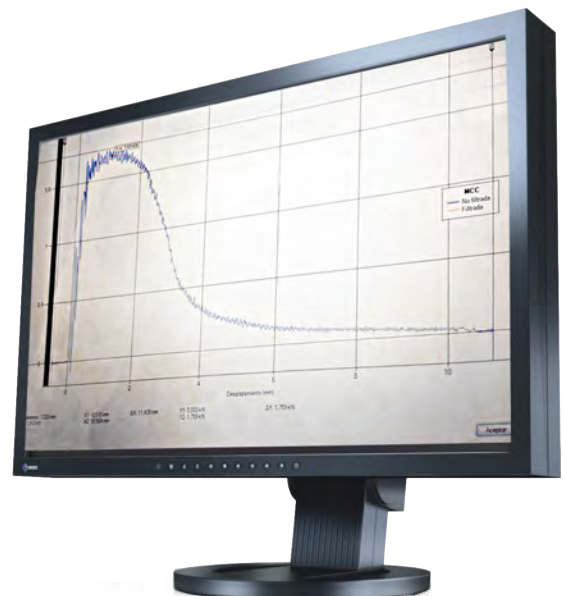


Impact test pendulums
Serie PIB

▶ Energy: 150 - 750 J



S.A.E. IBERTEST

Since 1970
Made in Spain (EU)

www.ibertest.com



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DESARROLLO REGIONAL
UNA MANERA DE HACER EUROPA

▶ Quality Engineering since 1970



■ **Tailored engineering:** testing technology focused on customer needs.

■ **Confidence and reliability:** Manufacturing in accordance with the most demanding quality criteria, and international Testing Standards.



■ **R+D+innovation:** committed with continuous improvement of our products.

■ **After sales service:** accompanying and supporting customers in their activities with calibration, predictive and preventive maintenance, reparation, up-dating and modernization services.



■ **Calibration Laboratory:** ENAC (member of ILAC). Accredited



▶ Headquarters

S.A.E. IBERTEST
Ramon y Cajal, 18-20.
28814 Daganzo de Arriba
Madrid · Spain



OVERVIEW

Motorized impact tester PIB Series with programmable electronic control unit and measuring system by digital encoder. To be used for resilience tests over metallic and non metallic materials with Charpy and Izod accessories.

Suitable for steel and metal processing industries, research institutes, accredited laboratories, technical colleges and research institutes.

Manufactured according to test standards, EN-ISO 148, EN-10045-1, DIN 50115, ISO/R 83, ASTM E23 and EU safety standard EN 60-204-1

On demand, we can supply a verification certificate issued by our Metrology Laboratory equipped with internationally traceable instruments.



MAIN FEATURES

- › Range of impact energies: from 150 to 750 J, depending on model, with energy resolution of 0.01J in full range.
- › Angle measuring by encoder (pulse digital transducer) with resolution of 0.018 degree.
- › Motorised hammer raising by clutch system “on the fly” to capture the hammer after the test.
- › Hammer release system setting with two configurations:
 1. When user closes the door
 2. When user pushes the start test key
- › Digital control module with touch screen, directly in the front of the equipment, along with an emergency stop button and opening push key in the access door.
- › Digital readout in kJ/m² located in the module screen (as well as in the PC, using WinCharpy software as an option)
- › Data output via USB standard interface for PC connection with WinCharpy software
- › Safety enclosure with interlocks to prevent the drop of the pendulum by accident.
- › Set of support-anvils for 55 x 10 x 10 mm Charpy specimens (free space between supports, 40 mm). Adjustable system for other sizes of specimens and tests (IZOD)
- › Available supports, anvils and impact strikers according to EN and ASTM standards, as well as special tests (on request).
- › Easily changeable striker knives and support-anvil sets.





Main component identification

| | |
|----|---|
| 1 | Hammer interlocking mechanism |
| 2 | Hammer |
| 3 | Impact striker |
| 4 | Pendulum arm |
| 5 | Motor system with clutch and brake |
| 6 | Pendulum axis |
| 7 | Anvil set |
| 8 | Supports for specimens (in figure, Charpy supports) |
| 9 | Levelling checking place |
| 10 | Main body |
| 11 | Control and results readout panel |
| 12 | Proximity sensors |
| 13 | Clamping bracket arm in the test position |

