

Overview of Steel Shape Products in JFE Steel[†]

FUJISAWA Kazuyoshi^{*1} TSUJIMOTO Kazuhito^{*2}

Abstract:

JFE Steel has developed, manufactured and marketed steel shapes products to meet various social needs. This paper outlines typical steel shapes products in JFE Steel.

1. Introduction

JFE Steel is actively engaged in the development of new steel products which respond to increasingly diverse and sophisticated social needs, and supplies numerous products to world markets. The company also offers a full line of steel shape products which contribute to the improvement of social infrastructure, such as products for construction and civil engineering.

This paper presents an overview of steel shape products in JFE Steel.

2. H-shapes

2.1 Fixed Outer Dimension H-shapes, “Super Hislend H”

In September 1961, JFE Steel began manufacturing and marketing H-shapes produced by Japan’s first universal mill. Since that time, the company has accumulated a wealth of experience and an extensive sales record, and has earned an outstanding reputation with its customers.

During this period, JFE Steel supplied steel products with excellent reliability and economy, such as thermo-mechanical control process (TMCP) heavy wide flange H-shapes “HBL®-JH325/355”¹⁾ with excellent weldability and high strength, fire resistant steel for building structural use “JFE-FR,” which possesses high temperature strength in addition to the above properties, and others. Among these, in November 1989, JFE Steel began marketing “Super Hislend H,”²⁾ in which the web depth

unit : mm

Width	200								250								300								350								400										
Depth	t	12	16	19	22	25	28	32	36	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190			
400	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
450	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
500	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
550	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
600	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
650	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
700	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
750	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
800	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
850	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
900	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
950	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						
1000	9	◇	◇	◇	◇																																						
	12	◇	◇	◇	◇																																						

◇ : Standard size ● : Additional size ★ : New 19size

Fig. 1 Super Hislend H section table

and flange width dimensions are fixed and standardized within each series. Super Hislend H products are widely used as hot rolled H-shapes with the same dimensions as welded H-shapes. In response to numerous requests, 19 new sizes were recently added to this product line, which now includes 42 series and 311 sizes, as shown in Fig. 1.

2.2 Welded Light Gauge H-shapes

“Welded light gauge H-shapes”³⁾ are steel shape products which are produced by slit processing of hot rolled steel strip and fabrication of an H-shape cross section by resistance welding. These products are mainly used as structural steel members in residential housing, greenhouses, and the like.

SWH400 under JIS G 3353, which is the product

[†] Originally published in *JFE GIHO* No. 26 (Aug. 2010), p. 1–3



^{*1} Staff General Manager,
Construction Materials & Business Development Dept.,
Construction Materials & Services Center,
JFE Steel



^{*2} Staff Manager,
Civil Engineering Materials Sec.,
Construction Materials Sales Dept.,
Construction Materials & Services Center,
JFE Steel

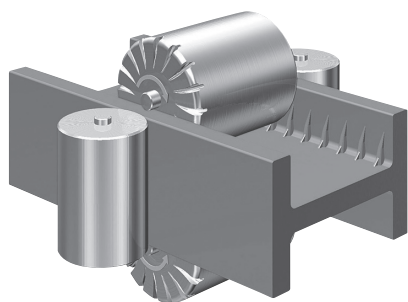


Fig. 2 Rolling device for J-grip H

standard, is a designated structural steel member as provided in public notice No. 1446, based on Article 37 of the Building Standards Act. Because this product has excellent accuracy of various dimensions, beginning with thickness, it offers easy fabrication, and is also an optimum material for automated processing lines. In comparison with hot rolled H-shapes, the surface properties of the product are attractive, and products possess excellent coatability and plating properties.

2.3 H-shapes with Inner Ribs “J-grip H”

“J-grip H” is a type of H-shape with ribs on the flange inner surface, and is produced for use in steel-concrete composite structures. The inner ribs are formed together with the H-shape by a rolling process using a universal rolling method, as illustrated in **Fig. 2**.

JFE Steel, in joint work with Obayashi Corporation, developed the “Steel-Concrete Composite Diaphragm Wall Construction Method”²⁴⁾ as a new construction method for diaphragm walls using a steel-concrete composite structure integrating “J-grip H” and concrete. This method realized cost reductions and space saving in open cut (cut and cover) construction projects in urban areas, where construction must be performed in a limited space without disturbing neighboring structures.

2.4 H-shapes for Bridge Piers “Stripe H”

“Stripe H” (**Photo 1**) is a product in which high adhesive performance with concrete is achieved in ordinary H-shapes by forming stripe-pattern ribs in the flange width direction on the outer surfaces of the



Photo 1 Striped-H

flanges of H-shapes in the hot rolling process. These H-shapes demonstrate excellent performance as steel-concrete composite structures.

Utilizing this advantage, JFE Steel and Maeda Corporation jointly developed the REED construction method (Rapid Earthquake Environment Durability: rapid construction method for high seismic resistance bridge piers), which enables labor saving in site work and shortening of construction period, by combining JFE’s Stripe H product and SEED Form (high durability precast concrete form) construction method.

