

Universal Testing Machines

Servohydraulic Testing Machines IBMU4 Series

 Capacity : 600 - 3000 kN



Since 1970
Made in Spain (EU)

www.ibertest.com



Introduction

For high load universal testing.

Manufactured according to Standards EN 10002-2; ASTM E4, ISO 7500-1; DIN 51221 and BS1610 guide.

Hydraulic gripping heads (upper and lower) with wedge closing system.

Specially indicated for combining test due to its double space design.

Tensile/compression or Tensile/Bending test can be carried out without interruption to change devices.

Additionally can be complemented with optional devices for other type of tests:

- › Folding
- › Punching
- › Penetration
- › Extrusion
- › Shearing

NEW: ALL in One PC interface

New user interface, with embedded touch screen PC, modern, easier and with improved performances.

An alternative to conventional table top PC's, placing together a compact design with touch screen, with all the performances of other systems.

This system is directly fitted to testing frame with an orientable support, reducing space requirements and offers an ergonomic working position for machine operation as well as for testing devices management.

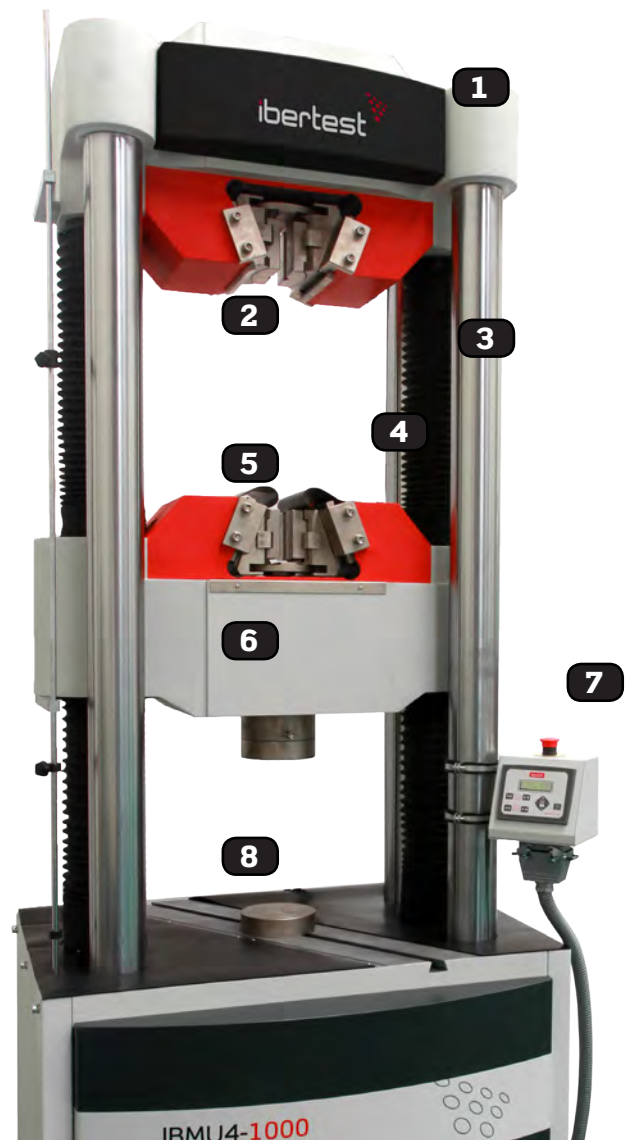


Manufacturing Quality

Double space test frame composed by:

- › 4 columns guiding columns.
- › Fixed upper crosshead.

Hydraulic gripping heads: incorporated to the mobile crosshead, whose height is adjustable by means of two motorized screw drives.



Elements identification

- 1. Fixed upper crosshead:** designed to provide high stiffness to the test frame
- 2. Upper tensile gripping head:** interchangeable wedge grips and hydraulic closing.
- 3. 4 chromed high stiffness columns:** to assure rigidity, optimum load sharing and axiality
- 4. High precision screw drivers:** with protective bellows
- 5. Mobile crosshead:** allows to adapt testing space to sample length
- 6. Lower tensile gripping head:** interchangeable wedge grips and hydraulic closing.
- 7. Remote control for grips:** UCR-B version shown.
- 8. Compression plates:** interchangeable with bending devices.

Load measurement

By means of full bridge strain gage load cell mounted on the lower base

- **Robust design** to withstand eventual overloads
- **High accuracy** to allow for machine Class 0.5/ISO 7500-1 from 2 to 100% of its nominal capacity
- **High repeatability and linearity** design

Displacement measurement

By means of wire draw linear position transducer with 1 micron resolution

For controlling piston position, automatic return to start position and stroke control (mm/min).

Once the test is ended, piston returns to initial fixed position to be ready for the next tests, which is really useful for **serial/repetitive tests**. This advantage can be activated or not activated using Win Test32 software.

End of stroke limit

For mobile crosshead.

By means of a bar detector placed on one of the side columns.

Once the crosshead reaches the limit, the detectors send a signal to the controller to automatically stop further movements

Avoids potential damages to machine elements due to a wrong movement operation.

