3**	**438.7**	**258.3**	**3.2**	**1.7**	**2.6**	**1.3**
RSD	**35.32**	**35.43**	**11.2**	**9.5**	**3.2**	**28.7**	**28.5**	**3.9**	**1.9**	**3.4**	**1.5**
median	23.69	21.51	11.7	6.7	9.3	1619.5	963.5	84.4	87.8	76.7	86.6
average + SD	31.82	28.93	13.1	7.6	9.5	1965.4	1164.4	87.1	89.4	79.1	87.5
average - SD	15.21	13.79	10.5	6.3	8.9	1087.9	647.8	80.7	86.1	73.8	84.8
minimum	15.20	13.77	10.2	6.4	8.7	1043.7	610.3	79.0	85.2	72.4	84.0
maximum	32.79	29.71	13.8	8.0	9.4	2097.1	1195.8	87.5	89.8	79.6	87.2
range	17.59	15.94	3.6	1.6	0.7	1053.4	585.5	8.5	4.6	7.2	3.2

YARN

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La imm	Lb 30 sec	Lc 1 min	imm rec 5	imm PD5	rec 5 30 sec	PD5 30 sec	rec 5 1 min	PD 5 1 min
	mm	mm	mm	mm	%	%	%	%	%	%
055b-1	47.0	49.5	49.0	48.5	89.4	5.3	91.5	4.3	93.6	3.2
055b-2	44.0	46.5	46.0	45.5	88.6	5.7	90.9	4.5	93.2	3.4
055b-3	48.0	51.0	50.5	49.5	87.5	6.3	89.6	5.2	93.8	3.1
055b-4	49.0	52.0	51.0	50.5	87.8	6.1	91.8	4.1	93.9	3.1
055b-5	48.0	51.0	50.0	49.0	87.5	6.3	91.7	4.2	95.8	2.1
average					**88.2**	**5.9**	**91.1**	**4.5**	**94.1**	**3.0**
uncertainty					**1.0**	**0.5**	**1.1**	**0.6**	**1.3**	**0.6**
SD					**0.8**	**0.4**	**0.9**	**0.5**	**1.0**	**0.5**
RSD					**0.9**	**6.9**	**1.0**	**10.3**	**1.1**	**17.3**
median					87.8	6.1	91.5	4.3	93.8	3.1
average + SD					89.0	6.3	92.0	4.9	95.1	3.5
average - SD					87.3	5.5	90.2	4.0	93.0	2.5
minimum					87.5	5.3	89.6	4.1	93.2	2.1
maximum					89.4	6.3	91.8	5.2	95.8	3.4
range					1.9	0.9	2.3	1.1	2.6	1.3

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
055b-1	0.81	0.72	10.8	18.46	0.43	26.2	98.3	0.9
055b-2	0.03	0.07	-121.6	21.15	1.68	15.4	93.3	3.4
055b-3	0.24	0.21	12.2	18.57	0.17	25.7	99.3	0.3
average	**0.36**	**0.34**	**-32.9**	**19.39**	**0.76**	**22.4**	**97.0**	**1.5**
uncertainty			**190.9**			**15.1**	**8.0**	**4.0**
SD	**0.40**	**0.34**	**76.8**	**1.5**	**0.8**	**6.1**	**3.2**	**1.6**
RSD	**111.78**	**102.13**	**-233.9**	**7.9**	**106.3**	**27.2**	**3.3**	**106.3**
median	0.24	0.21	10.8	18.6	0.4	25.7	98.3	0.9
average + SD	0.77	0.68	44.0	20.9	1.6	28.5	100.2	3.1
average - SD	-0.04	-0.01	-109.7	17.9	-0.1	16.3	93.7	-0.1
minimum	0.03	0.07	-121.6	18.5	0.2	15.4	93.3	0.3
maximum	0.81	0.72	12.2	21.2	1.7	26.2	99.3	3.4
range	0.78	0.65	133.8	2.7	1.5	10.8	6.0	3.0

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
055b-1	0.84	0.65	22.7	21.44	1.65	14.3	93.4	3.3
055b-2	0.13	0.05	63.6	21.14	1.97	15.4	92.1	4.0
055b-3	0.24	0.21	13.5	12.22	1.37	51.1	94.5	2.7
average	**0.41**	**0.30**	**33.3**	**18.27**	**1.66**	**26.9**	**93.4**	**3.3**
uncertainty			**66.2**			**52.0**	**3.0**	**1.5**
SD	**0.38**	**0.31**	**26.7**	**5.23**	**0.3**	**20.9**	**1.2**	**0.6**
RSD	**94.70**	**103.51**	**80.1**	**28.66**	**18.2**	**77.8**	**1.3**	**18.2**
median	0.24	0.21	22.7	21.14	1.7	15.4	93.4	3.3
average + SD	0.79	0.62	59.9	23.50	2.0	47.9	94.6	3.9
average - SD	0.02	-0.01	6.6	13.03	1.4	6.0	92.1	2.7
minimum	0.13	0.05	13.5	12.22	1.4	14.3	92.1	2.7
maximum	0.84	0.65	63.6	21.44	2.0	51.1	94.5	4.0
range	0.71	0.60	50.1	9.21	0.6	36.8	2.4	1.2

SINGLE FILAMENT

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
055b-1	37.0	40.0	38.5	83.8	91.9	4.1	40.5	39.0	81.1	89.2	5.4
055b-2	46.0	50.0	49.0	82.6	87.0	6.5	51.0	50.0	78.3	82.6	8.7
055b-3	48.0	52.5	51.0	81.3	87.5	6.3	53.0	51.5	79.2	85.4	7.3
055b-4	42.0	46.0	45.0	81.0	85.7	7.1	47.0	45.5	76.2	83.3	8.3
055b-5	46.0	49.5	48.5	84.8	89.1	5.4	50.5	49.5	80.4	84.8	7.6
average				**82.7**	**88.2**	**5.9**			**79.0**	**85.1**	**7.5**
uncertainty				**3.0**	**3.0**	**1.5**			**2.4**	**3.2**	**1.6**
SD				**1.6**	**2.4**	**1.2**			**1.9**	**2.6**	**1.3**
RSD				**2.0**	**2.7**	**20.3**			**2.4**	**3.0**	**17.2**
median				82.6	87.5	6.3			79.2	84.8	7.6
average + SD				84.3	90.6	7.1			81.0	87.6	8.7
average - SD				81.1	85.9	4.7			77.1	82.5	6.2
minimum				81.0	85.7	4.1			76.2	82.6	5.4
maximum				84.8	91.9	7.1			81.1	89.2	8.7
range				3.8	6.2	3.1			4.9	6.6	3.3

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
055b-1	41.0	39.0	78.4	89.2	5.4
055b-2	52.0	49.5	73.9	84.8	7.6
055b-3	53.5	52.0	77.1	83.3	8.3
055b-4	47.0	45.5	76.2	83.3	8.3
055b-5	51.5	50.0	76.1	82.6	8.7
average			**76.3**	**84.6**	**7.7**
uncertainty			**2.0**	**3.3**	**1.7**
SD			**1.6**	**2.7**	**1.3**
RSD			**2.1**	**3.1**	**17.3**
median			76.2	83.3	8.3
average + SD			78.0	87.3	9.0
average - SD			74.7	82.0	6.3
minimum			73.9	82.6	5.4
maximum			78.4	89.2	8.7
range			4.5	6.6	3.3

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
055b-1	0.02	21.15	0.07	0.00	0.03	24.81	1.40
055b-2	0.04	24.81	2.86	0.02	0.02	24.85	0.17
055b-3	0.02	23.89	0.03	-0.01	0.02	24.82	0.11
average	**0.02**	**23.28**	**0.99**	**0.00**	**0.02**	**24.83**	**0.56**
SD	**0.01**	**1.9**	**1.6**	**0.02**	**0.00**	**0.02**	**0.7**
RSD	**37.24**	**8.2**	**164.2**	**414.93**	**16.77**	**0.09**	**130.6**
median	0.02	23.9	0.1	0.00	0.02	24.82	0.2
average + SD	0.03	25.2	2.6	0.02	0.03	24.85	1.3
average - SD	0.02	21.4	-0.6	-0.01	0.02	24.81	-0.2
minimum	0.02	21.2	0.0	-0.01	0.02	24.81	0.1
maximum	0.04	24.8	2.9	0.02	0.03	24.85	1.4
range	0.02	3.7	2.8	0.03	0.01	0.04	1.3

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
055b-1	0.03	0.03	49.6	2.8	1.3	1367.7	166.1	15.4	99.7	0.8	94.4
055b-2	0.01	0.00	49.7	0.3	64.3	108.0	65.0	0.8	88.5	0.6	99.3
055b-3	0.05	0.03	49.7	0.2	50.6	-184.7	96.5	4.4	99.9	0.7	99.6
average	**0.03**	**0.02**	**49.7**	**1.1**	**38.7**	**430.4**	**109.2**	**6.9**	**96.0**	**0.7**	**97.8**
uncertainty			**0.1**	**3.6**	**82.2**	**2049.3**	**128.5**	**18.9**	**16.1**	**0.2**	**7.3**
SD	**0.02**	**0.01**	**0.0**	**1.5**	**33.1**	**824.9**	**51.7**	**7.6**	**6.5**	**0.1**	**2.9**
RSD	**64.68**	**68.84**	**0.1**	**130.6**	**85.5**	**191.7**	**47.4**	**110.8**	**6.8**	**12.5**	**3.0**
median	0.03	0.03	49.7	0.3	50.6	108.0	96.5	4.4	99.7	0.7	99.3
average + SD	0.05	0.03	49.7	2.6	71.8	1255.2	160.9	14.5	102.5	0.8	100.7
average - SD	0.01	0.01	49.6	-0.3	5.6	-394.5	57.5	-0.7	89.5	0.6	94.8
minimum	0.01	0.00	49.6	0.2	1.3	-184.7	65.0	0.8	88.5	0.6	94.4
maximum	0.05	0.03	49.7	2.8	64.3	1367.7	166.1	15.4	99.9	0.8	99.6
range	0.04	0.03	0.1	2.6	62.9	1552.4	101.0	14.6	11.3	0.2	5.2

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
055b-1	32.0	34.0	33.5	33.5	87.5	6.3	90.6	4.7	90.6	4.7
055b-2	35.0	37.5	37.0	36.5	85.7	7.1	88.6	5.7	91.4	4.3
055b-3	43.0	45.5	45.0	44.5	88.4	5.8	90.7	4.7	93.0	3.5
055b-4	37.0	39.5	39.0	38.5	86.5	6.8	89.2	5.4	91.9	4.1
055b-5	37.0	40.0	39.0	39.0	83.8	8.1	89.2	5.4	89.2	5.4
average					**86.4**	**6.8**	**89.7**	**5.2**	**91.2**	**4.4**
uncertainty					**2.2**	**1.1**	**1.2**	**0.6**	**1.8**	**0.9**
SD					**1.8**	**0.9**	**0.9**	**0.5**	**1.4**	**0.7**
RSD					**2.0**	**12.9**	**1.0**	**9.2**	**1.6**	**16.4**
median					86.5	6.8	89.2	5.4	91.4	4.3
average + SD					88.1	7.7	90.6	5.6	92.6	5.1
average - SD					84.6	5.9	88.7	4.7	89.8	3.7
minimum					83.8	5.8	88.6	4.7	89.2	3.5
maximum					88.4	8.1	90.7	5.7	93.0	5.4
range					4.6	2.3	2.1	1.1	3.8	1.9

38 % elastomultiester – 44 % modal – 18% viscose (sample 089)

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
089-1	19.95	17.23	13.7	0.46	0.56	98.2	97.8	1.1
089-2	144.31	125.38	13.1	-	0.48	-	98.1	1.0
089-3	120.36	103.97	13.6	-	0.97	-	96.1	1.9
average	**94.87**	**82.19**	**13.5**	**0.5**	**0.67**	**98.2**	**97.3**	**1.3**
uncertainty			**0.7**				**2.6**	**1.3**
SD	**65.98**	**57.27**	**0.3**	**0.0**	**0.26**	**-**	**1.0**	**0.5**
RSD	**69.55**	**69.68**	**2.2**	**0.0**	**38.98**	**-**	**1.1**	**39.0**
median	120.36	103.97	13.6	0.5	0.56	98.2	97.8	1.1
average + SD	160.85	139.47	13.8	0.0	0.93	-	98.4	1.9
average - SD	28.89	24.92	13.2	0.0	0.41	-	96.3	0.8
minimum	19.95	17.23	13.1	0.5	0.48	-	96.1	1.0
maximum	144.31	125.38	13.7	0.5	0.97	-	98.1	1.9
range	124.36	108.16	0.5	0.0	0.49	-	2.0	1.0

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
089-1	17.72	16.05	9.5	0.09	0.44	99.7	98.2	0.9
089-2	131.81	119.01	9.7	-	-	-	-	-
089-3	109.19	98.55	9.7	-	0.94	-	96.2	1.9
average	**86.24**	**77.87**	**9.6**	**0.1**	**0.69**	**99.7**	**97.2**	**1.4**
uncertainty			**0.4**				**12.8**	**6.4**
SD	**60.41**	**54.51**	**0.2**	**0.0**	**0.35**	**-**	**1.4**	**0.7**
RSD	**70.05**	**70.00**	**1.7**	**0.0**	**51.12**	**-**	**1.5**	**51.1**
median	109.19	98.55	9.7	0.1	0.69	99.7	97.2	1.4
average + SD	146.65	132.37	9.8	0.0	1.05	-	98.7	2.1
average - SD	25.83	23.36	9.5	0.0	0.34	-	95.8	0.7
minimum	17.72	16.05	9.5	0.1	0.44	-	96.2	0.9
maximum	131.81	119.01	9.7	0.1	0.94	-	98.2	1.9
range	114.09	102.96	0.3	0.0	0.50	-	2.0	1.0

