

# Technical Data Sheet

## UGI® 4121

### Chemical analysis (%)

C	Si	Mn	Cr	Mo	Ni	P	S
0.20 - 0.26	≤ 1.0	≤ 2.0	12.5 - 14.0	1.10 - 1.50	0.75 – 1.50	≤ 0.040	0.15 – 0.27

22-05-2017 – REV 01

### General presentation

UGI® 4121 is a martensitic grade which, thanks to the addition of Molybdenum combined with a high sulphur content, provides a good compromise between corrosion resistance and machinability that is better than that of other resulphurised martensitic stainless steel grades.

### Classification

Resulphurised martensitic stainless steel with the addition of Molybdenum.

### Designation

UGI® 4121 conforms to ASTM F899 and is mentioned in ISO 7153-1.

### Mechanical properties

The characteristics of UGI® 4121 in the softened condition and at ambient temperature are as follows:

Temperature	Tensile strength	Yield strength	Elongation
°C	Rm (MPa)	Rp 0.2% (MPa)	A (%)
20	776	510	25

UGI® 4121 can be hardened by a quenching treatment from 1030°C to 1070°C and by tempering.

Condition	Hardness
Air quenching 1030 – 1070°C	
Tempering 100-300°C	47 - 50 HRC

### Physical properties

Temperature	Density	Elasticity modulus	Thermal conductivity	Expansion coefficient	Electrical resistivity
(°C)	(gr/cm <sup>3</sup> )	(GPa)	(W/m.°C)	( / °C)	(μΩ.mm)
20	7.7	215	30		550
Between 20 and 300				11.5 X 10 <sup>-6</sup> °C	

### Corrosion resistance

The best corrosion resistance properties are obtained in the quenched and tempered condition. Polishing increases the corrosion resistance even further and a passivation treatment is recommended. Under such conditions, this grade will be water and vapour resistant.

If the grade was tempered at too high a temperature, the corrosion resistance will be impaired by carbide segregation precipitation at the grain boundaries. Annealing must not be carried out at temperatures between 400°C and 580°C as this will affect corrosion resistance.

### Machinability

Best machinability is obtained in the skin-passed condition (Rm: 800 – 950 MPa). Grinding and polishing are recommended to obtain a finer surface finish for optimum corrosion resistance. Localised overheating during grinding must be avoided, as this could affect the corrosion resistance.



Swiss Steel Group

Production sites: Ugitech SA  
www.swisssteel-group.com

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### Polishing

The presence of a large number of manganese sulphide inclusions (MnS) can reduce the quality of the polishing and its productivity. That is why optimal polishing is obtained on products in the quenched and tempered condition at low temperature < 200°C.

### Welding

This grade cannot be welded. Soft soldering is still possible.

### Heat treatment

#### Softening

- Soft annealing between 780°C and 830°C, slow cooling 30°C/h down to 600°C followed by air cooling.
- Softening annealing (subcritical): between 650°C and 760°C, followed by air cooling
- Intermediate annealing during cold deformation: preferably between 650°C and 680°C, followed by air cooling

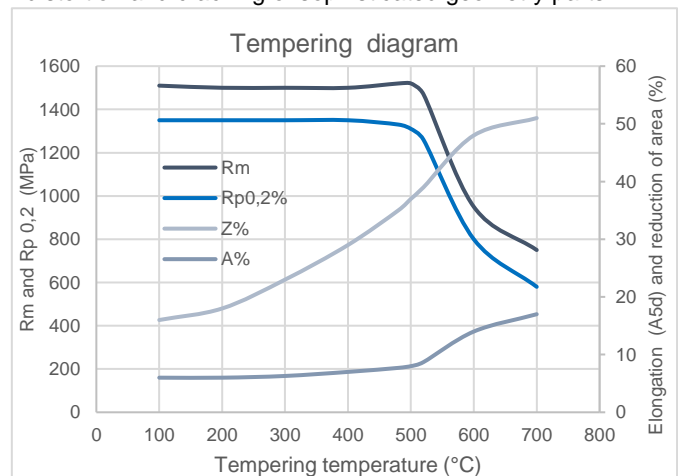
#### Quenching

- Oil quenching between 980°C and 1050°C, fast air or gas quenching

#### Tempering:

- Tempering is used to adjust the mechanical characteristics of the products, as shown in the diagram below.

- The tempering temperature range from 100°C to 300°C enables an optimum compromise between mechanical strength and corrosion resistance to be obtained.
- The temperature range between 400°C and 580°C must be avoided to prevent embrittlement and the associated reduction in corrosion resistance.
- Tempering must be carried out as soon as possible after quenching.
- The tempering temperature must rise slowly to avoid any distortion and cracking of sophisticated geometry parts.



### Available products

Product	Shape	Finish	Tolerance	Dimensions
Bright bar	round	turned and polished	ISO 9 - 10	∅ 22 - 115 mm
		drawn	ISO 9 - 10	∅ 1.8 - 30 mm
		ground	ISO 6 - 7 - 8 - 9	∅ 1.5 - 70 mm
	hexagonal	drawn		∅ 3.0 - 60 mm
Wire rod	round	pickled		∅ 5.5 - 32 mm
Drawn wire	round	unpolished	ISO 6 - 7 - 8 - 9	∅ 1.0 - 14 mm

For others, please contact us.

### Applications

- Rotary axes in the watch industries and automotive industries
- Cutting tools (drills) in the medical and the dental industries



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