New Products & Technologies

Fixed Outer Dimension H-Shapes "Super HISLEND-H"

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1 Conventional H-Shapes

The interrelationship between the inner and outer dimensions of conventional H-shapes gives rise to a number of practical disadvantages in construction work. While conventional beams of the same series have constant inner dimensions, the height ("depth") of the beam must be changed when a change in flange thickness is desired, as shown in **Fig. 1** (a). Likewise, a change in the web thickness means a change in flange width. When beams from different series are used together, a thickness diaphragm is necessary at the beam connection (**Fig. 2**), and when beams from different series are used at the ends and center section of long spans, filler plates are required at the bolted joints of the structure (**Fig. 3**). Finally, in ferroconcrete construction, the thickness of the poured concrete, as well as finished dimensions, is adversely affected by irregularities in the outer profile of the steel members.

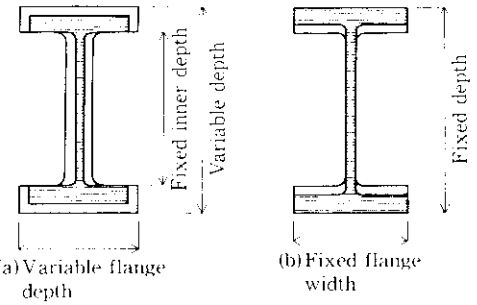

Fig. 1 Comparison of cross-sectional variations for the same product series

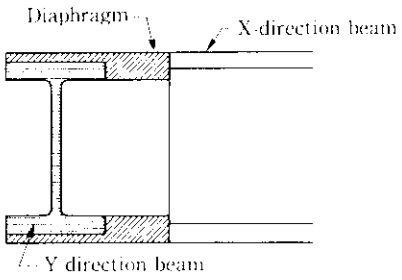

Fig. 2 Detail of connection of beams of different depths

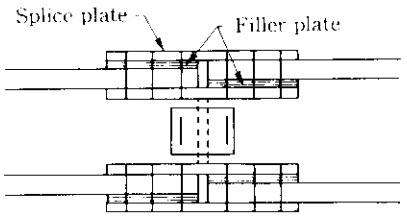

Fig. 3 Detail of bolt connection of beams of different depth

2 Features of Super-HISLEND-H Shapes

Super-HISLEND (High Web, Structural, Light, Economical, New-Dimensional)-H shapes were developed using new rolling techniques which allow simultaneous control of both the web height and flange width, making it possible to hold the outer profile dimensions of the beam constant while varying its inner dimensions. The features of this product, which is scheduled to go into production in November 1989, are as follows:

(1) Within the same series, both height and width are held constant, as shown in Fig. 1(b). A standardized system of dimensions has also been adopted. Size availability is shown in **Table 1**.

(2) Plate of the thickness series most commonly used in Japan has been adopted for both the web and flange thickness, so as to facilitate the design and fabrication of joints with connection made by commonly used plates.

(3) Efforts were made to minimize the size of the corner radius at the web-flange angle as shown in **Table 2**. Easy interchangeability with built-up H-shapes is thus possible.

(4) By improving dimensional accuracy and minimizing deviations, as shown in **Table 3**, on-site work and fitting up of steel skeletons have been made signifi-

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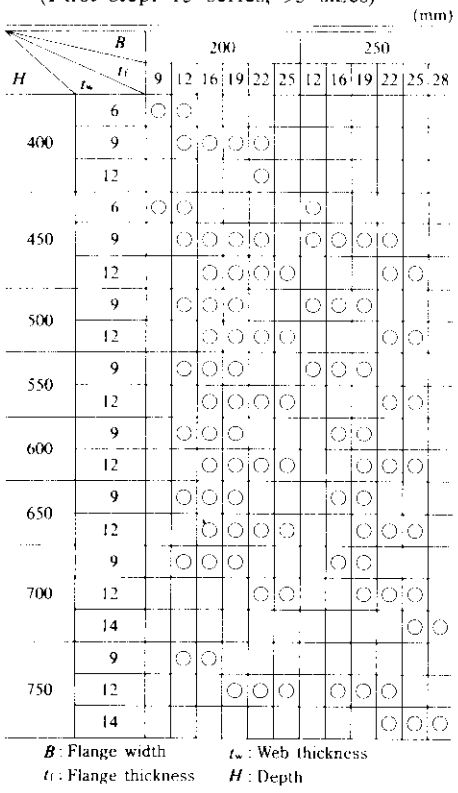
Table 1 Super HISLEND-H shape size availability (First step: 15 series, 95 sizes)



B : Flange width t_w : Web thickness
t_f : Flange thickness H : Depth

Table 2 Comparison of corner radius R (mm)

H shape \ H (mm)	400	450	500	550	>600
Conventional H	16	18	20	20	22
Super HISLEND-H	12	12	12	12*	15

*$H \leqq 550$ $R = 12$

cantly easier.

