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Steel pipe sheet piles

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Foreword

This translation has been made based on the original Japanese Industrial Standard 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 the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS A 5530:2010** is replaced with this Standard.

However, **JIS A 5530:2010** may be applied in the **JIS** mark certification based on the relevant provisions of Article 19 Clause 1, etc. of the Industrial Standardization Law until October 19, 2016.

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Steel pipe sheet piles

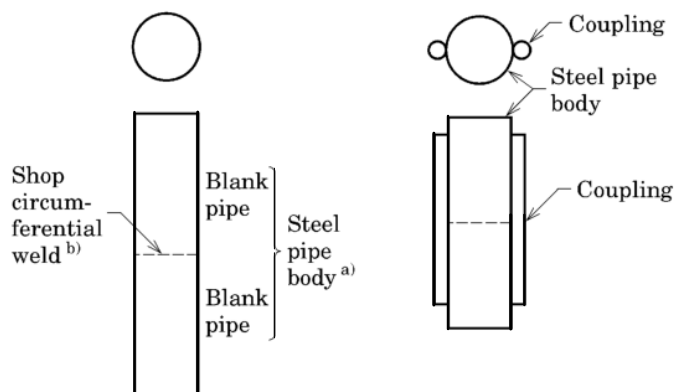
1 Scope

This Japanese Industrial Standard specifies the steel pipe sheet piles²⁾ used for sheathing, coffering¹⁾, foundation of structures and the like. The construction of steel pipe sheet pile and the designation of each part are shown in Figure 1 to Figure 3.

NOTE : This Standard is applicable to steel pipe sheet piles of which the pipe body outside diameter is 500 mm to 2 000 mm.

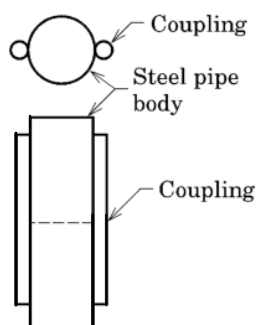
Notes ¹⁾ Coffering refers to an enclosing wall intended for preventing water influx.

²⁾ A steel pipe sheet pile normally refers to a product consisting of a steel pipe body and couplings attached to it. Some products, however, are only pipe bodies with no couplings attached, depending on the using conditions or pipe body construction.



- Notes ^{a)} A steel pipe body refers to a blank pipe as it is or blank pipes jointed by shop circumferential welding (hereafter referred to as “jointed pipes”).
- ^{b)} The shop circumferential welding refers to circumferential welding performed by the manufacturer for connecting a blank pipe to another blank pipe to make a steel pipe body.

Figure 1
Constitution of steel pipe body and designation of each part



- Notes ^{a)} The site circumferential welding refers to circumferential welding of steel pipe body performed by the constructor for connecting a steel pipe sheet pile to another steel pipe sheet pile.
- ^{b)} In the steel pipe sheet piles which are connected on site, the piles in the upper, the middle and the lower positions are designated as the upper steel pipe sheet pile, the middle steel pipe sheet pile and the lower steel pipe sheet pile, respectively. When there are two or more middle steel pipe sheet piles, the one in the lowest shall be designated as the first middle steel pipe sheet pile, and the one in the second, as the second middle steel pipe sheet pile, and so on.
- ^{c)} The members used for connecting the couplings of the steel pipe sheet piles when connecting the steel pipe sheet piles on site are designated as the connecting couplings.

Figure 2
Constitution of steel pipe sheet pile and designation of each part

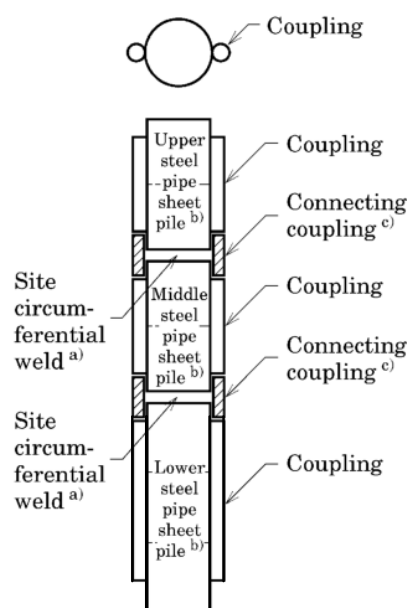


Figure 3
Constitution of steel pipe sheet piles connected on site and designation of each part

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 3101 *Rolled steels for general structure*
 JIS G 3192 *Dimensions, mass and permissible variations of hot rolled steel sections*
 JIS G 3193 *Dimensions, mass and permissible variations of hot rolled steel plates, sheets and strips*
 JIS G 3444 *Carbon steel tubes for general structure*
 JIS Z 2241 *Metallic materials—Tensile testing—Method of test at room temperature*
 JIS Z 3104 *Methods of radiographic examination for welded joints in steel*
 JIS Z 3121 *Methods of tensile test for butt welded joints*
 JIS Z 3211 *Covered electrodes for mild steel, high tensile strength steel and low temperature service steel*
 JIS Z 3312 *Solid wires for MAG and MIG welding of mild steel, high strength steel and low temperature service steel*
 JIS Z 3313 *Flux cored wires for gas shielded and self-shielded metal arc welding of mild steel, high strength steel and low temperature service steel*
 JIS Z 3351 *Solid wires for submerged arc welding of carbon steel and low alloy steel*
 JIS Z 3352 *Fluxes for submerged arc welding*
 JIS Z 8401 *Guide to the rounding of numbers*

3 Classification and symbols

The steel pipe sheet piles shall be classified into two grades, and symbols of grade shall be as given in Table 1.

