

MHRS-150

Digital Rockwell Hardness Tester

Professional manufacturer, best quality with competitive price ●
Recommended by the world UT NDT inspection association for training and examination ●
Core technology with independent intellectual property rights, certificate of CE, GOST and etc.. ●



Overview

Mitech MHRS-150 Digital Rockwell Hardness Tester, based on the mechanical principle of conical diamond or hard alloy indenter pressing into the sample surface to produce indentation, realizing the material hardness measurement by measuring the depth of the indentation. Capable of inspecting the finished or semi-finished parts of the machined sample, it is suitable for high accuracy hardness testing for batches parts with various metal or non-metallic materials. According to statistics, Rockwell hardness testing is the most widely used hardness testing method in metal processing industry, which utilization ratio is more than 70%. With novel appearance, stable performance, intuitive and convenient LCD display, and easy to operate the menu design, it is widely used in metal processing and manufacturing, various metal material's failure analysis and other fields like colleges and research institutions. It is the new type Brinell hardness testing instrument for testing the hardness of the materials like cast iron, steel, soft alloy and so on.

Technical Parameters

| Technical specifications | Technical Parameters |
|------------------------------------|--|
| Preliminary testing force | 98.07N , tolerance±2.0% |
| Testing force | 588.4N , 980.7N , 1471N , tolerance±1.0% |
| Measuring range | HRA : 20-88、 HRB : 20-100、 HRC : 20-70、 HRD : 40-77、 HRE : 70-100、 HRF : 60-100、 HRG : 30-94、 HRH : 80-100、 HRK : 40-100、 HRL : 50-115、 HRM : 50-115、 HRR : 50-115 |
| Testing force application Mode | Automatic operation (preliminary test needs manual operation) |
| Indenter specification | Diamond cone Rockwell indenter , Φ1.5875mm steel ball indenter |
| Display | LCD liquid crystal display |
| Rockwell scale | HRA、 HRB、 HRC、 HRD、 HRE、 HRF、 HRG、 HRH、 HRK、 HRL、 HRM、 HRP、 HRR、 HRS、 HRV |
| Conversion scale | HRA、 HRB、 HRC、 HRD、 HR15N、 HR30N、 HR45N、 HR15T、 HR30T、 HR45T、 HV、 HBW、 HK |
| Duration time | 1~30s |
| Indication error | 0.1HR |
| Maximum height of specimen | 170mm |
| Distance of indenter to outer wall | 165mm |
| Power supply | AC220V/50Hz |
| Dimensions | 550*220*730mm |
| Main unit weight | 85kg |

Features

- Widely used for high-precision hardness testing for parts with a variety of metal and non-metallic materials ;
- Option for various specifications of the indenter, support 15 types of Rockwell hardness scales testing;
- Equipped with high-speed thermal printer, it can quickly print out the test data;
- Support the conversion among various hardness scales such as Brinell, Vickers and etc;
- Adopt large-screen LCD, easy to operate, visually display the test results;
- Adopt diamond indenter, durable and accurate measurement;
- Use grating displacement sensor, and the indentation depth measurement error is small;
- With the error value correction function, the hardness value of the error can be corrected by key input, making the hardness value more accurately meet the test requirements;
- With the function of threshold overrun automatic alarm, which applies to the bulk of finished products or semi-finished pieces of paper-by-piece detection;
- The function of original ambient temperature real-time display can avoid the instrument working in the case of high or low temperature for a long time , resulting in increased test error and reducing the service life;
- Consistent with EN-ISO-6508、 GB/T230.1、 GB/T230.2、 JJG112、 ASTM E18 and other relevant standards at home and abroad.

