

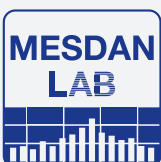
SEMI-AUTOMATIC STRENGTH TESTERS

TENSO-LAB



Tenso-Lab brand is one of the most widespread and flexible Universal Tensile Strength Testers worldwide.

- Different types available (single and dual column, with different capacity) to suit the most exigent requirements:
 - **for a variety of testing** (tensile strength, elongation, tear, seam slippage, compression, puncture, etc.)
 - **in different industries** (textiles, non-wovens, cardboard, leather, plastics, etc.)
 - **for various materials** (fibres, yarns, tapes, fabrics, garment accessories, felts, cords/twines, ropes, etc.)
- very strong structure, built according to CRE (Constant Rate of Extension) testing principle
- versatile, interchangeable load cells & clamps/jaws
- standard compliance, conforms to major testing methods (ISO, ASTM, JIS, BS, IWS, NEXT, M&S, etc.)
- easy to operate, the software includes a wide choice of ready-made testing routines; they can also be created by the end user (no special skills are needed)
- wide range of load cells, clamps, jaws/grips and tools
- top quality components
- made in Italy and designed to meet the highest testing standards



Single Column

Strength testers, up to 5 kN capacity,
code 2512E, 2512F

Tenso-Lab 4 series is the latest generation of the well-known Tenso-Lab semi-automatic tensile testers. The new models are distinguished by:

- **New hardware:** high sensibility and robustness (can be used to test fibers (single and bundle), single yarns, hanks/LEA, fabrics and garment accessories), direct-drive ball bearing screw, low speed operation available, extended capacity to 5000 N, ...
- **New components:** improved load cells performances (higher accuracy level and new capacity load cell added), quick load cell & clamps/jaws exchange, ...
- **New open software:** more intuitive and easy to operate, SQL database and standard Ethernet machine connection to data export, no restriction on testing routines (can be created by the enduser, no special skills needed).

Available models:

- **Tenso-Lab 4 Plus**, code **2512E**, with integrated PC
- **Tenso-Lab 4**, code **2512F**, with optional external PC

For more details, please see the specific brochure of Tenso-Lab 2512E-F.



Dual Column

Universal tensile strength testers, up to 50 kN capacity,
code 2515, 2516

Developed to meet the highest quality testing standards of the industry, research institutes, testing houses, vocational institutions.

Distinguished by its robust structure: two ball bearing screws combined with the strengthened guiding columns prevent any strain or buckling when the machine is exposed to heavy load ensuring smooth movement.

A variety of interchangeable load cells and clamps (mechanical and pneumatic) and a rich menu of preloaded testing methods enable the use of the Dual Column tester in a variety of industries like textile, automotive, medical, geotextiles, cardboard, plastic, rubber, nonwovens.

Designed to handle different kind of materials like yarns, cords, ropes, hanks, ribbons, fabrics, etc.

The tensile tester can perform a full range of tests including traction, compression, tearing, seam slippage, bending, hysteresis/fatigue cycles, all in compliance with the main international testing methods.

Available models:

- **Tenso-Lab, Code 2516**, maximum capacity up to 10 kN
- **Tenso-Lab, Code 2515**, maximum capacity up to 50 kN



Software

The control software of our Strength Testers, available in several languages, has been designed, and constantly updated, in close co-operation with the most important textile laboratories and end users.

- Easy to use
- Highly efficient
- Open towards the most common software applications
- Designed in compliance with the most relevant quality and safety manufacturing Standards

The operator can perform tests by selecting one of the available routines, or by manually entering all the testing parameters in the generic routines.

