Toraflex®

Rubber Expansion Joints

www.comeval.es

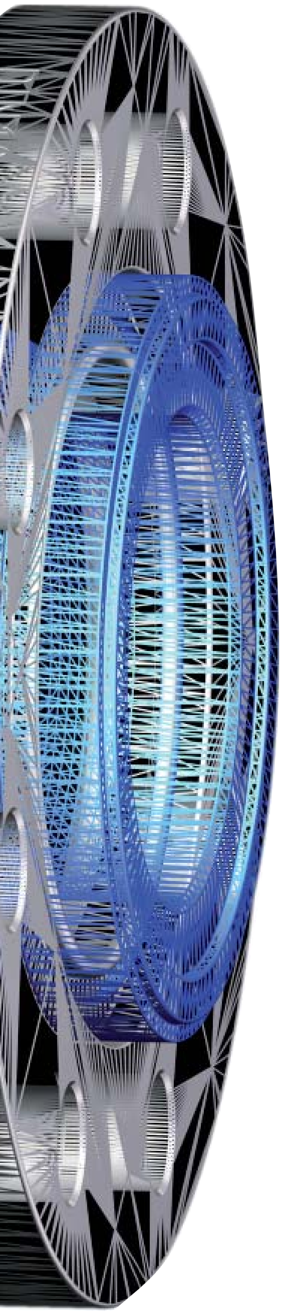
Toraflex® Rubber Expansions Joints
Index

Toraflex® Rubber Expansions Joints

Toraflex® Rubber Expansions Joints 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).

Toraflex® Rubber Expansions Joints Coding System

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

DESIGN
S10
S15
S20
S30

MATERIAL OF RUBBER
E = EPDM
N = NBR
H = HYPALON
V = VITON

FLANGE STYLE
10 = Flanges drilled to DIN PN10
16 = Flanges drilled to DIN PN16
AS = Flanges drilled to DIN ASA150

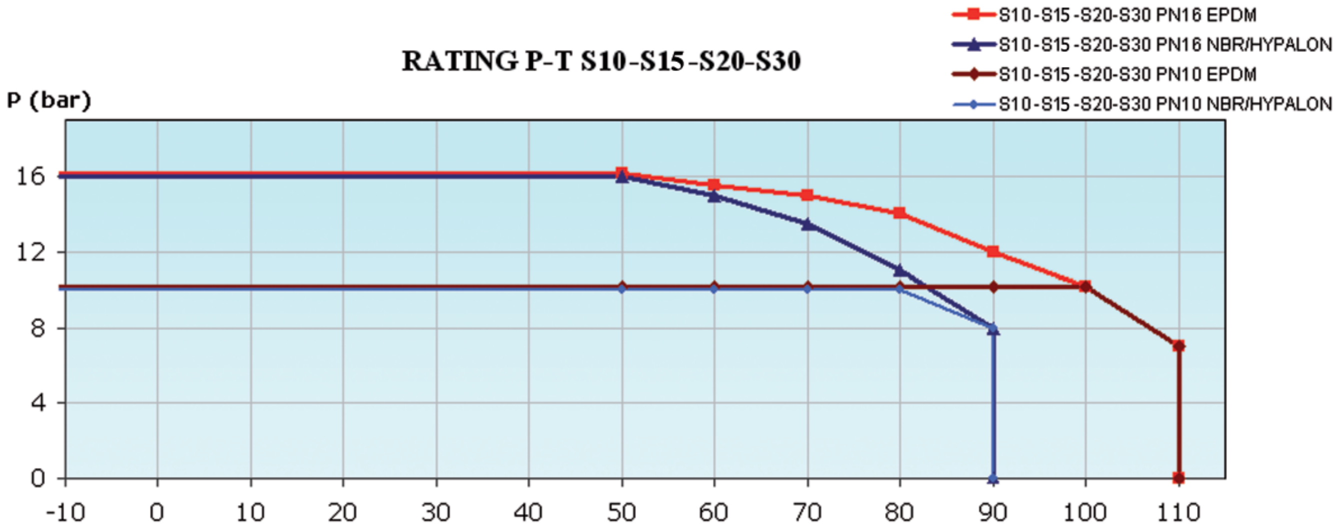
FLANGE MATERIAL
O = Standard Electro Galvanized Steel
G = Hot Dip Galvanized
I = Stainless Steel 316
J = Stainless Steel 304

SPECIAL PERFORMANCE
O = No Special Performance
R = Root Ring Reinforcement (For S20 / S30 only)
V = Vulcanized Vacuum Reinforcement Ring
T = External Vacuum Reinforcement Ring

LIMITERS
O = None
T = Carbon Steel Tie Rods

OTHER SPECIAL OPTIONS
0 = Standard

DN
050 = Valve size DN50
100 = Valve size DN100



-With PTFE sleeve, maximum working pressure is 7 bar.
-Check also medium-rubber compatibility .

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

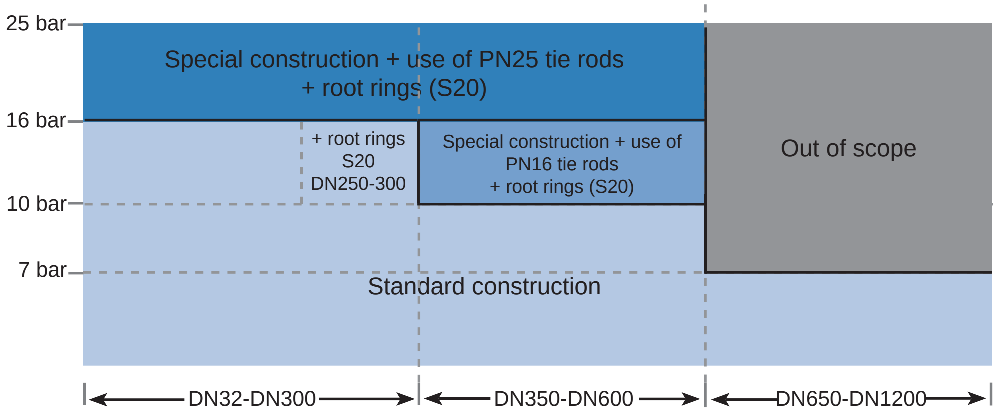
JOINT	VACUUM LIMIT
S10 up to DN100 S10 DN125-600	-0,85 bar-g (0,15 bar-abs) * -0,50 bar-g (0,50 bar-abs) *
S15 up to DN300	Full Vacuum
S20 up to DN600	-0,50 bar-g (0,50 bar-abs) **
S30 up to DN80	-0,50 bar-g (0,50 bar-abs)

** For full vacuum, use embedded special vacuum ring version*

** -0,85 bar-g (0,15 bar-abs) with external vacuum ring

PTFE joint is not suitable for vacuum service

MAXIMUM WORKING PRESSURE FOR S10/15/20

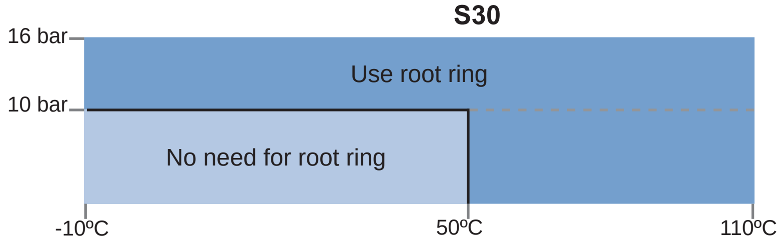


- With PTFE sleeve maximum working pressure = 7 bar

- For PN16 and PN25 construction it is particularly important to ensure that pipeline and counterflange are 90º and perpendicular to each other

- For S20 PN16 DN200-600
PN25 DN32-600
the use of root ring is highly recomended

S30



S30 with root ring integral type

Toraflex® Rubber Expansions Joints

Engineering & Performance Data for Toraflex Expansion Joints
Temperature and Chemical Resistance of Rubber Bellows

NBR Butadiene Acrylonitrile (-20ºC) -10ºC ... 75ºC (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) -5ºC ... 90ºC (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) -10ºC ... 80ºC (90ºC)
Good chlorine and weather resistance. Resistant to diluted acids and bases. Low resistance to oil and fats

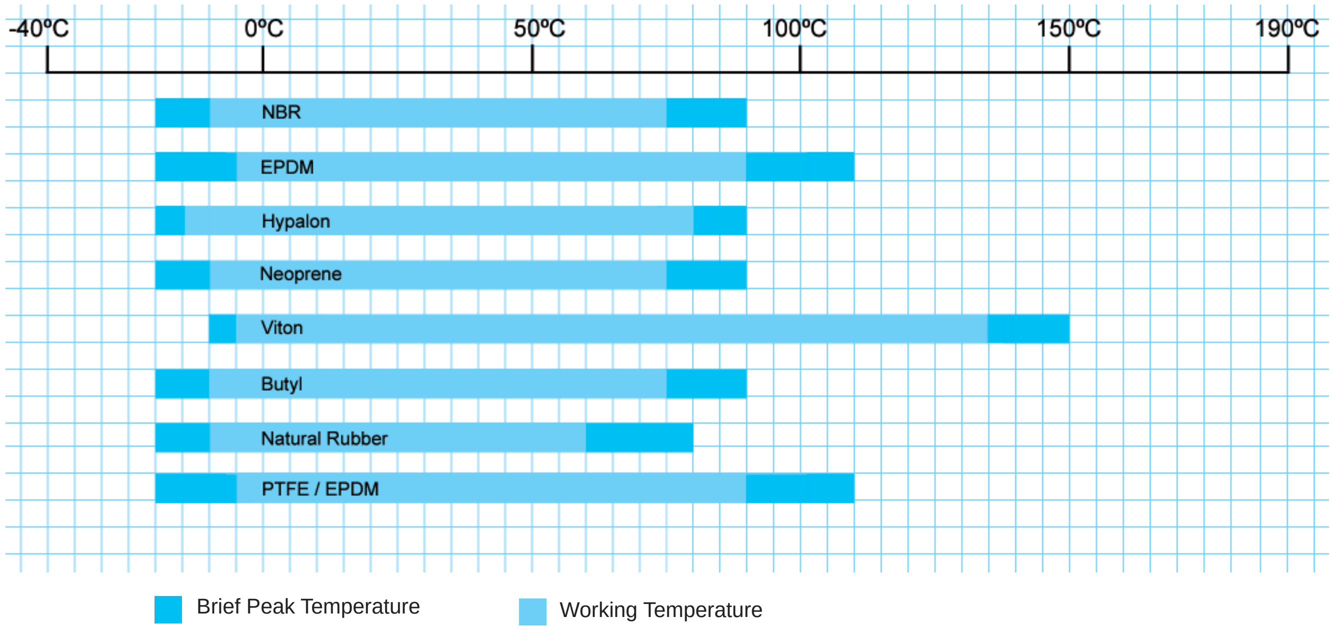
Neoprene (CR) Chloroprene rubber (-20ºC) -10ºC ... 75ºC (90ºC)
Good behaviour with water and many oils, and generally with many inorganic and organic products. Nearly tight with hydrocarbon gases. Good resistance to weather.

