METAL TREATING AST SPECIALISTS
Since 1943

**Akron Steel Treating Co.**
330-773-8211
1-800-364-ASTC (2782)
Fax: 330-773-0772
Email: info@AkronSteelTreating.com

Accredited Nadcap Heat Treating

## HARDNESS CONVERSIONS

| ROCKWELL SCALES | | | | | | | KNOOP 500gm & OVER | VICKERS 10KG | BRINELL 3000 KG | | TENSILE STRENGTH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C 150 KG DIAMOND | D 100 KG DIAMOND | A 60 KG DIAMOND | 45N 45 KG N DIAMOND | 30N 30 KG N DIAMOND | 15N 15 KG N DIAMOND | G 150 KG 1/16" BALL | HK | HV | DIA. (mm) | HB | KPSI |
| 68 | 77.0 | 85.5 | 75.5 | 84.5 | 93.0 | — | 920 | 940 | — | — | |
| 67 | 76.0 | 85.0 | 74.0 | 83.5 | — | — | 895 | 900 | — | — | |
| 66 | 75.5 | 84.5 | 73.5 | 83.0 | 92.5 | — | 870 | 865 | — | — | |
| 65 | 74.5 | 84.0 | 72.0 | 82.0 | 92.0 | — | 846 | 832 | — | — | |
| 64 | 74.0 | 83.5 | 71.0 | 81.0 | — | — | 822 | 800 | — | — | |
| 63 | 73.0 | 83.0 | 70.0 | 80.0 | 91.5 | — | 799 | 772 | — | — | |
| 62 | 72.0 | 82.5 | 69.0 | 79.5 | 91.0 | — | 776 | 746 | — | — | |
| 61 | 71.5 | 82.0 | 67.5 | 78.5 | 90.5 | — | 754 | 720 | — | — | |
| 60 | 70.5 | 81.0 | 66.5 | 77.5 | 90.0 | — | 732 | 697 | — | — | |
| 59 | 70.0 | 80.5 | 65.5 | 76.5 | — | — | 710 | 674 | — | — | 351 |
| 58 | 69.0 | 80.0 | 64.5 | 75.5 | 89.5 | — | 690 | 653 | 2.47 | 615 | 338 |
| 57 | 68.5 | 79.5 | 63.0 | 75.0 | 89.0 | — | 670 | 633 | 2.51 | 595 | 325 |
| 56 | 67.5 | 79.0 | 62.0 | 74.0 | 88.5 | — | 650 | 613 | 2.55 | 577 | 313 |
| 55 | 67.0 | 78.5 | 61.0 | 73.0 | 88.0 | — | 630 | 595 | 2.59 | 560 | 301 |
| 54 | 66.0 | 78.0 | 60.0 | 72.0 | 87.5 | — | 612 | 577 | 2.63 | 543 | 292 |
| 53 | 65.5 | 77.5 | 58.5 | 71.0 | 87.0 | — | 594 | 560 | 2.67 | 525 | 283 |
| 52 | 64.5 | 77.0 | 57.5 | 70.0 | 86.5 | — | 576 | 544 | 2.70 | 512 | 273 |
| 51 | 64.0 | 76.5 | 56.0 | 69.5 | 86.0 | — | 558 | 528 | 2.75 | 496 | 264 |
| 50 | 63.0 | 76.0 | 55.0 | 68.5 | 85.5 | — | 542 | 513 | 2.79 | 481 | 255 |
| 49 | 62.0 | 75.0 | 54.0 | 67.5 | 85.0 | — | 526 | 498 | 2.83 | 469 | 246 |
| 48 | 61.5 | 74.5 | 52.5 | 66.5 | 84.5 | — | 510 | 484 | 2.87 | 455 | 238 |
| 47 | 61.0 | 74.0 | 51.5 | 66.0 | 84.0 | — | 495 | 471 | 2.91 | 443 | 229 |
