Toraflex®

Rubber Joints

www.comeval.es

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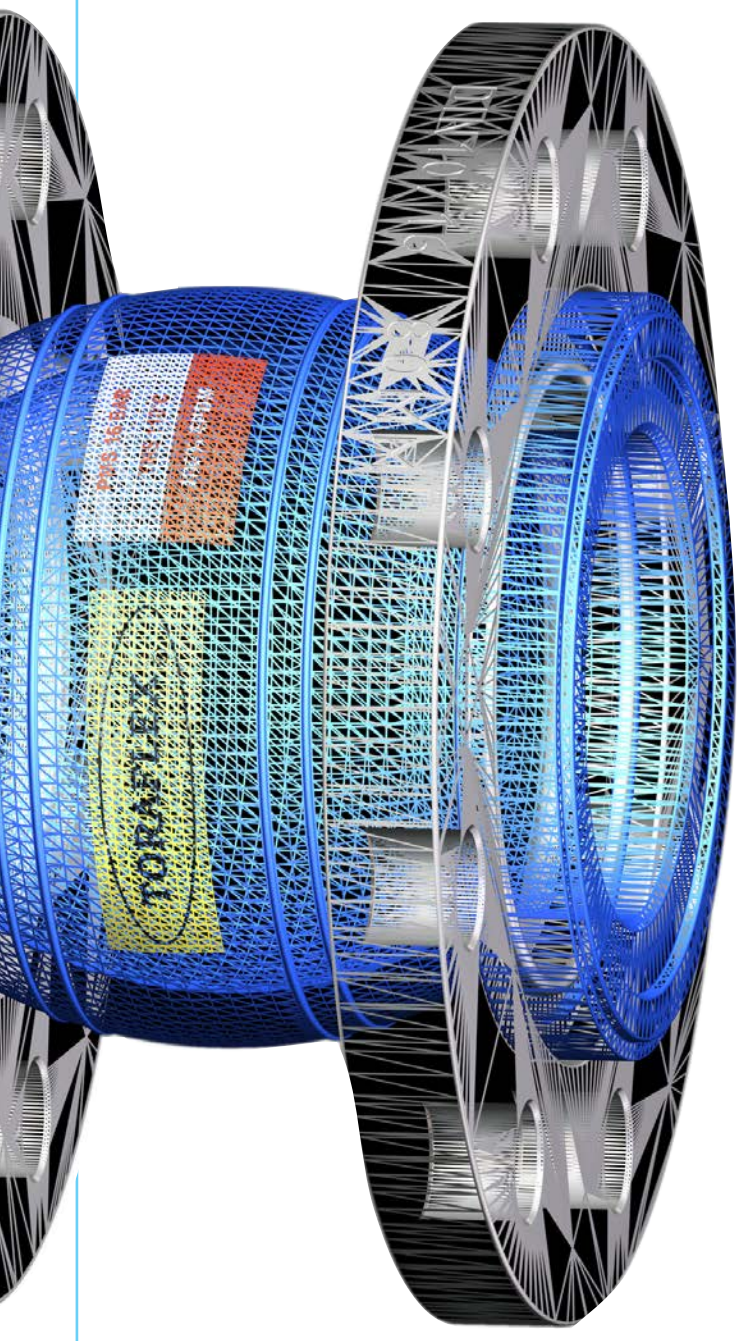


General Design Considerations

TORAFLEX® Rubber Joints are devised for piping works, consisting of a flexible main shell made of synthetic rubber with inner reinforcements to provide consistency, and pipe connections by means of loose flanges or threaded unions.

Rubber joints are easy to install due to their light weight and relatively small space requirement and their importance in the industry today is of enormous value as they protect highly valued installations and equipment and provide many benefits when installed into any rigid pipe system:

- Noise and vibrations caused by equipment such as pumps are absorbed by Rubber Joints. Noise is a very uncomfortable element for workers at plants and vibration causes fatigue stress in pipes and equipment that may easily lead to destruction. Rubber Joints alleviate such problems.

- Thermal movements appear in any rigid system due to temperature changes. Rubber Joints balance such movements.

- Rubber Joints provide a great assistance to the plant commissioning team by balancing slight pipe works misalignments and can even be used as telescopic mounting kits.

- Rubber joints can withstand surge pressures and mitigate the effects caused by water hammers thanks to their relatively high tensile strength.

- Thanks to its rubber composition and wide range of material options, they can work in a vast number of applications.

- An additional advantage is its non-conductive feature, very useful to avoid the electrolysis problem that appears when putting two different metals in contact.

TORAFLEX® Rubber Joints quality is backed up by experienced chemists and polymer specialised engineers and strict quality procedures. The whole process commences when selecting the rubber raw material in form of powder, which is finely mixed up according to the right engineering formulation, bonding, vulcanisation, cooling and cure period. Each joint is then subject to an individual and thoughtful testing procedure, including visual and functional tests to ensure their perfect performance. Results are registered and the joint is duly identified for full traceability.

TORAFLEX® Rubber Joints are comprehensive of a compact range of standard products with highly serialized production. Besides, our R+D+I section is ready to provide customized solutions to meet virtually any requirement.

As a result, we are in disposition to offer a high quality product, at a very competitive price and with large availability from stock.

Our specialised team, modern facilities, established quality procedures and dedicated service support provide added value to our products. We are ready to share our experience of more than 30 years supplying these products.

TORAFLEX® Rubber Joints are widely used in the industry of today. The following applications can be outlined:

Marine: (Fresh water generators, machine room equipment, marine engines, on deck systems, water cooling lines, lubricating circuits...).

H.V.A.C: (Heating, ventilating and air conditioned, specially absorbing vibrations and noise caused by pulsating pressure stations, cooling towers, condensers, chillers, compressors, rooters,,,)

Power: (Hydroelectric plants, turbine lines, cooling towers, condensate lines and deaireators..)

Water Works and Environmental Services: (Water treatment plants, pollution filters, strength balance in sewage lines, centrifugal rooters, sludge pumping lines....)

Process Industry: (slurries, solvents and other chemical compounds).

Codification

S	1	0	E	1	0	0	0	0	0	0	0	5	0

DESIGN	
S10	Single sphere rubber joints with flanges
S15	Single sphere rubber joints with flanges
S20	Double sphere rubber joints with flanges
S30	Double sphere rubber joints with threaded unions

MATERIAL OF RUBBER	
E	EPDM
R	NBR/CR
N	NBR
Y	Hypalon/EPDM
H	Hypalon
V	Viton
C	Neoprene
T	PTFE/EPDM-CR

CONNECTIONS	
10	Flanges drilled to EN 1092-1 DIN PN10
16	Flanges drilled to EN 1092-1 DIN PN16
A1	Flanges drilled to B16.5 Class 150
A3	Flanges drilled to B16.5 Class 300
00	Female threaded unions, BSPP
NP	Female threaded unions, NPT

CONNECTIONS MATERIAL	
0	Standard
G	Hot dip galvanized
I	Stainless steel 316
J	Stainless steel 304

ADDING PERFORMANCE	
0	None
R	Root ring reinforcement (for S20/S30 only)
V	Vulcanized vacuum reinforcement ring
T	External vacuum reinforcement ring
H	High Temperature applications

LIMITERS	
0	None
T	Carbon steel tie rods

OTHER SPECIAL OPTIONS	
0	Standard

VALVE SIZE	
050	DN50
100	DN100
912	DN1200

SERIES S10/S15/S20

Design Attributes

TORAFLEX® Rubber Joints are devised for piping works, consisting of a flexible main shell made of synthetic rubber with inner reinforcements to provide consistency, and pipe connections by means of loose flanges or threaded unions. Noise and vibrations caused by equipment such as pumps are absorbed by Rubber Joints. Rubber Joints balance thermal movements in rigid systems due to temperature changes, provide a great assistance to the plant commissioning team by balancing slight pipe works misalignments and can even be used as telescopic mounting kits.
Rubber joints can withstand surge pressures and mitigate the effects caused by water hammers thanks to their relatively high tensile strength. Its non-conductive feature avoids the electrolysis problem that appears when putting two different metals in contact. A correct pipe system arrangement and installation according to our Installation Operating and Maintenance Manual is essential to ensure a safe performance.

Light and easy to install, little installation space required, easy maintenance of replaceable bellows

4 different allowable movements: axial compression and expansion, lateral and angular deflection

Loose flanges for easy assembly, specially machined to accept the full turned rubber, with standard execution in zinc plated steel

Full turned rubber design, self-sealing, no additional gaskets are required; it prevents electrolytic corrosion

Precision injection molded of synthetic rubber and nylon

Rugged design with high burst pressure, to absorb noise and vibration and withstand water hammers to a certain extent by:
- Inner Reinforcement placed in between the outer and inner layers, made of braided nylon fabrics as standard
- End Bellows reinforcement

Lot number punched for full traceability purpose

Rubber material identification and maximum service pressure & temperature

S10/15
Spherical design for better strength and efficiency

S20
Double sphere design allows greater axial, lateral and angular movements subject to less effort and material wearing down during movements. With optional root ring

Main Features

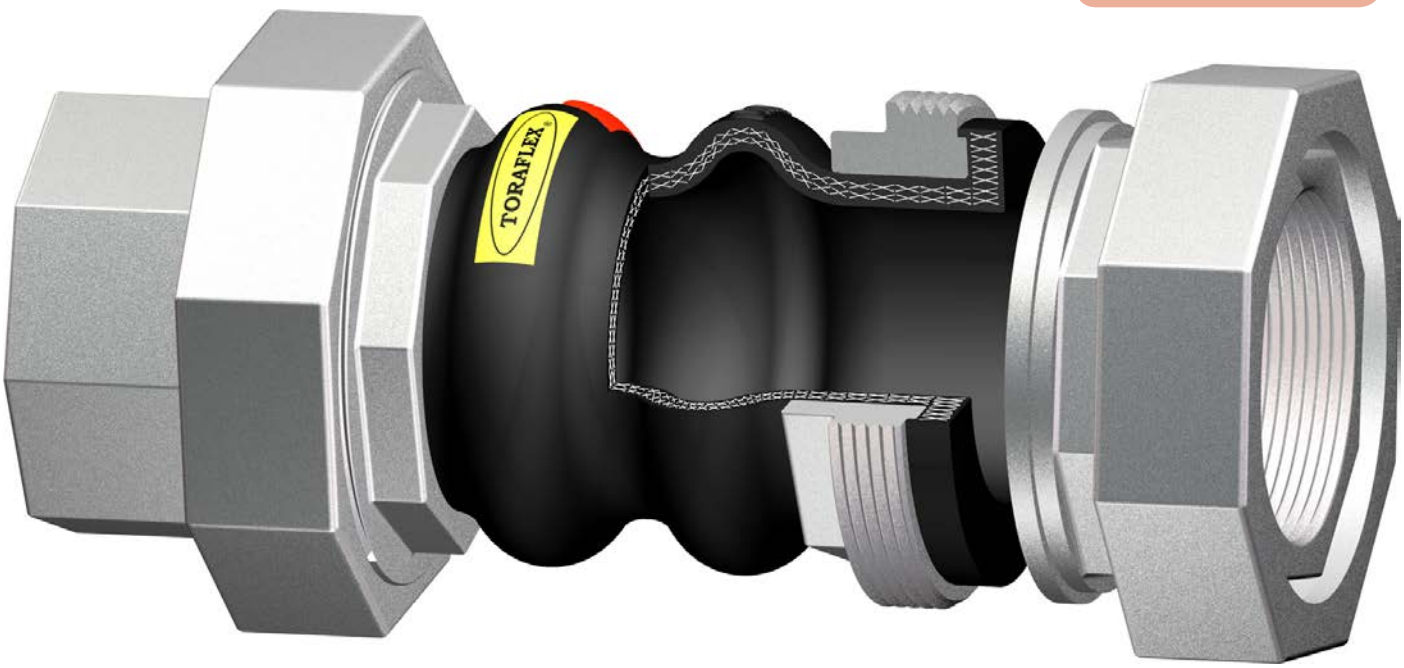
Nominal Pressure: PN10 / PN16
Valve end connections: Loose flanges drilled to EN 1092-1 PN10, PN16, or ASME B16.5 ASA150
Marking: EN 19
Pressure Tests: EN 12266-1
Rubber Joints are excluded from the Pressure Equipment Directive 2014/68/EU (PED), according to its article 1.2(O)
WRAS Approval for DN15-DN40

SERIES S30

Design Attributes

S30
Double Sphere design for better strength and efficiency allow greater axial, lateral and angular movements subject to less effort and material wearing down during movements

Precision injection moulded of synthetic rubber inserted into union threads



Rugged design with high burst pressure, to absorb noise and vibration and withstand water hammers to a certain extent

Light and easy to install, little installation space required, easy maintenance of replaceable bellows

