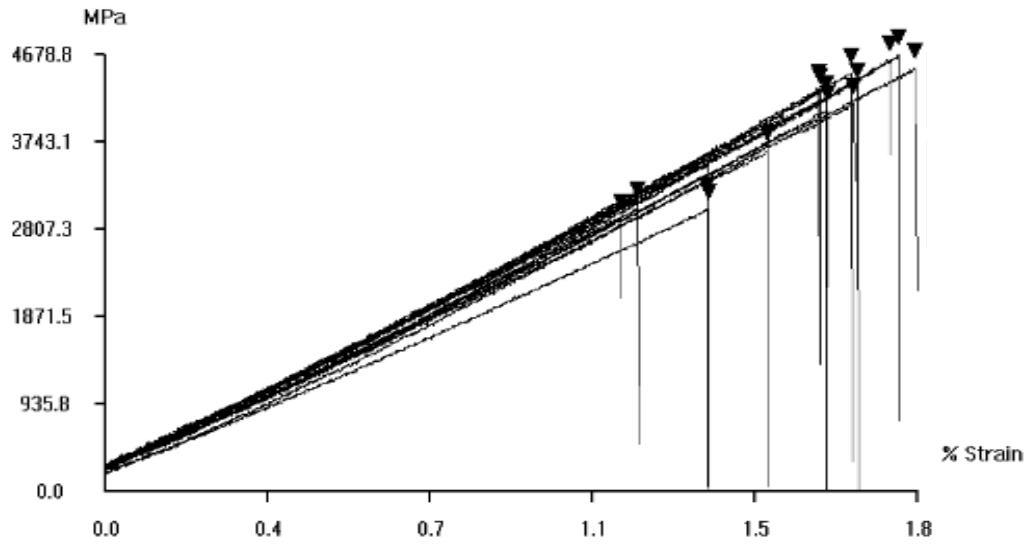

DIA-STRON
DELIVERING MEASUREMENT SOLUTIONS

Tensile and dimensional data acquired using Dia-Stron instruments for natural and synthetic fibre testing

Carbon Fibres

- Dimensional and tensile properties of both virgin and recycled carbon fibres obtained using the Dia-Stron LDS0200*/LEX820 system
- Samples mounted on one-part plastic tabs across a range of gauge lengths

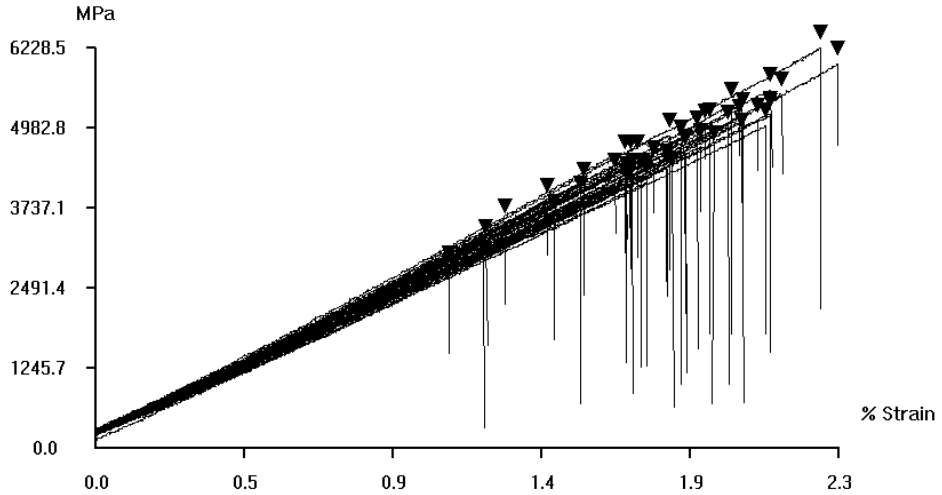


Toray T700S	Unit	Dia-Stron LDS/LEX	Product Specification
Fibre Diameter	µm	6.76	7
Modulus	GPa	226.28	230
Break Strain	%	1.58	2.1
Break Stress	MPa	4011.19	4900

