

Steel Hardness Conversion

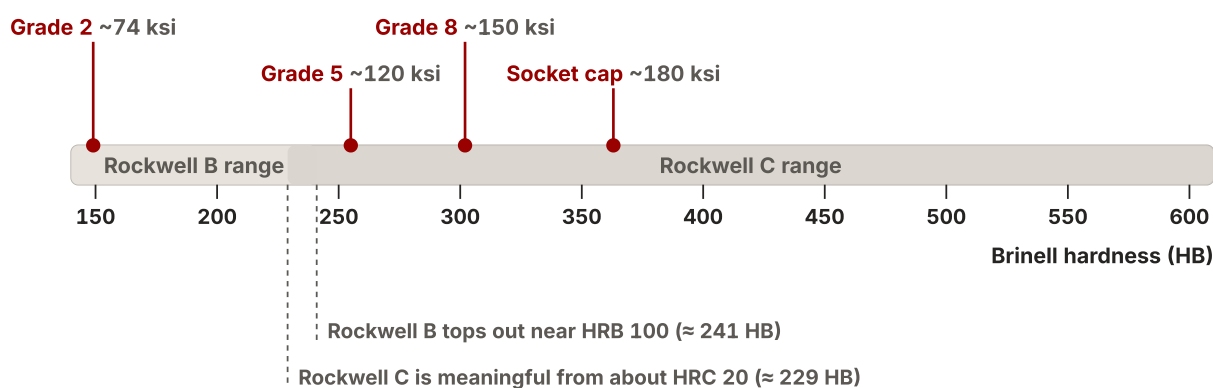
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Brinell, Rockwell C, Rockwell B, and roughly what it all means in tensile strength — lined up so you can read across from one scale to another.

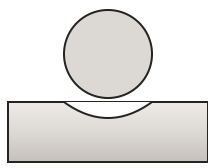
Hardness gets measured on different machines — **Brinell** (HB), **Rockwell C** (HRC, for harder steel), and **Rockwell B** (HRB, for softer) — and a test report might use any of them. This chart lines them up, plus the **approximate tensile strength** that goes with each, so you can read across from whatever number you were handed.

Steel only. These conversions are for non-austenitic steels (carbon and alloy). They do **not** hold for stainless, aluminum, brass, or cast iron — converting those this way gives misleading numbers. And every conversion is approximate; an actual test on the part is always more reliable.

Reading the scales

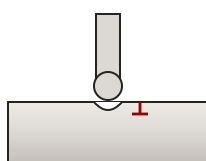


One steel, three scales. Rockwell B is used on the softer end and Rockwell C on the hard end; Brinell runs across both, which is why it is the first column of the chart. Where common fasteners land is marked in red.



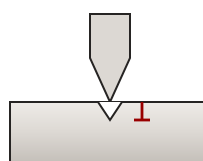
Brinell (HB)

Big hardened ball; measures the **width** of the dent. Good for softer and medium steel.



Rockwell B (HRB)

Small ball; measures how **deep** it sinks. Used on softer steel.



Rockwell C (HRC)

Diamond cone; measures **depth**. Used on hardened steel.

BRINELL (HB)	ROCKWELL C (HRC)	ROCKWELL B (HRB)	TENSILE (KSI, APPROX)
601	57.3	—	309
555	54.7	—	285
514	52.1	—	263
477	49.6	—	243
444	47.1	—	225
415	44.5	—	210



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BRINELL (HB)	ROCKWELL C (HRC)	ROCKWELL B (HRB)	TENSILE (KSI, APPROX)
388	41.8	—	195
363	39.1	—	182
341	36.6	—	170
321	34.3	—	160
302	32.1	—	150
285	29.9	—	141
269	27.6	—	133
255	25.4	—	126
241	22.8	100.0	118
229	20.5	98.2	111
217	—	96.4	105
207	—	94.6	100
197	—	92.8	95
187	—	90.7	90
179	—	89.0	87
170	—	86.8	83
156	—	82.9	76
149	—	80.8	73

Approximate conversions for non-austenitic steel, per ASTM E140 (hardness) and ASTM A370 (tensile). HRC is meaningful above ~20; HRB below it. Tensile roughly follows $\sim 500 \times$ Brinell (psi).

Where common fasteners land

It maps onto bolt grades nicely: a **Grade 2** bolt (~74 ksi) sits near **150 HB**; **Grade 5** (~120 ksi) around **250 HB / 24 HRC**; **Grade 8** (~150 ksi) around **300 HB / 32 HRC**; and an alloy **socket cap screw** (~180 ksi) up near **360 HB / 39 HRC**. Full strength numbers are on the bolt grades & strength chart.

Why it's only approximate: the relationship between hardness and strength varies a little with the steel's makeup, so treat these as close estimates — good for cross-reading a report or sanity-checking a number, not for certifying a part.

Reference values drawn from the governing standards. For critical applications, confirm against the standard and the manufacturer's published data.
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