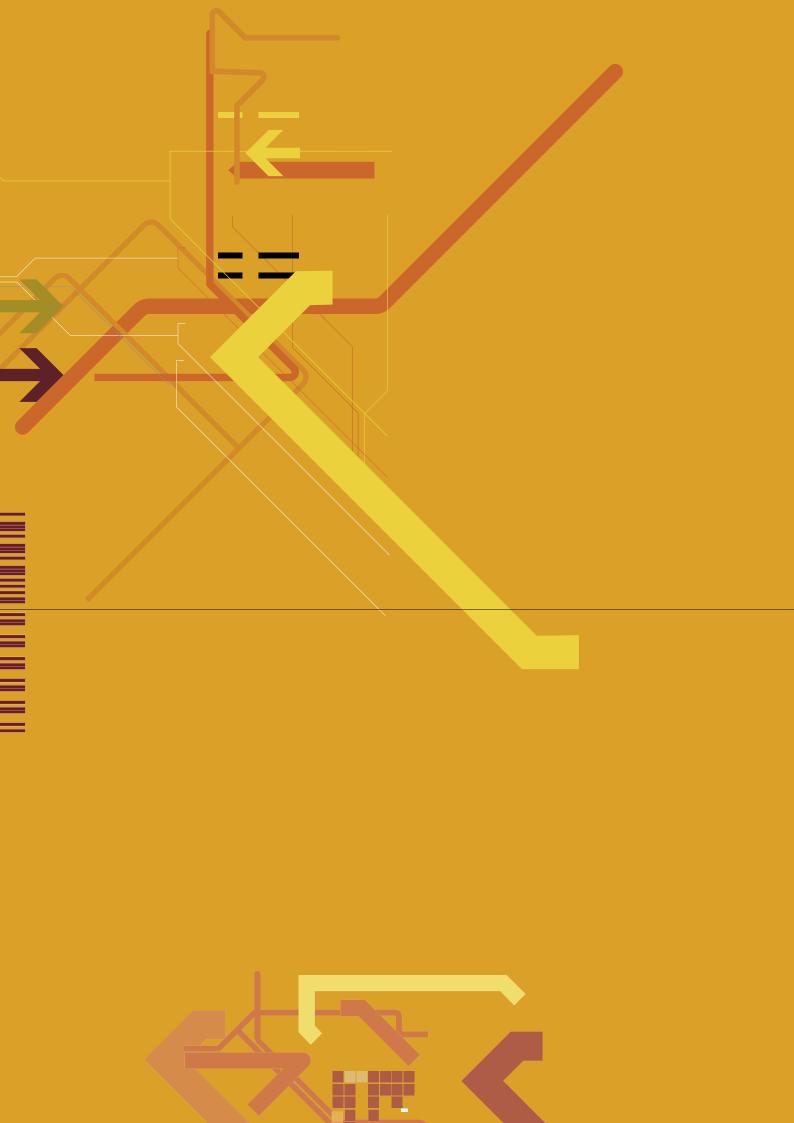


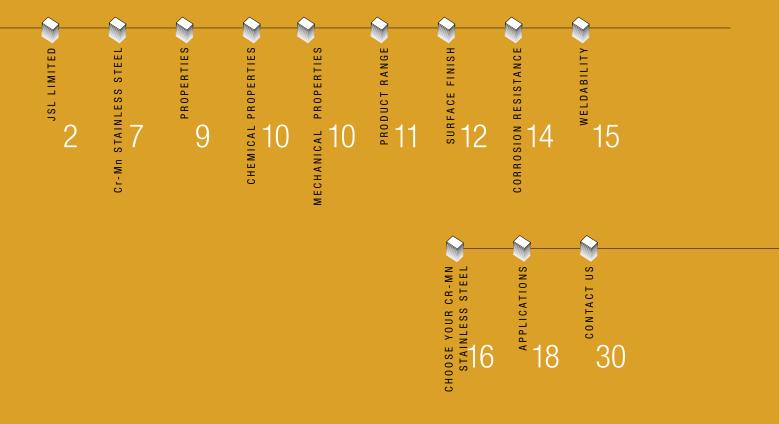
# **Chrome-Manganese Austenitic Stainless Steel**

Making Quality cost-effective





# Contents



# **JSL Limited**

Formerly Jindal Stainless Limited, JSL Limited is India's largest integrated producer of stainless steel in 300, 200, 400 and Duplex grades.







