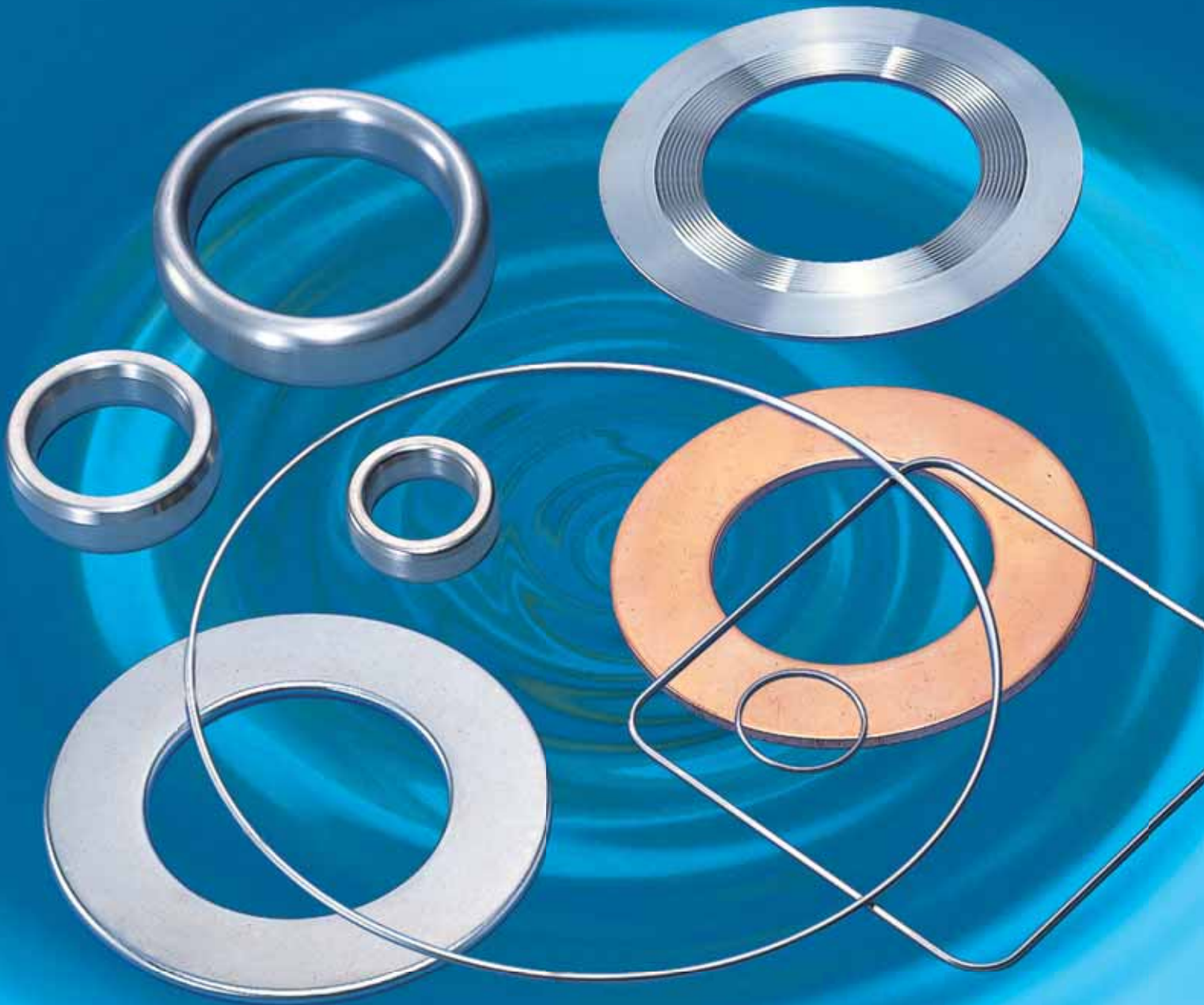




2014.7  
**CATALOGUE No.ZG05**

# Metal & Semimetallic Gasket



**NIPPON VALQUA INDUSTRIES, LTD.**

<http://www.valqua.co.jp>

Metal and semimetallic gaskets are used in environments where extreme temperatures and pressures prohibit the use of non-metallic gaskets.

Metal and semimetallic seals are used in a wide range of applications for various industries. These sectors include: oil refining, petrochemical, inorganic chemicals, thermal power generation, nuclear power generation, vessels, automobiles, aviation and numerous other industries.

Advancements in facilities and machine technology demand more reliable gasket performance.

This catalog is intended to introduce the various types, designs, materials, and dimensions of VALQUA's metal and semimetallic gaskets.

We hope this catalog will aid you in determining the most suitable sealing solution for your application needs.

**Registered trademarks**

The below are our registered trademarks in Japan. Indicators of registered trademarks have been omitted within this catalogue.

● VALQUA	● VALQUA(mark)
● VALQUAFOIL	● VALFLON

**Trademarks**

Trademark indicator has been omitted within this catalogue. The following is our trademark.

● TRYPACK
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※Please refer to VALQUA PRODUCTS Catalog No.Z901 (pages 14-17) for Spiral Wound Gaskets.



# TRYPACK

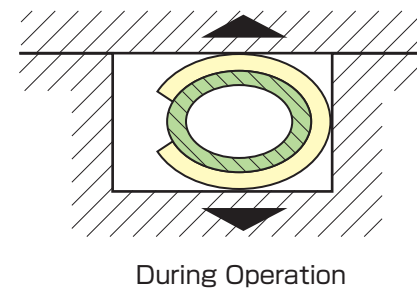
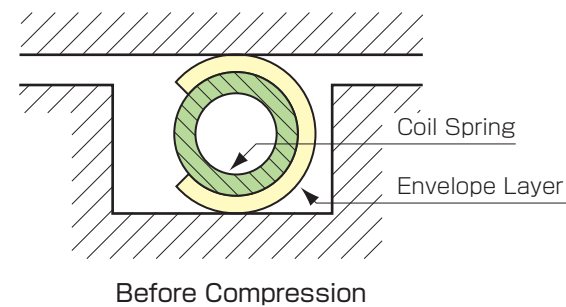
VALQUA No. 3645/3645LS

TRYPACK is an O-ring shaped gasket with an inner coil spring for elasticity and a metallic outer layer for sealing and/or stress distribution. Compared to a conventional metal gasket, TRYPACK provides greater compression recovery and therefore is able to seal even under lower loads. Additionally, TRYPACK retains the advantages of metal seals, enabling it to withstand extreme temperature ranges.

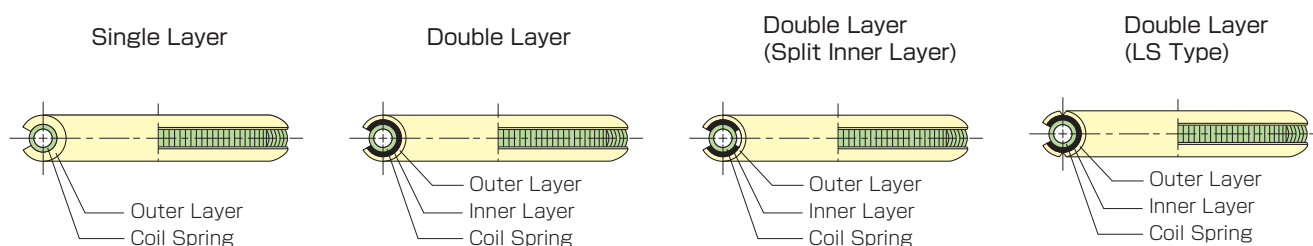
Even in ultra high vacuum environments where rubber and hollow O-rings may not provide adequate performance, TRYPACK maintains excellent sealing across a wide range of temperatures.

## • Features

- 1) Conforms to the sealing surface for excellent vacuum sealing.
- 2) Vacuum sealing performance is retained even during compression recovery.
- 3) Applicable from very low to high temperatures.
- 4) High baking temperature allows for use in vacuum environments where rubber O-rings are not applicable.
- 5) Metallic construction minimizes degradation from radiation and outgassing.
- 6) Resistance to induced radiation, low temperature, and outgassing make it appropriate for Aluminum lines. Tightening will not scratch or damage the opposing flange surface.
- 7) Only the end cross sections are welded (upset butt welding) for the coil spring, preserving structural and mechanical continuity (butt welding is used for cross sections above 1.7mm in diameter).
- 8) Seals with custom configurations are possible.



## • Product Types



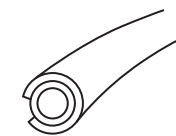
## • Materials

Component	Material	Frequency of Use	Function
Outer Layer	Aluminum (A1050P)	◎	Sealing
	Nickel (NLCP, NNCP)	◎	
	Silver	○	
	Stainless Steel (SUS304L, SUS316L)	○	
	Tantalum (TaP)	○	
	Copper (C1100P)	△	
Inner Layer	Stainless Steel (SUS304, SUS316)	◎	Stress distribution
	Inconel (Inco.600)	◎	
Coil Spring	Stainless Steel (SUS304-WPB)	◎	Elasticity
	Inconel (Inco. X750)	◎	

◎ : frequently used   ○ : used with some frequency   △ : used only for custom applications

## • TRYPACK Single Layer

### VALQUA No. 3645



In this gasket a coil spring is covered in a single layer. Due to the continuous stress distribution of the spring, a wide range of applications from low pressures to extreme vacuums is possible.

#### ● Dimensions and Configurations

Dimensions are based on JIS B 2290 standard vacuum flange dimensions (see page 35). For applications involving sealing with ultra low temperature fluids, JIS B 2210, JPI-7S-15 based dimensions are also defined (see page 35). Other dimensions and configurations are available upon request.

#### ● Applications

TRYPACK is used for the following industries and applications: aerospace, semiconductor, electronics, nuclear energy, accelerators, molding machines, and other connectors and valves.

## • TRYPACK Double Layer

### VALQUA No. 3645



An inner layer is inserted between the coil spring and outer layer in order to uniformly distribute the force exerted by the spring across the outer layer. This provides stable and high sealing performance over extended periods of time at high temperatures. For added elasticity, the inner skin may be split into upper and lower sections.

#### ● Dimensions and Configurations

Dimensions are defined in the same manner as the single layer type. Information for non standard flange configurations is available upon request.

#### ● Applications

Uses are similar to those of the single layer type. The double layer type is often preferred for locations where extended seal life is required.

## • TRYPACK Low Load Tightening TRYPACK LS

### VALQUA No. 3645LS



The V-shaped grooves on the upper and lower surfaces allow the seal to readily conform to the opposing surface. Sealing is achieved even under low tightening loads.

#### ● Dimensions and Configurations

Dimensions are defined in the same manner as the single and double layered types. Information for non standard flange configurations is available upon request.

#### ● Applications

Uses are similar to those of the double layer type. The TRYPACK LS is often preferred for locations where extended seal life or high temperature resistance is required.



## Ordering Information for TRYPACK

### Part Number, Configuration and Material Chart

Part Number	Configuration	Material
VALQUA No. <b>3645</b> Standard : 3645 Set : 3645S <sup>(1)</sup>	<b>Shape</b> Circle (Z) Track-Shaped Oval (C) Rectangular (E) Other (X)	<b>Cross Section</b> · Single Layer Open OD (A) Open ID (B) · Double Layer Open OD (C) Open ID (D) · Double Layer with Split Inner Layer Open OD (E) Open ID (F) Other (F)
		<b>Outer Layer</b> Aluminum (A1050P) (A) SUS304 (E) SUS304L (L) SUS316 (G) SUS316L (H) Nickel (N) Copper(C1100)(C) Silver (V) Other (X)
		<b>Spring + Inner Layer</b> SUS304+None (4) InconelX750+None (7) SUS304+SUS304 (A) SUS304+SUS316 (B) SUS304+Inconel 600 (C) InconelX750+SUS304 (E) InconelX750+SUS316 (F) InconelX750+Inconel600(G) Other (X)
		<b>Special Specifications</b> None (Z) Degreasing (B) Other (X)

Note(1) Product set includes retainers and/or multi-angled rings.  
Remarks 1. Configurations and materials may be specified using alphanumeric codes shown in parenthesis.  
2. For configurations and materials not listed, please consult VALQUA for more information.  
3. Please specify orders involving combinations of multi-angled rings and retainers.

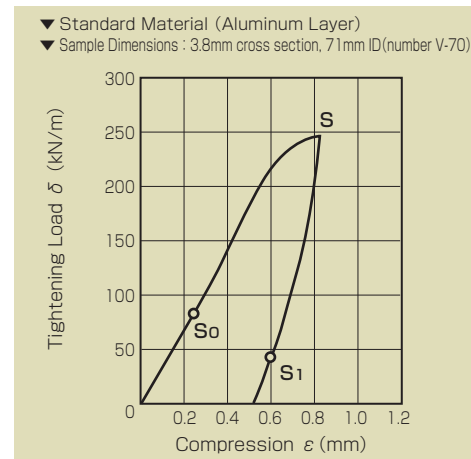
(Example) For Circle, Single Layer Open OD, SUS304 Outer Layer, Spring Inconel, No Custom Specifications  
The description would become : VALQUA No. 3645-ZAE7Z

For standard dimensions(see page 35) please specify nominal numbers or nominal dimensions(such as V-70).  
For other dimensions please specify actual dimensions(inner diameter and cross section).

## Design Guide

### Seal Performance

Sample Single Layer TRYPACK(V-70 : 71mm inner diameter × 3.8mm cross section)  
Outer Layer A1050P  
Coil Spring SUS304-WPB  
Flange SUS304(Rmax 3.2s)  
Leak Rate  $Q \leq 1 \times 10^{-11} \text{ Pa} \cdot \text{m}^3 / \text{s He} (S_0 \sim S_1)$



### Effect of Flange Surface Roughness on Sealing Performance

Surface Roughness	Tightening Load (kN/m)	
	Initial Sealing Point $S_0$ <sup>(1)</sup>	Sealing Limit Point $S_1$ <sup>(1)</sup>
0.8s	80~100	30~50
3.2s	70~90	30~50
6.3s	80~120	30~50
(Reference) Stick Finish 6.3s	100~160	30~50

Note(1)  $S_0, S_1$  are at  $1 \times 10^{-11} \text{ Pa} \cdot \text{m}^3 / \text{s}$ .

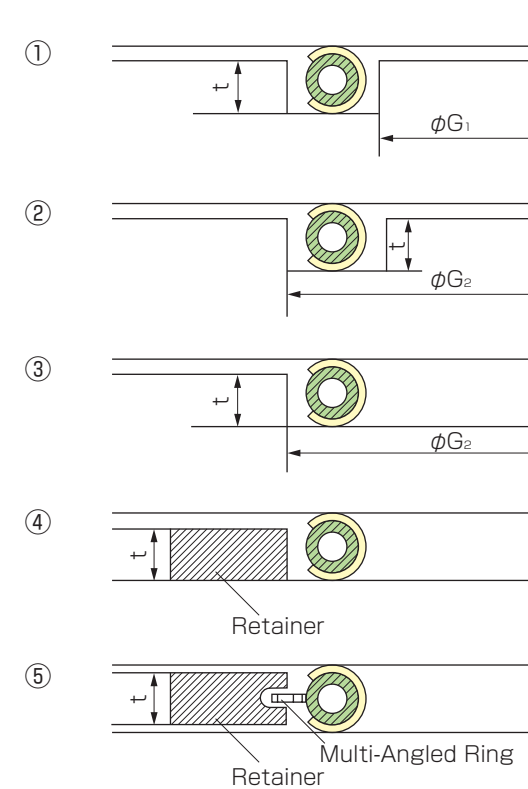
### Acceptable Dimensions and Groove Design Standards

CS Diameter d	ID Range D	Groove Depth $t \pm 0.1$	Groove ID for Vacuum $G_1 +0.06$	Groove OD for Internal Pressure (Ref.) $G_2 +0.06$	Groove Width (Minimum)	Average Tightening Load at Operation Point S (kN/m(kgf/cm))			
						Aluminum	Silver Copper	Nickel Tantalum	Stainless Steel
1.7	5 ~ 50	1.4	D-0.8	D + 2d + 0.5	2.3	200{200}	220{220}	250{250}	290{300}
2.6	10 ~ 100	2.1			3.4	220{220}	250{250}	340{350}	400{400}
3.8	25~1500	3.0	D-1.0	D + 2d + 1.0	5.0	250{250}	310{320}	490{500}	590{600}
5.6	150~2000	4.5			8.0	320{330}	390{400}	640{650}	780{800}
8.0	Above 175 <sup>(1)</sup>	7.0	D-1.0	D + 2d + 1.0	12.0	340{350}	490{500}	-	-
10.0	Above 175 <sup>(1)</sup>	9.0	D-2.0	D + 2d + 1.0	15.0	390{400}	590{600}	-	-
Recommended Flange Surface Roughness						0.8a	0.4a	0.2a	0.2a

Note(1) Please consult VALQUA concerning dimensions outside specified ranges.

Remarks 1. TRYPACK with cross sectional diameters between 3.8~8.0mm may be applied to groove dimensions based on JIS B2290 Vacuum System Flanges (see page 35).  
2. This chart applies to gaskets with open OD configurations. Please consult VALQUA for information on open ID configurations.  
3. Designs fulfill sealing levels that fall within standard Helium leak detection(HeLD)ranges. For applications outside these limits(e.g.  $10^{-9} \text{ Pa} \cdot \text{m}^3 / \text{s}$  levels), please consult VALQUA.

### Flange Types and Recommended Settings (Prior to Tightening)



Remarks 1. For vacuum applications, use flange configuration ①, ④ or ⑤.  
2. For internal pressure applications, use flange configuration ②, ③, ④ or ⑤.  
3. For applications where groove flange finish is critical, use flange configuration ③, ④ or ⑤.

### Standard Tightening Load Calculation

The required tightening load( $W_m$ [N])for sealing negative pressure is:

$$W_m = W_s = \pi (D+d)K$$

Where  $W_s$  : force required to properly close the flange upon the gasket and maintain a seal [N]

$D$  : TRYPACK Inner Diameter [mm]

$d$  : TRYPACK Cross Sectional Diameter [mm]

$K$  : Tightening load required to close the flange with respect to the circumference (average tightening load at point S) [kN/m]

(Reference)

TRYPACK may also be used for sealing against ultra low temperature fluids in low to mid pressure lines under positive pressure.

The required tightening load for positive pressure sealing is:

$$W_m = W_s + W_p$$

Where  $W_p$  : force derived from fluid pressure [N]

$$W_p = \frac{\pi}{4} (D+2d)^2 P$$

$P$  : maximum fluid pressure [MPa]

### Special Gaskets

#### Custom Configurations

Oval, rectangular and track-shaped configurations are available. Please refer to the dimensions in the chart below for rectangular and track-shaped configurations.

