O-rings

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ARTICLE DETECTION AND KIT ASSEMBLY

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EVENTI FORMATIVI
TRAINING EVENTS

Gli O-ring sono elementi di tenuta automatici, a doppio effetto. Lo schiacciamento iniziale in senso radiale o assiale dovuto al montaggio conferisce all'O-ring la sua capacità di tenuta iniziale.

Queste forze si combinano con la pressione del sistema, creando una forza di tenuta globale, che aumenta all'aumentare della pressione. Vengono impiegati quali elementi di tenuta primaria, come elementi energizzanti (in accoppiamento con i pattini e i raschiatori in PTFE) e coprono un gran numero di campi di applicazione. L'O-ring viene prevalentemente impiegato per tenute statiche, in modo radiale o assiale.

I vantaggi presentati dall'impiego di O-ring sono:

- economicità e soluzione a basso costo
- semplice disegno della cava, monopezzo, riduzione dei costi di progettazione
- semplicità di montaggio
- vasta scelta di compound per adattarsi alla maggior parte dei fluidi
- disponibilità quasi globale dovuta al suo impiego quasi in tutte le applicazioni

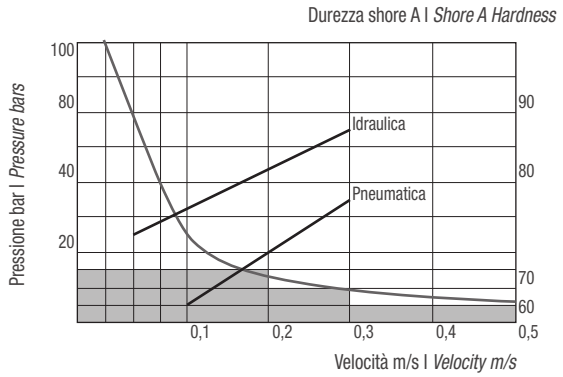
O-rings are independent, double effects sealing systems. The initial radial or axial compression at installation gives the O-ring its primary sealing capacity.

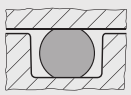
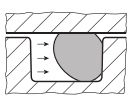
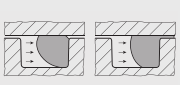
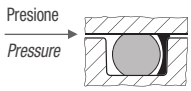
This combined with the pressure of the system allows for a sealing capacity that increases with increasing pressure.
O-rings are generally used as primary sealing rings or as energizing elements (combined with PTFE slippers or scrapers) and cover a variety of applications. O-rings are commonly used in static systems for radial or axial applications.

There are several advantages to O-rings:

- *inexpensive solutions*
- *require a simple single groove design (lower design costs)*
- *easily installed*
- *come in a variety of material to be easily adapted to the majority of fluids*
- *are widely available due to their large range of applications*

DATI TECNICI I *TECHNICAL DATA*				
Tipo Applicazione *Application type*	Pa Antiestrusione *Anti-extrusion Pa*		Velocità m/s *Velocity m/s*	Temperatura °C *Temperature °C*
	SÌ I *YES*	NO I *NO*		
Alternativo I *Alternated*	400	50	0.5	-60 +315
Statico I *Static*	> 50	50	-	-60 +315



PRINCIPIO DI FUNZIONAMENTO I *OPERATING PRINCIPLE*	
	Per effetto della sua elasticità un O-ring quando viene compresso fra due superfici effettua la tenuta. In presenza di pressione l'O-ring aumenta la sua spinta contro le superfici di tenuta proporzionalmente alla pressione. *The sealing effect results from the compression of the O-ring, which is elastic, between two surfaces. The O-ring exerts a force against the surfaces which is proportional to the pressure at which it is exposed.*
	In presenza di pressione l'O-ring si comporta come un liquido non comprimibile deformandosi contro le pareti di tenuta proporzionalemente alla pressione esercitata. *Under mechanical pressure the O-ring acts as an incompressible, viscous fluid, deforms against the groove walls and exerts a pressure proportional to the pressure it is exposed to.*
	Con l'aumentare della pressione l'Oring tende ad estrudere nel gioco tra gli accoppiamenti. *Further increasing the pressure causes subsequent stages of extrusion between the inner and out parts of the grove, until failure.*
	In questi casi si impiegano gli anelli antiestrusione inseriti nel lato opposto la pressione. *In these situations the O-ring is coupled with extrusion resistant rings (back-up rings), inserted on the opposite to pressure.*

Rugosità superficiale | *Surface roughness*

Tipo di carico I *Load*	Superficie I *Surface*	R_{max} µm	R_z µm	R_a µm
Radiale dinamico *Radial dynamic load*	Superficie di scorrimento *Sliding surface*	1.0 - 4.0	0.63 - 2.5	0.1 - 0.4
	Superficie di scorrimento *Sliding surface*	≤ 16.0	≤ 10.0	≤ 1.6
Radiale statico *Radial static load*	Superficie di scorrimento *Sliding surface*	≤ 16.0	≤ 10.0	≤ 1.6
Assiale statico *Axial static load*	Pressione pulsanti: superficie della cava *Pulsating pressure: groove surface*	≤ 10.0	≤ 6.3	≤ 0.3

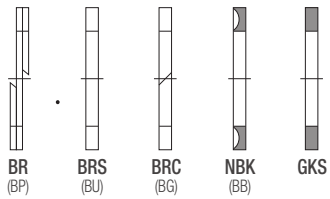
Anelli antiestrusione | *Back-up rings*

Gli anelli antiestrusione non hanno una funzione di tenuta, ma sono degli elementi di protezione e supporto contro l'estrusione dei sistemi di tenuta. Solitamente sono installati in cava con guarnizioni elastomeriche (tipico impiego con O-ring o X-ring). Generalmente il Back-up ring ha una sezione a forma rettangolare. Sotto vengono esposti i principali profili comunemente usati in applicazioni statiche o dinamiche.

Back-up rings have no sealing properties. They are supportive protection systems to avoid extrusion of the sealing element under pressure. They are generally inserted in the groove with elastomeric gaskets (typically O-rings or X-rings). Extrusion resistant rings have a rectangular cross-section. The table shows a range of the most common profiles used in both static and dynamic applications.