A leader and a name synonymous with enterprise, excellence and success, the company ethos mirrors characteristics of the metal it produces; JSL is innovative and versatile in its thought; strong and unrelenting in its operations; 'Think Green' in its manufacturing process; brilliant, appealing and beautiful in its community support activities.

Established in 1970, JSL Limited (formerly Jindal Stainless Limited), is the largest Stainless Steel conglomerate in India and the flagship company of the OP Jindal Group. An OHSAS 18001, ISO 9001, ISO 14001, ISO 18001, AD W0, PED certified company, JSL is the leading producer of Stainless Steel flat products in Austenitic, Ferritic, Martensitic and Duplex grades and global

leader in Chrome Manganese (Cr-Mn) 200 Series Stainless Steel grades. The company has strong export market and has presence in over 50 countries including US, Europe, China, Middle-East and South Asian countries.

JSL, while leading the Indian Stainless steel industry is also among the top 15 stainless steel producers worldwide.









# JSL - SUBSIDIARIES & JOINT VENTURES

# ART D'INOX (AUSTENITIC CREATIONS PVT. LTD)

- · Art in Stainless.
- Lifestyle product in Stainless Steel.
- Innovation & elegance blended with Stainless Steel utensils and artifacts.

# ARC (JINDAL ARCHITECTURE LIMITED)

- Provide technical and aesthetic solution.
- Innovative design in Architecture, Building and Construction segment.

#### JINDAL STAINLESS STEELWAY LIMITED

- Stainless Steel Service Center.
- JV between JSL and Steelway srl, Italy.
- Customized products & distribution services for specific products on JIT basis.

#### PT JINDAL STAINLESS, INDONESIA

- Cold Rolling facility, 75,000 tpa, being enhanced to 150,000 tpa.
- Setup to service customers in South-east Asia and Oceanic market.

# IBERJINDAL S.L., SPAIN

- JV with the Fagor group, Spain.
- Custom tailored stainless steel formats for the Spanish market.
- Setup to service customers in other European countries.

# JSL

# GREENFIELD PROJECT-ORISSA

- 1.6 million mt pa Steel Melting capacity.
- 3.2 million mtpa Hot Rolling capacity.
- 0.4 million mtpa Cold Rolling capacity.
- Facilities to produce major ferro-alloys; Fe-Cr, Fe-Mn, Si-Mn, etc.
- Fully integrated Stainless Steel plant from Mines to Cold Rolling along with 500 MW Power Plant.

# HISAR

• Steel Melting and Rolling capacity of 720,000 tpa.

# VISAKHAPATNAM PLANT

• 40,000 tpa Fe-Cr plant.









# Harness the power of a leader

JSL Stainless Steels are international in all respects. Behind our products and services lie the massive resources of one of the great metal producers. A clear focus on customer needs, coupled with cross market expertise, a wide product range and up-to-the-minute technology ensures that innovative solutions are provided.





# JSL has the expertise

You get our expertise, capability and coverage to bring you the right solutions whenever and wherever you need them.

This is the strength needed for today's challenges: world class plants and skills backed by JSL's research and development which is dedicated to stainless steel.

It all adds up to a powerful partnership for total success.

# Cr-Mn Stainless Steel

Making Quality Cost Effective

Cr-Mn Stainless Steel – A cost-effective solution with grades which exhibit good strength, corrosion resistance and formability.

JSL is the largest producer of Chrome-Manganese stainless steel in the world. Cr-Mn stainless steels have been developed as a cost-effective alternative to 304 grades stainless steel for certain applications. These grades contain Chromium (15%-19%), Nickel (1-5%) along with appropriate combination of Manganese, Copper and Nitrogen.

