ANSWERS FOR ARCHITECTS WHO DESIGN FOR BEAUTY, PERFORMANCE, UTILITY AND PRESTIGE WITH NICKEL STAINLESS STEEL

Nº 12004

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ANSWERS FOR ARCHITECTS WHO DESIGN FOR BEAUTY, PERFORMANCE, UTILITY AND PRESTIGE WITH NICKEL STAINLESS STEEL

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Architects and engineers are taking advantage of nickel-containing stainless steel's unique combination of properties. It is a versatile material, they have found, that is eminently suitable for so many building and constructional applications.
Amply portrayed in this publication, by photograph and simple annotation, is the diversity of applications to which nickel containing stainless steel has been applied throughout the world – from simple components to ingenious structures.
Often regarded in the past as a material reserved for prestigious applications, nickel stainless steel today is a practical, cost competitive and effective solution to many specific problems in the building industry. It is now the standard material specified for areas, both inaccessible and exposed, which are subject to corrosion.

While it is not the purpose of this publication to include freely available data, such as the range and properties of stainless steel, it is appropriate to include the material characteristics here, to avoid repetition throughout the many applications shown in this book. These are:

High resistance to corrosion; nickel containing stainless steel requires no protective coating or corrosion allowance.

Low maintenance costs - requires only a periodic wash with soap and water to maintain the original finish.

Tough, highly durable, with high tensile strength.

Wide variety of finishes available including satin, matt, and mirror polish; pearl, mosaic, or linen texture; to which colours such as gold, bronze, blue, red, green and black may be added by chemical process.

Weldable and readily formable by rolling or pressing.

The existence of fabricators in each country is an important factor. They have considerable expertise both in the fabrication of stainless steel and the building industry, and the ability to work closely with the architect to provide functional, elegant and economic structures in stainless steel. Architects can therefore design in stainless steel with confidence, as widely illustrated in this book. It is hoped that architects will find the book interesting and stimulating.

FAÇADES

Particularly well suited for the façades of buildings, nickel containing stainless steel is a functional, practical, and long lasting material with a universal aesthetic appeal.
Stainless steel has a durability that will last the lifetime of the building and, with periodic washing, its appearance will be retained, no other maintenance being necessary - an important and cost-effective feature of the material.

Whether in the form of profiled sheeting, panels, or curtain walling, the strength and stiffness of stainless steel allow thin gauge material to be used, minimising the weight with subsequent beneficial effect on structural steelwork and foundation costs.

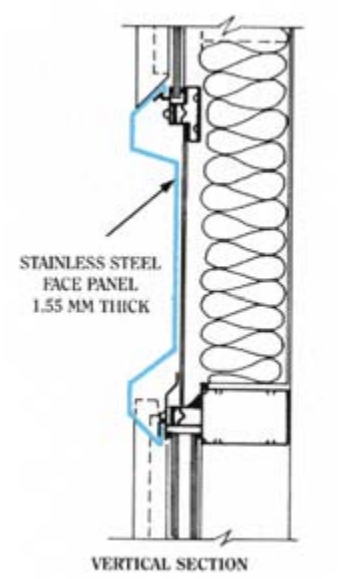
Harmonious with other building materials, stainless steel successfully blends with its environment, delicately reflecting surrounding colours with pleasing effect.

Swimming Pool, Lausanne, Switzerland.

The section of this stainless steel window is especially designed for energy saving. An insulating material separates the outer metallic components from the inner to avoid thermal transfer. Above the pool a walk-on perforated ceiling provides access for maintenance purposes. AISI Type 304 nickel stainless steel is used internally and externally.

Architects: 1. Lonchamp, P. Margot, H. Schaffner, F. Schlup

Courtesy of Franke AG, Aarburg, Switzerland



VERTICAL SECTION

Sun Life of Canada Towers, Toronto, Ontario, Canada.

In these two towers nickel stainless steel AISI Type 304 is used; 1.5 mm thick for the face panels and 0.8 mm thick for the mullions.

Architect: The Webb Zerafa Menkes Housden Partnership, Toronto

Courtesy of Atlas Steel

Courtesy of American Iron & Steel Institute

Royal Bank Plazza, Toronto, Canada.

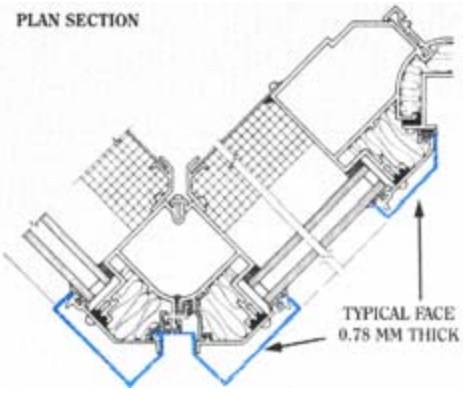
The mullions and spandrels for the curtain wall utilise nickel stainless steel AISI Type 304 in thicknesses of 0.78 mm and 1.57 mm respectively.

Architect: The Webb Zerafa Menkes Housden Partnership, Toronto

Science North Building, Sudbury, Ontario, Canada.

AISI Type 304 nickel containing stainless steel was used extensively for this unusual 'snowflake' shaped building. For the crows beaks, material thickness is 1.58 mm, but for the soffits, ridge caps, and outer panels of the curtain wall, the material is only 0.79 mm thick.

Architects: Townsend, Stefura, Baleshta & Nicholls, Sudbury; and Moriyama & Teshima, Toronto



Courtesy of Science North

Office building in Düsseldorf, West Germany.

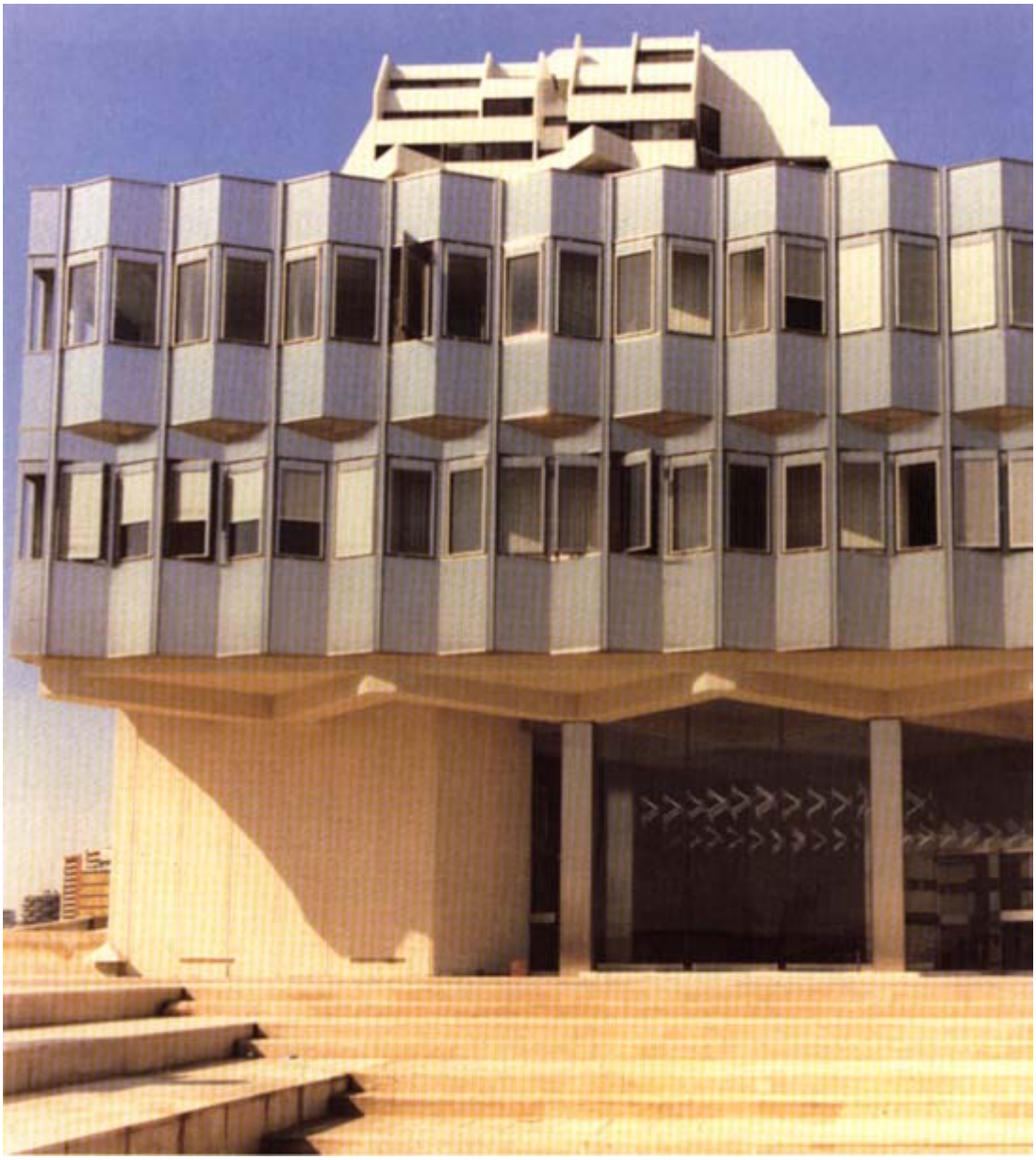
Stainless steel, AISI Type 304, mullions and tansoms enhance the lightness of the glazed façade.

Photo: C. Kappen

Trade and Industry Chamber of Creteil, France.

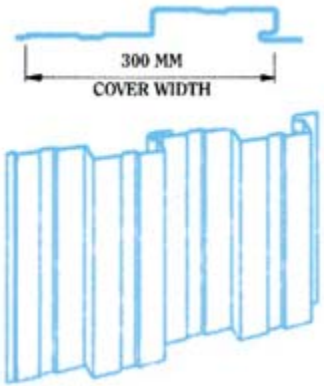
In this office building AISI Type 304 stainless steel is used for elements surrounding the façade panels and for the window frames and pillar covers. The panels were assembled in the workshop, transported to site, and erected.

Architect: M. Roussel



Courtesy of Entreprise Coisin, Gennevilliers, France. Photo: A. Beauvais

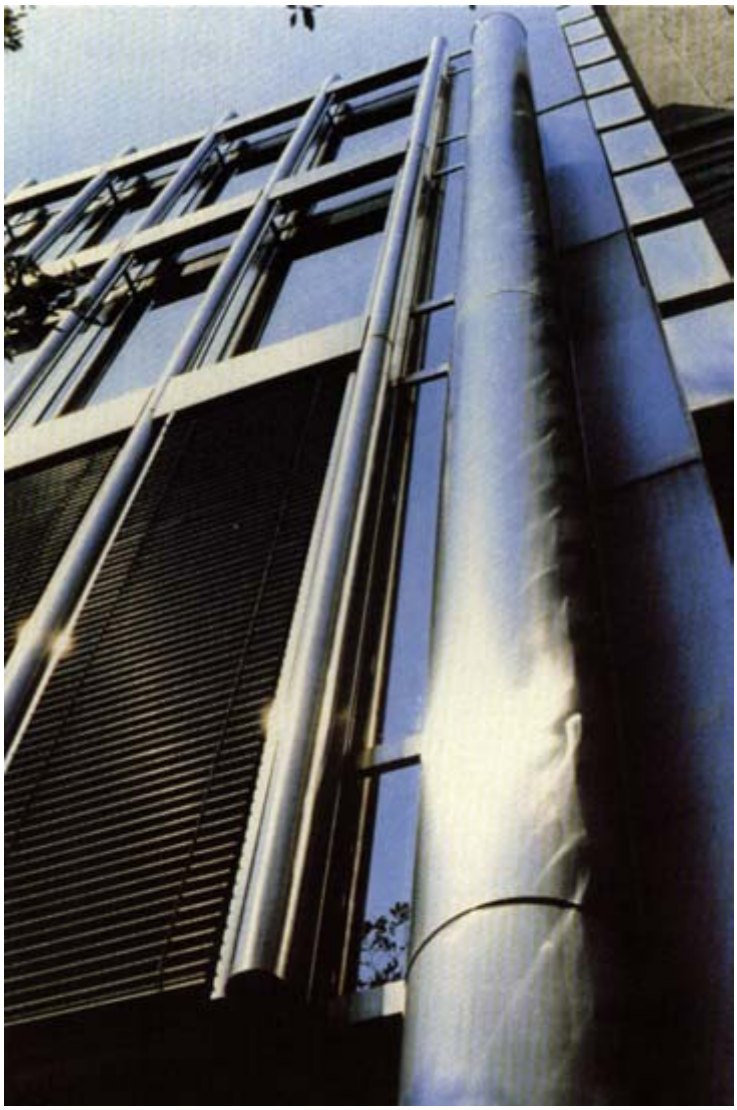
Courtesy of Robert Landsdale



Warehouse in Etobicoke, Ontario, Canada.

Standard roll-formed nickel stainless steel profiles are used to clad this industrial building with sheet material 0.8 mm thick, AISI Type 304 in a No. 4 finish.

Architect: Bregman and Hamann, Toronto, Canada



Courtesy of Dial-Norm AG

Headquarters of Cantonal Bank of Solothum, Switzerland.

Bright annealed AISI Type 304 nickel stainless steel was used for the panels, chimney cladding and formed sections of this representative building.

Architect: Zaugg and Rhiner & Hochuli.

Courtesy of Nisshin Steel Co. Japan

Printemps department store, Osaka, Japan.

Regular patterns of hemispheric pressings considerably stiffened the 0.6 mm thick stainless steel enabling large, yet light, panels to be produced for the curtain wall.
The mirror-polished finish to the AISI Type 304 material provides a splendid contrast in sunlight.

