

twilight

INSTRUMENTOS DE MEDICIÓN INDUSTRIAL

Impactometro Digital IZOD LY-ZIT (1 ,2.75,5.5, 11 Y 22 Joules)

LY-ZIT2275

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I . Application

Digital Izod impact testing machine is mainly used to test the impact toughness of non-metal materials, such as hard plastic, reinforced nylon, fiber glass, molten, electronic insulation materials and so on. It is the ideal test equipment of chemical industry, research units, tertiary institutions and the quality inspection departments.

II . Feature

2.1 This tester is an intelligent digital display impact testing machine which adopts computer technology. It can automatically correct the energy loss caused by the friction or the wind drag and get rid of energy correction due to the impact resistance value chart .Besides, the test of residual energy of the pendulum after specimen fracture detection and the correction in energy loss during impact can be once completed, and it makes the test efficiency and accuracy.

2.2 Adopts the LCD screen shows the test results to make reading more intuitive and completely eliminate influence of test error and visual error caused by the pointer friction and inertia. Reduce the friction loss of impact machine and improve the repeatability and accuracy.

2.3 IZOD Impact: maximum impact energy 22J

2.4 Charpy Impact: maximum impact energy 15J

This machine is combined by this two, so you should change the pendulum along with the jaw base when testing.

Note: This machine contains only Charpy Impact Pendulum and jaw base.

III. Main technical data specifications:

3.1 Technical data

3.1.1 Temperature of working environment: 15~35℃

3.1.2 Accuracy of impact energy: 0.5 % of maximum impact energy

3.1.3 Rising angle of pendulum: $150^{\circ} \pm 1^{\circ}$

3.1.4 Angle resolution: $360^{\circ} / 8000 = 0.045^{\circ}$

3.1.5 Power supply: 110V \pm 10%, 60Hz

3.1.6 Dimension: 600mm \times 450mm \times 850mm (length \times width \times height)

3.1.7 Weight of testing machine: 110kg

3.2 Technical specification

Parameter	ZIT2275
Impact Method	Izod
Impact energy (J)	1,2.75,5.5
Impact speed (m/s)	3.5m/s
Impact pendulum moment (N·m)	Pd1=0.53590Nm Pd2.75=1.47372 Nm Pd5.5=2.94744Nm
Angle of Pendulum Rising	150°±1°
Distance of Combat Center(mm)	335 mm
Impact blade	Distance between striking edge to Upper Surface of Clamps:22±0.2mm
Round angle radius of striking edge	R=0.8±0.2mm
Initial Energy Error	<±1.5%
Energy loss before correction	<0.5%

3.3 Sample types

Sample types of Charpy Impact

Sample types	Length (mm)	Width (mm)	Thickness (mm)	Standard span (mm)
1	80±2	10±0.5	4±0.2	62
2	50±1	6±0.5	4±0.2	40
3	120±2	15±0.5	10±0.5	70

Sample types of IZOD Impact

Sample types	Length (mm)	Width (mm)	Remaining width (mm)	Thickness (mm)	Jaw
1	80±2	10±0.2	8±0.1	4±0.2	1# 10mm
2	63.5±2	12.7±0.2	10.16±0.1	12.7±0.5	2# 12.7mm
3	63.5±2	12.7±0.2	10.16±0.1	6.4±0.3	2# 12.7mm
4	63.5±2	12.7±0.2	10.16±0.1	3.2±0.2	2# 12.7mm

IV. Structure and Performance

The machine contains machine frame, impact pendulum, jaw base, angle sensor, PLC, LCD, hammer device and so on.

4.1 Machine frame —Contains machine body and position institution and install level control in the machine body, operation is convenient and testing results is accurate.

4.2 Impact pendulum —The impact pendulum is made by connect set, the pendulum, pendulum, impact knife and so on.

4.3 Jaw base —The jaw base is a combined type of IZOD and Charpy. Charpy jaw base contains a fixed jaw block and three kinds of jaws, and the jaws be chosen according to the size of samples. The jaw base of IZOD contains a fixed jaw, moving jaw and wedged block, and so on. There are two fixed jaws (1# and 2#) to be chosen according to the samples, and that can do four kinds of testing. (See table of the sample type of IZOD Impact)

4.4 Electric control system— Electric control system consists of PLC, optical encoder, power supply and so on. It installed in the body support.

