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**Hot rolled steel sheet piles**

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## Foreword

This Japanese Industrial Standard has been revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Iron and Steel Federation (JISF) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied *mutatis mutandis* pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS A 5528**: 2012), which has been technically revised.

However, **JIS A 5528**: 2012 may be applied in the **JIS** mark certification based on the relevant provisions of Article 30, paragraph (1), etc. of the Industrial Standardization Act until 21 February 2022.

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# Hot rolled steel sheet piles

## 1 Scope

This Japanese Industrial Standard specifies the requirements for hot rolled steel sheet piles (hereafter referred to as steel sheet piles) used for sheathing, coffering, structural foundations and other similar applications.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS G 0320 *Standard test method for heat analysis of steel products*

JIS G 0404 *Steel and steel products — General technical delivery requirements*

JIS G 0415 *Steel and steel products — Inspection documents*

JIS G 3192 *Dimensions, mass and permissible variations of hot rolled steel sections*

JIS Z 2241 *Metallic materials — Tensile testing — Method of test at room temperature*

## 3 Symbols of grade

The steel sheet piles shall be classified into two grades and the symbols shall be as given in Table 1.

**Table 1 Symbols of grade**

Symbol of grade
SY295
SY390

## 4 Chemical compositions

The steel sheet piles shall be tested in accordance with **8.1** and the heat analysis values shall be as given in Table 2.

**Table 2 Chemical compositions**

Symbol of grade	Unit: %	
	P	S
SY295	0.040 max.	0.040 max.
SY390	0.040 max.	0.040 max.
If necessary, alloy elements other than those in this table may be added.		

## 5 Mechanical properties

### 5.1 Yield point or proof stress, tensile strength and elongation

The tensile test shall be carried out on steel sheet piles in accordance with 8.2, and the yield point or proof stress, tensile strength and elongation shall be as given in Table 3.

**Table 3 Yield point or proof stress, tensile strength and elongation**

Symbol of grade	Yield point or proof stress N/mm <sup>2</sup>	Tensile strength N/mm <sup>2</sup>	Test piece	Elongation %
SY295	295 min.	450 min.	No. 1A	18 min.
			No. 14B	24 min.
SY390	390 min.	490 min.	No. 1A	16 min.
			No. 14B	20 min.
NOTE 1 N/mm <sup>2</sup> = 1 MPa				

### 5.2 Coupling tensile strength of steel sheet piles having straight line shape

The steel sheet piles having straight line shape shall be tested in accordance with 8.3, and the coupling tensile strength <sup>1)</sup> shall be 3.92 MN/m or over for those of under 10 mm in thickness and 5.88 MN/m or over for those of 10 mm or over to and excluding 16 mm in thickness.

Note <sup>1)</sup> The value of maximum test force that the test piece withstands during the course of the coupling tensile strength test of steel sheet piles, which is converted to that of 1 m in width.

## 6 Shapes, dimensional tolerances and unit mass

The shapes, dimensional tolerances and unit mass shall be as follows.

