

MATERIAL NUMBER 1.6511 · CLASS 1.6

# 1.6511

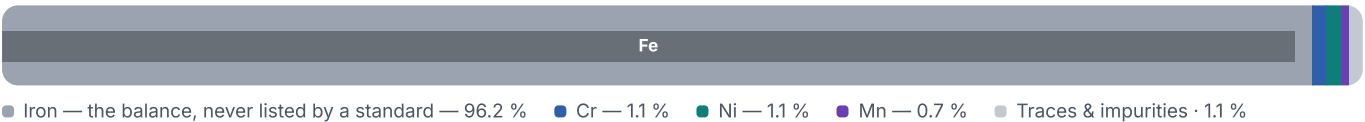
Chemical composition, mechanical and physical property values, and 91 standard designations from 17 regions.

|                              |                                               |                                      |
|------------------------------|-----------------------------------------------|--------------------------------------|
| DENSITY<br><b>7.85</b> g/cm³ | OTHER DESIGNATIONS<br><b>91</b> in 17 regions | PROPERTY VALUES<br><b>16</b> on file |
|------------------------------|-----------------------------------------------|--------------------------------------|

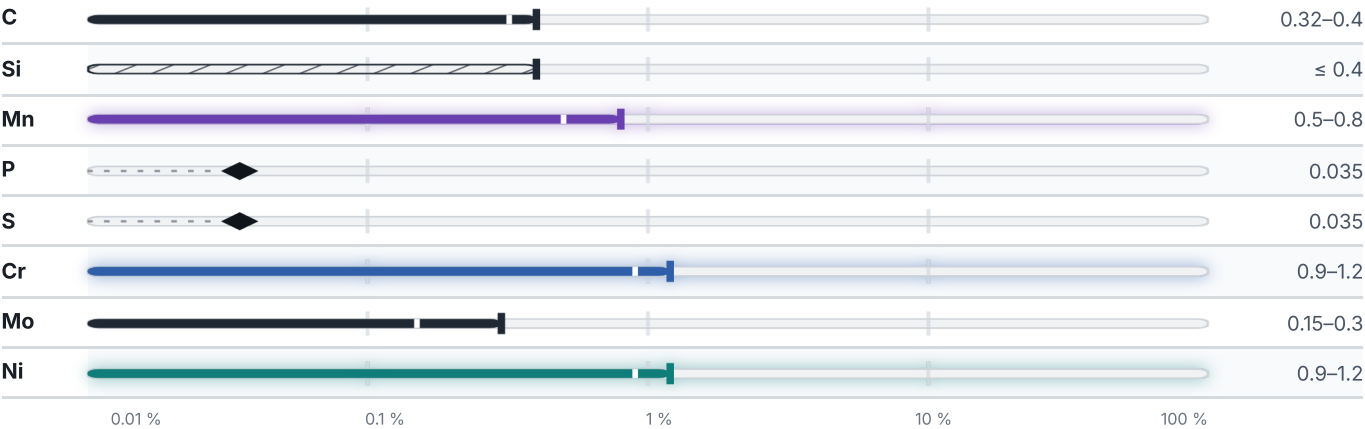
## Chemical composition

Mass fraction in %

What this alloy is



Logarithmic scale, 0.01 % to 100 % — every value here compares directly, decade by decade.



The scale is logarithmic, not the element's raw share of the alloy — the only honest way to fit 0.01 % and 100 % in one picture, and it means every value here can be compared with every other.

