OPERATION MANUAL

BMS 203-RSR

ROCKWELL&ROCKWELL SUPERFICIAL HARDNESS TESTER

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1. Technical Specifications 3
2. Standard Accessories 3
3. Unpacking Of Equipment 3
4. Setting into Operation 3
5. Testing 3
6. Adjusting Loading Speed 4
7. Rockwell Hardness Testing *(EN 6508-1, ASTM E18)* 4
9. Test Method 5

1. Technical Specifications

Pre-load (kgf)	***3 / 10***
Test loads (kgf)	***15,30,45,60,100,150***
Load selection	***by load selector disc***
Test method	***Rockwell, Rockwell Superficial***
Load application	***Hydraulic***
Max.test height	***220 mm***
Depth of throat	***145 mm***
Machine dim's	***710x520x280 mm***
Case dim's	***790x590x420 mm***
Weight (net/gross)	***82/110 kg***

2. Standard Accessories

Rockwell cone diamond indenter 1
1/16"" ball indenter 1
HRC Test block 1
HRB test block 1
Flat testing table 1
V testing anvil for round parts 1
Hardness conversion table 1
Wooden case for accessories 1
Cover 1
Allen spanners 2
Rubber bellow for elevating screw 1
Instruction manual 1
Calibration Certificate 1

3. Unpacking Of Equipment

Unscrew fixing steel sheet plates of upper side to wooden base of case and hold up upper side of wooden case by means of carrying handles. Take out two M8 bolts fastening equipment to lower wooden case. Locate equipment on a special table (see drawing of table enclosed) and fasten two M8 bolts by means of eye bull putting on flat testing table.
Open left cover .Take out wooden safety parts. Take out 3 off M6 bolts of top cover by means of 5 mm special alyen key which is in accessory box and take top cover hold it up with care. Pay attention not to touch Rockwell Dial gauge. You with care. Take out plastic safety parts. Equipment is now ready for testing.

4. Setting into Operation

Before starting to test, load application lever (KL2) has to be in starting position (see drawing) Choose pre-load by means of Pre-load adjusting disc (HR=10 kgf, HSR=3 kgf). Locate part to be tested on testing table, install indenter to holder (ML3) and assure load application lever in correct starting position (see drawing), choose load by means of load selector disc (VL1) (according to testing method in attached table)

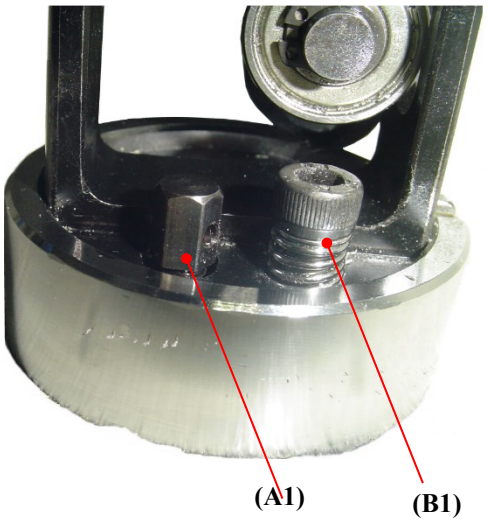
5. Testing

As soon as indenter touches on part, actuating main spindle (ML1) by means of arms (SM1) Rockwell dial gauge pointers start movement. Keep going until big pointers at “0” and small pointer at 3 in red dot. Now Pre –load is applied. (If big pointer is exceeded by ± 3 points start to test again) Then apply total load application lever (KL2) to forward (see drawing) and follow movement of big pointer until it stops. Wait 3-5 sec. more. Then take back lever (KL2) to starting position. And read value on display. I Black numbers on dial gauge for HRA, HRC and HRD with diamond indenter.

Red values for HRB, HRE, and HRF etc. with ball indenter. Outer black numbers for Rockwell Superficial values.

6. Adjusting Loading Speed

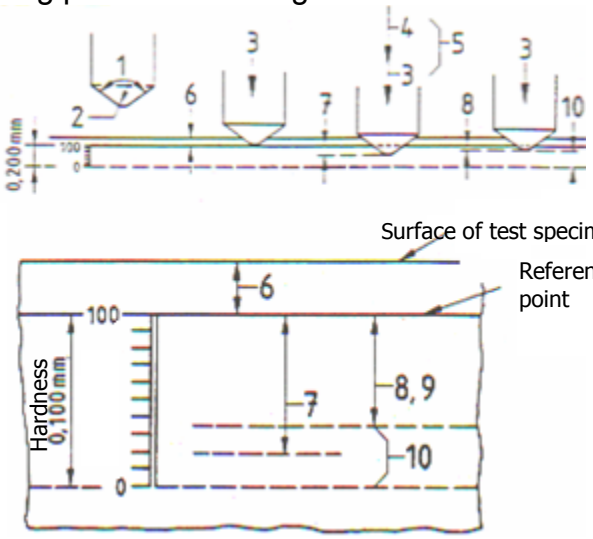
Load application is adjusted by hydraulic system. Hydraulic oil is filled at our works and hydraulic application speed is adjusted at our works. (But, working at extremely high temperatures or during transportation due to wrong handling if oil is reduced you may add some oil again. To do this, open left cover. There are two bolts on hydraulic piston (PS1) Take out bolt on the left (A1). Add some oil (Tellus 37 or similar) while adding oil, you can use load application lever (KL2) forward and backward. This helps oil to settle down easily. You can adjust hydraulic speed, by allen bolt on the right (B1). If you turn this bolt lock wise load application speed is decreased, if you turn anti clockwise it is increased.



