Approximate Hardness Conversion Numbers for Non-Austenitic Steels

Rockwell C Diamond 150 KG	Vickers	Brinell Hardness 10 mm Ball 3000 KG	Brinell Hardness Carbide Ball 3000 KG	Knoop Hardness 500 G & Over	Rockwell A Diamond 60 KG	Rockwell D Diamond 100 KG	Superficial 15N Diamond 15 KG	Superficial 30N Diamond 30 KG	Superficial 45N Diamond 45 KG	Shore Scleroscope	Rockwell C Diamond 150 KG	Tensile Strength Steel Only KPSI
68	940	—	—	920	85.6	76.9	93.2	84.4	75.4	97.3	68	—
67	900	—	—	895	85.0	76.1	92.9	83.6	74.2	95.0	67	—
66	865	—	—	870	84.5	75.4	92.5	82.8	73.3	92.7	66	—
65	832	—	739	846	83.9	74.5	92.2	81.9	72.0	90.6	65	—
64	800	—	722	822	83.4	73.8	91.8	81.1	71.0	88.5	64	—
63	772	—	705	799	82.8	73.0	91.4	80.1	69.9	86.5	63	—
62	746	—	688	776	82.3	72.2	91.1	79.3	68.8	84.5	62	—
61	720	—	670	754	81.8	71.5	90.7	78.4	67.7	82.6	61	—
60	697	—	654	732	81.2	70.7	90.2	77.5	66.6	80.8	60	—
59	674	—	634	710	80.7	69.9	89.8	76.6	65.5	79.0	59	—
58	653	—	615	690	80.1	69.2	89.3	75.7	64.3	77.3	58	—
57	633	—	595	670	79.6	68.5	88.9	74.8	63.2	75.6	57	—
56	613	—	577	650	79.0	67.7	88.3	73.9	62.0	74.0	56	—
55	595	—	560	630	78.5	66.9	87.9	73.0	60.9	72.4	55	301
54	577	—	543	612	78.0	66.1	87.4	72.0	59.8	70.9	54	292
53	560	—	525	594	77.4	65.4	86.9	71.2	58.6	69.4	53	283
52	544	500	512	576	76.8	64.6	86.4	70.2	57.4	67.9	52	273
51	528	487	496	558	76.3	63.8	85.9	69.4	56.1	66.5	51	264
50	513	475	481	542	75.9	63.1	85.5	68.5	55.0	65.1	50	255
49	498	464	469	526	75.2	62.1	85.0	67.6	53.8	63.7	49	246
48	484	451	455	510	74.7	61.4	84.5	66.7	52.5	62.4	48	237
47	471	442	443	495	74.1	60.8	83.9	65.8	51.4	61.1	47	229
46	458	432	432	480	73.6	60.0	83.5	64.8	50.3	59.8	46	222
45	446	421	421	466	73.1	59.2	83.0	64.0	49.0	58.5	45	215
44	434	409	409	452	72.5	58.5	82.5	63.1	47.8	57.3	44	208
43	423	400	400	438	72.0	57.7	82.0	62.2	46.7	56.1	43	201
42	412	390	390	426	71.5	56.9	81.5	61.3	45.5	54.9	42	194
41	402	381	381	414	70.9	56.2	80.9	60.4	44.3	53.7	41	188
40	392	371	371	402	70.4	55.4	80.4	59.5	43.1	52.6	40	181
39	382	362	362	391	69.9	54.6	79.9	58.6	41.9	51.5	39	176
38	372	353	353	380	69.4	53.8	79.4	57.7	40.8	50.4	38	171
37	363	344	344	370	68.9	53.1	78.8	56.8	39.6	49.3	37	168
36	354	336	336	360	68.4	52.3	78.3	55.9	38.4	48.2	36	162
35	345	327	327	351	67.9	51.5	77.7	55.0	37.2	47.1	35	157
34	336	319	319	342	67.4	50.8	77.2	54.2	36.1	46.1	34	153
33	327	311	311	334	66.8	50.0	76.6	53.3	34.9	45.1	33	149
32	318	301	301	326	66.3	49.2	76.1	52.1	33.7	44.1	32	145
31	310	294	294	318	65.8	48.4	75.6	51.3	32.5	43.1	31	142
30	302	286	286	311	65.3	47.7	75.0	50.4	31.3	42.2	30	138
29	294	279	279	304	64.8	47.0	74.5	49.5	30.1	41.3	29	135
28	286	271	271	297	64.3	46.1	73.9	48.6	28.9	40.4	28	132
27	279	264	264	290	63.8	45.2	73.3	47.7	27.8	39.5	27	128
26	272	258	258	284	63.3	44.6	72.8	46.8	26.7	38.7	26	125
25	266	253	253	278	62.8	43.8	72.2	45.9	25.5	37.8	25	122
24	260	247	247	272	62.4	43.1	71.6	45.0	24.3	37.0	24	120
23	254	243	243	266	62.0	42.1	71.0	44.0	23.1	36.3	23	117
22	248	237	237	261	61.5	41.6	70.5	43.2	22.0	35.5	22	114
21	243	231	231	256	61.0	40.9	69.9	42.3	20.7	34.8	21	112
20	238	226	226	251	60.5	40.1	69.4	41.5	19.6	34.2	20	110