Viton (FPM) Vinylidenefluoride-hexafluoro-propyleneco-polymer (-10ºC) -5ºC ... 135ºC (150º)
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.

Butyl (IIR) Isobutene-Isoprene (-20ºC) -10ºC 75ºC (90ºC)
Dilute mineral acids and alkalies, gases, compressed air (oil free), acidic slurries, chlorine free hydrochloric acid.
Resistance to concentrated acids is good with some important exceptions as nitric or sulphuric acids.
Good resistance to weather.

Natural Rubber (IR) Polyisoprene (-20ºC) -10ºC 60ºC (80ºC)
Inorganic salt solutions, dilute mineral acids, alkalies and salts. Abrasive services.
Not resistant to oxidizing media. Oils and most organic solvents attack it.

PTFE/EPDM Virgin PTFE + EPDM (-20ºC) -5ºC ... 90ºC (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 and material compatibility also to be considered for rubber selection.
Please consult our Technical Department for a particular application.

Toraflex® Rubber Expansions Joints

Engineering & Performance Data for Toraflex Expansion Joints
Manufacturing Design Standards and Reaction Forces

Manufacture Design Standards

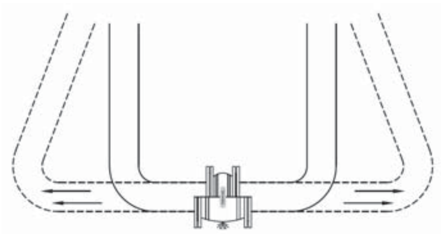
- QA certified to EN ISO 9001 procedures.
- Testing procedure according to EN12266-1.
- Marking according to EN19.
- Flanges drilled to EN1092-1 PN10, PN16, or ASME B16.5 ASA150.
- Rubber Joints are excluded from the Pressure Equipment Directive PED 97/23/CE, according to its article 1.3-15.

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

STYLE	S10/S15	S20	S30
SIZE 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

STYLE	S10/S15	S20	S30
SIZE 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.

Toraflex® Rubber Expansions Joints

Engineering & Performance Data for Toraflex Expansion Joints

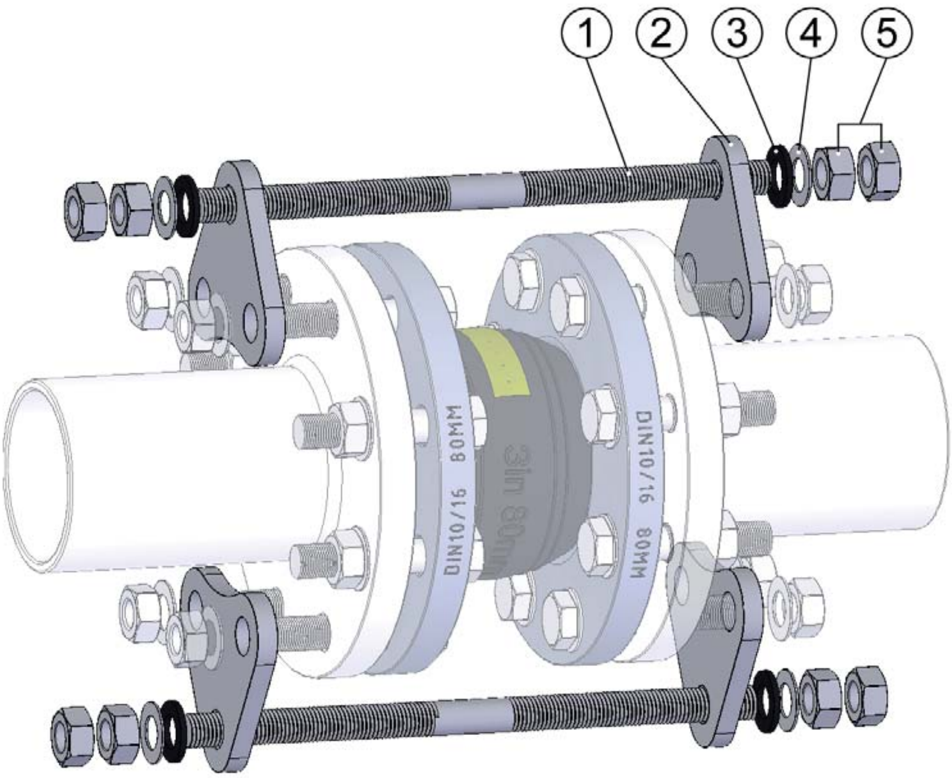
Guidelines to Application - Limit Rods

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.

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

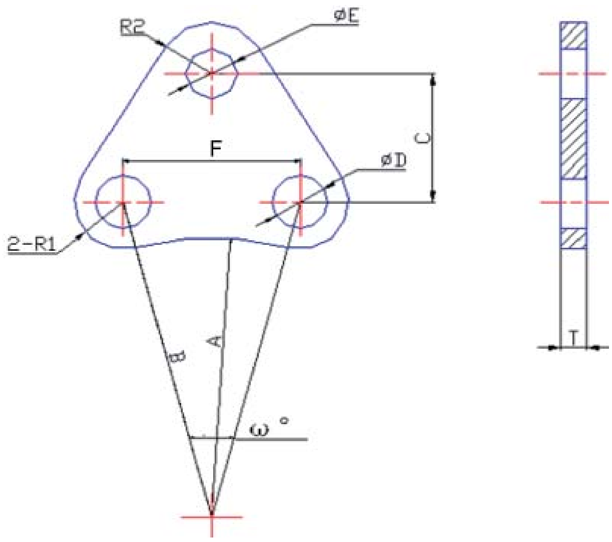
Limit rods can be used for vacuum service in combination with vacuum rings.



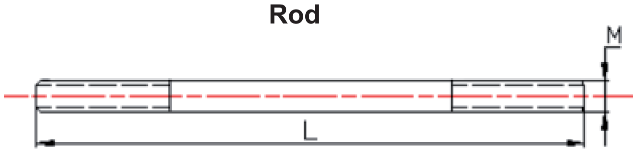
Limit Rods Parts:	1 Rod
	2 Plate
	3 Rubber Gasket
	4 Washer
	5 Nut
Standard Material: Carbon Steel Zinc Plated S235JR to EN10025 (old St 37-2 to DIN 17100)	
Material Options: Stainless Steel AISI 304, AISI 316, etc.	

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

Plate



Rod



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

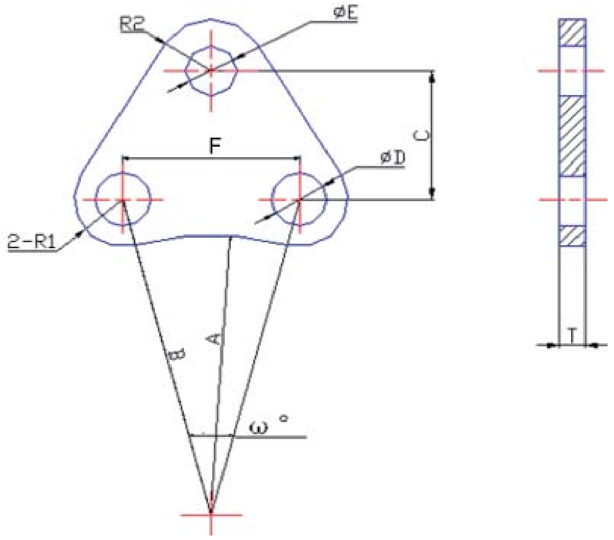
Size														
inch	mm.	M	L	A	B	W°	ØD	ØE	R1	R2	F	C	T	Number of Rod Sets per Joint
1-1/2"	40	16	240	37	55	90	18	18	18	20	78	60	10	2
2"	50	16	250	45	62,5	90	18	18	18	20	88	65	10	2
2-1/2"	65	16	260	33	72,5	90	18	18	20	20	103	65	10	2
3"	80	16	280	60	80	45	18	18	20	20	61	50	10	2
4"	100	16	290	70	90	45	18	18	20	20	69	50	10	2
5"	125	16	325	85	105	45	18	18	20	20	80	55	10	2
6"	150	16	340	94	120	45	23	18	22	20	92	60	12	2
8"	200	20	370	125	147,5	45	23	23	22	24	113	65	12	2
10"	250	20	440	153	175	30	23	23	22	24	91	65	18	3
12"	300	20	460	178	200	30	23	23	22	24	104	65	18	3
14"	350	20	460	208	230	22,5	23	23	22	24	90	60	20	4
16"	400	20	470	233	257,5	22,5	27	23	25	24	100	60	20	4
18"	450	20	480	258	282,5	18	27	23	25	24	88	60	20	4
20"	500	20	480	285	310	18	27	23	25	24	97	60	20	4
24"	600	24	495	333	362,5	18	30	27	30	28	113	70	20	4

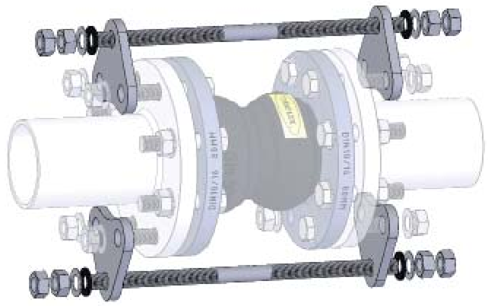
Rod Sets - S10 for flanges PN16 (Maximum Working Pressure: 16 bar (DN40-300); 10 bar (DN350-600))

Size														
inch	mm.	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	65	10	2
2-1/2"	65	16	260	53	72,5	90	18	18	20	20	103	65	10	2
3"	80	16	280	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	325	85	105	45	18	18	20	20	80	55	10	2
6"	150	16	340	98	120	45	23	18	22	20	92	60	12	2
8"	200	20	370	125	147,5	30	23	23	22	24	76	65	12	3
10"	250	20	440	153	177,5	30	27	23	25	24	92	65	18	3
12"	300	20	460	180	205	30	27	23	25	24	106	65	18	3
14"	350	20	460	210	235	22,5	27	23	25	24	92	65	20	4
16"	400	20	470	233	262,5	22,5	30	23	30	24	102	65	20	4
18"	450	20	480	263	292,5	18	30	23	30	24	92	65	20	4
20"	500	20	480	292	325	18	33	23	33	24	102	70	20	4
24"	600	24	495	348	385	18	37	27	37	28	120	80	22	4