(5) A wider variety of steel grades is now available.

3 Advantages of HISLEND-H Shapes

(1) The well-distributed range of sizes shown in **Fig. 4** gives users the best choice of product in terms of both section efficiency and economy.

(2) The use of fixed external dimensions, simplified, standard sizes, and standard plate thickness offers great practical convenience in design work to architects, engineers, and designers.

(3) Fixed outer dimensions make joint fit-up simple and easy.

(4) The use of standard plate thicknesses greatly sim-

Table 3 Improvements in dimensional accuracy of Super HISLEND-H shapes

(mm)

		Section nominal size	Permissible variation JIS G-3192	JASS 6*	Super HISLEND-H
Flange width	B		± 3.0	± 3.0	$+2.0$
Depth	H	$H<400$	$+3.0$	± 2.0	$+2.0$
		$400 \leqq H<600$	$+4.0$	$+H/200$	± 2.0
		$600 \leqq H<800$	± 5.0	$\pm H/200$	± 2.0
		$800 \leqq H$	–	± 4.0	–
Thickness	t_f	$t_f<16$	± 1.5	–	± 1.0
		$16 \leqq t_f<25$	$+2.0$		± 1.5
		$25 \leqq t_f<40$	$+2.5$		± 1.7
		$40 \leqq t_f$	$+3.0$		–
	t_w	$t_w<16$	± 1.0	–	± 0.7
		$16 \leqq t_w<25$	± 1.5	–	± 1.0
		$25 \leqq t_w<40$	± 2.0	–	± 1.5
		$40 \leqq t_w$	$+2.5$	–	–
Flange out-of-square	T		$H>300$ $T \leqq 1.5 \cdot B/100$ and $T \leqq 2.0$	$T \leqq B/100$ and $T \leqq 3.0$	$B \leqq 200$ $T \leqq B/100$ $B>200$ $T \leqq 2.0$
	t		–	$t \leqq h/100$ and $t \leqq 1.5$	$t \leqq h/100$
Web offcenter	S		$S \leqq 4.5$	$S \leqq 2.0$	$S \leqq 2.0$
Web deformation	δ			$\delta \leqq H/150$	$H<600$ $\delta \leqq 2.0$ $H \geqq 600$ $\delta \leqq 3.0$
Camber and sweep	e		$e \leqq L/1000$	$e \leqq L/1000$ and $e \leqq 10$	$e \leqq L/1000$ (Local $e \leqq L/1500$)

*Standard by Architectural Institute of Japan

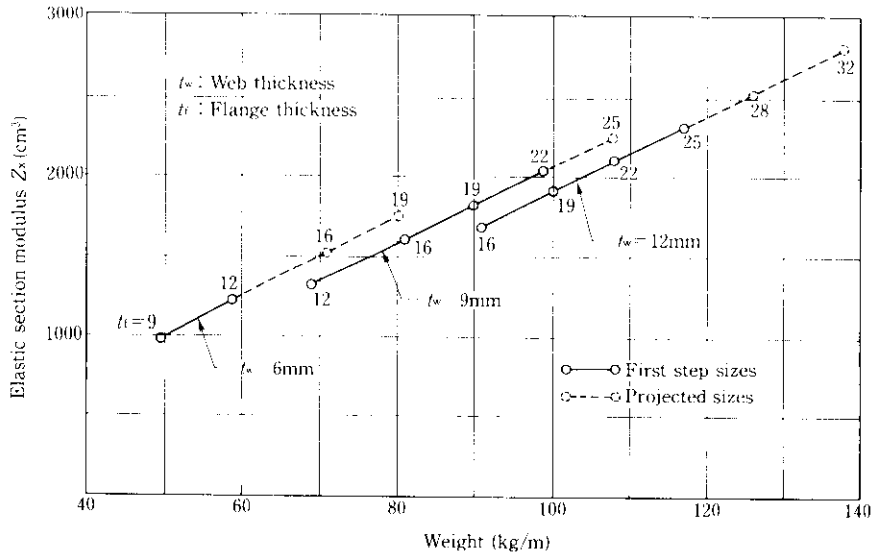


Fig. 4 Cross-sectional efficiency distribution of Super HISLEND-H shapes (example of H-450 × 200 series)

plifies connections with steel plate joints.

(5) The use of fixed outer dimensions eliminates variations in the thickness of the concrete layer and helps reduce irregularities of the concrete finish.

(6) Conversion from built-up H-shapes is easy; weight increases resulting from conversion have been minimized.

(7) The system of standardized dimensions and use of standard steel plate thickness facilitate material management.

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