It manufactures grades JSL AUS (201 Modified), J201 (UNS S20100), J4 (S20430 Modified) and J204Cu (UNS S20430).

All these grades have austenitic structure in annealed condition at ambient temperature; provide higher strength, excellent formability, weldability and good corrosion resistance. Addition of Copper enhances drawability, formability, reduces work hardening rate and also increases corrosion resistance in certain environments.







# Once you identify the applications, Cr-Mn Stainless Steel will be the greatest competitive advantage you will have.

It is also backed by the JSL team. It is here that by sharing resources, expertise, skills, research findings and experience between our specialist divisions we can bring you the best possible solutions for your requirement.

The market approach adopted as a keystone in JSL culture ensures that innovation is customer focused.

Take advantage of all the benefits associated with large scale production yet flexible enough to meet the needs of all users of stainless steel.

Through our fast, flexible, reliable and responsive systems, our aim is to ensure your total satisfaction.







# Cr-Mn Stainless Steel

Properties and Product range

JSL offers an extensive range of Chrome-Manganese stainless steels in sheet and coil form. Detailed product range description and respective properties are provided in the following pages.



# **Chemical Composition**

Grade	Elements	%C	%Mn	%S	%P	%Si	%Cr	%Ni	N ppm	%Cu	%Mo
AISI 304 (UNS S30400)	Min	-	-	-	-	-	17.5	8	-	-	-
	Max	0.07	2	0.03	0.045	0.75	19.5	10.5	1000	-	-
AISI 301 (UNS 30100)	Min	-	-	-	-	-	16	6	-	-	-
	Max	0.15	2	0.03	0.045	1	18	8	1000	-	-
J201 (UNS S20100)	Min	-	5.5	-	-	-	16	3.5	-	-	-
	Max	0.15	7.5	0.03	0.06	1	18	5.5	2500	-	-
JSLAUS (201 Modified)	Min	-	6	-	-	-	16	4	-	1.5	-
	Max	0.08	8	0.01	0.06	0.75	18	6	1000	2	-
J204 Cu (UNS S20430)	Min	-	6.5	-	-	-	16	1.5	1000	2	-
	Max	0.1	9	0.01	0.06	0.75	17.5	3.5	2000	4	-
J4 (S20430 Modified)	Min	-	8.5	-	-	-	15.5	1	-	1.5	-
	Max	0.1	10	0.01	0.07	0.75	16.5	2	2000	2	-
J316L (UNS S31603)	Min	-	-	-	-	-	16	10	-	-	2
	Max	0.03	2	0.03	0.045	-	18	14	1000	-	3
J216L (UNS S21603)	Min	-	6	-	-	-	16	6	-	1.5	1.5
	Max	0.03	8	0.015	0.06	0.75	18	8	0.25	2	2

\*In all the above mentioned grades, the balance content is Fe.

# **Mechanical Properties**

Grade		UTS (Mpa)	YS (Mpa)	%Elongation	Hardness (HRB)
AISI 304 (UNS 30400)	Co. Std	515min	205min	40min	92max
AISI 301 (UNS 30100)	Co. Std	515min	205min	40min	95max
J201 (UNS S20100)	Co. Std	515min	260min	40min	95max
JSLAUS (201 Modified)	Co. Std	600min	300min	40min	95max
J204Cu (UNS S20430)	Co. Std	620min	310min	40min	100max
J4 (S20430 Modified)	Co. Std	650min	325min	40min	100max
J316L (UNS S31603)	Co. Std	515min	310min	40min	100max
J216L (UNS S21603)	Co. Std	485min	170min	40min	95max

The dimensions below can also be customised to meet specific requirements.