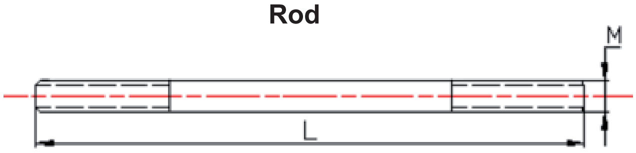
Dimensions in mm., subject to manufacturing tolerances
For higher maximum working pressures please consult us

Plate





Rod



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

Size														
inch	mm.	M	L	A	B	W°	ØD	ØE	R1	R2	F	C	T	Number of Rod Sets per Joint
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	320	60	80	45	18	18	20	20	61	50	10	2
4”	100	16	380	70	90	45	18	18	20	20	69	50	10	2
5”	125	16	380	85	105	45	18	18	20	20	80	55	10	2
6”	150	16	380	94	120	45	23	18	22	20	92	60	12	2
8”	200	20	515	125	147,5	45	23	23	22	24	113	65	12	2
10”	250	20	515	153	175	30	23	23	22	24	91	65	18	3
12”	300	20	515	178	200	30	23	23	22	24	104	65	18	3
14”	350	20	515	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	560	285	310	18	27	23	25	24	97	60	20	4
24”	600	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														
inch	mm.	M	L	A	B	W°	ØD	ØE	R1	R2	F	C	T	Number of Rod Sets per Joint
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	320	60	80	45	18	18	20	20	61	50	10	2
4”	100	16	380	70	90	45	18	18	20	20	69	50	10	2
5”	125	16	380	85	105	45	18	18	20	20	80	55	10	2
6”	150	16	380	98	120	45	23	18	22	20	92	60	12	2
8”	200	20	515	125	147,5	30	23	23	22	24	76	65	12	3
10”	250	20	515	153	177,5	30	27	23	25	24	92	65	18	3
12”	300	20	515	180	205	30	27	23	25	24	106	65	18	3
14”	350	20	515	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	560	292	325	18	33	23	33	24	102	70	20	4
24”	600	24	600	348	385	18	37	27	37	28	120	80	22	4

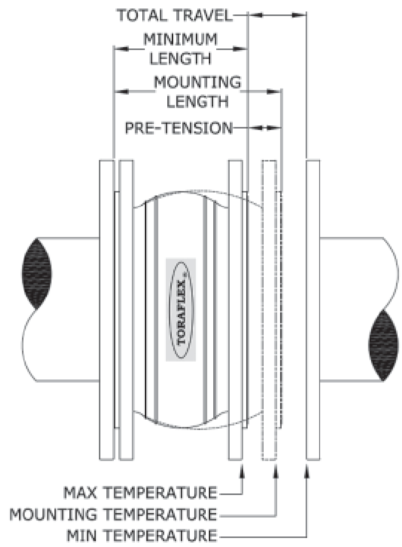
Dimensions in mm., subject to manufacturing tolerances
For higher maximum working pressures please consult us

Establishing the building installation length.

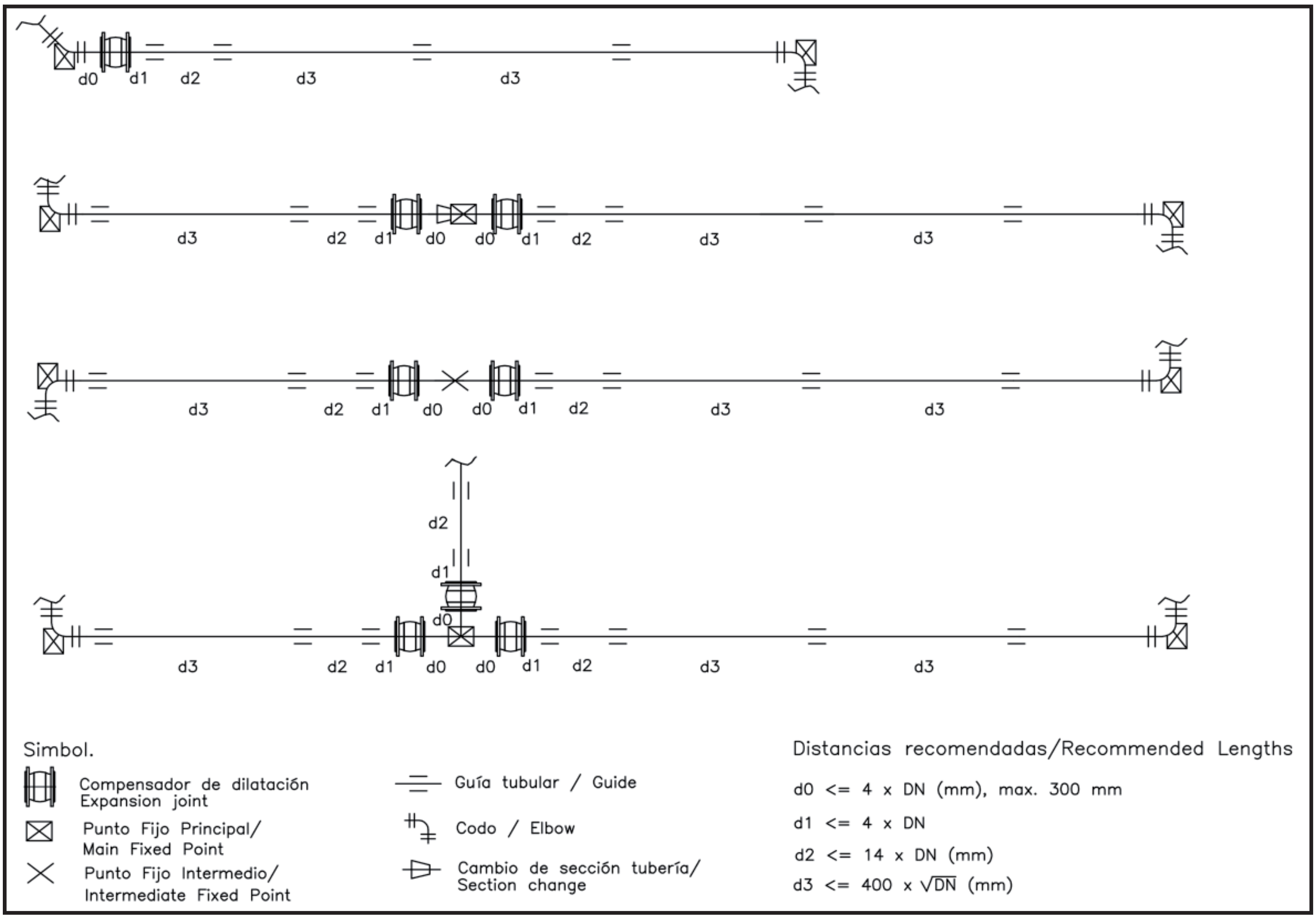
When all or most of the movement is in one direction, the joint can be installed with building length favouring the absorption in such direction.

This can reduce the number of joints needed and thus the number of anchors and guides.

Allowed building length range for each Joint type is stated in this manual.



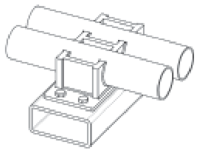
Herewith some examples and recommendations for location of Expansion Joints with proper anchoring and guiding.



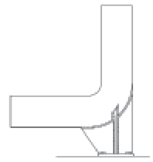
Anchoring and guiding for Joints working as Expansion Joints

ANCHORING. FIX POINTS

We call Fix Points to the anchors that absorb reaction forces.



Fixed point welded for pipes in parallel



Fixed point for elbow

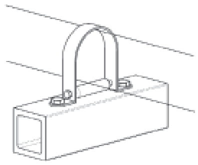
Every Rubber Joint has to be installed between two Fix Points.

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.

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.

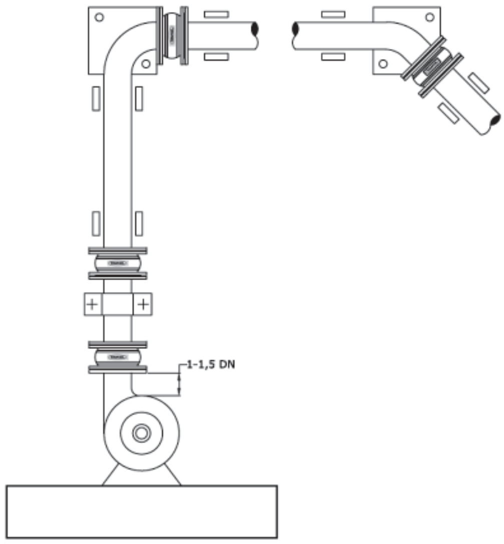


Guide with roller stand

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.

Installation Guidelines for Rubber Joints absorbing vibration and noise



Rubber Joints are commonly installed in pump groups to absorb vibration and noise.

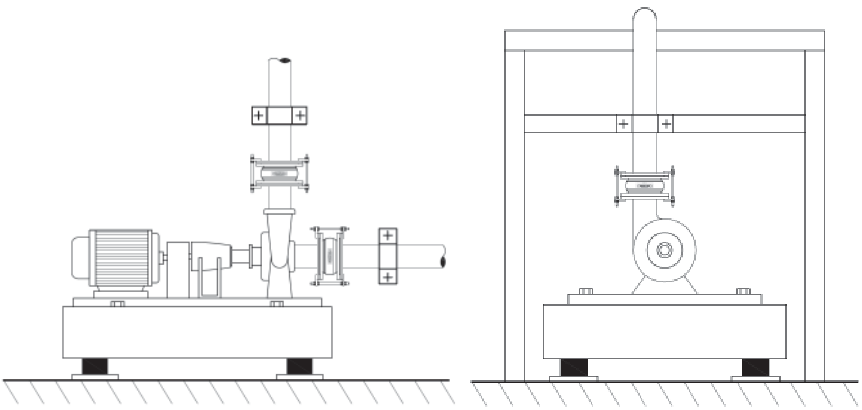
The Rubber Joint must be installed near the pump group, leaving just 1-1,5 DN distance. Leave more distance in case of abrasive media.

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 uch forces.



Toraflex® Rubber Expansions Joints

Single Sphere Expansion Joints

Attributes of Design

1 Spherical design for better strength and efficiency.

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

2 Precision injection moulded of synthetic rubber and nylon.

7 - 4 different allowable movements: axial compression and expansion, lateral and angular deflection.

