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(JFPA/JSA)

**O-rings — Part 2: Housing dimensions
and sizes**

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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 for establishment of Japanese Industrial Standard submitted by Japan Fluid Power Association (JFPA) /Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

Consequently **JIS B 2406:1991** has been withdrawn and replaced with this Standard.

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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 or utility model right. 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 or the utility model right.

JIS B 2401 series consists of the following 4 parts under the general title “*O-rings*”:

Part 1: O-rings

Part 2: Housing dimensions and sizes

Part 3: Quality acceptance criteria

Part 4: Anti-extrusion rings (back-up rings)

O-rings — Part 2 : Housing dimensions and sizes

Introduction

This Japanese Industrial Standard has been prepared based on the first edition of **ISO 3601-2** published in 2008 with some modifications of the technical contents which reflect the demands of the Japanese market.

The portions given continuous 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. Annex JA and Annex JB contain matters that are not given in the corresponding International Standard.

1 Scope

This Standard specifies the shapes and dimensions of housings for O-rings used for general machinery applications (hereafter referred to as the “housings”), with or without back-up rings. The basic housing dimensions for ISO O-rings for general industrial applications (Series F) specified in ISO 3601-2 are given in Annex JA.

For shapes and dimensions of O-rings, see JIS B 2401-1.

NOTE 1 Housing dimensions for special applications shall be as agreed between the purchaser and the manufacturer.

NOTE 2 The design standard for O-ring housings for hydraulic and pneumatic applications is given in Annex JB.

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

ISO 3601-2 : 2008 *Fluid power systems — O-rings — Part 2 : Housing dimensions for general applications* (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) indicated below shall be applied.

JIS B 0142 *Fluid power systems and components — Vocabulary*

NOTE : Corresponding International Standard : **ISO 5598** : 2008 *Fluid power systems and components — Vocabulary* (MOD)

JIS B 2401-1 *O-rings — Part 1 : O-rings*

NOTE : Corresponding International Standard : **ISO 3601-1** *Fluid power sys-*

tems — O-rings — Part 1 : Inside diameters, cross-sections, tolerances and designation codes (MOD)

JIS K 6253-3 Rubber, vulcanized or thermoplastic — Determination of hardness — Part 3 : Durometer method

NOTE : Corresponding International Standard : ISO 7619-1 : 2010 Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1 : Durometer method (Shore hardness) (MOD)

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in **JIS B 0142** apply.

4 Symbols

For the purpose of this Standard, the following symbols apply.

- b_1 : width of the O-ring housing (without back-up rings)
- b_2 : width of the O-ring housing (with one back-up ring)
- b_3 : width of the O-ring housing (with two back-up rings)
- b_4 : width of the housing for plane (flange) applications
- d_1 : O-ring inside diameter (in accordance with **JIS B 2401-1**)
- d_2 : O-ring cross-section diameter (in accordance with **JIS B 2401-1**)
- d_3 : housing groove diameter (for piston sealing)
- d_4 : cylinder inside diameter (for piston sealing)
- d_5 : rod diameter
- d_6 : housing groove diameter (for rod sealing)
- d_7 : outside diameter of housing for plane applications
- d_8 : inside diameter of housing for plane applications
- d_9 : piston diameter
- d_{10} : rod bore diameter
- E : fluctuation of depth of machined groove
- g : extrusion gap (half the diameter gap)
- h : depth of housing for plane applications
- K : depth of machined groove
- r_1 : roundness of the groove bottom
- r_2 : roundness of the groove corner
- t : depth of housing for dynamic and static (cylindrical surface) applications
- z : length of lead-in chamfer

5 Shapes and dimensions of housings

5.1 Cross-sectional shapes of housings for cylindrical surface and plane applications

The cross-sectional shapes of housings for cylindrical surface and plane applications shall be as shown in figure 1 and figure 2.