# **Product Range**

Product	Thickness (mm)	Width (mm)	Length (mm)	Surface Finish	Edge
Slab	160/200	600-1270	15000 (max)	As Cast & Ground	
Bloom	160 x 160 200 x 200		10000 (max)	As Cast & Ground	
Hot Rolled Sheet/Plate	4.0 - 50.0	1250 (max)	7000 (max)	Hot Rolled (Black)/ No. 1 (HR Annealed & Pickled)	Sheared/ Plasma/ Mill
Hot Rolled Coil	2.8 - 6.5	1250 (max)	Coil	Hot Rolled (Black)/ No. 1 (HR Annealed & Pickled)	Trim/Mill
Cold Rolled Coil	0.4 - 2.0 0.5 - 4.0	1000 (max) 1250 (max)	Coil / Sheet	(CR Annealed and Pickled 2D/2B/ No.3/No.4	Trim/Mill/ Slitted
Precision Strips	0.05 - 5.0	600 (max)	Coil	2B/BA	Trim/Mill/ Slitted





# **Surface Finish**

Surface	Finishes	Definition Applications
No. 1	Hot rolled, annealed, shot blasted and pickled.	Pipes, Tubing, General Fabrication.
No. 2D	Cold Rolled, annealed and pickled.	Sinks, Automotive trims, Heat exchanger.
No. 2B	Cold Rolled, annealed, pickled and skin passed.	Food industry, Cookware, Medical equipment, Construction material, White goods, Rail car, Trailer bodies.
No. 3	Cold Rolled, annealed, pickled and polished with 100 to 120 grit.	Kitchen equipment, Restaurants, Building construction, Medical equipment.
No. 4	Cold Rolled, annealed, pickled and polished with 150 to 180 grit.	Restaurants, Kitchen utensils, Building construction, Medical equipment.
Scotch Brite	Very fine hairline finish generated by polishing with rolls made out of scotch brite material.	Architectural purposes, Railway cabins, Elevator interiors, Paneling, Kitchen appliances.

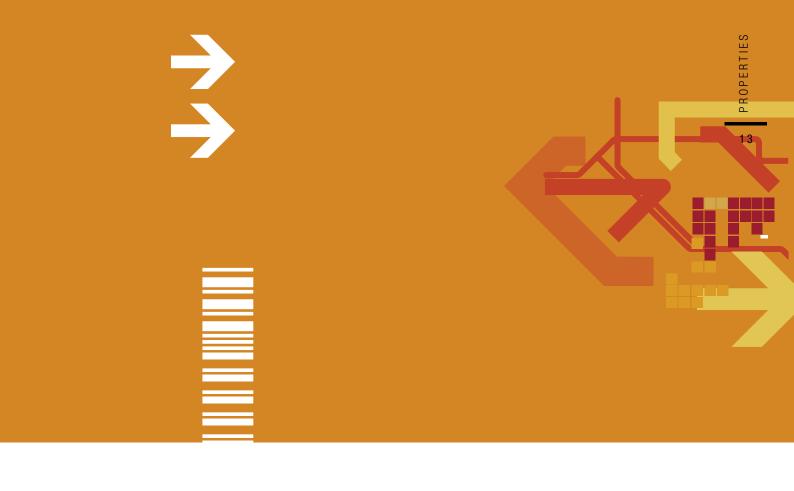
**Note:** Information in this document is only for explanation of general characteristics and properties of JSL products, not for Guarantee of the material. We have made all efforts to ensure accuracy of the information printed in this brochure, the use of information is at reader's risk and no warranty is implied or expressed by JSL with respect to the use of information contained herein. Technical information in this brochure is subject to change by environment condition and the purpose of use.

# **Certifications**

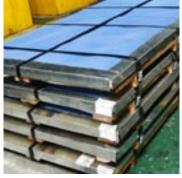
JSL is a OHSAS 18001:1999, ISO 9001:2000, ISO 14001:2004 and ADW (German Standards) and PED/97/23 certified company.

