#### Rectangular Configuration (Units:mm)

Cross Sectional Diameter d	Radius of Curvature (ID) R	Minimum Length per Side L
3.8	20	50×125
	25	60×150
	35	80×175
5.6	30	70×200
	50	110×200

#### Track-Shaped Configuration (Units:mm)

Cross Sectional Diameter d	Minimum Length per Side L
3.8	40×70
5.6	100×200

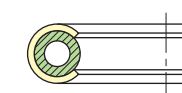
#### Cross Sectional Diameter, Inner Diameter and Custom Materials

Please consult with VALQUA for gaskets made to other dimensions or of custom materials.

Other special configurations shown below are also available.

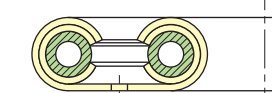
(1) Open Inner Diameter

For when the outer diameter is exposed to negative pressure



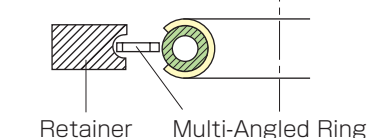
(2) Parallel Rings

For when a leak sensor is placed in between the two rings For enhanced seal reliability

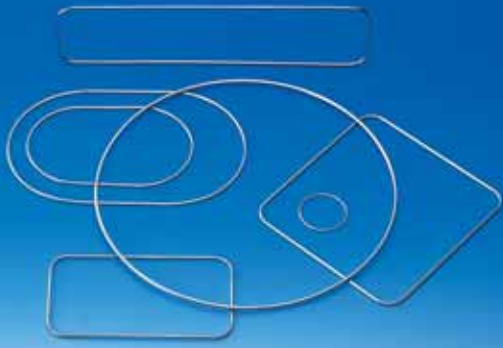


(3) Retainer Combination

For automation and improved ease of handling



A combination with only the TRYPACK and Multi-Angled Ring is also available.



# Metal Hollow O-Ring

VALQUA No.3640/3641

Metal Hollow O-Rings are made by configuring a metal tube into a specified shape. The tube's ends are then welded, polished and finally coated or plated.

It can maintain seals at high temperatures, pressures and vacuum, all at relatively low tightening load.

A wide range of configurations is available. This is especially suitable for applications where space is limited and light weight is desired. During the welding process internal uniformity is preserved.

## Product Types

Description	Cross Section	Applicable Range	VALQUA Part Number
Metal Hollow O-Ring (Standard Design)		Vacuum~7MPa	3640
Metal Hollow O-Ring (Balanced Design)		≥7MPa	3641

## Materials

	Material
Tube	SUS304 SUS316 SUS321 Incoloy 800
Surface Treatment	VALFLON (PTFE) Coating Silver Plating Nickel Plating Copper Plating Gold Plating

## Flange Types and Recommended Settings

(After Tightening)

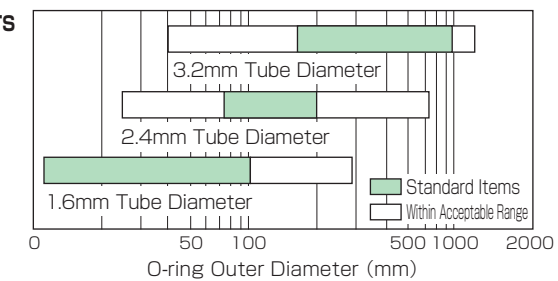
Internal Pressure (OD Based)			Outer Pressure and Vacuum (ID Based)
a	b	c	d

Remarks This chart depicts standard applications.  
For applications with external pressures exceeding 0.5MPa(5kgf/cm<sup>2</sup>) or other custom items used in vacuum, ID based standards must be used.

## Design Guidelines

### Tube Diameter : O-ring Outer Diameter

Range of O-ring Outer Diameters for each Tube Diameter



### Tube Thickness : Fluid Viscosity, Operating Pressure / Surface Treatment : Fluid Viscosity, Finish of Matching Surface

Type of Fluid (Viscosity)	Pressure Range	Tube Thickness(mm)	Matching Surface Roughness (Ra)			Tube Diameter (mm)
			Without Coating or Plating	PTFE Coated	Plated	
Vacuum, Gases (Volatile Fluids)	Vacuum <50MPa ≥50MPa	0.5, 0.8	— ※	0.8a	0.4a	φ 1.6 φ 2.4 φ 3.2
Water, Steam, Various Solutions (Low Viscosity Fluids)	<50MPa ≥50MPa	0.5	0.4a	0.8a	0.4a	
Spindle Oil, Hydraulic Oil, etc. (Mid Range Viscosity Fluids)	<50MPa ≥50MPa	0.25, 0.35, 0.5 0.5	0.8a	1.6a	0.8a	
Lubricant, Tar, Plastic, etc. (High Viscosity Fluids)	<50MPa ≥50MPa	0.25, 0.35, 0.5 0.5	0.8a	1.6a	1.6a	

(※For vacuum and standard gases VALFLON® coating or plating is required)

### Tube Material and Surface Treatment : Temperature Range

	Material	Temperature Range <sup>(1)</sup> (°C)
Tube Material	Stainless Steel (SUS304)	-250~540
	Stainless Steel (SUS316)	-250~820
	Stainless Steel (SUS321)	-250~870
	Incoloy 800	-250~980
Surface Treatment	VALFLON PTFE Coating	-200~260
	Silver Plating	-250~650
	Nickel Plating	-250~760
	Copper Plating	-250~400
	Gold Plating	-250~850

Note(1) Temperature ranges of surface treated seals are determined by the material with the lower maximum temperature (either the seal material or treatment material).

## Range of Available Sizes

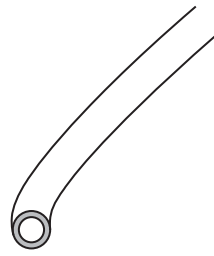
Tube Code	Tube Diameter × Wall Thickness	SUS304	SUS316	SUS321	Incoloy 800	Minimum Radius of Curvature for Rectangular Type <sup>(1)</sup> (ID)	Size Range (OD)
J	0.9×0.15			○		4	8 ~ 100
L	0.9×0.25		○				
G	1.6×0.15			○		7	11 ~ 200
A	1.6×0.25	○	○	◎	○		
M	1.6×0.35			○		6	
B	1.6×0.5	○		○	○		
H	2.4×0.15			○		22	25 ~ 350
C	2.4×0.25	○	○	○	○		
N	2.4×0.35			◎		17	
D	2.4×0.5	○	○	○	○		
E	3.2×0.25	○		○	○	45	40~1500
O	3.2×0.35			○			
F	3.2×0.5	○	○	◎	○	38	
P	3.2×0.8			○			
I	4.8×0.5	○		○		20	200~2000
K	6.4×0.8	○		○			

◎ : Popular Material ○ : Standard Stock Material

Note(1) Use as reference for corner radius values for Rectangular Type seals.

• Metal Hollow O-Ring **Standard Type**

**VALQUA No.3640**



No.3640 is a Metal Hollow O-Ring crafted by configuring a metal tube into a desired shape with the two ends welded together. The shape is then finely adjusted before the surface is polished and treated. The seal is suitable for low to mid pressure applications from vacuum(10<sup>-10</sup>Pa)to 7MPa(70kgf/cm<sup>2</sup>). For grooved flanges the seal may be installed as is, but raised face flanges require a retainer ring.

● **Dimensions and Configurations**

VALQUA's standard dimensions, groove design standards and tightening load calculations are defined in pages 10, 11, 36.

Dimensions following MS standards or other design requirements may be provided upon request. Oval, angled and other special shapes may also be available upon request.

● **Related Standards**

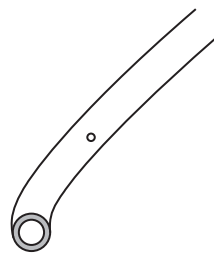
MS9141~2, MS9202~5, MS9371~7, AMS2400, AMS2410, AMS2418, AMS2422, AMS2424, AMS2515, AMS5570, AMS5576, AMS7325, MIL-Q-9858

● **Applications**

Its unique sealing mechanism and excellent performance make Metal Hollow O-Rings suitable for aircrafts, nuclear reactors, high vacuum devices, internal combustion engines, electronics, heavy duty electrical machinery, hydraulic devices, plastic forming devices, melt spinning devices for artificial fabrics and numerous other applications.

• Metal Hollow O-Ring **Balanced Type**

**VALQUA No.3641**



No.3641 incorporates pressure balancing holes to the Standard Type. For seals subjected to internal pressure, holes are placed on the inner diameter side. For seals subjected to external pressure, holes are placed on the outer diameter side. This product is well suited for applications involving high pressures above 7MPa (70kgf/cm<sup>2</sup>), however it may be used for lower pressure applications as well.

Our evaluations have shown that No.3641 can withstand fluid pressures of up to 588MPa(6000kgf/cm<sup>2</sup>).

Applicable flanges and their standard dimensions are identical to those of No.3640 (see page 36).

● **Dimensions and Configurations**

Dimensions and configurations for No.3641 are identical to those of No.3640 (see page 36).

● **Applications**

Applicable uses for No.3641 are identical to those of No.3640, but especially recommended for locations involving high pressures.

• **Ordering Information** for Metal Hollow O-Rings

■ **Part Number, Configuration and Material Chart**

Part Number	Configuration		Material <sup>(3)</sup>		
VALQUA No.	Shape	Cross Section	Tube Material	Surface Treatment	Special Specifications
Standard : 3640 3640S (Set) <sup>(2)</sup>	Circle (Z) Track-Shaped Oval (C) Rectangular (E) Other (X)	Standard (no holes) (Z) Holes on ID (N) Holes on OD (T) Other (X)	SUS304 (E) SUS316 (G) SUS321 (J) Incoloy 800 (W) Other (X)	None (Z) VALFLON® Coating <sup>(4)</sup> Silver Plated (V) Nickel Plated (N) Copper Plated (C) Gold Plated (5) Other (X)	None (Z) Degreased (B) Vacuum, External P (V) Other (X)
Balanced : 3641 <sup>(1)</sup> 3641S (Set)					

Notes(1) If clogging due to highly viscous or slurry fluids is a concern, please consult VALQUA.  
 (2) Product set comes with a retainer and the Metal Hollow O-Rings.  
 (3) Temperature ranges of surface treated Metal Hollow O-Rings are determined by the material with the lower maximum temperature(either the seal material or treatment material).  
 Remarks 1. Configurations and materials may be specified using alphanumeric codes shown in parenthesis.  
 2. For configurations and materials not listed, please consult VALQUA for more information.

(Example) For Balanced Type, Circle, Internal Pressure, SUS304, Silver Plating  
 · The description would become : VALQUA No.3641-Circle, Internal Pressure, SUS304, Silver Plating  
 Or · VALQUA No.3641-ZNEVZ

■ **Size Indications**

For standard sizes(see page 36)please specify the nominal number for the tube and dimensions.

For other sizes and configurations, please specify accordingly.

Dimension tolerances for general Metal Hollow O-Rings are based on the outer diameter tolerances.

Should inner diameter tolerance values be a concern(external pressure, vacuum, etc.), please specify accordingly.

If flanges or retainers are required, please specify the configurations, dimensions and materials.

Remarks Nominal dimensions for Metal Hollow O-Rings are based on the bare tube material without surface treatment. Please take into account the thickness of the surface treatment(coating / plating)accordingly.

## • Design Guidelines

### ■ Design Standards

#### ● For Internal Pressure (Based on Outer Diameter)<sup>(1)</sup>

(Units: mm)

Nominal CSD	O-ring OD D	Groove Bottom R Value (Max)	O-ring without Coating or Plating			O-ring with Coating or Plating <sup>(2)</sup>		
			Groove Depth E	Groove OD A	Min Groove Width G	Groove Depth E	Groove OD A	Min Groove Width G
0.9	8 ~ 100	0.2	0.65±0.05	(D+0.10) +0.10 -0	1.04	0.70±0.05	(D+0.20) +0.10 -0	1.14
1.6	11 ~ 65	0.3	1.20±0.05	(D+0.13) +0.13 -0	1.83	1.25±0.05	(D+0.23) +0.13 -0	1.93
	70 ~ 200			(D+0.20) +0.20 -0	1.86		(D+0.30) +0.20 -0	1.96
2.4	25 ~ 350	0.5	1.95±0.05	(D+0.20) +0.20 -0	2.74	2.00±0.05	(D+0.30) +0.20 -0	2.84
3.2	40 ~ 250	0.8	2.70±0.05	(D+0.20) +0.20 -0	3.62	2.75±0.05	(D+0.30) +0.20 -0	3.72
	260 ~ 1500			(D+0.30) +0.30 -0	3.67		(D+0.40) +0.30 -0	3.77
4.8	200 ~ 2000	1.2	4.05±0.05	(D+0.30) +0.30 -0	5.52	4.10±0.05	(D+0.40) +0.30 -0	5.62
6.4	400 ~ 2500	1.6	5.40±0.05	(D+0.30) +0.30 -0	7.36	5.45±0.05	(D+0.40) +0.30 -0	7.46

#### ● For External Pressure and Vacuum (Based on Inner Diameter)<sup>(1),(3)</sup>

(Units: mm)

Nominal CSD	O-ring OD D	Groove Bottom R Value (Max)	O-ring without Coating or Plating			O-ring with Coating or Plating <sup>(2)</sup>		
			Groove Depth E	Groove ID A	Min Groove Width G	Groove Depth E	Groove ID A	Min Groove Width G
0.9	8 ~ 100	0.2	0.65±0.05	(D-1.8) +0 -0.10	1.04	0.70±0.05	(D-1.9) +0 -0.10	1.14
1.6	11 ~ 65	0.3	1.20±0.05	(D-3.2) +0 -0.13	1.83	1.25±0.05	(D-3.3) +0 -0.13	1.93
	70 ~ 200			(D-3.2) +0 -0.20	1.86		(D-3.3) +0 -0.20	1.96
2.4	25 ~ 350	0.5	1.95±0.05	(D-4.8) +0 -0.20	2.74	2.00±0.05	(D-4.9) +0 -0.20	2.84
3.2	40 ~ 250	0.8	2.70±0.05	(D-6.4) +0 -0.20	3.62	2.75±0.05	(D-6.5) +0 -0.20	3.72
	260 ~ 1500			(D-6.4) +0 -0.30	3.67		(D-6.5) +0 -0.30	3.77
4.8	200 ~ 2000	1.2	4.05±0.05	(D-9.6) +0 -0.30	5.52	4.10±0.05	(D-9.7) +0 -0.30	5.62
6.4	400 ~ 2500	1.6	5.40±0.05	(D-12.8) +0 -0.30	7.36	5.45±0.05	(D-12.9) +0 -0.30	7.46

Notes (1) For cases where fluid pressure exceeds 50MPa(500kgf/cm<sup>2</sup>), groove and O-ring dimensional tolerances must be less than half of the standard values. Please consult VALQUA for such cases.

(2) Thicknesses of the plating and VALFLON PTFE coating are as follows:

Gold, Silver, Nickel, Copper plating : 0.025mm - 0.040mm

VALFLON PTFE coating : 0.025mm - 0.050mm

(3) Dimensional tolerances for general Metal Hollow O-Rings are based on the outer diameter tolerances. Should inner diameter tolerance values be a concern (external pressure, vacuum, etc.), please specify accordingly.

### ■ Standards for Tightening Load Calculation

#### ● Sealing Positive Pressure

The required tightening load  $W_m$  [N] for sealing a maximum fluid pressure of  $P$  is :

$$W_m = W_s + W_p$$

Where

$$W_s = \pi(D-d)K$$

$$W_p = \frac{\pi}{4} D^2 P$$

#### ● Sealing Negative Pressure

The required tightening load  $W_m$  [N] for sealing negative pressure is :

$$W_m = W_s = \pi(D-d)K$$

Where

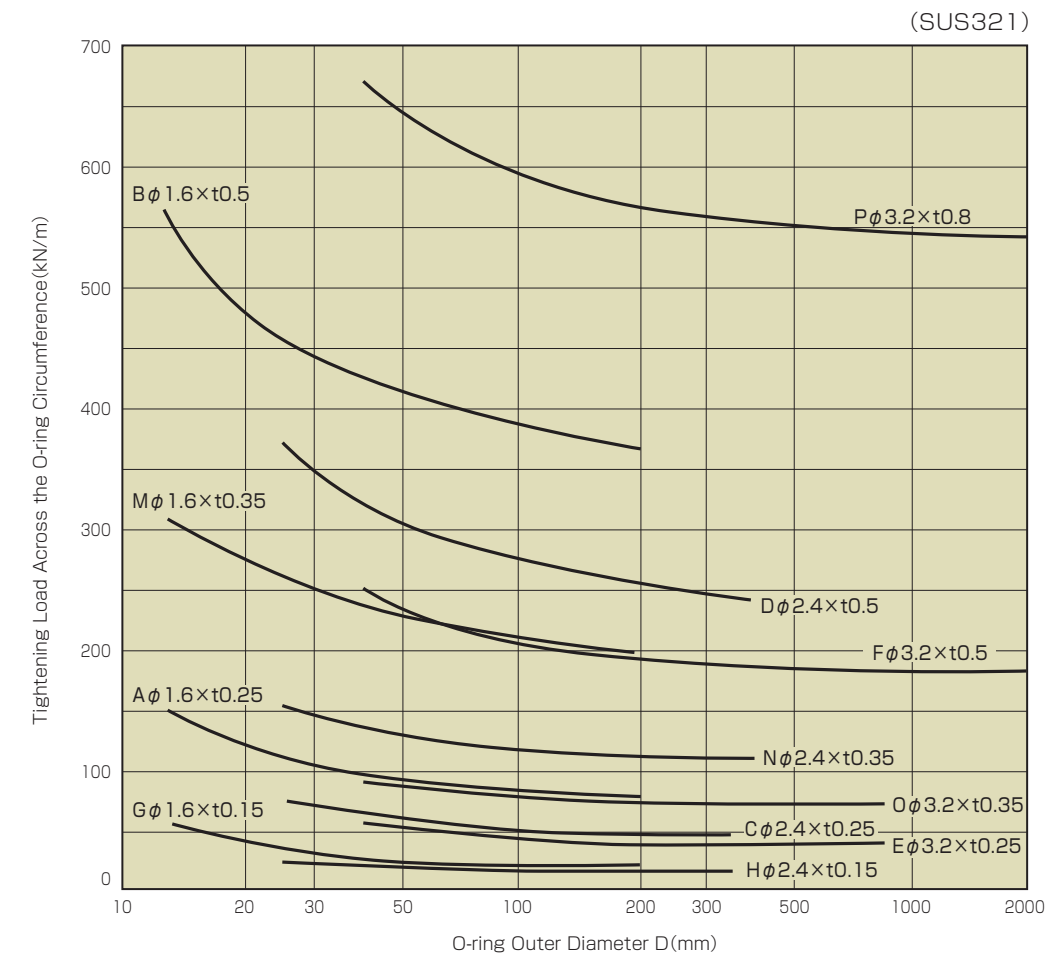
$W_s$  : Force required to fully secure the gasket in the groove to form a seal [N]

$W_p$  : Force from fluid pressure [N]

$D$  : Outer diameter of O-ring [mm]

$d$  : Cross sectional diameter of O-ring [mm]

$K$  : Tightening load across the O-ring circumference [kN/m] (see chart below)



Tightening Load Across the Metal Hollow O-Ring Circumference





# Metal Jacketed Gasket

VALQUA No.N510/N520/N530/N570/  
N580/N6520/N6580

Metal Jacketed Gaskets are semimetallic gaskets comprised of an Non-Asbestos cushion core covered in a thin metal layer. Metal Jacketed Gaskets are versatile in both shape and size, and are suited for not only pipes, towers and tanks, but also multi-path, multi-tube heat exchangers, internal combustion engines and compressors. For added sealing performance, variations of these semimetallic gaskets are available by applying the graphite VALQUAFOIL Gathered Tape (VF-70) or the VALQUAFOIL Gasket (VF-30).

