Rockwell, Rockwell Superficial, Brinell Hardness Tester HR-530 and HR-600

Specifications

Functions	• Conversion function [HV, HK, HR (Rockwell hardness A, B, C, D, F, G / Rockwell Superficial 15T, 30T, 45T, 15N, 30N, 45N), HS, HB, tensile strength] • GO/NG judgment function Serial test function (for specimens of the same thickness) • Cylindrical correction, spherical correction, offset correction, multi-point correction functions • Statistical calculation function • Graph generation function (X-R control charts)
Power supply	AC100V, 120V, 220V, 240V Auto-selection
Preleminary test force	29,42; 98,07 N
Statistic function	Maximum value, minimum value, mean value, standard deviation, upper limit, lower limit, GO count, range, NG count
Test force setting	By software setting
Table lifting	Manual (automatic breaking and load sequencing)
Standard	ISO 6508; JIS 7726; ISO 6506, JIS 7726; ISO 2039-2, ASTM D785, JIS K 7202; VDI/VDE 2616-1
Load control	Automatic (load/hold/unload)
Max. specimen depth	150 mm
Brinell Scale [N]	61,29; 98,07; 153,2; 245,2; 294,2; 306,5; 612,9; 980,7; 1226; 1839 N
Data output	RS-232C Digimatic, USB2
Force dwell time	1-120s (Selectable in units of 1s)

All main units are supplied without power cord, indenters and hardness reference materials.
Please choose the required accessories separately.

Please choose for example:
63DIA023 diamond indenter ISO 6508 and ASTM E18
63ETB040DG 60HRC hardness reference material ISO 6508 and ASTM E18
02ZAA021 power cord

Series 810

The HR-530 series offers five different hardness testing methods: Rockwell, Rockwell Superficial, Brinell, Brinell Depth Measurement and Plastic Testing in a single unit.

This makes it a versatile tool ready to tackle tasks in production, goods inwards inspection and quality control in general.

- A real time electronic test force control system is built into the compact body along with an electronic force gage. The test force control prevents the system from applying too much test force at the point of reaching total testforce.
- Real time force control provides accurate test force generation and stable time cycle sequences conform to ISO standards.
- The serial measurement mode enables fast execution of a high numbers of tests on identical workpieces.
- A magnet brake system stops the spindle movement immediately at sensing of workpiece contact. This enables the HR-530 to perform semi automatic test sequences, eliminating the user influence.
- The lever indenter arm design enables not only interior and exterior measurements but also an excellent specimen surface overview. The functionality is furthermore enhanced by an LED workroom illumination.
- The intelligent lever arm design allows testing at inside positions without cutting the specimen. The minimum diameter that can be entered by the lever arm with the standard size diamond indenter is 35 mm.
- The optional short type diamond indenter (Part No. 63DIA007) additionally enables inside testing from Ø22 mm.
- HR-530L long type with an optional max. specimen height of 395 mm.
- Indenters, test blocks and power cord are not included in the scope of delivery and have to be ordered separately.

HR-530 (810-233-33)

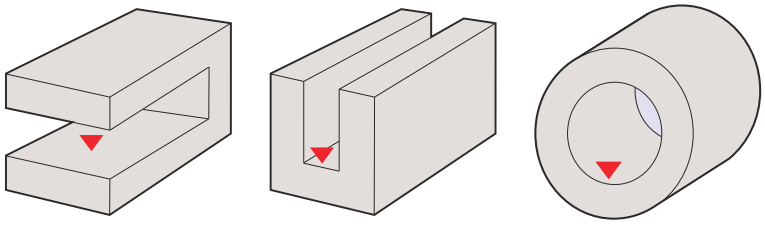
Maximum workpiece size:

Height 250mm
Depth 150 mm

HR-530L (810-333-33)

Maximum workpiece size:

Height 395 mm
Depth 150 mm



Mitutoyo

Rockwell, Rockwell Superficial, Brinell Hardness Tester HR-530 and HR-600

Metric

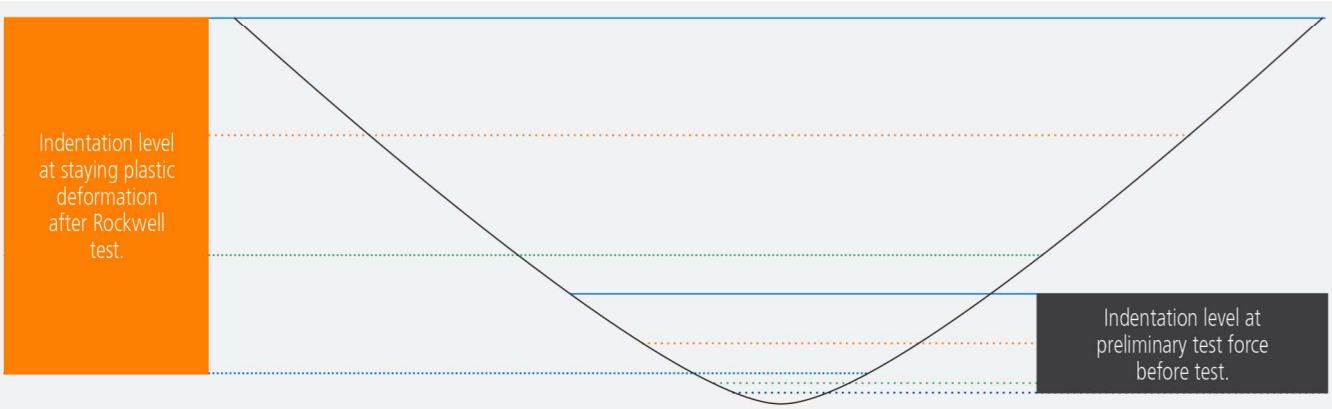
No.	Model	Rockwell Scale Diamond	Rockwell Scale Ball 1,5875 mm	Rockwell Scale Ball 3,175 mm	Rockwell Scale Ball 6,35 mm	Rockwell Scale Ball 12,7 mm	Rockwell Superficial Scale Diamond
810-233-33/810-333-33/810-512-23	HR-530 HR-530L HR-610A	HRA HRD HRC	HRF HRB HRG	HRH HRE HRK	HRL HRM HRP	HRR HRS HRV	HR15N HR39N HR45N
810-522-23/810-527-21	HR-620A HR-620B	HRA HRD HRC	HRF HRB HRG	HRH HRE HRK	HRL HRM HRP	HRR HRS HRV	HR15N HR39N HR45N

No.	Rockwell Superficial Scale Ball 1,5875 mm	Rockwell Superficial Scale Ball 3,175 mm	Rockwell Superficial Scale Ball 6,35 mm	Rockwell Superficial Scale Ball 12,7 mm	Ball Indentation plastic test	Rockwell Plastic Test Scales Ball 3,175 mm	Rockwell Plastic Test Scales Ball 6,35 mm	Rockwell Plastic Test Scales Ball 12,7 mm
810-233-33/810-333-33/810-512-23	HR15TW HR20TW HR45TW	HR15WW HR30WW HR45WW	HR15XW HR30XW HR54XW	HR15YW HR30YW HR45YW		HRE HRK	HRL HRM	HRR
810-522-23/810-527-21	HR15TW HR20TW HR45TW	HR15WW HR30WW HR45WW	HR15XW HR30XW HR54XW	HR15YW HR30YW HR45YW	HB 49N HB 132N HB 358N HB 961N	HRE HRK	HRL HRM	HRR

No.	Rockwell α Test Ball 12,7 mm	Vickers Depth Measurement	Brinell Scales indentation only Ball 1,0 mm	Brinell Scales indentation only Ball 2,5 mm	Brinell Scales indentation only Ball 5,0 mm	Brinell Scales indentation only Ball 10,0 mm	Brinell depth measurement Ball 2,5 mm
810-233-33/810-333-33/810-512-23	(HRR)		HBW 1/10 HBW 1/30	HBW 2,5/6,25 HBW 2,5/15625 HBW2,5/31,25 HBW 2,5/62,5 HBW 2,5/187,5	HBW 5/25 HBW 5/62,5 HBW 5/125	HBW 10/100	HBD 2,5/62,5 HBD 2,5/187,5
810-522-23/810-527-21	(HRR)	HVD 30 HVD 50	HBW 1/1 HBW 1/2,5 HBW 1/5 HBW 1/10 HBW 1/30	HBW 2,5/6,25 HBW 2,5/15625 HBW2,5/31,25 HBW 2,5/62,5 HBW 2,5/187,5	HBW 5/25 HBW 5/62,5 HBW 5/125 HBW5/250	HBW 10/100 HBW 10/250	HBD 2,5/62,5 HBD 2,5/187,5 HBD 5/250

Rockwell Diamond Indenter - Function Test

Additonally, the geometrical specification for the calibration of Rockwell diamond indenters, a „function test" is described in the relevant standards ISO 6508-2 and ASTM E-18.
The intention is to verify the applicability of the indenter in regard to various indentation depth levels under different test forces.
The diagram shows 4 indentation levels, as described in the ISO standard.



