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**Precast concrete products — General
rules for methods of performance test**

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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 Japan Precast Concrete Standard Committee (JPCC)/Japanese Standards Association (JSA) 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 5363**:2010 is replaced with this Standard.

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Precast concrete products — General rules for methods of performance test

1 Scope

This Japanese Industrial Standard specifies the general matters of the performance test for precast concrete products (hereafter referred to as products), which is one of the verification methods of the performance of the said products. However, this Standard is not applicable to concrete products for buildings which are separately specified in Japanese Industrial Standards.

This Standard does not restrict the use of other suitable test methods, and is applicable to the tests for type inspection (classification of performance test), final inspection and delivery inspection of a product, as appropriate. The comparison table between previous and current editions of this Standard on technically significant revisions is listed in Annex A.

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) listed below shall be applied.

JIS A 0203 *Concrete terminology*

JIS B 7505-1 *Aneroid pressure gauges — Part 1 : Bourdon tube pressure gauges*

JIS B 7721 *Tension/compression testing machines — Verification and calibration of the force-measuring system*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS A 0203**, and the following apply.

3.1 flexural strength test of product

test method in which a load is directly applied to a product under the condition where the bending fracture occurs on the product

3.2 shear strength test of product

test method in which a load is directly applied to a product under the condition where the shear fracture occurs on the product

3.3 compressive strength test of product

test method in which a load is directly applied to a product under the condition where the compressive fracture occurs on the product in its axial direction

3.4 internal pressure strength test of product

test method in which the hollow part of a product is filled with water and is subjected to an internal pressure, then the internal pressure strength of the product is determined and the leakage of water is examined

3.5 cracking load of product

value of the load by which a product is judged whether it holds the flexural cracking strength in the product performance test

3.6 ultimate load of product

value of the load by which a product is judged whether it holds the ultimate flexural strength in the product performance test

4 Classification of performance test methods of products

The performance test methods of products shall be classified as shown in Table 1.

Table 1 Classification of performance test methods of products

Performance test method	Shape of product	Loading method
Flexural strength test	Bar product Plate product	Two-position loading on simple beam Method in which a component in a simple beam form is supported at both ends, and load is applied to two positions across the centre of component (see Figure 1). One-position loading on simple beam Method in which a component in a simple beam form is supported at both ends, and load is applied to one position on the centre of component (see Figure 2). Lading on cantilever beam Method in which one end of component is fixed, and load is applied to the other end (see Figure 3 and Figure 4).
	Cube rigid frame product	Method in which the bottom plate of component of cube rigid frame is supported at both ends, and linear load is applied in the length direction of top plate (see Figure 5).
	Cylinder product	Method in which the cylindrical component is horizontally and linearly supported, and linear load is applied in the length direction of the top part (see Figure 6).
Shear strength test	Bar product Plate-type product	Loading on simple beam Method in which a component in a simple beam form is supported at both ends, and load is applied to two positions across the centre (see Figure 7). Loading on beam with one end overhanging Method in which a component is supported at two positions with one end overhanging, and load is applied to two positions, one on the overhanging end and the other between the supporting positions (see Figure 8).
Compressive strength test	Cylinder product, etc.	Axial compression loading Method in which a component is installed vertically, and the compressive force is applied in the axial direction of the component (see Figure 9).
Internal pressure strength test	Cylinder product Cube rigid frame product	Method in which the hollow part of cylindrical component or cube rigid frame is filled with water, and a test water pressure is applied (see Figure 10 and Figure 11).

5 Performance of testing machine

The testing machine for the performance test of at least Class 1 specified in **JIS B 7721**, or that having the performance at least equivalent thereto shall be used. For the measurement of water pressure, the pressure gauge of Grade 1.6 specified in **JIS B 7505-1** or superior shall be used.

6 Performance tests of product

6.1 Flexural strength test of product

6.1.1 Measuring items

Crack width, displacement and curvature may be selected as measuring items for the flexural strength test of products.

6.1.2 Loading and test methods

The loading and test methods shall be as follows.

- a) The load shall be applied to the product without an impact, and the flexural cracking strength shall be obtained from the load when cracking starts. The crack width corresponding to the load shall be measured, if necessary. The flexural cracking strength, critical cracking width strength, etc. may be obtained after the relation between the load and the crack width is determined.
- b) The ultimate flexural strength shall be obtained in such a way that the load is increased until the cross-sectional fracture occurs or the maximum load is confirmed.
- c) When the flexural strength test is carried out on the product only for the purpose of judging whether the product has the required strength, the load is increased up to that corresponding to the strength, and cracking, deformation, etc. shall be examined.

6.1.3 Installation of product and calculation of strength

The loading and test methods according to the shape of product shall be as follows.

- a) **Two-position loading on simple beam for bar product or plate product** The product shall be installed as shown in Figure 1. The product shall be supported at its both ends, and the load shall be applied on two positions across the centre of span.

In this case, a rubber plate or the like shall be placed on the supporting positions and the loading positions so that the load is uniformly distributed. When a local fracture is likely to occur at the loading position or at the supporting position before the start of the flexural fracture of the product, a preventive action may be taken. The flexural strength (bending moment) of the product shall be calculated as follows. The own weight may be ignored depending on its degree of influence.