Tabella A:
scelta materiali anelli antiestrusione

Table A:
Extrusion resistant materials



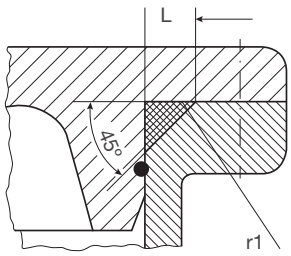
Materiale I Material		Esecuzione I *Supply*		Profilo I *Profile*				
		Standard *Standard*	Richiesta *Request*	BR	BRS	BRC	GKS	NBK
PT	PT PTFE Vergine I *PT Virgin PTFE*	◆		◆	◆	◆		
BM	PTFE caricato bronzo *Bronze-filled PTFE*		◆	◆	◆	◆	◆	◆
CG	PTFE caricato carbone *Carbon-filled PTFE*		◆	◆	◆	◆	◆	◆
VM	PTFE caricato vetro *Glass-filled PTFE*		◆	◆	◆	◆	◆	◆
NB	Gomma NBR 90° Sh *Elastomeric NBR 90° Sh*	◆						◆
PO	Termoplastico base poliestere *Thermoplastic Polyester based*	◆					◆	

Materiali | *Materials*

Campo di applicazione e caratteristiche *Characteristics and Application Field*	Materiale *Material*	Campo termico °C *Temperature °C*
Materiale standard per sistemi idraulici e pneumatici. Fluidi idraulici minerali a base d'olio, olii e grassi animali e vegetali. Liquidi antideflagranti (HFA, HFB, HFC), idrocarburi alifatici (propano, butano, petrolio), olii e grassi a base silicone. Acqua fino a + 80°C, aria. *Standard material for hydraulic and pneumatic systems. Suggested for aliphatic hydrocarbons (propane, butane, petroleum) oil, mineral oil and animal or vegetable grease, silicone based grease, HFA, HFB and HFC anti-explosion fluids; water up to +80°C and air.*	NBR	-30 +100
Olii e grassi minerali idrocarburi alifatici, aromatici e clorurati, benzina, gasolio, liquidi antideflagranti a base di fosfati.Olii e grassi a base di silicone. Acidi, soluzioni alcaline. Adatto per l'impiego sottovuoto. *Suggested for mineral oil and grease, aliphatic, aromatic and chlorinated hydrocarbons, gas and diesel fuel, phosphate-based non-flammable hydraulic fluids, silicone oil and grease, acids and alkaline solutions. Suitable for vacuum applications.*	FKM	-20 +200
Acqua calda, vapore, liquidi per freni, detergenti. Alcool, chetoni, refrigeranti motore, liquidi antideflagranti a base di fosfati, acidi e basi organici e inorganici. Non resiste agli olii minerali. *Suggested for hot water and steam, glycol based brake fluids, cleaning agents, many polar solvents (alcohols, ketones, esters), engine refrigeration fluids, phosphate-based non-flammable hydraulic fluids, many organic and inorganic acids and bases. Not suitable for mineral oil products (oils, greases and fuels).*	EPDM	-40 +140
Aria calda, ossigeno, gas inerti ad elevate temperature, ozono, raggi UV, oliialifatici per motori e trasmissioni, grassi ed olii animali e vegetali, liquidi per freni. Bassa resistenza agli olii minerali. Solo per applicazioni statiche. *Suggested for hot air, oxygen, inert gases, ozone, UV rays, aliphatic oils for engines and transformers, animal and vegetable oil and grease, brake fluids. Not very resistant to mineral oils. Only for static applications.*	VMQ	-55 +200
Per applicazioni con esposizione ad estese temperature, ottima resistenza a combustibili aromatici, lubrificanti a base di distre, aria calda, ozono, ossigeno e olii. *For applications at high extended temperature. High resistance to aromatic fuels, lubricants, hot air, ozone, oxygen and oils.*	FVMQ	-60 +200
Fluidi idraulici minerali a base d'olio, olii e grassi animali e vegetali. Liquidi antideflagranti (HFA, HFB, HFC), idrocarburi alifatici. Olii a base di silicone. Acqua fino a +80°C, aria. Bioolii in estere sintetica e olii vegetali. *Suggested for mineral hydraulic fluids, animal and vegetable oils and grease, HFA, HFB and HFC hydraulic fluids, aliphatic hydrocarbons, silicone based oils, water up to +80 °C and air and organic synthesized ester based oils.*	HNBR	-30 +150
Eccellente resistenza chimica alla maggior parte dei fluidi e dei prodotti chimici, paragonabile al PTFE, ottima resistenza alle temperature elevate. Basso rigonfiamento con quasi tutte le sostanze chimiche. Applicazioni tipiche nell'industria chimica e in tutti gli ambienti con sostanze aggressive e temperature elevate. *Excellent resistance to most chemical fluids and products (very much like PTFE). Very resistant to high temperatures. Low swelling with the majority of chemical substances. Typically used in chemical industry and in all applications with high temperature and aggressive agents.*	FFKM	-15 +325
Eccellente resistenza chimica alla maggior parte dei fluidi e delle sostanze chimiche, fatta eccezione per i metalli alcalini e per alcuni compound a base di fluoro. Possono essere impiegati per prodotti alimentari, farmaceutici e medicali. Si impiegano laddove la normale resistenza chimica e termica dei normali O-ring in elastomero non è più sufficiente. *Excellent resistance to most chemical fluids and substances with the exception of alkaline metals and some fluorine based compounds. Can be used with food, pharmaceutical and medical preparations. Typically used in applications where the standard properties of elastomeric O-Rings are not adequate.*	PTFE	-200 +260
Per applicazioni in sistemi idraulici e pneumatici con elevati carichi dinamici. Elevata resistenza all'usura. Resistenti agli olii e grassi minerali, ossigeno e ozono. Non sono resistenti a esteri, idrocarburi alifatici, aromatici e clorurati, acidi e soluzioni alcaline concentrati, acqua al di sopra dei +50°C. *Suggested for hydraulic or pneumatic systems with high dynamic loads. Highly resistant to wear and tear. Resistant to mineral oils and greases, oxygen and ozone. Not resistant to esters, aliphatic, aromatic and chlorinated hydrocarbons, acids and concentrated alkaline solutions, water at a temperature higher than 50°C.*	PUR	-40 +80