## Predicted transformation temperatures

computed from composition · °C

|                                |                                |                                |                               |
|--------------------------------|--------------------------------|--------------------------------|-------------------------------|
| PREDICTED AE3<br><b>766</b> °C | PREDICTED AE1<br><b>731</b> °C | PREDICTED ACM<br><b>607</b> °C | PREDICTED BS<br><b>515</b> °C |
|--------------------------------|--------------------------------|--------------------------------|-------------------------------|

Mechanical properties

39 values across 5 conditions

| QUENCHED AND TEMPERED                           | REH<br>N/mm <sup>2</sup> | RM<br>N/mm <sup>2</sup> | A<br>%  |        |                          |
|-------------------------------------------------|--------------------------|-------------------------|---------|--------|--------------------------|
| ≤ 8                                             | 900                      | 1100                    | 10      |        |                          |
| 8 – 20                                          | 800                      | 1000                    | 11      |        |                          |
| 20 – 50                                         | 700                      | 900                     | 12      |        |                          |
| 50 – 80                                         | 600                      | 800                     | 13      |        |                          |
| ≤ 160                                           | –                        | 750                     | 14      |        |                          |
| 160 – 330                                       | –                        | 700                     | 15      |        |                          |
| 330 – 660                                       | –                        | 650                     | 16      |        |                          |
| QUENCHING 820°C, WATER,<br>DRAWING 600°C, WATER | RM<br>N/mm <sup>2</sup>  | RE<br>N/mm <sup>2</sup> | A5<br>% | Z<br>% | KCU<br>kJ/m <sup>2</sup> |
| Ø 50                                            | 770                      | 590                     | 18      | 57     | 680                      |
| Ø 75                                            | 730                      | 540                     | 18      | 54     | 590                      |
| Ø 100                                           | 720                      | 490                     | 18      | 56     | 290                      |
| QUENCHING AND DRAWING                           | RM<br>N/mm <sup>2</sup>  | RE<br>N/mm <sup>2</sup> | A5<br>% | Z<br>% |                          |
| Ø 25                                            | 660                      | 380                     | 12      | 40     |                          |
| CONDITION · DIMENSION                           |                          |                         |         |        | HB                       |
| (annealing) , GOST 4543-71                      |                          |                         |         |        | 217                      |
| SOFT ANNEALED                                   |                          |                         |         |        | HB                       |
| Soft annealed                                   |                          |                         |         |        | 241                      |

Physical properties

8 values

| CONDITION · DIMENSION    | RHO<br>g/cm <sup>3</sup> | E<br>GPa          |
|--------------------------|--------------------------|-------------------|
| 20                       | 7.8                      | 212               |
| PROPERTY                 | VALUE                    | UNIT              |
| Density                  | 7.85                     | g/cm <sup>3</sup> |
| Transformation point Ac1 | 713                      | °C                |
| Transformation point Ac3 | 780                      | °C                |
| Transformation point Ar3 | 710                      | °C                |
| Transformation point Ar1 | 627                      | °C                |

## Technological properties

| PROPERTY           | VALUE             | UNIT |
|--------------------|-------------------|------|
| Weldability        | hard weldability. |      |
| Flake sensitivity  | predisposed       |      |
| Temper brittleness | predisposed       |      |

