



KARA ferritic stainless steel offer: grade **K34**

Chemical composition

Elements	C	Si	Mn	Cr	Mo
K34 (%)	0.05	0.35	0.40	16.2	1.25

Mean values

European designation

X6CrMoNb17-1 1. 4113⁽¹⁾

American designation

Type 434⁽²⁾

⁽¹⁾According to EN 10088-2

⁽²⁾According to ASTM A 240

IMDS n°

1850506

Our grade complies with:

- ▶ Stainless Europe Material Safety Data Sheet n° 1: stainless steels (European Directive 2001/58/EC).
- ▶ European Commission Directive 2000/53/EC for end-of-life vehicles, and to Annex II dated 27 June 2002.
- ▶ French standard NFA 36 711 "Non packaging steel-Stainless steel intended for use in contact with foodstuffs, products and beverages for human and animal consumption".
- ▶ NSF/ANSI 51-2002 edition international standard for "Food Equipment Materials" and the requirements of the FDA (United States Food and Drug Administration) regarding materials used in contact with foodstuffs.
- ▶ French decree No. 92-631 dated 8 July 1992 and European Regulation (EC) No. 1935/2004 of 27 October 2004 on materials and articles intended to come into contact with food (Directives 80/590/EEC and 89/109/EEC).
- ▶ French Ministerial Order dated 13 January 1976 relating to materials and articles.

General characteristics

The principal features of our grade **K34** are:

- ▶ good resistance to pitting corrosion,
- ▶ good resistance to industrial atmospheres,
- ▶ good resistance to salt spray corrosion,
- ▶ good formability,
- ▶ excellent polishability.

Applications

- ▶ Automobile hub caps and decorative trims,
- ▶ Decorative profile.

Product range

Forms: sheets, blanks, coils, strips, circles.

Thicknesses: 0.30 to 2 mm.

Width: according to thickness, consult us.

Finish: cold rolled.

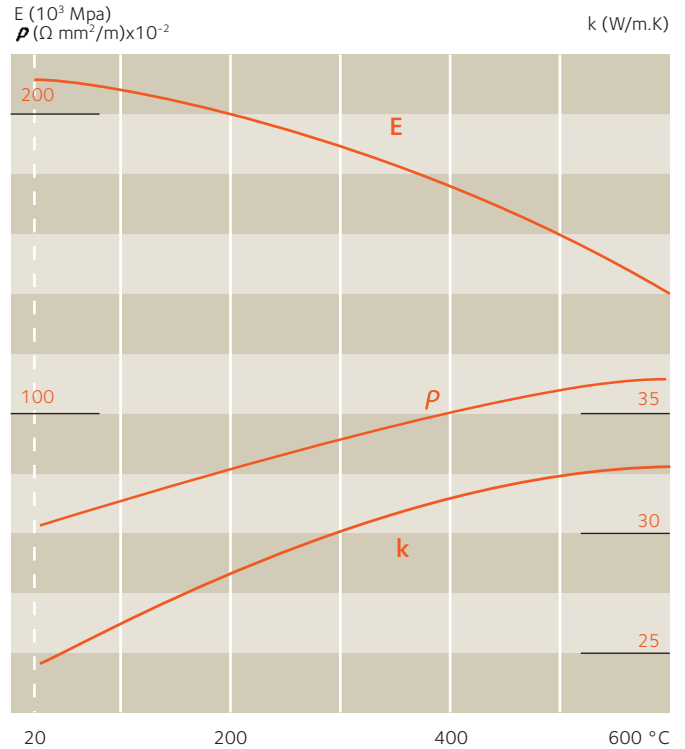


Physical properties

Cold rolled sheet - annealed.

Density	d	kg/dm ³	20 °C	7.7
Melting temperature		°C		1480
Specific heat	c	J/kg.K	20 °C	460
Thermal conductivity	k	W/m.K	20 °C	25
Mean coefficient of Thermal expansion	α	10 ⁻⁶ /K	20-200 °C 20-400 °C 20-600 °C	10.5 10.5 11.0
Electric resistivity	ρ	Ω mm ² /m	20 °C	0.70
Magnetic permeability	μ	≈ 0,8 kA/m DC ou AC	20 °C	550
Young's modulus	E	Mpa.10 ³	20 °C	220

Poisson's ratio at 20°C: 0.28



Tensile properties

In the annealed condition

According to NF EN 10002-1 (July 2001), specimen perpendicular to the rolling direction.

