USER'S MANUAL

Please keep this manual for reference.

W SERIES WEBSTER HARDNESS TESTER

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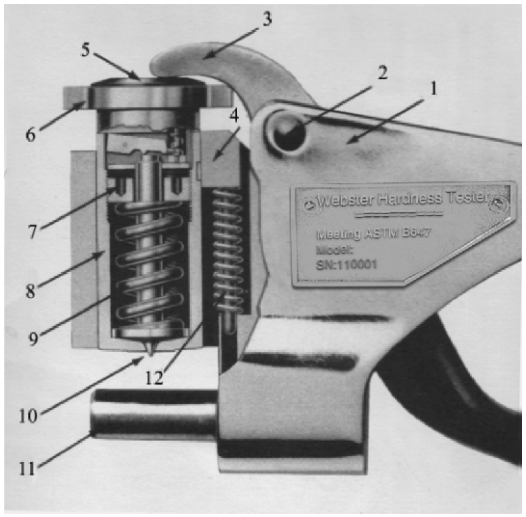
2023/03 Print

Content

1. Structure

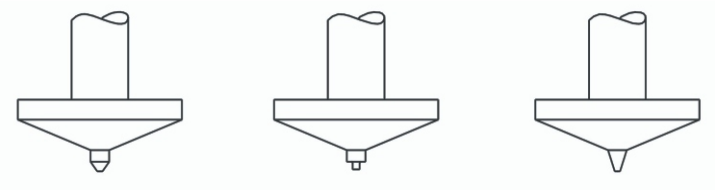
The structure of the Webster hardness tester is shown in Fig. 1:



1 – frame
2 – pivot screw
3 – handle
4 – reset key
5 – adjustmentscrew
6 – dial head
7 – adjustment nut
8 – indenter cylinder
9 – load spring
10 – indenter
11 – anvil
12 – return spring

Fig. 1: Structure of the Instrument

The indenters of different model of Webster hardness tester are shown in Fig. 2.



a. W-20 b. W-B75、W-BB75 c. W-B92

Fig. 2: Indenters

2. Main Technical Parameters

Testing Range: 0~20HW
Accuracy: 0.5HW (within 5~17HW)
Equivalent range: See Table 1
Weight: 0.5kg

Table 1: Models Selection

Model	Application	Testing Range	Specimen Size (mm)
W-20	Aluminum alloy	25-110 HRE 58-131 HV	Thickness 0.4-6 Inner diameter>10
W-20a			Thickness 0.4-13 Inner diameter>10
W-20b			Thickness 0.4-8 Inner diameter>6
W-B75	Brass in hard and half hard state, super-hard aluminum alloy	63-105 HRF	Thickness 0.4-6 Inner diameter>10
W-B75b			Thickness 0.4-8 Inner diameter>6
W-BB75	Soft brass, copper	18-100 HRE	Thickness 0.4-6 Inner diameter>10
W-BB75b			Thickness 0.4-8 Inner diameter>6
W-B92	Cold rolled steel sheet, stainless steel	50-92 HRB	Thickness 0.4-6 Inner diameter>10

3. Operation

Put the specimen between the anvil and the indenter cylinder, then press the handle down until the indicator hand come to a stop. Keep the handle pressed and take the reading.

3.1 Operation Tips

- Excessive pressure on the handle may damage the anvil.
- Torsion and slide of the workpiece will damage the indenter.
- The tester is not at its best accuracy below 4 HW and above 17 HW.
- The distance between the indentation and the edge of the workpiece

should be greater than 5mm.

- The distance between any indentations should be greater than 6mm.
- The surface of the workpiece must be vertical to the indenter.
- The back side of specimen must be in good contact with the anvil.
- Dirty workpiece will result in inaccurate readings.
- The oxide film of 10 μ m can affect the test result by up to 0.5~1HW.
- The painting on the workpiece must be removed before testing.
- Slow force application will result in a slightly lower reading.
- Use the calibration sheath with the W–20a tester when testing on thin workpieces and test block.

4. Verification and Calibration

4.1 Verification

The operator should verify the accuracy of the tester regularly. Calibration should be made if the tester is found inaccurate. When testing on the hardness block, use its upper surface only.

4.1.1 Verification of the Full Scale

Press the handle to the bottom without putting any specimen on the anvil of the hardness tester. The indicator should point at 20 ± 0.5HW. If the reading is out of tolerance, full scale calibration should be carried out following the steps in Section 4.2.1.