3 Outer layer protects the bellows surface form eventual ozone attack, strikes and other environmental aggressions.

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

4 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 Nylon plaited fabrics as standard, which provide high shell moulding resistance.
-End Bellows Reinforcement. Hardened steel wires to provide a greater consistence to the bellows outer neck.

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

9 Lot number punched for full traceability purpose.

10 Rubber material identification and maximum service pressure & temperature.

Toraflex® Rubber Expansions Joints

Double Sphere Expansion Joints
Attributes of Design

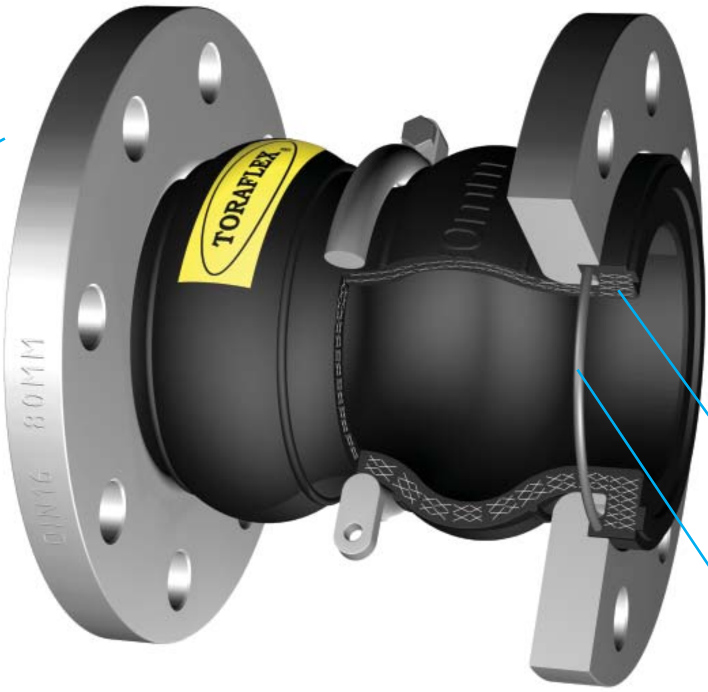
8 Light and easy to install, little installation space required, easy maintenance of replaceable bellows.

1 Double sphere design allow greater axial, lateral and angular movements subject to less effort and material wearing down during movements.

2 Precision injection moulded of synthetic rubber and nylon.

7 - 4 different allowable movements: axial compression and expansion, lateral and angular deflection.

3 Outer layer protects the bellows surface from eventual ozone attack, strikes and other environmental aggressions.



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

4 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 Nylon plaited fabrics as standard, which provide high shell moulding resistance.
-End Bellows Reinforcement. Hardened steel wires to provide a greater consistence to the bellows outer neck.

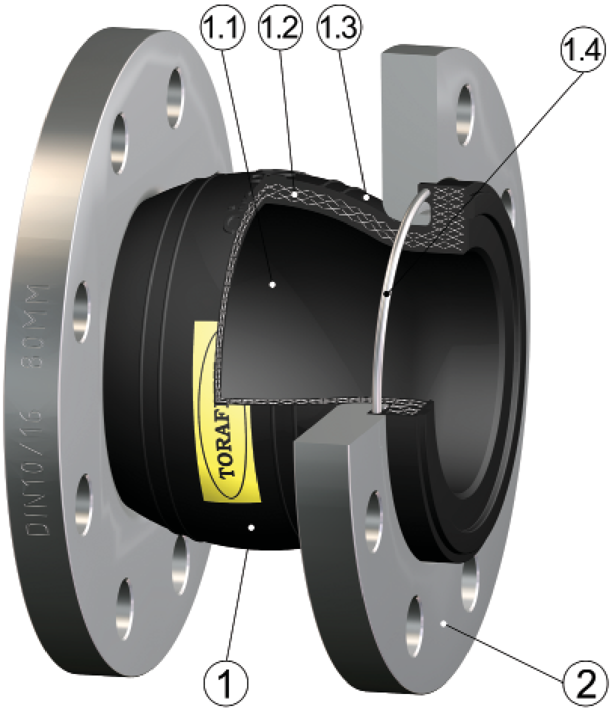
5 Full turned rubber design, self-sealing, no additional gaskets are required; it prevents electrolytic corrosion.

9 Lot number punched for full traceability purpose.

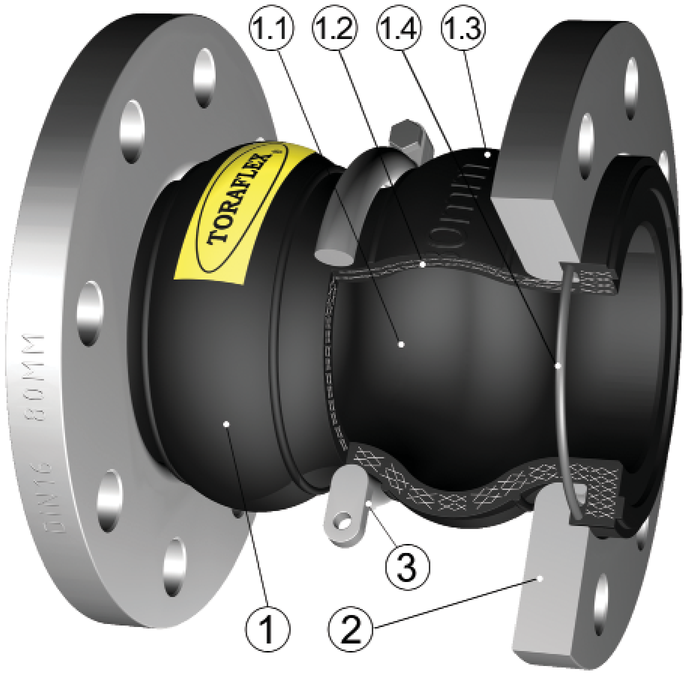
10 Rubber material identification and maximum service pressure & temperature.

Single and Double Sphere Expansion Joints
Parts and Materials

S10 / S15



S20



1- Vulcanised Rubber Bellow:	1.1 Rubber core (inner)
	1.2 Nylon tire cord
	1.3 Rubber cover (outer)
	1.4 Hard Steel Wire
Rubber options: EPDM, NBR, Hypalon, Neoprene, Viton, Butyl Rubber, Natural Rubber, PTFE/EPDM	
2- Loose Flanges:	
Standard Material: Carbon Steel Zinc Plated S235JR to EN10025 (old St 37-2 to DIN 17100)	
Flange Options: Stainless Steel AISI 304, AISI 316, hot dip galvanized, etc.	
3- Root ring (option for S20):	
Standard material: Ductile Iron EN JS1040 according to EN1563	

Toraflex® Rubber Expansions Joints

Double Sphere Expansion Joints with Threaded Unions

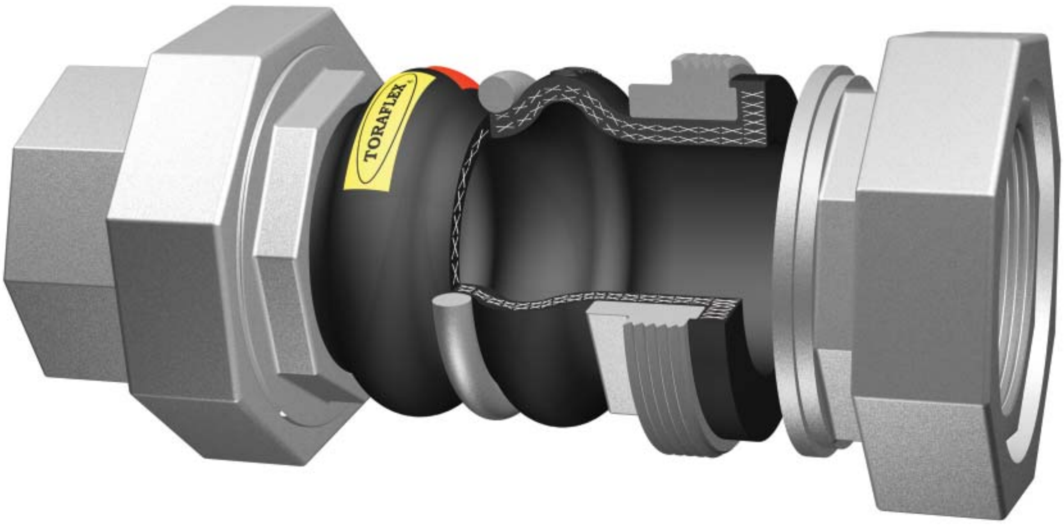
Attributes of Design

2 Precision injection moulded of synthetic rubber inserted into union threads.

1 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.

3 Outer layer protects the bellows surface form eventual ozone attack, strikes and other environmental aggressions.

8 Root ring, compulsory for temperatures above 50ºC and/ or pressures above 10 bar.

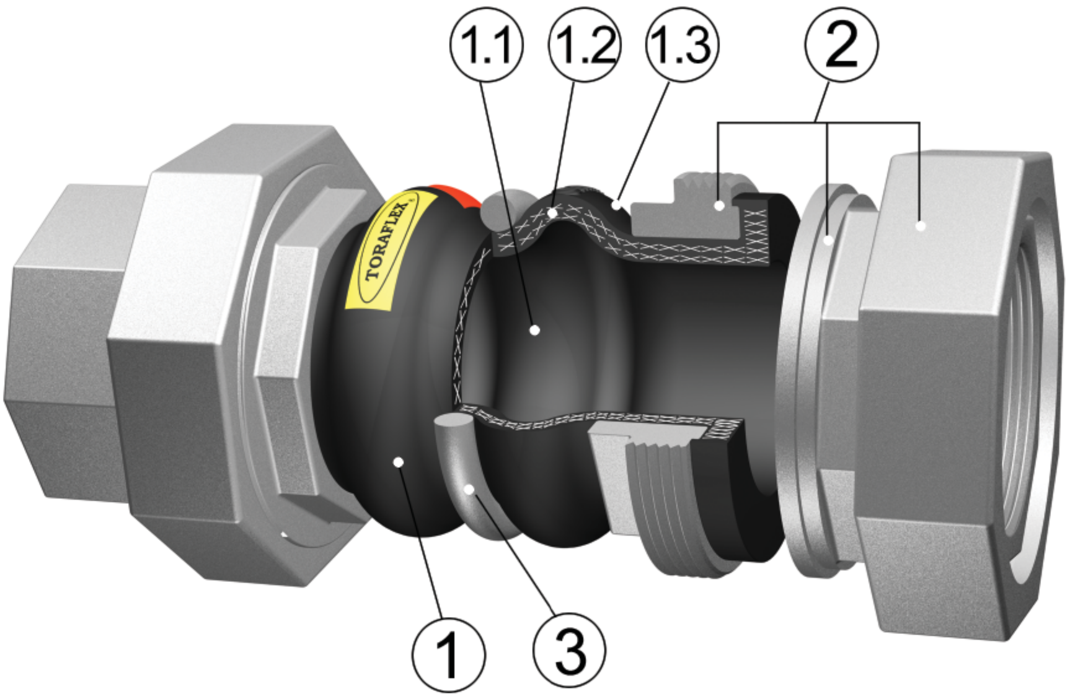


5 Light and easy to install, little installation space required, easy maintenance of replaceable bellows, no need for counterflanges.