Safety

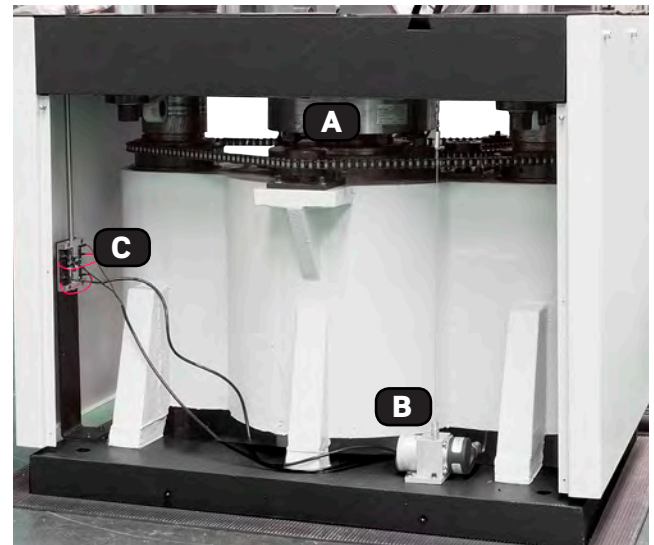
Machines are designed to cover and follow with fidelity all the requirements demanded by standards and regulations related with CE marking.

An push button, mushroom type is located in front of the working frame for emergency stop.

Foundation

If the laboratory floor is resistant and well levelled, foundation of the machine is optional, however recommended.

IBERTEST will provide all needed information, drawings and execution instructions for a proper basement construction.

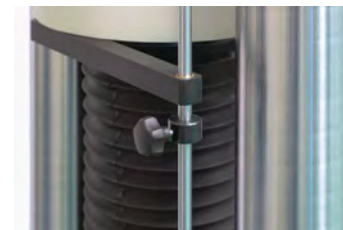


A Load cell and transmission

B Position transducer

C End of stroke limiter

End of stroke limiter rod



Regulable stopper for end of stroke



TENSILE GRIPPING HEADS

Hydraulic type, built in the frame of the machine.

Wedge type, hydraulic closure, with interchangeable gripping jaws, for clamping prismatic or cylindrical specimens.

- Flat jaws are suitable for clamping prismatic specimens
- Jaws notched "V" shape are suitable for clamping cylindrical specimens

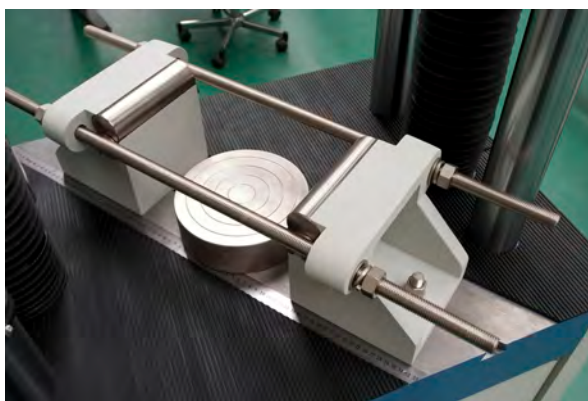


Remote controller for positioning and jaws operation

Includes as standard supply an UCRB model remote control unit for jaws independent opening and closing of each gripping head.

Test area for compression / flexural / bending

In the lower test area, various testing devices may be coupled, such as compression plates, or test devices for flexural, bending, punching, etc.



Accessory: tensile device for cabezales for button or/and threaded shouldered metallic specimens

Hydraulic system

Load application is made by means of a hydraulic piston, located within the machine frame.

To generate the pressure, a servo-hydraulic power unit, is comprised. The high pressure power unit is tight fitted and pollution-proof, with very low noise.

Regulating the flow of hydraulic fluid (and hence the charging rate) is performed by means of a high performance servovalve mounted on a manifold (hydraulic distributors).

The hydraulic unit, manifold and servovalve are located inside of a work desk and rests on a set of four bumpers which prevent the transmission of vibrations to the frame.

The working desk is made of aluminum fully paneled in painted steel sheet with epoxy finish for high corrosion resistance.



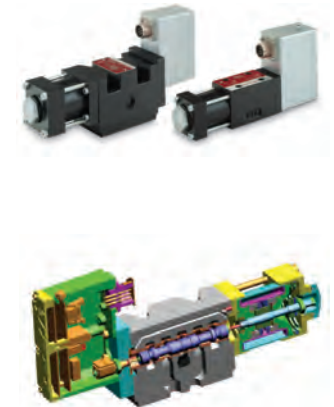
Control system

Closed-loop control the speed of load application, commanded by a microprocessed electronic module, model **MD2**

The module is installed in the operating frame of the machine and its operation is completely independent of the computer that connects via USB 2.0 or Ethernet.

Thus, the user can, if desired, replace the computer on their own without intervention of Service Technical Assistance IBERTEST without adjustments or recalibrate the machine.

The software acquires WINTEST32 these real-time data for graphing, calculations, sample results, etc..

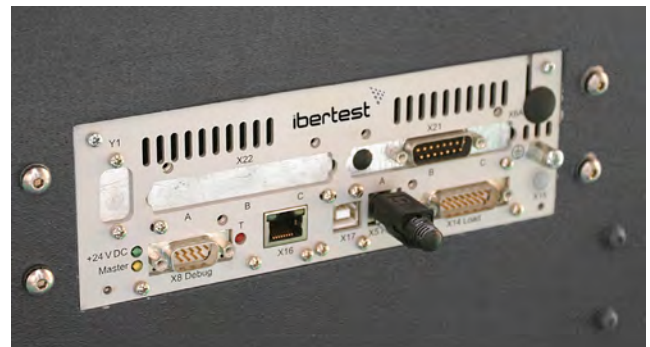


Close loop control

Signals coming from different transducers (load cell, encoder, extensometer, etc) are compared with the command value, defined previously on the test parameter via software. The error of the comparison is sent to the servomotor to be corrected, closing the control loop.