These values are consistent with
ASTM E 140 Tables 1 and 2 for non-austenitic steels

HARDNESS CONVERSION CHART

Precautions

Tests should be made on properly prepared specimens on flat surfaces. Readings taken on highly curved surfaces, such as ball bearing balls, will be lower than those taken on a flat surface.

Rough ground or machined surfaces offer unequal support to the penetrator, and therefore surface roughness must be much less than the size of the impression. Minimum allowable thickness of a specimen varies according to the hardness, load applied, and the kind of penetrator used.

When more than one range of load is available for a given instrument, the largest load should be used that is consistent with the dimensions and the nature of the specimen and with the maximum allowable size of the impression for the indentor.

Heterogeneous materials, such as cast iron, should be tested with a penetrator of sufficient size to average the local variance in hardness within these materials. The distance of the center of the indentation from the edge of the specimen or edge of another indentation shall be at least two and half times the diameter of the indentation.

The angle between the load line and the normal to the specimen shall not exceed 2 degrees.

When converted hardness numbers are reported, the original hardness test should be indicated; for example: 480 BHN (from Rockwell C)

Rockwell B 1/16 Ball 100 KG	Vickers	Brinell Hardness 10 mm Ball 3000 KG	Knoop Hardness 500 G & Over	Rockwell A Diamond 60 KG	Superficial Rockwell F 1/16 Ball 60 KG	Superficial 15T 1/16 Ball 15 KG	Superficial 30T 1/16 Ball 30 KG	45T 1/16 Ball 45 KG	Rockwell B 1/16 Ball 100 KG	Tensile Strength Steel Only KPSI	Shore Scleroscope
100	240	240	251	61.5	—	93.1	83.1	72.9	100	117	36.3
99	234	234	246	60.9	—	92.8	82.5	71.9	99	114	35.5
98	228	228	241	60.2	—	92.5	81.8	70.9	98	110	34.8
97	222	222	236	59.5	—	92.1	81.1	69.9	97	108	34.2
96	216	216	231	58.9	—	91.8	80.4	68.9	96	102	33.0
95	210	210	226	58.3	—	91.5	79.8	67.9	95	100	32.0
94	205	205	221	57.6	—	91.2	79.1	66.9	94	98	31.0
93	200	200	216	57.0	—	90.8	78.4	65.9	93	96	30.0
92	195	195	211	56.4	—	90.5	77.8	64.8	92	94	29.5
91	190	190	206	55.8	—	90.2	77.1	63.8	91	90	28.5
90	185	185	201	55.2	—	89.9	76.4	62.8	90	87	28.0
89	180	180	196	54.6	—	89.5	75.8	61.8	89	86	27.0
88	176	176	192	54.0	—	89.2	75.1	60.8	88	84	26.0
87	172	172	188	53.4	—	88.9	74.4	59.8	87	82	25.5
86	169	169	184	52.8	—	88.6	73.8	58.8	86	80	25.0