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

6 Lot number punched for full traceability purpose.

7 Rubber material identification and maximum service pressure & temperature.

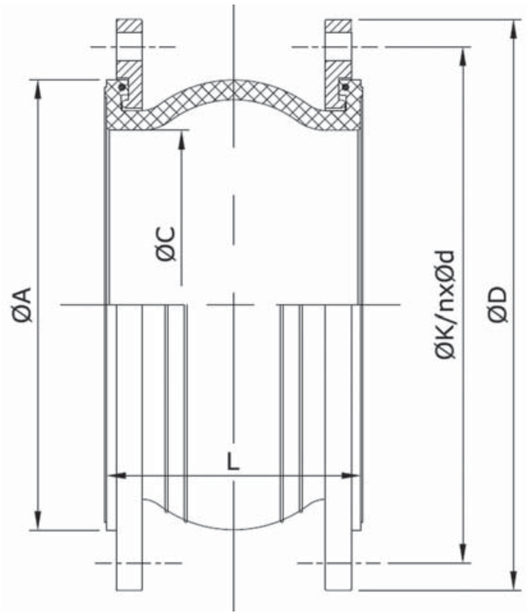


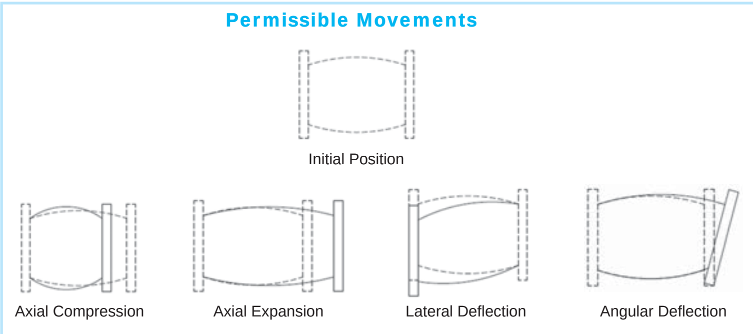
1- Vulcanised Rubber Bellow:	1.1 Rubber core (inner)
	1.2 Nylon tire cord
	1.3 Rubber cover (outer)
Rubber options: EPDM, NBR, Hypalon, Neoprene, Viton, Natural Rubber, Butyl Rubber	
2- Unions with threaded ends:	
Standard Material: Malleable Iron Zinc Plated EN-GJMB-350-10 according to EN1562 (old GTS 35-10 according to DIN 1692)	
3- Root ring:	
Standard Material: Malleable Iron Zinc Plated EN-GJMB-350-10 according to EN1562 (old GTS 35-10 according to DIN 1692)	

Toraflex® Rubber Expansions Joints

Single Sphere Expansion Joints - S10

Dimensional Details





DN		BUILDING LENGTH (mm)		MAX. MOVEMENTS ALLOWED FROM INITIAL POSITION*				ΦA (mm)	ΦC (mm)	Approx. Weight (kg)	
Inch	mm	INITIAL (L)	TOLERANCE INSTALLED (min-max)	AXIAL COMPRESSION (mm)	AXIAL EXPANSION (mm)	LATERAL DEFLECTION (mm)	ANGULAR DEFLECTION			PN10	PN16/ ASA150
1.1/4"	32	95	89-97	8	4	8	15º	68	35	3,2	3,2
1.1/2"	40	95	89-97	8	5	8	15º	68	37	4	4
2"	50	105	99-107	8	6	8	15º	86	50	5	5
2.1/2"	65	115	107-118	12	6	10	15º	106	65	6	6
3"	80	130	122-133	12	10	10	15º	118	72	8	8
4"	100	135	122-138	18	10	12	15º	152	98	9	9
5"	125	170	156-173	18	10	12	15º	182	122	11	11
6"	150	180	167-183	18	10	12	15º	213	146	13	13
8"	200	205	186-208	25	14	22	15º	262	194	19	19
10"	250	240	221-243	25	14	22	15º	323	245	24	27
12"	300	260	241-263	25	14	22	15º	372	295	29	33
14"	350	265	246-268	25	14	22	15º	409	320	39	48
16"	400	265	246-268	25	14	22	15º	471	365	48	62
18"	450	265	246-268	25	14	22	15º	520	420	56	73
20"	500	265	246-268	25	14	22	15º	572	480	69	111
24"	600	265	246-268	25	14	22	15º	690	585	71	138

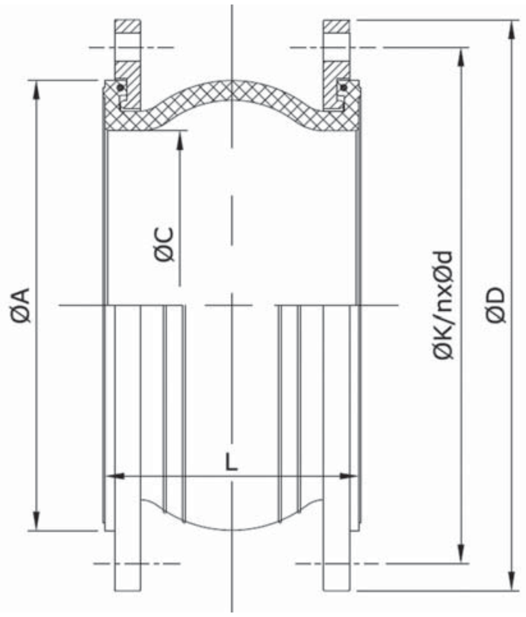
Dimensions are expressed in mm, and subjected to manufacturing tolerances. Data can be altered without notice by our Design Department for the product benefit.

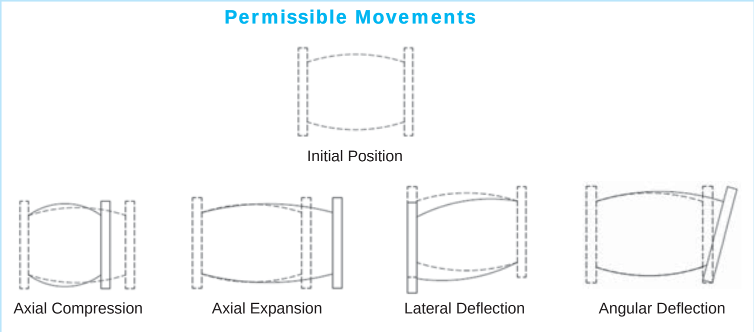
** The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination.*
** Given tolerance installed and movements allowed are valid for rubber bellows. For bellows with PTFE sleeve, values must be reduced by 1/2.*
** Increasing temperatures reduce the permissible movements capacity and number of cycles.*

Toraflex® Rubber Expansions Joints

Single Sphere Expansion Joints - S15

Dimensional Details





DN		BUILDING LENGTH (mm)		MAX. MOVEMENTS ALLOWED FROM INITIAL POSITION*				ΦA (mm)	ΦC (mm)	Approx. Weight (kg)	
Inch	mm	INITIAL (L)	TOLERANCE INSTALLED (min-max)	AXIAL COMPRESSION (mm)	AXIAL EXPANSION (mm)	LATERAL DEFLECTION (mm)	ANGULAR DEFLECTION			PN10	PN16/ ASA150
1”	25	130	122-133	30	20	30	35º	60	25	4	4
1.1/4”	32	130	122-133	30	20	30	35º	68	35	4	4
1.1/2”	40	130	122-133	30	20	30	35º	68	37	4,5	4,5
2”	50	130	122-133	30	20	30	35º	86	50	5,5	5,5
2.1/2”	65	130	122-133	30	20	30	30º	106	65	7	7
3”	80	130	122-133	30	20	30	30º	118	72	8	8
4”	100	130	122-133	30	20	30	25º	152	98	9	9
5”	125	130	122-133	30	20	30	25º	182	122	11	11
6”	150	130	122-133	30	20	30	15º	213	146	13	13
8”	200	130	122-133	30	20	30	15º	262	194	19	19
10”	250	130	122-133	30	20	30	10º	323	245	24	27
12”	300	130	122-133	30	20	30	10º	372	295	29	33

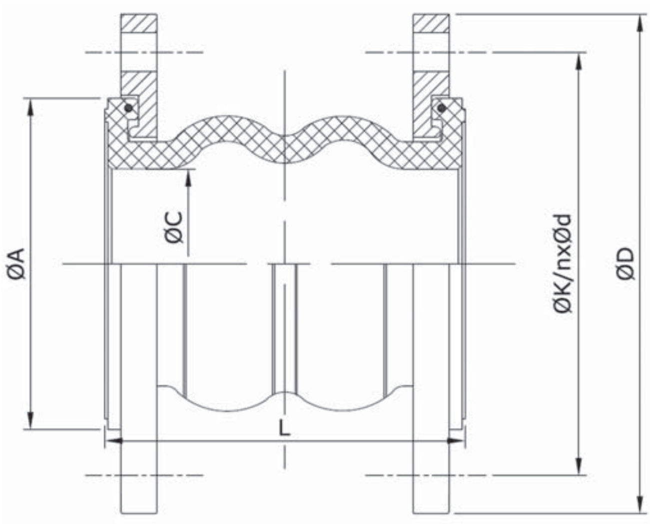
Dimensions are expressed in mm, and subjected to manufacturing tolerances. Data can be altered without notice by our Design Department for the product benefit.