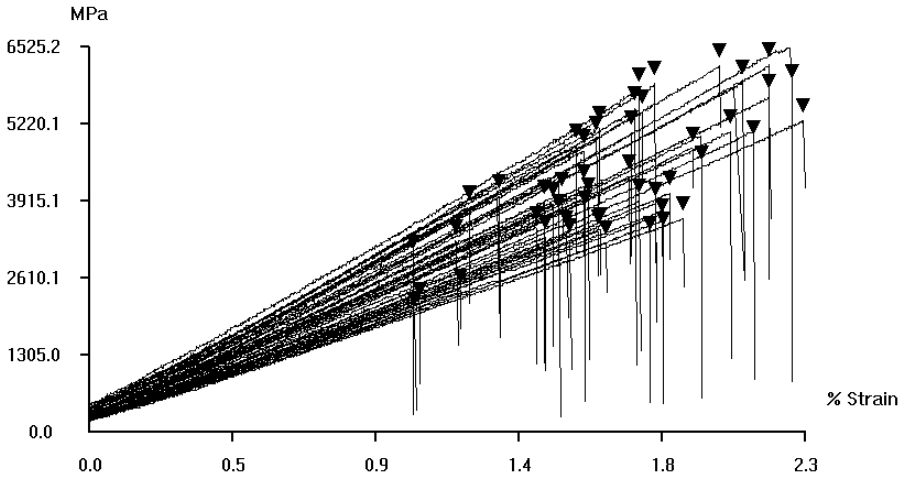
* Dimensional properties of carbon fibres can also be measured using the Dia-Stron FDAS770

Comparison of Virgin and Recycled Carbon Fibres

Virgin Carbon Fibres

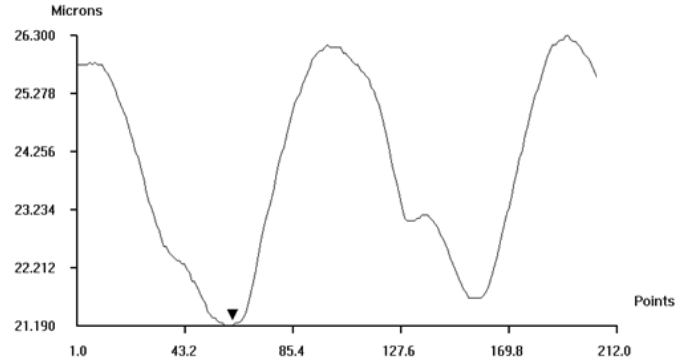


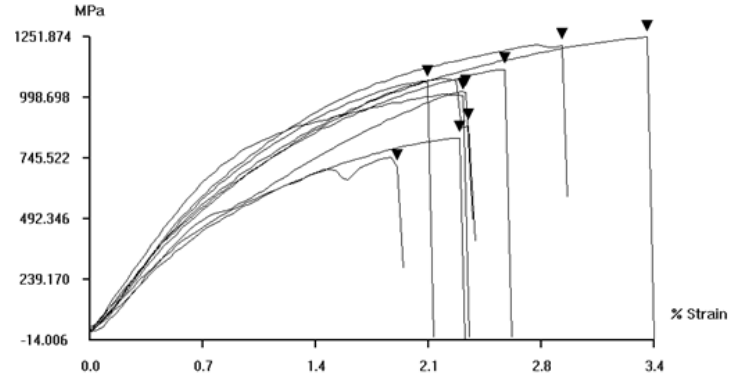
Recycled Carbon Fibres



CNT Yarn

- Dimensional and tensile properties of carbon nanotube yarns obtained using the Dia-Stron FDAS770/LEX820 system
- Samples mounted on one-part plastic tabs across a range of gauge lengths

