Ferritic Marine Grade Stainless Steel

445M2

Architectural Applications in Australia and New Zealand

Ferritic marine grade stainless steel 445M2 offers better resistance to corrosion and tea staining in atmospheric corrosion applications than the more familiar austenitic grade 316.

The grade was developed by Nisshin Stainless Steel specifically for architectural applications, although it is now used much more widely. It has given satisfactory performance in demanding environments, close to the ocean, for a number of years, without deteriorating.

The grade has been used in Japan since 1993, and in Australia since 2001.

Austral Wright Metals has no hesitation in suggesting 445M2 to replace 316 for most uses. Please consult us with details of your application.
## Architectural Applications of New Generation Ferritic Stainless Steel 445M2 in Australia and New Zealand

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Sentinel Building, Takapuna Beach, Auckland NZ

New Zealand’s tallest residential building
A luxury residential skyscraper in Takapuna. The largest and currently only real skyscraper in Auckland, it has 30 levels and is 150 m tall including the spire.
Insulation cladding at sulphuric acid plant, Ravensthorpe Nickel Smelter, WA
Insulation Cladding, BHP Billiton Nickel Smelter, Kalgoorlie WA

Sulphuric acid plant – a similar application to the Ravensthorpe plant on the preceding pages.
Acoustic cladding, Garden Island Dockyard, Sydney, NSW

The acoustic cladding was post-painted to meet the requirements of the Garden Island Heritage Plan
Litter Bins, Cottesloe Beach, WA

After 3 months exposure
Projects Using 445M2 in Australia & NZ

The image shows two photos of public bins adorned with labels indicating the types of waste they accept. The first photo features a bin with a sign for non-recyclable waste, while the second photo displays a bin with recycling labels. These images highlight the use of 445M2 stainless steel in creating durable and sustainable waste management solutions. The text and images together emphasize Austral Wright Metals' commitment to environmental responsibility through the application of their materials in public waste disposal systems.
After 15 months exposure

Note the salt deposits on top of the units, indicating severe marine conditions.
Air Supply Ducts, Applied Science Building, UNSW

Inside the duct - room to move
Expanded Metal Mesh, Lockers, NSW

Expanded metal mesh used for security screens on doors and windows.

The mesh provides security without obscuring the view.
Portal Building, Brisbane, Queensland
Fisherman’s Bench, Fraser Island, Queensland
Awnings, Adelaide CBD, SA
Fisheries Research Centre, Geraldton, WA
De Vlamingh Memorial, Perth WA

DSCF0510.JPG

DSCF0508.JPG

DSCF0509.JPG
Stainless steel 316 spiral welded ducts underwent unsightly tea staining at Lane Cove Leisure Centre (bottom left).

These atmospheres are notorious for their aggressiveness, caused by the combination of high temperatures, high humidity, and high levels of chlorine and chloramine in the atmosphere.

The tea staining was removed chemically from the spiral welded ducts, but unfortunately has returned on the 316 surface. The adjacent cable ladder covers were considered too badly stained to repair, and were replaced with 445M2 covers. These are not becoming tea stained.
Filter Plenums for Aeration, Waste Water Treatment Plant, Perth WA
Switchboard Cabinets, Glenelg, SA
Balustrade Covers, Melbourne, Victoria

Note: 445M2 is not available as tube. The balustrade cover at the bottom of the fence is 445M2.
This house is 330m from breaking surf. Door frames and lintels made from 316 require constant maintenance to remove tea staining. The 445M2 roof is unstained.

**Rondo Exangle Render Bead**

Rondo Building Products supply Exangle render bead made from 445M2 for use in marine environments.

Render bead is used under a cement render coating to enable the renderer to achieve a smooth, consistent external corner.
House Roof, Zilzie, near Rockhampton, Queensland

This house is 330m from breaking surf. The adjacent gutters are made in 316, and are tea stained.
Tank cladding, Boag’s Brewery, Launceston, Tasmania
The architects needed a practical, modern material that would harmonise with the eclectic mix of adjacent buildings, including a glass façade, copper clad library building, and the sandstone buildings of the main quadrangle. They chose 445M2 with a 2DR finish.
Stainless steel handrails (probably 316) adjacent to the airconditioning tower.
Tank Cooling Jackets
New Generation Ferritic Stainless Steel Marine Grade 445M2
In a Nutshell

Stainless steel grade 445M2 is a modern alternative to the familiar grade 316 for most applications. It is especially useful for architecture, where 445M2 has better tea staining resistance.