| 46 | 60.0 | 73.5 | 50.5 | 65.0 | 83.5 | — | 480 | 458 | 2.94 | 432 | 221 |
| 45 | 59.0 | 73.0 | 49.0 | 64.0 | 83.0 | — | 466 | 446 | 2.98 | 421 | 215 |
| 44 | 58.5 | 72.5 | 48.0 | 63.0 | 82.5 | — | 452 | 434 | 3.02 | 409 | 208 |
| 43 | 57.5 | 72.0 | 46.5 | 62.0 | 82.0 | — | 438 | 423 | 3.05 | 400 | 201 |
| 42 | 57.0 | 71.5 | 45.5 | 61.5 | 81.5 | — | 426 | 412 | 3.09 | 390 | 194 |
| 41 | 56.0 | 71.0 | 44.5 | 60.5 | 81.0 | — | 414 | 402 | 3.13 | 381 | 188 |
| 40 | 55.5 | 70.0 | 43.0 | 59.5 | 80.5 | — | 402 | 392 | 3.17 | 371 | 182 |
| 39 | 54.5 | 70.0 | 42.0 | 58.5 | 80.0 | — | 391 | 382 | 3.21 | 362 | 177 |
| 38 | 54.0 | 69.5 | 41.0 | 57.5 | 79 5 | — | 380 | 372 | 3.24 | 353 | 171 |
| 37 | 53.0 | 69.0 | 39.5 | 57.0 | 79.0 | — | 370 | 363 | 3.28 | 344 | 166 |
| 36 | 52.5 | 68.5 | 38.5 | 56.0 | 78.5 | — | 360 | 354 | 3.32 | 336 | 161 |
| 35 | 51.5 | 68.0 | 37.0 | 55.0 | 77.5 | — | 351 | 345 | 3.36 | 327 | 156 |
| 34 | 51.0 | 67.5 | 36.0 | 54.0 | 77.0 | — | 342 | 336 | 3.41 | 319 | 152 |
| 33 | 50.0 | 67.0 | 35.0 | 53.5 | 76.5 | — | 334 | 327 | 3.45 | 311 | 149 |
| 32 | 49.0 | 66.5 | 33.5 | 52.0 | 76.0 | — | 326 | 318 | 3.50 | 301 | 146 |
| 31 | 48.5 | 66.0 | 32.5 | 51.5 | 75.5 | — | 318 | 310 | 3.54 | 294 | 141 |
| 30 | 47.5 | 65.5 | 31.5 | 50.5 | 75.0 | 92.0 | 311 | 302 | 3.59 | 286 | 138 |
| 29 | 47.0 | 65.0 | 30.0 | 49.5 | 74.5 | 91.0 | 304 | 294 | 3.64 | 279 | 135 |
| 28 | 46.0 | 64.5 | 29.0 | 48.5 | 74.0 | 90.0 | 297 | 286 | 3.69 | 271 | 131 |
| 27 | 45.0 | 64.0 | 28.0 | 47.5 | 73.5 | 89.0 | 290 | 279 | 3.73 | 264 | 128 |
| 26 | 44.5 | 63.5 | 26.5 | 47.0 | 73.0 | 88.0 | 284 | 272 | 3.77 | 258 | 125 |
| 25 | 44.0 | 63.0 | 25.5 | 46.0 | 72.0 | 87.0 | 278 | 266 | 3.81 | 253 | 123 |
| 24 | 43.0 | 62.5 | 24.5 | 45.0 | 71.5 | 86.0 | 272 | 260 | 3.86 | 247 | 119 |
| 23 | 42.0 | 62.0 | 23.0 | 44.0 | 71.0 | 84.5 | 266 | 254 | 3.89 | 243 | 117 |
| 22 | 41.5 | 61.5 | 22.0 | 43.0 | 70.5 | 83.5 | 261 | 248 | 3.93 | 237 | 115 |
| 21 | 41.0 | 61.0 | 20.5 | 42.5 | 70.0 | 82.5 | 256 | 243 | 3.98 | 231 | 112 |
| 20 | 40.0 | 60.5 | 19.5 | 41.5 | 69.5 | 81.0 | 251 | 238 | 4.02 | 226 | 110 |

