

HAYNES[®] HR-120[®] alloy

Comparative Data

| Mechanical Property* | | HR-120 [®] | 214 [®] | 230 [®] | 556 [®] | X | 600 | 601 | RA330 | 253MA | 800H | 304 SS | 310 SS | 316 SS |
|---------------------------------------|--------|---------------------|------------------|------------------|------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Annealing Temperature | °F | 2250 | 2000 | 2250 | 2150 | 2150 | 2050 | 2100 | 2050 | 2000 | 2100 | 2000 | 2150 | 2000 |
| Typical ASTM Grain Size | - | 3 - 6 | 3 - 5 | 5 - 6 | 5 - 6 | 5 - 6 | 2 - 4 | 2 - 4 | 4 - 6 | 3 - 6 | 2 - 4 | 2 - 5 | 3 - 4 | 5 - 7 |
| Ultimate Tensile Strength, ksi | 70°F | 104.3 | 138.9 | 125.4 | 116.4 | 107.5 | 96.0 | 102.0 | 85.0 | 104.0 | 82.0 | 85.0 | 82.7 | 103.9 |
| | 1200°F | 72.9 | 114.9 | 97.7 | 83.1 | 78.5 | 65.0 | 74.0 | 55.7 | 64.6 | 59.0 | 43.0 | 54.0 | 60.5 |
| | 1400°F | 59.8 | 79.4 | 87.7 | 68.5 | 66.6 | 38.0 | 43.0 | 34.0 | 49.8 | 39.0 | 2736.0 | 35.1 | 39.0 |
| | 1600°F | 35.8 | 66.4 | 63.1 | 49.3 | 49.6 | 20.0 | 22.0 | 18.7 | 30.8 | 21.0 | 17.5 | 19.1 | 24.6 |
| | 1800°F | 18.6 | 16.7 | 35.2 | 30.7 | 31.1 | 11.0 | 13.0 | 10.7 | - | 11.0 | **7.4 | 10.5 | 14.0 |
| | 2000°F | 9.6 | 9.0 | 19.5 | 16.1 | 16.5 | (5.1) | 6.5 | - | - | 5.0 | - | 4.3 | 7.1 |
| | 2200°F | - | 5.0 | 9.4 | - | - | - | **5.2 | - | - | - | - | - | - |
| 0.2% Yield Strength, ksi | 70°F | 46.8 | 82.2 | 57.4 | 54.6 | 49.4 | 41.0 | 35.0 | 42.0 | 50.8 | 35.0 | 27.9 | 35.1 | 36.7 |
| | 1200°F | 26.0 | 75.9 | 39.5 | 30.6 | 30.3 | 30.0 | 25.4 | 21.5 | 24.1 | 16.9 | 11.0 | 20.7 | 20.5 |
| | 1400°F | 25.6 | 73.6 | 42.5 | 29.3 | 31.0 | 26.0 | 26.8 | 18.8 | 22.4 | 18.5 | 10.5 | 19.3 | 17.9 |
| | 1600°F | 26.4 | 50.4 | 37.3 | 27.9 | 28.4 | 11.0 | 19.2 | 15.9 | 18.1 | 18.5 | 7.4 | 12.2 | 10.6 |
| | 1800°F | 14.5 | 8.4 | 21.1 | 18.5 | 17.9 | 6.0 | 10.9 | 9.0 | - | 8.1 | - | 6.4 | - |
| | 2000°F | 7.4 | 4.2 | 10.8 | 8.7 | 9.1 | (3.1) | 5.1 | - | - | 3.3 | - | 3.1 | - |
| | 2200°F | - | 1.4 | 4.3 | - | - | - | **2.0 | - | - | - | - | - | - |
| Tensile Elongation, % | 70°F | 50 | 43 | 50 | 51 | 53 | 45 | 50 | 45 | 51 | 49 | 61 | 54 | 59 |
| | 1200°F | 55 | 33 | 55 | 57 | 64 | 49 | 46 | 51 | 44 | 38 | 37 | 21 | 40 |
| | 1400°F | 52 | 23 | 53 | 53 | 58 | 70 | 72 | 65 | 44 | 43 | 31 | 19 | 49 |
| | 1600°F | 71 | 34 | 65 | 69 | 75 | 80 | 90 | 69 | - | 87 | 35 | 28 | 59 |
| | 1800°F | 84 | 86 | 83 | 84 | 95 | 115 | 100 | 74 | - | 100 | **38 | 24 | 41 |
| | 2000°F | 84 | 89 | 83 | 95 | 98 | (120) | 120 | - | - | 108 | - | - | 85 |
| | 2200°F | - | 92 | 109 | - | - | - | 121 | - | - | - | - | - | - |
| Stress to Rupture in 1,000 Hours, ksi | 1200°F | 38.0 | - | 42.5 | 38.0 | 34.0 | 20.0 | 28.0 | - | 23.0 | 23.8 | 14.1 | 17.0 | 20.5 |
| | 1400°F | 17.0 | 25.0 | 20.0 | 17.5 | 15.0 | 8.1 | 9.8 | 7.0 | 9.2 | 9.8 | 7.4 | 7.4 | 8.8 |
| | 1600°F | 8.0 | 8.9 | 9.5 | 7.5 | 6.0 | 3.5 | 4.4 | 3.1 | 4.4 | 4.8 | 3.0 | 3.3 | 3.4 |
| | 1800°F | 3.5 | 1.8 | 3.0 | 3.0 | 2.4 | 1.8 | 2.2 | 1.3 | 1.9 | 1.9 | 1.2 | 1.4 | 1.3 |
| | 2000°F | 0.8 | 0.9 | **1.0 | - | **0.8 | (0.9) | 1.0 | 0.7 | 1.0 | - | - | - | - |

