# AVESTA 353 MA

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## Welding wire MIG

*For welding steel such as:*

| Outokumpu | EN | ASTM | SS* | BS* | NF* |
|---|---|---|---|---|---|
| 353 MA® | 1.4854 | S35315 | – | – | – |

* Obsolete national standards, replaced by EN 10088.

### CHARACTERISTICS

AVESTA 353 MA is designed for welding Outokumpu 353 MA, which is the highest alloyed steel with the best high temperature properties in Outokumpu Stainless' family of MA-steels. 353 MA's chemical composition is balanced to give optimal properties at temperatures above 1832°F (1000°). The steel, as well as the weld metal, has superior resistance to carbon and nitrogen pick-up at elevated temperatures. This is, among other things, achieved by an addition of rare earth metals (REM).

Due to the fully austenitic structure, the weld metal is somewhat more sensitive to hot cracking than for example 253 MA.

### WELDING DIRECTIONS

MIG welding of 353 MA is best performed using spray arc or pulsed arc. The weldability using short arc is somewhat limited and the welding of thin gauges (<3 mm) and in-position is best performed using pulsed arc.

353 MA has a tendency of giving a thick oxide layer during welding and hot rolling. Black plates and previous weld beads should be carefully brushed or ground prior to welding.

The joint should be prepared with a sufficient root gap to ensure full penetration. The fully austenitic structure makes the weld metal somewhat susceptible to hot cracking. High welding currents and big weld pools should be avoided. The heat input should be maximised to 1.0 kJ/mm and the material should be allowed to cool to below 212°F (100°C) between successive passes.

### WELDING DATA

| | ∅ (inch) | ∅ (mm) | Current (A) | Voltage (V) |
|---|---|---|---|---|
| Pulsed arc | 0.045″ | 1.14 | $I_{peak}$ = 350–450 A<br>$I_{bkg}$ = 50–150 A<br>Freq = 80–120 Hz | |

For further recommendations, please contact Avesta Welding

### Standard designations

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### Shielding gas recommendations

Ar + 30% He or Ar + 30% He + 2.5% $CO_2$

The helium addition improves the fluidity and gives a slightly wider penetration. Helium increases the energy in the arc and the heat should therefore be kept at a lower level than when welding without helium to compensate for the higher temperature in the arc. Addition of helium will increase the blackening slightly.

### Chemical composition - Typical values, %

| | | | |
|---|---|---|---|
| C | 0.05 | Cr | 27.5 |
| Si | 0.85 | Ni | 35.0 |
| Mn | 1.6 | N | 0.15 |
| Others | REM | | |

Ferrite: 0 FN

### Mechanical properties – Typical values, IIW

| | | Typ. values | Typ. values |
|---|---|---|---|
| Yield strength, $Rp_{0,2}$ | | 320 N/mm² | 46 ksi |
| Tensile strength, $R_m$ | | 590 N/mm² | 85 ksi |
| Elongation, A5 | | 43 % | 43 % |
| Impact strength, KV | +20°C | 160 J | 118 ft·lb |
| Hardness | | 200 Brinell | |

**Interpass temperature:** Max. 212°F (100°C)

**Heat input:** Max. 25.4 kJ/in (1.0 kJ/mm)

**Heat treatment:** Generally none.

**Structure:** Fully austenitic structure.

**Scaling temperature:** Approx. 2146°F (1175°C) (air).

**Corrosion resistance:** Superior properties for constructions running at service temperatures above 1000°C. Not intended for application exposed to wet corrosion.

**Approvals:** –