- Conversion values are only approximate and may be inaccurate for specific applications. Conversion data from ASTM Standard E140 and A370 courtesy of ASTM. Rockwell numbers have been rounded to nearest 0.5 hardness numbers. Conversion values are based on tests on non-austenitic steels. ASTM E140 should be consulted for hardness conversion data for a number of other metals.
- Conversion of hardness values should be used only when it is impossible to test the material on the hardness scale specified. All hardness values should be considered approximate and Rockwell hardness numbers should be rounded to the nearest whole number.
- The hardness-tensile strength relationship is approximate and applies only for steel. The tensile strength information should not be used for austenitic stainless steels but has been shown to be applicable for ferritic and martensitic stainless steels.
- Brinell hardness values above 450HB are based on the use of a tungsten carbide ball.

# HARDNESS CONVERSIONS

| ROCKWELL SCALES | | | | | | | | | KNOOP 500gm & OVER HK | 3000 KG | | 500 KG | TENSILE STRENGTH KPSI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B 100 KG 1/16" BALL | F 60 KG 1/16" BALL | G 150 KG 1/16" BALL | 45T 45 KG 1/16" BALL | 30T 30 KG 1/16" BALL | 15T 15 KG 1/16" BALL | E 100 KG 1/8" BALL | K 150 KG 1/8" BALL | A 60 KG DIAMOND | | DIA. (mm) | HB / HV | HB | |
| 100 | — | 82.5 | 73.0 | 83.0 | 93.0 | — | — | 61.5 | 251 | 3.91 | 240 | — | 116 |
| 99 | — | 81.0 | 72.0 | 82.5 | — | — | — | 61.0 | 246 | 3.96 | 234 | — | 114 |
| 98 | — | 79.0 | 71.0 | 82.0 | 92.5 | — | — | 60.0 | 241 | 4.01 | 228 | — | 109 |
| 97 | — | 77.5 | 70.0 | 81.0 | 92.0 | — | — | 59.5 | 236 | 4.06 | 222 | — | 104 |
| 96 | — | 76.0 | 69.0 | 80.5 | — | — | — | 59.0 | 231 | 4.11 | 216 | — | 102 |
| 95 | — | 74.0 | 68.0 | 80.0 | 91.5 | — | — | 58.5 | 226 | 4.17 | 210 | — | 100 |
| 94 | — | 72.5 | 67.0 | 79.0 | — | — | — | 57.5 | 221 | 4.21 | 205 | — | 98 |
| 93 | — | 71.0 | 66.0 | 78.5 | 91.0 | — | — | 57.0 | 216 | 4.26 | 200 | 166 | 94 |
| 92 | — | 69.0 | 65.0 | 78.0 | 90.5 | — | 100 | 56.5 | 211 | 4.32 | 195 | 162 | 92 |
| 91 | — | 67.5 | 64.0 | 77.0 | — | — | 99.5 | 56.0 | 206 | 4.37 | 190 | 159 | 90 |
| 90 | — | 66.0 | 63.0 | 76.5 | 90.0 | — | 98.5 | 55.0 | 201 | 4.43 | 185 | 156 | 89 |
| 89 | — | 64.0 | 62.0 | 76.0 | 89.5 | — | 98.0 | 54.5 | 196 | 4.48 | 180 | 154 | 88 |
| 88 | — | 62.5 | 61.0 | 75.0 | — | — | 97.0 | 54.0 | 192 | 4.53 | 176 | 150 | 86 |
| 87 | — | 61.0 | 60.0 | 74.5 | 89.0 | — | 96.5 | 53.5 | 188 | 4.58 | 172 | 147 | 84 |