ISO 6508 Table 4
25HRC
63HRC
64HR30N
91HR15N
MPE function test: +- 0,8HR units

63DIA001 Table 4
Alternate hardness levels for diamond indenters used for Rockwell regular and superficial scales (A, C, D, and N)

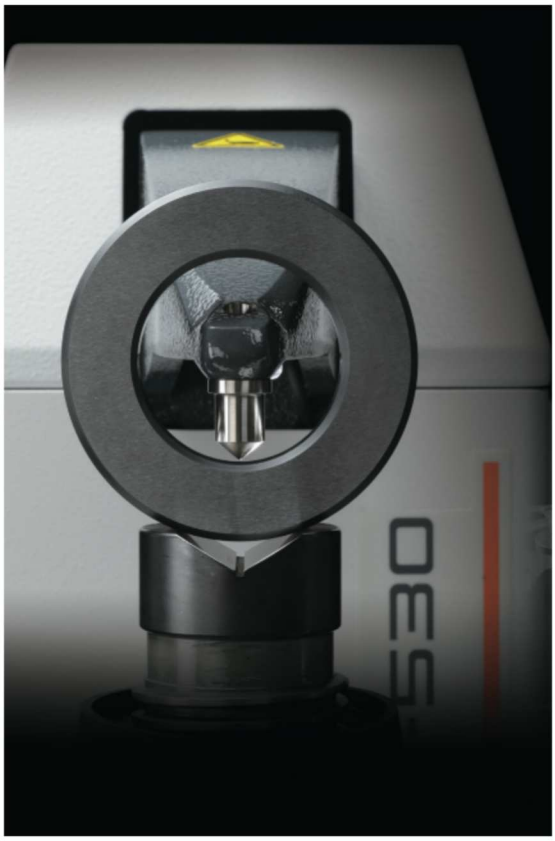
Scale	Nominal Hardness	Ranges
HRC	25	22 to 28
HRC	63	60 to 65
HR30N	64	60 to 69
HR15N	91	88 to 94

63DIA021 Table 5
Hardness levels for diamond indenters to be used for Rockwell regular scale testing only (A, C, and D)

Scale	Nominal Hardness	Ranges
HRC	25	22 to 28
HRC	63	60 to 65

63DIA022 Table 6
Hardness levels for diamond indenters to be used for Rockwell superficial scale testing only (N)

Scale	Nominal Hardness	Ranges
HR15N	91	88 to 94
HR30N	64	60 to 69
HR45N	25	22 to 29

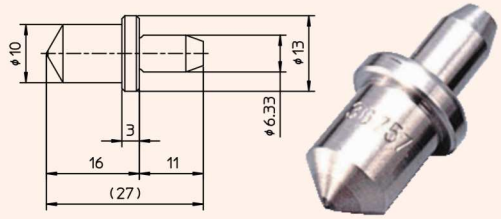


Rockwell Diamond Indenter

Code number	Description	Test Method 1	Standard 1	Standard 2	Calibration	AR-ARK Series	HR-100-200-400MR	HR-300-400MS	HR-500 Series	HR-600 Series
63DIA001	Diamond Indenter Rockwell w. function test table 4, HRA HRC HRD HRN	Rockwell	ISO 6508-2		DAkkS certificate	•		•	•	•
63DIA021	Diamond Indenter Rockwell w. function test table 5, HRA HRC HRD	Rockwell	ISO 6508-2		DAkkS certificate	•	•	•	•	•
63DIA022	Diamond Indenter Rockwell w. function test table 6, HRN	Rockwell	ISO 6508-2		DAkkS certificate	•		•	•	•
63DIA004	Diamond Indenter Rockwell w. function test	Rockwell	ASTM E18		DAkkS certificate	•	•	•	•	•
63DIA002	Diamond Indenter Rockwell without function test	Rockwell	ISO 6508-2		DAkkS certificate	•	•	•	•	•
63DIA023	Diamond Indenter Rockwell without function test	Rockwell	ISO 6508-2	ASTM E18	DAkkS certificate	•	•	•	•	•
63DIA007	Diamond Indenter Rockwell without function test HR-500, short	Rockwell	ISO 6508-2		DAkkS certificate				•	
63DIA008	Diamond Indenter Rockwell w. function test long type L 28 mm	Rockwell	ISO 6508-2		DAkkS certificate	•	•	•		
63DIA009	Diamond Indenter Rockwell w. function test slim type W 6 mm	Rockwell	ISO 6508-2		DAkkS certificate	•	•	•	•	•