Measured at 0.0 gf

YARN

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
089-1	31.95	27.63	13.5	7.22	3.87	71.1	84.5	7.8
089-2	16.42	14.53	11.5	7.17	4.01	71.3	84.0	8.0
089-3	19.25	17.36	9.8	8.10	5.00	67.6	80.0	10.0
average	**22.54**	**19.84**	**11.6**	**7.5**	**4.29**	**70.0**	**82.8**	**8.6**
uncertainty			**4.6**			**5.2**	**6.1**	**3.1**
SD	**8.27**	**6.89**	**1.9**	**0.5**	**0.62**	**2.1**	**2.5**	**1.2**
RSD	**36.71**	**34.73**	**16.1**	**7.0**	**14.33**	**3.0**	**3.0**	**14.3**
median	19.25	17.36	11.5	7.2	4.01	71.1	84.0	8.0
average + SD	30.81	26.73	13.5	8.0	4.91	72.1	85.3	9.8
average - SD	14.26	12.95	9.7	7.0	3.68	67.9	80.4	7.4
minimum	16.42	14.53	9.8	7.2	3.87	67.6	80.0	7.8
maximum	31.95	27.63	13.5	8.1	5.00	71.3	84.5	10.0
range	15.54	13.09	3.7	0.9	1.13	3.7	4.5	2.3

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
089-1	27.95	25.44	9.0	9.20	5.85	63.2	76.6	11.7
089-2	14.44	13.35	7.5	8.28	5.02	66.9	79.9	10.0
089-3	17.15	16.09	6.2	8.65	5.95	65.4	76.2	11.9
average	**19.85**	**18.29**	**7.6**	**8.7**	**5.61**	**65.2**	**77.6**	**11.2**
uncertainty			**3.4**			**4.6**	**5.1**	**2.5**
SD	**7.15**	**6.34**	**1.4**	**0.5**	**0.51**	**1.9**	**2.1**	**1.0**
RSD	**36.00**	**34.66**	**18.0**	**5.3**	**9.13**	**2.9**	**2.6**	**9.1**
median	17.15	16.09	7.5	8.7	5.85	65.4	76.6	11.7
average + SD	26.99	24.64	8.9	9.2	6.12	67.0	79.6	12.2
average - SD	12.70	11.95	6.2	8.3	5.09	63.3	75.5	10.2
minimum	14.44	13.35	6.2	8.3	5.02	63.2	76.2	10.0
maximum	27.95	25.44	9.0	9.2	5.95	66.9	79.9	11.9
range	13.51	12.09	2.7	0.9	0.93	3.7	3.7	1.9

Measured at 0.1 gf

YARN

Elongation based – 3 cycles

50%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
089-1	50.0	54.5	53.0	82.0	88.0	6.0	55.0	53.5	80.0	86.0	7.0
089-2	49.0	53.5	52.0	81.6	87.8	6.1	54.5	53.0	77.6	83.7	8.2
089-3	51.0	55.5	54.5	82.4	86.3	6.9	56.5	55.0	78.4	84.3	7.8
089-4	48.0	52.5	51.0	81.3	87.5	6.3	53.5	52.0	77.1	83.3	8.3
089-5	46.0	50.0	49.0	82.6	87.0	6.5	51.0	49.5	78.3	84.8	7.6
average				**82.0**	**87.3**	**6.4**			**78.3**	**84.4**	**7.8**
uncertainty				**0.7**	**0.9**	**0.4**			**1.4**	**1.3**	**0.6**
SD				**0.5**	**0.7**	**0.3**			**1.1**	**1.0**	**0.5**
RSD				**0.7**	**0.8**	**5.4**			**1.4**	**1.2**	**6.7**
median				82.0	87.5	6.3			78.3	84.3	7.8
average + SD				82.5	88.0	6.7			79.4	85.5	8.3
average - SD				81.4	86.6	6.0			77.2	83.4	7.3
minimum				81.3	86.3	6.0			77.1	83.3	7.0
maximum				82.6	88.0	6.9			80.0	86.0	8.3
range				1.4	1.7	0.9			2.9	2.7	1.3

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
089-1	56.0	54.5	76.0	82.0	9.0
089-2	55.0	53.5	75.5	81.6	9.2
089-3	57.0	55.5	76.5	82.4	8.8
089-4	53.5	52.5	77.1	81.3	9.4
089-5	51.5	50.0	76.1	82.6	8.7
average			**76.2**	**82.0**	**9.0**
uncertainty			**0.7**	**0.7**	**0.3**
SD			**0.6**	**0.5**	**0.3**
RSD			**0.8**	**0.7**	**3.0**
median			76.1	82.0	9.0
average + SD			76.8	82.5	9.3
average - SD			75.6	81.4	8.7
minimum			75.5	81.3	8.7
maximum			77.1	82.6	9.4
range			1.6	1.4	0.7

YARN

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
089-1	2.28	4.36	3.40	1.10	70.37	6.46	4.09
089-2	2.40	4.13	3.33	1.16	43.67	6.29	3.87
089-3	2.15	3.36	2.79	1.17	33.04	5.64	3.41
089-4	1.99	3.02	2.84	1.16	36.41	5.40	3.13
089-5	2.33	3.90	3.45	1.15	47.91	5.73	3.53
average	**2.23**	**3.75**	**3.16**	**1.15**	**46.28**	**5.90**	**3.60**
SD	**0.16**	**0.55**	**0.32**	**0.03**	**14.68**	**0.45**	**0.38**
RSD	**7.24**	**14.74**	**10.10**	**2.30**	**31.73**	**7.67**	**10.59**
median	2.28	3.90	3.33	1.16	43.67	5.73	3.53
average + SD	2.39	4.31	3.48	1.17	60.96	6.35	3.99
average - SD	2.07	3.20	2.84	1.12	31.60	5.45	3.22
minimum	1.99	3.02	2.79	1.10	33.04	5.40	3.13
maximum	2.40	4.36	3.45	1.17	70.37	6.46	4.09
range	0.41	1.34	0.65	0.07	37.33	1.06	0.97

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
089-1	59.46	53.02	12.9	8.2	10.8	6396.7	3092.5	82.6	86.4	74.2	83.6
089-2	38.05	34.07	12.6	7.7	10.5	3778.2	1823.4	83.5	86.7	74.8	84.5
089-3	30.04	26.75	11.3	6.8	10.9	2832.6	1534.1	86.6	88.8	77.5	86.4
089-4	32.03	28.60	10.8	6.3	10.7	3142.2	1833.5	87.9	88.7	78.4	87.5
089-5	42.34	37.79	11.5	7.1	10.8	4176.1	2058.6	84.4	86.2	77.1	85.9
average	**40.38**	**36.05**	**11.8**	**7.2**	**10.7**	**4065.2**	**2068.4**	**85.0**	**87.4**	**76.4**	**85.6**
uncertainty			**1.1**	**0.9**	**0.2**	**1744.9**	**747.4**	**2.7**	**1.6**	**2.2**	**1.9**
SD	**11.73**	**10.45**	**0.9**	**0.8**	**0.2**	**1405.5**	**602.0**	**2.2**	**1.3**	**1.8**	**1.5**
RSD	**29.04**	**28.99**	**7.7**	**10.6**	**1.7**	**34.6**	**29.1**	**2.6**	**1.5**	**2.4**	**1.8**
median	38.05	34.07	11.5	7.1	10.8	3778.2	1833.5	84.4	86.7	77.1	85.9
average + SD	52.11	46.50	12.7	8.0	10.9	5470.7	2670.4	87.2	88.6	78.2	87.1
average - SD	28.66	25.60	10.9	6.4	10.6	2659.6	1466.4	82.8	86.1	74.6	84.1
minimum	30.04	26.75	10.8	6.3	10.5	2832.6	1534.1	82.6	86.2	74.2	83.6
maximum	59.46	53.02	12.9	8.2	10.9	6396.7	3092.5	87.9	88.8	78.4	87.5
range	29.42	26.26	2.1	1.9	0.5	3564.1	1558.4	5.4	2.6	4.2	3.9

YARN

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
089-1	49.0	53.0	51.5	51.0	83.7	8.2	89.8	5.1	91.8	4.1
089-2	46.0	50.0	48.5	48.0	82.6	8.7	89.1	5.4	91.3	4.3
089-3	48.0	51.5	50.5	50.0	85.4	7.3	89.6	5.2	91.7	4.2
089-4	51.0	54.5	53.5	53.0	86.3	6.9	90.2	4.9	92.2	3.9
089-5	49.0	52.5	51.5	51.0	85.7	7.1	89.8	5.1	91.8	4.1
average					**84.7**	**7.6**	**89.7**	**5.1**	**91.8**	**4.1**
uncertainty					**1.9**	**1.0**	**0.5**	**0.2**	**0.4**	**0.2**
SD					**1.5**	**0.8**	**0.4**	**0.2**	**0.3**	**0.2**
RSD					**1.8**	**10.1**	**0.4**	**3.8**	**0.3**	**3.8**
median					85.4	7.3	89.8	5.1	91.8	4.1
average + SD					86.3	8.4	90.1	5.3	92.1	4.3
average - SD					83.2	6.9	89.3	5.0	91.4	4.0
minimum					82.6	6.9	89.1	4.9	91.3	3.9
maximum					86.3	8.7	90.2	5.4	92.2	4.3
range					3.7	1.8	1.1	0.5	0.9	0.4

SINGLE FILAMENT

Elongation based – 3 cycles

50%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
089-1	0.41	0.35	13.7	17.51	1.25	30.0	95.0	2.5
089-2	0.08	0.07	12.4	18.54	0.90	25.8	96.4	1.8
089-3	2.40	2.12	11.8	18.52	1.14	25.9	95.4	2.3
average	**0.96**	**0.85**	**12.6**	**18.19**	**1.10**	**27.2**	**95.6**	**2.2**
uncertainty			**2.5**			**5.9**	**1.8**	**0.9**
SD	**1.26**	**1.11**	**1.0**	**0.6**	**0.2**	**2.4**	**0.7**	**0.4**
RSD	**130.66**	**130.63**	**7.9**	**3.2**	**16.3**	**8.7**	**0.8**	**16.3**
median	0.41	0.35	12.4	18.5	1.1	25.9	95.4	2.3
average + SD	2.22	1.96	13.6	18.8	1.3	29.6	96.3	2.6
average - SD	-0.30	-0.26	11.6	17.6	0.9	24.9	94.9	1.8
minimum	0.08	0.07	11.8	17.5	0.9	25.8	95.0	1.8
maximum	2.40	2.12	13.7	18.5	1.3	30.0	96.4	2.5
range	2.33	2.05	2.0	1.0	0.4	4.1	1.4	0.7

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
089-1	0.39	0.36	7.6	18.55	0.38	25.8	98.5	0.8
089-2	0.08	0.07	14.5	18.48	1.73	26.1	93.1	3.5
089-3	2.19	2.00	8.5	17.63	0.51	29.5	98.0	1.0
average	**0.88**	**0.81**	**10.2**	**18.22**	**0.87**	**27.1**	**96.5**	**1.8**
uncertainty			**9.3**			**5.1**	**7.4**	**3.7**
SD	**1.14**	**1.04**	**3.7**	**0.51**	**0.7**	**2.1**	**3.0**	**1.5**
RSD	**128.87**	**129.05**	**36.6**	**2.81**	**85.2**	**7.6**	**3.1**	**85.2**
median	0.39	0.36	8.5	18.48	0.5	26.1	98.0	1.0
average + SD	2.03	1.85	13.9	18.73	1.6	29.2	99.5	3.2
average - SD	-0.26	-0.24	6.5	17.71	0.1	25.1	93.5	0.3
minimum	0.08	0.07	7.6	17.63	0.4	25.8	93.1	0.8
maximum	2.19	2.00	14.5	18.55	1.7	29.5	98.5	3.5
range	2.11	1.94	6.8	0.92	1.4	3.7	5.4	2.7

SINGLE FILAMENT

Elongation based – 3 cycles

50%

Manual method

JRC code	L0 mm	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %	Lc mm	Ld mm	imm rec 2 %	rec 2 %	PD 2 %
089-1	46.0	51.0	50.0	78.3	82.6	8.7	52.0	51.0	73.9	78.3	10.9
089-2	55.0	63.0	61.5	70.9	76.4	11.8	64.0	63.0	67.3	70.9	14.5
089-3	47.0	52.0	51.0	78.7	83.0	8.5	52.5	51.5	76.6	80.9	9.6
089-4	46.0	49.5	47.5	84.8	93.5	3.3	49.0	47.0	87.0	95.7	2.2
089-5	52.0	57.0	55.5	80.8	86.5	6.7	56.5	55.0	82.7	88.5	5.8
average				**78.7**	**84.4**	**7.8**			**77.5**	**82.8**	**8.6**
uncertainty				**7.8**	**7.8**	**3.9**			**9.5**	**11.8**	**5.9**
SD				**5.1**	**6.3**	**3.1**			**7.7**	**9.5**	**4.8**
RSD				**6.4**	**7.4**	**40.1**			**9.9**	**11.5**	**55.5**
median				78.7	83.0	8.5			76.6	80.9	9.6
average + SD				83.7	90.7	10.9			85.1	92.4	13.3
average - SD				73.6	78.1	4.7			69.8	73.3	3.8
minimum				70.9	76.4	3.3			67.3	70.9	2.2
maximum				84.8	93.5	11.8			87.0	95.7	14.5
range				13.9	17.1	8.6			19.7	24.7	12.4

