



Revised: Oct. '95
CATALOGUE No. ZL02

PACKINGS FOR HYDRAULICS



NIPPON VALQUA INDUSTRIES, LTD.

PIONEER OF SEAL ENGINEERING



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HOW TO SELECT VALQUA PACKINGS

Piston Seal Selection Guide

Name of Packing	Cross Section	Series	Features	Maximum Pressure MPa{kgf/cm ² }
U-Packing		UHP	Universal type U-Packing. Can be used on snap-in groove.	20.6{210}, 44.1{450} ⁽²⁾
		UNP	For high pressure service. Well follows up the eccentricity.	34.3 {350}
		MLP	For high pressure service. Sizes are based on JOHS-110, a Japanese standard for Hydraulic Cylinder in Steel Mill Machinery (Heavy Machinery).	44.1 {450} ⁽²⁾
SLIPPER SEAL®		APS	For low pressure service. Can be used alone.	20.6 {210}
		APL	For high pressure service. Can be used alone.	34.3 {350}
		APT	For high pressure service. Can be used alone. Reliability has been increased by attachment of Back-up Ring to prevent extrusion of sealing element.	34.3 {350}
V-Packing (1)		VNV	Rubber-proofed cotton fabric is used. Normally used in set of several rings.	58.8 {600}
		VNF		
		VGH	Synthetic rubber packing. Normally used in set of several rings.	17.2 {175}

Rod Seal Selection Guide

Name of Packing	Cross Section	Series	Features	Maximum Pressure MPa{kgf/cm ² }
U-Packing		UHR	Universal type U-Packing. Can be used on snap-in groove.	20.6{210}, 44.1{450} ⁽²⁾
		UNR	For high pressure service. Well follows up the eccentricity.	34.3{350}
		MLR	For high pressure service. Sizes are based on JOHS-110, a Japanese standard for Hydraulic Cylinder in Steel Mill Machinery (Heavy Machinery).	44.1{450} ⁽²⁾
		UHS	Symmetrical U-Packing. Can be used on snap-in groove.	20.6{210}, 44.1{450} ⁽²⁾
		UNS	Symmetrical U-Packing for high pressure service.	34.3{350}, 44.1{450} ⁽²⁾
V-Packing (1)		VNV	Rubber-proofed cotton fabric is used. Normally used in set of several rings.	58.8{600}
		VNF		
		VGH	Synthetic rubber packing. Normally used in set of several rings.	17.2{175}
MV-Packings		MV	Specially designed high performance combined packing. Standard combination includes 2 Rubber-proofed Cotton Fabric V-Packings. This can be used in the groove for V-Packings.	34.3{350}

Dust Seal Selection Guide

Name of Packing	Cross Section	Series	Features	Maximum Pressure MPa{kgf/cm ² }
Dust seal		DHS	Structured to have both dust lip and oil lip. Good against dust and does not cause oil ooze-out.	—
		DRL	Structured to have only dust lip. Good against dust.	—
		DSL	Modified version of DRL, having a pressed in metal guide.	—

Back-up Ring, Wear Ring Selection Guide

Name of Packing	Cross Section	Series	Features	Maximum Pressure MPa{kgf/cm ² }
Back-up Ring			Prevents packing extrusion and increases resistibility of a packing against pressure.	44.1{450}
Wear Ring		WPL	Phenol resin-proofed cotton fabric is used. A high performance piston bearing which effectively prevents shaft gyration.	44.1{450}

Material-Working Condition Relationship

Velocity m/s	Temperature Range °C	Standard Material		VALQUA No.
		Name	VALQUA Compound No.	
0.04~1	-20~80	TOUGHRETHANE®	R5590	E9625
	-20~80	TOUGHRETHANE®	R5990	TE9625
	-30~80	Nitrile Rubber	B0390	2060
	-10~150	Fluorocarbon Rubber	D0390	4060
0.01~1	-30~80	Nitrile Rubber back ring	B1270	2060
	-10~150	Fluorocarbon Rubber back ring	D0270	4060
0.01~1		PTFE for Sealing Element	3M0 3U8	7160 7160
		Polyamide for Back-up Ring		OTHERS
0.1~1.5	-30~80	Nitrile Rubber-proofed Cotton Fabric	2630-2-25	2630
	-10~150	Fluorocarbon Rubber-proofed Cotton Fabric	4630-4-25	4630
0.05~0.5	-30~80	Nitrile Rubber	B0390	2631
	-10~150	Fluorocarbon Rubber	D0390	4631

