

AUSTRALIAN

STAINLESS

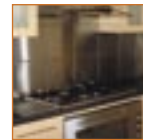
ASSDA
NO 29 SEPTEMBER 2004

SPECIALISING IN STAINLESS STEEL AND ITS APPLICATIONS



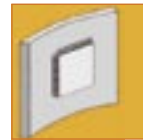
Cover Story ... Reflecting Urban Renewal with Stainless Steel Cladding

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VERSATILE STYLE WITH STAINLESS DECORATIVE TILES

PHOTOS COURTESY OF KARL JOHNSON, FUTURA TILES (BORDER SHEETMETAL)

A revolution is about to take place in the tiling industry with the introduction of stainless steel decorative tiles with a versatile design that will add style to any kitchen, bathroom, restaurant, bar and even as a feature wall.

There are many benefits to using stainless steel tiles. The tiles cannot burn or crack, graffiti can be easily removed, will not rust and is a stylish upgrade to the standard one piece splashbacks.

Available from Futura Tiles (Border Sheetmetal), the tiles are available in a wide variety of sizes, patterns, finishes and grades. Size ranges include: 65 x 290mm freeze, 290 x 290mm tile, 390 x 390mm tile.

Runaway Bay Designer Builder, Kerri Phillips, was so happy with the product that he installed

the stainless tiles in his own kitchen and found cutting the tiles no problem at all.

"They provide you with special blades. It's a delicate operation, as long as you're careful it's fine," says Phillips.

ASSDA major sponsor, Fagersta Steels, supplies grade 304 stainless and patterned sheet from ASSDA member, Rimex Metals to Futura Tiles (Border Sheetmetal) to produce the tiles.

The tiles are also available in various Rimex patterns and finishes including the standard brush finish, 5WL and 6WL surface finishes.

Manufactured from grade 304 stainless as standard, the tiles are also available in grade 316 stainless for applications with a close proximity to marine environments.

Installing stainless steel tiles

Stainless steel tiles are basically the same as laying most floor and wall tiles. Cut tiles using similar ceramic grinding methods by using blades with 1mm steel cutting wheels.

Grouting

When grouting, apply grout to tiles leaving the protective film covering on the face of the tile. Use only fine, sanitised water resistant grouts and do not apply sanded or abrasive grouts. Remove excess grout with a clean sponge leaving a smooth grout line.

Removing film covering

Peel the protective film covering from the tiles, then with a clean sponge, remove any grout left behind from the edges of the covering. Leave approximately 30 minutes and dust off with a clean lint free cloth.

Protecting

After all dust film from the grouting has been removed apply a small amount of polishing oil to a clean rag and wipe with the grain of the tile to remove any excess oil. This will resist finger printing and water spotting and will enhance and protect the stainless steel surface.



CLOCKWISE FROM TOP: Stainless steel tiles can be used for a variety of applications including a bar feature wall at Luna Rossa Restaurant (Gold Coast); a household benchtop; a bathroom toilet wall using patterned Rimex tiles at Calypso Tavern; and stainless steel tiles are a welcome alternative to one piece splashbacks found in many designer kitchens.

REFLECTING URBAN RENEWAL WITH STAINLESS STEEL CLADDING

PHOTOS COURTESY OF STEFAN JANNIDES PHOTOGRAPHY, BRISBANE - PH 07 3852 4977

Shining the way in major urban renewal precinct development is the Fujitsu Building, a speculative office building utilising stainless steel cladding to form a striking 'gateway' into Brisbane city.

Situated on Breakfast Creek Road, the five-storey Fujitsu Building is the first of three buildings in the 'Portal Business Community' to be developed by Ariadne Australia under a master plan by architects and planners, Cox Rayner.

'Portal' reflects an urban renewal of the former industrial site that has been used for petroleum storage and as a gasworks since the 1880's including the preservation of Queensland's oldest metal frame gasometer.

With this industrial setting in mind, the Fujitsu Building comprises economical materials and solar treatments to create intriguing textures in unconventional ways.