Lot number punched for full traceability purpose

Rubber material identification and maximum service pressure & temperature

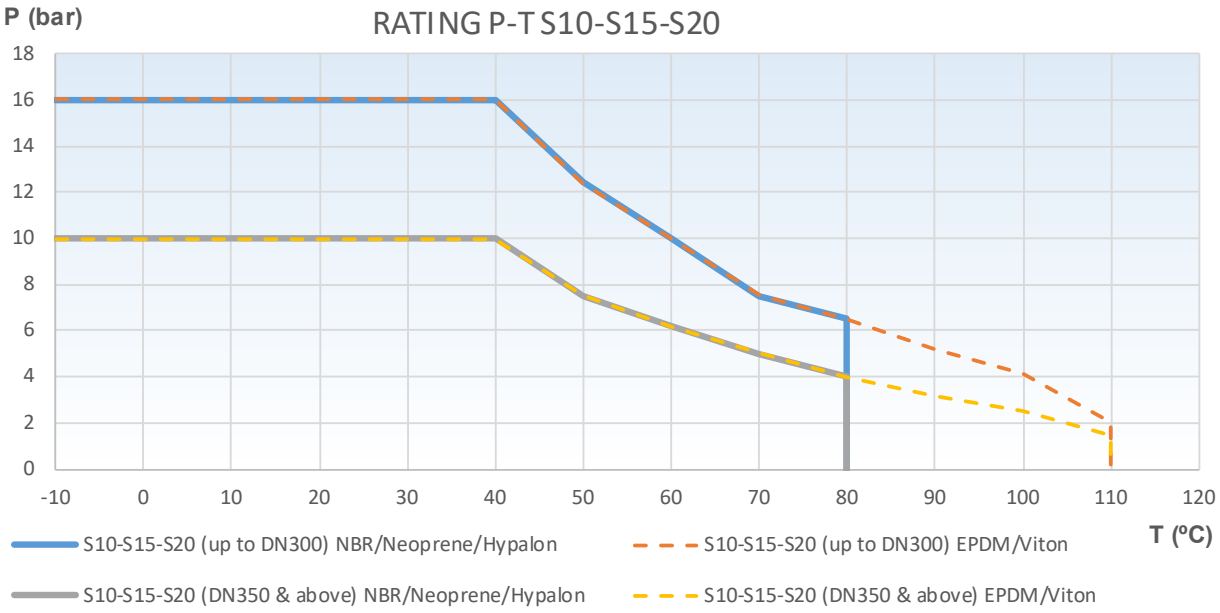
Main Features

Nominal Pressure: PN10 / PN16
Valve end connections: threaded unions to EN 10266-1, with parallel female threads GAS-Rp-BSPP
Marking: EN 19
Pressure Tests: EN 12266-1
Rubber Joints are excluded from the Pressure Equipment Directive 2014/68/EU (PED), according to its article 1.2(O)
WRAS Approval for DN20-DN80

SERIES S10/S15/S20

Main Duties / Limits of use

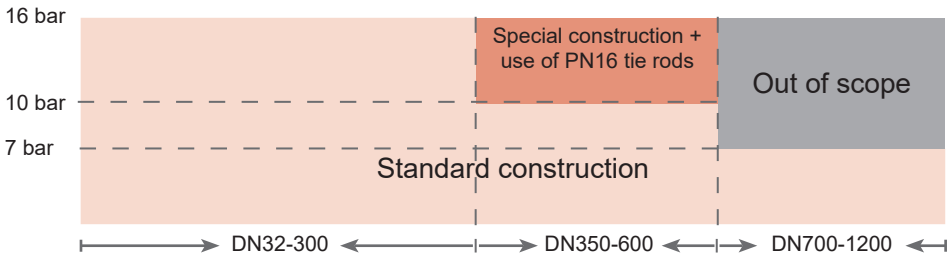
Liquids and gases compatible with materials of construction.
Questions referring to chemical resistance, please consult us



-With PTFE sleeve, maximum working pressure = 7 bar.
-Check also medium-rubber compatibility / resistance / limits of use
-Rubber joints are flexible components. Performance and limits of use greatly depend on proper installation arrangement, combination of absorbed movements, cycling of pressure or temperature, etc. Please refer also to our IOM manual.

JOINT	BURST PRESSURE
S10/S15/S20 DN32-200 (1.1/4"-8")	60 bar
S10/S15/S20 DN200-600 (10"-24")	40 bar

Maximum working pressure for S10/15/20



- With PTFE sleeve maximum working pressure = 7 bar

- For PN16 construction it is particularly important to ensure that pipeline and counterflange are 90º and perpendicular to each other

Vacuum application

- Rubber Joints are resistant to negative pressures to a certain extent. They can become wrinkled depending on vacuum suction degree; herewith the guidelines for vacuum applications:

JOINT	VACUUM LIMIT
S10 up to DN100 S10 DN125-600	-0,85 bar-g (0,15 bar-abs) * -0,50 bar-g (0,50 bar-abs) *
S15 up to DN300	-0,90 bar-g (0,10 bar-abs)*
S20 up to DN600	-0,80 bar-g (0,20 bar-abs) **

* For full vacuum, use embedded special vacuum ring version

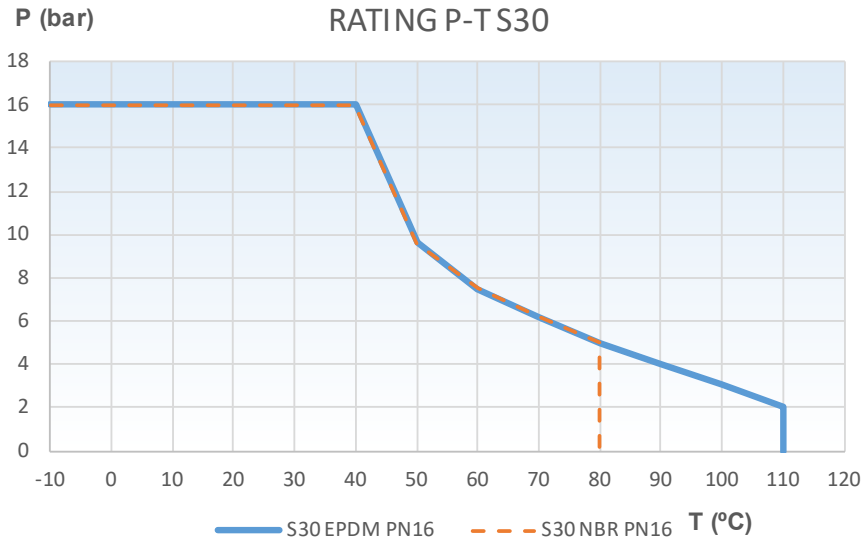
** -0,85 bar-g (0,15 bar-abs) with not embedded vacuum ring

PTFE joint is not suitable for vacuum service

SERIES S30

Main Duties / Limits of use

Liquids and gases compatible with materials of construction.
Questions referring to chemical resistance, please consult us



JOINT	BURST PRESSURE
S30 DN15-80 (1/2''-3'')	30 bar

Vacuum application

- Rubber Joints are resistant to negative pressures to a certain extent. They can become wrinkled depending on vacuum suction degree; herewith the guidelines for vacuum applications:

JOINT	VACUUM LIMIT
S30 up to DN80	-0,60 bar-g (0,4 bar-abs)

Main Duties / Limits of use

Temperature and Chemical Resistance of Bellows

NBR Butadiene Acrylonitrile (-20ºC) -10ºC ... 80ºC (90ºC)
Lubricating oil, cutting oils, fuel oils, animal and vegetable oils, aviation kerosen, LPG, oily air, natural gas.
Generally resistant to oils and solvents. Not suitable for steam or hot water. Limited resistance to ozone and wheather.

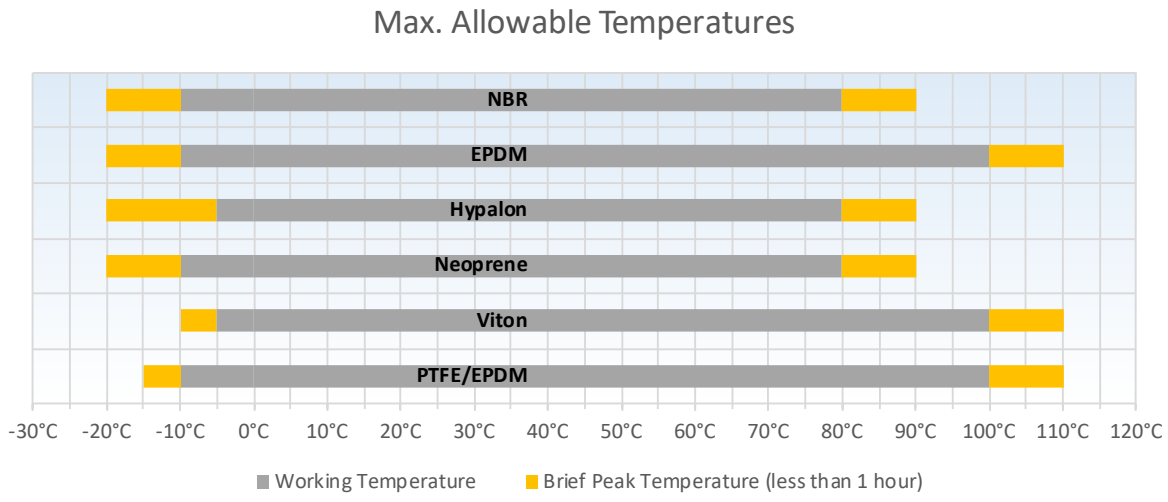
EPDM Ethylene Propylene Diene (-20ºC) -10ºC ... 100ºC (110ºC)
Salts in water, diluted acids, alkaline solutions, ester, ketones, alcohols, glycols, hot water, intermittent steam, sterilisation.
Good resistance to ozone and wheather.
It is attacked by hydrocarbon solutions, chlorinated hydrocarbons and other petroleum based oils.

Hypalon (CSM) Chlorosulfonated polyethylene (-20ºC) -5ºC ... 80ºC (90ºC)
Good chlorine and weather resistance. Resistant to diluted acids and bases. Low resistance to oil and fats.

Neoprene (CR) Chloroprene rubber (-20ºC) -10ºC ... 80ºC (90ºC)
Good behaviour with water and many oils, and generally with many inorganic and organic products. Nearly tight with hydrocarbon gases. Good resistance to weather.

Viton (FPM) Vinylidenefluoride-hexafluoro-propyleneco-polymer (-10ºC) -5ºC ... 100ºC (110ºC)
Strong and weak mineral acids, aliphatic hydrocarbons, chlorine gas, oils, aliphatic acids, phosporic acids, ozone, certain aromatic solvents. Not suitable for hot water, steam and dry heat. Not suitable for ketones and chlorine.

PTFE/EPDM Virgin PTFE + EPDM (-15ºC) -10ºC ... 100ºC (110ºC)
Excellent resistance to chemicals or biopharmaceuticals, strong acids and solvents, alkalies and salts in water.
Excellent resistance to weather.



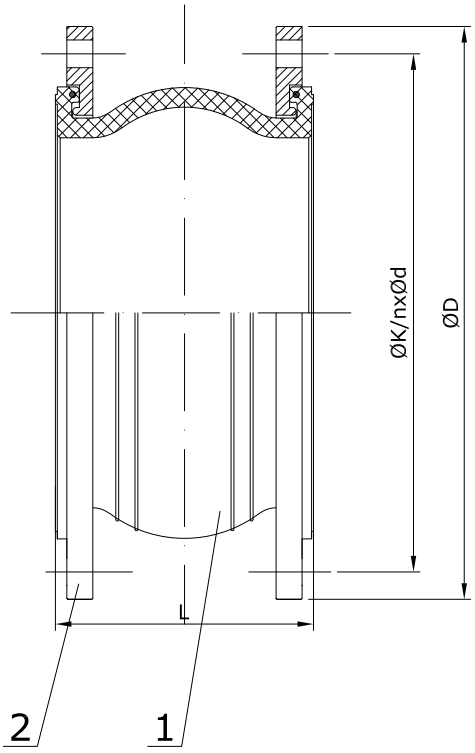
Temperature ranges given just for reference.
Pressure-temperature rating, material compatibility and other parameters also to be considered for rubber selection.
Rubber joints are flexible components. Performance and limits of use greatly depend on proper installation arrangement, combination of absorbed movements, cycling of pressure or temperature, etc. Please refer also to our IOM manual.
Please consult our Technical Department for a particular application.

Options

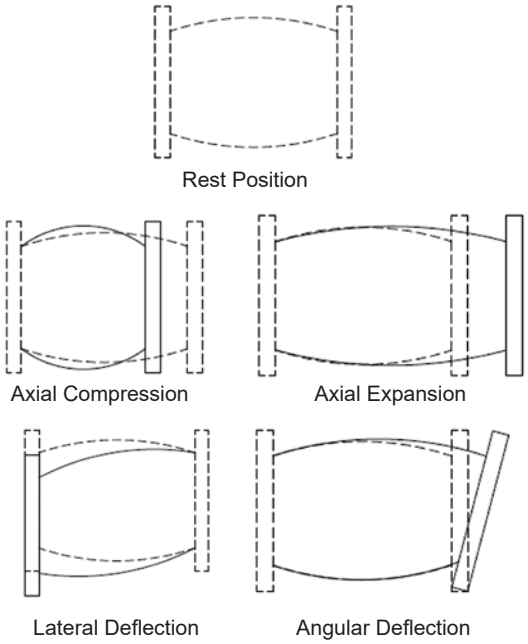
Other designs and approvals, please consult us

SERIES S10 DN32-600

Main Parts and Materials



Permissible Movements



Nº	PART	MATERIAL			
1	VULCANISED RUBBER BELLOW With nylon tire cord and hard steel wire reinforcement	S10E_	EPDM	S10C_	Neoprene
		S10N_	NBR	S10V_	Viton
		S10H_	Hypalon		
2	LOOSE FLANGES	Carbon steel zinc plated S235JR (EN 10025)			

Main Parameters S10 DN32-150

SIZE		NPS	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	5"	6"
		DN	32	40	50	65	80	100	125	150
L			95	95	105	115	130	135	170	180
Tolerance Installed (min-max)			89-97	89-97	99-107	107-118	122-133	122-138	156-173	167-183
MAX. MOVEMENTS*		AXIAL COMPRES.	8	8	8	12	12	18	18	18
		AXIAL EXPANS.	4	4	4	6	6	10	10	10
		LATERAL DEFL.	8	8	8	10	10	12	12	12
		ANGULAR DEFL.	15°	15°	15°	15°	15°	15°	15°	15°
FLANGES	PN10	ØD	140	150	165	185	200	220	250	285
		ØK	100	110	125	145	160	180	210	240
		nxØd	4x18	4x18	4x18	4x18	8x18	8x18	8x18	8x22
		Approx. Weight	3,5	4	5	6	8	9	11	13
	PN16	ØD	140	150	165	185	200	220	250	285
		ØK	100	110	125	145	160	180	210	240
		nxØd	4x18	4x18	4x18	4x18	8x18	8x18	8x18	8x22
		Approx. Weight	3,5	4	5	6	8	9	11	13
	ANSI150	ØD	118	127	153	178	191	229	254	279
		ØK	89	98	121	140	152	191	216	241
		nxØd	4x16	4x16	4x19	4x19	4x19	8x19	8x22	8x22
		Approx. Weight	3,5	4	5	6	8	9	11	13

Dimensions in mm subject to manufacturing tolerance / Weights in kg

* The maximum movements allowed are considered from rest position.
The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination. Given tolerance installed and movements allowed are valid for rubber bellows.
Increasing temperatures reduce the permissible movements capacity and number of cycles.