() Estimated

*Manufacturer's laboratory or published data

**Limited data

| Physical Property* | | HR-120® | 214® | 230® | 556® | X | 600 | 601 | RA330 | 253MA | 800H | 304 SS | 310 SS | 316 SS |
|--|---|--------------|-------------|--------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| Density, lb/in ³ | | 0.291 | 0.291 | 0.324 | 0.297 | 0.297 | 0.304 | 0.291 | 0.289 | 0.282 | 0.287 | 0.278 | 0.285 | 0.287 |
| Incipient Melting Point | °F | 2375 | 2475 | 2375 | 2425 | 2300 | 2470 | 2375 | 2450 | 2500 | 2475 | 2250 | 2550 | 2500 |
| | 70°F | 41.4 | 53.5 | 49.2 | 37.5 | 45.2 | 40.6 | 46.9 | 29.9 | 33.1 | 38.9 | 28.7 | 38.2 | 29.4 |
| Electrical Resistivity, μ ohm-in | 400°F | 44.4 | 53.9 | 49.8 | 40.5 | 46.7 | 41.5 | 48.2 | 43.0 | 40.6 | 43.0 | 34.6 | 41.7 | 34.5 |
| | 800°F | 46.3 | 54.3 | 50.7 | 43.5 | 48.4 | 43.0 | 49.2 | 45.6 | 48.8 | 46.1 | 40.6 | 45.7 | 39.3 |
| | 1200°F | 48.2 | 53.5 | 51.6 | 45.7 | 49.5 | - | 49.5 | 47.8 | 54.3 | - | 45.7 | 48.4 | 43.7 |
| | 1600°F | 49.4 | 49.6 | 50.3 | 17.3 | 49.8 | - | 50.2 | 49.1 | 56.3 | - | 47.2 | 50.8 | - |
| | 2000°F | 50.3 | 47.6 | (48.4) | 48.6 | 49.7 | - | 51.1 | - | (57.5) | - | - | - | - |
| | Thermal Conductivity, Btu-in/ft ² -hr °F | 70°F | 78 | 83 | 62 | 77 | 63 | 103 | 78 | 86 | 101 | 80 | 99 | 91 |
| 400°F | | 96 | 99 | 87 | 107 | 83 | 121 | 100 | 108 | 121 | 103 | 116 | 112 | 108 |
| 800°F | | 120 | 132 | 118 | 135 | 121 | 145 | 126 | 134 | 140 | 127 | 141 | 145 | 132 |
| 1200°F | | 150 | 175 | 148 | 160 | 152 | 172 | 153 | 162 | 156 | 152 | 167 | 182 | 152 |
| 1600°F | | 180 | 215 | 179 | 185 | 182 | 200 | 178 | 198 | 184 | 181 | 192 | 213 | 172 |