4.5 Display device— It is a LCD monitor.

4.6 Hammer device— It consists of hammer implement agency that used for releasing impact pendulum.

V. Working Principle

5.1 The working principle of impact machine is place pendulum on raise angle when testing. Then the pendulum has an initial energy E_0

$$E_0 = mgh = mgL (1 - \cos a_0) = P_d (1 - \cos a_0) \quad (1)$$

Therein: P_dPendulum moment Unit: Nm

a_0Actual elevation angle of pendulum

After impacting specimen, some of the energy is absorbed by the specimen, and the other energy make pendulum moving to the maximum elevation angle a_R . At this time, the kinetic energy turns into potential energy completely. The surplus energy of pendulum is:

$$E' = mgL (1 - \cos a_R) = P_d (1 - \cos a_R) \quad (2)$$

The specimen's absorbing energy is:

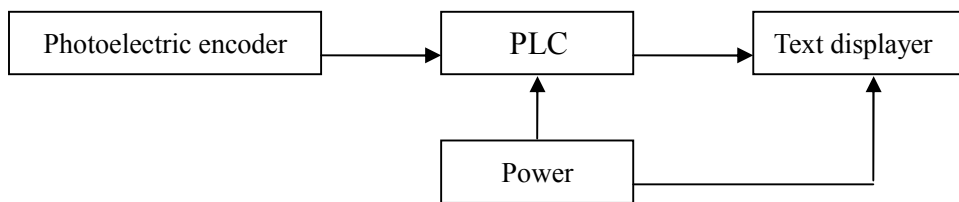
$$E = mgL (\cos a_R - \cos a_0) = P_d (\cos a_R - \cos a_0) \quad (3)$$

Note: The specimen's absorbing energy has not reduces the lost energy.

5.2 Calculation of impact energy and lost energy

According to the working principle of 5.1 and the formula above, you can get the initial energy, absorbing energy and lost energy as long as you measured the initial elevation, impacting elevation and the elevation when so free impact. So the accuracy of angle measuring influences the accuracy of energy measurement. This machine adopts the photoelectric encoder, which solve the problem of friction loss and testing accuracy.

Functional block diagram:



5.2.1 Calculation of energy loss

The energy loss of pendulum when specimen ruptured:

$$\Delta E = P_d (\cos a' - \cos a_0) (a_0 + a_R) / (a' + a_0) \quad (4)$$

Therein: a' -----The elevation angle of free impact

a_0 -----The initial elevation angle

a_R -----The elevation angle after impacting

5.2.2 Calculation of absorbing energy

According to the formula of (3),(4), the absorbing energy is:

$$E = P_d ((\cos a_R - \cos a_0) - (\cos a' - \cos a_0) (a_0 + a_R) / (a' + a_0)) \quad (5)$$

VI. Operation Method

6.1 Preparation before testing

6.1.1 Make testing materials into standard specimen. According to impact type and specimen type to choose responding jaw base, fixed jaw and pendulum.

6.1.2 Based on specimen's impact toughness to choose suitable energy pendulum and install it into pendulum shaft.

6.1.3 Check the level of testing machine.

6.2 Selection and installation of pendulum

Prior to test, under condition of unknowing specimen's impact strength, choose pendulum with max impact energy to get the testing data, and then to base on following principle to select impact pendulum.

6.2.1 Selection of Charpy impact pendulum: The energy by absorbing from specimen's rupture is within 10%-85% of total energy of pendulum.

6.2.2 Selection of IZOD impact pendulum: The energy by absorbing from specimen's rupture is within 10%-90% of total energy of pendulum.

6.2.3 When replacing and installing impact pendulum, firstly loosen tightening screw on joint sleeve of pendulum, take down pendulum and put all the components into accessory case. Then insert up locating shaft from joint sleeve on selected pendulum into location hole of pendulum shaft, and cover screw cover, make sure the cover align at up joint sleeve and lock up joint sleeve's tightening screw at the same time. It finishes installing pendulum.

6.3 Selection and installation of specimen support

6.3.1 Selection and installation of IZOD specimen support: According to specimen type to select suitable jaw to install on jaw base, put jaw base into dovetail groove on machine closely and use wrench to make jaw base fasten on machine.

6.3.2 Selection and installation of Charpy specimen support: According to specimen type to select suitable jaw to install on jaw base, adjust the jaw span and make the distance between the supporting blades of the two jaws conform to test requirements. First, place the template on the plane of the two jaw parallel, make the both sides of the template contact with the supporting blade, and make the blade of the pendulum in alignment of the V notch. After that, use wrench to make jaw base fasten on machine.