Architect: Daiken Design Co.

Courtesy of Haedrich AG

Office building in Zumikon, Switzerland.

The chimney design accentuates the elegant combination of white marble and AISI Type 304 nickel stainless steel. A rolled textured finish was given to the material which was 1.5 mm thick throughout.

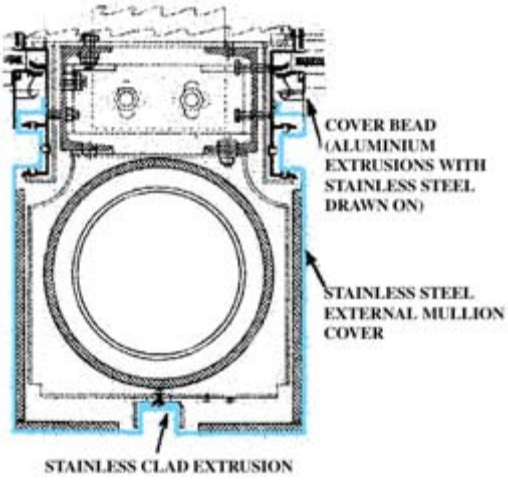
Architects: B. E. Honeggar and MOBAG.

National Westminster Tower, London.

183 m high, the elegance of stainless steel is dominant, and approximately 13,000 m^2 of nickel stainless steel were used for the mullion covers of this building.

As illustrated in the diagram, the mullions comprise two pressed sections, each one storey high, in 1.2 mm thick dull polished nickel stainless steel AISI Type 316.

Architect: R. Seifert and Partners



Courtesy of BSC Stainless, England. Photo: Daily Telegraph

Office building, Munich West Germany.

Stainless steel, readily coloured by the Inco chemical process, considerably enhances the range of finishes available to the architect. Dark blue was used for this building but the range of colours available is gold, bronze, red, green and black.

Architect: Dipl. Ing. Neumayer, Munich

Courtesy of Polygrat GmbH

Office building, Hagen, West Germany.

The façade panels, each more than 5 m in height, were constructed from No. 4 polished sheets of AISI Type 304 nickel stainless steel. Staircases and balustrading are entirely stainless steel.

Courtesy of Krupp, West Germany

Courtesy of Cedinox, Barcelona.

Ederra Building, Madrid, Spain.

More than 230 tonnes of nickel stainless steel were used for the curtain walling of this building in thicknesses ranging from 0.45 to 0.7 mm.
AISI Type 304 material was generally used except for selected external elements produced from AISI Type 316. This building features a system designed for affixing the stainless steel elements to the structure thus obviating fasteners.

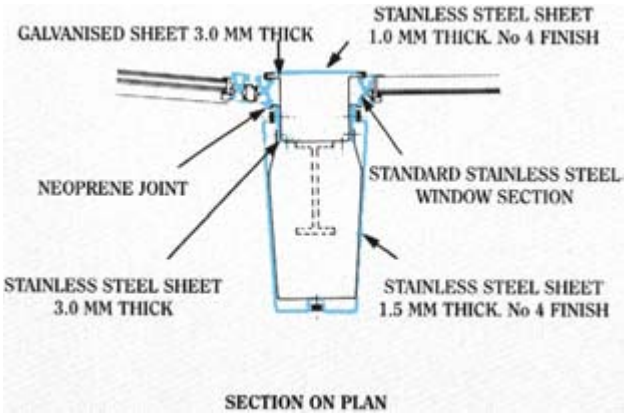
Architect: D. Manuel Aymerich Amadios

Courtesy of Entreprise Coisin, Gennevilliers, France

Railway Station,
Annecy, France.

The curtain wall mullions utilise 1.5 mm thick AISI Type 304 nickel stainless steel with a No. 4 finish while the frames of the fixed and rotating windows are standard roll formed profiles only 0.8 mm in thickness.

Architect: M. Dreyfus, SNCF



Head Office of Instituto
Bancario S. Paolo,
Turin, Italy.

Roll-formed profiles of AISI Type 304 nickel stainless steel strip are 1 mm in thickness for the main structure and 0.8 mm for the spring retaining sections.
Tubular sections are formed using a double seam which is locked by mechanical punching.
All surfaces have a No. 4 finish.

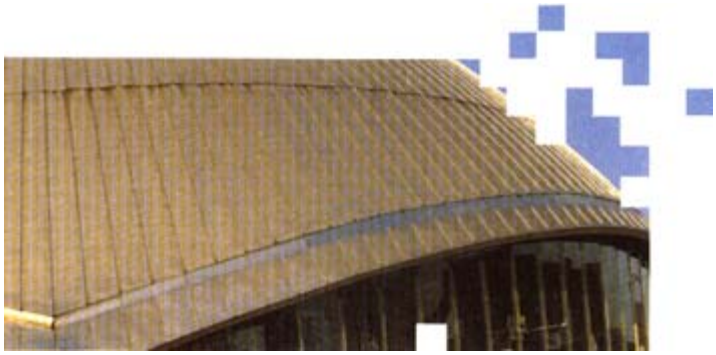
Architect: Dott. Arch. Ugo Cavallini, Turin

Warehouse and Office
building in Solingen,
West Germany.

Side wall cladding of these two buildings is made with a standard roll formed profile designed for galvanised or precoated sheets. In this case, profiles are formed from AISI Type 304 nickel stainless steel sheet, 1 mm thick.

Photo: C. Kappen

Courtesy of Centro Inox, Milan



ROOFING

The architectural application of nickel stainless steel to roofing, a traditionally problematical area, has been immensely successful, and at less cost than some other forms of metal roofing.
From initial applications such as church roofing (where in outlying areas the material is not susceptible to theft), stainless steel has been used to cover buildings such as hospitals, sports centres, and a variety of public buildings.
The excellent durability, high strength and good ductility of nickel stainless steel are ideal properties for roofing and permit thin gauge material to be specified.
Traditional systems such as standing seam and batten roll - which has visually bolder lines - use only 0.4 mm thick stainless steel strip, in lengths up to 9 m with either a matt-rolled finish or a terne-coated material.
Profiled, secret fix, prefabricated panel, seam-welded, folded joint systems demonstrate further adaptations and use of the material - which may be used with accessories such as gutters, downpipes, outlets, ridge and eaves sheeting - to provide a complete system for long life with minimum maintenance.

Coloured resin-coated nickel stainless steel, successfully developed and used in Japan, provides a new and attractive alternative for the architect.

Saint Louis Hospital, Paris, France

The structure supporting the glass roof of the hospital was constructed using special profiles in AISI Type 304 nickel stainless steel, as shown in the drawing.

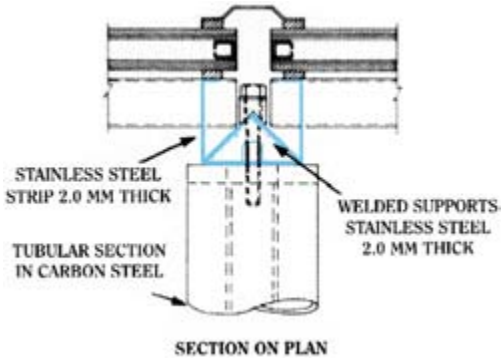
Courtesy of Frametal, Citry, France. Photo: F. Chabrolle

Swan Theatre, Stratford-upon-Avon, England.

Standing seams at 375 mm centres combine effectively with the hip wood rolls to provide a striking landmark to the extension of this famous theatre.
The roof cladding is teme-coated nickel stainless steel AISI Type 304 laid in 9-m-long strips.

Architects: Michael Reardon and Associates

Courtesy of Norman and Underwood Ltd., Leicester, England



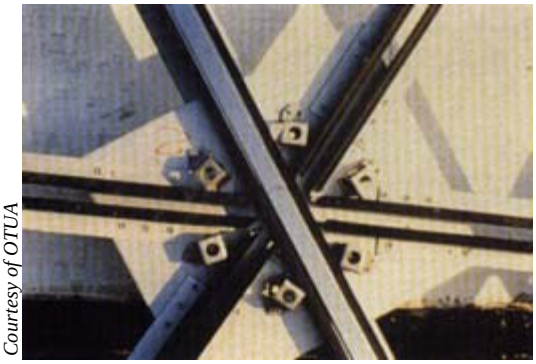
SECTION ON PLAN

Photo: F. Chabrolle

La Geode, Parc de la Villette, Paris, France.

6,433 triangles of AISI Type 316 stainless steel were used to clad the geodetic structilre of the 36 m diameter sphere. Nearly 80 tonnes of 1.5 mm thick sheets, cut in 133 different triangular sizes, were necessary.

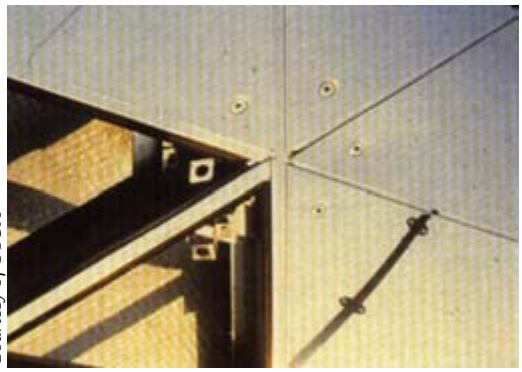
Architect: A. Fainsilber



Courtesy of OTUA

Under construction detail showing how stainless steel triangles were fastened to the secondary framework of the dome.

Architect: A. Fainsilber



Courtesy of OTUA

Head Office Nisshin Sugar Co. Ltd., Tokyo.

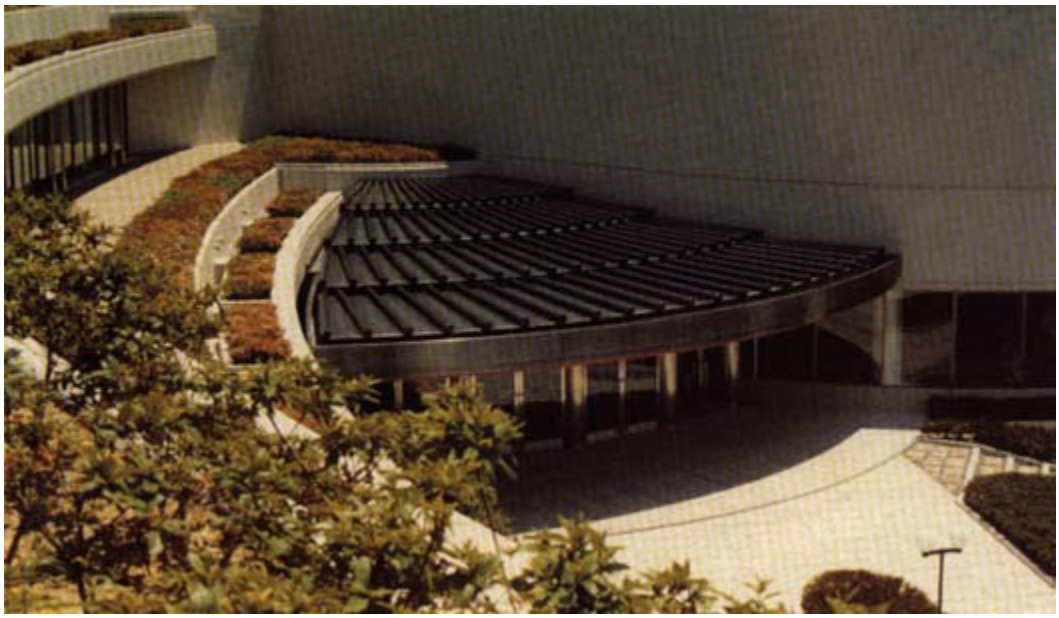
This building used nickel stainless steel extensively for the front entrance, roof and side wall cladding. Material comprised AISI Type 304 stainless steel with a brushed finish to which a red colour was chemically applied.

Designer: Nikken Design

Courtesy of Nisshin Steel Co., Japan

Coloured resin-coated nickel stainless steel, developed for roofing in Japan, is shown in this fine example which was constructed from press formed panels of 0.4 mm thick AISI Type 304 stainless steel substrate.

Courtesy of Nippon Metal Industry, Japan

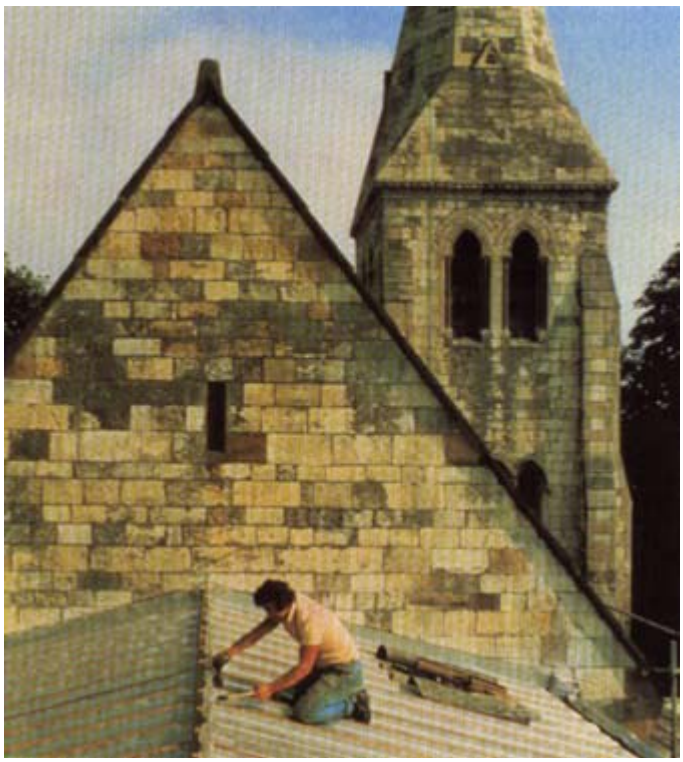


Courtesy of Nippon Metal Industry, Japan

Fukuoka Sun Palace, Fukuoka City, Japan.

