Brinell–Vickers conversion table

The conversion table is based on investigations of the material CW617N – CuZn40Pb2 and can only be applied exactly to this material. Nevertheless, it may be assumed that these conversion values differ only slightly for other copper-zinc alloys of approx. 60% copper and 40% zinc with lead. The table does not apply to alloys without lead or with silicon. The said investigations revealed that other measuring methods applying other load levels may yield other findings. This may be assumed for all copper-zinc alloys. Vickers hardness tests applying load stages < 2 return too great a scatter of measurements and are therefore impractical. Whenever possible, Vickers tests must apply the highest possible load stage to minimise this scatter.

Brinell hardness		Vickers hardness		
HBW 2.5/62.5	HBW 1/10	HV2	HV5	HV10
84.0	93.6	97.6	94.6	90.9
85.0	94.4	98.8	95.7	92.0
86.0	95.2	99.9	96.8	93.1
87.0	96.0	101.1	97.9	94.2
88.0	96.8	102.2	98.9	95.4
89.0	97.6	103.3	100.0	96.5
90.0	98.4	104.5	101.1	97.6
91.0	99.1	105.6	102.2	98.7
92.0	99.9	106.8	103.2	99.8
93.0	100.7	107.9	104.3	100.9
94.0	101.5	109.1	105.4	102.0
95.0	102.3	110.2	106.4	103.1
96.0	103.1	111.4	107.5	104.2
97.0	103.9	112.5	108.6	105.3
98.0	104.7	113.7	109.7	106.4
99.0	105.5	114.8	110.7	107.5
100.0	106.3	116.0	111.8	108.6
101.0	107.1	117.1	112.9	109.7
102.0	107.9	118.2	114.0	110.8
103.0	108.7	119.4	115.0	111.9
104.0	109.5	120.5	116.1	113.0
105.0	110.3	121.7	117.2	114.1
106.0	111.1	122.8	118.3	115.2
107.0	111.9	124.0	119.3	116.3
108.0	112.7	125.1	120.4	117.4
109.0	113.5	126.3	121.5	118.6
110.0	**114.3**	**127.4**	**122.5**	**119.7**
111.0	115.1	128.6	123.6	120.8
112.0	115.9	129.7	124.7	121.9
113.0	116.7	130.9	125.8	123.0
114.0	117.5	132.0	126.8	124.1
115.0	118.3	133.2	127.9	125.2
116.0	119.1	134.3	129.0	126.3
117.0	119.9	135.4	130.1	127.4
118.0	120.6	136.6	131.1	128.5
119.0	121.4	137.7	132.2	129.6

Brinell hardness		Vickers hardness		
HBW 2.5/62.5	HBW 1/10	HV2	HV5	HV10
120.0	122.2	138.9	133.3	130.7
121.0	123.0	140.0	134.3	131.8
122.0	123.8	141.2	135.4	132.9
123.0	124.6	142.3	136.5	134.0
124.0	125.4	143.5	137.6	135.1
125.0	126.2	144.6	138.6	136.2
126.0	127.0	145.8	139.7	137.3
127.0	127.8	146.9	140.8	138.4
128.0	128.6	148.1	141.9	139.5
129.0	129.4	149.2	142.9	140.6
130.0	130.2	150.3	144.0	141.8
131.0	131.0	151.5	145.1	142.9
132.0	131.8	152.6	146.2	144.0
133.0	132.6	153.8	147.2	145.1
134.0	133.4	154.9	148.3	146.2
135.0	134.2	156.1	149.4	147.3
136.0	135.0	157.2	150.4	148.4
137.0	135.8	158.4	151.5	149.5
138.0	136.6	159.5	152.6	150.6
139.0	137.4	160.7	153.7	151.7
140.0	138.2	161.8	154.7	152.8
141.0	139.0	163.0	155.8	153.9
142.0	139.8	164.1	156.9	155.0
143.0	140.6	165.3	158.0	156.1
144.0	141.4	166.4	159.0	157.2
145.0	142.2	167.5	160.1	158.3
146.0	142.9	168.7	161.2	159.4
147.0	143.7	169.8	162.2	160.5
148.0	144.5	171.0	163.3	161.6
149.0	145.3	172.1	164.4	162.7
150.0	146.1	173.3	165.5	163.8
151.0	146.9	174.4	166.5	165.0
152.0	147.7	175.6	167.6	166.1

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Procedural instructions for reliable hardness measurements

These procedural instructions are intended to safeguard reliable Brinell and/or Vickers hardness measurements on metals and specifically on copper-zinc alloys.

1. Preparing the sample

The sample's test surface must be prepared as set down in the latest wording of DIN EN ISO 6506-1 (Brinell) and/or DIN EN ISO 6507-1 (Vickers). Reliable hardness measurements are obtained when the surface roughness of the sample equals the recommended value listed in Table 1 for each testing method. Table 1 also lists recommended procedures for obtaining these surface roughnesses.

Table 1 – Recommended surface roughnesses Rz and surface treatment procedures

	Roughness parameter Rz/µm	Wet abrasion grained paper	Polishing diamond suspension, grained (µm)
Brinell (HBW 2.5/62.5)	2–3	P300–P500	—
Brinell (HBW 1/10)	< 1	P1200–P2500	—
Vickers (HV)	< 0.5	P1200–P2500	3 and/or 6

2. Hardness measurements

The hardness is measured as set down in DIN EN ISO 6506 (Brinell) or DIN EN ISO 6507 (Vickers). It is important to observe the specified distances to the edge of the sample and between the hardness indentations for copper and copper alloys. The schematic Figure 1 illustrates the specified distances.

The recommended procedure for copper and copper alloys, specifically brass alloys, is to determine the Brinell hardness (HBW 2.5/62.5) when the distances depicted in Figure 1 can be observed. In addition, the sample must exhibit the minimum thickness, as a function of the mean diameter of indentation, listed in Table B.1 of DIN EN ISO 6506. The HBW 2.5/62.5 hardness test is significantly less sensitive to factors like microstructural properties, surface quality, erroneous measuring of indentation diagonals, etc.

Elastic deformation reduces the indentation depth and so must be prevented on the sample. The sample must be positioned, fixed, and/or shimmed in such a manner that the flow of force for the hardness measurements progresses in a straight line from the indenter into the sample to the sample table.

Furthermore, the hardness value should be determined from at least 3-5 hardness indentations in order to obtain a statistically reliable result.

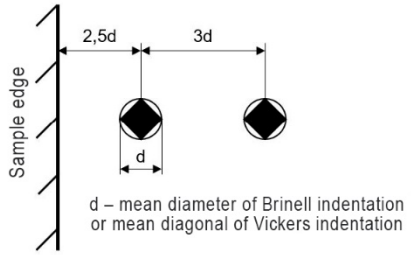

Fig 1 – Indentation spacing