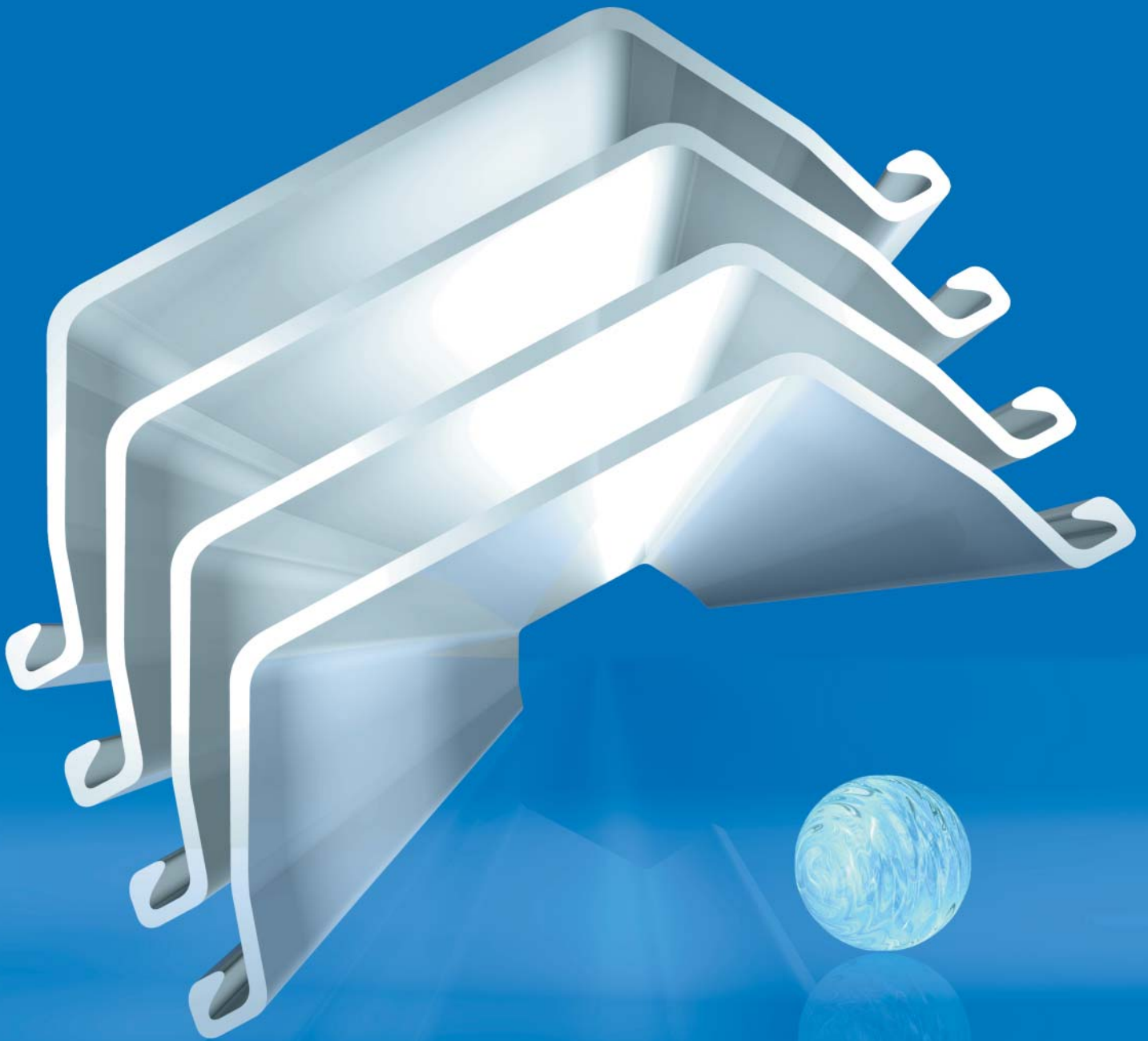




JFE

JFESP

JFE Steel Sheet Piles



JFE Steel Corporation

INTRODUCTION

Steel sheet piles that are widely used in the construction of river embankments, quay walls of ports, retaining walls, cut-off walls, earthquake strengthening structures, and in many other types of construction work are becoming increasingly important.

JFE has been taking full advantage of the state-of-the-art rolling mills at West Japan Works to produce steel sheet piles (U-shaped and Combined) that conform to the new JIS standard (JIS A 5523) established in 2000 and to conventional JIS standards (JIS A 5528). We also pride ourselves on the construction of corner steel sheet piles made by integral roll forming and heavy-duty-coated steel sheet piles (JFE marine coat) for use in the marine environment.

We are confident that the wide range of steel sheet piles produced by JFE (JFESP) will fully satisfy the demanding needs of our customers.

You are kindly invited to find out for yourself the many advantages to be had in using our JFESP steel sheet piles, as well.



◀ West Japan Works (Fukuyama)

▼ West Japan Works (Kurashiki)

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Features and Characteristics

1 A wide range of types and cost efficiencies to meet every need

Steel sheet piles (U-shaped and Combined) are available for economical design.

2 High reliability

Steel sheet piles are produced using the state-of-the-art facilities at our West Japan Works under rigorous quality control.

3 Excellent workability

The joints of steel sheet piles have a sufficient margin of flexibility when combined together to ensure excellent interchangeability and workability.