## • Product Types

Name	Cross Sectional Configuration	VALQUA Part No.
Metal Jacketed Gasket (All Covered)		N520
Metal Jacketed Gasket (Corrugated, All Covered)		N510
Metal Jacketed Gasket (Half Covered)		N530
Metal Jacketed Gasket (Circle, All Covered)		N570
Metal Jacketed Gasket (Double Covered)		N580
Metal Jacketed Gasket (French Cross-Section)		N520F
		N520C
VF Metal Jacketed Gasket (All Covered)		N6520
VF Metal Jacketed Gasket (Double Covered)		N6580

## • Materials

Metal Jacketed Gaskets consist of a core material covered in a metal layer. A VALQUAFOIL surface material may also be applied. Tape Seal (No.20) surface wrapping is also available upon request.

Component	Material		Frequency of Use							
	Name	Maximum Hardness(Hv)								
Sheet Metal	Low Carbon Steel	140	○	○	△	△	○	—	○	○
	Copper	80	○	△	○	○	△	○	—	—
	SUS304	180	○	○	△	△	○	○	○	○
	SUS304L	170	○	△	—	—	○	△	○	○
	SUS316	180	○	○	—	—	○	△	○	○
	SUS316L	170	○	△	—	—	○	△	○	○
	SUS321	180	○	△	—	—	△	△	○	○
	SUS347	180	○	△	—	—	○	△	○	○
	SUS410	190	○	○	—	—	○	△	○	○
	5Cr-0.5Mo Steel	150	○	○	—	—	○	△	○	○
	Brass	130	○	—	—	—	△	△	—	—
	Monel Metal	150	○	△	△	△	○	△	—	—
	Titanium	180	○	△	△	—	○	△	○	○
	Nickel	150	○	△	—	—	○	—	○	○
Aluminum	40	○	△	△	○	—	○	—	—	
Lead	10	△	—	—	△	—	○	—	—	
Core Material	Non-Asbestos Plate <sup>(1)</sup>		○	○	○	○	○	○	○	○
	VALFLON Sheet(PTFE)		△	—	—	—	△	—	△	△
Surface Material	Gathered Tape with Adhesive(No.VF-70) Or VALQUAFOIL Sheet(No.VF-30)		—	—	—	—	—	—	○	○

◎ : frequently used ○ : used with some frequency △ : used only for custom applications

Note(1) Non-Asbestos is a registered trademark product manufactured and sold by VALQUA.

■ Flange Surface Roughness (reference)  
The recommended flange surface roughness is 1.6a (Ra). However, this value may be adjusted based on the desired sealing level and fluids involved.

## • Range of Available Sizes

Metal Jacketed Gaskets have no maximum size limits. The largest size on record is 8040mm in outer diameter. Due to transportation limitations, sizes beyond 3500mm in outer diameter will be manufactured on-site.

## ■ Manufacturing Process of Metal Jacketed Gaskets for Heat Exchangers

Asbestos-free materials, typically available in 1000mm×1000mm dimensions, are often used as the core material for Metal Jacketed Gaskets. This core material must be patched together in multiple locations to manufacture larger sized gaskets. To minimize patch sites and increase gasket reliability, long strips of the core material are cut in a spiral manner at a specified width (10~25mm for heat exchange rings).

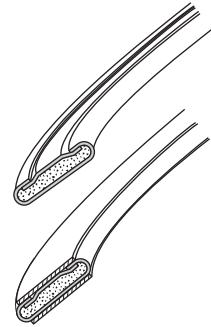
● No.N520, No.N6520, No.N580, No.N6580 are used as gaskets with ribs for multi-path tubular heat exchangers. The gasket ribs may be made to various configurations, but the minimum corner radius is 10mm (ID) for 3mm, 3.2mm thicknesses.



• Metal Jacketed Gasket **All Covered**

**VALQUA No.N520**  
**VALQUA No.N6520**

VF Metal Jacketed Gasket



No.N520 consists of a non-asbestos core material covered with two thin sheets of metal.

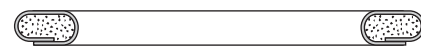
No.N6520 is a variation of No.N520 by applying VALQUAFOIL gathered tape or sheet(VF-70, VF-30, respectively)for improved seal performance.

● **Standard Dimensions**

JPI and ASME pipe Flanges:Conforms with ASME B 16.5, JPI-7S-15 standards for Class 150, Class 300(see page 38).

Other dimensions and configurations are also available.

Remarks1. For narrow widths of less than 5mm the cross sectional configuration will be as shown below.



2. Standard thickness is 3mm but may be adjusted upon request.

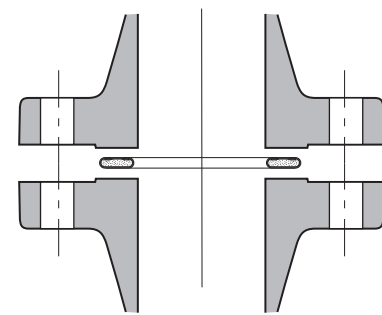
● **Related Standards** ASME B16.5, JPI-7S-15

● **Reference Standards** JIS B2238/2239, JPI-7S-43

● **Applications**

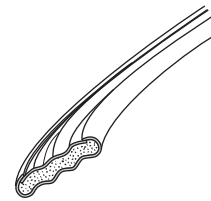
Metal Jacketed Gaskets are utilized where high temperatures and pressures do not allow for the use of non-metal gaskets. No.N520 is commonly used in the oil refining and petrochemical industries for heat exchangers that handle gases, oil gases and solvent fumes. Other applications include pressure vessel covers, valve bonnets, tower and tank connections, internal combustion engines, and cylinder head covers for compressors.

No.N6520 is ideal for applications requiring complete sealing or prohibiting the use of gasket pastes.



• Metal Jacketed Gasket **Corrugated, All Covered**

**VALQUA No.N510**



No.N510 is a gasket similar to No.N520 but with a corrugated cross section. Complete sealing is assured with low tightening load. The corrugated configuration also exhibits some pressure relieving effects observed in Labyrinth seals.

● **Dimensions and Cross Sectional Configurations**

Dimensions for a flat ring configuration are as shown below.

Range of Gasket OD(D)	Pitch(P)				Thickness (T)
	Gasket Width(W)	10<W ≤16	16<W ≤25	25<W ≤40	
D ≤ 100	3	3	3	—	3
100 < D ≤ 160	3	4.5	4.5	4.5	
160 < D ≤ 250	4.5	4.5	4.5	6.5	
250 < D ≤ 400	4.5	4.5	6.5	6.5	
400 < D ≤ 630	4.5	6.5	6.5	6.5	
630 < D ≤ 1,000	4.5	6.5	6.5	6.5	
1,000 < D ≤ 1,600	—	6.5	6.5	6.5	

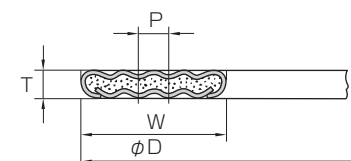
Remark The minimum inner diameter is 13mm.

● **Related Standards** ASME B16.20, ASME B16.5

● **Reference Standards** JIS B2238/2239

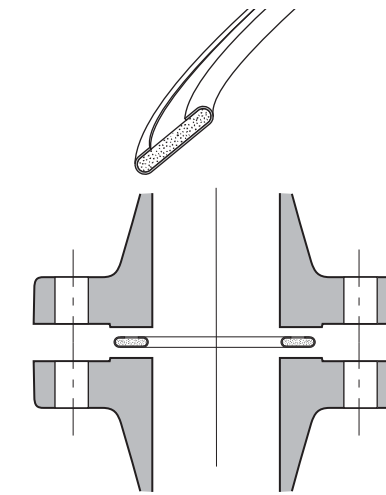
● **Applications**

No.N510 is utilized in oil refining and chemical industries involving steam, heated oils, oil gases and solvent vapors for raised, grooved and male & female pipe flanges. It may also be used in covers for valve bonnets, pressure vessels, towers and tanks.



• Metal Jacketed Gasket **Half Covered**

**VALQUA No.N530**



No.N530 is a gasket where the core material is covered with a thin metal sheet on one side. For applications requiring small diameters or narrow and flat sections No.N520 or No.N580 is not recommended.

● **Dimensions and Cross Sectional Configurations**

No.N530 can be configured as requested.

● **Related Standards**

ASME B16.5

● **Reference Standards**

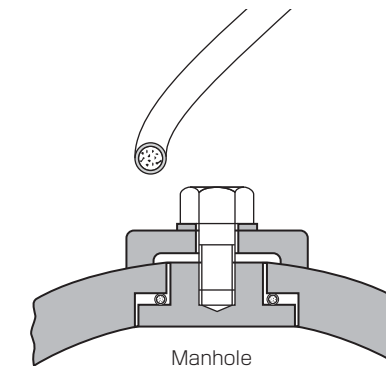
JIS B2238/2239

● **Applications**

No.N530 is utilized for boiler manholes or hand holes, steam traps, sight glasses and ignition plugs for internal combustion engines. For applications requiring round or flat shaped cross sections No.N570 may be used.

• Metal Jacketed Gasket **Circle, All Covered**

**VALQUA No.N570**



No.N570 is a gasket formed by wrapping a thin metal sheet around a strip of core material and finished into a round cross section. Various cross sectional configurations such as oval, ellipse, square, diamond and pear shapes are possible.

● **Dimensions and Cross Sectional Configurations**

Round, oval and rectangular shapes are available in requested sizes.

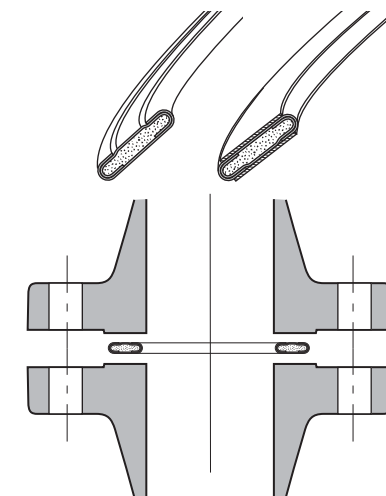
● **Applications**

No.N570 can be utilized for manholes or headers in water pipe boilers, steam traps, sight glasses and internal combustion engines where space is required.

• Metal Jacketed Gasket **Double Covered**

**VALQUA No.N580**  
**VALQUA No.N6580**

VF Metal Jacketed Gasket



No.N580 is a flat gasket with two thin metal sheets wrapped around the core material. The upper sheet is folded, overlapping into the lower sheet. For large sized gaskets in horizontal machines, the No.N580 may be selected over the No.N520 for greater reliability. No.N6580 is a N580 gasket with VALQUAFOIL gathered tape or sheet(VF-70, VF-30 respectively) applied to both sides for improved seal performance.

● **Dimensions and Cross Sectional Configurations**

The Double Covered Metal Jacketed Gasket can be configured as requested.

● **Reference Standards** ASME B16.5, JIS B2238/2239

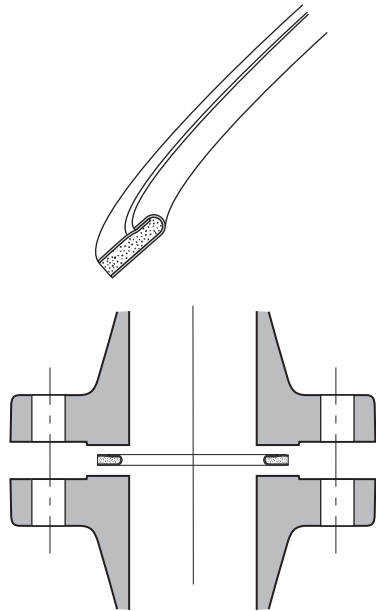
● **Applications**

No.N580 and No.N6580 gaskets may be used in environments with the same or harsher temperatures and pressures than that of No.N520. Applications include pipe flanges, large size pressure vessels, towers and tanks.

No.N6580 is ideal for applications requiring complete sealing or prohibiting the use of gasket pastes.

• Metal Jacketed Gasket **French Cross Section**

**VALQUA No.N520F**  
**VALQUA No.N520C**



No.N520F consists of a Non-Asbestos Plate, Non-Asbestos Joint Sheet, or a combination of both, wrapped with a thin metal sheet in a "C" shaped cross section. Two types of configurations are available depending on the malleability of the metal material used.

No.N520C is a sheet gasket such as the Non-Asbestos Joint Sheet with a thin metal cover on the inner diameter side (grommet processing).

● **Dimensions**

This product can be manufactured as requested.

● **Related Standards** ASME B16.5

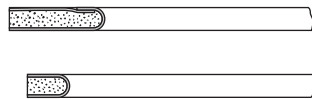
● **Reference Standards** JIS B2238/2239

● **Applications**

Applications include cylinder head covers for compressors and internal combustion engines, exhaust joints, sight glasses, valve bonnets and other locations requiring a custom shape. Also applicable towards locations such as polymerization reactor lids where VALFLON Jacketed Gaskets cannot be used. Below are configurations and materials especially suited for polymerization reactors.

VALQUA Part No.	Cross Sectional Configuration	Applications
<b>N520F-ZXP</b>	<p>Non-Asbestos Felt Sheet Non-Asbestos Joint Sheet</p>	Chloroprene, Vinyl Chloride or AS Resin used in polymerization reactors
	<p>Non-Asbestos Felt Sheet Corrugated Gasket Non-Asbestos Joint Sheet</p>	
<b>N520F-ZXA</b>	<p>Non-Asbestos Felt Sheet Non-Asbestos Joint Sheet</p>	Polymerization of Styrene Resin

**No.N520F**



**No.N520C**



• **Ordering Information** for Metal Jacketed Gaskets

■ **Part Number, Configuration and Material Chart**

Part Number	Configuration	Material		Special Specifications
VALQUA No. <b>N520</b>	Shape	Core Material	Metal Cover Material	
(Metal Jacketed Gasket) Corrugated Covered : N510 All Covered : N520 Half Covered : N530 Circle Covered : N570 Double Covered : N580 French Type : N520F, N520C	Circle (Z) Circle with Handle (T) Circle with ribs (Y) Track-Shaped Oval (C) Oval (N) Rectangular (E) Other (X)	VALFLON Sheet (4) Soft Non-Asbestos Plate (7) Other (X) Expanded Graphite (5)	Low Carbon Steel (S) Copper (C) SUS304 (E) SUS304L (L) SUS310S (O) SUS316 (G) SUS316L (H) SUS321 (J) SUS347 (K) SUS410 (R) 5Cr-0.5Mo Steel (F) Brass (B) Monel Metal (M) Titanium (T) Nickel (N) Aluminum (A) Lead (P) Other (X)	None (Z) Degreased (B) Tape Seal Wrap (T) Other (X)
(Metal Jacketed Gasket with VALQUAFOIL) Corrugated Covered : N6510 All Covered : N6520 Double Covered : N6580 French Type : N6520F				

Remarks 1. Configuration, core material, metal coating material, and special conditions may be specified using alphanumeric codes shown in parenthesis.  
2. For configurations and materials not listed, please consult VALQUA.

(Example) For Metal Jacketed Gasket, Flat Circular Configuration, Soft Non-Asbestos Plate, SUS316, Degreased  
Or  
· The description would become : VALQUA No.N520-Circle-Soft Non-Asbestos Plate-SUS316-Degreased  
· VALQUA No.N520-Z7GB

■ **Size Description**

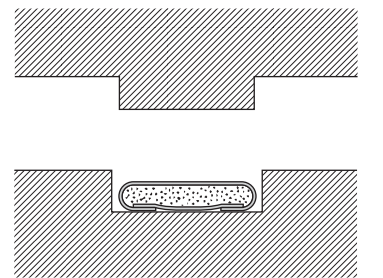
For orders with standard dimensions (see page 38), please specify the flange, configuration and diameter.

Flange	Configuration	Diameter
ASME or JPI Class 150 Raised Face : 150 ASME or JPI Class 300 Raised Face : 300	Gasket OD is inscribed in the bolts (page 38 Figure 1) : No Code Available Gasket OD is equivalent to the Raised Face OD (page 38 Figure 2) : NW	

(Example) 150NW-3

For applications outside these standard specifications, please provide configurations and dimensions.

Gaskets No.N520, No.N6520, No.N580, No.N6580 for heat exchangers consist of a flat surface and a folded surface. Please provide clear drawings specifying appropriate sides and views for non-symmetric designs. When installed, the side with overlapping sheets should be on the bottom as shown to the right.






# Metal Corrugated Gasket

VALQUA No.500

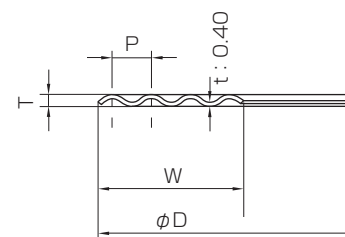
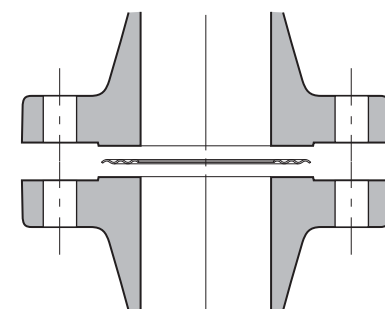
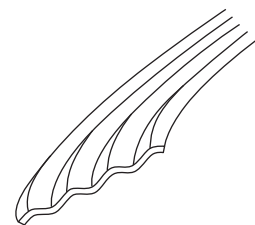
No.500 is a metal gasket made of a thin, corrugated metal sheet. It is appropriate for joint areas involving high temperatures and low pressure fluids.

## Product Types

Name	Cross Sectional Configuration	VALQUA Part No.
Metal Corrugated Gasket		500

## Metal Corrugated Gasket

### VALQUA No.500



No.500 is made of low carbon steel or stainless steel (such as SUS304). It seals under low pressures similar to Asbestos Joint Sheet gaskets, and its heat resistance is greater than Metal Jacketed Gaskets. These qualities allow No.500 to be used for class 150 and 300 globe, gate and check valve bonnets.

#### Dimensions and Configurations

Round, oval, and rectangular shapes are available.  
Dimensions of round shaped gaskets are shown below.

