

S355J2 All

General Information

S355J2 is a micro alloyed structural steel suitable for e.g. mechanical engineering applications. The steel possess a good weldability with max CEV =0.47 for all variants. The steel may be delivered with a controlled silicon content for good galvanizing properties. Below, a number of closely related variants with various impact strength are presented.

Variant SB9813 is delivered with a closely controlled C-content for predictable properties and with a CEV value of max 0.41.

Variant S355J2(M) is a M-treated variant

Variant S355K2 and S355L4 both show good Impact toughness

Variant 520M is a M-steel variant of S355J2

Variant 550M is a drawn or peeled version of S355J2

M-Steel®

The basis for the concept is that non-metallic inclusions are modified and controlled with calcium treatment in a way to minimize tool wear and to maximize chip control in machining operations. Our M-Steel treatment can be applied to any steel grade.

Similar designations

ASt 52, A52 FP, Q420q-D, 1501 Gr.224-460, A52 RBII, 1.0577, St52-3, SB9837 Grade32-36, SB9833

Chemical composition

| Variant | Cast | DI | Weldability | | C% | Si% | Mn% | P% | S% | Cr% | Ni% | Mo% | V% | Cu% | Al% |
|-----------------------|------|-----|-------------------------|-----|------|------|------|-------|-------|------|------|------|-------|------|-------|
| SB9813 | CC | | CEV 0.41 _{max} | Min | 0.13 | 0.15 | 1.00 | - | - | - | - | - | 0.030 | - | 0.025 |
| | | | Pcm 0.25 _{max} | Max | 0.18 | 0.25 | 1.30 | 0.025 | 0.025 | 0.15 | 0.25 | 0.07 | 0.120 | 0.30 | - |
| S355J2(M) | CC | | CEV 0.5 _{max} | Min | - | - | - | - | 0.020 | - | - | - | - | - | - |
| | | | Pcm 0.3 _{max} | Max | 0.20 | 0.55 | 1.60 | 0.035 | 0.040 | - | - | - | 0.150 | - | - |
| S355K2 | CC | | CEV 0.45 _{max} | Min | - | - | - | - | - | - | - | - | - | - | - |
| | | | Pcm 0.3 _{max} | Max | 0.20 | 0.55 | 1.60 | 0.030 | 0.030 | - | - | - | - | 0.55 | - |
| S355L4 | CC | | CEV 0.43 _{max} | Min | - | - | - | - | - | - | - | - | - | - | - |
| | | | Pcm 0.26 _{max} | Max | 0.16 | 0.55 | 1.60 | 0.030 | 0.030 | - | - | - | - | 0.40 | - |
| 520 M (2721, 2723) | CC | 0.9 | CEV 0.47 _{max} | Min | 0.05 | 0.05 | 1.00 | 0.000 | 0.020 | - | - | - | 0.030 | - | - |
| | | | Pcm 0.3 _{max} | Max | 0.20 | 0.50 | 1.50 | 0.025 | 0.040 | - | - | - | 0.100 | 0.55 | - |
| 550 M (2723) | CC | 0.9 | CEV 0.47 _{max} | Min | 0.05 | 0.05 | 1.00 | 0.000 | 0.020 | - | - | - | 0.030 | 0.00 | - |
| | | | Pcm 0.3 _{max} | Max | 0.20 | 0.50 | 1.50 | 0.025 | 0.040 | - | - | - | 0.100 | 0.55 | - |
| S355J2 EN10025-2:2019 | Std | | CEV 0.47 _{max} | Min | - | - | - | - | - | - | - | - | - | - | - |
| | | | Pcm 0.35 _{max} | Max | 0.20 | 0.55 | 1.60 | 0.030 | 0.030 | - | - | - | - | 0.55 | - |

