

THERMOWELL (MODEL : WL)

Thermowells which are made of solid bar stock of various heat and corrosion resistant alloys by drilling are usually preferred over the tip welded protection tubes for critical applications where high mechanical strength and longer service life are required. If the alloy bar material is correctly selected and designed properly, the Thermowell lasts long against corrosives, high pressure, high temperature, mechanical shock and vibration that may result from high velocity of fluids. In order to offer the best and safest Thermowells against Kármán's Turbulence and other stresses, automatic calculations of mechanical strength to fluid pressure and flow velocity to estimate frequency of critical resonance are made by a specially developed computer programme as based upon operating conditions at the site. At YAMARI, thermowells are manufactured by a genuine Two-Shaft Gun Drilling Machine of 2- metre max. depth and the latest NC Turning Machines.



Standard Bores and Depths

Bore Dia. (mm)	Max. Depth (mm)
4.0	500
5.5	700
7.0	800
8.5	1000
10.0	1200
11.0	1200
12.0	1200
16.0	1200

Standard Alloy Bar Materials :

Stainless Steel* 304, 321, 316, 347, 310, 446, 253MA
 Inconel 600, 601, 625, X-750
 Incoloy 800, 825
 Hastelloy B, C276, X
 Others Haynes 25, Carpenter 20Cb, Nichrome, HCF, 50Co-30Cr, Monel, Brass, Bronze, Titanium, Tantalum, Molybdenum
 *Low carbon types of Austenite S.S. are available on request.

Standard Sizes of Solid Bar Materials :

Round Bars : mm O.D.

25, 26, 28, 30, 32, 34, 36, 38, 40, 46, 48, 50, 55

Hexagonal Bars : mm Width across Flats

26, 29, 32, 35, 38, 41, 48, 50, 55

Tests and Inspections

- Pressure Test :
N₂ gass pressure test up to 10MPa is conducted upon request.
- Hydrostatic Pressure Test :
Internal pressure test up to 40MPa is conducted upon request.
- X-Ray Inspection :
X-ray inspection for uniformity in wall thickness, eccentricity of bore and smooth inner finish are also conducted upon request.
- Optional :
Helium leak Test
Dye penetrant Test
Cross checking of material with Mill Certificate



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Models of Solid Bar-stock Thermowell Model:WL

