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**Test methods for creep in
compression of refractory products**

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In the event of any doubts arising as to the contents,
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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 Technical Association of Refractories, Japan (TARJ)/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 R 2658:1995** is replaced with this Standard.

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Test methods for creep in compression of refractory products

Introduction

This Japanese Industrial Standard has been prepared based on the first edition of **ISO 3187** published in 1989 with some modifications of the technical contents to describe the testing methods and the summarizing methods of their results concretely, and to enhance the applicable testing apparatus.

The portions given sidelines or dotted underlines are the matters in which the contents of the original International Standard have been modified. A list of modifications with the explanations is given in Annex JC.

1 Scope

This Standard specifies the differential method up to 1 500 °C for determining the creep in compression of a refractory products produced by a constant load under the isothermal conditions.

NOTE 1 The determination up to 1 600 °C is permissible according to the performance of apparatus.

NOTE 2 The test method for creep in compression without using the differential method is given in Annex JA as a reference.

NOTE 3 The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 3187:1989 *Refractory products—Determination of creep in compression* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

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 B 7507 *Vernier, dial and digital callipers*

JIS B 7524 *Feeler gauges*

JIS B 7526 *Squares*

JIS C 1602 *Thermocouples*

JIS R 2001 *Glossary of terms used in refractory*

JIS R 2553 *Testing method for crushing strength and modulus of rupture of castable refractories*

JIS S 6032 *Plastics rulers*

JIS Z 8103 *Glossary of terms used in measurement*

JIS Z 8401 *Guide to the rounding of numbers*

3 Terms and definitions

For the purposes of this Standard, the definitions given in **JIS R 2001** and **JIS Z 8103**, and the following definitions apply.

3.1 creep

change as a function of time in height direction of refractory product subjected to compression under isothermal conditions

3.2 height change rate

change rate (%) in height direction of test piece at the test temperature (°C) from the height of test piece at room temperature

3.3 creep change rate

temporal change in height change rate of refractory product subjected to compression under isothermal conditions

This shall be obtained according to the following formula and rounded to two decimal places in accordance with **JIS Z 8401**.

$$[(L_{f0} - L_{ft})/L_0] \times 100 (\%)$$

where, L_{f0} : test piece height at test start at test temperature f (mm)

L_{ft} : test piece height at test time t at test temperature f (mm)

L_0 : test piece height at room temperature (mm)

4 Principle

A test piece of given dimensions to which a constant compressive load is applied is heated up to the test temperature at the specified rate of temperature rise, and when the test temperature is reached, the relation between the amount of deformation of the test piece and the elapsed time under the isothermal conditions is continuously recorded while keeping the temperature, and the amount of creep is calculated from the height change rate (%) obtained.

5 Apparatus and instrument

5.1 Creep testing apparatus

5.1.1 General

As shown in figure 1 and figure 2, each central axis of the round loading column (①), the test piece (⑤) and the supporting column (⑨) in the creep testing apparatus installed in the furnace shall be made to coincide, and this shall be maintained during

the test. The structure shall be such that the amount of deformation of test piece produced in the predetermined retention time in the temperature rise process and at the test temperature with constant pressure applied in this central axis direction can be calculated from the relative change amount of the length of tubes for position detection (⑦ and ⑧) contacted with the upper and lower disc spacers (② and ⑥) of the test piece. The apparatus with the structure using jigs that pass through the load part as shown in figure 3 may be used.

NOTE : Although both arrangements in figure 2 and figure 3 are within the scope of this Standard, figure 2 is preferable in which the deformation amount measuring instrument is positioned in the lower part of the testing apparatus. The reasons are overviewed in Annex A.

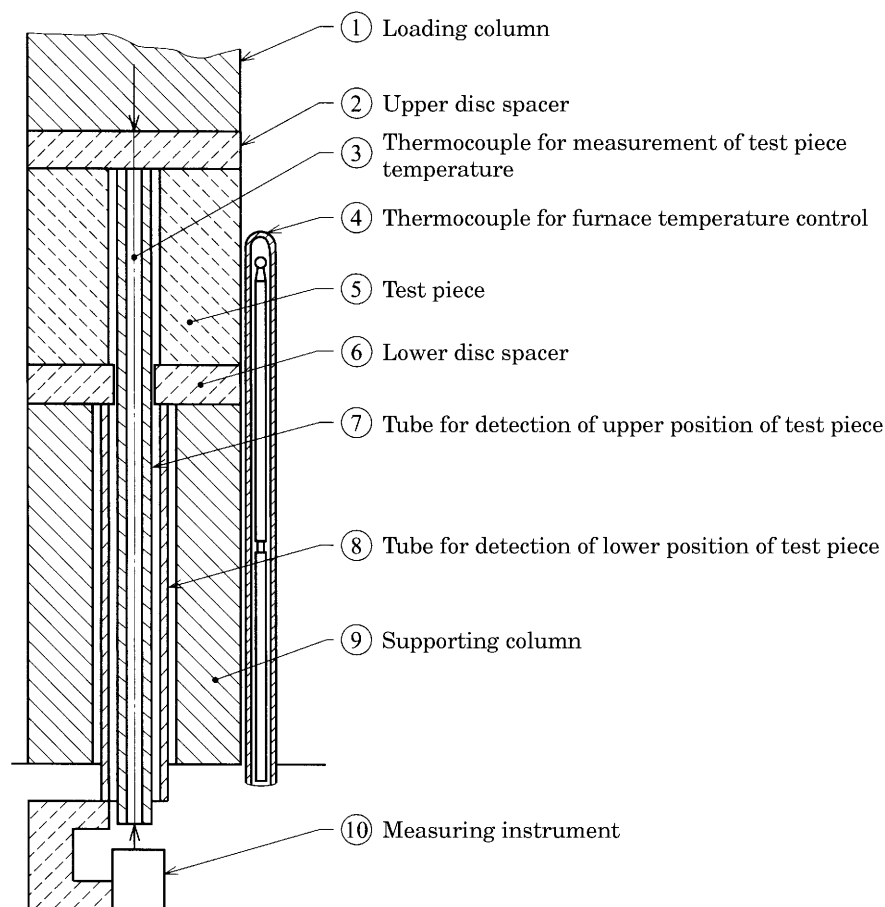


Figure 1 Outline of creep testing apparatus (when creep change rate of test piece is measured in lower part of apparatus)

