

Wabi Iron and Steel Corp.

1. GREY IRON

Heat Resistant Grey Iron

| Alloy Code | Nearest Spec | Physical Properties | | | | Characteristics | Applications |
|------------|--------------|---------------------|----------|------|----------------|---|---|
| | | TS (psi) | YS (psi) | % EL | Hardness (BHn) | | |
| GH1 | A 319 | | | | <240 | ASTM A319, Class II Type B, Max. Temperature Resistance 1100°F | Rabble arms, rabble teeth, launders, bullion moulds, slag, and furnace shells etc |
| GH1MOD | A319 | | | | 187-235 | | |
| GH2 | A 319 | 35,000 | | | 207-255 | | |
| GH3 | A 319 | 30,000 | | | 187-241 | | |
| GH4 | A 319 | 40,000 | | | | ASTM A319, Class I Type C-D, Max. Temperature Resistance 1400°F | |
| GH5 | A 319 | 35,000 | | | 207-255 | ASTM A319, Class I Type D, Max. Temperature Resistance 1450°F | |
| GH6 | - | 35,000 | | | 207-255 | | |
| GH7 | - | 20,000 | | | 200 max | | |
| GH8 | - | 20,000 | | | 201 max | | |
| GH9 | A 319 | 35,000 | | | 207-255 | | |
| GH10 | A319 | 40,000 min | | | 400-440 | | |
| GH11 | A 319 | 35,000 | | | 300 max | ASTM A319, Class II Type C, Max. Temperature Resistance 1200°F | |
| GH12 | | | | | 195-235 | | |
| GH13 | A319 | 25,000 | | | <200 | | |
| GH14 | A319 | | | | <240 | ASTM A319, Class III Type A, Max. Temperature Resistance 1000°F | |
| GH14 | A319 | | | | <240 | ASTM A319, Class III Type C, Max. Temperature Resistance 1200°F | |

Wabi Iron and Steel Corp.

Grey Iron Wheels

| Alloy Code | Nearest Spec | TS (psi) | YS (psi) | % EL | Hardness (BHN) | Characteristics | Applications |
|------------|--------------|----------|----------|------|----------------|--|-----------------|
| GWCU | | 35,000 | | | 500 on chill | Chilled Tread with Grey Flake Graphite Iron Hub | Mine Car Wheels |
| GWNI | | 35,000 | | | 500 on chill | Chilled Tread with Grey Flake Graphite Iron Hub, Tough, Abrasive, Acicular Structure | Mine Car Wheels |

Engineering Grade Grey Iron

| Alloy Code | Nearest Spec | TS (psi) | YS (psi) | % EL | Hardness (BHN) | Characteristics | Applications |
|------------|--------------|----------|----------|------|----------------|-----------------|---|
| GI25B | A48 | 25,000 | | | 150-210 | | General engineering grade irons for bearing housings, valve bodies, pump parts, gear boxes, counter weights, etc. |
| GI30A | A48 | 30,000 | | | 187-241 | | |
| GI30B | A48 | 30,000 | | | 187-241 | | |
| GI30C | A48 | 30,000 | | | 187-241 | | |
| GI35B | A48 | 35,000 | | | 207-255 | | |
| GI35N2 | A48 | 35,000 | | | 220-270 | | |
| GI35C | A48 | 35,000 | | | 207-255 | | |
| GI40A | A48 | 40,000 | | | 217-269 | | |
| GI40B | A48 | 40,000 | | | 217-269 | | |
| GI40C | A48 | 40,000 | | | 217-269 | | |
| GI50B | A48 | 50,000 | | | 250 nom | | |
| GI35BCR | A48 | 35,000 | | | 248-293 | | |
| GG 25 | DIN1691 | 36,200 | | | 215-260 | | |
| GI35NI | | 35,000 | | | 220-270 | | |