A classic example of elegance combined with simplicity obtained with the use of nickel stainless steel for the roof and side cladding of the Sun Palace. A brushed finish was given to the AISI Type 304 material which was then coloured black with the Inco chemical process.

Designer: Nikken Design



Courtesy of B.S.C. Stainless

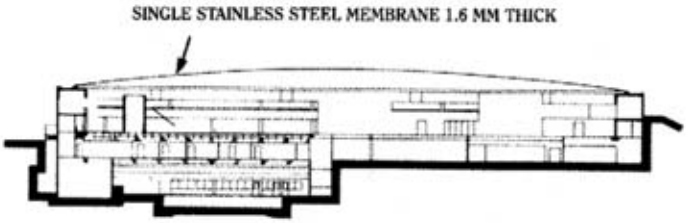
Church of Whiston, England.

For the restoration of this historical monument, the visually bold lines of the batten roll roofing system were chosen and executed in dull finished AISI Type 304 nickel stainless steel 0.5 mm thick.

Dalhousie University sports complex, Halifax, Nova Scotia, Canada.

The all-welded air-supported membrane roof of the university sports complex was constructed from only 1.6 mm-thick nickel stainless steel AISI Type 304. In the shape of a super ellipse, the low profile roof, which rises 3 m at the centre, measures 73 m x 91 m, and is supported by an increase in internal air pressure of only 0.05 p.s.i. In the event of the pressurising equipment failing, the roof is designed to support the full design load with a reversal of the meniscus shape.

Architects: Leslie R. Fairn & Associates, Halifax, Canada



Courtesy of Atlas Steel

Courtesy of Rostfria Tak AB, Sweden

JCC office building, Gothenburg, Sweden.

The roof of this building comprises nickel stainless steel strips, 0.4 mm thick AISI Type 316, jointed by a seam-welded, folded joint method developed by Rostfria Tak AB, of Fagersta in Sweden. This method produces a watertight joint which is suitable even for horizontally flat roofs. Wall panels, also in AISI Type 316 material, with a thickness of 0.7 mm were used for the side cladding.

Architects: Stjernberg & Hulten Arkitekter AB

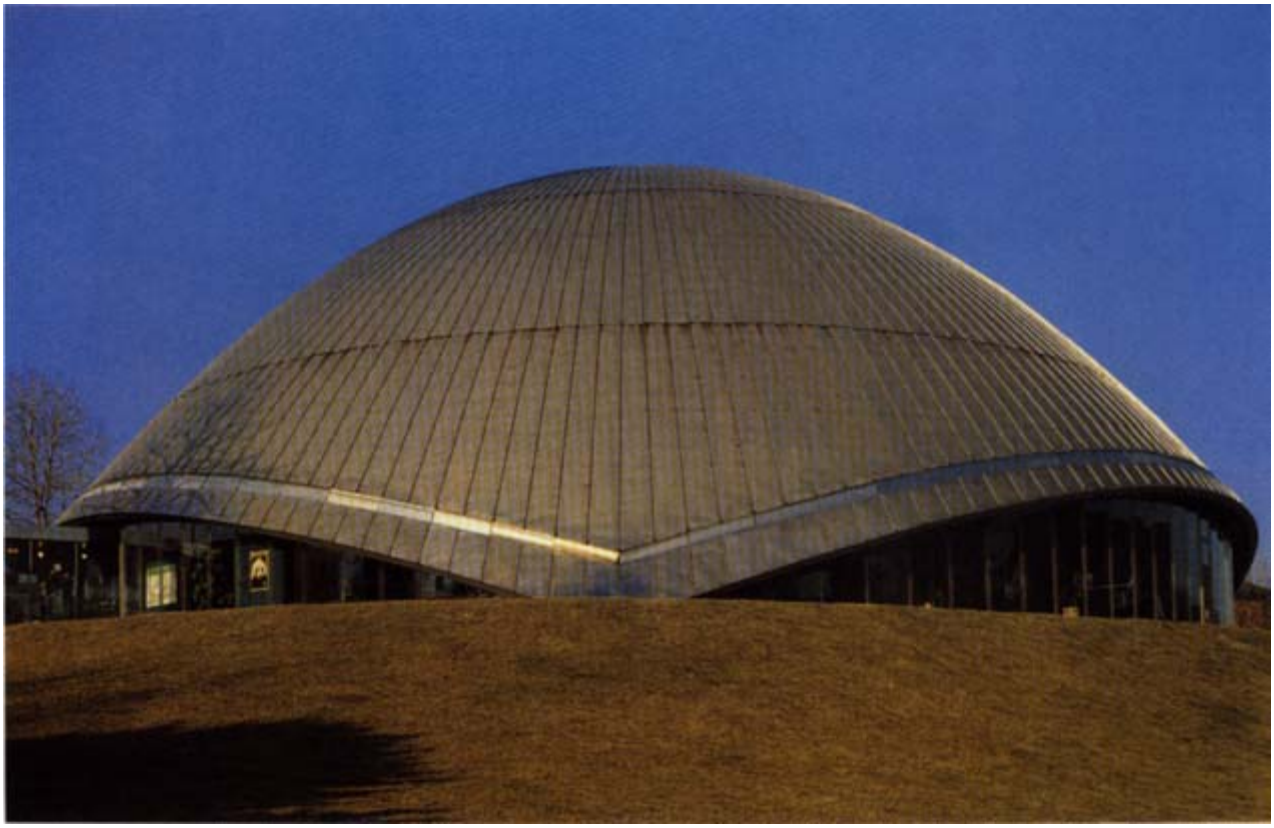


Photo: C. Kappen

Bochum Planetarium,
West Germany.

Long strips of nickel containing AISI Type 316 stainless steel, 0.5 mm thick, were used to cover this large spherical building. Standing-seam roofing technology was employed.

Architect: Baurat Schwartz

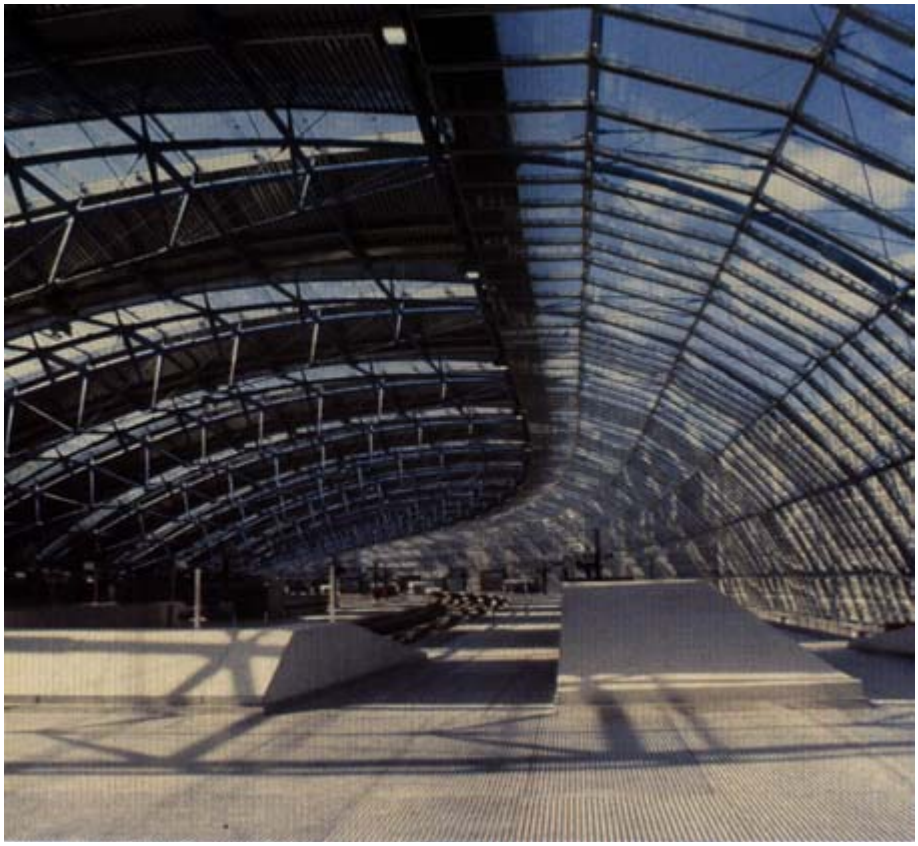


Photo: David J. Cochrane

The 6 acre roof of the award-winning Waterloo International Rail Terminal in London comprises alternating panels of glass and stainless steel for a durable, maintenance free life. 68mm deep and trapezoidal in section, AISI Type 316 stainless steel, 0.9mm in thickness, was press-braked to meet the design span of 4.8m.

Architects:
Nicholas Grimshaw and Partners

Courtesy of Centro Inox

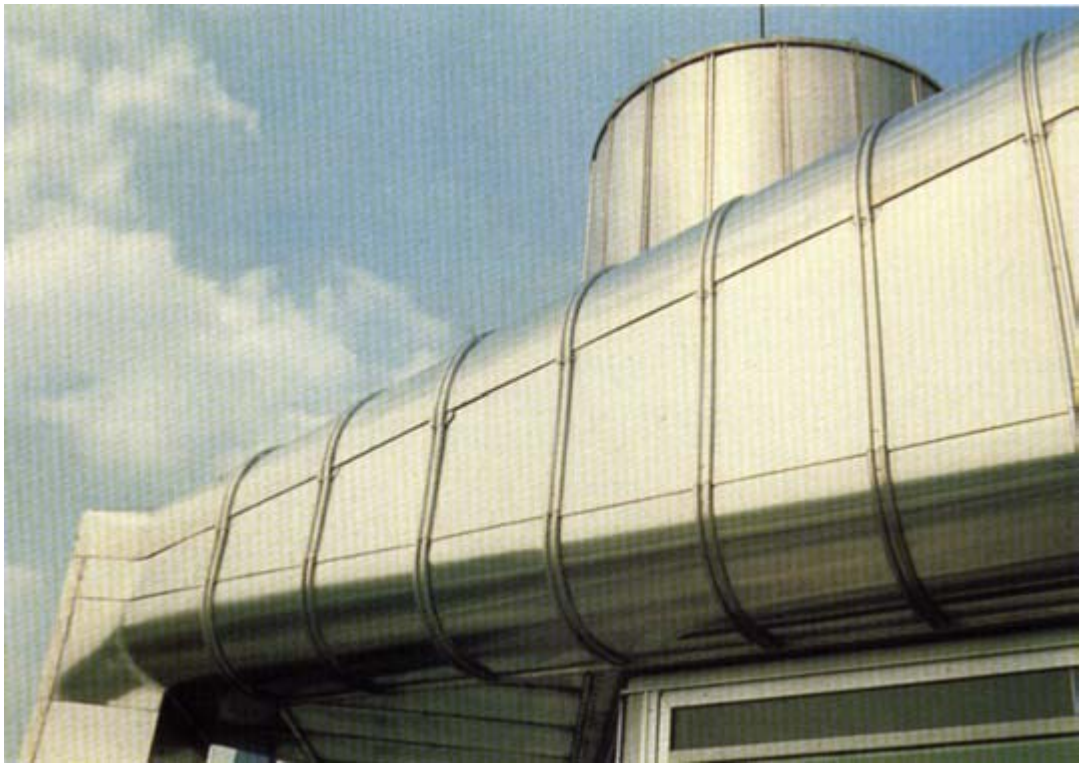
This building in Saronno, Italy,has a nickel stainless steel roof, formed by the standing seam method. Thin gauge 0.4 mm strips, 500-650 mm wide, are used in lengths up to 10 m, with the standing seam formed in position, using a small electrically powered machine.

Architect: E. Soncini, Milan

Courtesy of Centro Inox

Galleria, Milan, Italy.

In the restoration of this famous building, AISI Type 304 stainless steel was used for gutters, downpipes and channels for water discharge, to increase their lifespan and reduce maintenance costs.



Courtesy of Ugine

Val-de-Marne
Prefecture,
Creteil, France.

Batten and flat lock-seam roofing technology was used for the vertical part of the roofing using AISI Type 304 nickel stainless steel, 0.5 mm thick.

Architect: D. Badani, P. Roux-Dorlut

Courtesy of Nippon Metal Industry, Japan

Nickel stainless steel gutters and rainwater pipe of various shapes and sections using AlSl Type 304 material, 0.4 mm to 0.6 mm thick.