6.4 Placement of specimen

6.4.1 Placement of IZOD specimen:

Use a wrench to release the mobile jaw wedge, place the specimen into the jaw and make the IZOD specimen in alignment of template, then insert the blade into the specimen notch and make the specimen be vertical with the V notch, then clamp the specimen. Should ensure the clamping force is same, so that the test result will not be influence by the different clamping force.

6.4.2 Placement of Charpy specimen:

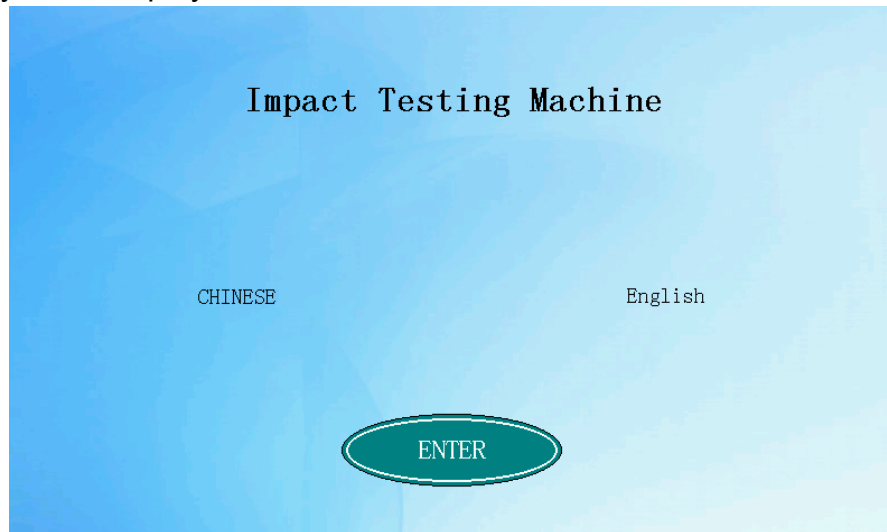
Specimen's notch towards left and backs to blade, two ends place the jaw. When use notched specimen, please let the notch be located the center of the two blade.

6.5 Operation of Testing Procedure

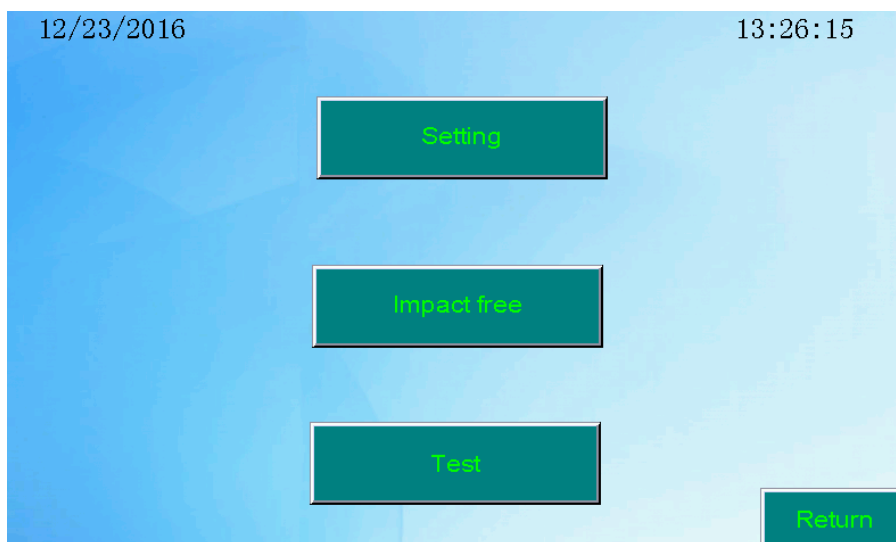
6.5.1 After do the above steps, it can do testing. Firstly, connect power of 220V, open

power switch and preheat for 5 minutes.

6.5.2 Displayer will display the main menu interface as below



Then click ENTER button the displayer will display as below:

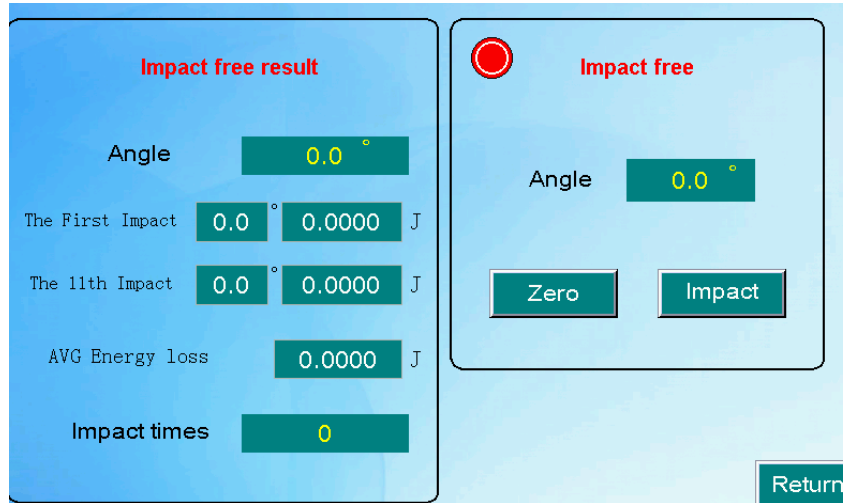


6.5.3 Click Setting button into setting interface as below:

Test No.	001	Sample width	10.0 mm
Tester No.	LARYEE	Sample thickness	4.0 mm
Sample material	PE	Sample type	Single-notch
Temperature	20.0 °C	Remaining width	8.0 mm
Standard	ISO 179	Span	62.0 mm
		Energy	Charpy Impact 5.0J
Setting	12/23/2016	13:27:40	To Test Return

On this interface, tester can input or choose test and sample information, ISO test standard or ASTM, impact methods and pendulum energy according to the test requirement.

6.5.4 Click Impact free button to into non-sample impacting test interface.

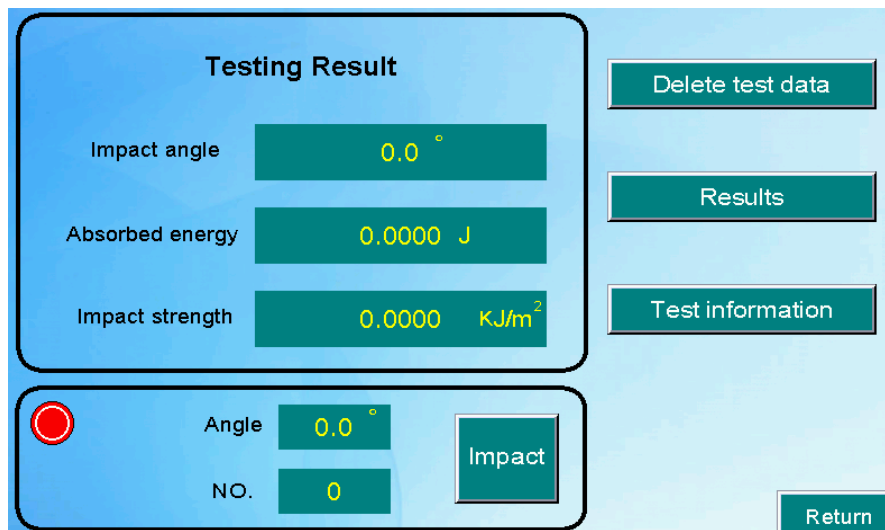


NOTE: Before the first test, it should select impact free with the purpose to test energy loss of this machine.

Before free test, it must ensure that the pendulum position should be vertical with angle zero: Take down pendulum vertically until pendulum statically, click Zero button to clear the angle to zero. After that kick up the pendulum rightward and push hammer lock to lock in and the high angle should be $150^{\circ} \pm 1^{\circ}$.

Then impacting one time, let the pendulum swing eleven cycles according ISO standard, the interface will show the first and 11th angle and energy loss value, and the AVG energy loss value automatically.

6.5.5 Click Return button to back to home interface, then could click Test button to test interface.



Take up pendulum rightward and hang up to lock in. The lower angle display should be $150^{\circ} \pm 1^{\circ}$ as the value of before. After select suitable jaws and sample, click impact button to start test.

