



Book of New Applications **3**rd edition





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Content

01 BUILDING AND CONSTRUCTION	7
02 ELECTRIC MACHINERY AND EQUIPMENT	31
03 AUTOMOTIVE	41
04 TRANSPORT	47
05 INDUSTRIAL MACHINERY	59
06 COOKWARE	79
07 HOME AND OFFICE	87
08 ART	97
09 OTHER	103

Message from the Chairman of the ISSF Market Development Committee

Jürgen Fechter

Chief Executive Officer, ThyssenKrupp Stainless AG

Member of the Executive Board, ThyssenKrupp AG

One of the objectives for ISSF is to grow the market profitably. Since its creation in 1996, the Market Development Committee (MDC) has identified and driven various market development projects. The MDC also facilitates the exchange of good stainless steel marketing ideas between various markets around the world.

This is the third edition of ISSF's Book of New Applications. The first and second editions were published in 2006 and 2007 respectively. The purpose of this publication has always been to inspire by disseminating ideas from recent applications and help the world stainless steel market to grow. Thanks to valuable support from ISSF members and Stainless Steel Development Associations (SSDAs) around the world, the books were produced in a very short time, and both were enthusiastically received.

This third edition has again relied on support from ISSF's members and the SSDAs. However, input in this edition has also come from ISSF committees and other projects we have undertaken. Inside you will find new applications that were first detailed in ISSF publications such as The Ferritic Solution, and in the brochures on Solar Architecture, Rebar and Building and Construction. Valuable support has also come from the Long Products Committee. By including more common applications for stainless steel we hope to attract the interest and attention of a wider range of markets.

The task of preparing the third Book of New Applications was given to an ISSF Stainless Steel Fellow. Shuhei Tsutsumi, from Nippon Yakin Kogyo in Japan has spent six months in Brussels working hard to develop this third ISSF Book of New Applications.

As you will see, there are applications from most sectors. Most geographical parts of the world are also represented, making the Book of Applications truly balanced and global.

I would like to thank Shuhei and all of the ISSF members who contributed to this Book of New Applications. I sincerely hope that this will help you, and us, to grow the market profitably.



Jürgen Fechter

Chairman, ISSF Market Development Committee

The four types of stainless steel

AUSTENITIC

Austenitic stainless steels contain a significant amount of chromium, and sufficient nickel or manganese to 'stabilise' the 'austenite' microstructure that gives these steels good formability and ductility (and makes them non-magnetic). A typical composition is 18% chromium and 8% nickel, as found in the popular '304' grade – to use the American Iron and Steel Institute (AISI) designation. Austenitic grades can be highly durable and corrosion resistant and have high ductility, low yield stress, relatively high tensile strength and good weldability. They have a very wide range of uses.

FERRITIC

Ferritic stainless steels have properties similar to those of mild steel but show better corrosion resistance. Most common are 11% and 16% chromium-containing grades – the former used mostly in vehicle exhaust systems and the latter mostly in cooking utensils, washing machines and indoor architecture.

AUSTENITIC-FERRITIC (DUPLEX)

These stainless steels, which contain high chromium and some nickel, have a roughly 50% ferritic, 50% austenitic microstructure. They are mostly used in the process industry and in seawater applications.

MARTENSITIC

Like ferritic grades, martensitic grades contain 12% -16% chromium. However, they have higher carbon content and are subjected to specific heat treatments during production, making them very hard and strong. They are used in applications such as turbine blades, cutlery and razor blades.

Surfaces

Surface finishing treatments applied to stainless steels can take many forms. The main surface finishes are described below.

Description	ASTM	EN 10088-2	Notes
Hot rolled	1	1E/1D	A comparatively rough, dull surface produced by hot rolling to the specified thickness, followed by annealing and descaling.
Cold rolled	2D	2D	A dull, cold rolled finish produced by cold rolling to the specified thickness, followed by annealing and descaling. May also be achieved by a final light pass on dull rolls.
Cold rolled	2B	2B	A bright, cold rolled finish commonly produced in the same way as the 2D finish, except that the annealed and descaled sheet receives a final cold roll pass on polished rolls. This is a general-purpose cold rolled finish and is more readily polished than 1 or 2D.
Bright Annealed	BA	2R	BA finish produced by performing bright annealing in inert atmosphere after cold-rolling and light cold rolling. Smoother and brighter than 2B.
Brushed or dull polished	No. 4	1J/2J	A general-purpose bright polished finish obtained by finishing with a 120-150 mesh abrasive, following initial grinding with coarser abrasives.
Satin polished (matt)	No. 6	1K/2K	A soft satin finish having lower reflectivity than brushed (or dull polished) finish. It is produced by Tampico brushed (or dull polished) finish, using a medium abrasive.
Bright polished (mirror)	No. 8	1P/2P	The most reflective finish commonly produced. It is obtained by polishing with successively finer abrasives then buffing with a very fine buffing compound. The surface is essentially free of grit lines caused by preliminary grinding operations.
Electropolished surfaces	-	-	This surface produced by electrolysis in electrolytic solution. This electrochemical process improves the surface finish by removing the peaks of irregular surface.

(NB: the above table is not official and should be used only as a guide)

01

BUILDING AND CONSTRUCTION

▪ Bridge Pole Decoration	8
▪ Bus Shelter	9
▪ Emergency Exit Door	10
▪ Facade Envelope	11
▪ Facade of Service Centre	12
▪ Facade of Metro Station	13
▪ Floor at Monza Circuit	14
▪ Glass Brick Support	15
▪ Mosaic Tiles	16
▪ Nedujinja Shrine Shinkyō	17
▪ Outdoor Escalator	18
▪ Pergola	19
▪ Press Fitting System for Drinking Water	20
▪ Private Residence	21
▪ Roof	22
▪ Roofing and Wall Tiles	23
▪ External Renovation of St Mary's Cathedral, Tokyo	24
▪ Solid Stainless Steel Rebar	25
▪ Stainless Steel Stairway	26
▪ Tensegrity Glass Beams	27
▪ Wall Panel	28
▪ Woven Cladding	29



Building and Construction Bridge Pole Decoration

The Octavio Frias de Oliveira bridge is considered a new landmark in São Paulo. The unique wire suspension bridge has one pole which carries two curved sections of highway at different levels. Stainless steel has been used as a decorative element on the pole by architect João Valente Filho. The stainless steel parts reflect the surroundings which creates interesting visual effects. The result is that the pole appears light and elegant.

Location/environment | SÃO PAULO, BRAZIL/OUTDOOR

Product | LONG PRODUCTS

Fabrication process | CUTTING AND CONFORMATION

Grade/surface | AISI 444/18 (LATERAL RIB) AND AISI 304/2B (SUPERIOR KNOTS)

Material thickness/diameter | 1.5 MM

Weight

Competing material | SEVERAL

Date of completion | MARCH 2008

Manufacturer | COPPERMAX

Material supplier | ARCELOR MITTAL INOX BRAZIL

Source of information | NÚCLEO INOX

Remarks



Building and Construction Bus Shelter

Sixty stainless steel shelters have been installed along New Delhi's Bus Rapid Transit (BRT) network. There will be 123 of the shelters in the network when construction is complete. The unique stainless shelters are accessible for disabled passengers. They contain display panels for bus routes and schedules, litter bins, a clock and an LCD display showing the GPS location of coming buses. The shelters are also fitted with lightweight stainless steel advertising panels which can be backlit.

Stainless steel, with its natural sheen and aesthetic appeal, is set to transform New Delhi's arterial bus routes in time for the 2010 Commonwealth Games which will be held in the city. Each stand uses two tons of 304 stainless.

Location/environment | NEW DELHI, INDIA/OUTDOOR

Product

Fabrication process

Grade/surface | SS304/SS316 – HAIRLINE, #4 OR MIRROR #8 FINISH

Material thickness/diameter

Weight

Competing material

Date of completion

Manufacturer | M/S JINDAL ARCHITECTURE LIMITED,

Material supplier

Source of information | ISSDA/STAINLESS INDIA, VOL. 13 NO. 4, SEPTEMBER 2008

Remarks





Building and Construction Emergency Exit Doors

A series of stainless steel doors have been built in grade 316 for the Bank of Mauritius. The doors were tailor-made for the Bank's main entrance and various emergency exits.

Location/environment | SOUTH AFRICA/INDOOR
 Product | STAINLESS STEEL SHEET
 Fabrication process | 3M PRODUCTS, NO WELDING
 Grade/surface | 316
 Material thickness/diameter:
 Weight
 Competing material
 Date of completion | MARCH 2007
 Manufacturer | WORLD POWER PRODUCTS
 Material supplier:
 Source of information | SASSDA
 Remarks



10



Building and Construction Facade Envelope

The facade envelope of the IESDE building in Curitiba, Brazil uses 0.5 x 2.5 m sheets of stainless steel which are connected using male-female stainless steel fittings. The design allowed the use of 1.0 mm sheet stainless, thereby minimising the weight of the facade.

Location/environment | CURITIBA, BRAZIL/OUTDOOR
 Product | STAINLESS STEEL SHEET
 Fabrication process | CUTTING, CONFORMATION AND ASSEMBLY
 Grade/surface | AISI 444/18
 Material thickness/diameter | 1.0 MM
 Weight | 8 TONS
 Competing material | MAINLY ALUMINIUM, GLASS, CERAMIC AND NATURAL STONE
 Date of completion | MAY 2008
 Manufacturer | ENGENHARE VIDRAÇARIA & GHAMA REVESTIMENTOS METÁLICOS
 Material supplier | ARCELOR MITTAL INOX BRAZIL
 Source of information | NÚCLEO INOX
 Remarks



11



Building and Construction Floor at Monza Circuit

A stainless steel tile floor was installed in the Sassoli Group Hospitality Building at the Monza Circuit in time for the 2008 Italian F1 Grand Prix. The wavy surface of the tile has a 5 mm pitch, increasing resistance and grip. A special layer positioned under the stainless steel tiles prevents the transfer of knocks and vibrations to the floor. Easy to lay, the tiles can be installed over existing floors.



Location/environment | MONZA, ITALY/INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process

Grade/surface | EN 1.4301 (AISI 304)/WAVY DESIGN WITH A 5 MM PITCH

Material thickness/diameter | 600 X 600 MM

Weight

Competing material

Date of completion | 2008

Manufacturer | STAINLESS PRODUCTS

Material supplier

Source of information | CENTRO INOX

Remarks



Building and Construction Glass Brick Support

Glass bricks are often used in homes and offices as walls and even as floors and ceilings. The bricks enable light to enter without compromising privacy. These stainless steel supports for glass bricks bring added strength to the structure and will not corrode, even in wet environments.