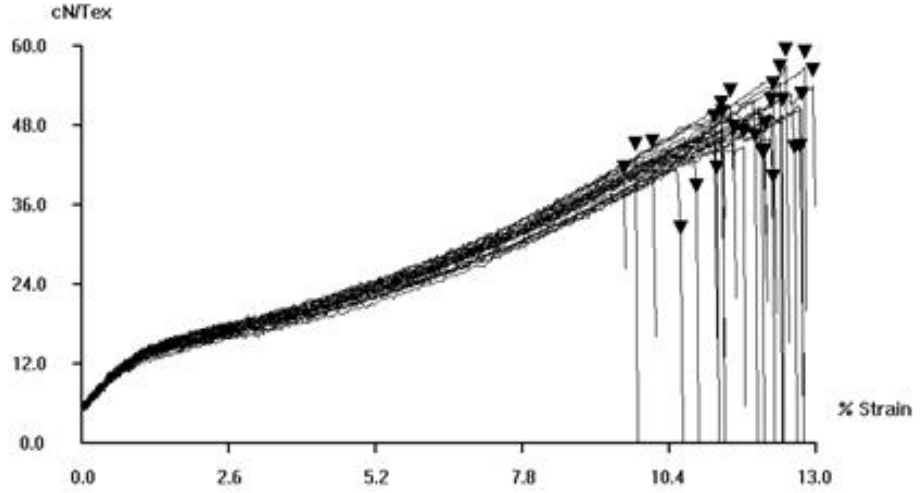




Galvorn CNT fibre (20 micron)	Unit	Dia-Stron LDS/LEX
Fibre Diameter	µm	26.32
Cross-sectional area	μm^2	533.17
Modulus	GPa	78.67
Break Strain	%	2.45
Breal Load	N	0.49
Break Stress	MPa	1010.91

PAN Fibres

- Dimensional and tensile properties of both polyacrylonitrile fibres obtained using the Dia-Stron FDAS770/LEX820 system
- Samples mounted on one-part plastic tabs across a range of gauge lengths

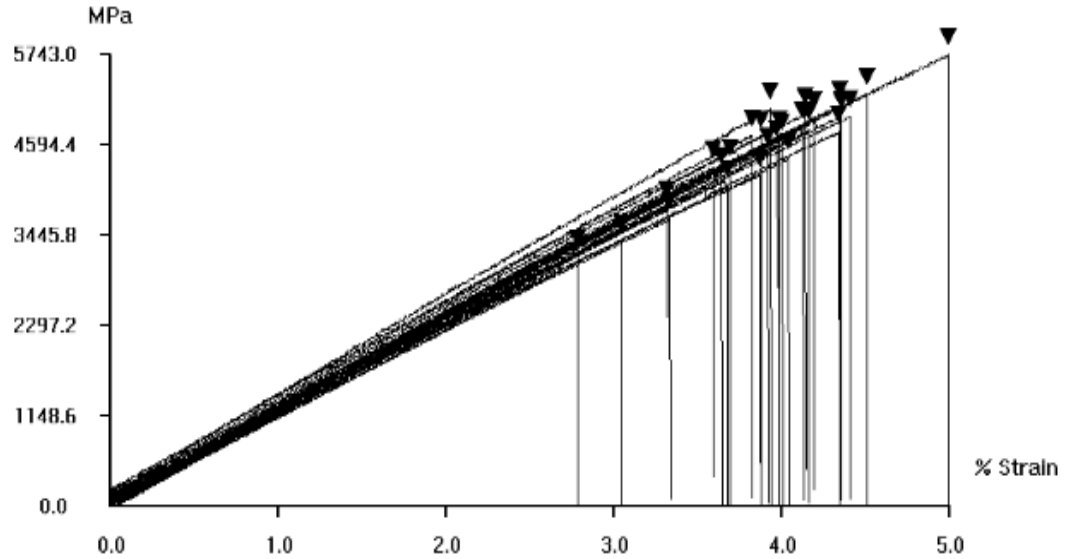


Parameter	Unit	Mean Value
Diameter	µm	12.97
Cross-sectional area	μm^2	129.39
Initial Modulus[1]	GPa	13.02
Break strain	%	12.37
Break Stress	MPa	679.76
Specific Stress[2]	cN/tex	47.41

1. Modulus calculated between 0.2-0.8% strain
2. Specific stress based on linear density of 1.77 dtex

Basalt Fibre

- Measurements obtained using the Dia-Stron LDS0200*/LEX820 system
- Samples mounted on one-part plastic tabs across a range of gauge lengths

