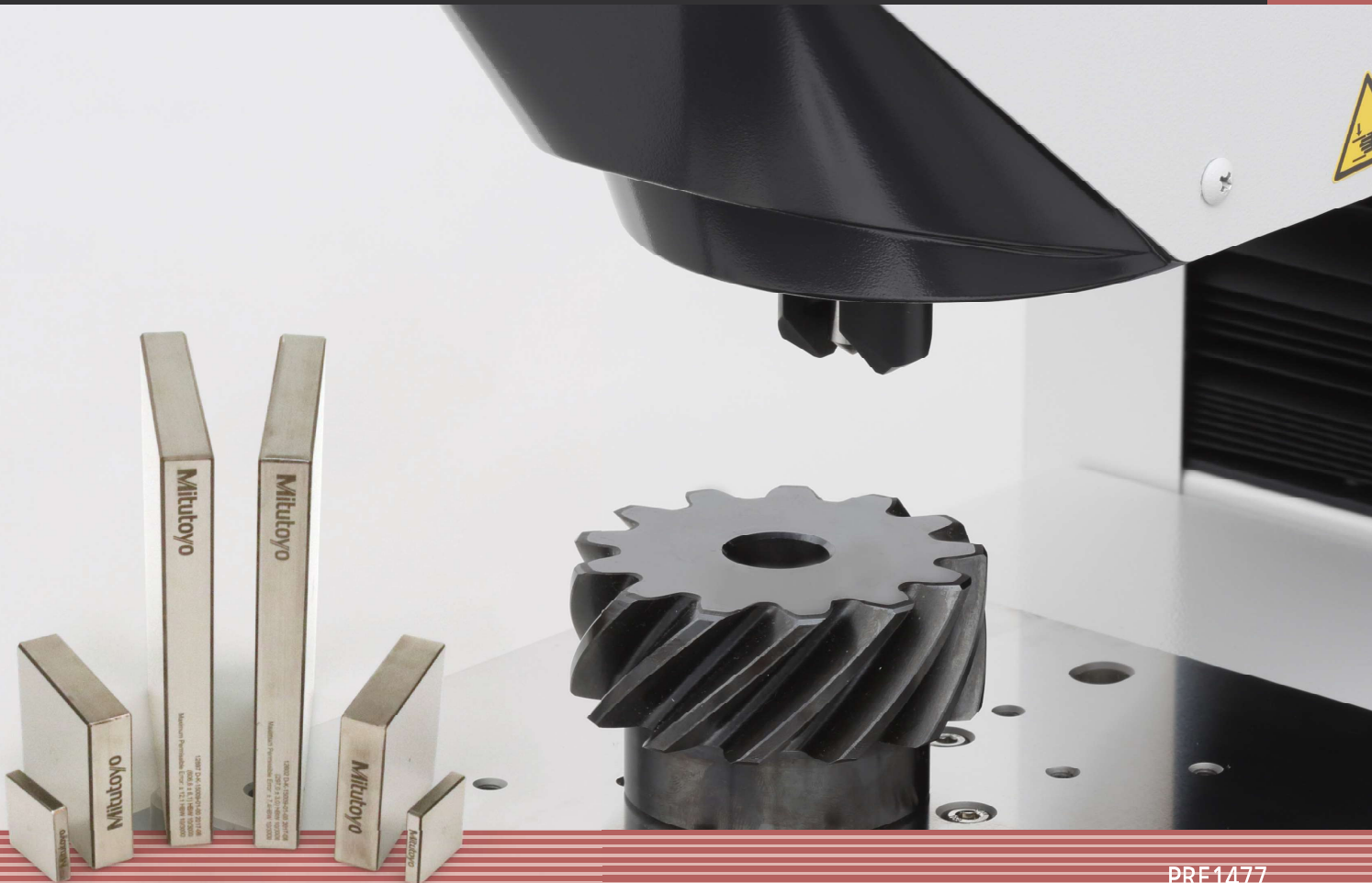


# HARDNESS REFERENCE MATERIALS AND INDENTERS

ACCESSORIES FOR HARDNESS TESTING

TEST EQUIPMENT  
AND SEISMOMETERS



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| Knoop    | Diamond indenters            |           |       | 35      |

## 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:



- 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

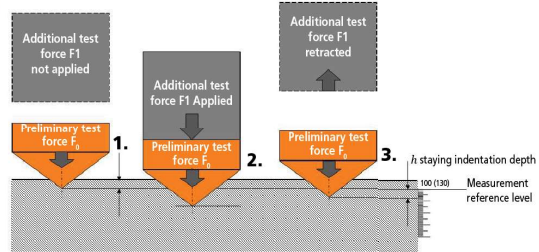
Maximum permissible error ± 11,6 HV10

# Rockwell Test Method

## Rockwell EN ISO 6508

### Test Method

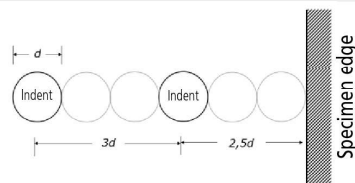
| Hardness symbol | Definition                    |                         |
|-----------------|-------------------------------|-------------------------|
| HRA             | Standard Rockwell hardness    | $100 - \frac{h}{0,002}$ |
| HRC             |                               |               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



### Minimum Distance

Distance between indentations  
 > 3x indentation diameter

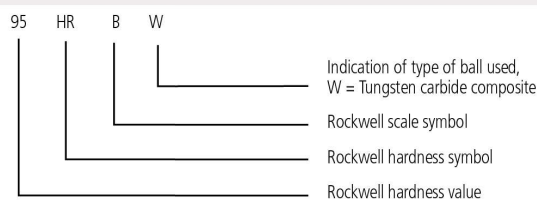
Distance from edge  
 > 2,5x indentation diameter



### Scales and Application

| Hardness symbol | Indenter      | Total test force |       | Applicable range of Rockwell Hardness | Application range                                                   |
|-----------------|---------------|------------------|-------|---------------------------------------|---------------------------------------------------------------------|
|                 |               | Kgf              | N     |                                       |                                                                     |
| 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 <sup>a</sup> |
|----------------|-----------------------------------------------------|----------------------------------|---------------------------------------------------------------------|
| HRA            | 20 - 40                                             | ± 2 HRA                          | ≤ 0,02 (100 - $\bar{H}$ ) or 0,8 HRA <sup>b</sup>                   |
|                | 45 - 75                                             |                                  |                                                                     |
|                | 80 - 95                                             |                                  |                                                                     |
| HRBW           | 10 - 50                                             | ± 4 HRBW<br>± 3 HRBW<br>± 2 HRBW | ≤ 0,04 (130 - $\bar{H}$ ) HRBW                                      |
|                | 60 - 80                                             |                                  |                                                                     |
|                | 85 - 100                                            |                                  |                                                                     |
| HRC            | 10 - 30                                             | ± 1,5 HRC                        | ≤ 0,02 (100 - $\bar{H}$ ) or 0,8 HRC <sup>b</sup>                   |
|                | 35 - 55                                             |                                  |                                                                     |
|                | 60 - 70                                             |                                  |                                                                     |
| HRD            | 40 - 47                                             | ± 2 HRD<br>± 1,5 HRD             | ≤ 0,02 (100 - $\bar{H}$ ) or 0,8 HRD <sup>b</sup>                   |
|                | 55 - 63                                             |                                  |                                                                     |
|                | 70 - 77                                             |                                  |                                                                     |
| HREW           | 70 - 77                                             | ± 2,5 HREW<br>± 2 HREW           | ≤ 0,04 (130 - $\bar{H}$ ) HREW                                      |
|                | 84 - 90                                             |                                  |                                                                     |
|                | 93 - 100                                            |                                  |                                                                     |
| HRFW           | 60 - 75                                             | ± 3 HRFW<br>± 2 HRFW<br>± 6 HRGW | ≤ 0,04 (130 - $\bar{H}$ ) HRFW                                      |
|                | 80 - 90                                             |                                  |                                                                     |
|                | 94 - 100                                            |                                  |                                                                     |
| HRGW           | 30 - 50                                             | ± 4,5 HRGW<br>± 3 HRGW           | ≤ 0,04 (130 - $\bar{H}$ ) HRGW                                      |
|                | 55 - 75                                             |                                  |                                                                     |
|                | 80 - 94                                             |                                  |                                                                     |
| HRHW           | 80 - 94                                             | ± 2 HRHW<br>± 4 HRKW<br>± 3 HRKW | ≤ 0,04 (130 - $\bar{H}$ ) HRHW                                      |
|                | 96 - 100                                            |                                  |                                                                     |
|                | 40 - 60                                             |                                  |                                                                     |
| HRKW           | 65 - 80                                             | ± 2 HRKW<br>± 2 HRN<br>± 3 HRTW  | ≤ 0,04 (130 - $\bar{H}$ ) HRKW                                      |
|                | 85 - 100                                            |                                  |                                                                     |
|                |                                                     |                                  |                                                                     |
| HRN            |                                                     | ± 2 HRN                          | ≤ 0,04 (100 - $\bar{H}$ ) or 1,2 HRN <sup>b</sup>                   |
| HRTW           |                                                     | ± 3 HRTW                         | ≤ 0,06 (100 - $\bar{H}$ ) or 2,4 HRTW <sup>b</sup>                  |

<sup>a</sup>  $\bar{H}$  is the mean hardness value

<sup>b</sup> The higher value of both is regarded as the permissible repeatability range of the hardness testing machine.





## 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 |          |      | DAkS        | 60x60x16mm | aluminium |
| 63ETB001D | 31    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 | ASTM E18 |      | DAkS        | 60x60x16mm | aluminium |
| 63ETB1126 | 40    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | aluminium |
| 63ETB1127 | 44    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | aluminium |
| 63ETB003  | 53    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | aluminium |
| 63ETB1176 | 57    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB006  | 62    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB008  | 65    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB010  | 68    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB1128 | 71    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB012  | 73    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB012D | 73    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 | ASTM E18 |      | DAkS        | 60x60x16mm | steel     |
| 63ETB1129 | 75    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB1130 | 77    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB1131 | 80    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB015  | 81    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB1132 | 82    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB016  | 83    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB017  | 84    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB018  | 85    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 |          |      | DAkS        | 60x60x16mm | steel     |
| 63ETB018D | 85    | HRA   | Rockwell    | 98.07                  | 10  | 588.4            | 60  |           | ISO 6508-3 | ASTM E18 |      | DAkS        | 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     |



|            |       |       |             | 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     |
| 63ETB1103 | 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     |
| 63ETB1106 | 64    | HR30N  | Rockwell    | 29.42                  | 3   | 294.2            | 30  |           | ISO 6508-3   |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB1107 | 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     |
| 63ETB1108 | 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     |

**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

| Order no.    | Value | Scale        | Test method | Preliminary Test Force |     | Total Test Force |       | Ball Ø mm | Guideline      |  | Grid | Calibration | Dimension  | Material  |
|--------------|-------|--------------|-------------|------------------------|-----|------------------|-------|-----------|----------------|--|------|-------------|------------|-----------|
|              |       |              |             | N                      | kgf | N                | kgf   |           |                |  |      |             |            |           |
| 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

| Order no. | Value | Scale | Test method | Preliminary Test Force |     | Total Test Force |     | Standard   |      | Calibration | Dimension | Material |
|-----------|-------|-------|-------------|------------------------|-----|------------------|-----|------------|------|-------------|-----------|----------|
|           |       |       |             | N                      | kgf | N                | kgf | ISO        | ASTM |             |           |          |
| 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  |



# Vickers Test Method

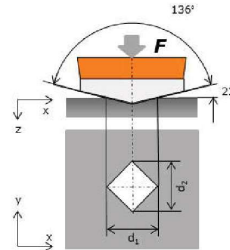
## Vickers EN ISO 6507

Test Method

$$HV = \frac{\text{Testforce } F}{\text{surface of indentation}}$$

$$HV = 0,102 \times \frac{2F \sin \frac{136^\circ}{2}}{d^2} = 0,1891 \times \frac{F}{d^2}$$

$$d = \frac{d_1 + d_2}{2} \text{ mean diagonal length}$$



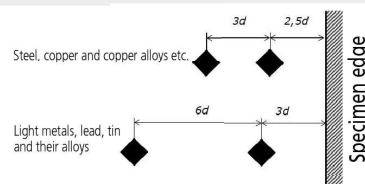
Minimum Distance

Distance between indentations (centre)

- > Minimum distance 3,0x indentation diagonal for steel etc.
- > Minimum distance 6,0x indentation diagonal for lead etc.