** 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. For bellows with PTFE sleeve, values must be reduced by 1/2.*
** Increasing temperatures reduce the permissible movements capacity and number of cycles.*

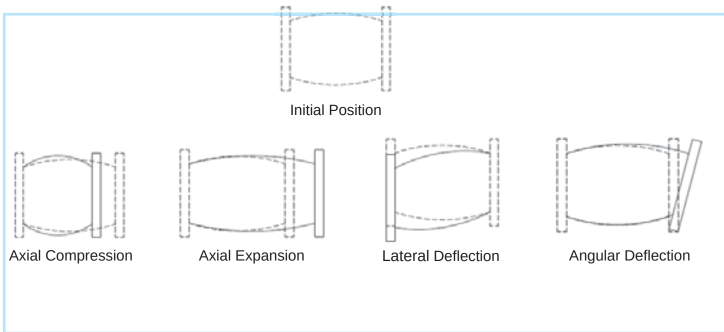
Toraflex® Rubber Expansions Joints

Single Sphere Expansion Joints - S20

Dimensional Details



Permissible Movements



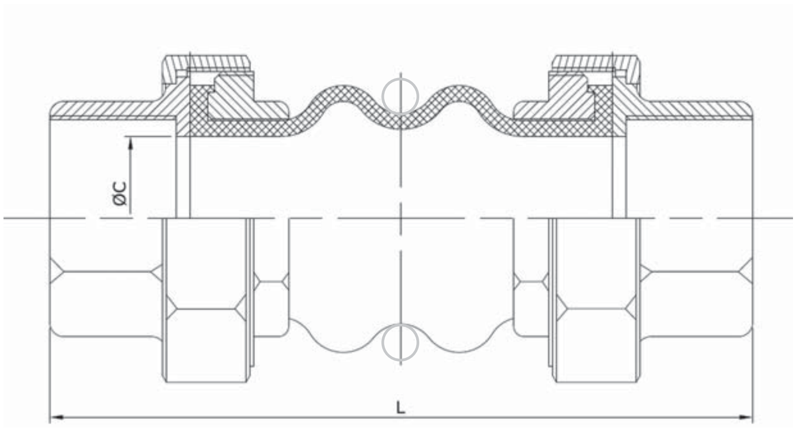
DN		BUILDING LENGTH (mm)		MAX. MOVEMENTS ALLOWED FROM INITIAL POSITION*				ΦA (mm)	ΦC (mm)	Approx. Weight (kg)	
Inch	mm	INITIAL (L)	TOLERANCE INSTALLED (min-max)	AXIAL COMPRESSION (mm)	AXIAL EXPANSION (mm)	LATERAL DEFLECTION (mm)	ANGULAR DEFLECTION			PN10	PN16/ ASA150
1.1/4”	32	175	168-178	50	30	35	40º	68	35	3,5	3,5
1.1/2”	40	175	168-178	50	30	35	40º	68	37	4	4
2”	50	175	168-178	50	30	35	40º	86	50	5,5	5,5
2.1/2”	65	175	168-178	50	30	35	40º	106	65	6	6
3”	80	175	168-178	50	30	35	40º	118	77	8	8
4”	100	225	218-228	57	35	40	35º	152	98	9	9
5”	125	225	218-228	57	35	40	35º	182	122	12	12
6”	150	225	218-228	57	35	40	35º	213	146	14	14
8”	200	325	318-328	63	35	45	30º	262	194	20	21
10”	250	325	318-328	63	35	45	30º	323	245	26	29
12”	300	325	318-328	63	35	45	30º	372	295	32	35
14”	350	350	344-353	40	30	30	20º	410	330	42	50
16”	400	350	344-353	40	30	30	20º	473	380	54	67
18”	450	350	344-353	40	30	30	20º	522	428	62	77
20”	500	350	344-353	40	30	30	20º	570	476	77	119
24”	600	350	344-353	40	30	30	20º	690	596	82	147

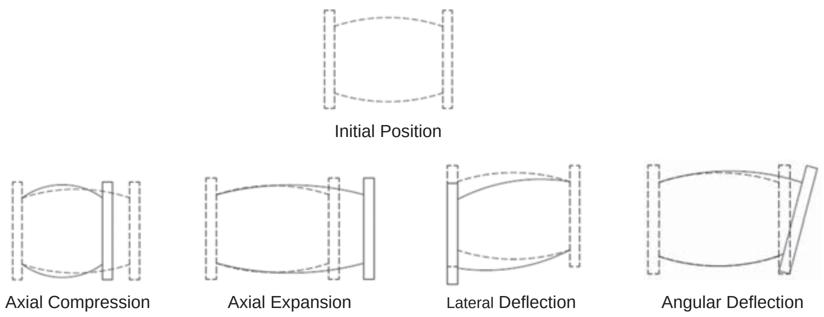
Dimensions are expressed in mm, and subjected to manufacturing tolerances. Data can be altered without notice by our Design Department for the product benefit.
** The stated movements are solely valid with the joint subject to a single movement direction. Values are proportionally reduced along with the movement combination.*
** Increasing temperatures reduce the permissible movements capacity and number of cycles.*

Toraflex® Rubber Expansions Joints

Double Sphere Expansion Joints with Threaded Unions - S30

Dimensional Details





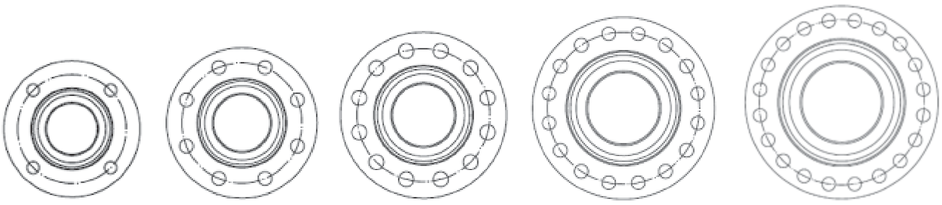
DN		BUILDING LENGTH (mm)		MAX. PERMISSIBLE MOVEMENTS FROM INITIAL POSITION*				ΦC (mm)	Approx. Weight (kg)
Inch	mm	INITIAL (L)	TOLERANCE INSTALLED (min-max)	AXIAL COMPRESSION (mm)	AXIAL EXPANSION (mm)	LATERAL DEFLECTION (mm)	ANGULAR DEFLECTION		
¾”	20	200	194-203	22	6	22	45º	17	0,7
1”	25	200	194-203	22	6	22	45º	25	1,2
1.1/4”	32	200	194-203	22	6	22	45º	32	1,4
1.1/2”	40	200	194-203	22	6	22	45º	39	2
2”	50	200	194-203	22	6	22	45º	47	2,6
2.1/2”	65	240	234-243	22	6	22	45º	60	3,8
3”	80	240	234-243	22	6	22	45º	70	5,2

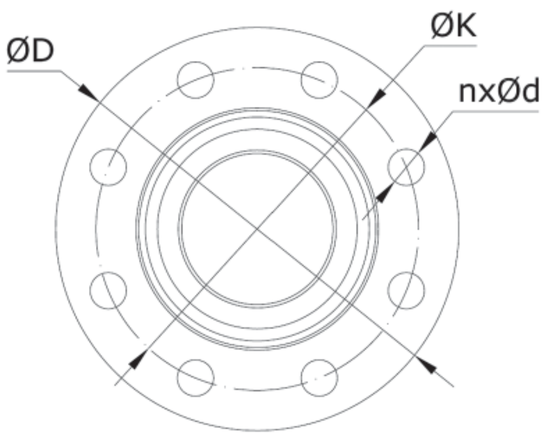
Dimensions are expressed in mm, and subjected to manufacturing tolerances. Data can be altered without notice by our Design Department for the product benefit.

** 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.*

Toraflex® Rubber Expansions Joints

S10 - S15 - S20 Flanges Drilling





DN		PN10			
Inch	**mm**	ØD	ØK	n	Ød
1.1/4"	32	140	100	4	18
1.1/2"	40	150	110	4	18
2"	50	165	125	4	18
2.1/2"	65	185	145	4	18
3"	80	200	160	8	18
4"	100	220	180	8	18
5"	125	250	210	8	18
6"	150	285	240	8	22
8"	200	340	295	8	22
10"	250	395	350	12	22
12"	300	445	400	12	22
14"	350	505	460	16	22
16"	400	565	515	16	26
18"	450	615	565	20	26
20"	500	670	620	20	26
24"	600	780	725	20	30

DN		ANSI150			
Inch	**mm**	ØD	ØK	n	Ød
1.1/4"	32	118	89	4	16
1.1/2"	40	127	98	4	16
2"	50	153	121	4	19
2.1/2"	65	178	140	4	19
3"	80	191	152	4	19
4"	100	229	191	8	19
5"	125	254	216	8	22
6"	150	279	241	8	22
8"	200	343	298	8	22
10"	250	406	362	12	25
12"	300	483	432	12	25
14"	350	533	476	12	29
16"	400	597	540	16	29
18"	450	635	578	16	32
20"	500	699	635	20	32
24"	600	813	749	20	32

DN		PN16			
Inch	**mm**	ØD	ØK	n	Ød
1.1/4"	32	140	100	4	18
1.1/2"	40	150	110	4	18
2"	50	165	125	4	18
2.1/2"	65	185	145	4	18
3"	80	200	160	8	18
4"	100	220	180	8	18
5"	125	250	210	8	18
6"	150	285	240	8	22
8"	200	340	295	12	22
10"	250	405	355	12	26
12"	300	460	410	12	26
14"	350	520	470	16	26
16"	400	580	525	16	30
18"	450	640	585	20	30
20"	500	715	650	20	33
24"	600	840	770	20	36

Dimensions are expressed in mm, and subject to manufacturing tolerances.

