Non-Austenitic Stainless Steel Fasteners: Why you can’t afford to gamble.
Corrosion is the tendency of metals to change from their pure, unstable form back to the more stable, metallic oxides commonly found in the ground as ore.

It is important to realise that all metals have the potential to corrode and the degree of corrosion that occurs is dependent on a number of different factors – not just the proximity of dissimilar metals.

Corrosion is a fact of life and even the best constructions and designs will corrode to a degree.

Roofing and cladding systems, whether they are pitched construction with metal liner panel systems, composite systems, fibre cement sheeting or flat construction, are all subject to conditions which led to a high corrosion risk.

However, the use of Stainless Steel in certain elements of the construction cost effectively minimises corrosion throughout the design life of the building (30-50 years), helping to prevent the effects of corrosion, preserve the integrity of the structure and reduce the need to carry out expensive and avoidable repairs.

One delicate issue regarding corrosion is the question of how knowledgeable a building or fixing expert has to be. The corrosion of metals is a highly specialised field, one that only experts with a thorough knowledge of physics, chemistry and metallurgy can fully understand.

Consequently, it is not the purpose of this document to provide a thorough understanding of the complex nature of fastener corrosion. Many publications exist which deal with the subject. ‘Corrosion problems in roofing and siding’ by Heinz Weiland is available from SFS intec.

The aim of this document is to alert the reader to the potential causes of corrosion to fasteners; to give a basic working knowledge of the types and limitations of anti-corrosion coatings available for fasteners and the suitability of different types of Stainless Steel.

If you would like further information or require assistance with individual design details, please do not hesitate to contact our technical helpline on 0113 2085 578.
Fastener corrosion in roofing and cladding

Generally, fastener corrosion is measured in terms of loss of performance – i.e. loss of tensile or shear strength and reduced pullover values – but what effect does it have on your credibility?

Fastener corrosion can cause unsightly rust stains to appear on a building’s façade. In extreme cases it can cause loss of the structural integrity of the building as a whole.

More worrying are the effects of hidden corrosion. Often this will only become apparent when the building demonstrates a catastrophic failure – the loss of roof panels or side cladding.

Whilst specifiers spend a great deal of time selecting the right roofing material or cladding panels, many fail to give due consideration to the fasteners.

Yet is has been clearly illustrated that any carbon steel fastener used in roof or cladding construction is liable to corrosion.

The result? Loss of visual harmony due to unsightly rust stains, failure of the system, expensive renovations... and a reputation that may be beyond repair.

Atmospheric pollution can lead to corrosion of the heads of fasteners, resulting in unsightly rust stains, reduced pullover values and eventual failure of the roofing and cladding system.

Water held by capillary action in side and end laps can lead to hidden corrosion on the concealed fastener shank. This will severely damage the mechanical performance of the fastener, resulting in eventual failure of the fastener and the system.

Whether new-build or refurbishment, moisture can be trapped within the construction. This will form condensation, which in turn causes the fastener to corrode, leading to failure of the fastener.

Fasteners used into timber within a humid atmosphere are susceptible to attack from organic acids that form in the wood. Even in timber which has been treated with preservatives, carbon steel and aluminium fasteners are known to corrode.
Corrosion protects

Carbon steel fasteners are used throughout the construction industry. However, carbon steel itself offers very little resistance to corrosion.

It is a common belief that the various protective surface coatings available offer sufficient resistance to corrosion in ‘non-critical application’?

But this begs the question “what is a non-critical application”?

Protective coatings applied to carbon steel fasteners can only offer temporary corrosion protection, and when the protective coating is damaged (e.g. during installation), the level of protection is severely reduced.

Organic coatings: fasteners are dipped into an organic suspension containing metal flakes (including zinc) and then heated in a stove furnace. To achieve a satisfactory coating, it is standard practice to repeat this process four times.

Zinc-plating: a pure zinc layer is applied to the carbon steel surface by positively charging the carbon steel to attract the negatively charged zinc ions.

Dual-Coating: a combination method where the fasteners have a base layer of zinc and an organic top coating.

Plastic Colour Caps: many post-fixed colour caps become dislodged and are lost in a relatively short time. Even with the cap in place, corrosion may be accelerated by trapped moisture beneath the head.

Sela Colour Head: factory moulded integral coloured nylon heads offer a much better degree of corrosion protection to the head of the fastener. However, the opportunity for hidden corrosion to attack the shank still exists.

The SFS intec iarius® range of Austenitic Stainless Steel Fasteners with integral coloured heads, offer effective corrosion resistance to the shank whilst maintaining the aesthetic appearance of the building.

Stainless Steel is defined as an iron alloy with a minimum chromium content of 11%. It is the chromium content that offers the resistance to corrosion, preventing the formation of rust on the surface and hence the term ‘Stainless’ Steel.