Location/environment | WORLDWIDE/INDOOR AND OUTDOOR

Product | STAINLESS STEEL REBAR

Fabrication process

Grade/surface | TYPE 204CU (UNS S20430)

Material thickness/diameter | 5 MM

Weight

Competing material | GALVANISED STEEL

Date of completion | 2007

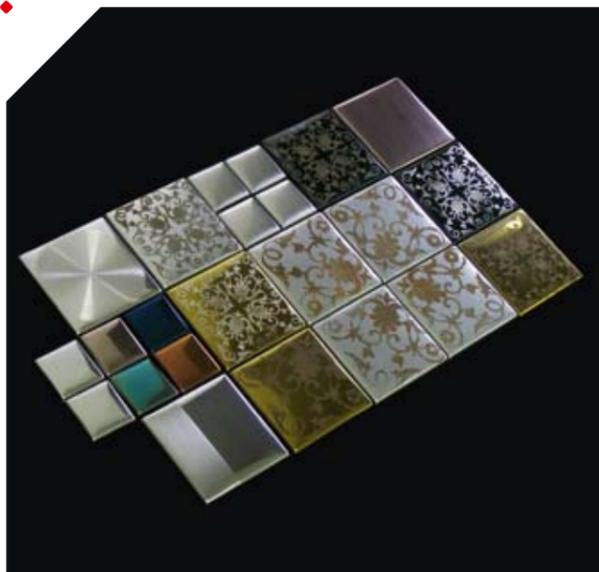
Manufacturer | UGITECH SA

Material supplier

Source of information | UGITECH SA/ISSF REBAR PROJECT

Remarks





Building and Construction Mosaic Tiles

Stainless steel tiles provide a long lasting decorative finish to a room. The tiles can have a stainless steel finish or they can be finished with an electrochemical colouring or a micro-texture or chromium-titanium using a physical vapour deposition(PVD) coating.

Location/environment | BELO HORIZONTE, BRAZIL/INDOOR
Product | STAINLESS STEEL SHEET
Fabrication process | CUTTING AND CONFORMATION
Grade/surface | AISI 304, 316 OR 444/ #7
Material thickness/diameter | 0.4 MM (FOR 2.4 X 2.4 CM TILES) AND 0.5 MM (FOR 5 X 5 CM TILES)
Weight | APPROXIMATELY 7 G (2.4 X 2.4 CM) AND 30 G (5 X 5 CM)
Competing material | CERAMICS
Date of completion | MARCH 2008
Manufacturer | MOZAIK
Material supplier | ARCELOR MITTAL INOX BRAZIL (PRODUCER) AND INOXTECH (DISTRIBUTOR)
Source of information | NÚCLEO INOX
Remarks



16



Building and Construction Nedujinja Shrine Shinkyō

Stainless steel rebar was chosen for its durability as a reinforcement material in concrete structures. A ferritic grade was selected over an austenitic grade because of its low thermal expansion properties and low cost.

Location/environment | TOKYO, JAPAN/OUTDOOR
Product | DEFORMED STAINLESS STEEL BARS
Fabrication process | BENDING
Grade/surface | TYPE 410L/PICKLED
Material thickness/diameter | 13 AND 19 MM
Weight | 1.2 TONS
Competing material | EPOXY COATED REINFORCEMENT BARS
Date of completion | SEPTEMBER 2006
Manufacturer | NSSC HIKARI WORKS
Material supplier | NSSC
Source of information | JSSA/NSSC
Remarks



17



Building and Construction

Outdoor Escalator

Traffic volumes make getting from one side of the road to another a nightmare for pedestrians in many of the world's cities. It is no exception in the world's second most populous country, India. To get around the problem, local governments are commissioning footbridges to enable pedestrians to cross busy streets.

In New Delhi, twelve of these crossings have been commissioned and six will be fitted with stainless steel escalators. There are plans to install another 20 to 25 of the escalator footbridges around the city. The system is also being introduced in Chennai where ten escalator footbridges have been commissioned. Tiruchi and Jaipur have each ordered four of the footbridges and more cities are sure to follow. The stainless steel escalator pictured here has been constructed at the entrance to the offices of Unitech in New Delhi, India. Many companies are choosing this solution for the entrances to their buildings.

Location/environment | NEWDELHI, INDIA/OUTDOOR

Product | STAINLESS STEEL SHEET CLADDING

Fabrication process

Grade/surface | SS304/SS316 - HAIRLINE, #4 OR MIRROR #8 FINISH

Material thickness/diameter

Weight

Competing material

Date of completion

Manufacturer | M/S TARINI ENGINEERING PVT LTD.

Material supplier

Source of information | ISSDA/STAINLESS INDIA, VOL. 13 NO. 3, JUNE 2008

Remarks



Building and Construction

Pergola

A stainless steel pergola has been constructed as a decorative element on a house in Chennai, India. The pergola is constructed from 150 mm diameter pipe with a 3 mm wall.

The pipes are regularly spaced and vary in length from 4.3 to 7.6 m. The most difficult part of the construction was creating a uniform matt finish along the entire length of the pipes.

Location/environment | CHENNAI, INDIA/OUTDOOR

Product

Fabrication process

Grade/surface | SS 304/MATT FINISH

Material thickness/diameter | 3 MM

Weight

Competing material

Date of completion

Manufacturer | M/S SREEVATSA STAINLESS STEEL FABRICATORS (P) LTD

Material supplier

Source of information | ISSDA/STAINLESS INDIA, VOL. 13 NO. 2, MARCH 2008

Remarks





1 Building and Construction Press Fitting System for Drinking Water Pipes

Grade 316 stainless steel is often selected for drinking water pipes. Costs are reduced considerably if the ferritic stainless grade 444 is used instead of the austenitic 316 grade. This strengthens the competitive position of stainless steel against the other materials that can be used in this application.

Location/environment | GERMANY AND SWITZERLAND/INDOOR

Product | COLD ROLLED STAINLESS STEEL STRIPS

Fabrication process | FORMING AND WELDING

Grade/surface | AISI 444/2B

Material thickness/diameter | 10 - 100 MM DIAMETER

Weight | 0.64 KG/M (AVG.)

Competing material | MLP/ALUMINIUM, COPPER, CARBON STEEL, PLASTIC

Date of completion | ONGOING

Manufacturer | FISCHER EDELSTAHLROHRE, SCHOELLER WERK, NIROSAN, ESTA ROHR

Material supplier | THYSSENKRUPP NIROSTA

Source of information | THYSSENKRUPP NIROSTA

Remarks



Building and Construction Private Residence

Stainless steel's high tensile strength can shield against hail and wind and affords excellent corrosion protection for a long life. A new colouring process has been used to bring appeal, elegance and style to the stainless roofing and wall system of this private house in the Bahamas. Located in an area prone to hurricanes and strong winds, the system has already been tested by winds exceeding 280 km/hour.

Location/environment | BAHAMAS/OUTDOOR

Product | STAINLESS STEEL COLD ROLLED SHEET

Fabrication process | STAMPING/COLOURING

Grade/surface | 316 L

Material thickness/diameter | 0.4 MM (0.015 INCHES)

Weight | 4.35 KG PER SQUARE METRE (0.9 LB PER SQUARE FOOT)

Competing material

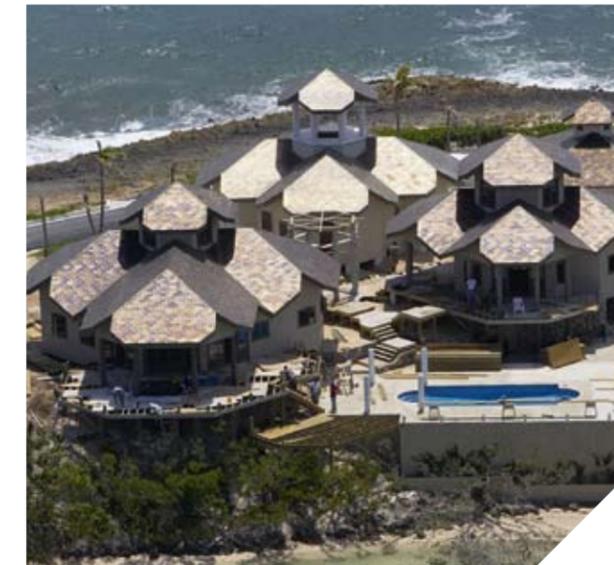
Date of completion | 2005

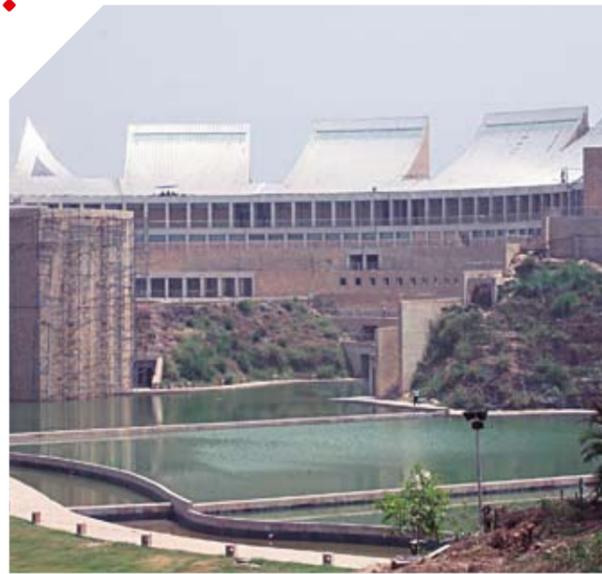
Manufacturer | MILLENIUM TILE

Material supplier | THYSSENKRUPP

Source of information | THYSSENKRUPP STAINLESS NORTH AMERICA

Remarks | ARCHITECT: GARY PETERSON, FLORIDA, USA. COLOURING PROCESS LICENSED BY POLISPECTRAL, GERMANY. ROOF COMPOUND IS A MIX OF BRONZE AND SLATE. THERE IS OCEAN ON BOTH FRONTAGES. AFTER TWO STORMS WITH 280 KM/HOUR (175 MPH) WINDS, THERE IS NO LEAKAGE.





Building and Construction

Roof

The Khalsa Heritage Complex at Anandpur Sahib is being built to commemorate significant events in the Sikh faith. Once completed, the Complex will be the world's most comprehensive Sikh heritage centre.

There are ten main blocks in the complex and all are being roofed with SS304 stainless steel. More than 4,250 square metres of stainless steel roofing, guttering and perimeter cladding will be installed.

Location/environment | PUNJAB, INDIA/OUTDOOR

Product

Fabrication process

Grade/surface | SS304/HAMMER TONE FINISH

Material thickness/diameter

Weight | 4,250 M2

Competing material

Date of completion

Manufacturer | M/S SREEVATSA STAINLESS STEEL FABRICATORS (P) LTD,

Material supplier

Source of information | ISSDA/STAINLESS INDIA, VOL. 12 NO. 4, JUNE 2007 AND VOL. 13 NO. 3, JUNE 2008

Remarks | THE ROOF COVERS THE KHALSA HERITAGE COMPLEX IN THE ANANDPUR SAHIB DISTRICT ROPAR, PUNJAB, INDIA.