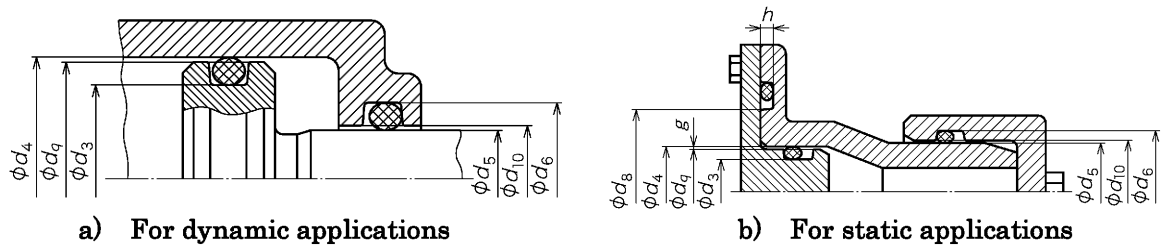


Figure 1 Cross-sectional shapes of piston sealing and rod sealing applications

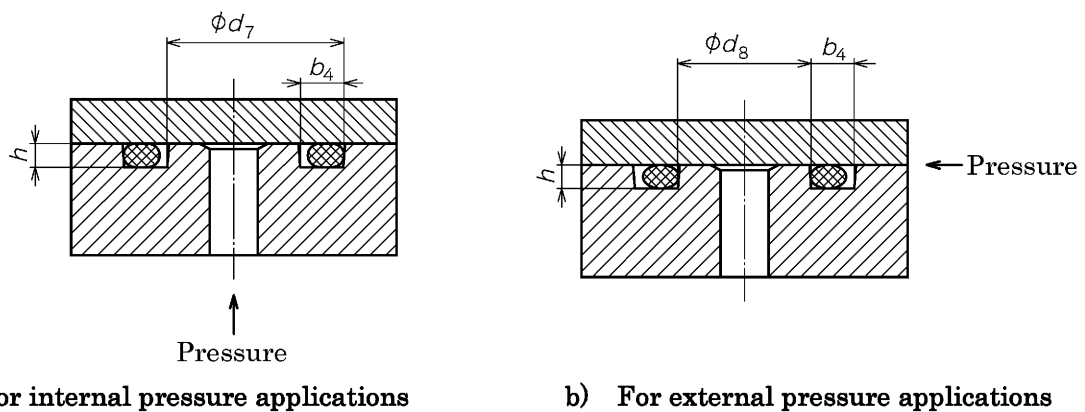


Figure 2 Cross-sectional shapes of plane (flange) seal static applications

5.1.1 Examples of housing

Examples of shapes of housings are shown in figure 3 and figure 4. See JIS B 2401-4 for details of backup rings.

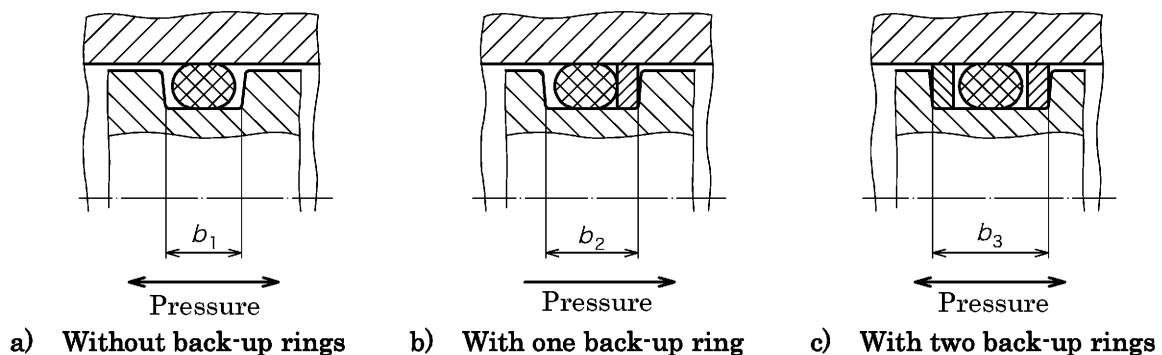


Figure 3 Piston sealing

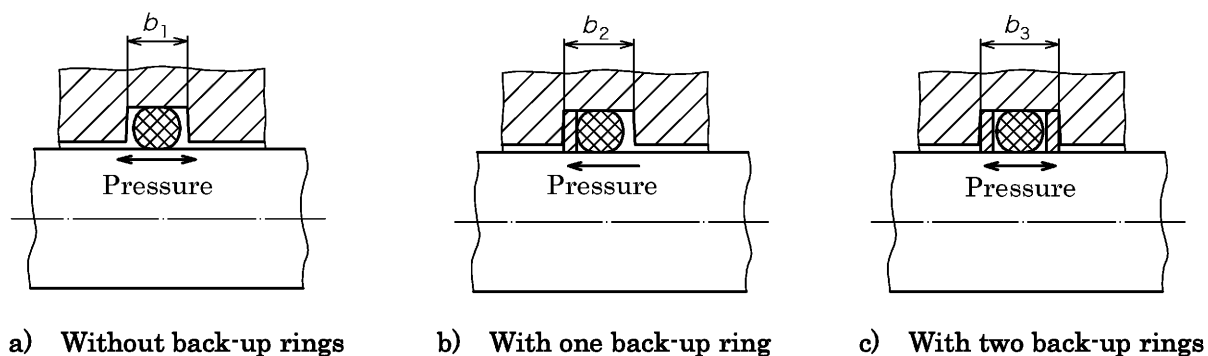


Figure 4 Rod sealing

5.1.2 Housings for plane (flange) static applications

Examples of housings for plane (flange) static applications are shown in figure 5.

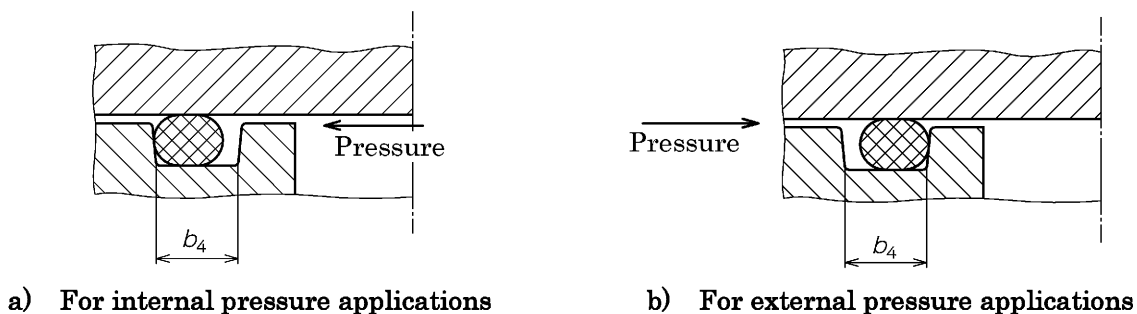


Figure 5 Housing for plane (flange) static applications

5.2 Surface condition

The surface conditions of contact surface of housing and O-ring sealing part are specified as shown in table 1 for each application. Surface conditions of mechanical part to be in contact with O-ring are decided based on the application and required life, and therefore, it is necessary to specify separate conditions for special applications. In design and application, any problem found in installation or actual usage shall be a matter of agreement between the purchaser and the manufacturer.

