

# Ferritic Stainless steel advantages for HVAC

## 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.
- > 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

### Corrosion resistance

- > Good corrosion resistance helps increase the longevity of the system and reduce maintenance costs.
- > In case of scratches, stainless steel repassivates unlike other materials which lose their protection.

### Thermal conductivity

- > Its low thermal conductivity coefficient gives this material good insulation properties, especially for tube connectors.

### Proof stress and Young's Modulus

- > Enables thickness reduction (lighter) and to have good resistance to torsion, to tearing and to pressure.

### Density

- > Low density, lower than that of copper and enamelled steel and therefore lighter.

### Fire & Heat resistance

- > The melting point of ferritic stainless steel is up to ~ 1500°C, a temperature, which is significantly higher than that of other materials such as aluminium (660°C), zinc (419°C) and copper (1083°C).
- > Giving off no toxic fumes and having good creep resistance.

### 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 drinking water and domestic water.
- > Stainless steel is hygienic and does not harm the air quality.
- > Stainless steel is the «green material» par excellence, infinitely recyclable, neutral in relation to the environment.

### Transformation and Durability

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



# The appropriate grades and surface finishes

Our experience enables us to recommend the most appropriate grade based on the applications:

- > K09 : painted structures
- > K41 : unpainted structures
- > K44 : heat exchanger tank, tank outer wrap
- > K45 : outer wrap

> **Bright Annealing:** particularly suitable for corrosion resistance.



> **Uginox Rolled-on:** particularly suitable in case of infrequent maintenance.



## Standards and Chemical composition

Commercial designations	Standards			Chemical composition (typical values)					
	ASTM		EN	C	Si	Mn	Cr	Mo	Others
	Désignations								
	TYP	UNS							
K09	409	S40900	1.4512	0.01	0.45	0.30	11.30		Ti = 0.19
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	K41	K44	K45
Density (kg/dm <sup>3</sup> )	7.7	7.7	7.7	7.7
Melting temperature in °C	1460	1505	1495	1500
Young's modulus in MPa x 10 <sup>3</sup> (20°C)	215	220	220	210
Yield Strength in MPa at 20°C	250	310	370	360
Thermal conductivity in W/m.K	26	25	23	21.3
Mean Thermal expansion coefficient 10 <sup>-6</sup> /K; 20-200°C	11	11	10.8	11.5
Ultimate tensile strength Rm in MPa at 20°C	420	480	520	510

## What is stainless steel?

"Water in the cooling towers often lead to the use of stainless steel due to the types of treatments used. Up until 2006 we mainly used austenitic stainless steels to meet the specifications and to propose interesting anti-perforation guarantees. Our first ferritic stainless steel tower dates back to 1999 (Isbergues.) This conclusive project enabled us to totally replace austenitics with ferritics in 2006/2007 when the Nickel was at its peak."

M. Alexandre Manon, Société Jacir Air-Traitement.