Building and Construction

Roofing and Wall Tiles

A new colouring process has been used to create these attractive stainless steel roof tiles. Although they were designed for use on roofs, architects are also now using the tiles as wall coverings, replacing bricks and more expensive aluminium panel systems. The tiles offer design possibilities that are only limited by the imagination of the architect. The tiles bring variances in colour, like wood or slate, and are regarded as a natural material. Changes in viewing angles bring changes in the hue of the colour, making the façade more interesting to the viewer. The colouring process increases the chromium oxide layer of the stainless steel. It acts like a raindrop, creating a rainbow when it bends incoming light. Since the layer is clear, ultraviolet light cannot attack the organic pigments that colour the tiles, ensuring it remains the same indefinitely.

Location/environment | UNITED STATES/OUTDOOR

Product | STAINLESS STEEL COLD ROLLED SHEET

Fabrication process | STAMPING

Grade/surface | 304

Material thickness/diameter | 0.4 MM (0.015 INCHES)

Weight | 4.35 KG PER SQUARE METRE (0.9 LB PER SQUARE FOOT)

Competing material | BRICK, ALUMINIUM

Date of completion | 2008

Manufacturer | MILLENIUM TILE

Material supplier

Source of information | THYSSENKRUPP STAINLESS NORTH AMERICA

Remarks | ARCHITECT: RUFFCORN, MOTT, STINE – SEATTLE, WASHINGTON, USA. THE STAINLESS COLOURING PROCESS LICENSED BY POLISPECTRAL, GERMANY.





Building and Construction

External Renovation of St Mary's Cathedral, Tokyo

St Mary's Cathedral, Tokyo was designed by Kenzo Tange in 1964. Originally the building was completed using grade SUS 304. Although highly corrosion resistant, this grade of stainless has exhibited minor thermal expansion problems in large-scale architectural projects. During the renovation of the cathedral, completed in 2007, the existing external stainless steel wall was replaced with SUS 445J1 grade. SUS 445J1 is a ferritic grade that also exhibits high corrosion resistance and excellent thermal expansion properties.



Location/environment | TOKYO, JAPAN/OUTDOOR

Product | COLD ROLLED STAINLESS STEEL STRIP

Fabrication process | FORMING

Grade/surface | SUS 445J1/DULL FINISH

Material thickness/diameter | 0.4 MM THICK

Weight | 47 METRIC TONS

Competing material | GALVALUME STEEL, COLOURED STEEL

Date of completion | SEPTEMBER 2007

Manufacturer | TAISEI CORPORATION/GANTAN BEAUTY INDUSTRY CO., LTD/ISIWATARI INDUSTRY

Material supplier | NIPPON METAL INDUSTRY CO., LTD.

Source of information | JSSA/NIPPON METAL INDUSTRY CO., LTD.

Remarks | HIGH CORROSION-RESISTANCE FERRITIC STAINLESS STEEL IS OFTEN USED IN THE RENOVATION OF PUBLIC BUILDINGS.



Building and Construction

Solid Stainless Steel Rebar

Solid stainless steel reinforcement bar (known as rebar) exhibits significant corrosion resistance and strength. This type of rebar is often used in bridge decks and other critical applications where exposure to salt is an issue. Salt exposure can occur in coastal environments and in climates where surfaces are treated with de-icing salts during winter. The stainless rebar can be incorporated during new bridge construction or during repair work.

Location/environment | NORTH AMERICA, EUROPE AND ASIA/OUTDOOR

Product | SOLID STAINLESS STEEL REBAR

Fabrication process | HOT ROLLED AND ACID CLEANED

Grade/surface | ENDURAMET® 2205, ENDURAMET® 316LN, ENDURAMET® 32, EN4362

Material thickness/diameter | DIAMETERS RANGE FROM 0.95 MM TO 6.03 MM

Weight | 180 TONS (10 TONS PER BRIDGE)

Competing material | CARBON STEEL REBAR AND EPOXY-COATED REBAR

Date of completion | JULY 2006

Manufacturer | CARPENTER TECHNOLOGY CORPORATION

Material supplier | CARPENTER TECHNOLOGY CORPORATION

Source of information | CARPENTER TECHNOLOGY CORPORATION

Remarks | SOLID STAINLESS STEEL REBAR HAS BEEN SHOWN TO EXTEND THE LIFE OF A BRIDGE TO MORE THAN 125 YEARS COMPARED TO 20 YEARS IF CARBON STEEL OR EPOXY COATED REBAR ARE USED. THE SUPERIOR CORROSION RESISTANCE OF STAINLESS ENABLES A THINNER CONCRETE COVER. THE STRENGTH OF STAINLESS REBAR COUPLED WITH ITS DUCTILITY MAKES IT AN IDEAL REINFORCEMENT SOLUTION IN AREAS PRONE TO SEISMIC ACTIVITY.





Building and Construction Stainless Steel Stairway

A low maintenance spiral staircase that can withstand a corrosive marine environment.



Location/environment | NORTHERN TERRITORY, AUSTRALIA/OUTDOOR (MARINE ENVIRONMENT, 1 KM FROM SEA)

Product | STAINLESS STEEL SHEET AND PIPE

Fabrication process

Grade/surface | GRADE 316/ELECTRO-POLISHED

Material thickness/diameter

Weight | 560 KILOGRAMS

Competing material

Date of completion | APRIL 2007

Manufacturer | NORTHERN STAINLESS PTY LTD.

Material supplier | ATLAS SPECIALTY METALS

Source of information | ASSDA/AUSTRALIAN STAINLESS STEEL MAGAZINE, ISSUE 39

Remarks | PHOTOGRAPH BY STANCAN DESIGN.



Building and Construction Tensegrity Glass Beams

The University of Pisa has developed a new type of glass panel beam that avoids glass fracture by creating a series of modular elements. The triangular elements are connected to each other using pre-tensioned stainless steel cables.

The structure relies on the principle of tensile integrity, or tensegrity as it is better known. Tensegrity refers to the integrity of structures that is based on the synergy between balanced tension and compression components.

All ancillary parts such as routels, studs, tie-rods and support systems for the sheets of glass are all made of stainless steel. This is for both aesthetic and durability reasons.

Location/environment | PISA, ITALY/INDOOR

Product | STAINLESS STEEL CABLE

Fabrication process

Grade/surface | EN 1.4401 (AISI 316)

Material thickness/diameter | 6 MM

Weight

Competing material

Date of completion

Manufacturer | DEPARTMENT OF STRUCTURAL ENGINEERING, UNIVERSITY OF PISA

Material supplier

Source of information | CENTRO INOX

Remarks | THE EXAMPLE PICTURED IS A PROTOTYPE.





Building and Construction Wall Panel

Grade STS445NF has been used to construct this wall panel. The grade has significant cost advantages over stainless steels with similar corrosion resistance and long-term performance.

Location/environment | SOUTH KOREA/INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | CUTTING

Grade/surface | STS445NF/2B

Material thickness/diameter | 0.3 MM

Weight | 1.0 KG

Competing material | PLASTICS, ALUMINIUM, CARBON STEEL, WOOD

Date of completion | JANUARY 2008

Manufacturer | SHINKWANG CO.

Material supplier | POSCO

Source of information | KOSA

Remarks



Building and Construction Woven Metal Cladding

Three-dimensional panels made from stainless steel wire are a new option for interior and exterior wall cladding. It is also possible to utilise this material to create transparent ceilings and other applications where light and air are allowed to filter through the mesh. Acoustic panelling can also be created.

The panels are created using the rubber pad forming (RPF) method. RPF uses a rubber upper die and a rigid mould as the lower die. The stainless mesh is inserted between the dies and pressure is applied. The rubber exerts pressure on the mesh which is deformed to the shape of the lower rigid die. The rigid die can be made of almost any material. The RPF process is relatively cheap and flexible, making it ideal for the production of prototypes or relatively small production runs.

Location/environment | NETHERLANDS/INDOOR AND OUTDOOR

Product | STAINLESS STEEL WIRE MESH

Fabrication process | RUBBER PAD FORMING

Grade/surface | TO CUSTOMER SPECIFICATION

Material thickness/diameter | 0.3 TO 3.0 MM

Weight | DEPENDANT ON WIRE MESH USED

Competing material | COPPER

Date of completion | 2007

Manufacturer | METAALWARENFABRIEK PHOENIX B.V

Material supplier | HAVER & BOECKER GEWEBE

Source of information | EURO INOX

Remarks | THE RUBBER PAD FORMING PROCESS CAN ALSO BE USED ON SHEET METAL.



02

ELECTRIC MACHINERY AND EQUIPMENT

▪ Hard Disc Cover	32
▪ Mobile Telephone	33
▪ Rotor Can for Circulation Pumps	34
▪ Solar Hot Water Heater	35
▪ Stove Components	36
▪ Washing Machine	37
▪ Watch Case	38



Electric Machinery and Equipment Hard Disc Cover

The stainless steel cover helps this high speed hard disk drive resist knocks and bumps.

Location/environment | SUZHOU, CHINA/INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process | STAMPING AND CLEANING

Grade/surface | SUS304 AND SUS430/BA, 2B AND SR

Material thickness/diameter | 0.5 MM

Weight

Competing material | ALUMINIUM

Date of completion | SEPTEMBER 2008

Manufacturer

Material supplier | SHANGHAI KRUPP STAINLESS

Source of information | SHANGHAI KRUPP STAINLESS

Remarks



Electric Machinery and Equipment Mobile Telephone

In an effort to satisfy customer requirements for thinner mobile telephones, manufacturers have begun to use stainless steel for the casing. Stainless steel is strong and flexible and resists shocks which may dislodge the upper crystal panels. This is not possible with traditional epoxy casings.

The stainless steel mobile featured here can have mirror or scour finishes. They are transparent-coated or ion-plated to reduce fingerprints and enhance the finish of the mobile. Care is taken during the finish processes to ensure the stainless steel surface is not damaged.

Location/environment | JAPAN/INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | FORMING AND ION-PLATING

Grade/surface | SUS304/HAIR LINE AND NO.8 (MIRROR)

Material thickness/diameter | 0.4 MM

Weight | 23.1 G

Competing material | PLASTICS, ALUMINIUM

Date of completion | OCTOBER 2007

Manufacturer | TOSHIBA CORPORATION

Material supplier | NISSHIN STEEL CO., LTD

Source of information | JSSA/NISSHIN STEEL CO., LTD

Remarks | THE MANUFACTURER HAS TAKEN FULL ADVANTAGE OF THE PROPERTIES OF STAINLESS STEEL TO CREATE A THINNER MOBILE TELEPHONE. THE FINISHES ADD AN UPSCALE APPEARANCE AND FEEL TO CREATE A PREMIUM PRODUCT.





