

Stainless, flawless

By **Andy Holland**, technical and marketing manager at **Rapierstar**, the UK's largest specialist supplier of fasteners to the window industry

Windows or doors for properties located in relatively harsh environments, such as by the coast with all the salty air or in an industrial area where air pollution levels are higher, have to be manufactured with hardware and components that will stand the test of time.

This is because the extent to which different metals and alloys resist corrosion varies massively. But do you think enough about how this impacts on the fasteners you are using in the assembly of your windows and doors?

If you choose window screws made from a metal that is relatively susceptible to the effects of moisture and surface contaminants – coated carbon steel primarily – your window and door quality could be undermined. Ultimately, this could cause problems for your customer within a matter of months after installation and result in costly remedial work as well as reputational damage.

That's why many fabricators will know to choose stainless steel fasteners to help prevent these risks. But did you know that stainless steel is actually a category of metals which is made up of a number of different alloys which again have varying performance characteristics?

Stainless steel's name comes from the fact that it does not stain, corrode or rust as easily as ordinary steel. Its origins go back to Sheffield in 1913 when its properties were discovered during the search for a corrosion-resistant material to make gun barrels. In addition to giving the world an incredibly versatile material for construction and engineering purposes, it was a discovery that has also transformed our ability to create safe and hygienic environments in medical care, food preparation, our homes and much more.

How do stainless steels work?

Stainless steel is an alloy of iron, chromium and, in some cases, nickel and other metals. It is completely and



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infinitely recyclable and doesn't degrade through the recycling process, offering immense longevity, ideal for the era of sustainable construction.

On contact with oxygen, a chromium oxide layer is formed on the surface of the material, a passive layer that protects it and has the unique ability to repair itself. This is why a stainless steel must have a minimum chromium content of 10.5%, and the higher the chromium content the better for corrosion resistance.

Each stainless steel alloy is categorised into a 'series' based on relative performance. For the fenestration sector these are principally austenitic (series 300), ferritic (series 400) and martensitic (also series 400). Within each of these bands there are individual grades based on the composition of the alloys.

Two types of stainless for window screws...

For window and door manufacturers Rapierstar offers two types of stainless steel fasteners – austenitic and martensitic. But how do they differ and compare with non-stainless steel screws? The comparison table shows how:



	Austenitic stainless steel	Martensitic stainless steel	Coated carbon steel
Grade	300 Series (AISI/SAE)	400 Series (AISI/SAE)	1xxx-9xxx (AISI/SAE)
Level of corrosion resistance	High	Medium to high	Low
Magnetic	No	Yes	Yes
Ductility	High	Low	Mid - High
Can it be hardened?	Yes	Yes	Yes
Can be used for fixing into reinforcement?	No – but it is suitable as a bi-metallic (hardened drill point)	Yes	Yes
Suitable for PVC-U?	Yes	Yes	Yes
Recommended for aluminium?	Yes	No	No

Austenitic stainless steel fasteners offer the highest level of resistance to corrosion, but this alloy is relatively soft. This means that a standard austenitic window screw will not self-drill into metal reinforcement successfully – a martensitic screw would, however, drill through with ease.

But this does not mean you cannot use austenitic stainless steel fasteners in reinforced PVC-U windows or

doors. You can pre-drill into the reinforcement or choose a costly bi-metallic screw.

Which stainless steel should you choose?

When manufacturing aluminium windows and doors there is only one choice – austenitic. This is because martensitic stainless steel screws corrode when fixed into aluminium through contact with a solution. This process of galvanic corrosion is the principle on which batteries work, with two metals reacting with each other in the presence of an electrolyte (in the case of windows, water) to create an electric current – the sacrificial metal will eventually corrode away as the battery runs flat.

Martensitic stainless steel fasteners, however, do offer an excellent and worthwhile upgrade for PVC-U window manufacturing if you are currently using coated carbon steel screws. But they will not be right for every application, especially in coastal and industrial areas, so seek guidance if you are thinking about upgrading.

Austenitic stainless steel fasteners give your windows and doors the most protection from corrosion. And whilst they are also the most expensive option, remember they will ultimately deliver the most reliable outcome. The cost uplift per box of screws is still relatively small, especially when you consider that fasteners make up only around 0.36% of the overall window cost. It is a tiny premium to pay for long term customer satisfaction and peace of mind.

There is plenty of information available at www.rapierstar.com to help you make the right fastener choices, including an application chart for Rapierstar's StarPVCU fastener range and Recommended Fixings Manuals (RFMs) for all the main PVC-U profile systems so choosing the right screws for assembly is easy.

Rapierstar's technical consultants are also available to provide support and guidance to fabricators online. □

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