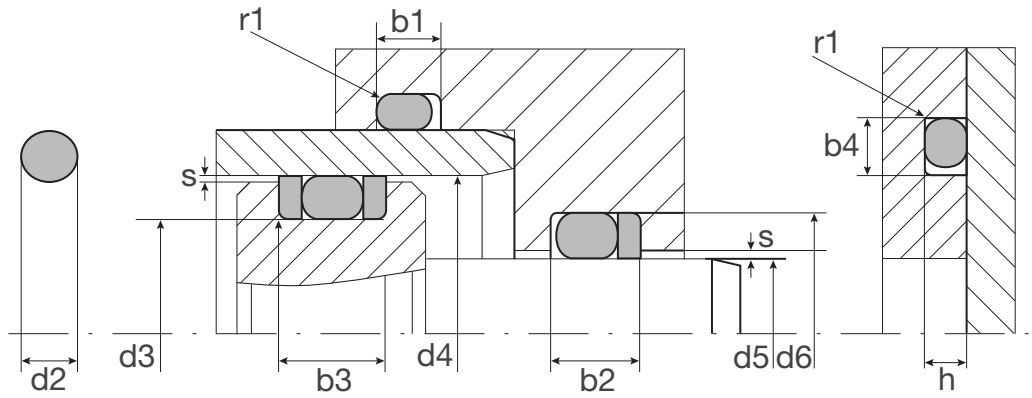
Cava triangolare I *Triangular housing*

Triangular housing is often applied to flanges or sealing systems with covers. This type of housing does not leave enough room for the O-ring deformation.



Sezione mm I *Section mm*	Larghezza L mm *Width L mm*	Raggio r1 mm *Radius r1 mm*
1.78	2.4 + 0.10	0.3
2.00	2.7 + 0.10	0.4
2.50	3.4 + 0.15	0.6
2.62	3.5 + 0.15	0.6
3.00	4.0 + 0.20	0.6
3.53	4.7 + 0.20	0.9
4.00	5.4 + 0.20	1.2
5.00	6.7 + 0.25	1.2
5.33	7.1 + 0.25	1.5
5.70	7.6 + 0.25	1.5
6.00	8.0 + 0.30	1.5
7.00	9.4 + 0.30	2.0
8.00	10.8 + 0.30	2.0
8.40	11.3 + 0.30	2.0

Schema per dimensionare la sede | *Housing dimensions diagram*



Sezione O-ring *O-ring section*	Tolleranza d2 *Tolerance d2*	Applicazione statica *Static seal*		Applicazione dinamica *Dynamic seal*			1 bk-up	2 bk-up	Flangia *Flange*		Gap		Back-up
d2 (mm)	NBR 70 Shore A	Pist. *Piston* d3 H8	Stelo *Rod* d6 H9	Pist. *Piston* d3 H8	Stelo *Rod* d6 H9	b1 +0.20	b2 +0.20	b3 +0.20	b4 +0.20	h +0.05	s	r1	T ±0.10
1.00	±0.20	d4 - 1.4	d5 + 1.4	d4 - 1.4	d5 + 1.4	1.4	-	-	1.4	0.7	Vedi tabella 2 | *See table 2*	0.2	-
1.20	±0.20	d4 - 1.7	d5 + 1.7	d4 - 1.7	d5 + 1.7	1.7	-	-	1.7	0.85		0.2	-
1.50	±0.20	d4 - 2.2	d5 + 2.2	d4 - 2.5	d5 + 2.5	2.0	3.0	4.0	2.1	1.1		0.3	1.0
1.60	±0.20	d4 - 2.4	d5 + 2.4	d4 - 2.6	d5 + 2.6	2.1	3.1	4.1	2.2	1.2		0.3	1.0
1.78	±0.20	d4 - 2.6	d5 + 2.6	d4 - 2.9	d5 + 2.9	2.4	3.8	5.2	2.6	1.3		0.3	1.4
2.00	±0.20	d4 - 3.0	d5 + 3.0	d4 - 3.3	d5 + 3.3	2.7	4.1	5.5	2.8	1.5		0.3	1.4
2.40	±0.20	d4 - 3.6	d5 + 3.6	d4 - 4.1	d5 + 4.1	3.2	4.6	6.0	3.3	1.8		0.3	1.4
2.50	±0.20	d4 - 3.7	d5 + 3.7	d4 - 4.3	d5 + 4.3	3.3	4.7	6.1	3.4	1.85		0.3	1.4
2.62	±0.25	d4 - 4.0	d5 + 4.0	d4 - 4.5	d5 + 4.5	3.6	5.0	6.4	3.8	2.0		0.3	1.4
3.00	±0.25	d4 - 4.6	d5 + 4.6	d4 - 5.2	d5 + 5.2	4.0	5.4	6.8	4.0	2.3		0.6	1.4
3.53	±0.25	d4 - 5.4	d5 + 5.4	d4 - 6.2	d5 + 6.2	4.8	6.2	7.6	5.0	2.7		0.6	1.4
4.00	±0.25	d4 - 6.2	d5 + 6.2	d4 - 7.0	d5 + 7.0	5.2	6.9	8.6	5.3	3.1		0.6	1.7
4.50	±0.35	d4 - 7.0	d5 + 7.0	d4 - 8.0	d5 + 8.0	5.8	7.5	9.2	5.9	3.5		0.6	1.7
5.00	±0.35	d4 - 8.0	d5 + 8.0	d4 - 8.8	d5 + 8.8	6.6	8.3	10.0	6.7	4.0		0.6	1.7
5.33	±0.35	d4 - 8.6	d5 + 8.6	d4 - 9.4	d5 + 9.4	7.1	9.0	10.9	7.3	4.3		0.6	1.7
5.70	±0.35	d4 - 9.2	d5 + 9.2	d4 - 10.0	d5 + 10.0	7.2	9.0	11.0	7.4	4.6		0.6	1.7
6.00	±0.35	d4 - 9.8	d5 + 9.8	d4 - 10.6	d5 + 10.6	7.4	9.3	11.2	7.6	4.9		0.6	1.7
6.50	±0.40	d4 - 10.8	d5 + 10.8	d4 - 11.4	d5 + 11.4	8.0	9.9	11.9	8.2	5.4		1.0	1.7
6.99	±0.40	d4 - 11.6	d5 + 11.6	d4 - 12.2	d5 + 12.2	9.5	12.3	15.1	9.7	5.8		1.0	2.5
8.00	±0.40	d4 - 13.4	d5 + 13.4	d4 - 14.2	d5 + 14.2	9.8	12.6	15.4	10.0	6.7		1.0	2.5
8.40	±0.40	d4 - 14.2	d5 + 14.2	d4 - 15.0	d5 + 15.0	10.0	12.8	15.6	10.3	7.1		1.0	2.5
9.00	±0.40	d4 - 15.4	d5 + 15.4	d4 - 16.2	d5 + 16.2	10.6	13.4	16.3	10.9	7.7		1.5	2.5
10.00	±0.40	d4 - 17.2	d5 + 17.2	d4 - 18.2	d5 + 18.2	11.6	14.5	17.4	12.0	8.6		2.0	2.5