Toraflex® Rubber Expansions Joints

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	ELASTOMER							MEDIA	ELASTOMER						
	NATURAL (NR/IR)	NEOPRENE (CR)	NITRILE/BUNA-N (NBR)	BUTYL (IIR)	HYPALON (CSM)	EPDM	VITON (FPM)		NATURAL (NR/IR)	NEOPRENE (CR)	NITRILE/BUNA-N (NBR)	BUTYL (IIR)	HYPALON (CSM)	EPDM	VITON (FPM)
Acetaldehyde	C	C	X	A	C	A	X	Calcium Acetate	B	B	B	A	A	A	X
Acetamide	C	B	B	A	B	A	B	Calcium Bisulfate	A	A	A	A	A	A	A
Acetic Acid-5%	B	B	C	A	B	A	A	Calcium Carbonate	A	A	A	A	A	A	A
Acetic Acid-10%	B	B	C	A	B	A	A	Calcium Chloride	A	A	A	A	A	A	A
Acetic Acid-20%	B	B	C	B	B	A	C	Calcium Hydroxide	A	A	A	A	B	A	A
Acetic Acid-30%	B	B	C	B	B	A	C	Calcium Hypochlorite	C	X	C	B	A	A	A
Acetic Acid-50%	C	C	C	B	B	A	C	Calcium Nitrate	A	A	A	A	A	A	A
Acetic Acid-99.5% Glacial	C	C	C	B	C	B	C	Calcium Oxide	A	A	A	A	A	A	-
Acetic Acid, Anyhydride	C	B	B	B	A	B	X	Calcium Sulfate	A	A	A	A	A	A	A
Acetone	B	B	X	A	B	A	X	Calcium Sulfide	A	B	A	A	A	A	A
Acetylene	A	B	A	A	B	A	A	Carbitol	X	B	B	A	B	B	A
Air	A	A	A	A	A	A	A	Carbolic Acid, Phenol	X	C	X	B	C	C	A
Air.Gas	C	B	A	B	B	C	A	Castor Oil	B	A	A	A	A	B	A
Alcohol Absolute	A	A	A	A	A	A	B	Cellosolve	X	C	C	A	B	A	B
Aluminum Chloride	A	A	A	A	A	A	A	Chlorinated Solvents (Wet or Dry)	X	X	X	X	X	X	A
Aluminum Hydroxide	A	A	B	A	B	A	C	Chlorine Dioxide	X	X	X	X	B	C	A
Aluminum Nitrate	A	A	A	A	A	A	A	Chlorine Gas, Dry	C	C	C	C	X	X	B
Aluminum Sulfate	A	A	A	A	A	A	A	Chlorine Gas, Wet	X	X	C	C	X	X	C
Ammonia-Anhydrous (Liquid]	A	A	B	A	B	A	C	Chlorine Water, 3%	B	C	B	X	B	-	A
Ammon¡a Gas, Cold	A	A	A	A	A	X	A	Chlorine Water-Saturated	X	X	C	X	B	C	A
Ammonia Gas, Hot	C	B	C	C	C	C	X	Chloro Acetic Acid	X	X	X	C	B	B	A
Ammonia in Water	A	A	B	A	B	A	C	Chloro Acetone	X	C	X	C	B	X	B
Ammonium Chloride	A	A	A	A	A	A	A	Chloroform	X	X	X	X	X	X	A
Ammonium Hydroxide	B	B	B	A	A	A	A	Chlorosulfonic Acid	X	X	X	X	C	X	X
Ammonium Nitrate	A	A	A	A	A	A	A	Chromic Acid - to 25 %	X	X	X	B	A	A	A
Ammonium Phosphate, Monobasic,	A	A	A	A	A	A	A	Citric Acid	A	A	B	A	A	A	A
Dibasic, Tribasic								Cobalt Chloride, 2N	A	A	A	A	-	C	A
Ammonium Sulfate	A	A	A	A	A	A	A	Copper Chloride (Cupric Chloride)	B	A	A	A	B	A	A
Amyl Acetate	C	X	X	B	X	B	X	Copper Cyanide	A	B	A	A	B	A	A
Amyl Alcohol	A	A	B	A	A	A	A	Corn Oil	X	B	A	A	B	A	A
Aniline	X	C	X	A	C	B	A	Cresylic Acid	X	X	C	X	C	X	A
Animal Fats	X	B	A	B	C	A	A	Cyclo Hexane	X	X	B	X	X	X	A
Arsenic Acid	A	A	B	A	A	A	A	Cyclo Hexanone	X	X	X	C	X	C	X
Barium Carbonate	A	A	A	A	A	A	A	Dichloro Difluoro Methane (Freon 12)	X	B	B	C	C	B	B
Barium Chloride	A	A	A	A	A	A	A	Dichloro Fluoro Methane (Freon 21)	X	X	X	C	X	X	X
Barium Hydroxide	A	A	A	A	A	A	A	Diethyl Ether	X	C	B	C	C	X	X
Barium Sulfate	A	A	A	A	A	A	A	Diethylene Glycol	A	A	A	A	A	A	A
Barium Sulfide	A	A	A	A	A	A	A	Dioctyl Phthalate	X	X	X	A	X	B	A
Beer	A	A	C	A	A	A	A	Ethanol	A	B	A	A	A	A	B
Beet Sugar Liquors	A	A	A	A	A	A	A	Ethanol Amine	B	B	B	A	B	B	C
Benzaldehyde	X	X	X	B	X	B	X	Ethers	X	X	B	C	B	X	X
Benzene (Benzol)	X	X	C	X	X	X	A	Ethyl Acetre Acid	C	C	C	C	B	C	C
Benzyl Alcohol	C	C	X	A	B	C	A	Ethyl Alcohol (Ethanol)	A	A	A	A	A	A	B
Benzy I Benzoate	X	X	X	A	-	B	A	Ethyl Cellúlose	B	B	B	A	B	B	A
Benzyl Chloride	X	X	X	C	X	X	A	Ethyl Chloride	B	B	C	A	B	C	A
Blast Furnace Gas	C	A	C	C	B	B	A	Ethyl Ether	X	X	B	C	B	X	X
Borax	A	A	B	A	A	A	A	Ethylene Bromide	X	X	X	X	X	C	B
Bordeaux Mixture	A	A	A	A	A	A	A	Ethylene Chloride	X	X	X	C	X	C	B
Boric Acid	A	A	A	A	A	A	A	Ethylene Dichloride	X	X	X	C	X	B	B
Brandy	A	A	A	A	A	A	B	Ethylene Glycol	A	A	A	A	A	A	A
Butane	X	B	A	X	A	C	A	Fatty Acids	C	C	B	C	C	X	A
1-Butene,2-Ethyl	X	B	-	X	-	X	A	Ferric Chloride	A	A	A	A	A	A	A
Butter	X	B	A	A	A	A	A	Ferric Nitrate	A	A	A	A	A	A	A
Butyl Acetate	X	X	X	B	X	B	X	Ferric Sulphate	A	A	A	A	A	A	A
Butyl Acetate Ricinoleate	X	X	X	X	-	-	-	Fluoro Benzene	X	X	X	X	X	X	A
Butyl Alcohol	A	A	A	A	A	A	A	Fluosilic Acid	A	B	B	A	A	B	A
Butyl Carbitol	X	B	A	A	A	A	A	Formaldehyde	B	B	B	A	A	A	A
Butyl Cellosolve	X	C	B	A	B	A	C	Formic Acid (Formylic Acid)	C	B	C	A	A	B	C
Butyl Ether	X	B	A	X	C	-	C	Freon 12	X	B	B	C	C	B	B
Butyric Acid	C	C	C	C	C	C	C	Fuels-ASTM Ref. Fuel A	X	A	A	X	X	X	A

Toraflex® Rubber Expansions Joints

Elastomer Selection

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

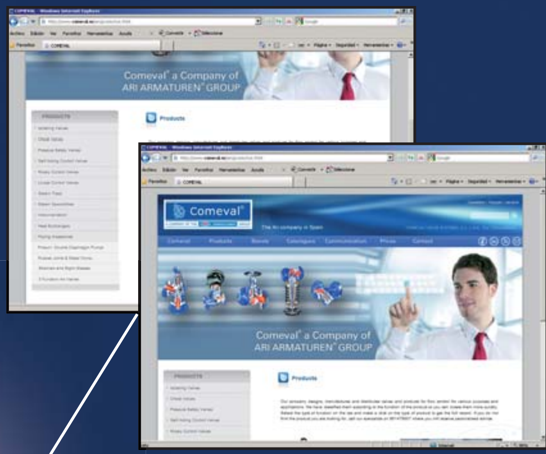
MEDIA	NATURAL (NR/IR)	NEOPRENE (CR)	NITRILE/BUNA-N (NBR)	BUTYL (IIR)	HYPALON (CSM)	EPDM	VITON (FPM)
	ELASTOMER						
Fúels-ASTM Ref. Fuel B	X	C	A	X	X	X	A
Fuels-ASTM Ref. Fuel C	-	C	-	X	C	X	A
Fuels-ASTM #1 Oil	X	B	A	X	B	X	A
Fuels-ASTM #2 Oil	X	B	A	X	-	-	-
Fuels-ASTM #3 Oil	X	B	A	X	C	X	A
Furfural (Furfurol)	X	C	X	A	C	A	X
Gasoline (Gasolene)	X	B	A	X	X	X	A
Gasoline-40% Aromatic	X	B	B	X	X	X	A
Gasoline-65 Octane	X	B	A	X	X	X	A
Glycerine	A	A	A	A	A	A	A
Glycol	A	A	A	A	A	A	A
Grease	X	B	A	X	C	X	A
Hexane	X	B	A	X	B	X	A
Hexanol	A	B	A	B	A	B	B
Hydrochloric Acid-10%	A	B	B	A	A	A	A
Hydrochloric Acid-25%	A	C	B	B	A	A	A
Hydrochloric Acid-38%	A	C	C	B	A	B	A
Hydrochloric Acid-50%	A	X	X	C	B	C	A
Hydro Cyanic Acid	B	C	B	B	A	B	A
Hydro Fluoric Acid-10%	B	B	B	A	A	A	-
Hydro Fluoric Acid-50%	C	C	X	B	A	B	-
Hydro Fluoric Acid-65%	C	C	X	B	A	B	X
Hydrofluosilicic Acid	A	B	B	A	A	B	A
Hydrogen Gas	B	A	A	A	A	B	A
Hydrogen Oxide	A	C	A	A	A	A	A
Hydrogen Peroxide-3%	B	B	B	B	B	B	A
Hydrogen Peroxide-10%	B	C	C	C	B	B	A
Hydrogen Peroxide-30%	C	X	C	C	C	B	A
Hydrogen Sulfide-Drv , (Cold/Hot}	C	C	X	A	C	A	B
Hydrogen Sulfide-Wet, Cold	C	B	C	A	A	A	A
Isobutyl Alcohol	B	B	B	A	A	A	B
Iso Octane	X	B	A	X	B	X	A
Isopropyl Alcohol	A	A	B	A	A	B	A
Isopropyl Ether	X	C	C	X	C	X	C
Jet Fuels: JP-1, A & A1	X	C	A	X	C	X	A
Kerosene (Kerosine)	X	B	A	X	C	X	A
Lactic Acid	C	B	C	B	A	B	A
Lead Acetate	B	A	B	A	A	A	X
Lubricating Oils, SAE 10,20,30,40,50	X	B	A	X	C	X	A
Magnesium Chloride_	A	A	A	A	A	A	A
Mercuric Chloride	B	B	A	A	A	A	A
Methyl Acetate	X	C	X	B	B	A	X
Methyl Alcohol (Methanol)	A	A	A	A	A	A	B
Methyl Bromide	C	X	C	B	X	A	A
Methyl Cellosolve	X	A	C	A	B	B	X
Methyl Chloride	X	X	X	C	X	C	B
Methyl Ethyl Ketone (MEK)	X	X	X	B	X	A	X
Methyl Formate	X	B	X	B	C	A	X
Methyl Isobutyl Ketone (MIBK)	X	X	X	B	X	B	X
Methylene Chloride	X	X	X	X	X	C	B
Milk	B	A	B	A	A	A	A
Mineral Oils	X	B	A	X	B	X	A
Mono Chloro Benzene	X	X	X	X	X	X	A
Naphthalin	X	X	X	X	X	X	A
Nickel Sulfate	A	A	A	A	A	A	A
Nitric Acid-10%	X	B	X	A	A	B	A
Nitric Acid-25%	X	C	X	B	A	B	A
Nitric Acid-35%	X	X	X	C	A	C	A
Nitric ACid-50%	X	X	X	C	B	X	A
Oleic Acid	X	C	A	B	B	B	A
Olive Oil	X	B	A	B	B	A	A
Oxalic Acid	B	B	C	A	B	A	C
Oxygen-Cold	B	A	C	A	A	B	A
Ozone	X	B	X	A	A	A	A
Palm Oil	X	C	A	B	B	-	A
Pentane	X	B	A	X	C	X	A
Perchloric Acid	A	A	X	B	A	B	A
Perchloro Ethylene	X	X	X	X	X	X	A
Petroleum-Below 250°F	X	B	A	X	C	X	A
Phenol	X	C	X	B	C	C	A

