

|                |                           |                                  |                            |
|----------------|---------------------------|----------------------------------|----------------------------|
| <b>Quality</b> | <b>X2CrNiMoCuS17-10-2</b> | Free machining <b>Austenitic</b> | <i>Technical card 2018</i> |
| Number         | <b>1.4598</b>             | <b>Stainless Steel</b>           | <i>Lucefin Group</i>       |

### Chemical composition

| C%      | Si%    | Mn%    | P%      | S%        | Cr%       | Ni%       | N%     | Mo%     | Cu%     |                  |
|---------|--------|--------|---------|-----------|-----------|-----------|--------|---------|---------|------------------|
| max     | max    | max    | max     |           |           |           | max    |         |         |                  |
| 0,03    | 1,00   | 2,00   | 0,045   | 0,10-0,20 | 16,5-18,5 | 10,0-13,0 | 0,10   | 2,0-2,5 | 1,3-1,8 | EN 10088-3: 2014 |
| + 0.005 | + 0.05 | ± 0.04 | + 0.005 | ± 0.02    | ± 0.2     | ± 0.15    | + 0.01 | ± 0.1   | ± 0.1   |                  |

Product deviations are allowed

### Temperature °C

| Melting range | Hot-forming  | Solution annealing (Solubilization) +AT | Stabilizing          | Soft annealing +A | MMA welding – AWS electrodes   |
|---------------|--------------|---|----------------------|-------------------|--|
| 1420-1380     | 1180-980     | 1120-1020<br>water                      | not required         | not suitable      | <i>pre-heating pre-heating</i><br>given the high sulfur content is not recommended |
| Sensitization | Quenching +Q | Tempering +T                            | Stress-relieving +SR |                   | joint with steel   |
| not required  | not suitable | not suitable                            | 450-230<br>air       |                   | carbon carbon carbon<br><i>cosmetic welding</i>                                    |

### Chemical treatment

▪ *Pickling* (10 - 15% HNO<sub>3</sub>) + (0,5 – 1,5% HF) hot ▪ *Passivation* (12% HNO<sub>3</sub>) + (4% di CuSO<sub>4</sub>) hot 50-60 °C

### Mechanical properties

**Heat-treated material** EN 10088-3: 2014 in conditions 1C, 1E, 1D, 1X, 1G, 2D

| size |     | Testing at room temperature |                       |         |         |                        |                        |                   |
|------|-----|-----------------------------|-----------------------|---------|---------|------------------------|------------------------|-------------------|
| mm   |     | R                           | Rp 0.2                | A%      | A%      | Kv <sub>2</sub> +20 °C | Kv <sub>2</sub> +20 °C | HBW <sup>a)</sup> |
| from | to  | N/mm <sup>2</sup>           | N/mm <sup>2</sup> min | min (L) | min (T) | J min (L)              | J min (T)              | max               |
|      | 160 | 500-700                     | 200                   | 40      | -       | 100                    | -                      | 215               |

<sup>a)</sup> for information only. (L) = longitudinal (T) = transversal

**Bright bars of heat-treated material** EN 10088-3: 2014 in conditions 2H, 2B, 2G, 2P

| size |                  | Testing at room temperature |                       |         |         |                        |                        |                |
|------|------------------|-----------------------------|-----------------------|---------|---------|------------------------|------------------------|----------------|
| mm   |                  | R                           | Rp 0.2                | A%      | A%      | Kv <sub>2</sub> +20 °C | Kv <sub>2</sub> +20 °C |                |
| from | to               | N/mm <sup>2</sup>           | N/mm <sup>2</sup> min | min (L) | min (T) | J min (L)              | J min (T)              |                |
|      | 10 <sup>b)</sup> | 600-930                     | 400                   | 15      | -       | -                      | -                      |                |
| 10   | 16               | 600-900                     | 400                   | 20      | -       | -                      | -                      | +AT            |
| 16   | 40               | 500-850                     | 200                   | 25      | -       | -                      | -                      | solubilization |
| 40   | 63               | 500-800                     | 200                   | 30      | -       | -                      | -                      |                |
| 63   | 160              | 500-700                     | 200                   | 40      | -       | -                      | -                      |                |

<sup>b)</sup> in the range of 1 mm ≤ d < 5 mm, values are valid only for rounds – the mechanical properties of non round bars of < 5 mm of thickness have to be agreed at the time of request and order  
(L) = longitudinal (T) = transversal

Effect of **cold-working** (hot-rolled +AT+C). Approximate values

|             |                   |          |           |           |           |           |           |           |           |
|-------------|-------------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| R           | N/mm <sup>2</sup> | 600      | 640       | 720       | 800       | 900       | 940       | 1020      | 1100      |
| Rp 0.2      | N/mm <sup>2</sup> | 300      | 450       | 600       | 700       | 800       | 880       | 940       | 1000      |
| Reduction % |                   | <b>0</b> | <b>10</b> | <b>20</b> | <b>30</b> | <b>40</b> | <b>50</b> | <b>60</b> | <b>70</b> |

