

# Ferritic Stainless steel advantages for domestic solar applications

## What is ferritic stainless ?

### KARA is the Aperam brand for ferritic stainless solutions

- > Ferritic stainless steel contains at least 10,5% chromium (as other stainless steels) but does not contain nickel
- > By choosing ferritic, you can avoid the erratic price fluctuations of the nickel and benefit from more price stability.
- > Ferritic like other stainless steels continually protects itself thanks to a passive layer of chrome which forms naturally on the surface when in contact with air humidity or water.
- > Ferritic stainless is magnetic. There is no link between magnetism and corrosion, the proof being duplex grades (austeno-ferritic) which offer excellent corrosion resistance and which are also magnetic

**KARA**   
key for value



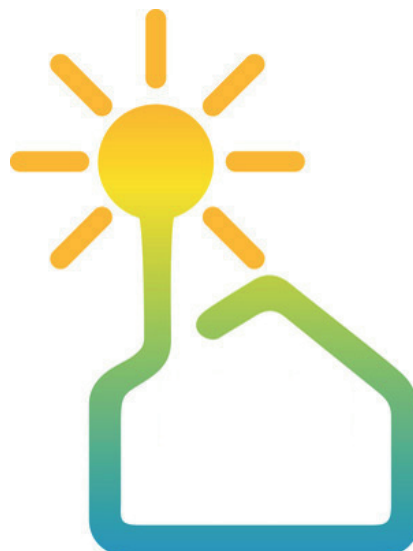
## Ferritic Stainless advantages

### Environment and recyclability

- > Stainless is ideally suited to rainwater collection: there is no leaching of elements which could alter their composition.
- > Stainless complies with all of the food-safe norms and can be used in contact with domestic water and drinking water.
- > Stainless steel is the «green material» par excellence, infinitely recyclable, neutral in relation to the environment.

### Mechanical & physical properties

- > The use of ferritic stainless steel enables thickness reduction thanks to its high proof stress and pressure resistance.
- > Good resistance to torsion and to tearing thanks to a high Young's modulus.
- > Ferritic has a low expansion co-efficient rate half that of austenitic and identical to that of glass.
- > The low thermal conductivity coefficient is an advantage for connectors.



### Heat Resistance

- > Little temperature impact on the mechanical properties unlike other materials. Ferritics generally have a good resistance to oxidation, to thermal fatigue and to creep.

### Corrosion resistance

- > No influence of stress corrosion for ferritics
- > Good corrosion resistance to different atmospheric exposure levels
- > Stainless has good corrosion resistance at 80°C enabling good resistance to certain cases of legionnaires disease and reduction of scale.

### Transformation and Durability

- > Stainless steel can be drawn, folded, suitable for adhesive bonding and can be hydroformed but is also weldable and can be repaired.
- > Stainless steel keeps its finish throughout the life of the installation thanks to its UV and infrared ray resistance.
- > Using stainless guarantees a positive relationship between the final Cost and the product lifecycle.

# The appropriate grade



Our experience enables us to recommend the most appropriate grade per application.

- > K09: painted structures
- > K30: fixing for captors
- > K41: expansion vessel, structures
- > K44: hot water tanks, absorbers, heat exchangers, frames tanks, frame and housing for solar and PV panels
- > K45: outer wrap of tanks and housing for captors



## Chemical Composition

Commercial designations	Standards			Chemical composition (typical values)					
	ASTM		EN	C	Si	Mn	Cr	Mo	Others
	Designations								
	TYPE	UNS							
K09	409	S40900	1.4512	0.01	0.45	0.30	11.30		Ti = 0.19
K30	430	S43000	1.4016	0.04	0.35	0.30	16.50		
K41	441 <sup>(1)</sup>	S43932/ S43940	1.4509	0.015	0.60	0.30	17.80		Ti+Nb = 0.65
K44	444	S44400	1.4521	0.015	0.50	0.30	17.70	1.85	Ti+Nb = 0.45
K45	445	S44500	1.4621	0.015	0.25	0.25	20.20		Nb = 0.45 - Cu = 0.45

(1) Typical designation

## Properties

Properties (typical values)	K09	K30	K41	K44	K45
Density (kg/dm <sup>3</sup> )	7.7	7.7	7.7	7.7	7.7
Melting temperature in °C	1460	1500	1505	1495	1500
Young's modulus in MPa x 10 <sup>3</sup> (20°C)	215	220	220	220	210
Yield Strength in MPa à 20°C	250	330	310	370	360
Thermal conductivity in W/m.K	26	25	25	23	21.3
Mean Thermal expansion coefficient 10 <sup>-6</sup> /K; 20-200°C	11	10.5	11	10.8	11.5
Ultimate tensile strength Rm in MPa at 20°C	420	500	480	520	510

## 2 examples of a 100% ferritic partnership

### Thermosyphon without glass



Aperam in partnership with leading companies is currently manufacturing and testing 100% ferritic thermosyphon demonstrators.

### Radiant panels



This radiant ceiling is totally ferritic.

For more technical information, consult the brochure

« Solar Water Heaters » on ISSF website (International Stainless Steel Forum) [www.worldstainless.org](http://www.worldstainless.org)

Information  
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