Table 1 Symbol of grade

Symbol of grade
SKY400
SKY490

4 Manufacturing method

The manufacturing method shall be as follows.

- a) The blank pipe is produced by spiral seam welding or straight seam welding by arc welding or electric resistance welding.

In shop circumferential welding, the seam welds of the connected blank pipes shall be staggered at least 1/8 the pipe circumferential length in the circumferential direction.

- b) Steel pipe body is either a blank pipe as it is or a jointed pipe made by jointing blank pipes by shop circumferential welding. Jointed pipes may be manufactured by connecting blank pipes of different types or different wall thicknesses by shop circumferential welding.
- c) Steel pipe sheet pile shall be manufactured by welding couplings to a steel pipe body.

5 Chemical composition

The blank pipes shall be subjected to the chemical analysis of **12.1**, and the heat analysis values shall be as given in Table 2.

Table 2 Chemical composition

Unit: %

Symbol of grade	C	Si	Mn	P	S
SKY400	0.25 max.	—	—	0.040 max.	0.040 max.
SKY490	0.18 max.	0.55 max.	1.65 max.	0.035 max.	0.035 max.
If required, other alloy elements than those specified in the table may be added.					

6 Mechanical properties

The blank pipes shall be subjected to the mechanical tests of **12.2**, and the tensile strength, yield point or proof stress, elongation, tensile strength of welds and flattening resistance shall satisfy the requirements in Table 3. In the flattening resistance test, the test piece shall be free from cracks when flattened by compression until the distance between the flat plates specified in Table 3 is attained. The tensile strength of welds shall apply to the blank pipes manufactured by arc welding, and the flattening property shall apply to the blank pipes produced by electric resistance welding.

Table 3 Mechanical properties

Symbol of grade	Tensile strength	Yield point or proof stress	Elongation %		Tensile strength of weld	Flattening resistance Distance between flat plates
	N/mm ²	N/mm ²	Tensile test piece	Tensile test direction	N/mm ²	mm
			Test piece No. 5	Normal to pipe axis ^{a)}		
SKY400	400 min.	235 min.	18 min.		400 min.	$\frac{2}{3} D^{b)}$
SKY490	490 min.	315 min.	18 min.		490 min.	$\frac{7}{8} D^{b)}$
NOTE : 1 N/mm ² = 1 MPa						
Notes ^{a)} When sample for tensile test is taken from a steel strip or steel sheet, the sampling direction shall be either in parallel or perpendicular to the rolling direction.						
^{b)} <i>D</i> is for outside diameter of pipe.						

7 Shop circumferential welding

The welding material for shop circumferential welding and the quality of welds shall be as follows.

- a) **Welding materials** The welding materials used for the shop circumferential welding to joint blank pipes to make a steel pipe body shall have a tensile strength equal or superior to the specified tensile strength for the blank pipe material and shall be any one or combination of materials specified in the following standards:

JIS Z 3211, JIS Z 3312, JIS Z 3313, JIS Z 3351, JIS Z 3352

Further, the welding material to be used for shop circumferential welding of different types of blank pipes shall have a tensile strength of 400 N/mm² or greater.

- b) **Quality of welds** Shop circumferential welds shall be subjected to the radiographic testing in 12.3, and the observed flaws shall be classified one of the types given in Annex 4 Table 1 of **JIS Z 3104**, and fall under the category of Class 1 to Class 3 in the table applicable to their types given in clause 6 of Annex 4 in **JIS Z 3104**.

8 Materials of couplings and connecting couplings

The materials of the couplings and the connecting couplings for SKY400 and SKY490 shall be equal or superior in quality to either STK400 of **JIS G 3444** or SS400 of **JIS G 3101**. The welding materials to be used for fitting the couplings and connecting couplings shall have a tensile strength equal or superior to the specified tensile strength of the materials of the couplings and the connecting couplings, and shall conform to 7 a).

9 Accessories, working and painting/coating

The purchaser may specify the attachment of accessories³⁾, working⁴⁾ and painting/coating to be performed on steel pipe sheet piles. Appearance, inspection, marking and so on in this case shall be as agreed between the purchaser and the manufacturer. In addition to the requirements specified in the main body of this Standard, typical shape and dimensions of accessories to be attached to the steel pipe body are shown in Annex A, and typical working and coating/painting to be performed on the steel pipe body are shown in Annex B.

Notes ³⁾ Accessories refers to the members temporarily required for the construction of steel pipe sheet pile.

⁴⁾ Working refers to the work performed on steel pipe sheet piles for the purpose of bringing out their performance such as load transmission to concrete.

10 Shapes, dimensions, mass and tolerances

10.1 Edge shapes of steel pipe sheet pile

The edge shapes of steel pipe sheet pile shall be as shown in Figure 4. Where the blank pipes of different wall thicknesses are connected, they shall normally have been worked at shop as shown in Figure 5. However, where a special reinforcement or working is required, it may be performed as agreed between the purchaser and the manufacturer.