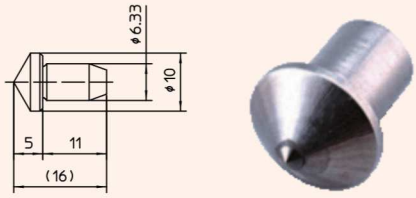
Standard shape diamond indenter

63DIA001
63DIA021
63DIA022
63DIA004
63DIA002
63DIA023



Short type diamond indenter 63DIA007 for inside testing from 22mm

63DIA007



Rockwell Ball Indenter

Code number	Description	Test Method 1	Standard 1	Standard 2	Calibration	AR-ARK Series	HR-100-200-400MR	HR-300-400MS	HR-500 Series	HR-600 Series
11AAD465	ø1.5875mm Rockwell carbide ball indenter	Rockwell			without certificate	•	•	•	•	•
11AAD466	ø3.175 mm Rockwell carbide ball indenter	Rockwell			without certificate	•	•	•	•	•
11AAD467	ø6.35 mm Rockwell carbide ball indenter	Rockwell			without certificate	•	•	•	•	
11AAD468	ø12.7 mm Rockwell carbide ball indenter	Rockwell			without certificate	•	•	•	•	
11AAD735	ø6.35 mm Rockwell carbide ball indenter	Rockwell			without certificate	•	•	•	•	•
11AAD742	ø12.7 mm Rockwell carbide ball indenter	Rockwell			without certificate	•	•	•	•	•

11AAD465

11AAD466

11AAD467

11AAD468

Rockwell Replacement Balls

Code number	Description	Test Method 1	Standard 1	Standard 2	Calibration	AR-ARK Series	HR-100-200-400MR	HR-300-400MS	HR-500 Series	HR-600 Series
19BAA507	ø1.5875 mm Rockwell carbide ball 1pc.	Rockwell			without certificate		•	•	•	•
19BAA508	ø3.175 mm Rockwell carbide ball 1pc.	Rockwell			without certificate		•	•	•	•
19BAA509	ø6.35 mm Rockwell carbide ball 1pc.	Rockwell			without certificate		•	•	•	•
19BAA510	ø12.7 mm Rockwell carbide ball 1pc.	Rockwell			without certificate		•	•	•	•
63BAL013	ø1.5875 mm Rockwell carbide ball 1pc.	Rockwell	ISO 6508-2	ASTM E18	DAkkS certificate		•	•	•	•
63BAL014	ø3.175 mm Rockwell carbide ball 1pc.	Rockwell	ISO 6508-2	ASTM E18	DAkkS certificate		•	•	•	•
63BAL015	ø6.35 mm Rockwell carbide ball 1pc.	Rockwell	ISO 6508-2	ASTM E18	DAkkS certificate		•	•	•	•
63BAL016	ø12.7 mm Rockwell carbide ball 1pc.	Rockwell	ISO 6508-2	ASTM E18	DAkkS certificate		•	•	•	•

Hardness reference materials in quality control: The best way to boost process reliability!

The daily verification, performed by the user, is described in the according hardness testing standards and significantly contributes to quality management processes.

In the daily verification process, all parameters of the hardness test system that build-up to the hardness value, are examined by indentations on the hardness reference material. This periodical inspection of the machine by means of hardness reference materials should be carried out daily before the start of the test schedule.

If the device is used only once a week, the check should only be done on that day.

In a three-shift operation, a check at the beginning of each shift makes sense.

Vickers, Knoop, and Brinell reference materials have a reference indentation for checking the optical measuring system.

During the calibration process of the hardness reference material, the reference indentation is marked on the surface of the test and the measurements are recorded in the calibration certificate. After measuring the reference indentation, the determined values can be compared with those in the calibration certificate and the function of the optical measuring system can be assessed.

An according documentation enhances the process safety, as value shifts due to damage or malfunction can be detected easily.

A comprehensive direct and indirect verification should be performed once a year as part of calibration.
The direct examination includes test force, measuring system, test cycle, and indenter.

Indirect testing using a hardness reference material block indicates the correct interaction of all the parameters that were checked in the direct verification of the testing machine. In addition, the repeatability of the results of the hardness testing machine can also be checked with hardness test blocks.