NOTE : The hardness, thickness and width of rubber plate, etc. should be selected by taking the product and test conditions into consideration.

$$M = \frac{2F(l-b) + gm(2l-L)}{8}$$

where, M : bending moment (kN·m)
 F : load (kN)
 g : acceleration of gravity (use 9.81 m/s²)
 m : mass of component (t)
 L : length of component (m)
 l : span (m)
 b : length between loading positions (m)

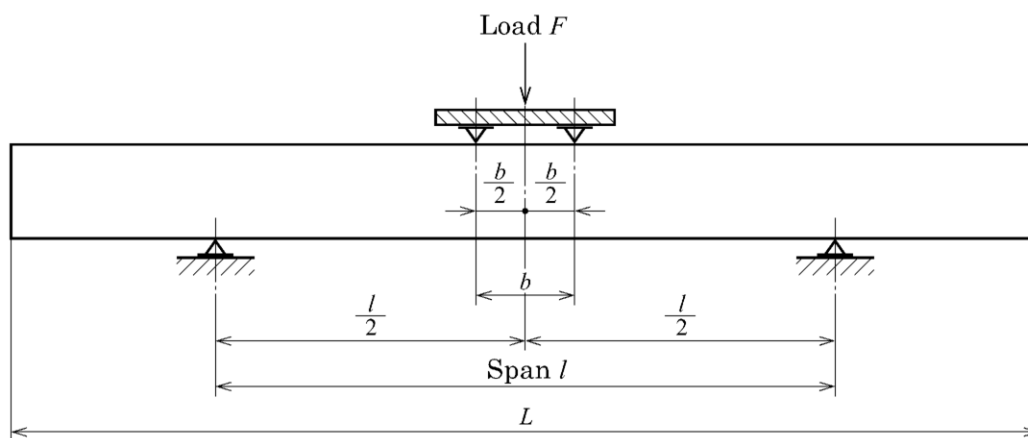


**Figure 1 Two-position loading on simple beam
(bar product or plate product)**

- b) **One-position loading on simple beam for bar product or plate product** The product shall be installed as shown in Figure 2. The product shall be supported at its both ends, and the load shall be applied on one position at the centre of span.

In this case, a rubber plate or the like shall be placed on the supporting positions and the loading position so that the load is uniformly distributed. When a local fracture is likely to occur at the loading position or at the supporting position before the start of the flexural fracture of the product, a preventive action may be taken. The flexural strength (bending moment) of the product shall be calculated as follows. The own weight may be ignored according to its degree of influence.

NOTE : The hardness, thickness and width of rubber plate, etc. should be selected by taking the product and test conditions into consideration.

$$M = \frac{Fl}{4}$$

where, M : bending moment (kN·m)
 F : load (kN)
 l : span (m)

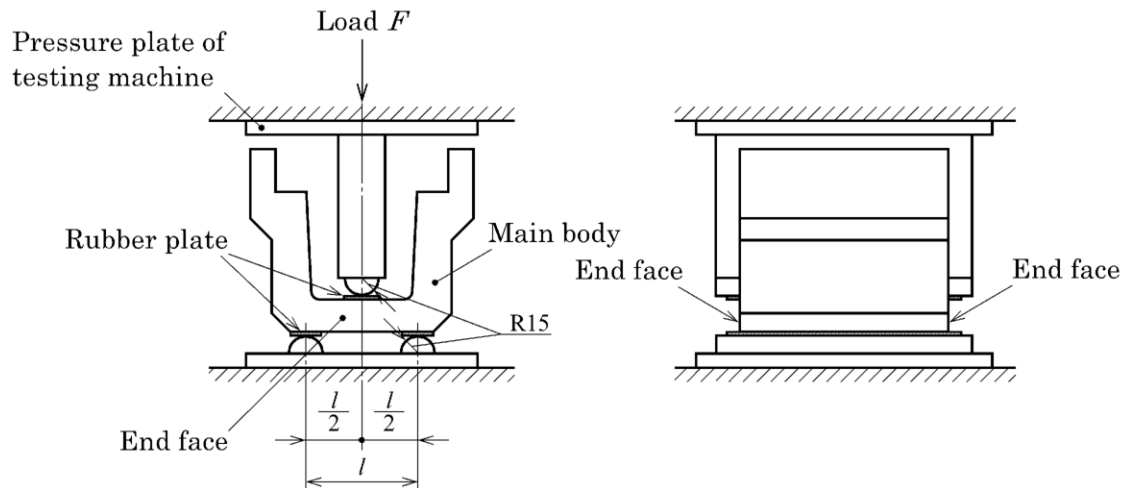


**Figure 2 One-position loading on simple beam
(bar product or plate product)**

- c) **Loading on cantilever beam for bar product or plate product** The bar-type product shall be installed and fixed with cushion material or the like inserted as shown in Figure 3. The plate-type product shall be installed and fixed with steel beam or the like inserted as shown in Figure 4. The load shall be applied to the loading position as perpendicularly as possible to the axis of the component.

In this case, a rubber plate or the like shall be placed on the supporting position and the loading position so that the load is uniformly distributed. When a local fracture is likely to occur at the loading position or at the supporting position before the start of the flexural fracture of the product, a preventive action may be taken. The flexural strength (bending moment) of the product shall be calculated as follows. The own weight of the cantilever part of the product shall be taken into consideration, if required.

NOTE : The hardness, thickness and width of rubber plate, etc. should be selected by taking the product and test conditions into consideration.

$$M = FH$$

where, M : bending moment (kN·m)
 F : load (kN)
 H : length from supporting position to loading position (m)