Table 1 Surface condition of contact surface of housing and O-ring sealing part

Unit : μm

Mechanical parts	Ap- plica- tion	Behaviour of pressure		Surface condition	
				Arithmetic mean height <i>Ra</i>	Maximum height (informative) <i>Rz</i>
Side faces and bottom face of housing	Static	Without pulsation	Plane	3.2	12.5
			Cylindrical surface	1.6	6.3
		With pulsation		1.6	6.3
	Dy- namic	When using a back-up ring		1.6	6.3
		When using no back-up ring		0.8	3.2
Contact surfaces of sealing parts with O-rings	Static	Without pulsation		1.6	6.3
		With pulsation		0.8	3.2
	Dy- namic	—		0.4	1.6
		Lead-in chamfer		3.2	12.5

5.3 Decision of necessity of back-up ring

If the diameter gap (2g) in figure 6, under the using condition, is equal to or less than the value shown in table 2, the use of back-up ring is not necessary, but if it exceeds the value of table 2, the use of back-up ring(s) is required.

Table 2 Maximum value of diameter gap (2g) when not using back-up ring

Unit : mm

Hardness of O-ring (Type A durometer hardness) ^{a)}	Diameter gap (2g)				
	Working pressure (MPa)				
	4.0 or under	Over 4.0 up to and incl. 6.3	Over 6.3 up to and incl. 10.0	Over 10.0 up to and incl. 16.0	Over 16.0 up to and incl. 25.0
70	0.35	0.30	0.15	0.07	0.03
90	0.65	0.60	0.50	0.30	0.17
Note ^{a)} Hardness shall be in accordance with JIS K 6253-3.					

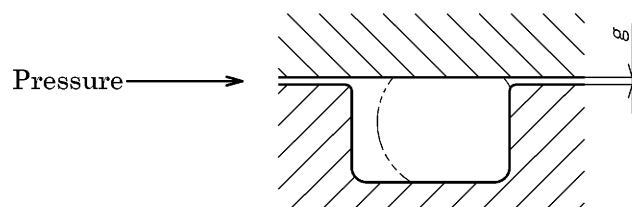


Figure 6 Cross-section of housing for cylindrical surface applications showing diameter gap (2g)

5.4 Shape and dimensions of housings for dynamic and static (cylindrical surface) applications

The shape and dimensions of housings for dynamic and static (cylindrical surface) applications shall be in accordance with table 3.

5.5 Shape and dimensions of housings for static (plane) applications

The shape and dimensions of housings for static (plane) applications shall be in accordance with table 4.

5.6 Shape and dimensions of housings for vacuum flange applications

The shape and dimensions of housings for vacuum flange applications shall be in accordance with table 5.

5.7 Basic dimensions of housings for ISO O-rings for general industrial applications (Series F)

The basic dimensions of housings for ISO O-rings for general industrial applications (Series F) shall be in accordance with Annex JA.

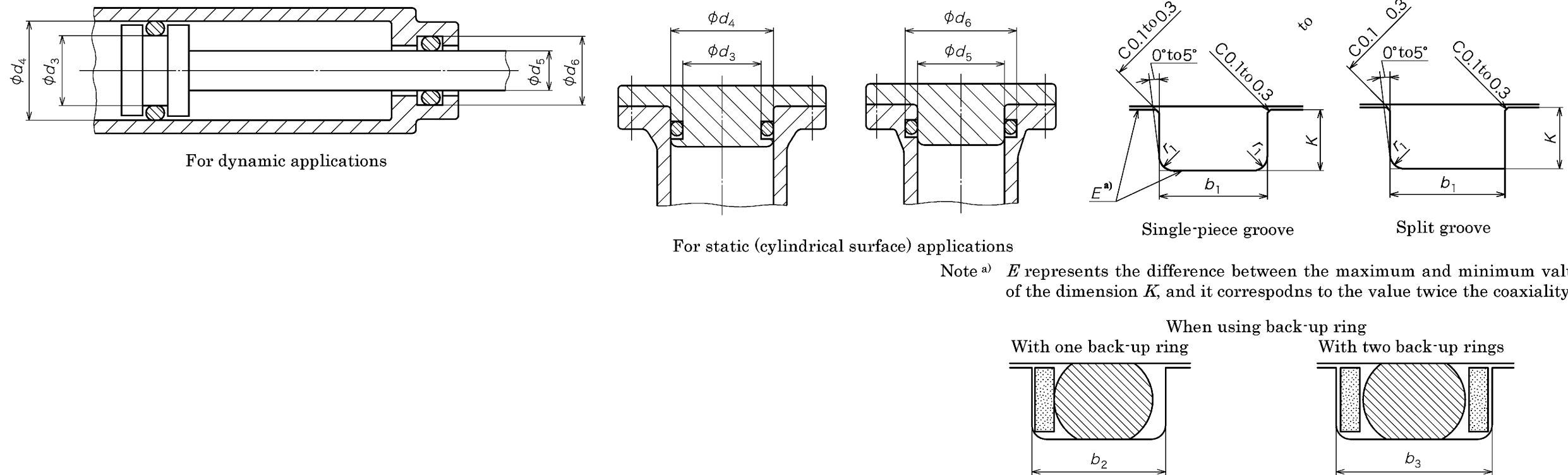
5.8 Design standard for housings for O-rings for hydraulic and pneumatic applications

For the design standard for housings for O-rings for hydraulic and pneumatic pressure applications, see Annex JB.