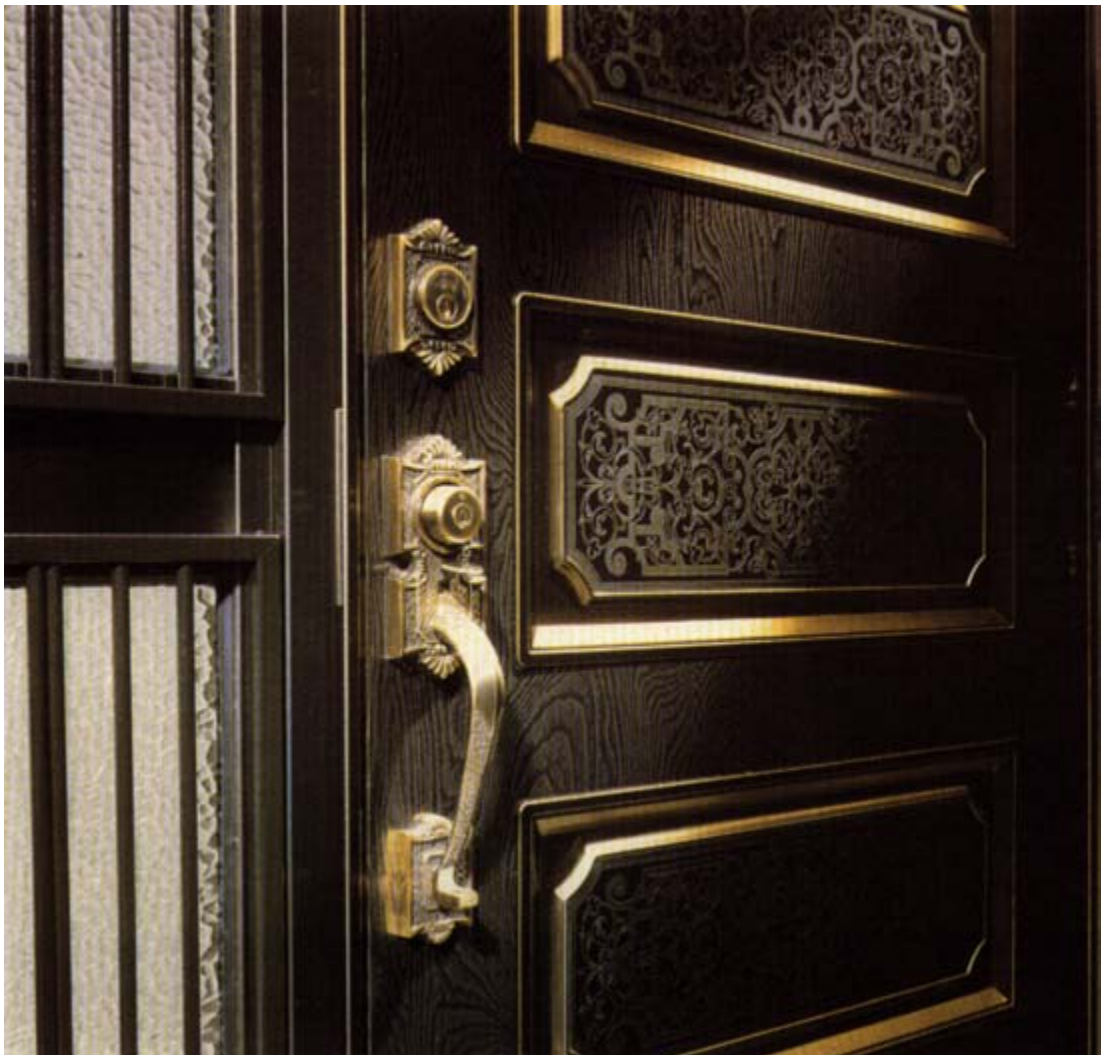
WINDOWS AND DOORS

Windows and doors manufactured from nickel stainless steel enhance the beauty of any building, and impress with their smooth finish and slender yet strong appearance. They are also extremely practical.

Simple washing with soap and water will retain a pristine appearance and can be carried out at the same time as the cleaning of glass surfaces. Costly maintenance and repainting are eliminated. Nickel-containing stainless steel has a strong resistance to impact, especially important in areas of high public activity.

Constant ease of opening doors and windows is ensured as the smooth surface does not retain dirt. Sections used for these products vary according to the manufacturer. They range from tubular section to roll-formed or press-braked sections, in thicknesses from 0.4 mm to 2 mm. Sections generally are welded to provide complete rigidity, with some designs incorporating an extruded aluminium core for this purpose. Proprietary nickel stainless steel doors are also available which have been tested and approved to provide a fire-resistance period of one hour. Window and door fittings such as hinges, handles and locking knobs, in a variety of forms, are available to complete and complement the design. Architects generally use stainless steel with either a satin or bright polished finish, but as shown here, with the addition of colour - by the Inco chemical process - the effect is striking.

Colour and ornate patterns, achieved by etching, demonstrate further the versatility of stainless steel to provide the architect with considerable design freedom.



Courtesy of the Clean-up Corporation

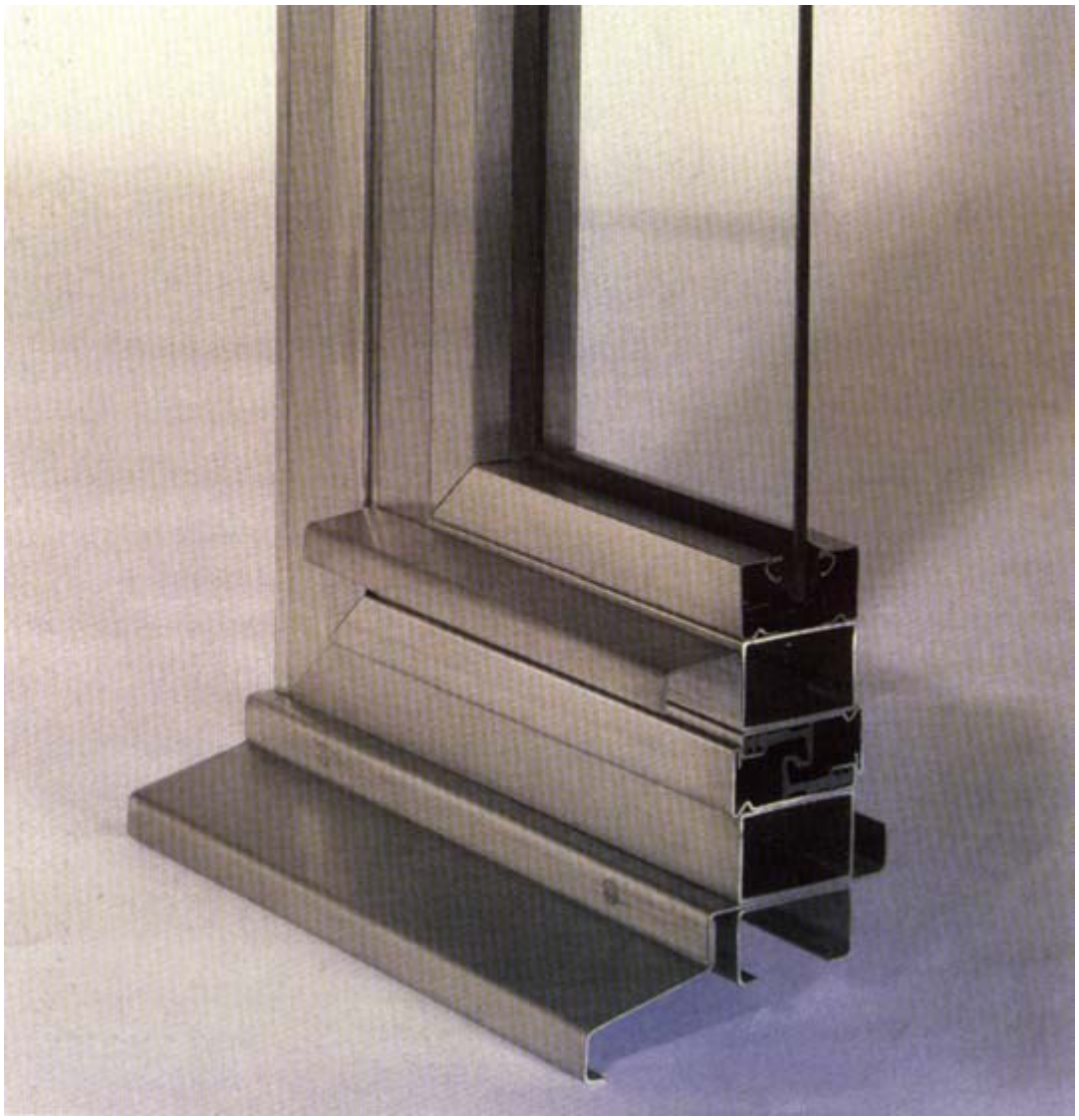
Breathtaking and beautiful designs are infinite in number when nickel stainless steel is etch-patterned and coloured. This superb example is one from the range of proprietary doors popular in Japan.

Courtesy of Pollards of London Ltd.

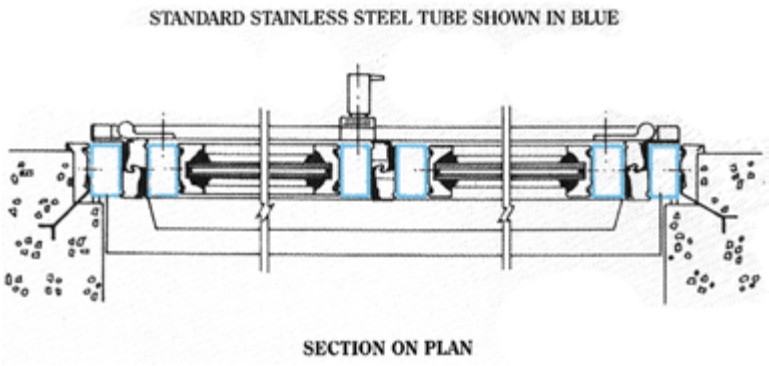
Queensgate Centre, Peterborough, England.

Screenfold doors in mirror-polished nickel stainless steel complement the shop entrances which feature a similar distinctive mirror finish in this busy centre. 1.2 mm thick AISI Type 316 material was used throughout the development.

Architect: Peterborough Development Corporation



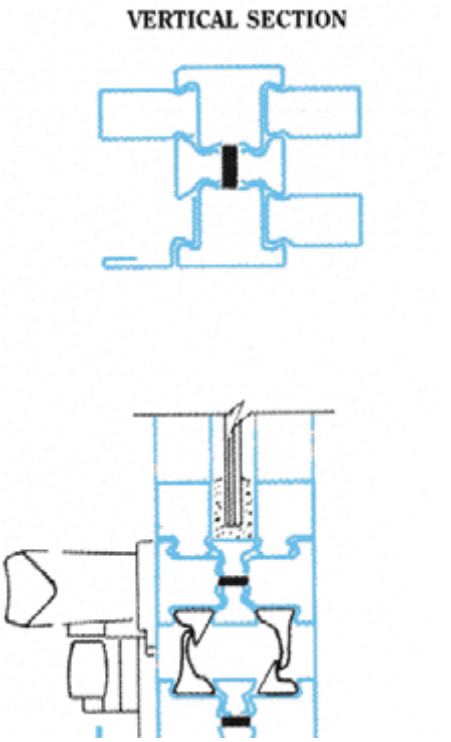
Courtesy of Frametal, Citry, France. Photo: F. Chabrolle



SECTION ON PLAN

In this system, the basic profile is a standard rectangular welded stainless steel tube.
A patented pareclose profile, and watertight seals, complete the system which allows all types of windows and doors to be fitted with 4 mm to 28 mm thick glazing.
The nickel stainless steel used is AISI Type 304 in thicknesses of 0.8 mm and I mm for the roll-formed pareclose section.

The patented basic profile of this system - allied to spring-closure profiles and to watertight seals - is suitable for all types of windows, with either single or double glazing, as well as doors, façade panels, and curtain walls. The profile is roll-formed from type 304 nickel stainless steel strip, 0.8 mm thick.



Courtesy of Entreprise Coisin, Gennevilliers, France

Ebbgate House, London.

Elegance and security are combined in this entrance façade and revolving doors manufactured from bright-finished nickel stainless steel. All material is AISI Type 316 with a thickness of 2 mm which provides, when formed and welded, strength and rigidity with slenderness.

Architect: Halford Associates

Courtesy of Pollards of London Ltd.

Courtesy of Entreprise Coisin, Gennevilliers, France. Photo: Alain Beauvais

Saint Charles railway station, Marseilles, France.

The impact resistance and durability of nickel stainless steel are particularly suited to applications in crowded public places. One example is access doors which are susceptible to damage.

Stainless steel flat door in Salford, England.

In this residential building, doors for main entrances, rear fire exits and interiors are in AISI Type 316 and 304 nickel stainless steels. respectively.

Courtesy of Drawn Metal Ltd, Leeds, England

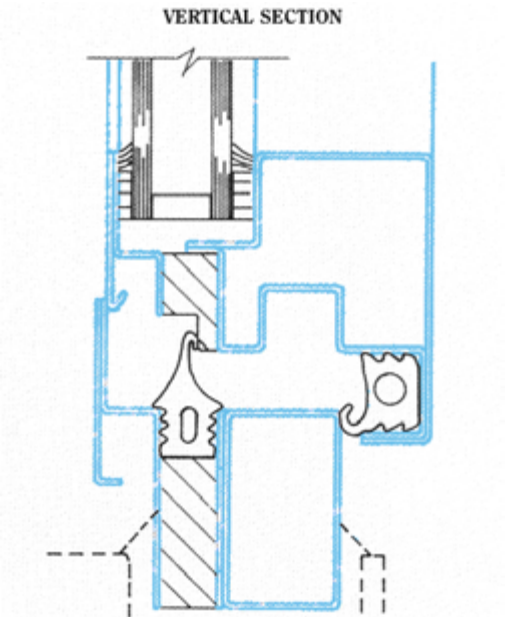
Photo: C. Kappen

Double plain door at Dusseldorf railway station, West Germany.

Satin finish stainless steel sheets are used for door panels and casing.

Architect: Dipl. Ing. Heinz Wilke 6c Partner, Dbsseldorf

All stainless steel window section, incorporating a thermal break, developed by Franke AG, Aarburg, Switzerland.



Stainless steel revolving door for the Banque de France building in Mames-la-Vallee, France.

