

## Database of Steel and Alloy ( Marochnik )

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## Characteristics for grade St3sp ( Cr3cn ).

|                    |                                        |
|--------------------|----------------------------------------|
| Grade :            | St3sp ( Cr3cn )                        |
| Classification :   | Normal quality structural carbon steel |
| Equivalent grades: | <a href="#">Go here</a>                |

## Chemical composition in % for grade St3sp ( Cr3cn )

| C           | Si         | Mn         | Ni      | S        | P        | Cr      | N         | Cu      | As       |
|-------------|------------|------------|---------|----------|----------|---------|-----------|---------|----------|
| 0.14 - 0.22 | 0.15 - 0.3 | 0.4 - 0.65 | max 0.3 | max 0.05 | max 0.04 | max 0.3 | max 0.008 | max 0.3 | max 0.08 |

## Mechanical properties under T=20°C for grade St3sp ( Cr3cn )

| Assortment                  | Dimension | Direct. | $\sigma_B$ | $\sigma_T$ | $\delta_5$ | $\psi$ | KCU                 | Heat treatment |
|-----------------------------|-----------|---------|------------|------------|------------|--------|---------------------|----------------|
| -                           | mm        | -       | MPa        | MPa        | %          | %      | kJ / m <sup>2</sup> | -              |
| Pipe, GOST 8696-74          |           |         | 372        | 245        | 23         |        |                     |                |
| Pipe, GOST 10705-80         |           |         | 372        | 225        | 22         |        |                     |                |
| Rolled stock, GOST 535-2005 |           |         | 370-490    | 205-255    | 23-26      |        |                     |                |
| Sheet trick, GOST 14637-89  |           |         | 370-480    | 205-245    | 23-26      |        |                     |                |
| Rebar, GOST 5781-82         |           |         | 373        | 235        | 25         |        |                     |                |
| Wire rods , GOST 30136-95   |           |         | 490-540    |            |            | 60     |                     |                |

Brinell hardness for St3sp ( Cr3cn ) ,

HB 10<sup>-1</sup> = 131 MPa

## Technological properties for grade St3sp ( Cr3cn )

|                     |                      |
|---------------------|----------------------|
| Weldability:        | without limitations. |
| Flakes :            | not predisposed      |
| Temper brittleness: | not predisposed      |

## Physical properties for grade St3sp ( Cr3cn )

| T     | E 10 <sup>-5</sup> | $\alpha$ 10 <sup>6</sup> | $\lambda$      | $\rho$            | C            | R 10 <sup>9</sup> |
|-------|--------------------|--------------------------|----------------|-------------------|--------------|-------------------|
| Grade | MPa                | 1/Grade                  | Watt/(m·Grade) | kg/m <sup>3</sup> | J/(kg·Grade) | Ohm·m             |
| 20    |                    |                          |                | 7850              |              |                   |

## Equivalent steels for grade St3sp ( Cr3cn )

Warning! Indicated both exact and nearest equivalents.

