

HEAT TREATMENT DATA

Steel Heat Treatment Color Chart

Steel changes color in a predictable sequence as it heats. This one page chart covers the glow colors used at forging and hardening temperatures and the oxide colors used at tempering temperatures, with every figure given in °F and °C.

Forging and Hardening Heat Colors

Heat Color	°F	°C	Color
Yellow / White	2,500	1,371	
Yellow	2,300	1,260	
Bright Orange	2,100	1,149	
Orange	1,600	871	
Bright Red	1,500	816	
Cherry Red	1,400	760	
Dark (Black) Red	1,250	677	

Source: Bethlehem Steel Corp., 1936

Temper Colors and What They Indicate

Temper Color	°F	°C	Color
Light Gray	700	371	
Gray	660	349	
Blue	580	304	
Blue / Black (Gunmetal)	500	260	
Straw / Brown	475	246	
Straw	460	238	
Tan	380	193	

Source: Bethlehem Steel Corp., 1936

Plain carbon tool steels, quench from
1,350°F to 1,550°F
732°C to 843°C

Alloy tool steels, quench from
1,450°F to 1,652°F
788°C to 900°C

High speed steels, austenitize at
2,250°F to 2,400°F
1,232°C to 1,316°C

Avoid the blue brittleness band. Carbon and some alloy steels held between 450°F and 700°F (230°C to 370°C) can lose toughness, so critical tools and high strength parts are tempered below or above that band, never inside it.

How to read this chart

Two different effects produce these colors. Above roughly 900°F (482°C) the glow is incandescence and the color follows temperature closely. Below 700°F (371°C) the color comes from a growing oxide film, so it reflects both the temperature and the time held at that temperature. Rapid torch heating needs a higher temperature than a slow furnace soak to reach the same color, and thick sections read hotter at the surface than at the core. Treat this as a shop reference and confirm critical temperatures with a calibrated thermocouple or a temperature indicating crayon.

Aobo Steel, tool steel supplier

Aobo Steel supplies forged tool steel from Huangshi, Hubei, China, where the local supply chain covers ESR melting, vacuum degassing and LF refining, forging, hot rolling, turned and peeled bar, heat treatment and third party inspection. We have worked in tool steel since 2003 and supply to order in cold work grades such as D2, D3 and O1, hot work grades such as H10 and H13, and stainless grades 420, 440C and 4Cr13. Mill test certificates to EN 10204 3.1 travel with every shipment, and each order is checked against its working hardness range before it leaves the works.

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