Pitch(P) Gasket Width(W)	Pitch			
	10<W ≤ 16	16<W ≤ 25	25<W ≤ 40	40<W ≤ 60
OD Classification(D)				
D ≤ 100	2	3	3	3
100 < D ≤ 160	3	3	3	3
160 < D ≤ 250	3	3	4.5	4.5
250 < D ≤ 400	3	3	4.5	4.5
400 < D ≤ 630	3	4.5	4.5	6.5
630 < D ≤ 1,000	3	4.5	6.5	6.5
1,000 < D ≤ 1,600	3	6.5	6.5	6.5

Remark Minimum gasket inner diameter is 13mm.

(Units:mm)

Nominal Thickness(T)	Pitch(P)
0.8	2
1	3
1.2	4.5
1.2	6.5

●Reference Standards DIN2698

#### Applications

Used in various valve bonnets for high temperature/low pressure steam, oil gases, solvent vapors, and thermal oils.

## Ordering Information for Metal Corrugated Gaskets

### Part Number, Configuration and Material Chart

Part Number	Configuration		Material	Special Specifications
VALQUA No.	Shape	Cross Section	Metal Material	
500				
Metal Corrugated Gasket : 500	Circle (Z) Track-Shaped Oval (C) Oval (N) Other (X)	Standard (Z) Other (X)	Low Carbon Steel (S) SUS304 (E) SUS316 (G) 5Cr-0.5Mo Steel (F) Other (X)	None (Z) Degreased (B) Other (X)

Remarks 1. Configuration, material, and special conditions may be specified using alphanumeric codes shown in parenthesis.  
2. For configurations and materials not listed, please consult VALQUA.

### Size Description

Please specify gasket configurations and dimensions.



# Metal Flat Gasket and Serrated Gasket

VALQUA No.540/560

The Metal Flat Gasket is a simple, economical gasket made from rolls of sheet metal to manufacture specified gasket shapes and sizes. The Serrated Gasket's surface is jagged to minimize the effective contact area and improve seal efficiency. Both seals are used in high temperature/high pressure valve bonnets, pipe flanges and cover gaskets for pressure vessels.

## • Product Types

Name	Cross Sectional Configuration	VALQUA Part No.
Metal Flat Gasket		560
Serrated Gasket(Outer Wing Cross Section)		540
Serrated Gasket(Inner Wing Cross Section)		
Serrated Gasket(Wingless Cross Section)		
Serrated Gasket (Outer and Inner Wing Cross Section)		
Kammprofile Gasket	VALQUAFOIL Sheet VALQUAFOIL Sheet	6540H 6540HP

## • Materials

Material		Frequency of Use	
Name	Maximum Hardness(Hv)		
Low Carbon Steel	140	○	○
Soft Iron	100	○	○
Copper	80	○	○
SUS304	180	○	○
SUS304L	170	○	○
SUS316	180	○	○
SUS316L	170	○	○
SUS321	180	○	△
SUS347	180	○	△
SUS410	190	○	△
SUS430	190	○	△
5Cr-0.5Mo Steel	150	○	○
Monel Metal	150	○	○
Titanium	180	○	○
Silver	50	○	—
Hastelloy B	220	○	△
Aluminum	40	○	○
Lead	10	○	—

■ Flange Surface Roughness(reference)  
The recommended flange surface roughness is 1.6a(Ra).  
However, this value may be adjusted based on the desired sealing level and fluids involved.

○ : frequently used   ○ : used with some frequency   △ : used only for custom applications

## • Range of Available Sizes

### ■ Maximum OD of Single Sheet Gaskets

Production limits of single sheet gaskets are as follows.

Please note that values may vary depending on material availability.

(Units:mm)

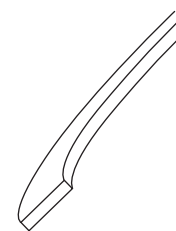
Material	Max. OD of Single Sheet Gasket <sup>(1)</sup>	Material	Max. OD of Single Sheet Gasket <sup>(1)</sup>
Low Carbon Steel	1500	SUS410	1200
Soft Iron	2000 <sup>(2)</sup>	SUS430	1200
Copper	1200	5Cr-0.5Mo Steel	1200
SUS304	1200	Monel Metal	1200
SUS304L	1200	Titanium	1200
SUS316	1200	Silver	200
SUS316L	1200	Hastelloy B	1000
SUS321	1200	Aluminum	1200
SUS347	1200	Lead	1500

Notes(1) Maximum production size without welding.

(2) Manufactured with forged and heat treatment materials.

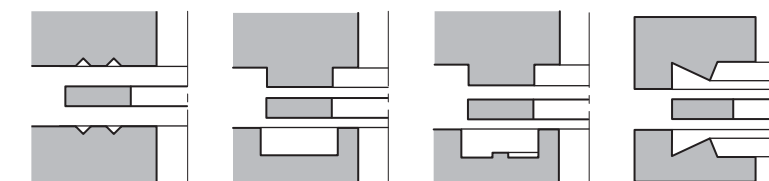
## • Metal Flat Gasket

### VALQUA No.560



No.560 is a machine finished gasket made from rolls of sheet metal to customer specifications.

Seal performance and pressure resistance may be improved by using the product with a flange with concentric V-shaped grooves or processed nubbins.



### ●Dimensions and Configurations

This product can be manufactured as requested. If not specified, a nominal thickness of 3mm is applied.

### ●Related Standards

ASME B 16.5, DIN 2695

### ●Reference Standards

JIS B 2238/2239

### ●Applications

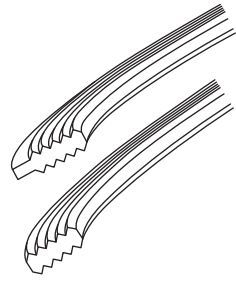
No.560 may be utilized in pipe flanges for high temperature/high pressure steam or process lines, tanks, vessels, heat exchangers, autoclaves and valve bonnets. It is applicable to raised faced, grooved, and male & female joints. No.560 has been used for knife edge shaped grooves in bakeable flanges of vacuum equipment. For such cases, JIS H 3100 Oxygen Free Copper Plate C1020P-1/2H or an equivalent or higher Oxygen Free Copper Plate ASTM F68 Class 1 material is used.

For standard dimensions, please see page 39.



## • Serrated Gasket

### VALQUA No.540



No.540 is a serrated gasket made from rolls of sheet metal or bars. It has excellent sealing performance and pressure resistance, but the jagged surface may scratch the flange. Retouching the flange surface upon gasket replacement is recommended.

#### ●Standard Dimensions

JIS Pipe Flange: Outer Wing Cross Section dimensions are determined based on JIS B 2202-1984 pipe flange gasket standards(10K,16K,20K,40K, 63K) (see page 44).

JPI and ANSI Pipe Flange: Standard Outer Wing Cross Section dimensions are determined based on ASME/ANSI B 16.5-1988 (classes 150, 300, 600, 900) (see page 45).

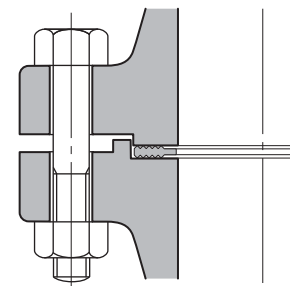
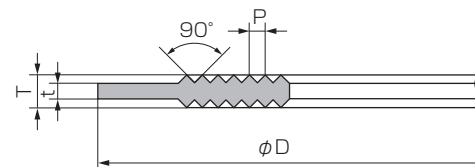
#### ●Non-Standard Dimensions and Configurations

Dimensions of round shaped gaskets are shown below.

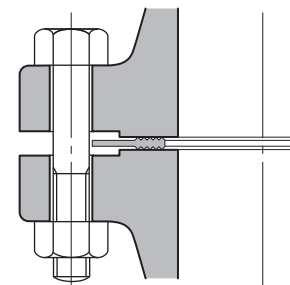
(Units:mm)

OD Classification (D)	Pitch (P)	Nominal Thickness (T)	Wing Thickness (t)
D ≤ 100	1	3	2
100 < D ≤ 250		4.5	3
250 < D ≤ 630		6	4.5
630 < D ≤ 1600		8	6

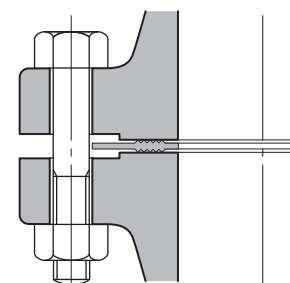
Gaskets outside of the above mentioned specifications are available upon request.



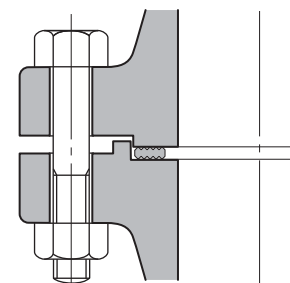
(Inner Wing Cross Section)



(Outer Wing Cross Section)



(Inner and Outer Wing Cross Section)



(Wingless Cross Section)

#### ●Related Standards

ASME B16.5, DIN 2697

#### ●Reference Standards

JIS B 2238/2239

#### ●Applications

No.540 is utilized in high temperature/high pressure raised face and male & female pipe flanges, pressure vessels, tanks, towers and valve bonnets. It may also be used for screw-in locations requiring low friction.

## • Ordering Information for Metal Flat Gaskets and Serrated Gaskets

### ■ Part Number, Configuration and Material Chart

#### (Serrated Gasket)

Part Number	Configuration		Material	Special Specifications
VALQUA No.	Shape	Cross Section	Metal Material	
540				
Serrated Gasket : 540 Kammprofile Gasket : 6540H Kammprofile Gasket : 6540HP	Circle (Z) Circle with ribs (Y) Other (X)	All Serrated (Z) Outer Wing (M) Inner Wing (V) Inner and Outer Wing (W) Other (X)	Low Carbon Steel (S) Copper (C) SUS304 (E) SUS304L (L) SUS316 (G) SUS316L (H) 5Cr-0.5Mo Steel (F) Monel Metal (M) Titanium (T) Aluminum (A) Other (X)	None (Z) Degreased (B) V Groove Process (K) Other (X)

#### (Metal Flat Gasket)

Part Number	Shape	Cross Section	Metal Material	Special Specifications
VALQUA No.				
560				
Metal Flat Gasket : 560 Metal Flat Gasket with VALQUAFOIL : 6560	Circle (Z) Circle with ribs (Y) Track-Shaped Oval (C) Rectangular (E) Other (X)	Wingless (Z) Outer Wing (M) Inner Wing (V) Inner and Outer Wing (W) Other (X)	Soft Iron (D) Low Carbon Steel (S) Copper (C) SUS304 (E) SUS304L (L) SUS316 (G) SUS316L (H) SUS321 (J) SUS347 (K) SUS410 (R) SUS430 (U) 5Cr-0.5Mo Steel (F) Monel Metal (M) Titanium (T) Silver (V) Aluminum (A) Lead (P) Other (X)	None (Z) Degreased (B) Other (X)

- Remarks 1. Configuration, core material, metal coating material, and special conditions may be specified using alphanumeric codes shown in parenthesis.  
2. For configurations and materials not listed, please consult VALQUA.  
3. Please specify requests for Copper Flat Gaskets for bakeable flanges.

(Example) For Serrated Gasket, Circle, Outer Wing, SUS304, V Groove Process  
· The description would become: VALQUA No.540 - Circle - Outer Wing - SUS304 - V Groove Process  
Or · VALQUA No.540-ZMEK

### ■ Size Description

For standard dimensions (see pages 44, 45), please specify the flange and diameter.

Flange	Diameter
JIS10K	: 10K
JIS16K, 20K	: 20K
JIS40K	: 40K
JIS63K	: 63K
ASME and JPI Class150	: 150
//	300 : 300
//	600 : 600
//	900 : 900

(Example) JIS10K-50

For unlisted flanges, please specify configurations and dimensions.



# Ring Joint Gasket

VALQUA No.550 Series

Ring Joint Gaskets are pressure-energized gaskets. It can be used in pipe flanges, pressure containers and valve bonnets handling high temperature/high pressure steam, gases, hot oils, oil gases and solvent vapors. These gaskets can reduce the strength required by bolts and flanges compared to simple compression metal gaskets.

## • Product Types

Name	Cross Sectional Configuration	VALQUA Part No.
Ring Joint Gasket (Oval Cross Section)		<b>550-ZO</b>
Ring Joint Gasket (Octagonal Cross Section)		<b>550-ZS</b>
Ring Joint Gasket (API-RX Cross Section)		<b>550-ZA</b>
Ring Joint Gasket (API-BX Cross Section)		<b>550-ZP</b>
Improved Bridgeman Gasket (Wedge Cross Section)		<b>550-ZB</b>
Delta Ring (Triangular Cross Section)		<b>550-ZD</b>
Lens Ring (Lens Cross Section)		<b>550-ZL</b>
Double Cone Shaped Gasket (Double Cone Cross Section)		<b>550-ZW</b>
Circle Shaped Metal Gasket (Circle Cross Section)		<b>550-ZR</b>
Diamond Cross Section Ring		<b>550-ZE</b>

## • Materials

Material		Frequency of Use					
Name	Maximum Hardness (H <sub>a</sub> )						
Low Carbon Steel	120	○	◎	◎	◎	◎	◎
Soft Iron	90	◎	◎	◎	◎	○	-
Copper	60	△	○	-	-	-	○
SUS304	160	◎	◎	◎	◎	○	△
SUS304L	150	○	○	○	○	△	-
SUS310S	160	○	△	△	△	-	-
SUS316	160	◎	○	○	○	-	△
SUS316L	150	◎	○	○	○	-	△
SUS321	160	○	△	△	○	-	-
SUS347	160	○	△	△	△	-	-
SUS430	170	△	△	△	△	-	-
5Cr-0.5Mo Steel	130	◎	○	○	○	△	-
Monel Metal	140	○	-	○	△	-	-
Titanium	140	○	-	○	○	-	-
Aluminum	40	△	-	-	-	◎	○
Nickel	120	○	-	-	△	-	-

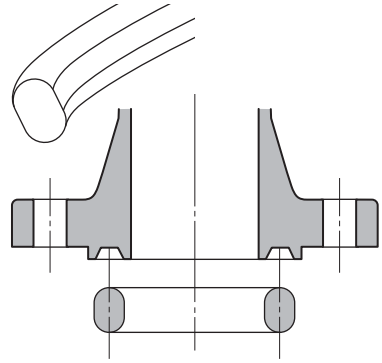
◎ : frequently used   ○ : used with some frequency   △ : used only for custom applications

■ Flange Surface Roughness (reference)  
The recommended flange surface roughness is 1.6a (Ra).  
However, this value may be adjusted based on the desired sealing level and fluids involved.

## • Ring Joint Gasket Oval and Octagonal Type Cross Sections

### VALQUA No.550-ZO

Oval Cross Section



No.550-ZO is a metal ring with an oval shaped cross section, and No.550-ZS has an octagonal shaped cross section. Dimensions and materials are standardized according to JPI-7S-23 or ASME B16.20 standards. These gaskets are for ring joint face flanges specified in JPI-7S-15, ASME B16.5, API SPEC 6A, MSS SP-44, and BS 1560 standards.

#### ●Standard Dimensions

JPI-7S-23-83 class 150-2500 standards are applied to JPI, API, ASME, and MSS pipe flanges.

#### ●Related Standards

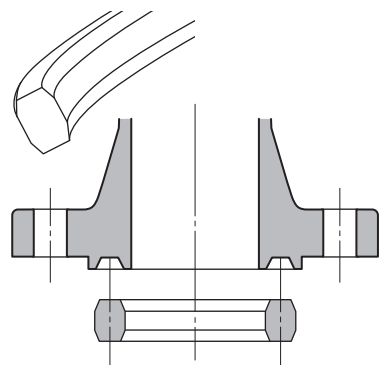
ASME B16.5, API SPEC 6A, JIS F 7102 (520SR), MSS SP-44, BS 1560, JPI-7S-15

#### ●Applications

These gaskets are utilized in numerous applications such as petroleum and petrochemical industries, for thermal power generation and steam turbines on vessels. Uses also include flanges, valve bonnets, pressure containers, towers and vessels handling high temperature/high pressure steam, gases, hot oils, oil gases, solvent vapors, and Oxygen.

### VALQUA No.550-ZS

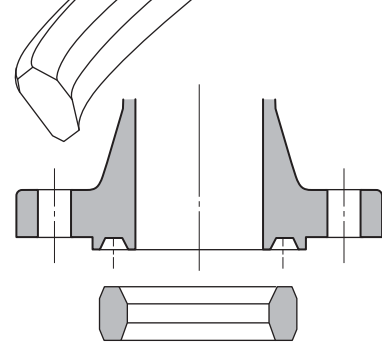
Octagonal Cross Section



## • Ring Joint Gasket API-RX and API-BX Type Cross Sections

### VALQUA No.550-ZA

API-RX Cross Section



No.550-ZA is a gasket often used for high pressure applications such as oil drilling. Conforming to API SPEC 6A standards, the octagonal RX type is used for the 6B flange, and the BX type is used for the 6BX flange.

#### ●Standard Dimensions

(RX Cross Section Type)

API Pipe Flange...API SPEC 6A class 2000~10,000

(see page 48)

#### ●Standard Dimensions

(BX Cross Section Type)

API Pipe Flange...API SPEC 6A class 2000~20,000

(see page 49)

#### ●Related Standards

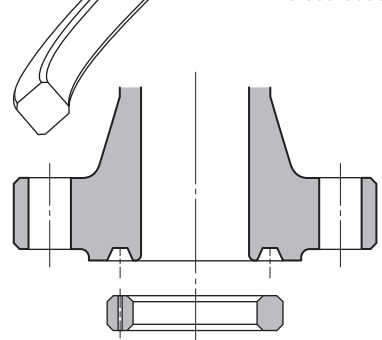
JPI-7S-23, ASME B16.5, ASME B16.20, MSS SP-44, JIS F 7102.(520SR), API SPEC 6A, BS1560, JPI-7S-15

#### ●Applications

The item is used in high pressure joint locations as those in oil drilling equipment.

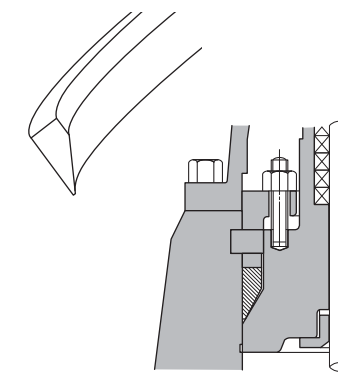
### VALQUA No.550-ZP

API-BX Cross Section



## • Improved Bridgeman Gasket

### VALQUA No.550-ZB



No.550-ZB is a unique self-sealing gasket which applies P.W. Bridgeman's "Unsupported Area Principle". Downward pressure on the edge face of the floating head increases the tension force.

The joint structure requires some precision, but bolts and flanges will only have to withstand the stresses from the edge faces.

For Soft Iron and Low Carbon Steel gaskets, silver plating may be applied to better conform to the opposing surface while preventing adhesion.