5.9 Determination of the proper O-ring dimensions for custom housings used for cylindrical surface seal and plane seal applications

For the decision on how to determine O-ring dimensions for custom housings used for cylindrical surface seal and plane seal applications, see Annex A.

Table 3 Shapes and dimensions of housing for dynamic and static (cylindrical surface) applications



Note a) E represents the difference between the maximum and minimum values of the dimension K , and it corresponds to the value twice the coaxiality.

Size code of O-ring	Dimensions and tolerances of housing												Informative								Unit : mm			
	d_3, d_5		Informative			d_4, d_6		Informative			r_1 (max.)	$E^{a)}$ (max.)	Thickness of back-up ring			Actual dimensions of O-ring		Squeeze allowance		Squeeze ratio (%)				
													Tolerance symbol of axial dimension corresponding to the permissible deviations for $d_3, d_5^{b)}$			Tolerance symbol of hole dimension corresponding to the permissible deviations for $d_4, d_6^{b)}$						Tetrafluoroethylene resin		
													Without back-up rings	With one back-up ring	With two back-up rings	Spiral	Bias-cut	Endless	max.	min.	max.	min.		
P 3	3	0 −0.05	h9	f8	e9	6	+0.05 0	H10	2.5	3.9	5.4	0.4	0.05	0.7±0.05	1.25±0.1	1.25±0.1	1.9±0.08	2.8	±0.14	0.48	0.27	24.2	14.8	
P 4	4					7		3.8										±0.14						
P 5	5					8		4.8										±0.15						
P 6	6					9		5.8										±0.15						
P 7	7					10		6.8										±0.16						
P 8	8					11		7.8										±0.16						
P 9	9					12		8.8										±0.17						
P 10	10					13		9.8										±0.17						
P 10A	10	0 −0.06	h9	f8	e8	14	+0.06 0	H9	3.2	4.4	6.0	0.4	0.05	0.7±0.05	1.25±0.1	1.25±0.1	2.4±0.09	9.8	±0.17	0.49	0.25	19.7	10.8	
P 11	11					15												10.8	±0.18					
P 11.2	11.2					15.2												11.0	±0.18					
P 12	12					16												11.8	±0.19					
P 12.5	12.5					16.5												12.3	±0.19					
P 14	14					18												13.8	±0.19					
P 15	15					19												14.8	±0.20					
P 16	16					20												15.8	±0.20					
P 18	18					22												17.8	±0.21					
P 20	20					e7												24	19.8					±0.22
P 21	21																	25	20.8					±0.23
P 22	22																	26	21.8					±0.24

Table 3 (continued)

Size code of O-ring	Dimensions and tolerances of housing													Informative										Unit : mm	
	d_3, d_5		Informative			d_4, d_6		Informative			b_1	b_2	b_3	r_1 (max.)	$E^{a)}$ (max.)	Thickness of back-up ring			Actual dimensions of O-ring			Squeeze allowance		Squeeze ratio (%)	
											+0.25 0														
			Tolerance symbol of axial dimension corresponding to the permissible deviations for $d_3, d_5^{b)}$					Tolerance symbol of hole dimension corresponding to the permissible deviations for $d_4, d_6^{b)}$			Without back-up rings	With one back-up ring	With two back-up rings			Tetrafluoroethylene resin			Cross-sec- tion diameter	Inside diameter $c)$		max.	min.	max.	min.
											Spiral	Bias-cut	Endless												
P 22A	22	0 −0.08	h9	f8	e8	28	+0.08 0	H9	4.7	6.0	7.8	0.8	0.08	0.7±0.05	1.25±0.1	1.25±0.1	3.5±0.10	21.7	±0.24	0.60	0.32	16.7	9.4		
P 22.4	22.4					28.4												22.1	±0.24						
P 24	24					30												23.7	±0.24						
P 25	25					31												24.7	±0.25						
P 25.5	25.5					31.5												25.2	±0.25						
P 26	26					32												25.7	±0.26						
P 28	28					34												27.7	±0.28						
P 29	29					35												28.7	±0.29						
P 29.5	29.5					35.5												29.2	±0.29						
P 30	30					36												29.7	±0.29						
P 31	31					e7												37	30.7					±0.30	
P 31.5	31.5																	37.5	31.2					±0.31	
P 32	32																	38	31.7					±0.31	
P 34	34																	40	33.7					±0.33	
P 35	35																	41	34.7					±0.34	
P 35.5	35.5																	41.5	35.2					±0.34	
P 36	36																	42	35.7					±0.34	
P 38	38																	44	37.7					±0.37	
P 39	39																	45	38.7					±0.37	
P 40	40																	46	39.7					±0.37	
P 41	41				47													40.7	±0.38						
P 42	42				48													41.7	±0.39						
P 44	44				50													43.7	±0.41						
P 45	45				51													44.7	±0.41						
P 46	46				52													45.7	±0.42						
P 48	48				54													47.7	±0.44						
P 49	49				55													48.7	±0.45						
P 50	50				56													49.7	±0.45						
P 48A	48	0 −0.10	h9	f8	e8	58	+0.10 0	H9	7.5	9.0	1.5	0.8	0.10	0.9±0.06	1.9±0.13	1.9±0.13	5.7±0.13	47.6	±0.44	0.83	0.47	14.2	8.4		
P 50A	50					60												49.6	±0.45						
P 52	52				e7	62												51.6	±0.47						
P 53	53					63												52.6	±0.48						
P 55	55					65												54.6	±0.49						
P 56	56					66												55.6	±0.50						
P 58	58					68												57.6	±0.52						
P 60	60					70												59.6	±0.53						