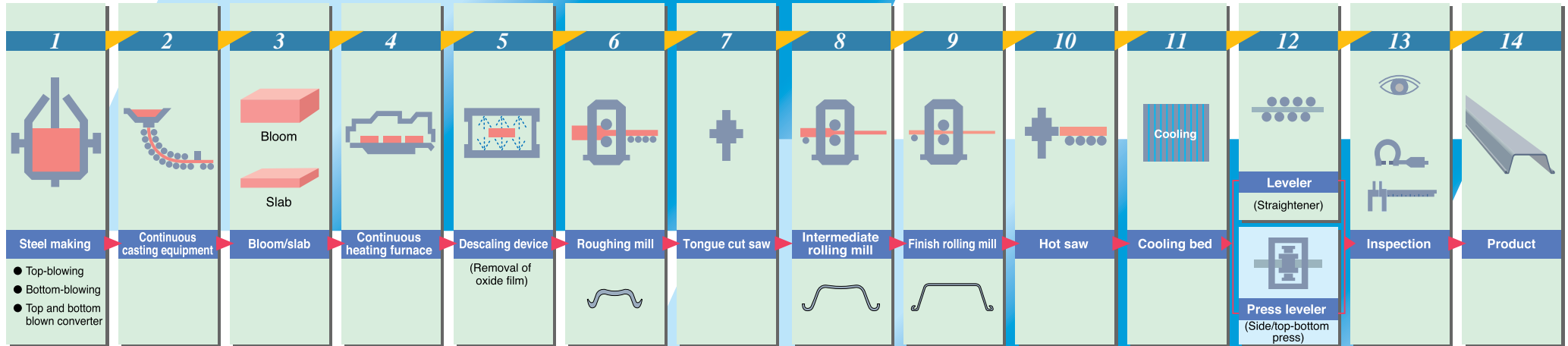


Usage and Applications

Steel sheet piles can be used for a very wide range of purposes including those listed below.

- 1 For permanent structures** — Quay walls, embankments, breakwaters, retaining walls, scour protection walls, cut-off walls, dams, and training dikes, amongst others
- 2 For temporary works** — Earth retaining, breasting, double cofferdams, and islet building, amongst others
- 3 Special uses** — Oil retaining walls, protection of underground oil transport pipes, fill-up aseismic reinforcement walls, liquefaction prevention, and land subsidence prevention, amongst others

Production Process of Steel Sheet Piles



Intermediate rolling mill



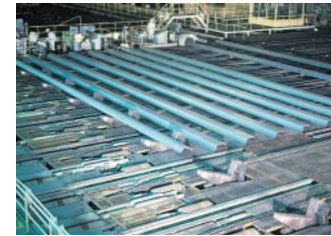
Hot saw



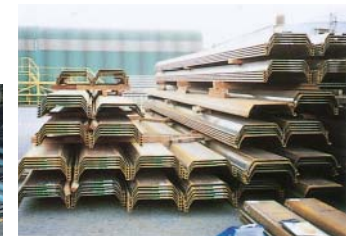
Cooling bed



Leveler



Inspection of product



Shipment of product

Standards

The standards most affecting the production of steel sheet piles are JIS A 5523 (hot-rolled steel sheet piles for welding) and JIS A 5528 (hot-rolled steel sheet piles).

■ Chemical composition

(Unit: %)

Standard	Designation	Chemical composition (%)						Carbon equivalent (%)
		C	Si	Mn	P	S	Free nitrogen	Ceq
JIS A 5523 (hot-rolled steel sheet piles for welding)	SYW295	0.18 or less	0.55 or less	1.50 or less	0.040 or less	0.040 or less	0.0060 or less	0.44 or less
	SYW390 *	0.18 or less	0.55 or less	1.50 or less	0.040 or less	0.040 or less	0.0060 or less	0.46 or less
JIS A 5528 (hot-rolled steel sheet piles)	SY295	—	—	—	0.040 or less	0.040 or less	—	—
	SY390	—	—	—	0.040 or less	0.040 or less	—	—

* SYW390 is not manufactured usually, If you want this products, contact with us beforehand.

Notes: 1. The carbon equivalent is calculated using the following formula: Carbon equivalent (%) = C + Mn/6 + Si/24 + Ni/40 + Cr/5 + Mo/4 + V/14

2. The value of free nitrogen is represented by the total nitrogen in accordance with JIS A 5523, item #5. Chemical composition, Note 2.

■ Mechanical properties

(Unit: %)

Standard	Designation	Mechanical properties					
		Yield point or yield strength (N/mm ²)	Tensile strength (N/mm ²)	Elongation (%)	Charpy absorbed energy (J) Height of sample x Width (mm)		
					10 x 10	10 x 7.5	10 x 5
JIS A 5523 (hot-rolled steel sheet piles for welding)	SYW295	295 or more	490 or more	17 or more	43 or more	32 or more	22 or more
	SYW390 *	390 or more	540 or more	15 or more	43 or more	32 or more	22 or more
JIS A 5528 (hot-rolled steel sheet piles)	SY295	295 or more	490 or more	17 or more	—		
	SY390	390 or more	540 or more	15 or more	—		

* SYW390 is not manufactured usually, If you want this products, contact with us beforehand.

Notes: The Charpy absorbed energy is the value at the test temperature of 0°C.

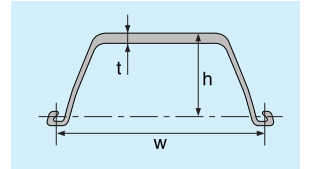
■ Tolerances for shapes and dimensions

Item		Shape of cross section
		U-shaped
		<p>The diagram shows a U-shaped cross-section of a metal profile. It includes a top flange with a central thickness and sloped sides. The 'Effective height' is the vertical distance from the top of the flange to the bottom of the U. The 'Total height' is the vertical distance from the top of the flange to the bottom of the U, including the thickness of the flange. The 'Effective width' is the horizontal distance between the vertical lines of the sloped sides. The 'Total width' is the horizontal distance between the outer edges of the flanges. A 'Joint' is indicated at the bottom of the U, where the two sides meet.</p>
		JIS tolerance
Total width		+ 10mm - 5mm
Total difference in width		No specification
Total height		± 4%
Thickness	Less than 10 mm	± 1.0mm
	10 mm or more up to less than 16 mm	± 1.2mm
	16 mm or more	± 1.5mm
Length		+ Not specified 0
Curvature	10 m or less in length	Total length × 0.12% or less
	More than 10 m in length	(Total length - 10m) × 0.10% + 12mm or less
Warpage	10 m or less in length	Total length × 0.25% or less
	More than 10 m in length	(Total length - 10m) × 0.20% + 25mm or less
Curvature of edges		No specification
Difference in cross section cut at right angles		4% or less of width