Mitutoyo reference materials:

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- First-class quality
- Independent DAkkS calibration according to DIN EN ISO in an accredited laboratory
- Multiple calibrations (up to 3 scales on one test block), surface grid, and calibrations according to ASTM on request
- Large square or rectangular surface
- Space advantage over triangular or round plates
- Short delivery time
- MPE "Maximum Permitted Error" of the hardness testing system engraved – all relevant information at a glance:
  (does not apply for carbide reference materials)

Example:

12599 D-K-15009-01-00 2019-06
(387,8 ± 3,9) HV10
Maximum permissible error ± 11,6 HV10

DAkkS Accreditation number and date

12599 D-K-15009-01-00 2019-06

Hardness of reference block, scale, and range

(387,8 ± 3,9) HV10

MPE of hardness testing machine

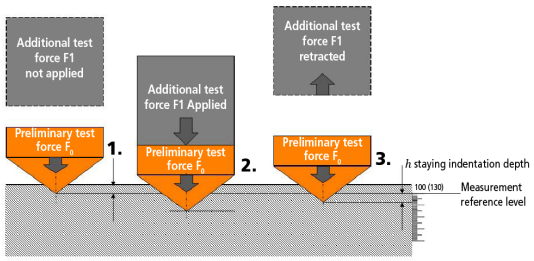
Maximum permissible error ± 11,6 HV10

Rockwell Test Method

Rockwell EN ISO 6508

Test Method

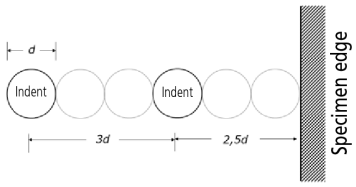
Hardness symbol	Definition	
HRA HRC HRD	Standard Rockwell hardness	$100 - \frac{h}{0{,}002}$
HRBW HREW HRFW HRGW HRHW HRKW	Standard Rockwell hardness	$130 - \frac{h}{0{,}002}$
HRN HRTW	Rockwell Superficial hardness	$100 - \frac{h}{0{,}001}$



Minimum Distance

Distance between indentations
› 3x indentation diameter

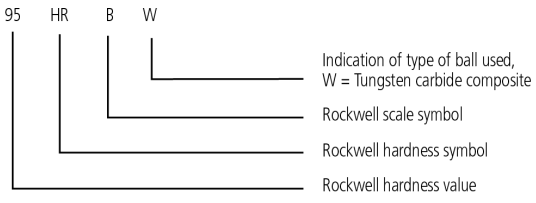
Distance from edge
› 2,5x indentation diameter



Scales and Application

Hardness symbol	Indenter	Total test force Kgf	Total test force N	Applicable range of Rockwell Hardness	Application range
HRA	Diamond	60	588,4	20 - 95 HRA	Carbide, sheet steel
HRD	Diamond	100	980,7	40 - 77 HRD	Case- hardened steel
HRC	Diamond	150	1471	10 – 70 HRC	Steel (100HRB or more to 70HRC or less)
HRFW	1,5875mm ball	60	588,4	60 - 100 HRFW	Bearing metal, annealed copper
HRBW	1,5875mm ball	100	980,7	20 - 100 HRBW	Brass
HRGW	1,5875mm ball	150	1471	30 - 94 HRGW	Hard aluminum alloy, beryllium copper, phosphor bronze.
HRHW	3,175mm ball	60	588,4	80 - 100 HRHW	Bearing metal, grind stone
HREW	3,175mm ball	100	980,7	70 - 100 HREW	Bearing metal
HRKW	3,175mm ball	150	1471	40 - 100 HRKW	Bearing metal
HR15N	Diamond	15	147,1	70 - 94 HR15N	Thin surface-hardened layer on steel such as carburized or nitrided
HR30N	Diamond	30	294,2	42 - 86 HR30N	
HR45N	Diamond	45	441,3	20 - 77 HR45N	
HR15TW	1,5875mm ball	15	147,1	67 - 93 HR15TW	Sheet of mild steel, brass, bronze, etc.
HR30TW	1,5875mm ball	30	294,2	29 - 82 HR30TW	
HR45TW	1,5875mm ball	45	441,3	10 - 72 HR45TW	

Designation of test results



MPE and repeatability

Rockwell Scale	Hardness range of the calibrated reference material	Permissible bias Rockwell units	Permissible repeatability range of the testing machine[a]
HRA	20 - 40	± 2 HRA	≤ 0,02 (100 – $\bar{H}$) or 0,8 HRA [b]
	45 - 75		
	80 - 95	± 1,5 HRA	
HRBW	10 - 50	± 4 HRBW	≤ 0,04 (130 – $\bar{H}$) HRBW
	60 - 80	± 3 HRBW	
	85 - 100	± 2 HRBW	
HRC	10 - 30	± 1,5 HRC	≤ 0,02 (100 – $\bar{H}$) or 0,8 HRC [b]
	35 - 55		
	60 - 70		
HRD	40 - 47	± 2 HRD	≤ 0,02 (100 – $\bar{H}$) or 0,8 HRD [b]
	55 - 63		
	70 - 77	± 1,5 HRD	
HREW	70 - 77	± 2,5 HREW	≤ 0,04 (130 – $\bar{H}$) HREW
	84 - 90		
	93 - 100	± 2 HREW	
HRFW	60 - 75	± 3 HRFW	≤ 0,04 (130 – $\bar{H}$) HRFW
	80 - 90		
	94 - 100	± 2 HRFW	
HRGW	30 - 50	± 6 HRGW	≤ 0,04 (130 – $\bar{H}$) HRGW
	55 - 75	± 4,5 HRGW	
	80 - 94	± 3 HRGW	
HRHW	80 - 94	± 2 HRHW	≤ 0,04 (130 – $\bar{H}$) HRHW
	96 - 100		
HRKW	40 - 60	± 4 HRKW	≤ 0,04 (130 – $\bar{H}$) HRKW
	65 - 80	± 3 HRKW	
	85 - 100	± 2 HRKW	
HRN		± 2 HRN	≤ 0,04 (100 – $\bar{H}$) or 1,2 HRN[b]
HRTW		± 3 HRTW	≤ 0,06 (100 – $\bar{H}$) or 2,4 HRTW[b]