Distance from centre of indentation to specimen edge

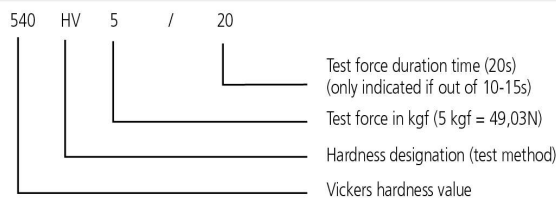
- > Minimum distance 2,5x indentation diagonal for steel etc.
- > Minimum distance 3,0x indentation diagonal for lead etc.



Scales and Application

| Test force range        | Hardness symbol | Nominal value of the test force F | Indenter             | Application                                                                                                             | Hardness Range                            |
|-------------------------|-----------------|-----------------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Microhardness test      | HV 0,001        | 0,009 807                         | Diamond pyramid 136° | Microstructure, very thin layers of material, ceramic materials, HV0,1 hardening depth: CHD NHD SHD                     | 1 HV to 3000 HV<br>diagonal length >20 µm |
|                         | HV 0,002        | 0,019 61                          |                      |                                                                                                                         |                                           |
|                         | HV 0,003        | 0,029 42                          |                      |                                                                                                                         |                                           |
|                         | HV 0,005        | 0,049 63                          |                      |                                                                                                                         |                                           |
|                         | HV 0,01         | 0,098 07                          |                      |                                                                                                                         |                                           |
|                         | HV 0,015        | 0,147                             |                      |                                                                                                                         |                                           |
|                         | HV 0,02         | 0,196 1                           |                      |                                                                                                                         |                                           |
|                         | HV 0,025        | 0,245 2                           |                      |                                                                                                                         |                                           |
|                         | HV 0,05         | 0,490 3                           |                      |                                                                                                                         |                                           |
|                         | HV 0,1          | 0,980 7                           |                      |                                                                                                                         |                                           |
| Low-force hardness test | HV 0,2          | 1,961                             | Diamond pyramid 136° | Thin layers of material, sheet metal, general small parts, hardening depth: CHD NHD SHD, surface hardness, weld testing | 1 HV to 3000 HV<br>diagonal length >20 µm |
|                         | HV 0,3          | 2,942                             |                      |                                                                                                                         |                                           |
|                         | HV 0,5          | 4,903                             |                      |                                                                                                                         |                                           |
|                         | HV 1            | 9,807                             |                      |                                                                                                                         |                                           |
|                         | HV 2            | 19,61                             |                      |                                                                                                                         |                                           |
|                         | HV 3            | 29,42                             |                      |                                                                                                                         |                                           |
| Hardness test (Macro)   | HV 5            | 49,03                             | Diamond pyramid 136° | General parts, weld testing, sintered parts, surface hardness, Jominy test (HV30)                                       | 1 HV to 3000 HV<br>diagonal length >20 µm |
|                         | HV 10           | 98,07                             |                      |                                                                                                                         |                                           |
|                         | HV 20           | 196,1                             |                      |                                                                                                                         |                                           |
|                         | HV 30           | 294,2                             |                      |                                                                                                                         |                                           |
|                         | HV 50           | 490,3                             |                      |                                                                                                                         |                                           |
|                         | HV 100          | 980,7                             |                      |                                                                                                                         |                                           |

Designation of test results



MPE and repeatability

| Hardness of the calibrated reference material $H_{CRM}$ | Maximum permissible relative HV repeatability of the testing machine $r_{rel} \% HV$ |                  |          |
|---------------------------------------------------------|--------------------------------------------------------------------------------------|------------------|----------|
|                                                         | HV 5 to HV 100                                                                       | HV 0,2 to < HV 5 | < HV 0,2 |
| HV ≤ 250                                                | 6.0 %                                                                                | 12.0 %           | 18.0%    |
| HV > 250                                                | 4.0 %                                                                                | 8.0 %            | 12.0%    |

| Mean diagonal length $\bar{d}$ mm | Maximum permissible error HVb <sub>rel</sub> of the testing machine ± %HV |
|-----------------------------------|---------------------------------------------------------------------------|
| 0,02 ≤ $\bar{d}$ < 0,06           | 0,24/≤ $\bar{d}$                                                          |
| 0,06 ≤ $\bar{d}$ ≤ 1,4            | 3                                                                         |

$$\bar{d} = \frac{(d_1 + d_2 + d_3 + d_4 + d_5)}{5}$$

# VICKERS MICRO

## ISO 6507-3, ASTM E92 (option)

Dimensions: 30x30x6mm

|         |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| HV0,01  | 200 | 250 | 300 |     |     |     |     |     |     |     |     |     |     |     |     |  |
| HV0,015 | 200 | 250 | 300 | 350 | 400 |     |     |     |     |     |     |     |     |     |     |  |
| HV0,02  | 200 | 250 | 300 | 350 | 400 | 450 | 500 |     |     |     |     |     |     |     |     |  |
| HV0,025 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 |     |     |     |     |  |
| HV0,05  | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |  |
| HV0,1   | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |  |
| HV0,2   | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |  |
| HV0,3   | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |  |
| HV0,5   | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |  |
| HV1     | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |  |

Steel

Tolerance of nominal value  $\pm 25HV$

Values indicated in orange are outside the 20 $\mu$ m limit of ISO 6507 and are exclusively supplied with ASTM E92 calibration certificates.

Optional availability:

- calibration of up 3 test scales on one test block
- calibration according to ASTM E92
- lasered grid for accurate indentation spacing

| Order no. | Value | Scale   | Test method | Preliminary Test Force |       | Standard |          | Grid | Calibration | Dimension | Material |
|-----------|-------|---------|-------------|------------------------|-------|----------|----------|------|-------------|-----------|----------|
|           |       |         |             | N                      | kgf   | ISO      | ASTM     |      |             |           |          |
| HV0,01    |       |         |             |                        |       |          |          |      |             |           |          |
| 63ETB497  | 200   | HV0,01  | Vickers     | 0.09807                | 0.01  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB498  | 250   | HV0,01  | Vickers     | 0.09807                | 0.01  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB499  | 300   | HV0,01  | Vickers     | 0.09807                | 0.01  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| HV0,015   |       |         |             |                        |       |          |          |      |             |           |          |
| 63ETB514  | 200   | HV0,015 | Vickers     | 0.1471                 | 0.015 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB515  | 250   | HV0,015 | Vickers     | 0.1471                 | 0.015 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB516  | 300   | HV0,015 | Vickers     | 0.1471                 | 0.015 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB517  | 350   | HV0,015 | Vickers     | 0.1471                 | 0.015 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB518  | 400   | HV0,015 | Vickers     | 0.1471                 | 0.015 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| HV0,02    |       |         |             |                        |       |          |          |      |             |           |          |
| 63ETB531  | 200   | HV0,020 | Vickers     | 0.1961                 | 0.02  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB532  | 250   | HV0,020 | Vickers     | 0.1961                 | 0.02  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB533  | 300   | HV0,020 | Vickers     | 0.1961                 | 0.02  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB534  | 350   | HV0,020 | Vickers     | 0.1961                 | 0.02  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB535  | 400   | HV0,020 | Vickers     | 0.1961                 | 0.02  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB536  | 450   | HV0,020 | Vickers     | 0.1961                 | 0.02  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB537  | 500   | HV0,020 | Vickers     | 0.1961                 | 0.02  |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| HV0,025   |       |         |             |                        |       |          |          |      |             |           |          |
| 63ETB548  | 200   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB549  | 250   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB550  | 300   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB551  | 350   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB552  | 400   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB553  | 450   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB554  | 500   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB555  | 550   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB556  | 600   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB557  | 650   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB558  | 700   | HV0,025 | Vickers     | 0.2452                 | 0.025 |          | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |

|           |       |        |             | Preliminary Test Force |      | Standard   |          |      |             |           |          |
|-----------|-------|--------|-------------|------------------------|------|------------|----------|------|-------------|-----------|----------|
| Order no. | Value | Scale  | Test method | N                      | kgf  | ISO        | ASTM     | Grid | Calibration | Dimension | Material |
| HV0,05    |       |        |             |                        |      |            |          |      |             |           |          |
| 63ETB578  | 200   | HV0,05 | Vickers     | 0.4903                 | 0.05 | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB579  | 250   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB580  | 300   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB581  | 350   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB582  | 400   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB583  | 450   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB584  | 500   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB585  | 550   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB586  | 600   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB587  | 650   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB588  | 700   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB589  | 750   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB590  | 800   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB591  | 850   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB592  | 900   | HV0,05 | Vickers     | 0.4903                 | 0.05 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| HV0,1     |       |        |             |                        |      |            |          |      |             |           |          |
| 63ETB595  | 200   | HV0,1  | Vickers     | 0.9807                 | 0.1  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB596  | 250   | HV0,1  | Vickers     | 0.9807                 | 0.1  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB597  | 300   | HV0,1  | Vickers     | 0.9807                 | 0.1  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB598  | 350   | HV0,1  | Vickers     | 0.9807                 | 0.1  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB599  | 400   | HV0,1  | Vickers     | 0.9807                 | 0.1  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB600  | 450   | HV0,1  | Vickers     | 0.9807                 | 0.1  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB601  | 500   | HV0,1  | Vickers     | 0.9807                 | 0.1  |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB602  | 550   | HV0,1  | Vickers     | 0.9807                 | 0.1  |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB603  | 600   | HV0,1  | Vickers     | 0.9807                 | 0.1  |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB604  | 650   | HV0,1  | Vickers     | 0.9807                 | 0.1  |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB605  | 700   | HV0,1  | Vickers     | 0.9807                 | 0.1  |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB606  | 750   | HV0,1  | Vickers     | 0.9807                 | 0.1  |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB607  | 800   | HV0,1  | Vickers     | 0.9807                 | 0.1  |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB608  | 850   | HV0,1  | Vickers     | 0.9807                 | 0.1  |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB609  | 900   | HV0,1  | Vickers     | 0.9807                 | 0.1  |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| HV0,2     |       |        |             |                        |      |            |          |      |             |           |          |
| 63ETB612  | 200   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB613  | 250   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB614  | 300   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB615  | 350   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB616  | 400   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB617  | 450   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB618  | 500   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB619  | 550   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB620  | 600   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB621  | 650   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB622  | 700   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB623  | 750   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB624  | 800   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB625  | 850   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB626  | 900   | HV0,2  | Vickers     | 1.961                  | 0.2  | ISO 6507-3 |          |      | DAkKS       | 30x30x6mm | steel    |

|           |       |       |             | Preliminary Test Force |     | Standard   |      |      |             |           |          |
|-----------|-------|-------|-------------|------------------------|-----|------------|------|------|-------------|-----------|----------|
| Order no. | Value | Scale | Test method | N                      | kgf | ISO        | ASTM | Grid | Calibration | Dimension | Material |
| HV0,3     |       |       |             |                        |     |            |      |      |             |           |          |
| 63ET8629  | 200   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8630  | 250   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8631  | 300   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8632  | 350   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8633  | 400   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8634  | 450   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8635  | 500   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8636  | 550   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8637  | 600   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8638  | 650   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8639  | 700   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8640  | 750   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8641  | 800   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8642  | 850   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8643  | 900   | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| HV0,5     |       |       |             |                        |     |            |      |      |             |           |          |
| 63ET8647  | 200   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8648  | 250   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8649  | 300   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8650  | 350   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8651  | 400   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8652  | 450   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8653  | 500   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8654  | 550   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8655  | 600   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8656  | 650   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8657  | 700   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8658  | 750   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8659  | 800   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8660  | 850   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8661  | 900   | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| HV1       |       |       |             |                        |     |            |      |      |             | 30x30x6mm |          |
| 63ET8664  | 200   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8665  | 250   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8666  | 300   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8667  | 350   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8668  | 400   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8669  | 450   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8670  | 500   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8671  | 550   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8672  | 600   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8673  | 650   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8674  | 700   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8675  | 750   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8676  | 800   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8677  | 850   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |
| 63ET8678  | 900   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkS        | 30x30x6mm | steel    |



