Casting Material: Chrome Nickel Molybdenum Steel AISI 8620/8630

AISI 8620 and AISI8630 are Nickel Molybdenum steel for high strength by investment casting, which contain chromium, nickel and molybdenum. Those two steel grade will be supplied as heat treatment condition.

AISI 8620: IC 8620, ASTM A-732 GR 13Q; AS 1444 GR 8620/8620H, EN10084, 1.6523 20NiCrMo2-2; JIS G4103/G4052 SNCM 220; UNS G86200/H86200

AISI 8630: UNS G86300; AMS 6280, 6281, 6355, 6550; ASTM A322 A331; MIL SPEC MIL-S-16974; SAE J404, J412,J770; DIN 1.6545; UNI 30NiCrMo2KB, ; ASTM A304; SAE J1268

Those two grades are popular used in the quenched and tempered condition for strength. Applications include machinery parts where strength and hardness are requisites.

In casting purpose, it's origin from ASTM A732 Standard Specification for Castings, Investment, Carbon and Low Alloy Steel for General Application and Cobalt Alloy for High Strength at Elevated Temperatures:

13Q, IC 8620 Chemical Composition (Physical Properties) and Mechanical Property

C: 0.15-0.25; Mn 0.65-0.95; P 004; S 0.045; Si 0.20-0.80; Ni 0.40-0.70; Cr 0.40-0.70; Mo 0.15-0.25; (Cu 0.50, W 0.10)
Tensile 105Ksi(724Mpa), Yield 85Ksi(586MPa), Elongation 10%, Heat treatment Quench Temper

14Q, IC 8630 Chemical Composition (Physical Properties) and Mechanical Property

C: 0.25-0.35; Mn 0.65-0.95; P 004; S 0.045; Si 0.20-0.80; Ni 0.20-0.70; Cr 0.40-0.70; Mo 0.15-0.25; (Cu 0.50, W 0.10)
Tensile 150Ksi(1030Mpa), Yield 115Ksi(793MPa), Elongation 7%, Heat treatment Quench Temper

In ASTM A29, Standard Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements

8620: C: 0.18-0.23; Mn 0.70-0.90; P 0.035; S 0.040; Si 0.15-0.35; Ni 0.40-0.70; Cr 0.40-0.60; Mo 0.15-0.25;

8630: C: 0.28-0.33; Mn 0.70-0.90; P 0.035; S 0.040; Si 0.15-0.35; Ni 0.40-0.70; Cr 0.40-0.60; Mo 0.15-0.25;

8620 HEAT TREATMENT:

Annealing: heat to 820-850, cool in finance.
Normalising: heat to 900-925, cool in furnace.
Hardening: heat to 840-870, cool in air or oil.
Tempering: heat to 150-200, cool in steel air.
Carburising: at 900-950
Tempering: 150-200 to improve case toughness with minimal effect on it's hardness.
Nitriding: at 500-530
8630 HEAT TREATMENT:
Annealing: heat to 845, cool rapidly to 730, then cool to 640, at a rate not to exceed 11 per hour; or heat to 845, cool rapidly to 665, and hold for 6 hours for a predominantly spheroidized structure, heat to 760, cooled rapidly to 730, then cool to 650 at a rate not to exceed to 6 per hour; or heat to 760, cooled rapidly to 665 and hold for 8 hours.
Normalising: heat to 900-925, cool in air.
Hardening: Austenilized at 870, and quench in oil.
Tempering: after quenching, reheat to the temperature required for providing the desired hardness or mechanical properties.

American Specification for AISI Designation

This designation has been standardized by SAE and AISI. A 2- and 3- digit number signifies the composition range of alloying elements followed by a 2 digit number referring to average carbon content in hundredths of a percent. Some of the most generally used steels are as bellow:

10XX -- Plain carbon steel
13XX -- Manganese 1.75 steel
25XX – Nickel 5.0 steel
31XX – Nickel 1.25; Chromium 0.65
40XX – Molybdenum 0.25 steel
41XX – Chromium 0.50 or 0.95; Molybdenum 0.12 or 0.20
43XX – Nickel 1.80; Chromium 0.50 or 0.80; Molybdenum 0.25
44XX – Manganese 0.80; Molybdenum 0.40
46XX – Nickel 1.85; Molybdenum 0.25
51XX – Chromium 0.80, 0.88, 0.93, 0.95 or 1.00
61XX – Chromium 0.60, 0.80 or 0.95; Vanadium 0.12 or 0.10 min or 0.15 min
81XX – Nickel 0.30; Chromium 0.40; Molybdenum 0.12
Material Data Sheet

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92XX – Manganese 0.85; Silicon 2.00

93XX – Nickel 3.25; Chromium 1.20; Molybdenum 0.12

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