[a] $\bar{H}$ is the mean hardness value

[b] The higher value of both is regarded as the permissible repeatability range of the hardness testing machine.

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ROCKWELL

ISO 6508-3, ASTM E18 (option) — **Dimensions: 60x60x16mm**

HRA	31	40	44	53	57	62	65	68	71	73	75	77	79	80	81	82	83	84	85
HRB	40	66	72	89	93	100													
HRC						25	30	35	40	45	50		55		60		63	65	67
HRD		**10**	**16**	**28**		42	48	52	56	60	62	65	67	69	71	72	73	75	76
HRE	73	91	97	**106**															
HRF	76	92	97	**105**															
HRGW			41	62															
HRKW	45	71	78	91															
HR15N				**62**		71	75	78	80	83	85	87	88	89	90	91		92	93
HR30N				**28**		43	50	56	60	64	68	71	73	76	78	79	81	82	84
HR45N				**2**		22	31	38	44	50	54	58	61	64	67	69	71	73	74
HR15TW	70	80	82	87	91														
HR30TW	43	57	62	72	78														
HR45TW	**5**	36	43	57	66														

Aluminium — **Steel**

Shown hardness values are only an approximation and can turn out different after heat treatment.
Values indicated in orange are outside the application range of ISO 6508-3.

Optional availability:
- calibration of up 3 test scales on one test block
- calibration according to ASTM E18
- lasered grid for accurate indentation spacing

				Preliminary Test Force		Total Test Force			Standard					
Order no.	Value	Scale	Test method	N	kgf	N	kgf	Ball Ø mm	ISO	ASTM	Grid	Calibration	Dimension	Material
HRA														
63ETB001	31	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB001D	31	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	aluminium
63ETB1126	40	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1127	44	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB003	53	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1176	57	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB006	62	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB008	65	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB010	68	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1128	71	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB012	73	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB012D	73	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	steel
63ETB1129	75	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1130	77	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1131	80	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB015	81	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1132	82	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB016	83	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB017	84	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB018	85	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB018D	85	HRA	Rockwell	98.07	10	588.4	60		ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	steel

				Preliminary Test Force		Total Test Force			Standard					
Order no.	Value	Scale	Test method	N	kgf	N	kgf	Ball Ø mm	ISO	ASTM	Grid	Calibration	Dimension	Material
HRBW														
63ETB021	40	HRBW	Rockwell	98.07	10	980.7	100	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB021D	40	HRBW	Rockwell	98.07	10	980.7	100	1.5875	ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	aluminium
63ETB1133	66	HRBW	Rockwell	98.07	10	980.7	100	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB023	72	HRBW	Rockwell	98.07	10	980.7	100	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1135	89	HRBW	Rockwell	98.07	10	980.7	100	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1136	93	HRBW	Rockwell	98.07	10	980.7	100	1.5875	ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1136D	93	HRBW	Rockwell	98.07	10	980.7	100	1.5875	ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	steel
63ETB029	100	HRBW	Rockwell	98.07	10	980.7	100	1.5875	ISO 6508-3			DAkkS	60x60x16mm	steel
HRC														
63ETB033	25	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB033D	25	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	steel
63ETB034	30	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB035	35	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB036	40	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB037	45	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB037D	45	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	steel
63ETB038	50	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB039	55	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB040	60	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB040DG	60	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3	ASTM E18	Grid	DAkkS	60x60x16mm	steel
63ETB041	63	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB042	65	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB042D	65	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	steel
63ETB043	67	HRC	Rockwell	98.07	10	1471	150		ISO 6508-3			DAkkS	60x60x16mm	steel
HRD														
63ETB1138	10	HRD	Rockwell	98.07	10	980.7	100		non standard			Works	60x60x16mm	steel
63ETB1139	16	HRD	Rockwell	98.07	10	980.7	100		non standard			Works	60x60x16mm	steel
63ETB1140	28	HRD	Rockwell	98.07	10	980.7	100		non standard			Works	60x60x16mm	steel
63ETB1141	42	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB047	48	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB048	52	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB049	56	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB049D	56	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	steel
63ETB050	60	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1142	62	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1143	65	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB052	67	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1144	69	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB053	71	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB054	73	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB054D	73	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	steel
63ETB055	74	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1145	76	HRD	Rockwell	98.07	10	980.7	100		ISO 6508-3			DAkkS	60x60x16mm	steel