## VICKERS MACRO

### ISO 6507-3, ASTM E92 (option)

### Dimensions: 60x60x16mm

|              | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |
|--------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| <b>HV1</b>   | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |
| <b>HV2</b>   | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |
| <b>HV3</b>   | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |
| <b>HV5</b>   | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |
| <b>HV10</b>  | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |
| <b>HV20</b>  | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |
| <b>HV30</b>  | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |
| <b>HV50</b>  | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |
| <b>HV100</b> | 80 | 110 | 130 | 170 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 |

Aluminium

Steel

Tolerance of nominal value  $\pm 25\text{HV}$

Optional availability:

- calibration of up 3 test scales on one test block
- calibration according to ASTM E92
- lasered grid for accurate indentation spacing

|           |       |       |             | Preliminary Test Force |     | Standard   |      |      |             |            |           |
|-----------|-------|-------|-------------|------------------------|-----|------------|------|------|-------------|------------|-----------|
| Order no. | Value | Scale | Test method | N                      | kgf | ISO        | ASTM | Grid | Calibration | Dimension  | Material  |
| HV1       |       |       |             |                        |     |            |      |      |             | 60x60x16mm |           |
| 63ETB760  | 80    | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB761  | 110   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB762  | 130   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB763  | 170   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB764  | 200   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB765  | 250   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB766  | 300   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB767  | 350   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB768  | 400   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB769  | 450   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB770  | 500   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB771  | 550   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB772  | 600   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB773  | 650   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB774  | 700   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB775  | 750   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB776  | 800   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB777  | 850   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB778  | 900   | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |



|           |       |       |             | Preliminary Test Force |     | Standard   |      |      |             |            |           |
|-----------|-------|-------|-------------|------------------------|-----|------------|------|------|-------------|------------|-----------|
| Order no. | Value | Scale | Test method | N                      | kgf | ISO        | ASTM | Grid | Calibration | Dimension  | Material  |
| HV2       |       |       |             |                        |     |            |      |      |             |            |           |
| 63ETB680  | 80    | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB681  | 110   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB682  | 130   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB683  | 170   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB684  | 200   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB685  | 250   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB686  | 300   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB687  | 350   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB688  | 400   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB689  | 450   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB690  | 500   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB691  | 550   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB692  | 600   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB693  | 650   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB694  | 700   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB695  | 750   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB696  | 800   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB697  | 850   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB698  | 900   | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| HV3       |       |       |             |                        |     |            |      |      |             |            |           |
| 63ETB700  | 80    | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB701  | 110   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB702  | 130   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB703  | 170   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | aluminium |
| 63ETB704  | 200   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB705  | 250   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB706  | 300   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB707  | 350   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB708  | 400   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB709  | 450   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB710  | 500   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB711  | 550   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB712  | 600   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB713  | 650   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB714  | 700   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB715  | 750   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB716  | 800   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB717  | 850   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |
| 63ETB718  | 900   | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 60x60x16mm | steel     |



|           |       |       |             | Preliminary Test Force |     | Standard   |      |      |             |            |           |
|-----------|-------|-------|-------------|------------------------|-----|------------|------|------|-------------|------------|-----------|
| Order no. | Value | Scale | Test method | N                      | kgf | ISO        | ASTM | Grid | Calibration | Dimension  | Material  |
| HV5       |       |       |             |                        |     |            |      |      |             |            |           |
| 63ETB720  | 80    | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB721  | 110   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB722  | 130   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB723  | 170   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB724  | 200   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB725  | 250   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB726  | 300   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB727  | 350   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB728  | 400   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB729  | 450   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB730  | 500   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB731  | 550   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB732  | 600   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB733  | 650   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB734  | 700   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB735  | 750   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB736  | 800   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB737  | 850   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB738  | 900   | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| HV10      |       |       |             |                        |     |            |      |      |             |            |           |
| 63ETB1300 | 80    | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB740  | 110   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB741  | 130   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB742  | 170   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB743  | 200   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB744  | 250   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB745  | 300   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB746  | 350   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB747  | 400   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB749  | 500   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB750  | 550   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB751  | 600   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB752  | 650   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB753  | 700   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB754  | 750   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB755  | 800   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB756  | 850   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB757  | 900   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB853  | 450   | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |





|           |       |       |             | Preliminary Test Force |     | Standard   |      |      |             |            |           |
|-----------|-------|-------|-------------|------------------------|-----|------------|------|------|-------------|------------|-----------|
| Order no. | Value | Scale | Test method | N                      | kgf | ISO        | ASTM | Grid | Calibration | Dimension  | Material  |
| HV20      |       |       |             |                        |     |            |      |      |             |            |           |
| 63ETB1301 | 80    | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB866  | 110   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB867  | 130   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB868  | 170   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB869  | 200   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB870  | 250   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB871  | 300   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB872  | 350   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB873  | 400   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB874  | 450   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB875  | 500   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB876  | 550   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB877  | 600   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB878  | 650   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB879  | 700   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB880  | 750   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB881  | 800   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB882  | 850   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB883  | 900   | HV20  | Vickers     | 196.1                  | 20  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| HV30      |       |       |             |                        |     |            |      |      |             |            |           |
| 63ETB1302 | 80    | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB888  | 110   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB889  | 130   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB890  | 170   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB891  | 200   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB892  | 250   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB893  | 300   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB894  | 350   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB895  | 400   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB896  | 450   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB897  | 500   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB898  | 550   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB899  | 600   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB900  | 650   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB901  | 700   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB902  | 750   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB903  | 800   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB904  | 850   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB905  | 900   | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |



|           |       |       |             | Preliminary Test Force |     | Standard   |      |      |             |            |           |
|-----------|-------|-------|-------------|------------------------|-----|------------|------|------|-------------|------------|-----------|
| Order no. | Value | Scale | Test method | N                      | kgf | ISO        | ASTM | Grid | Calibration | Dimension  | Material  |
| HV50      |       |       |             |                        |     |            |      |      |             |            |           |
| 63ETB1303 | 80    | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB906  | 110   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB907  | 130   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB908  | 170   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB909  | 200   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB910  | 250   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB911  | 300   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB912  | 350   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB913  | 400   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB914  | 450   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB915  | 500   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB916  | 550   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB917  | 600   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB918  | 650   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB919  | 700   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB920  | 750   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB921  | 800   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB922  | 850   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB923  | 900   | HV50  | Vickers     | 490.3                  | 50  | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| HV100     |       |       |             |                        |     |            |      |      |             |            |           |
| 63ETB1304 | 80    | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB924  | 110   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB925  | 130   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB926  | 170   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | aluminium |
| 63ETB927  | 200   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB928  | 250   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB929  | 300   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB930  | 350   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB931  | 400   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB932  | 450   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB933  | 500   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB934  | 550   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB935  | 600   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB936  | 650   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB937  | 700   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB938  | 750   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB939  | 800   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB940  | 850   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |
| 63ETB941  | 900   | HV100 | Vickers     | 980.7                  | 100 | ISO 6507-3 |      |      | DAkkS       | 60x60x16mm | steel     |

# Carbide Reference Materials Vickers

## VICKERS

### ISO 6507-3, ASTM E92 (option)

Dimensions: 45x35x8mm

|        |      |      |      |      |      |
|--------|------|------|------|------|------|
| HV 0,1 | 1300 | 1400 | 1600 | 1700 |      |
| HV 0,2 | 1300 | 1400 | 1600 | 1700 | 2100 |
| HV 0,3 | 1300 | 1400 | 1600 | 1700 | 2100 |
| HV 0,5 | 1300 | 1400 | 1600 | 1700 | 2100 |
| HV1    | 1300 | 1400 | 1600 | 1700 | 2100 |
| HV2    | 1300 | 1400 | 1600 | 1700 | 2100 |
| HV3    | 1300 | 1400 | 1600 | 1700 | 2100 |
| HV5    | 1300 | 1400 | 1600 | 1700 | 2100 |
| HV10   | 1300 | 1400 | 1600 | 1700 | 2100 |
| HV30   | 1300 | 1400 | 1600 | 1700 |      |

Carbide

Values indicated in orange are outside the 20µm limit of ISO 6507 and are exclusively supplied with ASTM E92 calibration certificates.  
Shown hardness values are only an approximation and can turn out significantly higher.

Optional availability:

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

| Order no. | Value | Scale | Test method | Preliminary Test Force |     | Standard   |          | Grid | Calibration | Dimension | Material |
|-----------|-------|-------|-------------|------------------------|-----|------------|----------|------|-------------|-----------|----------|
|           |       |       |             | N                      | kgf | ISO        | ASTM     |      |             |           |          |
| HV0,1     |       |       |             |                        |     |            |          |      |             |           |          |
| 63CTB001  | 1300  | HV0,1 | Vickers     | 0.9807                 | 0.1 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB002  | 1400  | HV0,1 | Vickers     | 0.9807                 | 0.1 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB012  | 1600  | HV0,1 | Vickers     | 0.9807                 | 0.1 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB004  | 1700  | HV0,1 | Vickers     | 0.9807                 | 0.1 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| HV0,2     |       |       |             |                        |     |            |          |      |             |           |          |
| 63CTB006  | 1300  | HV0,2 | Vickers     | 1.961                  | 0.2 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB007  | 1400  | HV0,2 | Vickers     | 1.961                  | 0.2 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB008  | 1600  | HV0,2 | Vickers     | 1.961                  | 0.2 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB009  | 1700  | HV0,2 | Vickers     | 1.961                  | 0.2 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB010  | 2100  | HV0,2 | Vickers     | 1.961                  | 0.2 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| HV0,3     |       |       |             |                        |     |            |          |      |             |           |          |
| 63CTB011  | 1300  | HV0,3 | Vickers     | 2.942                  | 0.3 | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB003  | 1400  | HV0,3 | Vickers     | 2.942                  | 0.3 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB013  | 1600  | HV0,3 | Vickers     | 2.942                  | 0.3 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB014  | 1700  | HV0,3 | Vickers     | 2.942                  | 0.3 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB015  | 2100  | HV0,3 | Vickers     | 2.942                  | 0.3 |            | ASTM E92 |      | DAkKS       | 45x35x8mm | carbide  |
| HV0,5     |       |       |             |                        |     |            |          |      |             |           |          |
| 63CTB016  | 1300  | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB017  | 1400  | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB018  | 1600  | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB019  | 1700  | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB020  | 2100  | HV0,5 | Vickers     | 4.903                  | 0.5 | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| HV1       |       |       |             |                        |     |            |          |      |             |           |          |
| 63CTB021  | 1300  | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB022  | 1400  | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB023  | 1600  | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB024  | 1700  | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB025  | 2100  | HV1   | Vickers     | 9.807                  | 1   | ISO 6507-3 |          |      | DAkKS       | 45x35x8mm | carbide  |

|           |       |       |             | Preliminary Test Force |     | Standard   |      |      |             |           |          |
|-----------|-------|-------|-------------|------------------------|-----|------------|------|------|-------------|-----------|----------|
| Order no. | Value | Scale | Test method | N                      | kgf | ISO        | ASTM | Grid | Calibration | Dimension | Material |
| HV2       |       |       |             |                        |     |            |      |      |             |           |          |
| 63CTB026  | 1300  | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB027  | 1400  | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB028  | 1600  | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB029  | 1700  | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB030  | 2100  | HV2   | Vickers     | 19.61                  | 2   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HV3       |       |       |             |                        |     |            |      |      |             |           |          |
| 63CTB031  | 1300  | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB032  | 1400  | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB033  | 1600  | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB034  | 1700  | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB035  | 2100  | HV3   | Vickers     | 29.42                  | 3   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HV5       |       |       |             |                        |     |            |      |      |             |           |          |
| 63CTB036  | 1300  | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB037  | 1400  | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB038  | 1600  | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB039  | 1700  | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB040  | 2100  | HV5   | Vickers     | 49.03                  | 5   | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HV10      |       |       |             |                        |     |            |      |      |             |           |          |
| 63CTB046  | 1300  | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB047  | 1400  | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB048  | 1600  | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB049  | 1700  | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB050  | 2100  | HV10  | Vickers     | 98.07                  | 10  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HV30      |       |       |             |                        |     |            |      |      |             |           |          |
| 63CTB0041 | 1300  | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB0042 | 1400  | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB0043 | 1600  | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB0044 | 1700  | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB0045 | 2100  | HV30  | Vickers     | 294.2                  | 30  | ISO 6507-3 |      |      | DAkKS       | 45x35x8mm | carbide  |

|                                                                                     |  |                                                                                                                                                                |  |
|-------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  | <b>Kögel Werkstoff- und Material-Lösungssysteme GmbH</b>                                                                                                       |  |
| Ammerlaan 1<br>42699 Solingen<br>Germany                                            |  | phone: +49 212 357 20 60<br>fax: +49 212 357 20 69                                                                                                             |  |
| e-mail: koegel@koegel.de<br>web: www.koegel.de                                      |  | fax: +49 212 357 20 69<br>koegel@koegel.de                                                                                                                     |  |
| akkreditiert nach DIN EN ISO 9001 durch die                                         |  |                                                                                                                                                                |  |
| <b>Deutsche Akkreditierungsstelle GmbH</b>                                          |  |  <b>DAkkS</b><br>Deutscher<br>Akkreditationsrat<br>für<br>Normenkonformität |  |
| als Kalibrierlaboratorium für 1. Kalibrierungstechniken in der                      |  |                                                                                                                                                                |  |
| der Deutschen Kalibrierdienst <b>DKD</b>                                            |  |                                                                                                                                                                |  |
| <b>Kalibrierzettel</b><br>Kalibrierung von                                          |  | <b>Kalibrierzettel</b><br>Calibration von                                                                                                                      |  |
| Identifizierung<br>Identification                                                   |  | Identifizierung<br>Identification                                                                                                                              |  |
| Instrument<br>Meßgerät                                                              |  | Instrument<br>Measuring instrument                                                                                                                             |  |
| Hersteller<br>Manufacturer                                                          |  | Hersteller<br>Manufacturer                                                                                                                                     |  |
| Typ<br>Type                                                                         |  | Typ<br>Type                                                                                                                                                    |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
| Wert<br>Value                                                                       |  | Wert<br>Value                                                                                                                                                  |  |
| Maßzahl/Größe<br>Measured quantity                                                  |  | Maßzahl/Größe<br>Measured quantity                                                                                                                             |  |
|                                                                                     |  |                                                                                                                                                                |  |