Anelli antiestrusione | *Back-up rings*

Gioco radiale S I *Radial g ap S*						
Durezza O-ring *O-ring hardness*	Press.	Sezione O-ring d 2 I *O-ring section*				
	bar	Up to 2	2 - 3	3 - 5	5 -	> 7
70° Sh	≤ 35	0.08	0.09	0.10	0.13	0.15
	≤ 70	0.05	0.07	0.08	0.09	0.10
	≤ 105	0.03	0.04	0.05	0.07	0.08
90° Sh	≤ 35	0.13	0.15	0.20	0.23	0.25
	≤ 70	0.10	0.13	0.15	0.18	0.20
	≤ 105	0.07	0.09	0.10	0.13	0.15
	≤ 140	0.05	0.07	0.08	0.09	0.10
	≤ 175	0.04	0.05	0.07	0.08	0.09
	≤ 210	0.03	0.04	0.05	0.07	0.08
	≤ 350	0.02	0.03	0.03	0.04	0.04

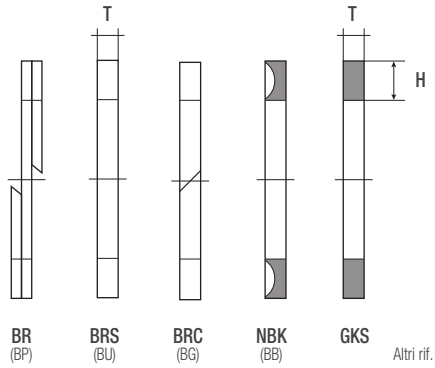
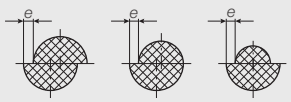
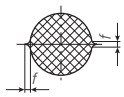
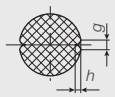
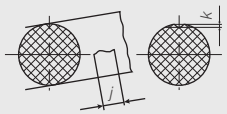
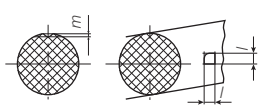


Tabella 2 I *Tab 2*

LIMITI ALLE DEVIAZIONI AMMESSE PER LE FORME E SUPERFICI IN CONF. ALLA DIN 3771/4 | *ACCEPTACE CRITERIA FOR SURFACE FINISH AND DIMENSIONS ACCORDING TO DIN3771/4*

Illustrazione *O-ring section*	Categorie del difetto *Defect Description*		Limiti massimi accettabili (mm) I *Max acceptable limits (mm)*									
			Grado N I *Level N*					Grado S I *Level S*				
			Corda I *Cord*					Corda I *Cord*				
			0 2.25	2.25 3.15	3.15 4.50	4.50 6.30	6.30 8.00	0 2.25	2.25 3.15	3.15 4.50	4.50 6.30	6.30 8.00
	Fuori registro *Out of adjustment*	e	0.08	0.10	0.13	0.15	0.15	0.08	0.08	0.10	0.12	0.13
	Bave combinate a fuori registro *Burrs and out of adjustment*	f	0.10	0.12	0.14	0.16	0.18	0.10	0.10	0.13	0.15	0.15
	Bave rientranti *Concave burrs*	g	0.18	0.27	0.36	0.53	0.70	0.10	0.15	0.20	0.20	0.30
		h	0.08	0.08	0.10	0.10	0.13	0.05	0.08	0.10	0.10	0.13
	Appiattimenti ovalizzazioni *Oval flattening*		Le variazioni della sezione della corda sono accettabili se l'appiattimento mantiene le dimensioni dell'OR in tolleranza. Variations in the cord section are acceptable if the flattening is within the O-ring tolerance									
	Rugosità superficiale *Surface roughness*		0,05 x I.D. oppure I 0,05 x I.D. or					0,03 x I.D. oppure I 0,03 x I.D. or				
		j	1.50	1.50	6.50	6.50	6.50	1.50	1.50	5.00	5.00	5.00
		k	0.08	0.08	0.08	0.08	0.08	0.05	0.05	0.05	0.05	0.05
	Buchi mancanze *Hole or lack of material*	l	0.60	0.80	1.00	1.30	1.70	0.15	0.25	0.40	0.63	1.00
		m	0.08	0.08	0.10	0.10	0.13	0.08	0.08	0.10	0.10	0.13

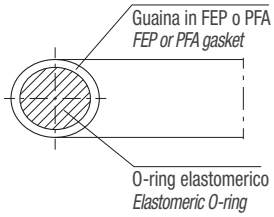
O-ring incapsulati FEP-PFA | *Coated O-ring FEP-PFA*

Gli O-ring Viton Silicone Epdm con rivestimento continuo FEP (Fluoro Etilene Propilene) o PFA(PerfluoroAlcoxy) sono indicati per prestazioni ad alto livello.

I FEP O-ring consistono in O-ring incapsulati con guaina in FEP o PFA in modo continuo per garantire una copertura ermetica all'elastomero. Il tutto è ottenibile grazie alla malleabilità termoplastica del rivestimento.

The O-Rings Viton Silicone EPDM, lined with FEP (Fluorinated Ethylene Propylene) or PFA (Perfluoroalkoxy), are suitable for high level performance.

The FEP O-Rings are encapsulated in a gasket of FEP or PFA which has high malleable and thermoplastic characteristics and covers the elastomeric material hermetically and continuously.