Architect: MM. Lagneau and Coulon

Courtesy of Entreprise Coisin, Gennevilliers, France. Photo: Alain Beauvais

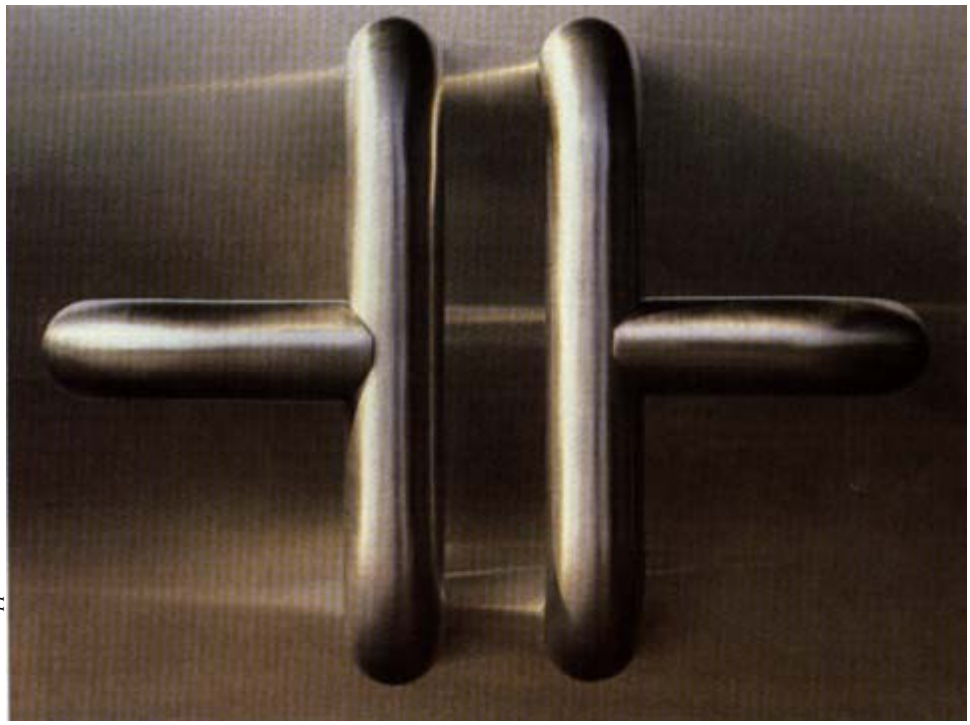


Photo: C. Kappen

Courtesy of Centro Inox, Italy

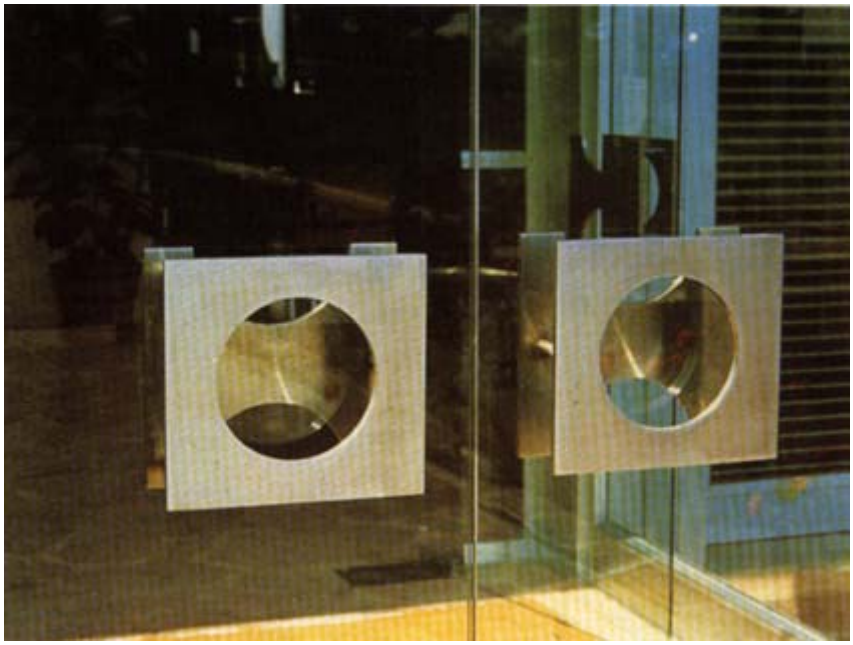
Nickel-containing stainless steel is frequently used for the fabrication of door handles. Examples of fixed or opening handles made from sheet and tube are illustrated.

Architect: Dr. Arch. Prof. Arnaboldi

Courtesy of Hagri, West Germany

Courtesy of Hagri, West Germany

The high ductility of nickel stainless steel is evident in these handles formed from tubular section.



Courtesy of Ugine, France

BUILDING ENTRANCES

The aesthetic appeal of stainless steel and the prestige image of the shop or building are complementary, hence the popularity of stainless steel for these applications.

But it is also functional – and good impact resistance, durability and easy maintenance are features fully appreciated by architect and client.

Architectural use of stainless steel has wide variations for shopfront and building applications, and material ranging from 0.4 mm to 3 mm in thickness has successfully been used to meet the desired features.

Satin and mirror finishes, either separately or mixed to provide an effective contrast, provide a smooth surface which will reflect surrounding colours and provide a most pleasing effect.

Bank Entrance, Florence, Italy.

Nickel stainless steel, 1.5 mm thick, clads a carbon steel structure to complement the stone work of this bank entrance.

Designers: G. A. Fusi and A. Bartolini

Courtesy of Centro Inox, Milan, Italy

Shopping Mall, Munich Railway Station, West Germany.

The glazing of this shopfront is supported by a grid made from nickel stainless steel sections. Cladding of the two pillars is made from sheets provided with a vertical unidirectional polish.

Architects: Planung Fahr and Partner PFP, Munich, West Germany

Photo: C. Kappen

Courtesy of Nisshin Steel Co, Japan

Railway Station,
Tokuyama, Japan.

The glazed façade is supported by a grid made from AISI Type 304 stainless steel sections.

Courtesy of BSC Stainless, England

Office Building,
Paris, France.

The protective front to the entrance of this office building near Paris is made from satin finish nickel stainless steel sheet AISI Type 304.

West Cross House,
Brentford, England.

A mirror-polish finish highlights the cladding of the entrance.

Architects: Eric Askew and Partners

Courtesy of Ugine, France

Exhibition Hall, Munich, West Germany.

AISI Type 304 nickel stainless steel sections retain the glazing of this car exhibition hall.

Architects: Zintzmeyer 8r Lux AG

Photo: C. Kappen

Courtesy of Centro Inox, Milan, Italy.

In this shopfront, nickel stainless steel was used for outside claddings and structural members which were formed from sheet.

Designers: M. Aquilina, C. Marri

Two shopfronts in Düsseldorf, West Germany, where satin-finished stainless steel was used in both sheet and section form.

Architects: Hentrich-Petschnigg and Partner, Ddsseldorf, West Germany

Photo: C. Kappen

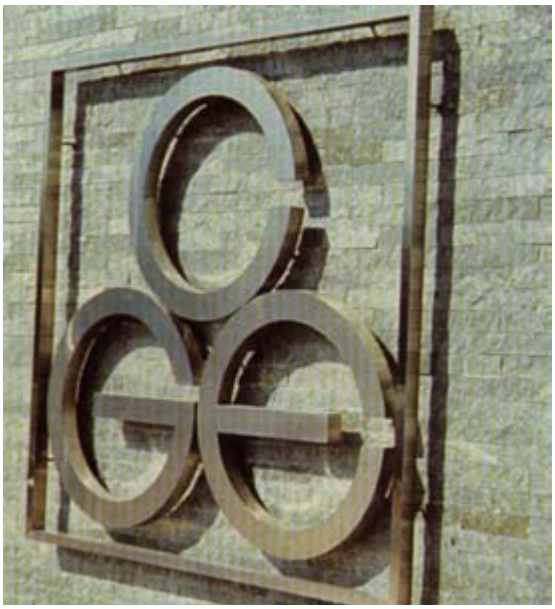
Architects: Hentrich-Petschnigg and Partner, Düsseldorf.

Photo: C. Kappen

Office Building,
Hagen,
West Germany.

Nickel stainless steel is used for the string course, the central pillar and the ceiling of this office building entrance. Note the chequered effect achieved by alternating the unidirectional finish given to the ceiling tiles.

Courtesy of Krupp, West Germany



Courtesy of Ugine, France

The sign of this industrial company is enhanced by the use of nickel stainless steel.

Trade Centre, Paris,
France.

Satin-finish, nickel-containing stainless steel was chosen for the Charles Jourdan store.

Designer: M. Favereau

Courtesy of Ugine, France. Photo: Mazo

STREET FURNITURE

Street furniture must meet many requirements that are, in themselves, not readily compatible: the design must integrate with the environment, the material must have structural strength and durability, and an ability to resist extremes of weather and de-icing salts.

As illustrated, nickel stainless steel, which has exceptional properties, has been chosen for a variety of street applications including: parapets, balustrades, handrails, kiosks, lamp poles, shelters, fountains, directional signs and showcases.

Readily fabricated and exceptionally durable, stainless steel requires only minimal maintenance, and it is perfectly suited to provide an attractive, functional, long lasting and cost-effective solution to many exposed fabrications.

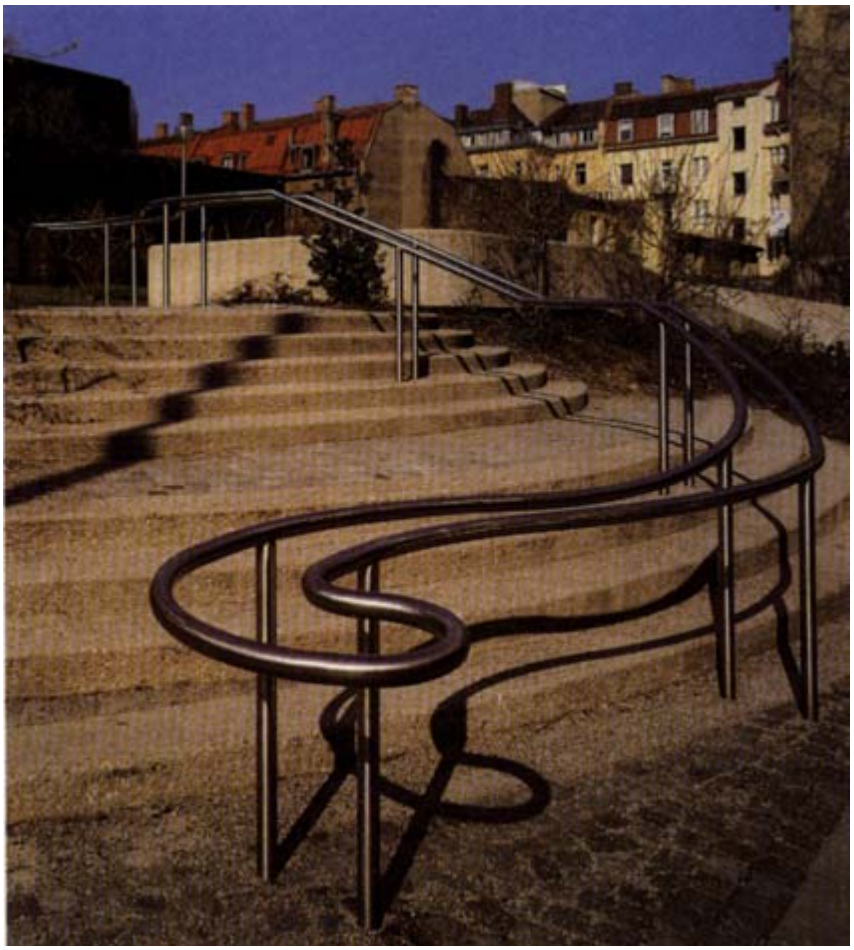


Photo: C. Kappen

Many different types of nickel stainless steel parapets and handrails are used in public areas, stainless steel tubes of various sizes and shapes generally being incorporated with glass panels or nickel stainless steel safety-wire netting.

Photo: C. Kappen

The Lighting poles of this pedestrian area in Duisburg, West Germany, are in AISI Type 304 nickel stainless steel.

Architects: Rudiger and Rudiger, Braunschweig, West Germany

Photo: C. Kappen

Gate Lodge,
Dillenburg,
West Germany.

The gate lodge of a cold-rolling mill is entirely made from satin-finish nickel stainless steel sheet.

Courtesy of Krupp, West Germany

An example of an integrated design with an infill safety wire netting in nickel stainless steel.

Photo: C. Kappen

Bus Shelters,
Düsseldorf, West
Germany.

Bus shelters framed externally with tubular sections in nickel stainless steel.

Photo: C. Kappen

Main Station,
Düsseldorf, West
Germany.

Nickel stainless steel angles for wall comer protection, and the tubular support for the ticket punch machine, were made from polished sheet.

Photo: C. Kappen

Kiosk,
Munich Railway
Station,
West Germany.

A kiosk, identical to six set up inside the Munich railway station. The façade structure is clad with nickel stainless steel strip, 3 mm thick, while the lower panels are made from roll-textured stainless steel sheet, 1.5 mm thick.