# Kögel Werkstoff- und Materialprüfsysteme GmbH

|         |
|---------|
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| 2301010 |
| 001010  |

## 1. Werkstoffprüfung

### Einzelne Probeprüfung

Messgerät für die DIN EN ISO 2287-1 und für die Normenreihe Messung

Einzel-Züge, Messung der Zugfestigkeitsgrenze mit der Messungsbühne Modell 1000, Messung, Messwertumrechnung ISO 2287-1 und ISO 2287-2 für die Normenreihe Messung

Einzel-Züge, Messung der Streckgrenze (Strecke) mit der Messungsbühne Modell 1000

Messungsbühne (Messung der Zugfestigkeitsgrenze)

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze)

Messungsbühne (Messung der Streckgrenze)

Messungsbühne (Messung der Zugfestigkeitsgrenze)

Messungsbühne (Messung der Streckgrenze)

Messungsbühne (Messung der Zugfestigkeitsgrenze)

Messungsbühne (Messung der Streckgrenze)

Messungsbühne (Messung der Zugfestigkeitsgrenze)

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Messungsbühne (Messung der Zugfestigkeitsgrenze)

Messungsbühne (Messung der Streckgrenze)

Messungsbühne (Messung der Zugfestigkeitsgrenze)

Messungsbühne (Messung der Streckgrenze)

## 2. Temperaturprüfungen

### Temperaturprüfungen

Messungsbühne (Messung der Zugfestigkeitsgrenze) 7,5 °C

Messungsbühne (Messung der Streckgrenze) 1,5 °C

## 3. Messungsbühne

### Messungsbühne

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

Messungsbühne (Messung der Zugfestigkeitsgrenze) 0,2 mm/s

Messungsbühne (Messung der Streckgrenze) 0,2 mm/s

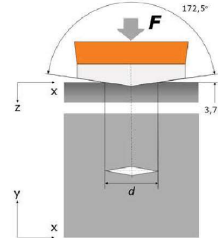
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# Knoop Test Method

## Knoop EN ISO 4545

$$HK = \text{Constant} \times \frac{\text{Testforce } F}{\text{surface of indentation}}$$

$$HK = 0,102 \times \frac{2F \tan(\alpha/2)}{d(\beta/\tan)} = 1,451 \times \frac{F}{d^2}$$

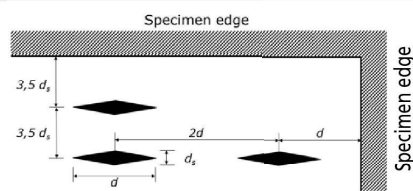


### Distance between indentations (centre)

- > Long side  $\bar{d}$ : Minimum distance 2,0x indentation diagonal  $d$
- > Short side  $\bar{d}_s$ : Minimum distance 3,5x indentation diagonal  $d_s$

### Distance from centre of indentation to specimen edge

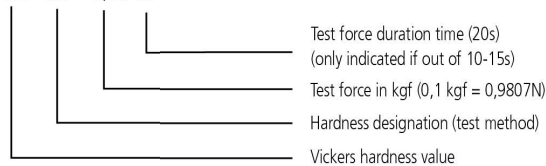
- > Long side  $\bar{d}$ : Minimum distance 1,0x indentation diagonal  $d$
- > Short side  $\bar{d}_s$ : Minimum distance 3,5x indentation diagonal  $d_s$



Knoop hardness test

| Hardness symbol | Nominal value of the test force F<br>N | Application range                                                                                                                                         |
|-----------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| HK 0,001        | 0,009807                               | Microstructure, very thin layers of material,<br>ceramic materials, glass (especially HK0,1)<br>surface hardness, hardening depth CHD NHD:<br>HK0,1 - HK2 |
| HK 0,002        | 0,01961                                |                                                                                                                                                           |
| HK 0,005        | 0,04903                                |                                                                                                                                                           |
| HK 0,005        | 0,04903                                |                                                                                                                                                           |
| HK 0,01         | 0,09807                                |                                                                                                                                                           |
| HV 0,02         | 0,1961                                 |                                                                                                                                                           |
| HK 0,025        | 0,2452                                 |                                                                                                                                                           |
| HK 0,05         | 0,4903                                 |                                                                                                                                                           |
| HK 0,1          | 0,9807                                 |                                                                                                                                                           |
| HK 0,2          | 1,961                                  |                                                                                                                                                           |
| HK 0,3          | 2,942                                  |                                                                                                                                                           |
| HK 0,5          | 4,903                                  |                                                                                                                                                           |
| HK 1            | 9,807                                  |                                                                                                                                                           |
| HK 2            | 19,61                                  |                                                                                                                                                           |

620 HK 0,1 / 20



| Hardness of the calibrated<br>reference material $H_{CRM}$ | Maximum permissible relative HK repeatability<br>of the testing machine $r_{rel} \%HK$ |                      |
|------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------|
|                                                            | HK 0,5 to HK 2                                                                         | HK 0,001 to < HK 0,5 |
| $100 \leq HK \leq 250$                                     | 16.0 %                                                                                 | 18.0 %               |
| $250 < HK \leq 650$                                        | 10.0 %                                                                                 | 10.0 %               |
| $HK > 650$                                                 | 8.0 %                                                                                  | 8.0 %                |
| Mean diagonal length<br>$\bar{d}$<br>mm                    | Maximum permissible error $HKb_{rel}$<br>of the testing machine<br>$\pm \%HK$          |                      |
| $0,02 \leq \bar{d} < 0,06$                                 | $0,24 / \leq \bar{d}$                                                                  |                      |
| $0,06 \leq \bar{d}$                                        | 4                                                                                      |                      |

$$\bar{d} = \frac{(d_1 + d_2 + d_3 + d_4 + d_5)}{5}$$



## KNOOP MICRO

### ISO 4545-3, ASTM E92 (option)

Dimensions: 30x30x6mm

|         |     |     |     |     |     |     |     |     |  |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|--|
| HK0,005 | 250 | 300 | 400 | 500 |     |     |     |     |  |
| HK0,01  | 250 | 300 | 400 | 500 | 600 |     |     |     |  |
| HK0,015 | 250 | 300 | 400 | 500 | 600 | 700 |     |     |  |
| HK0,025 | 250 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |  |
| HK0,03  | 250 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |  |
| HK0,05  | 250 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |  |
| HK0,1   | 250 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |  |
| HK0,2   | 250 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |  |
| HK0,3   | 250 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |  |
| HK0,5   | 250 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |  |
| HK1     | 250 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |  |
| HK2     | 250 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |  |

Aluminium

Steel

Values indicated in orange are outside the 20µm limit of ISO 4545 and are exclusively supplied with ASTM E92 calibration certificates.

Optional availability:

- calibration of up to 3 test scales on one test block
- calibration according to ASTM E92
- lasered grid for accurate indentation spacing

| Order no. | Value | Scale   | Test method | Preliminary Test Force |       | Standard   |          | Grid | Calibration | Dimension | Material |
|-----------|-------|---------|-------------|------------------------|-------|------------|----------|------|-------------|-----------|----------|
|           |       |         |             | N                      | kgf   | ISO        | ASTM     |      |             |           |          |
| HK0,005   |       |         |             |                        |       |            |          |      |             |           |          |
| 63ETB943  | 250   | HK0,005 | Knoop       | 0,04903                | 0,005 |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB944  | 300   | HK0,005 | Knoop       | 0,04903                | 0,005 |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB945  | 400   | HK0,005 | Knoop       | 0,04903                | 0,005 |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB1212 | 500   | HK0,005 | Knoop       | 0,04903                | 0,005 |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| HK0,01    |       |         |             |                        |       |            |          |      |             |           |          |
| 63ETB951  | 250   | HK0,01  | Knoop       | 0,09807                | 0,01  |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB952  | 300   | HK0,01  | Knoop       | 0,09807                | 0,01  |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB953  | 400   | HK0,01  | Knoop       | 0,09807                | 0,01  |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB1213 | 500   | HK0,01  | Knoop       | 0,09807                | 0,01  |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB956  | 600   | HK0,01  | Knoop       | 0,09807                | 0,01  |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| HK0,015   |       |         |             |                        |       |            |          |      |             |           |          |
| 63ETB959  | 250   | HK0,015 | Knoop       | 0,1471                 | 0,015 | ISO 4545-3 |          |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB960  | 300   | HK0,015 | Knoop       | 0,1471                 | 0,015 | ISO 4545-3 |          |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB961  | 400   | HK0,015 | Knoop       | 0,1471                 | 0,015 | ISO 4545-3 |          |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB1214 | 500   | HK0,015 | Knoop       | 0,1471                 | 0,015 | ISO 4545-3 |          |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB964  | 600   | HK0,015 | Knoop       | 0,1471                 | 0,015 |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |
| 63ETB965  | 700   | HK0,015 | Knoop       | 0,1471                 | 0,015 |            | ASTM E92 |      | DAkkS       | 30x30x6mm | steel    |