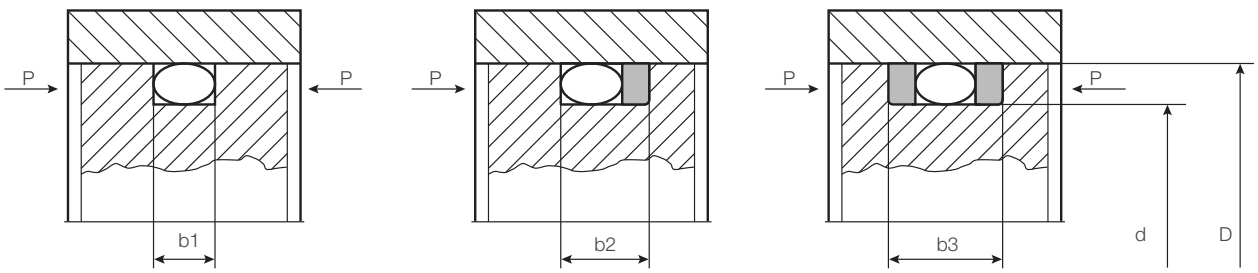
Guaine di rivestimento (dati tecnici) | *Gasket coating (technical data)*

FEP	1 alto grado resistenza a rottura I *1 Highly resistant to break*
	2 chimicamente inerte I *2 Chemically inert*
	3 basso coefficiente di attrito I 3 *Low friction coefficient*
	4 mantenimento delle proprietà da -270° a + 204° I *4 Teperatures range from -270° to 204°*
	5 rispetta norma FDA 21 CRF. 177.1550 I *5 According to FDA 21 CRF. 177.15550*
PFA	1 alto grado resistenza a rottura I *1 Highly resistant to break*
	2 alto punto di fusione I *2 High melting point*
	3 basso coefficiente di attrito I *3 Low friction coefficient*
	4 mantenimento delle proprietà da -195° a +260° I *4 Teperatures range from -195° to 260°*
	5 rispetta norma FDA 21 CRF. 177.1550 I *5 According to FDA 21 CRF. 177.15550*

Pressione di lavoro fino 250 bar
Sustain pressure up to 250 bars

SEZIONE CORDA O-RING E SPESSORE RIVESTIMENTO I *O-RING SECTION AND COATING THICKNESS*							
Radiale I *Radial*				Assiale I *Axial*			
d2	Guaina *Gasket*	Profondità cava *Housing depth*	Larghezza cava *Housing width*	Profondità cava *Housing depth*	Larghezza cava *Housing width*	Raggio *Radius*	Tolleranza *Tolerance*
1.78	0.25	1.48	2.39	1.19	2.39	0.40	0.015
2.62	0.30	2.23	3.58	1.90	3.58	0.60	0.018
3.53	0.38	3.10	4.77	2.69	4.77	1.00	0.018
5.33	0.50	4.70	7.08	4.29	7.08	1.20	0.022
7.00	0.50	6.09	9.52	5.79	9.52	1.50	0.022

O-ring e O-ring con back-up ring | *O-ring and O-ring with back-up*



Serie da preferire/Dimensioni sede solo O-ring/1 back-up/2 Back-up
Preferred series/O-ring Dimensions only/1 Back-Up/2 Back-Up

Tenuta pistone | *Piston sealing system*

CIL.	Codice e descrizione *Code and description*	∅ cava *Housing*	Larghezza cava *Housing depth*			r. cava *H. radius*
D H8	Descrizione I *Description*	d h9	b1 +0.2	b2 +2.0	b3 +2.0	r3
6	O-RING NBR 3,5 x 1,5	3.8	2.0	3.0	4.0	0.2
8	O-RING NBR 5,5 x 1,5	5.8	2.0	3.0	4.0	0.2
10	O-RING NBR 7,5 x 1,5	7.8	2.0	3.0	4.0	0.2
12	O-RING NBR 2037-012 9.25 x 1.78	9.4	2.4	3.8	5.2	0.2
12	O-RING NBR 8,5 x 1,5	9.0	2.7	4.1	5.5	0.2
14	O-RING NBR 2043-013 10.82 x 1.78	11.4	2.4	3.8	5.2	0.2
14	O-RING NBR 10 x 2	11.0	2.7	4.1	5.5	0.2
15	O-RING NBR 2050-014 12.42 x 1.78	12.4	2.4	3.8	5.2	0.2
15	O-RING NBR 11 x 2	12.0	2.7	4.1	5.5	0.2
16	O-RING NBR 2050-014 12.42 x 1.78	13.4	2.4	3.8	5.2	0.2
16	O-RING NBR 12 x 2	13.0	2.7	4.1	5.5	0.2
18	O-RING NBR 2056-015 14.00 x 1.78	15.4	2.4	3.8	5.2	0.2
18	O-RING NBR 14 x 2	15.0	2.7	4.1	5.5	0.2
20	O-RING NBR 2068-017 17.17 x 1.78	17.4	2.4	3.8	5.2	0.2
20	O-RING NBR 16 x 2	17.0	2.7	4.1	5.5	0.2
22	O-RING NBR 2068-017 18.77 x 1.78	19.4	2.4	3.8	5.2	0.2
22	O-RING NBR 18 x 2	19.0	2.7	4.1	5.5	0.2
25	O-RING NBR 2087-020 21.95 x 1.78	22.4	2.4	3.8	5.2	0.2
25	O-RING NBR 21 x 2	22.0	2.7	4.1	5.5	0.2
28	O-RING NBR 3093-119 23.47 x 2.62	24.0	3.6	5.0	6.4	0.3
28	O-RING NBR 22 x 3	23.4	4.0	5.4	6.8	0.3
30	O-RING NBR 3100-120 25.07 x 2.62	26.0	3.6	5.0	6.4	0.3
30	O-RING NBR 24 x 3	25.4	4.0	5.4	6.8	0.3
32	O-RING NBR 3106-121 26.64 x 2.62	28.0	3.6	5.0	6.4	0.3
32	O-RING NBR 26 x 3	27.4	4.0	5.4	6.8	0.3
35	O-RING NBR 3118-123 29.82 x 2.62	31.0	3.6	5.0	6.4	0.3
35	O-RING NBR 29 x 3	30.4	4.0	5.4	6.8	0.3
40	O-RING NBR 3137-126 34.60 x 2.62	36.0	3.6	5.0	6.4	0.3
40	O-RING NBR 34 x 3	35.4	4.0	5.4	6.8	0.3
42	O-RING NBR 3143-127 36.14 x 2.62	38.0	3.6	5.0	6.4	0.3
42	O-RING NBR 36 x 3	37.4	4.0	5.4	6.8	0.3
45	O-RING NBR 3156-129 39.34 x 2.62	41.0	3.6	5.0	6.4	0.3
45	O-RING NBR 39 x 3	40.0	4.0	5.4	6.8	0.3