**Minimum 0.2% proof strength at high temperatures** on material +AT EN 10088-3: 2014

|                          |                   |            |            |            |            |            |            |            |            |            |            |
|--------------------------|-------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| <b>R<sub>p</sub> 0.2</b> | N/mm <sup>2</sup> | 165        | 150        | 137        | 127        | 119        | 113        | 108        | 103        | 100        | 98         |
| Test at                  | °C                | <b>100</b> | <b>150</b> | <b>200</b> | <b>250</b> | <b>300</b> | <b>350</b> | <b>400</b> | <b>450</b> | <b>500</b> | <b>550</b> |

|                          |                                    |   |      |      |      |      |      |
|--------------------------|------------------------------------|---|------|------|------|------|------|
| <b>Thermal expansion</b> | 10 <sup>-6</sup> • K <sup>-1</sup> | ▶ | 16.5 | 17.3 | 17.7 | 18.1 | 18.4 |
|--------------------------|------------------------------------|---|------|------|------|------|------|

|                              |     |     |     |     |     |     |     |
|------------------------------|-----|-----|-----|-----|-----|-----|-----|
| <b>Modulus of elasticity</b> | GPa | 200 | 194 | 186 | 179 | 172 | 165 |
|------------------------------|-----|-----|-----|-----|-----|-----|-----|

|                       |   |           |
|-----------------------|---|-----------|
| <b>Poisson number</b> | ν | 0.27-0.30 |
|-----------------------|---|-----------|

|                               |                        |      |
|-------------------------------|------------------------|------|
| <b>Electrical resistivity</b> | Ω • mm <sup>2</sup> /m | 0.75 |
|-------------------------------|------------------------|------|

|                                |                           |      |
|--------------------------------|---------------------------|------|
| <b>Electrical conductivity</b> | Siemens•m/mm <sup>2</sup> | 1.33 |
|--------------------------------|---------------------------|------|

|                      |          |     |
|----------------------|----------|-----|
| <b>Specific heat</b> | J/(Kg•K) | 500 |
|----------------------|----------|-----|

|                |                    |      |
|----------------|--------------------|------|
| <b>Density</b> | Kg/dm <sup>3</sup> | 8.00 |
|----------------|--------------------|------|

|                             |         |      |
|-----------------------------|---------|------|
| <b>Thermal conductivity</b> | W/(m•K) | 14.5 |
|-----------------------------|---------|------|

|                                       |                |       |
|---------------------------------------|----------------|-------|
| <b>Relative magnetic permeability</b> | μ <sub>r</sub> | 1.008 |
|---------------------------------------|----------------|-------|

|    |           |            |            |            |            |            |
|----|-----------|------------|------------|------------|------------|------------|
| °C | <b>20</b> | <b>100</b> | <b>200</b> | <b>300</b> | <b>400</b> | <b>500</b> |
|----|-----------|------------|------------|------------|------------|------------|

The symbol ▶ indicates temperature between 20 °C and 100 °C, 20 °C and 200 °C .....

|                             |                   |               |               |                  |                 |   |
|-----------------------------|-------------------|---------------|---------------|------------------|-----------------|---|
| <b>Corrosion resistance</b> | Atmospheric       |               | Chemical      |                  |                 | x intergranular,<br>different varieties of<br>salts |
| Fresh water                 | <i>industrial</i> | <i>marine</i> | <i>medium</i> | <i>oxidizing</i> | <i>reducing</i> |   |
| <b>x</b>                    | <b>x</b>          | <b>x</b>      | <b>x</b>      | <b>x</b>         | <b>x</b>        |   |

|                 |    |
|-----------------|----|
| <b>Magnetic</b> | no |
|-----------------|----|

|                      |      |
|----------------------|------|
| <b>Machinability</b> | high |
|----------------------|------|

|                  |  |
|------------------|--|
| <b>Hardening</b> | cold-drawn and other cold plastic deformations |
|------------------|--|

|                                   |  |
|-----------------------------------|--|
| <b>Service temperature in air</b> | continuous service up to 900 °C; intermittent service up to 860 °C |
|-----------------------------------|--|

|               |            |            |              |               |              |              |                 |
|---------------|------------|------------|--------------|---------------|--------------|--------------|-----------------|
| <b>Europe</b> | <b>USA</b> | <b>USA</b> | <b>China</b> | <b>Russia</b> | <b>Japan</b> | <b>India</b> | <b>R. Corea</b> |
| EN            | UNS        | ASTM       | GB           | GOST          | JIS          | IS           | KS              |

X2CrNiMoCuS17-10-2