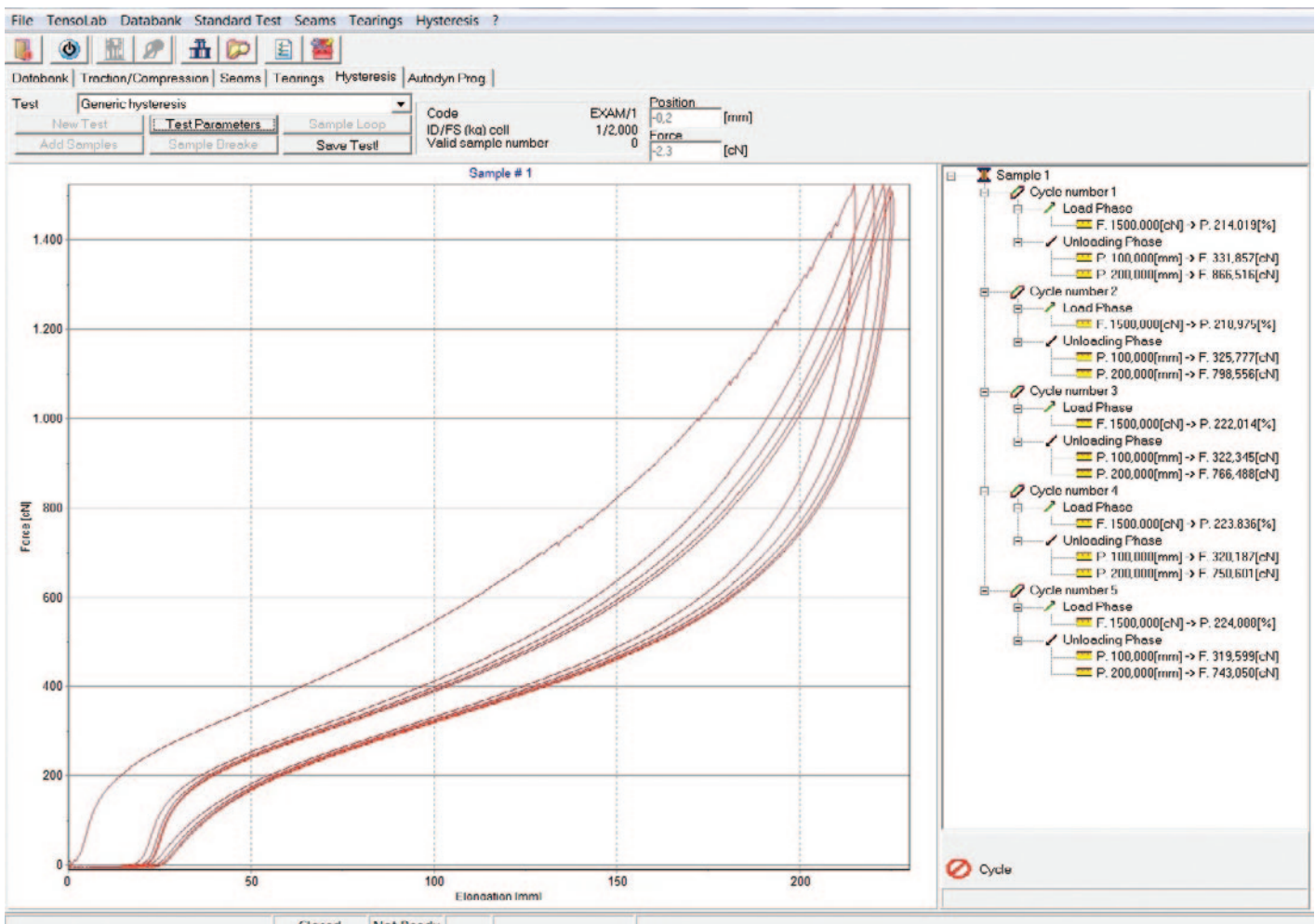
Traction, compression, tearing, delamination, adhesion, seam slippage tests and hysteresis cycles can be performed according to specific international Standards, (ISO, ASTM, BS, DIN, IWS, UNI and M&S), or to customized parameters.

Results are stored in a data bank with easy access, and can be recalled for further use, to be printed, shared or exported into an Excel sheet for an additional data management.

Hysteresis

Hysteresis is very important for the analysis of elastic materials (both yarns and fabrics). The evaluation of the capacity of maintaining their elastic properties is analysed by stressing the sample with a series of traction-and-release cycles.

This software routine stands out for its flexibility: the operator can set the number of cycles and the upper and lower limits for strength or elongation with pauses, and decide to acquire the correspondent data (setting the strength to acquire elongation, or the opposite).