JRC code	Le mm	Lf mm	imm rec 3 %	rec 3 %	PD 3 %
089-1	52.0	51.0	73.9	78.3	10.9
089-2	64.5	63.5	65.5	69.1	15.5
089-3	53.0	51.5	74.5	80.9	9.6
089-4	50.0	49.0	82.6	87.0	6.5
089-5	57.5	56.5	78.8	82.7	8.7
average			**75.0**	**79.6**	**10.2**
uncertainty			**8.0**	**8.3**	**4.1**
SD			**6.4**	**6.7**	**3.3**
RSD			**8.6**	**8.4**	**32.6**
median			74.5	80.9	9.6
average + SD			81.5	86.2	13.5
average - SD			68.6	72.9	6.9
minimum			65.5	69.1	6.5
maximum			82.6	87.0	15.5
range			17.2	17.9	8.9

SINGLE FILAMENT

Elongation based – 5 cycles

50%

JRC code	load C1 at 25% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 25% elong gf	load C-5 at 25% elong gf	L5 5th unload mm	L6 6th load mm
089-1	0.18	0.98	1.88	0.08	3.25	1.29	-
089-2	0.38	1.77	0.07	0.09	5.24	3.57	0.24
089-3	0.58	1.36	0.66	0.10	5.75	3.09	0.11
089-4	0.14	3.13	0.57	0.08	2.85	3.65	0.30
average	**0.32**	**1.81**	**0.79**	**0.09**	**4.27**	**2.90**	**0.21**
SD	**0.21**	**0.9**	**0.8**	**0.01**	**1.44**	**1.10**	**0.1**
RSD	**64.40**	**52.0**	**96.6**	**9.70**	**33.66**	**37.94**	**44.6**
median	0.28	1.6	0.6	0.09	4.24	3.33	0.2
average + SD	0.52	2.8	1.6	0.10	5.71	4.00	0.3
average - SD	0.11	0.9	0.0	0.08	2.83	1.80	0.1
minimum	0.14	1.0	0.1	0.08	2.85	1.29	0.1
maximum	0.58	3.1	1.9	0.10	5.75	3.65	0.3
range	0.45	2.2	1.8	0.02	2.90	2.36	0.2

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
089-1	2.79	2.55	2.6	-	8.5	3929.4	1817.5	96.1	92.5	94.8	-
089-2	4.67	4.38	7.2	0.5	6.1	5698.3	1378.0	92.9	99.7	85.7	99.1
089-3	5.13	4.80	6.2	0.2	6.5	5668.8	987.7	94.6	97.4	87.6	99.6
089-4	2.43	2.20	7.3	0.6	9.3	3400.1	2108.5	87.5	97.7	85.4	98.8
average	**3.75**	**3.48**	**5.8**	**0.4**	**7.6**	**4674.1**	**1572.9**	**92.8**	**96.8**	**88.4**	**99.1**
uncertainty			**3.5**	**0.5**	**2.5**	**1886.1**	**783.3**	**6.0**	**4.9**	**7.0**	**0.9**
SD	**1.35**	**1.30**	**2.2**	**0.2**	**1.6**	**1185.5**	**492.3**	**3.8**	**3.1**	**4.4**	**0.4**
RSD	**35.87**	**37.29**	**37.9**	**44.6**	**20.5**	**25.4**	**31.3**	**4.1**	**3.2**	**5.0**	**0.4**
median	3.73	3.47	6.7	0.5	7.5	4799.1	1597.7	93.7	97.5	86.7	99.1
average + SD	5.10	4.78	8.0	0.6	9.1	5859.6	2065.2	96.5	99.9	92.8	99.5
average - SD	2.41	2.18	3.6	0.2	6.0	3488.7	1080.6	89.0	93.8	84.0	98.8
minimum	2.43	2.20	2.6	0.2	6.1	3400.1	987.7	87.5	92.5	85.4	98.8
maximum	5.13	4.80	7.3	0.6	9.3	5698.3	2108.5	96.1	99.7	94.8	99.6
range	2.71	2.60	4.7	0.4	3.2	2298.2	1120.8	8.6	7.2	9.4	0.7

SINGLE FILAMENT

Elongation based – 5 cycles

50%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
089-1	49.0	53.5	53.0	52.5	81.6	9.2	83.7	8.2	85.7	7.1
089-2	46.0	49.0	48.5	48.0	87.0	6.5	89.1	5.4	91.3	4.3
089-3	49.0	52.5	52.0	51.5	85.7	7.1	87.7	6.1	89.8	5.1
089-4	48.0	52.0	51.0	50.0	83.3	8.3	87.5	6.3	91.7	4.2
089-5	45.0	48.0	48.0	47.5	86.7	6.7	86.7	6.7	88.9	5.6
average					**84.9**	**7.6**	**86.9**	**6.5**	**89.5**	**5.3**
uncertainty					**2.9**	**1.4**	**2.5**	**1.3**	**3.0**	**1.5**
SD					**2.3**	**1.1**	**2.0**	**1.0**	**2.4**	**1.2**
RSD					**2.7**	**15.2**	**2.3**	**15.6**	**2.7**	**22.7**
median					85.7	7.1	87.5	6.3	89.8	5.1
average + SD					87.2	8.7	88.9	7.5	91.9	6.5
average - SD					82.5	6.4	84.9	5.5	87.1	4.1
minimum					81.6	6.5	83.7	5.4	85.7	4.2
maximum					87.0	9.2	89.1	8.2	91.7	7.1
range					5.4	2.7	5.4	2.7	6.0	3.0

Pure elastane from bobbin (sample 093)

YARN

Elongation based – 3 cycles

300%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
093-1	9.63	6.19	35.7	21.06	4.81	86.0	96.8	9.6
093-2	9.77	6.24	36.1	27.44	6.06	81.7	96.0	12.1
093-3	9.71	6.08	37.4	27.46	0.34	81.7	99.8	0.7
average	9.71	6.17	36.4	25.32	3.74	83.1	97.5	7.5
uncertainty			2.2			6.1	5.0	14.9
SD	0.07	0.08	0.9	3.69	3.00	2.5	2.0	6.0
RSD	0.73	1.33	2.4	14.56	80.37	3.0	2.1	80.5
median	9.71	6.19	36.1	27.44	4.81	81.7	96.8	9.6
average + SD	9.78	6.25	37.3	29.01	6.74	85.6	99.5	13.5
average - SD	9.63	6.09	35.5	21.63	0.73	80.7	95.5	1.5
minimum	9.63	6.08	35.7	21.06	0.34	81.7	96.0	0.7
maximum	9.77	6.24	37.4	27.46	6.06	86.0	99.8	12.1
range	0.14	0.16	1.7	6.39	5.71	4.3	3.8	11.4

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
093-1	6.91	5.03	27.2	22.01	6.70	85.3	95.5	13.4
093-2	6.94	5.06	27.1	27.02	9.22	82.0	93.9	18.4
093-3	6.83	4.99	26.9	22.08	0.13	85.3	99.9	0.3
average	6.89	5.03	27.1	23.70	5.35	84.2	96.4	10.7
uncertainty			0.3			4.7	7.8	23.3
SD	0.06	0.04	0.1	2.87	4.69	1.9	3.1	9.4
RSD	0.82	0.71	0.5	12.12	87.68	2.3	3.2	87.7
median	6.91	5.03	27.1	22.08	6.70	85.3	95.5	13.4
average + SD	6.95	5.06	27.2	26.58	10.04	86.1	99.6	20.1
average - SD	6.84	4.99	26.9	20.83	0.66	82.3	93.3	1.3
minimum	6.83	4.99	26.9	22.01	0.13	82.0	93.9	0.3
maximum	6.94	5.06	27.2	27.02	9.22	85.3	99.9	18.4
range	0.11	0.07	0.3	5.01	9.08	3.3	6.1	18.2

YARN

Elongation based – 3 cycles

200%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
093-1	4.93	3.73	24.3	6.95	2.76	93.1	97.2	5.5
093-2	4.96	3.75	24.4	6.60	2.50	93.4	97.5	5.0
093-3	4.73	3.60	23.9	7.92	4.37	92.1	95.6	8.7
093-4	5.05	3.84	24.0	-	-	-	-	
093-5	5.09	3.86	24.2	4.25	0.58	95.8	99.4	1.2
093-6	5.06	3.84	24.1	4.53	0.54	95.5	99.5	1.1
average	**4.97**	**3.77**	**24.1**	**6.05**	**2.15**	**94.0**	**97.9**	**4.3**
uncertainty			**0.2**			**2.0**	**2.0**	**4.0**
SD	**0.13**	**0.10**	**0.2**	**1.59**	**1.62**	**1.6**	**1.6**	**3.2**
RSD	**2.67**	**2.62**	**0.8**	**26.34**	**75.29**	**1.7**	**1.7**	**75.3**
median	5.01	3.80	24.1	6.60	2.50	93.4	97.5	5.0
average + SD	5.10	3.87	24.3	7.64	3.77	95.5	99.5	7.5
average - SD	4.84	3.67	23.9	4.46	0.53	92.4	96.2	1.1
minimum	4.73	3.60	23.9	4.25	0.54	92.1	95.6	1.1
maximum	5.09	3.86	24.4	7.92	4.37	95.8	99.5	8.7
range	0.36	0.26	0.5	3.67	3.83	3.7	3.8	7.7

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
093-1	3.82	3.25	14.9	6.50	3.96	93.5	96.0	7.9
093-2	3.84	3.23	15.9	7.66	3.20	92.3	96.8	6.4
093-3	3.64	3.10	14.8	8.01	5.06	92.0	94.9	10.1
093-4	3.94	3.32	15.7	-	-	-	-	-
093-5	3.95	3.36	14.9	4.36	0.15	95.6	99.9	0.3
093-6	3.95	3.34	15.4	4.45	-	95.6	-	-
average	**3.86**	**3.27**	**15.3**	**6.20**	**3.09**	**93.8**	**96.9**	**6.2**
uncertainty			**0.5**			**2.1**	**3.3**	**6.7**
SD	**0.12**	**0.10**	**0.5**	**1.73**	**2.11**	**1.7**	**2.1**	**4.2**
RSD	**3.13**	**2.95**	**3.0**	**27.89**	**68.07**	**1.8**	**2.2**	**68.1**
median	3.89	3.29	15.2	6.50	3.58	93.5	96.4	7.2
average + SD	3.98	3.36	15.7	7.92	5.20	95.5	99.0	10.4
average - SD	3.74	3.17	14.8	4.47	0.99	92.1	94.8	2.0
minimum	3.64	3.10	14.8	4.36	0.15	92.0	94.9	0.3
maximum	3.95	3.36	15.9	8.01	5.06	95.6	99.9	10.1
range	0.31	0.26	1.1	3.65	4.91	3.7	4.9	9.8

YARN

Elongation based – 3 cycles

200%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
093-1	30.0	32.5	31.5	95.8	97.5	5.0	33.0	31.5	95.0	97.5	5.0
093-2	33.0	36.0	34.0	95.5	98.5	3.0	36.5	34.5	94.7	97.7	4.5
093-3	32.0	35.5	34.0	94.5	96.9	6.3	36.0	35.0	93.8	95.3	9.4
093-4	38.0	42.0	40.5	94.7	96.7	6.6	42.5	41.5	94.1	95.4	9.2
093-5	31.0	34.5	33.5	94.4	96.0	8.1	35.5	34.5	92.7	94.4	11.3
average				**95.0**	**97.1**	**5.8**			**94.1**	**96.1**	**7.9**
uncertainty				**0.8**	**1.2**	**2.3**			**1.1**	**1.8**	**3.7**
SD				**0.6**	**0.9**	**1.9**			**0.9**	**1.5**	**3.0**
RSD				**0.7**	**1.0**	**32.6**			**0.9**	**1.5**	**37.5**
median				94.7	96.9	6.3			94.1	95.4	9.2
average + SD				95.6	98.0	7.7			94.9	97.5	10.8
average - SD				94.3	96.2	3.9			93.2	94.6	4.9
minimum				94.4	96.0	3.0			92.7	94.4	4.5
maximum				95.8	98.5	8.1			95.0	97.7	11.3
range				1.5	2.5	5.0			2.3	3.4	6.7

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
093-1	33.0	32.0	95.0	96.7	6.7
093-2	37.0	35.5	93.9	96.2	7.6
093-3	36.5	35.0	93.0	95.3	9.4
093-4	43.0	41.5	93.4	95.4	9.2
093-5	36.0	34.5	91.9	94.4	11.3
average			**93.5**	**95.6**	**8.8**
uncertainty			**1.4**	**1.1**	**2.2**
SD			**1.1**	**0.9**	**1.8**
RSD			**1.2**	**0.9**	**20.2**
median			93.4	95.4	9.2
average + SD			94.6	96.5	10.6
average - SD			92.3	94.7	7.0
minimum			91.9	94.4	6.7
maximum			95.0	96.7	11.3
range			3.1	2.3	4.6