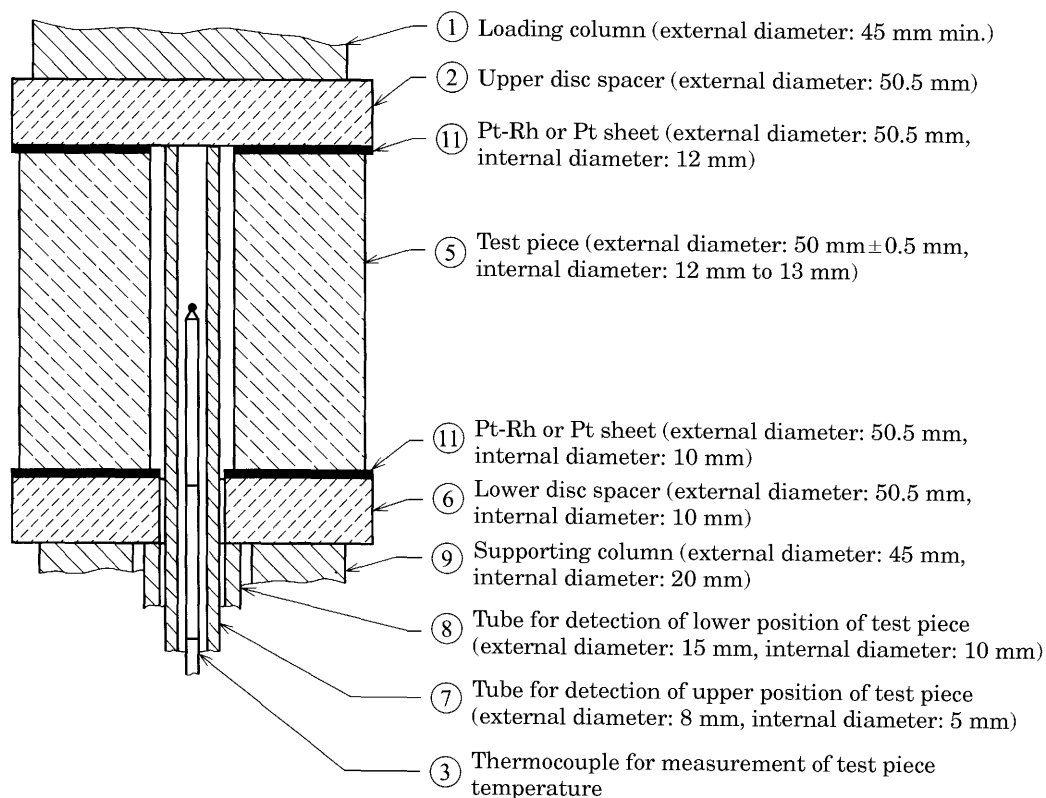


Figure 2 Detail of creep testing apparatus (when creep change rate of test piece is measured in lower part of apparatus)

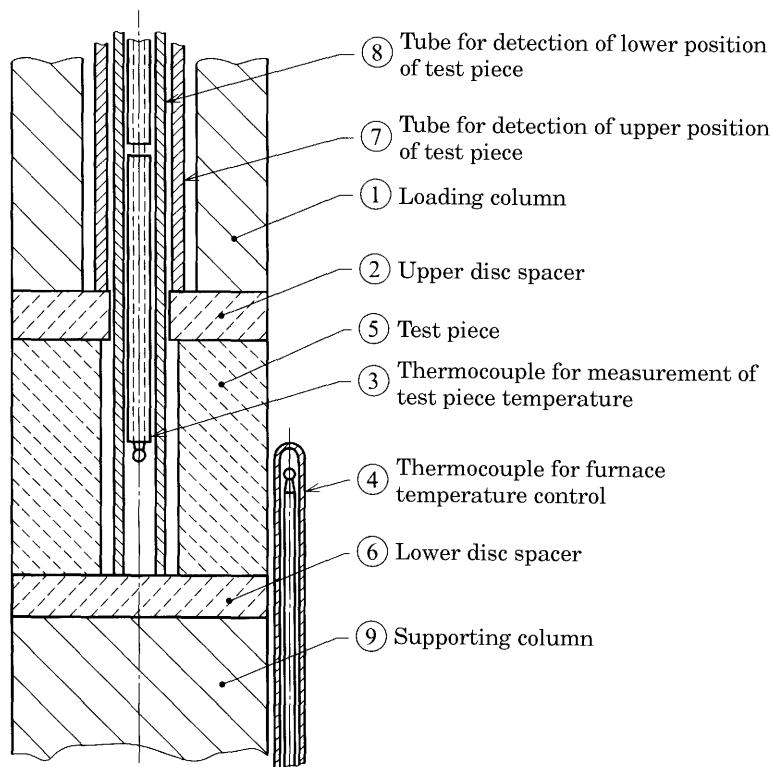


Figure 3 Outline of creep testing apparatus (when creep change rate of test piece is measured in upper part of apparatus)