|           |       |         |             | Preliminary Test Force |       | Standard   |          |      |             |           |          |
|-----------|-------|---------|-------------|------------------------|-------|------------|----------|------|-------------|-----------|----------|
| Order no. | Value | Scale   | Test method | N                      | kgf   | ISO        | ASTM     | Grid | Calibration | Dimension | Material |
| HK0,025   |       |         |             |                        |       |            |          |      |             |           |          |
| 63ETB967  | 250   | HK0,025 | Knoop       | 0.2452                 | 0.025 | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB968  | 300   | HK0,025 | Knoop       | 0.2452                 | 0.025 | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB969  | 400   | HK0,025 | Knoop       | 0.2452                 | 0.025 | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1216 | 500   | HK0,025 | Knoop       | 0.2452                 | 0.025 | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB972  | 600   | HK0,025 | Knoop       | 0.2452                 | 0.025 | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB973  | 700   | HK0,025 | Knoop       | 0.2452                 | 0.025 | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1217 | 800   | HK0,025 | Knoop       | 0.2452                 | 0.025 | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1218 | 900   | HK0,025 | Knoop       | 0.2452                 | 0.025 |            | ASTM E92 |      | DAkKS       | 30x30x6mm | steel    |
| HK0,03    |       |         |             |                        |       |            |          |      |             |           |          |
| 63ETB1227 | 250   | HK0,03  | Knoop       | 0.2942                 | 0.03  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1228 | 300   | HK0,03  | Knoop       | 0.2942                 | 0.03  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1229 | 400   | HK0,03  | Knoop       | 0.2942                 | 0.03  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1230 | 500   | HK0,03  | Knoop       | 0.2942                 | 0.03  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1231 | 600   | HK0,03  | Knoop       | 0.2942                 | 0.03  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1232 | 700   | HK0,03  | Knoop       | 0.2942                 | 0.03  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1233 | 800   | HK0,03  | Knoop       | 0.2942                 | 0.03  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1234 | 900   | HK0,03  | Knoop       | 0.2942                 | 0.03  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| HK0,05    |       |         |             |                        |       |            |          |      |             |           |          |
| 63ETB975  | 250   | HK0,05  | Knoop       | 0.4903                 | 0.05  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB976  | 300   | HK0,05  | Knoop       | 0.4903                 | 0.05  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB977  | 400   | HK0,05  | Knoop       | 0.4903                 | 0.05  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1219 | 500   | HK0,05  | Knoop       | 0.4903                 | 0.05  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB980  | 600   | HK0,05  | Knoop       | 0.4903                 | 0.05  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB981  | 700   | HK0,05  | Knoop       | 0.4903                 | 0.05  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1220 | 800   | HK0,05  | Knoop       | 0.4903                 | 0.05  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1221 | 900   | HK0,05  | Knoop       | 0.4903                 | 0.05  | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| HK0,1     |       |         |             |                        |       |            |          |      |             |           |          |
| 63ETB984  | 250   | HK0,1   | Knoop       | 0.9807                 | 0.1   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB985  | 300   | HK0,1   | Knoop       | 0.9807                 | 0.1   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB986  | 400   | HK0,1   | Knoop       | 0.9807                 | 0.1   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1222 | 500   | HK0,1   | Knoop       | 0.9807                 | 0.1   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB989  | 600   | HK0,1   | Knoop       | 0.9807                 | 0.1   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB990  | 700   | HK0,1   | Knoop       | 0.9807                 | 0.1   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1223 | 800   | HK0,1   | Knoop       | 0.9807                 | 0.1   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1224 | 900   | HK0,1   | Knoop       | 0.9807                 | 0.1   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| HK0,2     |       |         |             |                        |       |            |          |      |             |           |          |
| 63ETB862  | 300   | HK0,2   | Knoop       | 1.961                  | 0.2   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB993  | 250   | HK0,2   | Knoop       | 1.961                  | 0.2   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB994  | 400   | HK0,2   | Knoop       | 1.961                  | 0.2   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1235 | 500   | HK0,2   | Knoop       | 1.961                  | 0.2   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB997  | 600   | HK0,2   | Knoop       | 1.961                  | 0.2   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB998  | 700   | HK0,2   | Knoop       | 1.961                  | 0.2   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1225 | 800   | HK0,2   | Knoop       | 1.961                  | 0.2   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1226 | 900   | HK0,2   | Knoop       | 1.961                  | 0.2   | ISO 4545-3 |          |      | DAkKS       | 30x30x6mm | steel    |



|           |       |       |             | Preliminary Test Force |     | Standard   |      |      |             |           |          |
|-----------|-------|-------|-------------|------------------------|-----|------------|------|------|-------------|-----------|----------|
| Order no. | Value | Scale | Test method | N                      | kgf | ISO        | ASTM | Grid | Calibration | Dimension | Material |
| HK0,3     |       |       |             |                        |     |            |      |      |             |           |          |
| 63ETB564  | 250   | HK0,3 | Knoop       | 2.942                  | 0.3 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB565  | 300   | HK0,3 | Knoop       | 2.942                  | 0.3 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB566  | 400   | HK0,3 | Knoop       | 2.942                  | 0.3 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1207 | 500   | HK0,3 | Knoop       | 2.942                  | 0.3 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB569  | 600   | HK0,3 | Knoop       | 2.942                  | 0.3 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB570  | 700   | HK0,3 | Knoop       | 2.942                  | 0.3 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1208 | 800   | HK0,3 | Knoop       | 2.942                  | 0.3 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1209 | 900   | HK0,3 | Knoop       | 2.942                  | 0.3 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| HK0,5     |       |       |             |                        |     |            |      |      |             |           |          |
| 63ETB465  | 250   | HK0,5 | Knoop       | 4.903                  | 0.5 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB466  | 300   | HK0,5 | Knoop       | 4.903                  | 0.5 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB467  | 400   | HK0,5 | Knoop       | 4.903                  | 0.5 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1200 | 500   | HK0,5 | Knoop       | 4.903                  | 0.5 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB470  | 600   | HK0,5 | Knoop       | 4.903                  | 0.5 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB471  | 700   | HK0,5 | Knoop       | 4.903                  | 0.5 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1201 | 800   | HK0,5 | Knoop       | 4.903                  | 0.5 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1202 | 900   | HK0,5 | Knoop       | 4.903                  | 0.5 | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| HK1       |       |       |             |                        |     |            |      |      |             |           |          |
| 63ETB474  | 250   | HK1   | Knoop       | 9.807                  | 1   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB475  | 300   | HK1   | Knoop       | 9.807                  | 1   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB476  | 400   | HK1   | Knoop       | 9.807                  | 1   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1203 | 500   | HK1   | Knoop       | 9.807                  | 1   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB479  | 600   | HK1   | Knoop       | 9.807                  | 1   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB494  | 700   | HK1   | Knoop       | 9.807                  | 1   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1204 | 800   | HK1   | Knoop       | 9.807                  | 1   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1205 | 900   | HK1   | Knoop       | 9.807                  | 1   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| HK2       |       |       |             |                        |     |            |      |      |             |           |          |
| 63ETB512  | 250   | HK2   | Knoop       | 19.61                  | 2   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB513  | 300   | HK2   | Knoop       | 19.61                  | 2   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB529  | 400   | HK2   | Knoop       | 19.61                  | 2   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1206 | 500   | HK2   | Knoop       | 19.61                  | 2   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB547  | 600   | HK2   | Knoop       | 19.61                  | 2   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB593  | 700   | HK2   | Knoop       | 19.61                  | 2   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1210 | 800   | HK2   | Knoop       | 19.61                  | 2   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |
| 63ETB1211 | 900   | HK2   | Knoop       | 19.61                  | 2   | ISO 4545-3 |      |      | DAkKS       | 30x30x6mm | steel    |



# Carbide Reference Materials Knoop

## KNOOP

### ISO 4545-3, ASTM E92 (option)

### Dimensions: 45x35x8mm

|          |      |      |      |      |      |
|----------|------|------|------|------|------|
| HK 0,005 | 1300 | 1400 |      |      |      |
| HK 0,1   | 1300 | 1400 | 1600 | 1700 | 2100 |
| HK 0,2   | 1300 | 1400 | 1600 | 1700 | 2100 |
| HK 0,3   | 1300 | 1400 | 1600 | 1700 | 2100 |
| HK 0,5   | 1300 | 1400 | 1600 | 1700 | 2100 |
| HK 1     | 1300 | 1400 | 1600 | 1700 | 2100 |
| HK 2     | 1300 | 1400 | 1600 | 1700 | 2100 |

Carbide

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

Optional availability:

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

| Order no. | Value | Scale  | Test method | Preliminary Test Force |      | Standard   |      | Grid | Calibration | Dimension | Material |
|-----------|-------|--------|-------------|------------------------|------|------------|------|------|-------------|-----------|----------|
|           |       |        |             | N                      | kgf  | ISO        | ASTM |      |             |           |          |
| HK0,05    |       |        |             |                        |      |            |      |      |             |           |          |
| 63CTB051  | 1300  | HK0,05 | Knoop       | 0.4903                 | 0.05 | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB052  | 1400  | HK0,05 | Knoop       | 0.4903                 | 0.05 | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HK0,1     |       |        |             |                        |      |            |      |      |             |           |          |
| 63CTB053  | 1300  | HK0,1  | Knoop       | 0.9807                 | 0.1  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB054  | 1400  | HK0,1  | Knoop       | 0.9807                 | 0.1  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB055  | 1600  | HK0,1  | Knoop       | 0.9807                 | 0.1  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB056  | 1700  | HK0,1  | Knoop       | 0.9807                 | 0.1  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB057  | 2100  | HK0,1  | Knoop       | 0.9807                 | 0.1  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HK0,2     |       |        |             |                        |      |            |      |      |             |           |          |
| 63CTB058  | 1300  | HK0,2  | Knoop       | 1.961                  | 0.2  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB059  | 1400  | HK0,2  | Knoop       | 1.961                  | 0.2  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB060  | 1600  | HK0,2  | Knoop       | 1.961                  | 0.2  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB061  | 1700  | HK0,2  | Knoop       | 1.961                  | 0.2  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB062  | 2100  | HK0,2  | Knoop       | 1.961                  | 0.2  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HK0,3     |       |        |             |                        |      |            |      |      |             |           |          |
| 63CTB063  | 1300  | HK0,3  | Knoop       | 2.942                  | 0.3  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB064  | 1400  | HK0,3  | Knoop       | 2.942                  | 0.3  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB065  | 1600  | HK0,3  | Knoop       | 2.942                  | 0.3  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB066  | 1700  | HK0,3  | Knoop       | 2.942                  | 0.3  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB067  | 2100  | HK0,3  | Knoop       | 2.942                  | 0.3  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HK0,5     |       |        |             |                        |      |            |      |      |             |           |          |
| 63CTB068  | 1300  | HK0,5  | Knoop       | 4.903                  | 0.5  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB069  | 1400  | HK0,5  | Knoop       | 4.903                  | 0.5  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB070  | 1600  | HK0,5  | Knoop       | 4.903                  | 0.5  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB071  | 1700  | HK0,5  | Knoop       | 4.903                  | 0.5  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB072  | 2100  | HK0,5  | Knoop       | 4.903                  | 0.5  | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HK1       |       |        |             |                        |      |            |      |      |             |           |          |
| 63CTB073  | 1300  | HK1    | Knoop       | 9.807                  | 1    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB074  | 1400  | HK1    | Knoop       | 9.807                  | 1    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB075  | 1600  | HK1    | Knoop       | 9.807                  | 1    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB076  | 1700  | HK1    | Knoop       | 9.807                  | 1    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB077  | 2100  | HK1    | Knoop       | 9.807                  | 1    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| HK2       |       |        |             |                        |      |            |      |      |             |           |          |
| 63CTB078  | 1300  | HK2    | Knoop       | 19.61                  | 2    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB079  | 1400  | HK2    | Knoop       | 19.61                  | 2    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB080  | 1600  | HK2    | Knoop       | 19.61                  | 2    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB081  | 1700  | HK2    | Knoop       | 19.61                  | 2    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |
| 63CTB082  | 2100  | HK2    | Knoop       | 19.61                  | 2    | ISO 4545-3 |      |      | DAkKS       | 45x35x8mm | carbide  |