| 2000°F | | 205 | 234 | (210) | 210 | - | (230) | 203 | - | - | - | - | - | - |
| Mean Coefficient of Thermal Expansion, μ in/in-°F (R to Temp.) | 400°F | 7.9 | 7.4 | 7.2 | 8.2 | 7.9 | 7.7 | 8.0 | 8.6 | 9.3 | 8.8 | 9.1 | 8.9 | 9.1 |
| | 800°F | 8.8 | 7.9 | 7.6 | 8.6 | 8.2 | 8.1 | 8.3 | 9.1 | 9.8 | 9.2 | 9.6 | 9.2 | 9.8 |
| | 1200°F | 9.2 | 8.6 | 8.1 | 9.0 | 8.6 | 8.6 | 8.9 | 9.6 | 10.1 | 9.6 | 10.2 | 9.7 | 10.3 |
| | 1400°F | 9.5 | 9.0 | 8.3 | 9.2 | 8.8 | 8.9 | 9.2 | 9.7 | 10.3 | 9.9 | 10.7 | 10.0 | 10.4 |
| | 1600°F | 9.7 | 9.6 | 8.6 | 9.4 | 9.0 | 9.1 | 9.5 | 9.8 | 10.5 | 10.2 | 10.8 | 10.4 | 10.5 |
| | 1800°F | 9.9 | 10.2 | 8.9 | 9.5 | 9.2 | 9.3 | 9.8 | 10.0 | 10.8 | (10.5) | 11.0 | 40.7 | 10.7 |
| | 2000°F | - | 11.1 | (9.2) | 9.6 | (9.4) | (9.5) | 10.2 | (10.2) | (11.1) | - | 11.4 | 11.0 | - |
| | Modulus of Elasticity, psi x 10 ⁶ | 70°F | 28.7 | 31.6 | 30.6 | 29.7 | 29.8 | 31.1 | 30.0 | 28.5 | 29.0 | 28.4 | 27.9 | 29.0 |
| 400°F | | 27.0 | 29.6 | 29.3 | 28.2 | 28.6 | 29.7 | 28.5 | 26.9 | 26.8 | 26.6 | 26.6 | 26.9 | 26.9 |
| 800°F | | 24.7 | 27.4 | 27.3 | 25.6 | 26.7 | 27.8 | 26.6 | 24.9 | 24.4 | 24.4 | 24.1 | 24.3 | 24.2 |
| 1200°F | | 22.5 | 25.3 | 25.3 | 23.1 | 24.7 | 25.5 | 24.1 | 22.4 | 21.7 | 22.3 | 21.1 | 21.8 | 21.5 |
| 1400°F | | 21.4 | 23.9 | 24.1 | 21.8 | 23.3 | 24.3 | 22.5 | 21.0 | 20.2 | 21.1 | 19.4 | 20.5 | 20.0 |
| 1600°F | | 20.2 | 22.3 | 23.1 | 20.9 | 22.2 | 22.8 | 20.5 | 19.5 | - | 20.0 | - | 19.2 | - |
| 1800°F | | 18.9 | 20.2 | 21.9 | 20.1 | 20.4 | 21.0 | 18.4 | 18.0 | 17.6 | 18.7 | - | - | - |
| 2000°F | | 17.3 | 19.0 | - | - | - | - | 16.2 | - | - | 17.2 | - | - | - |

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