| 86 | — | 59.0 | 59.0 | 74.0 | 88.5 | — | 95.5 | 53.0 | 184 | 4.62 | 169 | 146 | 83 |
| 85 | — | 57.5 | 58.0 | 73.0 | — | — | 94.5 | 52.5 | 180 | 4.67 | 165 | 142 | 82 |
| 84 | — | 56.0 | 57.0 | 72.5 | 88.0 | — | 94.0 | 51.5 | 176 | 4.71 | 162 | 141 | 81 |
| 83 | — | 54.0 | 56.0 | 72.0 | 87.5 | — | 93.0 | 51.0 | 173 | 4.75 | 159 | 138 | 80 |
| 82 | — | 52.5 | 55.0 | 71.0 | — | — | 92.0 | 50.5 | 170 | 4.80 | 156 | 136 | 77 |
| 81 | — | 51.0 | 54.0 | 70.5 | 87.0 | — | 91.0 | 50.0 | 167 | 4.84 | 153 | 134 | 73 |
| 80 | — | 49.0 | 53.0 | 69.5 | 86.5 | — | 90.5 | 49.5 | 164 | 4.88 | 150 | 131 | 72 |
| 79 | — | 47.5 | 52.0 | 69.0 | — | — | 89.5 | 49.0 | 161 | 4.93 | 147 | 129 | 70 |
| 78 | — | 46.0 | 51.0 | 68.5 | 86.0 | — | 88.5 | 48.5 | 158 | 4.98 | 144 | 128 | 69 |
| 77 | — | 44.0 | 50.0 | 67.5 | 85.5 | — | 88.0 | 48.0 | 155 | 5.02 | 141 | 124 | 68 |
| 76 | — | 42.5 | 49.0 | 67.0 | — | — | 87.0 | 47.5 | 152 | 5.06 | 139 | 122 | 67 |
| 75 | 99.5 | 41.0 | 48.0 | 66.5 | 85.0 | — | 86.0 | 47.0 | 150 | 5.10 | 137 | 121 | 66 |
| 74 | 99.0 | 39.0 | 47.0 | 65.5 | 84.5 | — | 85.0 | 46.5 | 147 | 5.13 | 135 | 119 | 65 |
| 73 | 98.5 | 37.5 | 46.0 | 65.0 | — | — | 84.5 | 46.0 | 145 | 5.18 | 132 | 116 | 64 |
| 72 | 98.0 | 36.0 | 45.0 | 64.5 | 84.0 | — | 83.5 | 45.5 | 143 | 5.22 | 130 | 114 | 63 |
| 71 | 97.5 | 34.5 | 44.0 | 63.5 | — | 100 | 82.5 | 45.0 | 141 | 5.27 | 127 | 113 | 62 |
| 70 | 97.0 | 32.5 | 43.0 | 63.0 | 83.5 | 99.5 | 81.5 | 44.5 | 139 | 5.32 | 125 | 112 | 61 |
| 69 | 96.0 | 31.0 | 42.0 | 62.5 | 83.0 | 99.0 | 81.0 | 44.0 | 137 | 5.36 | 123 | 110 | 60 |
| 68 | 95.5 | 29.5 | 41.0 | 61.5 | — | 98.0 | 80.0 | 43.5 | 135 | 5.40 | 121 | 108 | 59 |
| 67 | 95.0 | 28.0 | 40.0 | 61.0 | 82.5 | 97.5 | 79.0 | 43.0 | 133 | 5.44 | 119 | 106 | 58 |
| 66 | 94.5 | 26.5 | 38.5 | 60.5 | 82.0 | 97.0 | 78.0 | 42.5 | 131 | 5.48 | 117 | 105 | 57 |
| 65 | 94.0 | 25.0 | 37.5 | 59.5 | — | 96.0 | 77.5 | 42.0 | 129 | 5.51 | 116 | 103 | 56 |
| 64 | 93.5 | 23.5 | 36.5 | 59.0 | 81.5 | 95.5 | 76.5 | 41.5 | 127 | 5.54 | 114 | 101 | — |
| 63 | 93.0 | 22.0 | 35.5 | 58.5 | 81.0 | 95.0 | 75.5 | 41.0 | 125 | 5.58 | 112 | 99 | — |
| 62 | 92.0 | 20.5 | 34.5 | 57.5 | — | 94.5 | 74.5 | 40.5 | 124 | 5.63 | 110 | 97 | — |
| 61 | 91.5 | 19.0 | 33.5 | 57.0 | 80.5 | 93.5 | 74.0 | 40.0 | 122 | 5.68 | 108 | 95 | — |
| 60 | 91.0 | 17.5 | 32.5 | 56.5 | 80.0 | 93.0 | 73.0 | 39.5 | 120 | 5.70 | 107 | 94 | — |
| 59 | 90.5 | 16.0 | 31.5 | 55.5 | — | 92.5 | 72.0 | 39.0 | 118 | 5.73 | 106 | 93 | — |
| 58 | 90.0 | 14.5 | 30.5 | 55.0 | 79.5 | 92.0 | 71.0 | 38.5 | 117 | 5.77 | 104 | 92 | — |