	Pressure MPa{kgf/cm ² }	Temperature °C
TOUGHRETHANE®	34.3{350} 44.1{450} (2)	-20~80
Nitrile Rubber	20.6{210} 44.1{450} (2)	-30~80
Fluorocarbon Rubber	20.6{210} 44.1{450} (2)	-10~150
Super Rubber	34.3{350} 44.1{450} (2)	-25~120

The standard materials for series UHP, MLP, UHR, UHS and DHS are TOUGHRETHANE®, Nitrile Rubber and Fluorocarbon Rubber.

Velocity m/s	Temperature Range °C	Standard Material		VALQUA No.
		Name	VALQUA Compound No.	
0.04~1	-20~80	TOUGHRETHANE®	R5590	E9625
	-20~80	TOUGHRETHANE®	R5590	E9625
	-30~80	Nitrile Rubber	B0390	2060
0.04~1	-10~150	Fluorocarbon Rubber	D0390	4060
0.1~1.5	-30~80	Nitrile Rubber-proofed Cotton Fabric	2630-52-25	2630
	-10~150	Fluorocarbon Rubber-proofed Cotton Fabric	4630-4-25	4630
0.05~0.5	-30~80	Nitrile Rubber	B0390	2631
	-10~150	Fluorocarbon Rubber	D0390	4631
0.1~1.5	-30~80	Nitrile Rubber	B0390	2632
	-25~120	Super Rubber	B5090	2632
	-10~150	Fluorocarbon Rubber	D0390	4632

Velocity m/s	Temperature Range °C	Standard Material		VALQUA No.
		Name	VALQUA Compound No.	
0.04~1	-20~80	TOUGHRETHANE®	R5590	E9625
	-30~80	Nitrile Rubber	B0390	2060
	-10~150	Fluorocarbon Rubber	D0390	4060
0.04~1	-20~80	TOUGHRETHANE®	R0190	P9625
0.04~1	-20~80	TOUGHRETHANE®	R0190	P9625

Velocity m/s	Temperature Range °C	Standard Material		VALQUA No.
		Name	VALQUA Compound No.	
0.04~1	-30~150	PTFE	2N0	7645
0.04~1	-30~150	Phenol Resinproofed Cotton Fabric		432

Note

(1) It can also be used in combination with either Rubber-proofed Cotton Fabric V-Packing or Rubber V-Packing.

(2) Serviceable pressure when Back-up Ring is used together.

All values shown here are typical and for reference only. Do not use for specification limits.

TOUGHRETHANE® is the registered trade name owned by us for reinforced urethane rubber products, SLIPPER SEAL® for PTFE and rubber rings combined packings, TOUGHRILE® for reinforced nitrile rubber products.

