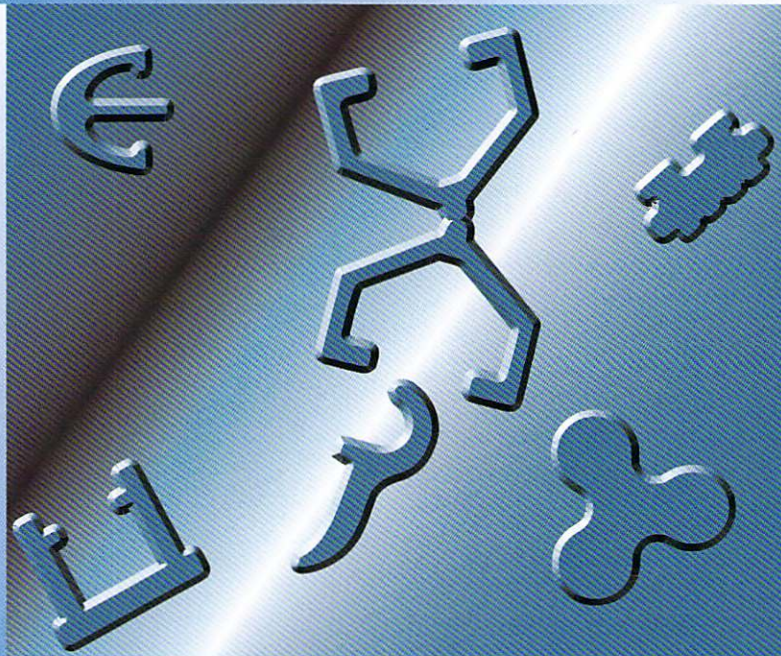


The Tools of Free Design Hot Extruded Steel Shapes



Nippon Steel Corporation



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Introduction

Since 1941, the first successful of making steel shapes with hot extrusion using glass lubricants in France, the number of applications for hot extrusion steel shapes has shown remarkable growth in such fields as structural members and machine parts.

Nippon Steel installed the hot extrusion plant at its Hikari Works in 1960. Based on the many years of research and development, we have established a sophisticated hot extrusion production system with high-quality steel shapes. Currently, these shapes are highly evaluated by our customers.

Hot extruded shapes possess diverse features that cannot be obtained with other production processes. We strongly recommend these quality shapes to improve machinery performance, reduce processes, enhance labor savings, and cut costs.

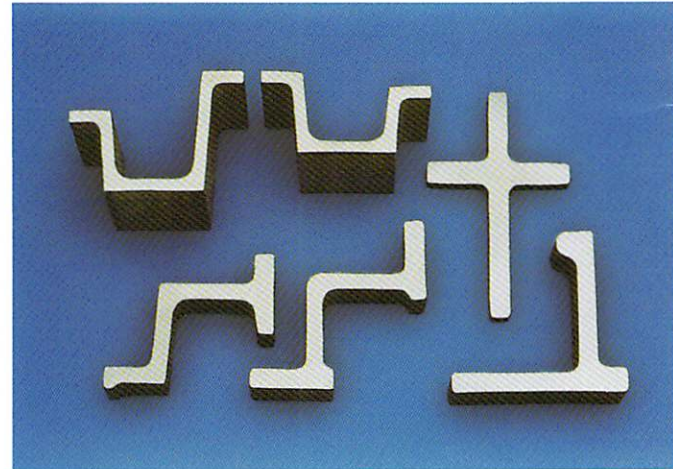
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Features of Hot Extrusion Process

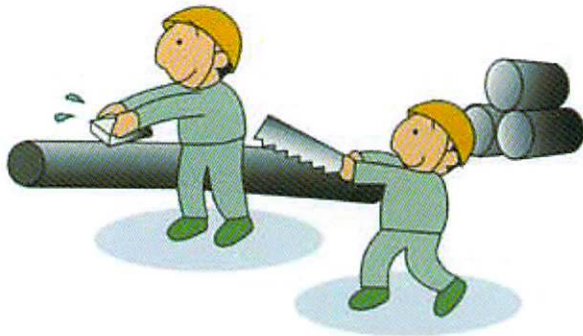
Hot extruded shapes are produced by means of the hot extrusion method. In this method, round billets are heated to around 1,200°C, and then hot extruded through dies mechanically processed into diverse configurations. The hot extruded shapes thus obtained are then subjected to tensile straightening and other finishing processes to produce the final product.

Accordingly, the hot extrusion process is suitable for producing shapes of complex configuration, multiple-grade/small-lot shapes, and difficult-to-process materials.