#### ●Dimensions and Cross Sectional Configurations

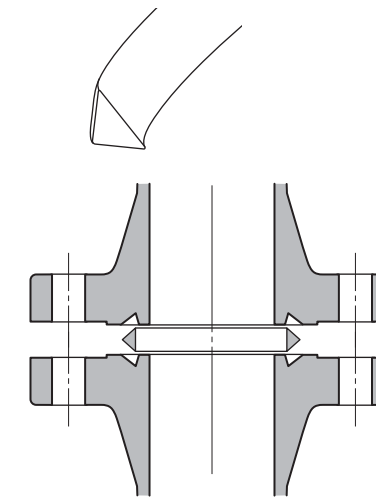
Requested dimensions are available, provided the configuration is a ring.

#### ●Applications

No.550-ZB is used for cover packings of valve bonnets, heat exchangers, and autoclaves of high temperatures and high pressures of 9.8MPa {100kgf/cm<sup>2</sup>} or more.

## • Delta Ring

### VALQUA No.550-ZD



No.550-ZD is a self-sealing gasket with a triangular cross section. It can be used for pressure container covers and valve bonnets up to pressures of 34.3MPa{350kgf/cm<sup>2</sup>}.

For improved sealing performance, silver plating may be used.

#### ●Dimensions and Cross Sectional Configurations

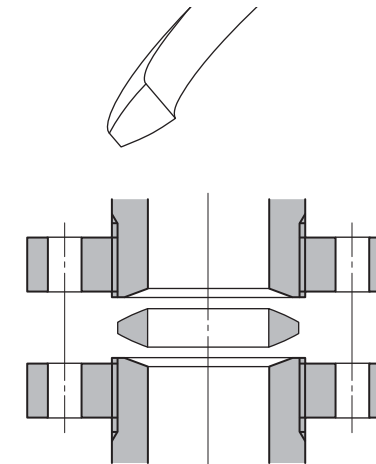
Requested dimensions are available, provided the configuration is a ring.

#### ●Applications

No.550-ZD is used for high temperature/high pressure autoclaves and heat exchanger covers and valve bonnets.

## • Lens Ring

### VALQUA No.550-ZL



No.550-ZL is a gasket with a cross section similar to that of a convex lens. The self-sealing gasket seals at a line contact with the cone shaped flange angled at 20 degrees.

#### ●Dimensions and Cross Sectional Configurations

Requested dimensions are available, provided the configuration is a ring.

Production is based on MSS SP-65 or DIN 2696 standards.

#### ●Related Standards

MSS SP-65, DIN 2696

#### ●Applications

No.550-ZL has been used for pipe flanges and pressure container covers for high temperature/high pressure ammonia and methanol compound lines. It has also been used for 294 MPa{3000kgf/cm<sup>2</sup>} high pressure polyethylene polymer lines.

## • Double Cone Shaped Metal Gasket

### VALQUA No.550-ZW

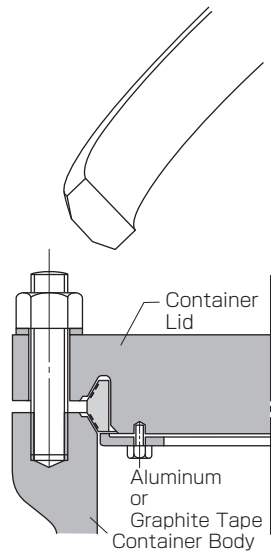
No.550-ZW is a self-sealing gasket with a double cone shaped cross section. When Low Carbon Steel is used, an Aluminum board or Graphite tape is often used to ensure a seal. This method alleviates the need for a precisely finished surface and also does not damage the surface.

#### ●Dimensions and Cross Sectional Configurations

Requested dimensions are available, provided the configuration is a ring.

#### ●Applications

No.550-ZW is utilized in covers for high temperature/high pressure vessels and heat exchangers.



## • Circle Shaped Metal Gasket

### VALQUA No.550-ZR

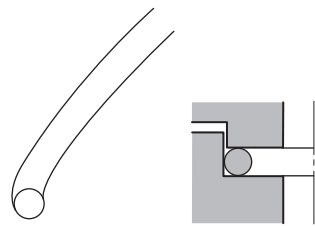
No.550-ZR is a gasket with a circle cross section and is often used for small, high pressure joint locations.

#### ●Dimensions and Cross Sectional Configurations

This product can be manufactured as requested.

#### ●Applications

No.550-ZR is used for valve bonnets, compressors, vacuum pumps, reactors, high pressure unions, and joint nipple locations.



## • Diamond Shaped Metal Gasket

### VALQUA No.550-ZE

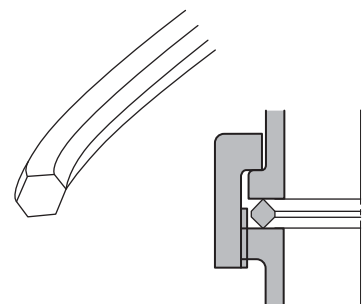
No.550-ZE is a small metal ring with a diamond cross section, often used in locations tightened by twisting such as joint nipples.

#### ●Dimensions and Cross Sectional Configurations

Requested dimensions are available, provided the configuration is a ring.

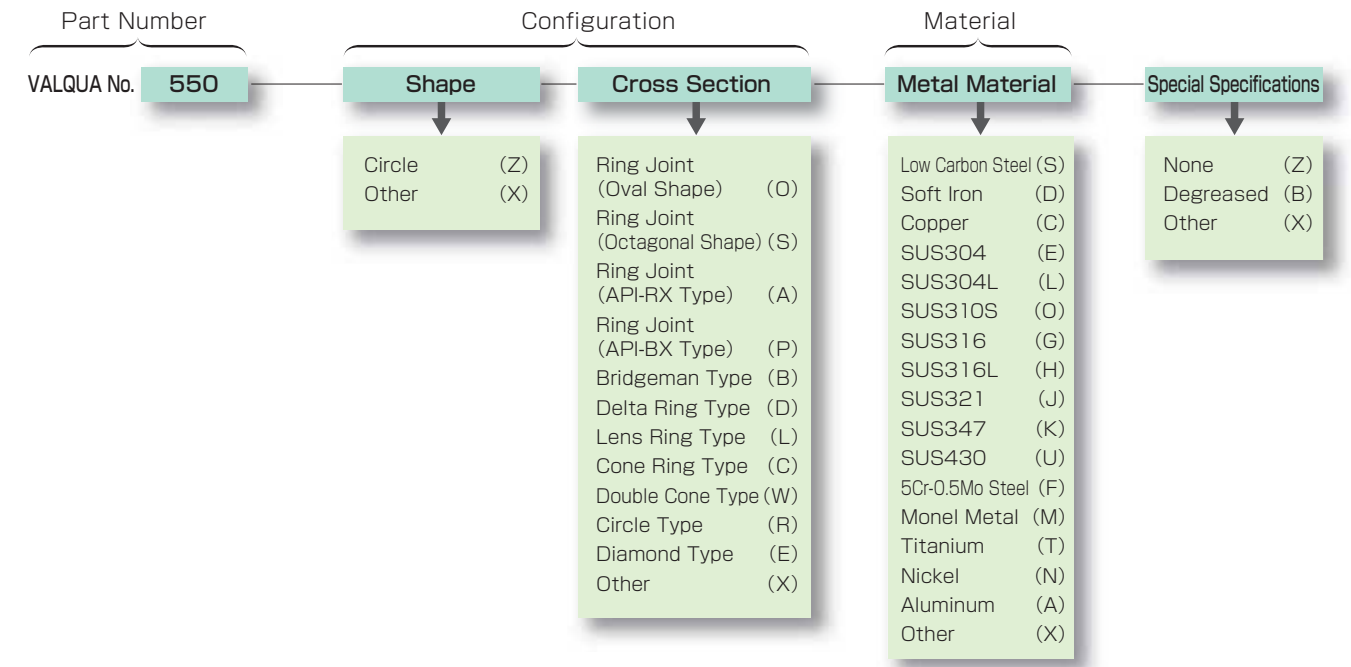
#### ●Applications

No.550-ZE is used in high temperature/high pressure manometer mounts and nipple shaped joints.



## • Ordering Information for Ring Joint Gaskets

### ■ Part Number, Configuration and Material Chart



Remarks 1. Configuration and material, and special specifications may be specified using alphanumeric codes shown in parenthesis.  
2. For configurations and materials not listed, please consult VALQUA.

(Example) For Ring Joint Circle, Oval Cross Section, SUS304L, Degreased  
Or · The description would become: VALQUA No.550 - Circle·Oval Type·SUS304L·Degreased  
· VALQUA No.550 - ZOLB

### ■ Size Description

For Oval, Octagonal, API-RX, API-BX type Ring Joint Gaskets, please specify the ring number (see pages 46~49).

(Example) R-50

For other sizes, please specify the configuration and dimensions.





# Blind Plate and Holding Ring

VALQUA No.555 Series

The No.555 series allows pipe opening and closures by installing blind plates or holding rings in place of oval or octagonal Ring Joint Gaskets. These products are designed and manufactured to meet customer specific application requirements.

## Product Types

Name	Cross Sectional Configuration	VALQUA Part No.
Blind Plate (Oval Cross Section)		555-60
Holding Ring (Oval Cross Section)		555-70
Combination of Blind Plate and Holding Ring (Oval Cross Section)		555-80
Blind Plate (Octagonal Cross Section)		555-6S
Holding Ring (Octagonal Cross Section)		555-7S
Combination of Blind Plate and Holding Ring (Octagonal Cross Section)		555-8S
Blind Plate (Flat Cross Section)		555-6P
Holding Ring (Flat Cross Section)		555-7P
Combination of Blind Plate and Holding Ring (Flat Cross Section)		555-8P

### Materials

Materials are based on oval and octagonal Ring Joint Gaskets(see page 25).

### Dimensions

Requested dimensions are available, provided the configuration is a ring.

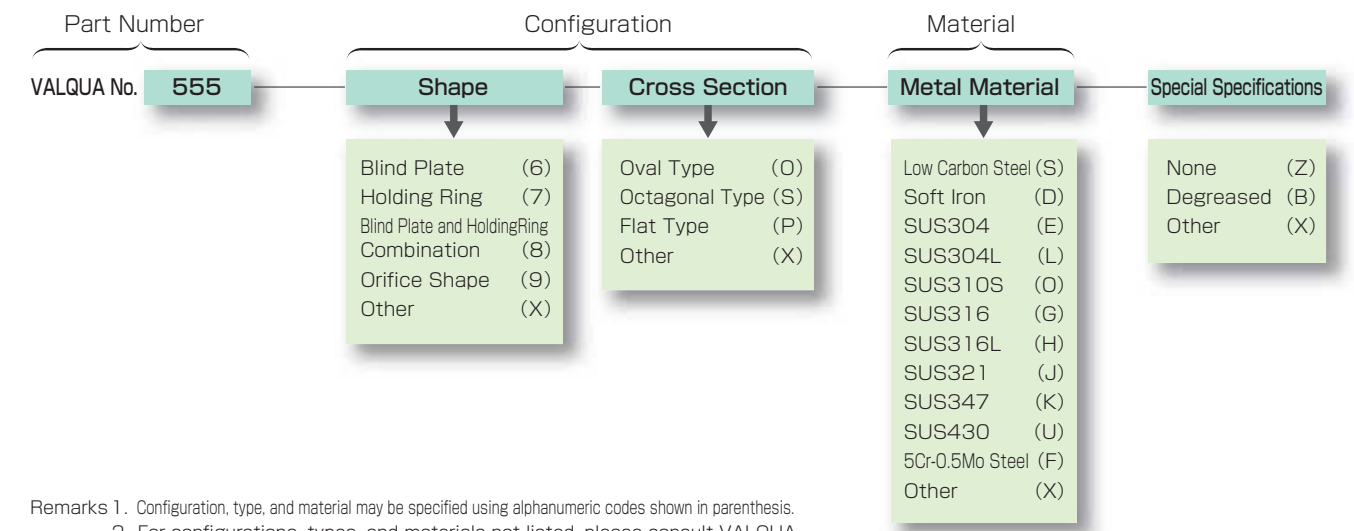
### Reference Standards

JPI-7S-23, API STD 600

Remark Pipe diameters in the figures above are not to scale.

## Ordering Information for Blind Plate and Holding Ring

### Part Number, Configuration and Material Chart



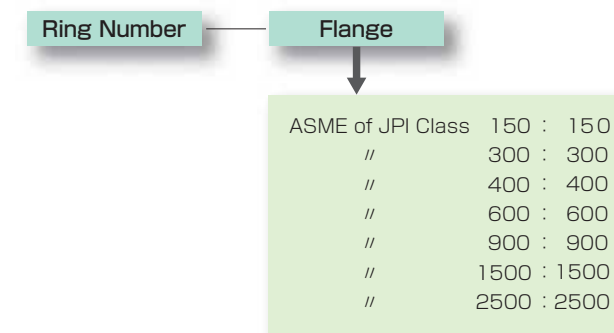
Remarks 1. Configuration, type, and material may be specified using alphanumeric codes shown in parenthesis.  
2. For configurations, types, and materials not listed, please consult VALQUA.

(Example) For Blind Plate(Octagonal Type), SUS316L, No Special Specifications  
Or The description would become: Valqua No.555 - Blind Plate-Octagonal Type-SUS316L  
VALQUA No.555-6SHZ

### Size Description

(1) For oval and octagonal cross section types

Please specify the ring number(see pages 46~49)and flange.



(Example) R20-600  
For special specifications, please indicate the configuration and dimensions.

(2) For flat types

Please specify the flange and diameter.

(3) For orifice plates

Please specify the configuration and dimensions with a drawing.



# Other Metal Gaskets

VALQUA No. 550 Series

These gaskets are designed and manufactured to meet customer specific application requirements. Please consult Valqua.

## • Product Types

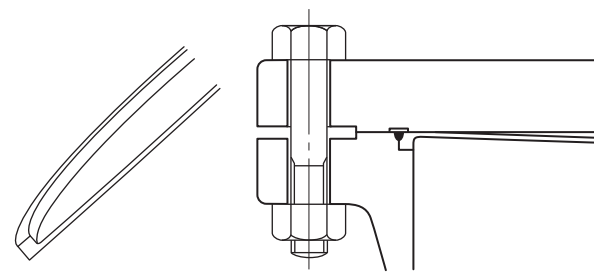
Name	Cross Sectional Configurations	VALQUA Part No.
Diaphragm Cross Section Plate		550-ZX
Canopy Seal		550-ZX
Sealing Membrane		550-ZX
Omega Seal Ring		550-ZX
Seal Plate		550-ZX

## • Materials

Please consult VALQUA for options.

## • Diaphragm Cross Section Plate

### VALQUA No.550-ZX



• Diaphragm Cross Section Plate

No.550-ZX is used in heat exchanger covers for high temperature/high pressure lines. Leaks will not occur as it is welded to the body.

#### ● Dimensions and Cross Sectional Configurations

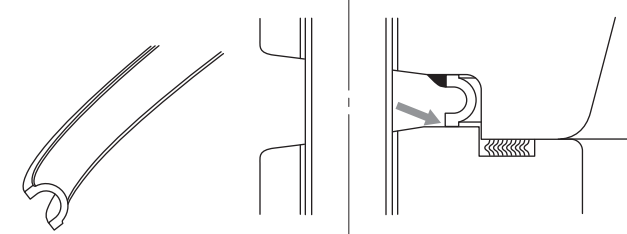
Requested dimensions are available, provided the configuration is a ring.

#### ● Applications

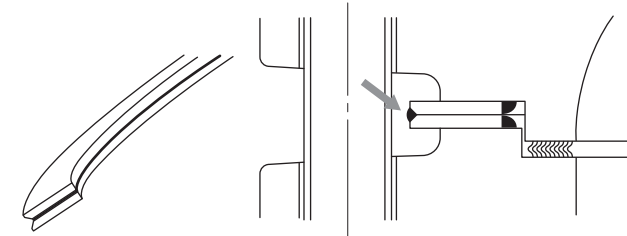
No.550-ZX is mainly utilized as a cover gasket for high pressure heat exchangers for Ammonia compound lines.

## • Canopy Seal / Sealing Membrane / Omega Seal Ring / Seal Plate

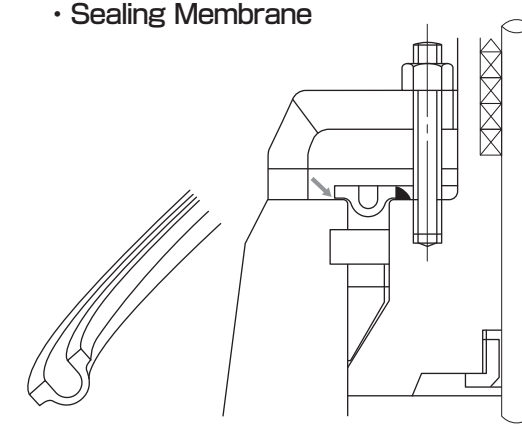
### VALQUA No.550-ZX



• Canopy Seal



• Sealing Membrane



• Omega Seal Ring

The Canopy Seal is an emergency seal with a C shaped cross section. The Sealing Membrane is an emergency seal consisting of two flat metal gaskets with tapered ends stacked on top of each other.

Both are used in valve bonnets and casing covers for pumps, with one section welded to the body as shown in the figures. In the case of an emergency, the locations indicated with an arrow can then be welded on-site.

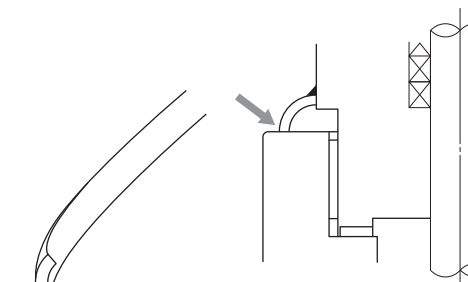
Larger high temperature/high pressure valves often incorporate the Omega Seal Rings, and smaller valves use Seal Plates.

#### ● Dimensions and Cross Sectional Configurations

Requested dimensions are available, provided the configuration is a ring.

#### ● Applications

No.550-ZX is used in valve bonnets for light-water reactor nuclear power plants using coolants or other hazardous materials and chemical plants handling toxic materials. It is also used as casing covers for heat exchangers and pumps.



• Seal Plate

## • Ordering Information for Other Metal Gaskets

### ■ Part Number and Material Chart

Part Number	Material
VALQUA No. 550-ZX	Metal Material
	Low Carbon Steel (S) SUS347 (K)
	Soft Iron (D) SUS430 (U)
	Copper (C) 5Cr-0.5Mo Steel (F)
	SUS304 (E) Monel Metal (M)
	SUS304L (L) Titanium (T)
	SUS310S (O) Nickel (N)
	SUS316 (G) Aluminum (A)
	SUS316L (H) Other (X)
	SUS321 (J)

Remarks 1. Material may be specified using alphanumeric codes shown in parenthesis.  
2. For materials not listed, please consult VALQUA.

### ■ Size Description

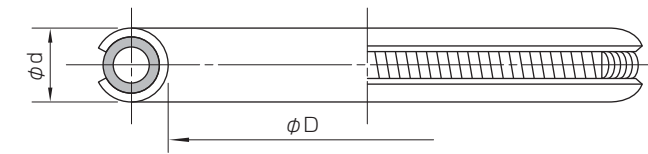
Please specify configurations and dimensions with a drawing.