# Brinell Test Method

## Brinell EN ISO 6506

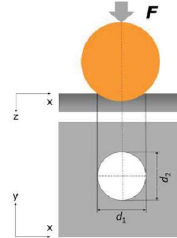
### Test Method

$$HBW = \text{constant} \times \frac{\text{Testforce } F}{\text{surface of indentation}}$$

$$HBW = 0,102 \times \frac{\text{Testforce } F}{\pi D^2 (1 - \sqrt{1 - d^2/D^2})}$$

$$d = \frac{d_1 - d_2}{2} \text{ mean indentation diameter}$$

D = ball diameter



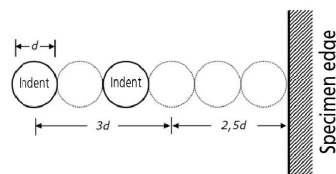
### Minimum Distance

Distance between indentations

> 3x indentation diameter

Distance from edge

> 2,5x indentation diameter



### Scales and Application

| Hardness symbol Brinell scales | Ball diameter D mm | Test force F N | Force-area index 0,102 x F/D <sup>2</sup> | HBW Hardness as in ISO 6506-4 | Material/Range as recommended in ISO 6506-1                                                              |
|--------------------------------|--------------------|----------------|-------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------|
| HBW 1/30                       | 1                  | 294,2          | 30                                        | 95,5 - 653,8 HBW              | Steel<br>Nickel and Titanium alloys<br>Cast iron >140HBW<br>Copper alloys >200HBW                        |
| HBW 2,5/187,5                  | 2,5                | 1839           |                                           |                               |                                                                                                          |
| HBW 5/750                      | 5                  | 7355           |                                           |                               |                                                                                                          |
| HBW 10/3000                    | 10                 | 29420          |                                           |                               |                                                                                                          |
| HBW 10/1500                    | 10                 | 14710          | 15                                        | 47,77 - 326,9 HBW             | Light metals and their alloys                                                                            |
| HBW 1/10                       | 1                  | 98,07          | 10                                        | 31,85 - 217,8 HBW             | Cast iron <140HBW<br>Copper and copper alloys 35 - 200 HBW<br>Light metals and their alloys 35 - 200 HBW |
| HBW 2,5/62,5                   | 2,5                | 612,9          |                                           |                               |                                                                                                          |
| HBW 5/250                      | 5                  | 2452           |                                           |                               |                                                                                                          |
| HBW 10/1000                    | 10                 | 9807           |                                           |                               |                                                                                                          |
| HBW 1/5                        | 1                  | 49,03          | 5                                         | 15,92 - 109 HBW               | Copper and copper alloys <35 HBW<br>Light metals and their alloys 35 - 80 HBW                            |
| HBW 2,5/31,25                  | 2,5                | 306,5          |                                           |                               |                                                                                                          |
| HBW 5/125                      | 5                  | 1226           |                                           |                               |                                                                                                          |
| HBW 10/500                     | 10                 | 4903           |                                           |                               |                                                                                                          |
| HBW 1/2,5                      | 1                  | 24,52          | 2,5                                       | 7,96 - 54,48 HBW              | Light metals                                                                                             |
| HBW 2,5/15,625                 | 2,5                | 153,2          |                                           |                               |                                                                                                          |
| HBW 5/62,5                     | 5                  | 612,9          |                                           |                               |                                                                                                          |
| HBW 10/250                     | 10                 | 2452           |                                           |                               |                                                                                                          |
| HBW 1/1                        | 1                  | 9,807          | 1                                         | 3,18 - 21,79 HBW              | Lead<br>Tin                                                                                              |
| HBW 2,5/6,25                   | 2,5                | 61,29          |                                           |                               |                                                                                                          |
| HBW 5/25                       | 5                  | 245,2          |                                           |                               |                                                                                                          |
| HBW 10/100                     | 10                 | 980,7          |                                           |                               |                                                                                                          |

### Designation of test results

360 HBW 2,5 187,5 / 20

Test force duration time (20s)  
(only indicated if out of 10-15s)

Test force in kgf (187,5 kgf = 1839N)

Ball diameter, in mm

Hardness designation (test method)

Brinell hardness value

### MPE and repeatability

| Hardness of the calibrated reference material H <sub>c</sub> |                                   |                      | Permissible repeatability of the testing machine (r <sub>rel</sub> ) % | permissible error E <sub>rel</sub> of the testing machine ± % |
|--------------------------------------------------------------|-----------------------------------|----------------------|------------------------------------------------------------------------|---------------------------------------------------------------|
| Force-area index 30                                          |                                   |                      |                                                                        |                                                               |
| < 250 HBW                                                    |                                   |                      | 3                                                                      | ± 3,0                                                         |
| 250 HBW ≤ H <sub>c</sub> ≤ 450 HBW                           |                                   |                      | 2,5                                                                    | ± 2,5                                                         |
| > 450 HBW                                                    |                                   |                      | 2                                                                      | ± 2,0                                                         |
| Force-area index 10                                          | Force-area index 5                | Force-area index 2,5 |                                                                        |                                                               |
| < 100HBW                                                     | < 70HBW                           | < 70HBW              | 3                                                                      | ± 3,0                                                         |
| 100 HBW ≤ H <sub>c</sub> ≤ 200HBW                            | 70 HBW ≤ H <sub>c</sub> ≤ 100 HBW | N/A                  | 3                                                                      | ± 3,0                                                         |
| > 200 HBW                                                    | > 100 HBW                         | N/A                  | 3                                                                      | ± 3,0                                                         |



| BRINELL                       |    |     |     |     |     |                        |     |     |     |     |     |     |     |
|-------------------------------|----|-----|-----|-----|-----|------------------------|-----|-----|-----|-----|-----|-----|-----|
| ISO 6506-3, ASTM E10 (option) |    |     |     |     |     | Dimensions: 60x60x16mm |     |     |     |     |     |     |     |
| HBW 1/2,5                     | 80 |     |     |     |     |                        |     |     |     |     |     |     |     |
| HBW 1/5                       | 80 | 110 | 130 |     |     |                        |     |     |     |     |     |     |     |
| HBW 1/10                      | 80 | 110 | 130 | 170 | 200 | 250                    |     |     |     |     |     |     |     |
| HBW 1/30                      |    | 110 | 130 | 170 | 200 | 250                    | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
| HBW 2,5/15,625                | 80 |     |     |     |     |                        |     |     |     |     |     |     |     |
| HBW 2,5/31,25                 | 80 | 110 | 130 |     |     |                        |     |     |     |     |     |     |     |
| HBW 2,5/62,5                  | 80 | 110 | 130 | 170 | 200 | 250                    |     |     |     |     |     |     |     |
| HBW 2,5/187,5                 |    | 110 | 130 | 170 | 200 | 250                    | 300 | 350 | 400 | 450 | 500 | 550 | 600 |
| Aluminium                     |    |     |     |     |     | Steel                  |     |     |     |     |     |     |     |

Tolerance of nominal value  $\pm 25\text{HBW}$

Optional availability:

- calibration of up to 3 test scales on one test block
- lasered grid for accurate indentation spacing

| Order no. | Nominal Value | Scale     | Test method | Test Force |     | Force Area Ratio | Standard   |          | Calibration | Grid | Dimension  | Material  |
|-----------|---------------|-----------|-------------|------------|-----|------------------|------------|----------|-------------|------|------------|-----------|
|           |               |           |             | N          | kgf |                  | ISO        | ASTM     |             |      |            |           |
| HBW 1/2,5 |               |           |             |            |     |                  |            |          |             |      |            |           |
| 63ETB196  | 80            | HBW 1/2,5 | Brinell     | 24,52      | 2,5 | 2,5              | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | aluminium |
| HBW 1/5   |               |           |             |            |     |                  |            |          |             |      |            |           |
| 63ETB210  | 80            | HBW 1/5   | Brinell     | 49,03      | 5   | 5                | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB210D | 80            | HBW 1/5   | Brinell     | 49,03      | 5   | 5                | ISO 6506-3 | ASTM E10 | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB211  | 110           | HBW 1/5   | Brinell     | 49,03      | 5   | 5                | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB211D | 110           | HBW 1/5   | Brinell     | 49,03      | 5   | 5                | ISO 6506-3 | ASTM E10 | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB212  | 130           | HBW 1/5   | Brinell     | 49,03      | 5   | 5                | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | aluminium |
| HBW 1/10  |               |           |             |            |     |                  |            |          |             |      |            |           |
| 63ETB224  | 80            | HBW 1/10  | Brinell     | 9,807      | 1   | 10               | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB224D | 80            | HBW 1/10  | Brinell     | 9,807      | 1   | 10               | ISO 6506-3 | ASTM E10 | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB225  | 110           | HBW 1/10  | Brinell     | 9,807      | 1   | 10               | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB226  | 130           | HBW 1/10  | Brinell     | 9,807      | 1   | 10               | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB226D | 130           | HBW 1/10  | Brinell     | 9,807      | 1   | 10               | ISO 6506-3 | ASTM E10 | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB227  | 170           | HBW 1/10  | Brinell     | 9,807      | 1   | 10               | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | aluminium |
| 63ETB228  | 200           | HBW 1/10  | Brinell     | 9,807      | 1   | 10               | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | steel     |
| 63ETB228D | 200           | HBW 1/10  | Brinell     | 9,807      | 1   | 10               | ISO 6506-3 | ASTM E10 | DAkkS       |      | 60x60x16mm | steel     |
| 63ETB229  | 250           | HBW 1/10  | Brinell     | 9,807      | 1   | 10               | ISO 6506-3 |          | DAkkS       |      | 60x60x16mm | steel     |



|                |               |                |             | Test Force |        |                  | Standard   |          |             |      |            |           |
|----------------|---------------|----------------|-------------|------------|--------|------------------|------------|----------|-------------|------|------------|-----------|
| Order no.      | Nominal Value | Scale          | Test method | N          | kgf    | Force Area Ratio | ISO        | ASTM     | Calibration | Grid | Dimension  | Material  |
| HBW 1/30       |               |                |             |            |        |                  |            |          |             |      |            |           |
| 63ETB239       | 110           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | aluminium |
| 63ETB240       | 130           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | aluminium |
| 63ETB241       | 170           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | aluminium |
| 63ETB242       | 200           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB242D      | 200           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 | ASTM E10 | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB243       | 250           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB244       | 300           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB245       | 350           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB245D      | 450           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 | ASTM E10 | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB246       | 400           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB247       | 450           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB248       | 500           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB249       | 550           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB250       | 600           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB250D      | 600           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 | ASTM E10 | DAkKS       |      | 60x60x16mm | steel     |
| 63ETB251       | 650           | HBW 1/30       | Brinell     | 294.2      | 30     | 30               | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | steel     |
| HBW 2,5/15,625 |               |                |             |            |        |                  |            |          |             |      |            |           |
| 63ETB267       | 80            | HBW 2,5/15,625 | Brinell     | 153.2      | 15,625 | 2.5              | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | aluminium |
| HBW 2,5/31,25  |               |                |             |            |        |                  |            |          |             |      |            |           |
| 63ETB282       | 80            | HBW 2,5/31,25  | Brinell     | 306.5      | 31.25  | 5                | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | aluminium |
| 63ETB282D      | 80            | HBW 2,5/31,25  | Brinell     | 306.5      | 31.25  | 5                | ISO 6506-3 | ASTM E10 | DAkKS       |      | 60x60x16mm | aluminium |
| 63ETB283       | 110           | HBW 2,5/31,25  | Brinell     | 306.5      | 31.25  | 5                | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | aluminium |
| 63ETB283D      | 110           | HBW 2,5/31,25  | Brinell     | 306.5      | 31.25  | 5                | ISO 6506-3 | ASTM E10 | DAkKS       |      | 60x60x16mm | aluminium |
| 63ETB285       | 130           | HBW 2,5/31,25  | Brinell     | 306.5      | 31.25  | 5                | ISO 6506-3 |          | DAkKS       |      | 60x60x16mm | aluminium |

