



**MATERIAL No.: ALLOY 825/ N08825/ 2.4858**

**DESCRIPTION**

|                                |   |                                   |   |
|--------------------------------|---|-----------------------------------|---|
| <b>EN symbol (short)</b>       | NiCr21Mo  | <b>Density lb/in<sup>2</sup></b>  | 0,294   |
| <b>Alloy</b>                   | 825   | <b>Hardness HB</b>                | 135-165   |
| <b>UNS</b>                     | N 08825   | <b>Composition</b>                | Nickel Chrome Molybdenum alloy super alloy  |
| <b>AFNOR</b>                   | NC 21 FeDu  | <b>Category</b>                   | Heat resistant steels and alloys  |
| <b>BS</b>                      | NA 16   | <b>Structure</b>                  | cubic-face-centered grid  |
| <b>Registered work's label</b> | Incoloy® 825  | <b>Corrosion</b>                  | against crevice corrosion<br>good resistance to tensile corrosion<br>sati factionary against pitting corrosion                        |
|                                |   | <b>Additional characteristics</b> | enduring in oxidation, reducing and sulfuric substances<br>enduring in sulfuric acid and phosphoric acid solutions<br>No translation! |
| <b>Description</b>             | Titanium stabilized, fully austenitic nickel iron chrome alloy, good resistance to crevice / tensile / pitting corrosion. |                                   |   |

**CHEMICAL COMPOSITION**

|                     |              | C     | Si   | Mn   | P    | S     | Cr    | Mo   | Ni    | Fe      | Ti   | Cu   | AL   | Co   |
|---------------------|--------------|-------|------|------|------|-------|-------|------|-------|---------|------|------|------|------|
| <b>2.4858</b>       | <b>Min %</b> |       |      |      |      |       | 19,50 | 2,50 | 38,00 | balance | 0,60 | 1,50 |      |      |
|                     | <b>Max %</b> | 0,025 | 0,50 | 1,00 | 0,02 | 0,015 | 23,50 | 3,50 | 46,00 | balance | 1,20 | 3,00 | 0,20 | 1,00 |
| (Key to Steel 2010) |              |       |      |      |      |       |       |      |       |         |      |      |      |      |
| <b>alloy 825</b>    | <b>Min %</b> |       |      |      |      |       | 19,50 | 2,50 | 38,00 | 22,00   | 0,60 | 1,50 |      |      |
| <b>N 08825</b>      | <b>Max %</b> | 0,05  | 0,50 | 1,00 |      | 0,03  | 23,50 | 3,50 | 46,00 |         | 1,20 | 3,00 | 0,20 |      |
| ASTM B 423          |              |       |      |      |      |       |       |      |       |         |      |      |      |      |

**PHYSICAL PROPERTIES**

| Property                          | Value |
|-----------------------------------|-------|
| <b>Density: lb/in<sup>2</sup></b> | 0,294 |

| <b>Hardness: HB</b>                    |  | 135-165                             |   |   |  |
|--|--|-------------------------------------|---|---|--|
| <b>Permeability at 20°C/68°F</b>       |  | 1,004                               |   |   |  |
| <b>Temperature T</b><br>°C/F<br>(°C/F) | <b>Specific heat</b><br>J / kgK<br>(Btu / lb °F) | <b>Thermal conductivity</b><br>W/mK | <b>Electric resistance</b><br>μΩ · cm<br>(Ω circ mill / ft) | <b>Modulus of elasticity</b><br>kN/mm <sup>2</sup><br>(10 <sup>3</sup> ksi) | <b>Expansion rate from 70°F bis T</b><br>10 <sup>-6</sup> / K<br>(10 <sup>-6</sup> / °F) |
| 20/68<br>(93/200)                      | 440 (0105)<br>(110)                              | 10,8 (73)                           | 11,2  | 195(28,7)<br>(27,4)   |  |
| 100/212                                | 462  | 2,4                                 | 114   | 190   | 14,1   |
| 200/392<br>(204/400)                   | 488<br>(0,117)                                   | 14,1<br>(98)                        | 118<br>(710)  | 185<br>(26,8)   | 14,9<br>(8,3)  |
| 400/762<br>(427/800)                   | 540<br>(0,131)                                   | 16,9<br>(120)                       | 124<br>(751)  | 174<br>(25,0)   | 15,6<br>(8,7)  |
| 500/932<br>(538/1000)                  | 565<br>(0,137)                                   | 18,3<br>(131)                       | 126<br>(761)  | 168<br>(23,8)   | 15,8<br>(8,8)  |
| 700/1292<br>(760/1400)                 | 615<br>(0,153)                                   | 21<br>(155)                         | 127<br>(765)  | 154<br>(21,2)   | 16,7<br>(9,5)  |
| 900/1652<br>(982/1800)                 | 680<br>(0,167)                                   | 25,7<br>(192)                       | 129<br>(782)  | 130<br>(17,3)   | 17,6<br>(9,9)  |
| 1000/1832                              | 710  | 28,1                                | 130   | 119   | 17,9   |