Whereas many speculative office buildings typically appear anonymous and soulless, the Fujitsu Building is an endeavour to demonstrate how speculative office buildings can be designed

within meagre budgets to impart character reflective of place. This character was achieved by adopting an efficient floor plan and combining inexpensive materials such as stainless steel cladding.

The master plan concept turns the building through 90 degrees to north/south. This initiative optimises passive energy efficiency through screened and recessed glazing, ground level set-in, thermally insulated lightweight panel cladding and the concept of the roof as shade parasol.

Stramit Building Products selected uncoated stainless steel from their premium products range to create contrasted profiles and textures.

ASSDA major sponsor, Austral Wright Metals provided technical assistance by recommending and supplying grade 445M2 stainless steel from ASSDA sponsor Nisshin Steel Company in Japan.

Grade 445M2 is a ferritic stainless steel that offers superior corrosion resistance compared to grade 316. A lower reflectivity matt finish was chosen for the site, next to one of the main roads into the Brisbane central business district.

The matt finish doesn't compromise the corrosion resistance of the grade, which is important as the Brisbane River is very close.

445M2 is suitable for roofing and cladding in marine environments and other areas where the environment is too severe for grade 304.

Because it is ferritic, grade 445M2 has mechanical and physical properties more like carbon steel than the austenitic grades and is much easier to roll form into flat panels like those on the Fujitsu Building.

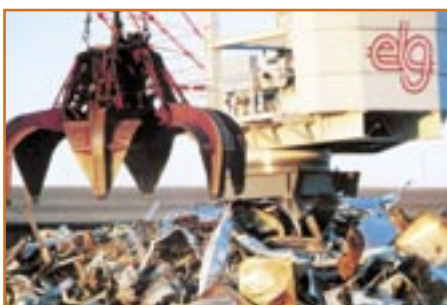
Thermal expansion is similar to carbon steel, so the grade can be designed with long roofing and cladding spans using well known practices.

The Fujitsu Building has received industry awards including the 2002 Queensland Metal Building Product Design award and the 2003 QMBA award for commercial projects over \$10 million.

The final two buildings of the Portal Business Community will comprise a 42 apartment development with views of the Brisbane River and a four level office building modelled on the Fujitsu Building.



ABOVE: The Fujitsu Building (at night) and the Portal Business Community imparts a welcoming gateway to Brisbane.
LEFT: Stainless cladding in contrast with tile work generated by computer scrambling to enliven the street interface.



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CREVICES AND CORROSION

BY ASSDA TECHNICAL COMMITTEE

A crevice is a narrow gap between a piece of metal and another piece of metal or tightly adhering material like plastic or a film of bacterial growth.

Many metals and alloys are susceptible to crevice corrosion, but in stainless steel, crevices are the first and most common place for corrosive attack to begin. With a little understanding, crevice corrosion can either be avoided or minimised.

Crevice can be:

- The space under a washer or bolt head.
- The gap between plates bolted together.
- The gap between components intermittently welded.
- The space under a sticky label.
- The space between a gasket and the metal in a flange (especially if the gasket is absorbent).
- Any other tight gap.

Crevice can be designed into the structure, they can be created during fabrication or can occur during service.

Prevention measures should therefore also aim at design, fabrication and service.

Why crevices can corrode

To work at its best, stainless needs free access to oxygen. Crevices are wide enough to permit entry of moisture, but narrow enough to prevent free circulation.

The result is that the oxygen in the moisture is used up. In addition, if chlorides are present they will concentrate in the stagnant conditions and, by a combination of reactions, the moisture can become acidic.

These are all conditions that can lead to the breakdown of the passive film on the stainless. Attack can then progress rapidly.

Crevice can create conditions much more aggressive than on adjacent surfaces. Having crevices builds in weak spots where attack can begin and begin in much less severe

conditions than anticipated for the remainder of the structure.