Applications

- Used for quality control in metal processing manufacturing
- Used for failure analysis testing of metallic materials;
- Demonstration experiment for education and teaching in Colleges and Universities;
- Hardness testing of materials in scientific research institutions

The Scope of Application

- Sample thickness:the specimen should have a certain size and thickness to ensure the distance between the adjacent indentation center and the distance from the indentation center to edge of the specimen is greater than 3mm, and the minimum thickness of the specimen should not be less than 8 times the depth of indentation. After the test, the back of the sample shall not have obvious deformation marks, and the minimum thickness of the sample depends on the load size used in its material and hardness test.Table 1-1 shows the minimum thickness of the sample table for the user reference;
- Table 1-2 shows the range of material and hardness values for different hardness test scales.

Table1-1

| Scale | Hardness value HR | Minimum thickness(mm) | Scale | Hardness value HR | Minimum thickness(mm) |
|-------|-------------------|-----------------------|-------|-------------------|-----------------------|
| HRA | 70 | 0.7 | B | 80 | 1.0 |
| | 80 | 0.5 | | 90 | 0.8 |
| | 90 | 0.4 | | 100 | 0.7 |
| HRB | 25 | 2.0 | C | 20 | 1.5 |
| | 30 | 1.9 | | 30 | 1.3 |
| | 40 | 1.7 | | 40 | 1.2 |
| | 50 | 1.5 | | 50 | 1.0 |
| | 60 | 1.3 | | 60 | 0.8 |
| | 70 | 1.2 | | 70 | 0.7 |

Table1-2

| Scale | Indenter type | preliminary testing | Testing force | Measuring range | Application |
|-------|-----------------|----------------------|----------------|-----------------|--|
| HRA | Diamond cone | | 60kgf(588.4N) | 20-88HRA | hard alloy, carbide, surface quenched steel, carburizing steel |
| HRD | | | 100kgf(980.7N) | 40-77HRD | thin steel sheet, surface quenched steel |
| HRC | | | 150kgf(1471N) | 20-70HRC | quenched steel, tempered steel, chilled cast iron |
| HRF | Φ1.5875mm | 98.07 N (10kgf) | 60kgf(588.4N) | 60-100HRF | cast iron, aluminum, magnesium alloy, bearing alloy |
| HRB | (1/16inch) | | 100kgf(980.7N) | 20-100HRB | mild steel, copper alloy, annealed steel |
| HRG | steel ball | | 150kgf(1471N) | 30-94HRG | phosphorus iron, beryllium bronze, malleable cast iron |
| HRH | Φ3.175mm | | 60kgf(588.4N) | 80-100HRH | aluminum, zinc, lead etc. |
| HRE | (1/8inch) | | 100kgf(980.7N) | 70-100HRE | bearing alloy, tin, hard plastics and other soft materials |
| HRK | steel ball | | 150kgf(1471N) | 40-100HRK | bearing alloy, tin, hard plastics and other soft materials |
| HRL | Φ6.35mm(1/4 | | 60kgf(588.4N) | 50-115HRL | Hard plastic ,hard rubber, aluminum, tin, bronze, mild steel, synthetic resin, friction materials and etc. |
| HRM | inch)steel ball | | 100kgf(980.7N) | 50-115HRL | |
| HRR | Φ12.7(1/2 | | 60kgf(588.4N) | 50-115HRL | |

Indication Error

| Scale | Standard hardness range | Allowed maximum tolerance |
|-------|---------------------------------------|---------------------------|
| HRA | (20-75)HRA ; (75-88)HRA | ±2HRA ; ±1.5HRA |
| HRB | (20-45)HRB ; (45-80)HRB ; (80-100)HRB | ±4HRB ; ±3HRB ; ±2HRB |
| HRC | (20-70)HRC | ±1.5HRC |
| HRD | (40-70)HRD ; (70-77)HRD | ±2HRD ; ±1.5HRD |
| HRE | (70-90)HRE ; (90-100)HRE | ±2.5HRE ; ±2HRE |
| HRF | (60-90)HRF ; (90-100)HRF | ±3HRF ; ±2HRF |
| HRG | (30-50)HRG ; (50-75)HRG ; (75-94)HRG | ±6HRG ; ±4.5HRG ; ±3HRG |
| HRH | (80-100)HRH | ±2HRH |
| HRK | (40-60)HRK ; (60-80)HRK ; (80-100)HRK | ±4HRK ; ±3HRK ; ±2HRK |
| HRL | (100-120)HRL | ±1.2HRL |
| HRM | (85-110)HRM | ±1.5HRM |
| HRR | (114-125)HRR | ±1.2HRR |