MATERIALS AND THEIR FEATURES

Classification	Material	VALQUA Compound No.	Physical Characteristics				Abrasion Resistance ◎ Excellent ○ Good	Permissible Temperature Range °C
			Hardness HS JIS A	Tensile Strength MPa {kgf/cm ² }	Elongation %	Permanent Compression Set % (°C×h)		
Rubber	Nitrile Rubber (NBR)	B0570	70	17.5 {180}	300	18 (120×70)	○	-30~120
		B1270	70	15.5 {160}	330	16 (100×70)	○	-25~120
		B1370	70	13.5 {135}	210		○	-45~100
		B2670	70	20.5 {210}	270	11 (100×70)	◎	-25~120
		B0180	83	21.0 {215}	240	14 (100×70)	○	-20~120
		B0380	78	16.5 {170}	220	12 (100×70)	○	-25~120
		B0780	82	20.5 {210}	200	16 (100×70)	○	-25~120
		B0880	80	21.0 {215}	180	12 (100×70)	◎	-25~120
		B0385	89	23.0 {235}	170		◎	-25~120
		B0390	88	19.0 {195}	160	16 (120×70)	○	-30~120
		B0490	89	16.0 {165}	160		○	-40~100
	B5090	90	29.5 {300}	160	13 (120×70)	◎	-25~150	
	Urethane Rubber (U)	R0190	92	40.0 {410}	440	14 (70×22)	◎	-30~100
		R0490	93	43.0 {440}	360	20 (70×22)	◎	-20~120
		R5590	90	44.0 {450}	500	35 (70×22)	◎	-30~100
		R5990	90	39.0 {400}	450	35 (70×22)	◎	-20~100
		R5595	95	44.0 {450}	450	35 (70×22)	◎	-30~100
		R5995	95	39.0 {400}	450	40 (70×22)	◎	-20~100
	Fluorocarbon Rubber (FPM)	D0270	73	16.0 {165}	270	8 (175×22)	○	-20~200
		D0875	78	18.5 {190}	280		○	-30~200
		D0390	90	17.5 {180}	170	14 (175×22)	○	-20~200
Ethylene Propylene Rubber (EPDM)	H1070	70	20.0 {205}	280	13 (175×22)	○	-50~130	
Resin	Phenol Resin-proofed Cotton Fabric		90 (Rockwell M)	78.5 {800}			◎	-55~140
	Polyamide		117 (Rockwell R)	78.5 {800}	30		◎	-55~120
	PTFE	VALFLON® 3U8	73 (Durometer D)	18.5 {190}	240		◎	-100~200
		VALFLON® 2N0	65 (Durometer D)	16.5 {170}	280		◎	-100~200
VALFLON® 9B1		62 (Durometer D)	17.5 {180}	280		◎	-100~200	

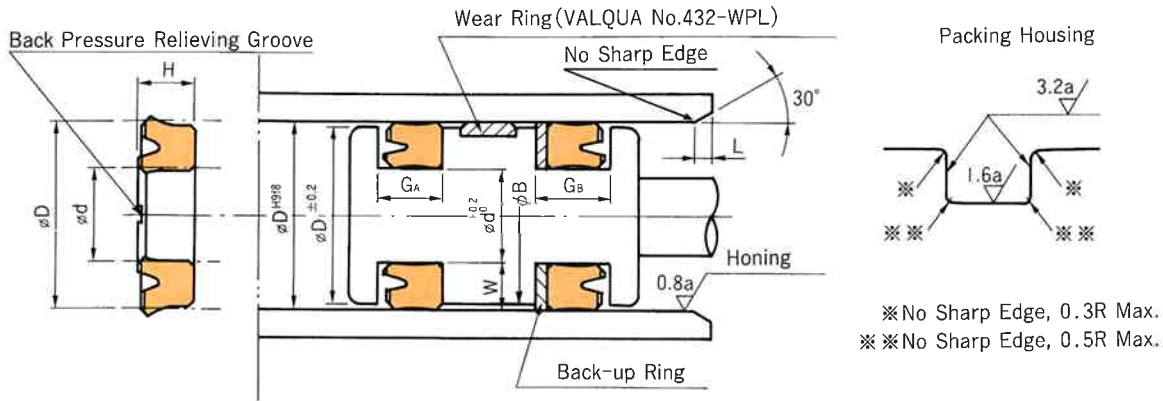
All values shown above are typical. Do not use for specification limits.