MEDIA	NATURAL (NR/IR)	NEOPRENE (CR)	NITRILE/BUNA-N (NBR)	BUTYL (IIR)	HYPALON (CSM)	EPDM	VITON (FPM)
	ELASTOMER						
Phosphoric Acid-10%	A	B	A	A	A	A	A
Phosphoric Acid-20%	B	B	C	A	A	A	A
Phosphoric Acid-50%	C	B	X	B	B	B	A
Phosphoric Acid-85%	C	B	X	B	B	B	A
Picric Acid	C	C	C	C	A	C	A
Picric Acid-Water Solution	A	B	B	A	A	B	A
Potassium Acetate	B	B	B	A	B	A	B
Potassium Bicarbonate	A	A	A	-	A	-	A
Potassium Bisulfate	A	A	A	A	A	-	A
Potassium Borate	A	A	A	A	A	A	A
Potassium Carbonate	A	A	A	A	A	A	A
Potassium Chlorate	A	A	A	A	A	A	A
Potassium Chloride	A	A	A	A	A	A	A
Potassium Hydroxide	B	B	C	A	A	B	C
Potassium Nitrate	A	A	A	A	A	A	A
Potassium Permanganate	A	C	C	A	B	A	A
Propy I Acetate	X	X	X	B	C	C	X
Propyl Alcohol (Propanol)	A	A	B	A	A	B	A
Propylene Dichloride	X	X	X	X	X	X	B
Rum	A	A	A	A	A	A	B
Sewage (Sewerage)	C	A	A	B	A	B	A
Sodium Acetate	C	B	C	A	A	A	X
Sodium Bicarbonate (Baking Soda)	A	A	A	A	A	A	A
Sodium Bisulfite	A	A	A	A	A	A	A
Sodium Chloride	A	A	A	A	A	A	A
Soidum Hydroxide	A	B	C	A	B	A	B
Sodium Hypo Chlorite-5%	C	C	C	B	A	B	A
Sodium Hypo Chlorite-20%	X	X	X	C	A	C	-
Sodium Meta-Phosphate	A	C	B	A	B	A	A
Sodium Nitrate	B	B	C	A	A	A	A
Sodium Perborate	B	B	B	A	B	A	A
Sodium Peroxide	B	B	B	A	A	B	A
Sodium Phosphate, mono, dibasic, tribasic	A	B	B	A	A	A	A
Sodium Sulphate	A	A	A	A	A	A	A
Sodium Thiosulfate	A	A	A	A	A	A	A
Steam - to 225°F	C	C	C	B	B	A	X
Stearic Acid	X	B	A	B	C	B	A
Styrene	X	X	X	X	X	X	A
Sugar Liquors-Cane, Beet & Maple	A	A	A	A	A	A	A
Sulfur Dioxide	C	C	C	B	A	A	A
Sulfuric Acid-10%	A	A	B	A	A	A	A
Sulfuric Acid-25%	B	B	C	B	A	B	A
Sulfuric Acid-50%	B	B	C	B	A	B	A
Sulfuric Acid-75%	X	X	X	B	B	C	A
Sulfuric Acid-95%	X	X	X	X	C	C	A
Sulfuric Acid-Fuming	X	X	X	X	C	X	B
Tannic Acid	A	A	C	C	A	C	A
Tar-Bituminous	X	C	B	X	C	X	A
Tartaric Acid	A	C	B	B	A	B	A
Tertiary Butyl Alcohol	A	A	A	A	A	A	B
Tetralin	X	X	X	X	X	X	A
Toluene	X	X	C	X	X	X	A
Tributyl Phosphate	C	X	X	B	C	C	X
Trichloro Ethylene	X	X	X	X	X	X	A
Tricresyl Phosphate	C	C	X	A	C	A	B
Triethanol Amine (Tea)	B	B	B	A	A	B	B
Triethylene Glycol	A	-	A	A	A	-	A
Trisodium Phosphate	A	A	A	A	A	A	A
Turbine Oil	X	B	B	X	B	X	A
Urea	A	B	B	A	A	-	-
Vaseline	X	B	A	X	B	X	A
Vegetable Oils	X	B	A	A	B	A	A
Vinegar	B	B	C	A	B	A	A
Vinyl Chloride	C	X	X	B	X	C	X
Water	A	B	A	A	A	A	A
Water-Drinking	A	B	A	A	A	A	A
Water-Seawater/River Water	A	B	B	A	A	A	A
Whiskey and Wine	A	A	B	A	A	A	A
Xylene (Xylol)	X	X	C	X	X	X	A

Toraflex® Rubber Expansions Joints

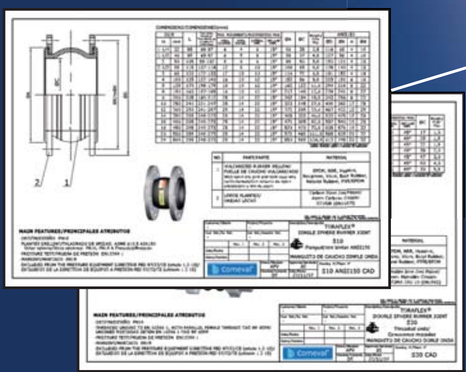
The Toraflex Information Data Source

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.

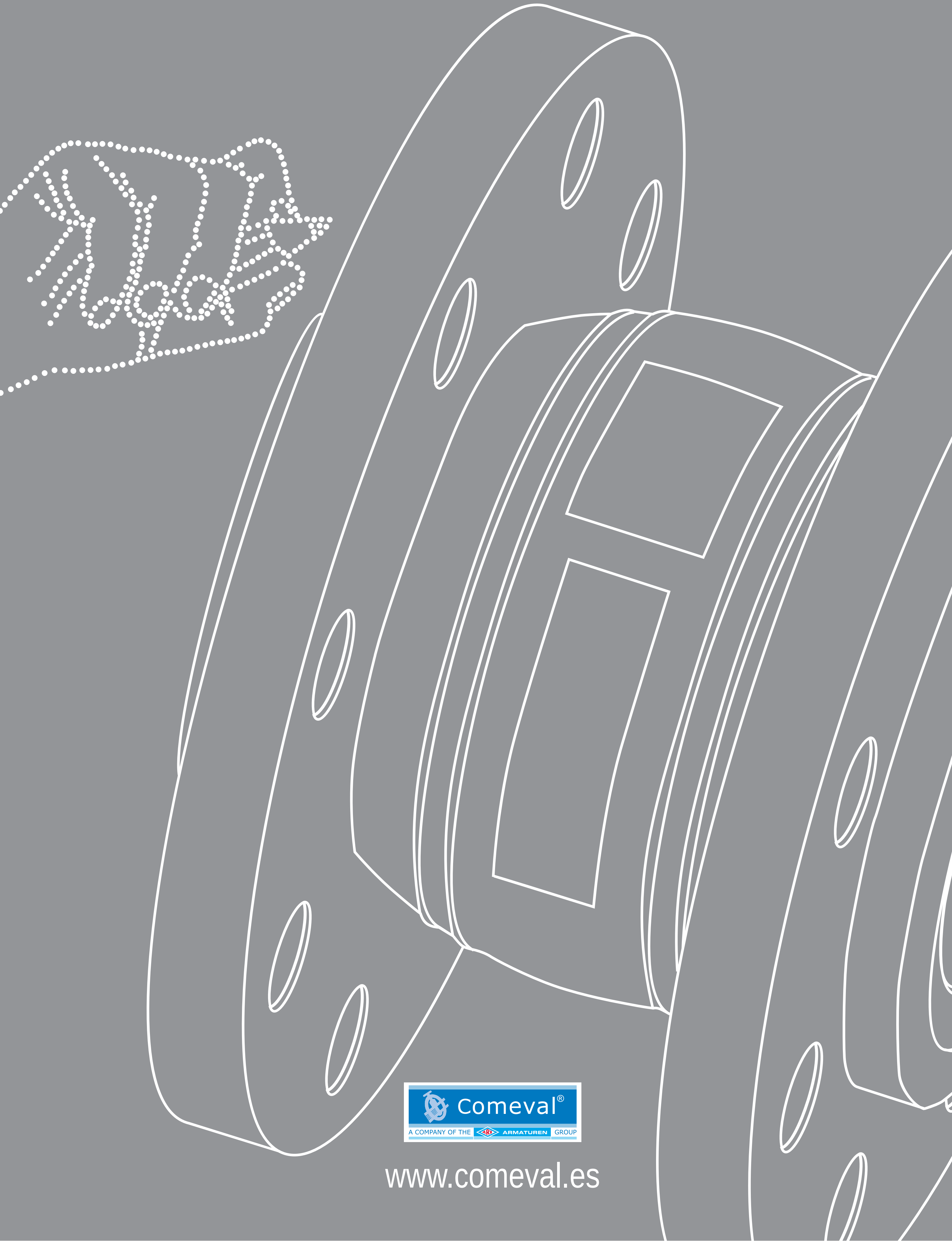
Operating and Maintenance Manuals
Provided along every valve into the sealed plastic bag. Also accessible via Internet at all times

Join us on the next to start your Toraflex® experience
www.comeval.es

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

Moulding the success.

Toraflex®



Comeval®
A COMPANY OF THE ARI ARMATUREN GROUP

www.comeval.es