| 57 | 89.5 | 13.0 | 29.5 | 54.5 | — | 91.0 | 70.5 | 38.0 | 115 | 5.81 | 103 | 90 | — |
| 56 | 89.0 | 11.5 | 28.5 | 53.5 | 79.0 | 90.5 | 69.5 | 37.5 | 114 | 5.85 | 101 | 88 | — |
| 55 | 88.0 | 10.0 | 27.5 | 53.0 | 78.5 | 90.0 | 68.5 | — | 112 | 5.87 | 100 | 87 | — |
| 54 | 87.5 | 8.5 | 26.5 | 52.5 | — | 89.5 | 68.0 | 37.0 | 111 | — | — | 86 | — |
| 53 | 87.0 | 7.0 | 25.5 | 51.5 | 78.0 | 89.0 | 67.0 | 36.5 | 110 | — | — | 85 | — |
| 52 | 86.5 | 5.5 | 24.5 | 51.0 | 77.5 | 88.0 | 66.0 | 36.0 | 109 | — | — | 84 | — |
| 51 | 86.0 | 4.0 | 23.5 | 50.5 | — | 87.5 | 65.0 | 35.5 | 108 | — | — | 83 | — |
| 50 | 85.5 | 2.5 | 22.5 | 49.5 | 77.0 | 87.0 | 64.5 | 35.0 | 107 | — | — | 82 | — |
| 49 | 85.0 | — | 21.5 | 49.0 | 76.5 | 86.5 | 63.5 | 34.5 | 106 | — | — | 81 | — |
| 48 | 84.5 | — | 20.5 | 48.5 | — | 85.5 | 62.5 | 34.0 | 105 | — | — | 80 | — |
| 47 | 83.5 | — | 19.5 | 47.5 | 76.0 | 85.0 | 61.5 | 33.5 | 104 | — | — | — | — |
| 46 | 83.0 | — | 18.5 | 47.0 | 75.5 | 84.5 | 61.0 | — | 103 | — | — | 79 | — |
| 45 | 82.5 | — | 17.5 | 46.5 | — | 84.0 | 60.0 | 33.0 | 102 | — | — | 78 | — |
| 44 | 82.0 | — | 16.5 | 45.5 | 75.0 | 83.5 | 59.0 | 32.5 | 101 | — | — | 77 | — |
| 43 | 81.5 | — | 15.5 | 45.0 | 74.5 | 82.5 | 58.0 | 32.0 | 100 | — | — | — | — |
| 42 | 81.0 | — | 14.5 | 44.5 | — | 82.0 | 57.5 | 31.5 | 99 | — | — | 76 | — |
| 41 | 80.5 | — | 13.5 | 43.5 | 74.0 | 81.5 | 56.5 | 31.0 | 98 | — | — | 75 | — |
| 40 | 79.5 | — | 12.5 | 43.0 | 73.5 | 81.0 | 55.5 | — | 97 | — | — | 74 | — |
| 39 | 79.0 | — | 11.5 | 42.5 | — | 80.0 | 54.5 | 30.5 | 96 | — | — | — | — |
| 38 | 78.5 | — | 10.5 | 41.5 | 73.0 | 79.5 | 54.0 | 30.0 | 95 | — | — | 73 | — |
| 37 | 78.0 | — | 9.5 | 41.0 | 72.5 | 79.0 | 53.0 | 29.5 | 94 | — | — | 72 | — |
| 36 | 77.5 | — | 8.5 | 40.5 | — | 78.5 | 52.0 | 29.0 | 93 | — | — | 71 | — |
| 35 | 77.0 | — | 7.5 | 39.5 | 72.0 | 78.0 | 51.5 | 28.5 | 92 | — | — | 70 | — |
| 34 | 76.5 | — | 6.5 | 39.0 | — | 77.0 | 50.5 | 28.0 | 91 | — | — | 69 | — |
| 33 | 75.5 | — | 5.5 | 38.5 | 71.5 | 76.5 | 49.5 | — | 90 | — | — | 68 | — |
| 32 | 75.0 | — | 4.5 | 37.5 | 71.0 | 76.0 | 48.5 | 27.5 | 89 | — | — | 67 | — |
| 31 | 74.5 | — | 3.5 | 37.0 | — | 75.5 | 48.0 | 27.0 | 88 | — | — | — | — |
| 30 | 74.0 | — | 2.5 | 36.5 | 70.5 | 75.0 | 47.0 | 26.5 | 87 | — | — | 66 | — |


*With pride, we participate in these organizations:*

METAL TREATING AST SPECIALISTS

Since 1943

ASM INTERNATIONAL

NMA PRECISION

Accredited Nadcap Heat Treating

**Combining Art & Science for Solutions that Work!**