The frequency of this loop is **1 kHz** (1000 times per second) with MD2 module. (higher frequencies on request).

Close loop control can be defined against any reading channel (load, position or strain).



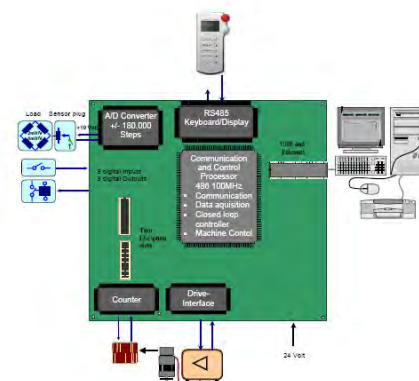
Electronic control module IBERTEST - MD2

Automatic recognition of transducers

When connecting a load cell or an extensometer, the MD2 module automatically collects its data calibration (linearization, measuring range, units, etc..)

These data are stored in a built-in transducer connector EEPROM memory, which allows the exchange of cells or transducers without losing the calibration data.

The maximum resolution obtainable in each transducer is $\pm 180,000$ points on each channel.



Models and features

MODEL	IBMU4 600	IBMU4 1000	IBMU4 1500	IBMU4 2000	IBMU4 3000
Maximum load	600 kN	1000 kN	1500 kN	2000 kN	3000 kN
Class according to ISO 7500-1	0.5				
Measurement range	From 1% to 100% of the load cell nominal capacity				
Load measurement	Strain-gage load cell				
Load resolution	5 digits with floating point				
Load cell repeatability	Better or equal to ± 0.5 %				
Columns n° (diameter)	4 (Ø 100 mm)	4 (Ø 100 mm)	4 (Ø 105 mm)	4 (Ø 110 mm)	4 (Ø 125 mm)
Screw drivers n° (diameter)	2 (Ø 120 mm)	2 (Ø 120 mm)	2 (Ø 120 mm)	2 (Ø 120 mm)	2 (Ø 140 mm)
Piston stroke	250 mm	250 mm	250 mm	250 mm	250 mm
Maximum loading speed	75 mm/min	75 mm/min	50 mm/min	50 mm/min	50 mm/min
Piston displacement speed	150 mm/min	150 mm/min	100 mm/min	100 mm/min	100 mm/min
Crosshead elevation speed	350 mm/min	350 mm/min	200 mm/min	200 mm/min	200 mm/min
Free distance (between columns)	540 mm	540 mm	840 mm	750 mm	700 mm
Max.distance between tensile gripping heads (piston stroke included)	780 mm	780 mm	1000 mm	1000 mm	800 mm
Max. distance between compression plates	750 mm	750 mm	850 mm	850 mm	800 mm
Displacement resolution	0.001 mm				
Testing frame dimensions: (width x depth x height) mm	1000 x 790 x 2640	1000 x 790 x 2640	1300 x 900 x 3250	1420 x 1150 x 3800	1300 x 800 x 3300
Testing frame approx. weight	2900 kg	2900 kg	8500 kg	10120 kg	12000 kg
Hydraulic workframe dimensions (width x depth x height) in mm	910 x 980 x 1100				
Approx weight of the hydraulic workframe	325 kg				
Power supply	Three-phase 380 V plus neutral and ground, 50/60 Hz (to specify)				

IBERTEST reserves the right to modify the characteristics described without notice.

ELECTRONIC DIGITAL MODULES

CONTROL SYSTEMS

MD CONTROL UNITS . MODULAR SYSTEM

Electronic controller units MD are specially designed for data acquisition and close loop control of testing instruments.

Measuring transducers are plugged to the MD module and the measurement is exported to the computer via USB or Ethernet.

The IBERTEST software WinTest32 makes data collection and shows real-time for drawing graphs and test results calculation.

This new system, based in external modules, substitutes the old electronic cards mounted into the computer, improving the performance, reliability and data acquisition speed.

Due to the external module configuration, the computer can be fast and easily changed by any other suitable PC or laptop, without need to make adjustments or calibrations.

This is very useful in case of eventual breakdown of the computer, or when obsolete computer needs to be changed.

MD2 MODULAR CONTROL UNIT, FOR STATIC TESTS

MD2 unit has been designed for **static** machines. The MD2 can be used either in electromechanical or servohydraulic machines.

The MD2 unit has the following input channels:

- Load channel. With a resolution of ± 180.000 steps. For the connection of a load cell or pressure transducer.
- X-Head position channel. For connecting a digital incremental position transducer (encoder) or a resolver (encoder emulator) or position transducers (SSI, draw wire linear transducers, etc.)
- 2 Bus extension slots for data acquisition cards "plug-in" type, for connection of further load cells, extensometers, LVDTs, position transducers, etc.

The MD2 unit comprises an analogical $\pm 10V$ drive channel for a servovalve (hydraulic machines) or a servo-motor (electromechanical machines).