Architects: Ekkehard Fahr, Dieter Schaich

Courtesy of Cedinox, Barcelona, Spain

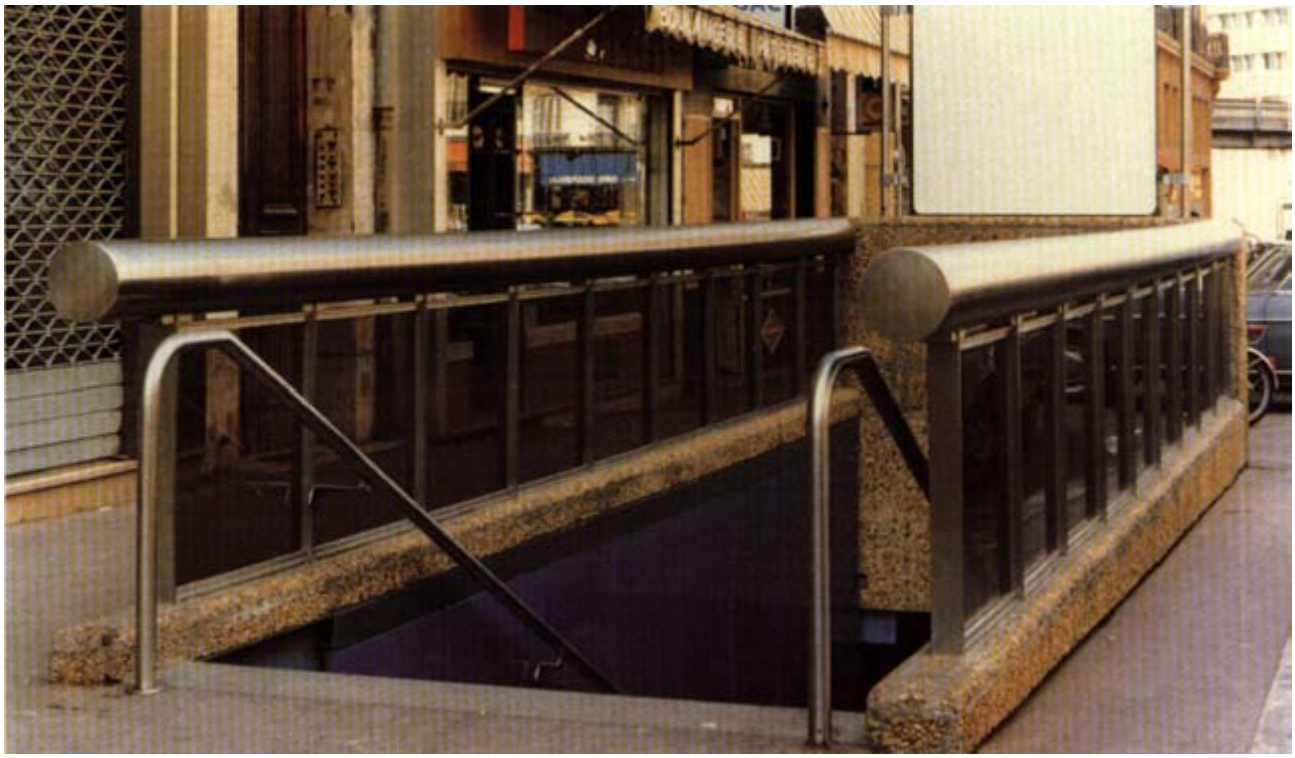
Slender tubular handrailing and stanchions with ball joints adorn this street subway entrance.

Photo: C. Kappen

Bus Shelter, Bottrop, West Germany.

Neatly designed, this bus shelter uses nickel stainless steel square hollow sections for the framework supporting the glass partitions. The surround for the advertising panel is also in stainless steel.

Tinted glass panels are retained by slender nickel stainless steel sections for this underground entrance in which the large diameter safety rail provides a striking feature.



Courtesy of Enterprise Voisin, France

Courtesy of Centro Inox, Milan, Italy

Milan
Cathedral, Italy.

The continuous handrail and twin columns typify the use of a single section size in this stainless steel example.

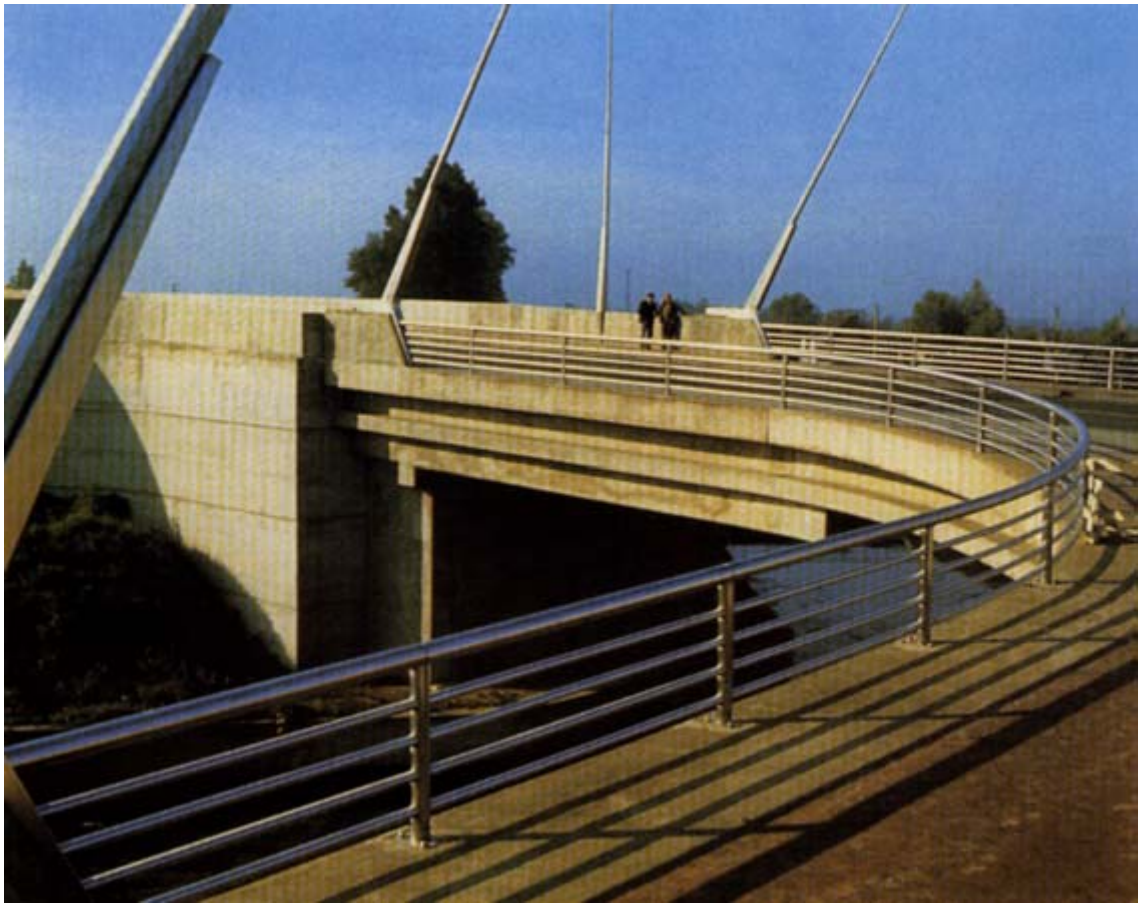
Information board made from polished stainless steel in Paris-La Defense, France.

Courtesy of Ugine, France

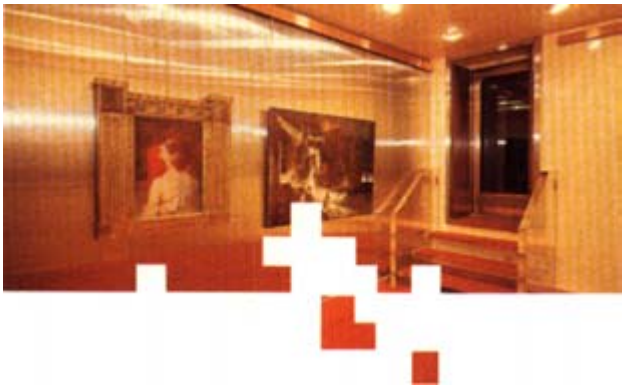
A great many cash point shelters of this type are in use throughout France. Mullions and wall panels of nickel-containing stainless steel are used in their fabrication.

Photo: Ph. Declety

Bridge parapet made from nickel stainless steel tubes in Pont-de-l'Arche, France.



Courtesy of Ugine, France



INTERIOR

Widely specified for interior uses, nickel stainless steel is a material favoured by architect and client for its versatility, functional and decorative characteristics rather than for its corrosion resistance.

Visually attractive, with a sense of strength and permanence, the material requires only simple and minimal maintenance in its many applications which include: lift cars, escalator panels, staircases and balustrading, handrailing, wall panels, ceilings, floors, architraves and corner guards.

This list does not pretend to be exhaustive, but serves to illustrate the material's adaptability and purpose. Other familiar applications, which are not shown, include sinks, and professional hygiene equipment used in hospitals and catering establishments.

AGF Building, Madrid, Spain.

The decorative cladding to the lift landing façades is made with satin-finish nickel stainless steel panels. Stainless steel strip, inserted in the file flooring, adds a distinctive splendour to the entrance hall.

Architects: M. Andraut, P. Parat, A. Capieu

Courtesy of Folcra S.A., Barcelona, Spain. Photo: J. Franceli

Courtesy of Inco Nickel News

Commerce Court, Toronto, Canada.

Stringers and balustrading in nickel stainless steel complement the elegant curve of the staircase in this building.

Designer: 1. M. Pei and Partners, New York, USA

Citibank, Sao Paulo, Brazil.

This elegant reception area was produced from AlSl Type 304 nickel stainless steel.

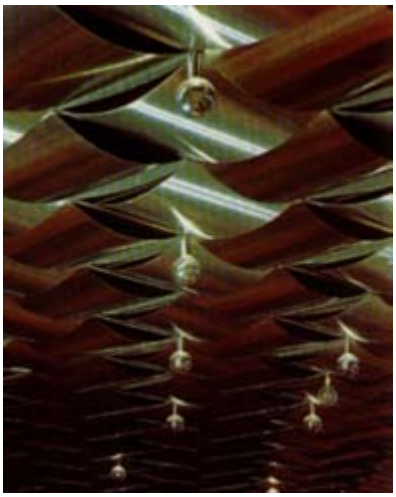
Architect: Croce, Alfalo E. Gasped and Jaakko Poyry Engenhad Ltda

Courtesy of Acesita

The oval pillars of the entrance hall of this bank in Rome, Italy, have a cladding made from four segments of mirror-polished nickel stainless steel sheets, 1.2 mm thick, AISI Type 304.

Architects: R. Colella, M. Zappetti, V. Zoffoli

Courtesy of Centro Inox, Milan, Italy



Courtesy of Krupp, West Germany

Frankfurt Airport, West Germany.

The verticillated ceiling of this airport restaurant is made from formed sheets of AISI Type 304 nickel stainless steel. Wall and counter claddings are also in nickel stainless steel.

Savings Bank, Wuppertal, West Germany.

Tubular sections of nickel stainless steel are structurally efficient and offer simplicity of maintenance.

Courtesy of Grimberg GmbH, Germany.

Courtesy of MEPC plc Photo P. Revere

Shopping Mall, Bond Street Station, London, England.

Satin-finished nickel stainless steel and glass combine impressively in this mall which is open to the station concourse. The 2 storey high mullions are 60 x 30 mm rectangular hollow section, and all horizontal members are flat plate. Escalator panels and safety handrailing are also manufactured in AISI Type 304 nickel stainless steel.

Architects: Chapman Taylor & Partners

Office Building, Bochum, West Germany.

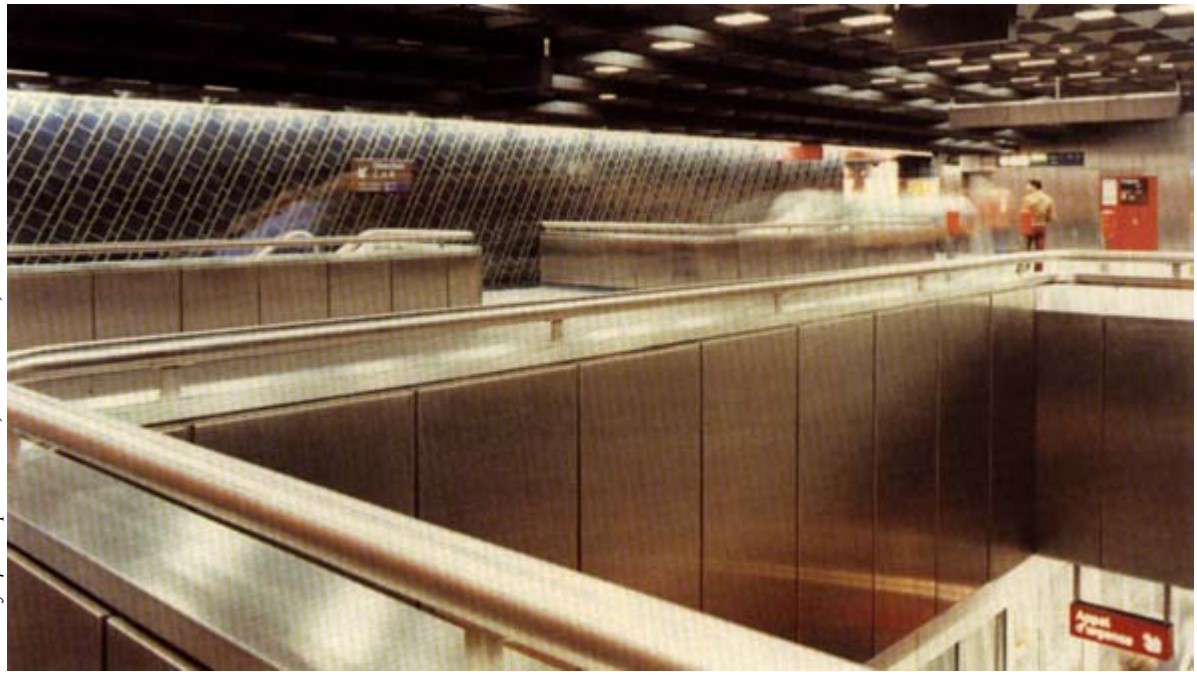
Decorative wall cladding of the lift landing hall was provided by nickel stainless steel, which was also used in the form of polished sheet panels for the floor and ceiling.