## Gasket Dimension Tables

■ TRYPACK .....	35
■ Metal Hollow O-Ring .....	36
■ Metal Jacketed Gasket/Metal Jacketed Gasket with VALQUAFOIL ...	38
■ Metal Flat Gasket .....	43
■ Serrated Gasket .....	44
■ Ring Joint Gasket .....	46

## • TRYPACK

■ Single Layer(No. 3645), Double Layer(No. 3645), Low Load Tightening LS(No. 3645LS)



### ● For JIS/JPI Pipe Flanges

(Units : mm)

Nominal No. (Dimensions)	Applicable Flange(Call Diameter)			TRYPACK	
	JIS B 2210		JPI-7S-15	Inner Dia. (D)	Cross Sectional Dia.(d)
	10 K	16 K 20 K	Class 150 300		
V 24	10A	10A	1/2B	25	3.8
V 30			3/4	31	
V 34	15	15		35	
V 36				37	
V 40	20	20	1	41	
V 45	25	25		46	
V 50			1 1/2	51	
V 55	32	32	1 1/2	56	
V 60	40	40		61	
V 65				66	
V 70	50	50	2	71	
V 85	65	65	2 1/2	86	
V100	80			101	
V105		80	3	106	
V115	90		3 1/2	116	
V120		90		121	
V125	100			126	
V130		100	4	131	
V150	125			151	
V160		125	5	161	
V175	150			176	
V180				181	
V185			6	186	
V190		150		191	
V205				206	
V225				226	
V230	200		8	231	
V240		200		241	
V250				251	
V255	225			256	
V260				261	
V275				276	
V290	250		10	291	
V300		250		301	
V325				326	
V335	300			336	
V350		300	12	351	
V380	350		14	381	
V390		350		391	
V430	400		16	431	
V440		400		441	
V450				451	
V480	450			481	
V490			18	491	
V500		450		501	
V530	500			531	
V540			20	541	
V550		500		551	
V620				621	
V640	600		24	641	
V650		600		651	

### ● For JIS B 2290 Vacuum Flanges

Nominal No.	TRYPACK	
	Inner Dia. (D)	Cross Sectional Dia.(d)
V 24	25	3.8
V 34	35	
V 40	41	
V 55	56	
V 70	71	
V 85	86	
V 100	101	
V 120	121	
V 150	151	
V 175	176	
V 225	226	5.6
V 275	276	
V 325	326	
V 380	381	
V 430	431	
V 480	481	8.0
V 530	531	
V 585	586	
V 640	641	
V 690	691	
V 740	741	
V 790	791	
V 845	846	
V 950	951	
V1055	1056	

- Remarks 1. These VALQUA dimensions are based on the JIS B 2210(1968)JIS B 2210(1984)and JPI-7S-15-93 standards.  
 2. Please process the flange face to accommodate use of TRYPACK, as the product used alone will require a groove. When utilizing a flat face flange, use with a retainer is recommended.  
 3. For standardized flanges, tightening load requirements may change depending on pressures and bolt materials. Refer to Standard Tightening Torque Calculations(page 5).  
 4. Table values are based on open OD configurations. For information concerning open ID configurations, please consult VALQUA.  
 5. Other cross sectional diameters such as 1.7, 2.6, 8.0, 10.0 etc. are also available.

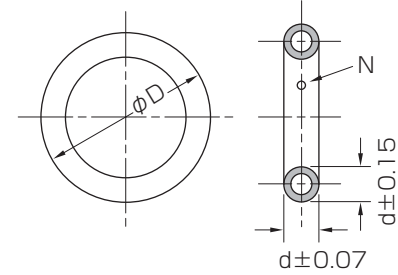
## • Metal Hollow O-Ring

Both Standard and Balanced Metal Hollow O-Rings can be classified into twelve standard dimensions based on cross sectional diameter and wall thickness.

### ■ Standard(No. 3640)and Balanced(No. 3641)Types

#### ● For 1.6mm Diameter(d)Tubes (Units : mm)

Tube Code	Tube Diameter x Wall Thickness
G	$\phi 1.6 \times 0.15$
A	$\phi 1.6 \times 0.25$
M	$\phi 1.6 \times 0.35$
B	$\phi 1.6 \times 0.5$



(Units: : mm)

Nominal Dimensions	Actual O-ring Dimension (No PTFE coating or plating)		For Balanced Types	
	OD(D)	Dimensional Tolerance	No. of holes(N) ( $\phi 0.6 \times N$ )	
13	13.0	+0.13 0	1	
14	14.0			
16	16.0			
18	18.0			
20	20.0			
22	22.0		+0.20 0	2
25	25.0			
28	28.0			
30	30.0			
32	32.0			
35	35.0	+0.30 0		4
38	38.0			
40	40.0			
42	42.0			
45	45.0			
48	48.0		+0.30 0	4
50	50.0			
55	55.0			
60	60.0			
65	65.0			
70	70.0	+0.30 0		4
75	75.0			
80	80.0			
85	85.0			
90	90.0			
95	95.0		+0.30 0	4
100	100.0			

Remark VALQUA defined dimensions

## • Metal Hollow O-Ring

#### ● For 2.4mm Tube Diameter(d) (Units : mm)

Tube Code	Tube Diameter x Wall Thickness
H	$\phi 2.4 \times 0.15$
C	$\phi 2.4 \times 0.25$
N	$\phi 2.4 \times 0.35$
D	$\phi 2.4 \times 0.5$

(Units : mm)

Nominal Dimension	Actual O-ring Dimension (No PTFE coating or plating)		For Balanced Types only	
	OD(D)	Dimensional Tolerance	No. of holes(N) ( $\phi 0.6 \times N$ )	
75	75.0	+0.20 0	4	
80	80.0			
85	85.0			
90	90.0			
95	95.0			
100	100.0			
105	105.0			
110	110.0			
115	115.0			
120	120.0			
125	125.0		+0.30 0	4
130	130.0			
135	135.0			
140	140.0			
145	145.0			
150	150.0			
160	160.0			
170	170.0			
180	180.0			
190	190.0			
200	200.0			

Remark VALQUA defined dimensions

#### ● For 3.2mm Tube Diameter(d) (Units : mm)

Tube Code	Tube Diameter x Wall Thickness
E	$\phi 3.2 \times 0.25$
O	$\phi 3.2 \times 0.35$
F	$\phi 3.2 \times 0.5$
P	$\phi 3.2 \times 0.8$

(Units : mm)

Nominal Dimension	Actual O-ring Dimension (No PTFE coating or plating)		For Balanced Types only
	OD(D)	Dimensional Tolerance	No. of holes(N) ( $\phi 0.6 \times N$ )
150	150.0	+0.20 0	4
160	160.0		
170	170.0		
180	180.0		
190	190.0		
200	200.0		
210	210.0		
220	220.0		
230	230.0		
240	240.0		
250	250.0		
260	260.0		
270	270.0		
280	280.0		
290	290.0		
300	300.0		
320	320.0		
340	340.0		
360	360.0		
380	380.0		
400	400.0		
450	450.0	+0.30 0	4
500	500.0		
550	550.0		
600	600.0		
650	650.0		
700	700.0		
750	750.0		
800	800.0		
850	850.0		
900	900.0		
950	950.0		
1000	1000.0		

Remark VALQUA defined dimensions

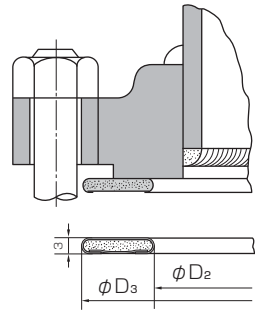


## • Metal Jacketed Gasket and Metal Jacketed Gasket with VALQUAFOIL

Dimensions shown below are for 3mm thick All Covered gaskets. Other gasket thicknesses can also be accommodated. The Metal Jacketed Gasket with VALQUAFOIL is an All Covered Metal Jacketed Gasket(No. N520)with 0.4mm thick VALQUAFOIL(graphite), gathered tape(VF-70)or sheet(VF-30)applied to both sides.

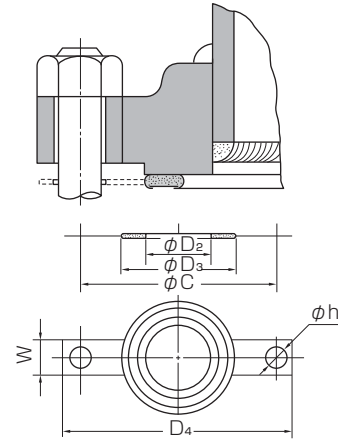
### ■ All Covered Gaskets(No. N520 and No. N6520)

#### Standard Metal Jacketed Gasket



(Fig.1)

#### Metal Jacketed Gasket with Holder



(Fig.2)

Remarks 1. Gaskets come standard with 0.4mm thick holders attached. Please specify if holders are not needed.  
2. Unless otherwise specified, the holder will be made of the gasket material. If another material is desired, please consult VALQUA.

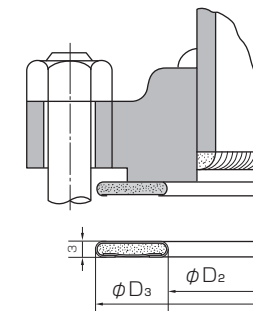
### ● For JPI Pipe Flanges

(Units: : mm)

Nominal Dia.	Figure 1			Figure 2										
	ID D <sub>2</sub>	OD D <sub>3</sub>		Gasket Area				Holder Area						
		Class 150	Class 300	ID D <sub>2</sub>	OD D <sub>3</sub>		Length D <sub>4</sub>	Dist. between Hole Centers C	Bolt Hole Dia. H		Width W			
					Class 150	Class 300			Class 150	Class 300	Class 150	Class 300	Class 150	Class 300
1/2	25	47	53	25	35	35	89	95	60.5	66.5	16	16	26	26
3/4	33	56	66	33	43	43	98	117	70	82.5	16	20	26	30
1	38	66	72	38	51	51	108	124	79.5	89	16	20	26	30
1 1/4	48	75	82	48	64	64	117	133	89	98.5	16	20	26	30
1 1/2	54	85	94	54	73	73	127	156	98.5	114.5	16	23	26	33
2	73	104	110	73	92	92	152	165	120.5	127	20	20	30	30
2 1/2	86	123	129	86	105	105	178	191	139.5	149	20	23	30	33
3	108	135	148	108	127	127	191	210	152.5	168	20	23	30	33
3 1/2	121	161	164	—	—	—	—	—	—	—	—	—	—	—
4	132	173	180	132	157	157	229	254	190.5	200	20	23	30	33
5	160	196	215	160	186	186	254	279	216	235	23	23	33	33
6	190	221	250	190	216	216	279	318	241.5	270	23	23	33	33
8	238	277	306	238	270	270	343	381	298.5	330	23	26	33	36
10	286	338	360	286	324	324	406	445	362	387.5	26	29	36	44
12	343	408	420	343	381	381	483	520	432	451	26	32	36	47
14	375	449	484	375	413	413	535	585	476	514.5	29	32	44	47
16	425	512	538	425	470	470	595	650	539.5	571.5	29	35	44	50
18	489	547	595	489	533	533	635	710	578	628.5	32	35	47	50
20	533	604	651	533	584	584	700	775	635	686	32	35	47	50
24	641	715	772	641	692	692	815	915	749.5	813	35	42	50	62

Remark These VALQUA dimensions are based on the JPI-7S-15-93 standards.

### ■ All Covered Metal Jacketed Gaskets(No.N520 and No.N6520)



### ● For JIS Pipe Flanges

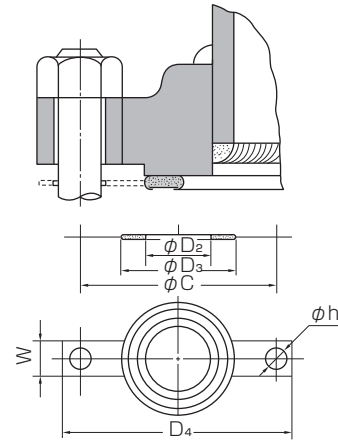
(Units: : mm)

Nominal Dia.	Contact Width	W	JIS 5K		JIS 10K		JIS 16K, 20K		JIS 30K		JIS 40K	
			D <sub>2</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>3</sub>
10	3/8	7	25	44	32	52	32	52	38	58	38	58
15	1/2	7	30	49	37	57	37	57	41	63	41	63
20	3/4	7	35	54	42	62	42	62	46	68	46	68
25	1	8	43	64	51	73	51	73	54	78	54	78
32	1 1/4	9	52	77	58	83	58	83	62	88	62	88
40	1 1/2	10	55	82	61	88	61	88	70	99	70	99
50	2	10	65	92	76	103	76	103	85	113	85	113
65	2 1/2	10	90	117	96	123	96	123	110	139	110	139
80	3	10	101	128	106	133	112	139	120	149	120	149
90	3 1/2	10	111	138	116	143	125	149	130	162	130	162
100	4	13	115	148	125	158	134	164	134	172	139	182
125	5	13	150	183	156	189	169	202	169	207	174	225
150	6	13	180	213	186	219	204	237	209	250	214	264
200	8	16	220	259	230	269	243	282	248	295	258	313
250	10	19	279	324	286	332	307	355	307	358	317	378
300	12	19	322	369	330	377	357	405	367	418	372	432
350	14	19	365	412	375	422	402	449	412	463	417	477
400	16	22	419	472	431	485	451	509	466	522	471	532
450	18	22	479	532	486	540	516	574				
500	20	25	523	582	535	595	565	628				
550	22	25	580	640	590	648	620	682				
600	24	25	630	690	640	698	670	732				
650	26	25	685	744	690	748						
700	28	25	735	794	750	808						
750	30	25	790	848	805	868						
800	32	25	840	898	855	918						
850	34	25	890	948	905	968						
900	36	25	940	998	955	1018						
1000	40	25	1040	1098	1060	1122						
1100	44	25	1150	1208	1170	1232						
1200	48	25	1255	1318	1275	1342						
1350	54	25	1410	1473	1430	1496						
1500	60	25	1565	1628	1585	1656						

Remark These VALQUA dimensions are based on the JIS B 2238-1996 standards.

• Metal Jacketed Gasket and Metal Jacketed Gasket with VALQUAFOIL

■ All Covered Metal Jacketed Gaskets(No.N520 and No.N6520)with Holders



● For JIS Pipe Flanges

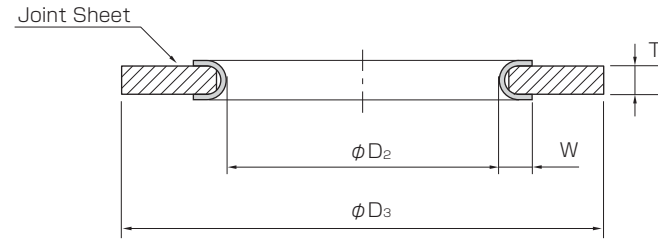
(Units : mm)

Nominal Dia.	For 10kgf/cm <sup>2</sup> Large Raised Face Flange						For 16kgf/cm <sup>2</sup> Large Raised Face Flange						For 30kgf/cm <sup>2</sup> Large Raised Face Flange						For 40kgf/cm <sup>2</sup> Large Raised Face Flange					
	Gasket Area			Holder Area			Gasket Area			Holder Area			Gasket Area			Holder Area			Gasket Area			Holder Area		
	ID D <sub>2</sub>	OD D <sub>3</sub>	Length D <sub>4</sub>	Dist. between Hole Centers C	Bolt Hole Dia. h	Width W	ID D <sub>2</sub>	OD D <sub>3</sub>	Length D <sub>4</sub>	Dist. between Hole Centers C	Bolt Hole Dia. h	Width W	ID D <sub>2</sub>	OD D <sub>3</sub>	Length D <sub>4</sub>	Dist. between Hole Centers C	Bolt Hole Dia. h	Width W	ID D <sub>2</sub>	OD D <sub>3</sub>	Length D <sub>4</sub>	Dist. between Hole Centers C	Bolt Hole Dia. h	Width W
10	36	46	90	65	15	25	36	46	90	65	15	25	42	52	110	75	19	29	42	52	110	75	19	29
15	41	51	95	70	15	25	41	51	95	70	15	25	45	55	115	80	19	29	45	55	115	80	19	29
20	46	56	100	75	15	25	46	56	100	75	15	25	50	60	120	85	19	29	50	60	120	85	19	29
25	54	67	125	90	19	29	54	67	125	90	19	29	57	70	130	95	19	29	57	70	130	95	19	29
32	60	76	135	100	19	29	60	76	135	100	19	29	64	80	140	105	19	29	64	80	140	105	19	29
40	62	81	140	105	19	29	62	81	140	105	19	29	71	90	160	120	23	33	71	90	160	120	23	33
50	77	96	155	120	19	29	77	96	155	120	19	29	86	105	165	130	19	29	86	105	165	130	19	29
65	97	116	175	140	19	29	97	116	175	140	19	29	111	130	200	160	23	33	111	130	200	160	23	33
80	107	126	185	150	19	29	113	132	200	160	23	33	121	140	210	170	23	33	121	140	210	170	23	33
90	110	136	195	160	19	29	119	145	210	170	23	33	124	150	230	185	25	35	124	150	230	185	25	35
100	125	151	210	175	19	29	134	160	225	185	23	33	134	160	240	195	25	35	139	165	250	205	25	35
125	156	182	250	210	23	33	169	195	270	225	25	35	169	195	275	230	25	35	174	200	300	250	27	37
150	186	212	280	240	23	33	204	230	305	260	25	35	209	235	325	275	27	37	214	240	355	295	33	43
200	230	262	330	290	23	33	243	275	350	305	25	35	248	280	370	320	27	37	258	290	405	345	33	43
250	286	324	400	355	25	35	307	345	430	380	27	37	307	345	450	390	33	43	317	355	475	410	33	43
300	330	368	445	400	25	35	357	395	480	430	27	37	367	405	515	450	33	43	372	410	540	470	39	49
350	375	413	490	445	25	35	402	440	540	480	33	43	412	450	560	495	33	43	417	455	585	515	39	49
400	431	475	560	510	27	37	451	495	605	540	33	43	466	510	630	560	39	49	471	515	645	570	39	49
450	486	530	620	565	27	37	516	560	675	605	33	43	—	—	—	—	—	—	—	—	—	—	—	—
500	535	585	675	620	27	37	565	615	730	660	33	43	—	—	—	—	—	—	—	—	—	—	—	—
550	590	640	745	680	33	43	620	670	795	720	39	49	—	—	—	—	—	—	—	—	—	—	—	—
600	640	690	795	730	33	43	670	720	845	770	39	49	—	—	—	—	—	—	—	—	—	—	—	—

Remark These VALQUA dimensions are based on the JIS B 2238-1996 standards.