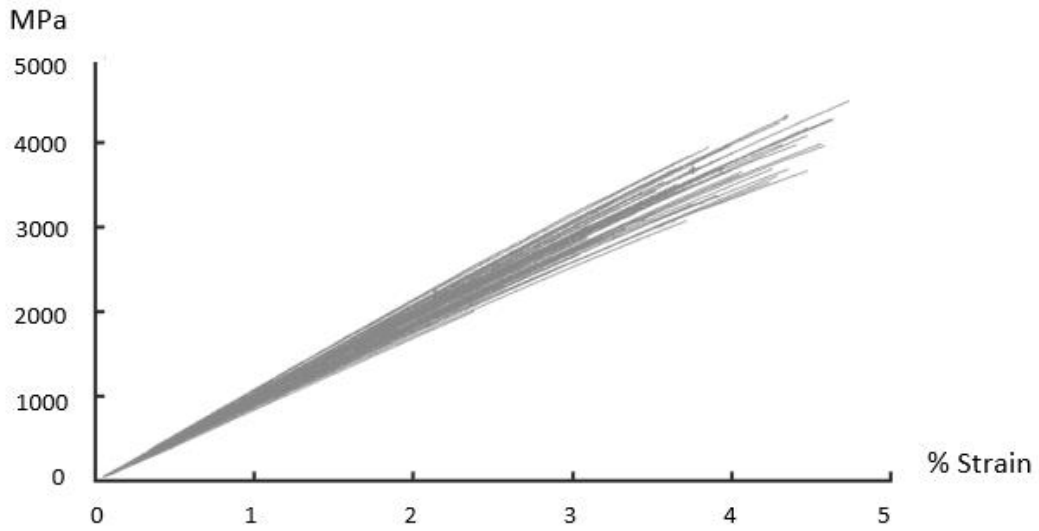


Mafic (assembled roving)	Unit	Dia-Stron	Generic Data
Fibre Diameter	µm	10.4	13 – 19
Modulus	GPa	112.9	86 – 92
Break Strain	%	3.85	3.5
Break Stress	MPa	4363	2900 - 3100

* Dimensional properties of basalt fibres can also be measured using the Dia-Stron FDAS770

Glass Fibre (E-Glass)

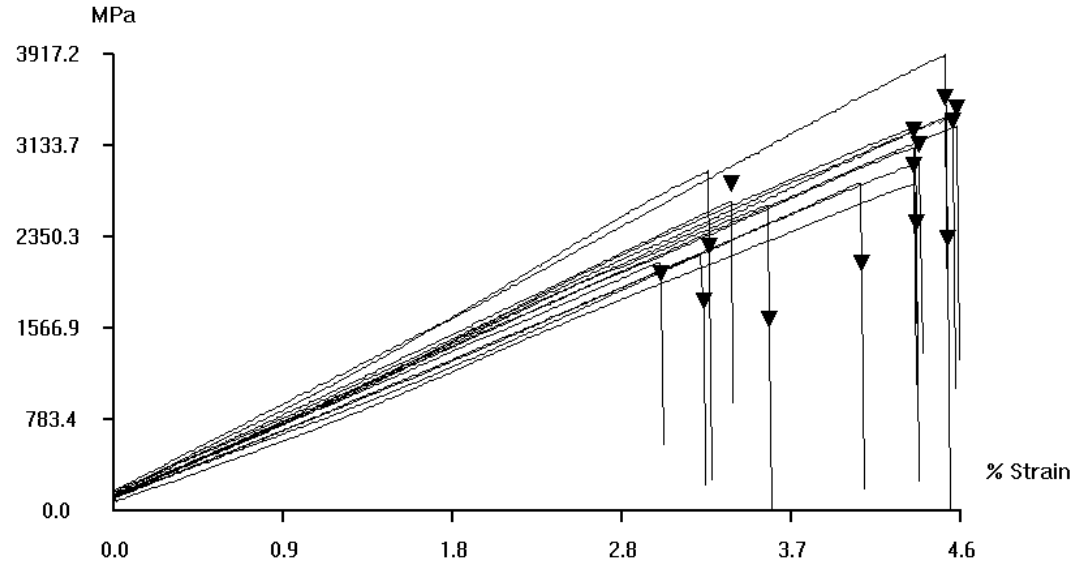
- Measurements obtained using the Dia-Stron FDAS770/LEX820 system
- Samples mounted on one-part plastic tabs



Glass Fibre (Hybon 2026)	Unit	Dia-Stron LEX	Generic Product
Diameter	µm	13.4	6 – 21
Modulus	GPa	97	72.5 – 75.5
Break Strain	%	3.57	4.7
Break Stress	MPa	3563	3100 - 3800