MD2 features a high quality build-in electrical safety box, dustproof, ensuring the perfect state of the internal electronics.

This compact box allows to integrate the module within the frame of the machine itself (TESTCOM model) or within the electric panel of the machine (machines EUROTEST, IBMT4, UMIB, IBMU4).



The transducers comprises connector-plugs with built-chip EEPROM memory.

The transducer calibration data (unit of measure, range, zero position, linearization, etc.) are stored in the EEPROM memory. Thus, the transducer is automatically recognized as input channel when plugged to the by MD

Electronic digital modules MD

PID CONTROL

The MD module uses PID (proportional-integral-derivative) for control loop feedback of the application of force to the test specimen.

The PID controller calculates an error value as the difference between the measured process variable (force, position or strain) and the desired setpoint.

The three signals coming from the PID are combined to generate a new command signal, which is sent to the servovalve or servomotor to eliminate the deviation as fast as possible and assuring the stability of the process.

The process of detection, evaluation and new signal generation is repeated again and again. The time consumed is the **closed loop control** time and the lower the time, the faster the controller.

3 CONTROL OPTIONS

MD electronics allows to close the control loop with the applied load (control in kN/s) or with the position (control in mm/s) or with the material deformation (control in mm/s):

1. Load control

The MD module receives the signal from the load cell and compares this feedback value with the command value (N/s or kN/s).

2. Position control

The MD module receives the signal from machine's position transducer (encoder, resolver, LVDT, etc.) and compares this feedback value with the command value (mm/min).

3. Strain control

The MD module receives the signal from machine's deformation transducer (extensometer) and compares this feedback value with the command value (mm/s or mm/min)

APPLICATIONS OF EACH TYPE OF CONTROL

Load control is normally used on low load resistance tests materials which undergo deformation just before fracture, such as concrete, cement, ceramics, rocks, adhesives, etc. as well as in metals test on material elastic zone.

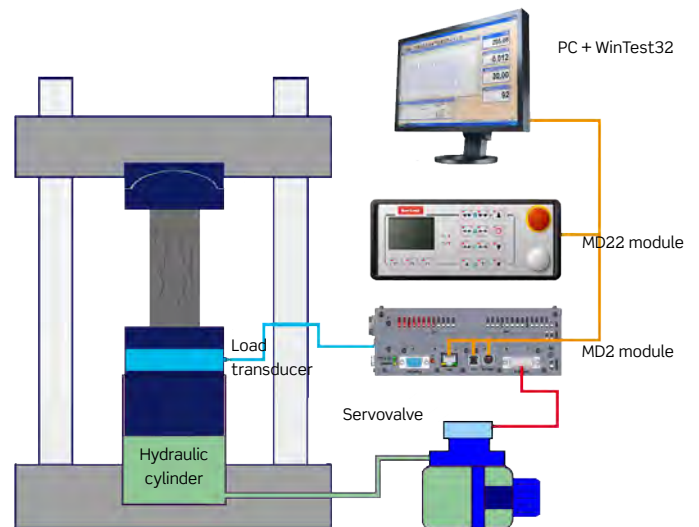
Position control is used in materials with high deformation, as rubers, elastomers, etc as well as on metals after elastic range.

Strain control is used in fracture tests and for research applications.

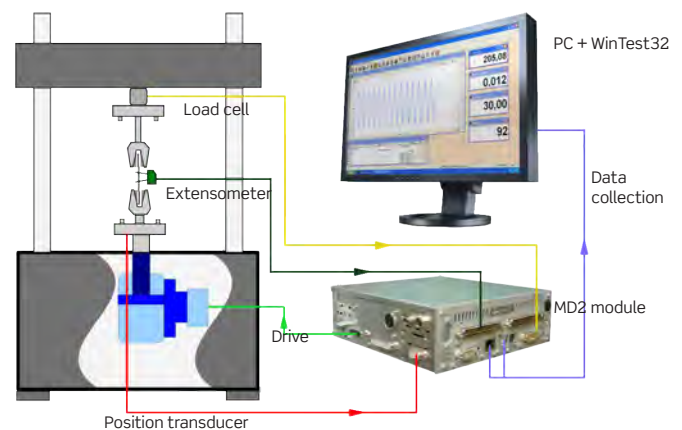
AUTOMATIC AND PROGRAMMABLE CONTROL CHANGE.

The IBERTEST WinTest32 testing software allows to define several criteria for changing control automatically (defined variation in the slope of the graphic, certain value of strength, load, position or deformation).

This feature is used in several applications as in metals testing, to allow the control change among behaviour regions of the material (change from elastic to plastic behaviour)







Test control scheme for Servohydraulic Compression Testing Machines



Test control scheme for Servohydraulic Universal Testing Machines



Specifications of MD2 and MD22 modules, for static and dynamic tests

MODULE	MD2	MD22
Front View		
Rear View		
Application purposes	Static tests	
Microprocessor	CPU 800 MHz	
Channels	Up to 4	
Resolution	± 180.000 steps per channel	
Max sampling frequency	1 kHz 1000 reading per sec per channel	
Sincronization	All channels fully synchronous and simultaneous	
Closing loop time	1 milisecond (1000 times per second)	
Drive interface	$\pm 10V$ -Command-Output (generated with ± 15 Bit resolution) I/O's and relays for safety functions	
Expansion possibilities	Up to 8 modules can be connected. 32 total synchronous channels	
PC communication	USB 2.0 full speed and/or Ethernet 10 / 100 Mbit	
Digital Inputs (24 V)	8	
Digital outputs (24 V)	8	
Serial sensor interface	COM1 (internal)	
Debug interface	COM2: 115 kB	
Slot for safety shield	YES	
Power supply	DC 24 V	
Remote control option	YES	NO