Example of Hysteresis test

Indicative images / graphics, that may vary depending on the type of test (if performed by Single or Dual Column)

Work Area

The “work area” or “work done to break” data are mainly used for weaving yarns.

If we have two yarns with the same breaking strength, but one stretches more than the other, the actual performance of the former on a weaving loom will surely be better, compared to the latter yarn with less elongation.

This superior yarn performance can be measured in both terms of quality and efficiency.

For experienced weavers it is therefore fundamental to know this parameter, which in practice is represented by the area below the curve (up to the maximum peak force).

Elongation at Break

The strength tester standard data are referred to the maximum force and the elongation at the maximum force peak. Some customers, especially those testing composite materials, are interested in measuring the real breaking point of a specimen, in addition to the standard data.

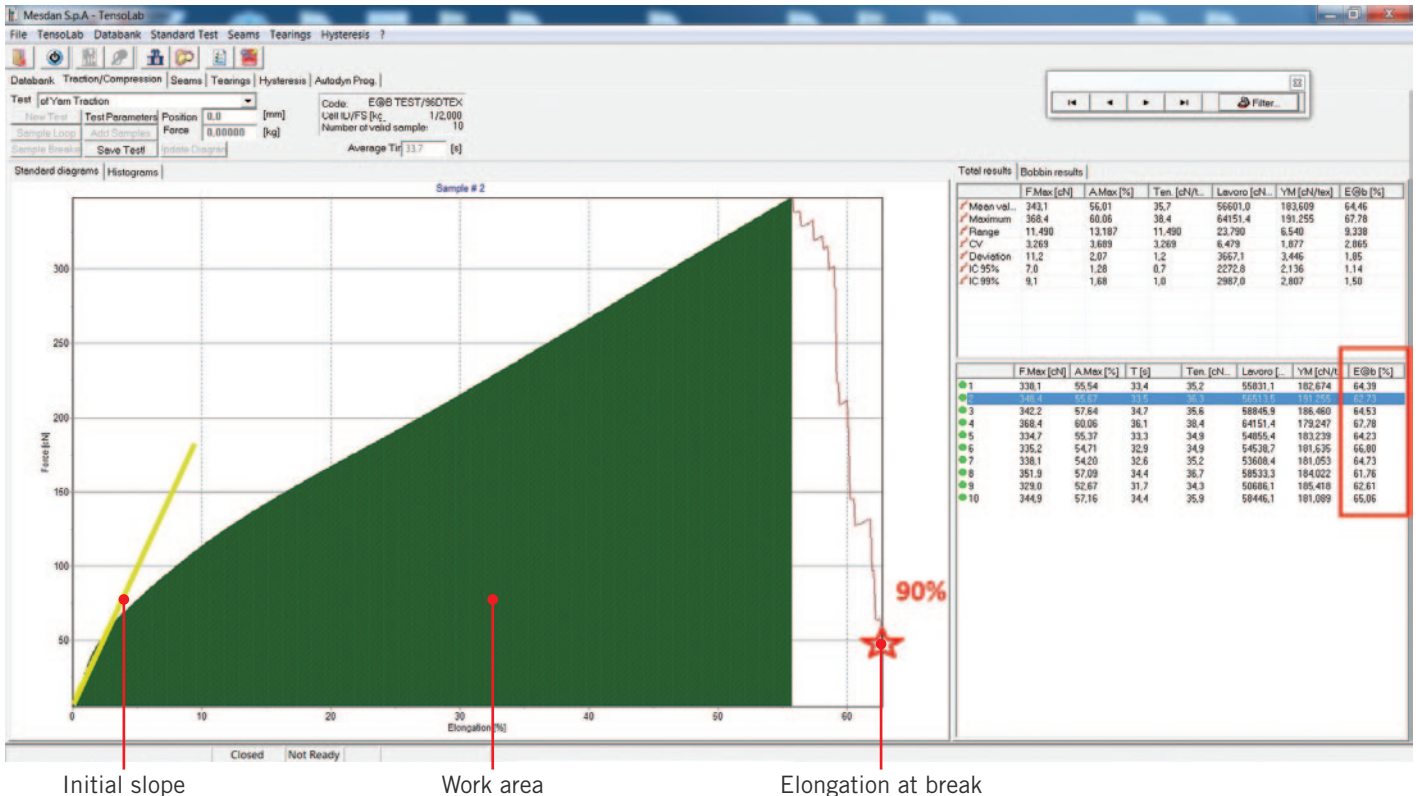
Basically, it is referred to the point after the force has reached its peak value and tends to decrease slowly towards the total and real specimen rupture.