Information / restriction of technical rules need to be observed!
Installation, Operating and Maintenance Manual can be downloaded at www.comeval.es

The engineer, designing a system or a plant, is responsable for the selection of the correct valve
Product suitability must be verified, contact manufacturer for information

SERIES S10 DN200-600

Main Parameters S10 DN200-600

SIZE	NPS	8”	10”	12”	14”	16”	18”	20”	24”
	DN	200	250	300	350	400	450	500	600
L		205	240	260	265	265	265	265	265
Tolerance Installed (min-max)		191-208	224-243	242-263	246-268	246-268	246-268	246-268	246-268
MAX. MOVEMENTS*	AXIAL COMPRES.	20	22	24	25	25	25	25	25
	AXIAL EXPANS.	14	14	14	16	16	16	16	16
	LATERAL DEFL.	18	18	18	22	22	22	22	22
	ANGULAR DEFL.	15°	15°	15°	15°	15°	15°	15°	15°
FLANGES PN10	ØD	340	395	445	505	565	615	670	780
	ØK	295	350	400	460	515	565	620	725
	nxØd	8x22	12x22	12x22	16x22	16x22	20x26	20x26	20x30
	Approx. Weight	19	24	29	39	48	56	69	71
FLANGES PN16	ØD	340	405	460	520	580	640	715	840
	ØK	295	355	410	470	525	585	650	770
	nxØd	12x22	12x26	12x26	16x26	16x30	20x30	20x33	20x36
	Approx. Weight	19	27	33	48	62	73	111	138
FLANGES ANSI150	ØD	343	406	483	533	597	635	699	813
	ØK	298	362	432	476	540	578	635	479
	nxØd	8x22	12x25	12x25	12x29	16x29	16x32	20x32	20x32
	Approx. Weight	19	27	33	48	62	73	111	138

Dimensions in mm subject to manufacturing tolerance / Weights in kg

SERIES S10 DN700-1200

Main Parts and Materials

Nº	PART	MATERIAL	
1	VULCANISED RUBBER BELLOW With nylon tire cord and hard steel wire reinforcement	S10E_	EPDM
		S10N_	NBR
2	LOOSE FLANGES	Carbon steel zinc plated S235JR (EN 10025)	

Main Parameters

SIZE	NPS	28”	32”	36”	40”	48”
	DN	700	800	900	1000	1200
L		265	265	265	265	265
Tolerance Installed (min-max)		246-268	246-268	246-268	246-268	246-268
MAX. MOVEMENTS*	AXIAL COMPRES.	25	25	25	25	25
	AXIAL EXPANS.	14	14	14	14	14
	LATERAL DEFL.	22	22	22	22	22
	ANGULAR DEFL.	8°	4°	4°	2°	2°
FLANGES PN10	ØD	895	1015	1115	1230	1455
	ØK	840	950	1050	1160	380
	nxØd	30x30	24x33	28x33	28x36	32x39
FLANGES PN16	ØD	910	1025	115	1230	1485
	ØK	840	950	1050	1170	1390
	nxØd	24x36	24x39	28x39	28x42	32x48

Dimensions in mm subject to manufacturing tolerance / Weights in kg

* The maximum movements allowed are considered from rest position.
The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination. Given tolerance installed and movements allowed are valid for rubber bellows.
Increasing temperatures reduce the permissible movements capacity and number of cycles.

Information / restriction of technical rules need to be observed!
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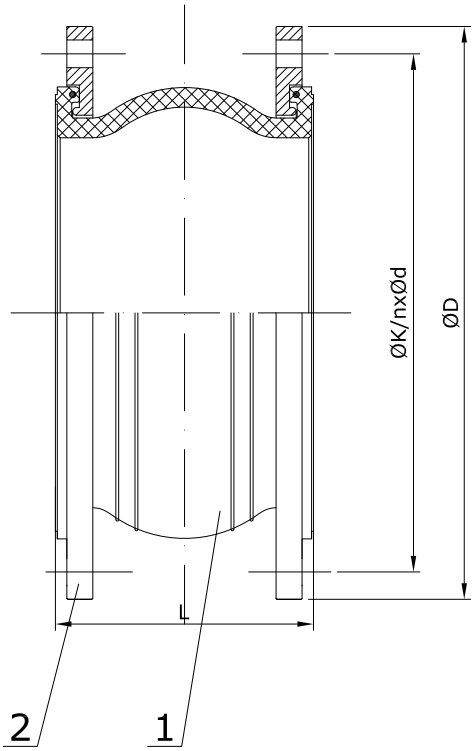
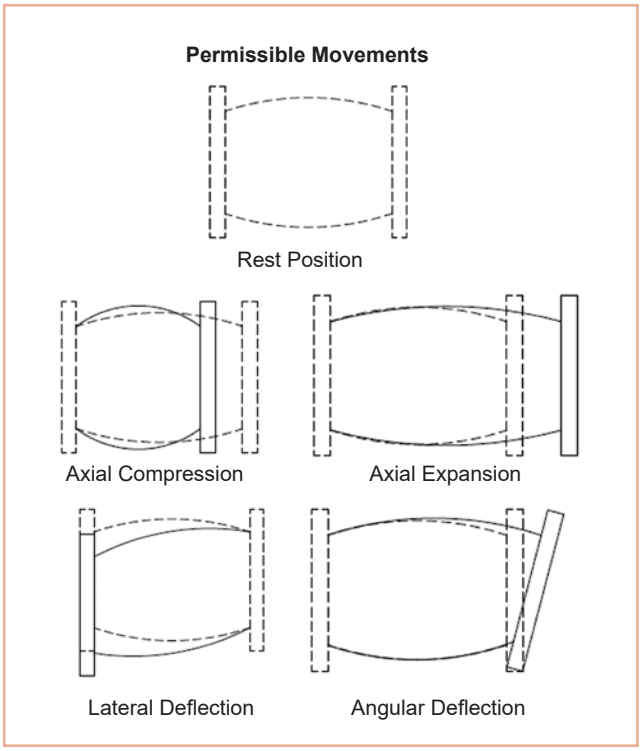
The engineer, designing a system or a plant, is responsable for the selection of the correct valve
Product suitability must be verified, contact manufacturer for information

SERIES S10T DN25-500

Main Parts and Materials





Nº	PART	MATERIAL	
1	VULCANISED RUBBER BELLOW With nylon tire cord and hard steel wire reinforcement	S10T_	EPDM + PTFE inner sleeve
2	LOOSE FLANGES	Carbon steel zinc plated S235JR (EN 10025)	

Main Parameters

SIZE		NPS	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	5"
		DN	25	32	40	50	65	80	100	125
L			102	102	102	112	122	137	142	177
Tolerance Installed (min-max)			99-103	99-103	99-103	109-113	118-123	133-138	136-144	170-179
MAX. MOVEMENTS*		AXIAL COMPRES.	4	4	4	6	6	9	9	9
		AXIAL EXPANS.	2	2	3	3	5	5	5	5
		LATERAL DEFL.	4	4	4	5	5	6	6	6
		ANGULAR DEFL.	7°	7°	7°	7°	7°	7°	7°	7°
FLANGES	PN10	ØD	115	140	150	165	185	200	220	250
		ØK	85	100	110	125	145	160	180	210
		nxØd	4x14	4x18	4x18	4x18	4x18	8x18	8x18	8x18
		Approx. Weight	3,5	4	4,5	5,5	6,5	8,5	9,5	12
	PN16	ØD	115	140	150	165	185	200	220	250
		ØK	85	100	110	125	145	160	180	210
		nxØd	4x14	4x18	4x18	4x18	8x18	8x18	8x18	8x18
		Approx. Weight	3,5	4	4,5	5,5	6,5	8,5	9,5	12

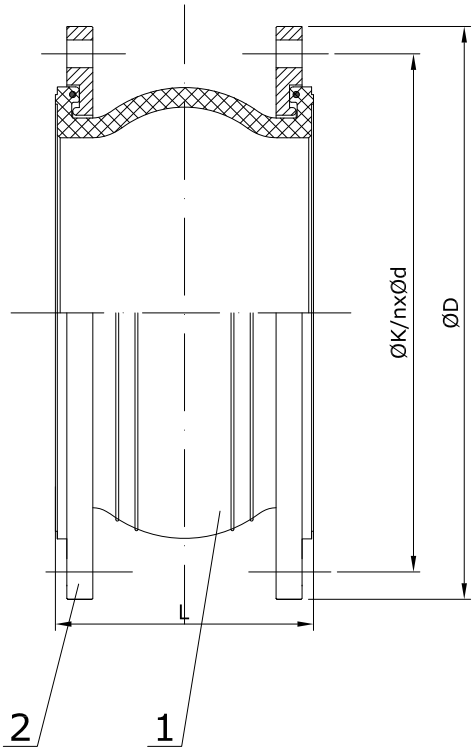
Dimensions in mm subject to manufacturing tolerance / Weights in kg

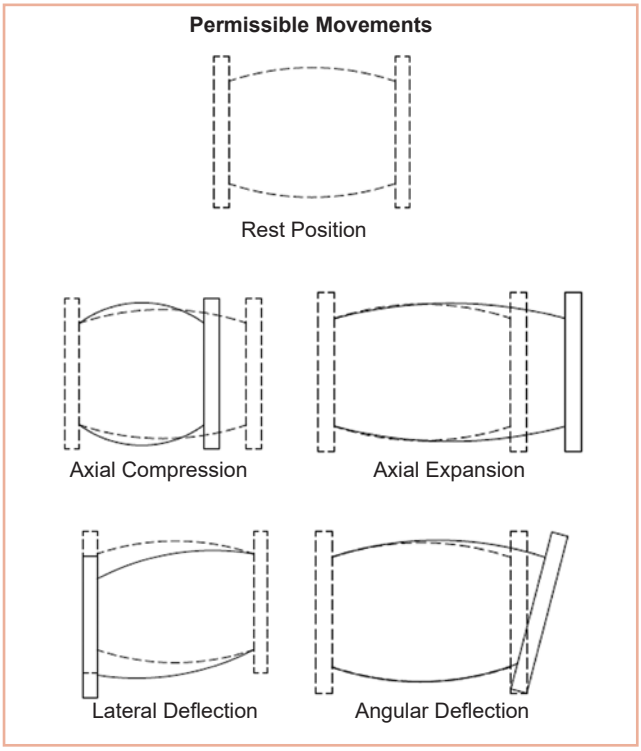
* The maximum movements allowed are considered from rest position.
The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination.
Increasing temperatures reduce the permissible movements capacity and number of cycles.

Information / restriction of technical rules need to be observed!
Installation, Operating and Maintenance Manual can be downloaded at www.comeval.es

The engineer, designing a system or a plant, is responsable for the selection of the correct valve
Product suitability must be verified, contact manufacturer for information

SERIES S10T DN25-500





Main Parameters

SIZE		NPS	6"	8"	10"	12"	14"	16"	18"	20"
		DN	150	200	250	300	350	400	450	500
L			187	212	247	267	272	272	272	272
Tolerance Installed (min-max)			181-189	203-215	238-250	258-270	264-276	264-276	264-276	264-276
MAX. MOVEMENTS*		AXIAL COMPRES.	12	12	12	12	12	12	12	12
		AXIAL EXPANS.	7	7	7	7	7	7	7	7
		LATERAL DEFL.	11	11	11	11	11	11	11	11
		ANGULAR DEFL.	7°	7°	7°	7°	7°	7°	7°	7°
FLANGES	PN10	ØD	285	340	395	445	505	565	615	670
		ØK	240	295	350	400	460	515	565	620
		nxØd	8x22	8x22	12x22	12x22	16x22	16x26	20x26	20x26
		Approx. Weight	14	20	25	30	41	50	58	71
	PN16	ØD	285	340	405	560	520	580	640	715
		ØK	240	295	355	410	470	525	585	650
		nxØd	8x22	12x22	12x26	12x26	16x26	16x30	20x30	20x33
		Approx. Weight	14	20	25	30	41	50	58	71

Dimensions in mm subject to manufacturing tolerance / Weights in kg

* The maximum movements allowed are considered from rest position.
The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination.
Increasing temperatures reduce the permissible movements capacity and number of cycles.