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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                           |                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Kögel Workstoff- und Materialsysteme GmbH</b><br>amtschiffstr. 1<br>42699 Solingen<br>phone: +49 212 33 50 00<br>fax: +49 212 33 50 10 | beauftragte Stelle:<br>Hg- und Alu-Produktion                                                                                                                                                                                                                              |
| akkreditiert durch die / zugeordnet für die                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                           |                                                                                                                                                                                                                                                                            |
| <b>Deutsche Akkreditierungsgesellschaft mbH</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                           |                                                                                                                                                                                                                                                                            |
| als <b>Kalibrierlabor</b> für die im <b>nationalen Laborverzeichnis</b> für die                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                           |                                                                                                                                                                                                                                                                            |
| <b>Deutschen Kalibrierdienst</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                           |                                                                                                                                                                                                                                                                            |
| <div style="display: flex; justify-content: space-around;">    </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                           |                                                                                                                                                                                                                                                                            |
| <div style="display: flex; justify-content: space-between;"> <div> <b>Kalibrierbereich:</b><br/>           Gasanalyseverf.         </div> <div> <b>Akkreditierungsnr.:</b><br/>           13388<br/>           2017         </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                           |                                                                                                                                                                                                                                                                            |
| <b>Gegenstand</b><br>des Kalibrierens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>messungstechnische</b><br>Verfahren                                                                                                    | Diese Kalibrierungsumgebung ist<br>ausschließlich zur Messung von<br>der Messgröße der Gasanalyseverf.<br>des Messgeräts der Gasanalyseverf.<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung |
| <b>Hersteller</b><br>des Messgeräts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>21 090</b>                                                                                                                             | Diese Kalibrierungsumgebung ist<br>ausschließlich zur Messung von<br>der Messgröße der Gasanalyseverf.<br>des Messgeräts der Gasanalyseverf.<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung |
| <b>Typ</b><br>des Messgeräts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Reinhold AGC</b>                                                                                                                       | Diese Kalibrierungsumgebung ist<br>ausschließlich zur Messung von<br>der Messgröße der Gasanalyseverf.<br>des Messgeräts der Gasanalyseverf.<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung |
| <b>Identifizierung</b><br>des Messgeräts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>1238</b>                                                                                                                               | Diese Kalibrierungsumgebung ist<br>ausschließlich zur Messung von<br>der Messgröße der Gasanalyseverf.<br>des Messgeräts der Gasanalyseverf.<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung |
| <b>Auftraggeber</b><br>des Kalibrierens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>13064</b>                                                                                                                              | Diese Kalibrierungsumgebung ist<br>ausschließlich zur Messung von<br>der Messgröße der Gasanalyseverf.<br>des Messgeräts der Gasanalyseverf.<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung |
| <b>Auftraggeber</b><br>des Kalibrierens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>2</b>                                                                                                                                  | Diese Kalibrierungsumgebung ist<br>ausschließlich zur Messung von<br>der Messgröße der Gasanalyseverf.<br>des Messgeräts der Gasanalyseverf.<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung |
| <b>Anzahl der Stellen des Kalibrierbereichs</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>2</b>                                                                                                                                  | Diese Kalibrierungsumgebung ist<br>ausschließlich zur Messung von<br>der Messgröße der Gasanalyseverf.<br>des Messgeräts der Gasanalyseverf.<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung |
| <b>Datum der Kalibrierung</b><br>des Kalibrierbereichs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>08.04.2017</b>                                                                                                                         | Diese Kalibrierungsumgebung ist<br>ausschließlich zur Messung von<br>der Messgröße der Gasanalyseverf.<br>des Messgeräts der Gasanalyseverf.<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung<br>(Gasanalyseverf.) für die Kalibrierung |
| Diese Kalibrierungsumgebung ist ausschließlich zur Messung von der Messgröße der Gasanalyseverf. des Messgeräts der Gasanalyseverf. (Gasanalyseverf.) für die Kalibrierung (Gasanalyseverf.) für die Kalibrierung (Gasanalyseverf.) für die Kalibrierung. Diese Kalibrierungsumgebung ist ausschließlich zur Messung von der Messgröße der Gasanalyseverf. des Messgeräts der Gasanalyseverf. (Gasanalyseverf.) für die Kalibrierung (Gasanalyseverf.) für die Kalibrierung (Gasanalyseverf.) für die Kalibrierung. Diese Kalibrierungsumgebung ist ausschließlich zur Messung von der Messgröße der Gasanalyseverf. des Messgeräts der Gasanalyseverf. (Gasanalyseverf.) für die Kalibrierung (Gasanalyseverf.) für die Kalibrierung (Gasanalyseverf.) für die Kalibrierung. |                                                                                                                                           |                                                                                                                                                                                                                                                                            |
| <b>Zeichn.</b><br>des Kalibrierbereichs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Zeichn. des Kalibrierbereichs</b><br>des Kalibrierbereichs                                                                             | <b>Zeichn.</b><br>des Kalibrierbereichs                                                                                                                                                                                                                                    |
| <div style="display: flex; justify-content: space-around;"> <div>  </div> <div>  </div> <div>  </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                           |                                                                                                                                                                                                                                                                            |
| <div style="display: flex; justify-content: space-around;"> <div> <b>Zeichn.</b><br/>           des Kalibrierbereichs         </div> <div> <b>Zeichn.</b><br/>           des Kalibrierbereichs         </div> <div> <b>Zeichn.</b><br/>           des Kalibrierbereichs         </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                           |                                                                                                                                                                                                                                                                            |

[illegible]



| Order no.     | Nominal Value | Scale         | Test method | Test Force |       | Force Area Ratio | Standard   |          | Calibration | Grid | Dimension  | Material  |
|---------------|---------------|---------------|-------------|------------|-------|------------------|------------|----------|-------------|------|------------|-----------|
|               |               |               |             | N          | kgf   |                  | ISO        | ASTM     |             |      |            |           |
| HBW 2,5/62,5  |               |               |             |            |       |                  |            |          |             |      |            |           |
| 63ETB299      | 80            | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB299D     | 80            | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 | ASTM E10 | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB299G     | 80            | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        | Grid | 60x60x16mm | aluminium |
| 63ETB301      | 110           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB301G     | 110           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        | Grid | 60x60x16mm | aluminium |
| 63ETB302      | 130           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB302D     | 130           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 | ASTM E10 | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB302G     | 130           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        | Grid | 60x60x16mm | aluminium |
| 63ETB303      | 170           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB303G     | 170           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        | Grid | 60x60x16mm | aluminium |
| 63ETB304      | 200           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB304D     | 200           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 | ASTM E10 | DAkS        |      | 60x60x16mm | steel     |
| 63ETB305      | 250           | HBW 2,5/62,5  | Brinell     | 612.9      | 62.5  | 10               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| HBW 2,5/187,5 |               |               |             |            |       |                  |            |          |             |      |            |           |
| 63ETB315      | 110           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB316      | 130           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB317      | 170           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB318      | 200           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB318D     | 200           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 | ASTM E10 | DAkS        |      | 60x60x16mm | steel     |
| 63ETB318G     | 200           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        | Grid | 60x60x16mm | steel     |
| 63ETB319      | 250           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB320      | 300           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB320G     | 300           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        | Grid | 60x60x16mm | steel     |
| 63ETB321      | 350           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB321D     | 350           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 | ASTM E10 | DAkS        |      | 60x60x16mm | steel     |
| 63ETB322      | 400           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB322G     | 400           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        | Grid | 60x60x16mm | steel     |
| 63ETB323      | 450           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB324      | 500           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB325      | 550           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB326      | 600           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | steel     |
| 63ETB326D     | 600           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 | ASTM E10 | DAkS        |      | 60x60x16mm | steel     |
| 63ETB1400     | 650           | HBW 2,5/187,5 | Brinell     | 1839       | 187.5 | 30               | ISO 6506-3 | ASTM E10 | DAkS        |      | 60x60x16mm | steel     |
| HBW 5/62,5    |               |               |             |            |       |                  |            |          |             |      |            |           |
| 63ETB343      | 80            | HBW 5/62,5    | Brinell     | 612.9      | 62.5  | 2.5              | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |
| HBW 5/125     |               |               |             |            |       |                  |            |          |             |      |            |           |
| 63ETB358      | 80            | HBW 5/125     | Brinell     | 1226       | 125   | 5                | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |
| 63ETB359      | 110           | HBW 5/125     | Brinell     | 1226       | 125   | 5                | ISO 6506-3 |          | DAkS        |      | 60x60x16mm | aluminium |

**ISO 6506-3, ASTM E10 (option)**

Dimensions: 150x100x16mm

[illegible]

Steel

Optional availability:

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

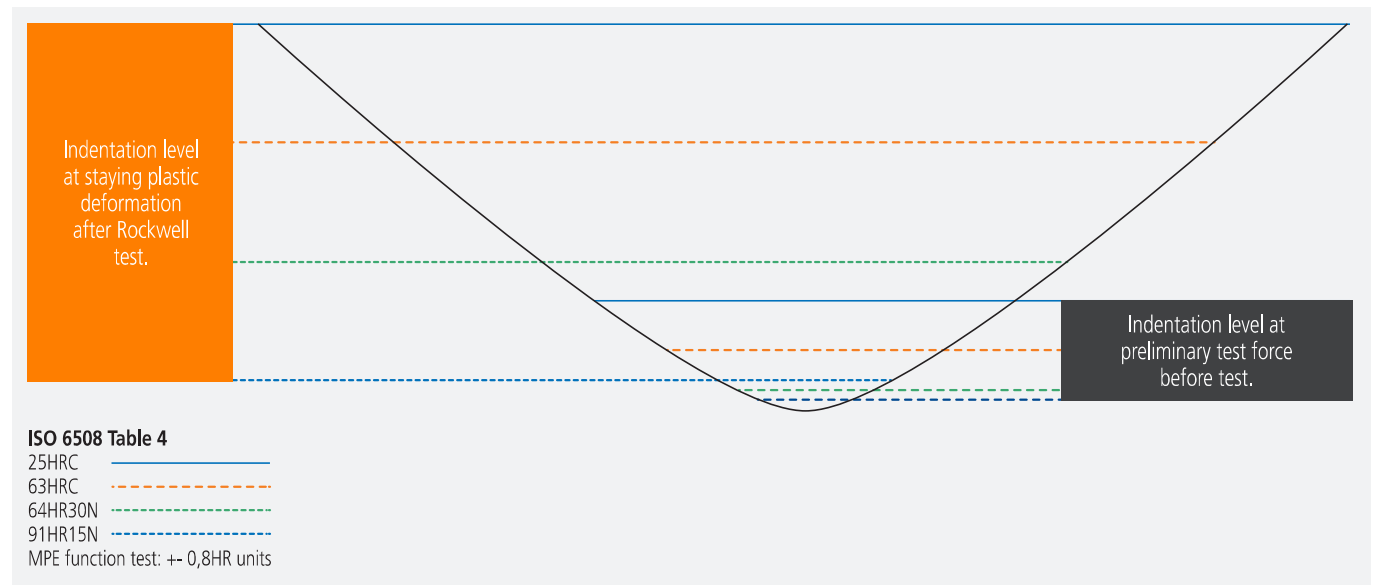
|           |               |           |             | Test Force |     |                  | Standard   |          |             |      |              |           |
|-----------|---------------|-----------|-------------|------------|-----|------------------|------------|----------|-------------|------|--------------|-----------|
| Order no. | Nominal Value | Scale     | Test method | N          | kgf | Force Area Ratio | ISO        | ASTM     | Calibration | Grid | Dimension    | Material  |
| HBW 5/250 |               |           |             |            |     |                  |            |          |             |      |              |           |
| 63ETB387  | 80            | HBW 5/250 | Brinell     | 2452       | 250 | 10               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB387D | 80            | HBW 5/250 | Brinell     | 2452       | 250 | 10               | ISO 6506-3 | ASTM E10 | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB388  | 110           | HBW 5/250 | Brinell     | 2452       | 250 | 10               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB389  | 130           | HBW 5/250 | Brinell     | 2452       | 250 | 10               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB389D | 130           | HBW 5/250 | Brinell     | 2452       | 250 | 10               | ISO 6506-3 | ASTM E10 | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB390  | 170           | HBW 5/250 | Brinell     | 2452       | 250 | 10               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB391  | 200           | HBW 5/250 | Brinell     | 2452       | 250 | 10               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB391D | 200           | HBW 5/250 | Brinell     | 2452       | 250 | 10               | ISO 6506-3 | ASTM E10 | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB392  | 250           | HBW 5/250 | Brinell     | 2452       | 250 | 10               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| HBW 5/750 |               |           |             |            |     |                  |            |          |             |      |              |           |
| 63ETB403  | 110           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB404  | 130           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB405  | 170           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | aluminium |
| 63ETB406  | 200           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB406D | 200           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 | ASTM E10 | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB407  | 250           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB408  | 300           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB409  | 350           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB409D | 350           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 | ASTM E10 | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB410  | 400           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB411  | 450           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB412  | 500           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB413  | 550           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB414  | 600           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB414D | 600           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 | ASTM E10 | DAkkS       |      | 150x100x16mm | steel     |
| 63ETB415  | 650           | HBW 5/750 | Brinell     | 7355       | 750 | 30               | ISO 6506-3 |          | DAkkS       |      | 150x100x16mm | steel     |