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				Preliminary Test Force		Total Test Force			Standard					
Order no.	Value	Scale	Test method	N	kgf	N	kgf	Ball Ø mm	ISO	ASTM	Grid	Calibration	Dimension	Material
HREW														
63ETB1008	73	HREW	Rockwell	98.07	10	980.7	100	3.175	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1008D	73	HREW	Rockwell	98.07	10	980.7	100	3.175	ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	aluminium
63ETB1146	91	HREW	Rockwell	98.07	10	980.7	100	3.175	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1009	97	HREW	Rockwell	98.07	10	980.7	100	3.175	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1009D	97	HREW	Rockwell	98.07	10	980.7	100	3.175	ISO 6508-3	ASTM E18		DAkkS	60x60x16mm	aluminium
63ETB1147	106	HREW	Rockwell	98.07	10	980.7	100	3.175	ISO 6508-3			Works	60x60x16mm	aluminium
HRFW														
63ETB1100	76	HRFW	Rockwell	98.07	10	588.4	60	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1101	92	HRFW	Rockwell	98.07	10	588.4	60	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1102	97	HRFW	Rockwell	98.07	10	588.4	60	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1103	105	HRFW	Rockwell	98.07	10	588.4	60	1.5875	non standard			Works	60x60x16mm	aluminium
HRGW														
63ETB1104	41	HRGW	Rockwell	98.07	10	1471	150	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1105	62	HRGW	Rockwell	98.07	10	1471	150	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
HRKW														
63ETB1106	45	HRKW	Rockwell	98.07	10	1471	150	3.175	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1107	71	HRKW	Rockwell	98.07	10	1471	150	3.175	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1108	78	HRKW	Rockwell	98.07	10	1471	150	3.175	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1109	91	HRKW	Rockwell	98.07	10	1471	150	3.175	ISO 6508-3			DAkkS	60x60x16mm	aluminium
HR15N														
63ETB1110	62	HR15N	Rockwell	29.42	3	147.1	15		non standard			Works	60x60x16mm	aluminium
63ETB1111	71	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB090	75	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB091	78	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1112	80	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB093	83	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB094	85	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1113	87	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB095	88	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1114	89	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB096	90	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB097	91	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB098	92	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB099	93	HR15N	Rockwell	29.42	3	147.1	15		ISO 6508-3			DAkkS	60x60x16mm	steel

				Preliminary Test Force		Total Test Force			Standard					
Order no.	Value	Scale	Test method	N	kgf	N	kgf	Ball Ø mm	ISO	ASTM	Grid	Calibration	Dimension	Material
HR30N														
63ETB1115	28	HR30N	Rockwell	29.42	3	294.2	30		non standard			Works	60x60x16mm	aluminium
63ETB1116	43	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB103	50	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1121	56	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1122	60	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB106	64	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB107	68	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1123	71	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB108	73	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1124	76	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1125	78	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1134	81	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB111	82	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1148	84	HR30N	Rockwell	29.42	3	294.2	30		ISO 6508-3			DAkkS	60x60x16mm	steel
HR45N														
63ETB1149	2	HR45N	Rockwell	29.42	3	441.3	45		non standard			Works	60x60x16mm	aluminium
63ETB1150	22	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB116	31	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1151	38	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1152	44	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1153	50	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1154	58	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB121	61	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1155	64	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1156	67	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1157	69	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1158	71	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB1159	73	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
63ETB125	74	HR45N	Rockwell	29.42	3	441.3	45		ISO 6508-3			DAkkS	60x60x16mm	steel
HR15TW														
63ETB1011	80	HR15TW	Rockwell	29.42	3	147.1	15	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1160	70	HR15TW	Rockwell	29.42	3	147.1	15	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB130	82	HR15TW	Rockwell	29.42	3	147.1	15	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1161	87	HR15TW	Rockwell	29.42	3	147.1	15	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB133	91	HR15TW	Rockwell	29.42	3	147.1	15	1.5875	ISO 6508-3			DAkkS	60x60x16mm	steel
HR30TW														
63ETB1117	43	HR30TW	Rockwell	29.42	3	294.2	30	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1118	57	HR30TW	Rockwell	29.42	3	294.2	30	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1119	62	HR30TW	Rockwell	29.42	3	294.2	30	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1120	72	HR30TW	Rockwell	29.42	3	294.2	30	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1013	78	HR30TW	Rockwell	29.42	3	294.2	30	1.5875	ISO 6508-3			DAkkS	60x60x16mm	steel
HR45TW														
63ETB1162	5	HR45TW	Rockwell	29.42	3	441.3	45	1.5875	non standard			Works	60x60x16mm	aluminium
63ETB1163	36	HR45TW	Rockwell	29.42	3	441.3	45	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1164	43	HR45TW	Rockwell	29.42	3	441.3	45	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1165	57	HR45TW	Rockwell	29.42	3	441.3	45	1.5875	ISO 6508-3			DAkkS	60x60x16mm	aluminium
63ETB1166	66	HR45TW	Rockwell	29.42	3	441.3	45	1.5875	ISO 6508-3			DAkkS	60x60x16mm	steel