Aramid

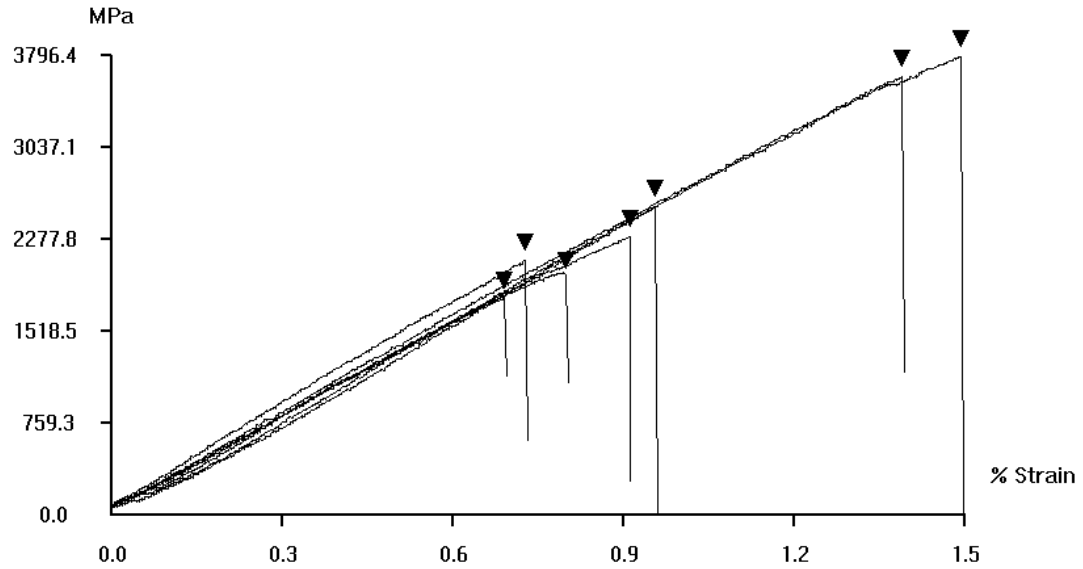
- Measurements obtained using the Dia-Stron FDAS770/LEX820 system
- Samples mounted using one-part plastic tabs



Aramid	Unit	Dia-Stron FDAS/LEX	Generic product
Fibre Diameter	µm	14.61	5 – 15
Modulus	GPa	69.9	70 – 140
Break Strain	%	3.46	2.8 – 3.6
Break Stress	MPa	2506.18	2900 - 3450

Silicon Carbide

- Dimensional and tensile properties of SiC fibres obtained using the Dia-Stron LDS0200*/LEX820 system
- Samples mounted on one-part plastic tabs across a range of gauge lengths

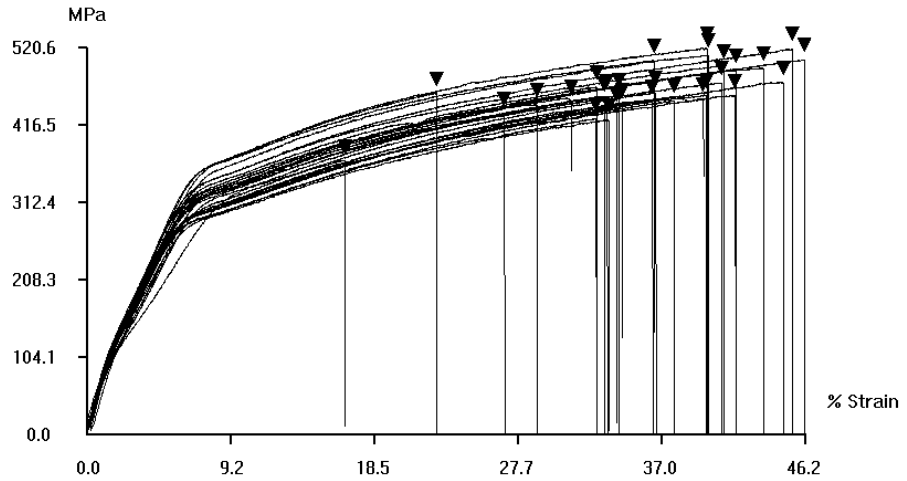


SiC (Hi-Nicalon Type S)	Unit	Dia-Stron (LDS/LEX)	product specifications
Fibre Diameter	µm	12.14	-
Modulus	GPa	371.52	380
Break Strain	%	0.80	-
Break Stress	GPa	2.76	3.1