Information / restriction of technical rules need to be observed!
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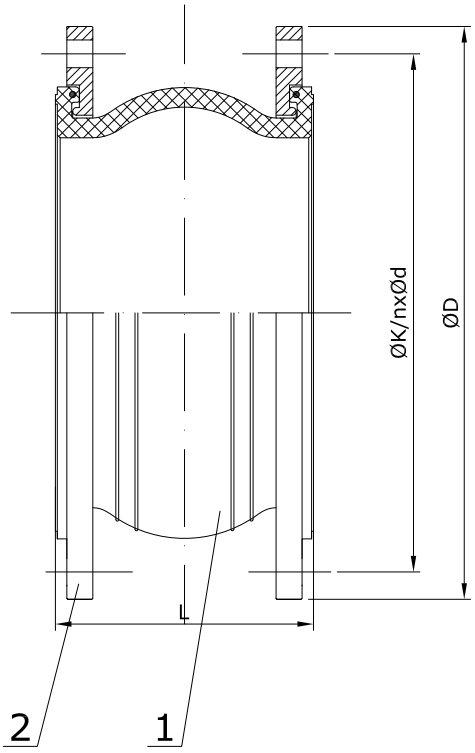
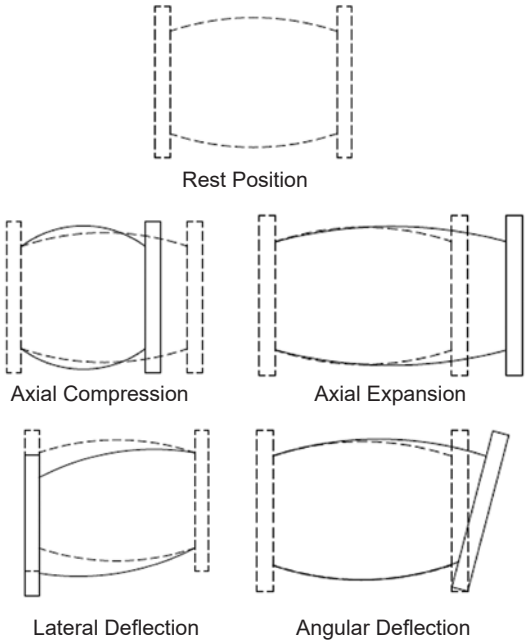
The engineer, designing a system or a plant, is responsable for the selection of the correct valve
Product suitability must be verified, contact manufacturer for information

SERIES S15

Main Parts and Materials



Permissible Movements



Nº	PART	MATERIAL			
1	VULCANISED RUBBER BELLOW With nylon tire cord and hard steel wire reinforcement	S15E_	EPDM	S15C_	Neoprene
		S15N_	NBR	S15V_	Viton
		S15H_	Hypalon		
2	LOOSE FLANGES	Carbon steel zinc plated S235JR (EN 10025)			

Main Parameters

SIZE		NPS	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
		DN	25	32	40	50	65	80
L			130	130	130	130	130	130
Tolerance Installed (min-max)			124-132	124-132	124-132	124-132	124-132	124-132
MAX. MOVEMENTS*		AXIAL COMPRES.	12	12	12	12	12	12
		AXIAL EXPANS.	10	10	10	10	10	10
		LATERAL DEFL.	12	12	12	12	12	12
		ANGULAR DEFL.	15	15	15	15	15	15
FLANGES	PN10	ØD	115	140	150	165	185	200
		ØK	85	100	110	125	145	160
		nxØd	4x14	4x18	4x18	4x18	4x18	8x18
		Approx. Weight	4	4	4,5	5,5	7	8
	PN16	ØD	115	140	150	165	185	200
		ØK	85	100	110	125	145	160
		nxØd	4x14	4x18	4x18	4x18	4x18	8x18
		Approx. Weight	4	4	4,5	5,5	7	8
	ANSI150	ØD	108	118	127	153	178	191
		ØK	79	89	98	121	140	152
		nxØd	4x16	4x16	4x16	4x19	4x19	4x19
		Approx. Weight	4	4	4,5	5,5	7	8

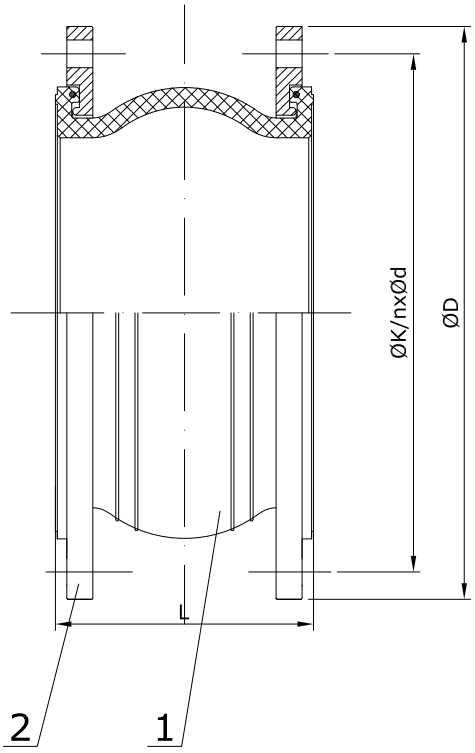
Dimensions in mm subject to manufacturing tolerance / Weights in kg

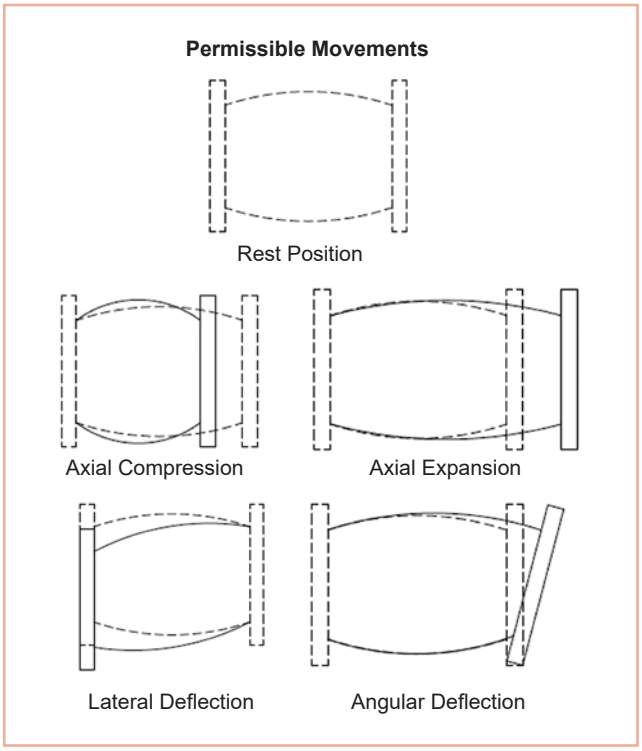
* The maximum movements allowed are considered from rest position.
The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination. Given tolerance installed and movements allowed are valid for rubber bellows.
Increasing temperatures reduce the permissible movements capacity and number of cycles.

Information / restriction of technical rules need to be observed!
Installation, Operating and Maintenance Manual can be downloaded at www.comeval.es

The engineer, designing a system or a plant, is responsable for the selection of the correct valve
Product suitability must be verified, contact manufacturer for information

SERIES S15





Main Parameters

SIZE	NPS	4”	5”	6”	8”	10”	12”
	DN	100	125	150	200	250	300
L		130	130	130	130	130	130
Tolerance Installed (min-max)		124-132	124-132	124-132	124-132	124-132	124-132
MAX. MOVEMENTS*	AXIAL COMPRES.	12	12	12	12	12	12
	AXIAL EXPANS.	10	10	10	10	10	10
	LATERAL DEFL.	12	12	12	12	12	12
	ANGULAR DEFL.	15	15	15	15	15	15
FLANGES PN10	ØD	220	250	285	340	395	445
	ØK	180	210	240	295	350	400
	nxØd	8x18	8x18	8x22	8x22	12x22	12x22
	Approx. Weight	9	11	13	19	24	29
FLANGES PN16	ØD	220	250	285	340	405	460
	ØK	180	210	240	295	355	410
	nxØd	8x18	8x18	8x22	12x22	12x26	12x26
	Approx. Weight	9	11	13	19	27	33
FLANGES ANSI150	ØD	229	254	279	343	406	483
	ØK	191	216	241	298	362	432
	nxØd	8x19	8x22	8x22	8x22	12x25	12x25
	Approx. Weight	9	11	13	19	27	33

Dimensions in mm subject to manufacturing tolerance / Weights in kg

* The maximum movements allowed are considered from rest position.
The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination. Given tolerance installed and movements allowed are valid for rubber bellows.
Increasing temperatures reduce the permissible movements capacity and number of cycles.

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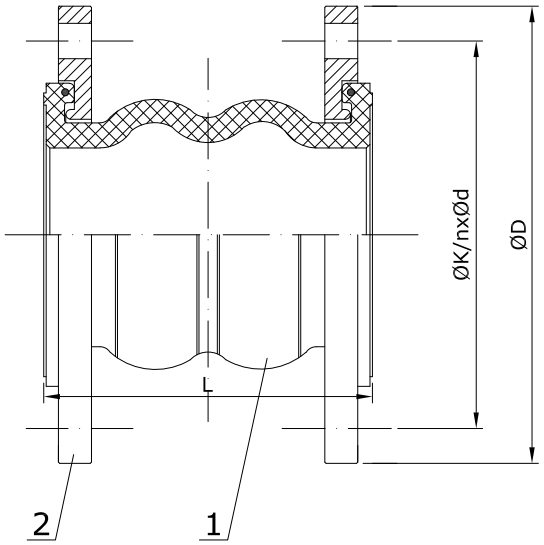
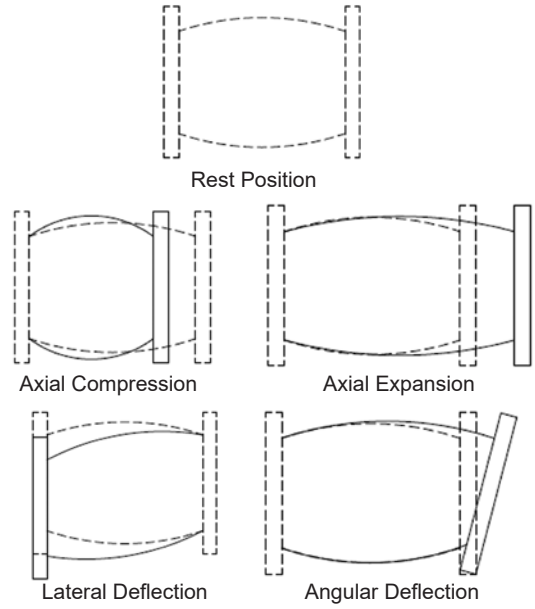
The engineer, designing a system or a plant, is responsable for the selection of the correct valve
Product suitability must be verified, contact manufacturer for information

SERIES S20

Main Parts and Materials



Permissible Movements



Nº	PART	MATERIAL			
1	VULCANISED RUBBER BELLOW With nylon tire cord and hard steel wire reinforcement	S20E_	EPDM	S20C_	Neoprene
		S20N_	NBR	S20V_	Viton
		S20H_	Hypalon		
2	LOOSE FLANGES	Carbon steel zinc plated S235JR (EN 10025)			

Main Parameters

SIZE	NPS	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	5"	6"
	DN	32	40	50	65	80	100	125	150
L		175	175	175	175	175	225	225	225
Tolerance Installed (min-max)		169-177	169-178	169-179	169-180	169-181	219-227	219-227	219-227
MAX. MOVEMENTS*	AXIAL COMPRES.	25	25	25	25	25	30	30	30
	AXIAL EXPANS.	15	15	15	15	15	20	20	20
	LATERAL DEFL.	20	20	20	20	20	25	25	25
	ANGULAR DEFL.	30	30	30	30	30	30	30	30
FLANGES PN10	ØD	140	150	165	185	200	220	250	285
	ØK	100	110	125	145	160	180	210	240
	nxØd	4x18	4x18	4x18	4x18	8x18	8x18	8x18	8x22
	Approx. Weight	3,5	4	5,5	6	8	9	12	14
FLANGES PN16	ØD	140	150	165	185	200	220	250	285
	ØK	100	110	125	145	160	180	210	240
	nxØd	4x18	4x18	4x18	4x18	8x18	8x18	8x18	8x22
	Approx. Weight	3,5	4	5,5	6	8	9	12	14
FLANGES ANSI150	ØD	118	127	153	178	191	229	254	279
	ØK	89	98	121	140	152	191	216	241
	nxØd	4x16	4x16	4x19	4x19	4x19	8x19	8x22	8x22
	Approx. Weight	3,5	4	5,5	6	8	9	12	14

Dimensions in mm subject to manufacturing tolerance / Weights in kg

* The maximum movements allowed are considered from rest position.
The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination. Given tolerance installed and movements allowed are valid for rubber bellows.
Increasing temperatures reduce the permissible movements capacity and number of cycles.

Information / restriction of technical rules need to be observed!
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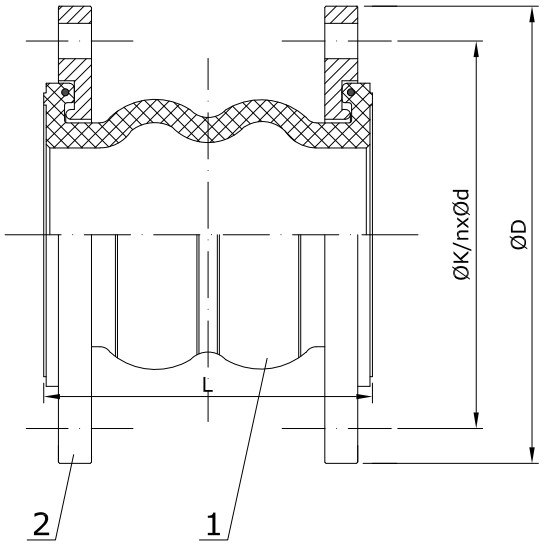
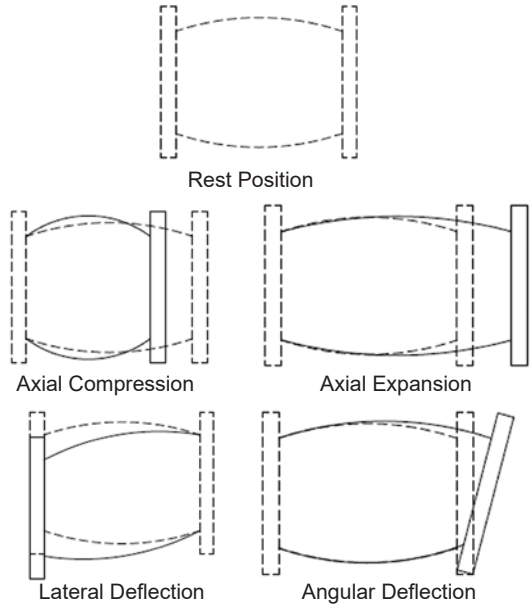
The engineer, designing a system or a plant, is responsable for the selection of the correct valve
Product suitability must be verified, contact manufacturer for information

SERIES S20





Main Parameters

SIZE		NPS	8”	10”	12”	14”	16”	18”	20”	24”
		DN	200	250	300	350	400	450	500	600
L			325	325	325	350	350	350	350	350
Tolerance Installed (min-max)			319-327	319-328	319-329	345-352	345-353	345-354	345-355	345-356
MAX. MOVEMENTS*		AXIAL COMPRES.	40	40	40	40	40	40	40	40
		AXIAL EXPANS.	25	25	25	25	25	25	25	25
		LATERAL DEFL.	30	30	30	30	30	30	30	30
		ANGULAR DEFL.	30	30	30	30	30	30	30	30
FLANGES	PN10	ØD	340	395	445	505	565	615	670	780
		ØK	295	350	400	460	515	565	620	725
		nxØd	8x22	12x22	12x22	16x22	16x22	20x26	20x26	20x30
		Approx. Weight	20	26	32	42	54	62	77	82
	PN16	ØD	340	405	460	520	580	640	715	840
		ØK	295	355	410	470	525	585	650	770
		nxØd	12x22	12x26	12x26	16x26	16x30	20x30	20x33	20x36
		Approx. Weight	21	29	35	50	67	77	119	147
	ANSI150	ØD	343	406	483	533	597	635	699	813
		ØK	298	362	432	476	540	578	635	479
		nxØd	8x22	12x25	12x25	12x29	16x29	16x32	20x32	20x32
		Approx. Weight	21	29	35	50	67	77	119	147

Dimensions in mm subject to manufacturing tolerance / Weights in kg

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Increasing temperatures reduce the permissible movements capacity and number of cycles.