Models Chart: main specifications and values

| MODEL | PIB-300-MW | PIB-450-MW | PIB-750-MW |
|------------------------|---|-----------------------|-----------------------|
| Standards | EN-ISO 148, EN-ISO 10045-1, DIN 50115 and ASTM E23 | | |
| Max. Impact energy | 300 J | 450 J | 750 J |
| Hammer weight | 20,4 kg | 30,4 kg | 50,5 kg |
| Pendulum length | 770 mm | 770 mm | 770 mm |
| Max. pendulum velocity | 5,42 m/s | 5,42 m/s | 5,42 m/s |
| Measurement system | Digital encoder | Digital encoder | Digital encoder |
| Energy: resolution | 0,01 J | 0,01 J | 0,01 J |
| Angle: resolution | 0,018° | 0,018° | 0,018° |
| Dimensions | 2150 x 600 x 920 mm | 2150 x 600 x 920 mm | 2150 x 600 x 920 mm |
| Approx. net weight | 750 kg | 900 kg | 1200 kg |
| Power | 500 W | 500 W | 500 W |
| Power supply | 1-Ph, 230V+N+E, 50 Hz | 1-Ph, 230V+N+E, 50 Hz | 1-Ph, 230V+N+E, 50 Hz |
| Striker | According to EN standard (included in equipment supply) | | |

CONSTRUCTION RELEVANT DETAILS

The pendulum body is manufactured in high strength cast-iron high precision machined.

The horizontal shaft which holds the pendulum rotates on ball bearings with very low friction coefficient.

The hammer (type-C disc shape) is fixed by screws at the bottom of the arm. Impact striker is assembled on the hammer. One EN striker is supplied with the machine, being easily changeable by ASTM strikers.

When pendulum is in rest position, the striker edge is no farther than 2.5 mm from where it would touch the test piece.

The specimen should be in horizontal position, as well as perpendicular to the plane in which the pendulum rotates. The striker edge must impact in the opposite face with notch.

The oscillation plane of the impact tester is perpendicular to the transverse axis of Charpy specimen (or to the IZOD bench screw) with a levelling better than 3:1000.

Impact tester machine is levelled on the foundation with the aid of 4 levelling screws located in the base, then it is casted and anchored with four bolts (supplied with the machine)



AUTOMATIC OPERATION SYSTEM

Pendulum raising is achieved by means of one electric motor with gear reduction, which allows the pendulum be lifted automatically as far as their stand by position, where is held by means of a locking system with a proximity detector.

User can select between 2 different modes of pendulum releasing:

- 1. Manual mode:** Pressing the button located in the touch screen of control module. For safety, if the door is not closed the pendulum will not be released.
- 2. Automatic mode:** Pendulum releases when access door is closed. This second option is highly useful to gain agility in running multiple and repetitive tests

Using both, automatic saving of test data and automatic releasing system, it is possible to reach a low cycletime for each test between 5 and 8 seconds per test.

After the test, both braking and raising of pendulum are automatic, with pendulum catching "on the fly" by means of the special clutch assembled in the machine.



ELECTRONIC CONTROL MODULE

The electronic & digital control module is integrated in the frontal panel of the machine. It includes a touch screen, what means that tests can be programmed and get results with no need of PC.

With USB port to connect as option one PC or printer.

The PLC displays the menu and operation options available. Using the touch screen it can be performed, among others, following functions:

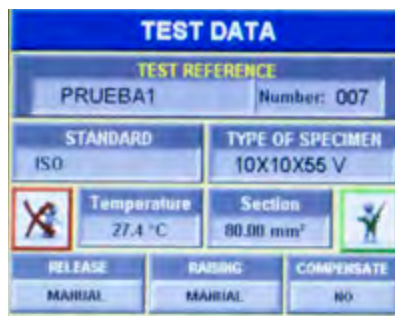
- Selection between operating language (Spanish, English, French and Russian)
- Configuring and running tests
- Retrieve data from previous tests to see or delete them
- Operating adjustments and settings:
 - Calibration with certified standard specimens (available as accessories)
 - Self verification: The machine runs automatically, the operating sequence indicated by the standard to check the adjustment parameters.
 - Calculation of energy losses by the possible friction in axis bearings and/or air resistance, with automatic adjustment



| | |
|---|-------------------------------|
| 1 | Digital control module |
| 2 | Door opening push button |
| 3 | Emergency stop button |
| 4 | USB connection for PC/printer |



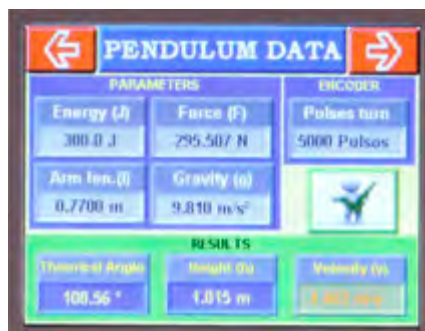
Touch screen



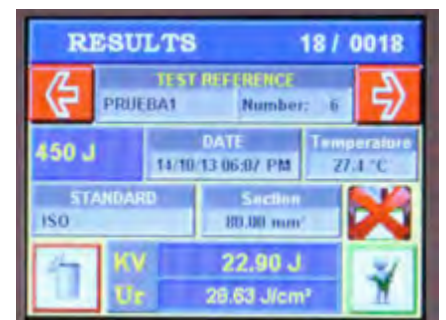
Virtual keyboard screen



Specimen Data



Pendulum setup



Testing results

PERIMETER SECURITY PROTECTION

Manufactured in aluminium profile with metacrylate and polycarbonate panels with high impact resistance.