Mechanical Properties

| Variant | Condition ⓘ | Format | Dimension [mm] | Yield strength min [MPa] | Tensile strength [MPa] | Elongation A ₅ [%] | Hardness | Impact (ISO-V) strength _{min} |
|-----------------------|-------------|-------------|----------------|--------------------------|------------------------|-------------------------------|------------|--|
| SB9813 | +AR | | < 16 | 355** | 520-600 | 25 | 160-180 HB | -20 °C 40 J (long) |
| | | | 16 < 40 | 345** | 520-600 | 25 | 160-180 HB | -20 °C 40 J (long) |
| S355J2(M) | +AR | All formats | < 16 | 355** | 490-630 | 22 | 150-190 HB | -20 °C 27 J (long) |
| | | All formats | 17 < 40 | 345** | 490-630 | 22 | 150-190 HB | -20 °C 27 J (long) |
| | | All formats | 41 < 63 | 335** | 490-630 | 21 | 150-190 HB | -20 °C 27 J (long) |
| | | | 64 < 80 | 325** | 490-630 | 30 | 150-190 HB | -20 °C 27 J (long) |
| S355K2 | +AR | | < 16 | 355** | 470-630 | 22 | 140-190 HB | -20 °C 40 J (long) |
| | | | 16 < 40 | 345** | 470-630 | 22 | 140-190 HB | -20 °C 40 J (long) |
| | | | 40 < 63 | 335** | 470-630 | 21 | 140-190 HB | -20 °C 40 J (long) |
| S355L4 | +AR | | < 16 | 355** | 470-630 | 22 | 140-190 HB | -40 °C 60 J (long) |
| | | | 16 < 40 | 345** | 470-630 | 22 | 140-190 HB | -40 °C 60 J (long) |
| | | | 40 < 63 | 335** | 470-630 | 21 | 140-190 HB | -40 °C 60 J (long) |
| | | | 63 < 80 | 325** | 470-630 | 20 | 140-190 HB | -40 °C 60 J (long) |
| | | | 80 < 100 | 315** | 470-630 | 20 | 140-190 HB | -40 °C 60 J (long) |
| 520 M (2721, 2723) | +AR | | 25 < 40 | 400* | 520-630 | 22 | < 200 HB | -20 °C 40 J (long) |
| | | Round bar | 40 < 63 | 390* | 520-630 | 22 | < 200 HB | -20 °C 40 J (long) |
| | | Round bar | 63 < 100 | 380* | 520-630 | 21 | < 200 HB | -20 °C 40 J (long) |
| | | Round bar | 100 < 200 | 350* | 500-600 | 18 | < 200 HB | -20 °C 27 J (long) |
| | +N | Round bar | 25 < 40 | 345* | 470-630 | 25 | < 200 HB | -40 °C 40 J (long) |
| | | Round bar | 40 < 63 | 335* | 470-630 | 24 | < 200 HB | -40 °C 40 J (long) |
| | | Round bar | 63 < 80 | 325* | 470-630 | 23 | < 200 HB | -40 °C 40 J (long) |
| | | Round bar | 80 < 100 | 315* | 470-630 | 23 | < 200 HB | -40 °C 40 J (long) |
| | | Round bar | 100 < 150 | 295* | 450-600 | 21 | < 200 HB | -40 °C 40 J (long) |
| | | Round bar | 150 < 200 | 285* | 450-600 | 20 | < 200 HB | -40 °C 40 J (long) |
| 550 M (2723) | +C | Round bar | 22 < 55 | 500* | 550-750 | 12 | < 220 HB | 20 °C 27 J (long) |
| | +SH | Round bar | 55 < 70 | 380* | 490-630 | 22 | < 200 HB | -20 °C 27 J (long) |
| | | Round bar | 70 < 120 | 350 | 490-630 | 20 | < 200 HB | -20 °C 27 J (long) |
| S355J2 EN10025-2:2019 | +AR | | < 16 | 355** | 470-630 | 22 | 140-190 HB | -20 °C 27 J (long) |
| | | | 16 < 40 | 345** | 470-630 | 22 | 140-190 HB | -20 °C 27 J (long) |
| | | | 40 < 63 | 335** | 470-630 | 21 | 140-190 HB | -20 °C 27 J (long) |
| | | | 63 < 80 | 325** | 470-630 | 20 | 140-190 HB | -20 °C 27 J (long) |
| | | | 80 < 100 | 315** | 470-630 | 20 | 140-190 HB | -20 °C 27 J (long) |

