Rubber Expansion Joints

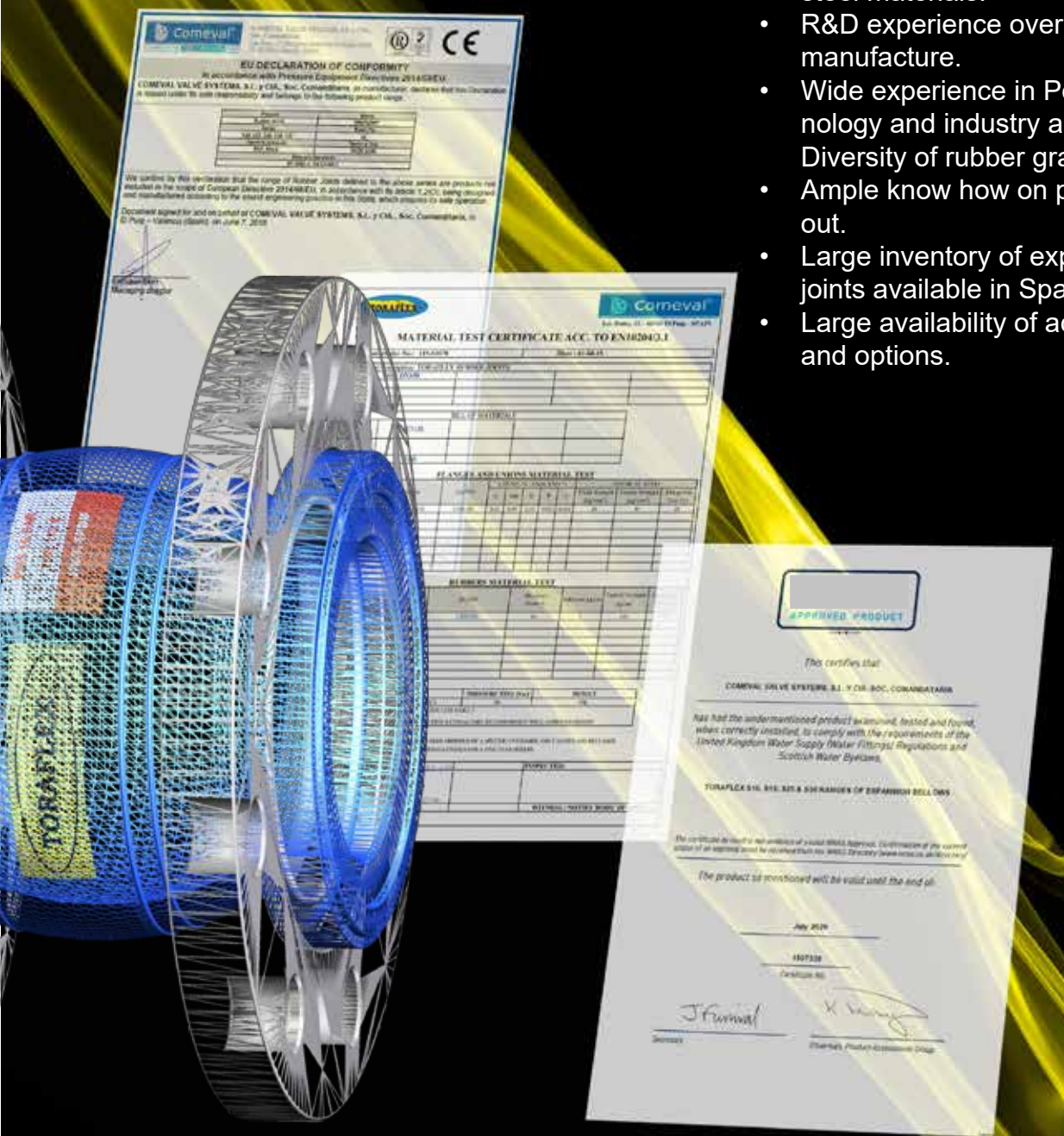
Toraflex®

Distributor:

Interflex Hose & Bellows Ltd. • *www.interflex.co.uk*
Ludlow Business Park • Ludlow • Shropshire • SY8 1FF • United Kingdom
Tel.: +44 (0)1584 878500 • Email: toraflex@interflex.co.uk

Why choosing the Toraflex® range of Flexible Joints?