Heat Resistant Compacted Graphite Iron

| Alloy Code | Nearest Spec | TS (psi) | YS (psi) | % EL | Hardness (BHN) | Characteristics | Applications |
|------------|--------------|----------|----------|------|----------------|---|--------------|
| CG250 | A 842 | 34,000 | 23000 | 2 | 179 max | Good thermal conductivity with improved strength at temperature | Moulds |

2. OTHER IRON

Engineering Grade Nodular Iron

Wabi Iron and Steel Corp.

| Alloy Code | Nearest Spec | Physical Properties | | | | Characteristics | Applications |
|------------|--------------|---------------------|----------|------|----------------|---|---|
| | | TS (psi) | YS (psi) | % EL | Hardness (BHn) | | |
| N60 | A536 | 60,000 | 40,000 | 18 | 149-187 | Near fully ferritic Nodular iron. May be annealed. Excellent machinability. | Shock resistant parts, low temperature service, machine components subject to shock and fatigue loads. |
| N601 | A536 | 60,000 | 40,000 | 18 | 149-187 | | Applications may also include pressure containing parts for use at elevated temperature, valves, fittings for steam and chemical plant equipment. |
| N603 | A536 | 60,000 | 40,000 | 18 | 149-187 | | |
| N65 | A536 | 60,000 | 40,000 | 18 | 149-187 | Nodular iron generally produced as cast, with predominately ferritic matrix with a maximum pearlite of approximately 20%. | Large bearing supports and turntables for radar antenna |
| N651 | A536 | 65,000 | 45,000 | 12 | 170-207 | | pump parts, hydraulic cylinders, manifolds. |
| N653 | A536 | 65,000 | 45,000 | 12 | 170-207 | | |
| N65Mn | A536 | 60,000 | 40,000 | 12 | 149-207 | | |
| N65MW | A536 | 65,000 | 45,000 | 12 | 170-207 | | |
| N806 | A536 | 80,000 | 55,000 | 6 | 187-255 | Generally produced as cast with a ferritic/pearlitic matrix with approximately 50% pearlite. | Crankshafts, gears, rollers. |
| N801 | A536 | 80,000 | 55,000 | 6 | 187-255 | | |
| N803 | A536 | 80,000 | 55,000 | 6 | 187-255 | | |
| N1001 | A536 | 100,000 | 70,000 | 3 | 217-269 | Mostly pearlitic matrix, (bullseye ferrite). Usually normalized and tempered. | High strength gears and machine components. |
| N1003 | A536 | 100,000 | 70,000 | 3 | 217-270 | | Best combination of strength, wear resistance and response to surface hardening. |
| N15 | | 120,000 | 100,000 | 2 | 300-340 | Produced as cast with significant alloy to produce an acicular matrix. | Applications involving high strength and abrasion. |
| GRP400 | ISO 1083 | 58,015 | 36,259 | 12 | <201 | | |
| GRP500 | ISO 1083 | 72,519 | 46,412 | >7 | 170-241 | | |
| GRP600 | ISO 1083 | 87,023 | 53,664 | >3 | 192-269 | | |
| GRP700 | ISO 1083 | 101,526 | 60,916 | >2 | 229-302 | | |
| GGG40 | DIN 1693 | 58,015 | 36,259 | 15 | 120-180 | | |
| N651NI | A536 | 65,000 | 45,000 | 12 | 170-207 | | |
| N653NI | A536 | 65,000 | 45,000 | 12 | 170-207 | | |
| N653%NI | A536 | | | | | | |

Heat Resistant Nodular Iron

Wabi Iron and Steel Corp.

| Alloy Code | Nearest Spec | TS (psi) | YS (psi) | % EL | Hardness (BHN) | Characteristics | Applications |
|------------|--------------|----------|----------|------|----------------|--|----------------------------------|
| NHS | | | | | | Stable ferritic structure to near 1550°F | Elevated temperature application |
| N65MOD | A536 | | | | | | |