* Dimensional properties of SiC fibres can also be measured using the Dia-Stron FDAS770

PEEK Fibres

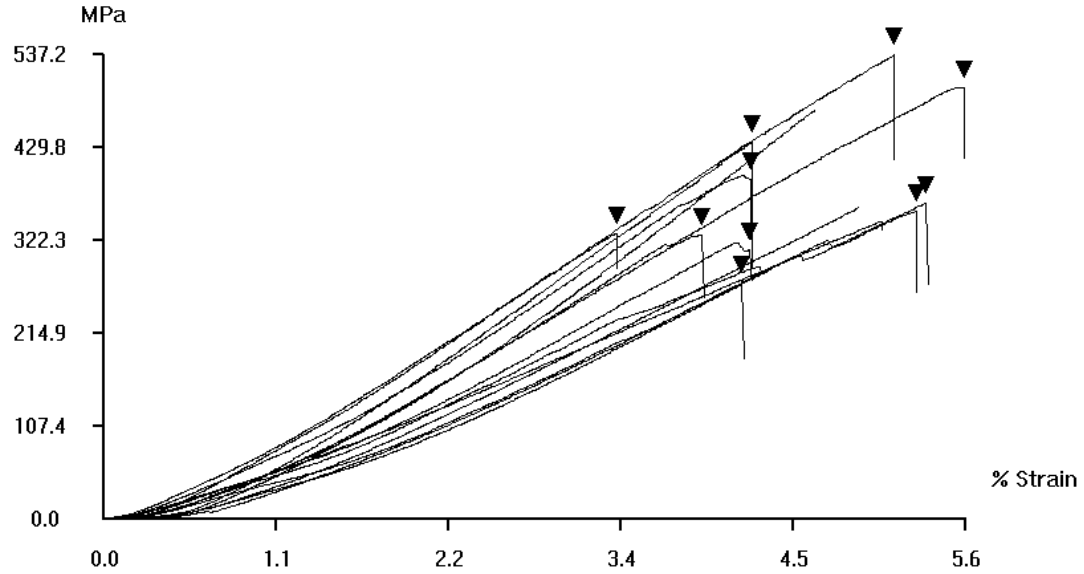
- Dimensional and tensile properties of polyetheretherketone fibres obtained using the Dia-Stron FDAS770/LEX820 system
- Samples mounted on one-part plastic tabs across a range of gauge lengths



Zyex™ PEEK monofilament	Unit	Dia-Stron (LDS/LEX)
Fibre Diameter	µm	36.35
Cross-sectional area	μm^2	1044.18
Modulus	GPa	8.12
Break Strain	%	35.37
Break load		0.483
Break Stress	GPa	462.97

Sisal

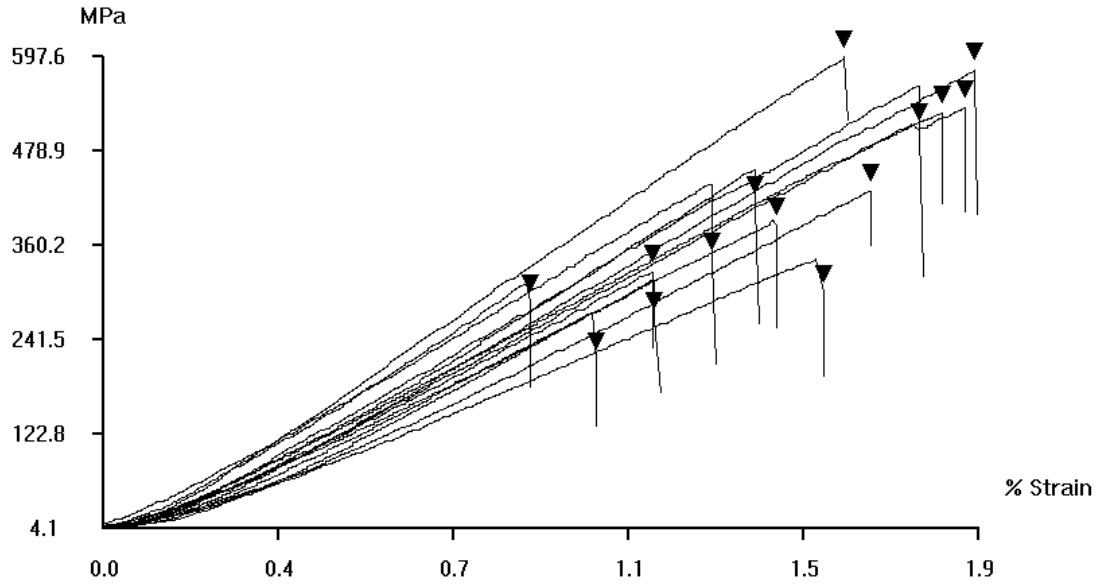
- Dimensional and tensile properties of sisal fibres obtained using the Dia-Stron FDAS770/LEX820 system
- Samples mounted on one-part plastic tabs using UV curing adhesive