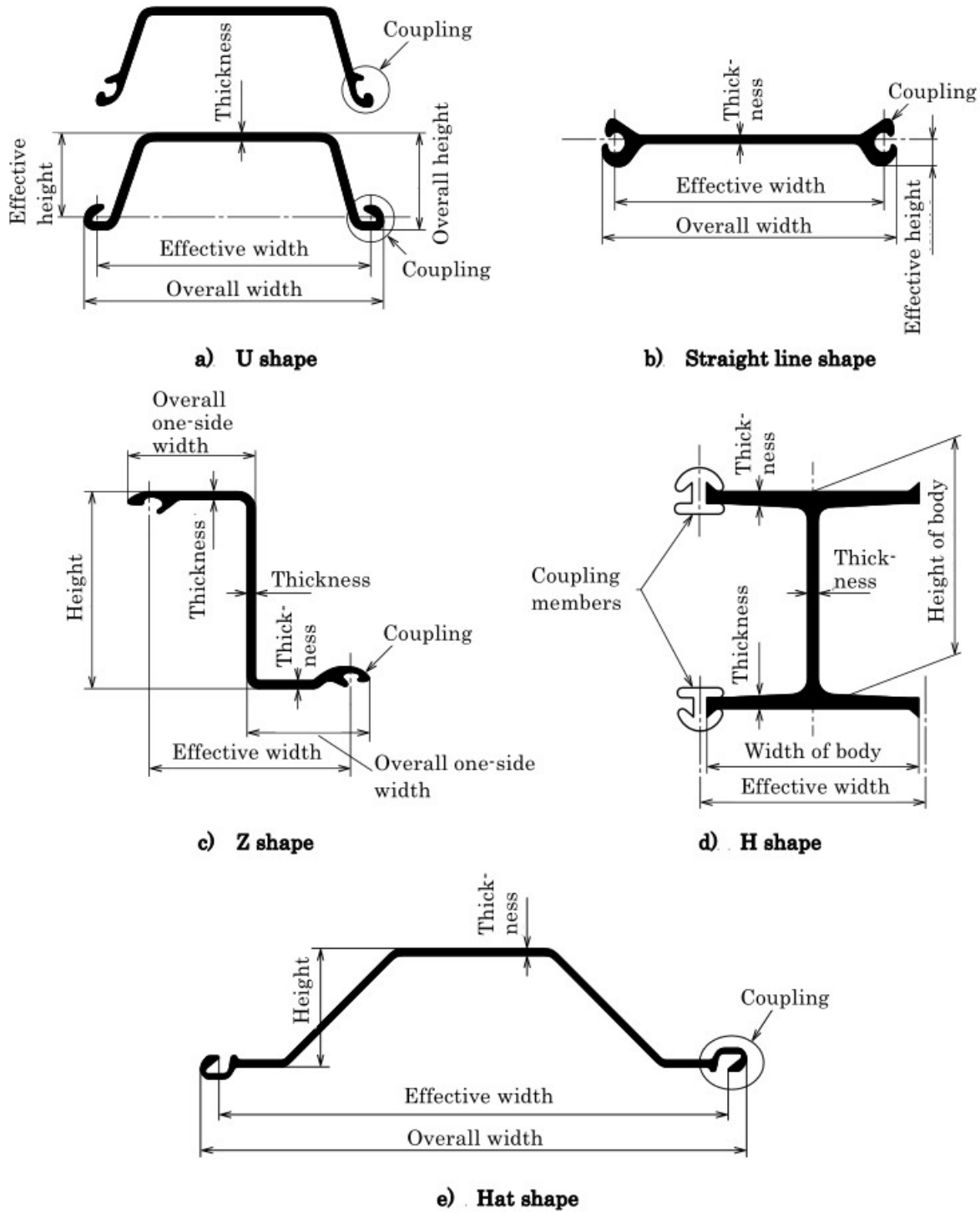
- The sectional shapes of steel sheet piles shall be a U shape, straight line shape, Z shape, H shape and hat shape, and the designation of each part shall be as given in Figure 1.
- The coupling of steel sheet piles shall have a shape that allows adequate engagement at the time of piling and easy disengagement at the time of extracting, and should be of a structure that secures water-tightness as much as possible.
- The shapes and dimensional tolerances of steel sheet piles shall be as given in Ta-

ble 4.

- d) The unit mass shall be upon the agreement between the purchaser and the manufacturer.
- e) According to the specification by the purchaser, boring or mounting of accessories for suspension of steel sheet pile at construction may be carried out. The inspection, marking, etc. in this case shall be upon the agreement between the purchaser and the manufacturer.

## **7 Appearance**

The steel sheet piles shall be free from defects detrimental to use. However, such defects may be removed or repaired in accordance with Clause **9** of **JIS G 3192**.