Grade 316 has long been known as ‘marine grade’. It is often used in marine atmospheres, where the corrosive effects of salt deposits can produce unsightly brown stains, known as ‘tea staining’. While these do not progress to the rapid corrosion and thickness loss experienced with carbon steel, the appearance does not meet the expectations for stainless steel.

445M2 is a new generation ferritic grade, without the limitations of the older lean ferritic grade 430. Generous levels of chromium (22%) and molybdenum (1.1%) give it ample corrosion resistance, and clever steelmaking makes it easily weldable. Some people can be surprised that 445M2 is magnetic. Magnetism does not affect corrosion resistance.

The grade comes with the assurance of many years of satisfactory service performance in Japan and in Australia. It was first used in Japan in 1993, and in Australia in 2002.

Fabricators report that 445M2 behaves like carbon steel in the workshop, and it is easier to make high quality items. It has a lower rate of work hardening, and lower thermal expansion than 316. Together, these mean better product quality - crisper folds, flatter panels. The performance of 445M2 in roll forming is outstanding.

- **AVAILABILITY**

  Austral Wright Metals stock 445M2 as coil and sheet in a range of thicknesses: 0.55, 0.7, 0.9, 1.2, 1.5, 1.6, 2.0, 2.5 and 3.0mm. Width of 1219mm is standard. The surface finishes available are 2B and No4. In addition, Austral Wright Metals stock 0.55 x 940 mm in the lower gloss 2DR finish, specifically for roofing and rainwater goods.

  Unfortunately 445M2 is not available as tube, bar or sections.

- **WARRANTY**

  Austral Wright Metals will provide a project specific warranty for each application, taking account of construction and location details. The useful service life of 445M2 is expected to be better than that of grade 316. Please consult Austral Wright Metals for your application.

- **DESIGN & FABRICATION**

  Design with 445M2 follows the normal practices with stainless steels. Where variation in ambient temperature is a factor (eg roofs and facades), the lower thermal expansion of 445M2 means lighter support structures can be used than for grade 316.

  Fabrication follows the practices used for carbon steel, since springback is similar. 445M2 can be TIG or MIG welded, with or without filler metal. Use 316LSi welding wire. The only special requirements for welding 445M2 are that the parent metal and filler metal must be clean and free of grease, and the gas shielding must be good – and it must not contain nitrogen, hydrogen or excessive (>3%) carbon dioxide.

Summary

• New generation ferritic marine grade stainless steel 445M2 can replace grade 316
• Available exclusively from Austral Wright Metals
• Features of 445M2, compared to 316:
  o Corrosion advantages
    ▪ Better atmospheric corrosion resistance
    ▪ Better general corrosion resistance in acids
    ▪ Better pitting & crevice corrosion resistance in chloride solutions
    ▪ Immune from stress corrosion cracking in potable water
    ▪ Immune from sensitisation and intergranular corrosion, when properly welded
  o Fabrication advantages
    ▪ Behaves like G300 carbon steel, giving less springback and tool wear than 316
    ▪ Outstanding roll forming characteristics
    ▪ Easy to achieve crisper bends and flatter panels
    ▪ Easily weldable
• Applications
  o Grade 445M2 can replace 316 in most applications
    ▪ Austral Wright Metals customers have used 445M2 in roofs, walls, façades, air conditioning ducts and plenums, cable trays, chemical tanks, switchboard cabinets, commercial catering, refrigerators, kitchens, barbeque benches hoods and plates, freezer trays, brick ties, water features, lighting fixtures, cooling jackets, expanded metal mesh, perforated screens, signs, engraved labels, stove tops, kick plates, water tanks, pergola brackets, street furniture, fan housings, street litter bins, houseboat trim, abattoir equipment, signs, commercial dishwashers, render bead, ballistic doors, door frames, eyelets, heating element tubing, mail boxes.

Comparison of Corrosion Resistance in a Marine Atmosphere
Grades 304, 316 and 445M2

Samples exposed for 2 years at Miyakojima, Okinawa, Japan, a coral island about 300 km SW of the main Okinawa island. The test site is about 1.5 km from the surf in an extreme marine sub-tropical environment, subject to frequent tropical cyclones (typhoons).
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