Table 3 (continued)

Size code of O-ring	Dimensions and tolerances of housing													Informative											
	d_3, d_5		Informative			d_4, d_6		Informative			b_1	b_2	b_3	r_1 (max.)	$E^{a)}$ (max.)	Thickness of back-up ring			Actual dimensions of O-ring		Squeeze allowance		Squeeze ratio (%)		
											+0.25 0														
			Tolerance symbol of axial dimension corresponding to the permissible deviations for $d_3, d_5^{b)}$					Tolerance symbol of hole dimension corresponding to the permissible deviations for $d_4, d_6^{b)}$			Without back-up rings	With one back-up ring	With two back-up rings			Tetrafluoroethylene resin			Cross-sec- tion diameter	Inside diameter ^{c)}		max.	min.	max.	min.
																Spiral	Bias-cut	Endless							
P 62	62	0 −0.10	h9	f8	e7	72	+0.10 0	H9	7.5	9.0	11.5	0.8	0.10	0.9±0.06	1.9±0.13	1.9±0.13	5.7±0.13	61.6	±0.55	0.83	0.47	14.2	8.4		
P 63	63					73												62.6	±0.56						
P 65	65					75												64.6	±0.57						
P 67	67					77												66.6	±0.59						
P 70	70					80												69.6	±0.61						
P 71	71					81												70.6	±0.62						
P 75	75					85												74.6	±0.65						
P 80	80					90												79.6	±0.69						
P 85	85					e6												95	84.6					±0.73	
P 90	90																	100	89.6					±0.77	
P 95	95																	105	94.6					±0.81	
P 100	100																	110	99.6					±0.84	
P 102	102																	112	101.6					±0.85	
P 105	105																	115	104.6					±0.87	
P 110	110																	120	109.6					±0.91	
P 112	112																	122	111.6					±0.92	
P 115	115																	125	114.6					±0.94	
P 120	120																	130	119.6					±0.98	
P 125	125				f7	—												135	124.6					±1.01	
P 130	130																	140	129.6					±1.05	
P 132	132																	142	131.6					±1.06	
P 135	135																	145	134.6					±1.09	
P 140	140																	150	139.6					±1.12	
P 145	145																	155	144.6					±1.16	
P 150	150																	160	149.6					±1.19	
P 150A	150	0 −0.10	h9	f7	—	165	+0.10 0	H9	11.0	13.0	17.0	1.2	0.12	1.4±0.08	2.75±0.15	2.75±0.15	8.4±0.15	149.5	±1.19	1.05	0.65	12.3	7.9		
P 155	155					170												154.5	±1.23						
P 160	160					175												159.5	±1.26						
P 165	165					180												164.5	±1.30						
P 170	170					185												169.5	±1.33						
P 175	175					190		174.5										±1.37							
P 180	180					195		179.5										±1.40							
P 185	185		h8			200		184.5										±1.44							
P 190	190					205		189.5										±1.48							
P 195	195					210		194.5										±1.51							
P 200	200					215		199.5										±1.55							

Table 3 (continued)

Size code of O-ring	Dimensions and tolerances of housing													Informative										Unit : mm	
	d_3, d_5		Informative			d_4, d_6		Informative			b_1	b_2	b_3	r_1 (max.)	$E^{a)}$ (max.)	Thickness of back-up ring			Actual dimensions of O-ring			Squeeze allowance		Squeeze ratio (%)	
											+0.25 0														
			Tolerance symbol of axial dimension corresponding to the permissible deviations for $d_3, d_5^{b)}$					Tolerance symbol of hole dimension corresponding to the permissible deviations for $d_4, d_6^{b)}$			Without back-up rings	With one back-up ring	With two back-up rings			Tetrafluoroethylene resin			Cross-sec- tion diameter	Inside diameter $c)$		max.	min.	max.	min.
																Spiral	Bias-cut	Endless							
P 205	205	0 −0.10	h8	f7	—	220	+0.10 0	H8	11.0	13.0	17.0	1.2	0.12	1.4±0.08	2.75±0.15	2.75±0.15	8.4±0.15	204.5	±1.58	1.05	0.65	12.3	7.9		
P 209	209					224												208.5	±1.61						
P 210	210					225												209.5	±1.62						
P 215	215					230												214.5	±1.65						
P 220	220					235												219.5	±1.68						
P 225	225					240												224.5	±1.71						
P 230	230					245												229.5	±1.75						
P 235	235					250												234.5	±1.78						
P 240	240					255												239.5	±1.81						
P 245	245					260												244.5	±1.84						
P 250	250					265												249.5	±1.88						
P 255	255					f6												270	254.5					±1.91	
P 260	260																	275	259.5					±1.94	
P 265	265			280														264.5	±1.97						
P 270	270			285														269.5	±2.01						
P 275	275			290														274.5	±2.04						
P 280	280			295														279.5	±2.07						
P 285	285			300														284.5	±2.10						
P 290	290			305														289.5	±2.14						
P 295	295			310														294.5	±2.17						
P 300	300			315														299.5	±2.20						
P 315	315			330														314.5	±2.30						
P 320	320			335														319.5	±2.33						
P 335	335			350														334.5	±2.42						
P 340	340			355														339.5	±2.45						
P 355	355			370		354.5												±2.54							
P 360	360			375		359.5												±2.57							
P 375	375	390	374.5	±2.67																					
P 385	385	400	384.5	±2.73																					
P 400	400	415	399.5	±2.82																					