Working Conditions

- Operation Temperature : 10 ~ 30°C ;
- Relative Humidity : ≤65% ;
- The surrounding environment should avoid of vibration, strong magnetic field, corrosive medium and heavy dust

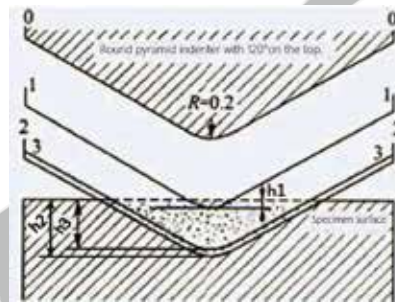
Working Principle

The Rockwell hardness test is taking the diamond cone with 120° apex angle or the hardened steel ball with specified diameter as the indenter to press into sample surface with specific test force, then get the Rockwell hardness of the measured metallic materials according to the sample surface indentation depth.

The Rockwell hardness measurement principle is shown as below figure. 0-0 is the position that the diamond indenter is not yet in contact with the sample. 1-1 figure is the indenter position under the affect of the preliminary test force, the indentation depth is h_1 . The preliminary test is to eliminate the influence to the testing result accuracy caused by the roughness of the sample surface. 2-2 in the figure is the indenter position under the influence of the testing force (the preliminary test force and the main test force). The depth is h_2 . 3-3 in the figure is the indenter position after dismounting the main test force. As the metal elasticity will recovery some degree after deformation, the really indentation depth of the indenter is h_3 . The plastic deformation caused by the main test force make the indenter pressing into the depth is $h = h_3 - h_1$. Rockwell hardness value is determined by the size of h , the greater the depth h , the lower the hardness, otherwise, the higher the hardness. In the traditional concept, usually use a constant C minus h to represent the level of hardness, while the depth of indentation per 0.002mm as a unit of hardness. The hardness value obtained is called the Rockwell hardness value, denoted by the symbol HR.

$$HR = \frac{c - h}{0.002}$$

In the formula, c is a constant (for HRC, HRA, c is 0.2; for HRB, c is 0.26). The Rockwell hardness value HR obtained is an unknown number which is usually read directly on the test machine indicator when testing.



Rockwell hardness tester working principle Figure

It should be noted that the measured hardness values would be different with different indenter and test force. Therefore, the Rockwell hardness testing specifies 15 different hardness test scales according to the different indenter specification and test force sizes. And the HRB, HRC, HRA are the most widely used.

Configurations

| | NO. | Name | QTY. | Remarks |
|------------------------|-----|---|------|--|
| Standard Configuration | 1 | Main unit | 1 | |
| | 2 | Diamond Rockwell indenter | 1 | |
| | 3 | φ1.5875mm 1/16 inch ball indenter | 1 | |
| | 4 | Counterweights | 3 | |
| | 5 | Thermal printing paper | 1 | |
| | 6 | Small testing table | 1 | Diameter 60mm |
| | 7 | Large testing table | 1 | Diameter 150mm |
| | 8 | V-shape testing table | 1 | Test cylindrical specimens |
| | 9 | Rockwell standard block | 3 | |
| | 10 | Fuse 0.5A | 2 | |
| | 11 | Power cable | 1 | |
| | 12 | Plastic dust cover | 1 | |
| | 13 | Attached files | 1 | |
| | 14 | Instrument case | 1 | |
| Optional Configuration | 1 | Φ3.175mm 1/8inch steel ball indenter | 1 | Mainly use to testing Rockwell hardness for non-ferrous materials like hard plastic and so on. |
| | 2 | Φ6.35mm 1/4inch steel ball indenter | 1 | |
| | 3 | Φ12.7mm 1/2inch steel steel ball indenter | 1 | |