#### TEMPERATURE INFORMATION

##### **Application area**

**Operation temperature** -321 °F to 1022 °F

##### **Soft annealing**

**Working temperature** 1688 °F to 1796 °F

**Explanation report** cooling by water

**Processing information** preferably 1700°F

##### **Solution heat treatment**

**Working temperature** 2102 °F to 1652 °F quick cooling air/water

**Explanation report** when reaching 1652°F re-heating is required

**Processing information** heat oven to must value and insert component  
hold for approx. 60 min per 4" thickness

#### STANDARDS / INFORMATION

| <b>Standards</b>                    | <b>Description</b>   |
|-------------------------------------|--|
| <a href="#">ASTM B 163</a>          | Standard Specifications for seamless nickel and nickel alloy condensers and heat-exchanger tubes |
| <a href="#">ASTM B 704</a>          | Standard Specification for Welded Alloy Tubes  |
| <a href="#">ASTM B 705</a>          | Standard Specification for Nickel-Alloy Welded Pipe  |
| <a href="#">DIN 17744 (2002/09)</a> | nickel-forgeable alloy with molybdenum and chrome  |
| <a href="#">DIN 17750 (2002/09)</a> | ribbons and sheet metal out of nickel with nickel-wrought alloy properties                       |
| <a href="#">DIN 17751 (2002/09)</a> | tubes out of nickel with nickel-wrought alloy properties   |
| <a href="#">DIN 17752 (2002/09)</a> | rod made from nickel with nickel-wrought alloy properties  |
| <a href="#">DIN 17753 (2002/09)</a> | wire out of nickel with nickel-wrought alloy properties  |

#### **PROCESS INFORMATION**

|  |  |
|--|--|
| <b>Cold forming</b>                                    | string cold work hardening, process component in annealed state, forming >15% require anew annealing |
| <b>Chip removing process</b>                           | process when annealed - mind tendency for cold work hardeneing                                       |
| <b>Welding</b>   |  |
| <b>- Material classification acc. CEN ISO/TR 15608</b> | <b>45</b>  |
| <b>- Type</b>  | WIG<br>plasma welding<br>MIG/MAG   |
| <b>- Add. material</b>                                 | material nr. 2831/ rod electrode W.Nr. 2621  |
| <b>- Hints</b>   | No translation!  |

#### **MAIN FIELDS OF APPLICATION**

|                                  |  |
|----------------------------------|--|
| <b>Details of application</b>    | good resistance to sulfuric, hydrochloric, phosphoric acids and organic acids, seawater and chloride lye |
| <b>Certifications</b>            | pressure container from 68°F-797°F<br>NACE MR-01-75  |
| <b>offshore plants</b>           | Pipe works   |
| <b>sea and lake water plants</b> | Sea-water-cooled heat exchangers   |
| <b>offshore plants</b>           | Sea water desalination plant   |

#### **RANGE OF PRODUCTS**

| <b>Product type</b> | <b>Product</b> |
|---------------------|----------------|
| Plates / Sheets     | plates/sheets  |

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

Pipe/Tube/Fitting/Flange/Valve/Plate

Stainless Steel/Nickel Alloy/Duplex