- Strictly compliant with legal regulations, safety and reliability.
- Stringent QC with vulcanized rubber shell tests and traceability of steel materials.
- R&D experience over 30 years of manufacture.
- Wide experience in Polymer technology and industry application. Diversity of rubber grades.
- Ample know how on pipework lay out.
- Large inventory of expansion joints available in Spain.
- Large availability of accessories and options.



Full turned rubber design, self-sealing, no aditional gaskets are required. It prevents electrolytic corrosion

Rubber material identification and maximum service pressure and temperature.

Inner Reinforcement placed in between the outer and inner layers. Made of nylon plaited fabrics as standard.

Toraflex ®- A comprehensive portfolio of flexible expansion joints for pipework systems

S10 Single sphere Expansion Joints

DN25 - DN1200 / PN10-16 / Flanged to EN1092-2 type 21/B, PN10/16 / Marking: EN19 / Pressure Tests: EN12266-1

- Loose flanges for easy assembly.
- Precision injection molded of synthetic rubber and nylon.
- 4 different allowable movements: axial compression and expansion, lateral and angular deflection.
- Outer layer protects the bellows surface form eventual ozone attack.
- Spherical design for better strength and efficiency.

S15 Single sphere Expansion joint, single length

DN25 - DN300 / PN10-16 / Flanged to EN1092-2 type 21/B, PN10/16 / Marking: EN19 / Pressure Tests: EN12266-1

- Loose flanges for easy assembly.
- Precision injection molded of synthetic rubber and nylon.
- 4 different allowable movements: axial compression and expansion, lateral and angular deflection.
- Outer layer protects the bellows surface form eventual ozone attack.
- Spherical design for better strength and efficiency.

S20 Double Sphere Eexpansion Joints

DN25 - DN600 / PN10-16 / Flanged to EN1092-2 type 21/B, PN10/16 / Marking: EN19 / Pressure Tests: EN12266-1

- Loose flanges for easy assembly.
- Precision injection molded of synthetic rubber and nylon.
- 4 different allowable movements: axial compression and expansion, lateral and angular deflection.
- Outer layer protects the bellows surface form eventual ozone attack.
- Spherical design for better strength and efficiency.
- Double sphere design allows greater axial, lateral and angular movements subject to less effort and material wearing down during movements.
- With optional root ring

S30 Threaded unions Expansion Joints

DN25 - DN1200 / PN10-16 / Threaded to EN10266-1, GAS-Rp-BSPP/ Marking: EN19 / Pressure Tests: EN12266-1

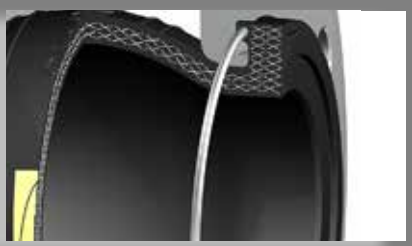
- Light and easy to install.
- Precision injection molded of synthetic rubber and nylon.
- Outer layer protects the bellows surface form eventual ozone attack.
- Spherical design for better strength and efficiency.
- Double sphere design allows greater axial, lateral and angular movements subject to less effort and material wearing down during movements.
- With root ring as standard.

Rubber materials

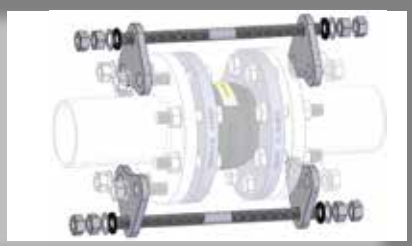
EPDM, NBR/CR, NBR, PTFE/EPDM, HYPALON, VITON, NEOPRENE

Applications

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...



End Bellows Reinforcement. Hardened steel wires to provide a greater consistence to the bellows outer neck.



Limit rods can control joint bellow over-extension and/or over-compression. Limit rods can be used for vacuum service in combination with vacuum rings.

Root ring. for increasing strength.

Options within the Toraflex® range

Flanges
ANSI class 150# standard, Stainless Steel material, Hot dip galvanized.

Spool Joints
Special construction spools for civil construction and plant machinery

Metal Joints
S25 and S50 stainless steel bellows, double corrugated layer, inner sleeve for gaseous and higher temperature media.

