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**Saddle supported horizontal
pressure vessels**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Health, Labour and Welfare, and 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 High Pressure Gas Safety Institute of Japan (KHK)/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 B 8278 : 1993** is replaced with this Standard.

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Contents

		Page
1	Scope	1
2	Normative references	1
3	Definitions	1
4	Meaning of symbols.....	1
5	Design of saddle of horizontal cylindrical vessel and peripheral parts ..	4
5.1	Design in general.....	4
5.2	Combination of load	4
5.3	Reaction force of saddle.....	4
5.4	Stress in axis direction of centre part of cylindrical shell and saddle part	5
5.5	Circumferential shear stress of shell plate at saddle part	6
5.6	Circumferential stress at saddle horn part	6
5.7	Compression stress at bottom of shell plate of saddle part	7
5.8	Stress generated on end plate.....	8
5.9	Stress evaluation	8

Saddle supported horizontal pressure vessels

1 Scope This Japanese Industrial Standard specifies calculation related to a saddle of horizontal cylindrical pressure vessels, supported by two saddles symmetrically installed which receive uniformly-distributed load. As for the rule of application, where there is a specification, it shall be in accordance with **JIS B 8265** or **JIS B 8266**, and where there is no specification, it shall be in accordance with the agreement between the purchaser and the manufacturer.

2 Normative references The following Standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) shall be applied.

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

JIS B 8265 *Construction of pressure vessel—General principles*

JIS B 8266 *Alternative standard for construction of pressure vessels*

3 Definitions For the purposes of this Standard, the definitions given in **JIS B 0190** apply.

4 Meaning of symbols Meaning of symbols used in this Standard shall be as follows.

A : distance from the shell tangent line to the centre of the saddle (mm) (see figure 1)

a : sum of sectional areas of one stiffening ring and shell plate considered as effective in reinforcing (mm²) (see figure 2)

B : horizontal width of the saddle (mm) (see figure 1)

b : width of the saddle (mm) (see figure 1)

C_1, C_2 : coefficient according to the stiffening ring mounting location, and shall be in accordance with table 1.

Table 1 Coefficient according to stiffening ring mounting location

Coefficient	Stiffening ring mounting location			
	Within saddle plane		Neighbourhood of saddle	
	Inside surface of shell plate	Outside surface of shell plate	Inside surface of shell plate	Outside surface of shell plate
C_1	-1	+1	+1	-1
C_2	+1	-1	-1	+1

D_m : mean diameter of the shell (mm) (see figure 1)

H : depth of the end plate (mm)

- H_v : height from the bottom surface of the saddle base plate to the centre of the vessel (mm) (see figure 1)
- h : length of the wear plate measured along circumferential direction of the shell from the saddle horn part (mm) (see figure 1)
- $K_{1t}, K_{1b}, K_2, K_3, K_4', K_5, K_6, K_7, K_8$ and K_9 : coefficient decided according to the supporting angle of the saddle (shall be as table 2)
- K_4 : coefficient decided according to the supporting angle of the saddle end (A/R_m)
- L : distance between the tangent lines of the shell (mm) (see figure 1)
- L_s : distance between the centres of the saddles (mm) (see figure 1)
- L_e : length of effective section corresponding to bending moment of the shell in the circumferential direction, and shall be $4R_m$ or $L/2$ (mm), whichever is the smaller
- F_s : horizontal component of force by wind load or earth quake load (N), whichever is the greater
- F_v : vertical load equivalent to horizontal load (N)
- l_F : flange length of the stiffening ring (mm) (see figure 2)
- M_C : maximum bending moment in the circular direction at the saddle part (N·mm)
- M_{LC} : bending moment at the centre part of the cylindrical shell (N·mm)
- M_{LS} : bending moment of the saddle part (N·mm)
- N_C : compression load in the circular direction at the saddle horn (N)
- n_R : number of the stiffening rings mounted to each saddle
- P : design pressure or hydraulic test pressure, and minus value for external pressure (MPa)
- Q : reaction force in the vertical direction generated on one saddle (N)
- R_m : mean radius of the shell (mm) (see figure 1)
- t_s : thickness of the shell plate (mm) (see figure 1)
- t_h : thickness of the end plate (mm) (see figure 1)
- t_w : thickness of the wear plate (mm) (see figure 1)
- W : tare of the vessel (including the weight of content and accessories) (N)
- Z_1, Z_2 : composite section modulus of the stiffening ring and the shell plate considered as effective in reinforcing (mm³)
- Z_C : section modulus of the shell plate at the central part of the cylindrical shell (mm³)
- Z_{st}, Z_{sb} : section modulus of the shell plate at the saddle part (mm³)
- θ : supporting angle of the saddle (°)
- σ_{1t} : composite stress of the top of shell plate at the saddle part (N/mm²)