Sisal	Unit	Dia-Stron FDAS/LEX
Fibre Diameter	µm	228.37
Modulus	GPa	10.35
Break Strain	%	3.83
Break Stress	MPa	393.88

Jute

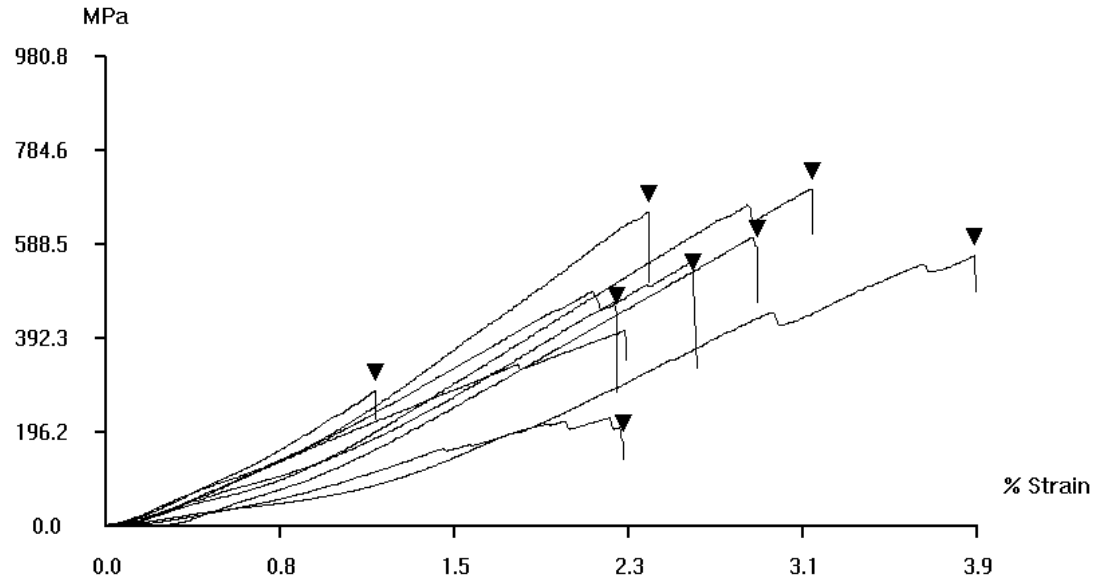
- Dimensional and tensile properties of jute fibres obtained using the Dia-Stron FDAS770/LEX820 system
- Samples mounted on one-part plastic tabs with UV curing adhesive



Jute	Unit	Dia-Stron FDAS/LEX
Fibre Diameter	µm	71.72
Modulus	GPa	32.42
Break Strain	%	1.31
Break Stress	MPa	408.09