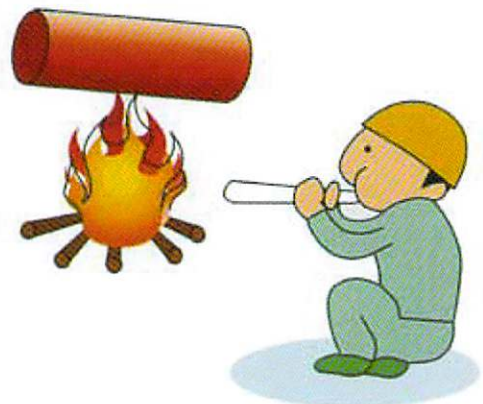


● Introduction to Manufacturing Process

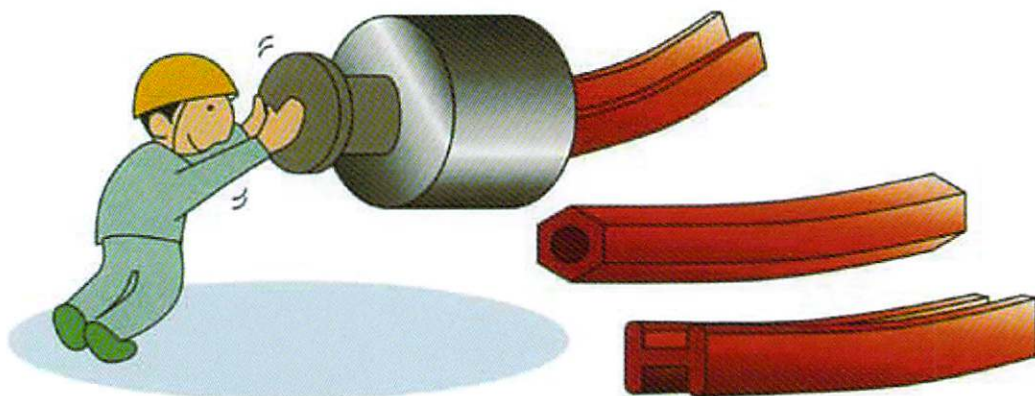
1. Material



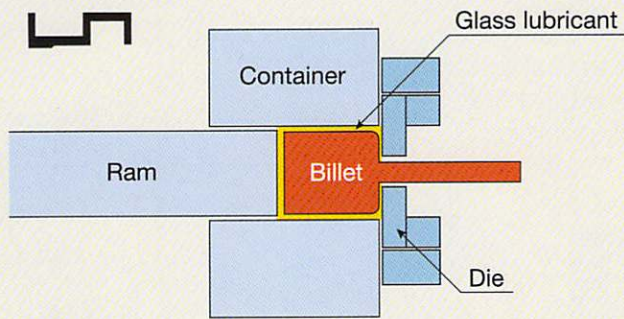
2. Heating



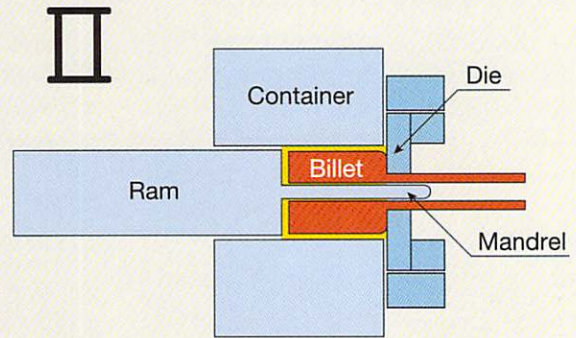
3. Hot extrusion



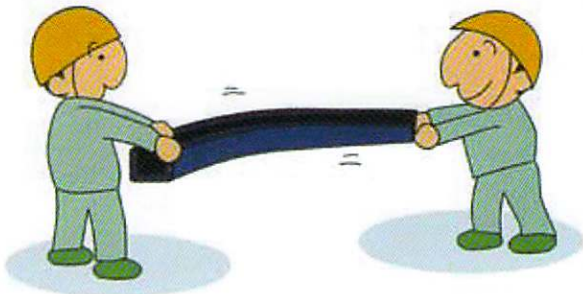
For Solid Shapes



For Hollow Shapes



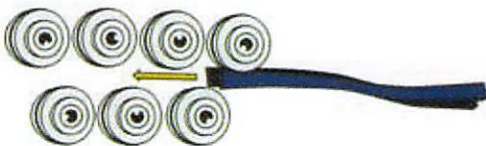
4. Tensile straightening



7. Press straightening



5. Roll straightening



8. Final inspection



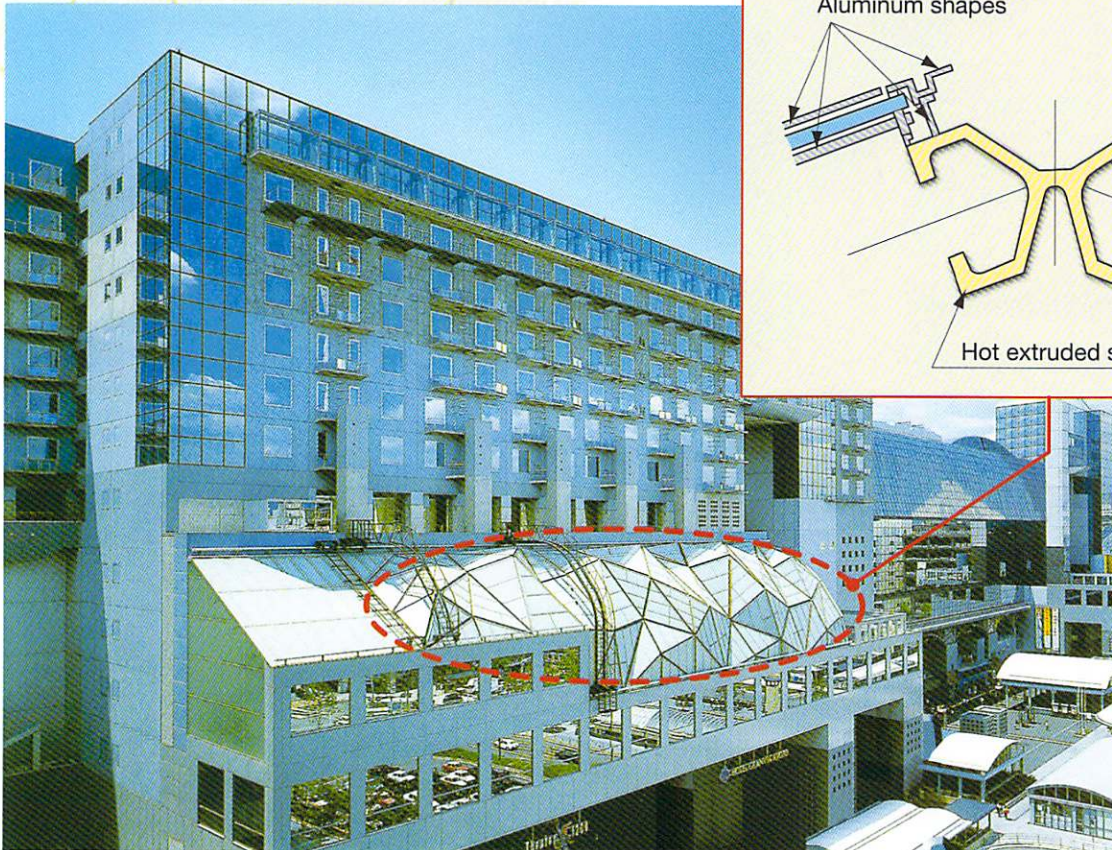
6. Cutting



Merit of Hot Extruded Shapes

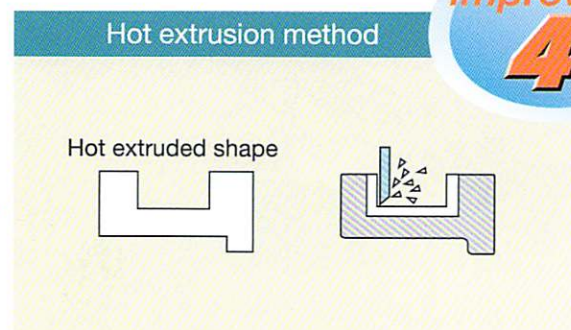
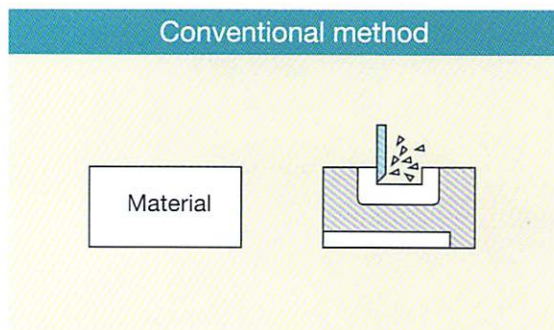
1 Freedom of Design

In contrast to standard specified shapes by rolling process, hot extruded shapes combine both decorative and structural functions that allow the design of structural members that permit optimal originality and freedom in building design.



2 Save the Machining Process

In contrast to the conventional method by machining (lathe, milling) from material block, the hot extrusion process forms shapes by passing the material through die calibers, thereby greatly saving the machining process.