Typical applications and allowable movements:

- EPDM rubber bellows:
- Fresh and sea water, hot water in HVAC installations.
- NBR rubber bellows:
- Kerosene, oils and fats.
- Hypalon® rubber bellows:
- Acids and alkalis, chloride
- Axial movement, angular movement and lateral movement only without limiting rods.

On site and Off site after market service and engineering support

We provide engineering application on installation and pipework layout upon request. Our support also includes general arrangement drawings, fluid compatibility tables, Operating and Maintenance Instructions and Certificates.

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TORAFLEX

Rubber Expansion Joints - *Series S10*

Rubber expansion Joints are flexible unions for pipes and rigid systems whose main purpose is no other than protect equipment, avoiding rigid systems and pipe work rupture by thermal expansion and contraction, to absorb vibrations and noise generated by pressure pumping stations and also to assist with pipe alignment and being used as dismantling joints. They are consisting of synthetic rubber convolution fitted with metallic connectors at their ends, being flanges or threaded unions and are designed to perform axial movements and lateral and angular deflections.

Spherical design for better strength and efficiency

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

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 moulded of synthetic rubber and nylon

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

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 braided 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

Lot number punched for full traceability purpose

Rubber material identification and maximum service temperature

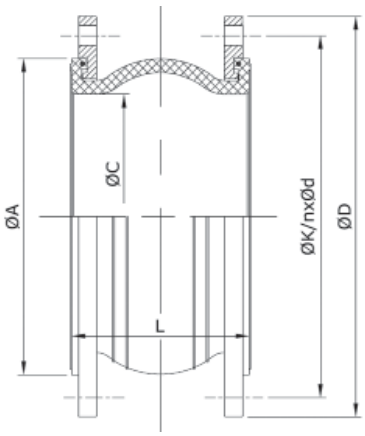
Designed and manufactured in accordance with good Engineering Sound Practice (ESP)* Patterns available for diverse convolution shape – single and double sphere – with sizes from DN 32 up to DN 1200* Rating: PN16 (up to DN300); PN10 (DN350-600); PN7 (DN650-1200) * MAWT: depending on rubber grade <EPDM: -10ºC..+110ºC; NBR: -10ºC…+90ºC; HYPALON: -10ºC…+90ºC>* Bursting pressure: 60 barg up to DN 200 and 40 bar on larger sizes* Flanges drilled to EN 1092-1 EN 1092-1 PN10, PN16 or ANSI150 – loose flat flanges * Testing Standard: EN 12266-1 * Marking Standard: EN 19 * PED 97/23/CE (Art.1.3 – 15) – Excluded from CE marking.
For Vacuum application please consult us.

Main Parts and Materials

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	
2- Loose Flanges:	
Standard Material: Carbon Steel Zinc Plated S235JR to EN10025 (St 37-2 to DIN 17100)	
Flange Options: Stainless Steel , Galvanised Steel, Vacuum Rings, Limit Rods, etc.	

Series S10

Main Valve Dimensions (mm)



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

Nominal dimensions subject to manufacturing tolerance

** 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.*

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TORAFLEX

Rubber Expansion Joints - *Series S15*

Rubber expansion Joints are flexible unions for pipes and rigid systems whose main purpose is no other than protect equipment, avoiding rigid systems and pipe work rupture by thermal expansion and contraction, to absorb vibrations and noise generated by pressure pumping stations and also to assist with pipe alignment and being used as dismantling joints. They are consisting of synthetic rubber convolution fitted with metallic connectors at their ends, being flanges or threaded unions and are designed to perform axial movements and lateral and angular deflections.

Spherical design for better strength and efficiency

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

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 moulded of synthetic rubber and nylon

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

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 braided 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

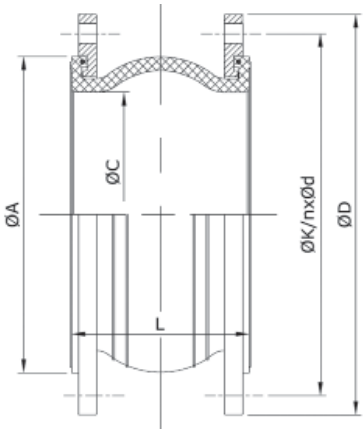
Lot number punched for full traceability purpose