• Metal Jacketed Gasket and Metal Jacketed Gasket with VALQUAFOIL

■ French Type Metal Jacketed Gasket(No. N520-C)



● For JIS and JPI Pipe Flanges

Nominal Dia.		ID $D_2$	OD $D_3$								Width W	Thickness T
A	B		JIS				JPI					
			5K	10K	16K	20K	Class 150	Class 300				
10	3/8	20	45	53	53	53	—	—	3	3		
15	1/2	24	50	58	58	58	47	53	3	3		
20	3/4	30	55	63	63	63	56	66	4	3		
25	1	37	65	74	74	74	66	72	4	3		
32	1 1/4	45	78	84	84	84	75	82	5	3		
40	1 1/2	51	83	89	89	89	85	94	5	3		
50	2	63	93	104	104	104	104	110	5	3		
65	2 1/2	77	118	124	124	124	123	129	5	3		
80	3	90	129	134	140	140	135	148	5	3		
90	3 1/2	102	139	144	150	150	161	164	5	3		
100	4	115	149	159	165	165	173	180	5	3		
125	5	141	184	190	203	203	196	215	5	3		
150	6	167	214	220	238	238	221	250	5	3		
175	7	192	240	245	—	—	—	—	5	3		
200	8	218	260	270	283	283	277	306	5	3		
225	9	244	285	290	—	—	—	—	5	3		
250	10	270	325	333	356	356	338	360	5	3		
300	12	321	370	378	406	406	408	420	5	3		
350	14	359	413	423	450	450	449	484	5	3		
400	16	410	473	486	510	510	512	538	5	3		
450	18	460	533	541	575	575	547	595	5	3		
500	20	513	583	596	630	630	604	651	5	3		
550	22	564	641	650	684	684	—	—	5	3		
600	24	615	691	700	734	734	715	772	5	3		
							Series A	Series B	Series A	Series B		
650	26	667	746	750	784	805	774	722	835	769	5	3
700	28	718	796	810	836	855	831	773	898	822	5	3
750	30	770	850	870	896	918	882	824	952	883	5	3
800	32	820	900	920	945	978	939	878	1006	937	5	3
850	34	872	950	970	995	1038	990	932	1057	991	5	3
900	36	923	1000	1020	1045	1088	1047	984	1117	1045	5	3
950	38	974	—	—	—	—	1111	1042	1054	1096	5	3
1000	40	1025	1100	1124	1158	—	1162	1092	1114	1146	5	3
1050	42	1078	—	—	—	—	1219	1143	1165	1197	5	3
1100	44	1130	1210	1234	1258	—	1276	1194	1219	1248	5	3
1150	46	1180	—	—	—	—	1327	1253	1273	1315	5	3
1200	48	1230	1320	1344	1368	—	1384	1304	1324	1365	5	3
1250	50	1283	—	—	—	—	1435	1354	1378	1416	5	3
1300	52	1335	—	—	1474	—	1492	1405	1428	1467	5	3
1350	54	1385	1475	1498	1534	—	1549	1461	1492	1527	5	3
1400	56	1435	—	—	1584	—	1606	1511	1543	1591	5	3
1450	58	1488	—	—	—	—	1663	1577	1593	1651	5	3
1500	60	1540	1630	1658	1694	—	1714	1644	1644	1702	5	3

Remark For larger flanges with B values greater than 26, two JPI standard values, Series A and B, are shown.

• Metal Flat Gasket

● Knife Edge Type Metal Seal Flange(Bakeable Flange for Vacuum Equipment)

(Units : mm)

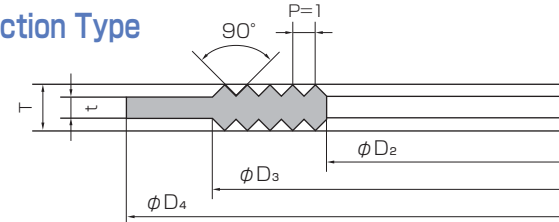
Nominal Dia.	ID $a \pm 0.1$	OD $b \begin{matrix} +0.05 \\ -0.1 \end{matrix}$	Thickness $t \pm 0.07$
16	16.3	21.3	2
25	26.0	34.9	2
40	37.0	48.2	2
63	64.0	82.4	2
100	102.0	120.5	2
160	153.0	171.3	2
200	204.0	222.1	2
250	256.0	273.3	2

Remark These dimensions are based on the JVIS 003-1982 standard.

## • Serrated Gasket

Standard Serrated Gaskets are based on the Outer Wing Cross Section Type Gasket. Inner Wing Cross Section Types, Inner and Outer Wing Cross Section Types, and Wingless Cross Section Types are also available.

### ■ Outer Wing Cross Section Type



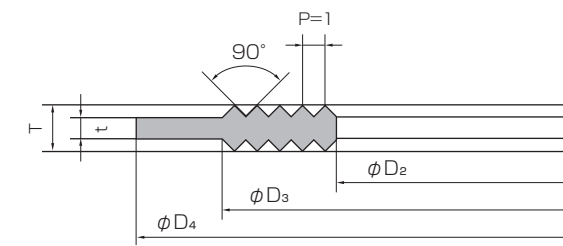
### ● For JIS Pipe Flanges

(Units : mm)

Nominal Dia.	For 10K Large Raised Face					For 16K and 20K Large Raised Face				
	Serrated Area			Wing Area		Serrated Area			Wing Area	
	ID D <sub>2</sub>	OD D <sub>3</sub>	Thickness T	OD D <sub>4</sub>	Thickness t	ID D <sub>2</sub>	OD D <sub>3</sub>	Thickness T	OD D <sub>4</sub>	Thickness t
10	36	46	3	52	2	36	46	3	52	2
15	41	51	3	57	2	41	51	3	57	2
20	46	56	3	62	2	46	56	3	62	2
25	54	67	3	74	2	54	67	3	74	2
32	60	76	3	84	2	60	76	3	84	2
40	62	81	3	89	2	62	81	3	89	2
50	77	96	4.5	104	3	77	96	4.5	104	3
65	97	116	4.5	124	3	97	116	4.5	124	3
80	107	126	4.5	134	3	113	132	4.5	140	3
90	110	136	4.5	144	3	119	145	4.5	150	3
100	125	151	4.5	159	3	134	160	4.5	165	3
125	156	182	4.5	190	3	169	195	4.5	202	3
150	186	212	4.5	220	3	204	230	4.5	237	3
175	205	237	4.5	245	3	—	—	—	—	—
200	230	262	6	270	4.5	243	275	6	282	4.5
225	250	282	6	290	4.5	—	—	—	—	—
250	286	324	6	332	4.5	307	345	6	354	4.5
300	330	368	6	377	4.5	357	395	6	404	4.5
350	375	413	6	422	4.5	402	440	6	450	4.5
400	431	475	6	484	4.5	451	495	6	510	4.5
450	486	530	6	539	4.5	516	560	6	573	4.5
500	535	585	6	594	4.5	565	615	6	627	4.5
550	590	640	8	650	6	620	670	8	684	6
600	640	690	8	700	6	670	720	8	734	6

Nominal Dia.	For 40K Raised Face					For 63K Raised Face				
	Serrated Area			Wing Area		Serrated Area			Wing Area	
	ID D <sub>2</sub>	OD D <sub>3</sub>	Thickness T	OD D <sub>4</sub>	Thickness t	ID D <sub>2</sub>	OD D <sub>3</sub>	Thickness T	OD D <sub>4</sub>	Thickness t
10	25	35	3	59	2	25	35	3	64	2
15	32	42	3	64	2	32	42	3	69	2
20	40	50	3	69	2	40	50	3	75	2
25	47	60	3	79	2	47	60	3	80	2
32	52	68	3	89	2	52	68	3	90	2
40	56	75	4.5	100	3	56	75	4.5	107	3
50	71	90	4.5	114	3	71	90	4.5	125	3
65	86	105	4.5	140	3	86	105	4.5	152	3
80	101	120	4.5	150	3	101	120	4.5	162	3
90	104	130	4.5	162	3	104	130	4.5	179	3
100	119	145	4.5	182	3	119	145	4.5	194	3
125	144	170	4.5	224	3	144	170	4.5	235	3
150	179	205	6	265	4.5	179	205	6	275	4.5
200	228	260	6	315	4.5	228	260	6	327	4.5
250	277	315	6	377	4.5	277	315	6	394	4.5
300	337	375	6	434	4.5	337	375	6	446	4.5
350	377	415	6	479	4.5	377	415	6	488	4.5
400	421	465	6	531	4.5	421	465	6	545	4.5

Remark These VALQUA dimensions are based on the JIS B 2238-1996 standards.



### ● For JPI and ASME/ANSI Pipe Flanges

(Units : mm)

Nominal Dia.	For Class 150 R.F.					For Class 300 R.F.					For Class 600 R.F.					For Class 900 R.F.				
	Serrated Area			Wing Area		Serrated Area			Wing Area		Serrated Area			Wing Area		Serrated Area			Wing Area	
	ID D <sub>2</sub>	OD D <sub>3</sub>	Thickness T	OD D <sub>4</sub>	Thickness t	ID D <sub>2</sub>	OD D <sub>3</sub>	Thickness T	OD D <sub>4</sub>	Thickness t	ID D <sub>2</sub>	OD D <sub>3</sub>	Thickness T	OD D <sub>4</sub>	Thickness t	ID D <sub>2</sub>	OD D <sub>3</sub>	Thickness T	OD D <sub>4</sub>	Thickness t
½	25	35	3	47	2	25	35	3	54	2	25	35	3	54	2	25	35	3	63	2
¾	33	43	3	57	2	33	43	3	66	2	33	43	3	66	2	33	43	3	70	2
1	38	51	3	66	2	38	51	3	73	2	38	51	3	73	2	38	51	3	79	2
1¼	48	63	3	76	2	48	63	3	82	2	48	63	3	82	2	48	63	3	89	2
1½	54	73	3	85	2	54	73	3	95	2	54	73	3	95	2	54	73	3	98	2
2	73	92	4.5	104	3	73	92	4.5	111	3	73	92	4.5	111	3	73	92	4.5	142	3
2½	86	105	4.5	123	3	86	105	4.5	130	3	86	105	4.5	130	3	86	105	4.5	165	3
3	108	127	4.5	136	3	108	127	4.5	149	3	108	127	4.5	149	3	108	127	4.5	168	3
3½	121	140	4.5	161	3	121	140	4.5	165	3	121	140	4.5	161	3	—	—	—	—	—
4	132	157	4.5	174	3	132	157	4.5	180	3	132	157	4.5	193	3	132	157	4.5	206	3
5	160	186	4.5	196	3	160	186	4.5	215	3	160	186	4.5	241	3	160	186	4.5	247	3
6	190	216	4.5	222	3	190	216	4.5	250	3	190	216	6	266	4.5	190	216	6	288	4.5
8	238	270	6	279	4.5	238	270	6	307	4.5	238	270	6	320	4.5	238	270	6	358	4.5
10	286	324	6	339	4.5	286	324	6	361	4.5	286	324	6	399	4.5	286	324	6	434	4.5
12	343	381	6	409	4.5	343	381	6	422	4.5	343	381	6	456	4.5	343	381	6	498	4.5
14	375	413	6	450	4.5	375	413	6	485	4.5	375	413	6	491	4.5	375	413	6	520	4.5
16	425	470	6	514	4.5	425	470	6	539	4.5	425	470	6	564	4.5	425	470	6	574	4.5
18	489	533	6	548	4.5	489	533	6	596	4.5	489	533	6	612	4.5	489	533	8	637	6
20	533	584	6	606	4.5	533	584	8	653	6	533	584	8	681	6	533	584	8	697	6
24	641	692	8	716	6	641	692	8	774	6	641	692	8	789	6	641	692	8	837	6

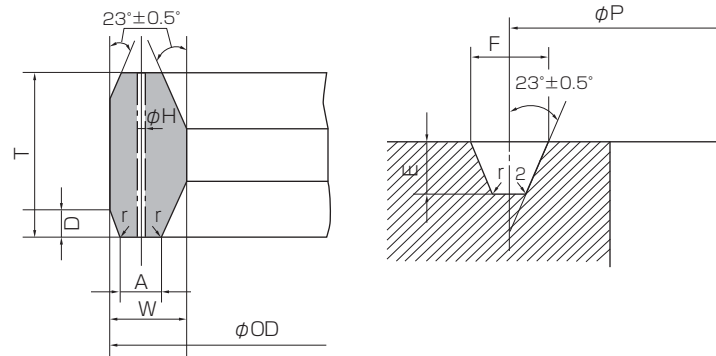
Remark These VALQUA dimensions are based on the JPI-7S-15-93 and ASME/ANSI B16.5-1988 standards.





# • Ring Joint Gasket

## ■ API-RX Cross Section(No.550-ZA)



φH : For ring numbers RX-82 to RX-91 only, a hole is required at the center of A.  
 RX 82~85 : 1.6mm  
 RX 86~87 : 2.4mm  
 RX 88~91 : 3.2mm

Note No holes are required for other ring numbers.

### ● For API Pipe Flanges

(Units : mm)

Ring No.	Applicable Flange(Nominal Dia.)						Gasket					Groove				
	6B Flange			Segment Flange	Clamp Connector		Outer Dia. OD (+0.50/0)	Width W (+0.20/0)	Flat Area Width A (+0.15/0)	Outer Slant Ht. D (0/-0.79)	Height T (+0.20/0)	Edge Radius r (±0.39)	Depth E (+0.39/0)	Width F (±0.20)	Groove Ctr Dia. P (±0.12)	Groove Bottom Radius r <sub>z</sub> (max)
	Class 2000	Class 3000	Class 5000		Class 5000	Class 5000										
RX 20	1 <sup>13</sup> / <sub>16</sub>	1 <sup>13</sup> / <sub>16</sub>	1 <sup>13</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>16</sub>		1 <sup>13</sup> / <sub>16</sub>	76.20	8.73	4.62	3.18	19.05	1.59	6.35	8.73	68.26	0.79
RX 23	2 <sup>1</sup> / <sub>16</sub>				2 <sup>1</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>16</sub>	93.27	11.91	6.45	4.24	25.40	1.59	7.94	11.91	82.55	0.79
RX 24		2 <sup>1</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>16</sub>		2 <sup>9</sup> / <sub>16</sub>	2 <sup>9</sup> / <sub>16</sub>	105.97	11.91	6.45	4.24	25.40	1.59	7.94	11.91	95.25	0.79
RX 25				3 <sup>1</sup> / <sub>8</sub>			109.54	8.73	4.62	3.18	19.05	1.59	6.35	8.73	101.60	0.79
RX 26	2 <sup>9</sup> / <sub>16</sub>						111.92	11.91	6.45	4.24	25.40	1.59	7.94	11.91	101.60	0.79
RX 27		2 <sup>9</sup> / <sub>16</sub>	2 <sup>9</sup> / <sub>16</sub>		3 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>16</sub>	118.27	11.91	6.45	4.24	25.40	1.59	7.94	11.91	107.95	0.79
RX 31	3 <sup>1</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>8</sub>					134.54	11.91	6.45	4.24	25.40	1.59	7.94	11.91	123.83	0.79
RX 35			3 <sup>1</sup> / <sub>8</sub>		4 <sup>1</sup> / <sub>16</sub>	4 <sup>1</sup> / <sub>16</sub>	147.24	11.91	6.45	4.24	25.40	1.59	7.94	11.91	136.53	0.79
RX 37	4 <sup>1</sup> / <sub>16</sub>	4 <sup>1</sup> / <sub>16</sub>					159.94	11.91	6.45	4.24	25.40	1.59	7.94	11.91	149.23	0.79
RX 39			4 <sup>1</sup> / <sub>16</sub>		5 <sup>1</sup> / <sub>8</sub>		172.64	11.91	6.45	4.24	25.40	1.59	7.94	11.91	161.93	0.79
RX 41	5 <sup>1</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>					191.69	11.91	6.45	4.24	25.40	1.59	7.94	11.91	180.98	0.79
RX 44			5 <sup>1</sup> / <sub>8</sub>				204.39	11.91	6.45	4.24	25.40	1.59	7.94	11.91	193.68	0.79
RX 45	7 <sup>1</sup> / <sub>16</sub>	7 <sup>1</sup> / <sub>16</sub>			7 <sup>1</sup> / <sub>16</sub>	7 <sup>1</sup> / <sub>16</sub>	221.85	11.91	6.45	4.24	25.40	1.59	7.94	11.91	211.14	0.79
RX 46			7 <sup>1</sup> / <sub>16</sub>				222.25	13.49	6.68	4.78	28.58	1.59	9.53	13.49	211.14	1.59
RX 47							245.27	19.84	10.34	6.88	41.28	2.38	12.70	19.84	228.60	1.59
RX 49	9	9			9	9	280.59	11.91	6.45	4.24	25.40	1.59	7.94	11.91	269.88	0.79
RX 50			9				283.37	16.67	8.51	5.28	31.75	1.59	11.11	16.67	269.88	1.59
RX 53	11	11			11	11	334.57	11.91	6.45	4.24	25.40	1.59	7.94	11.91	323.85	0.79
RX 54			11				337.34	16.67	8.51	5.28	31.75	1.59	11.11	16.67	323.85	1.59
RX 57	13 <sup>5</sup> / <sub>8</sub>	13 <sup>5</sup> / <sub>8</sub>			13 <sup>5</sup> / <sub>8</sub>	13 <sup>5</sup> / <sub>8</sub>	391.72	11.91	6.45	4.24	25.40	1.59	7.94	11.91	381.00	0.79
RX 63							441.72	26.99	14.78	8.46	50.80	2.38	15.88	26.99	419.10	2.38
RX 65	16 <sup>3</sup> / <sub>4</sub>				16 <sup>3</sup> / <sub>4</sub>	16 <sup>3</sup> / <sub>4</sub>	480.62	11.91	6.45	4.24	25.40	1.59	7.94	11.91	469.90	0.79
RX 66		16 <sup>3</sup> / <sub>4</sub>					483.39	16.67	8.51	5.28	31.75	1.59	11.11	16.67	469.90	1.59
RX 69	17 <sup>3</sup> / <sub>4</sub>					18 <sup>3</sup> / <sub>4</sub>	544.12	11.91	6.45	4.24	25.40	1.59	7.94	11.91	533.40	0.79
RX 70		17 <sup>3</sup> / <sub>4</sub>					550.07	19.84	10.34	6.88	41.28	2.38	12.70	19.84	533.40	1.59
RX 73	21 <sup>1</sup> / <sub>4</sub>					21 <sup>1</sup> / <sub>4</sub>	596.11	13.49	6.68	5.28	31.75	1.59	9.53	13.49	584.20	1.59
RX 74		20 <sup>3</sup> / <sub>4</sub>					600.87	19.84	10.34	6.88	41.28	2.38	12.70	19.84	584.20	1.59
RX 82							67.87	11.91	6.45	4.24	25.40	1.59	7.94	11.91	57.15	0.79
RX 84							74.22	11.91	6.45	4.24	25.40	1.59	7.94	11.91	63.50	0.79
RX 85							90.09	13.49	6.68	4.24	25.40	1.59	9.53	13.49	79.38	1.59
RX 86							103.58	15.08	8.51	4.78	28.58	1.59	11.11	16.67	90.49	1.59
RX 87							113.11	15.08	8.51	4.78	28.58	1.59	11.11	16.67	100.01	1.59
RX 88							139.30	17.46	10.34	5.28	31.75	1.59	12.70	19.84	123.83	1.59
RX 89							129.78	18.26	10.34	5.28	31.75	1.59	12.70	19.84	114.30	1.59
RX 90							174.63	19.84	12.17	7.42	44.45	2.38	14.29	23.02	155.58	1.59
RX 91							286.94	30.16	19.81	7.54	45.24	2.38	17.46	33.34	260.35	2.38
RX 99							245.67	11.91	6.45	4.24	25.40	1.59	7.94	11.91	234.95	0.79
RX201				1 <sup>3</sup> / <sub>8</sub>			51.46	5.74	3.20	1.45 <sup>(1)</sup>	11.30	0.40 <sup>(2)</sup>	3.97	5.56	46.04	0.79
RX205				1 <sup>13</sup> / <sub>16</sub>			62.31	5.56	3.05	1.83 <sup>(1)</sup>	11.10	0.40 <sup>(2)</sup>	3.97	5.56	57.15	0.40
RX210				2 <sup>9</sup> / <sub>16</sub>			97.63	9.53	5.41	3.18 <sup>(1)</sup>	19.05	0.79 <sup>(2)</sup>	6.35	9.53	88.90	0.79
RX215				4 <sup>1</sup> / <sub>16</sub>			140.89	11.91	5.33	4.24 <sup>(1)</sup>	25.40	1.59 <sup>(2)</sup>	7.94	11.91	130.18	0.79