Shape and Cross-sectional Performance

1 U-shaped steel sheet pile

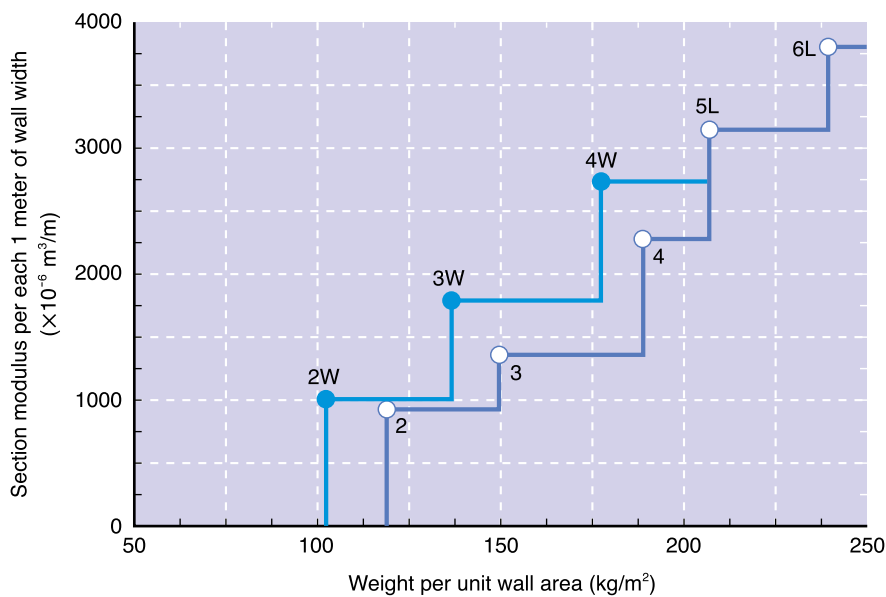
Select an appropriate type of U-shaped steel sheet pile based on the usage and load conditions.



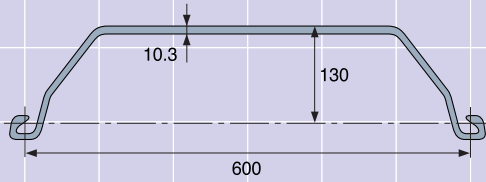
List of cross-sectional performance values

Type	Dimensions			Per steel sheet pile				Per each meter of wall width			
	Effective width W (mm)	Effective height h (mm)	Thickness t (mm)	Cross section $\times 10^{-4}$ (m ²)	Geometrical moment of inertia $\times 10^{-8}$ (m ⁴)	Section modulus $\times 10^{-6}$ (m ³)	Unit weight (kg/m)	Cross section $\times 10^{-4}$ (m ² /m)	Geometrical moment of inertia $\times 10^{-8}$ (m ⁴ /m)	Section modulus $\times 10^{-6}$ (m ³ /m)	Unit weight (kg/m ²)
JFESP-2W	600	130	10.3	78.70	2,110	203	61.8	131.2	13,000	1,000	103
JFESP-3W	600	180	13.4	103.9	5,220	376	81.6	173.2	32,400	1,800	136
JFESP-4W	600	210	18.0	135.3	8,630	539	106	225.5	56,700	2,700	177
JFESP-2	400	100	10.5	61.18	1,240	152	48.0	153.0	8,740	874	120
JFESP-3	400	125	13.0	76.42	2,220	223	60.0	191.0	16,800	1,340	150
JFESP-4	400	170	15.5	96.99	4,670	362	76.1	242.5	38,600	2,270	190
JFESP-5L	500	200	24.3	133.8	7,960	520	105	267.6	63,000	3,150	210
JFESP-6L	500	225	27.6	153.0	11,400	680	120	306.0	86,000	3,820	240