**Figure 1 Designation of each part**



**Table 4 Shape and dimensional tolerances**

Item	Sectional shape				
	Straight line shape	U shape	Hat shape	Z shape	H shape
Width	±4 mm	+10 mm -5 mm		+8 mm -4 mm	±4 mm
Height	—	±4 %		±5 mm	±1.0 %
Thick- ness	Under 10 mm	+1.5 mm -0.7 mm	±1.0 mm		
	10 mm or over to and excl. 16 mm	+1.5 mm -0.7 mm	±1.2 mm		
	16 mm or over	—	±1.5 mm		
Length	+ Not specified 0				
Deflec- tion <sup>a)</sup>	10 m or un- der in length	Length (m) × 0.15 % max.	Length (m) × 0.12 % max.	Length (m) × 0.15 % max.	
	Over 10 m in length	[(Length - 10) m × 0.10 % + 15 mm] max.	[(Length - 10) m × 0.10 % + 12 mm] max.	[(Length - 10) m × 0.10 % + 15 mm] max.	
Camber <sup>a)</sup>	10 m or un- der in length	Length (m) × 0.20 % max.	Length (m) × 0.25 % max.	Length (m) × 0.15 % max.	
	Over 10 m in length	[(Length - 10) m × 0.10 % + 20 mm] max.	[(Length - 10) m × 0.20 % + 25 mm] max.	[(Length - 10) m × 0.15 % + 15 mm] max.	
Difference in ver- tically cut sec- tions	4 % of width max.			4 % of height and width max.	
<p>Applicable positions of tolerances on width, height and thickness shall be as given in Figure 1. Tolerances on width shall be applied to overall width for a straight line shape, a U shape and a hat shape, to overall one side width for a Z shape, and to the width of body for an H shape. Tolerances on height shall be applied to overall height for a U shape and to the height of body for an H shape.</p> <p>Note <sup>a)</sup> Deflection shall be in the parallel direction to a sheet pile wall and camber in the vertical direction to a sheet pile wall.</p>					

## 8 Tests

### 8.1 Chemical analysis

The chemical analysis shall be as follows.

- a) The chemical compositions shall be obtained from heat analysis values, and general requirements for chemical analysis and sampling method shall be in accordance with Clause **8** of **JIS G 0404**.
- b) The heat analysis method shall be in accordance with **JIS G 0320**.

## **8.2 Mechanical tests**

### **8.2.1 General requirements**

General requirements for mechanical test shall be in accordance with Clause **7** and Clause **9** of **JIS G 0404**. The sampling method shall be in accordance with Class A in **7.6** of **JIS G 0404**. The number of test pieces, sampling position and sampling direction shall be as follows.

- a) **Number of tensile test pieces** One tensile test piece shall be taken from one unit of steel sheet piles belonging to the same heat and having the same sectional shape and the same sectional dimensions. For a unit exceeding 50 t in mass, two test pieces shall be taken.
- b) **Sampling position and sampling direction of tensile test piece** The tensile test piece shall be taken parallel to the rolling direction from the position in shaded area as given in Figure 2. When sampling of Figure 2 is impracticable, the test piece shall be taken as close to the specified position as possible.

### **8.2.2 Test piece**

The tensile test piece shall be No. 1A or No. 14B specified in **JIS Z 2241**.

### **8.2.3 Test method**

The tensile test method shall be in accordance with **JIS Z 2241**.

