

SOUTHERLY ALLOY

Alloy 20 Plate and Sheet | UNS N08020 | Werkstoff Nr. 2.4660 | NiCr20CuMo | NS1403

ASTM B463 / ASME SB463 (with B906) — Rolled Plate, Sheet, and Strip

Product Description

Alloy 20 plate and sheet carries UNS N08020 as flat product to ASTM B463, from 4.76 to 63.5 mm plate down through light sheet and strip. Thickness and width together fix the form, so an order has to name both. Flat product lines acid storage tanks, reactor vessels, column internals, scrubber linings, and ducting. The stabilised chemistry means a rolled and welded shell keeps its corrosion resistance without a second anneal. Material under 0.38 mm takes a lower elongation floor, which the mill certificate records.

Chemical Composition

| Element           | Content (UNS N08020)   | Element         | Content (UNS N08020) |
|-------------------|------------------------|-----------------|----------------------|
| Nickel (Ni)       | 32.0–38.0%             | Chromium (Cr)   | 19.0–21.0%           |
| Copper (Cu)       | 3.0–4.0%               | Molybdenum (Mo) | 2.0–3.0%             |
| Niobium (Nb + Ta) | 8 × C min., 1.00% max. | Manganese (Mn)  | 2.00% max.           |
| Silicon (Si)      | 1.00% max.             | Carbon (C)      | 0.07% max.           |
| Phosphorus (P)    | 0.045% max.            | Sulfur (S)      | 0.035% max.          |
| Iron (Fe)         | Balance                |                 |                      |

Copper is the deliberate addition behind the acid performance, and the niobium range scales with the carbon content at eight times carbon as a minimum. ASTM B463, B473, and B729 share this one composition table, so a single window governs every product form. The mill certificate governs final acceptance.

Minimum Room-Temperature Mechanical Properties

| Standard / Form and Condition                                   | Tensile Strength, min. | Yield Strength (0.2%), min. | Elongation / Hardness, min. |
|-----------------------------------------------------------------|------------------------|-----------------------------|-----------------------------|
| Plate, ASTM B463 – stabilised annealed, 4.76–63.5 mm            | ≥ 80 ksi (551 MPa)     | ≥ 35 ksi (241 MPa)          | 30%, 217 HB or 95 HRB max.  |
| Sheet and strip, ASTM B463 – stabilised annealed, under 4.76 mm | ≥ 80 ksi (551 MPa)     | ≥ 35 ksi (241 MPa)          | 30%, 217 HB or 95 HRB max.  |

Material under 0.015 in. (0.38 mm) takes a 20% elongation floor rather than the 30% shown above, measured over a 1 in. gauge length. The hardness figures are informative only, and the standard bars their use as a basis for rejection. ASTM B906 draws the lines between plate, sheet, and strip.

Physical Properties (typical values)

| Property                        | Value                          |
|---------------------------------|--------------------------------|
| Density                         | Approx. 8.08 g/cm <sup>3</sup> |
| Melting range                   | Approx. 1385–1443 °C           |
| Modulus of elasticity           | Approx. 193 GPa                |
| Shear modulus                   | Approx. 76 GPa                 |
| Thermal conductivity at 20 °C   | Approx. 12.3 W/m-K             |
| Electrical resistivity at 20 °C | Approx. 1.08 μΩ-m              |
| Specific heat at 20 °C          | Approx. 500 J/kg-K             |
| Thermal expansion, 25–100 °C    | Approx. 14.7 μm/m-°C           |
| Magnetic response               | Essentially non-magnetic       |
| Strengthening route             | Cold work only                 |

Typical values from the published Special Metals data sheet for the grade, intended for design work rather than acceptance testing. Density is quoted at 8.08 g/cm<sup>3</sup>, and the melting range follows the same source.

Applicable Standards

| Standard / Designation                              | Scope                                                   |
|-----------------------------------------------------|---------------------------------------------------------|
| ASTM B463 / ASME SB463                              | Plate, sheet, and strip                                 |
| ASTM B906                                           | Flat product thickness and width definitions            |
| ASTM B473 / ASME SB473                              | Bar cut from the same heat for nozzle and support parts |
| ASTM B729 / ASME SB729                              | Seamless tube for the same vessel                       |
| NACE MR0175 / ISO 15156-3                           | Sour service qualification for oil and gas              |
| UNS N08020 · W.Nr. 2.4660 · NiCr20CuMo · GB/T 15007 | Material designations                                   |
| NS1403                                              |                                                         |
| SAE AMS                                             | No aerospace specification covers this grade            |

Alloy 20 is stabilised with niobium, so most welded joints need no post-weld anneal and enter service as welded. Heat treatment differs by form: flat product and tubular product hold at 982–1010 °C, while bar holds at 927–1010 °C, and every route is water quenched or rapidly cooled. Filler metal: ER320LR to AWS A5.14, or E320LR to AWS A5.11.

Typical Supply Dimensions

| Product Form | Typical Supply Range                                   |
|--------------|--------------------------------------------------------|
| Plate        | 4.76–63.5 mm thick to ASTM B463, and wider than 250 mm |
| Sheet        | Under 4.76 mm thick, from 600 mm wide                  |
| Strip        | Cold rolled under 4.76 mm thick, under 600 mm wide     |
| Cut plate    | Sheared or plasma cut to the fabrication drawing       |
| Formed plate | Rolled shells and dished heads to the drawing          |

Thickness and width together fix the product name, so an order has to state both. Flat product holds at 982–1010 °C for the anneal, and a welded shell usually enters service without a second cycle.

Surface Finishes

| Surface Condition               | Typical Use                                                  |
|---------------------------------|--------------------------------------------------------------|
| Stabilised annealed and pickled | Standard delivery for acid and chloride service              |
| Hot rolled                      | As-rolled surface for parts that will be blasted or machined |
| Cold rolled                     | Smoother sheet and strip for lining and cladding work        |
| Polished                        | Reduced roughness for product-contact and hygienic duty      |
| Ground plate                    | Tight thickness and flatness for tube sheets                 |

Southerly Alloy — nickel alloy bar, rod, pipe, tube, plate and fittings · [www.southerly-alloy.com](http://www.southerly-alloy.com) · Values are for reference; the mill test certificate prevails for final acceptance.