



MATERIAL No.: ALLOY C22/ N06022/ 2.4602

DESCRIPTION

| | | | |
|--------------------------------|----------------|----------------------------------|--|
| EN symbol (short) | NiCr21Mo14W | Density lb/in³ | 0,314 |
| Alloy | 22 | Hardness HB | 240(max) |
| UNS | N 06022 | Composition | Nickel Chrome Molybdenum Wolfram alloy |
| Registered work's label | Hastelloy® C22 | Category | high-temperature resisting steels and alloys |
| | | Structure | |
| | | Corrosion | high corrosion resistance |

Description Alloy 2.4602 (alloy 22) is a highly non-corrosive nickel chrome molybdenum wolfram alloy and shows an excellent resistance to oxidizing, reducing and mixed acids.

CHEMICAL COMPOSITION

| | | C | Mn | P | S | Cr | Mo | Si | V | Co | W | Fe | Ni |
|---------------|--------------|------|------|-------|-------|-------|-------|------|------|------|------|------|------|
| 2.4602 | Min % | | | | | 20,00 | 12,50 | | | | 2,50 | 2,00 | bal. |
| | Max % | 0,01 | 0,50 | 0,025 | 0,015 | 22,50 | 14,50 | 0,08 | 0,35 | 2,50 | 3,50 | 6,00 | bal. |

(Key to Steel 2010)

| | | | | | | | | | | | | | |
|-----------------|--------------|-------|------|-------|-------|-------|-------|------|------|------|------|------|------------|
| alloy 22 | Min % | | | | | 20,00 | 12,50 | | | | 2,50 | 2,00 | remainder. |
| N 06022 | Max % | 0,015 | 0,50 | 0,020 | 0,020 | 22,50 | 14,50 | 0,08 | 0,35 | 2,50 | 3,50 | 6,00 | remainder |

ASTM B622

PHYSICAL PROPERTIES

| Property | Value | | | | |
|-----------------------------------|----------------------|----------------------------------|----------------------------|------------------------------|---------------------------------------|
| Density: lb/in³ | 0,314 | | | | |
| Hardness: HB | 240(max) | | | | |
| Permeability at 20°C/68°F | < 1,001 | | | | |
| Temperature T | Specific heat | Thermal conductivity | Electric resistance | Modulus of elasticity | Expansion rate from 70°F bis T |
| °C/F | J / kgK | W/mK | μΩ · cm | kN/mm ² | 10 ⁻⁶ / K |
| (°C/F) | (Btu / | (Btu·in / ft ² ·h·°F) | (Ω circ mill / | (10 ³ ksi) | (10 ⁻⁶ / °F) |

| | lb °F) | | ft) | | |
|----------------------------|----------------|---------------|--------------|---------------|---------------|
| 100 / 212 | 423 (--) | 11,1 (--) | 123 (--) | 202 (--) | 12,4 (--) |
| 200 / 393 (204 /400) | 444 (0,106) | 13,4 (94) | 124 (746) | 197 (28,4) | 12,4 (6,9) |
| 300 / 572 316 / 600 | 460 (0,119) | 15,5 (111) | 125 (753) | 190 (27,6) | 12,5 (7,0) |
| 400 / 752 (427 / 800)(| 476 (0,114) | 17,5 (131) | 126 (759) | 185 (26,2) | 13,1 (7,4) |
| 500 / 932/ (538 / 1000) | 495 (0,117) | 19,5 (140) | 127 (767) | 178 (25,7) | 13,7 (7,7) |
| 600 / 1112 (649/ 1200) | 514 (0,125) | 21,3 (156) | 128 (774) | 173 (24,8) | 14,3 (8,1) |
| 700 / 1292 (760 /14009 | 533 | 23,2 | 129 | 167 (23,6) | 14,9 (8,5) |
| 800 / 1472 (871 / 1600) | | | | 159 (22,3) | 15,5 (8,8) |
| 1000 / 1832 | | | | 143 (20,7) | 16,2 |