Table 3 (continued)

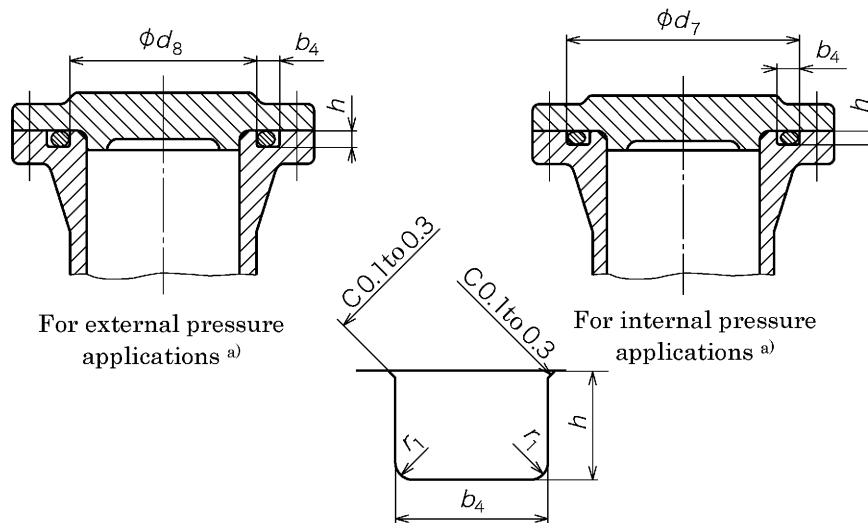
Size code of O-ring	Dimensions and tolerances of housing													Informative											
	d_3, d_5		Informative			d_4, d_6		Informative			b_1	b_2	b_3	r_1 (max.)	$E^{a)}$ (max.)	Thickness of back-up ring			Actual dimensions of O-ring		Squeeze allowance		Squeeze ratio (%)		
											+0.25 0														
			Tolerance symbol of axial dimension corresponding to the permissible deviations for $d_3, d_5^{b)}$					Tolerance symbol of hole dimension corresponding to the permissible deviations for $d_4, d_6^{b)}$			Without back-up rings	With one back-up ring	With two back-up rings			Tetrafluoroethylene resin			Cross-sec- tion diameter	Inside diameter $c)$		max.	min.	max.	min.
																Spiral	Bias-cut	Endless							
G 25	25	0 −0.10	h9	f8	e9	30	+0.10 0	H10	4.1	5.6	7.3	0.7	0.08	0.7±0.05	1.25±0.1	1.25±0.1	3.1±0.10	24.4	±0.25	0.70	0.40	21.85	13.3		
G 30	30				35	29.4												±0.29							
G 35	35				e8	40												34.4	±0.33						
G 40	40					45												39.4	±0.37						
G 45	45					50												44.4	±0.41						
G 50	50					55		49.4										±0.45							
G 55	55				e7	60		54.4										±0.49							
G 60	60					65		59.4										±0.53							
G 65	65					70		64.4										±0.57							
G 70	70					75		69.4										±0.61							
G 75	75					80		74.4										±0.65							
G 80	80					85		79.4										±0.69							
G 85	85				e6	90		84.4										±0.73							
G 90	90					95		89.4										±0.77							
G 95	95					100		94.4										±0.81							
G 100	100					105		99.4										±0.85							
G 105	105					110		104.4										±0.87							
G 110	110					115		109.4										±0.91							
G 115	115					120		114.4										±0.94							
G 120	120					125		119.4										±0.98							
G 125	125				f7	—		130										124.4	±1.01						
G 130	130							135										129.4	±1.05						
G 135	135							140										134.4	±1.08						
G 140	140							145										139.4	±1.12						
G 145	145							150										144.4	±1.16						
G 150	150	0 −0.10	h9	f7	—	160	+0.10 0	H9	7.5	9.0	11.5	0.8	0.10	0.9±0.06	1.9±0.13	1.9±0.13	5.7±0.13	149.3	±1.19	0.83	0.47	14.2	8.4		
G 155	155					165												154.3	±1.23						
G 160	160					170												159.3	±1.26						
G 165	165					175												164.3	±1.30						
G 170	170					180												169.3	±1.33						
G 175	175					185		174.3										±1.37							
G 180	180					190		179.3										±1.40							
G 185	185		h8			195		184.3										±1.44							
G 190	190					200		189.3										±1.47							
G 195	195					205		194.3										±1.51							
G 200	200					210		199.3										±1.55							

Table 3 (concluded)