Electric Machinery and Equipment Rotor Can for Circulation Pumps

The efficiency of this circulation pump has been improved by using a ferritic grade of stainless steel instead of the usual austenitic grade.



Location/environment | WORLDWIDE/INDOOR

Product | COLD ROLLED STAINLESS STEEL COIL

Fabrication process | DEEP DRAWING

Grade/surface | AISI 444/2B

Material thickness/diameter | 1.00 MM

Weight | 0.1 KG/PUMP

Competing material | AUSTENITIC STAINLESS STEEL

Date of completion | ONGOING

Manufacturer | GRUNDFOS

Material supplier | THYSSENKRUPP NIROSTA

Source of information | THYSSENKRUPP NIROSTA, GRUNDFOS

Remarks | THERE IS SIGNIFICANT DEMAND FOR THIS ROTOR CAN WITH VOLUME APPROACHING 500 TONS/YEAR.



Electric Machinery and Equipment Solar Hot Water Heater

A basic solar water heating system works on very simple principles, can cost little to install and usually requires minimal maintenance. From a technical point of view, ferritic stainless steels have various advantages in this application, not least of which is their corrosion resistance. The initial cost of these units is also low.

Location/environment | SWITZERLAND/OUTDOOR

Product | STAINLESS STEEL SHEET

Fabrication process | ABSORPTION PANEL: STAMPED AND SPOT WELDED. TANK: MIG WELDING.

Grade/surface | TYPE 444/INNER CYLINDER IN 2B, ENVELOPE IN BA

Material thickness/diameter | ABSORPTION PANEL: 0.6 MM. TANK: 1.5 AND 2.0 MM.

Weight | 125 KG

Competing material | 316L ENAMELLED STEEL

Date of completion | NOVEMBER 2008

Manufacturer | ABSORPTION PANEL AND STAND: ENERGIE SOLAIRE. TANK: DEPOSITOS COBALLES.

Material supplier | ARCELORMITTAL STAINLESS EUROPE

Source of information | ISSF FERRITIC STAINLESS STEEL PROJECT

Remarks | FERRITIC GRADES OF STAINLESS HAVE ALREADY PROVEN THEMSELVES IN HOT WATER TANKS AND ARE WELL ACCEPTED. ASSEMBLING TWO FERRITIC STAINLESS SHEETS TOGETHER MAKES A SUPER-EFFECTIVE ABSORBER PANEL WITH 98% OF THE SURFACE AREA USED FOR HEAT EXCHANGE. THIS COMPARES VERY WELL WITH TRADITIONAL BLACK-PAINTED COPPER TUBES WHICH CAN ONLY UTILISE 30% OF THEIR SURFACE AREA FOR HEAT EXCHANGE.





Electric Machinery and Equipment Stove Components

The components in this Whirlpool stove are now made of ferritic grade 439. A ferritic grade was selected due to its appropriateness for the purpose and lower cost. The switch has enabled Whirlpool to protect their existing market share and develop new markets.



Location/environment | BRAZIL/INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process | FORMING

Grade/surface | 439/POLISH

Material thickness/diameter | 0.5 MM

Weight

Competing material | 304

Date of completion | DECEMBER 2007

Manufacturer | WHIRLPOOL

Material supplier | ARCELORMITTAL INOX BRAZIL

Source of information | ARCELORMITTAL INOX BRAZIL

Remarks



Electric Machinery and Equipment Washing Machine

Stainless steel was used for the inner and outer drum of this washing machine. Stainless steel has a long history of proven corrosion resistance in this type of application.

Location/environment | WUXI, CHINA/INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process | STAMPING, FORMING AND WELDING

Grade/surface | 430 AND 430TI/BA AND 2B

Material thickness/diameter | 0.4 - 0.6 MM

Weight

Competing material | PLASTIC

Date of completion | SEPTEMBER 2008

Manufacturer

Material supplier | SHANGHAI KRUPP STAINLESS

Source of information | SHANGHAI KRUPP STAINLESS

Remarks





Electric Machinery and Equipment
Watch Case

Stainless steel is widely used in the watchmaking industry due to its long life and beautiful appearance.



Location/environment | WORLDWIDE/INDOOR AND OUTDOOR

Product | STAINLESS STEEL PLATE

Fabrication process | FORMING AND GRINDING

Grade/surface | 316L/NO. 1

Material thickness/diameter

Weight

Competing material | CARBON STEEL AND PLASTIC

Date of completion | 2006

Manufacturer

Material supplier | TISCO

Source of information | TISCO

Remarks

03

AUTOMOTIVE

- Motorcycle Exhaust System 42
- Silencer Wool 43
- Truck Protector 44



Automotive Motorcycle Exhaust System

Changes to emission limits have led Honda to redesign this motorcycle exhaust system. The quality of the system has been improved with the switch to ferritic stainless steel grade 409.



Location/environment | BRAZIL/OUTDOOR
Product | STAINLESS STEEL PIPE
Fabrication process | FORMING AND WELDING
Grade/surface | 409/2B
Material thickness/diameter | 1.2 MM THICK AND 25.4 MM DIAMETER
Weight
Competing material | CARBON STEEL
Date of completion | DECEMBER 2008
Manufacturer | HONDA
Material supplier | ARCELORMITTAL INOX BRAZIL
Source of information | ARCELORMITTAL INOX BRAZIL
Remarks



Automotive Silencer Wool

Silencer wool is used in automotive exhausts to reduce noise emissions from the vehicle. The wool is obtained by placing static cutting tools on moving wire to produce a continuous chip. The stainless steel chips are then used to make stainless wool which is then pre-formed in various shapes such as sleeves to produce high performance silencers.

Location/environment | WORLDWIDE/INDOOR
Product | STAINLESS STEEL WIRE
Fabrication process | PEELED WOOL FROM DRAWN WIRE
Grade/surface | AISI 430(EN4016), 434(EN4113) OR 446 STAINLESS STEEL
Material thickness/diameter
Weight
Competing material | GLASS FIBRES AND CAST STAINLESS FIBRES
Date of completion
Manufacturer | NUOVA TEMAS
Material supplier
Source of information | NUOVA TEMAS/ISSF LONG PRODUCTS COMMITTEE
Remarks





Automotive Truck Protector

The side and rear protectors of this truck are made from stainless steel to improve safety and strength in the event of an accident. Stainless steel also gives the vehicle an aesthetically pleasing appearance.



Location/environment | SOUTH KOREA/OUTDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | FORMING AND BENDING

Grade/surface | STS304, STS430J1L/2B

Material thickness/diameter | 10 MM

Weight | 2 KG

Competing material | ALUMINIUM, CARBON STEEL

Date of completion | OCTOBER 2008

Manufacturer | MIRYUNG INDUSTRIAL MACHINERY CO.

Material supplier | BNG

Source of information | KOSA

Remarks

04

TRANSPORT

▪ Bicycle Rim	48
▪ Chemical Tanker	49
▪ Container Tank	50
▪ Folding Moped and Bicycle	51
▪ Madrid Metro	52
▪ Railway Wagons	53
▪ Shenzhou Spaceship	54
▪ Subway Car, Beijing	55
▪ Tunnel Ventilation Fan	56
▪ Vespa Silencer	57



Transport Bicycle Rim

Creating a bicycle rim from stainless steel provides added strength and an enhanced appearance. Stainless steel replaced aluminium in this application.



Location/environment | SUZHOU, CHINA/OUTDOOR
Product | LONG AND FLAT STAINLESS STEEL PRODUCTS
Fabrication process | STAMPING, FORMING AND WELDING
Grade/surface | 430TI/2B
Material thickness/diameter | 0.7 MM
Weight
Competing material | ALUMINIUM
Date of completion | SEPTEMBER 2008
Manufacturer
Material supplier | SHANGHAI KRUPP STAINLESS
Source of information | SHANGHAI KRUPP STAINLESS
Remarks



Transport Chemical Tanker

Stainless steel has been used to build 53 tankers that will transport chemicals. Duplex 316L has been utilised for its ability to withstand the corrosive environment at sea and the chemicals that will be transported in the vessel.

Location/environment | CHINA/OUTDOOR
Product | STAINLESS STEEL PLATE
Fabrication process | FORMING, WELDING, PICKLING AND PASSIVATION
Grade/surface | 316L OR DUPLEX STAINLESS STEEL
Material thickness/diameter
Weight
Competing material | CARBON STEEL
Date of completion | FEBRUARY 2007
Manufacturer | CHUANDONG SHIPYARD OF CSIC
Material supplier | TISCO
Source of information | TISCO /CSSC
Remarks





Transport Container Tank

Container tanks are used to transport gas and liquid on the same vessels as standard shipping containers. Stainless steel is chosen for this application because of its strength and ability to withstand the corrosive environment onboard a ship at sea.



Location/environment | WORLDWIDE/OUTDOOR

Product | STAINLESS STEEL PLATE

Fabrication process | FORMING AND WELDING

Grade/surface | 410L, TTS443, 316L

Material thickness/diameter

Weight

Competing material | CARBON STEEL

Date of completion | 2007

Manufacturer

Material supplier | TISCO

Source of information | TISCO

Remarks



Transport

Folding Moped and Bicycle

Folding mopeds and bicycles are ideal as supplementary vehicles because they can be carried on to public transport or fitted into the boot of a car. They can be easily unfolded, used and folded together again.

The use of stainless steel enables the mopeds and bicycles to be used in seaside locations, where corrosion is a constant danger for bikes made with carbon steel. The stainless steel can also be thinner without compromising the bicycle's load-bearing capacity, making it lighter during transport by hand or by car.

Location/environment | ITALY/OUTDOOR

Product | STAINLESS STEEL TUBES AND SMALL ITEMS

Fabrication process

Grade/surface | EN 1.4301 (AISI 304); EN 1.4305 (AISI 303)

Material thickness/diameter

Weight

Competing material

Date of completion

Manufacturer | DI BLASI INDUSTRIALE SRL

Material supplier

Source of information | CENTRO INOX

Remarks





Transport Madrid Metro

Stainless steel has been widely used in the Madrid Metro because of its durability, ease of cleaning and aesthetic appearance.



Location/environment | MADRID, SPAIN/INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process

Grade/surface | 304/SATINATED

Material thickness/diameter | 2.0 MM

Weight

Competing material

Date of completion | JUNE 2008

Manufacturer | INOXBIER

Material supplier | ACERINOX, S.A.

Source of information | CEDINOX

Remarks

52



Transport Railway Wagons

The use of modified chromium-alloyed stainless steel 1.4003 has significant advantages over carbon steels in this application. The corrosion resistance of this grade means the cost of operating the wagons is more attractive over their lifecycle. Modified 1.4003 also has higher strength over carbon steels, enabling a greater load bearing capacity while reducing the weight of the wagon.