Fluid Resistance ○ : Suitable △ : Careful Attention Required X : Unsuitable														Features and Typical Applications
Operating Oils					Lubricating Oils					Grease		Waters		
Petroleum Oils	Emulsified Fluids	Water + Glycols	Phosphate Esters	Brake Oils	Engine Oils	Gear Oils	Machine Oils	Spindle Oils	Silicon Oils	Lithium Grease	Silicon Grease	Cold Water	Steam, Hot Water	
○	○	○	×	×	○	○	○	○	○	○	○	○	×	Conforming to JIS B 2401 Class 1A.
○	○	○	×	×	○	○	○	○	○	○	○	○	×	For Back Ring of SLIPPER SEAL®.
△	△	△	×	×	△	△	△	△	△	△	△	△	×	Cold resistant.
○	○	○	×	×	○	○	○	○	○	○	○	○	×	Abrasion resistant. For TOUGHRILE® Self-lubricating Pneumatic Packing.
○	○	○	×	×	○	○	○	○	○	○	○	○	×	For Pneumatic Packing.
○	○	○	×	×	○	○	○	○	○	○	○	○	×	For Back Ring of SLIPPER SEAL®.
○	○	○	×	×	○	○	○	○	○	○	○	○	×	Abrasion resistant. For Pneumatic Packing.
○	○	○	×	×	○	○	○	○	○	○	○	○	×	For Pneumatic Packing.
○	○	○	×	×	○	○	○	○	○	○	○	○	×	Abrasion resistant. For TOUGHRILE® Self-lubricating Pneumatic Packing.
○	○	○	×	×	○	○	○	○	○	○	○	○	×	Conforming to JIS B 2401 Class 1B. For Hydraulic U-Packing, V-Packing and Dust Seal.
△	△	△	×	×	△	△	△	△	△	△	△	△	×	Cold resistant.
○	○	○	×	×	○	○	○	○	○	○	○	○	△	Tough and heat resistant. For abrasion resistant Super Rubber Hydraulic U-Packing, V-Packing and Dust Seal.
○	×	×	×	×	△	×	○	○	○	○	○	△	×	For Hdraulic Dust Seal.
○	×	×	×	×	△	×	○	○	○	○	○	△	×	Long life. Millable type. For Hydraulic U-Packing.
○	×	×	×	×	△	×	○	○	○	○	○	△	×	For Hydraulic U-Packing, Dust Seal.
○	×	×	×	×	△	×	○	○	○	○	○	△	×	Long life. Hydraulic U-Packing and Dust Seal.
○	×	×	×	×	△	×	○	○	○	○	○	△	×	For Hydraulic U-Packing.
○	×	×	×	×	△	×	○	○	○	○	○	△	×	Long life. For Hydraulic U-Packing.
○	△	×	○	×	○	○	○	○	○	○	○	○	×	Conforming to JIS B 2401 Class 4D. For Back Ring of oil, heat and chemical resistant SLIPPER SEAL®.
○	△	×	○	×	○	○	○	○	○	○	○	○	×	Oil, heat, chemical and cold resistant.
○	△	×	○	×	○	○	○	○	○	○	○	○	×	Oil, heat and chemical resistant U-Packing, V-Packing and Dust Seal.
×	×	○	○	○	×	×	×	×	○	×	○	○	○	For steam and brake fluids.
○	○	○	○	×	○	○	○	○	○	○	○	○	△	For Wear Ring.
○	○	○	○	○	○	○	○	○	○	○	○	△	△	For Back-up Ring.
○	○	○	○	○	○	○	○	○	○	○	○	△	△	For SLIPPER SEAL®.
○	○	○	○	○	○	○	○	○	○	○	○	△	△	For Back-up Ring.
○	○	○	○	○	○	○	○	○	○	○	○	○	○	For SLIPPER SEAL® and soft mating material.

DIMENSIONAL DATA

UHP Series U-Packing for Piston Seal

- TOUGHRETHANE® <VALQUA No. TE9625-UHP, E9625-UHP>
- Nitrile Rubber <VALQUA No. 2060-UHP>
- Fluorocarbon Rubber <VALQUA No. 4060-UHP>