Designed to minimize the potential risks arising from the improper use of these equipment.

Fully compliant with the requirements of national and international standards. The design of the protection housing facilitates an easy handling and changing of fixtures, pendulums, strikers or other accessories during maintenance and calibration tasks.

Controlled accesses by security locks with electric interlocks, having two functions:

1. To prevent the opening of the door when pendulum is moving.
2. To detect any opened locking and avoid the release of the pendulum.

Tests can be started immediately after closing the door in security protection.

This advantage must be taken under consideration in tests with temperature (low) conditioned specimens (according to ASTM E23), so these must be tested in less than 5 seconds after removing the specimens from the cooling device.



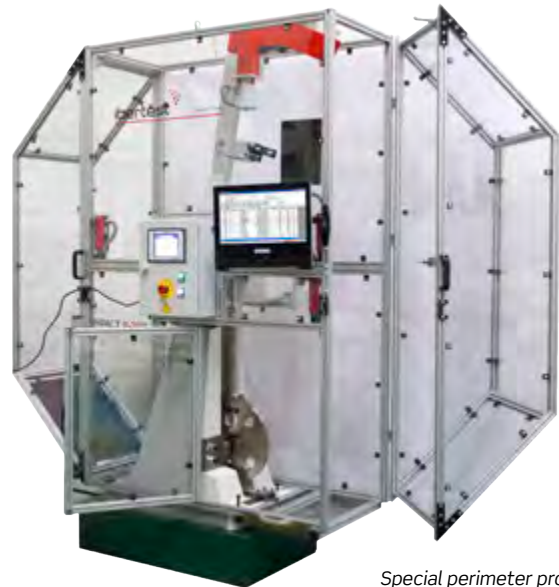
Standard perimeter protection with fixed side trapezoids

Tray for broken Charpy specimens (optional)

Allows extraction of test specimens, without having to access inside of the protection

Special option: Side opening

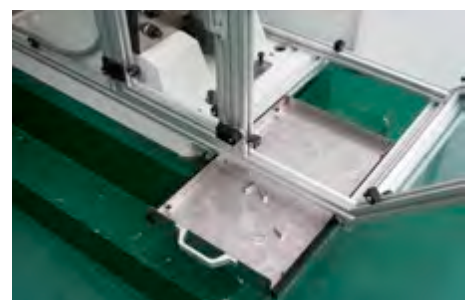
Highly recommended for a frequently exchange of pendulums (for testing different energies) where it is necessary be able to easily access inside of the protection. With this option the lateral trapezoids opens easily, turning on a hinge. Side opening is also controlled by electric lockings.



Special perimeter protection with side trapezoids with locking and quick release by hinges



Safety cutout device in front main door - Outer and inner views



Removable tray for broken specimens (optional)

IMPACT STRIKER

The impact striker (or knife) is the fixture that transmits the energy stored in the pendulum against the test specimen.

There are two types of impact strikers:

1. Striker according to EN-ISO 148
2. Striker according to ASTM E23

No changes are needed in the hammers to fix one or another striker.



INTERCHANGEABLE PENDULUMS FOR LOWER ENERGIES

At the same equipment can be mounted low energy pendulums to test materials with lower resilience (see below table).

| MODEL | PIB-300-MW | PIB-450-MW | PIB-750-MW |
|-------------------|------------|---------------|-----------------|
| Impact energy | 300 J | 450 J | 750 J |
| Optional energies | 150 J | 150 and 300 J | 150, 300, 450 J |



For 450 and 750 Joules impact testers it is included a system to facilitate the exchange of pendulums: releasing the pendulum from its axis, the pendulum rests on a small platform, movable on a rail track. This system is a great aid for a quick and easy pendulum extraction.

To install the second pendulum, just follow the procedure in reverse order.

When installing another pendulum, an optical system automatically recognizes the new installed.

The impact tester automatically reconfigures according to the new installed energy.



ANVILS

The radii of the anvils are subjected to wear by the continuous friction of specimens and should be substituted when wear causes that radius of curvature is greater than the limit required by the standard (1.05 mm according to ASTM or 1.5 mm according to EN)

IBERTEST offers as an option a system with special anvils where only it is possible to replace the part subjected to wear, without having to replace the entire anvil.

Anvil with removable radius (optional)

This special set of supports-anvils incorporates detachable parts with the radius carved in the edge of the anvil.

The detachable parts have two radii carved in opposite edges. When one radius is out of function (quite used) can be disassembled from the anvil and turned to 180 degree to be used twice, making longer in two times the working life of this anvil.

It means that customer does not need to replace the complete set support-anvil, only it is needed to turn this part or replace these detachable parts when both radii are worn out.