This value is indicated with the word “E @ b”.

Young Modulus

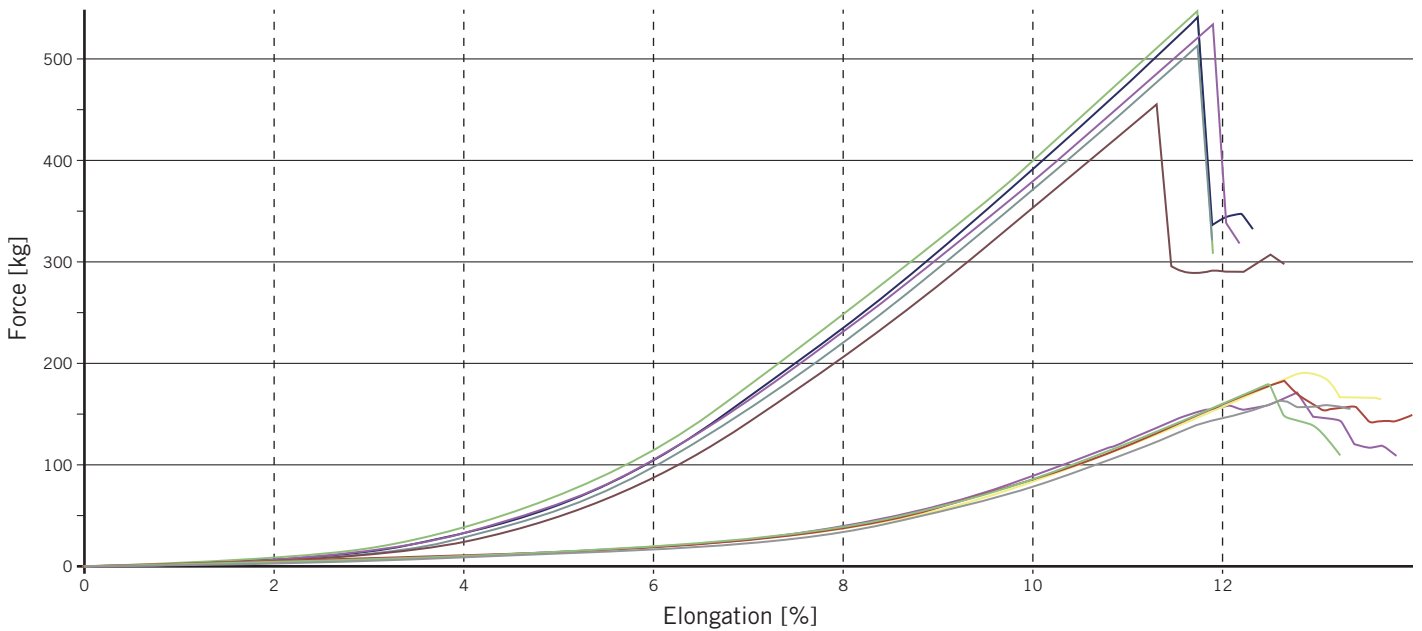
The young modulus is used above all on synthetic filament yarns and fibers.

It is referred to the point on the strength curve beyond which the fiber/yarn begins to lose elasticity and does not return into its initial position (becomes inelastic). Namely, the end of the elastic range of the yarn. Before reaching this point, the yarn/fiber can go back to zero elongation without changing its molecular structure and therefore behaving as a genuine, “undamaged” yarn/fiber. Comparing two yarns of the same composition and count, the higher the modulus, the better the performance. It is based on the inclination of the starting curve, called the “initial slope” (“I / S”) which is referred to the yellow line of the strength/elongation curve.



Indicative images / graphics, that may vary depending on the type of test (if performed by Single or Dual Column)

Example of Fabric Traction test



Load Cells

The choice of the load cell and clamps is of the utmost importance for a correct performance of the test according to the strength of the samples and to the testing method to accomplish.