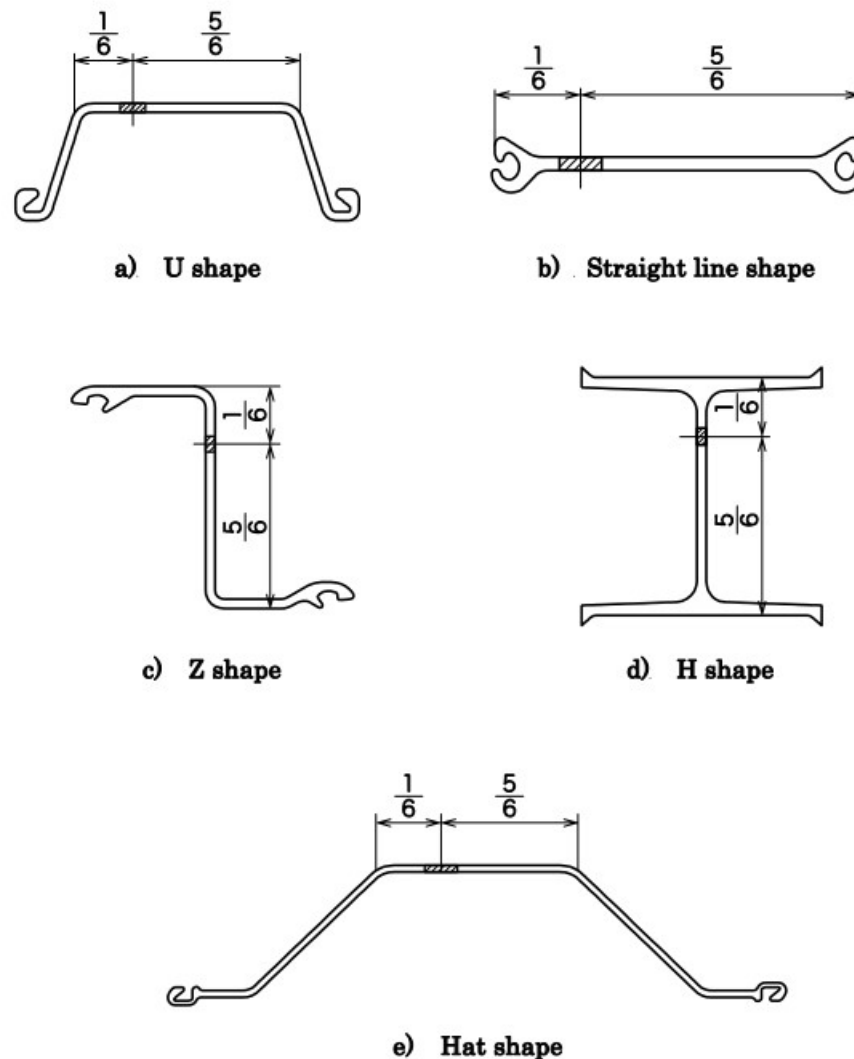


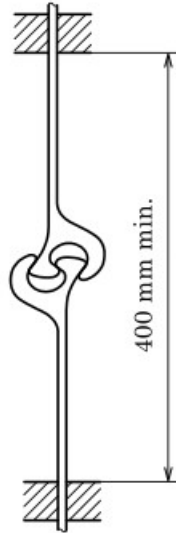
Figure 2 Sampling position of tensile test piece

### 8.3 Coupling tensile test on steel sheet piles having straight line shape

The coupling tensile test on steel sheet piles having straight line shape shall be as follows.

- a) Two coupling tensile test pieces shall be taken at right angles to the rolling direction from each unit of steel sheet piles belonging to the same heat and having the same sectional dimensions. In this case, the dimensions of one test piece shall be about 100 mm in width and about 300 mm in length, and each test piece shall have a coupling on one side to represent the coupling of one steel sheet pile to be engaged.
- b) The coupling tensile test shall be carried out by measuring the disengagement strength of coupling (the breaking strength if the test piece breaks before the disengagement of coupling) in accordance with **JIS Z 2241**. In this case, the test piece

shall be set in such a manner that the two couplings engage each other, with the tensile axis parallel to the axis of the test pieces as given in Figure 3. The distance between grips shall be 400 mm or over.



**Figure 3 State of test pieces adequately set**

## 9 Inspection

The inspection shall be as follows.

- a) General requirements for inspection shall be in accordance with **JIS G 0404**.
- b) Chemical compositions shall comply with the requirements of Clause 4.
- c) Mechanical properties shall comply with the requirements of Clause 5.
- d) Shape and dimensions shall comply with the requirements of Clause 6.
- e) Appearance shall comply with the requirements of Clause 7.

## 10 Re-inspection

For steel sheet piles having failed to meet the requirements of tensile test or coupling tensile test, retest may be carried out for acceptance in accordance with **9.8 of JIS G 0404**.

## 11 Marking

For each steel sheet pile that has passed the inspection, the following items shall be marked by suitable means so as to ensure that the marking remains until the time of pile driving. However, part of the items may be omitted in the case where approval is given by the purchaser, as far as the product can still be identified.

- a) Symbol of grade

- b) Heat number or inspection number
- c) Code (as agreed between the purchaser and the manufacturer) indicating shape and dimensions (or sectional performance)
- d) Length (in metre)
- e) Manufacturer's name or abbreviation

## 12 Report

Unless otherwise specified, the manufacturer shall submit the inspection document to the purchaser. The report shall be in accordance with Clause **13** of **JIS G 0404**. Unless otherwise specified in the order, the type of the inspection document to be submitted shall be in accordance with **5.1** of **JIS G 0415**.

When any chemical composition other than those given in Table 2 is added, the content rate shall be reported.

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Errata for **JIS** (English edition) can be downloaded in PDF format at Webdesk (purchase information page) of our website (<https://www.jisa.or.jp/>).

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