4.1.2 Verification of the Test Block

Test on the standard test block. For W–20, W–20a and W–20b testers, the reading should be ± 0.5HW of the hardness number marked on the block. For W–B75, W–B75b and W–B92 testers, the reading should be 5HW ± 0.5HW; and for W–BB75 and W–BB75b, the reading should be 17HW ± 0.5 HW. If the reading is out of tolerance, load spring calibration should be carried out following the steps in Section 4.2.2.

4.2 Calibration

The calibration of the Webster hardness tester includes full scale calibration and load spring calibration. Full scale calibration is to set a benchmark, and load spring calibration is to provide a reference point for the tester.

Fig.3: Regulate the adjusting screw

Fig.4: Regulate the adjusting nut

4.2.1 Calibration of Full Scale

Press the handle to the bottom without putting any specimen on the anvil of The hardness tester. As shown in Fig. 3, regulate the full–scale adjustment screw with a small screwdriver to bring the indicator at 20. If the reading is smaller than 20, the adjustment screw should be regulated clockwise; if the reading is greater than 20, the adjustment screw should be regulated anticlockwise. If the pointer cannot be set to 20 by regulating the adjustment screw, the indenter is worn and needs to be changed. Change the indenter Following the steps in Section 5.

4.2.2 Calibration of the Load Spring

Screw off the pivot screw, and take out the handle from the frame, then remove the dial head from the indenter cylinder, leaving the cylinder in the frame. Then the adjustment nut can be seen in the indenter cylinder. As shown in Fig. 4, rotate the adjustment nut with the calibration wrench. If the reading of the test block is smaller than the number marked on the test block, rotate the adjustment nut counterclockwise, otherwise, rotate the adjustment nut clockwise. When the nut is rotated 30o to 45o, the reading will change by 1 unit. Reassemble the tester and verify the tester both on the test block and on the anvil after regulating it.

After load spring calibration, the full scale must be verified following the steps in Section 4.1.1.

Repeat the above steps until both full scale and hardness block readings

meet the requirements in Section 4.1.

NOTE: DO NOT calibrate the readings of the test block by regulating the Adjustment screw.

4.2.3 Calibration of the W–20a Tester

Put the calibrating sheath on the anvil first; then calibrate the tester following the steps in Section 4.2.

5. Changing the Indenter

In case the reading can not be set to the full scale of 20 by regulating the adjustment screw, which means the indenter is worn, the indenter should be changed. Follow the steps below to change the indenter.

Screw off the pivot screw, and take out the handle from the frame, then emove the dial head from the indenter cylinder, leaving the cylinder in the frame. Then the adjustment screw can be seen in the indenter cylinder. As shown in Fig. 4, rotate the adjustment screw off with the calibration wrench, then take the indenter out and replace with a new indenter.

After the indenter is replaced, the load spring needs to be adjusted with the adjusting nut. Only one rotation of the calibration nut is enough after the resistance of the load spring is felt. The indenter tip will be damaged by excessive pressure of the load spring after indenter replacement. Reassemble and calibrate the tester following the steps in Section 4.2.

6. Verification Report

The verification report should include the following information:

- Name and grade of material
- Model and serial number of the hardness tester
- Reading of each test (accurate to 0.5 scale)
- Average hardness value (accurate to 0.5 scale)
- Designation of standard applied
- Inspector name and date

7. Standard Package

- 1 tester
- 1 Calibration sheath (W–20a only)
- 1 standard test block (with verification certificate)
- 1 spare indenter
- 1 calibration wrench
- 1 flat screwdriver
- 1 instruction manual
- 1 carrying case

8. Spare Parts

- Indenter
- Standard test blocks
- Dial head
- Dial glass
- Calibration sheath for W–20a

9. Maintenance

The Webster hardness testers of this series are precision instruments, of which the service life mainly depends on the correct method of use and timely and proper maintenance. The following items should be taken into account:

- Prevent dust and dirt.
- Prevent rust.
- Prevent falling off.
- Do not disassemble the dial head.