Architects: Friesleben, Diisseldorf, West Germany

Nickel stainless steel is the most suitable material for covering walls and doors of elevators. Satin finish sheets, as well as textured sheets, contribute to the prevention of disfigurement from graffiti.

Courtesy of Centro Inox, Milan, Italy

Courtesy of Grimberg GmbH. West Germany



Courtesy of Enterprise Voisin, Gennevilliers, France. Photo: A. Beauvais

Wall claddings, escalator side panels, and handrails made from nickel stainless steel in the Lille Metro, France.

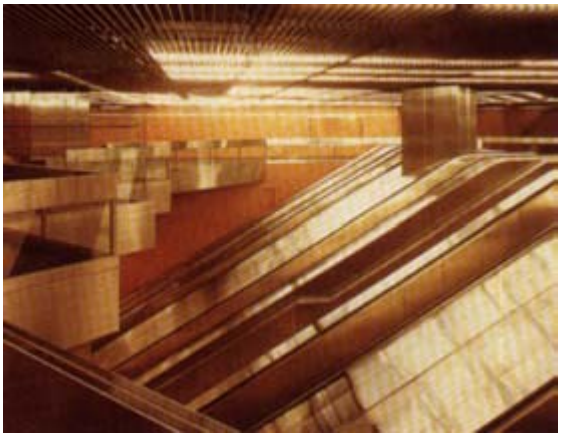
The handrail and balustrade in the staircase of the main administrative building of Dr Ing. Koenig AG, Switzerland, is in satin-brushed finish AISI Type 304 nickel stainless steel.

Architects: Schatt and Schneider

Courtesy of Lips and Sons AG

Escalators, Metro Station Charles de Gaulle, France.

The use of nickel stainless steel is virtually indispensable for surfaces, such as escalator side claddings, which require high resistance to scratching and impact.



Courtesy of Ugine, Paris, France

Photo: C. Kappen

Satin-finish nickel stainless steel wall claddings at Diisseldorf railway station, West Germany.

Architects: Dipl. Ing. Heinz Wilke St Partner, Diisseldorf, West Germany

Courtesy of Dial-Norm AG

Parish Hall,
Ostermundigen,
Switzerland.

Suspended panels of pyramid-shaped illuminations in satin-brushed AISI Type 304 nickel stainless steel alternate effectively with glass panels which utilise U-shaped mirror-polished stainless steel frames.

Architects: AAP Atelier fur Architektur and Planng

Photo: C. Kappen

Exhibition Hall,
Munich,
West Germany.

Nickel stainless steel is widely used for the interior of this car exhibition hall, including: staircases, handrails, columns supporting the mezzanine floors, and ceilings.

GENERAL APPLICATIONS

Many applications of nickel stainless steel in buildings are unseen, but their function and performance are vital to the safety of the structure and its cladding.

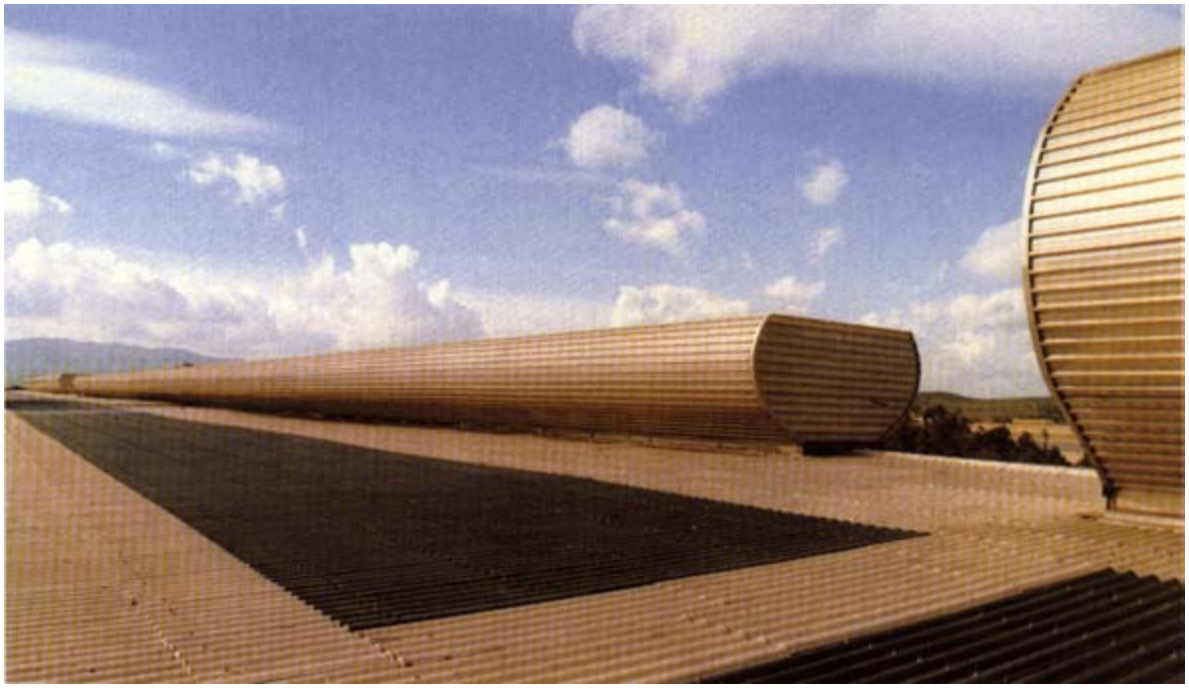
Without maintenance, stainless steel is relied upon to provide a long lifespan – with no loss of strength – in a frequently hostile, corrosive environment.

A variety of proprietary components are used in buildings. These include: wall ties, brickwork support angles, corbels, dovetail channel, anchor bolts, indented foundation bolts, reinforcing bar, restraint straps, lintels, joist hangers, mesh reinforcement, high strength bolts, dowels and other fixings. In the form of floorplate, either solid, grid, or plank stainless steel is increasingly being specified in the industrial building sector, and in offshore oil platforms operating in the North Sea.

Stairways, treads, and catwalks are also fabricated in stainless steel for its high resistance to abrasion. Stainless steel in tubular form is the dominant material used in corrosive areas such as swimming pools, where hygiene is also a key factor. Pool accessories, ladders and handrails utilise the material's excellent qualities and simple maintenance needs.

In larger sizes, nickel stainless steel is also used for structural members, as depicted here by roof trusses, one of which was also clad with stainless steel sheeting for longevity.

Stainless steel in all forms is an important and essential material to the building and construction industries. It provides a cost-effective solution in many problem areas and its increasing use serves to demonstrate that the anathema to designers – corrosion, and its consequences – can be avoided.



Courtesy of Cedinox, Barcelona, Spain

Two examples of functional claddings made from nickel stainless steel.

Cladding of a static ventilator on the roof of an industrial building in Algeciras, Spain, made with cold-formed sections of AISI Type 304 stainless steel.

Warm-worked nickel stainless steel reinforcing bar in AISI Type 316 material combines high tensile strength (1000 $Nlmm^2$) with high shear strength (750 $Nlmm^2$) and excellent corrosion resistance to provide long life reinforcement.

Outer column for elevator in a building in Milan, Italy. Elements of cold-worked sections 1.2 and 1.5 mm thick, are used to clad a carbon steel structure.

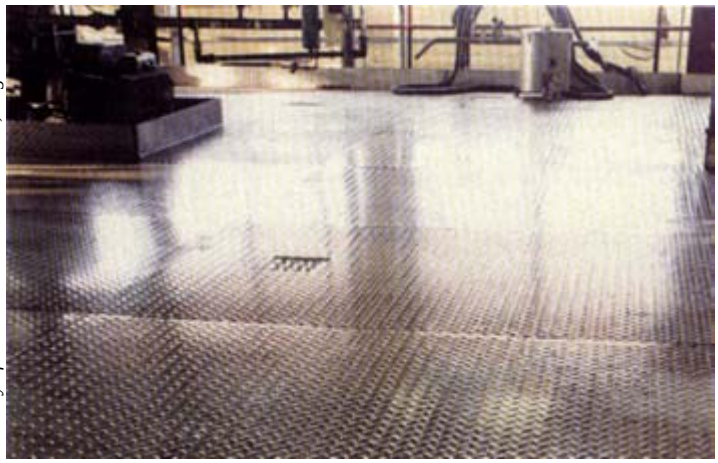
Courtesy of Centro Inox, Milan, Italy

Courtesy of Wincro Metal Industries Ltd., Sheffield. England

Nickel stainless steel-textured sheet is particularly well suited to the production of a non-skid and wear-resistant surface for important areas at the bottom of escalators.

Courtesy of Nisshin Steel Co., Japan

Courtesy of Wincro Metal Industries Ltd., England



Kodak, Processing Plant, England.

Corrosion resistance and hygiene, demanded by many industrial sectors, are provided by nickel stainless steel floorplate. For this application AISI Type 304 material, 4.5 mm thick, was shotblasted and descaled to give the superb finish. The raised teardrop pattern combines easy cleaning and drainage with high slip resistance.

Courtesy of Redman Fisher Engineering Ltd., England

ELPRO plant, General Motors Co., England.

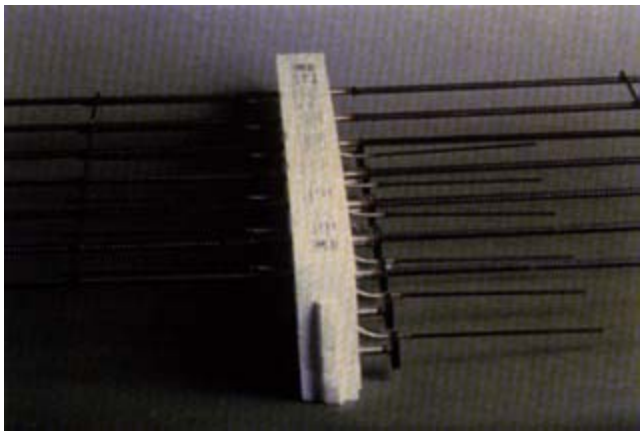
Grid flooring in nickel stainless steel AISI Type 304 was laid in 1 m x 1 m sections to form the walkway across the highly corrosive phosphate pretreatment plant. So corrosive is this environment that nickel stainless steel was used for the supporting structure, handrailing, purlins and cladding.

Courtesy of Scomark Special Products Ltd., England

Plank flooring formed from strip material incorporates return edges for stiffness and fixing purposes.
It has high load-carrying capacity combined with lightness and is produced in AISI Types 304 & 316 nickel stainless steels.

Courtesy of Nippon Metal Industry, Japan

Water supply tubing in nickel stainless steel.



Courtesy of Schock GmbH, Baden-Baden, West Germany

In this design for securing the thermal insulation between the outer balcony and the inner floor of a building, the part of the reinforcement extending across the polystyrene insulation material is in nickel stainless steel, ensuring excellent corrosion resistance and low thermal conductivity. AISI Type 316 stainless steel rods are joined to carbon steel reinforcing rods by flash butt welding.

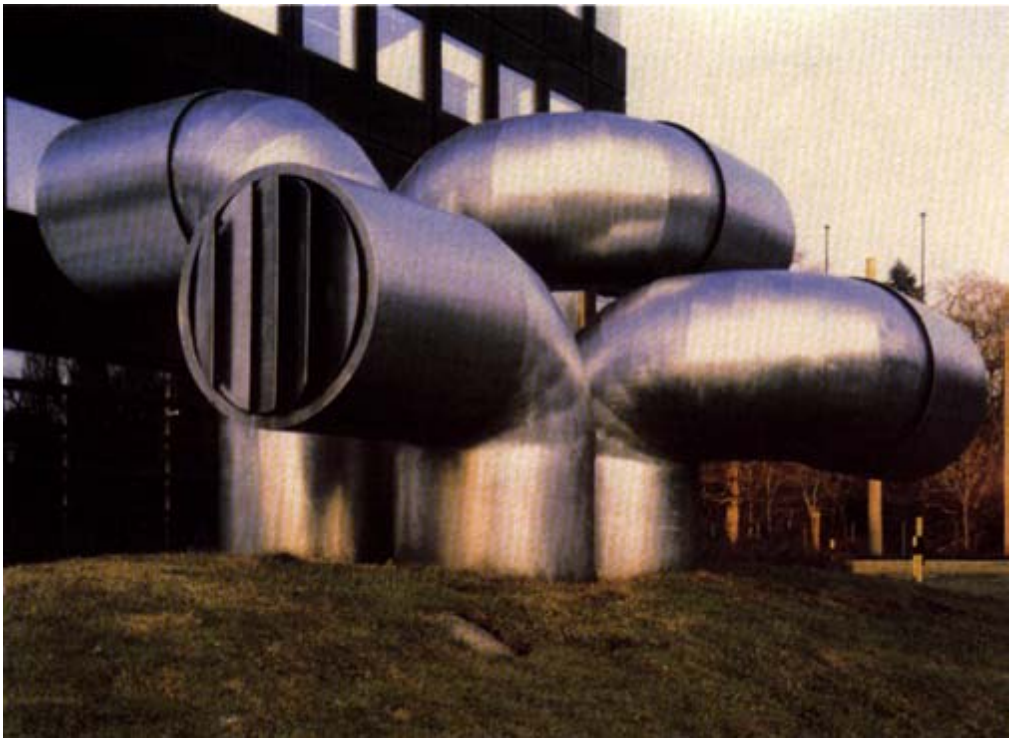


Photo: C. Kappen

A range of exhaust ducts made from AISI Type 316 chromium-nickel-molybdenum stainless steel.

Designer: Graesel, Bochum, West Germany

Courtesy of Selkirk Chimneys, England

Civic offices,
Chester-le-
Street, England.