CIL.	Codice e descrizione *Code and description*	∅ cava *Housing*	Larghezza cava *Housing depth*			r. cava *H. radius*
D H8	Descrizione I *Description*	d h9	b1 +0.2	b2 +2.0	b3 +2.0	r3
48	O-RING NBR 4162-223 40.87 x 3.53	42.6	4.8	6.2	7.6	0.3
48	O-RING NBR 40 x 4	41.8	5.2	6.9	8.6	0.4
50	O-RING NBR 4175-224 44.04 x 3.53	44.6	4.8	6.2	7.6	0.3
50	O-RING NBR 42 x 4	43.8	5.2	6.9	8.6	0.4
52	O-RING NBR 4175-224 44.04 x 3.53	46.6	4.8	6.2	7.6	0.3
52	O-RING NBR 44 x 4	45.8	5.2	6.9	8.6	0.4
55	O-RING NBR 4187-225 47.22 x 3.53	49.6	4.8	6.2	7.6	3.0
55	O-RING NBR 47 x 4	48.8	5.2	6.9	8.6	0.4
60	O-RING NBR 4212-227 53.57 x 3.53	54.6	4.8	6.2	7.6	0.3
60	O-RING NBR 52 x 4	53.8	5.2	6.9	8.6	0.4
63	O-RING NBR 4225-228 56.74 x 3.53	57.6	4.8	6.2	7.6	0.3
63	O-RING NBR 55 x 4	56.8	5.2	6.9	8.6	0.4
65	O-RING NBR 4225-228 56.74 x 3.53	59.6	4.8	6.2	7.6	0.3
65	O-RING NBR 57 x 4	58.8	5.2	6.9	8.6	0.4
70	O-RING NBR 4250-230 63.09 x 3.53	64.6	4.8	6.2	7.6	0.3
70	O-RING NBR 62 x 4	63.8	5.2	6.9	8.6	0.4
75	O-RING NBR 4262-231 66.27 x 3.53	69.6	4.8	6.2	7.6	0.3
75	O-RING NBR 67 x 4	68.6	5.2	6.9	8.6	0.4
80	O-RING NBR 4287-233 72.62 x 3.53	74.6	4.8	6.2	7.6	0.3
80	O-RING NBR 72 x 4	73.8	5.2	6.9	8.6	0.4
85	O-RING NBR 4312-235 78.97 x 3.53	79.6	4.8	6.2	7.6	0.3
85	O-RING NBR 77 x 4	78.8	5.2	6.9	8.6	0.4
90	O-RING NBR 6312-338 78.74 x 5.34	81.4	7.1	8.8	10.5	0.4
90	O-RING NBR 80 x 5	82.0	6.6	8.3	10.0	0.4
95	O-RING NBR 6337-340 85.09 x 5.34	86.4	7.1	8.8	10.5	0.4
95	O-RING NBR 85 x 5	87.0	6.6	8.3	10.0	0.4
100	O-RING NBR 6362-342 91.44 x 5.34	91.4	7.1	8.8	10.5	0.4
100	O-RING NBR 90 x 5	92.0	6.6	8.3	10.0	0.4
105	O-RING NBR 6375-343 92.62 x 5.34	96.4	7.1	8.8	10.5	0.4
105	O-RING NBR 95 x 5	97.0	6.6	8.3	10.0	0.4
110	O-RING NBR 6400-345 100.97 x 5.34	101.4	7.1	8.8	10.5	0.4
110	O-RING NBR 100 x 5	102.0	6.6	8.3	10.0	0.4
115	O-RING NBR 6412-346 104.14 x 5.34	106.4	7.1	8.8	10.5	0.4

CIL.	Codice e descrizione *Code and description*	∅ cava *Housing*	Larghezza cava *Housing depth*			r. cava *H. radius*
D H8	Descrizione I *Description*	d h9	b1 +0.2	b2 +2.0	b3 +2.0	r3
115	O-RING NBR 105 x 5	107.0	6.6	8.3	10.0	0.4
120	O-RING NBR 6437-348 110.50 x 5.34	111.4	7.1	8.8	10.5	0.4
120	O-RING NBR 110 x 5	112.0	6.6	8.3	10.0	0.4
125	O-RING NBR 6450-349 113.67 x 5.34	116.4	7.1	8.8	10.5	0.4
125	O-RING NBR 115 x 5	117.0	6.6	8.3	10.0	0.4
130	O-RING NBR 351 120.02 x 5.34	121.4	7.1	8.8	10.5	0.4
130	O-RING NBR 120 x 5	122.0	6.6	8.3	10.0	0.4
135	O-RING NBR 8475-427 120.02 x 6.99	123.4	9.5	12.0	14.5	0.6
140	O-RING NBR 8500-429 126.37 x 6.99	128.4	9.5	12.0	14.5	0.6
150	O-RING NBR 8537-432 135.90 x 6.99	138.4	9.5	12.0	14.5	0.6
160	O-RING NBR 8575-435 145.42 x 6.99	148.4	9.5	12.0	14.5	0.6
170	O-RING NBR 8625-438 158.12 x 6.99	158.4	9.5	12.0	14.5	0.6
180	O-RING NBR 8650-439 164.47 x 6.99	168.4	9.5	12.0	14.5	0.6
190	O-RING NBR 8700-441 177.17 x 6.99	178.4	9.5	12.0	14.5	0.6
200	O-RING NBR 8725-442 183.52 x 6.99	188.4	9.5	12.0	14.5	0.6