YARN

Elongation based – 3 cycles

100%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
093-1	1.97	1.74	11.7	0.85	-	98.3	-	-
093-2	1.99	1.73	13.1	0.88	-	98.3	-	-
093-3	1.55	1.39	10.3	1.12	0.07	97.8	99.9	0.1
average	**1.84**	**1.62**	**11.7**	**1.0**	**0.07**	**98.1**	**99.9**	**0.1**
uncertainty			**3.4**			**0.7**		
SD	**0.25**	**0.20**	**1.4**	**0.2**	**-**	**0.3**	**-**	**-**
RSD	**13.49**	**12.34**	**11.7**	**15.7**	**-**	**0.3**	**-**	**-**
median	1.97	1.73	11.7	0.9	0.07	98.3	99.9	0.1
average + SD	2.09	1.82	13.1	1.1	-	98.4	-	-
average - SD	1.59	1.42	10.3	0.8	-	97.8	-	-
minimum	1.55	1.39	10.3	0.9	-	97.8	-	-
maximum	1.99	1.74	13.1	1.1	-	98.3	-	-
range	0.44	0.35	2.7	0.3	-	0.5	-	-

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
093-1	1.78	1.67	6.2	-	-	-	-	-
093-2	1.78	1.67	6.2	-	-	-	-	-
093-3	1.50	1.39	7.3	-	0.76	-	98.5	1.5
average	**1.68**	**1.58**	**6.6**	**-**	**0.76**	**-**	**98.5**	**1.5**
uncertainty			**1.7**					
SD	**0.16**	**0.16**	**0.7**	**-**	**-**	**-**	**-**	**-**
RSD	**9.59**	**10.10**	**10.1**	**-**	**-**	**-**	**-**	**-**
median	1.78	1.67	6.2	-	0.76	-	98.5	1.5
average + SD	1.85	1.73	7.2	-	-	-	-	-
average - SD	1.52	1.42	5.9	-	-	-	-	-
minimum	1.50	1.39	6.2	-	-	-	-	-
maximum	1.78	1.67	7.3	-	-	-	-	-
range	0.28	0.28	1.2	-	-	-	-	-

YARN

Elongation based – 5 cycles

300%

JRC code	load C1 at 150% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 150% elong gf	load C-5 at 150% elong gf	L5 5th unload mm	L6 6th load mm
093-1	3.50	12.81	9.32	0.98	0.57	19.67	16.06
093-2	3.61	15.91	12.50	0.96	0.57	20.62	12.49
093-3	3.59	16.10	13.17	0.89	0.50	23.04	13.84
093-4	3.55	10.11	6.43	1.14	0.78	9.55	7.19
093-5	3.60	9.13	7.20	1.07	0.69	11.33	9.14
average	**3.57**	**12.81**	**9.73**	**1.01**	**0.62**	**16.84**	**11.75**
SD	**0.05**	**3.21**	**3.04**	**0.10**	**0.11**	**6.00**	**3.57**
RSD	**1.29**	**25.08**	**31.26**	**9.69**	**18.26**	**35.65**	**30.41**
median	3.59	12.81	9.32	0.98	0.57	19.67	12.49
average + SD	3.61	16.02	12.77	1.11	0.74	22.84	15.32
average - SD	3.52	9.60	6.69	0.91	0.51	10.84	8.17
minimum	3.50	9.13	6.43	0.89	0.50	9.55	7.19
maximum	3.61	16.10	13.17	1.14	0.78	23.04	16.06
range	0.11	6.98	6.74	0.25	0.29	13.49	8.86

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
093-1	6.91	5.39	39.4	32.1	22.0	58.4	16.4	91.5	93.8	86.9	89.3
093-2	7.06	5.47	41.2	25.0	22.6	59.1	15.8	89.4	91.7	86.3	91.7
093-3	7.07	5.40	46.1	27.7	23.6	55.7	13.8	89.3	91.2	84.6	90.8
093-4	7.07	5.63	19.1	14.4	20.3	68.5	22.0	93.3	95.7	93.6	95.2
093-5	7.13	5.65	22.7	18.3	20.7	64.9	19.3	93.9	95.2	92.5	93.9
average	**7.05**	**5.51**	**33.7**	**23.5**	**21.8**	**61.3**	**17.4**	**91.5**	**93.5**	**88.8**	**92.2**
uncertainty			**14.9**	**8.9**	**1.7**	**6.5**	**4.0**	**2.7**	**2.5**	**5.0**	**3.0**
SD	**0.08**	**0.12**	**12.0**	**7.1**	**1.3**	**5.2**	**3.2**	**2.1**	**2.0**	**4.0**	**2.4**
RSD	**1.14**	**2.26**	**35.7**	**30.4**	**6.1**	**8.5**	**18.5**	**2.3**	**2.2**	**4.5**	**2.6**
median	7.07	5.47	39.4	25.0	22.0	59.1	16.4	91.5	93.8	86.9	91.7
average + SD	7.13	5.63	45.7	30.6	23.2	66.5	20.7	93.6	95.5	92.8	94.6
average - SD	6.97	5.38	21.7	16.4	20.5	56.1	14.2	89.3	91.5	84.8	89.8
minimum	6.91	5.39	19.1	14.4	20.3	55.7	13.8	89.3	91.2	84.6	89.3
maximum	7.13	5.65	46.1	32.1	23.6	68.5	22.0	93.9	95.7	93.6	95.2
range	0.22	0.26	27.0	17.7	3.2	12.8	8.2	4.7	4.5	9.0	5.9

YARN

Elongation based – 5 cycles

200%

JRC code	load C1 at 100% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 100% elong gf	load C-5 at 100% elong gf	L5 5th unload mm	L6 6th load mm
093-1	2.18	3.19	3.40	1.06	1.38	5.03	3.21
093-2	2.20	2.80	4.09	1.09	1.38	1.68	-
093-3	2.17	4.55	1.02	1.04	1.35	3.07	2.74
average	**2.18**	**3.51**	**2.84**	**1.06**	**1.37**	**3.26**	**2.97**
SD	**0.01**	**0.92**	**1.61**	**0.02**	**0.02**	**1.68**	**0.33**
RSD	**0.51**	**26.17**	**56.86**	**2.03**	**1.34**	**51.60**	**11.14**
median	2.18	3.19	3.40	1.06	1.38	3.07	2.97
average + SD	2.20	4.43	4.45	1.09	1.39	4.94	3.30
average - SD	2.17	2.59	1.22	1.04	1.35	1.58	2.64
minimum	2.17	2.80	1.02	1.04	1.35	1.68	2.74
maximum	2.20	4.55	4.09	1.09	1.38	5.03	3.21
range	0.02	1.75	3.08	0.04	0.03	3.35	0.47

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
093-1	3.88	3.39	10.1	6.4	12.8	129.8	63.2	96.8	96.6	95.0	96.8
093-2	3.95	3.45	3.4	-	12.7	127.1	62.9	97.2	95.9	98.3	-
093-3	3.85	3.39	6.1	5.5	11.9	129.2	62.0	95.5	99.0	96.9	97.3
average	**3.89**	**3.41**	**6.5**	**5.9**	**12.5**	**128.7**	**62.7**	**96.5**	**97.2**	**96.7**	**97.0**
uncertainty			**8.3**	**5.9**	**1.2**	**3.5**	**1.5**	**2.3**	**4.0**	**4.2**	**3.0**
SD	**0.05**	**0.03**	**3.4**	**0.7**	**0.5**	**1.4**	**0.6**	**0.9**	**1.6**	**1.7**	**0.3**
RSD	**1.30**	**0.98**	**51.6**	**11.1**	**3.8**	**1.1**	**1.0**	**1.0**	**1.7**	**1.7**	**0.3**
median	3.88	3.39	6.1	5.9	12.7	129.2	62.9	96.8	96.6	96.9	97.0
average + SD	3.95	3.44	9.9	6.6	13.0	130.1	63.3	97.4	98.8	98.4	97.4
average - SD	3.84	3.38	3.2	5.3	12.0	127.3	62.1	95.6	95.6	95.1	96.7
minimum	3.85	3.39	3.4	5.5	11.9	127.1	62.0	95.5	95.9	95.0	96.8
maximum	3.95	3.45	10.1	6.4	12.8	129.8	63.2	97.2	99.0	98.3	97.3
range	0.10	0.06	6.7	0.9	0.8	2.7	1.2	1.8	3.1	3.3	0.5

YARN

Elongation based – 5 cycles

200%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
093-1	28.0	30.5	29.5	29.0	95.5	8.9	97.3	5.4	98.2	3.6
093-2	30.0	32.5	31.5	30.5	95.8	8.3	97.5	5.0	99.2	1.7
093-3	32.0	34.0	33.5	33.0	96.9	6.3	97.7	4.7	98.4	3.1
093-4	29.0	31.5	30.5	29.5	95.7	8.6	97.4	5.2	99.1	1.7
093-5	31.0	33.5	32.5	32.0	96.0	8.1	97.6	4.8	98.4	3.2
average					**96.0**	**8.0**	**97.5**	**5.0**	**98.7**	**2.7**
uncertainty					**0.6**	**1.3**	**0.2**	**0.3**	**0.6**	**1.1**
SD					**0.5**	**1.1**	**0.1**	**0.3**	**0.5**	**0.9**
RSD					**0.5**	**13.1**	**0.1**	**5.3**	**0.5**	**33.7**
median					95.8	8.3	97.5	5.0	98.4	3.1
average + SD					96.5	9.1	97.6	5.3	99.1	3.6
average - SD					95.5	7.0	97.4	4.7	98.2	1.8
minimum					95.5	6.3	97.3	4.7	98.2	1.7
maximum					96.9	8.9	97.7	5.4	99.2	3.6
range					1.3	2.7	0.3	0.7	1.0	1.9

Pure elastane from bobbin (sample 094)

YARN

Elongation based – 3 cycles

300%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
094-1	13.28	8.65	34.9	30.61	8.54	79.6	94.3	17.1
094-2	13.14	8.52	35.2	19.68	3.29	86.9	97.8	6.6
094-3	13.14	8.57	34.8	18.97	0.29	87.4	99.8	0.6
average	**13.19**	**8.58**	**34.9**	**23.09**	**4.04**	**84.6**	**97.3**	**8.1**
uncertainty			**0.5**			**10.8**	**6.9**	**20.7**
SD	**0.08**	**0.06**	**0.2**	**6.53**	**4.18**	**4.4**	**2.8**	**8.4**
RSD	**0.60**	**0.74**	**0.6**	**28.27**	**103.38**	**5.1**	**2.9**	**103.4**
median	13.14	8.57	34.9	19.68	3.29	86.9	97.8	6.6
average + SD	13.27	8.64	35.1	29.62	8.22	89.0	100.1	16.4
average - SD	13.11	8.52	34.7	16.56	-0.14	80.3	94.5	-0.3
minimum	13.14	8.52	34.8	18.97	0.29	79.6	94.3	0.6
maximum	13.28	8.65	35.2	30.61	8.54	87.4	99.8	17.1
range	0.14	0.13	0.4	11.65	8.25	7.8	5.5	16.5

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
094-1	9.69	7.36	24.0	25.35	9.16	83.1	93.9	18.3
094-2	9.66	7.31	24.3	21.07	1.10	86.0	99.3	2.2
094-3	9.67	7.30	24.5	16.38	7.22	89.1	95.2	14.4
average	**9.67**	**7.32**	**24.3**	**20.93**	**5.83**	**86.0**	**96.1**	**11.7**
uncertainty			**0.6**			**7.4**	**7.0**	**20.9**
SD	**0.01**	**0.04**	**0.2**	**4.49**	**4.20**	**3.0**	**2.8**	**8.4**
RSD	**0.14**	**0.49**	**1.0**	**21.42**	**72.12**	**3.5**	**2.9**	**72.2**
median	9.67	7.31	24.3	21.07	7.22	86.0	95.2	14.4
average + SD	9.69	7.36	24.5	25.42	10.03	89.0	98.9	20.1
average - SD	9.66	7.29	24.1	16.45	1.62	83.1	93.3	3.2
minimum	9.66	7.30	24.0	16.38	1.10	83.1	93.9	2.2
maximum	9.69	7.36	24.5	25.35	9.16	89.1	99.3	18.3
range	0.02	0.07	0.5	8.97	8.05	6.0	5.4	16.1

YARN

Elongation based – 3 cycles

200%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
094-1	6.28	4.94	21.3	5.45	2.20	94.6	97.8	4.4
094-2	6.24	4.92	21.2	5.71	3.00	94.3	97.0	6.0
094-3	6.87	5.36	22.0	5.88	2.23	94.1	97.8	4.5
094-4	6.39	5.05	21.0	4.26	0.48	95.7	99.5	1.0
094-5	6.47	5.14	20.6	4.39	0.30	95.6	99.7	0.6
094-6	6.49	5.14	20.8	4.02	0.16	96.0	99.8	0.3
average	6.46	5.09	21.1	4.95	1.40	95.0	98.6	2.8
uncertainty			0.5			0.9	1.3	2.6
SD	0.23	0.16	0.5	0.82	1.22	0.8	1.2	2.4
RSD	3.50	3.18	2.3	16.52	87.69	0.9	1.2	87.7
median	6.43	5.10	21.1	4.92	1.34	95.1	98.7	2.7
average + SD	6.68	5.25	21.6	5.77	2.62	95.9	99.8	5.2
average - SD	6.23	4.93	20.6	4.13	0.17	94.2	97.4	0.3
minimum	6.24	4.92	20.6	4.02	0.16	94.1	97.0	0.3
maximum	6.87	5.36	22.0	5.88	3.00	96.0	99.8	6.0
range	0.63	0.44	1.4	1.86	2.84	1.9	2.8	5.7