Location/environment | AUSTRALIA AND CHINA/OUTDOOR

Product | HOLT ROLLED STAINLESS STEEL SHEETS

Fabrication process | FORMING AND WELDING

Grade/surface | 1.4003 MODIFIED, HOT ROLLED/NO. 1 FINISH

Material thickness/diameter | 3.5 TO 8.0 MM

Weight

Competing material | CARBON STEEL

Date of completion | ONGOING

Manufacturer | QUEENSLAND RAIL, BRADKEN, UNITED, QRRS

Material supplier | THYSSENKRUPP STAINLESS

Source of information | THYSSENKRUPP STAINLESS

Remarks



53



Transport Shenzhou Spaceship

Stainless steel plate is used to build floating tanks and other facilities that simulate the environment in space. They are used to train astronauts for China's space exploration programme.



Location/environment | CHINA/OUTDOOR

Product | STAINLESS STEEL PLATE

Fabrication process | FORMING

Grade/surface | STAINLESS STEEL COMBINED MATERIAL

Material thickness/diameter

Weight

Competing material | CARBON STEEL

Date of completion | 2008

Manufacturer | CHINA NATIONAL SPACE ADMINISTRATION

Material supplier | TISCO

Source of information | TISCO

Remarks



Transport Subway Car, Beijing

Stainless steel is an ideal solution for subway cars due to its strength and light weight. Grade 301L was selected for this subway car for Beijing's new No. 10 subway line.

Location/environment | BEIJING, CHINA/INDOOR AND OUTDOOR

Product | STAINLESS STEEL PIPE AND PLATE

Fabrication process | FORMING AND WELDING

Grade/surface | 301L

Material thickness/diameter

Weight

Competing material | CARBON STEEL

Date of completion | JANUARY 2008

Manufacturer | CHANG CHUN RAILWAY VEHICLES CO., LTD.

Material supplier | TISCO

Source of information | TISCO

Remarks



Transport Tunnel Ventilation Fan

Eight stainless steel Jetfoil fans have been installed in a tunnel near Riva del Garda, Italy. The tunnel is 970 m long and 11 m wide. The fans can operate at a temperature of 400° C for 90 minutes, meeting strict fire safety requirements.

Another 14 reversible induction fans have been installed in a 1,580m long double tunnel near the town of Cesena, Italy. The blowing direction of the fans can be reversed in the event of a fire to direct smoke and heat away from people who may be caught in the tunnel during a fire. Ten of the fans are used during normal operation of the tunnel, while the remaining four fans are only used in emergency fire conditions. The fans are certified in compliance with the EN 12101-3 standards which means the fans can be operated for two hours in temperatures of up to 400° C.

Location/environment | RIVA DEL GARDA AND CESENA, ITALY/INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process

Grade/surface | EN 1.4404 (AISI 316L)

Material thickness/diameter

Weight

Competing material

Date of completion

Manufacturer | FLÄKT WOODS SPA

Material supplier

Source of information | CENTRO INOX

Remarks



Transport Vespa Silencer

The era of the 1950s and 1960s is still evoked by the latest Vespa. The iconic scooter maintains its charm, even with the addition of advanced modern technology such as its stainless steel silencer. Made almost completely of stainless, the silencer for the LX 125cc and 151cc 4T models enhances the environmental credentials of the Vespa by reducing emissions and noise pollution. Studies and tests are still underway to ensure this delicate component is increasingly efficient, strong and continues to eliminate noise and other pollution.

Location/environment | WORLDWIDE/OUTDOOR

Product | STAINLESS STEEL SHEET AND TUBE

Fabrication process

Grade/surface | EN 1.4301 (AISI 304) / EN 1.4512 (AISI 409)

Material thickness/diameter

Weight | INTERNAL 1,654 KG; EXTERNAL 2,710 KG

Competing material

Date of completion

Manufacturer | PIAGGIO & C. SPA

Material supplier

Source of information | CENTRO INOX

Remarks



05

INDUSTRIAL MACHINERY

▪ Air Duct Unit	60
▪ Autoclaves	61
▪ Biogas Plant	62
▪ Bipolar Plates for Fuel Cells	63
▪ De-dusting Device	64
▪ Drag Chain Systems	65
▪ Large Hadron Collider Quadrupole Magnets	66
▪ Meat Processing Machinery	67
▪ Modern Abattoir	68
▪ Photovoltaic Cell	69
▪ Pressure Chamber	70
▪ S19 Industrial PC	71
▪ Steam Turbine Blades	72
▪ Sugar Industry Machinery	73
▪ Turbo Generator End Ring	74
▪ Water Treatment Plant	75
▪ Wine Tanks	76



Industrial Machinery Air Duct Unit

The manufacturer applied cellular sheet metal and laser cutting/welding technology to the design and manufacture of an air duct unit to be used under the forming section of a papermaking machine.

Location/environment | FINLAND/INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | LASER WELDING/CUTTING AND TRADITIONAL SHEET METAL WORK

Grade/surface | EN 1.4404/2B/1D

Material thickness/diameter

Weight

Competing material

Date of completion | MARCH 2008

Manufacturer | HIGH METAL PRODUCTION/METSO PAPER

Material supplier | OUTOKUMPU STAINLESS AND RUUKKI

Source of information | OUTOKUMPU OYJ

Remarks | THIS PRODUCT WON THE PLOOTU FENNICA AWARD IN 2008.



Industrial Machinery Autoclaves

This type of autoclave is often manufactured with a layer of carbon steel, lead lining and brick lining. Replacing these layers with duplex stainless steel grade SAF2205 and changing the design slightly has led to improvements in process, performance, safety, maintenance, and cost to manufacture.

Location/environment | SOUTH AFRICA/OUTDOOR

Product | STAINLESS STEEL PLATE

Fabrication process

Grade/surface | SAF2205

Material thickness/diameter

Weight

Competing material | CARBON STEEL

Date of completion | 2008

Manufacturer | IMPALA PLATINUM HOLDINGS

Material supplier

Source of information | SASSDA

Remarks





Industrial Machinery Biogas Plant

The plant is made of Verinox coil with LIPP bending technique. Verinox coil consists of two layers, one of stainless steel and the other of galvanised iron. The layers are connected using pressure adhesion.



Location/environment | SOUTH KOREA/OUTDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | FORMING AND BENDING

Grade/surface | STS316TI/2B

Material thickness/diameter | 0.3 MM STAINLESS STEEL/TOTAL 2.5 MM

Weight | 10 TONS

Competing material | PLASTIC, CARBON STEEL

Date of completion | OCTOBER 2008

Manufacturer | JUNGLIM NATURAL INDUSTRY

Material supplier

Source of information | KOSA

Remarks | MATERIAL THICKNESS CAN BE MODIFIED DEPENDING ON THE CUSTOMER'S PREFERENCE OR PURPOSE.



Industrial Machinery Bipolar Plates for Fuel Cells

The production costs of fuel cells need to be significantly reduced before the technology can gain commercial acceptance. The Proton Exchange Membrane fuel cell stack contains the membrane electrode assembly, bipolar plate, seal, and end plate. Of these components, the bipolar plate is one of the most costly and problematic to produce.

The bipolar plate is a multi-functional component in a PEM fuel cell stack. Its primary function is to supply reactant gases to the gas diffusion electrodes via flow channels. Stainless steel grade 444 is an excellent material to use for the bipolar plates. It is comparable to austenitic 316 grade in corrosion resistance. It also has the advantage of being significantly less costly than 316 grade.

The Mexican Centre for Research and Technological Development in Electrochemistry (CIDETEQ) has undertaken research which shows that grades 316 and 444 both exhibit good performance in the fuel cell. The plate underwent 500 hours of operational testing.

Location/environment | QUERÉTARO, MÉXICO/INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | CUTTING AND MACHINING

Grade/surface | GRADE 444

Material thickness/diameter | 3.43 MM

Weight | 0.250 KG

Competing material | STAINLESS 316, 316L AND GRAPHITE

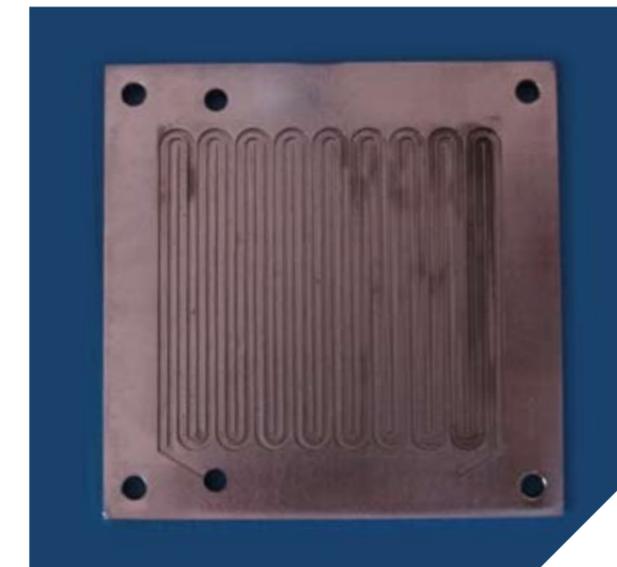
Date of completion | MAY 2008

Manufacturer | CIDETEQ AND INMEC SA DE CV

Material supplier | THYSSENKRUPP MEXINOX

Source of information | CENDI

Remarks





Industrial Machinery De-dusting Device

This de-dusting device removes unwanted particles from the air. Ease of cleaning and long life make stainless steel a good choice for this application.

Location/environment | CHINA/INDOOR
 Product | STAINLESS STEEL PLATE
 Fabrication process | FORMING AND WELDING
 Grade/surface | 317L
 Material thickness/diameter
 Weight
 Competing material | CARBON STEEL
 Date of completion | 2007
 Manufacturer
 Material supplier | TISCO
 Source of information | TISCO
 Remarks



64



Industrial Machinery Drag Chain Systems

Stainless steel is often used to manufacture the huge drag chain systems used on offshore oil and gas platforms. Brevetti Stendalto, a company based in Monza, Italy, has designed, engineered, manufactured, tested and installed three drag chain systems for the Statfjord Late Life project. The three drag chain systems, weighing 36 tons, were designed in stainless steel so they would successfully endure the many challenges of the harsh offshore environment of the oil platform.

Location/environment | NORTH SEA/OUTDOOR (OFFSHORE)
 Product | STAINLESS STEEL SHEET
 Fabrication process | COLD ROLLED SHEET/TUBE/BAR
 Grade/surface | EN 1.4404 (AISI 316L)/ELECTRO-POLISHED
 Material thickness/diameter | SHEETS: 3 TO 8 MM
 | TUBES: DIAMETER 25 MM
 | BAR: UP TO 22 MM
 | SCREWS AND BOLTS: A4

Weight | 36 TONS
 Competing material
 Date of completion | 2008
 Manufacturer | BREVETTI STENDALTO SPA
 Material supplier
 Source of information | CENTRO INOX
 Remarks



65



Industrial Machinery Large Hadron Collider Quadrupole Magnets

The European Organization for Nuclear Research (CERN) completed the installation of a 27 km long particle accelerator in mid 2008. Known as the Large Hadron Collider, the system is based on superconducting quadrupole magnets which function as magnetic lenses focussing a particle beam in both vertical and horizontal directions. The 2 mm thick collars surrounding the coil conductors are an essential structural component of the magnets. They operate at cryogenic temperature (1.9 Kelvin) under high mechanical stresses (up to 600 MPa). The austenitic stainless steel NIROSTA 4375 used for the collars has the outstanding magnetic and mechanical properties required to ensure accurate positioning of the coils and uniformity of the magnetic fields. This chromium, manganese, nickel and nitrogen alloyed stainless steel is characterised by a minimum strength of 850 MPa and a relative permeability of 1.001-1.005 between 1.9 and 293 Kelvin.