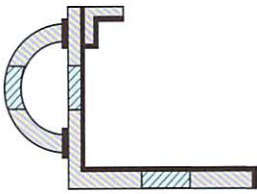


Yield improvement:
40%

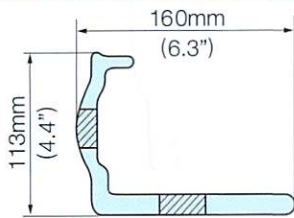
3 Save the Welding Process

Because hot extruded shapes are produced by means of solid forming, the welding processes can be saved. Further, stress relief can be saved, whereby thermal deformation during welding, thereby contributing greatly to cost cutting. In addition, the quality deterioration of weld portion can be prevented and the reliability of end products can be improved.

Conventional shape fastener

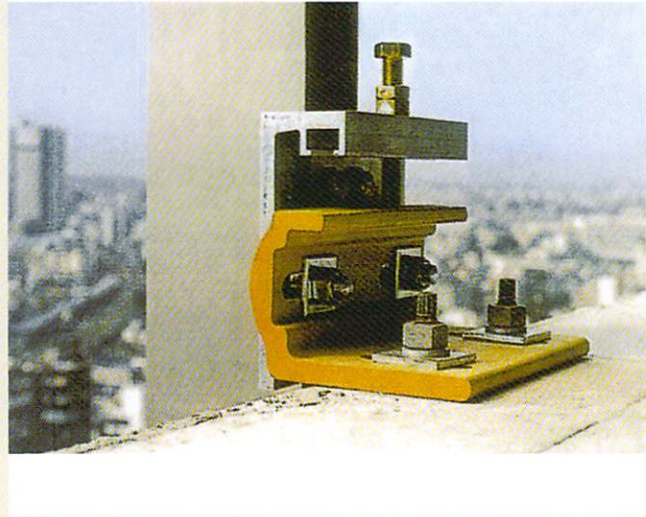


Hot extruded shape fastener



Unit: mm (inches)

Example of hot extruded shape fasteners for building wall

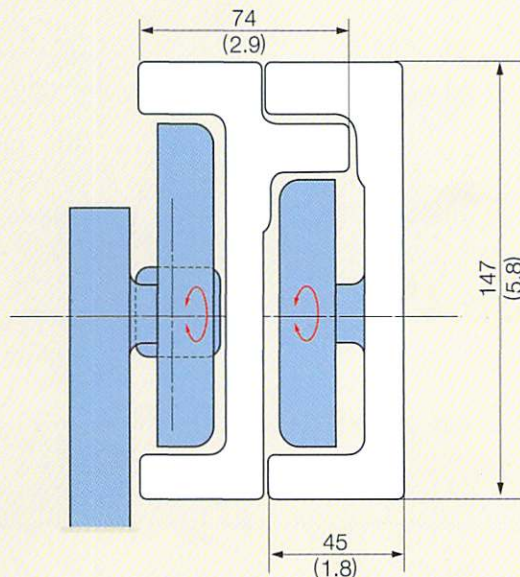


4 Suitable for Small-lot Production and Model Changes of Shapes

The cost of hot extrusion tools is much lower than that of rolling mill tools (rolls): Accordingly, the hot extrusion process allows not only the minor dimensions changes of each product to be altered simply by changing tools, but also the production of small lots starting at one-ton units that otherwise are economically untenable for rolling processes.