Flax

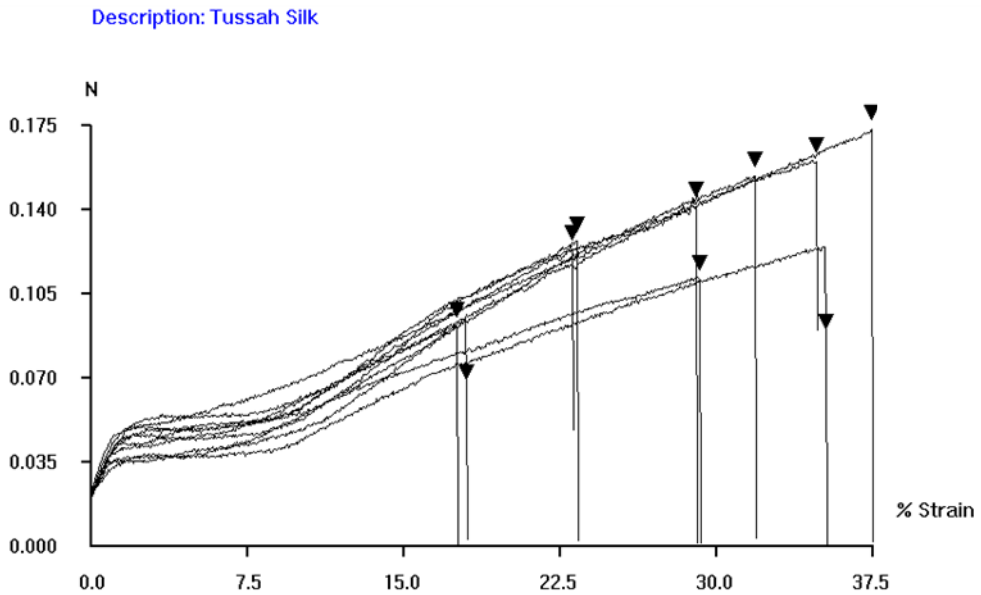
- Dimensional and tensile properties of flax fibres obtained using the Dia-Stron FDAS770/LEX820 system
- Samples mounted on one-part plastic tabs using UV curing adhesive



Flax	Unit	Dia-Stron FDAS/LEX
Fibre Diameter	µm	89.31
Modulus	GPa	26.67
Break Strain	%	2.36
Break Stress	MPa	667.22

Tussah Silk

- Dimensional and tensile properties of silk fibres obtained using the Dia-Stron FDAS770/LEX820 system
- Samples mounted on one-part plastic tabs using UV curing adhesive



Other examples of fibres measured using Dia-Stron instrumentation

Spider Silk – LEX

T. Vehoff, A. Glišović, H. Schollmeyer, A. Zippelius and T. Salditt
Mechanical Properties of Spider Dragline Silk: Humidity, Hysteresis and Relaxation, Biophysical Journal, 93, 4425-4432 (2007)

Flax, Hemp, Nettle, Sisal, Palm – FDAS/LEX

W. Garat, S. Corn, N. Le Moigne, J. Beaugrand and A. Bergeret
Dimensional variations and mechanical behaviour of natural fibres from various plant species in controlled hygro/hydrothermal conditions
ECCM18 - 18th European Conference on Composite Materials, Athens, Greece, 24-28th June 2018

Cellulose – LEX820

A. B. Fall, F. Hagel, J. Edberg, A. Malti, P. A. Larsson, L. Wågberg, H. Granberg and K. M. O. Håkansson
Spinning of Stiff and Conductive Filaments from Cellulose Nanofibrils and PEDOT:PSS Nanocomplexes
ACS Appl. Polym. Mater. 2022, 4, 6, 4119–4130, 17 May 2022

Phosphate Glass Fibres and Composites – LSM/LEX

C. Tan, I. Ahmed , A. J. Parsons , C. Zhu , J. Zhang , C. D. Rudd and X. Liu
Investigating the use of Chitosan as a Coupling Agent to Improve the Interfacial Properties of Phosphate Glass Fibre/Polycaprolactone Composites
21st International Conference on Composite Materials Xi'an, 20-25th August 2017

Banana and Pineapple Fibres – FDAS/LEX

J. Bossu, N. Le Moigne, S. Corn, J. Moreau, C. Delisée, J. Beauchêne, B. Clair, H. Angellier-Coussy, A. Viretto.
GuyaValoFibres: exploring the potential of Amazonian unvalorized ligno-cellulosic resources for fibres-based composites applications
Exploring Lignocellulosic Biomass! Challenges and Opportunity for Bioeconomics; 26-29th June 2018, Reims, France

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