Specimen

Lo = 80 mm (thickness < 3 mm)

Lo = 5,65 √So (thickness ≥ 3 mm)

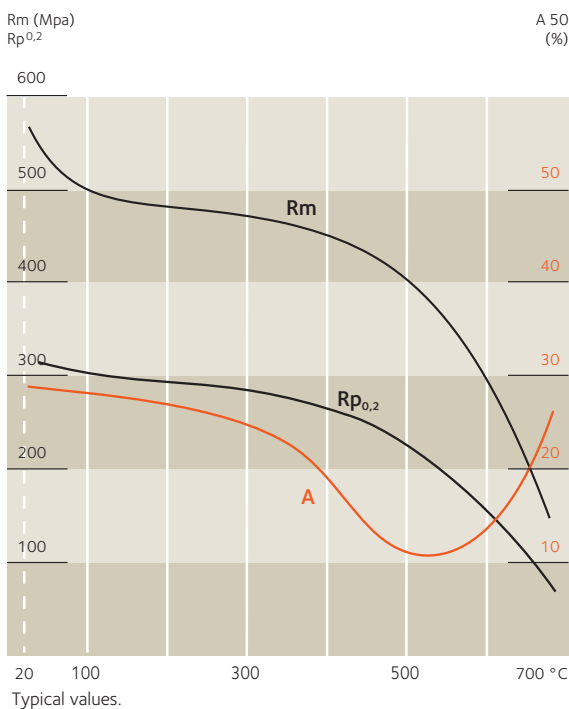
Condition	R _m ⁽¹⁾ (Mpa)	R _{p0.2} ⁽²⁾ (Mpa)	A ⁽³⁾ (%)	HV
Cold rolled*	540	370	28	168

1 Mpa = 1 N/mm².

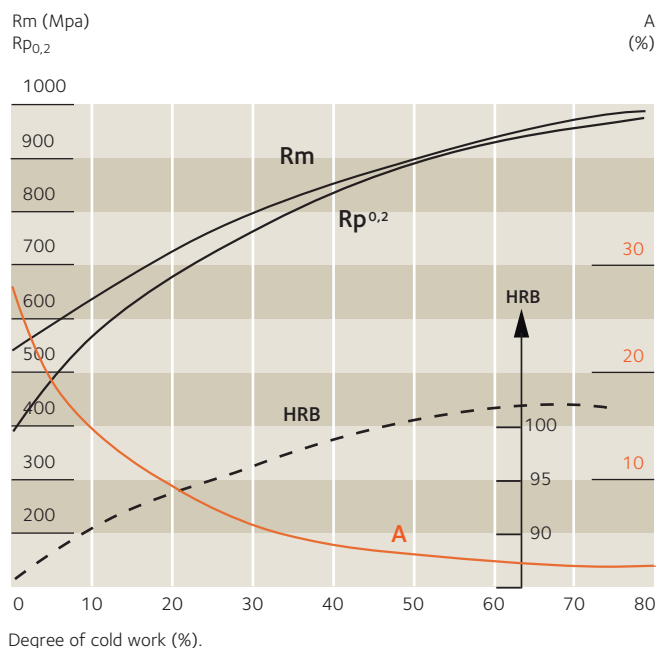
* Mean values.

⁽¹⁾ Ultimate Tensile Strength (UTS). ⁽²⁾ Yield Strength (YS) ⁽³⁾ Elongation

At high temperature



Effect of cold work



Corrosion resistance

The presence of molybdenum in these grades confers good resistance to pitting corrosion and extends its range of application.

Our grade **K34** has good resistance to rural and urban atmospheres and to fresh waters.

Our grade **K34** also shows good resistance in the salt spray test (≥ 400 h).

Like all ferritic stainless steels, K34 is insensitive to stress corrosion cracking.

K34 is guaranteed to meet the requirements of the Kesternich test.

For welded structures, the stabilized grades **K36** or **K45** should be preferred.