In essence: A practical solution with very low maintenance required, saving work time and money



Conventional set of anvils (supplied as standard)



Anvil system with removable radii



Detail of detachable radius

IMPACT TESTER FOUNDATION

According to the standards, the impact testers should be mounted over a solid foundation which must be prepared by the Customer.

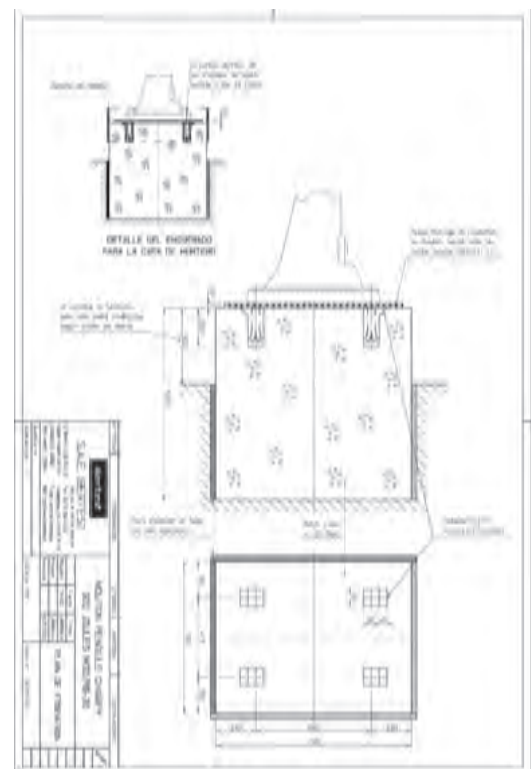
Given the requirements imposed by the standards, for impact tester foundations, two alternative methods are considered:

1.- **By means of concrete base.** In this case, for proper leveling it is necessary to use a self leveling mortar. IBERTEST provides the needed drawings for the construction of this concrete base once Customer confirms the Order for the impact tester.

2.- **By means of metallic base + concrete plate.** IBERTEST can supply the drawing for the metal base with 200 mm thick, manufactured of planned surface steel with 3/1000 flatness uncertainty. For anchoring it is needed a mini-slab manufactured by concrete.

IBERTEST will provide needed drawings for the construction of the concrete slab once Customer confirms the Order for the impact tester.

If you wish to be homologated according to ASTM E-23, we recommend to follow for the second alternative.



PC SYSTEM (OPTIONAL)

The angle information reached by the pendulum and acquired by the encoder is processed by the digital electronic module to calculate the energy and resilience values

However this module has a USB port built-in for the connection of an external PC, allowing a simultaneous work together with the control module.

Impact tester machines can implement a PC + data acquisition system, which are described as follows:

“All in One” PC

Supplied by IBERTEST with a touch screen and integrated CPU in one unique flat module, with following main specifications (minimum):

- › Dual-core processor: 1.8 GHz
- › RAM 2 GB
- › 320 GB HD.
- › TFT 15.6” touch screen, with scratch and impact resistance
- › USB connection, ethernet, Wi-Fi, 3G.

PC is fixed to the protection structure by means of an articulated support with adaptable positioning, with following advantages:

- › Regulable height positioning, allowing a proper height for the operator ergonomy.
- › Articulated and tilt support to optimize the viewing angle.
- › Laboratory space saving.
- › Modern appearance.

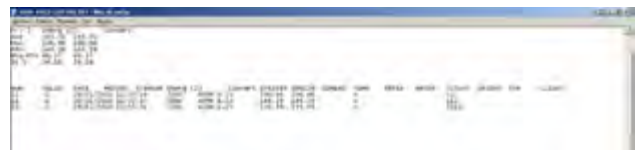
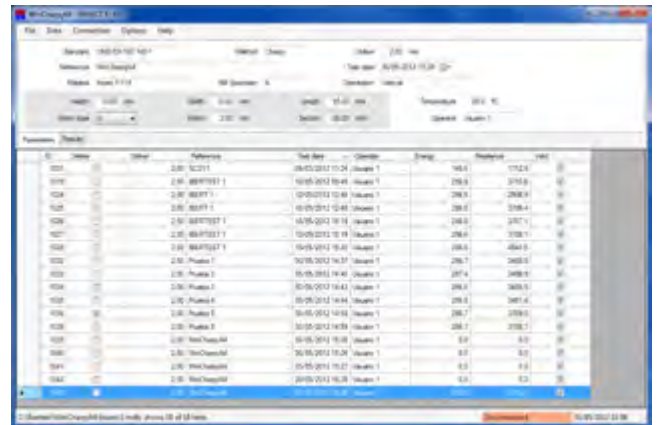
WinCharpy Software

PC has installed the last Windows version together with the WinCharpy software package.

Main advantage of this system is the test results displaying in a table, shown at all times, while the module only shows the current test data.