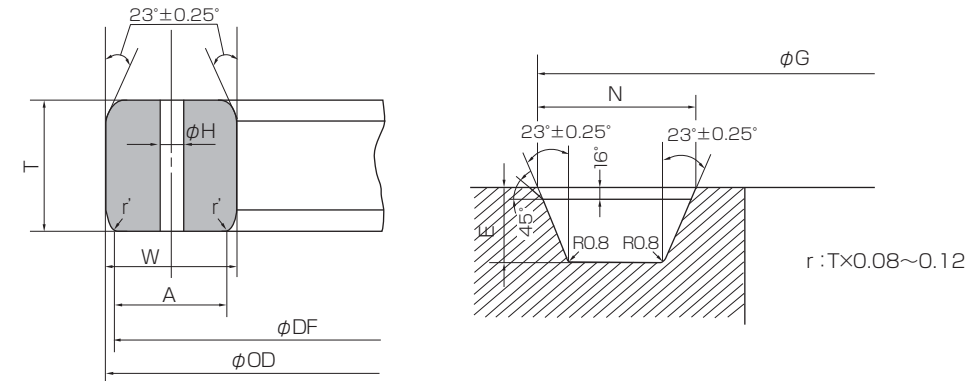
Notes(1) Dimensional tolerance is (-0.38)

(2) Dimensional tolerance is (+0.39)

Remarks 1. These dimensions are based on the API SPEC 6A(1989)standards.

2. Applicable flanges include: API SPEC6A(1989)- 6B, Segment Flanges, and Clamp Connectors.

## ■ API-BX Cross Section(No. 550-ZP)



### ● For API Pipe Flanges

(Units : mm)

Ring No.	Applicable Flange(Nominal Dia.)						Gasket					Groove			
	Class 2000	Class 3000	Class 5000	Class 10000	Class 15000	Class 20000	Outer Dia. OD (0/-0.15)	Height T (+0.20/0)	Width W (+0.20/0)	OD of Flat Area DF (±0.05)	Width of Flat Area A (+0.15/0)	Hole Dia. H (±0.5)	Depth E (+0.39/0)	Outer Dia. G (+0.10/0)	Width N (+0.10/0)
BX-150				1 <sup>11</sup> / <sub>16</sub>	1 <sup>11</sup> / <sub>16</sub>		72.19	9.30	9.30	70.87	7.98	1.6	5.56	73.48	11.43
BX-151				1 <sup>13</sup> / <sub>16</sub>	1 <sup>13</sup> / <sub>16</sub>	1 <sup>13</sup> / <sub>16</sub>	76.40	9.63	9.63	75.03	8.26	1.6	5.56	77.77	11.84
BX-152				2 <sup>1</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>16</sub>	2 <sup>1</sup> / <sub>16</sub>	84.68	10.24	10.24	83.24	8.79	1.6	5.95	86.23	12.65
BX-153				2 <sup>9</sup> / <sub>16</sub>	2 <sup>9</sup> / <sub>16</sub>	2 <sup>9</sup> / <sub>16</sub>	100.94	11.38	11.38	99.31	9.78	1.6	6.75	102.77	14.07
BX-154				3 <sup>1</sup> / <sub>16</sub>	3 <sup>1</sup> / <sub>16</sub>	3 <sup>1</sup> / <sub>16</sub>	116.84	12.40	12.40	115.09	10.64	1.6	7.54	119.00	15.39
BX-155				4 <sup>1</sup> / <sub>16</sub>	4 <sup>1</sup> / <sub>16</sub>	4 <sup>1</sup> / <sub>16</sub>	147.96	14.22	14.22	145.95	12.22	1.6	8.33	150.62	17.73
BX-156				7 <sup>1</sup> / <sub>16</sub>	7 <sup>1</sup> / <sub>16</sub>	7 <sup>1</sup> / <sub>16</sub>	237.92	18.62	18.62	235.28	15.98	3.2	11.11	241.83	23.39
BX-157				9	9	9	294.46	20.98	20.98	291.49	18.01	3.2	12.70	299.06	26.39
BX-158				11	11	11	352.04	23.14	23.14	348.77	19.86	3.2	14.29	357.23	29.18
BX-159				13 <sup>5</sup> / <sub>8</sub>	13 <sup>5</sup> / <sub>8</sub>	13 <sup>5</sup> / <sub>8</sub>	426.72	25.70	25.70	423.09	22.07	3.2	15.88	432.64	32.49
BX-160			13 <sup>5</sup> / <sub>8</sub>				402.59	23.83	13.74	399.21	10.36	3.2	14.29	408.00	19.96
BX-161							491.41	28.07	16.21	487.45	12.24	3.2	17.07	497.94	23.62
BX-162				16 <sup>3</sup> / <sub>4</sub>	16 <sup>3</sup> / <sub>4</sub>		475.49	14.22	14.22	473.48	12.22	1.6	8.33	478.33	17.91
BX-163				18 <sup>3</sup> / <sub>4</sub>			556.16	30.10	17.37	551.89	13.11	3.2	18.26	563.50	25.55
BX-164				18 <sup>3</sup> / <sub>4</sub>	18 <sup>3</sup> / <sub>4</sub>		570.56	30.10	24.59	566.29	20.32	3.2	18.26	577.90	32.77
BX-165				21 <sup>1</sup> / <sub>4</sub>			624.71	32.03	18.49	620.19	13.97	3.2	19.05	632.56	27.20
BX-166				21 <sup>1</sup> / <sub>4</sub>			640.03	32.03	26.14	635.51	21.62	3.2	19.05	647.88	34.87
BX-167	26 <sup>3</sup> / <sub>4</sub>						759.36	35.86	13.11	754.28	8.03	1.6	21.43	768.32	22.91
BX-168		26 <sup>3</sup> / <sub>4</sub>					765.25	35.86	16.05	760.17	10.97	1.6	21.43	774.22	25.86
BX-169				5 <sup>1</sup> / <sub>8</sub>			173.52	15.84	12.93	171.27	10.69	1.6	9.5	176.66	16.92
BX-170							218.03	14.22	14.22	216.03	12.22	1.6	8.33	220.88	17.91
BX-171							267.44	14.22	14.22	265.43	12.22	1.6	8.33	270.28	17.91
BX-172							333.07	14.22	14.22	331.06	12.22	1.6	8.33	335.92	17.91
BX-303	30	30					852.75	37.95	16.97	847.37	11.61	1.6	22.61	862.30	27.33

Remarks 1. These dimensions are based on the API SPEC 6A(1989)standards.

2. Applicable to API SPEC6A(1989)- 6BX flange.

# Product Packaging Metal Material Color Chart

Many metal materials are used in our metal and semimetallic gaskets. VALQUA utilizes a color coded identification system to prevent inadvertent mixing of materials. This system is also used in product packaging to aid in inventory control and proper gasket selection.

## ■ For VALQUA No.550-ZO and No.550-ZS

For OD values less than or equal to 350mm, the gaskets are vacuum packed, placed in boxes, and identified with major classification colors. All other products are wrapped with major classification color tape for easy identification and affixed with a sub classification color label stamped with the material name.

Metal Material	Color		VALQUA Material Code	Color Label Example
	Major Classification	Sub Classification		
Soft Iron	Blue	Blue	D	Soft Iron
Low Carbon Steel		White	S	Low Carbon Steel
5Cr-0.5Mo Steel	Red	Red	F5	ASTM F5
1.25Cr-0.5Mo Steel		Brown	F11	ASTM F11
Other Metals		Orange	—	
SUS 304	Yellow	Yellow	304	SUS 304
SUS 304L		Pink	304L	SUS 304L
SUS 316		Brown	316	SUS 316
SUS 316L		Green	316L	SUS 316L
SUS 321		White	321	SUS 321
SUS 347		Blue	347	SUS 347
Other Stainless Steels		Orange	—	
Copper		Green	Green	Cu
Monel Metal	Brown		M	Monel Metal
Nickel	Pink	Brown	Ni	Nickel
Titanium		White	Ti	Titanium

## ■ Packaging for Other Products

Packaging for products other than Ring Joint Gaskets will vary according to gasket type, configuration, dimension and order quantity.

Products are packed using transparent or craft paper tape and classification color coded with twine. Sub classification colors are used during the manufacturing process.

Metal Material	Color		Metal Material	Color	
	Major Classification	Sub Classification		Major Classification	Sub Classification
Soft Iron	Blue	Blue	Copper	Green	Green
Low Carbon Steel		White	Brass		White
0.5Mo Steel	Red	Yellow	White Copper		Pink
5Cr-0.5Mo Steel		Red	Monel Metal	Brown	
1Cr-0.5Mo Steel		Green	Aluminum	Pink	
1.25Cr-0.5Mo Steel		Brown	Nickel	Brown	
2.25Cr-1Mo Steel		Sky Blue	Lead	Red	
SUS 410		White	Titanium	White	
SUS 405		Pink	Silver	Blue	
SUS 430		Blue			
SUS 304	Yellow	Yellow			
SUS 304L		Pink			
SUS 321		White			
SUS 316		Brown			
SUS 316L		Green			
SUS 310S		Sky Blue			
SUS 347		Blue			

Old part numbers are summarized by metal materials and cross sectional configurations.

Metal Material	Type	Metal Jacketed Gasket							Ring Joint Gasket			Metal Flat Gasket	
		Metal Corrugated Gasket	Corrugated Covered	All Covered	French Type	Half Covered	Circle Covered	Double Covered	Serrated Gasket	Oval Cross Section	Octagonal Cross Section		Other <sup>(1)</sup> Cross Section
Low Carbon Steel		500	510	520	520-F	530	570	580	540	550-O	550-S	550-P	560
Soft Iron									541	551-O	551-S	551-P	561
Copper		502	512	522	522-F	532	572	582	542	552-O	552-S	552-P	562
Stainless Steel [SUS304, SUS304L, SUS316, SUS316L, SUS310S, SUS317L, SUS321, SUS347, SUS410, SUS430, etc.]		503	513	523		533	573	583	543	553-O	553-S	553-P	563
Other Metals and Alloys [5Cr-0.5Mo Steel, Titanium, Tantalum, Silver, Monel Metal, Brass, White Copper, Nickel Silver Sheet, Inconel, Hastelloy, etc.]		504	514	524		534	574	584	544	554-O	554-S	554-P	564
Aluminum		507	517	527	527-F	537	577	587	547	557-O	557-S	557-P	567
Nickel		508		528					548	558-O	558-S	558-P	568
Lead				529	529-F							559-P	569

Note(1) Lens Ring, Delta Ring, Double Cone Shape, Circle Shape, Diamond Cross Sectional Shape, Diaphragm Cross Sectional Shape, Canopy Seal, Sealing Membrane, API-RX Cross Section, API-BX Cross Section.

## Chemical Composition and Physical Properties of Metal Materials

### (1) Chemical Composition

Material Name	Chemical Composition (%)											Standard
	C	Si	Mn	P	S	Ni	Cr	Other				
SUS 304	≤0.08	≤1.00	≤2.00	≤0.045	≤0.030	8.00~10.50	18.00~20.00	-				JIS/G4303
SUS 304L	≤0.030	≤1.00	≤2.00	≤0.045	≤0.030	9.00~13.00	18.00~20.00	-				//
SUS 310S	≤0.08	≤1.50	≤2.00	≤0.045	≤0.030	19.00~22.00	24.00~26.00	-				//
SUS 316	≤0.08	≤1.00	≤2.00	≤0.045	≤0.030	10.00~14.00	16.00~18.00	Mo2.00~3.00				//
SUS 316L	≤0.030	≤1.00	≤2.00	≤0.045	≤0.030	12.00~15.00	16.00~18.00	Mo2.00~3.00				//
SUS 321	≤0.08	≤1.00	≤2.00	≤0.045	≤0.030	9.00~13.00	17.00~19.00	Ti≥5×C%				//
SUS 347	≤0.08	≤1.00	≤2.00	≤0.045	≤0.030	9.00~13.00	17.00~19.00	Nb≥10×C%				//
SUS 410	≤0.15	≤1.00	≤1.00	0.040	0.030	(≤0.60)	11.50~13.50					//
SUS 430	≤0.12	≤0.75	≤1.00	≤0.040	≤0.030		16.00~18.00					//
F5	≤0.15	≤0.50	0.30~0.60	≤0.030	≤0.030	≤0.50	4.0~6.0	0.44~0.65				ASTM/A182

Material Name	Chemical Composition (%)											Standard	
	C	Si	Mn	Mg	Fe	S	Ni	Cu	Ti	Zn	Al		Pb
Copper C1100								≥99.90					JIS/H3100
Aluminum A1050		≤0.25	≤0.05	≤0.05	≤0.40			≤0.05	≤0.03	≤0.05	≥99.50		JIS/H4000
Lead PbP											≥99.90		JIS/H4301
Nickel NNCP	≤0.15	≤0.35	≤0.35		≤0.40	≤0.01	≥99.0	≤0.25					JIS/H4551
Monel NCuP	≤0.3	≤0.5	≤2.0		≤2.5	≤0.024	≥63.0	28.0~34.0					JIS/H4551

### (2) Physical Properties

Material Name	Physical Properties					
	Density 10 <sup>-3</sup> kg·m <sup>-3</sup> {g/cm <sup>3</sup> }	Melting Point °C	Coefficient of Thermal Expansion <sup>(1)</sup> 10 <sup>-6</sup> K <sup>-1</sup>	Thermal Conductivity W·m <sup>-1</sup> ·K <sup>-1</sup> {cal/cm·s·deg}	Specific Heat kJ·kg <sup>-1</sup> ·K <sup>-1</sup> {cal/g·deg}	Elastic Modulus GPa {kg/mm <sup>2</sup> }
SUS 304	8.03	1399~1454	17.3	16{0.039}	0.50{0.12}	193{19,700}
SUS 304L	8.03	1399~1454	17.3	16{0.039}	0.50{0.12}	193{19,700}
SUS 310S	8.03	1399~1454	15.9	14{0.034}	0.50{0.12}	200{20,400}
SUS 316	8.03	1371~1399	15.9	16{0.039}	0.50{0.12}	193{19,700}
SUS 316L	8.03	1371~1399	15.9	16{0.039}	0.50{0.12}	193{19,700}
SUS 321	8.03	1399~1427	16.6	16{0.039}	0.50{0.12}	193{19,700}
SUS 347	8.03	1399~1427	16.6	16{0.039}	0.50{0.12}	193{19,700}
SUS 410	7.75	1482~1532	9.9	25{0.060}	0.46{0.11}	200{20,400}
SUS 430	7.76	1427~1510	10.4	26{0.063}	0.46{0.11}	200{20,400}
F5	7.76	1482~1538	11.2	37{0.088}	0.46{0.11}	200{20,400}
Monel Metal	8.84	1299~1349	11.5	22{0.052}	0.42{0.10}	179{18,300}
Copper	8.96	1083	17.7	391{0.934}	0.42{0.10}	78.5{8,000}
Aluminum	2.70	660.2	23.1	204{0.487}	0.88{0.21}	68.6{7,000}
Lead	11.34	327.4	29.2	35{0.084}	0.13{0.03}	16.2{1,650}
Nickel	8.89	1435~1446	10.4	75{0.180}	0.46{0.11}	204{20,800}

Note(1) Varies with temperature

VALQUA Part No.	Product Name	Reference Page
500	Metal Corrugated Gasket	18
N510	Metal Jacketed Gasket(Corrugated, All Covered)	14
N520	Metal Jacketed Gasket(All Covered)	14
N520C	Metal Jacketed Gasket(French Cross Section Type)	16
N520F	Metal Jacketed Gasket(French Cross Section Type)	16
N530	Metal Jacketed Gasket(Half Covered)	15
540	Serrated Gasket	22
550-ZB	Improved Bridgeman Gasket	27
550-ZD	Delta Ring	27
550-ZX	Other Metal Gaskets	32
555-ZL	Lens Ring	27
550-ZO	Ring Joint Gasket(Oval Cross Section)	26
550-ZR	Circle Shaped Metal Gasket	28
550-ZS	Ring Joint Gasket(Octagonal Cross Section)	26
550-ZA, ZP	Ring Joint Gasket(API-RX, BX Cross Section)	26
550-ZW	Double Cone Shaped Metal Gasket	28
555-60	Blind Plate (Oval Cross Section)	30
555-70	Holding Ring(Oval Cross Section)	30
555-80	Combination of Blind Plate and Holding Ring(Oval Cross Section)	30
555-6P	Blind Plate(Flat Cross Section)	30
555-7P	Holding Ring (Flat Cross Section)	30
555-8P	Combination of Blind Plate and Holding Ring(Flat Cross Section)	30
555-6S	Blind Plate (Octagonal Cross Section)	30
555-7S	Holding Ring(Octagonal Cross Section)	30
555-8S	Combination of Blind Plate and Holding Ring (Octagonal Cross Section)	30
560	Metal Flat Gasket	21
N570	Metal Jacketed Gasket(Circle, All Covered)	15
N580	Metal Jacketed Gasket(Double Covered)	15
3640	Metal Hollow O-Ring(Standard Type)	8
3641	Metal Hollow O-Ring(Balanced Type)	8
3645	TRYPACK	2
6520	Metal Jacketed Gasket with VALQUAFOIL (All Covered)	14
6580	Metal Jacketed Gasket with VALQUAFOIL (Double Covered)	15





**"VALQUA" is a compounded word coming from VALUE and QUALITY  
which is the symbol and motto of the company.**

The above trade mark is registered in Japan, Australia, China, India, Indonesia,  
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