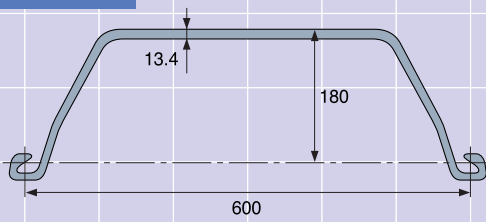
Section modulus per weight



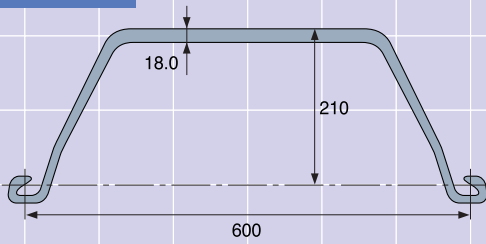
JFESP-2W



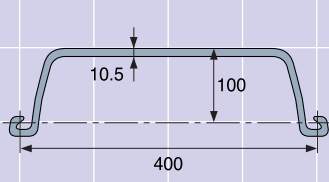
JFESP-3W



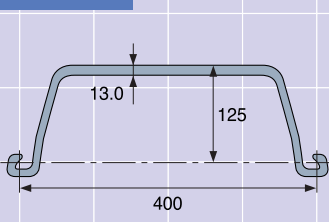
JFESP-4W



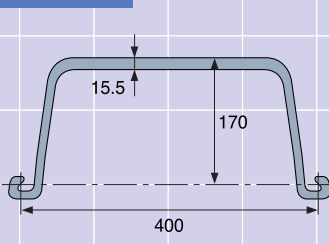
JFESP-2



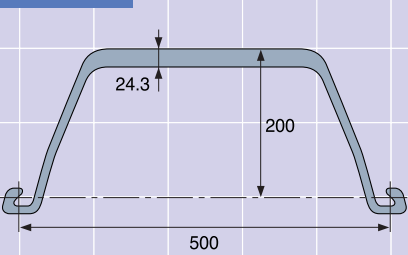
JFESP-3



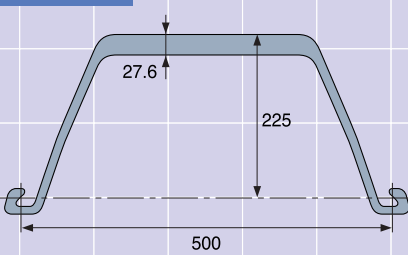
JFESP-4



JFESP-5L



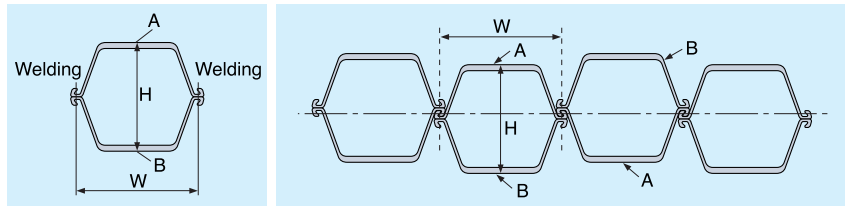
JFESP-6L



Shape and Cross-sectional Performance

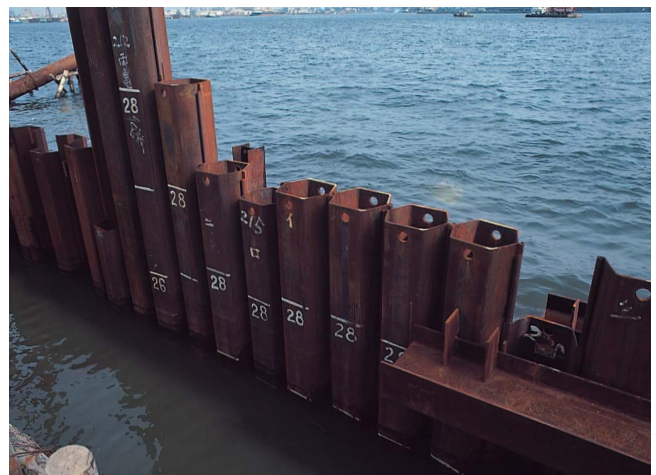
2 Combined steel sheet piles

Combined steel sheet piles are made by welding two U-shaped sheet piles together. As a result, great cross-sectional performance can be expected. Combined steel sheet piles are used for large mooring quay walls. An appropriate combination of types permits economical design that best accommodates each set of design conditions.



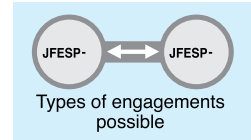
■ Combined steel sheet piles

Type		Dimensions		Cross section		Geometrical moment of inertia		Section modulus		Weight (kg/m ²) Length of A/B steel sheet piles		
A	B	H (mm)	W (mm)	Single $\times 10^{-4}$ (m ²)	Per each meter of wall $\times 10^{-4}$ (m ² /m)	Single $\times 10^{-8}$ (m ⁴)	Per each meter of wall $\times 10^{-8}$ (m ⁴ /m)	Single $\times 10^{-6}$ (m ³)	Per each meter of wall $\times 10^{-6}$ (m ³ /m)	100%	90%	80%
JFESP-3W	JFESP-3W	404	600	207.8	396.3	50,600	84,300	2,500	3,760	272	258	245
JFESP-4W	JFESP-3W	435	600	239.2	398.7	65,300	112,000	2,810	4,890	313	299	286
JFESP-4W	JFESP-4W	466	600	270.6	451.0	86,600	144,000	3,720	5,630	354	336	301
JFESP-4	JFESP-4	387	400	194.0	484.0	41,600	104,000	2,150	5,380	380	361	342
JFESP-5L	JFESP-5L	445	500	267.6	535.2	80,500	161,000	3,620	7,240	420	399	378
JFESP-6L	JFESP-5L	471	500	286.8	573.6	92,500	185,000	3,850	7,700	450	429	408
JFESP-6L	JFESP-6L	497	500	306.0	612.0	108,000	216,000	4,350	8,700	480	456	432

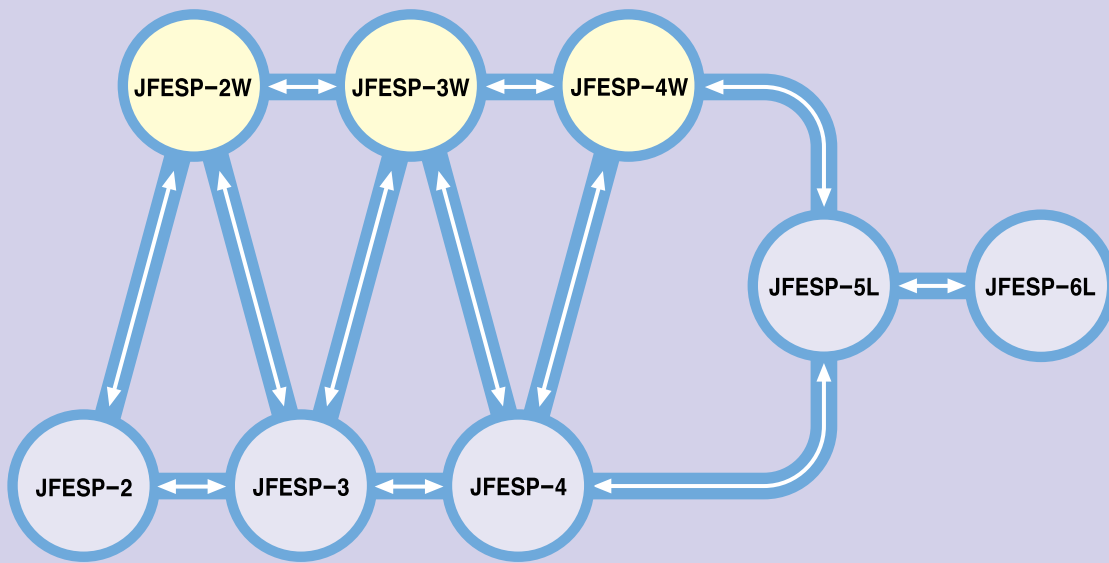


Interchangeability and Turning Angle of Steel Sheet Piles

JFESP joints can be mutually engaged within the ranges shown below.



U-shape

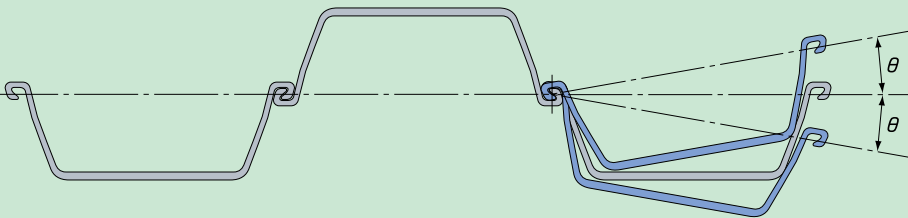


● The standard engagement range is shown here, which may vary according to the working conditions.