| USA                                                                                                                                    | Germany                                                                                                                                        | Japan                  | France                                                                           | England                                                                                                                                                                                                       | European                                                                                                                                       | Italy                                                                                                                            | Belgium                        | Spain                                                                                       | China                                                                        | Sweden       | Bulgaria                                                                | Hungary                                     | Poland                        | Romania                    | Czechia        | Finland                             | Austria |
|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------|---------------------------------------------|-------------------------------|----------------------------|----------------|-------------------------------------|---------|
| -                                                                                                                                      | DIN, WNr                                                                                                                                       | JIS                    | AFNOR                                                                            | BS                                                                                                                                                                                                            | EN                                                                                                                                             | UNI                                                                                                                              | NBN                            | UNE                                                                                         | GB                                                                           | SS           | BDS                                                                     | MSZ                                         | PN                            | STAS                       | CSN            | SFS                                 | ONORM   |
| A284Gr.D<br>A570(36)<br>A573Gr.58<br>A611Gr.C<br>GradeC<br>K01804<br>K02001<br>K02301<br>K02502<br>K02601<br>K02701<br>K02702<br>M1017 | 1.0038<br>1.0116<br>DC03<br>Fe360B<br>Fe360D1<br>RS137-2<br>RS137-3<br>S235J0<br>S235J2G3<br>S235JR<br>S235JRG2<br>S137-2<br>S137-3<br>S137-3G | SS330<br>SS34<br>SS400 | E24-2<br>E24-2NE<br>E24-3<br>E24-4<br>S235J0<br>S235J2G3<br>S235J2G4<br>S235JRG2 | 1449-<br>27/23CR<br>1449-<br>37/23CR<br>37/23HR<br>40B<br>40C<br>40D<br>4360-40B<br>4360-40D<br>4449-250<br>722M24<br>Fe360BFU<br>Fe360D1FF<br>HFS3<br>HFS4<br>HFW3<br>HFW4<br>S235J2G3<br>S235JR<br>S235JRG2 | 1.0114<br>Fe37-3FN<br>Fe37-3FU<br>Fe37B1FN<br>Fe37B1FU<br>Fe37B3FN<br>Fe37B3FU<br>S235<br>S235J0<br>S235J2G3<br>S235J2G4<br>S235JR<br>S235JRG2 | Fe360B<br>Fe360BFN<br>Fe360C<br>Fe360CFN<br>Fe360D<br>Fe360DFF<br>Fe37-2<br>S235J0<br>S235J2G3<br>S235J2G4<br>S235JR<br>S235JRG2 | FE360BFN<br>FE360BFU<br>FED1FF | AE235BFN<br>AE235BFU<br>AE235D<br>Fe360BFN<br>Fe360BFU<br>Fe360D1FF<br>S235J2G3<br>S235JRG2 | Q235<br>Q235A<br>Q235A-<br>B<br>Q235A-<br>Z<br>Q235B<br>Q235B-<br>Z<br>Q235C | 1312<br>1313 | BS13ps<br>BS13sp<br>Ew-08AA<br>S235J2G3<br>S235JRG2<br>WS13ps<br>WS13sp | Fe235B/FN<br>Fe235D<br>S235J2G3<br>S235JRG2 | St3S<br>St3SX<br>St3V<br>St3W | OL37.1<br>OL37.2<br>OL37.4 | 11375<br>11378 | FORM300H<br>RACOLD03F<br>RACOLD215S | RS1360B |

## Specification :

## Mechanical properties :

 $\sigma_B$  - Tensile strength , [MPa] $\sigma_T$  - Yield stress, [MPa]

|            |                                             |
|------------|---------------------------------------------|
| $\delta_5$ | - Specific elongation at fracture , [ % ]   |
| $\psi$     | - Reduction of area , [ % ]                 |
| KCU        | - Impact strength , [ kJ / m <sup>2</sup> ] |
| HB         | - Brinell hardness , [MPa]                  |

**Physical properties :**

|           |                                                                 |
|-----------|-----------------------------------------------------------------|
| T         | - Test temperature , [Grade]                                    |
| E         | - Young modulus , [MPa]                                         |
| $\alpha$  | - Coefficient of linear expansion ( range 20° - T ) , [1/Grade] |
| $\lambda$ | - Thermal (heat) conduction coefficient , [Watt/(m·Grade)]      |
| $\rho$    | - Density , [kg/m <sup>3</sup> ]                                |
| C         | - Specific heat ( range 20° - T ) , [J/(kg·Grade)]              |
| R         | - Electrical resistance , [Ohm·m]                               |

**Weldability :**

|                            |                                                                                                                              |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>without limitations</b> | - welding is done without heating and subsequent heat treating                                                               |
| <b>limited weldability</b> | - welding is possible under heating up to 100-120 grade and subsequent heat treating                                         |
| <b>hard weldability</b>    | - obtaining the quality welding needs the additional operations: heating up to 200-300 grade; the heat treating is annealing |

Database of steels and alloys (Marochnik) contains information about chemical composition and properties more than 2500 steels and alloys (stainless steel, alloy steel, carbon steel, structural steel, tool steel, cast iron, aluminum alloy, titanium alloy, copper alloy, nickel alloy, magnesium alloy and others).  
Helpful for specialists in grade technology, structural engineer, mechanical engineer, metallurgy and metal trader

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