CIL.	Codice e descrizione *Code and description*	∅ cava *Housing*	Larghezza cava *Housing depth*			r. cava *H. radius*
D H8	Descrizione I *Description*	d h9	b1 +0.2	b2 +2.0	b3 +2.0	r3
210	O-RING NBR 8775-444 196.22 x 6.99	198.4	9.5	12.0	14.5	0.6
220	O-RING NBR 8800-445 202.57 x 6.99	208.4	9.5	12.0	14.5	0.6
230	O-RING NBR 8850-446 215.27 x 6.99	218.4	9.5	12.0	14.5	0.6
240	O-RING NBR 8900-447 227.97 x 6.99	228.4	9.5	12.0	14.5	0.6
250	O-RING NBR 8950-448 240.67 x 6.99	238.4	9.5	12.0	14.5	0.6
280	O-RING NBR 81050-450 266.07 x 6.99	268.4	9.5	12.0	14.5	0.6
300	O-RING NBR 81100-451 278.77 x 6.99	288.4	9.5	12.0	14.5	0.6
320	O-RING NBR 81200-453 304.17 x 6.99	308.4	9.5	12.0	14.5	0.6
350	O-RING NBR 81300-455 329.57 x 6.99	388.4	9.5	12.0	14.5	0.6
400	O-RING NBR 81500-459 380.37 x 6.99	388.4	9.5	12.0	14.5	0.6
420	O-RING NBR 81600-461 405.26 x 6.99	408.4	9.5	12.0	14.5	0.6
450	O-RING NBR 81700-463 430.66 x 6.99	438.4	9.5	12.0	14.5	0.6
480	O-RING NBR 81800-465 456.06 x 6.99	468.4	9.5	12.0	14.5	0.6
500	O-RING NBR 81900-467 481.46 x 6.99	488.4	9.5	12.0	14.5	0.6

Tenuta stelo | *Rod sealing system*

STE. *ROD.*	Codice e descrizione *Code and description*	∅ cava *Housing*	Larghezza cava *Housing depth*			r. cava *H. radius*
D g6	Descrizione I *Description*	d H9	b1 +0.2	b2 +2.0	b3 +2.0	r3
4	O-RING NBR 2015-007 3.68 x 1.78	6.6	2.4	3.8	5.2	0.2
4	O-RING NBR 4 x 1.5	6.2	2.0	3.0	4.0	0.2
5	O-RING NBR 2018-008 4.47 x 1.78	7.6	2.4	3.8	5.2	0.2
5	O-RING NBR 5 x 1.5	7.2	2.0	3.0	4.0	0.2
6	O-RING NBR 2025-010 6.07 x 1.78	8.6	2.4	3.8	5.2	0.2
6	O-RING NBR 6 x 1.5	8.2	2.0	3.0	4.0	0.2
8	O-RING NBR 2031-011 7.65 x 1.78	10.6	2.4	3.8	5.2	0.2
8	O-RING NBR 8 x 2	11.0	2.7	4.1	5.5	0.2
10	O-RING NBR 2043-013 10.82 x 1.78	12.6	2.4	3.8	5.2	0.2
10	O-RING NBR 10 x 2	13.0	2.7	4.1	5.5	0.2
10	O-RING NBR 2050-014 12.42 x 1.78	14.6	2.4	3.8	5.2	0.2
12	O-RING NBR 12 x 2	15.0	2.7	4.1	5.5	0.2
14	O-RING NBR 2056-015 14.00 x 1.78	16.6	2.4	3.8	5.2	0.2
14	O-RING NBR 14 x 2	17.0	2.7	4.1	5.5	0.2
15	O-RING NBR 2062-016 15.60 x 1.78	17.6	2.4	3.8	5.2	0.2
15	O-RING NBR 15 x 2	18.0	2.7	4.1	5.5	0.2
16	O-RING NBR 2062-016 15.60 x 1.78	18.6	2.4	3.8	5.2	0.2
16	O-RING NBR 16 x 2	19.0	2.7	4.1	5.5	0.2
18	O-RING NBR 2075-018 18.77 x 1.78	20.6	2.4	3.8	5.2	0.2
18	O-RING NBR 18 x 2	21.0	2.7	4.1	5.5	0.2
20	O-RING NBR 2081-019 20.35 x 1.78	22.6	2.4	3.8	5.2	0.2
20	O-RING NBR 20 x 2	23.0	2.7	4.1	5.5	0.2
22	O-RING NBR 3087-118 21.89 x 2.62	26.0	3.6	5.0	6.4	0.3
22	O-RING NBR 22 x 3	26.6	4.0	5.4	6.8	0.3
25	O-RING NBR 3100-120 25.07 x 2.62	29.0	3.6	5.0	6.4	0.3
25	O-RING NBR 25 x 3	29.6	4.0	5.4	6.8	0.3
28	O-RING NBR 3112-122 28.24 x 2.62	32.0	3.6	5.0	6.4	0.3
28	O-RING NBR 28 x 3	32.6	4.0	5.4	6.8	0.3
30	O-RING NBR 3118-123 29.82 x 2.62	34.0	3.6	5.0	6.4	0.3
30	O-RING NBR 30 x 3	34.6	4.0	5.4	6.8	0.3
32	O-RING NBR 3125-124 31.42 x 2.62	36.0	3.6	5.0	6.4	0.3
32	O-RING NBR 32 x 3	36.6	4.0	5.4	6.8	0.3
35	O-RING NBR 3137-126 34.60 x 2.62	39.0	3.6	5.0	6.4	0.3