Unit : mm																								
Size code of O-ring	Dimensions and tolerances of housing													Informative										
	d_3, d_5		Informative			d_4, d_6		Informative		b_1	b_2	b_3	r_1 (max.)	$E^a)$ (max.)	Thickness of back-up ring			Actual dimensions of O-ring		Squeeze allowance		Squeeze ratio (%)		
										+0.25 0					Tetrafluoroethylene resin			Cross-sec- tion diameter	Inside diameter ^{c)}		max.	min.	max.	min.
										Without back-up rings	With one back-up ring	With two back-up rings			Spiral	Bias-cut	Endless							
G 210	210	0 −0.10	h8	f7	—	220	+0.10 0	H8	7.5	9.0	11.5	0.8	0.10	0.9±0.06	1.9±0.13	1.9±0.13	5.7±0.13	209.3	±1.61	0.83	0.47	14.2	8.4	
G 220	220					230												219.3	±1.68					
G 230	230					240												229.3	±1.73					
G 240	240					250												239.3	±1.81					
G 250	250					260												249.3	±1.88					
G 260	260					f6												270	259.3					±1.94
G 270	270																	280	269.3					±2.01
G 280	280																	290	279.3					±2.07
G 290	290																	300	289.3					±2.14
G 300	300																	310	299.3					±2.20
NOTE 1	P3 to P400 of JIS B 2401-1 shall be used for dynamic and static applications, and G25 to G300 shall be used only for static applications and not for dynamic applications. A material such as VMQ, which has less mechanical strength, should not be used for dynamic applications even with P3 to P400.																							
NOTE 2	Even though e7 ($\begin{smallmatrix} -0.040 \\ -0.061 \end{smallmatrix}$) of size codes of O-rings P20 to P22 exceed the tolerances on d_3 and d_5 ($\begin{smallmatrix} 0 \\ -0.06 \end{smallmatrix}$), e7 may be used.																							
Notes ^{b)}	See JIS B 0401-1 and JIS B 0401-2 .																							
^{c)}	The tolerance values shown in the table are those for NBR given in JIS B 2401-1 , and they shall be multiplied by 1.5 for VMQ and ACM, and by 1.2 for FKM and HNBR.																							

Table 4 Shapes and dimensions of housing for static (plane) applications

Unit : mm



Note a) For static (plane) applications, where internal pressure is exerted, the design shall be such that the outer periphery of the O-ring comes in close contact with the outer wall of the housing, and where external pressure is exerted, the design shall be such that the inner periphery of the O-ring comes in close contact with the inner wall of the housing.

Unit : mm

Size code of O-ring	Dimensions and tolerances of housing					Informative					
	d_8 (ex- ternal pres- sure)	d_7 (in- ternal pres- sure)	b_4 +0.25 0	h ±0.05	r_1 (max.)	Actual dimensions of O-ring		Squeeze allowance		Squeeze ratio (%)	
						Cross- section di- ameter	Inside diame- ter ^{b)}	max.	min.	max.	min.
P3	3	6.2	2.5	1.4	0.4	1.9± 0.08	2.8 ±0.14	0.63	0.37	31.8	20.3
P4	4	7.2					3.8 ±0.14				
P5	5	8.2					4.8 ±0.15				
P6	6	9.2					5.8 ±0.15				
P7	7	10.2					6.8 ±0.16				
P8	8	11.2					7.8 ±0.16				
P9	9	12.2					8.8 ±0.17				
P10	10	13.2					9.8 ±0.17				
P10A	10	14	3.2	1.8	0.4	2.4± 0.09	9.8 ±0.17	0.74	0.46	29.7	19.9
P11	11	15					10.8 ±0.18				
P11.2	11.2	15.2					11.0 ±0.18				
P12	12	16					11.8 ±0.19				
P12.5	12.5	16.5					12.3 ±0.19				
P14	14	18					13.8 ±0.19				
P15	15	19					14.8 ±0.20				
P16	16	20					15.8 ±0.20				
P18	18	22					17.8 ±0.21				
P20	20	24					19.8 ±0.22				
P21	21	25					20.8 ±0.23				
P22	22	26					21.8 ±0.24				

Table 4 (continued)

Unit : mm

Size code of O-ring	Dimensions and tolerances of housing					Informative					
	d_8 (ex- ternal pres- sure)	d_7 (in- ternal pres- sure)	b_4 +0.25 0	h ±0.05	r_1 (max.)	Actual dimensions of O-ring		Squeeze allowance		Squeeze ratio (%)	
						Cross- section di- ameter	Inside diame- ter ^{b)}	max.	min.	max.	min.
P22A	22	28	4.7	2.7	0.8	3.5± 0.10	21.7 ±0.24	0.95	0.65	26.4	19.1
P22.4	22.4	28.4					22.1 ±0.24				
P24	24	30					23.7 ±0.24				
P25	25	31					24.7 ±0.25				
P25.5	25.5	31.5					25.2 ±0.25				
P26	26	32					25.7 ±0.26				
P28	28	34					27.7 ±0.28				
P29	29	35					28.7 ±0.29				
P29.5	29.5	35.5					29.2 ±0.29				
P30	30	36					29.7 ±0.29				
P31	31	37					30.7 ±0.30				
P31.5	31.5	37.5					31.2 ±0.31				
P32	32	38					31.7 ±0.31				
P34	34	40					33.7 ±0.33				
P35	35	41					34.7 ±0.34				
P35.5	35.5	41.5					35.2 ±0.34				
P36	36	42					35.7 ±0.34				
P38	38	44					37.7 ±0.37				
P39	39	45					38.7 ±0.37				
P40	40	46					39.7 ±0.37				
P41	41	47					40.7 ±0.38				
P42	42	48					41.7 ±0.39				
P44	44	50					43.7 ±0.41				
P45	45	51					44.7 ±0.41				
P46	46	52					45.7 ±0.42				
P48	48	54					47.7 ±0.44				
P49	49	55					48.7 ±0.45				
P50	50	56					49.7 ±0.45				
P48A	48	58	7.5	4.6	0.8	5.7± 0.13	47.6 ±0.44	1.28	0.92	22.0	16.5
P50A	50	60					49.6 ±0.45				
P52	52	62					51.6 ±0.47				
P53	53	63					52.6 ±0.48				
P55	55	65					54.6 ±0.49				
P56	56	66					55.6 ±0.50				
P58	58	68					57.6 ±0.52				
P60	60	70					59.6 ±0.53				
P62	62	72					61.6 ±0.55				
P63	63	73					62.6 ±0.56				
P65	65	75					64.6 ±0.57				
P67	67	77					66.6 ±0.59				
P70	70	80					69.6 ±0.61				
P71	71	81					70.6 ±0.62				
P75	75	85					74.6 ±0.65				