Table one shows laboratory measurements of critical temperatures needed to cause pitting on an open surface (CPT) and crevice (CCT) attack of a metal plate beneath a PTFE washer in a 10% ferric chloride solution.

The CCT is at least 20°C lower than the temperature to cause pitting corrosion in this aggressive liquid. (Ferric chloride solution is an aggressive corrodent and is used because it is similar to the liquid in a pit when it is actively corroding.)

Factors influencing crevices:

Crevice Shape

The geometry of the crevice will influence its susceptibility to attack and the speed of progress. The narrower and deeper (relative to its width) a crevice is the worse attack will be.

Metal to flexible plastic crevices tend to be narrower than rigid metal to metal gaps so metal to plastic joints provide more aggressive crevices.

Environment

The more aggressive the liquid outside the crevice, the more likely it is that the crevice will be attacked.

This is why crevice attack can be a problem in a salty swimming pool but not in a fresh water tank.

In the atmosphere, crevices beside the sea give more problems than in rural environments. If the liquid outside the crevice is very oxidising, eg with bleach, hydrogen peroxide or ozone, then crevice attack will tend to be more severe.

Temperature

Once the CCT is exceeded, then as with pitting corrosion, higher temperatures mean corrosion is more rapid. The rule of thumb is that a 10°C rise in temperature will double the corrosion rate.

This means that when comparing Far North Queensland to Tasmania, not only are crevices

more likely to start corroding but also that once they do, they will corrode faster because the temperature is consistently higher.

Alloy Resistance

Using a more corrosion resistant alloy gives less crevice attack. For example, in seawater at ambient temperature, crevices will form on 304 if there is a 0.9mm gap, on 316 if there is a 0.4mm gap and on 904L (similar corrosion resistance to 2205) if there is a 0.15mm gap.

Minimising the risk of crevice corrosion

Good design, fabrication and operating practices will anticipate and hence minimise crevice corrosion.

Design

Design to minimise the occurrence of crevices. If a crevice is a necessary part of a component's design – can it be made wider?

Full penetration butt welds are best for joints. Seal lap joints and avoid gaps between pipes and fittings.

Minimise use of bolted connections and other fasteners. Where crevices can't be avoided use a steel grade resistant to crevice corrosion in the operating environment. It is also possible to seal the crevices to keep out corrosive liquids, but care must be taken that the seal is permanent.

Be careful that the sealant "wets" the surface. If it doesn't it may form its own crevice. Sealants that dry and shrink can form their own crevices.

Gaskets between flanges will probably form a slight crevice, but if the gasket does not absorb the liquid and is compressed between the surfaces (and not bulging around the flange), then the crevice is usually shallow enough so that crevice corrosion is not a problem.

Fabrication

Ensure full root penetration of welded joints with smooth weld bead. Avoid under cut and cracks in welding. Use of sticky labels or markers of various kinds (such as crayons) should be avoided, as should smears of grease or oil.

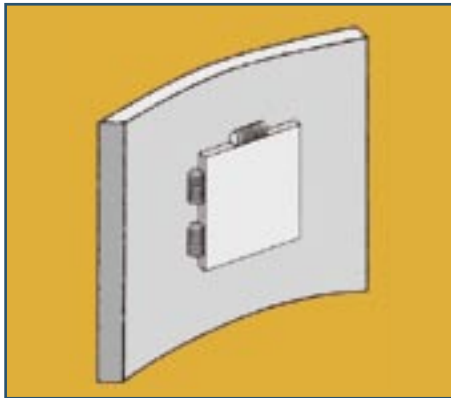
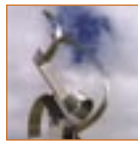
"Smooth and clean" at all times. ASSDA Accredited Fabricators are assessed on their knowledge of crevice corrosion.