Example of folk lift mast shape

Unit: mm (inches)

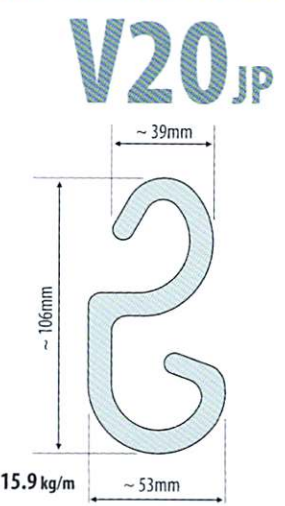


Configurations and Application Examples

Unit:mm (inches)

Civil engineering member

1 Sheet pile connection





V20_{JP}


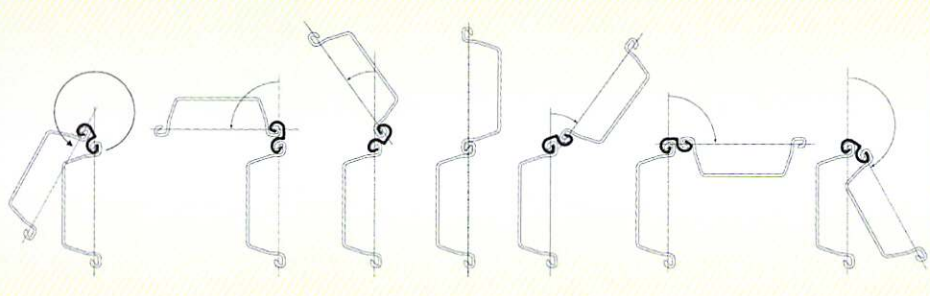
~ 39mm

106mm

15.9 kg/m

~ 53mm

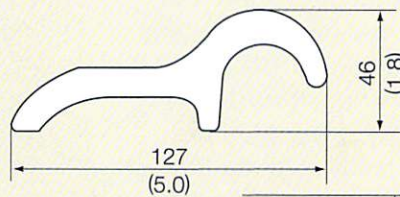
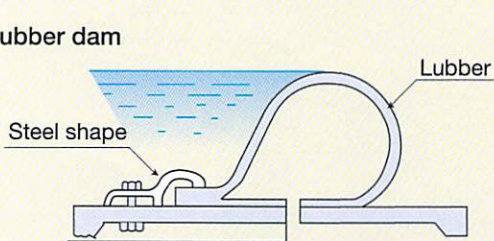
	Swing angle		Total flexibility	
	minimum α	maximum α		
U type 	FSP-II	75 °	168 °	~ 93 °
	FSP-III	68 °	153 °	~ 85 °
	FSP-IV	68 °	153 °	~ 85 °
	FSP-V	50 °	141 °	~ 91 °
	FSP-VI	57 °	149 °	~ 92 °
	NSP-II	74 °	147 °	~ 73 °
	NSP-III	63 °	150 °	~ 87 °
Hat type 	NSP-10H	31 °	154 °	~ 123 °
	NSP-25H	31 °	154 °	~ 123 °

Produced in Japan by the Nippon Steel Corporation under authority of PilePro LLC USA

2 Clamping bar

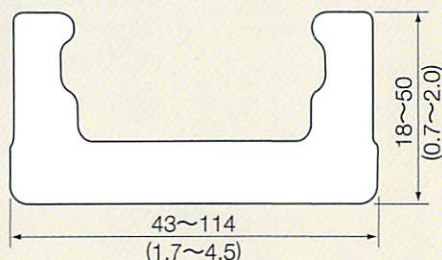
• Lubber dam



Steel grade	SUS304 (AISI 304)
Sectional area	2,977mm ² (4.6in ²)
Unit weight	23.4kg/M (15.7lb/ft)

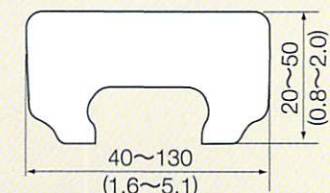
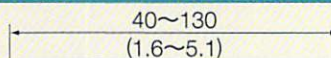
Machinery parts

1 Rail for Linear Motion system



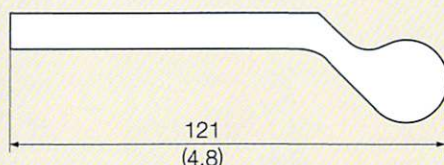
Steel grade	SMn455
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2 Block for Linear Motion system



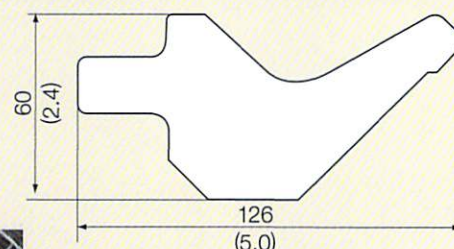
Steel grade	SCM420H
	AISI4150H
	Equivalent to Stainless grade440C

3 Hinge for cashbox



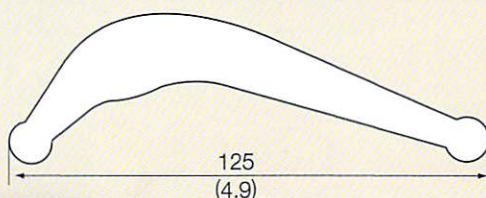
Steel grade	SS400 (ASTM A36)
Sectional area	1,400mm ² (2.2in ²)
Unit weight	11.3kg/M (7.6 lb/ft)