The standard turning angle is shown below for when steel sheet piles of the same type are engaged.

U-shaped steel sheet piles

$$\theta = \pm 6^\circ$$

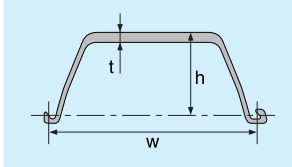


Corner Steel Sheet Piles

Hot-rolled corner steel sheet piles

Steel sheet piles made by hot rolling for 90° corners have less deformation than processed corner sheet piles. These piles have the added advantage that they can be piled up for easy transport and storage.

They can also be driven in the same way as general steel sheet piles.



■ Cross-sectional performance

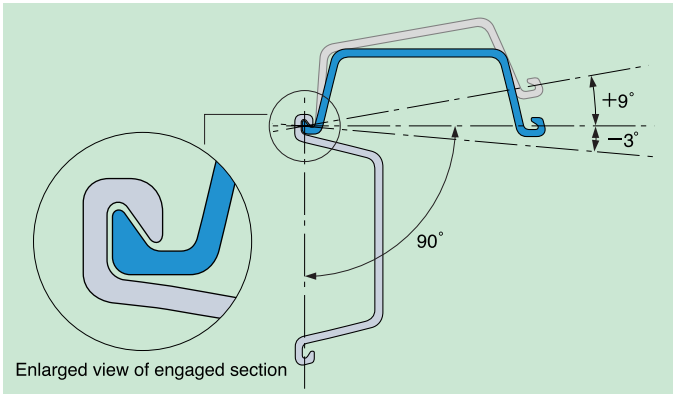
Type	Dimensions			Cross section Per each pile $\times 10^{-4} \text{ (m}^2\text{)}$	Weight		Geometrical moment of inertia		Section modulus	
	W (mm)	h (mm)	t (mm)		Per each pile (kg/m)	Per each meter of wall (kg/m ²)	Per each pile $\times 10^{-8} \text{ (m}^4\text{)}$	Per each meter of wall $\times 10^{-8} \text{ (m}^4\text{/m)}$	Per each pile $\times 10^{-6} \text{ (m}^3\text{)}$	Per each meter of wall $\times 10^{-6} \text{ (m}^3\text{/m)}$
JFESP-C3	400	125	13.0	76.42	60.0	150	2,220	16,800	223	1,340
JFESP-C4	400	170	15.5	96.99	76.1	190	4,670	38,600	362	2,270

1 Material

The material used in the production of hot-rolled corner steel sheet plates is the same as that used in general steel sheet piles.

2 Standard turning angle

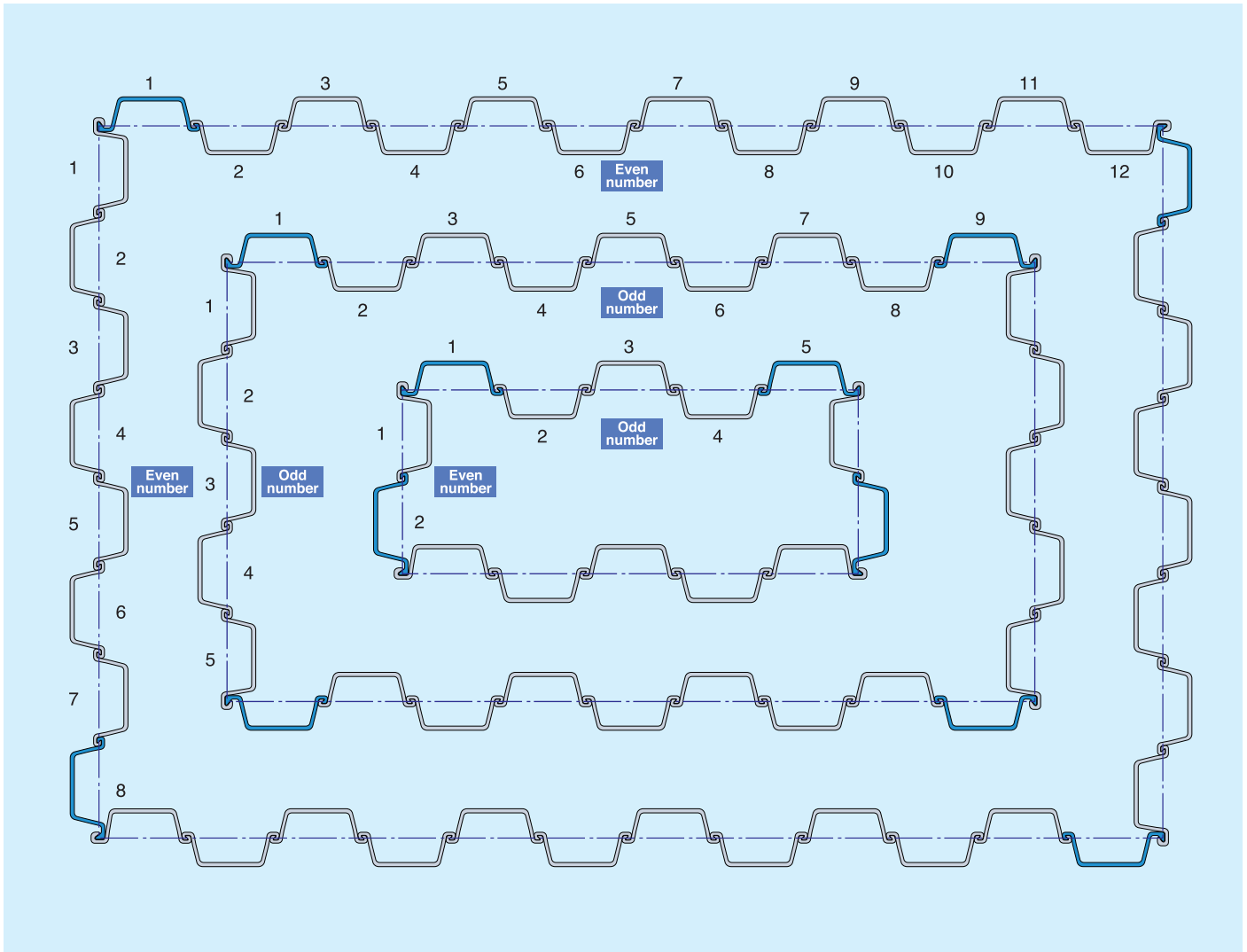
The standard turning angles when type C3 and type 3 are engaged, as well as when type C4 and type 4 are engaged, are shown below.



