

## ABRAMAX® 420 Cr

Abramax® 420 Cr is a wear-resistant steel with special heat and corrosive environment resistance as well. It is delivered in quenched and tempered condition, which gives it hardness at about 400 HBW, as well as workshop-friendly properties. Abramax® 420 Cr will provide increased service life in comparison to conventional wear-resistant steels, especially when exposed to elevated temperatures.

Abramax® 420 Cr gives improved processing possibilities. It comes along with excellent cold forming,

machining and welding properties. Its quenched and tempered microstructure provides full repeatability of forming with tight bending radii as well as narrow and hard heat affected zone after thermal cutting and welding.

Typical application markets for Abramax® 420 Cr are: energy, mining, quarries, recycling, yellow goods and elevated temperature industries.

### CHEMICAL ANALYSIS (max values)

C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Mo (%)	Ni (%)	B (%)
0.15	0.3	1.5	0.020	0.010	2.5	0.2	0.2	0.004

### MECHANICAL PROPERTIES (typical values)

Hardness (HBW)	Yield strength (MPa)	Tensile strength (MPa)	Elongation A5 (%)	Impact strength (KV -20°C, J)
400	1000	1250	12	40

**Hardness range** (delivery condition): 370–430 HBW\*

\*Brinell hardness measured according to EN ISO 6506-1, on a milled surface below surface typically 0,5–3 mm depending on plate thickness.

#### Dimensions

Abramax® 420 Cr is delivered in a thickness range of 4–80 mm and typical widths and lengths, as well as special dimensions required by customer.

#### Heat resistance

Abramax® 420 Cr has much better heat resistance than conventional wear-resistant steels. It will maintain high hardness and wear resistance in temperatures about 400°C – 450°C. At an operating temperature of 300°C, Abramax® 420 Cr typically has 100% of its initial hardness and at 400°C, it typically maintains about 87% of its initial hardness. This makes Abramax® 420 Cr one of the most multi-purpose wear-resistant steels on the market.

### METALLURGICAL CONCEPT

Abramax® Cr is the next evolution of wear-resistant steels. Thanks to specially selected alloy combinations based around chromium and combined with sequences of modern heat treatments, it is not only labeled as a wear-resistant but also as a heat-resistant steel as well. Additionally, fully dissolved chromium provides extreme hardenability, which allows the use of modern quenching processes. Modern water quenching methods and subsequent refined heat treatments allow it to achieve high hardness and very good

heat resistance, as well as equalized internal stress levels. What is more, high chromium content provides increased resistance to corrosive materials.

Abramax® Cr is produced by the world's leader in continuously developed quenched and tempered steels. With every plate produced to meet the highest and most rigorous standards, Abramax® Cr guarantees incredible steel cleanliness and extended properties.

## PROCESSING REQUIREMENTS

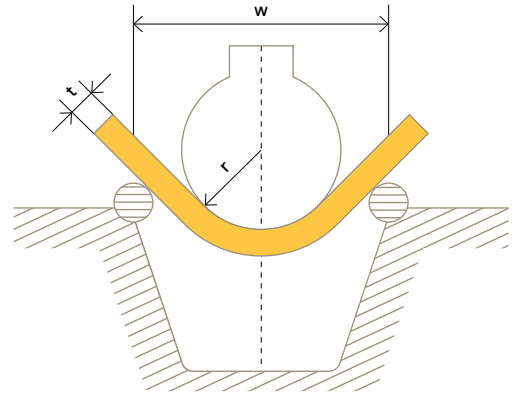
### BENDING

Bending can be done with no problems when the following conditions are met:

- Forming should be performed at room temperature;
- Thermal and mechanical cut edges should be grinded;
- Bending radius and die width should be used according to steel grade and thickness;
- Bending machine should have sufficient bending force and tools harder than formed steel;
- Surface scratches should be removed;

#### Minimum bending radii and die width for plate thickness "t"

Rolling direction	Minimum bending radius (r)	Minimum die width (w)
Transversal	3 x t	12 x t
Longitudinal	4 x t	12 x t



### WELDING

Abramax® Cr steels are carbon steels and their weldability is good. Due to high strength and hardness, they require correct treatment:

- They can be welded with all common welding methods;
- It is recommended to use soft welding consumables;
- Heat input should be as low as possible;
- Depending on thickness, it is recommended to use suitable preheating temperature.