4 Die for bending press



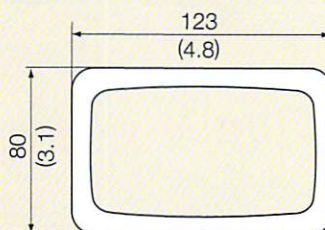
Steel grade	AISI-4150H
Sectional area	3,808mm ² (5.9in ²)
Unit weight	29.9kg/M (20.1 lb/ft)

5 Clamp



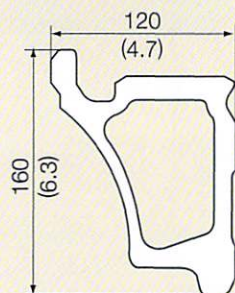
Steel grade	S45C (AISI 1045)
Sectional area	1,852mm ² (2.9in ²)
Unit weight	14.5kg/M

6 Frame member for agricultural machinery (plow)



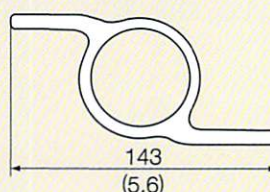
Steel grade	NNB40EX (Low Alloy)
Sectional area	3,474mm ² (5.4in ²)
Unit weight	27.3kg/M (18.3 lb/ft)

7 Parts for loom



Steel grade	SS400 (ASTM A36)
Sectional area	5,612mm ² (8.7in ²)
Unit weight	44.1kg/M (29.6 lb/ft)

8 Parts for automobile underbody



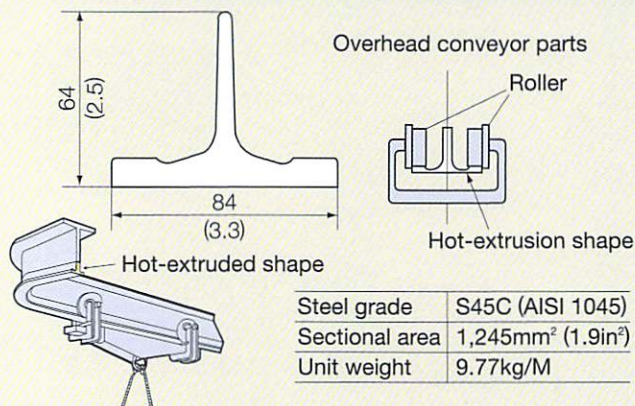
Steel grade	SS400 (ASTM A36)
Sectional area	1,730mm ² (2.7in ²)
Unit weight	13.6kg/M (9.1 lb/ft)

Configurations and Application Examples

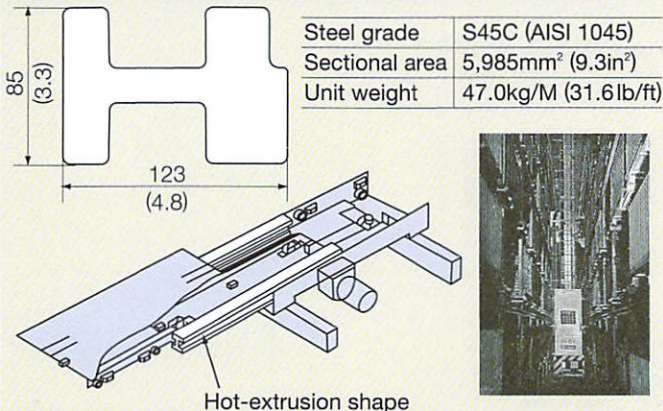
Unit:mm (inches)