Corner Steel Sheet Piles

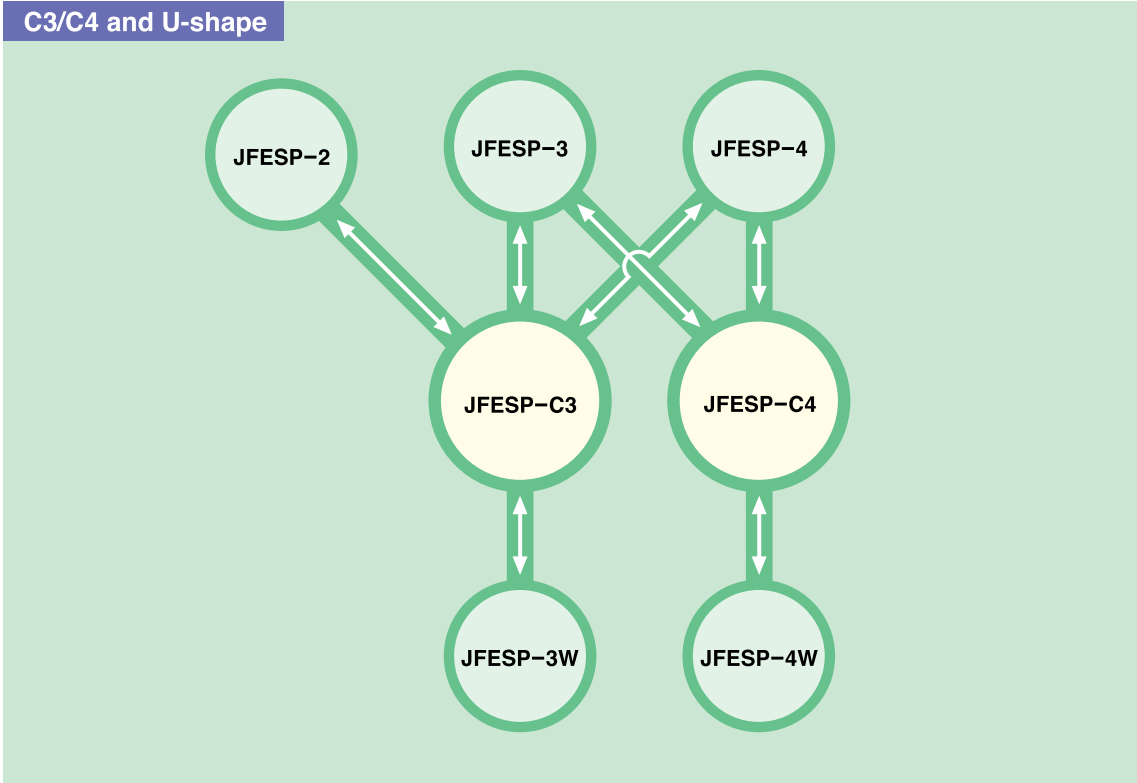
3 Driving procedure

Wall closing is easy when the central dimension of the steel sheet pile wall is a multiple of the effective width of the steel sheet piles.



Corner Steel Sheet Piles

4 Interchangeability

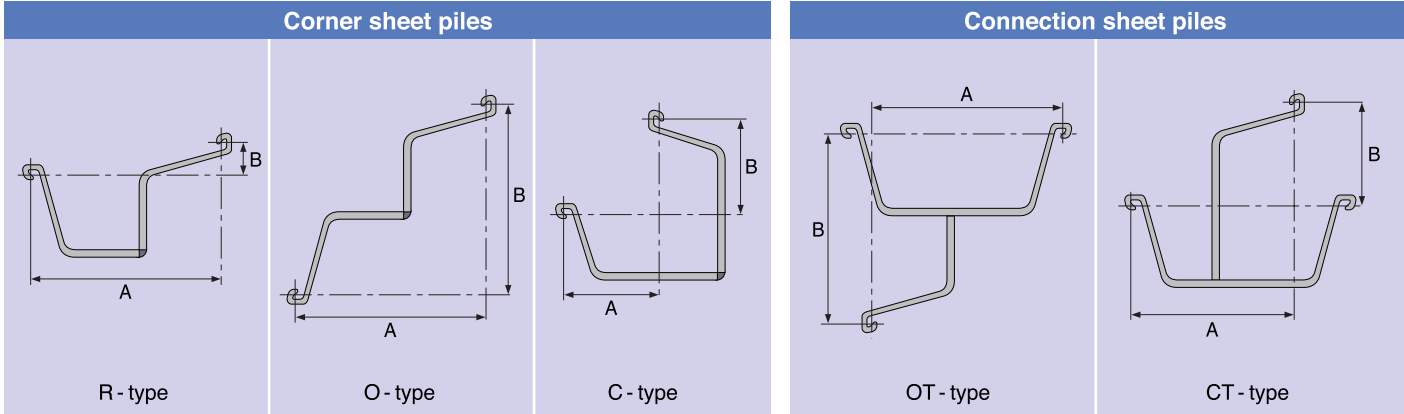


- Interchangeability of corner-side joints
- The standard engagement range is shown here, which may vary according to the working conditions.

Fabricated steel sheet piles

Steel sheet piles processed into shapes other than those shown below are also available.

■ U-shaped steel sheet piles



- Fabricated steel sheet piles are produced according to the dimensions A and B.