Rubber material identification and maximum service temperature

Designed and manufactured in accordance with good Engineering Sound Practice (ESP)* Patterns available for diverse convolution shape – single and double sphere – with sizes from DN 32 up to DN 1200* Rating: PN16 * MAWT: depending on rubber grade <EPDM: -10ºC..+110ºC; NBR: -10ºC…+90ºC; HYPALON: -10ºC…+90ºC>* Bursting pressure: 60 barg up to DN 200 and 40 bar on larger sizes* Flanges drilled to EN 1092-1 PN 10, PN 16 or ANSI 150 – loose flat flanges * Testing Standard: EN 12266-1 * Marking Standard: EN 19 * PED 97/23/CE (Art.1.3 – 15) – Excluded from CE marking.
For Vacuum application please consult us.

Main Parts and Materials

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	
2- Loose Flanges:	
Standard Material: Carbon Steel Zinc Plated S235JR to EN10025 (St 37-2 to DIN 17100)	
Flange Options: Stainless Steel, Galvanised STeel, Vacuum Rings, Limit Rods, etc.	



Series S15

Main Valve Dimensions (mm)

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

Nominal dimensions subject to manufacturing tolerance

** 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.*

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TORAFLEX

Rubber Expansion Joints - *Series S30*

Rubber expansion Joints are flexible unions for pipes and rigid systems whose main purpose is no other tan protect equipment, avoiding rigid systems and pipe work rupture by thermal expansion and contraction, to absorb vibrations and noise generated by pressure pumping stations and also to assist with pipe alignment and being used as dismantling joints. They are consisting of synthetic rubber convolution fitted with metallic connectors at their ends, being threaded unions and are designed to perform axial movements and lateral and angular deflections. The threaded unions are specially used on OEM equipment.

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

Light and easy to install, little installation space required

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

Lot number punched for full traceability purpose

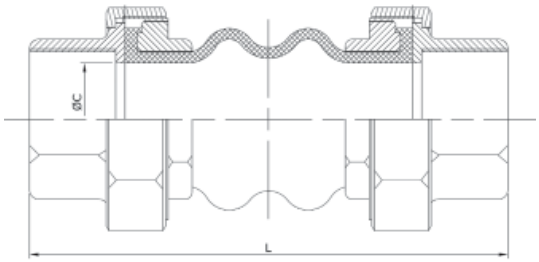
Rubber material identification and maximum service temperature

Designed and manufactured in accordance with good Engineering Sound Practice (ESP)* Patterns available for double sphere – with sizes from DN 20 up to DN 80* Rating: PN 16* MAWT: depending on rubber grade <EPDM: -10ºC..+110ºC; NBR: -10ºC…+90ºC; HYPALON: -10ºC…+90ºC>* Bursting pressure: 30 barg *End Connections by threaded ends to BSPP * Testing Standard: EN 12266-1 * Marking Standard: EN 19 * PED 97/23/CE – Paragraph 3 (Art.1.3 – 15) – Excluded from CE marking.
For Pressure > 10 bar and/or Temperature > 50ºC root ring must be used (Please consult us).
For Vacuum application please consult us.

Main Parts and Materials

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)	

Series S30



Main Valve Dimensions (mm)

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

Nominal dimensions subject to manufacturing tolerance

** 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.*

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Rubber Expansion Joints - *Series S20*

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

Precision injection moulded of synthetic rubber and nylon

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

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

Different allowable movements: axial compression and expansion, lateral and angular deflection

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 braided 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

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

Lot number punched for full traceability purpose

Rubber material identification and maximum service temperature

Designed and manufactured in accordance with good Engineering Sound Practice (ESP)* Patterns available for diverse convolution shape – single and double sphere – with sizes from DN 32 up to DN 1200* Rating: PN16 (DN32-200), PN16 (DN250-300 with root ring), PN10 (DN250-300 without root ring), PN10 (DN350-600) * MAWT: depending on rubber grade <EPDM: -10ºC..+110ºC; NBR: -10ºC…+90ºC; HYPALON: -10ºC…+90ºC>* Bursting pressure: 60 barg up to DN 200 and 40 bar on larger sizes* Flanges drilled to EN1092-1 PN 10, PN 16 or ANSI 150 – loose flat flanges * Testing Standard: EN12266-1 * Marking Standard: EN19 * PED 97/23/CE (Art.1.3 – 15) – Excluded from CE marking.
For Vacuum application please consult us.