Stainless Steels form a very thin surface layer of oxide film, called the passivating layer. This protects the metal beneath and it scratched, the exposed surface rapidly oxidises to form a placement layer.

There are more than 200 alloys that are recognised as ‘Stainless Steels’, but not all possess the same level of corrosion resistance.

Martensitic Stainless Steels are usually referred to as 400 series and contain the minimum chromium content required to develop a passivating layer. Fasteners manufactured from this grade have a poor resistance to corrosion and are not considered suitable for use in roofing and cladding.

Ferritic Stainless Steels contain 12-30% chromium. However they have a low ductility, cannot be hardened and are subject to brittleness. As a result, Ferritic Stainless Steels are also unsuitable for the manufacture of fasteners for the construction industry.

Austenitic Stainless Steels contain at least 17% chromium and 8% nickel. They are widely used in the construction industry for applications requiring a high level of corrosion resistance.

Grade 304 Austenitic Stainless Steel Fasteners (300 series) have to be manufactured using advanced production techniques and contains 18-20% chromium and 8-10% nickel. Fasteners manufactured from this grade of Stainless Steel offer the optimum corrosion resistance.

Austenitic Stainless Steel Fasteners be classed as ‘life long’ to minimum building design life of 30 years as detailed in British Standard BS 7543 – 1992.

Austenitic Stainless Steel Fasteners are often only specified on prestigious contracts, or in areas close to marine or other highly corrosive atmospheres.

But Austenitic Stainless Steel Fasteners should be specified wherever the potential for corrosion exists.

British Standard BS 5427:1996 Code of Practice for performance and loading criteria for profiled sheeting in building, recommends that only 300 series Austenitic Stainless Steel is used for the manufacture of fasteners designed for roofing and cladding applications.

One reason why Stainless Steel Fasteners are not widely used is a perception that only a limited range is available. However, in recent years, SFS intec have developed Stainless Steel Fasteners for all applications and these are illustrated overleaf.

Stainless Steel Fasteners are also perceived to be expensive. In reality they represent a small fraction of the total construction cost, adding only a few pence per faster.

Their effectiveness is proven. Using anything else is a risk you cannot afford to take.
Specify Austenitic Stainless - Specify SFS intec

SFS offer a wide programme of SX Stainless Steel Fasteners suitable for many roofing and cladding applications – All are manufactured by the Company from Austenitic Stainless Steels.

Corrosion resistant fasteners in Austenitic chrome-nickel steels provide the only reliable way of fundamentally avoiding the corrosion problem.

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Partners in quality design SFS intec

Intensive research and development
Close co-operation with the user and day-to-day work on construction sites all over the world supply us with the ideas and stimuli for continuous innovations and further development. The latest research and development facilities are at our disposal.

Highly Specialised precision manufacturing.
Independent of outside manufacturers, SFS intec puts the latest findings from the market and its development work into practice – quickly and precisely – in its own high-quality production plants. Highly specialised manufacturing know-how, the latest production facilities and trained specialists are your guarantee for uncompromising quality.

Secure guarantee of quality
SFS intec fasteners have been awarded the necessary approvals and test certificates by national and international testing institutes. It is no accident that SFS intec was the first company in this industry in Switzerland to qualify for BS 14002 certification, confirming the Company’s commitment to continuous process improvement, environmental, health and safety controls as well as quality. SFS intec has subsequently gained BS EN ISO9002:1994 registered firm status for wholesale distribution of products within a quality management system.

On-Site advice and fast supply
SFS intec service starts and finishes in close contact with the user on the construction site. Your qualified SFS intec technical advisor is never more than a telephone call away. And because we know that even the best fastener is of little use to you unless it is on the construction site at the right time, we pay great attention to delivering on time.

SFS intec Security®: The biggest plus is it fastens down Part L
Now there’s a revolutionary, OEM approved supply chain warranty package that can help you take a positive step to complying with the latest building regulations. Security® is the only fastener and warranted ancillary package that facilitates your building’s compliance with Part L. So you get it right first time, specify the correct grade of sealant butyl and profile filler material.

Security® delivers outstanding performance in the critical areas of procedure and compliance. When constructing a new roof, or substantially replacing major aspects of a roof structure, Security® allows you to adopt the principles of “Robust Details”, reduce thermal bridging, improve air tightness and prevent air leakage.

Most experts advocate good detailing and workmanship for the long and warn against quick-fix solutions. Make sure you use the experts who can guarantee your building in future proof. For more information on how Security® can benefit your next project, call 0800 269371 or visit www.sfsintec.biz/uk

Worldwide presence
Advanced technology has assured SFS intec fasteners of great success throughout the world. The international SFS intec organisation includes subsidiaries and marketing associates in more than 100 countries. Employing over 3500 people and achieving a turnover in excess of £500 million, all offering the same high level of product and service.

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To make you more competitive.