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
094-1	5.07	4.43	12.6	4.53	2.46	95.5	97.5	4.9
094-2	5.01	4.40	12.2	5.74	3.64	94.3	96.4	7.3
094-3	5.42	4.69	13.5	5.56	3.11	94.4	96.9	6.2
094-4	5.15	4.52	12.2	4.34	-	95.7	-	-
094-5	5.19	4.58	11.8	4.43	-	95.6	-	-
094-6	5.22	4.59	12.1	4.42	-	95.6	-	-
average	5.18	4.54	12.4	4.84	3.07	95.2	96.9	6.1
uncertainty			0.6			0.7	1.5	2.9
SD	0.14	0.11	0.6	0.64	0.59	0.6	0.6	1.2
RSD	2.75	2.39	4.8	13.14	19.25	0.7	0.6	19.3
median	5.17	4.55	12.2	4.48	3.11	95.5	96.9	6.2
average + SD	5.32	4.64	13.0	5.47	3.66	95.8	97.5	7.3
average - SD	5.03	4.43	11.8	4.20	2.48	94.5	96.3	5.0
minimum	5.01	4.40	11.8	4.34	2.46	94.3	96.4	4.9
maximum	5.42	4.69	13.5	5.74	3.64	95.7	97.5	7.3
range	0.41	0.29	1.7	1.40	1.18	1.4	1.2	2.4

YARN

Elongation based – 3 cycles

200%

Manual method

JRC code	L0 mm	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %	Lc mm	Ld mm	imm rec 2 %	rec 2 %	PD 2 %
094-1	29.0	32.0	30.0	94.8	98.3	3.4	32.5	30.5	94.0	97.4	5.2
094-2	31.0	34.0	32.0	95.2	98.4	3.2	34.5	32.5	94.4	97.6	4.8
094-3	32.0	35.0	33.0	95.3	98.4	3.1	35.5	33.5	94.5	97.7	4.7
094-4	34.0	36.5	35.0	96.3	98.5	2.9	37.0	35.5	95.6	97.8	4.4
094-5	33.0	35.5	34.5	96.2	97.7	4.5	35.5	35.0	96.2	97.0	6.1
average				**95.6**	**98.3**	**3.5**			**94.9**	**97.5**	**5.0**
uncertainty				**0.8**	**0.4**	**0.8**			**1.2**	**0.4**	**0.8**
SD				**0.7**	**0.3**	**0.6**			**0.9**	**0.3**	**0.6**
RSD				**0.7**	**0.3**	**18.4**			**1.0**	**0.3**	**12.6**
median				95.3	98.4	3.2			94.5	97.6	4.8
average + SD				96.2	98.6	4.1			95.9	97.8	5.7
average - SD				94.9	98.0	2.8			94.0	97.2	4.4
minimum				94.8	97.7	2.9			94.0	97.0	4.4
maximum				96.3	98.5	4.5			96.2	97.8	6.1
range				1.5	0.8	1.6			2.3	0.8	1.6

JRC code	Le mm	Lf mm	imm rec 3 %	rec 3 %	PD 3 %
094-1	32.5	30.5	94.0	97.4	5.2
094-2	34.5	33.0	94.4	96.8	6.5
094-3	35.5	34.0	94.5	96.9	6.3
094-4	37.5	36.0	94.9	97.1	5.9
094-5	36.0	34.5	95.5	97.7	4.5
average			**94.6**	**97.2**	**5.7**
uncertainty			**0.7**	**0.5**	**1.0**
SD			**0.6**	**0.4**	**0.8**
RSD			**0.6**	**0.4**	**14.0**
median			94.5	97.1	5.9
average + SD			95.2	97.6	6.5
average - SD			94.1	96.8	4.9
minimum			94.0	96.8	4.5
maximum			95.5	97.7	6.5
range			1.5	1.0	1.9

YARN

Elongation based – 3 cycles

100%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
094-1	1.55	1.34	13.5	2.68	0.92	94.6	98.2	1.9
094-2	3.20	2.80	12.5	1.08	0.69	97.9	98.6	1.4
094-3	2.72	2.48	8.8	0.98	0.18	98.0	99.6	0.4
average	**2.49**	**2.21**	**11.6**	**1.58**	**0.60**	**96.8**	**98.8**	**1.2**
uncertainty			**4.8**			**3.7**	**1.5**	**1.5**
SD	**0.85**	**0.77**	**2.5**	**0.95**	**0.38**	**1.9**	**0.8**	**0.8**
RSD	**34.06**	**34.74**	**21.3**	**60.37**	**63.52**	**2.0**	**0.8**	**63.5**
median	2.72	2.48	12.5	1.08	0.69	97.9	98.6	1.4
average + SD	3.34	2.97	14.1	2.53	0.98	98.8	99.6	2.0
average - SD	1.64	1.44	9.1	0.63	0.22	94.9	98.0	0.4
minimum	1.55	1.34	8.8	0.98	0.18	94.6	98.2	0.4
maximum	3.20	2.80	13.5	2.68	0.92	98.0	99.6	1.9
range	1.65	1.46	4.7	1.70	0.74	3.4	1.5	1.5

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
094-1	1.53	1.40	8.5	2.08	0.09	95.8	99.8	0.2
094-2	2.87	2.71	5.6	0.88	0.84	98.2	98.3	1.7
094-3	2.59	2.43	6.2	0.91	0.04	98.2	99.9	0.1
average	**2.33**	**2.18**	**6.7**	**1.29**	**0.33**	**97.4**	**99.4**	**0.7**
uncertainty			**3.0**			**2.6**	**1.7**	**1.7**
SD	**0.71**	**0.69**	**1.5**	**0.69**	**0.45**	**1.4**	**0.9**	**0.9**
RSD	**30.48**	**31.60**	**22.9**	**53.17**	**137.96**	**1.4**	**0.9**	**138.0**
median	2.59	2.43	6.2	0.91	0.09	98.2	99.8	0.2
average + SD	3.04	2.87	8.3	1.98	0.78	98.8	100.3	1.6
average - SD	1.62	1.49	5.2	0.60	-0.12	96.1	98.5	-0.3
minimum	1.53	1.40	5.6	0.88	0.04	95.8	98.3	0.1
maximum	2.87	2.71	8.5	2.08	0.84	98.2	99.9	1.7
range	1.35	1.31	2.9	1.20	0.80	2.4	1.6	1.6

YARN

Elongation based – 5 cycles

300%

JRC code	load C1 at 150% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 150% elong gf	load C-5 at 150% elong gf	L5 5th unload mm	L6 6th load mm
094-1	3.71	13.68	11.96	1.34	0.75	22.55	17.59
094-2	5.14	12.36	11.56	1.44	0.90	18.91	11.64
094-3	5.22	11.42	10.79	1.54	0.97	16.48	12.69
094-4	5.29	10.85	9.80	1.55	0.99	15.08	10.79
094-5	5.32	13.59	11.42	1.56	0.95	16.75	13.07
average	**4.93**	**12.38**	**11.10**	**1.49**	**0.91**	**17.95**	**13.16**
SD	**0.69**	**1.27**	**0.84**	**0.10**	**0.10**	**2.91**	**2.63**
RSD	**13.95**	**10.23**	**7.58**	**6.51**	**10.76**	**16.21**	**20.03**
median	5.22	12.36	11.42	1.54	0.95	16.75	12.69
average + SD	5.62	13.65	11.95	1.58	1.01	20.86	15.79
average - SD	4.25	11.11	10.26	1.39	0.81	15.04	10.52
minimum	3.71	10.85	9.80	1.34	0.75	15.08	10.79
maximum	5.32	13.68	11.96	1.56	0.99	22.55	17.59
range	1.61	2.83	2.16	0.22	0.24	7.47	6.80

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
094-1	9.51	7.61	45.1	35.2	19.9	55.9	20.2	90.9	92.0	85.0	88.3
094-2	9.51	7.54	37.8	23.3	20.7	62.5	17.5	91.8	92.3	87.4	92.2
094-3	9.28	7.51	33.0	25.4	19.1	62.7	18.5	92.4	92.8	89.0	91.5
094-4	9.49	7.66	30.2	21.6	19.3	63.9	18.8	92.8	93.5	90.0	92.8
094-5	9.36	7.52	33.5	26.1	19.7	61.2	18.0	90.9	92.4	88.8	91.3
average	**9.43**	**7.57**	**35.9**	**26.3**	**19.7**	**61.3**	**18.6**	**91.8**	**92.6**	**88.0**	**91.2**
uncertainty			**7.2**	**6.5**	**0.8**	**3.9**	**1.2**	**1.0**	**0.7**	**2.4**	**2.2**
SD	**0.10**	**0.07**	**5.8**	**5.3**	**0.6**	**3.2**	**1.0**	**0.8**	**0.6**	**1.9**	**1.8**
RSD	**1.10**	**0.88**	**16.2**	**20.0**	**3.2**	**5.1**	**5.4**	**0.9**	**0.6**	**2.2**	**1.9**
median	9.49	7.54	33.5	25.4	19.7	62.5	18.5	91.8	92.4	88.8	91.5
average + SD	9.53	7.63	41.7	31.6	20.4	64.4	19.6	92.6	93.2	90.0	93.0
average - SD	9.33	7.50	30.1	21.0	19.1	58.1	17.6	90.9	92.0	86.1	89.5
minimum	9.28	7.51	30.2	21.6	19.1	55.9	17.5	90.9	92.0	85.0	88.3
maximum	9.51	7.66	45.1	35.2	20.7	63.9	20.2	92.8	93.5	90.0	92.8
range	0.23	0.15	14.9	13.6	1.6	8.0	2.6	1.9	1.4	5.0	4.5

YARN

Elongation based – 5 cycles

200%

JRC code	load C1 at 100% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 100% elong gf	load C-5 at 100% elong gf	L5 5th unload mm	L6 6th load mm
094-1	2.60	2.89	2.98	1.62	2.11	4.20	2.91
094-2	2.86	3.60	3.04	1.64	2.18	3.96	3.54
094-3	3.25	3.11	3.75	1.60	2.10	5.01	2.33
094-4	3.52	3.21	3.38	1.62	2.12	3.49	0.38
094-5	2.26	4.20	3.28	1.51	1.96	4.56	2.26
average	**2.90**	**3.40**	**3.29**	**1.60**	**2.09**	**4.24**	**2.28**
SD	**0.50**	**0.52**	**0.31**	**0.05**	**0.08**	**0.58**	**1.18**
RSD	**17.26**	**15.15**	**9.38**	**3.04**	**3.92**	**13.58**	**51.73**
median	2.86	3.21	3.28	1.62	2.11	4.20	2.33
average + SD	3.40	3.91	3.59	1.65	2.18	4.82	3.46
average - SD	2.40	2.88	2.98	1.55	2.01	3.67	1.10
minimum	2.26	2.89	2.98	1.51	1.96	3.49	0.38
maximum	3.52	4.20	3.75	1.64	2.18	5.01	3.54
range	1.25	1.31	0.77	0.12	0.22	1.51	3.15

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
094-1	5.82	5.16	8.4	5.8	11.4	130.4	81.1	97.1	97.0	95.8	97.1
094-2	5.98	5.24	7.9	7.1	12.3	133.2	76.1	96.4	97.0	96.0	96.5
094-3	5.96	5.25	10.0	4.7	11.9	131.2	64.7	96.9	96.2	95.0	97.7
094-4	5.86	5.17	7.0	0.8	11.8	130.6	60.3	96.8	96.6	96.5	99.6
094-5	4.50	4.02	9.1	4.5	10.7	129.2	86.5	95.8	96.7	95.4	97.7
average	**5.62**	**4.97**	**8.5**	**4.6**	**11.6**	**130.9**	**73.8**	**96.6**	**96.7**	**95.8**	**97.7**
uncertainty			**1.4**	**2.9**	**0.7**	**1.8**	**13.7**	**0.6**	**0.4**	**0.7**	**1.5**
SD	**0.63**	**0.53**	**1.2**	**2.4**	**0.6**	**1.5**	**11.0**	**0.5**	**0.3**	**0.6**	**1.2**
RSD	**11.25**	**10.73**	**13.6**	**51.7**	**5.2**	**1.1**	**14.9**	**0.5**	**0.3**	**0.6**	**1.2**
median	5.86	5.17	8.4	4.7	11.8	130.6	76.1	96.8	96.7	95.8	97.7
average + SD	6.26	5.50	9.6	6.9	12.2	132.4	84.8	97.1	97.0	96.3	98.9
average - SD	4.99	4.43	7.3	2.2	11.0	129.5	62.7	96.1	96.4	95.2	96.5
minimum	4.50	4.02	7.0	0.8	10.7	129.2	60.3	95.8	96.2	95.0	96.5
maximum	5.98	5.25	10.0	7.1	12.3	133.2	86.5	97.1	97.0	96.5	99.6
range	1.48	1.23	3.0	6.3	1.6	4.0	26.2	1.3	0.8	1.5	3.2

YARN

Elongation based – 5 cycles

200%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
094-1	29.0	31.5	30.5	30.0	95.7	8.6	97.4	5.2	98.3	3.4
094-2	29.0	32.0	31.0	30.0	94.8	10.3	96.6	6.9	98.3	3.4
094-3	31.0	33.5	32.5	31.5	96.0	8.1	97.6	4.8	99.2	1.6
094-4	33.0	35.5	34.5	33.5	96.2	7.6	97.7	4.5	99.2	1.5
094-5	32.0	34.5	33.5	33.0	96.1	7.8	97.7	4.7	98.4	3.1
average					**95.8**	**8.5**	**97.4**	**5.2**	**98.7**	**2.6**
uncertainty					**0.7**	**1.4**	**0.6**	**1.2**	**0.6**	**1.2**
SD					**0.6**	**1.1**	**0.5**	**1.0**	**0.5**	**1.0**
RSD					**0.6**	**13.1**	**0.5**	**18.4**	**0.5**	**37.4**
median					96.0	8.1	97.6	4.8	98.4	3.1
average + SD					96.3	9.6	97.9	6.2	99.2	3.6
average - SD					95.2	7.4	96.9	4.3	98.2	1.6
minimum					94.8	7.6	96.6	4.5	98.3	1.5
maximum					96.2	10.3	97.7	6.9	99.2	3.4
range					1.4	2.8	1.2	2.4	1.0	1.9