# **Corrosion resistance**

Test Solution	Concentration	Temperature	304	201	204Cu	<b>JSLAus</b>	J4	216L	316L
	4%	20°C	Α	Α	Α	А	Α	Α	Α
Nitric Acid	14%	20°C	Α	Α	Α	Α	Α	Α	Α
Millio Acid	35%	Boiling	Α	В	В	В	В	В	Α
	70%	Boiling	В	С	В	В	С	В	В
	5%	20°C	С	С	В	С	С	В	В
	5%	Boiling	E	Е	E	Е	Е	E	Е
	50%	20°C	D	Е	D	D	D	С	D
Sulphuric Acid	50%	Boiling	E	Е	Е	Е	Е	E	Е
	98%	20°C	Α	Α	Α	Α	Α	Α	Α
	98%	Boiling	В	С	В	D	Е	В	В
Hydro chlorine	100%	20°C	E	Е	Е	Е	Е	E	Е
	1%	20°C	Α	Α	Α	Α	Α	Α	Α
Phosphoric Acid	5%	20°C	Α	Α	Α	Α	Α	Α	Α
	10%	20°C	Α	Α	Α	Α	Α	Α	Α
	5%	20°C	Α	Α	Α	Α	Α	Α	Α
Oxalic Acid	5%	Boiling	Α	В	В	В	В	В	Α
	10%	Boiling	Α	В	В	В	В	В	Α
	10%	20°C	Α	Α	Α	Α	Α	Α	Α
Acetic Acid	100%	20°C	Α	Α	Α	Α	Α	Α	Α
	50%	Boiling	Α	Α	Α	Α	Α	Α	Α
Formic Acid	5%	50°C	Α	Α	Α	Α	Α	Α	Α
	5%	20°C	Α	Α	Α	Α	Α	Α	Α
Lactic Acid	5%	50°C	Α	Α	Α	Α	Α	Α	Α
	10%	Boiling	Α	Α	Α	Α	Α	Α	Α
Citric Acid	5%	50°C	Α	Α	Α	Α	Α	Α	Α
Olli lo Acid	15%	Boiling	Α	Α	Α	Α	Α	Α	Α
Carbolic Acid	99%	20°C	Α	Α	Α	Α	Α	Α	Α
Tartaric Acid	99%	20°C	Α	Α	Α	Α	Α	Α	Α

# Weldability

Welding Methods	Applicable Thickness (mm)	J4	J 204Cu	201	JSL AUS	304	216L	316L	Applications
Shielded Metal arc welding	t > 0.8	1	1	1	1	1	1	1	Butt Welding, corner arc welding reinforce welding, wide diameter pipe.
TIG Welding	0.5 <t>3</t>	1	1	1	1	1	1	1	Butt welding thin sheets, corner reinforce welding, narrow diameter tube, pipe.
MIG Welding	t > 3	1	1	1	1	1	1	1	Thick sheet/plate welding, corner reinforce welding, wide diameter pipe.
Plasma Arc welding	t > 3	1	1	1	1	1	1	1	Butt welding thick sheets/ plates, corner reinforce welding, wide diameter pipe.
Spot Welding	0.5 <t<3< td=""><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>Kitchenware, rail car, vehicle.</td></t<3<>	2	2	2	2	2	2	2	Kitchenware, rail car, vehicle.
Projection Welding	0.5 <t<3< td=""><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>Projection welding is particularly applicable where many spot welds are required in restricted area; where the parts are pressing, so that projections can be formed during the final pressing operation.</td></t<3<>	2	2	2	2	2	2	2	Projection welding is particularly applicable where many spot welds are required in restricted area; where the parts are pressing, so that projections can be formed during the final pressing operation.
Lap Seam Welding	0.5 <t<2< td=""><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>Automobile, gas burner, freezerparts, kitchenware.</td></t<2<>	2	2	2	2	2	2	2	Automobile, gas burner, freezerparts, kitchenware.
Soldering	0.3 <t<2< td=""><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>Joining small parts when strength &amp; precision is not vital.</td></t<2<>	3	3	3	3	3	3	3	Joining small parts when strength & precision is not vital.

- 1. Widely used as one of the recommended welding methods
- 2. Ordinarily used but has limitations3. Used only for specific application

# **Grades and Electrode types**

Grades	Electrodes Type
J4, J204Cu, 201, JSL AUS, 202, 204, 304	304, 304L, 308, 308L
216L, 316L	316L









# One for Every One

Any industry you might operate in, be certain of at least one application that can do just right with Cr-Mn stainless steels.