Operation

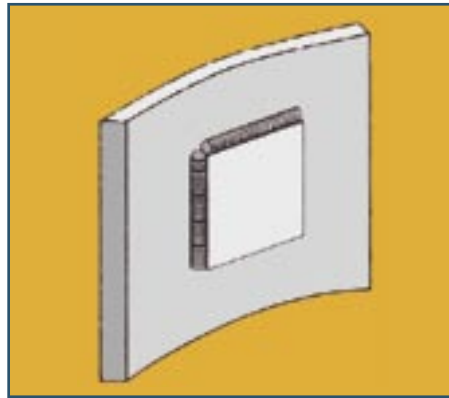
Sediment and scale can both result in crevices.

TABLE 1: CRITICAL TEMPERATURES REQUIRED TO CAUSE PITTING

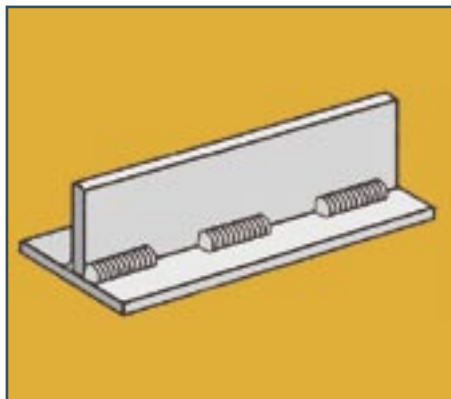
Alloy	304	316	904L	Duplex 2205	Super Duplex 2507
CCT °C	<-10	-10	12	13	38
CPT °C	3	10	42	33	78



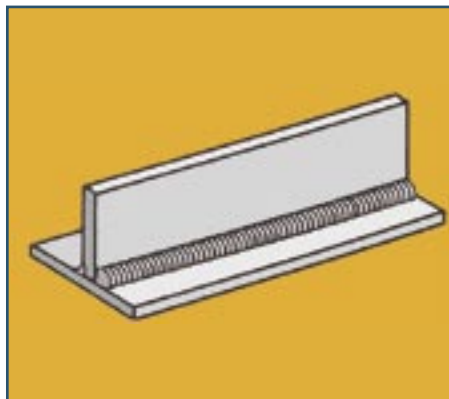
Reinforcing pad, staggered welds - adequate strength.



Reinforced pad, seal weld - best corrosion resistance.



Staggered fillets - severe crevice



Continuous fillets both sides - crevice sealed

If the problem can't be designed out, routine maintenance will minimise risk. Crevice corrosion under bacteria film can occur. Maintaining circulation reduces the risk that debris will collect and form crevices in dead legs or low flow areas.

Further Reading

The Nickel Institute's free publication #11021 "High Performance Stainless Steels" contains much of the information used in this article.

This publication and a mathematical model useful for assessing crevice corrosion risk can be downloaded from the Nickel Institute website - www.nickelinstitute.org.

If more detailed corrosion mechanism information is required, then "Corrosion of Stainless Steels" by A. John Sedriks is a good intermediate point.

Credits

The Australian Stainless Steel Development Association (ASSDA) would like to acknowledge the contribution of the following Technical Committee members for their contribution to the production of this article.

- Richard Matheson - Executive Director, ASSDA
- Graham Sussex - Technical Specialist, ASSDA
- Peter Moore - Technical Services Manager, Atlas Specialty Metals

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3. ASSDA emails member suppliers that provide the products relevant to your requirements.
3. Suppliers contact you directly and assist you with your product and service requirements.

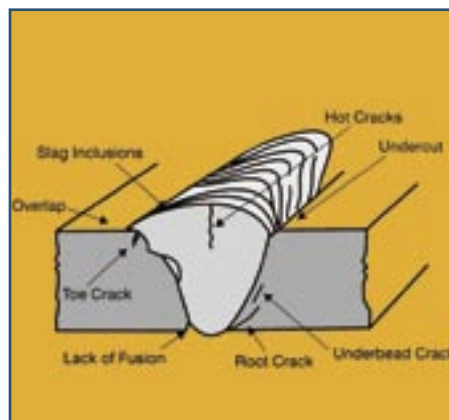


Figure 1: Typical crack defects around a weld (WTIA).