## Designations across standards

91 designations · 3 documented as identical

| Russia / CIS |      | 31 | United Kingdom |                       | 10       |
|--------------|------|----|----------------|-----------------------|----------|
| 36ChNM       | gost |    | 110            |                       | bs       |
| 36KhNM       | gost |    | 34CrNiMo6      |                       | bs       |
| 40G2         | gost |    | 36NiCrMo4      |                       | bs       |
| 40KhN2L      | gost |    | 708M40         |                       | bs       |
| 40KHN2MA     | gost |    | 816M40         |                       | bs       |
| 40KHN2MA     | gost |    | 817A37         |                       | bs       |
| 40KHN2SMA-VD | gost |    | 817M37         |                       | bs       |
| 40KhN2VA     | gost |    | 817M40         |                       | bs       |
| 40KHSN2MA    | gost |    | 818M40         |                       | bs       |
| 40XH2MA      | gost |    | EN 110         |                       | bs       |
| 40XH2MA-Ш    | gost |    |                |                       |          |
| 40XHBA       | gost |    | United States  |                       | 9        |
| 40XHMA       | gost |    | G43400         |                       | uns      |
| EI-643-VD    | gost |    | G98400         | This grade's own name | uns      |
| PK40G2       | gost |    | 4340           |                       | aisi-sae |
| PK40Kh2      | gost |    | 9840           | This grade's own name | aisi-sae |
| PK40KhN2G    | gost |    | G43400         |                       | aisi-sae |
| PK40N2M      | gost |    | G43406         |                       | aisi-sae |
| ПК40Г2-7.4   | gost |    | G98400         |                       | aisi-sae |
| ПК40Н2М-6.4  | gost |    | Gr.9840        |                       | aisi-sae |
| ПК40Н2М-6.8  | gost |    | A829           |                       | astm     |
| ПК40Н2М-7.2  | gost |    |                |                       |          |
| ПК40Н2М-7.6  | gost |    | France         |                       | 7        |
| ПК40Х2-6.4   | gost |    | 35NCD2         |                       | afnor    |
| ПК40Х2-6.8   | gost |    | 35NCD5         |                       | afnor    |
| ПК40Х2-7.4   | gost |    | 35NCD6         |                       | afnor    |
| ПК40ХН2Г-6.4 | gost |    | 36CrNiMo4      |                       | afnor    |
| ПК40ХН2Г-6.8 | gost |    | 36NiCrMo4      |                       | afnor    |
| ПК40ХН2Г-7.4 | gost |    | 40NCD3         |                       | afnor    |
| ст.40ХН2МА   | gost |    | 42CD4TS        |                       | afnor    |
| ЭИ643-ВД     | gost |    | Italy          |                       | 6        |
|              |      |    | 35NiCrMo6KB    |                       | uni      |
|              |      |    | 36NiCrMo4      |                       | uni      |
|              |      |    | 38NiCrMo4      |                       | uni      |
|              |      |    | 38NiCrMo4KB    |                       | uni      |
|              |      |    | 40NiCrMo7      |                       | uni      |
|              |      |    | KB             |                       | uni      |

|                                  |     |                                |                                 |
|----------------------------------|-----|--------------------------------|---------------------------------|
| <b>Spain</b>                     | 5   | <b>Europe</b>                  | 2                               |
| 35NiCrMo4                        | une | 1.6511                         | din-en                          |
| 36CrNiMo4                        | une | 36CrNiMo4                      | This grade's own name<br>din-en |
| 42CrMo4                          | une |                                |                                 |
| F.1280                           | une | <b>Poland</b>                  | 2                               |
| F.1280-35NiCrMo4                 | une | 36HNM                          | pn                              |
|                                  |     | 40HNMA                         | pn                              |
| <b>United States / Aerospace</b> | 5   |                                |                                 |
| 6359                             | ams | <b>Bulgaria</b>                | 2                               |
| 6409                             | ams | 36CrNiMo4                      | bds                             |
| 6414                             | ams | 40ChN2MA                       | bds                             |
| 6415                             | ams |                                |                                 |
| 6454                             | ams | <b>International</b>           | 1                               |
|                                  |     | 36CrNiMo4                      | iso                             |
| <b>Czechia</b>                   | 4   |                                |                                 |
| 16 XXX NN                        | csn | <b>Serbia</b>                  | 1                               |
| 16341                            | csn | Č.5430                         | srps                            |
| 16342                            | csn |                                |                                 |
| 16343                            | csn | <b>Hungary</b>                 | 1                               |
|                                  |     | 36CrNiMo4                      | msz                             |
| <b>Japan</b>                     | 3   |                                |                                 |
| SCNM439                          | jis | <b>Australia / New Zealand</b> | 1                               |
| SNCM439                          | jis | 4340                           | as-nzs                          |
| SNCM447                          | jis |                                |                                 |
|                                  |     | <b>Romania</b>                 | 1                               |
|                                  |     | T35MoCrNi08                    | stas                            |

**Note on use.** The data is compiled to the best of our knowledge from publicly available standards and manufacturer documentation. It replaces neither material testing nor an inspection document to EN 10204. Please request a mill certificate to EN 10204 2.1, 3.1 or 3.2 together with your enquiry. The standard in its current valid edition always prevails.

### Enquiry about 1.6511

Quotation, availability, mill certificate or a technical question — directly on the material page.

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#### MATERIAL NO.

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#### ISSUED

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