Main Parts and Materials

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

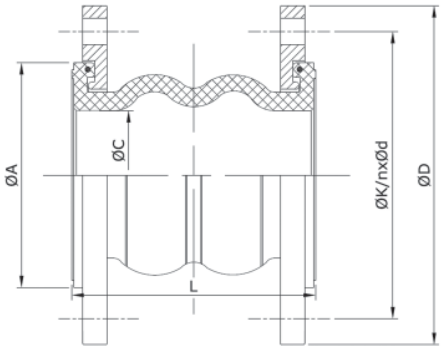
2- Loose Flanges:

Standard Material: Carbon Steel Zinc Plated S235JR to EN10025 (St 37-2 to DIN 17100)

Flange Options: Stainless Steel, Galvanised Steel, Vacuum Rings, Limit Rods, etc.

Series S20

Main Valve Dimensions (mm)



DN		BUILDING LENGTH (mm)		MAX. MOVEMENTS ALLOWED FROM INITIAL POSITION*					
Inch	mm	INITIAL (L)	Tolerance Installed (min-max)	Axial Compression (mm)	Axial Expansion (mm)	Lateral Deflection (mm)	Angular Deflection	ΦA (mm)	ΦC (mm)
1.1/4”	32	175	168-178	50	30	35	40º	68	35
1.1/2”	40	175	168-178	50	30	35	40º	68	37
2”	50	175	168-178	50	30	35	40º	86	50
2.1/2”	65	175	168-178	50	30	35	40º	106	65
3”	80	175	168-178	50	30	35	40º	118	77
4”	100	225	218-228	57	35	40	35º	152	98
5”	125	225	218-228	57	35	40	35º	182	122
6”	150	225	218-228	57	35	40	35º	213	146
8”	200	325	318-328	63	35	45	30º	262	194
10”	250	325	318-328	63	35	45	30º	323	245
12”	300	325	318-328	63	35	45	30º	372	295
14”	350	350	344-353	40	30	30	20º	410	330
16”	400	350	344-353	40	30	30	20º	473	380
18”	450	350	344-353	40	30	30	20º	522	428
20”	500	350	344-353	40	30	30	20º	570	476
24”	600	350	344-353	40	30	30	20º	690	596

Nominal dimensions subject to manufacturing tolerance

** 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.*

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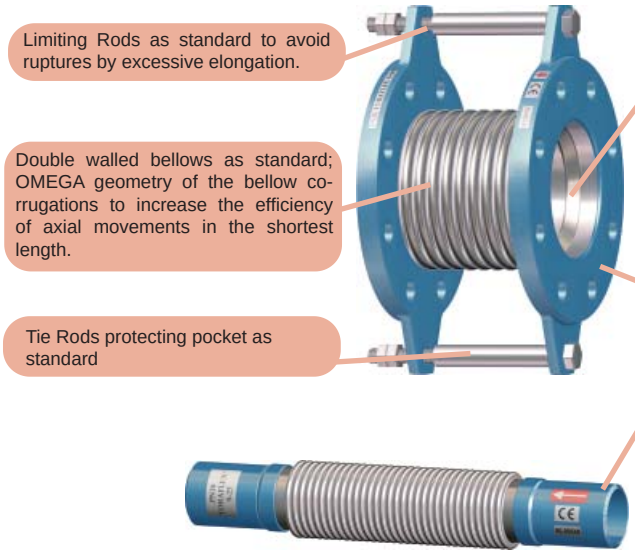
TORAFLEX

Metallic Expansion Compensators - *Series S25 / S50*

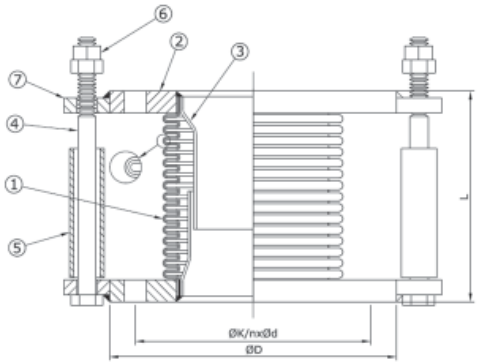
Metal Compensators are flexible unions used on rigid pipe work systems to absorb axial thermal movements, noise and pipe alignment and are featured by a significantly larger temperature resistance as well as a more permissibility to pressure compared to rubber expansion joints. S25 and S50 compensators are serial manufactured products offering a standard performance to the election of the contractor in line with the philosophy of an off the shelf delivery at a quite economic cost. Should other compensators to match with other lengths and working pressures are required; our Technical Office would be pleased to help on request.