|             |               |             |             | Test Force |      |                  | Standard   |          |             |      |              |           |
|-------------|---------------|-------------|-------------|------------|------|------------------|------------|----------|-------------|------|--------------|-----------|
| Order no.   | Nominal Value | Scale       | Test method | N          | kgf  | Force Area Ratio | ISO        | ASTM     | Calibration | Grid | Dimension    | Material  |
| HBW 10/250  |               |             |             |            |      |                  |            |          |             |      |              |           |
| 63ETB418    | 80            | HBW 10/250  | Brinell     | 2452       | 250  | 2.5              | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| HBW 10/500  |               |             |             |            |      |                  |            |          |             |      |              |           |
| 63ETB434    | 80            | HBW 10/500  | Brinell     | 4903       | 500  | 5                | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB434D   | 80            | HBW 10/500  | Brinell     | 4903       | 500  | 5                | ISO 6506-3 | ASTM E10 | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB435    | 110           | HBW 10/500  | Brinell     | 4903       | 500  | 5                | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB435D   | 110           | HBW 10/500  | Brinell     | 4903       | 500  | 5                | ISO 6506-3 | ASTM E10 | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB436    | 130           | HBW 10/500  | Brinell     | 4903       | 500  | 5                | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| HBW 10/1000 |               |             |             |            |      |                  |            |          |             |      |              |           |
| 63ETB450    | 80            | HBW 10/1000 | Brinell     | 9807       | 1000 | 10               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB450D   | 80            | HBW 10/1000 | Brinell     | 9807       | 1000 | 10               | ISO 6506-3 | ASTM E10 | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB451    | 110           | HBW 10/1000 | Brinell     | 9807       | 1000 | 10               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB452    | 130           | HBW 10/1000 | Brinell     | 9807       | 1000 | 10               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB452D   | 130           | HBW 10/1000 | Brinell     | 9807       | 1000 | 10               | ISO 6506-3 | ASTM E10 | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB453    | 170           | HBW 10/1000 | Brinell     | 9807       | 1000 | 10               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB454    | 200           | HBW 10/1000 | Brinell     | 9807       | 1000 | 10               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB454D   | 200           | HBW 10/1000 | Brinell     | 9807       | 1000 | 10               | ISO 6506-3 | ASTM E10 | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB455    | 250           | HBW 10/1000 | Brinell     | 9807       | 1000 | 10               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| HBW 10/1500 |               |             |             |            |      |                  |            |          |             |      |              |           |
| 63ETB063    | 80            | HBW 10/1500 | Brinell     | 14710      | 1500 | 15               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB064    | 110           | HBW 10/1500 | Brinell     | 14710      | 1500 | 15               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB067    | 130           | HBW 10/1500 | Brinell     | 14710      | 1500 | 15               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB068    | 170           | HBW 10/1500 | Brinell     | 14710      | 1500 | 15               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB069    | 200           | HBW 10/1500 | Brinell     | 14710      | 1500 | 15               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB070    | 250           | HBW 10/1500 | Brinell     | 14710      | 1500 | 15               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB076    | 300           | HBW 10/1500 | Brinell     | 14710      | 1500 | 15               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| HBW 10/3000 |               |             |             |            |      |                  |            |          |             |      |              |           |
| 63ETB481    | 110           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB482    | 130           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB483    | 170           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | aluminium |
| 63ETB484    | 200           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB484D   | 200           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 | ASTM E10 | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB485    | 250           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB486    | 300           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB487    | 350           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB487D   | 350           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 | ASTM E10 | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB488    | 400           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB489    | 450           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB490    | 500           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB491    | 550           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB492    | 600           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB492D   | 600           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 | ASTM E10 | DAkKS       |      | 150x100x16mm | steel     |
| 63ETB493    | 650           | HBW 10/3000 | Brinell     | 29420      | 3000 | 30               | ISO 6506-3 |          | DAkKS       |      | 150x100x16mm | steel     |

## Rockwell Diamond Indenter - Function Test

Additionally, 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.



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 |

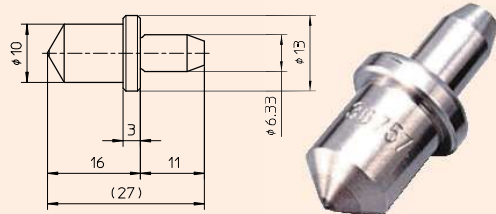


# Rockwell Diamond Indenter

| 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 | •             | •                | •            | •             | •             |

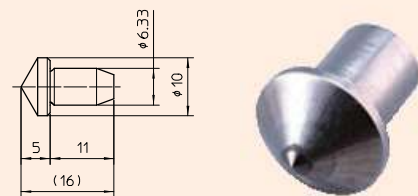
## Standard shape diamond indenter

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   |               | •                | •            | •             | •             |

## Brinell Indenter

| Code number | Description                           | Test Method 1 | Test Method 2         | Standard 1 | Standard 2 | Calibration         | HR-100-200-300-400-500 Series | HR-600 Series | HV-100 Series |
|-------------|---------------------------------------|---------------|-----------------------|------------|------------|---------------------|-------------------------------|---------------|---------------|
| 11AAD469    | ø1 mm Brinell carbide ball indenter   | Brinell       |                       |            |            | without certificate | •                             |               | •             |
| 11AAD470    | ø2.5 mm Brinell carbide ball indenter | Brinell       |                       |            |            | without certificate | •                             |               | •             |
| 11AAD471    | ø5 mm Brinell carbide ball indenter   | Brinell       |                       |            |            | without certificate | •                             |               |               |
| 11AAD472    | ø10 mm Brinell carbide ball indenter  | Brinell       |                       |            |            | without certificate | •                             |               |               |
| 11AAD721    | ø1 mm Brinell carbide ball indenter   | Brinell       |                       |            |            | without certificate | •                             | •             |               |
| 11AAD722    | ø2.5 mm Brinell carbide ball indenter | Brinell       |                       |            |            | without certificate | •                             | •             |               |
| 11AAD723    | ø5 mm Brinell carbide ball indenter   | Brinell       | Ball indentation test |            |            | without certificate | •                             | •             |               |
| 11AAD724    | ø10 mm Brinell carbide ball indenter  | Brinell       |                       |            |            | without certificate | •                             | •             |               |



11AAD469



11AAD470



11AAD471



11AAD472

## Brinell Replacement Balls

| Code number | Description                       | Test Method |  | Standard 1 | Standard 2 | Calibration         | HR-100-200-300-400-500 Series | HR-600 Series | HV-100 Series |
|-------------|-----------------------------------|-------------|--|------------|------------|---------------------|-------------------------------|---------------|---------------|
| 198AA281    | ø1 mm Brinell carbide ball 1pc.   | Brinell     |  |            |            | without certificate | •                             | •             | •             |
| 198AA283    | ø2.5 mm Brinell carbide ball 1pc. | Brinell     |  |            |            | without certificate | •                             | •             | •             |
| 198AA162    | ø5 mm Brinell carbide ball 1pc.   | Brinell     |  |            |            | without certificate | •                             | •             |               |
| 198AA163    | ø10 mm Brinell carbide ball 1pc.  | Brinell     |  |            |            | without certificate | •                             | •             |               |
| 63BAL009    | ø1 mm Brinell carbide ball 1pc.   | Brinell     |  | ISO 6506-2 | ASTM E10   | DAKKS certificate   | •                             | •             | •             |
| 63BAL010    | ø2.5 mm Brinell carbide ball 1pc. | Brinell     |  | ISO 6506-2 | ASTM E10   | DAKKS certificate   | •                             | •             | •             |
| 63BAL011    | ø5 mm Brinell carbide ball 1pc.   | Brinell     |  | ISO 6506-2 | ASTM E10   | DAKKS certificate   | •                             | •             |               |
| 63BAL012    | ø10 mm Brinell carbide ball 1pc.  | Brinell     |  | ISO 6506-2 | ASTM E10   | DAKKS certificate   | •                             | •             |               |



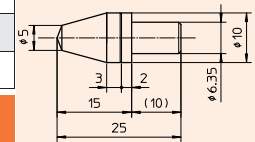
## Vickers Indenters

The grinding process for Vickers diamond indenters leaves a junction line at the point, where the faces of the diamond join together, rather than having a perfect tip. ISO and ASTM standards define the maximum length of the junction line depending on the test force that is being used. Due to the obtained length, the indenter is classified for the use in different test force ranges. The values in the table include uncertainty of measurement.

| Parameters for Vickers indenters DIN EN ISO | 6507-2              |  |
|---------------------------------------------|---------------------|--|
| Plane angle                                 | $136^\circ \pm 30'$ |  |
| Junction line between opposite faces        | junction line       |  |
| HV 5                                        | $2,0 \mu\text{m}$   |  |
| HV 0,2 - HV5                                | $1,0 \mu\text{m}$   |  |
| HV 0,01 - 0,2                               | $0,5 \mu\text{m}$   |  |

## Vickers Diamond Indenter - Macro

| Code number | Description                                  | Test Method | Standard 1 | Calibration       | HV-100 Series | AVK Series |
|-------------|----------------------------------------------|-------------|------------|-------------------|---------------|------------|
| 63DIA011    | Diamond Indenter Vickers, usable from HV 0,2 | Vickers     | ISO 6507-2 | DAkkS certificate | •             | •          |
| 63DIA012    | Diamond Indenter Vickers, usable from HV 5   | Vickers     | ISO 6507-2 | DAkkS certificate | •             | •          |
| 63DIA020    | Diamond Indenter Vickers ASTM E92            | Vickers     | ASTM E92   | DAkkS certificate | •             | •          |



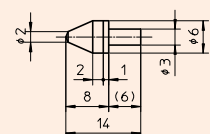
## Knoop Diamond Indenter - Macro

| Code number | Description            | Test Method | Standard 1 | Calibration       | HV-100 Series | AVK Series |
|-------------|------------------------|-------------|------------|-------------------|---------------|------------|
| 63DIA014    | Diamond Indenter Knoop | Knoop       | ISO 4545-2 | DAkkS certificate | •             | •          |
| 63DIA018    | Diamond Indenter Knoop | Knoop       | ASTM E92   | DAkkS certificate | •             | •          |



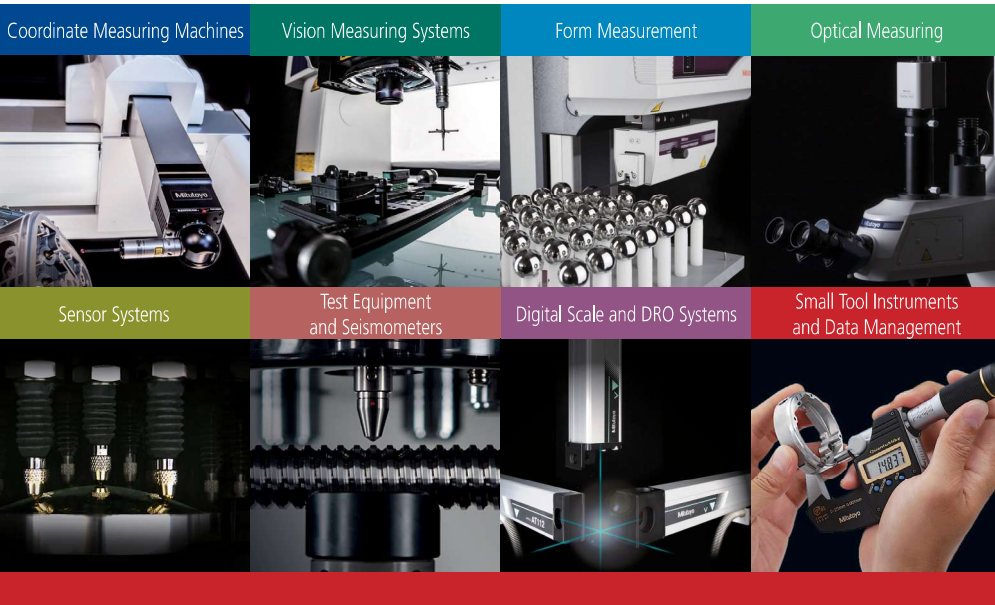
## Knoop Diamond Indenter - Micro

| Code number | Description            | Test Method | Standard 1 | Calibration       | HM-100 Series | HM-200 Series | MVK-Series |
|-------------|------------------------|-------------|------------|-------------------|---------------|---------------|------------|
| 63DIA013    | Diamond Indenter Knoop | Knoop       | ISO 4545-2 | DAkkS certificate | •             | •             | •          |
| 63DIA017    | Diamond Indenter Knoop | Knoop       | ASTM E92   | DAkkS certificate | •             | •             | •          |



## Vickers Diamond Indenter - Micro

| Code number | Description                                  | Test Method | Standard 1 | Calibration       | HM-100 Series | HM-200 Series | MVK-Series |
|-------------|----------------------------------------------|-------------|------------|-------------------|---------------|---------------|------------|
| 63DIA015    | Diamond Indenter Vickers, usable from HV0,01 | Vickers     | ISO 6507-2 | DAkkS certificate | •             | •             | •          |
| 63DIA016    | Diamond Indenter HV0,2                       | Vickers     | ISO 6507-2 | DAkkS certificate | •             | •             | •          |
| 63DIA019    | Diamond Indenter ASTM E92                    | Vickers     | ASTM E92   | DAkkS certificate | •             | •             | •          |



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# Mitutoyo

**Mitutoyo Europe GmbH**

Borsigstraße 8-10  
41469 Neuss

Tel. +49 (0) 2137-102-0  
Fax +49 (0) 2137-102-351

[info@mitutoyo.eu](mailto:info@mitutoyo.eu)  
[www.mitutoyo.eu](http://www.mitutoyo.eu)