Pure elastane from bobbin (sample 095)

YARN

Elongation based – 3 cycles

300%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
095-1	19.03	12.53	34.2	-	-	-	-	-
095-2	18.31	12.09	34.0	-	-	-	-	-
095-3	20.40	13.00	36.3	14.24	5.83	90.5	96.1	11.7
average	**19.25**	**12.54**	**34.8**	**14.24**	**5.83**	**90.5**	**96.1**	**11.7**
uncertainty			**3.2**					
SD	**1.06**	**0.46**	**1.3**	**-**	**-**	**-**	**-**	**-**
RSD	**5.52**	**3.63**	**3.7**	**-**	**-**	**-**	**-**	**-**
median	19.03	12.53	34.2	14.24	5.83	90.5	96.1	11.7
average + SD	20.31	13.00	36.1	-	-	-	-	-
average - SD	18.18	12.08	33.5	-	-	-	-	-
minimum	18.31	12.09	34.0	-	-	-	-	-
maximum	20.40	13.00	36.3	-	-	-	-	-
range	2.09	0.91	2.3	-	-	-	-	-

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
095-1	14.35	10.80	24.7	-	-	-	-	-
095-2	13.79	10.52	23.7	-	-	-	-	-
095-3	15.21	11.42	24.9	17.64	7.99	88.2	94.7	16.0
average	**14.45**	**10.91**	**24.5**	**17.64**	**7.99**	**88.2**	**94.7**	**16.0**
uncertainty			**1.6**					
SD	**0.72**	**0.46**	**0.7**	**-**	**-**	**-**	**-**	**-**
RSD	**4.95**	**4.22**	**2.7**	**-**	**-**	**-**	**-**	**-**
median	14.35	10.80	24.7	17.64	7.99	88.2	94.7	16.0
average + SD	15.17	11.37	25.1	-	-	-	-	-
average - SD	13.73	10.45	23.8	-	-	-	-	-
minimum	13.79	10.52	23.7	-	-	-	-	-
maximum	15.21	11.42	24.9	-	-	-	-	-
range	1.42	0.90	1.2	-	-	-	-	-

YARN

Elongation based – 3 cycles

200%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
095-1	9.61	7.61	20.8	3.84	0.65	96.2	99.4	1.3
095-2	9.52	7.54	20.8	4.28	0.84	95.7	99.2	1.7
095-3	9.39	7.44	20.8	4.06	0.93	95.9	99.1	1.9
095-4	9.41	7.45	20.8	4.67	2.41	95.3	97.6	4.8
095-5	9.33	7.39	20.8	4.73	2.62	95.3	97.4	5.2
095-6	9.39	7.44	20.8	5.28	2.70	94.7	97.3	5.4
average	**9.44**	**7.48**	**20.8**	**4.48**	**1.69**	**95.5**	**98.3**	**3.4**
uncertainty			**0.03**			**0.5**	**1.0**	**2.1**
SD	**0.10**	**0.08**	**0.02**	**0.52**	**0.98**	**0.5**	**1.0**	**2.0**
RSD	**1.09**	**1.08**	**0.1**	**11.67**	**57.83**	**0.5**	**1.0**	**57.8**
median	9.40	7.45	20.8	4.48	1.67	95.5	98.3	3.3
average + SD	9.54	7.56	20.8	5.00	2.67	96.0	99.3	5.3
average - SD	9.34	7.40	20.8	3.95	0.71	95.0	97.3	1.4
minimum	9.33	7.39	20.8	3.84	0.65	94.7	97.3	1.3
maximum	9.61	7.61	20.8	5.28	2.70	96.2	99.4	5.4
range	0.28	0.22	0.1	1.44	2.05	1.4	2.1	4.1

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
095-1	7.85	6.87	12.5	4.08	0.10	95.9	99.9	0.2
095-2	7.74	6.76	12.7	4.41	0.32	95.6	99.7	0.6
095-3	7.65	6.73	12.0	4.48	0.62	95.5	99.4	1.2
095-4	7.68	6.70	12.8	5.20	3.27	94.8	96.7	6.5
095-5	7.62	6.65	12.7	5.42	3.17	94.6	96.8	6.3
095-6	7.64	6.67	12.7	5.45	3.49	94.6	96.5	7.0
average	**7.70**	**6.73**	**12.6**	**4.84**	**1.83**	**95.2**	**98.2**	**3.7**
uncertainty			**0.3**			**0.6**	**1.7**	**3.4**
SD	**0.09**	**0.08**	**0.3**	**0.59**	**1.63**	**0.6**	**1.6**	**3.3**
RSD	**1.12**	**1.18**	**2.2**	**12.15**	**89.41**	**0.6**	**1.7**	**89.4**
median	7.67	6.72	12.7	4.84	1.90	95.2	98.1	3.8
average + SD	7.78	6.81	12.8	5.43	3.46	95.7	99.8	6.9
average - SD	7.61	6.65	12.3	4.25	0.19	94.6	96.5	0.4
minimum	7.62	6.65	12.0	4.08	0.10	94.6	96.5	0.2
maximum	7.85	6.87	12.8	5.45	3.49	95.9	99.9	7.0
range	0.23	0.22	0.7	1.37	3.39	1.4	3.4	6.8

YARN

Elongation based – 3 cycles

200%

Manual method

JRC code	L0 mm	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %	Lc mm	Ld mm	imm rec 2 %	rec 2 %	PD 2 %
095-1	30.0	33.0	31.5	95.0	97.5	5.0	33.5	31.5	94.2	97.5	5.0
095-2	33.0	35.5	34.5	96.2	97.7	4.5	36.0	34.5	95.5	97.7	4.5
095-3	34.0	37.0	36.5	95.6	97.8	7.4	36.5	35.0	94.9	98.5	2.9
095-4	31.0	33.5	32.0	96.0	98.4	3.2	34.0	32.5	95.2	97.6	4.8
095-5	32.0	34.5	33.0	96.1	98.4	3.1	35.0	33.5	95.3	97.7	4.7
average				**95.8**	**98.0**	**4.6**			**95.0**	**97.8**	**4.4**
uncertainty				**0.6**	**0.5**	**2.1**			**0.6**	**0.5**	**1.0**
SD				**0.5**	**0.4**	**1.7**			**0.5**	**0.4**	**0.8**
RSD				**0.5**	**0.4**	**36.9**			**0.5**	**0.4**	**19.0**
median				96.0	97.8	4.5			95.2	97.7	4.7
average + SD				96.3	98.4	6.4			95.5	98.2	5.2
average - SD				95.3	97.5	2.9			94.5	97.4	3.6
minimum				95.0	97.5	3.1			94.2	97.5	2.9
maximum				96.2	98.4	7.4			95.5	98.5	5.0
range				1.2	0.9	4.2			1.3	1.0	2.1

JRC code	Le mm	Lf mm	imm rec 3 %	rec 3 %	PD 3 %
095-1	33.5	32.0	94.2	96.7	6.7
095-2	36.5	35.5	94.7	96.2	7.6
095-3	37.0	36.0	95.6	97.1	5.9
095-4	34.5	33.5	94.4	96.0	8.1
095-5	35.0	34.0	95.3	96.9	6.3
average			**94.8**	**96.6**	**6.9**
uncertainty			**0.8**	**0.6**	**1.1**
SD			**0.6**	**0.5**	**0.9**
RSD			**0.6**	**0.5**	**13.2**
median			94.7	96.7	6.7
average + SD			95.4	97.0	7.8
average - SD			94.2	96.1	6.0
minimum			94.2	96.0	5.9
maximum			95.6	97.1	8.1
range			1.4	1.1	2.2

YARN

Elongation based – 3 cycles

100%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
095-1	5.20	4.60	11.5	1.21	0.20	97.6	99.6	0.4
095-2	5.10	4.53	11.2	1.06	0.66	97.9	98.7	1.3
095-3	5.17	4.57	11.6	1.07	0.54	97.9	98.9	1.1
average	**5.16**	**4.57**	**11.4**	**1.11**	**0.46**	**97.8**	**99.1**	**0.9**
uncertainty			**0.6**			**0.4**	**1.2**	**1.2**
SD	**0.05**	**0.04**	**0.2**	**0.09**	**0.24**	**0.2**	**0.5**	**0.5**
RSD	**0.98**	**0.78**	**2.0**	**7.77**	**50.55**	**0.2**	**0.5**	**50.6**
median	5.17	4.57	11.5	1.07	0.54	97.9	98.9	1.1
average + SD	5.21	4.60	11.7	1.20	0.70	98.0	99.5	1.4
average - SD	5.11	4.53	11.2	1.03	0.23	97.6	98.6	0.5
minimum	5.10	4.53	11.2	1.06	0.20	97.6	98.7	0.4
maximum	5.20	4.60	11.6	1.21	0.66	97.9	99.6	1.3
range	0.10	0.07	0.4	0.15	0.45	0.3	0.9	0.9

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
095-1	4.69	4.41	6.0	1.14	0.35	97.7	99.3	0.7
095-2	4.62	4.37	5.4	1.00	0.61	98.0	98.8	1.2
095-3	4.67	4.38	6.2	0.97	0.52	98.1	99.0	1.0
average	**4.66**	**4.38**	**5.9**	**1.04**	**0.49**	**97.9**	**99.0**	**1.0**
uncertainty			**1.0**			**0.4**	**0.7**	**0.7**
SD	**0.03**	**0.02**	**0.4**	**0.09**	**0.14**	**0.2**	**0.3**	**0.3**
RSD	**0.71**	**0.49**	**7.0**	**8.44**	**27.66**	**0.2**	**0.3**	**27.7**
median	4.67	4.38	6.0	1.00	0.52	98.0	99.0	1.0
average + SD	4.69	4.40	6.3	1.12	0.63	98.1	99.3	1.3
average - SD	4.63	4.36	5.5	0.95	0.36	97.8	98.7	0.7
minimum	4.62	4.37	5.4	0.97	0.35	97.7	98.8	0.7
maximum	4.69	4.41	6.2	1.14	0.61	98.1	99.3	1.2
range	0.06	0.04	0.8	0.16	0.27	0.3	0.5	0.5

YARN

Elongation based – 5 cycles

300%

JRC code	load C1 at 150% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 150% elong gf	load C-5 at 150% elong gf	L5 5th unload mm	L6 6th load mm
095-1	8.65	9.58	7.82	2.70	1.65	13.62	11.16
095-2	8.61	9.49	8.05	2.75	1.70	12.65	9.69
095-3	8.67	10.50	8.94	2.53	1.54	15.70	9.89
095-4	8.47	8.47	7.27	2.67	1.69	13.81	9.89
095-5	8.53	13.41	11.40	2.42	1.48	17.14	11.34
average	**8.58**	**10.29**	**8.70**	**2.61**	**1.61**	**14.58**	**10.39**
SD	**0.08**	**1.88**	**1.63**	**0.13**	**0.10**	**1.81**	**0.79**
RSD	**0.97**	**18.31**	**18.70**	**5.11**	**6.18**	**12.38**	**7.60**
median	8.61	9.58	8.05	2.67	1.65	13.81	9.89
average + SD	8.67	12.18	10.32	2.75	1.71	16.39	11.18
average - SD	8.50	8.41	7.07	2.48	1.51	12.78	9.60
minimum	8.47	8.47	7.27	2.42	1.48	12.65	9.69
maximum	8.67	13.41	11.40	2.75	1.70	17.14	11.34
range	0.20	4.94	4.13	0.33	0.23	4.49	1.65

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
095-1	14.99	12.17	27.2	22.3	18.8	61.1	19.1	93.6	94.8	90.9	92.6
095-2	15.11	12.24	25.3	19.4	19.0	61.9	19.8	93.7	94.6	91.6	93.5
095-3	15.23	12.17	31.4	19.8	20.1	60.8	17.8	93.0	94.0	89.5	93.4
095-4	14.54	11.74	27.6	19.8	19.3	63.3	20.0	94.4	95.2	90.8	93.4
095-5	14.93	11.94	34.3	22.7	20.0	60.9	17.3	91.1	92.4	88.6	92.4
average	**14.96**	**12.05**	**29.2**	**20.8**	**19.4**	**61.6**	**18.8**	**93.1**	**94.2**	**90.3**	**93.1**
uncertainty			**4.5**	**2.0**	**0.7**	**1.3**	**1.5**	**1.6**	**1.3**	**1.5**	**0.7**
SD	**0.26**	**0.21**	**3.6**	**1.6**	**0.6**	**1.1**	**1.2**	**1.3**	**1.1**	**1.2**	**0.5**
RSD	**1.75**	**1.72**	**12.4**	**7.6**	**3.1**	**1.7**	**6.4**	**1.4**	**1.2**	**1.3**	**0.6**
median	14.99	12.17	27.6	19.8	19.3	61.1	19.1	93.6	94.6	90.8	93.4
average + SD	15.22	12.26	32.8	22.4	20.0	62.7	20.0	94.4	95.3	91.5	93.6
average - SD	14.70	11.84	25.6	19.2	18.8	60.5	17.6	91.9	93.1	89.1	92.6
minimum	14.54	11.74	25.3	19.4	18.8	60.8	17.3	91.1	92.4	88.6	92.4
maximum	15.23	12.24	34.3	22.7	20.1	63.3	20.0	94.4	95.2	91.6	93.5
range	0.69	0.50	9.0	3.3	1.3	2.5	2.7	3.3	2.8	3.0	1.1