Table 4 (continued)

Unit : mm

Size code of O-ring	Dimensions and tolerances of housing					Informative						
	d_8 (ex- ternal pres- sure)	d_7 (in- ternal pres- sure)	b_4 +0.25 0	h ±0.05	r_1 (max.)	Actual dimensions of O-ring			Squeeze allowance		Squeeze ratio (%)	
						Cross- section di- ameter	Inside diame- ter ^{b)}		max.	min.	max.	min.
P80	80	90	7.5	4.6	0.8	5.7± 0.13	79.6	±0.69	1.28	0.92	22.0	16.5
P85	85	95					84.6	±0.73				
P90	90	100					89.6	±0.77				
P95	95	105					94.6	±0.81				
P100	100	110					99.6	±0.84				
P102	102	112					101.6	±0.85				
P105	105	115					104.6	±0.87				
P110	110	120					109.6	±0.91				
P112	112	122					111.6	±0.92				
P115	115	125					114.6	±0.94				
P120	120	130					119.6	±0.98				
P125	125	135					124.6	±1.01				
P130	130	140					129.6	±1.05				
P132	132	142					131.6	±1.06				
P135	135	145					134.6	±1.09				
P140	140	150					139.6	±1.12				
P145	145	155					144.6	±1.16				
P150	150	160					149.6	±1.19				
P150A	150	165	11.0	6.9	1.2	8.4± 0.15	149.5	±1.19	1.7	1.3	19.9	15.8
P155	155	170					154.5	±1.23				
P160	160	175					159.5	±1.26				
P165	165	180					164.5	±1.30				
P170	170	185					169.5	±1.33				
P175	175	190					174.5	±1.37				
P180	180	195					179.5	±1.40				
P185	185	200					184.5	±1.44				
P190	190	205					189.5	±1.48				
P195	195	210					194.5	±1.51				
P200	200	215					199.5	±1.55				
P205	205	220					204.5	±1.58				
P209	209	224					208.5	±1.61				
P210	210	225					209.5	±1.62				
P215	215	230					214.5	±1.65				
P220	220	235					219.5	±1.68				
P225	225	240					224.5	±1.71				
P230	230	245					229.5	±1.75				
P235	235	250					234.5	±1.78				
P240	240	255					239.5	±1.81				
P245	245	260					244.5	±1.84				
P250	250	265					249.5	±1.88				
P255	255	270					254.5	±1.91				
P260	260	275					259.5	±1.94				
P265	265	280					264.5	±1.97				

Table 4 (continued)

Unit : mm

Size code of O-ring	Dimensions and tolerances of housing					Informative						
	d_8 (ex- ternal pres- sure)	d_7 (in- ternal pres- sure)	b_4 +0.25 0	h ±0.05	r_1 (max.)	Actual dimensions of O-ring			Squeeze allowance		Squeeze ratio (%)	
						Cross- section di- ameter	Inside diame- ter ^{b)}		max.	min.	max.	min.
P270	270	285	11.0	6.9	1.2	8.4± 0.15	269.5	±2.01	1.7	1.3	19.9	15.8
P275	275	290					274.5	±2.04				
P280	280	295					279.5	±2.07				
P285	285	300					284.5	±2.10				
P290	290	305					289.5	±2.14				
P295	295	310					294.5	±2.17				
P300	300	315					299.5	±2.20				
P315	315	330					314.5	±2.30				
P320	320	335					319.5	±2.33				
P335	335	350					334.5	±2.42				
P340	340	355					339.5	±2.45				
P355	355	370					354.5	±2.54				
P360	360	375					359.5	±2.57				
P375	375	390					374.5	±2.67				
P385	385	400					384.5	±2.73				
P400	400	415					399.5	±2.82				
G25	25	30	4.1	2.4	0.7	3.1± 0.10	24.4	±0.25	0.85	0.55	26.6	18.3
G30	30	35					29.4	±0.29				
G35	35	40					34.4	±0.33				
G40	40	45					39.4	±0.37				
G45	45	50					44.4	±0.41				
G50	50	55					49.4	±0.45				
G55	55	60					54.4	±0.49				
G60	60	65					59.4	±0.53				
G65	65	70					64.4	±0.57				
G70	70	75					69.4	±0.61				
G75	75	80					74.4	±0.65				
G80	80	85					79.4	±0.69				
G85	85	90					84.4	±0.73				
G90	90	95					89.4	±0.77				
G95	95	100					94.4	±0.81				
G100	100	105					99.4	±0.85				
G105	105	110					104.4	±0.87				
G110	110	115					109.4	±0.91				
G115	115	120					114.4	±0.94				
G120	120	125					119.4	±0.98				
G125	125	130					124.4	±1.01				
G130	130	135					129.4	±1.05				
G135	135	140					134.4	±1.08				
G140	140	145					139.4	±1.12				
G145	145	150					144.4	±1.16				