Location/environment | FRANCE AND SWITZERLAND/100 M UNDERGROUND
Product | COLD ROLLED STAINLESS STEEL STRIPS
Fabrication process | STAMPING
Grade/surface | NIROSTA 4375/2B (CR MN NI N 20 9 7/EN 4375)
Material thickness/diameter | 2.00 MM
Weight | 860 T FOR 528 QUADRUPOLE MAGNETS
Competing material | NONFERROUS METAL
Date of completion | 2008
Manufacturer | ERNESTO MALVESTITI S.P.A., ACCEL INSTRUMENTS GMBH
Material supplier | THYSSENKRUPP NIROSTA
Source of information | THYSSENKRUPP NIROSTA
Remarks



66

Industrial Machinery Meat Processing Machinery

When the client wanted to expand the boning room of their meat processing plant, they selected a stainless steel solution. The installation of the new facility was completed without interruption to existing operations. While grade 304 was selected for most of the new facility, some 316 grade stainless was used for the double and triple tier conveyors. A glass bead blast finish was used over most of the stainless steel, primarily to remove weld stain and further enhance the hygiene features of stainless steel.

Location/environment | AUSTRALIA/INDOOR
Product
Fabrication process
Grade/surface | 304 AND 316
Material thickness/diameter
Weight | 100 TONS
Competing material
Date of completion | SEPTEMBER 2006
Manufacturer | G&B STAINLESS
Material supplier
Source of information | ASSDA, AUSTRALIAN STAINLESS MAGAZINE EDITION 37
Remarks



67



Industrial Machinery Modern Abattoir

Stainless steel trays, conveyors and automatic return hooks are used to transport meat around this modern abattoir (slaughterhouse).

Location/environment | NEW DELHI/INDIA

Product

Fabrication process

Grade/surface | SS04

Material thickness/diameter

Weight

Competing material

Date of completion

Manufacturer | M/S FOOD PROCESSING EQUIPMENT COMPANY

Material supplier

Source of information | ISSDA/STAINLESS INDIA, VOL. 13 NO. 3, JUNE 2008

Remarks



68



Industrial Machinery Photovoltaic Cell

Amorphous silicon photovoltaic cells are produced by coating stainless steel precision strip with three light-sensitive layers. These are sensitised for blue, green and red respectively so the full spectrum of visible light can be used.

The sandwich of stainless steel and the photovoltaic coating can be adhesively bonded to nearly any smooth surface. A protective layer protects the cell from weather.

The total thickness of the triple junction cell is below 1 μm . Deposited on an ultra-thin stainless steel foil, this type of cell is flexible and can even follow curved roof geometries.

Location/environment | USA/OUTDOOR

Product | STAINLESS STEEL STRIP

Fabrication process | ROLL-TO-ROLL VACUUM DEPOSITION

Grade/surface | 416/BRIGHT ANNEALED

Material thickness/diameter | 0.13 MM (0.005 INCHES) THICK

Weight | 2.8 KG SQUARE METRE

Competing material

Date of completion

Manufacturer | UNITED SOLAR OVONIC (UNI-SOLAR.COM)

Material supplier

Source of information | ISSF SOLAR ARCHITECTURE PROJECT

Remarks



69



Industrial Machinery Pressure Chamber

This stainless steel pressure chamber is specifically made for use in the Qinshan nuclear powerplant in China. The stainless steel for this application must be produced to strict quality requirements.

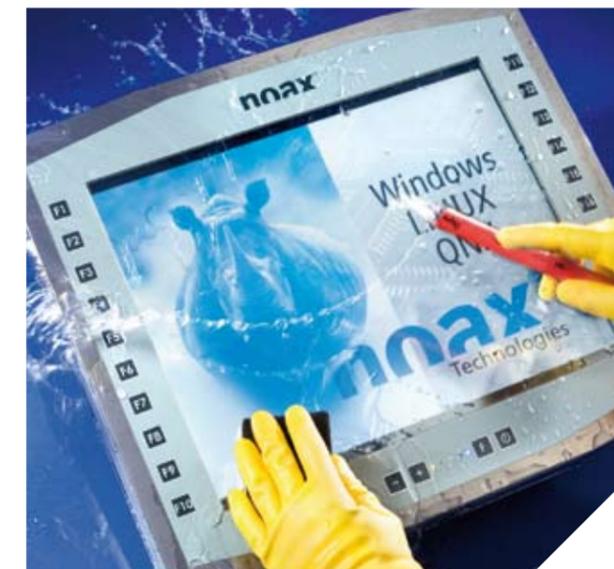
Location/environment | CHINA/INDOOR
Product | STAINLESS STEEL PLATE
Fabrication process | FORMING AND WELDING
Grade/surface | Z2CN18-10, Z2CND17-12
Material thickness/diameter
Weight
Competing material | CARBON STEEL
Date of completion
Manufacturer | QINSHAN POWERPLANT
Material supplier | TISCO
Source of information | TISCO
Remarks



Industrial Machinery S19 Industrial PC (IPC)

The S19 is characterised by its completely smooth, corrosion-resistant stainless steel design. The use of a specially tapered, food-safe rubber seal between the bezel and the 19 inch touch screen means that the noax IPC has no exposed crevices and joints. This allows it to satisfy the stringent hygiene standards required in food processing, clinical areas, chemical or pharmaceutical laboratories. The fully enclosed design has no ventilation slots or external fans, ensuring that the S19 is completely protected against splash water and that it achieves the National Electrical Manufacturers Association's NEMA 4 (IP65) grade of protection.

Location/environment | OUTDOOR OR INDOOR HARSH ENVIRONMENT
Product | STAINLESS STEEL INDUSTRIAL PC
Fabrication process | LASER CUTTING, MILLING, WELDING, FOLDING, POLISHING
Grade/surface | 304/POLISHED
Material thickness/diameter | 1.5 MM X 2 MM X 6 MM
Weight | 22 KILOGRAMS
Competing material
Date of completion | 2007
Manufacturer | NOAX TECHNOLOGIES AG
Material supplier
Source of information | NOAX TECHNOLOGIES AG/EURO INOX
Remarks





Industrial Machinery Steam Turbine Blades

Coal, gas and nuclear powerplants produce electricity by heating water to create steam. The steam is driven through turbine blades at very high pressure. The blades drive the turbine which generates electricity. The typical operating temperature of the steam is around 600° C. The blades must be tough and resistant to stress, cracking and corrosion. The super-martensitic stainless steels used in these blades are perfect for use in this application.

Location/environment | WORLDWIDE/INDOOR
Product | STAINLESS STEEL BARS
Fabrication process | MACHINED FROM BARS OR FORGED AND MACHINED, DEPENDING ON SIZE
Grade/surface | SUPER- MARTENSITIC STAINLESS STEEL (FOR EXAMPLE, 0.2C, 13CR MO V)
Material thickness/diameter
Weight
Competing material
Date of completion
Manufacturer | ALSTOM SWITZERLAND SA
Material supplier
Source of information | ISSF LONG PRODUCTS COMMITTEE
Remarks



72



Industrial Machinery Sugar Industry Machinery

Sugar can be highly corrosive on many metals. Switching to a ferritic grade of stainless for this machinery enables the equipment to be used for longer periods and improves performance during operation. The sugar produced in the machinery also meets higher international standards for sugar quality.

Location/environment | BRAZIL/INDOOR
Product | STAINLESS STEEL TUBE AND FLAT PRODUCTS
Fabrication process | FORMING AND WELDING
Grade/surface | TUBES: 444 AND 439. FLAT: 410D – WEAR APPLICATION.
Material thickness/diameter | 1.5 MM THICK AND 38.1 MM DIAMETER
Weight
Competing material | CARBON STEEL
Date of completion | DECEMBER 2006
Manufacturer
Material supplier | ARCELORMITTAL INOX BRAZIL
Source of information | ARCELORMITTAL INOX BRAZIL
Remarks



73



Industrial Machinery Turbo Generator End Ring

The diameter of the end ring of a turbo generator can be between 0.5 and 1.6 metres. The end ring must pass stringent tests to ensure it can operate without deformation at speeds of up to 3,600 revolutions per minute. Non-magnetic stainless steel reduces the losses in the ring that are caused by eddy currents and thermal stresses. The ring is cold formed to provide the highest yield strength and to ensure plastic deformation does not occur during operation.

Location/environment | WORLDWIDE/INDOOR
Product | FORGED RING
Fabrication process | FORGING AND MACHINING
Grade/surface | 18MN 18CR STAINLESS STEEL
Material thickness/diameter
Weight
Competing material
Date of completion
Manufacturer | ALSTOM SWITZERLAND SA
Material supplier
Source of information | ISSF LONG PRODUCTS COMMITTEE
Remarks



74

Industrial Machinery Water Treatment Plant

Stainless steel has been used for the pipes and fittings of this advanced large-scale water treatment plant.

Location/environment | AUSTRALIA/OUTDOOR
Product | STAINLESS STEEL PIPE, PIPE FITTINGS AND FLANGES
Fabrication process | PASSIVATION AND WELDING
Grade/surface | 316, 316L
Material thickness/diameter | 25-600NB
Weight | 350 TONS
Competing material
Date of completion | SEPTEMBER 2007
Manufacturer | D&R STAINLESS AND PERFAB PTY. LTD. AND STAINLESS PIPE AND FITTINGS
Material supplier
Source of information | ASSDA, AUSTRALIAN STAINLESS MAGAZINE EDITION 41
Remarks | THE CONTRACTOR FOR THIS PROJECT WAS THIESS PTY. LTD.



75



Industrial Machinery

Wine Tanks

These wine tanks are manufactured from CS444 stainless steel. This material is not normally used in the food and beverage industry but is appropriate for this application.



Location/environment | SOUTH AFRICA/INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process

Grade/surface | CS444

Material thickness/diameter

Weight

Competing material

Date of completion | JANUARY 2008

Manufacturer | IMVUSA STAINLESS

Material supplier | COLUMBUS STAINLESS

Source of information | SASSDA

Remarks

06

COOKWARE

- Double Wall Food Transport Container 80
- Industrial Kitchen Hob 81
- Metallic Scrubber 82
- Soup Serving Dish 83
- Water Tank 84



Cookware

Double Wall Food Transport Container

The double wall food container is designed to carry up to 30 litres of hot or cold food. The double wall provides insulation during transport, ensuring the food arrives fresh and ready to use. The container also comes with three internal, 10 litre pots, enabling you to carry three different types of food at the same time. A special lid form prevents leakage and spillage.