WinCharpy software acquires complete data for each test, storing these in the computer so they can be retrieved for later analysis, statistics, evaluations, etc..

The test data can be exported to ASCII files, to be used by other software programs (Microsoft Excel, LIMS, etc ...)



INSTRUMENTED IMPACT TESTING PENDULUM

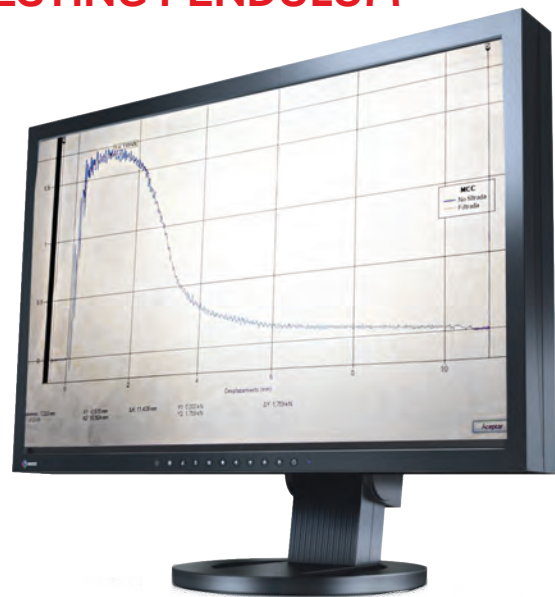
Instrumented test method

Measuring of the force egerced againts the specimen by the striker during the test.

Instrumented striker with extensometric gauge, combined with a very high speed data acquisition system.

Testing standards:

- ISO 14556:2000: Steel. Charpy V-notch pendulum impact test -- instrumented test method.
- ASTM E2298-13a. Standard Test Method for Instrumented Impact Testing of Metallic Materials



Introduction to the instrumented impact method

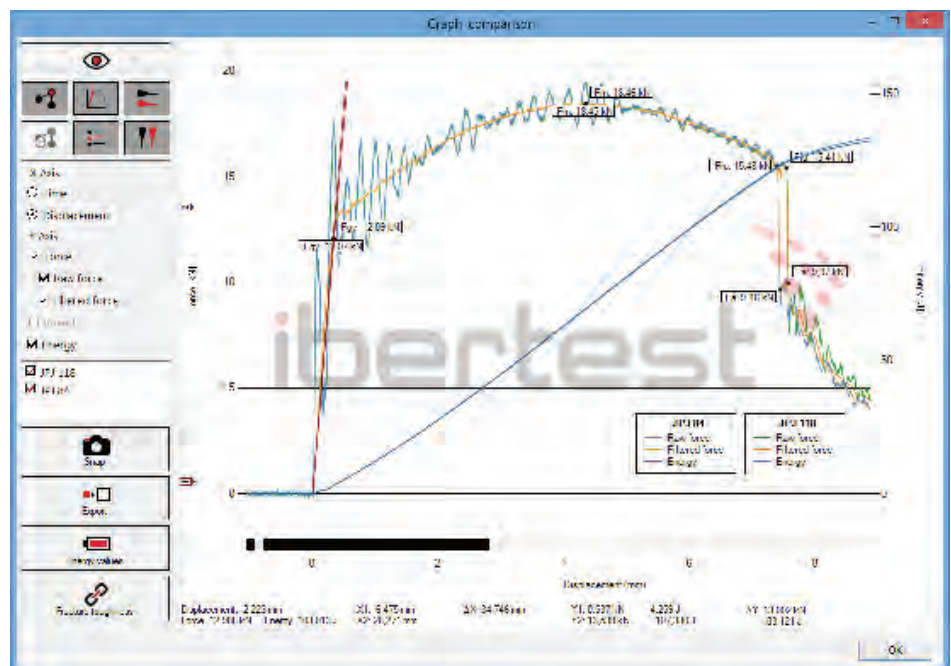
Traditional impact tests provide useful, standardized and easily comparable data. However, due to their nature, the amount of information they can offer is limited.

Instrumented impact testing allows to continuously measure the force signal in the striker during the short duration of the impact. This way it can offer much more information about the fracture behavior of the material than traditional Charpy test. It is especially suitable for tech centers, authorized laboratories, universities and research institutes.

Instrumented testing directly provides the maximum force, yield point or energy absorbed before brittle fracture, among other data. Besides, it can be used to estimate the percent shear fracture and fracture toughness. Another advantage is the ability to classify specimens into standard categories, from the shape of the measured curve.

Thanks to this it is possible to observe material characteristics that can often be overlooked or wrongfully settled during traditional testing.