Information / restriction of technical rules need to be observed!
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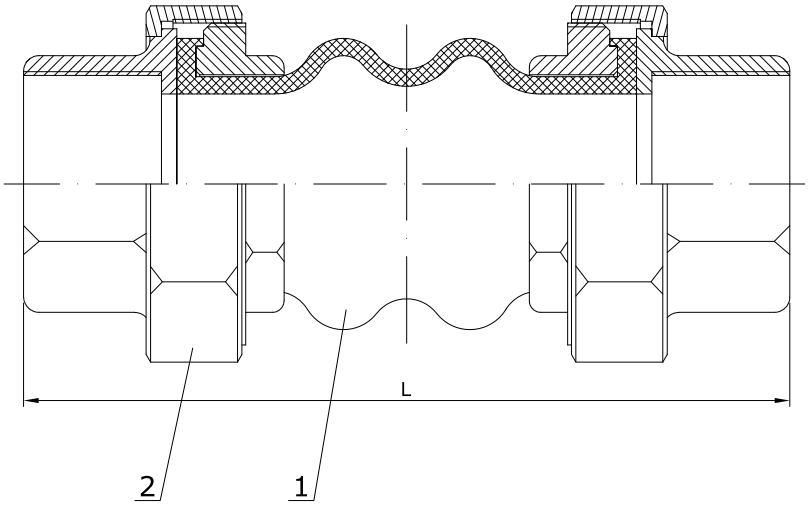
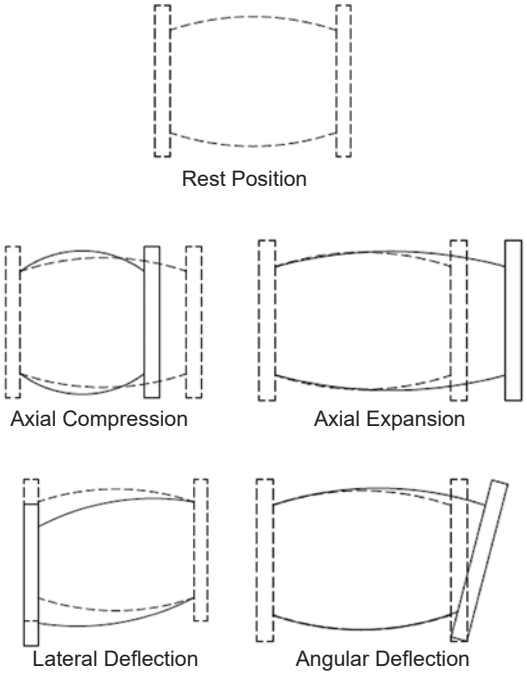
The engineer, designing a system or a plant, is responsable for the selection of the correct valve
Product suitability must be verified, contact manufacturer for information

SERIES S30

Main Parts and Materials



Permissible Movements



Nº	PART	MATERIAL	
1	VULCANISED RUBBER BELLOW With nylon tire cord and hard steel wire reinforcement	S30E_	EPDM
		S30N_	NBR (inner layer) / EPDM (outer layer)
		S30H_	Hypalon
		S30C_	Neoprene
		S30V_	Viton
2	UNIONS WITH THREADED ENDS	Malleable iron zinc plated EN-GJMB-350-10 (EN 1562)	

Main Parameters

SIZE	NPS	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
	DN	20	25	32	40	50	65	80
L		200	200	200	200	200	240	240
Tolerance Installed (min-max)		194-203	194-203	194-203	194-203	194-203	234-243	234-243
MAX. MOVEMENTS*	AXIAL COMPRES.	22	22	22	22	22	22	22
	AXIAL EXPANS.	6	6	6	6	6	6	6
	LATERAL DEFL.	22	22	22	22	22	22	22
	ANGULAR DEFL.	45°	45°	45°	45°	45°	45°	45°
Approx. Weight		1	1,5	1,5	2	3	4	5,5

Dimensions in mm subject to manufacturing tolerance / Weights in kg

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The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination. Given tolerance installed and movements allowed are valid for rubber bellows.
Increasing temperatures reduce the permissible movements capacity and number of cycles.

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The engineer, designing a system or a plant, is responsable for the selection of the correct valve
Product suitability must be verified, contact manufacturer for information

SERIES S10/S15/S20/S30

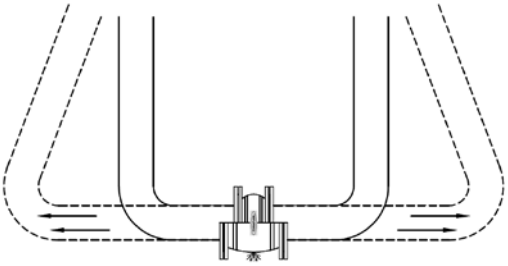
Reaction Forces

Rubber Joints are flexible components which break the pipe system rigidity. A Rubber Joint acts as a piston by the forces arising from the internal pressure of the pipe. To prevent the pipes from damage they have to be properly anchored in order to absorb these reaction forces (Fr).

The reaction force caused by internal pressure in a Rubber Joint is calculated by the following formula:

$$Fr\ (N) = P\ (kg/cm^2) \times A\ (cm^2) \times 10$$

Fr =Reaction Force
P = Pressure (Maximum Working Pressure and Testing Pressure must be considered)
A = Effective cross sectional area



Joint under pressure acts as a piston.
Results shown when working without anchoring.

Effective Area Values

In rest position

SIZE	TYPE		
	S10/S15	S20	S30
DN	Effective Area (cm^2)		
20	-	-	7
25	-	-	13
32	21	21	17
40	21	21	25
50	42	42	35
65	59	59	49
80	77	85	71
100	129	129	-
125	193	193	-
150	277	277	-
200	437	437	-
250	692	692	-
300	934	934	-
350	1086	1110	-
400	1445	1492	-
450	1847	1839	-
500	2306	2222	-
600	3286	3337	-

After compressed

SIZE	TYPE		
	S10/S15	S20	S30
DN	Effective Area (cm^2)		
20	-	-	20
25	-	-	31
32	28	82	37
40	28	82	48
50	52	119	62
65	77	147	80
80	97	186	107
100	167	269	-
125	240	360	-
150	333	471	-
200	535	702	-
250	814	1017	-
300	1075	1307	-
350	1237	1358	-
400	1618	1779	-
450	2042	2155	-
500	2524	2568	-
600	3545	3759	-

Other Reaction Forces:

- Reaction forces caused by the innate joint resistance to move, calculated through the joint stiffness, normally given in N/mm (linear) and Nm (torsion).

- Reaction forces caused by the friction of the guides.

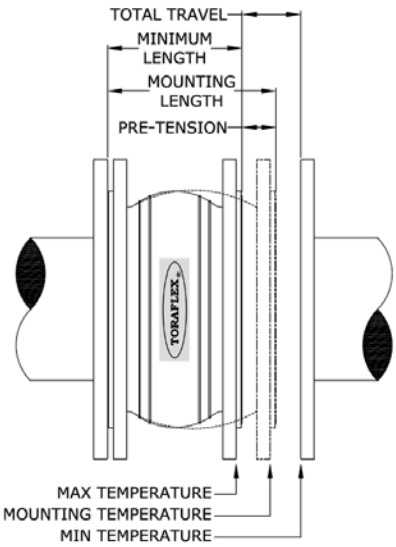
- Apart from reaction forces caused by the joint installation itself, pipe system weight and centrifugal forces on bends caused by velocity of the fluid must also be considered for anchoring.

Engineering & Performance Data for Toraflex Rubber Joints

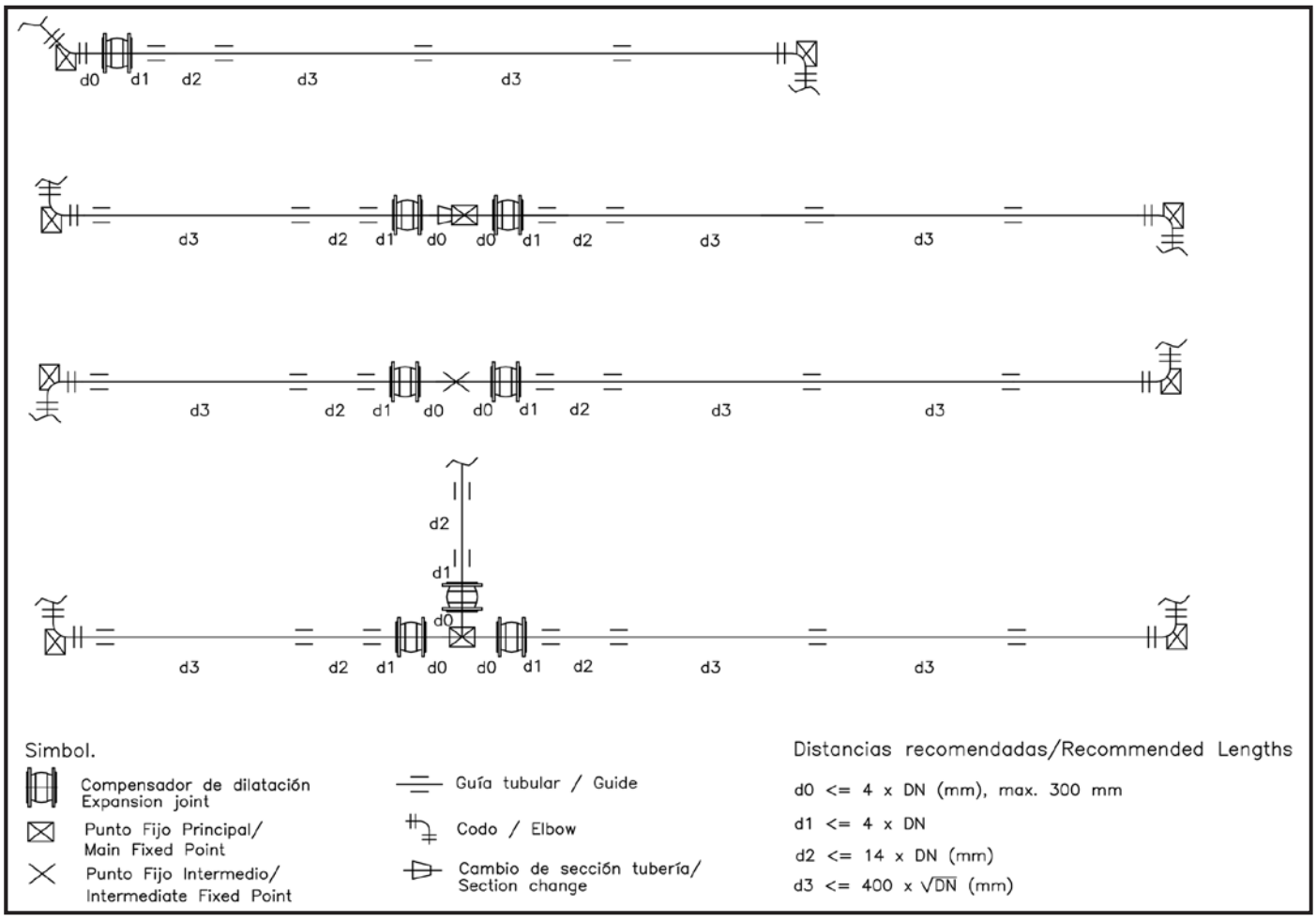
Installation Length

Establishing the building installation length.

The Joint may be installed in its rest position or slightly compressed to favor the absorption of movement under pipe contraction. Building length limits for each Joint type is shown in this Data Sheet.



Herewith some examples and recommendations for location of Rubber Joints working as Expansion Joints with proper anchoring and guiding.



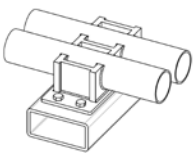
Anchoring and guiding for Joints working as Expansion Joints

Engineering & Performance Data for Toraflex Rubber Joints

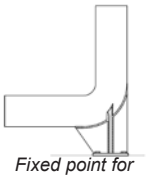
Anchoring, Fix Points and Guiding

ANCHORING. FIX POINTS

We call Fix Points to the anchors that absorb reaction forces.
Every Rubber Joint has to be installed between two Fix Points within a straight pipe section.
Intermediate Fix Points are the ones just absorbing forces caused by Joint stiffness and friction of guides, whereas Main Fix Points also absorb the forces caused by internal pressure, centrifugal forces and weights not supported by Guides.
Main Fix Points are normally located in pump groups, valves, bends, crosses, line ending or flow change sections of the pipe work.



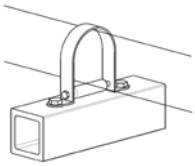
Fixed point welded for pipes in parallel



Fixed point for elbow

GUIDING

Guides not only support the pipe system weight, but also maintain correct alignment so that the Joints work adequately. It is important to notice that Guides supporting the pipe system are not Fixed Points. The Guides should be positioned according to certain rules given further on and they prevent buckling of the line. Special Guides can be used to allow movement in more than one direction.



