



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 2490 : 2008

(HPI)

**Test method for sealing behavior of
gaskets for pipe flanges**

ICS 23.040.80; 23.100.60

Reference number : JIS B 2490 : 2008 (E)

PROTECTED BY COPYRIGHT

Date of Establishment: 2008-03-20

Date of Public Notice in Official Gazette: 2008-03-21

Investigated by: Japanese Industrial Standards Committee
Standards Board

Technical Committee on Machine Elements

JIS B 2490:2008, First English edition published in 2008-11

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

Contents

	Page
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Quantity symbols	1
5 Test gasket	2
5.1 Dimensions	2
5.2 Number	2
5.3 Inspection	2
5.4 Pretreatment	2
6 Test platen	2
6.1 Dimensions and structure	2
6.2 Area of contact surface of gasket	3
7 Test medium	3
8 Test equipment	3
8.1 Loading equipment	3
8.2 Displacement gauge (measurement for compressive deformation amount of gasket)	3
8.3 Internal pressure loading equipment	4
8.4 Leak rate measurement equipment	4
9 Test method	4
9.1 Test procedure	4
9.2 Test condition and preparation	5
9.3 Preload	6
9.4 Test sequence	6
9.5 Measurement for leak rate	6
9.6 Measurement for compressive load and amount of compressive deforma- tion of gasket	6
10 Treatment of results	7
10.1 Effective clamping pressure	7
10.2 Compressive deformation amount of gasket	7
10.3 Basic leak rate	7
10.4 Graphical display	8
11 Report	8
Annex A (normative) Dimensions of gasket used for test	9

Annex B (informative) Test platen	10
Annex C (informative) Test equipment	12
Annex D (informative) Leak rate measurement equipment	13
Annex E (normative) Report	14

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from High Pressure Institute of Japan (HPI) with a draft of Industrial Standard prepared from association standard (**HPIS Z104**:2005) based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

This **JIS** document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Test method for sealing behavior of gaskets for pipe flanges

1 Scope

This Japanese Industrial Standard specifies the test method for sealing behaviour of gaskets for pipe flanges at room temperature on which internal pressure works. The non-metallic gaskets such as joint sheet gasket, PTFE sheet gasket, expansive graphite gasket and PTFE jacket type gasket, and the spiral wound gasket shall be subject to this Standard and the metallic jacket type gasket and metallic gasket (corrugated gasket, metallic flat gasket, ring joint gasket, etc.) are not subject to.

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 B 0116 *Glossary of terms for packings and gaskets*

JIS B 0190 *Glossary of terms used in construction of pressure vessels*

JIS B 2404 *Dimensions of gaskets for use with pipe flanges*

JIS B 7505 *Bourdon tube pressure gauges*

3 Terms and definitions

For the purposes of this Standard, the definitions given in **JIS B 0116** and **JIS B 0190**, and the following definitions apply.

3.1 basic leak rate

leak rate defined so as to be dimensions-independent when shapes of gaskets are similar

3.2 test platen

a metallic cylinder used for compressing the gasket uniformly in place of flange

4 Quantity symbols

The quantity symbols used in this Standard shall be as follows.

A_g : Area of contact surface of gasket (mm²)

D : Outside diameter of gasket seat of test platen (mm)

D_2 : Nominal inside diameter of gasket (mm)

D_3 : Nominal outside diameter of gasket (mm)

d_i : Inside diameter of contact surface of gasket (mm)

d_o : Outside diameter of contact surface of gasket (mm)

k : Shape factor of gasket

L : Leak rate of gasket in test (Pa · m³/s)

- L_s : Basic leak rate (Pa · m³/s)
 P : Test internal pressure (MPa)
 T : Nominal thickness of gasket (mm)
 T_a : Arithmetic average of measured values of initial thickness of gasket (mm)
 W : Compressive load (N)
 W_0 : Preload (N)
 δ : Measured value of compressive deformation amount of gasket (mm)
 δ_a : Arithmetic average of measured values of compressive deformation amount of gasket (mm)
 σ : Clamping pressure of gasket (N/mm²)
 σ_e : Effective clamping pressure (N/mm²)
 $\sigma_{\max}$: Maximum test clamping pressure of gasket, and that shall be 40 N/mm² for non-metallic gasket and 100 N/mm² for spiral wound gasket

5 Test gasket

5.1 Dimensions

The dimensions of gasket used for test shall be 50 A in nominal diameter of 20 K in nominal pressure specified in **JIS B 2404** (see Annex A).