85	165	165	180	52.3	—	88.2	73.1	57.8	85	79	24.5
84	162	162	176	51.7	—	87.9	72.4	56.8	84	77	24.0
83	159	159	173	51.1	—	87.6	71.8	55.8	83	76	23.5
82	156	156	170	50.6	—	87.3	71.1	54.8	82	75	23.0
81	153	153	167	50.0	—	86.9	70.4	53.8	81	74	22.5
80	150	150	164	49.5	—	86.6	69.7	52.8	80	72	22.0
79	147	147	161	48.9	—	86.3	69.1	51.8	79	70	21.5
78	144	144	158	48.4	—	86.0	68.4	50.8	78	69	21.3
77	141	141	155	47.9	—	85.6	67.7	49.8	77	68	21.0
76	139	139	152	47.3	—	85.3	67.1	48.8	76	67	—
75	137	137	150	46.8	99.6	85.0	66.4	47.8	75	66	—
74	135	135	147	46.3	99.1	84.7	65.7	46.8	74	65	—
73	132	132	145	45.8	98.5	84.3	65.1	45.8	73	63	—
72	130	130	143	45.3	98.0	84.0	64.4	44.8	72	62	—
71	127	127	141	44.8	97.4	83.7	63.7	43.8	71	61	—
70	125	125	139	44.3	96.8	83.4	63.1	42.8	70	60	—
69	123	123	137	43.8	96.2	83.0	62.4	41.8	69	59	—
68	121	121	135	43.3	95.6	82.7	61.7	40.8	68	58	—
67	119	119	133	42.8	95.1	82.4	61.0	39.8	67	57	—
66	117	117	131	42.3	94.5	82.1	60.4	38.7	66	56	—
65	116	116	129	41.8	93.9	81.8	59.7	37.7	65	—	—
64	114	114	127	41.4	93.4	81.4	59.0	36.7	64	—	—
63	112	112	125	40.9	92.8	81.1	58.4	35.7	63	—	—
62	110	110	124	40.4	92.2	80.8	57.7	34.7	62	—	—
61	108	108	122	40.0	91.7	80.5	57.0	33.7	61	—	—
60	107	107	120	39.5	91.1	80.1	56.4	32.7	60	—	—
58	104	104	117	38.6	90.0	79.5	55.0	30.7	58	—	—
57	103	103	115	38.1	89.4	79.2	54.4	29.7	57	—	—
56	101	101	114	37.7	88.8	78.8	53.7	28.7	56	—	—
55	100	100	112	37.2	88.2	78.5	53.0	27.7	55	—	—
54	—	—	111	36.8	87.7	78.2	52.4	26.7	54	—	—
53	—	—	110	36.3	87.1	77.9	51.7	25.7	53	—	—
52	—	—	109	35.9	86.5	77.5	51.0	24.7	52	—	—
51	—	—	108	35.5	86.0	77.2	50.3	23.7	51	—	—
50	—	—	107	35.0	85.4	76.9	49.7	22.7	50	—	—
49	—	—	106	34.6	84.8	76.6	49.0	21.7	49	—	—
48	—	—	105	34.1	84.3	76.2	48.3	20.7	48	—	—
47	—	—	104	33.7	83.7	75.9	47.7	19.7	47	—	—
46	—	—	103	33.3	83.1	75.6	47.0	18.7	46	—	—
45	—	—	102	32.9	82.6	75.3	46.3	17.7	45	—	—
44	—	—	101	32.4	82.0	74.9	45.7	16.7	44	—	—
43	—	—	100	32.0	81.4	74.6	45.0	15.7	43	—	—
42	—	—	99	31.6	80.8	74.3	44.3	14.7	42	—	—
41	—	—	98	31.2	80.3	74.0	43.7	13.6	41	—	—
40	—	—	97	30.7	79.7	73.6	43.0	12.6	40	—	—
39	—	—	96	30.3	79.1	73.3	42.3	11.6	39	—	—
38	—	—	95	29.9	78.6	73.0	41.6	10.6	38	—	—
37	—	—	94	29.5	78.0	72.7	41.0	9.6	37	—	—
36	—	—	93	29.1	77.4	72.3	40.3	8.6	36	—	—
35	—	—	92	28.7	76.9	72.0	39.6	7.6	35	—	—
34	—	—	91	28.2	76.3	71.7	39.0	6.6	34	—	—
33	—	—	90	27.8	75.7	71.4	38.3	5.6	33	—	—
32	—	—	89	27.4	75.2	71.0	37.6	4.6	32	—	—
31	—	—	88	27.0	74.6	70.7	37.0	3.6	31	—	—
30	—	—	87	26.6	74.0	70.4	36.3	2.6	30	—	—