Rail for industrial machinery

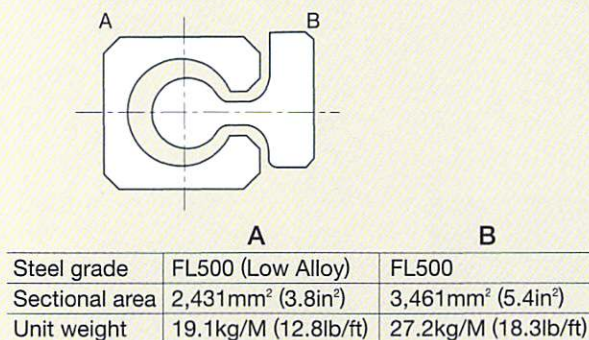
1 Rail



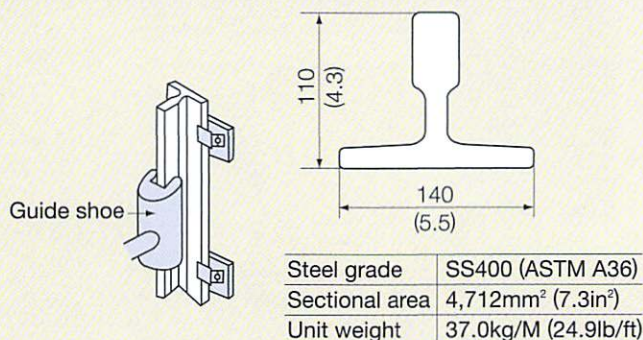
2 Guide rail for stacker crane



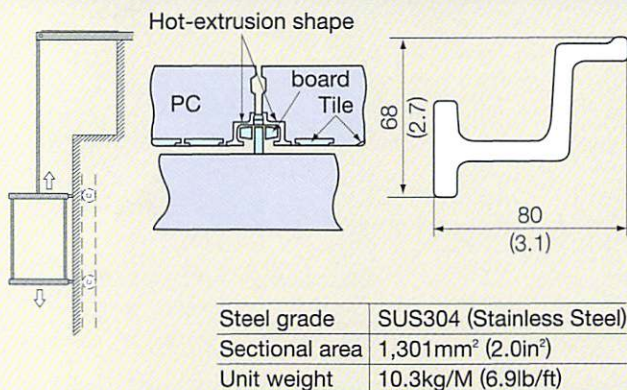
3 Shift fork system for folk lift



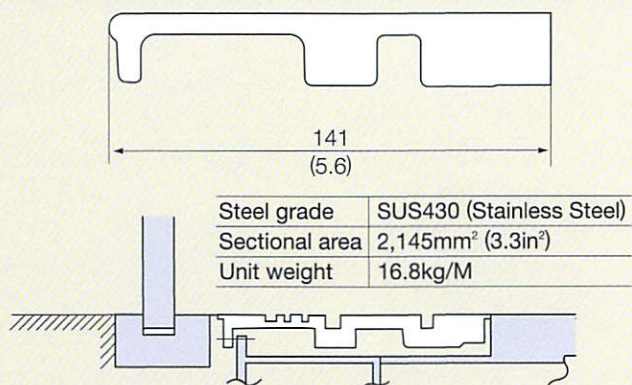
4 35-kg rail for elevator



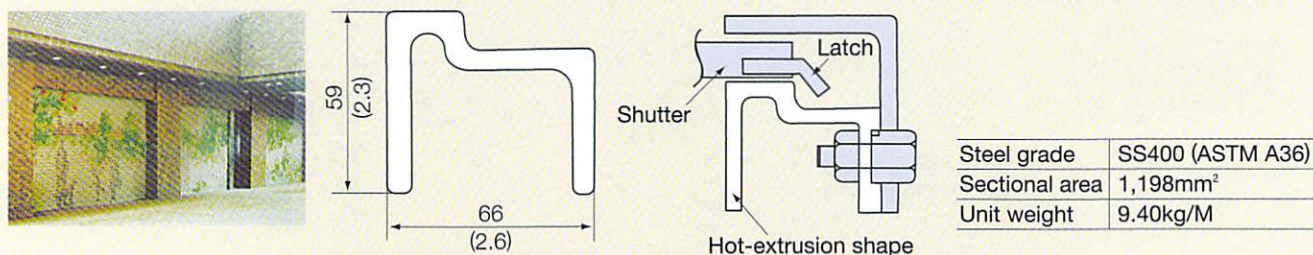
5 Guide rail for high-rise building window cleaner gondola



6 Door threshold for elevator

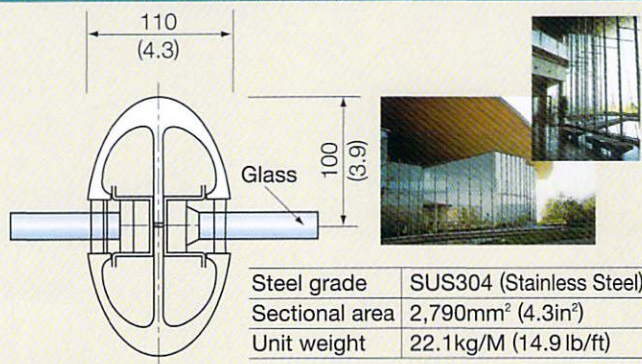


7 Large-size shutter rail for building

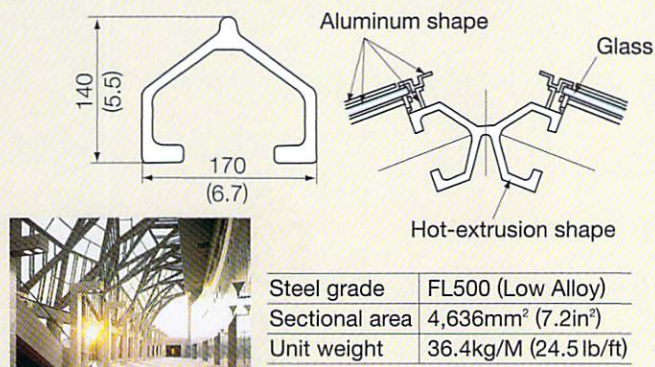


Architectural member

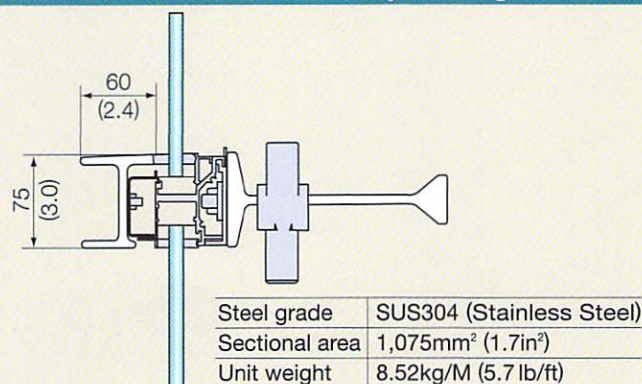
1 Window frame of museum



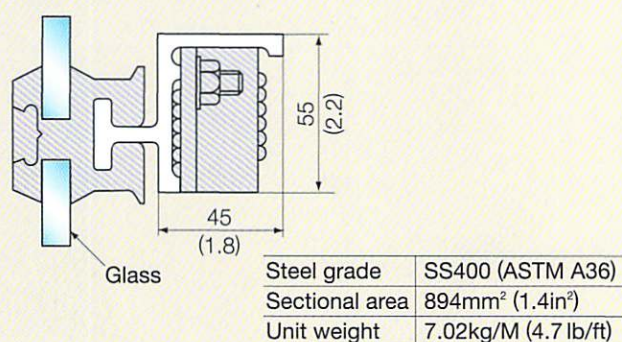
2 Window frame of station building



3 Transom member of university building



4 Window frame of event building



In Placing Orders

■ Available steel grades:

Carbon steel, low alloy steel, stainless steel and titanium

■ Delivery Terms after Order Receipt:

- When stocked billets are used:
75 days after initial order receipt, 50~75 days after receipt of a repeat order
- When steel is tapped after order receipt:
100 days after initial order receipt, 50~75 days after receipt of a repeat order
- When hot extrusion is commissioned:
50~75 days after arrival of the hot extruding material

■ Minimum lot available for order receipt (standard):

[Export]

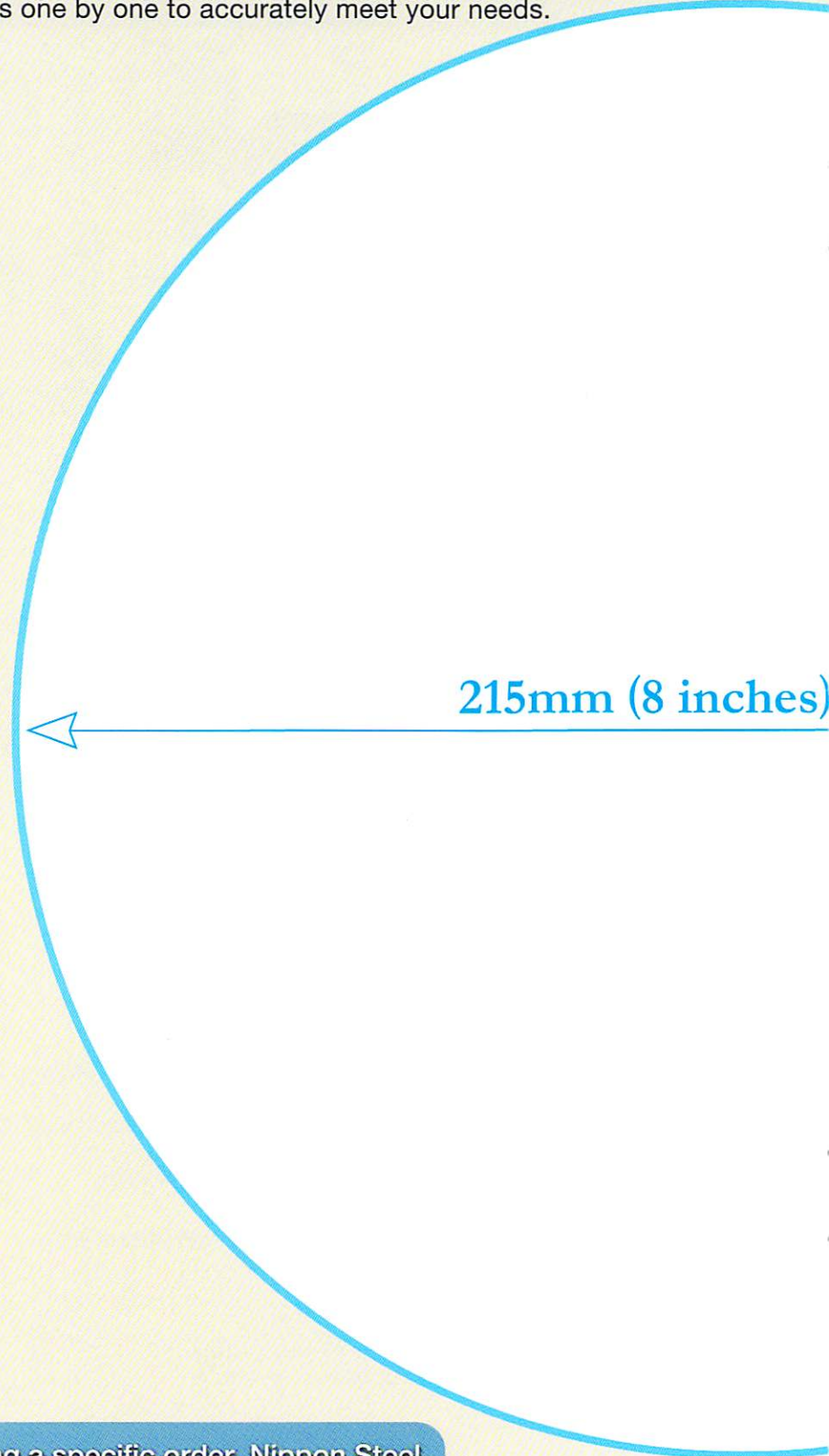
All material	Total 15MT/1 time (34,000 Lbs/1 time)
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※ When you need lower amount, to be discussed.