ADVANCED HAND-HELD REMOTE UNIT UCRD-7

Basic features

1. Operation via function keys and digital control pad DIGIPOTI, for scrolling, data input and menu navigation.
2. OLED graphics display 128 x 64 dots.
3. Dimensions: L 26 x W 120 x H 200 mm
4. Keys UP/DOWN /STOP for crosshead or actuator movement. More accurate movements are possible using the digital control pad Digi-Poti".
5. Selection of operation mode: via remote control unit or via software.
6. Magnetic backing allows to be placed at an ergonomic position.
7. Grips opening and closing: with upper/lower grips independent operation.
8. Extensometer positioning for automatic models.
9. Emergency stop, according to CE mark requirements.

Advanced features

UCRD-7 unit can perform several simple predefined tests without need of a computer or additional software.

- › Tensile of metallic materials
- › General tension/compression test
- › Bending
- › Shear
- › Brazilian concrete test
- › Cycles

Test configuration

- › Pre-load value and speed to reach preload.
- › Maximum stress speed within elastic range.
- › Maximum extension speed within yield range.

Sample definition:

- › Thickness, width, diameter, initial section (S_0), gauge length (l_0), parallel length (l_c)

Available type of control :

- › Load-Position
- › Load-Extension-Position (only with extensometer)
- › Control mode change during testing

The UCRD-7 can detect end of elastic range, end of yield and breakage, with the following criteria:

- › Defined values: MPa, kN/mm², kN, N
- › Relative drop in relation to F_m : %
- › Absolute drop: N, kN



Example: tensile test of metals

Results showed/calculated by UCRD-7:

- › Original cross-sectional area of the gauge length
- › Tensile strength
- › Percentage elongation at maximum load (F_m)
- › Load at fracture
- › Percentage elongation at fracture load (F_b)
- › Young's modulus (only with extensometer)
- › Proof stress points: 3 points (only with extensometer)
- › Proof stress point at total elongation (only with extensometer)
- › Upper/lower yield stress
- › Percentage reduction of area after fracture
- › Percentage elongation after fracture

WINTEST32 SOFTWARE

FOR MATERIALS TESTING

Introduction

32-bit software pack, running under Windows™, specially developed by IBERTEST to be used in universal testing machines.

Thanks to its flexibility and power, you can easily customize software WinTest32, to every need.

Indeed, the system allows user to configure tests according to the major international standards for engineering materials (UNE, ASTM, ISO, ... etc). However, for a small supplement, IBERTEST can adapt WinTest32 software to special needs or for your laboratory.

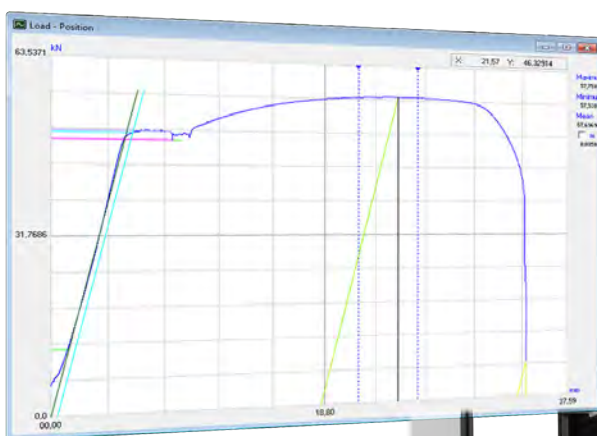
During design phase of WinTest32 software, IBERTEST paid special attention to the ease of use, so the program can be handled even by users with little experience in computers.

The WinTest32 control screen provides toolbar and intuitive menu for quickly identify available actions, to select and configure test parameters without consulting the manual.

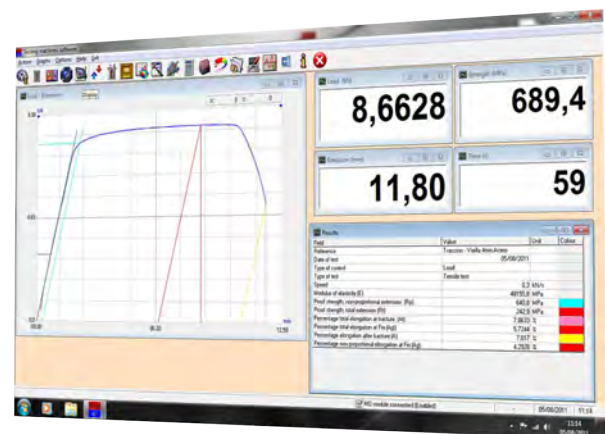


The software shows the user available options and its possible settings at each time, guiding user step by step interactively through test configuration.

Thus, WinTest32 helps user to optimize processes when using materials testing machine, getting the best performance both in the execution of the test and in the results analysis.



Initial control screen



Screen of test results



Using WINTEST32 on a Tocu Screen "All in One"

WINTEST32 SOFTWARE PROVIDES COMPLETE CONTROL BEFORE, DURING AND AFTER THE EXECUTION OF THE TEST.