Manufacturing Design according to EJMA -1998 / 7TH edition * Compliant with PED 97/23/CE – 1st Category, fluids Group nº 2 (toxic, flammable or Oxide fluids excluded)* Design Pressure: S50: (PN 16 DN 32-DN 300), S25: (PN 10 all size range)* Design Temperature: +300ºC (please observe the Pressure / Temperature Chart)* Vacuum Pressure: 10^{-3} mmHg (abs)* End Connections: S50 – steel flanges DIN EN1092 PN16; S25 – Steel or Stainless Steel Butt Welding Ends – DIN 2339* Marking Standard: EN 19

Series S50

S50



Main Parts and Materials

Item	Part	Material
1	Bellows	St. Steel SS304
2	Flange	Steel DIN ST-37.2
3	Internal sleeve	St. Steel SS304
4	limit rods	Steel DIN ST-44.2
5	Limit pipe	St. Steel SS304
6	Nut	Steel DIN ST-44.2
7	Lug	Steel DIN ST-44.2

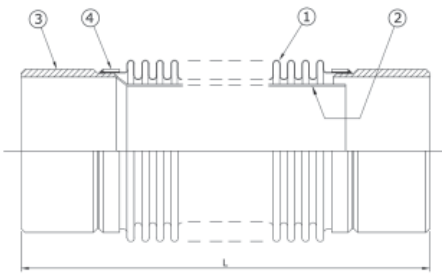
Main Valve Dimensions (mm)

DN (mm)	L	Axial Movement	ØD	ØK	n	Ød
32	150	+10, -25	140	100	4	18
40	150	+10, -25	150	110	4	18
50	150	+10, -25	165	125	4	18
65	150	+10, -25	185	145	4	18
80	150	+10, -25	200	160	8	18
100	150	+10, -25	220	180	8	18
125	150	+10, -25	250	210	8	18
150	150	+10, -25	285	240	8	22
200	200	+10, -35	340	295	12	22
250	200	+10, -35	405	355	12	26
300	200	+10, -35	460	410	12	26

Nominal dimensions subject to manufacturing tolerance

Series S25

S25



Main Parts and Materials

Item	Part	Material
1	Bellows	St. Steel SS304
2	Internal sleeve	St. Steel SS304
3	Tube ends	Steel DIN ST-44.2
4	Seal ring	St. Steel SS304

Main Valve Dimensions (mm)

DN (mm)	L	Axial Movement	Nº Corrug.
20	250	+5, -25	30
25	250	+5, -25	28
32	350	+10, -40	36
40	350	+10, -40	32
50	350	+10, -40	24
65	350	+10, -40	20
80	350	+10, -40	20
100	350	+10, -40	16
125	350	+10, -40	15
150	350	+10, -40	14
200	350	+10, -40	13
250	350	+10, -40	12
300	350	+10, -40	12

Nominal dimensions subject to manufacturing tolerance

Distributor :