The “RI-Bridge Construction Method” (Rapid Integrated Bridge Construction Method)⁵⁾ is a further development of REED method for rationalization of bridge construction work and improvement of aseismic capacity. This is a rapid construction method for ramen-type integrated superstructure-pier bridges, in which the steel girder and steel-concrete piers (REED method) are integrated in a rigid connection structure. Rational bridge construction is enabled with the aid of this structure, as it has the merits of safety against bridge collapse and reduction of bending moment of the beams and pier base parts, while providing higher aseismic capacity, because the bridge behaves as a total system of the piers and beams.

3. Steel Sheet Piles

3.1 Hat-shaped 900 Width Steel Sheet Piles

Steel sheet piles are widely used in both permanent and temporary construction applications as backfill walls and cutoff walls in port and harbor projects, river projects, etc., taking advantage of their excellent workability and economy. The steel sheet piles currently produced are of the U-shape or hat-shape types. U-shaped steel sheet piles are manufactured in widths of 400 mm and 500 mm, and as wide-width steel sheet piles with a width of 600 mm, which are the main stream for permanent construction.

The 900 mm width steel sheet pile shown in **Photo 2** was developed in 2004 as a steel sheet pile which demonstrates higher performance in terms of workability, structural reliability, and economy than conventional



Photo 2 Hat-shaped steel sheet piles

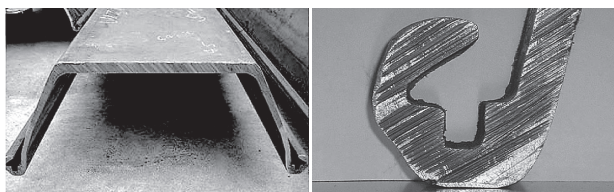


Photo 3 J Pocket Pile (Steel sheet piles)

wide steel sheet piles. This JFE Steel product is hat-shaped and features the world's maximum width (900 mm) in a single hot rolled steel sheet pile.

3.2 Steel Sheet Pile with Pocket for Cutoff Walls “J Pocket Pile”

The ministerial ordinance (standard) of Japan's Ministry of the Environment sets a strict impermeable performance requirement for cutoff walls for coastal waste disposal sites. Therefore, improved reliability in the waterproof treatment of joints in steel sheet piles used as steel cutoff walls is necessary.

JFE Steel developed and commercialized “J Pocket Pile,”⁶⁾ as shown in **Photo 3**, as a new steel sheet pile which is capable of demonstrating high reliability in impermeable performance. As an advantage of this product, “J Pocket Pile” has a joint shape which improves impermeable performance by providing a space, or “pocket,” in the joint parts, in which sealing material can be inserted before installation or filled after installation. This high impermeable performance has been demonstrated in field tests, and “J Pocket Piles” have already been used in four final waste disposal site construction projects. Furthermore, containment works have attracted attention as a countermeasure for soil contamination in urban areas in recent years. “J Pocket Pile” can also be applied as a cutoff wall for this purpose, and also has a record of use in countermeasures to prevent oil spills.

4. Steel Sections for Shipbuilding

JFE Steel and JFE Bars & Shapes are engaged in product development and process development for steel sections which can be used in ship hulls⁷⁾. Unequal leg and thickness angles (NAB) and bulb plates (BP) are representative examples of steel sections for shipbuilding, and were the first products of their types to be man-

ufactured in Japan. At present, JFE Steel and JFE Bars & Shapes offer a wide product line of steel sections for shipbuilding, which includes unequal leg plates (ABS), flat bars (FB), and equal leg angles (AB), in addition to the above-mentioned products, and are certified as manufacturers by the major ship classification societies.

5. Rails

JFE Steel produces rails from 37 kg to 60 kg specification for use in railways in Japan⁸⁾. In contrast to the standard length of 25 m, JFE Steel has the capability to manufacture 50 m lengths for use on Shinkansen super-express lines, which contribute to improved maintainability and running performance by reducing the number of rail joints. On the other hand, in overseas, the ability to withstand severe loading conditions is required in order to achieve higher transportation efficiency by increasing loading, mainly in rails used in mine railways. JFE Steel manufactures heat treated rails with excellent wear resistance and damage resistance to meet this need.

6. Conclusion

This paper has presented an overview of typical steel shape products of JFE Steel.

In the future, JFE Steel will continue to expand its rich product line and develop new products to meet the needs of its customers, so that users of JFE steel sections can enjoy the benefits of higher performance, reliability, convenience, and economy.

References

- 1) For example, Kimura, T. et al. Kawasaki Steel Giho. 1998, vol. 30, no. 4, p. 215–221.
- 2) For example, Shiga, K. et al. Kawasaki Steel Giho. 1991, vol. 23, no. 1, p. 1–7.
- 3) For example, JFE Steel Catalogue. cat. no. D1J-004-00.
- 4) JFE Steel Catalogue. cat. no. D1J-521-01.
- 5) “RI-Bridge industrial method.” Construction Technology Certification Report by Advanced Construction Technology Center. 2005-08.
- 6) Oka, Y.; Oki, T.; Ozumi, S.; Watabe, Y. “Impermeable performance verification test of steel sheet pile with a groove in the joint in sea area,” Proc. of the 39th Conf. of JGS. 2004-07, p. 2285–2286.
- 7) For example, Suzuki, S. et al. JFE Giho. 2003, no. 2, p. 42–43.
- 8) JFE Steel Catalogue. cat. no. D1J-003-05.