<p>1 WL·01</p> <p>Hexagonal Screwed-in Type</p>		<p>Order Code: WL·01 / 316 - 250 / R¹/₂ - 9 / 15 ×</p> <p>Model No. Material "U" Length "P" Thread Std. "B" Bore "D2" Dia.</p> <p>18 - 45/∅20/29×33.5Hex - Rc¹/₂</p> <p>*D1" Dia. For Tapered Well Only Factory Standard Unless Otherwise Specified *S" Thread Std.</p> <p align="right">⊗ Thread Allowance</p>
<p>2 WL·11</p> <p>Hexagonal Screwed-in Type</p>		<p>Order Code: WL·11 / 304 - 300 / R³/₄ - 8.5×65 / 11</p> <p>Model No. Material "U" Length "P" Thread Std. "B"×Length Bore Size "B2" Dia.</p> <p>/ 17 × 21 - 45/∅20/35×40.4Hex - Rc¹/₂</p> <p>*D2" Dia. "D1" Dia. For Tapered Well Only Factory Standard Unless Otherwise Specified *S" Thread Std.</p> <p align="right">⊗ Thread Allowance</p>
<p>3 WL·12</p> <p>Hexagonal Lagging Extension Type</p>		<p>Order Code: WL·12 / 310 - 450 / R1 - 11 / 17 ×</p> <p>Model No. Material "U" Length "P" Thread Std. "B" Bore "D2" Dia.</p> <p>/ 26 × 75 - ∅25/38×43.9Hex - Rc¹/₂</p> <p>*D1" Dia. For Tapered Well Only "T" Length Factory Standard Unless Otherwise Specified *S" Thread Std.</p> <p align="right">⊗ Thread Allowance</p>
<p>4 WL·02</p> <p>Hexagonal Lagging Extension Type</p>		<p>Order Code: WL·02 / 321 - 300 / NPT1 - 11 / 17 ×</p> <p>Model No. Material "U" Length "P" Thread Std. "B" Bore "D2" Dia.</p> <p>/ 26 × 75 × 34 - ∅25/34/41×47.3Hex - Rc³/₄</p> <p>*D1" Dia. For Tapered Well Only "T" Length "N" Dia. Factory Standard Unless Otherwise Specified *S" Thread Std.</p> <p align="right">⊗ Thread Allowance</p>
<p>5 WL·21</p> <p>Hexagonal Heavy Duty Type</p>		<p>Order Code: WL·21 / 321 - 350 / R1¹/₂ - 11 / 17</p> <p>Model No. Material "U" Length "P" Thread Std. "B" Bore "D2" Dia.</p> <p>× 26 × 34 - ∅50/25/50×57.7Hex - Rc³/₄</p> <p>*D1" Dia. For Tapered Well Only "N" Dia. Factory Standard Unless Otherwise Specified *S" Thread Std.</p> <p align="right">⊗ Thread Allowance</p>
<p>6 WL·22</p> <p>Hexagonal Heavy Duty Type</p>		<p>Order Code: WL·22 / 316 - 400 / R1 - 7×65 / 11</p> <p>Model No. Material "U" Length "P" Thread Std. "B"×Length Bore Size</p> <p>/ 17 × 26 × 34 - ∅50/25/35×40.4Hex - Rc¹/₂</p> <p>*D2" Dia. "D1" Dia. For Tapered Well Only "N" Dia. Factory Standard Unless Otherwise Specified *S" Thread Std.</p> <p align="right">⊗ Thread Allowance</p>
<p>7 WL·04</p> <p>Screwed-in Weld Type</p>		<p>Order Code: WL·04 / 304 - 300 / R³/₄ - 11 / 17 ×</p> <p>Model No. Material "U" Length "P" Thread Std. "B" Bore "D2" Dia.</p> <p>21 - 75 × 28-∅20 - Rc¹/₂</p> <p>*D1" Dia. For Tapered Well Only "T" Length "N" Factory Standard Unless Otherwise Specified *S" Thread Std.</p> <p align="right">⊗ Thread Allowance</p>

