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**ISHR-P151
PORTABLE ROCKWELL
HARDNESS TESTER
OPERATION MANUAL**



Attention

This Instruction Manual shall be carefully read through in prior to use of the apparatus to clearly understand the detailed operation steps and special notes, and avoid apparatus damage or personal injury caused by improper use.

Description

- 1 The hardness values can be read directly from the Rockwell and after rapid and accurate operations. It can be considered as a non-destructive testing with very small indentations. This kind of testers can be used at site to test the finished or semi-finished work pieces piece by piece in batches. Rockwell hardness testers are mostly applied in the metal-processing enterprises.
- 2 It simplifies the operation steps of Rockwell Hardness Test: directly load total test force; maintain it for a few seconds; release the total test force and then the test is finished, with no step of maintaining the preliminary test force of 10Kg.
- 3 It thoroughly follows the Rockwell Hardness Test Principle, and complies with relevant regulation of ISO6508, and ASTM E18.

Principle and Structure

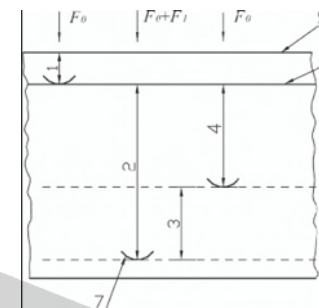
- 1 The indenter is pressed (diamond cone or carbide ball) into the specimen surface in two steps. After maintaining the pressure for a predetermined period of time, unload the major test force F1, and measure the remaining indentation depth h under initial test force F0.
- 2 Rockwell hardness value is:

$$HR = N - \frac{h}{s}$$

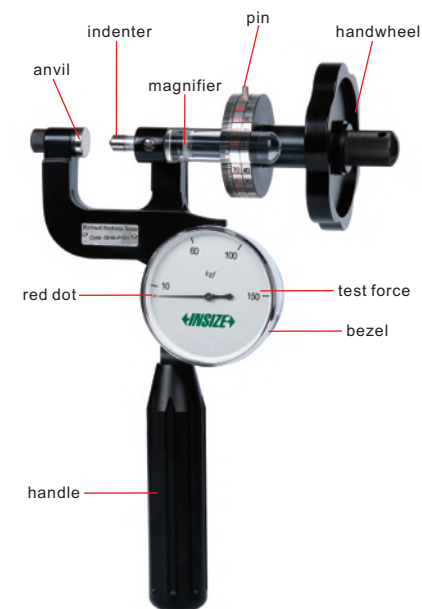
In this equation:

N — a constant related to scales; for A, C scales, N=100; for B scales, N=130.

S — unit indentation depth, for Rockwell hardness it is 0.002mm.



- 1 — indentation depth under initial test force F0;
- 2 — indentation depth under total test forces F0+F1;
- 3 — elastic recovery depth when major test force F1 is removed;
- 4 — remaining indentation depth h;
- 5 — test piece surface;
- 6 — datum plane;
- 7 — position of indenter



Main Technical Parameters

Initial test force: 10kg

Test force: 30, 100, 150kg

Force applying method: by screw

Indenter: 120°diamond cone, Ø1.588mm carbide balls

Testing Items: HRC, HRB, HRA

Resolution: 1HR

Accuracy: Meets the requirements of ISO6508/6506

Application: All metals, including steel, forged steel, cast iron, copper, copper alloy, aluminum, aluminum alloy and carbides etc.

Operation

1 Test Conditions:

Make sure the surface is flat and smooth. It is forbidden to have scale, decarburized layer, steel pit or dust on the surface of the part.

2 Set the load dial to "0":

Check the indicator, it should rest exactly on the red dot "0" on the indicator dial. If it doesn't, adjust the dial by turning the bezel to locate the red dot.

3 Fix the test piece:

Put the test piece into the opening of the tester with its back side contacting the anvil tight, and be sure to keep its testing surface vertical to the principal axis of the indenter. Turn the hand wheel to make the main shaft of the tester move to the left, and the indenter is made to hit on the test piece surface.

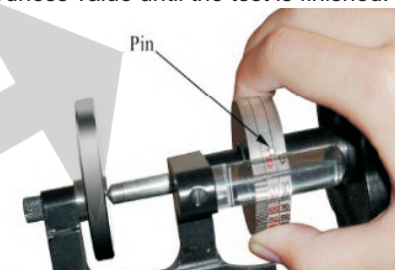
4 Apply initial test force:

Slowly turn the hand wheel clockwise to bring the indicator to the position of initial force F_0 (for Rockwell Hardness Tester $F_0=10\text{Kg}$).



5 Set the full scale line to "0":

Rotate the rotational drum dial anticlockwise until its pin rests against the upper edge of the magnifier. Meanwhile, the operator should adjust the observing angle to make the full-scale benchmark line on the fixed drum dial (the red scale mark 130, black scale mark 100) exactly aligned beneath the reading scale mark of the magnifier. The operator should keep this viewing angle also known as the viewing angle for reading the hardness value until the test is finished.



6 Load and unload major test force:

Rotate the hand wheel stably clockwise to bring the indicator to the position of total test force $F=F_0+F_1$ (e.g., for HRC scale, $F=150\text{kg}$). The indicator should be aligned exactly to the marked scale of the selected test force. If the indicator goes beyond the scale mark, the testing should be considered as failure. Then unload the test force and choose a new point on the test piece to make a new test.

The time duration from loading initial test force to loading total test force should be no more than 8 seconds.

After loading total test force, the test force should be maintained 3 to 5 seconds. Then completely unload major test force within 2 seconds to bring the indicator back to the position of initial test force F_0 .

Scale	Test force
HRA	60kg
HRB	100kg
HRC	150kg



7 Take the reading:

Looking through the magnifier, determine the superposition of reading line of the barrel dial aligned with that of the magnifier, the value of which represents the hardness value of this test.

Each long scale mark on the rotational drum dial represents 10 hardness units, and the value is shown above the mark. Between every two long scale marks there are 10 graduations, each of which indicates 1 hardness units.

Read the black numbers under C on the rotational drum dial for Scales HRA, HRC which test with diamond indenter; read the red numbers under B on the rotational drum dial for Scales which test with ball indenter.

8 Unload the initial force:

Rotate the hand wheel stably counter-clockwise to bring the indicator to the position of red dot and remove the workpiece.