Abrasion Resistant Alloy Iron

| Alloy Code | Nearest Spec | TS (psi) | YS (psi) | % EL | Hardness (BHN) | Characteristics | Applications |
|------------|--------------|----------|----------|------|----------------|---|--|
| NH | A532 | 55,000 | | | 550 min | Low to High stress abrasive conditions | Coal pulverizer parts, mill liners, head liners, grates, pulp dischargers, trunnion liners, pump parts, chute liners, lifter bars etc. |
| NCRA/CML | A532 | 80,000 | | | 675 min | Low to High stress abrasive conditions | As above |
| NCRB | A532 | 80,000 | | | 675 min | | Transporting abrasive media |
| HCT | A532 | 80,000 | | | 400-675 | Annealed to 400 BHN maximum and Hardened to 675 BHN minimum | Pipes, elbows, reducers (Hydro-transportation parts) |
| NH4 | A532 | 80,000 | | | 600 min | | Pump parts |
| ELVI | N/A | | | | 585-650 | | Casings, impellers, diffusers, suction liners |
| VAM20 | N/A | | | | 600 min | | Apron feed liners and gyratory crusher liners |
| HC253 | A532 | | | | 700 min | | |
| HC26M | A532 | | | | 650 min | | Horizontal shaft impactor parts |
| HC153 | A532 | | | | 650 min | | |
| HC26TN | N/A | | | | 650 min | | |
| HC302 | Metso | | | | 600 min | Customer Alloy, corrosion and erosive application | Flue - Gas desulphurization (FGD) |
| PC15 | A532 | 80,000 | | | 605-688 | | |
| HC27E | A532 | | | | 650 min | | |

3. STEEL

Low Alloy Steel

Wabi Iron and Steel Corp.

| Alloy Code | Nearest Spec | Physical Properties | | | | Characteristics | Applications |
|------------|--------------|---------------------|------------|---------|----------------|---|--------------|
| | | TS (psi) | YS (psi) | % EL | Hardness (BHN) | | |
| 4330 | A487 | 105-150,000 | 85-135,000 | 15 | 200-420 | Low alloy steels are produced to specific chemistry and heat treatments to meet required physical properties for application. | |
| 4340 | AISI | | | | | | |
| 4620 | AISI | 75,000 | 50,000 | 25 | 150-190 | | |
| 8620 | A487, A148 | 80,000 | 50,000 | 22 | 160-200 | | |
| 8625 | | | | | 200-490 | | |
| 8630 | A148 | 90-150,000 | 60-135,000 | 20 to 9 | 200-420 | | |
| 8637 | A148 | | | | 275-325 | | |
| WC6 | A217 | 70-95000 | 40,000 | 20 | | | |
| WC9MOD | | 94,000 | 70,000 | 22 | 190-240 | | |
| A4876Q | A487 | 185,000 | 150,000 | 4 min | 425-475 | | |
| 4130 | A148 | | | | 200-250 | | |
| 4140 | A148 | 127,600 | 95,700 | 9 | 275-325 | | |
| C5 | A217 | 70-95,000 | 40,000 | 20 | 160-210 | | |
| WC11 | A217 | 80-105,000 | 50,000 | 18 | 170-220 | | |
| LC2-1 | A352 | 105-130,000 | 80,000 | 18 | 190-240 | | |
| WC1 | A217 | 65-90,000 | 35,000 | 24 | 150-190 | | |
| C12 | A217 | 90-115,000 | 60,000 | 18 | 160-210 | | |
| RA-11002 | | 150,000 | 135,000 | 7 | 160-210 | | |

Abrasion Resistant Steel

Wabi Iron and Steel Corp.