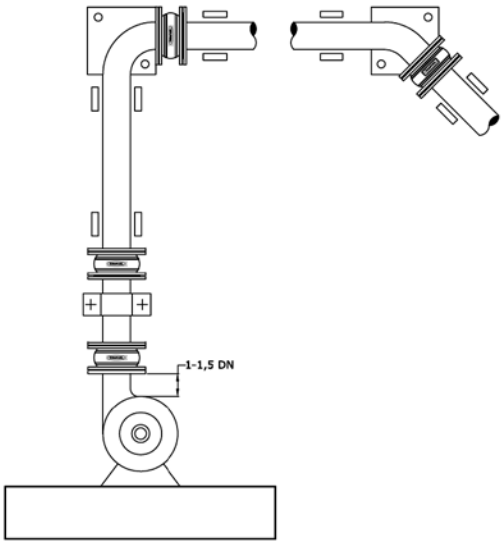
Guide with roller stand

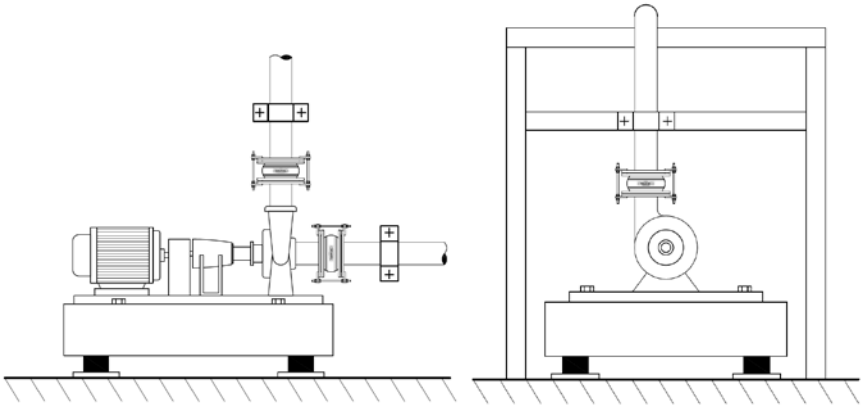
LIMIT RODS

The main purpose of Limit Rods is to absorb the force caused by internal pressure, and avoid reaction force over Fix Points. Fix Points will be released but they are still necessary. A Joint with Limit Rods will work only with axial movements. They are normally used with high pressures and large DNs, that may require very strong anchoring. They also relieve pump frames.
Limit rods can control Joint bellow over-extension and/or over-compression.

Installation Guidelines for Rubber Joints absorbing vibration and noise

Rubber Joints are commonly installed in pump groups to absorb vibration and noise. The Rubber Joint be installed in its rest position. Do not overstretch it to fill a gap between counterflanges and Joint faces. Alternative measures should be taken in such a case (modify pipe arrangement, spacer, etc.).
The Rubber Joint must be installed near the pump group, leaving just 1-1,5 DN distance. Leave more distance in case of abrassive media.
The Pump group frame must be properly anchored to absorb the reaction forces and another Fix Point must be set immediately after the Rubber Joint to limit the vibrations amplitude onto the pipe.
Proper guiding of the pipe is also necessary to ensure the equipment works correctly.
Absorbing pipe expansion/compression must be carried out independently.
In case Main Fix Points could not be sized to absorb the reaction force caused by internal pressure, limit rods can be used to relieve them from such forces.





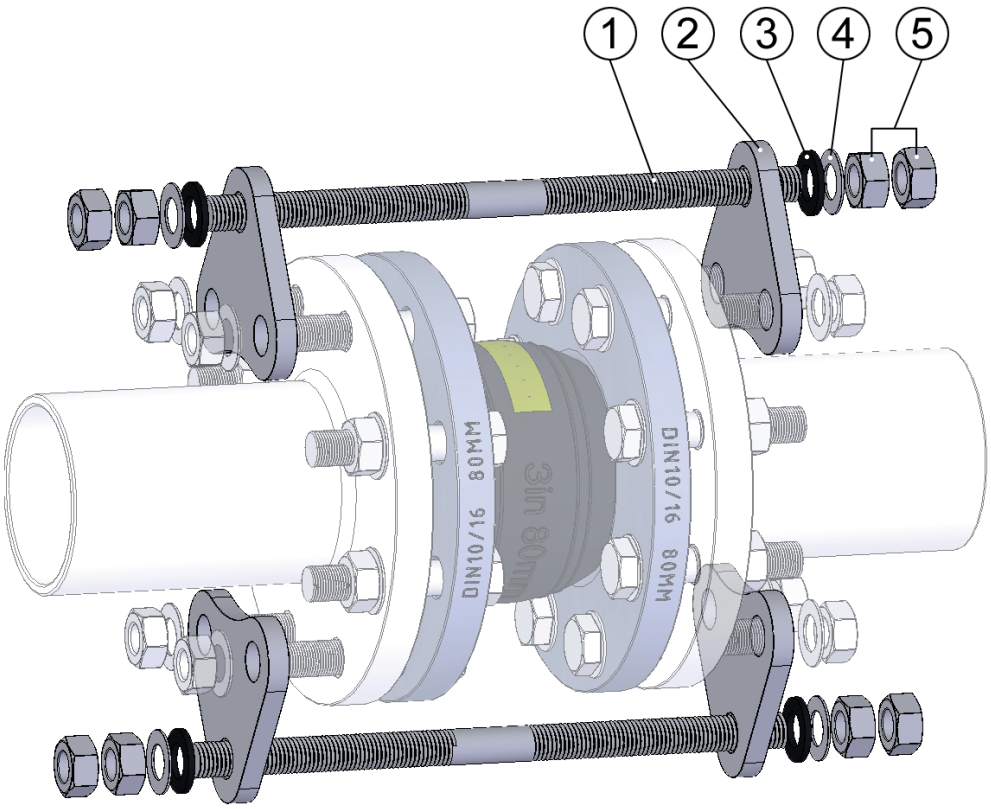
SERIES S10/S15/S20

Limit Rods - Guidelines to Application

The main purpose of Limit Rods is to absorb the force caused by internal pressure, and avoid reaction force over Fix Points. Fix Points will be released but they are still necessary. A Joint with limit rods will work only with axial movements. They are normally used with high pressures and large DNs, that may require very strong anchoring. They also relieve pump frames.

Limit rods can control Joint bellow over-extension and/or over-compression.

Limit rods can be used to avoid or correct mounting mistakes by over expansion.



Main Parts and Materials

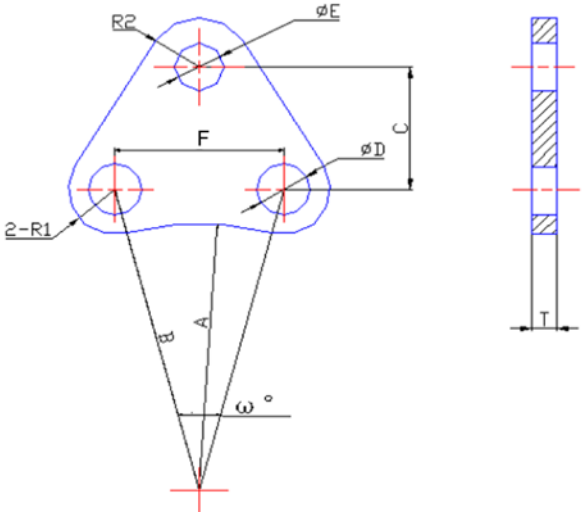
Limit Rods Parts:	1 Rod
	2 Plate
	3 Rubber gasket
	4 Washer
	5 Nut
Standard Material: Carbon steel zinc plated S235JR to EN 10025 (old St 37-2 to DIN 17100)	
Material Options: Stainless steel AISI 304, AISI 316, etc.	

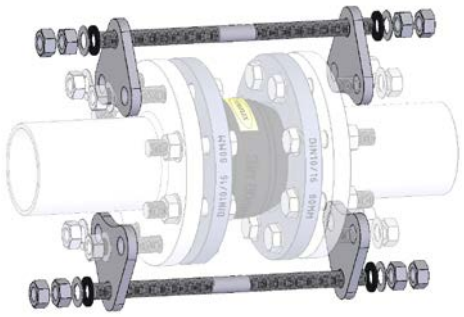
Each Rod Set is comprehensive of:
1 rod + 2 plates + 2 rubber gaskets + 2 washers + 4 nuts

SERIES S10

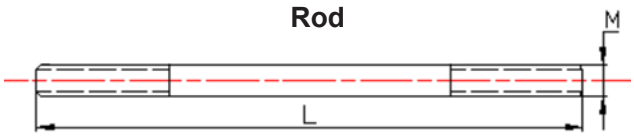
Limit Rods - Dimensions

Plate





Rod



Rod Sets - S10 for flanges PN10 (Maximum Working Pressure: 10 bar)

SIZE NPS	SIZE DN	M	L	A	B	W°	ØD	ØE	R1	R2	F	C	T	Number of Rod Sets per Joint
1-1/2”	40	16	240	37	55	90	18	18	18	20	78	60	10	2
2”	50	16	250	45	62,5	90	18	18	18	20	88	60	10	2
2-1/2”	65	16	260	53	72,5	90	18	18	20	20	103	65	10	2
3”	80	16	290	60	80	45	18	18	20	20	61	50	10	2
4”	100	16	290	70	90	45	18	18	20	20	69	50	10	2
5”	125	16	330	85	105	45	18	18	20	20	80	50	10	2
6”	150	16	350	98	120	45	23	18	22	20	92	55	12	2
8”	200	20	385	125	147,5	45	23	22	22	24	113	60	12	2
10”	250	20	435	153	175	30	23	22	22	24	91	55	18	3
12”	300	20	460	178	200	30	23	22	22	24	104	55	18	3
14”	350	20	480	208	230	22,5	23	22	22	24	90	55	20	4
16”	400	20	480	233	257,5	22,5	27	22	25	24	100	56	20	4
18”	450	20	485	258	282,5	18	27	22	25	24	88	55	20	4
20”	500	20	485	285	310	18	27	22	25	24	97	55	20	4
24”	600	24	500	333	362,5	18	30	26	30	28	113	60	22	4

Rod Sets - S10 for flanges PN16 (Maximum Working Pressure: 16 bar (DN40-300); 10 bar (DN350-600))

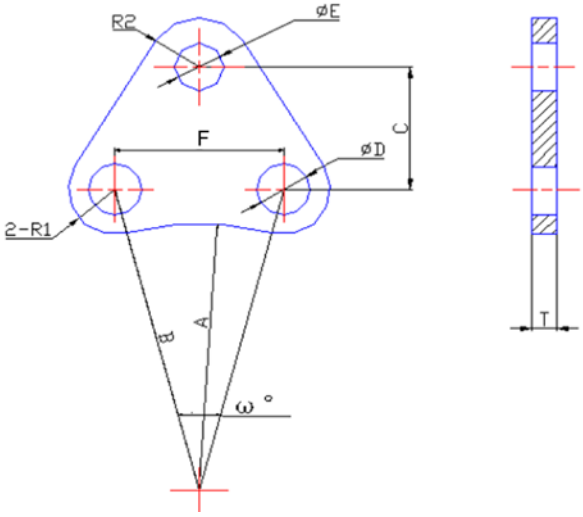
SIZE NPS	SIZE DN	M	L	A	B	W°	ØD	ØE	R1	R2	F	C	T	Number of Rod Sets per Joint
1-1/2”	40	16	240	37	55	90	18	18	18	20	78	60	10	2
2”	50	16	250	45	62,5	90	18	18	18	20	88	60	10	2
2-1/2”	65	16	260	55	72,5	90	18	18	18	20	103	65	10	2
3”	80	16	290	62	80	45	18	18	18	20	61	50	10	2
4”	100	16	290	72	90	45	18	18	18	20	69	50	10	2
5”	125	16	330	87	105	45	18	18	18	20	80	50	10	2
6”	150	16	350	98	120	45	23	18	22	20	92	55	12	2
8”	200	20	385	126	147,5	30	23	22	22	24	76	55	12	3
10”	250	20	435	153	177,5	30	27	22	25	24	92	60	18	3
12”	300	20	460	180	205	30	27	22	25	24	106	60	18	3
14”	350	20	480	210	235	22,5	27	22	25	24	92	60	20	4
16”	400	20	480	233	262,5	22,5	30	22	30	24	102	60	20	4
18”	450	20	485	263	292,5	18	30	22	30	24	92	60	20	4
20”	500	20	485	292	325	18	33	22	33	24	102	65	20	4
24”	600	24	500	349	385	18	36	26	37	28	120	70	22	4

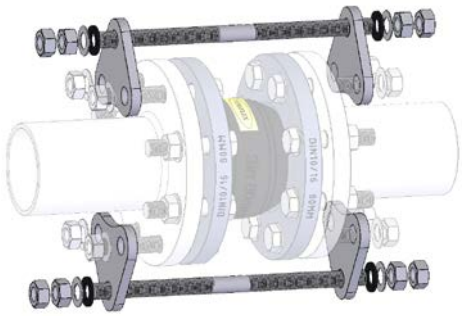
Dimensions in mm., subject to manufacturing tolerances
For higher maximum working pressures please consult us

SERIES S15

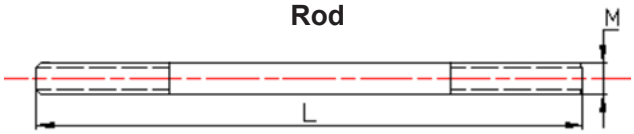
Limit Rods - Dimensions

Plate





Rod



Rod Sets - S15 for flanges PN10 (Maximum Working Pressure: 10 bar)

SIZE		M	L	A	B	W°	ØD	ØE	R1	R2	F	C	T	Number of Rod Sets per Joint
NPS	DN													
1-1/2”	40	16	280	37	55	90	18	18	18	20	78	60	10	2
2”	50	16	280	45	62,5	90	18	18	18	20	88	60	10	2
2-1/2”	65	16	280	53	72,5	90	18	18	20	20	103	65	10	2
3”	80	16	290	60	80	45	18	18	20	20	61	50	10	2
4”	100	16	290	70	90	45	18	18	20	20	69	50	10	2
5”	125	16	290	85	105	45	18	18	20	20	80	50	10	2
6”	150	16	300	98	120	45	23	18	22	20	92	55	12	2
8”	200	20	310	125	147,5	45	23	22	22	24	113	60	12	2
10”	250	20	330	153	175	30	23	22	22	24	91	55	18	3
12”	300	20	330	178	200	30	23	22	22	24	104	55	18	3