You can create a commercial advantage in your market place. Talk to us and find how your company can benefit by using Cr-Mn stainless steels.

# Choose the Cr-Mn stainless steel for the right application

JSL offers five types of Cr-Mn stainless steels:

JSL AUS (201 modified) J204Cu (UNS S20430) J4 (S20430 Modified) J201 (UNS S20100) & J216L (UNS S21603)

On the following pages, each of the above Cr-Mn stainless steels has been described with its characteristics, fabrication, applications and more importantly, how it compares with AISI 304.

If you feel you need to know more, just call the JSL team. Your company can benefit from our commitment to providing a level of support that helps you create a commercial advantage in your market place. If like most of our customers, you allow us to work closely with you, we can develop an understanding of your material requirements and, where appropriate, your business and markets you operate in. Every

support and operational member involved in servicing your account, from the melting shops to the local sales company, will be aware of your specific product needs and operational parameters. The total involvement ensures that the product and support you receive not only meet your material requirements but also contributes fully to your business objectives.









# **JSL AUS**

JSL AUS (201 modified) is a Chrome-Manganese-Nickel (min. 4% nickel) austenitic Stainless Steel grade. It has a higher annealed strength than AISI 304. Addition of copper reduces work hardening rate to facilitate cold working/forming. The alloy is non-magnetic in annealed condition; it becomes mildly magnetic after cold working. JSL AUS is a cost effective alternative to AISI 304, having similar formability and weldability.



# **Fabrication**

**Welding:** JSL AUS can be welded by all conventional methods applied to AISI 304 austenitic stainless steel. Filler wires or electrodes of the conventional chromiumnickel 300 series can be used. Its susceptibility to inter-granular corrosion in weld heat-affected zone is analogous to AISI 304.

**Cold Forming:** JSL AUS is very tough, ductile and readily amenable to deep drawing, bending, stretch forming and spinning.

# APPLICATIONS



CATERING AND FOOD PROCESSING

Extra deep drawn utensils, pressure cookers, cook line, hot food wells, beverage dispensers.



pressure cooker



colander



Spin driers of washing machines and dish washers.



spin dryer



dish washer



Kitchen sinks, elevators, escalators, door and window frames, column claddings, telephone booths, steel furniture.



sink

ARCHITECTURE BUILDING AND CONSTRUCTION



column cladding



hand railing



frame



NDUSTRY

Beer, wine, beverage and dairy equipment, food processing and packing equipment.



processing equipment



brewing casks



dairy equipment



J204Cu

J204Cu (UNS S20430) is a Chrome-Manganese stainless steel with moderate amounts of Nickel, Copper and Nitrogen. Addition of Copper to austenitic stainless steel increases stacking fault energy, reduces work hardening rate and enhances formability. Nitrogen increases strength and pitting resistance of stainless steels. Manganese as austenite former replaces a part of Nickel and has beneficial effect on weldability. J204Cu has a higher annealed strength, similar corrosion resistance in a variety of mild corrosive media and similar formability and weldability in comparison with AISI 304.

# **Fabrication**

Welding: J204Cu can be welded by all conventional methods applied to 18/8 type of austenitic stainless steel. Filler wire or electrodes of the conventional Chromium-Nickel 300 series stainless steel can be used. Resistance to inter-granular corrosion can be restored by post weld annealing treatment.

Cold Forming: J204Cu can readily be cold rolled, cold drawn and formed in similar manner as AISI 304. J204Cu can take up-to 80% cold reduction without intermediate annealing. It is less magnetic than AISI 304 on cold working.

APPLICATIONS

Deep drawn

utensils,

cookware,

industrial kitchen equipment, flasks, milk cans, ice and water dispensers, water filters.



FOOD PROCESSING



CONSUMER DURABLES

Toasters, microwave ovens, thermo ware, baking ovens.









