

**STANDARD REFERENCE:**

EN 10083-2: 2006 (Hot-rolled products)

**RODACCIAI REFERENCES AND COMPARABLE STANDARDS**

| EUROPE           |        | ITALY         | GERMANY        |        | FRANCE           | UK               | USA       |
|------------------|--------|---------------|----------------|--------|------------------|------------------|-----------|
| EN 10083-2: 2006 |        | (UNI 7845-78) | (DIN 17200-86) |        | (NF A 35-552-86) | (BS 970 pt.3-96) | ASTM A 29 |
| Grade            | N°     |               | Werkstoff      | N°     |                  |                  |           |
| C22E             | 1.1151 | -             | Ck 22          | 1.1151 | XC 18            | 070M20           | 1020      |

**CHEMICAL COMPOSITION (CAST ANALYSIS) (%)**

| EUROPE | C         | Si / max | Mn        | P / max | S           | Cr / max | Mo / max | Ni / max | Al | Pb |
|--------|-----------|----------|-----------|---------|-------------|----------|----------|----------|----|----|
| C22E   | 0,17÷0,24 | 0,40     | 0,40÷0,70 | 0,035   | ≤ 0,035     | 0,40     | 0,10     | 0,40     | -  | -  |
| C22EPb |           |          |           |         | 0,020÷0,040 |          |          |          |    |    |

**MECHANICAL PROPERTIES - AS ROLLED CONDITION**

| Size mm    | HB max to condition                      |                     | Normalized (+N)             |                          |                        |
|------------|--|---------------------|-----------------------------|--------------------------|------------------------|
|            | Treated to improve shearability (+S)     | Soft annealing (+A) | R <sub>p0,2</sub> (MPa) min | R <sub>m</sub> (MPa) min | A <sub>5</sub> (%) min |
| ≤ 16       | it can be sheared without heat treatment | -                   | 240                         | 430                      | 24                     |
| > 16 ≤ 40  |  | -                   | 210                         | 410                      | 25                     |
| > 40 ≤ 100 |  | -                   | 210                         | 410                      | 25                     |

**MECHANICAL PROPERTIES - BRIGHT PRODUCTS CONDITION\***

| Size mm    | as Rolled + as Rolled + Turned (+SH) |                      | Cold Drawn(+C)              |                      |                        |
|------------|--------------------------------------|----------------------|-----------------------------|----------------------|------------------------|
|            | Hardness HB                          | R <sub>m</sub> (MPa) | R <sub>p0,2</sub> (MPa) min | R <sub>m</sub> (MPa) | A <sub>5</sub> (%) min |
| ≥ 5 ≤ 10   | -                                    | -                    | 425                         | 550÷900              | 7                      |
| > 10 ≤ 16  | -                                    | -                    | 340                         | 500÷800              | 8                      |
| > 16 ≤ 40  | 136÷200                              | 460÷650              | 270                         | 470÷770              | 9                      |
| > 40 ≤ 63  | 136÷200                              | 460÷650              | 240                         | 450÷750              | 10                     |
| > 63 ≤ 100 | 136÷200                              | 460÷650              | 215                         | 425÷700              | 10                     |

\*For reference only

For size &lt;5 mm the mechanical properties may be agreed at the time of enquiry and order

**WORKING TEMPERATURES RECOMMENDED**

| Operation | Hot forgings deformation | Isothermal annealing | Soft annealing | Quenching in water | Tempering |
|-----------|--------------------------|----------------------|----------------|--------------------|-----------|
| °C        | 850÷1150                 | 880÷900              | 650÷700        | 870÷890            | 580÷620   |

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**QUENCHING AND TEMPERING**  
 NOT ALLOYED

**KV20 - R20PB**