Rod Sets - S15 for flanges PN16 (Maximum Working Pressure: 16 bar)

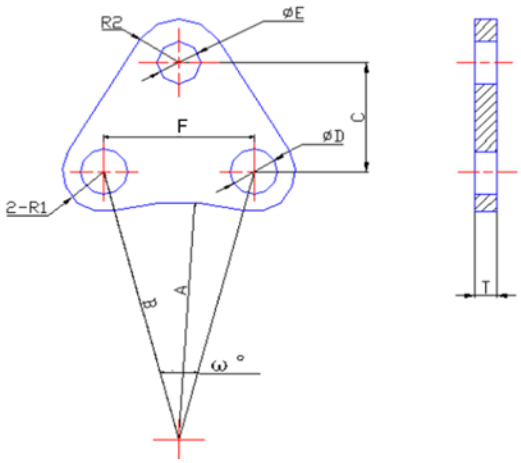
SIZE		M	L	A	B	W°	ØD	ØE	R1	R2	F	C	T	Number of Rod Sets per Joint
NPS	DN													
1-1/2”	40	16	280	37	55	90	18	18	18	20	78	60	10	2
2”	50	16	280	45	62,5	90	18	18	18	20	88	65	10	2
2-1/2”	65	16	280	53	72,5	90	18	18	20	20	103	65	10	2
3”	80	16	290	60	80	45	18	18	20	20	61	50	10	2
4”	100	16	290	70	90	45	18	18	20	20	69	50	10	2
5”	125	16	290	85	105	45	18	18	20	20	80	55	10	2
6”	150	16	300	98	120	45	23	18	22	20	92	60	12	2
8”	200	20	310	125	147,5	30	23	23	22	24	76	65	12	3
10”	250	20	330	153	177,5	30	27	23	25	24	92	65	18	3
12”	300	20	330	180	205	30	27	23	25	24	106	65	18	3

Dimensions in mm., subject to manufacturing tolerances
For higher maximum working pressures please consult us

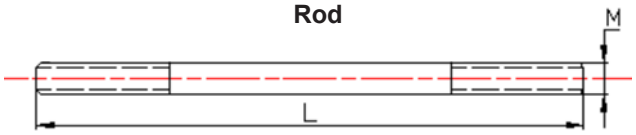
SERIES S20

Limit Rods - Dimensions

Plate



Rod



Rod Sets - S20 for flanges PN10 (Maximum Working Pressure: 10 bar)

SIZE		M	L	A	B	W°	ØD	ØE	R1	R2	F	C	T	Number of Rod Sets per Joint
NPS	DN													
1-1/2”	40	16	320	37	55	90	18	18	18	20	78	60	10	2
2”	50	16	320	45	62,5	90	18	18	18	20	88	65	10	2
2-1/2”	65	16	320	33	72,5	90	18	18	20	20	103	65	10	2
3”	80	16	330	60	80	45	18	18	20	20	61	50	10	2
4”	100	16	385	70	90	45	18	18	20	20	69	50	10	2
5”	125	16	385	85	105	45	18	18	20	20	80	55	10	2
6”	150	16	395	94	120	45	23	18	22	20	92	60	12	2
8”	200	20	505	125	147,5	45	23	23	22	24	113	65	12	2
10”	250	20	520	153	175	30	23	23	22	24	91	65	18	3
12”	300	20	520	178	200	30	23	23	22	24	104	65	18	3
14”	350	20	560	208	230	22,5	23	23	22	24	90	60	20	4
16”	400	20	560	233	257,5	22,5	27	23	25	24	100	60	20	4
18”	450	20	560	258	282,5	18	27	23	25	24	88	60	20	4
20”	500	20	570	285	310	18	27	23	25	24	97	60	20	4
24”	600			333	362,5	18	30	27	30	28	113	70	20	4

Rod Sets - S20 for flanges PN16 (Maximum Working Pressure: 16 bar (DN40-300); 10 bar (DN350-600))

SIZE		M	L	A	B	W°	ØD	ØE	R1	R2	F	C	T	Number of Rod Sets per Joint
NPS	DN													
1-1/2”	40	16	320	37	55	90	18	18	18	20	78	60	10	2
2”	50	16	320	45	62,5	90	18	18	18	20	88	65	10	2
2-1/2”	65	16	320	53	72,5	90	18	18	20	20	103	65	10	2
3”	80	16	330	60	80	45	18	18	20	20	61	50	10	2
4”	100	16	385	70	90	45	18	18	20	20	69	50	10	2
5”	125	16	385	85	105	45	18	18	20	20	80	55	10	2
6”	150	16	395	98	120	45	23	18	22	20	92	60	12	2
8”	200	20	505	125	147,5	30	23	23	22	24	76	65	12	3
10”	250	20	520	153	177,5	30	27	23	25	24	92	65	18	3
12”	300	20	520	180	205	30	27	23	25	24	106	65	18	3
14”	350	20	560	210	235	22,5	27	23	25	24	92	65	20	4
16”	400	20	560	233	262,5	22,5	30	23	30	24	102	65	20	4
18”	450	20	560	263	292,5	18	30	23	30	24	92	65	20	4
20”	500	20	570	292	325	18	33	23	33	24	102	70	20	4
24”	600			348	385	18	37	27	37	28	120	80	22	4

Dimensions in mm., subject to manufacturing tolerances
For higher maximum working pressures please consult us

Elastomer Selection

This table is to be used only as a guide in selecting the most satisfactory elastomers for resistance to various chemicals. Because of variables in actual service conditions, the accuracy of the ratings cannot be guaranteed.

A = Excellent B = Good C = Conditional X = Not Recommended - = No Information

MEDIA	EPDM	HYPALON	NBR	NEOPRENE	VITON
ACETALDEHYDE 50%	B	C	X	C	X
ACETIC ACID, GLACIAL	B	C	C	X	C
ACETIC ACID 30%	B	B	B	A	B
ACETIC ANHYDRIDE I	C	A	C	B	X
ACETONE	B	B	X	C	X
ACETYL CHLORIDE	X	X	X	X	A
ACETYLENE	B	B	A	B	A
ADIPIC ACID	B	-	A	A	-
ALUMINUM ACETATE	B	A	B	B	X
ALUMINUM CHLORIDE	B	A	A	A	A
ALUMINUM FLUORIDE	B	A	A	A	A
ALUMINUM NITRATE	B	A	A	A	A
ALUMINUM SULFATE	B	A	A	A	A
AMMONIA ANHYDROUS	B	B	B	A	X
AMMONIA GAS (COLD)	B	A	A	A	X
AMMONIA GAS (HOT)	C	B	X	B	X
AMMONIUM CARBONATE	B	-	X	A	-
AMMONIUM CHLORIDE	B	A	A	A	A
AMMONIUM HYDROXIDE	B	A	X	A	B
AMMONIUM NITRATE	B	A	A	A	-
AMMONIUM NITRITE	B	A	A	A	-
AMMONIUM PHOSPHATE	B	A	A	A	-
AMMONIUM SULFATE	B	A	A	A	-
AMYL ACETATE	X	X	X	X	X
AMYL ALCOHOL	B	A	B	B	B
ANILINE	B	C	X	X	C
ANILINE DYES	B	B	X	B	B
ANILINE HYDROCHLORIDE	C	X	B	X	B
ANIMAL FATS	C	B	A	B	A
AQUA REGIA	X	A	X	X	B
ARSENIC ACID	B	A	A	A	A
ARSENIC TRICHLARIDE	X	-	A	A	-
ASPHALT	-	B	B	B	A
BARIUM CHLORIDE	B	A	A	A	A
BARIUM SULFATE	B	A	A	A	A
BARIUM SULFIDE	B	A	A	A	A
BEER	B	A	A	A	A
BENZENE	X	X	X	X	A
BENZYL ALCOHOL	B	B	X	B	A
BENZYL BENZOATE	C	X	X	X	X
BENZYL CHLORIDE	X	X	X	X	A
BENZOIC ACID	X	X	C	X	A
BORDEAUX MIXTURE	B	A	B	B	A
BORIC ACID	B	A	A	A	A
BRINE	B	A	A	A	A
BROMINE-ANHYDROUS	X	X	X	X	A
BROMINE TRIFLUORIDE	X	X	X	X	X
BROMINE WATER	B	A	X	X	A
BROMOTOLUENE	X	X	X	X	A
BUNKER OIL	X	X	A	X	A
BUTADIENE	X	C	X	X	A
BUTANE	X	B	A	A	A
BUTTER	B	B	A	B	A
BUTYL ACETATE	X	X	X	X	X
BUTYL ALCOHOL	C	A	A	A	A
BUTYL AMINE	B	X	C	X	X
BUTYL BENZOATE	C	X	X	X	A

Elastomer Selection

MEDIA	EPDM	HYPALON	NBR	NEOPRENE	VITON
BUTYL CELLOSOLVE	B	B	C	C	X
BUTYL STEARATE	X	X	B	X	A
CALCIUM ACETATE	B	B	B	B	X
CLACIUM BISULFITE	X	A	X	A	A
CALCIUM CHLORIDE	B	A	A	A	A
CLACIUM HYDROXIDE	B	A	A	A	A
CALCIUM HYPOCHLORITE	B	A	B	C	A
CALCIUM NITRATE	B	A	A	A	A
CALCIUM SULFIDE	B	A	A	A	A
CARBITOL	C	B	B	B	B
CARBOLIC ACID (PHENOL)	C	X	X	C	A
CARBON BISULFIDE	X	X	C	X	A
CARBON DIOXIDE	C	B	A	B	A
CARBONIC ACID	B	A	B	A	A
CARBON MONOXIDE	B	B	A	B	A
CARBON TETRACHLORIDE	X	X	C	X	X
CASTOR OIL	C	B	A	A	A
CELLOSOLVE	C	X	X	X	C
CELLOSOLVE ACETATE	C	X	X	X	X
CHLORINE (DRY)	X	B	X	C	A
CHLORINE (WET)	X	C	X	C	A
CHLORINE DIOXIDE	X	C	X	X	A
CHLOROACETONE	B	C	X	C	X
CHLOROACETIC ACID	B	A	X	X	X
CHLOROBENZENE	X	X	X	X	A
CHLOROBUTADIENE	X	X	X	X	A
CHLOROFORM	X	X	X	X	A
CHLOROTOLUENE	X	X	X	X	A
CHROM PLATING SOLUTIONS	C	X	X	X	A
CHROMIC ACID	B	B	X	C	A
CITRIC ACID	B	A	A	A	A
COBALT	B	A	A	A	A
COCOANUT OIL	X	C	A	B	A
COD LIVER OIL	B	B	A	B	A
COKE OVEN GAS	X	C	X	X	A
COPPER ACETATE	B	B	B	B	X
COPPER CHLORIDE	B	B	A	B	A
COPPER CYANIDE	B	A	A	X	A
COPPER SULFATE	B	A	A	A	A
CORN OIL	X	B	A	C	A
COTTONSEED OIL	C	B	A	B	A
CREOSOTE (COAL TAR)	X	X	A	B	A
CRESOL	X	X	X	C	A
CRESYLIC ACID	X	X	X	C	A
CUMENE	X	X	X	X	A
CYCLOHEXANE	X	X	A	C	A
CYCLOHEXANOL	X	B	C	A	A
CYCLOHEXANONE	B	X	X	X	X
P-CYMENE	X	X	X	X	A
DECALIN	X	X	X	X	A
DENATURED ALCOHOL	B	A	A	A	A
DETERGENT SOLUTION NON-HYDROCARBON	B	B	A	B	A
DIACETONE	B	X	X	X	X
DIACETONE ALCOHOL	B	B	X	B	X
DIBENZYL ETHER	C	X	X	C	X
DIBUTYL AMINE	B	X	X	X	X
DIBUTYL ETHER	X	X	X	C	C
DIBUTYL PHTHALATE	C	X	X	X	C
DIBUTYL SEBECASE	C	X	X	X	B
DICHLOROBENZENE	X	X	X	X	A

Elastomer Selection

MEDIA	EPDM	HYPALON	NBR	NEOPRENE	VITON
DICHLORO-ISOPROPYL ETHER	X	C	X	X	C
DIESEL OIL	X	C	A	C	A
DIETHLAMINE	B	C	B	B	X
DIETHLAMINE BENZENE	X	X	X	X	A
DIETHYL EITHER	X	C	X	C	X
DIETHYLENE GLYCOL	B	A	A	A	A
DIETHYL SEBECATE	C	B	B	X	B
DIHYDROGEN MONOXIDE	B	A	A	A	A
DIISOBUTYLENE	B	X	B	X	A
DIISOPROPYL BENZENE	X	X	X	X	A
DIISOPROPYL KETONE	B	X	X	X	X
DIMETHYL FORMAMIDE	B	X	B	C	X
DIMETHYL PHTHALATA	B	X	X	X	B
DINITROTOLUENE	X	X	X	X	A
DIOCTYL PHTHALATE	C	X	C	X	B
DIOCTYL SEBECATE	C	X	X	X	C
DIPENTENE	X	X	B	X	A
DIPHENYL (PHENYLBENZENE)	X	X	X	X	A
DOWTHERM OIL	X	X	X	X	A
DRY CLEANING FLUIDS	X	X	C	X	A
ETHANE	X	B	A	B	A
ETHANOLAMINE	B	C	B	B	X
ETHYL ACETATE	B	X	X	C	X
ETHYL ACETOACETATE	B	X	X	C	X
ETHYL ALCOHOL	B	A	A	A	C
ETHYL BENZENE	X	X	X	X	A
ETHYL BENZOATE	B	X	X	X	A
ETHYL CELLULOSE	C	B	B	B	X
ETHYL CHLORIDE	X	X	A	X	A
ETHYL ETHER	X	X	C	C	X
ETHYL FORMATE	C	B	X	B	A
ETHYL PENTOCHLOROBENZENE	X	X	X	X	A
ETHYL SILICATE	B	B	A	A	A
ETHYLENE	C	B	A	C	A
ETHYLENE CHLORIDE	X	X	X	X	A
ETHYLENE CHLOROHYDRIN	C	B	X	B	A
ETHYLENE DIAMINE	B	B	A	A	X
ETHYLENE DICHLORIDE	X	X	X	X	A
ETHYLENE GLYCOL	B	A	A	A	A
ETHYLENE TRICHIORIDE	X	X	X	X	A
FATTY ACIDS	X	B	B	B	A
FERRIC CHLORIDE	B	A	A	A	A
FERRIC NITRATE	B	A	A	A	A
FERRIC SULFATE	B	A	A	A	A
FISH OIL	X	-	A	X	A
FLUOROBORIC ACID	B	A	A	A	-
FLUOROBENZENE	X	-	X	X	A
FLUOROLUBE	B	A	A	B	C
FLUOSILIC ACID	C	A	A	B	A
FORMIDEHYDE	B	A	C	B	X
FORMIC ACID	B	A	B	A	C
FREON 12	C	A	A	A	B
FREON 13	A	A	A	A	A
FREON 21	X	X	A	X	X
FREON 22	B	A	A	A	X
FREON 114	B	A	A	A	B
FUEL OIL	X	B	A	B	A
FURFURAL	B	C	X	C	X
GALLIC ACID	B	B	B	B	A
GASOLINE	X	C	A	C	A