Table of Weights

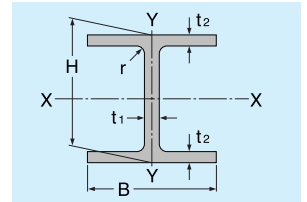
(Unit: kg)

Type Length m	U-shaped steel sheet pile							
	2W	3W	4W	2	3	4	5L	6L
1.0	61.8	81.6	106	48.0	60.0	76.1	105	120
5.0	309	408	530	240	300	380	525	600
5.5	340	449	583	264	330	419	578	660
6.0	371	490	636	288	360	457	630	720
6.5	402	530	689	312	390	495	682	780
7.0	433	571	742	336	420	533	735	840
7.5	464	612	795	360	450	571	788	900
8.0	494	653	848	384	480	609	840	960
8.5	525	694	901	408	510	647	892	1,020
9.0	556	734	954	432	540	685	945	1,080
9.5	587	775	1,007	456	570	723	998	1,140
10.0	618	816	1,060	480	600	761	1,050	1,200
10.5	649	857	1,113	504	630	799	1,102	1,260
11.0	680	898	1,166	528	660	837	1,155	1,320
11.5	711	938	1,219	552	690	875	1,208	1,380
12.0	742	979	1,272	576	720	913	1,260	1,440
12.5	772	1,020	1,325	600	750	951	1,312	1,500
13.0	803	1,061	1,378	624	780	989	1,365	1,560
13.5	834	1,102	1,431	648	810	1,027	1,418	1,620
14.0	865	1,142	1,484	672	840	1,065	1,470	1,680
14.5	896	1,183	1,537	696	870	1,103	1,522	1,740
15.0	927	1,224	1,590	720	900	1,142	1,575	1,800

Note: The type and length are determined by taking the design and workability into consideration.

JFESP Related Products

H-section steel piles



■ Dimensions and cross-sectional performance

Nominal dimensions	Dimensions					Cross section m ²	Unit weight kg/m	Geometrical moment of inertia x 10 ⁻⁸ (m ⁴)		Section modulus x 10 ⁻⁶ (m ³)		Radius of gyration of area x 10 ⁻² (m)	
	H mm	B mm	t ₁ mm	t ₂ mm	r mm			I _x	I _y	Z _x	Z _y	i _x	i _y
200×200	200	200	8	12	13	63.53	49.9	4,720	1,600	472	160	8.62	5.02
250×250	250	250	9	14	13	91.43	71.8	10,700	3,650	860	292	10.8	6.32
300×300	300	300	10	15	13	118.5	93.0	20,200	6,750	1,350	450	13.1	7.55
350×350	344	348	10	16	13	144.0	113	32,800	11,240	1,910	646	15.1	8.84
	350	350	12	19	13	171.9	135	39,800	13,600	2,280	776	15.2	8.89
400×400	400	400	13	21	22	218.7	172	66,600	22,400	3,330	1,120	17.5	10.1
	400	408	21	21	22	250.7	197	70,900	23,800	3,540	1,170	16.8	9.75
	414	405	18	28	22	295.4	232	92,800	31,000	4,480	1,530	17.7	10.2
	428	407	20	35	22	360.7	283	119,000	39,400	5,570	1,930	18.2	10.4
	458	417	30	50	22	528.6	415	187,000	60,500	8,170	2,900	18.8	10.7
	498	432	45	70	22	770.1	605	298,000	94,400	12,000	4,370	19.7	11.1
500×500	500	500	25	25	26	368.3	289	163,000	52,200	6,520	2,090	21.0	11.9

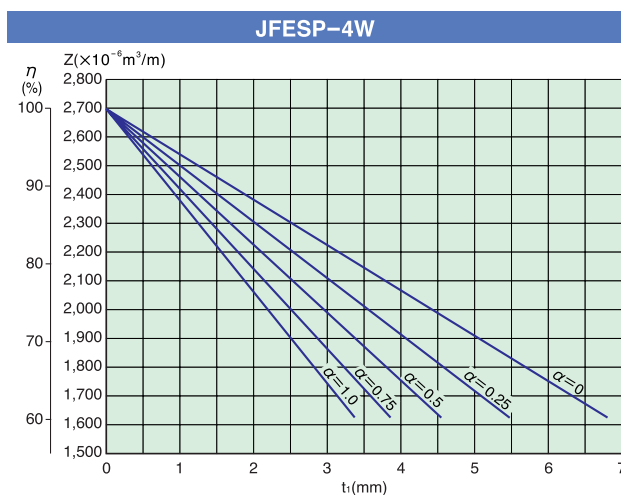
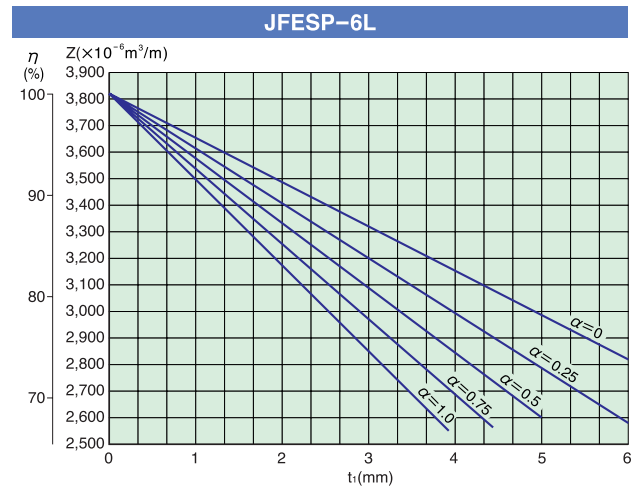
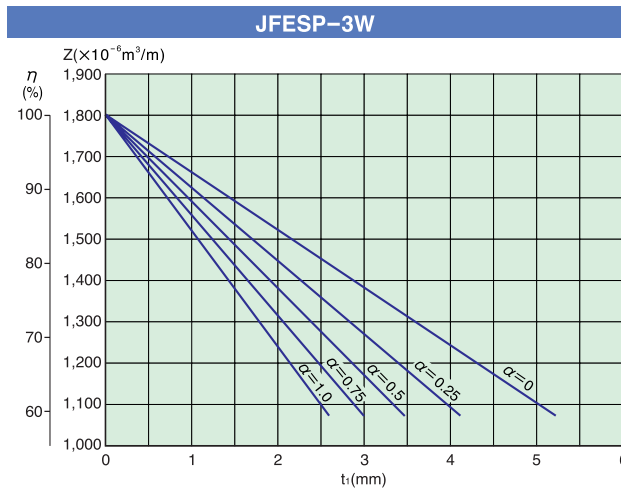
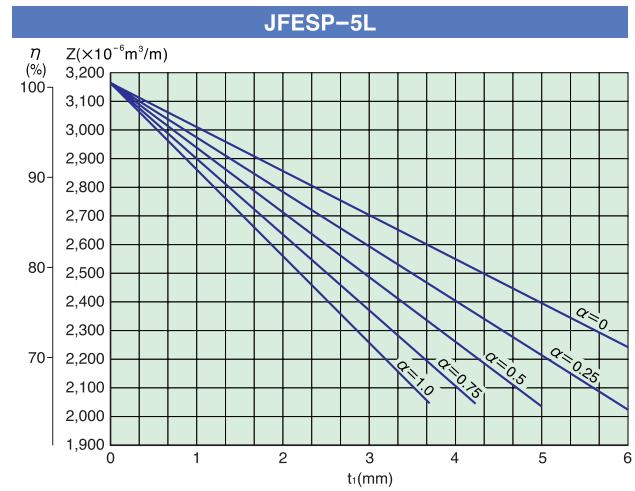
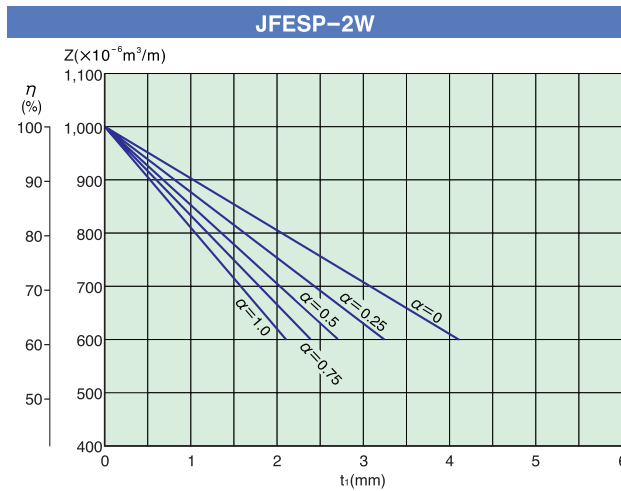
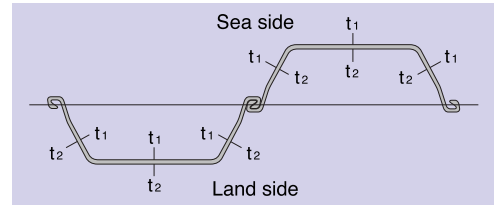
Length : The standard length conforms to JIS standards. The maximum length is 30.0 m.