$Rp_{0.2}$ * R_{eh} , ** R_{eI}

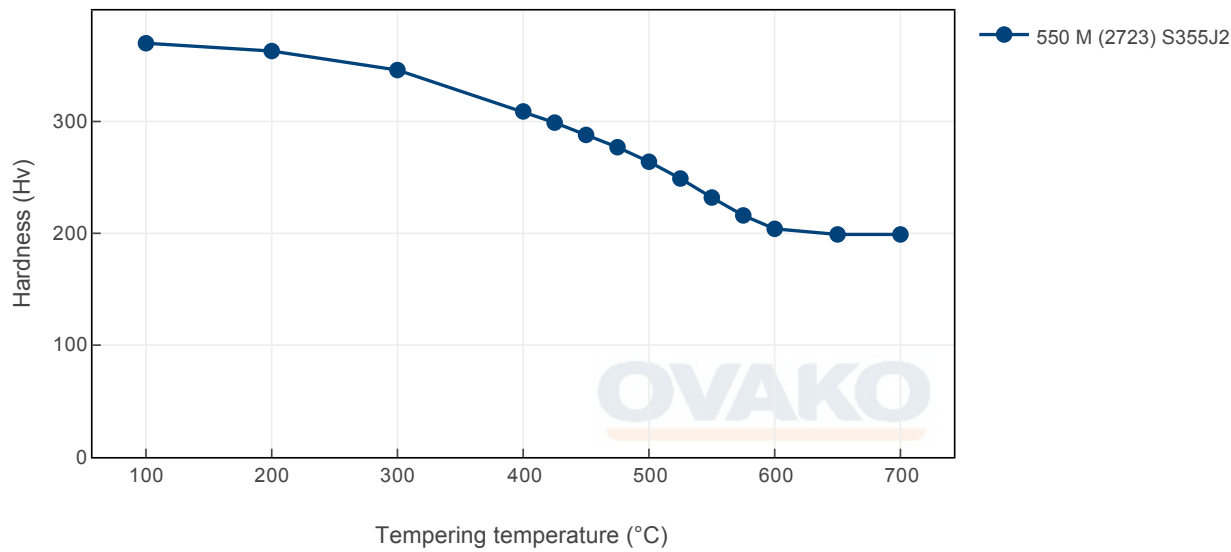
Transformation temperatures

| | Temperature °C |
|-----|----------------|
| MS | 400 |
| AC1 | 720 |
| AC3 | 815 |

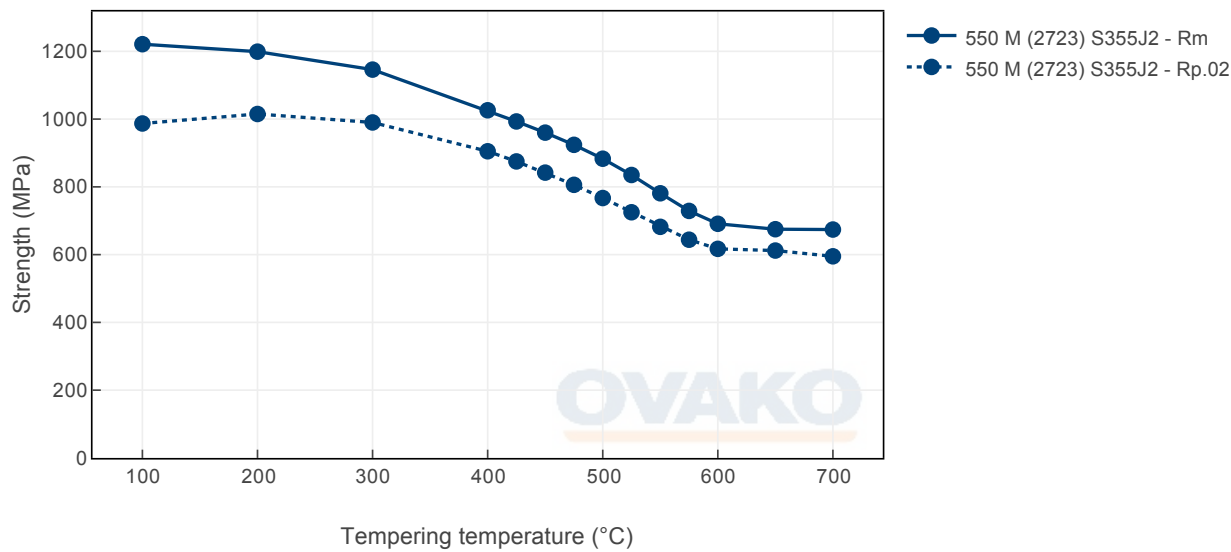
Heat Treatment Guide generated Graphs

The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.