Elastomer Selection

MEDIA	EPDM	HYPALON	NBR	NEOPRENE	VITON
GELATIN	B	A	A	A	A
GLUCOSE	B	A	A	A	A
GLUE	B	A	A	A	A
GLYCERIN	B	A	A	A	A
GLYCOLS	B	A	A	A	A
GREEN SULFATE LIQUOR	B	B	B	B	A
HEXANE	X	B	A	B	A
HELIX ALCOHOL	X	B	A	B	A
HYDRAULIC OIL (PETROLEUM)	X	B	A	B	A
HYDROBROMIC ACID	B	A	X	X	A
HYDROBROMIC ACID (HOT) 37%	X	X	X	X	B
HYDROCHLORIC BC (COLD) 37%	B	A	C	B	A
HYDROCYANIC ACID	B	A	B	B	A
HYDROFLUORIC ACID (CONC.) HOT	B	C	X	X	C
HYDROFLUORIC ACID (CONC.) COLD	B	A	X	X	A
HYDROFLUORIC ACID - ANHYDROUS	B	A	X	X	X
HYDROFLUOSILIC ACID	C	A	A	B	A
HYDROGEN GAS	B	A	A	A	A
IODINE	X	A	X	X	X
ISOBUTYL ALCOHOL	B	A	B	A	A
ISOOCTANE	X	B	A	B	A
ISOPROPYL ACETATE	C	X	X	X	X
ISOPROPYL ALCOHOL	B	A	B	B	A
ISOPROPYL CHLORIDE	X	X	X	X	A
ISOPROPYL ETHER	X	C	B	C	X
KEROSENE	X	C	A	B	A
LACTIC ACID (COLD)	B	A	A	A	A
LACTIC ACID (HOT)	B	A	X	X	A
LARD	C	X	A	B	A
LAVE-ER OIL	X	X	B	X	A
LEAD ACETATE	B	X	B	A	X
LEAD NITRATE	B	A	A	A	-
LEAD SULFAMATE	B	A	B	A	A
LINSEED OIL	X	B	A	B	A
LIQUEFIED PETROLEUM GAS	X	B	A	B	A
LYE	B	A	B	B	B
MAGNESIUM CHLORIDE	B	A	A	A	A
MAGNESIUM HYDROXIDE	B	A	B	A	A
MAGNESIUM SULFATE	B	A	A	A	A
MALEIC ACID	B	X	X	C	A
MALEIC ANHYDRIDE	C	A	X	C	X
MALIC ACID	B	B	A	C	A
MERCURY	B	A	A	A	A
MESITYL OXIDE	C	X	X	X	X
METHANE	X	B	A	B	B
METHYL ACETATE	B	X	X	B	X
METHYL ALCOHOL	B	A	A	A	A
METHYL BROMIDE	C	X	B	X	A
METHYL BUTYL KETONE (PROPYL ACETONE)	B	X	X	X	X
METHYL CELLOSOLVE	C	B	B	B	X
METHYL CHLORIDE	X	X	X	X	A
METHYL ETHYL KETONE (MEK)	C	X	X	C	X
METHYL ISOBUTYL KETONE	C	X	X	X	X
METHYL OLEATE	C	X	X	X	B
MILK	B	A	A	A	A
MINERAL OIL	X	B	A	B	A
MONOCHIOROBENZENE	X	X	X	X	A
MONOETHANOLAMINE	B	X	X	X	X
MONOMETHYLETHER	X	B	A	C	A
MONOVINYL ACETYLENE	B	B	A	B	A

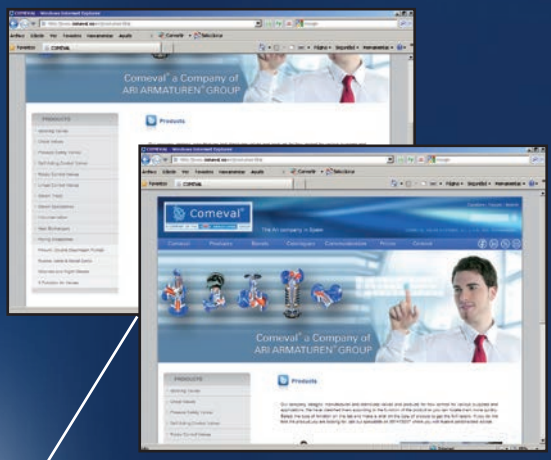
Elastomer Selection

MEDIA	EPDM	HYPALON	NBR	NEOPRENE	VITON
NAPHTHA	X	X	B	C	A
NAPHTHALENE	X	X	X	X	A
NAPTHENIC ACID	X	X	X	X	A
NATURAL GAS	X	A	A	A	A
NICKEL ACETATE	B	X	B	B	X
NICKEL CHLORIDE	B	A	A	A	A
NICKEL SULFATE	B	A	A	A	A
NITRIC ACID-CONC.	B	B	X	X	C
NITRIC ACID-DILUTE	B	A	X	B	A
NITROBENZENE	B	X	X	X	B
NITROETHANE	C	B	X	C	X
NITROMETHANE	C	C	X	B	X
NITROGEN	B	A	A	A	A
OCTACHLOROTULUENE	X	X	X	X	A
OCTYL ALCOHOL	X	B	B	A	A
OLEIC ACID	X	C	C	C	B
OLEUM	B	B	B	C	A
OLIVE OIL	C	B	A	B	A
O-DICHLOROBENZENE	B	B	B	B	A
OXALIC ACID	B	B	B	B	A
OXYGEN-COLD	B	A	B	A	A
OZONE	B	A	X	C	A
PALMITIC ACID	C	C	A	B	A
PEANUT OIL	X	B	A	C	A
PERCHLORIC ACID	C	B	X	B	A
PERCHLOROETHYLENE	X	X	B	X	A
PETROLEUM	X	B	A	B	A
PHENOL (CARBOLIC ACID)	B	B	X	C	A
PHENYLBENZENE	X	X	X	X	A
PHENYL HYDRAZINE	C	X	X	X	A
PHORONE	X	X	X	X	X
PHOSPHORIC ACID-20%	B	A	B	B	A
PHOSPHORIC ACID-80%	B	B	X	B	A
PHOSPHORUS TRICHLORIDE	B	X	X	X	A
PICRIC ACID	B	B	B	A	A
PINE OIL	X	X	A	X	A
POLYVINYL ACETATE EMULSION	B	B	-	B	A
POTASSIUM ACETATE	B	A	B	B	X
POTASSIUM CHLORIDE	B	A	A	A	A
POTASSIUM CUPRO CYANIDE	A	A	A	A	A
POTASSIUM CYANIDE	B	A	A	A	A
POTASSIUM DICHROMATE	B	B	A	A	A
POTASSIUM HYDROXIDE	B	A	B	B	X
POTASSIUM NITRATE	B	A	A	A	A
POTASSIUM SULFATE	B	B	A	A	A
PROPANE	X	B	A	B	A
PROPYL ACETATE	C	X	X	X	X
PROPYL ALCOHOL	B	A	A	A	A
PROPYL NITRATE	B	B	X	X	X
PROPYLENE	X	X	X	X	A
PYRANOL (TRANSFORMER OIL)	X	C	A	B	A
PYRIDINE	B	B	X	X	X
SAL AMMONIAC	B	A	A	A	A
SALICYLIC AICD	B	A	B	A	A
SALT WATER	B	A	A	A	A
SEWAGE	B	A	A	B	A
SILICONE GREASES	B	A	A	A	A
SILICONE OILS	B	A	A	A	A
SILVER NITRATE	B	A	B	A	A
SKYDROL 500	B	X	X	X	X

Elastomer Selection

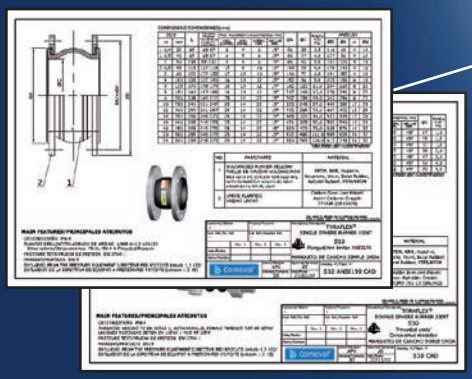
MEDIA	EPDM	HYPALON	NBR	NEOPRENE	VITON
SKYDROL 7000	B	X	X	X	B
SOAP SOLUTIONS	B	A	A	B	A
SODA ASH	B	A	A	A	A
SODIUM ACETATE	B	A	B	B	X
SODIUM BICARBONATE	B	A	A	A	A
SODIUM BISULFITE	B	A	A	A	A
SODIUM BORATE	B	A	A	A	A
SODIUM CHLORIDE (BRINE)	B	A	A	A	A
SODIUM CYANIDE	B	A	A	A	A
SODIUM HYDROXIDE	B	A	B	A	B
SODIUM HYPOCHLORITE	C	A	B	A	A
SODIUM METAPHOSPHATE	B	B	A	B	A
SODIUM NITRATE	B	A	B	B	-
SODIUM PERBORATE	B	B	B	B	A
SODIUM PEROXIDE	B	B	B	B	A
SODIUM PHOSPHATE	B	A	A	B	A
SODIUM SILICATE	B	A	A	A	A
SODIUM SULFATE	B	A	A	A	A
SODIUM THIOSULFATE	B	A	B	A	A
SOYBEAN OIL	X	C	A	B	A
STANNIC CHLORIDE	B	A	A	B	A
STEAM	B	X	X	C	X
STEARIC ACID	B	B	B	B	-
STYRENE	X	X	X	X	B
SUCROSE SOLUTION	B	B	A	B	A
SULFUR	B	A	X	A	A
SULFUR CHLORIDE	X	B	C	C	A
SULFUR DIOXIDE	B	B	X	X	A
SULFURIC TRIOXIDE	C	X	X	X	A
SULFURIC ACID 10%	B	A	C	B	A
SULFURIC ACID 10-75%	B	C	X	X	A
SULFUROUS ACID	B	A	B	B	A
TANNIC ACID	B	A	A	A	A
TAR BITUMINOUS	X	X	B	C	A
TARTARIC ACID	C	A	A	B	A
TERPINEOL	X	X	B	X	A
TERTIARY BUTYL ALCOHOL	C	B	B	B	A
TETRACHLOROETHYLENE	X	X	X	X	A
TETRAETHYL LEAD	X	X	B	B	A
TOLUENE	X	X	X	X	A
TRANSFORMER OIL	X	C	A	B	A
TRANSMISSION FLUID -A-	X	B	A	B	A
TRICHLOROETHANE	X	X	X	X	A
TRICHLOROACETIC ACID	C	X	B	X	B
TRICHLOROETHYLENE	X	X	X	X	A
TRICRESYL PHOSPHATE	X	X	X	X	A
TRIETHANOL AMINE	B	B	B	A	X
TRINITROTOLUENE	X	B	X	B	A
TURBINE OIL	X	X	B	X	A
TURPENTINE	X	X	A	X	A
VEGETABLES OILS	X	B	A	C	A
VINEGAR	B	A	B	B	A
VINYL CHLORIDE	X	X	X	X	A
WATER	B	A	A	A	A
WHISKEY, WINES	B	A	A	A	A
WHITE OIL	X	X	A	B	A
WOOD OIL	X	C	A	B	A
XYLENE	X	X	X	X	A
ZINC CHLORIDE	B	A	A	A	A
ZINC SULFATE	B	A	A	A	A

Data Sheets Manual
Comprehensive of all technical and engineering information on the comprehensive portfolio.



Web Site Product Sheet
Valve description, main dimensions, operating parameters and other links accessible at your finger tips.

Arrangement Drawings
Standardized sectional parts and dimensional drawings for use on engineering projects or enquiries.



Price Lists
Up dated price book comprehensive of all models including actuated valves.

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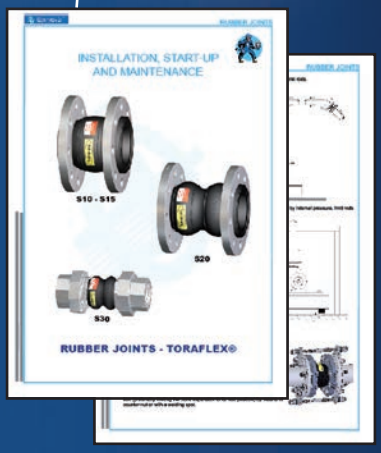

Operating and Maintenance Manuals
Provided along every valve into the sealed plastic bag. Also accessible via Internet at all times

Other TORAFLEX products include the range of Metal Bellows Compesators. Contact your Toraflex distributor for details.

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