Resistance to localised corrosion

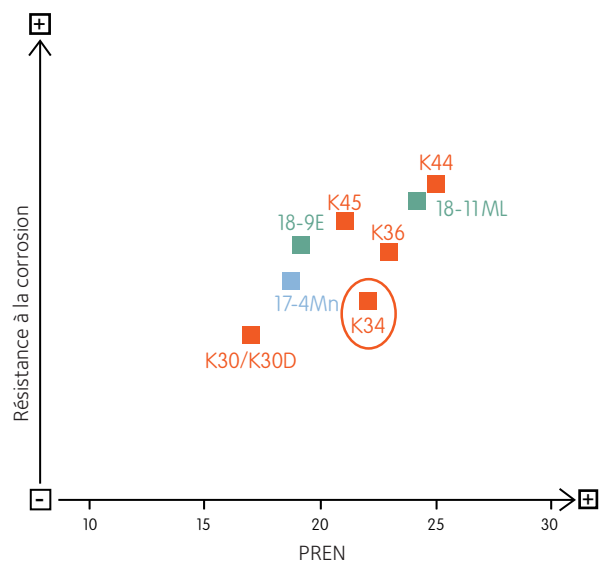
Grade designations	Standards		
	ASTM		EN
	Designations		
Type	UNS		
K30/K30D	430	S43000	1.4016
K45	445 ⁽¹⁾	S44500	1.4621 ⁽²⁾
K34	434		1.4113
K36	436	S43600	1.4526
K44	444	S44400	1.4521
17-4Mn	201.1	S20100 ⁽³⁾	1.4618 ⁽²⁾
18-9E	304	S30400	1.4301
18-11 ML	316 316 L	S31600 S31603	1.4401 1.4404

(1) Common designation.

(2) Pending revision of standard.

(3) With copper addition and «rich side» pro.

Typical pitting potential values in NaCl 0.02M at 23° and pH6.6 as a function of the PREN (%Cr+3.3%Mo+16%N).



Forming

In the annealed condition, our grade **K34** can be cold formed using all the common processes (folding, contour forming, bending, deep drawing, slitting, etc.).

Thicknesses less than 0.7 mm can be folded sharply through 180°, while for larger thicknesses, the minimum bending radius r is related to the thickness t by : $r \geq 0,5e$ (épaisseur).

We advise the forming of our K34 grade, as with all ferritics, using the deep drawing method, allowing the metal to flow, with minimum blank holder force, to the required rate prior to the point of creasing.

Deep drawing operations involving considerable stretching can be facilitated by initial forming to produce blanks with radii of curvature.

Welding

In general AISI 434/1.4113 grades are poorly suited to welding operations, since they readily form martensite in the weld, leading to brittle and relatively undeformable joints.

Our grade **K34** can be resistance welded by spot or seam techniques. Good results are obtained without the need for post treatment provided that forging of the weld is sufficient.

Welding process	No filler metal	With filler metal		Shielding gas*	
	Typical thicknesses	Thickness	Métal d'apport		*Hydrogen and nitrogen forbidden in all cases
			Rod	Wire	
Resistance : Spot, Seam	≤ 2 mm				
TIG	< 1.5 mm	> 0.5 mm	ER 316 L (Si)	ER 316 L (Si)	Argon Argon + Helium
PLASMA	< 1.5 mm	> 0.5 mm		ER 316 L (Si)	Argon Argon + Helium
MIG		> 0.8 mm		ER 316 L (Si)	Argon + 2 % CO ₂ Argon + 2 % O ₂ Argon + 2 % CO ₂ + Helium
S.A.W		> 2 mm		E 316 L	
Electrode		Repairs	E 316 L		
Laser	< 5 mm				Helium Argon in certain conditions

The addition of hydrogen or nitrogen to the argon must be avoided since these gases decrease the ductility of the welds. For the same reason, nitrogen shielding must not be employed, while additions of CO₂ must be limited to 3 %.

In order to restrict grain growth in the HAZ, the use of high welding powers must be avoided.

For example, in automatic TIG welding, the power should not exceed 2.5 kJ/cm for a sheet thickness of 1.5 mm.

Pulsed MIG/MAG welding has a lower power input than conventional MIG welding and enables better control of both bead geometry and grain size.

Post-weld heat treatment is generally not necessary.

The welds must be mechanically or chemically descaled, then passivated.

Oxyacetylene torch welding is to be proscribed.

Where there is a risk of intergranular corrosion, it is recommended to use a stabilized grade, such as **K36** or **K45**.

Heat treatment and finishing

Annealing

At 800 °C after cold working.

Polishing - brushing - buffing - satin finishing

No particular difficulties.

Pickling

Nitric-hydrofluoric acid mixture

(10% HNO₃ + 2% HF)

Descaling pastes for weld zones.

Passivation

20-25 % HNO₃ solution at 20 °C

Passivating pastes for weld zones

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