YARN

Elongation based – 5 cycles

200%

JRC code	load C1 at 100% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 100% elong gf	load C-5 at 100% elong gf	L5 5th unload mm	L6 6th load mm
095-1	5.76	3.19	2.86	2.70	3.40	3.93	2.94
095-2	5.69	2.79	2.74	2.73	3.36	3.66	2.67
095-3	5.69	3.16	3.13	2.73	3.40	3.87	2.82
095-4	5.75	3.01	3.40	2.71	3.29	4.39	2.93
095-5	5.91	2.57	2.84	2.73	3.38	3.39	2.36
average	**5.76**	**2.94**	**2.99**	**2.72**	**3.36**	**3.85**	**2.75**
SD	**0.09**	**0.26**	**0.27**	**0.01**	**0.04**	**0.37**	**0.24**
RSD	**1.60**	**8.95**	**8.94**	**0.53**	**1.33**	**9.67**	**8.78**
median	5.75	3.01	2.86	2.73	3.38	3.87	2.82
average + SD	5.85	3.20	3.26	2.73	3.41	4.22	2.99
average - SD	5.67	2.68	2.73	2.70	3.32	3.48	2.50
minimum	5.69	2.57	2.74	2.70	3.29	3.39	2.36
maximum	5.91	3.19	3.40	2.73	3.40	4.39	2.94
range	0.23	0.62	0.66	0.03	0.11	1.01	0.58

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
095-1	9.16	8.07	7.9	5.9	11.9	125.8	58.9	96.8	97.1	96.1	97.1
095-2	9.06	8.01	7.3	5.3	11.6	123.0	59.1	97.2	97.3	96.3	97.3
095-3	9.12	8.02	7.8	5.6	12.0	124.5	59.7	96.8	96.9	96.1	97.2
095-4	9.13	8.01	8.8	5.9	12.3	121.6	57.3	97.0	96.6	95.6	97.1
095-5	9.47	8.33	6.8	4.7	12.0	124.0	57.2	97.4	97.2	96.6	97.6
average	**9.19**	**8.09**	**7.7**	**5.5**	**12.0**	**123.8**	**58.4**	**97.1**	**97.0**	**96.2**	**97.3**
uncertainty			**0.9**	**0.6**	**0.3**	**1.9**	**1.4**	**0.3**	**0.3**	**0.5**	**0.3**
SD	**0.16**	**0.14**	**0.7**	**0.5**	**0.2**	**1.6**	**1.2**	**0.3**	**0.3**	**0.4**	**0.2**
RSD	**1.76**	**1.71**	**9.7**	**8.8**	**2.0**	**1.3**	**2.0**	**0.3**	**0.3**	**0.4**	**0.2**
median	9.13	8.02	7.8	5.6	12.0	124.0	58.9	97.0	97.1	96.1	97.2
average + SD	9.35	8.23	8.4	6.0	12.2	125.4	59.6	97.3	97.3	96.5	97.5
average - SD	9.03	7.95	7.0	5.0	11.7	122.2	57.3	96.8	96.7	95.8	97.0
minimum	9.06	8.01	6.8	4.7	11.6	121.6	57.2	96.8	96.6	95.6	97.1
maximum	9.47	8.33	8.8	5.9	12.3	125.8	59.7	97.4	97.3	96.6	97.6
range	0.41	0.33	2.0	1.2	0.7	4.2	2.6	0.6	0.7	1.0	0.6

YARN

Elongation based – 5 cycles

200%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
095-1	29.0	31.5	30.5	30.0	95.7	8.6	97.4	5.2	98.3	3.4
095-2	30.0	32.5	31.5	31.0	95.9	8.3	97.5	5.0	98.3	3.3
095-3	31.0	33.5	32.5	32.0	96.0	8.1	97.6	4.8	98.4	3.2
095-4	28.0	30.5	29.5	29.0	95.5	8.9	97.3	5.4	98.2	3.6
095-5	31.0	33.5	32.5	32.0	96.0	8.1	97.6	4.8	98.4	3.2
average					**95.8**	**8.4**	**97.5**	**5.0**	**98.3**	**3.4**
uncertainty					**0.2**	**0.5**	**0.1**	**0.3**	**0.1**	**0.2**
SD					**0.2**	**0.4**	**0.1**	**0.2**	**0.1**	**0.1**
RSD					**0.2**	**4.4**	**0.1**	**4.4**	**0.1**	**4.4**
median					95.9	8.3	97.5	5.0	98.3	3.3
average + SD					96.0	8.8	97.6	5.3	98.4	3.5
average - SD					95.6	8.0	97.4	4.8	98.2	3.2
minimum					95.5	8.1	97.3	4.8	98.2	3.2
maximum					96.0	8.9	97.6	5.4	98.4	3.6
range					0.4	0.9	0.3	0.5	0.2	0.3

Elastane extracted from fabric (sample 096)

YARN

Elongation based – 3 cycles

300%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
096-1	8.00	5.19	35.1	29.47	5.09	80.4	96.6	10.2
096-2	7.73	5.00	35.3	35.75	11.60	76.2	92.3	23.2
096-3	6.91	4.60	33.4	19.06	4.75	87.3	96.8	9.5
average	7.55	4.93	34.6	28.09	7.15	81.3	95.2	14.3
uncertainty			2.6			14.0	6.4	19.2
SD	0.57	0.30	1.0	8.43	3.86	5.6	2.6	7.7
RSD	7.50	6.17	3.0	29.99	54.00	6.9	2.7	54.0
median	7.73	5.00	35.1	29.47	5.09	80.4	96.6	10.2
average + SD	8.12	5.23	35.7	36.52	11.01	86.9	97.8	22.0
average - SD	6.98	4.63	33.6	19.67	3.29	75.7	92.7	6.6
minimum	6.91	4.60	33.4	19.06	4.75	76.2	92.3	9.5
maximum	8.00	5.19	35.3	35.75	11.60	87.3	96.8	23.2
range	1.09	0.60	1.9	16.68	6.85	11.1	4.6	13.7

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
096-1	5.78	4.04	30.1	40.84	14.90	72.8	90.1	29.8
096-2	5.73	4.10	28.4	24.84	10.06	83.4	93.3	20.1
096-3	4.93	3.63	26.4	19.46	6.90	87.0	95.4	13.8
average	5.48	3.92	28.3	28.38	10.62	81.1	92.9	21.2
uncertainty			4.6			18.4	6.7	20.0
SD	0.48	0.26	1.9	11.13	4.03	7.4	2.7	8.1
RSD	8.69	6.51	6.6	39.20	37.96	9.2	2.9	37.9
median	5.73	4.04	28.4	24.84	10.06	83.4	93.3	20.1
average + SD	5.96	4.18	30.2	39.51	14.65	88.5	95.6	29.3
average - SD	5.00	3.67	26.4	17.25	6.59	73.7	90.2	13.2
minimum	4.93	3.63	26.4	19.46	6.90	72.8	90.1	13.8
maximum	5.78	4.10	30.1	40.84	14.90	87.0	95.4	29.8
range	0.85	0.47	3.7	21.39	8.00	14.3	5.3	16.0

YARN

Elongation based – 3 cycles

200%

JRC code	load C1 gf	load C2 gf	SD 1 %	La mm	Lb mm	imm rec 1 %	rec 1 %	PD 1 %
096-1	5.09	4.00	21.4	13.64	11.30	86.4	88.7	22.6
096-2	4.77	3.78	20.8	9.46	7.88	90.5	92.1	15.8
096-3	4.39	3.53	19.6	11.85	12.69	88.2	87.3	25.4
average	**4.75**	**3.77**	**20.6**	**11.65**	**10.62**	**88.4**	**89.4**	**21.2**
uncertainty			**2.3**			**5.2**	**6.2**	**12.3**
SD	**0.35**	**0.23**	**0.9**	**2.10**	**2.48**	**2.1**	**2.5**	**5.0**
RSD	**7.42**	**6.20**	**4.5**	**18.00**	**23.31**	**2.4**	**2.8**	**23.3**
median	4.77	3.78	20.8	11.85	11.30	88.2	88.7	22.6
average + SD	5.10	4.00	21.5	13.75	13.10	90.4	91.9	26.2
average - SD	4.40	3.53	19.7	9.56	8.15	86.3	86.9	16.3
minimum	4.39	3.53	19.6	9.46	7.88	86.4	87.3	15.8
maximum	5.09	4.00	21.4	13.64	12.69	90.5	92.1	25.4
range	0.70	0.47	1.8	4.18	4.81	4.2	4.8	9.6

JRC code	load C3 gf	load C4 gf	SD 4 %	Lc mm	Ld mm	imm rec 3 %	rec 3 %	PD 3 %
096-1	4.00	3.31	17.3	13.96	12.46	86.0	87.5	24.9
096-2	3.86	3.29	14.8	7.86	7.45	92.1	92.6	14.9
096-3	3.70	3.17	14.3	11.66	11.04	88.3	89.0	22.1
average	**3.85**	**3.26**	**15.4**	**11.16**	**10.31**	**88.8**	**89.7**	**20.6**
uncertainty			**3.9**			**7.7**	**6.4**	**12.8**
SD	**0.15**	**0.08**	**1.6**	**3.08**	**2.58**	**3.1**	**2.6**	**5.2**
RSD	**3.91**	**2.34**	**10.2**	**27.60**	**25.02**	**3.5**	**2.9**	**25.0**
median	3.86	3.29	14.8	11.66	11.04	88.3	89.0	22.1
average + SD	4.00	3.33	17.0	14.24	12.90	91.9	92.3	25.8
average - SD	3.70	3.18	13.9	8.08	7.73	85.8	87.1	15.5
minimum	3.70	3.17	14.3	7.86	7.45	86.0	87.5	14.9
maximum	4.00	3.31	17.3	13.96	12.46	92.1	92.6	24.9
range	0.30	0.14	2.9	6.10	5.01	6.1	5.0	10.0

Measured at 0.15 gf

YARN

Elongation based – 3 cycles

200%

JRC code	load C1	load C2	SD 1	La	Lb	imm rec 1	rec 1	PD 1
	gf	gf	%	mm	mm	%	%	%
096-1	4.22	3.33	21.1	4.22	4.70	95.8	95.3	9.4
096-2	4.53	3.57	21.2	0.69	2.10	99.3	97.9	4.2
096-3	4.83	3.80	21.3	0.34	-	99.7	-	-
average	4.53	3.57	21.2	1.75	3.40	98.3	96.6	6.8
uncertainty			0.3			5.3	16.5	33.0
SD	0.30	0.24	0.1	2.14	1.84	2.1	1.8	3.7
RSD	6.66	6.60	0.6	122.39	54.02	2.2	1.9	54.1
median	4.53	3.57	21.2	0.69	3.40	99.3	96.6	6.8
average + SD	4.83	3.80	21.3	3.90	5.23	100.4	98.4	10.5
average - SD	4.23	3.33	21.1	-0.39	1.56	96.1	94.8	3.1
minimum	4.22	3.33	21.1	0.34	2.10	95.8	95.3	4.2
maximum	4.83	3.80	21.3	4.22	4.70	99.7	97.9	9.4
range	0.60	0.47	0.2	3.88	2.60	3.9	2.6	5.2

JRC code	load C3	load C4	SD 4	Lc	Ld	imm rec 3	rec 3	PD 3
	gf	gf	%	mm	mm	%	%	%
096-1	3.35	2.87	14.3	3.42	3.39	96.6	96.6	6.8
096-2	3.60	3.16	12.2	0.11	1.10	99.9	98.9	2.2
096-3	3.95	3.39	14.2	0.35	-	99.7	-	-
average	3.63	3.14	13.6	1.29	2.24	98.7	97.8	4.5
uncertainty			2.9			4.6	14.6	29.1
SD	0.30	0.26	1.2	1.84	1.62	1.8	1.6	3.2
RSD	8.32	8.35	8.7	142.44	72.36	1.9	1.7	72.1
median	3.60	3.16	14.2	0.35	2.24	99.7	97.8	4.5
average + SD	3.94	3.40	14.8	3.14	3.87	100.6	99.4	7.7
average - SD	3.33	2.88	12.4	-0.55	0.62	96.9	96.1	1.3
minimum	3.35	2.87	12.2	0.11	1.10	96.6	96.6	2.2
maximum	3.95	3.39	14.3	3.42	3.39	99.9	98.9	6.8
range	0.60	0.52	2.1	3.31	2.30	3.3	2.3	4.6