STE. *ROD.*	Codice e descrizione *Code and description*	∅ cava *Housing*	Larghezza cava *Housing depth*			r. cava *H. radius*
D g6	Descrizione I *Description*	d H9	b1 +0.2	b2 +2.0	b3 +2.0	r3
35	O-RING NBR 35 x 3	39.6	4.0	5.4	6.8	0.3
36	O-RING NBR 3143-127 36.14 x 2.62	40.0	3.6	5.0	6.4	0.3
36	O-RING NBR 36 x 3	40.6	4.0	5.4	6.8	0.3
40	O-RING NBR 4162-223 40.87 x 3.53	45.4	4.8	6.2	7.6	0.4
40	O-RING NBR 40 x 4	46.2	5.2	6.9	8.6	0.4
42	O-RING NBR 4162-223 40.87 x 3.53	47.4	4.8	6.2	7.6	0.4
42	O-RING NBR 42 x 4	48.2	5.2	6.9	8.6	0.4
45	O-RING NBR 4175-224 44.04 x 3.53	50.4	4.8	6.2	7.6	0.4
45	O-RING NBR 45 x 4	41.2	5.2	6.9	8.6	0.4
48	O-RING NBR 4187-225 47.22 x 3.53	53.4	4.8	6.2	7.6	0.4
48	O-RING NBR 48 x 4	54.2	5.2	6.9	8.6	0.4
50	O-RING NBR 4200-226 50.39 x 3.53	55.4	4.8	6.2	7.6	0.4
50	O-RING NBR 50 x 4	56.2	5.2	6.9	8.6	0.4
52	O-RING NBR 4200-226 50.39 x 3.53	57.4	4.8	6.2	7.6	0.4
52	O-RING NBR 52 x 4	58.2	5.2	6.9	8.6	0.4
55	O-RING NBR 4212-227 53.57 x 3.53	60.4	4.8	6.2	7.6	0.4
55	O-RING NBR 55 x 4	61.2	5.2	6.9	8.6	0.4
56	O-RING NBR 4225-228 56.74 x 3.53	61.4	4.8	6.2	7.6	0.4
56	O-RING NBR 56 x 4	62.2	5.2	6.9	8.6	0.4
60	O-RING NBR 4237-229 59.92 x 3.53	65.4	4.8	6.2	7.6	0.4
60	O-RING NBR 60 x 4	66.2	5.2	6.9	8.6	0.4
63	O-RING NBR 4250-230 63.09 x 3.53	68.4	4.8	6.2	7.6	0.4
63	O-RING NBR 63 x 4	69.2	5.2	6.9	8.6	0.4
65	O-RING NBR 4262-231 66.27 x 3.53	70.4	4.8	6.2	7.6	0.4
65	O-RING NBR 65 x 4	71.2	5.2	6.9	8.6	0.4
70	O-RING NBR 4275-232 69.44 x 3.53	75.4	4.8	6.2	7.6	0.4
70	O-RING NBR 70 x 4	76.2	5.2	6.9	8.6	0.4
75	O-RING NBR 4300-234 75.79 x 3.53	80.4	4.8	6.2	7.6	0.4
75	O-RING NBR 75 x 4	81.2	5.2	6.9	8.6	0.4
80	O-RING NBR 6235-339 81.95 x 5.34	88.6	7.1	8.8	10.5	0.4
80	O-RING NBR 80 x 5	88.0	6.6	8.3	10.0	0.4
85	O-RING NBR 6337-340 85.09 x 5.34	93.6	7.1	8.8	10.5	0.4
85	O-RING NBR 85 x 5	93.0	6.6	8.3	10.0	0.4

STE. *ROD.*	Codice e descrizione *Code and description*	∅ cava *Housing*	Larghezza cava *Housing depth*			r. cava *H. radius*
D g6	Descrizione I *Description*	d H9	b1 +0.2	b2 +2.0	b3 +2.0	r3
90	O-RING NBR 6362-342 91.44 x 5.34	98.6	7.1	8.8	10.5	0.4
90	O-RING NBR 90 x 5	98.0	6.6	8.3	10.0	0.4
95	O-RING NBR 6375-343 94.62 x 5.34	103.6	7.1	8.8	10.5	0.4
95	O-RING NBR 95 x 5	103.0	6.6	8.3	10.0	0.4
100	O-RING NBR 64.00-345 100.97 x 5.34	108.6	7.1	8.8	10.5	0.4
100	O-RING NBR 100 x 5	108.0	6.6	8.3	10.0	0.4
105	O-RING NBR 64.12-346 104.14 x 5.34	113.6	7.1	8.8	10.5	0.4
105	O-RING NBR 105 x 5	113.0	6.6	8.3	10.0	0.4
110	O-RING NBR 64.37-348 110.50 x 5.34	118.6	7.1	8.8	10.5	0.4
110	O-RING NBR 110 x 5	118.0	6.6	8.3	10.0	0.4
115	O-RING NBR 64.50-349 113.67 x 5.34	123.6	7.1	8.8	10.5	0.4
115	O-RING NBR 115 x 5	123.0	6.6	8.3	10.0	0.4
120	O-RING NBR 351 120.02 x 5.34	128.6	7.1	8.8	10.5	0.4
120	O-RING NBR 120 x 5	128.0	6.6	8.3	10.0	0.4
125	O-RING NBR 353 126.37 x 5.34	133.6	7.1	8.8	10.5	0.4
125	O-RING NBR 125 x 5	133.0	6.6	8.3	10.0	0.4
130	O-RING NBR 354 129.54 x 5.34	138.6	7.1	8.8	10.5	0.4
130	O-RING NBR 130 x 5	138.0	6.6	8.3	10.0	0.4
135	O-RING NBR 8537-432 135.90 x 6.99	146.6	9.5	12.0	14.5	0.6

STE. *ROD.*	Codice e descrizione *Code and description*	∅ cava *Housing*	Larghezza cava *Housing depth*			r cava *H. radius*
D g6	Descrizione I *Description*	d H9	b1 +0.2	b2 +2.0	b3 +2.0	r3
140	O-RING NBR 8550-433 139.07 x 6.99	151.6	9.5	12.0	14.5	0.6
150	O-RING NBR 8600-437 151.77 x 6.99	161.6	9.5	12.0	14.5	0.6
160	O-RING NBR 8625-438 158.12 x 6.99	171.6	9.5	12.0	14.5	0.6
170	O-RING NBR 8675-440 170.82 x 6.99	181.6	9.5	12.0	14.5	0.6
180	O-RING NBR 8725-442 183.52 x 6.99	191.6	9.5	12.0	14.5	0.6
190	O-RING NBR 8750-443 189.87 x 6.99	201.6	9.5	12.0	14.5	0.6
200	O-RING NBR 8800-445 202.57 x 6.99	211.6	9.5	12.0	14.5	0.6
210	O-RING NBR 8850-446 215.27 x 6.99	221.6	9.5	12.0	14.5	0.6
220	O-RING NBR 8850-446 215.27 x 6.99	231.6	9.5	12.0	14.5	0.6
230	O-RING NBR 8900-447 227.97 x 6.99	241.6	9.5	12.0	14.5	0.6
240	O-RING NBR 8950-448 240.67 x 6.99	251.6	9.5	12.0	14.5	0.6
250	O-RING NBR 81000-449 253.30 x 6.99	261.6	9.5	12.0	14.5	0.6
280	O-RING NBR 81000-451 278.77 x 6.99	291.6	9.5	12.0	14.5	0.6
300	O-RING NBR 81200-453 304.17 x 6.99	311.6	9.5	12.0	14.5	0.6
320	O-RING NBR 81250-454 316.87 x 6.99	331.6	9.5	12.0	14.5	0.6
350	O-RING NBR 81400-457 354.97 x 6.99	361.6	9.5	12.0	14.5	0.6
360	O-RING NBR 81400-457 354.97 x 6.99	371.6	9.5	12.0	14.5	0.6
400	O-RING NBR 81600-461 405.26 x 6.99	411.6	9.5	12.0	14.5	0.6

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