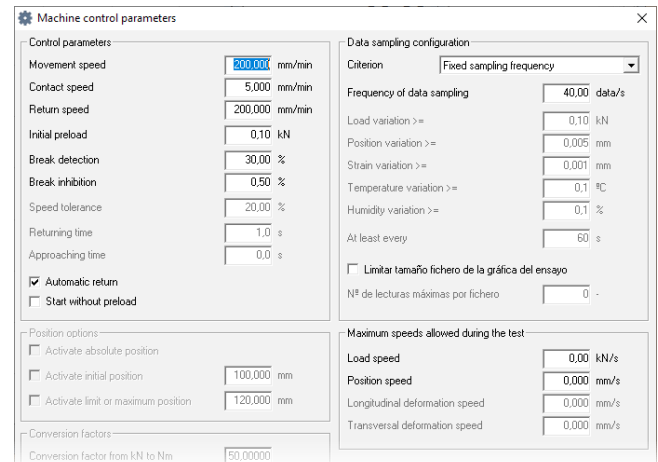
1. PRE-TEST CONFIGURATION

To configure tests at your convenience, the software offers many options, such as:

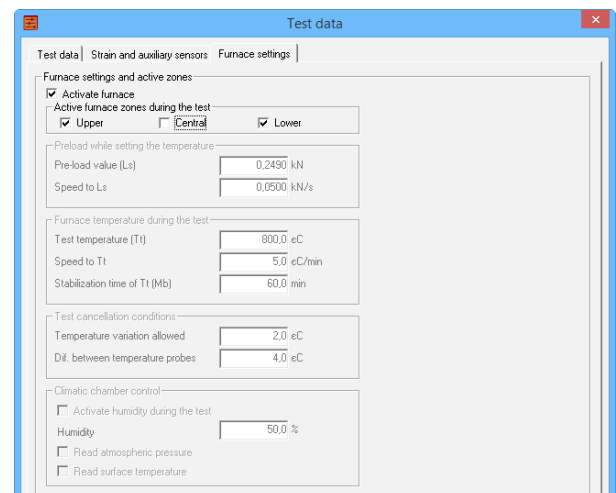
- › *Setting-up of the machine:* Establishment of safety limits, speed of movements, preload, automatic return, etc.
- › *Users management,* with custom options for each user. Provides system security and prevents unauthorized use.
- › Type of test to perform: Tensile, compression, bending, cycles, etc. The settings change automatically according to the chosen type of test.
- › Working method: *preconfigured* by IBERTEST (according to a Standard Test) or *free configuration* according to the criteria of the user (always within the physical and mechanical limitations of the machine, testing devices and sensors).
- › *Individual or serial testing.* Serial tests are well suited for example, repetitive tests with machines intended for Production Quality Control.
- › Select the type of automatic control in *stroke, load or strain* (with appropriate optional transducers)
- › Activation of *additional sensors* placed on the machine or in the specimen, such as strain gauges, temperature sensors, etc. ¹
- › Select the type of *diagram* (load-time, load-stroke, load-strain, etc.) for the *graphical representation* of the test.
- › *Results to display* on screen (in real time) or in the report (after the validation of the test).
- › Automatic execution of calculations derived from the test results (strength, elastic modules, etc.) by means of a software integrated *programmable calculator*.
- › Design of *test reports*, fully customizable. Test reporting is essential for laboratories subjected to Good Laboratory Practices (GLP), or Quality Assurance Systems, as per ISO-EN 17025.

And many more options.

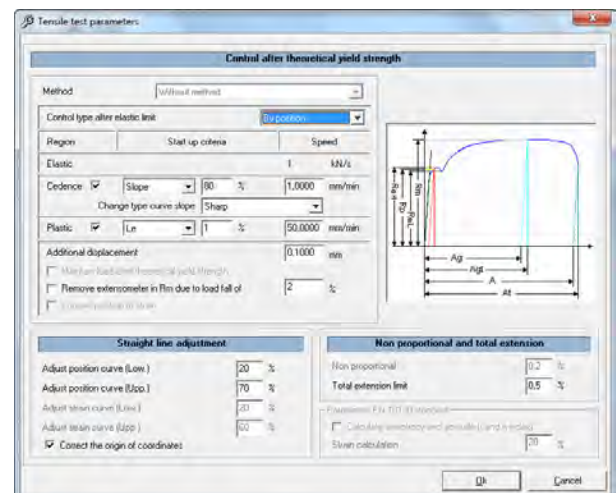
(1): For sensors previously installed into the system.



Testing machine setting-up



Configuration of Tests



Auxiliary window "traction parameters" Available when selecting a tensile test.

2. SPECIMENS IDENTIFICATION

By means of window: "Specimen Parameters", user has multiple options to label specimens.

- › Name of test / specimen / sample, origin, batch, client, auto-numbering, date, etc.
- › Test material, geometry of the specimen (length, width, diameter), mass, density, etc..
- › Free text. For adding any important info not reflected above.

3. TEST DEVELOPMENT

The program performs tests automatically, according to the method and parameters previously introduced in the test configuration.

For test monitoring, PC screen shows, in real time, following features:

- › Graphical representation: XY charts of load-stroke, load-strain, stroke-strain, etc.
- › Instant numerical values, obtained by the sensors connected to the system (position, load, strain, etc).
- › Real-time execution and presentation, of the results of the calculations pre-programmed by the user with the integrated programmable calculator.