<p>8 WL-05</p> <p>Flanged (Screwed-in) Type</p>		<p>Order Code: WL-05 / 304 - 500 / R³/₄ / -JIS10K25ARF /</p> <p>Model No. Material 304SS "U" Length "P" Thread Std. Flange Rating</p> <p>304 / 11 / 17 × 21 - 50×34 - Rc¹/₂</p> <p>Material 304SS "B" Bore "D2" Dia. "D1" Dia. For Tapered Well Only Neck Dimension Length × "N" Dia. "S" Thread Std</p>
<p>9 WL-06</p> <p>Flanged (Weld) Type</p>		<p>Order Code: WL-06 / 316 - 1250 / JIS10K20ARF / 316</p> <p>Model No. Material 316SS "U" Length Flange Rating Material 316SS</p> <p>/ 9 / 15 × 18 - 50×28 - Rc¹/₂</p> <p>"B" Bore "D2" Dia. "D1" Dia. For Tapered Well Only Neck Dimension Length × "N" Dia. "S" Thread Std</p>
<p>10 WL-61</p> <p>Flanged (Weld) Type</p>		<p>Order Code: WL-61 / 316 - 600 / ANSI1"600LBRF / 316 -</p> <p>Model No. Material 316SS "U" Length Flange Rating Material 316SS</p> <p>8.5×65 / 11 / 17 × 26 - 50×34 - Rc¹/₂</p> <p>"B" × Length Bore Size "B2" Bore "D2" Dia. "D1" Dia. For Tapered Well Only Neck Dimension Length × "N" Dia. "S" Thread Std</p>
<p>11 WL-07</p> <p>Plain Weld Type</p>		<p>Order Code: WL-07 / 304 - 300 - 9 / 17 -</p> <p>Model No. Material 304SS "U" Length "B" Bore "D2" Dia.</p> <p>250×30 / Rc¹/₂</p> <p>Neck Dimension Length × "N" Dia. "S" Thread Std</p>
<p>12 WL-08</p> <p>Weld Type</p>		<p>Order Code: WL-08 / 321 - 500 - 11 / 22 - 25 -</p> <p>Model No. Material 321SS "U" Length "B" Bore "D2" Dia. "D1" Dia. For Tapered Well Only</p> <p>50×41 / Rc¹/₂</p> <p>Neck Dimension Length × "N" Dia. "S" Thread Std</p>
<p>13 WL-09</p> <p>Ball Joint Type</p>		<p>Order Code: WL-09 / 316 - 1300 / 25.4R×34.9D×3.2T -</p> <p>Model No. Material 316SS "U" Length Ball Joint Dimension "R" × "D" × "T"</p> <p>10 / 14.3 / 19 - 75×26.6 - NPT¹/₂</p> <p>"B" Bore "D2" Dia. "D1" Dia. For Tapered Well Only Neck Dimension Length × "N" Dia. "S" Thread Std</p>
<p>14 WL-10</p> <p>Van Stone Type</p>		<p>Order Code: WL-10 / 304 - 250 / 50×6.5 - 11 /</p> <p>Model No. Material 304SS "U" Length Raised Face "D" × "Q" "B" Bore</p> <p>17 / 26 / 65×34 - Rc¹/₂</p> <p>"D2" Dia. "D1" Dia. For Tapered Well Only Neck Dimension Length × "N" Dia. "S" Thread Std</p>

Other special types are also available upon request

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BLIND FLANGES

JIS FLANGE

FLAT FACE (FF)

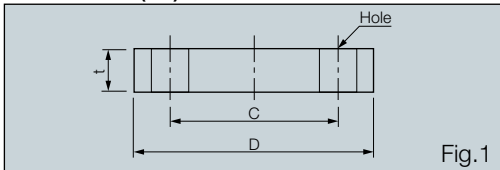


Fig.1

RAISED FACE (RF)

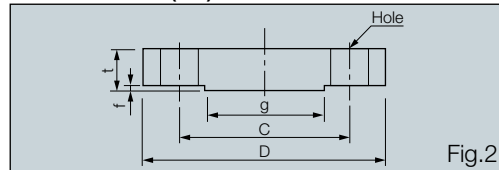


Fig.2

Dimensional Specifications

Unit : mm

Flange Rating	Size A	Size B	D	t	f	g	C	f	No. of Bolt Holes	Hole Dia.	Bolt Size	Nom. Weight(kg)
JIS 5K	15	1/2	80	9	1	44	60	1	4	12	M10	0.32
	20	3/4	85	10	1	49	65	1	4	12	M10	0.41
	25	1	95	10	1	59	75	1	4	12	M10	0.52
	32	1 1/4	115	12	2	70	90	2	4	15	M12	0.91
JIS 10K	40	1 1/2	120	12	2	75	95	2	4	15	M12	0.99
	15	1/2	95	12	1	51	70	1	4	15	M12	0.63
	20	3/4	100	14	1	56	75	1	4	15	M12	0.78
	25	1	125	14	1	67	90	1	4	19	M16	1.22
JIS 10K	32	1 1/4	135	16	2	76	100	2	4	19	M16	1.66
	40	1 1/2	140	16	2	81	105	2	4	19	M16	1.80

ANSI FLANGE

RAISED FACE (RF)