For example, transition temperature determination is much more evident and precise than through the method of visual estimation of the broken specimen surface



Instrumented testing screen with IBERTEST WinCharpy® software

Features

The IBERTEST instrumented impact test system has the following characteristics :

Fully compliant with ISO 14556:2000 and ASTM E2298-13a

Suitable for assembly in the IBERTEST pendulums:

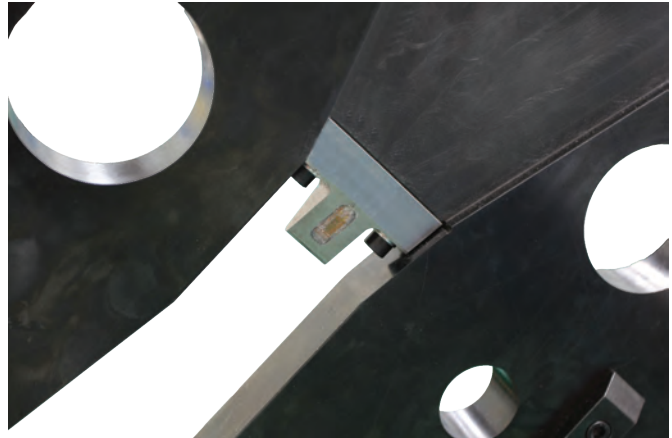
- PIB-300-MW
- PIB-450-MW
- PIB-750-MW

Installation on older models may be possible after a technical enquiry.

Compact design: acquisition hardware and analysis software in the same system.

Interchangeable striker tips.

Suitable for standard size and miniaturized specimens..



State of the art data acquisition system

Sample rate: 1 Mhz.

Resolution: 16 bits.

Acquisition length: 100 ms.

Impact detection and automatic processing of the captured data, allowing fast batch testing.

Compatible with WinCharpy® software for storing, viewing and analyzing previous tests.

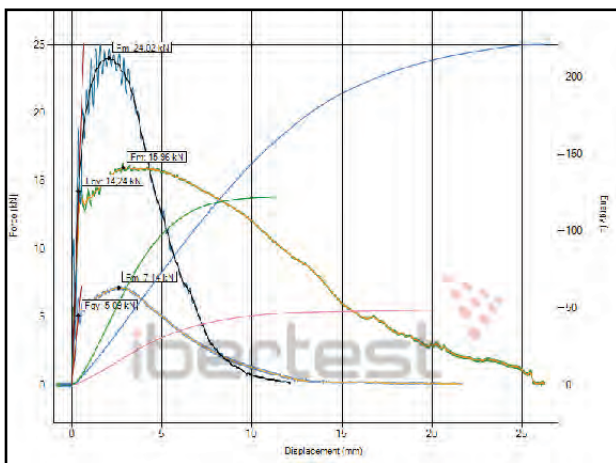
Modern and powerful graphical analysis tool, allowing several simultaneous tests on screen for comparison. Especially suitable for studying the behavior changes from temperature variation or batch disparity analysis.

Digital filtering with smart transient correction.

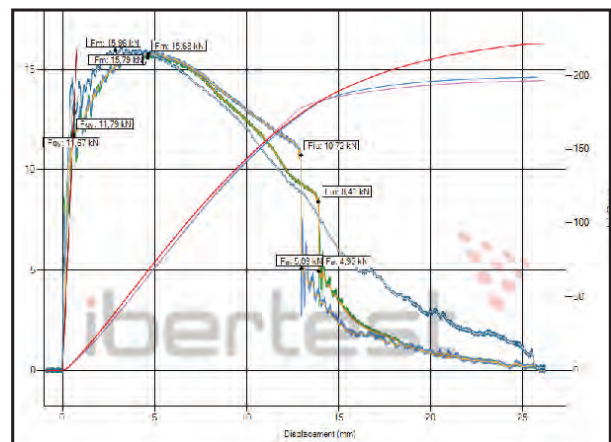
Automatic detection of points of interest and type of curve according to the standards. It also allows manual fine tuning.

Determination of percent shear fracture, fracture toughness and statistical energy parameters.

Image and table full data exporting.



Several testing results comparison in the same graphic



Results comparison of the same material at several testing temperatures

BROACHING MACHINES FOR CHARPY SPECIMEN PREPARATION

Broaching machine allows perform “V” and “U” type notches correctly for Charpy and Izod specimens with 10x10 mm section according to EN 10045-1 and ASTM E23.

With each broaching machine, IBERTEST supplies broaches with “V” and “U” notches for 2 mm. depth (1 broach chosen by the Customer)



HAND OPERATING BROACHING MACHINE

Suitable for wrench mounting. Robust appearance, easy and simple to use with easy & low maintenance required.

Specimen is placed in a support, securing it with a screw clamp. A cogged wheel inside the machine endents with the rack which moves upwards or downwards when the wheel is turned. The rack pulls a multiple teeth broach performing the notch in the specimen. Broach is guided into a squared section which is moved downwards.

MOTOR DRIVEN BROACHING MACHINE

Robust construction and independent machine, with 3-phase motor and control panel.