If something goes wrong, the user can stop the test at any time during its execution.

4. TEST RESULTS: ANALYSIS AND MANAGEMENT

Once test is completed, results and the graphical representation are shown in the screen. If user rejects the test, results won't be stored. Before validating the test, you can perform following actions:

- › Select and expand areas of the graph (zoom).
- › Change the type of XY chart.
- › Location and search for singular points of the chart.

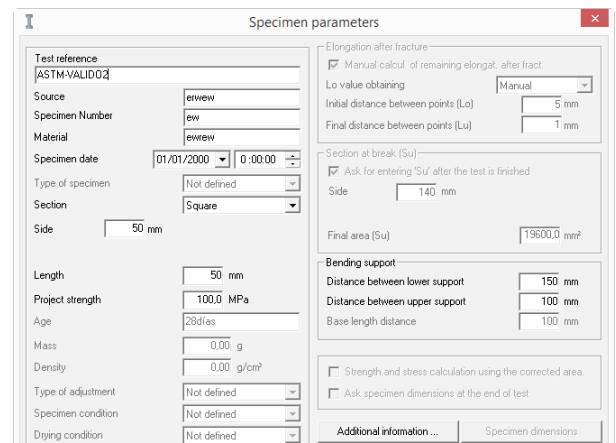
The statistical program allows you to compare several tests including consecutive superimpose curves, create 2D and 3D bar and lines diagrams, create bmp images, etc.

The output files can be converted to XML, ASCII or CSV formats to be exported to other systems such as Excel, LIMS, etc.

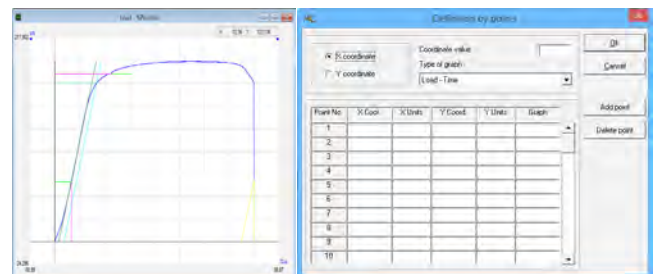
TEST SIMULATION MODULE

Additional module that allows to recover machine parameters (real tests) and reuse on other computers. Being able to simulate once again the test as if performed in real time, without the need for connection to the machine. Main characteristics:

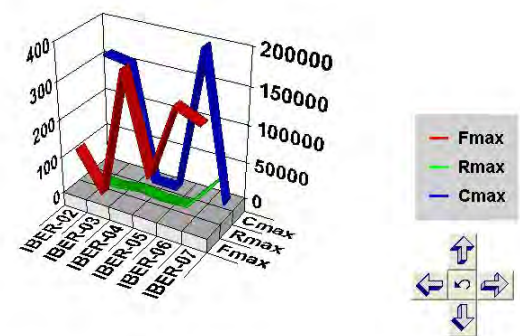
- › Test recovery from network or local
- › Real test simulation
- › Graph visualization on real time
- › Calculation of test parameters
- › Generación de informes



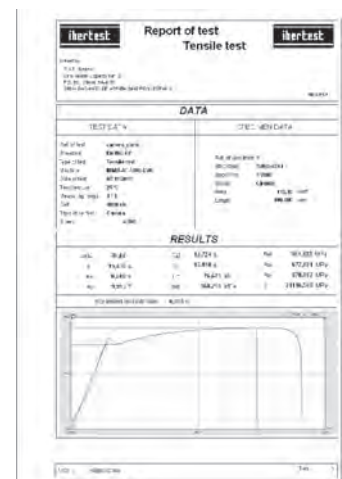
Setting parameters for the test specimen



Location of significant points on the graph of the test



Test comparison - 3D representation



Example of a test report

Main Features

Operating system	WinTest32 works with all Microsoft™ Windows® (32 and 64 bits) operating systems and shares common features with other Windows® programs (system of menus, toolbars, file management, sizing of windows, colors, etc..)
Help functions (usability).	<p>The icon toolbar can be displayed as reduced version, including only the more common features and larger icons.</p> <p>The program is compatible with touch screen computers.</p> <p>The F1 key activates the help window. Help support includes a complete user manual for each application.</p>
Type of tests	Tensile, compression, flexure (one or two load points), bending, extrusion, penetration, shear, etc., on metallic and nonmetallic materials.
Test models	<p>WinTest32 comprises test models according to most commonly used standards (EN, ASTM, ISO, etc.). The user can configurate similar test models.</p> <p>Under request, we can make modifications to configure your WinTest32 software to your special needs (consult additional cost)</p>
Cyclical testing	<p>WinTest32 allows to create cyclic tests, with rising, keeping or falling of the load applied to the specimen. The change of slope or ramp can be done in response to load, stroke or both figures inclusive.</p> <p>When necessary, the slope changes may be accompanied by the control mode (load or stroke) changes.</p>
Serial testing	<p>Possibility of grouping several tests together, in series and subseries.</p> <p>It is possible to obtain statistical information of the grouped tests parameters.</p>
Multi-frame control	Management of up to six testing zones, in alternately way, using the same PC and the same software. The software shows the available test zones to selecting.
Measurement channels	<p>Simultaneous representation of several measurement channels at once.</p> <p>WinTest can manage up to 16 channels (both deformation or auxiliars). The channels can be configured by the user. To use all features offered by WinTest32, you may need additional hardware.</p>
Calculator programming	<p>The system integrates a programmable formula calculator.</p> <p>In this way, you can combine parameters of the specimen with results or values obtained during the test, in order to obtain derivatives results (modules, strength, unit conversion, etc.) in real time.</p>
File management	Test results automatically recorded on hard disk, and the configuration of the machine at the time of their execution. These tests can be recovered for further analysis.
Data exportation	The output files can be exported in XML, ASCII or CSV and Excel format (csv or xls), allowing these files to be imported for most of the programs, word processors and spreadsheets on the market.
Statistics	<p>Incorporates the possibility of performing statistical analysis on tests previously recorded on hard disk.</p> <p>The statistics can be displayed as graphs, histograms, level with Gaussian distribution, charts, dimensional comparison (both tapes and volumes), test curves comparison by superimposing them on a diagram of coordinates, etc.</p>