AND CONSTRUCTION ARCHITECTURE BUILDING

Handrails for staircase, elevators, escalators, internal panels, door window frames, thermal window spacers.





escalators



deep drawn can

# **J**4

J4 (S20430 Modified) is a Chrome-Manganese austenitic stainless steel with moderate amount of Copper, Nickel and Nitrogen. Manganese and Nitrogen additions render this grade more economical while endowing it with good strength and high formability making it highly suitable for a wide variety of consumer and structural applications. Presence of Copper in this steel reduces work hardening rate and improves drawability. Nitrogen improves resistance to pitting corrosion. The alloy is non-magnetic in annealed condition like AISI 304. J4 can be used both in fully annealed condition and in temper rolled as well as cold rolled condition.



# **Fabrication**

Welding: J4 can be welded by all conventional methods applied to 18/8 type of austenitic stainless steel. Filler wire or electrodes of the conventional Chromium- Nickel 300 series Stainless Steel can be used.

**Cold Forming:** It is tough, ductile and readily amenable to drawing, bending, stretch forming and spinning.

# APPLICATIONS



CATERING

Shallow/medium drawn utensils, tableware, cutlery, stands for water filters, in-house water tanks and dog pots.



cutlery





medium drawn utensils



Steel furniture, fruit stands, flower vases, decorative pipes and tubes, gas CONSUMER stoves and gift items.





decorative pipe



flower vase



ARCHITECTURE BUILDING AND CONSTRUCTION In-house panels, handrails and structural support framework, door knobs, hinges and dust bin.



hand rail



door handle



MATERIAL HANDLING Roll formed sections and conveyors.







INDUSTRY





baggage conveyor





baggage conveyor

# J201

J201 (UNS S20100) is a Chrome-Manganese-Nickel austenitic stainless steel similar in properties to AISI 301. J201 in annealed condition is having fully austenitic structure. The combination of Manganese, Nitrogen and Nickel renders a superior combination of strength and toughness at ambient and cryogenic temperatures. J201 possesses good resistance to oxidation. J201 will perform in most deep drawing applications and it is resistant to a wide variety of mild to moderately corrosive media.



# **Fabrication**

Welding: J201 can be welded by all types of conventional methods applied to 18/8 steels. Filler wires or electrodes of the conventional Chromium-Nickel 300 series can be used. Its susceptibility to intergranular corrosion in weld heat-affected zone is analogous to AISI 304.

Cold Forming: J201 is very tough, ductile and responsive to deep drawing, bending, stretch forming and spinning.

# APPLICATIONS



FOOD PROCESSING CATERING AND



Extra deep drawn utensils, pressure cookers, cook wells, beverage dispensers and



line, hot food

icemakers.

ice maker



bain marie



industrial owen



CONSUMER DURABLES Spinning basket of washing machines and dish washers.







Kitchen sinks, elevators, escalators, door and window frames, column claddings, telephone booths, steel furniture, internal panels & roofing, framework.



furniture







column cladding

# J216L

J216L is a Chrome-Manganese-Nickel-Molybdenum austenitic stainless steel with moderate amount of nitrogen and copper, which offers a number of advantages over conventional AISI 316L stainless steel. The corrosion resistance of this stainless steel is comparable to AISI 316L. This alloy has nearly 50% higher strength in annealed condition and higher elevated temperature strength. It can be cold rolled to significantly higher tensile strength while retaining a very low magnetic permeability. A distinct combination of properties makes J216L highly suited for numerous applications in chemical, petrochemical, pulp, paper, oil and gas industries which currently use AISI 316L.



# **Fabrication**

Since J216L and AISI 316L have comparable work hardening rate and sufficiently high ductility, the fabrication techniques are essentially similar.

Welding: The alloy possesses good weldability like stainless steels of 300 series. Gas tungsten-arc and gas metal arc techniques have been used for such grade. It can be welded to other stainless steels with conventional welding electrodes currently used.

# APPLICATIONS



FOOD PROCESSING



MISCELLANEOUS APPLICATIONS

Hose clamps, Piston rings, Packing equipment.



hose clamp



clamps





piston rings



Beer, wine, and beverage equipment.



beer filter tanks



wine filter tanks



bottling equipment



Dairy and Food Processing Equipment

dairy processing



food processing



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