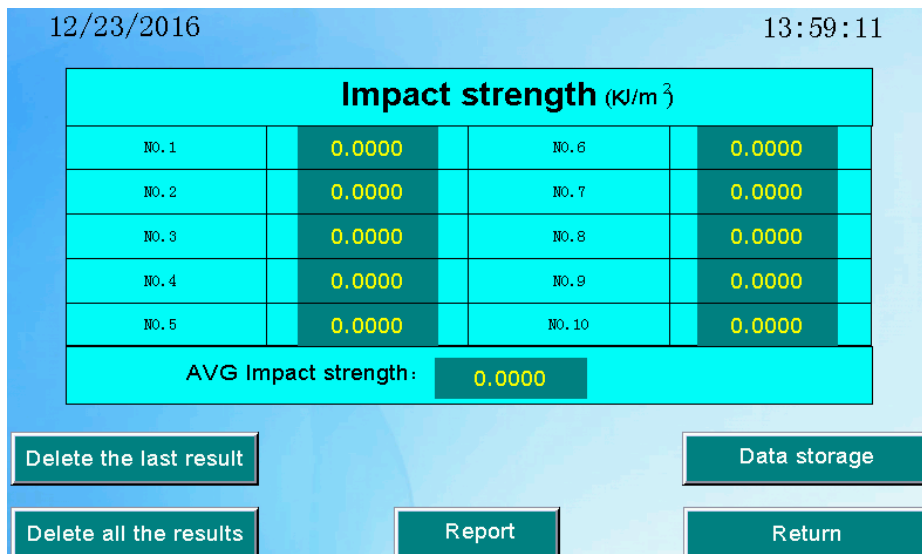


It will appear an impact confirmation window, then can click "Yes" to start impact sample.

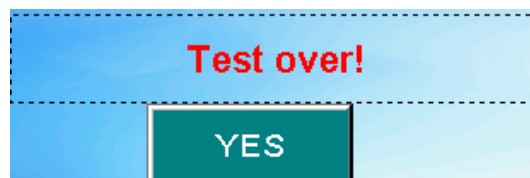
After impact, tester need take up pendulum rightward and hang up to lock in again, meanwhile the test result will appear on the above interface and the number of test times will increase one.

NOTE: Before new test operator can click "Delete the current data" or "Reset all the data" button to delete history test data.

6.5.6 After finish all the testing, it could click "Viewing Results" button to into testing results interface as follows:



NOTE: For this test system, by default, a group has 10 times test, after the 10th test, the system will appear a note window as follow:



At this time, still can continue to do the eleventh test, but after the 11th test, the first result will be deleted automatically, and the second test result will turn to first, similarly, the 11th result will appear on the NO.10 place.

6.5.7 After all the test, could click “Viewing Results” button to view all the test result:

12/23/2016 14:41:09

Impact strength (KJ/m ²)			
NO. 1	0.0000	NO. 6	0.0000
NO. 2	0.0000	NO. 7	0.0000
NO. 3	0.0000	NO. 8	0.0000
NO. 4	0.0000	NO. 9	0.0000
NO. 5	0.0000	NO. 10	0.0000
AVG Impact strength:		0.0000	

Buttons: Delete the last result, Data storage, Delete all the results, Report, Return

Then click “Report” to report and print window:

Test report

Data: 2016/12/23
Time: 14:42:52

Test No.
Material
Tester No.

Temperature 0.0 °C
Width 0.0 mm
Thickness 0.0 mm
Energy 1.0J

Absorbed energy 0.0000

No.1 strength 0.0000
No.2 strength 0.0000
No.3 strength 0.0000
No.4 strength 0.0000
No.5 strength 0.0000
No.6 strength 0.0000
No.7 strength 0.0000
No.8 strength 0.0000
No.9 strength 0.0000
No.10 strength 0.0000
AVG strength 0.0000



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Buttons: Print, Return

Click “Data” button to storage window:

mm/dd/yy HH:MM:SS

TIME	DATE	Width	Thickness	Absorbed energy	Impact strength	Charpy Impact	Izod Impact
hh:mm:ss	mm/dd/yy	###.#	###.#	#####.#####	#####.#####	#####.###	#####.###

Buttons: Delete, Manual store, Pull out U disk, Return

On this window, you can click “Manual store” button to store the test data to USB disk, After click “ Pull out U disk” and connect the U disk to computer, there can find the test results files with the save path of “HMI\HMI-000\CSV”.

VII. Safeguard and Maintenance

7.1 During transportation should be discharged the pendulum to avoid damaging the parts of machine.

7.2 Smear rust preventing oil when the pendulum don't use, and place it in box.

7.3 It is forbidden to replace and dismantle accessories of pendulum, avoid changing the impact constant and impact center distance.

7.4 Before use, should check the screw of pendulum, power, electromagnet and switch.

7.5 To ensure less fraction of bearing, regularly put in machine oil HJ-5 or HJ-7.

VIII. Transportation and Installation

8.1 When move the machine, should avoid slanting, not allow to collision and strong vibration.

8.2 Before installed the machine, clean the rust preventing oil in the machine, and wipe up the dust with clean cotton yarn, and don't dismantle the accessories when clean and wipe up the machine.

8.3 The accuracy of machine has high correlation with the correctness of installation, so the testing machine must be installed correctly on the cement stage.

8.4 The testing machine should be installed in a horizontal position.

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