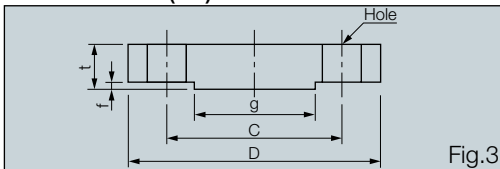


Fig.3

RING JOINT (RTJ)

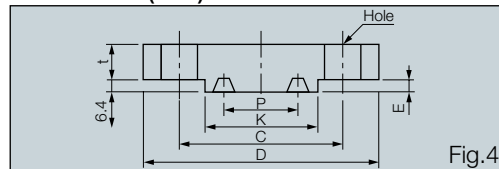


Fig.4

RAISED FACE (RF)

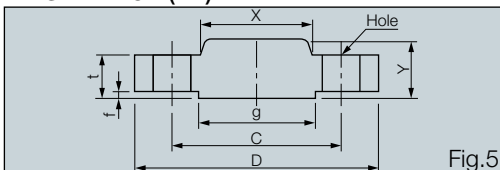


Fig.5

RING JOINT (RTJ)

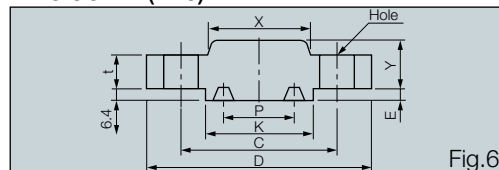


Fig.6

Dimensional Specifications

Unit : mm

Flange	Size A	Size B	D	Min.t	f	g	C	No. of Bolt Holes	Hole Dia.	Bolt Size (inch)	Nom. Weight (Kg)	Hub		RTJ		
												X	Y	Min.K	P	E
ANSI 150lbs	15	1/2	89	11.5	1.6	35.1	60.5	4	15.8	1/2	0.43	30.2	16.0	--	--	--
	20	3/4	99	13.0	1.6	42.9	69.9	4	15.8	1/2	0.62	38.1	16.0	--	--	--
	25	1	108	14.5	1.6	50.8	79.2	4	15.8	1/2	0.87	49.5	18.0	63.5	74.62	6.4
	32	1 1/4	117	16.0	1.6	63.5	88.9	4	15.8	1/2	1.16	58.7	21.0	73.5	57.15	6.4
ANSI 300lbs	40	1 1/2	127	18.0	1.6	73.2	98.6	4	15.8	1/2	1.54	65.1	22.4	83.0	65.07	6.4
	15	1/2	95	14.5	1.6	35.1	66.5	4	15.8	1/2	0.65	38.1	22.4	51.0	34.14	6.4
	20	3/4	117	16.0	1.6	42.9	82.5	4	19.0	5/8	1.09	48.0	25.4	63.5	42.88	6.4
	25	1	124	18.0	1.6	50.8	88.9	4	19.0	5/8	1.38	54.0	27.0	70.0	50.80	6.4
ANSI 300lbs	32	1 1/4	133	19.5	1.6	63.5	98.6	4	19.0	5/8	1.82	63.5	27.0	63.5	60.32	6.4
	40	1 1/2	155	21.0	1.6	73.2	114.5	4	22.4	3/4	2.70	70.0	30.3	90.5	68.28	6.4