Stainless Steel Technical Support

For technical support and supply advice, contact ASSDA during office hours.

Phone 07 3220 0722
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 Web www.assda.asn.au



ASSDA Accredited Fabricators

An ASSDA Accredited Fabricator gives asset owners and specifiers greater certainty of high quality service in stainless steel fabrication

Find an ASSDA Accredited Fabricator quickly and easily by searching the *Stainless Steel Specialists Register* online at www.assda.asn.au



CLEANING AND PROTECTING STAINLESS SCULPTURES

WORDS AND IMAGES COURTESY OF JIM PICOT, REVOLUTION ADVANCED METALS & MATERIALS

“Windhover” is a dramatic stainless steel sculpture created by the late Lenton Parr, located on the eastern foreshore of Port Phillip Bay in Sandringham, Melbourne.

Unveiled in December 2001, the sculpture’s vertical lines and arcs are evocative of the yachts often seen sailing out on the Bay.

However, two and a half years of zero maintenance and exposure to salt spray from the bay have taken their toll, turning the surface of the stainless steel a blotchy brown.

Called tea staining, it’s caused by deposition of salt on the surface which is then trapped in the crevices of the brushed finish.

Regular reactivation by rain has perpetuated a corrosion cycle leading to quite rapid and severe surface staining.

The problem was how to clean the sculpture and then to ensure that it would remain protected from teastaining in the future.

Conventional weld pickling products containing hydrofluoric acid are very aggressive and risk damage to or discolouration of the surface.

Strong acids may also create an environmental and safety hazard when used in such a public place.

Many cleaning formulations are available based on phosphoric, sulphamic, oxalic or nitric acids. They have various degrees of handling and disposal restrictions.

The formulations may also contain mild abrasives and wetting agents/detergents to aid the cleaning process.



LEFT TO RIGHT: Windhover sculpture with teastaining before cleaning of the installation (left) and after applying the cleaning paste and water-based protective products by Revolution Advanced Metals and Materials (right).

In July 2004, ASSDA Member, Revolution Advanced Metals and Materials, used a cleaning paste based on a moderate concentration of phosphoric acid which is relatively safe to handle.

Inadvertent skin contact by this product does not cause the burning and possible ulceration associated with strong concentrations of nitric and hydrofluoric acid preparations.

The cleaning product was brushed on and left to react for 3-4 hours. The brown tea-staining gradually disappeared.

In some particularly bad sections a second application was necessary to completely remove all traces of the staining, but it left a completely blemish-free surface.

In this case, residue from the cleaning product was simply washed away with water. In other cases, however, check with local authorities for correct disposal procedures.

One of the problems when washing stainless steel with water is the streaking caused by uneven drying.

This was very noticeable on the sculpture.

Also, because it is unlikely that ongoing regular cleaning will occur, it is also important to limit the access of chlorides to the surface. Otherwise the staining problem will recur.

To overcome both these problems, a water-based protective product with oils and non-ionic surfactants but no phosphates was sprayed on and wiped over.

After polishing with a dry cloth all streaking vanished. It left an invisible film that stopped further streaking and fingermarks.

Best of all, it brought up the lustre of the brushed finish, and left Windhover looking as good as the day it was made.

Regular re-application should maintain the finish and help prevent tea staining in future.

Correct design, fabrication and on-going maintenance will all assist in keeping stainless steel sculptures and other structures erected adjacent to the coast in good condition.

Revolution Advanced Metals & Materials

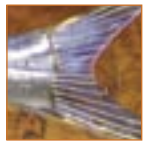
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FISHING FOR COMPLEMENTS: STAINLESS STEEL FISH ART

PHOTO COURTESY OF STEVE MASON, MASOSA

Steve Mason and his mate were sitting on a couch one day drinking beer when Steve came up with the idea of using stainless to turn his mate's wall into a work of art.

Steve's mate had just purchased a new unit with a large sea green wall. As the pair sat staring at the wall, Steve got an idea that would change his life and complement his mate's wall.