Location/environment | TURKEY/INDOOR

Product | COLD ROLLED STAINLESS STEEL

Fabrication process | DEEP DRAWING, SATIN POLISHING AND POINT WELDING

Grade/surface | 304/SATIN FINISH (HAIR LINE 360 GRADE)

Material thickness/diameter | 1.00 MM INNER AND OUTER WALL, 0.80 MM INTERNAL POTS

Weight | 9.7 KG

Competing material | ALUMINIUM

Date of completion

Manufacturer | ÖZTIRYAKILER METAL GOODS

Material supplier

Source of information | PASDER

Remarks



Cookware

Industrial Kitchen Hob

This industrial kitchen hob has been redesigned using ferritic stainless steel to replace austenitic grade 304. The substitution has led to lower material costs for the manufacturer which can be passed on to clients.

Location/environment | ITALY/INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | FORMING AND WELDING

Grade/surface | AISI441L1/2B

Material thickness/diameter | 0.8 MM

Weight

Competing material | PAINTED CARBON STEEL

Date of completion | 2007

Manufacturer | MARENO

Material supplier | TKL-AST

Source of information | THYSSENKRUPP NIROSTA/TKL-AST

Remarks





Cookware Metallic Scrubber

The original version of this air scrubber was made of aluminium and imported into Brazil already assembled. To avoid importation costs, the scrubber kit was redesigned using stainless steel grade AISI 430 which has better mechanical and corrosion resistance than the aluminium original.

- Location/environment | RIO DE JANEIRO, BRAZIL/INDOOR
- Product | STAINLESS STEEL SHEET
- Fabrication process | PUNCHING, CONFORMATION AND ASSEMBLY
- Grade/surface | STAINLESS STEEL AISI 430/2B
- Material thickness/diameter | 0.6 MM FOR ALL THREE MODELS: (1) 235X245X9 MM; (2) 239X302X9 MM; (3) 280X302X9 MM
- Weight | TOTAL WEIGHT OF ASSEMBLY KIT: (1) 0.6 KG; (2) 0.7 KG; (3) 0.8 KG
- Competing material | ALUMINIUM SHEET
- Date of completion | SEPTEMBER 2008
- Manufacturer | FALMEC DO BRASIL IND. E COM. S/A
- Material supplier | ARCELOR MITTAL INOX BRASIL/INOXTECH
- Source of information | NÚCLEO INOX
- Remarks | STAINLESS STEEL IS USED FOR THE SCRUBBER FRAME. THE ELEMENT IS STILL MADE OF ALUMINIUM.



Cookware Soup Serving Dish

This dish has been designed to keep soup or similar liquids warm while they are being displayed and served. The dish can be heated with an electrical heating element or with a fuel burner. The roll-top lid opens completely to facilitate easy serving and handling.

- Location/environment | TURKEY/INDOOR
- Product | COLD ROLLED STAINLESS STEEL
- Fabrication process | DEEP DRAWING, POLISHING AND POINT WELDING
- Grade/surface | AISI 304/MIRROR FINISH POLISHED
- Material thickness/diameter | 3.00 MM FRAME, 1.20 MM LID, 0.80 INTERNAL POT AND LID
- Weight | 12.5 KG
- Competing material
- Date of completion
- Manufacturer | ÖZTIRYAKILER METAL GOODS
- Material supplier
- Source of information | PASDER
- Remarks





Cookware

Water Tank

Unlike plastic, which is often used to manufacture water tanks in India, stainless steel does not degrade after long term exposure to sunlight. The quality of the water in the tank is also better because stainless does not absorb pollutants, chemical, pesticides or other contaminants.

This is particularly important considering the tanks are used to store drinking water.

The tanks cost marginally more than a plastic tank but the long life and quality of the water are significant benefits. Capacities of 500, 1,000, 1,500, 2,000 and 2,500 litres are available.



Location/environment | CHENNAI, INDIA/INDOOR AND OUTDOOR

Product

Fabrication process

Grade/surface | SS AISI 30400

Material thickness/diameter

Weight

Competing material | PLASTIC

Date of completion

Manufacturer | M/S SREEVATSA STAINLESS STEEL FABRICATORS (P) LTD,

Material supplier

Source of information | ISSDA/STAINLESS INDIA, VOL. 13 NO. 2, MARCH 2008

Remarks

07

HOME AND OFFICE

- Fasteners for Solar Panels 88
- Garbage and Recycle Bins 89
- Office Desk 90
- Stainless Steel Cabinet 91
- River Sink 92
- Table "Credenza" 93
- Wedge Chair 94
- Thermal Solar System 95



Home and Office

Fasteners for Solar Panels

Solar panels are exposed to high wind and snow loads. The fastening systems used to secure them are critical and must have a life-span that exceeds that of the panels. Typically 25 years is the minimum life. As they are partly covered they are not cleaned by rain. The manufacturer utilised a medium-lean duplex grade of stainless with 23% chromium and 4% nickel (EN 1.4362, UNS S 32304), ideal for the purpose.

Location/environment | GERMANY/OUTDOOR

Product | STAINLESS STEEL PLATE AND SHEET

Fabrication process | CUTTING, BENDING, DRILLING

Grade/surface | DUPLEX STAINLESS STEEL (23% CR, 4% NI), EN 1.4362, UNS S 32304/2E BLASTED SURFACE TO EN STANDARDS

Material thickness/diameter | 1.5 TO 8.0 MM DEPENDING ON DESIGN

Weight | VARIES DEPENDING ON DESIGN

Competing material | STAINLESS STEEL GRADE 316L OR 316TI, GALVANISED CARBON STEEL

Date of completion | 2002

Manufacturer | MODERSOHN.DE

Material supplier

Source of information | MODERSOHN.DE/ISSF SOLAR ARCHITECTURE PROJECT

Remarks



Home and Office

Garbage and Recycle Bins

The stainless steel garbage and recycle bins at the University of Queensland have been laser cut to provide an aesthetically pleasing finish.

Location/environment | AUSTRALIA/OUTDOOR

Product | 1.6 MM STAINLESS STEEL SHEET

Fabrication process | LASER CUTTING

Grade/surface | 304/NO. 4 FINISH

Material thickness/diameter

Weight

Competing material

Date of completion | FEBRUARY 2008

Manufacturer | ROCKPRESS

Material supplier

Source of information | ASSDA, AUSTRALIAN STAINLESS MAGAZINE EDITION 42

Remarks





Home and Office Office Desk

The Zeus office desk is representative of the work of French designer, Vincent Pujardieu who likes to create objects that are imbued with personality. The desk's dovetail assembly, a technology of the Renaissance, is used to link the foot and top of the desk.



Location/environment | PARIS, FRANCE/INDOOR

Product | STAINLESS STEEL PLATE

Fabrication process

Grade/surface | 18-9E (TYPE304)/MIRROR FINISH

Material thickness/diameter | 8 MM

Weight | 240 KG

Competing material

Date of completion | OCTOBER 2008

Manufacturer | LA MORANDIÈRE EURL (33)

Material supplier | ARCELORMITTAL STAINLESS EUROPE

Source of information | ARCELORMITTAL STAINLESS EUROPE

Remarks



Home and Office

Stainless Steel Cabinet

Extensive corrosion tests were performed on this stainless steel cabinet after it was redesigned using ferritic stainless instead of austenitic grade 304. The results of the tests were extremely positive, justifying the manufacturer's decision to change to ferritic stainless steel.

Location/environment | ITALY/INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | BENDING AND SPOT WELDING

Grade/surface | AISI441L1/2B

Material thickness/diameter | 0.8 MM

Weight

Competing material | PAINTED CARBON STEEL

Date of completion | 2007

Manufacturer | FACILITAS

Material supplier | TKL-AST

Source of information | THYSSENKRUPP NIROSTA/TKL-AST

Remarks





Home and Office River Sink

Grade 304 has been used to create this high-quality, decorative sink.



Location/environment | UNITED STATES/INDOOR

Product | COLD ROLLED STAINLESS STEEL SHEET

Fabrication process | DRAWING

Grade/surface | 304

Material thickness/diameter | 1.65 MM

Weight

Competing material | CORIAN®, COPPER, BRONZE, NICKEL

Date of completion | 2007

Manufacturer | ELKAY

Material supplier | NORTH AMERICAN STAINLESS (NAS)

Source of information | NORTH AMERICAN STAINLESS (NAS)

Remarks | CORIAN IS A REGISTERED TRADEMARK OF THE DUPONT CORPORATION.



Home and Office Table “Credenza”

Called Credenza, this table provides both style and long-lasting functionality.

Location/environment | UNITED STATES/INDOOR

Product | STAINLESS STEEL COLD ROLLED SHEET

Fabrication process | LASER CUT PARTS, BROKEN AND WELDED EDGES. GROUND BY HAND. CUSTOM FINISH.

Grade/surface | HAND CIRCULAR-PATTERN FINISH AND #4 FINISH

Material thickness/diameter

Weight

Competing material

Date of completion

Manufacturer | LUMBRE INC.

Material supplier | THYSSENKRUPP

Source of information | THYSSENKRUPP STAINLESS NORTH AMERICA/LUMBRE INC.

Remarks





Home and Office Wedge Chair

The stainless steel Wedge Chair provides both style and comfort.

Location/environment | UNITED STATES/INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process | LASER CUT PARTS

Grade/surface | BEAD BLASTED CHAIR TOP. #4 FINISH ON SIDES.

Material thickness/diameter

Weight

Competing material

Date of completion

Manufacturer | LUMBRE INC.

Material supplier | THYSSENKRUPP MEXINOX

Source of information | THYSSENKRUPP STAINLESS NORTH AMERICA

Remarks | DESIGN BY GABRIEL SALCIDO.



Home and Office Thermal Solar System

High-performance ferritic grades of stainless were used to improve the cost-effectiveness of these gravity-fed hot water tanks. Typically the tanks are mounted outside next to solar panels on roofs.

Location/environment | SOUTH AFRICA/OUTDOOR

Product | STAINLESS STEEL COLD ROLLED SHEET

Fabrication process | BENDING, WELDING

Grade/surface | TANK INTERIOR: 441. ENVELOPE: 430/BRIGHT ANNEALED

Material thickness/diameter | 1.5 MM

Weight

Competing material | GALVANISED CARBON STEEL, ALUMINIUM

Date of completion

Manufacturer | SUNTANK.COM

Material supplier

Source of information | SUNTANK.COM/ISSF SOLAR ARCHITECTURE PROJECT

Remarks



08

ART

- Intangible Something 98
- Pic Perf 99
- Sculptured Balls 100

Art

Intangible Something

Bruce R. MacDonald is an artist who has been working with stainless steel for more than 25 years. Intangible Something is just one of the works he has created.