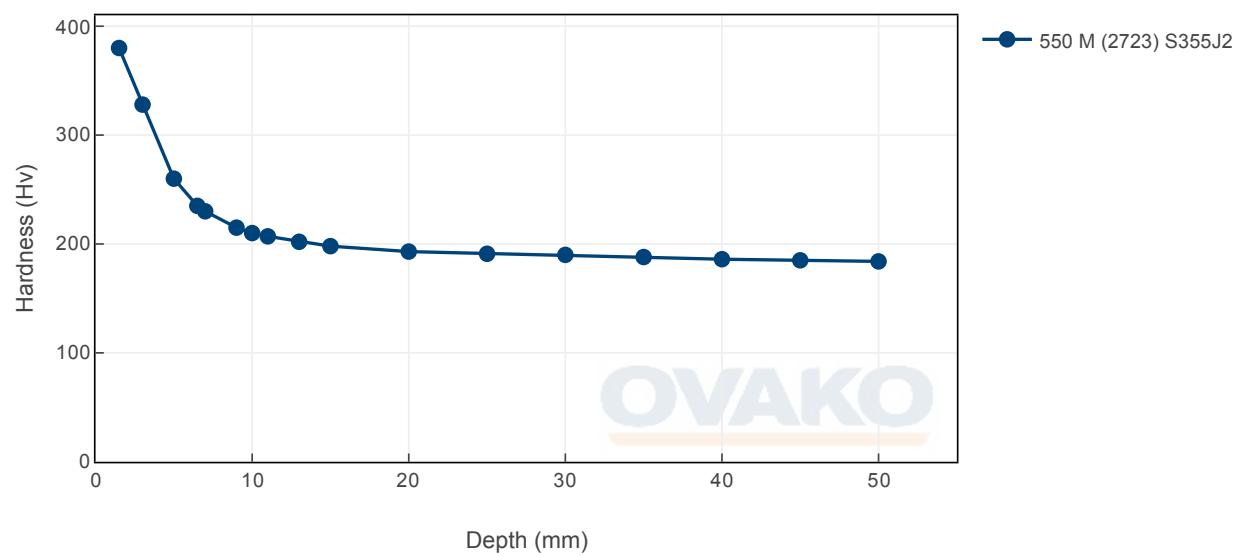
Tempering Diagram (hardness)



Tempering Diagram (strength)



Jominy



SUSTAINABILITY-ENVIRONMENTAL IMPACT DATA

At Ovako sustainability and reduction of our environmental impact is a major focus in everything we do. Further information is found [here](#).

In many international comparisons the crude steel Scope 1-2 emission is a key parameter, ie. the CO₂ emission from the steel works itself.

As of 1 January 2022 we carbon offset all our scope 1 and 2 volume shown below.

| Steel works | Hofors | Smedjebacken | Imatra |
|----------------------|--------|--------------|--------|
| CO ₂ e/kg | 120 | 62 | 76 |

To get the full picture of our products environmental impact we have to look at all of our CO₂ emission sources. Not only the steel work Scope 1-2 itself, but all operations downstream in our production, heating and heat treatment furnaces etc (full scope 1-2) as well as all the emission from input material, eg. alloys, scope 3.

| Steel Grade | Format | Condition ⓘ | Scope 1-3 (CO ₂ e kg /1000 kg steel) | Climate compensated Net emission = Scope 3 (CO ₂ e kg /1000 kg steel) Scope 1 - 2 = 0 (compensated) |
|--------------------|-----------|-------------|---|---|
| SB9813 | Flat bar | +AR | 404 | 167 |
| 550 M (2723) | Round bar | +AR | 526 | 222 |
| 520 M (2721, 2723) | Round bar | +AR | 525 | 221 |

As of 1 January 2022 we use carbon offset for all our scope 1- 2 emissions, so in practice the climate compensated data is the same as the full Scope 3 level.

All above data are to be seen as typical values for the specified format and condition. Detailed information about your specific product please contact your sales contact.

Other properties (typical values)

| Youngs module (GPa) | Poisson's ratio (-) | Shear module (GPa) | Density (kg/m ³) |
|-------------------------------|--|--|--|
| 210 | 0.3 | 80 | 7800 |
| Average CTE 20-300°C (µm/m°C) | Specific heat capacity 50/100°C (J/kg°C) | Thermal conductivity Ambient temperature (W/m°C) | Electrical resistivity Ambient temperature (µΩm) |
| 12 | 460 - 480 | 40 - 45 | 0.20 - 0.25 |

Contact us

Would you like to know more about our offers? Don't hesitate to contact us:

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Via telephone: +46 8 622 1300

For more detailed information please visit <http://www.ovako.com/en/Contact-Ovako/>

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