"He wanted something to hang on the wall to break up the space, so I made him a school of eight mackerel," Mason said.

A boilermaker from Woodford, Queensland, Mason loves to go fishing and is inspired by pictures of fish in magazines, but soon found that choosing the right material was important.

"I heated some stainless to colour it and left it aside for about 18 months. When I found it again and noticed the colours had not faded significantly, I decided to make fish out of 316."

"The colours that appear and the sheen and lustre of 316 really suits fish," Mason said.



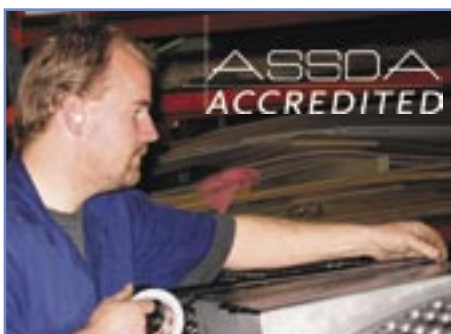
Working closely with fish photos and sketches, Mason tries to capture distinguishing features of each species including bream, barramundi, whiting, coral trout, marlin and many more.

Mason sources stainless steel scrap from ASSDA member Smorgon Steel Recyclers (Metalcorp, Hemmant - Queensland) and purchases grade 316 stainless steel sheet from ASSDA member Midway Metals (Queensland) to create many of his art sculptures.

Steve Mason now works full-time creating stainless steel fish art under the trading name of Masosa and sells his art through mailorder catalogue and in person at the Eumundi Markets, Queensland every Saturday morning.

Ranging from \$145 to \$3,000 in price, Steve's art now complements walls in cafes, fish and chip shops, art galleries and beside home pools. Best of all, it is the perfect present for one wall (or every wall) of any fishing fanatic.

ASSDA ACCREDITED FABRICATORS: SETTING THE STANDARD



The Australian Stainless Steel Development Association (ASSDA) is raising the standard for stainless steel fabrication quality in Australia by introducing an Accreditation Scheme to give asset owners and specifiers greater certainty that applications using stainless steel will be performed by technically competent industry specialists.

The Accreditation Scheme is designed to encourage and promote high quality service in stainless steel fabrication by recognising ASSDA Accredited Fabricators as providers of a

standardised level of quality that aims to meet and exceed quality expectations of asset owners and specifiers.

The stainless steel industry has grown to more than double its size since the association started in 1992 and since that time the industry has seen a rapid increase in demand for stainless steel.

Stainless steel is different. It requires specialist knowledge and practice to ensure the marvellous properties of stainless steel are able to show themselves. When stainless fails because of poor workmanship it ultimately affects the reputation of the product and the industry.

ASSDA Accreditation Scheme

ASSDA Accreditation is a sharp instrument that targets the key issues of stainless steel fabrication expertise and aims to meet the expectation of asset owners and specifiers that the job will be properly specified and trouble free.

ASSDA Accredited Fabricators

Selecting an ASSDA Accredited Fabricator for a project is the best way to minimise the risk of

failure, get the most accurate information about stainless steel for your job and achieve the most cost effective outcome.

ASSDA Accredited Fabricators have been assessed for their knowledge, experience, quality, training and commitment and meet the high standard set by recognised best practice in the industry.

All approved ASSDA Accredited Fabricators have demonstrated experience in quality stainless steel fabrication over many projects or installations.

Stainless Steel Specialists Register

The *Stainless Steel Specialists Register* lists those businesses which are competent, for defined business functions, in the supply of semi-finished materials, and/or design, fabrication and installation of stainless steel structures and equipment. The Register provides a list of ASSDA Accredited Fabricators and will be available on the ASSDA website - www.assda.asn.au.

To find out how you can benefit from the Scheme, phone 07 3220 0722, email assda@assda.asn.au or visit the ASSDA website.

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Web www.rimexmetals.com.au

Page 3 - Fujitsu Building**Ariadne**

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