Dimensional Specifications

Unit : mm

Flange	Size A	Size B	D	Min.t	f	g	C	No. of Bolt Holes	Hole Dia.	Bolt Size (inch)	Nom. Weight (Kg)	Hub		RTJ		
												X	Y	Min.K	P	E
ANSI 400lbs & 600lbs	15	1/2	95	14.5	6.4	35.1	66.5	4	15.8	1/2	0.76	38.1	22.4	51.0	34.14	6.4
	20	3/4	117	16.0	6.4	42.9	82.6	4	19.0	5/8	1.27	48.0	25.4	63.5	42.88	6.4
	25	1	124	18.0	6.4	50.8	88.9	4	19.0	5/8	1.59	54.0	27.0	70.0	50.80	6.4
	32	1 1/4	133	21.0	6.4	63.5	98.5	4	19.0	5/8	2.24	63.5	28.5	79.5	60.32	6.4
	40	1 1/2	155	22.5	6.4	73.2	114.5	4	22.4	3/4	3.30	70.0	32.0	90.5	68.28	6.4
ANSI 900lbs & 1,500lbs	15	1/2	121	22.5	6.4	35.1	82.5	4	22.4	3/4	1.79	38.1	32.0	60.5	39.67	6.4
	20	3/4	130	25.5	6.4	42.9	88.9	4	22.4	3/4	2.40	44.5	35.1	67.0	44.45	6.4
	25	1	149	28.5	6.4	50.8	101.6	4	25.4	7/8	3.44	52.5	41.2	71.5	50.80	6.4
	32	1 1/4	159	28.5	6.4	63.5	111.3	4	25.4	7/8	3.95	63.5	41.2	81.5	60.32	6.4
	40	1 1/2	178	32.0	6.4	73.2	124.0	4	28.5	1	5.41	70.0	44.5	92.0	68.28	6.4

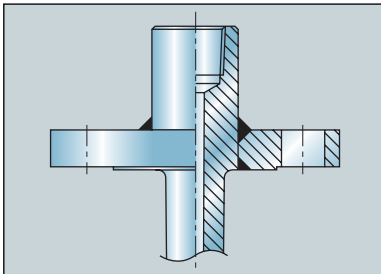
Types of Jointing Flanges with Thermowell

For the rigorous weld-jointing requirements, skilled technicians are selected among the TIG welding workers at our factory who all have qualifications and license granted by Japan Welding Association and Japan Stainless Steel Society, and are exclusively

engaged in this precise job. The welding procedures and requirements generally follow to ASME Boiler Code QW 201.1~2, WPS and PQR, JPI 7S-31, etc. Grooves on each flange are carefully determined and machined to primary "J"

or secondary Bevel shapes to enable perfect fillet welding. A serrated flange face can be machined. Please consult factory.

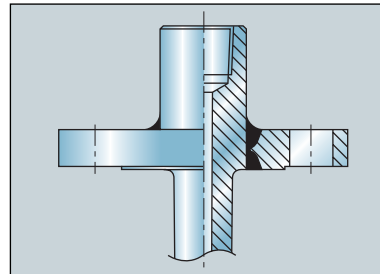
1. Groove welded Type



Commonly made to weld relatively lower rating flanges. At the upper edge or the both edges of center hole of the flange, groove(s) for fillet welding is provided. TIG or Plasma Arc Welders are normally used. It is essential that the clearance between

center hole of the flange and neck of the thermowell be kept minimal in diameters.

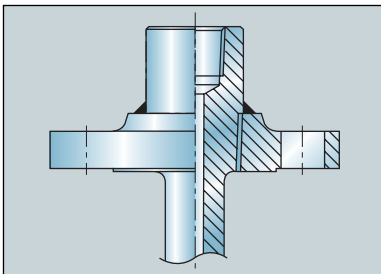
2. Full Penetration Weld Type



Suitable for flanges of medium to high rating. This fully welded joint has an excellent strength to high pressure and perfect integrity to liquid and gas leak. High degree of welding technique is employed for void-free welding job. For some of Stainless

Steel and alloy combinations, additional costs of post-weld heat treatment may be necessary for stress relief and restoring the original metal structure.

3. Threaded and Enlarged Neck Weld Type



Where the installation space permits, neck of the thermowell is machined to a larger diameter to provide curved edge at its bottom and positioned flush with flange face, so that the welded part may be shifted outward to prevent possible fatigue

from concentration of mechanical stress due to bending and vibration by virtue of the curved edge prepared on a heavier solid neck. This special design can be applied to the other types of welding joint.