

# Ferritic Stainless steel advantages for photovoltaic 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.
- > 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

K44, K41,  
K30, K30ED

## Ferritic Stainless advantages

### Environment and recyclability

- > Stainless steel is particularly well suited to recovering rainwater run-off, there is no leaching of elements which could alter their composition unlike other materials used for frames.
- > Stainless complies with all of the food-safe norms and can be used in contact with drinking water.
- > Stainless steel is the «green material» par excellence, infinitely recyclable, neutral in relation to the environment.



### Fire and 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.
- > Low temperature impact on mechanical properties unlike other materials used for frames. Ideally suited for roofing.

### Mechanical and physical properties

- > Ferritics have a low expansion coefficient, identical to that of glass ( $9.10^{-6}/K$ ).
- > Ferritic stainless is magnetic which facilitates transfer operations.
- > Good resistance to torsion and to tearing thanks a high Young's modulus.
- > Its resistance to cracking ensures safe load resistance.
- > The use of a ferritic stainless steel enables thickness reduction thanks its yield strength coefficient.
- > Its low thermal conductivity coefficient gives this material good insulation properties.

### Transforming and perennity

- > The welding capability of stainless steel allows the production of frames without the need for a thermal bridge.
- > Its ease of transformation enables the use of hand tool seven for folding.
- > Stainless steel has good corrosion resistance to the different atmospheric exposure levels.
- > Stainless steel is insensitive to UV and infra-red rays: retaining its appearance throughout the life of the installation.
- > Stainless use guarantees a positive relationship between the final cost and the lifecycle cost of the structure.

# The appropriate grades

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

- > K30/K30ED: hook fixing, thin-film cells substrate
- > K41: panel support rails, captor housing
- > K44: frame and housing for photovoltaic solar captor



## Standards and Chemical composition

Commercial designations	Standards		Chemical composition (typical values)						
	ASTM		EN	C	Si	Mn	Cr	Mo	Others
	Designations								
	TYP	UNS							
K30	430	S43000	1.4016	0.04	0.35	0.30	16.50		
K30ED	430	S43000	1.4016	0.015	0.35	0.40	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



(1) Typical designation

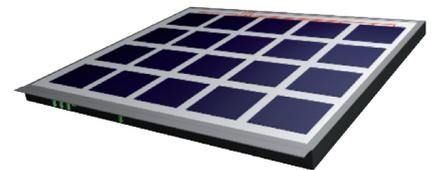
## Properties

Properties (typical values)	K30	K30ED	K41	K44
Density (kg/dm <sup>3</sup> )	7.7	7.7	7.7	7.7
Melting temperature in °C	1500	1500	1505	1495
Young's modulus in MPa x 10 <sup>3</sup> (20°C)	220	220	220	220
Yield Strength in MPa at 20°C	330	300	310	370
Thermal conductivity in W/m.K	25	25	25	23
Mean Thermal expansion coefficient 10 <sup>-6</sup> /K; 20-200°C	10.5	10.5	11	10.8
Ultimate tensile strength Rm in Mpa at 20°C	500	480	480	520

## Photovoltaic panels

Ferritics have many advantages for the manufacture of photovoltaic frames:

- > When in contact with elements such as water, there is no leaching of elements which could alter their composition.
- > Similar to the expansion coefficient of glass, enabling the thickness reduction of the watertight seam.
- > Mechanical properties and high Young's modulus ensure the strength of the installation.



## Example of partnership

### Dualsun

For its solar panel 2 for 1, we advised **Dualsun** on the choice of a stainless steel. This hybrid solar panel developed by **Dualsun** is made up of a front face of solar cells and a reverse side of flat heat exchangers comprising two sheets of stainless steel. This thin heat exchanger allows the coolant to be uniformly distributed over the entire surface of the exchanger. The heat exchanger has a high thermal coefficient which allows efficient hot water production and at the same time, cooling of photovoltaic cells that will facilitate output further. So, **Dualsun** technology offers a hybrid solar panel visually identical to a standard photovoltaic panel that fits into any type of roofing (single-family home or collective dwellings). The stainless steel grade selected for **Dualsun** hybrid technology ensures:

- > Good thermal conductivity
- > Good resistance to corrosion
- > Sustainable integration of the heat exchanger into the hybrid solar panel.



Information  
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