21 m high and 250 mm diameter, the bright-annealed nickel stainless steel chimneys, in AISI Type 304 material, are a feature of this building. Comprising two thin-gauge tubular sections with a Rockwool insulating infill, lengths of 760 mm, with a coupler at each end, are joined together with a locking band.

Courtesy of Morgan Grenfell Lorry Photo P. Revere

Stockley House,
London, England.

4-1 m deep triangulated roof trusses in spans ranging from 11.5 to 20 m, support the glass roof of the 7-storey high atrium. Access trolleys, for cleaning purposes, are also supported by the all-welded trusses, fabricated using circular hollow sections of 114.1 mm diameter, for the chord members, 76.1 mm diameter for the bracings, and 219.1 mm diameter for the end frames. The material specified was AISI Type 304 nickel stainless steel with a matt finish.

Architect: A. Bonner. Architech Consulting Engineer: Bunyan Meyer and Partners

For hygienic reasons and appearance, swimming pools must be clean and require simple and minimum maintenance only. This demands the use of materials resistant to corrosion caused by chlorinated water, and periodic disinfections, which are easy to wash and will not require any costly maintenance. Nickel stainless steel is that ideal material. It is used increasingly throughout the world, not only for the pool itself but for all kinds of accessories. Grades used are AISI Type 316 for the pool and AISI Types 304 and 316 for accessories.

Courtesy of Nisshin Steel Co., Japan

Photo: C. Kappen

An army of exhaust ducts made from AISI Type 316 chromium-nickel-molybdenum stainless steel.

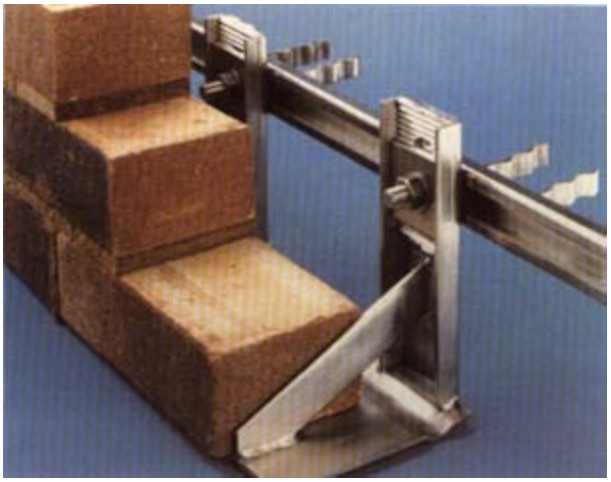
Designer: Graesel. Bochum, West Germany

Courtesy of British Nuclear Fuels plc.

Nuclear Plant, Sellafield, England.

Covering an area of 41.5 x 100 m, around 350 tonnes of type 321S12 nickel stainless steel were used for the roof structure of the receipt and storage pond hall at the Sellafield nuclear plant. The 4 m deep trusses were fabricated from plate formed into angles ranging from 200 x 200 x 16 mm down to 100 x 100 x 10 mm. Rectangular hollow-section roof purlins of 300 x 200 x 8 mm were braced with circular hollow sections 324 mm diameter x 10 mm in thickness.

Consulting Engineer:
A. P. Mann, Allott & Lomax



Courtesy of Ancon Stainless Steel Fixings Ltd., Sheffield, England

Supporting brick-clad façades is simplified by the use of nickel stainless steel, generally AISI Type 304 or 316 for high corrosion-risk areas. Wind loads and the self-weight of brickwork (generally 2 storey height) are transferred back to the structure using stainless steel angles as shown. Recent developments incorporate simple methods of adjusting levels on site.

Thanks to stainless steel, many monuments and artistic treasures in danger of collapse can be saved. In this case the Madonnina in Milan Cathedral, Italy. The new AISI Type 316 nickel stainless steel skeleton replaced the former carbon steel frame which had completely corroded.

Courtesy of Centro Inox, Milan, Italy

Courtesy of Centro Inox, Milan, Italy

Swimming pool ladder made from mirror-polish AISI Type 304 stainless steel tube, 45 mm in diameter.

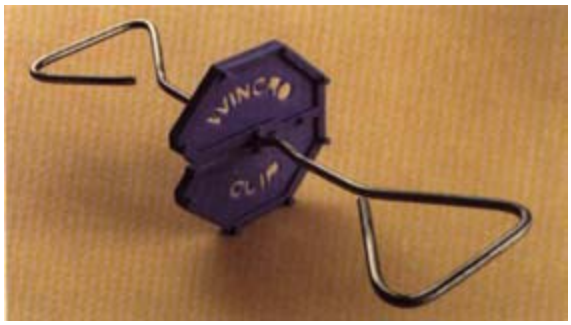
Courtesy of Centro Inox, Milan, Italy

Nickel stainless steel is well suited to the fabrication of playground equipment such as slides. Its smooth, self-cleaning surface will not retain dirt nor corrode. Strong and durable, stainless steel meets all the security requirements for this type of public equipment

Essential for all buildings with a cavity wall construction, wall ties in AISI Type 304 or 316 material, in varying forms such as vertical twist and double triangle, provide the degree of corrosion resistance and strength necessary for this application.

Courtesy of Wincro Metal Industries Ltd., England

Courtesy of W. Modersohn GmbH, Spenge, West Germany



Courtesy of Wincro Metal Industries Ltd.

Masonry Fixings.

Brick, marble or stone claddings, on either renovated buildings or new construction, are secured using stainless steel fixings thanks to the excellent resistance to corrosion and weathering of AISI Types 304 and 316 nickel-containing stainless steel, used in the fabrication of a considerable variety of fixings, including wall ties, corbels, brickwork support angles and bolts.

Courtesy of Nisshin Steel Co., Japan

Stainless steel tube for domestic water services.

In many countries nickel stainless steel tube is widely used for the supply and distribution of domestic water. AISI Type 304 is generally used in this application with mechanical fittings for the site-jointing of the thin-walled tube,

SCULPTURE

"Beauty is bought by judgement
of the eye,
Not uttered by base sale of
chapmens tongues"
William Shakespeare

As with any sculptural art form, its acceptability is to individual taste, but the elegance of curve and line provided by these nickel stainless steel examples can only be admired.
Stainless steel, with its high strength and ductility, is such an adaptable material that it is ideal for sculptures, which invariably require the material to be shaped, welded, and polished for visual effect. The legendary durability of stainless steel will also ensure that these street works of art will be seen by generations to come.

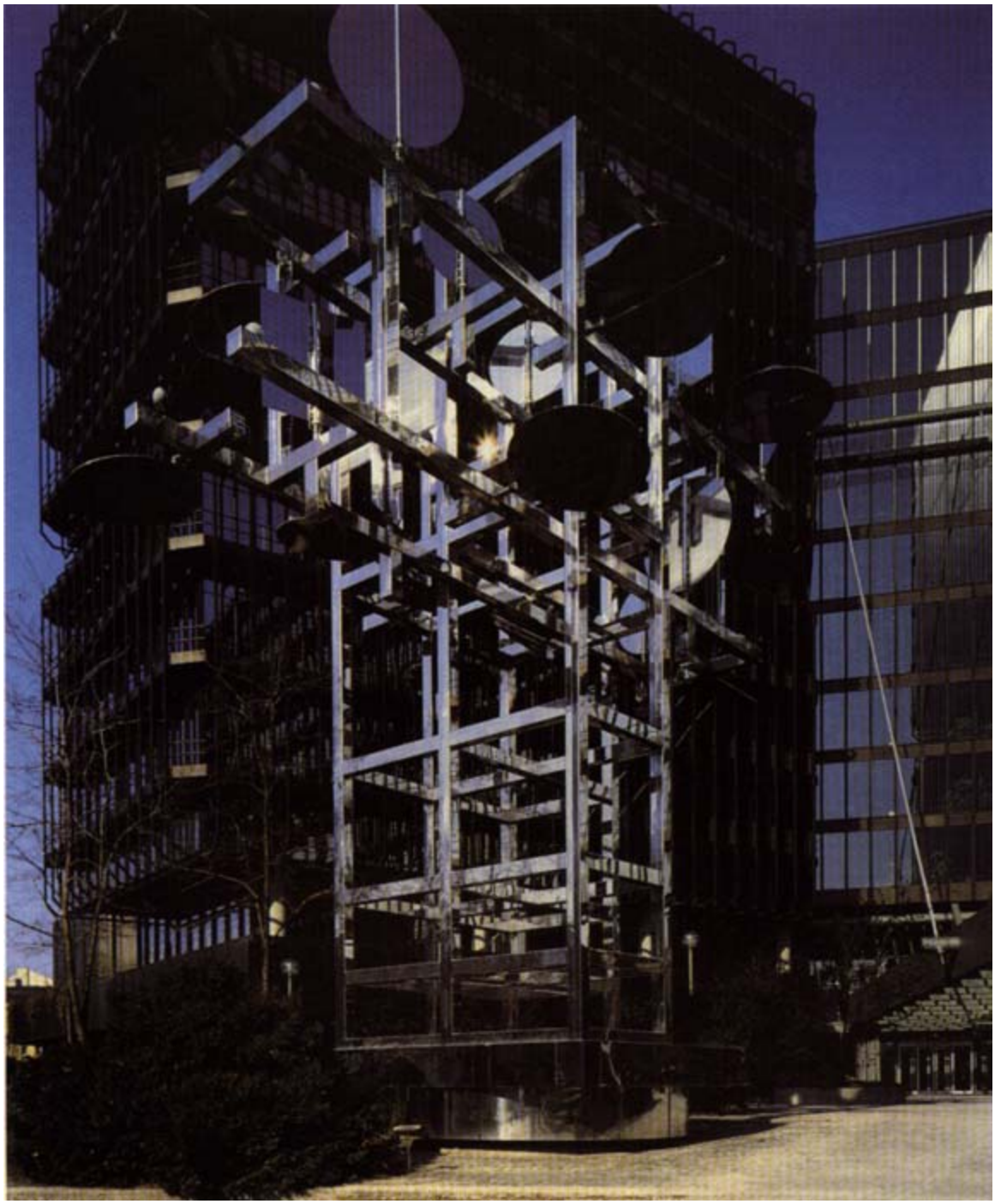
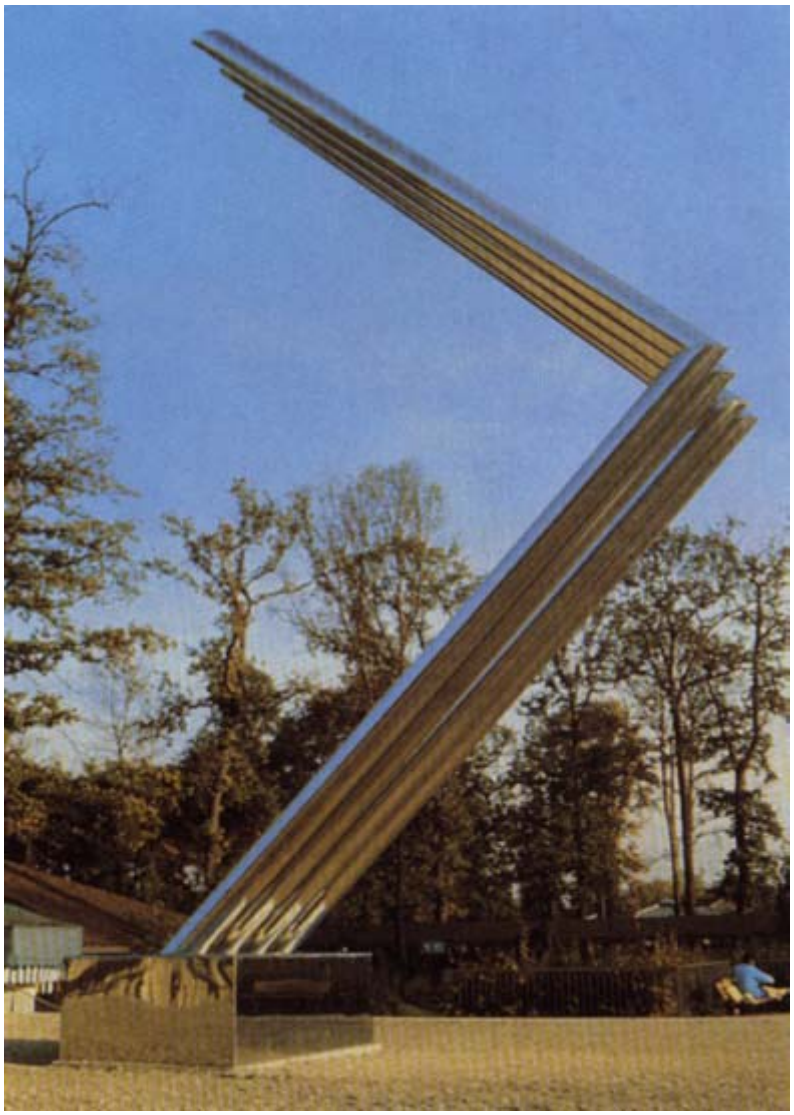


Photo: C. Kappen

European Patent Office
in Munich,
West Germany.

Moving sculpture in nickel stainless steel by Nicolas Schöffer.



Courtesy of Ugine, France

Nickel stainless steel sculpture by Agam in Vincennes, near Paris, France.

Courtesy of Cedinox, Barcelona, Spain

Sculpture by Alfaro made from nickel stainless steel square tubes in Tarrega. Spain.

Courtesy of Paul Tobler & Co., St. Gall, Switzerland Photo: C. Seltrecht.

Headquarters of
Cantonal Bank, St. Gall,
Switzerland.

A group of three similar sculptures made from minor polished nickel stainless steel graces the entrance hall of this building.

Sculptor: Paul Talman.