Nippon Steel recommend the extensive

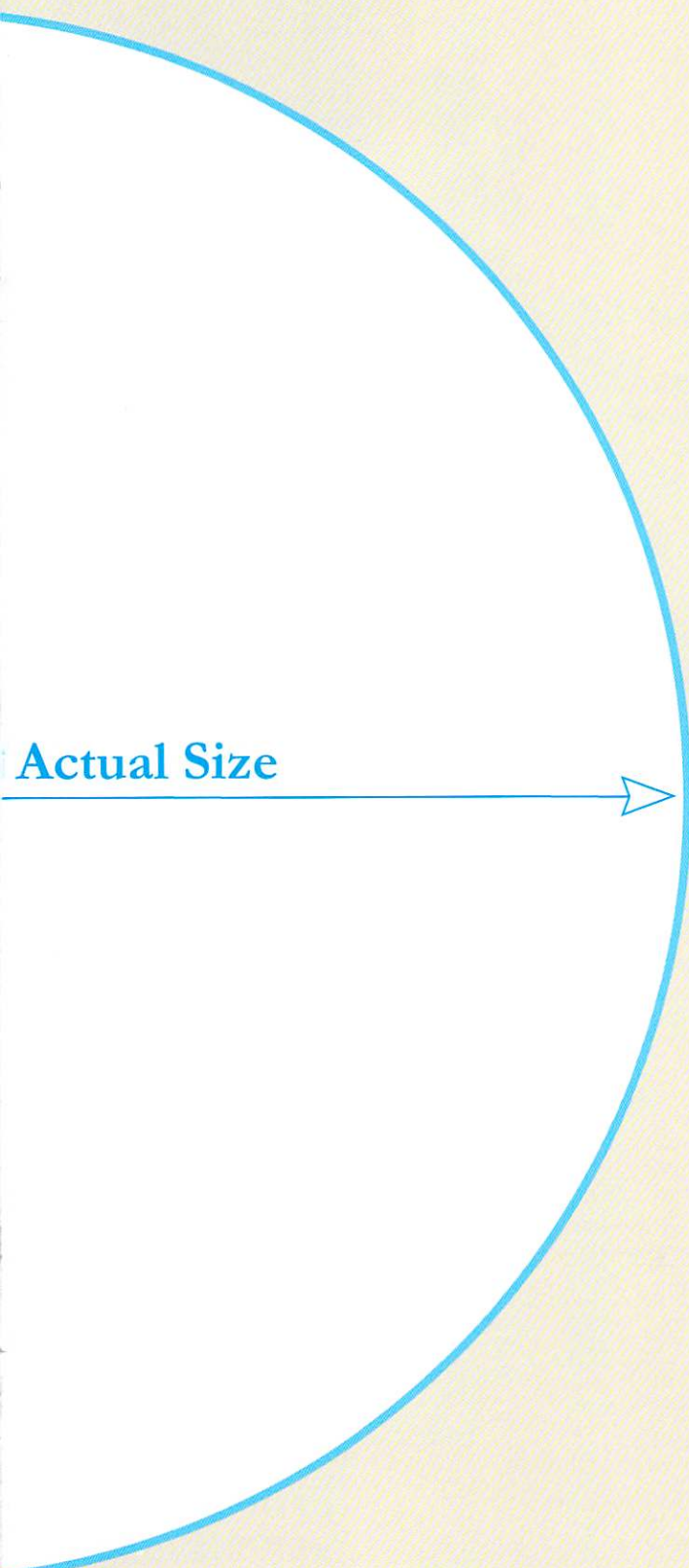
Specific (Order-made) configuration shapes can save the cost.

Make inquiries by drawing your imagination within the 215m-diameter circle shown below. Our technical staff will examine inquires one by one to accurately meet your needs.



When inquiries are made regarding a specific order, Nippon Steel technical staff will examine each inquiry and make appropriate proposals, including optimum product configurations.

application of hot extruded shapes!



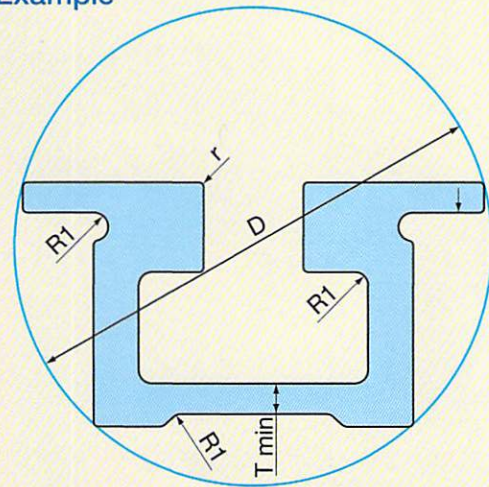
Actual Size

■ Available Dimension

Circumscribed circle Dia.	ϕ 215mm (8 inches)
Minimum thickness	6mm (0.2 inches) ※
Corner (r)	2mm (0.08 inches)
Corner (R1)	5mm (0.2 inches)
Minimum area (S min)	300mm ² (0.49 in ²)
Maximum area (S max)	6,000mm ² (9.30 in ²)
Length	1m~11m (3.2~36 feet)
Maximum weight	250kg (574 lbs)

※Minimum thicknesses differ depending on the configuration.

■ Example



Production Base

Nippon Steel produces a wide range of iron and steel products at its ten production bases nationwide.

Stainless steel seamless tubes and pipe are produced at the hot extrusion and specialty tube mill of the HIKARI PIPE & TUBE. (formerly HIKARI WORKS).



No.	Steelworks	Major Products	Major Products (exd. pipe and tubes)
①	Hikari Pipe & Tube	Hot extruded steel shapes, Stainless seamless pipe and tubes, Electric-resistance welded pipe and tubes	Titanium product Hot-extrusion shape
②	Head Office	—	
③	Muroran Works	—	Bar, Wire rod
④	Kamaishi Works	—	Wire rod
⑤	Tokyo Works	Carbon seamless pipe and tubes	
⑥	Kimitsu Works	UO, Electric-resistance welded, Continuous butt welded and Spiral welded pipe	Plate, sheet, Wire rod, shape
⑦	Nagoya Works	Electric-resistance welded pipe and tubes	Plate, sheet
⑧	Sakai Works	—	shapes
⑨	Hirohata Works		sheet
⑩	Yawata Works	Spiral-welded pipe and tubes	sheet, shapes, Rail
⑪	Oita Works	—	Plate, sheet

On the Leading Edge:Nippon Steel

NIPPON STEEL

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