#### Recommended soft welding consumables for Abramax® 420 Cr

Welding method	AWS classification	EN classification
MAG/GMAW, solid wire	AWS A5.28 ER70X-X	EN ISO 14341-A- G 38x
	AWS A5.28 ER80X-X	EN ISO 14341-A- G 42x
MAG/MCAW, metal cored wire	AWS A5.28 E7XC-X	EN ISO 17632-A- T 42xH5
	AWS A5.28 E8XC-X	EN ISO 17632-A- T 46xH5
MAG/FCAW, flux cored wire	AWS A5.29 E7XT-X	EN ISO 17632-A- T 42xH5
	AWS A5.29 E8XT-X	EN ISO 17632-A- T 46xH5
MMA (SMAW, stick)	AWS A5.5 E70X	EN ISO 2560-A- E 42xH5
	AWS A5.5 E80X	EN ISO 2560-A- E 46xH5
SAW	AWS A5.23 F49X	EN ISO 14171-A- S 42x
	AWS A5.23 F55X	EN ISO 14171-A- S 46x
TIG/GTAW	AWS A5.18 ER70X	EN ISO 636-A- W 42x
	AWS A5.28 ER80X	EN ISO 636-A- W 46x

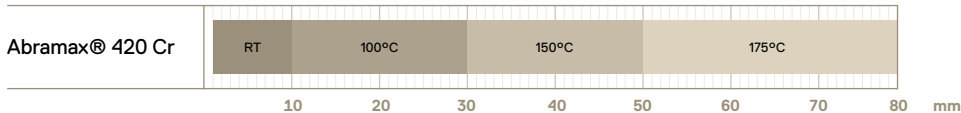
X = stands for one or more characters

In special welding condition when preheating cannot be performed or welding has to be done outside it is recommended to use stainless consumables.

## Recommended stainless welding consumables for Abramax 420 Cr

Welding method	AWS classification	EN classification recommended	EN classification suitable
MAG/GMAW, solid wire	AWS 5.9 ER307	EN ISO 14343-A: B 18 8 Mn/	EN ISO 14343-A:B 23 12 X/
		EN ISO 14343-B: SS307	EN ISO 14343-B: SS309X
MAG/MCAW, metal cored wire	AWS 5.9 EC307	EN ISO 17633-A: T 18 8 Mn/	EN ISO 17633-A: T 23 12 X/
		EN ISO 17633-B TS307	EN ISO 17633-B: TS309X
MAG/FCAW, flux cored wire	AWS 5.22 E307T-X	EN ISO 17633-A: T 18 8 Mn/	EN ISO 17633-A: T 23 12 X/
		EN ISO 17633-B TS307	EN ISO 17633-B: TS309X
MMA (SMAW, stick)	AWS 5.4 E307-X	EN ISO 3581-A: 18 18 Mn/	EN ISO 3581-A: 22 12 X/
		EN ISO 3581-B: 307	EN ISO 3581-B: 309X
SAW	AWS 5.9 ER307	EN ISO 14343-A: B 18 8 Mn/	EN ISO 14343-A:B 23 12 X/
		EN ISO 14343-B: SS307	EN ISO 14343-B: SS309X
TIG/GTAW	AWS5.9 ER307	EN ISO 14343-A: B 18 8 Mn/	EN ISO 14343-A:B 23 12 X/
		EN ISO 14343-B: SS307	EN ISO 14343-B: SS309X

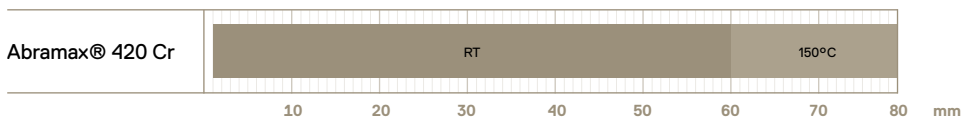
## Recommended preheating for welding Abramax® 420 Cr, heat input 1.7 kJ/mm



## THERMAL CUTTING

All the classical thermal cutting processes can be used: flame, plasma and laser. For flame cutting the preheating conditions are required to minimize risk of cold cracking.

## Recommended preheating for flame cutting of Abramax® 420 Cr



## DRILLING

Drilling can be done with HSS with 8% Co drills, but for better productivity, tungsten carbide tip drills are recommended. Cement carbide tips for drilling should be in class P20, coated with hard CVD layer. Drilling machine should be stable and robust. Attachments should keep drilled part without any vibrations, in order to perform process seamlessly. It is recommended to use coolant for every drilling with coolant mix 8 – 10 %.

## Recommended drilling parameters for Abramax® 420 Cr, HSS + Co drill

Drill diameter, mm	Drill type	Cutting speed $V_c$ , m/min	Feed rate $f_n$ mm/rev
10 - 30	HSS + Co	7 - 8	0.1 - 0.35

## Recommended drilling parameters for Abramax® 420 Cr, drill with tungsten carbide tip

Drill diameter, mm	Drill type	Cutting speed $V_c$ , m/min	Feed rate $f_n$ mm/rev
7.5 - 33	Tungsten carbide tip	50 - 70	0.08 - 0.33

## TOLERANCES

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According to EN 10029 and tighter at the time of order.

Surface quality according to EN 10163.

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## CONTACT

### TECHNICAL SUPPORT

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