MECHANICAL PROPERTIES (20°C / 68°F)

| | |
|---|----------|
| Yield strengthRp0,2 min.N/mm²/ ksi | 310/ 45 |
| Yield strength1,0 min. N/mm²/ksi | 335 /49 |
| Tensile strength Rm N/mm²/ ksi | 690 /100 |
| Elongation A 5 (%) | 45 |
| ISO V-notch impact toughness (Average values at RT) j/cm² | >=150 |
| ISO V-notch impact toughness (Average values at(-196°C) -320°F) j/cm² | >=120 |
| Remarks | |

TEMPERATURE INFORMATION

| | |
|--------------------------------|--|
| Application area | |
| Operation temperature | -321 °F to 1382 °F |
| Explanation report | good application possibilities, if strong oxidizing agents are available (such as ferric (III) chloride, chlorine, formic acid, sea wtater, acetic acid) |
| Solution heat treatment | |
| Working temperature | 2021 °F to 2075 °F |
| Explanation report | fast cooling with water, air cooling possible for thicknesses up to 0.06" |

| | |
|--------------------------------|--------------------------------|
| Solution heat treatment | |
| Working temperature | 2012 °F to 1652 °F |
| Explanation report | fast cooling with water or air |
| Processing information | |

STANDARDS / INFORMATION

| Standards | Description |
|-------------------------------------|--|
| ASTM B 366 | Standard Specification for Factory-Made Wrought nickel and nickel alloy fittings |
| ASTM B 564-06 | Standard Specification for Nickel Alloy Forging |
| ASTM B 574 | Standard Specification for LOW-Carbon Nickel-Molybdenum Alloy Rod |
| ASTM B 575 | Standard Specification for Plate, Sheet and Strip |
| ASTM B 619 | Standard Specification for Welded Nickel and Alloy Pipe |
| ASTM B 622 | Standard Specification for Seamless Nickel and Nickel-Cobalt Alloy Pipe and Tube |
| ASTM B 626 | Standard Specification for Welded Nickel and Nickel-Cobalt Alloy Tube |
| DIN 17744 (2002/09) | nickel-forgeable alloy with molybdenum and chrome |
| DIN 17750 (2002/09) | ribbons and sheet metal out of nickel with nickel-wrought alloy properties |
| DIN 17751 (2002/09) | tubes out of nickel with nickel-wrought alloy properties |
| DIN 17752 (2002/09) | rod made from nickel with nickel-wrought alloy properties |
| DIN 17753 (2002/09) | wire out of nickel with nickel-wrought alloy properties |

PROCESS INFORMATION

| | |
|--|---|
| Cold forming | in solution annealed state, great modifications require intermittent annealing |
| Chip removing process | preferably in solution annealed state, due to tendency to cold-work hardening slow cutting rate at constant contact of cutting tools |
| Welding | |
| - Material classification acc. CEN ISO/TR 15608 | 43 |
| - Type | welds very good |
| - Add. material | |
| - Hints | generally no heat treatment necessary after welding process |

MAIN FIELDS OF APPLICATION

| | |
|-------------------------------|---|
| Details of application | Good possibilities for application when there are strong oxidants like ferric chloride, chlorine, formic acid, sea water, acetic acid |
|-------------------------------|---|

| | |
|---|---------------|
| Certifications | NACE MR-01-75 |
| Chemical Industry | |
| Flue gas desulphurization plants | |
| Environmental technology | sewage works |
| waste incineration plants | |

RANGE OF PRODUCTS

| Product type | Product |
|--------------------------------------|--|
| Plates / Sheets | plates/sheets plate/sheet cuts |
| Rotating components | fittings from barsteel |
| Fittings | welded elbows welded reductions Welded T-pieces seamless elbows seamless reductions seamless T-pieces |
| Flanges / Collars / Flared tube ends | flared tube end collars various flanges (weld neck flange, blind flange etc.) |
| Pipes / Tubes | welded pipes/tubes welded square pipes/tubes seamless pipes/tubes |
| Bar steel | flat steel section steel round bar steel hexagon steel |

[Pipe/Tube/Fitting/Flange/Valve/Plate](#)

Stainless Steel/Nickel Alloy/Duplex