"TECHNICAL SUPPORT HAS NEVER BEEN EASIER"

TELEDIAGNOSIS is a remote diagnostic service and maintenance support, available for all IBERTEST equipment and testing machines equipped with data acquisition system by computer.

The immediate attention of TELEDIAGNOSIS service for customers located worldwide, minimizes downtimes and avoids delays in the work of laboratory, while reducing or eliminating the overhead of moving the IBERTEST technicians.

To run TELEDIAGNOSIS a link program is used which establishes a remote connection to control the computer of the machine, quick and safe, ensuring IBERTEST services even at facilities with distant locations.

Thereby, an easy and effective intervention from our Technical Service is possible regardless of the location of the machine, as long as an access to INTERNET is available.

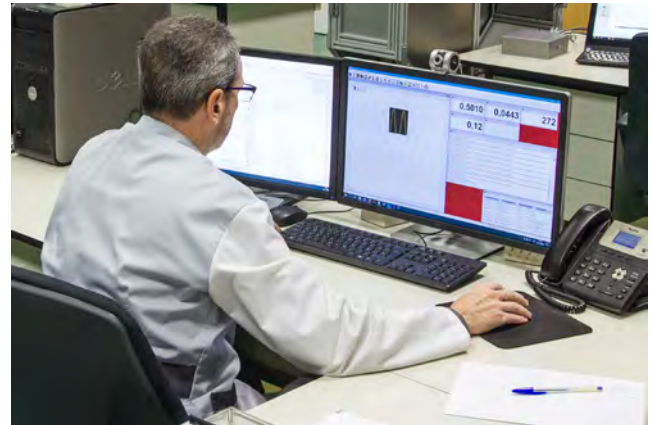
Even on those occasions when the Technical Service must act "in situ", the TELEDIAGNOSIS is helpful to clearly identify the problem in advance and improve first-visit resolution rates.

During a TELEDIAGNOSIS session, the following actions can be performed:

- › **Software revision and correction.** IBERTEST technicians can inspect the software file system, looking for wrong configurations, lost files and directories, corrupted files, viruses or others. Once the errors are detected, only the appropriate libraries and changes are transferred, without reinstalling complete programs.
- › **Remote handling.** IBERTEST technicians can operate the remote machine in real time to perform maneuvers, tests of mechanical movement, installation of testing transducers and accessories, verification of electrical and electronic systems, on/off alarm and security systems, etc.
- › **Videoconference.** Through webcam a videoconference between client and our technicians can be maintained, thus we can get visual-information about the correct operation of the machine's mechanical and hydraulic systems. Also, by written or voice messages, it is possible to exchange views and comments, and give appropriate instructions to the user, when necessary, to perform some physical action in the machine.
- › **Updates.** The software can be easily updated to its latest version, which allows enjoying the advantages resulting from the continuing work of review and program development.
- › **Factory reset.** All machines have a backup, stored in our servers in Madrid, which allows you to restore the original configurations when necessary.

TELEDIAGNOSIS

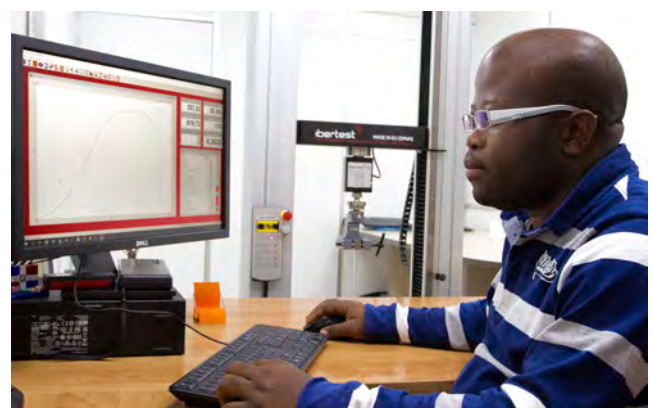
REMOTE DIAGNOSIS SERVICE



IBERTEST Spain - Madrid Technical Services



Real time TELEDIAGNOSIS link



End-user laboratory (anywhere in the world)

Remote diagnostic service by TELEDIAGNOSIS is free during the first year and during the warranty period.

After the guarantee period, many of our customers require the Annual Telediagnosis Pass, which covers interventions of up to 5 hours a year.

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ibertest



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