Table 2: Hardness Conversion Table for W–20 Series

Webster HW	Rockwell HRE	Rockwell HRF	Vickers HV
18	101	98.5	131
17	97	95	119
16	92.5	91	108
15	88	87.2	99
14	84	83	91
13	79.5	78	83
12	75	74	78
11	71	70	73
10	67	66	69
9	62.5	62.5	65
8	58	58	61
7	54	54	58
6	49.5	50	
5	45	46.5	
4	41		

Table 3: Conversion Table for W–B75 Series

HW	HRB
4	53.0
5	53.3
6	54.1
7	54.8
8	56.7
9	58.5
10	60.8
11	63.4
12	66.4
13	69.7
14	73.5
15	77.9
16	82.1
17	86.9
18	92.2

Table 4: Conversion Table for W–BB75 Series

HW	HRF
4	30.2
5	34.9
6	39.6
7	44.3
8	49.0
9	53.7
10	58.4
11	63.1
12	67.8
13	72.5
14	77.3
15	82.0
16	86.7
17	91.4
18	96.1

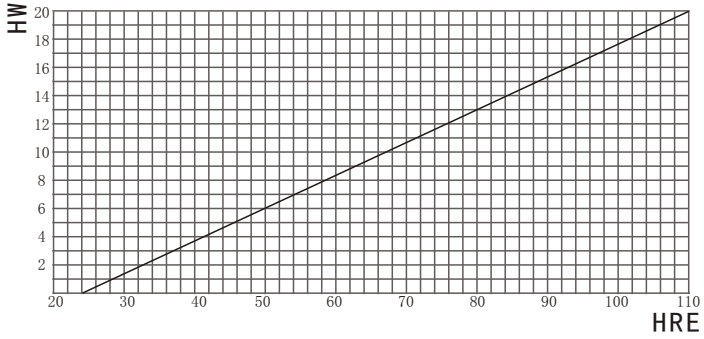


Fig. 5: Rockwell Conversion Curve for W–20 Series

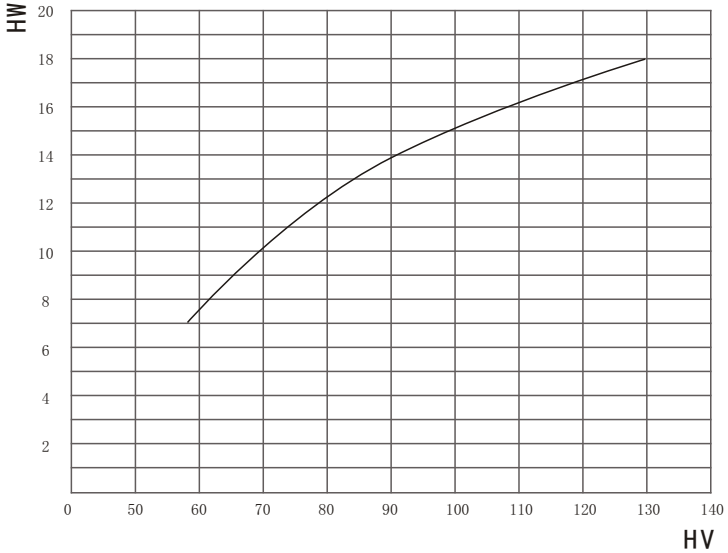


Fig. 6: Vickers Conversion Curve for W–20 Series

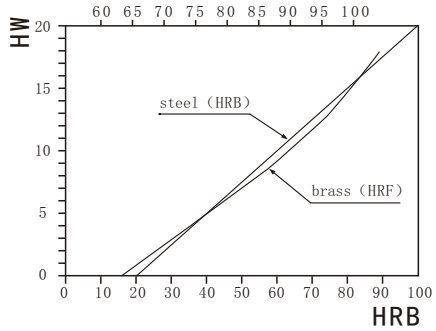


Fig. 7: Conversion Curve for W–B75 Series

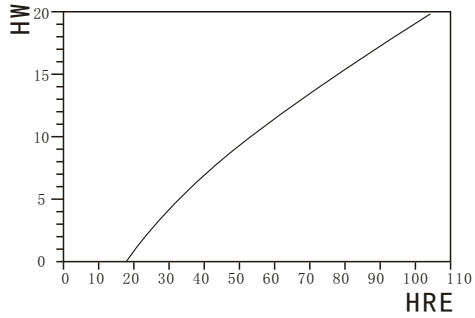


Fig. 8: Conversion Curve for W–BB75 Series

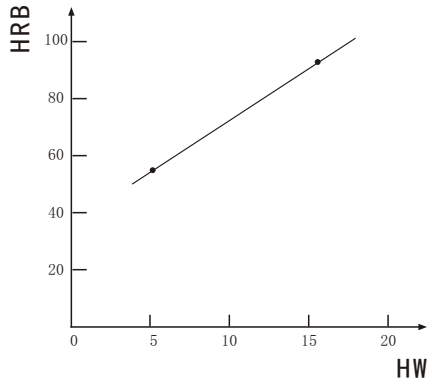


Fig. 9: Conversion Curve for W–B92 Series