The broach is mounted on a guide-carriage which is displaced in turn by an standard screw in its full stroke.

It is supplied with guides that ensure the perfect alignment of the broach path perpendicularly to the fastening system of the specimen.

It has adjustable stops to ensure a proper positioning of the notch in all specimens, as well as stop screws to adjust the depth or the notch.

At the beginning of the process it is performed a soft clamping pressure (manual operation).

Safety: there are limit switches at each end of stroke of the broach



PINCERS

According to ASTM E23 for positioning of Charpy specimens in the pendulum.

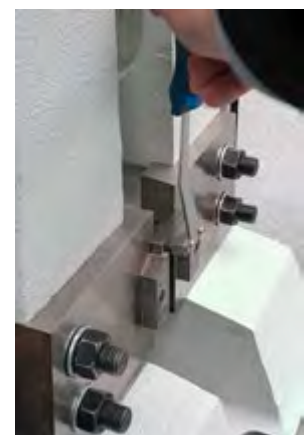


“SHOVEL” TYPE DEVICE

Developed by SAE IBERTEST for a perfect positioning and centering of test specimens in the impact tester machine.

This device has been developed due to the problems in the use of ASTM E23 pincers for sample positioning in the impact test supports.

Using standard pincers to meet ASTM E23 sometimes is complex, specially in the time needed, for sample positioning in the supports, making it difficult to fix time requirements according to this standard (5 seconds to remove the test piece from the cooling cryostat placing it in the pendulum for breaking immediately this sample)



THERMOSTATIC BATH CIRCULATORS

Digital thermostatic baths for homologation according to ASTM E23

To prepare specimens at low temperature before being tested in the impact tester.

Excellent control of low temperatures.

With display to show real temperature and setpoint. with excellent resolution. RS-232 interface for external PC connection and verify possible changes of temperature.



| MODELS/ SPECIFICATIONS | IB-FP-50-MA | IB-PF-89-ME |
|-------------------------|-----------------------|-----------------------|
| Temperature range | -50 ... + 200 °C | -90 ... + 100 °C |
| Resolution | 0.01 / 0.1 °C | 0.01 °C |
| Stability margin | ± 0.02 °C | ± 0.02 °C |
| Power | 2000 W | 1300 W |
| Pump capacity (maximum) | 450 mbar | 450 mbar |
| Maximum pump flow | 11-16 l/min | 11-16 l/min |
| Refrigeration agent | R404a | R404a / R508b |
| Approx. net weight | 55 kg | 133 kg |
| Dimensions | 420 x 490 x 700 mm | 550 x 600 x 900 mm |
| Power supply | 1 x 230 V - 50/60 Hz. | 1 x 230 V - 50/60 Hz. |

GAUGE TO ADJUST THE SPECIMEN SUPPORTS IN THE IMPACT TESTER.

Checking system for knife-support centering



SET OF BCR AND NIST SPECIAL CHARPY SPECIMENS FOR EN-ISO-148 (EN-10045-2E) & ASTM E23 HOMOLOGATION

These are needed for homologation of impact tester machine according to EN and ASTM.

For ASTM E23 homologation, broken specimens must be submitted to NIST (USA) with the certification leaflet duly filled in

5 specimens of high and 5 of low energy are included on each set.



FIXTURE FOR IZOD TESTS

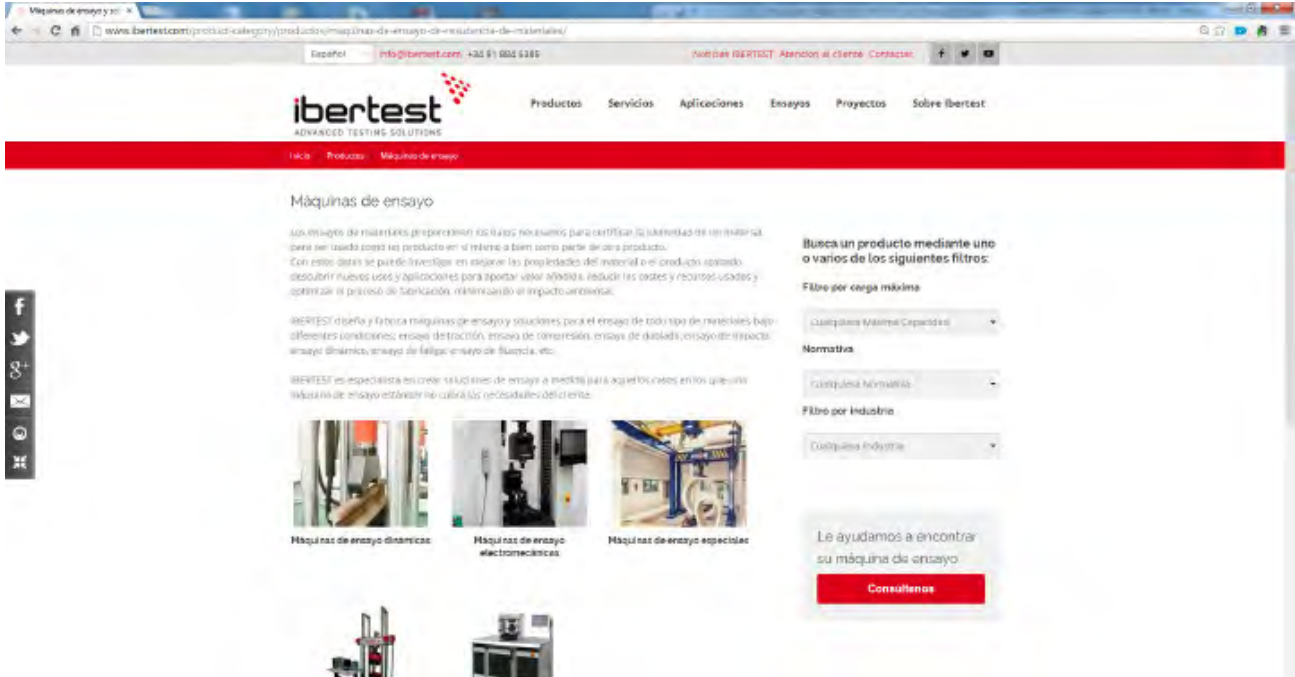
Set of accessories for impact tests according to IZOD, including:

- IZOD pendulum, including arm and hammer-striker.
- Special trigger for IZOD hammer.
- Anvil and supports set for 10 x 10 mm IZOD specimens. Other sizes, pls. ask to us.

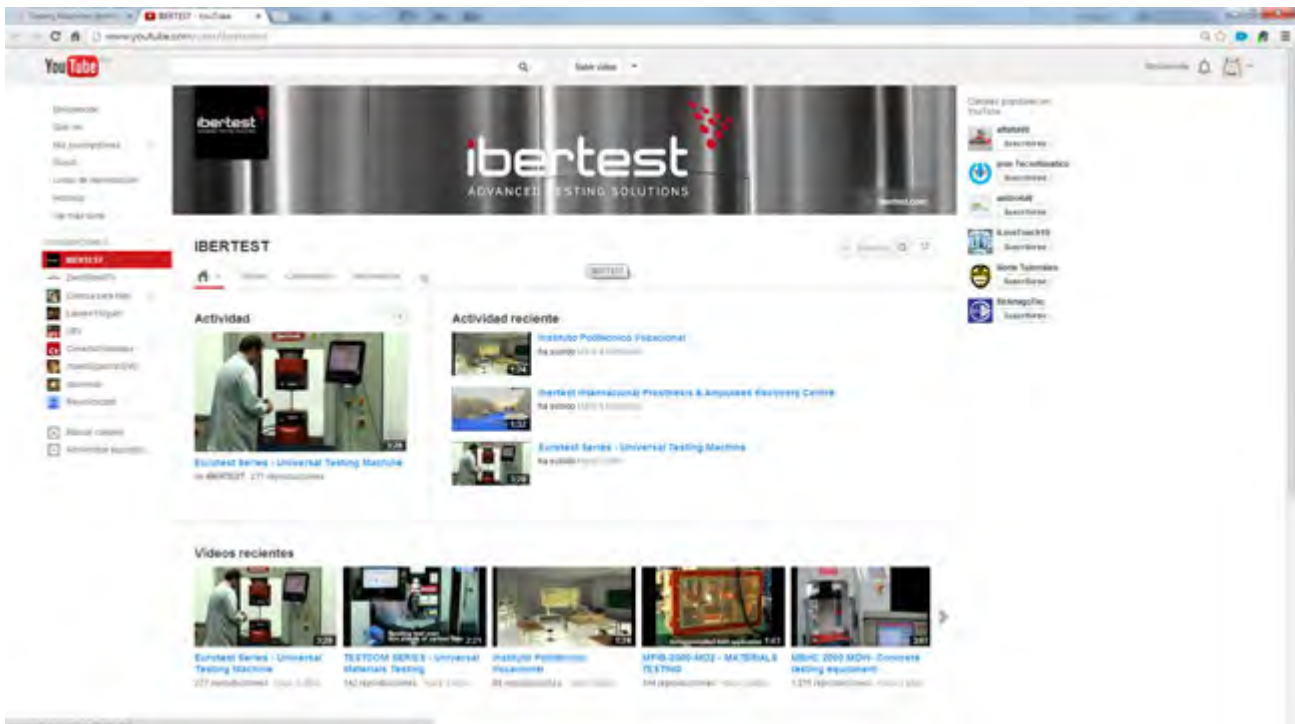
Do you need more information?

To find more information about our products and services, visit our web site.

WWW.IBERTEST.ES



Also on YouTube: <http://www.youtube.com/ibertestint>



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