Load cells are interchangeable and can be replaced in a fast and easy way (in a couple of minutes), since they need to be calibrated only the first time before testing; then they are automatically identified by the Strength Tester at the subsequent changes.

Main features:

- easily interchangeable;
- high quality (manufactured by HBM);
- high precision;
- dual accuracy range.

Load cells are manufactured by HBM - Hottinger Baldwin Messtechnik (accuracy class: up to 50 kN; $\pm 0,02\%$).

For the models 2515 and 2516 the "x10 Force Gain" settings is available, to reduce the nominal load cell capacity to the 10%, and to increase the accuracy of 1 decimal (not available for the 20 N load cell).

Available load cells:

Max. capacity (N)	Accuracy (cN)
*10	0,2
20	0,4
100	2
*500	10
1.000	20
5.000	100
10.000	200
50.000	1.000



Clamps & Jaws

Our Strength Testers fit a huge range of mechanical and pneumatic clamps to test fibres*, yarns and fabrics in accordance with the relevant standards.

Clamps and jaws are interchangeable, and designed to be mounted in an easy and fast way.

The unique design and the robust construction guarantee an effective clamping of the sample to test without altering its characteristics, even in case of slippery samples.

The instruments are already equipped with connections for compressed air.

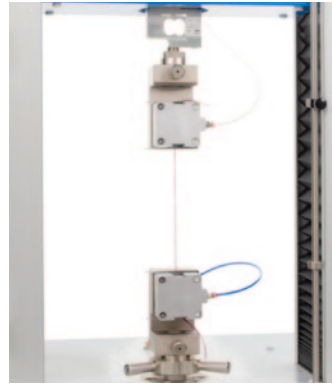
* only for Single Column Tenso-Lab

Example of available clamps and tools

** only for dual column Tenso-Lab



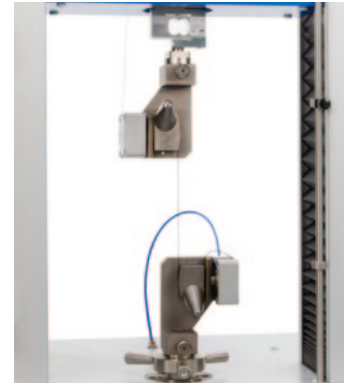
Pneumatic clamps for delicate yarns (POY, Lycra, cotton, worsted yarns), 20N max capacity, **Code 2510.978 ****



Pneumatic clamps for standard yarns and sewing threads, 50N max capacity, **Code 2510.982 ****



Mechanical clamps for normal yarns, 30N capacity, **Code 2512E.994**



Clamps for high tenacity yarns with conical introducer, **Code 2510.980**



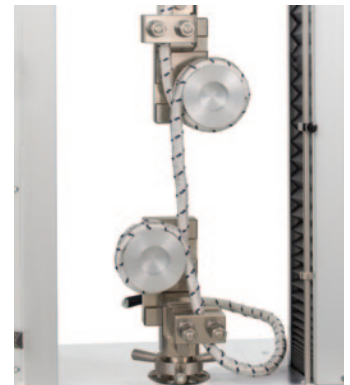
Mechanical clamps for high tenacity yarns, Scott 300, **Code 2510.996**



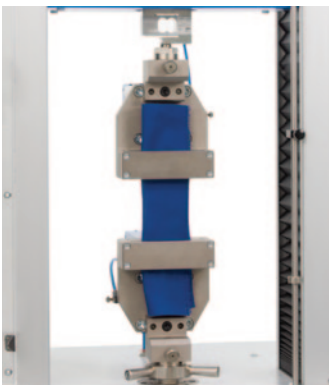
LEA clamps for hanks, **Code 2512E.990**



Self-tightening high tenacity clamps for ribbons, 100 mm wide, **Code 2512E.920**



