Specification for joint plates and shoes for precast concrete piles
SIRIM STANDARDS

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Foreword

This SIRIM Standard was developed by the Project Committee on Joint Plates and Shoes for Precast Concrete Piles established by SIRIM Berhad.

This standard was developed with the following objectives:

a) to understand requirements and importance of pile joints for building and civil engineering works;

b) to provide comprehensive standard that specifies requirements for joints plates and shoes for precast concrete piles; and

c) to be used as a guidance by users and manufacturers.

This standard will be subjected to review to reflect current needs and conditions. Users and other interested parties may submit comments on the contents of this standard for consideration into future versions.

Compliance with this standard does not by itself grant immunity from legal obligations.
Specification for joint plates and shoes for precast concrete piles

1. Scope

This standard specifies the requirements for joint plates and shoes which are intended to be used in manufacturing of concrete piles as described in MS 1314:Part 1 to MS 1314:Part 6.

This standard does not cover the installation and jointing of piles on site.

2. Normative references

The following normative references are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the normative reference (including amendments) applies.

MS 146, Steel for the reinforcement of concrete - Weldable reinforcing steel - Bar, coil and decoiled product - Specification

MS 1314:Part 1, Precast concrete piles: Part 1: General requirements and specifications

MS 1314:Part 2, Precast concrete piles: Part 2: Method for determination of bending strength of precast concrete piles (bend test)


MS 1314:Part 4, Precast concrete piles: Part 4: Precast pretensioned spun concrete piles (spun piles) - Class A, Class B and Class C


MS 1492, Welding - Recommendations for welding of metallic materials

MS EN 10025-2, Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels

BS EN 1561, Founding - Grey cast irons

ASTM A769, Standard specification for carbon and high-strength electric resistance forge-welded steel structural shapes
3. Terms and definitions

For the purposes of this standard, the terms and definitions given in MS 1314 (all parts) and the following apply.

3.1 joint plate

Fabricated steel component to connect the ends of two piles which includes centering bar, perimeter skirting and anchorage bar.

3.2 pile shoe

Fabricated component to protect and reinforce the tip of a starter pile.

4. Types of joint plates

4.1 Standard types of joint plates

4.1.1 Precast square pile

In lengthening of piles, the mild steel end plates are jointed centrally and axially and subjected to full penetration field butt welding. The standard detail of precast square pile joint plate is shown in Figure 1.

![Figure 1. Precast square pile joint plate detail](image-url)
4.1.2 Precast pretensioned spun pile

The standard detail for precast pretensioned spun pile joint plate is shown in Figure 2.

![Figure 2. Precast pretensioned spun pile joint plate detail](image)

**Key**
- **D**: Outer diameter of pile
- **R**: Root
- **A**: Throat thickness
- **W**: Width

**Figure 2. Precast pretensioned spun pile joint plate detail**

4.2 Special type of plate

For special type of joint plate, the detailed dimensional drawing and design shall be subjected to agreement between manufacturer and purchaser.

5. Types of pile shoes

5.1 Standard types of pile shoes

5.1.1 Precast square pile

The standard types of pile shoes used for precast square pile are shown in Figure 3.
Figure 3. Standard types of pile shoes for precast square pile
5.1.2 Precast pretensioned spun pile

The standard types of pile shoes used for spun pile are shown in Figure 4.

**Figure 4. Standard types of pile shoes for spun pile**
5.2 Special type of pile shoe

For special type of pile shoe, the detail dimensional drawing and design shall be subjected to agreement between manufacturer and purchaser.

6. Material requirements

6.1 Mild steel plate

The mild steel plate shall be minimum of grade S275 in accordance with MS EN 10025-2.

6.2 Reinforcement bar

The material used shall be minimum of grade B500B in accordance with MS 146.

6.3 Cast iron

The material used shall comply with BS EN 1561.

7. Welding

The method of welding shall comply with one of the following standards, i.e. MS 1492, ASTM A769 or equivalent.

7.1 Welding requirements

In addition to standard welding requirements, the following conditions apply.

a) the correct welding current;

b) the correct welding voltage;

c) the optimum welding speed;

d) the correct flow of shielding gas;

e) the correct size of core wire; and

f) the correct thickness of material.

7.2 Workmanship

Welding joints shall be visibly free from spatters, cracks, undercuts, pitting, degraded crater, slag inclusion, blowholes or other welding defects.
8. Dimensional requirements

8.1 Dimensions of a joint plate

The dimensions of a joint plate shall comply with MS 1314.

8.2 Dimensions of a pile shoe

The dimensions of a pile shoe for precast pile are as specified in Table 1.

Table 1. Dimensions of pile shoe for precast pile

<table>
<thead>
<tr>
<th>Type of pile shoe</th>
<th>Description of tolerance</th>
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<tr>
<td>Type 1: Flat shoe</td>
<td>The minimum thickness of mild steel plate of the flat shoe shall be 6 mm.</td>
</tr>
<tr>
<td>[Thickness 6 mm, min.]</td>
<td></td>
</tr>
<tr>
<td>Type 2: Cast iron shoe</td>
<td>The minimum height of the cast iron shoe shall be 75 mm and the thickness of mild steel plate shall be not less than 8 mm.</td>
</tr>
<tr>
<td>[Thickness 8 mm, min.]</td>
<td></td>
</tr>
<tr>
<td>Type 3: Fabricated pointed shoe</td>
<td>The minimum height of the shoe shall be 100 mm and the thickness of the mild steel plate shall be not less than 8 mm.</td>
</tr>
<tr>
<td>[Thickness 8 mm, min.]</td>
<td></td>
</tr>
<tr>
<td>Type 4: Rock shoe (Oslo shoe)</td>
<td>The thickness of the fin shall be the same with the joint’s base plate which is according to the respective MS 1314 standard. The minimum height shall be 100 mm and the minimum height of extended Oslo point shall be 75 mm.</td>
</tr>
<tr>
<td>Same thickness for fin and plate</td>
<td></td>
</tr>
</tbody>
</table>
Table 1. Dimensions of pile shoe for precast pile (continued)

<table>
<thead>
<tr>
<th>Type of pile shoe</th>
<th>Description of tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 5: X-pointed shoe</td>
<td>The thickness of the fin shall be the same with the joint base plate which is according to the respective MS 1314 standard. The minimum height shall be 100 mm.</td>
</tr>
</tbody>
</table>

9. Testing

9.1 Material

The material shall be tested in accordance with the relevant material standard.

9.2 Dimension

The dimension of joint plate and shoe shall be checked and comply with the requirements in Clause 8.

10. Marking

Every batch shall be marked with the following information:

a) manufacturer's name, trademark or brand name;
b) type of joint plate or pile shoe;
c) size for concrete pile according to MS 1314; and
d) manufacturing date or batch number.
Acknowledgements

SIRIM Berhad would like to thank the members of the Project Committee on Joint Plates and Shoes for Precast Concrete Piles who have contributed their ideas, time and expertise in the development of this standard.

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