| Alloy Code | Nearest Spec | TS (psi) | YS (psi) | % EL | Hardness (BHN) | Characteristics | Applications |
|------------|--------------|------------|----------|------|----------------|---|--|
| NCR13 | | | | | 475-625 | Tool steel with toughness between low alloy steels and high chrome irons | Hammers, wear plates, crusher aprons |
| WSSS | | 240,000 | | | 375-500 | Martensitic abrasion resistant high strength steel with moderate toughness | |
| WSSSPC | | | | | 368-418 | | |
| HIMN | A128 | 100,000 | 50,000 | 40 | 180-200 | Hadfield high manganese steel with good gouging abrasion resistance and exceptional toughness | Jaw crusher plates, mantles, rail switches |
| HIMNB1 | A128 | 100,000 | 50,000 | 40 | 180-200 | As above | Hammers |
| HIMNB3 | A128 | 60,000 min | | | 200 Typ | As above | Hammers |
| HIMNC | A128 | 120,000 | 60,000 | 40 | 200-225 | As above | Hammers |
| CMSTEEL | | | | | 325-375 | Pearlitic Chrome-Moly steels | Ball and SAG mill liners |
| CMSTM | | | | | 325-400 | As above | Ball and SAG mill liners |
| CMSTH | | | | | 350-400 | As above | Ball and SAG mill liners |
| HIMNE1 | A128 | 120,000 | 60,000 | 40 | 200-225 | Hadfield high manganese steel with good gouging abrasion resistance | |
| CR6 | | | | | 525-575 | | |
| MET 500 | | | | | 450-520 | Martensitic abrasion resistant high strength steel with moderate toughness | |
| CR3-1 | | | | | 450-520 | | |
| CR# | | | | | 450-520 | | |
| 4320 | | | | | 375-425 | Martensitic abrasion resistant high strength steel with good toughness | |
| NCR13N | | | | | 525-575 | | |
| NCR13N1 | | | | | 550-600 | | |
| W222 | | | | | 370-420 | Martensitic abrasion resistant high strength steel with moderate toughness | |

Carbon Steel

Wabi Iron and Steel Corp.

| Alloy Code | Nearest Spec | TS (psi) | YS (psi) | % EL | Hardness (BHN) | Characteristics | Applications |
|------------|--------------|----------|----------|------|----------------|--|---|
| CS65 | A27 | 65,000 | 35,000 | 24 | 130-170 | Good toughness and machinability | Carbon and Low Alloy Steels are used for numerous industrial applications, including, transportation, mining, construction, agriculture, power generation, oil & gas, materials handling, forestry, military and special machinery. |
| CS70 | A27 | 70,000 | 40,000 | 22 | 150-190 | | |
| CS80 | A148 | 80,000 | 40,000 | 18 | 180-220 | Highest strength for carbon steel grades | |
| CSM | A148 | 80,000 | 40,000 | 18 | 180-220 | Good response to surface hardening | |

4. STAINLESS STEEL

Corrosion Resistant Stainless Steel

Wabi Iron and Steel Corp.