Self-tightening high tenacity clamps for ropes, **Code 2515.988 ****



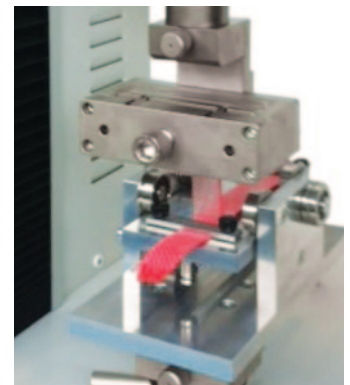
Pneumatic maxi clamps with rubber jaws for high tenacity & heavy fabrics, 100 mm wide, **Code 2510.130 ****



Mechanical clamps with rubber jaws, 100 mm wide, **Code 2510.846**



Mechanical clamps for non-woven and geo-textiles, (EN ISO 10319), 200 mm width, with rubber jaws, **Code 2515.142 ****



Adhesion peel bond kit (roller type, UNI EN ISO 11644; IUF 470; UNI EN 388 Annex C, 2017). Available on demand **



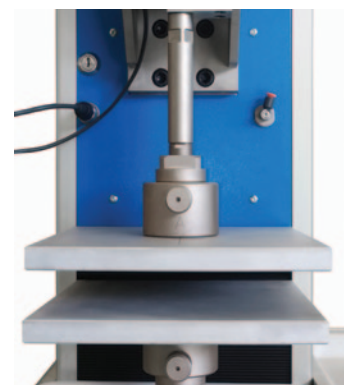
CBR perforation Testing Kit for non-wovens (EN ISO 12236, UNI 8279-14), **Code 2510.690 ****



Perforation Testing Kit according to EN 388 Standard, **Code 2510.681**



Perforation/punching Testing Kit (ASTM D6797, ISO 90735), **Code 2512E.799**



Compression Test Set. Available on demand

* only for Single Column Tenso-Lab



Fibre bundle 0" & 1/8" Clamps (Pressley Method), **Code 331A.2** (clamps) + **Code 331A.8** (clamps holders) *



Pneumatic Clamps for single fibre, (**Code 2512E.725**) *



Pneumatic Clamps for yarns, complete with metal & rubber jaws, **Code 2512E.700** *



Pneumatic Clamps ("Bollard") for high-tenacity yarns, **Code 2512E.760** *



Pneumatic Clamps for medium-light fabrics, up to 60 Kg capacity approx, 100 mm width, **Code 2512E.705** *



Pneumatic Clamps for medium-heavy fabrics, up to 300 Kg capacity approx., 100 mm width, **Code 2512E.730** *



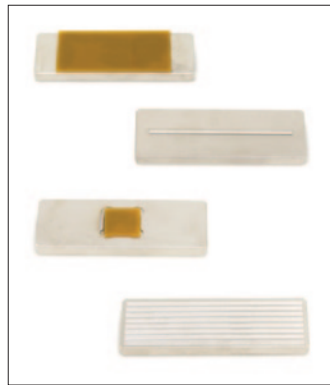
Mechanical PBF Clamps for films, width 25mm, **Code 2512A.997**



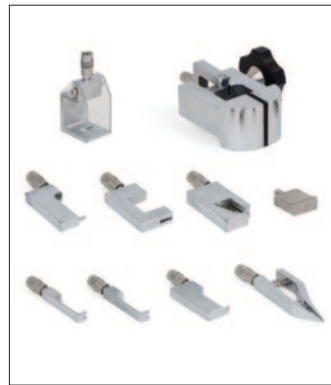
Nail tearing tool, bottom part (UNI 7275), **Code 2512A.856**



Mechanical Loop Clamps for stretch & recovery evaluation, according to ASTM D4964, **Code 2510.932**



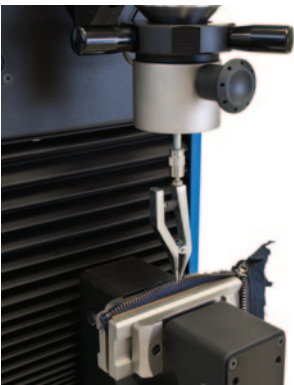
Example of interchangeable jaws, rubber/knurled, Grab, Contact Line, etc.