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DAkkS calibration according to VDI/VDE 2616-1					Dimensions: 60x60x16mm				
HR2,5/62,5	63	74	79	84					
HR2,5/187,5					60	67	72	77	80
	Aluminium				Steel				

Shown hardness values are only an approximation and can turn out different after heat treatment.

Optional availability:
- lasered grid for accurate indentation spacing

				Preliminary Test Force		Total Test Force			Guideline					
Order no.	Value	Scale	Test method	N	kgf	N	kgf	Ball Ø mm			Grid	Calibration	Dimension	Material
HR 2,5/62,5														
63ETB1167	63	HR 2,5/62,5	Rockwell	98.07	10	612.9	62.5	2.5	VDI/VDE 2616-1			DAkkS	60x60x16mm	aluminium
63ETB1168	74	HR 2,5/62,5	Rockwell	98.07	10	612.9	62.5	2.5	VDI/VDE 2616-1			DAkkS	60x60x16mm	aluminium
63ETB1169	79	HR 2,5/62,5	Rockwell	98.07	10	612.9	62.5	2.5	VDI/VDE 2616-1			DAkkS	60x60x16mm	aluminium
63ETB1170	84	HR 2,5/62,5	Rockwell	98.07	10	612.9	62.5	2.5	VDI/VDE 2616-1			DAkkS	60x60x16mm	aluminium
HR 2,5/187,5														
63ETB1171	60	HR 2,5/187,5	Rockwell	98.07	10	1839	187.5	2.5	VDI/VDE 2616-1			DAkkS	60x60x16mm	steel
63ETB1172	67	HR 2,5/187,5	Rockwell	98.07	10	1839	187.5	2.5	VDI/VDE 2616-1			DAkkS	60x60x16mm	steel
63ETB1173	72	HR 2,5/187,5	Rockwell	98.07	10	1839	187.5	2.5	VDI/VDE 2616-1			DAkkS	60x60x16mm	steel
63ETB1174	77	HR 2,5/187,5	Rockwell	98.07	10	1839	187.5	2.5	VDI/VDE 2616-1			DAkkS	60x60x16mm	steel
63ETB1175	80	HR 2,5/187,5	Rockwell	98.07	10	1839	187.5	2.5	VDI/VDE 2616-1			DAkkS	60x60x16mm	steel

Carbide Reference Materials Rockwell

ISO 6508-3, ASTM E18 (option)	Dimensions: 45x35x8mm			
HRA	89.1	90.1	91.9	92.8
	Carbide			

Shown hardness values are only an approximation and can turn out significantly higher.

Optional availability:

- calibration up to 3 test scales on one test block
- calibration according to ASTM E92

			Preliminary Test Force			Total Test Force		Standard				
Order no.	Value	Scale	Test method	N	kgf	N	kgf	ISO	ASTM	Calibration	Dimension	Material
HRA												
63CTB083	89	HRA	Rockwell	98.07	10	588.4	60	ISO 6508-3		DAkkS	45x35x8mm	carbide
63CTB084	90	HRA	Rockwell	98.07	10	588.4	60	ISO 6508-3		DAkkS	45x35x8mm	carbide
63CTB085	92	HRA	Rockwell	98.07	10	588.4	60	ISO 6508-3		DAkkS	45x35x8mm	carbide
63CTB086	93	HRA	Rockwell	98.07	10	588.4	60	ISO 6508-3		DAkkS	45x35x8mm	carbide