The heart of his artistic work today is an ongoing exploration of the optical properties of abraded metal. Some finishing techniques create a surface that seems to project off the material, others seem to recede from the surface plane and others simply place it accurately in space. By mixing these on a panel and lighting it directly the artist is able to create a three dimensional space out of a two dimensional object.

A photograph gives you the composition of the piece, but the essence of the work is the dynamic of the surface experienced by a viewer moving around in front of the panel.

The metal itself is not the art just the medium. These are light sculptures and can be placed indoors or out and can be lit with colour shifting bulbs.

Location/environment | UNITED STATES/INDOOR AND OUTDOOR

Product | STAINLESS STEEL COLD ROLLED SHEET

Fabrication process

Grade/surface | 316L

Material thickness/diameter

Weight

Competing material

Date of completion

Manufacturer | BRM DESIGN

Material supplier | THYSSENKRUPP

Source of information | THYSSENKRUPP STAINLESS NORTH AMERICA

Remarks | PRIVATE COLLECTION. MORE WORK BY BRUCE R. MACDONALD CAN BE FOUND AT BRMDESIGN.COM.



Art

Pic-Perf

Pic-Perf allows any image to be created in perforated metal. It utilises the basic perforation process to create pictures, designs or words by manipulating the size and pitch of thousands of holes.

Producing the images in stainless steel means they are more durable and can be used to provide an up-market advertising solution. The fact that the stainless steel can be recycled adds to the environmental credentials of the concept.

In addition to the aesthetic function of Pic-Perf, the basic functions of perforated plates still apply. These include ventilation, sun screening, partitions, balustrades, car park screening, acoustic applications and facades. Instead of being purely practical, they can now convey a message or create an emotion.

Location/environment | SOUTH AFRICA/INDOOR AND OUTDOOR

Product | STAINLESS STEEL SHEET

Fabrication process | PERFORATION MACHINE

Grade/surface | ALL TYPES OF STAINLESS

Material thickness/diameter

Weight

Competing material

Date of completion | ONGOING

Manufacturer | LOCKERS ENGINEERS

Material supplier

Source of information | SASSDA

Remarks





Art

Sculptured Balls

This series of sculptured balls are made of mirror finished stainless steel. The sculpture is installed in a private office.

Location/environment | SYDNEY, AUSTRALIA/INDOOR

Product

Fabrication process

Grade/surface | MIRROR FINISH

Material thickness/diameter

Weight

Competing material

Date of completion

Manufacturer | STAINLESS METAL CRAFT

Material supplier

Source of information | ASSDA, AUSTRALIAN STAINLESS MAGAZINE EDITION 35

Remarks

09

OTHER

- Medical Sink 104
- Peelable Laminated Shim 105



Other Medical Sink

Many stainless steel products have medical applications. This stainless steel sink is easy to keep clean and is used in both clinics and hospital.



Location/environment | CHINA/INDOOR

Product | STAINLESS STEEL PLATE

Fabrication process | FORMING AND WELDING

Grade/surface | 420, 304/2B

Material thickness/diameter

Weight

Competing material | PORCELAIN

Date of completion | 2007

Manufacturer | FENGHUA TIAHONG MEDICAL DEVICE COMPANY

Material supplier | TISCO

Source of information | TISCO

Remarks



Other Peelable Laminated Shim

A shim is a thin piece of material that is used to fill space between things, usually for support, levelling or adjustment of fit. The stainless steel shim featured here can be peeled off for ease of use.

The laminated shim consists of layers of stainless foil that are 0.05 mm thick. The foils are bonded together with polymer resin and then pressed into individual panels in a laminating process that uses both pressure and heat.

Location/environment | GERMANY/INDOOR

Product | STAINLESS STEEL SHEET

Fabrication process | BONDED WITH POLYMER RESIN AND PRESSED

Grade/surface | 304

Material thickness/diameter | 0.05 MM

Weight | 9.8 KG PER PANEL OF 1.6 MM X 1,200 MM X 600 MM

Competing material

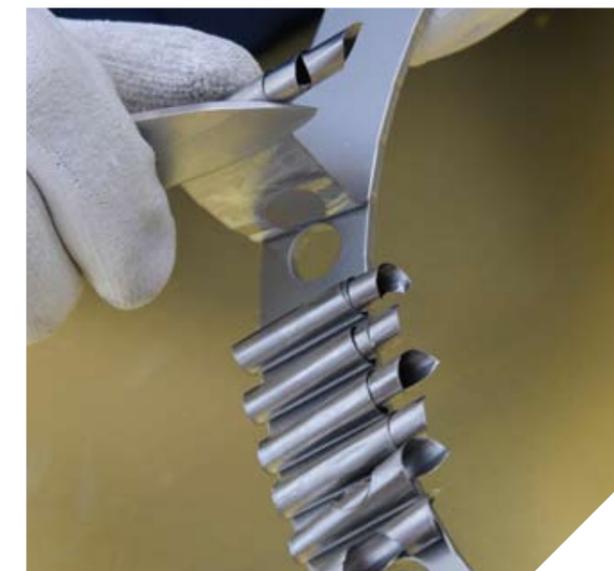
Date of completion

Manufacturer | GEORG MARTIN GMBH DEUTSCHLAND

Material supplier

Source of information | EURO INOX

Remarks | LAMINATED SHIMS ARE USED IN MANY INDUSTRY SECTORS TO REDUCE MACHINING, MANUFACTURING AND LOGISTICS COSTS. THE MATERIAL PROVIDES ADVANTAGES ALONG THE WHOLE PROCESS CHAIN. ASSEMBLY LEAD TIMES ARE REDUCED, HANDLING IS MADE EASIER AND MAINTENANCE AND REPAIR OPERATIONS ARE SIMPLE AND FAST.



List of References

Australia	I AUSTRALIAN STAINLESS STEEL DEVELOPMENT ASSOCIATION (ASSDA) Email: asssda@assda.asn.au Web: http://www.assda.asn.au Telephone: +61 7 3220 0722 Fax: +61 7 3220 0733
Belgium	I EURO INOX Email: info@euro-inox.org Web: http://www.euro-inox.org Telephone: +32 2 706 8267 Fax: +32 2 706 8269
Brazil	I ARCELORMITTAL INOX BRASIL S.A. Web: http://www.arcelormittalinoxbrasil.com.br Telephone: +55 31 3235 4200 Fax: +55 31 3235 4264
Brazil	I NUCLEO INOX Email: nucleoinox@nucleoinox.org.br Web: http://www.nucleoinox.org.br Telephone: +55 11 3813 0969 Fax: +55 11 3813 1064
China	I SHANGHAI KRUPP STAINLESS (SKS) Web: http://www.skschina.com/ Telephone: +86 21 3887 4887 Fax: +86 21 6870 2025
China	I STAINLESS STEEL COUNCIL OF CHINA SPECIAL STEEL ENTERPRISES ASSOCIATION (CSSC) Email: bxgfh@yahoo.com.cn Web: http://www.cssc.org.cn Telephone: +86 10 6513 3322 Fax: +86 10 6523 6395
China	I TAIYUAN IRON & STEEL (GROUP) CO. LTD. (TISCO) Email: tgxcb@tisco.com.cn Web: http://www.tisco.com.cn Telephone: +86 351 313 1696 Fax: +86 351 313 4170
Finland	I OUTOKUMPU OYJ Email: stainless.info@outokumpu.com Web: http://www.outokumpu.com Telephone: +358 9 4211 Fax: +358 9 421 3888
France	I ARCELORMITTAL STAINLESS EUROPE Email: stainless.europe@arcelormittal.com Web: http://www.ugine-alz.com Telephone: +33 1 7192 0652 Fax: +33 1 7192 0791
France	I UGITECH SA Web: http://www.ugitech.com Telephone: +33 4 7989 3115
Germany	I THYSSENKRUPP NIROSTA GMBH Email: marketing.nirosta@thyssenkrupp.com Web: http://www.nirosta.de Telephone: +49 21 518 301 Fax: +49 21 518 320

India	<p>I INDIAN STAINLESS STEEL DEVELOPMENT ASSOCIATION (ISSDA)</p> <p>Email: nissda@gmail.com Web: http://www.stainlessindia.org Telephone: +91 11 2686 5631 Fax: +91 11 2686 3376</p>
Italy	<p>I CENTRO INOX</p> <p>Email: info@centroinox.it Web: http://www.centroinox.it Telephone: +39 2 8645 0559 Fax: +39 2 860 986</p>
Japan	<p>I JAPAN STAINLESS STEEL ASSOCIATION (JSSA)</p> <p>Web: http://www.jssa.gr.jp Telephone: +81 3 5687 7831 Fax: +81 3 5687 8551</p>
Mexico	<p>I CENDI</p> <p>Email: direccion@cendi.org.mx Web: http://www.cendi.org.mx Telephone: +52 444 824 1182 Fax: +52 444 824 1182 Ext 111</p>
South Africa	<p>I SOUTHERN AFRICA STAINLESS STEEL DEVELOPMENT ASSOCIATION (SASSDA)</p> <p>Email: info@sassda.co.za Web: http://www.sassda.co.za Telephone: +27 11 803 5610 Fax: +27 11 803 2011</p>
South Korea	<p>I KOREA IRON AND STEEL ASSOCIATION (KOSA)</p> <p>Web: http://www.kosa.or.kr Telephone: +82 2 559 3567 Fax: +82 2 559 3509</p>
Spain	<p>I CEDINOX</p> <p>Email: cedinox@cedinox.es Web: http://www.cedinox.es Telephone: +34 91 398 5231 Fax: +34 91 398 5190</p>
Turkey	<p>I PASDER</p> <p>Email: pasder@pas-der.com Web: http://www.pas-der.com Telephone: +90 212 351 3314 Fax: +90 212 351 3313</p>
United States	<p>I CARPENTER TECHNOLOGY CORPORATION</p> <p>Email: investorrelations@cartech.com Web: http://www.cartech.com Telephone: +1 610 208 2000 Fax: +1 610 208 2361</p>
United States	<p>I NORTH AMERICAN STAINLESS (NAS)</p> <p>Web: http://www.northamericanstainless.com Telephone: +1 502 347 6000 Fax: +1 502 347 6001</p>
United States	<p>I THYSSENKRUPP STAINLESS NORTH AMERICA</p> <p>Email: thyssenkruppstainlessna@mexinox.com Web: http://www.mexinox.com Telephone: +1 866 338 8383 Fax: +1 847 317 1404</p>

ISSF

Rue Colonel Bourg 120
1140 Brussels • Belgium

T: +32 2 702 8900

F: +32 2 702 8912

E: info@issf.org



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