Zipper testing kit (ASTM D2061), **Code 2510.157**



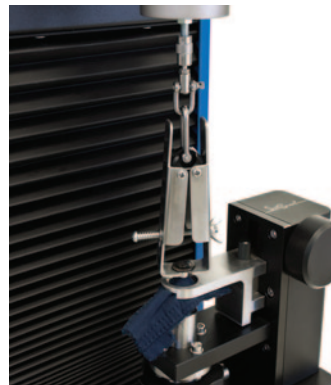
Upper Long Nose Vise Grip, for trousers' hooks and other accessories, according to M&S P115 (for buttons), **Code 2510.152**



Element for Zipper Kit (**Code 2510.157**), in compliance with ASTM D2061 Standard



Upper Universal Grip (**Code 2510.151**), Lower Fabric Clamp (**Code 2510.150**), for buttons, etc.



Upper (**Code 2510.155**) & Lower (**Code 2510.154**), Grasp Button Kit, & Lower Fabric Clamp (**Code 2510.150**), for buttons, etc.



Upper Stud Grip (**Code 2510.153**), Lower Fabric Clamp (**Code 2510.150**), to test male parts of baby snaps, etc.

TENSO-LAB

TECHNICAL FEATURES

Technical Features	Code			
	2512E	2512F	2515	2516
Model	Single Column Tensile Strength Tester		Dual Column Tensile Strength Tester	
Load Capacity	5000 N		50000 N	10000 N
Available load cells	10 - 20 - 100 - 500 - 1000 - 5000 N		20 - 100 - 1000 5000 - 10000 - 50000 N	20 - 100 - 1000 5000 - 10000 N
Load cells accuracy class	± 0.02% (5000 division) HBM 6 wire load cell system with high sensitivity (2mV/V)			
Speed accuracy	± 0.01% under stable conditions		-	
Speed range	from 0.001 to 1800 mm/min		from 0,5 to 500 mm/min	
Max force at full speed	5000 N		50.000 N	10.000 N
Max speed at full load	1000 mm/min		500 mm/min	
Max returning speed	1800 mm/min		500 mm/min	
Force measure accuracy	± 0.03%			
Force maximum resolution (load cell of 10 N)	0.0001 cN		-	
Force minimum resolution (load cell of 5000 N)	0.05 cN		-	
Frame stiffness	5000 N/mm		-	
Testing principle	CRE (Constant Rate of Extension)			
Crosshead travel (1)	900 mm		1200 mm	
Crosshead guidance	double linear slide with 4 skates integrated within the column		double round bar with linear ball bearings	
Position accuracy	0.0001 mm		-	
Inner distance between columns	-		400 mm	
Operating temperature	from 0°C to +50°C			
Operating humidity	from +10 to +90% non-condensing		from +10 to +70% non-condensing	
Machine Configuration	table top; base cabinet available		floor standing machine	
Machine control	a full machine control via dedicated controller with real-time operating system			
Dimensions	(L) 370 x (W) 480 x (H) 1415 mm		(L) 900 x (W) 600 x (H) 1900 mm	
Weight	82 kg		322 kg	280 kg
Power supply	115-240 Vac, single-phase, 50/60 Hz, 700 W		115 or 230 Vac, single-phase, 50/60 Hz, 300 W	
Calibration Certificate	ISO 17025 Calibration Certificate (Accredia - ILAC) available on demand			
Calibration Report ISO 9001	available on demand			
Available software languages	Italian, English, Spanish, Chinese		Italian, English, Spanish, Chinese, German, French, Portuguese	
Calibration and verification of the force measuring system according to ISO 7500-1. Meets 0,5 accuracy class of ISO 7500-1.				

(1) Maximum extension, load cell & clamps excluded (800 mm of usable test space)

OPTIONAL ACCESSORIES

- A wide range of interchangeable load cells (see above table)
- A wide range of interchangeable pneumatic and mechanical clamps complying with relevant international standards
- Foot switch, necessary for pneumatic clamps (Code 2512E.618 for 2512E-F; Code 2515.300 for 2515& 2516)
- PC and printer
- Silent compressor, Code 3390
- UPS, Code 2341.900

REFERENCE STANDARDS

Tenso-Lab series complies with a variety of testing methods (ISO, EN ISO, ASTM, M&S, IWS, NEXT, BS, GB, JIS, etc...)

Officially approved by Marks & Spencer

Photographs and descriptions of the present leaflet have to be considered as purely indicative and not binding