Measured at 0.0 gf

YARN

Elongation based – 3 cycles

200%

Manual method

JRC code	L0	La	Lb	imm rec 1	rec 1	PD 1	Lc	Ld	imm rec 2	rec 2	PD 2
	mm	mm	mm	%	%	%	mm	mm	%	%	%
096-1	31.0	34.0	32.5	95.2	97.6	4.8	36.0	35.0	91.9	93.6	12.9
096-2	30.0	34.0	33.0	93.3	95.0	10.0	35.0	33.5	91.7	94.2	11.7
096-3	29.0	32.0	31.0	94.8	96.6	6.9	33.0	32.5	93.1	94.0	12.1
096-4	30.0	33.5	32.5	94.2	95.8	8.3	34.5	34.0	92.5	93.3	13.3
096-5	32.0	35.0	34.0	95.3	96.9	6.3	35.5	34.5	94.5	96.1	7.8
average				**94.6**	**96.4**	**7.3**			**92.7**	**94.2**	**11.6**
uncertainty				**1.0**	**1.2**	**2.5**			**1.4**	**1.4**	**2.7**
SD				**0.8**	**1.0**	**2.0**			**1.1**	**1.1**	**2.2**
RSD				**0.9**	**1.0**	**27.3**			**1.2**	**1.2**	**19.0**
median				94.8	96.6	6.9			92.5	94.0	12.1
average + SD				95.4	97.4	9.2			93.9	95.3	13.8
average - SD				93.7	95.4	5.3			91.6	93.1	9.4
minimum				93.3	95.0	4.8			91.7	93.3	7.8
maximum				95.3	97.6	10.0			94.5	96.1	13.3
range				2.0	2.6	5.2			2.9	2.8	5.5

JRC code	Le	Lf	imm rec 3	rec 3	PD 3
	mm	mm	%	%	%
096-1	36.5	35.0	91.1	93.6	12.9
096-2	35.0	34.0	91.7	93.3	13.3
096-3	33.0	32.0	93.1	94.8	10.3
096-4	34.5	33.5	92.5	94.2	11.7
096-5	36.0	35.0	93.8	95.3	9.4
average			**92.4**	**94.2**	**11.5**
uncertainty			**1.3**	**1.0**	**2.1**
SD			**1.1**	**0.8**	**1.7**
RSD			**1.1**	**0.9**	**14.5**
median			92.5	94.2	11.7
average + SD			93.5	95.1	13.2
average - SD			91.4	93.4	9.9
minimum			91.1	93.3	9.4
maximum			93.8	95.3	13.3
range			2.6	2.0	4.0

YARN

Elongation based – 5 cycles

300%

JRC code	load C1 at 150% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 150% elong gf	load C-5 at 150% elong gf	L5 5th unload mm	L6 6th load mm
096-1	3.66	13.41	11.40	0.73	0.41	20.00	16.35
096-2	3.68	14.07	8.99	0.75	0.39	20.26	16.59
096-3	3.64	12.66	7.54	0.87	0.52	12.14	10.19
096-4	3.69	12.64	8.81	0.87	0.50	12.40	7.23
096-5	3.59	13.94	10.61	0.82	0.46	14.99	10.66
average	**3.65**	**13.34**	**9.47**	**0.81**	**0.46**	**15.96**	**12.20**
SD	**0.04**	**0.68**	**1.54**	**0.06**	**0.06**	**3.97**	**4.11**
RSD	**1.03**	**5.10**	**16.22**	**8.00**	**12.13**	**24.87**	**33.68**
median	3.66	13.41	8.99	0.82	0.46	14.99	10.66
average + SD	3.69	14.03	11.01	0.87	0.51	19.93	16.32
average - SD	3.61	12.66	7.93	0.74	0.40	11.99	8.09
minimum	3.59	12.64	7.54	0.73	0.39	12.14	7.23
maximum	3.69	14.07	11.40	0.87	0.52	20.26	16.59
range	0.10	1.43	3.86	0.14	0.13	8.12	9.36

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
096-1	5.76	4.63	40.0	32.7	19.7	56.3	11.3	91.1	92.4	86.7	89.1
096-2	5.84	4.65	40.5	33.2	20.4	51.9	10.7	90.6	94.0	86.5	88.9
096-3	5.93	4.76	24.3	20.4	19.8	59.4	14.2	91.6	95.0	91.9	93.2
096-4	5.98	4.76	24.8	14.5	20.4	58.0	13.6	91.6	94.1	91.7	95.2
096-5	5.89	4.60	30.0	21.3	21.9	55.8	12.7	90.7	92.9	90.0	92.9
average	**5.88**	**4.68**	**31.9**	**24.4**	**20.4**	**56.3**	**12.5**	**91.1**	**93.7**	**89.4**	**91.9**
uncertainty			**9.9**	**10.2**	**1.1**	**3.5**	**1.9**	**0.6**	**1.3**	**3.3**	**3.4**
SD	**0.08**	**0.07**	**7.9**	**8.2**	**0.9**	**2.8**	**1.5**	**0.5**	**1.0**	**2.7**	**2.7**
RSD	**1.41**	**1.57**	**24.9**	**33.7**	**4.4**	**5.0**	**12.2**	**0.5**	**1.1**	**3.0**	**3.0**
median	5.89	4.65	30.0	21.3	20.4	56.3	12.7	91.1	94.0	90.0	92.9
average + SD	5.96	4.75	39.9	32.6	21.3	59.1	14.0	91.6	94.7	92.0	94.6
average - SD	5.80	4.61	24.0	16.2	19.5	53.5	11.0	90.7	92.7	86.7	89.1
minimum	5.76	4.60	24.3	14.5	19.7	51.9	10.7	90.6	92.4	86.5	88.9
maximum	5.98	4.76	40.5	33.2	21.9	59.4	14.2	91.6	95.0	91.9	95.2
range	0.21	0.16	16.2	18.7	2.2	7.5	3.6	1.0	2.6	5.4	6.2

YARN

Elongation based – 5 cycles

200%

JRC code	load C1 at 100% elong gf	L1 1st unload mm	L2 2nd load mm	load C5 at 100% elong gf	load C-5 at 100% elong gf	L5 5th unload mm	L6 6th load mm
096-1	1.68	1.14	1.62	0.69	1.07	1.70	4.62
096-2	1.35	1.80	1.57	0.70	1.09	1.72	2.41
096-3	2.14	1.58	0.80	0.79	1.10	1.60	-
096-4	1.23	1.39	0.61	0.77	1.04	1.72	-
096-5	1.43	1.74	0.57	0.82	1.06	1.71	-
average	**1.56**	**1.53**	**1.03**	**0.76**	**1.07**	**1.69**	**3.52**
SD	**0.36**	**0.27**	**0.52**	**0.06**	**0.02**	**0.05**	**1.56**
RSD	**23.05**	**17.60**	**50.05**	**7.83**	**2.03**	**2.89**	**44.49**
median	1.43	1.58	0.80	0.77	1.07	1.71	3.52
average + SD	1.93	1.80	1.55	0.82	1.09	1.74	5.08
average - SD	1.20	1.26	0.52	0.70	1.05	1.64	1.95
minimum	1.23	1.14	0.57	0.69	1.04	1.60	2.41
maximum	2.14	1.80	1.62	0.82	1.10	1.72	4.62
range	0.91	0.66	1.05	0.13	0.06	0.12	2.21

JRC code	load C6 imm gf	load C6 30 sec gf	imm PD 5 %	PD 5 30 sec %	SD 6 %	H5 %	HR %	imm rec 1 %	rec 1 %	imm rec 5 %	rec 5 30 sec %
096-1	3.87	3.39	3.4	9.3	12.3	154.0	63.3	98.9	98.4	98.3	95.4
096-2	3.76	3.33	3.4	4.8	11.6	156.1	80.8	98.2	98.4	98.3	97.6
096-3	3.77	3.35	3.2	-	11.3	138.4	51.5	98.4	99.2	98.4	-
096-4	3.29	2.93	3.4	-	11.0	135.3	84.9	98.6	99.4	98.3	-
096-5	3.36	3.01	3.4	-	10.5	128.9	74.5	98.3	99.4	98.3	-
average	**3.61**	**3.20**	**3.4**	**7.0**	**11.3**	**142.5**	**71.0**	**98.5**	**99.0**	**98.3**	**96.5**
uncertainty			**0.1**	**28.1**	**0.8**	**14.8**	**16.9**	**0.3**	**0.6**	**0.1**	**14.1**
SD	**0.26**	**0.21**	**0.1**	**3.1**	**0.7**	**12.0**	**13.6**	**0.3**	**0.5**	**0.0**	**1.6**
RSD	**7.31**	**6.71**	**2.9**	**44.5**	**6.0**	**8.4**	**19.2**	**0.3**	**0.5**	**0.0**	**1.6**
median	3.76	3.33	3.4	7.0	11.3	138.4	74.5	98.4	99.2	98.3	96.5
average + SD	3.88	3.42	3.5	10.2	12.0	154.5	84.6	98.7	99.5	98.4	98.0
average - SD	3.35	2.99	3.3	3.9	10.7	130.6	57.4	98.2	98.4	98.3	94.9
minimum	3.29	2.93	3.2	4.8	10.5	128.9	51.5	98.2	98.4	98.3	95.4
maximum	3.87	3.39	3.4	9.3	12.3	156.1	84.9	98.9	99.4	98.4	97.6
range	0.58	0.46	0.2	4.4	1.8	27.2	33.4	0.7	1.0	0.1	2.2

YARN

Elongation based – 5 cycles

200%

Manual method

JRC code	L0	La	Lb	Lc	imm rec 5	imm PD5	rec 5	PD5	rec 5	PD 5
		imm	30 sec	1 min			30 sec	30 sec	1 min	1 min
	mm	mm	mm	mm	%	%	%	%	%	%
096-1	27.0	29.0	28.0	27.5	96.3	7.4	98.2	3.7	99.1	1.9
096-2	34.0	36.5	35.0	34.5	96.3	7.4	98.5	2.9	99.3	1.5
096-3	33.0	35.5	34.5	34.0	96.2	7.6	97.7	4.5	98.5	3.0
096-4	28.0	30.0	29.0	28.5	96.4	7.1	98.2	3.6	99.1	1.8
096-5	30.0	32.0	31.0	30.5	96.7	6.7	98.3	3.3	99.2	1.7
average					**96.4**	**7.2**	**98.2**	**3.6**	**99.0**	**2.0**
uncertainty					**0.2**	**0.4**	**0.4**	**0.7**	**0.4**	**0.8**
SD					**0.2**	**0.4**	**0.3**	**0.6**	**0.3**	**0.6**
RSD					**0.2**	**4.8**	**0.3**	**16.4**	**0.3**	**31.4**
median					96.3	7.4	98.2	3.6	99.1	1.8
average + SD					96.6	7.6	98.5	4.2	99.3	2.6
average - SD					96.2	6.9	97.9	3.0	98.7	1.3
minimum					96.2	6.7	97.7	2.9	98.5	1.5
maximum					96.7	7.6	98.5	4.5	99.3	3.0
range					0.5	0.9	0.8	1.6	0.8	1.6

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Abstract
In December 2003, the European Commission's Joint Research Centre (JRC) was entrusted by DG Enterprise to verify the validity and applicability of the testing methods, proposed by DuPont, for the identification, characterisation and quantification of their new fibre (elastomultiester). This is an elastic bicomponent fibre made by a combination of two different polyesters (side-by-side structure). The elastic properties are due to crimps that are formed, after heat treatment, and due to the different shrinkage of the two components. The crimp is not mechanically induced and the yarn can be used directly, as no texturing or covering before weaving is needed.
Experimental results confirmed that microscopy and differential scanning calorimetry (DSC) can identify both the multicomponent nature of the new fibre and its chemical composition, whereas Fourier Transform Infrared Spectroscopy (FT-IR) can confirm only its chemical composition.
The normal pre-treatment, described in Directive 96/73/EC, was proved to be applicable to the new bicomponent fibre and the agreed allowance value of 1.50 % was adopted for the new fibre, in agreement with the European Network of National Experts on Textile Labelling (ENNETL). The solubility properties of elastomultiester were evaluated. In particular, the chemical methods 1, 2, 4, 6 – 9, 13 and 14 of Directive 96/73/EC were tested and considered suitable for the quantification of elastomultiester in binary mixtures with other fibres. With the exception of method 14, the novel fibre was insoluble in all the mentioned methods and showed correction factors *d* equal to the ones of polyester (1.00 for methods 1, 2, 4, 7, 9, 13 and 1.01 for methods 6 and 8, respectively). In addition, also the manual separation method described in Directive 96/73/EC was proved to be suitable for the quantification of elastomultiester in binary mixtures with other fibres.
A new quantitative method based on DSC was developed and successfully applied to the quantification of binary mixtures of elastomultiester with polyester and cotton and to ternary mixtures with polyester/cotton, polyester/viscose and modal/viscose. The method is also applicable to mixtures of elastomultiester with nylon. It led to a good repeatability and results were generally as good as the ones obtained with chemical methods. The comparison with quantification based on the manual separation method showed differences usually lower than 1 %. The method shows two important advantages, the first being the rapidity of the analysis and the second being the possibility to avoid manual separation in the quantification of mixtures polyester/elastomultiester.
The JRC developed a method to measure the recoverable stretch and the permanent deformation of yarns and single filaments based on elongation. Experiments performed on single filaments of elastomultiester showed that, at 50 % elongation, the novel fibre is intrinsically elastic and proved that the elasticity is not due to the construction of yarns and to the fact that they contain several single filaments; on the contrary single filaments are as elastic as yarns. In fact, in these conditions the per cent permanent deformations were usually lower than or equal to 10 %.
Based on experimental results, discussions during the 2nd, 3rd, and 4th ENNETL meetings, the name and definition agreed and proposed for the new fibre were "elastomultiester: fibre formed by interaction of two or more chemically distinct linear macromolecules in two or more distinct phases (of which none exceeds 85 % by mass) which contains ester groups as dominant functional unit (at least 85 %) and which, after suitable treatment, when stretched to one and half times its original length and released, recovers rapidly and substantially to its original length".

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

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