5.2 Number

The number of gaskets used for test shall be three.

5.3 Inspection

It is visually confirmed that there is no defect to harm the sealing behaviour on the surface and outer and inner perimeter of gasket to be used for test. The thickness at the centre of width of gasket is measured at four points equidistantly and the arithmetic average of them shall be the initial thickness T_a of gasket. For the measurement, the micrometer or thickness gauge having the accuracy of not more than 0.01 mm in scale interval shall be used.

5.4 Pretreatment

The gasket used for test shall be maintained in the environment of 23 °C ± 2 °C in temperature and (50 ± 5) % in relative humidity for at least 48 h until the test is started.

6 Test platen

6.1 Dimensions and structure

The test platen shall have a gasket seat of $D = 96 \text{ mm} \pm 0.3 \text{ mm}$ in outside diameter, and the surface roughness of seat shall be in the range between Ra 3.2 µm and 6.3 µm in arithmetic average roughness and between Rz 12.5 µm and 25 µm in the maximum height roughness. An example of test platen is as shown in Annex B.

6.2 Area of contact surface of gasket

The area A_g of contact surface of gasket shall be obtained, depending on the type of gasket, from the inside diameter d_i and outside diameter d_o of contact surface of gasket as shown in figure 1 and table 1 according to formula (1).

$$A_g = \frac{\pi}{4} (d_o^2 - d_i^2) \dots\dots\dots (1)$$

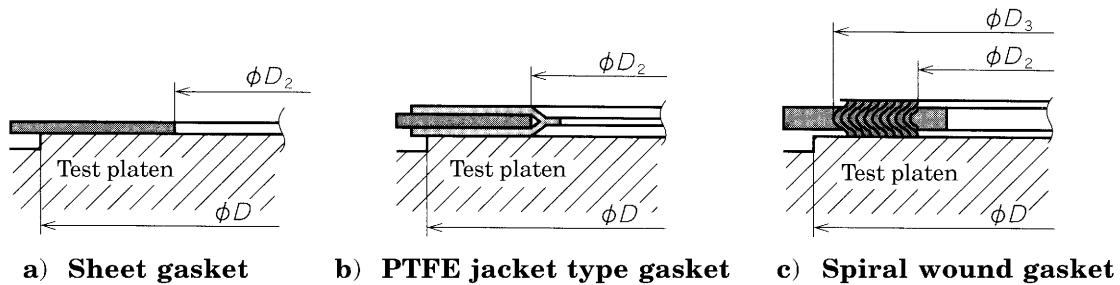


Figure 1 Dimensions of contact surface of gasket

Table 1 Dimensions of contact surface of gasket

Type of gasket	Inside diameter d_i	Outside diameter d_o
Sheet gasket	D_2	D
PTFE jacket type gasket	D_2	D
Spiral wound gasket	D_2	$D_3^{a)}$
Note ^{a)} The outside diameter of contact surface of spiral wound gasket shall be the nominal outside diameter D_3 .		

7 Test medium

The test medium shall be helium gas.

8 Test equipment

8.1 Loading equipment

The test platen fitted with test gasket is loaded by compressive load by using the loading equipment through a load cell. The loading equipment shall be capable of controlling at a definite load. The structure of standard test equipment is as shown in Annex C.

8.2 Displacement gauge (measurement for compressive deformation amount of gasket)

For the test platen, the displacement gauge for measuring the compressive deformation amount of gasket shall be set. The displacement gauge is equally set at two or more points of the outer perimeter of test platen, the displacement between the upper and the lower platens is measured and it is taken as the compressive deformation amount of gasket. The displacement gauge with higher resolution than 0.001 mm shall be used. The deformation of test platen itself influences the measurement results of compressive deformation amount of gasket in some cases, therefore each test load is