| Alloy Code | Nearest Spec | Physical Properties | | | | Characteristics | Applications |
|------------|--------------|---------------------|----------|--------|----------------|---|--|
| | | TS (psi) | YS (psi) | % EL | Hardness (BHn) | | |
| CA15 | A217-A743 | 90,000 | 65,000 | 18 | 241 max | Good atmospheric corrosion resistance. Widely used in mild corrosive environments, hardenable, good erosion resistance | Pump parts, valves, fittings, hydroelectric components |
| CA15M | A217-A743 | | | | 185 max | | |
| CA6NM | A487-A743 | 110,000 | 80,000 | 15 min | 229-277 | Improved atmospheric corrosion resistance and strength to CA15. Improved resistance to cavitation | |
| CB7CU | A747 | 175,000 | 125,000 | 5 | 375 min | Hardenable with good corrosion resistance, superior combination of strength, toughness and weldability with moderate good corrosion resistance. Used in highly oxidizing media (HNO ₃), acid mine waters | |
| CF3 | A743 | 70,000 | 30,000 | 35 | 135-185 | The CF series are the most widely used corrosion resistant alloys at room or cryogenic temperatures. "M" variations enhance resistance to halogen ion and reducing acids. Low carbon and stabilized grades are used where application does not permit post welding heat treatment. CF series are not hardenable and rely on the dual phase ferrite to austenite ratio to adjust strength. | |
| CF8 | A743 | 70,000 | 30,000 | 35 | 135-185 | | |
| CF3M | A743 | 70,000 | 30,000 | 30 | 135-185 | | |
| CF8M | A743 | 70,000 | 30,000 | | 135-185 | | |
| CG3M | A743 | 70,000 | 35,000 | 35 | 135-185 | | |
| CG8M | A743 | 75,000 | 35,000 | 25 | 135-185 | Greater resistance to pitting and corrosion in reducing media than CF8M; not suitable for nitric acid or other strongly oxidizing environments | |
| CD4MCU | A890, A995 | 100,000 | 70,000 | 16 | 224-270 | Similar to CF8 in corrosion resistance but higher strength and stress corrosion cracking resistance, excellent resistance to environments involving abrasion or erosion corrosion, Usefully employed in handling both oxidizing and reducing corrodents | |
| CN7M | A743 | 62,000 | 25,000 | 35 min | 140-170 | Highly resistant to H ₂ SO ₄ , H ₃ PO ₄ , H ₂ SO ₃ , salts and sea water. Has good resistance to dilute hydrochloric acid, hot chloride salt solutions and nitric acid. | |
| 282 | | 88,000 | | | 350-450 | | |
| SS329 | A890,AISI329 | 95,000 | 65,000 | 25 | 135-185 | Cast equivalent to AISI 329, a second generation dual phase alloy with good toughness and SCC resistance | |
| UNS32550 | 2114 | 100,000 | 65,000 | 20 | 220-270 | Commonly known by trade name Ferralium 255. Exhibits improved localized corrosion resistance than either CF3M or CD4MCU, with excellent SCC resistance. | |
| NITRONIC | UNS521800 | | | | 135-185 | | |
| CE30 | A743 | 80,000 | 40,000 | 10 | 190 | Dual phase alloy with higher carbon content. Good stress corrosion cracking (SCC) resistance in Polythionic acid. Other corrosives include acid mine waters, caustic soda, hot nitric acid, hot oil products, organic acids and sulphite liquors | |

Heat Resistant Stainless Steel

Wabi Iron and Steel Corp.

| Alloy Code | Nearest Spec | TS (psi) | YS (psi) | % EL | Hardness (BHn) | Characteristics | Applications |
|------------|--------------|----------|----------|------|----------------|--|---|
| HCSS | A297 | 55,000 | | | 200-250 | Used mainly in environments containing high sulphur bearing gases, such as sulphur recovery units, where high temperature strength is not an important consideration. | |
| HD | A297 | 75,000 | 35,000 | 8 | 160-210 | | |
| HE | A297 | 85,000 | 40,000 | 9 | 160-210 | | |
| HF | A297 | 70,000 | 35,000 | 25 | 160-210 | | |
| HH | A297 | 75,000 | 35,000 | 10 | 160-210 | | Rabble arms, glass plant equipment, other roasting furnace parts etc. |
| HH1 | A447 | 75,000 | 35,000 | 10 | 160-210 | | |
| HH2 | A297 | 75,000 | 35,000 | 10 | 160-210 | | |
| HK | A297 | 65,000 | 35,000 | 10 | 160-210 | AISI 310 Max Use Temp 2100° F Good hot gas corrosion resistance. Better than HH. Greater high temperature strength than HC and HD, their creep and rupture strength increases as nickel is raised within the series. | Furnace Parts etc. |
| HT | A297 | 65,000 | | 4 | 160-210 | Have stable austenitic structures, good high temperature strength, enhanced resistance to thermal cycling and thermal stresses, combined with high resistance to oxidizing and reducing environments. | |
| HU | A297 | 65,000 | | 4 | 160-210 | | |
| M343 | Z80 CN 25-3 | | | | 250-330 | | |
| 353MA | N/A | | | | | | |