Interflex Hose & Bellows Ltd. • *www.interflex.co.uk*

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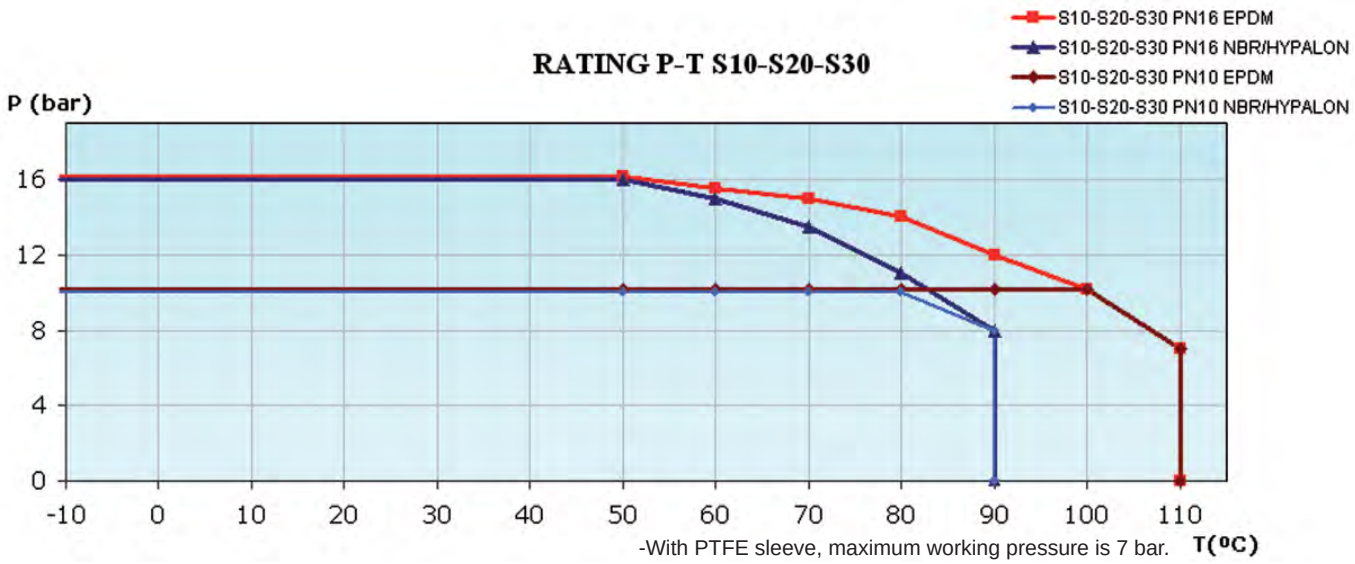
TORAFLEX® RUBBER JOINTS

Rubber Bellows Working Parameters



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

JOINT	BURST PRESSURE
S10-S20 DN32-200 (1.1/4”-8”)	60 bar
S10-S20 DN200-600 (10”-24”)	40 bar
S30 DN15-80 (1/2”-3”)	30 bar

VACUUM APPLICATION

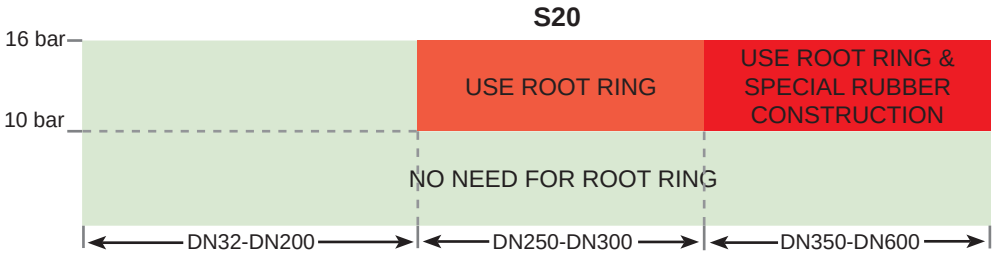
Rubber Joints are resistant to negative pressures to a certain extent. They can collapse depending on vacuum suction degree; herewith the guidelines for vacuum applications:

JOINT	TEMPORARY VACUUM LIMIT
S10 DN32-200 (1.1/4”-8”)	-0,55 bar-g (0,45 bar-abs)
S10 DN250-600 (10”-24”)	
S20 DN32-600 (1.1/4”-24”)	-0,25 bar-g (0,75 bar-abs)
S30 DN15-80 (1/2”-3”)	

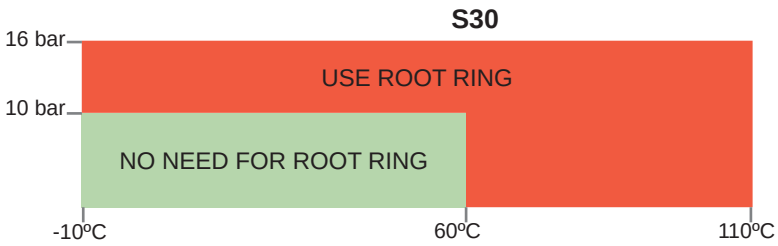
For temporary vacuum service beyond these limits, or in case of permanent vacuum service at any value, use special joints with vacuum ring and limit rods assembled as shown in figure at left.

Limits rods for vacuum application in S10 and S20 Joints

USE OF ROOT RINGS FOR DOUBLE SPHERE RUBBER JOINTS



S20 with root ring split type



S30 with root ring integral type