Material: The standard for H-section steel piles used in the foundations of civil engineering and construction structures is JIS A 5526 H-Section Steel Piles SHK400, 400M, and 490M, while the standard for H-section steel piles for general structures is JIS G 3101 Rolled Steel Material for General Structures SS400.

Section Modulus of Steel Sheet Piles after Corrosion

Calculations of the section modulus of steel sheet piles after corrosion are shown below.

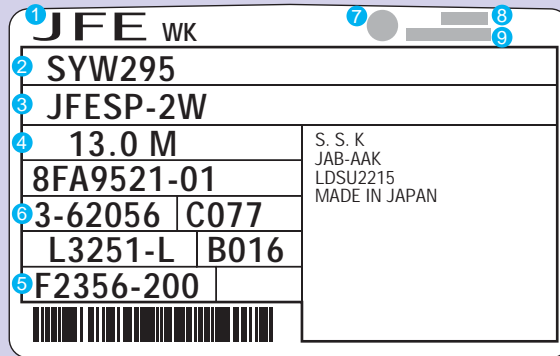
Z	Section modulus of steel sheet pile after corrosion ($\times 10^{-6} \text{ m}^3/\text{m}$)
Z_0	Section modulus of steel sheet pile without corrosion ($\times 10^{-6} \text{ m}^3/\text{m}$)
η	Ratio of section modulus of steel sheet pile after corrosion to Z_0 : $\eta = Z/Z_0$ (%)
t_1, t_2	Thickness of corrosion on respective sides of steel sheet pile (mm)
α	Ratio of t_2 to t_1 : $\alpha = t_2/t_1$



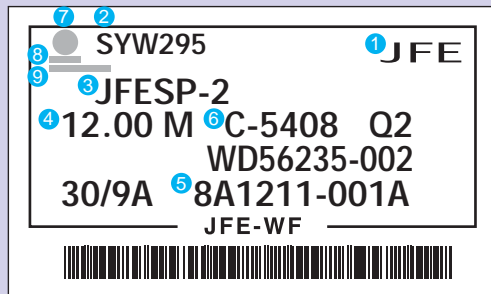
● For details, refer to "Steel Sheet Piles - From Design to Installation" issued by the Japanese Association for Steel Pipe Piles.

Forms and Methods of Packing

Examples of labeling



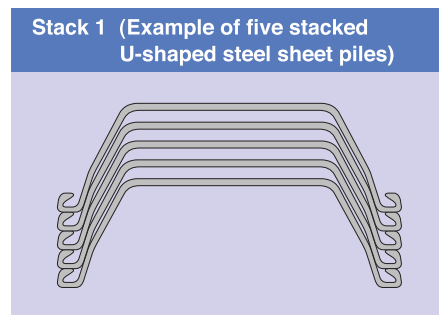
- ① Company mark
- ② Standard code
- ③ Type of sheet pile
- ④ Length
- ⑤ Product No.
- ⑥ Steel No.
- ⑦ JIS mark
- ⑧ Abbreviation of accredited certification body
- ⑨ Certification No.



The standard methods of packing steel sheet piles are shown below.

Kind	Type	Method of packing	Number of stacked sheet piles
U-shape	JFESP-2W	Stack 1	5 sheets
	JFESP-3W		
	JFESP-4W	Stack 1	5 sheets (less than 20 m) 3 sheets (20 m or more)
	JFESP-2		
	JFESP-3	Stack 1	5 sheets
	JFESP-4	Stack 1	4 sheets
	JFESP-5L	Stack 1	5 sheets (less than 20 m) 3 sheets (20 m or more)
	JFESP-6L		3 sheets

[Note] Contact us regarding other forms and methods of packing.



•For further information, please contact our nearest office or send your inquiries to :

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