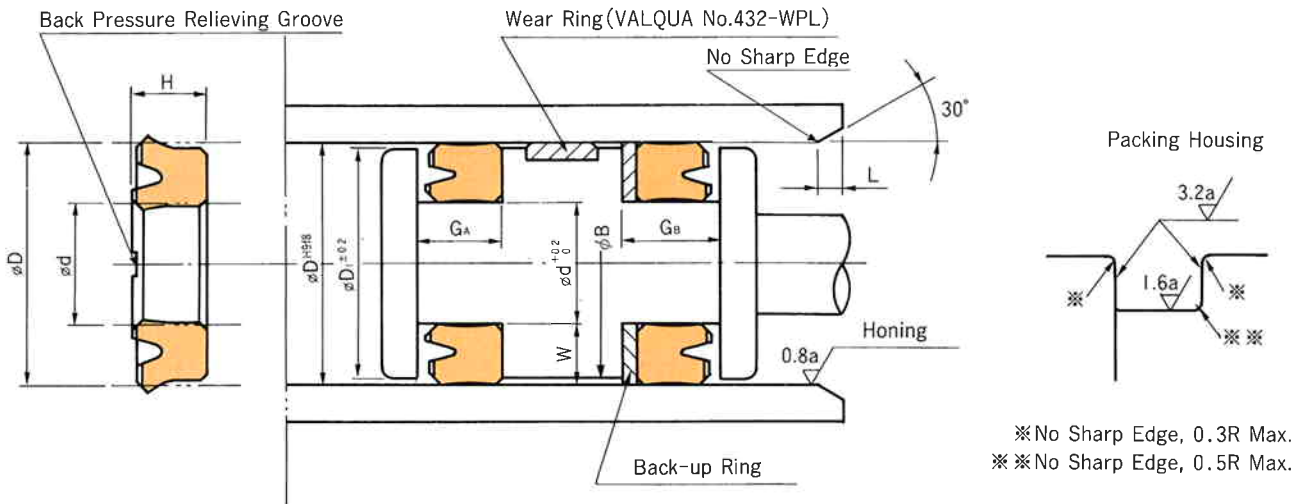
Unit : mm

Dash No.	D	d	H	GA	GB	D ₁	L	W
UHP 40	40	30	6.5	7 ^{+0.3} ₀	9 ^{+0.3} ₀	39	2	5
UHP 50	50	40	6.5	7 ^{+0.3} ₀	9 ^{+0.3} ₀	49	2	5
UHP 63	63	53	6.5	7 ^{+0.3} ₀	9 ^{+0.3} ₀	62	2	5
UHP 80	80	71	6.5	7 ^{+0.3} ₀	9 ^{+0.3} ₀	79	2	4.5
UHP 90	90	80	6.5	7 ^{+0.3} ₀	9 ^{+0.3} ₀	89	2	5
UHP100	100	85	9.5	10 ^{+0.5} ₀	13 ^{+0.5} ₀	98	3	7.5
UHP125	125	112	9.0	9.5 ^{+0.3} ₀	12.5 ^{+0.5} ₀	123	3	6.5
UHP140	140	125	9.5	10 ^{+0.5} ₀	13 ^{+0.5} ₀	138	3	7.5
UHP150	150	136	9.0	9.5 ^{+0.3} ₀	12.5 ^{+0.5} ₀	148	3	7
UHP160	160	145	9.5	10 ^{+0.5} ₀	13 ^{+0.5} ₀	157	3	7.5
UHP180	180	165	9.5	10 ^{+0.5} ₀	13 ^{+0.5} ₀	177	3	7.5
UHP200	200	180	12.5	13 ^{+0.5} ₀	16 ^{+0.5} ₀	197	4	10
UHP220	220	200	12.5	13 ^{+0.5} ₀	16 ^{+0.5} ₀	217	4	10
UHP224	224	204	12.5	13 ^{+0.5} ₀	16 ^{+0.5} ₀	221	4	10
UHP250	250	230	12.5	13 ^{+0.5} ₀	16 ^{+0.5} ₀	147	4	10

When determining the size "B", please refer to Fig.8 "Limit For Extrusion" given in page 34.

UNP Series U-Packing for Piston Seal

○ TOUGHRETHANE® <VALQUA No. TE9625-UNP, E9625-UNP>



Unit : mm

Dash No.	D	d	H	$G_A^{+0.5}_0$	$G_B^{+0.5}_0$	D_1	L	W
UNP180	180	155	16	17	20	177	5	12.5
UNP190	190	165	16	17	20	187	5	12.5
UNP200	200	175	16	17	20	197	5	12.5
UNP205	205	180	16	17	20	202	5	12.5
UNP215	215	190	16	17	20	212	5	12.5
UNP224	224	199	16	17	20	221	5	12.5
UNP237	237	212	19	20	23	234	5	12.5
UNP250	250	225	19	20	23	247	5	12.5
UNP261	261	236	19	20	23	257	5	12.5
UNP275	275	250	19	20	23	271	5	12.5
UNP280	280	255	19	20	24	276	5	12.5
UNP295	295	265	19	20	24	291	6	15
UNP300	300	270	19	20	24	296	6	15
UNP310	310	280	19	20	24	306	6	15
UNP330	330	300	19	20	24	326	6	15

Nitrile rubber and fluorocarbon rubber are available on request.

When determining the size "B", please refer to Fig.8 "Limit For Extrusion" given in page 34.