7. Rockwell Hardness Testing *(EN 6508-1, ASTM E18)*

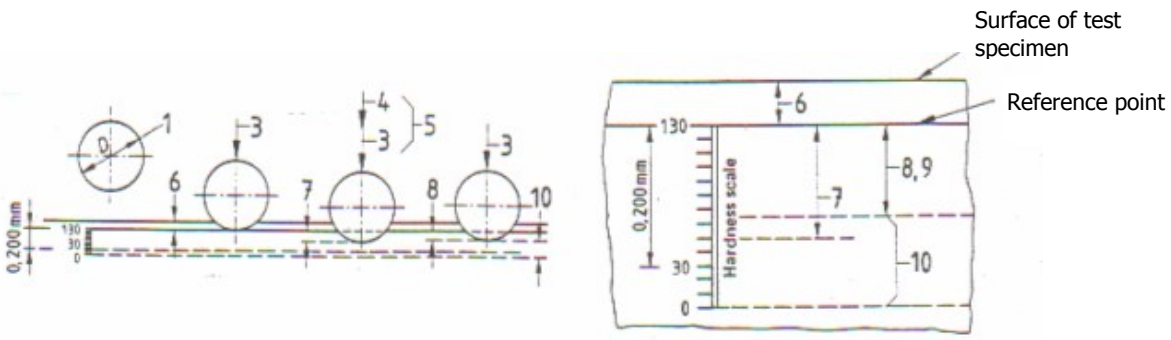
Rockwell Hardness testing method is evaluated from penetration depth of 120° diamond cone or ball indenter with different dias (please refer to table enclosed)

Below application shows working procedures using Rockwell diamond cone (HRC-HRA etc.)



Nr	Symbol	Description
1	0	120 ° Diamond cone
2	0	Radius of diamond tip= 0,2 mm
3	F_0	Pre-Load
4	F_1	Additional Load
5	F	Total load F_0+ F_1
6	t_0	Depth of penetration under pre-load, mm
7	t_1	Depth of penetration under additional load, mm
8	t_b	Increase in depth of penetration from F_1 to F_0, mm
9	e	Equality as of 0,002 mm increase of depth of penetration e= tb / 0,002
10	0	Rockwell hardness = 100-e

Below application shows working procedures using 1/16” ball indenter (HRB etc.)



Nr	Symbol	Description
1	D	Ball dia=1/16“ =1,5875 mm
3	F_0	Pre-load
4	F_1	Additional load
5	F	Total load =F_0+F_1
6	t_0	Depth of penetration under pre-load, mm
7	t_1	Depth of penetration under additional load, mm
8	t_b	Increase in depth of penetration from F_1 to F_0, mm
9	e	Equality as of 0,002 mm increase of depth of penetration e= tb / 0,002
10	HRB/HRF	Rockwell hardness= 130-e

9. Test Method

Test method	Indenter	Pre-load (kgf)	Total load (kgf)	Field of application
HRA	Diamond cone	10	60	Surface hardened parts with thin cases (≥0,4 mm)
HRB	1/16" ball	10	100	Nonferrous metals, unhardened steels
HRC	Diamond cone	10	150	Hardened steels
HRD	Diamond cone	10	100	Surface hardened parts with medium cases
HRE	1/8" ball	10	100	Aluminyum and magnesium alloys, antifriction metals,synetic metals
HRF	1/16" ball	10	60	Annealed cupper alloys, thin sheet metals (≥ 0,6 mm)
HRG	1/16" ball	10	150	Phospor-bronze,melleable iron of medium hardness
HRH	1/8" ball	10	60	Aluminium,zinc,lead,grinding stones
HRK	1/8" ball	10	150	Antifriction and other metals of very low hardness
HRL	1/4" ball	10	60	As HRK and hard rubber
HRM	1/4" ball	10	100	As HRK and HRL,laminated wood
HRP	1/4" ball	10	150	HRK,HRL or HRM and synthetic materials
HRR	1/2" ball	10	60	
HRS	1/2" ball	10	100	
HRV	1/2" ball	10	150	As HRK,HRL,HRM,HRP,HRR or HRS
HR 15 N HR 30 N HR 45 N	Diamond cone	3	15 30 45	As HRA,HRC or HRD ,but especially thin case depth (≥ 0,18 mm)
HR15T HR30T HR45T	1/16" ball	3	15 30 45	As HRB,HRF or HRG but especially for thin sheet metals (≥ 0,25 mm)
HR15W HR30W HR45W	1/8" ball	3	15 30 45	For metals with very low hardness and for very thin cases, for example thin linings of antifriction metals,HRX and HRY especially for sintered metals
HR15X HR30X HR45X	1/4" ball	3	15 30 45	
HR15Y HR30Y HR45Y	1/2" ball	3	15 30 45	