Typical characteristics of case hardening treatments

Process	Nature of case	Process temperature, °C (°F)	Typical case depth	Case hardness, HRC
Carburizing				
Pack	Diffused carbon	815–1090 (1500–2000)	125 μm–1.5 mm (5–60 mils)	50–63(a)
Gas	Diffused carbon	815–980 (1500–1800)	75 μm–1.5 mm (3–60 mils)	50–63(a)
Liquid	Diffused carbon and possibly nitrogen	815–980 (1500–1800)	50 μm–1.5 mm (2–60 mils)	50–65(a)
Vacuum	Diffused carbon	815–1090 (1500–2000)	75 μm–1.5 mm (3–60 mils)	50–63(a)
Nitriding				
Gas	Diffused nitrogen, nitrogen compounds	480–590 (900–1100)	125 μm–0.75 mm (5–30 mils)	50–70
Salt	Diffused nitrogen, nitrogen compounds	510–565 (950–1050)	2.5 μm–0.75 mm (0.1–30 mils)	50–70
Ion	Diffused nitrogen, nitrogen compounds	340–565 (650–1050)	75 μm–0.75 mm (3–30 mils)	50–70
Carbonitriding and nitrocarburizing				
Gas	Diffused carbon and nitrogen	760–870 (1400–1600)	75 μm–0.75 mm (3–30 mils)	50–65(a)
Liquid (cyaniding)	Diffused carbon and nitrogen	760–870 (1400–1600)	2.5–125 μm (0.1–5 mils)	50–65(a)
Ferritic nitrocarburizing	Diffused carbon and nitrogen	565–675 (1050–1250)	2.5–25 μm (0.1–1 mil)	40–60(a)

(a) Requires quench from austenitizing temperature. Source: *Practical Heat Treating, Second Edition,* by Jon L. Dossett and Howard E. Boyer, ASM International, 2006, p 142