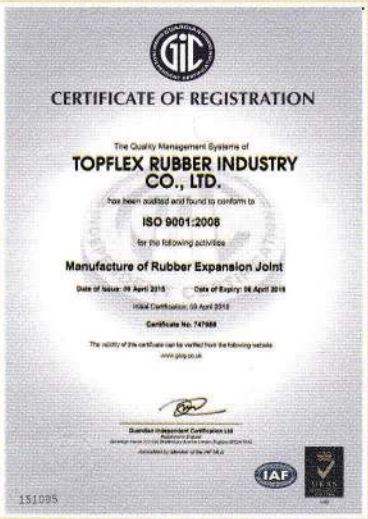
RuGaVAL


CERTIFICATE OF REGISTRATION

The Quality Management Systems of

TOPFLEX RUBBER INDUSTRY CO., LTD.

has been audited and found to conform to

ISO 9001:2008

for the following activities

Manufacture of Rubber Expansion Joint

Date of Issue: 09 April 2015 Date of Expiry: 08 April 2018

Initial Certification: 09 April 2015

Certificate No: 747988

The validity of this certificate can be verified from the following website:
www.gicg.co.uk

Guardian Independent Certification Ltd

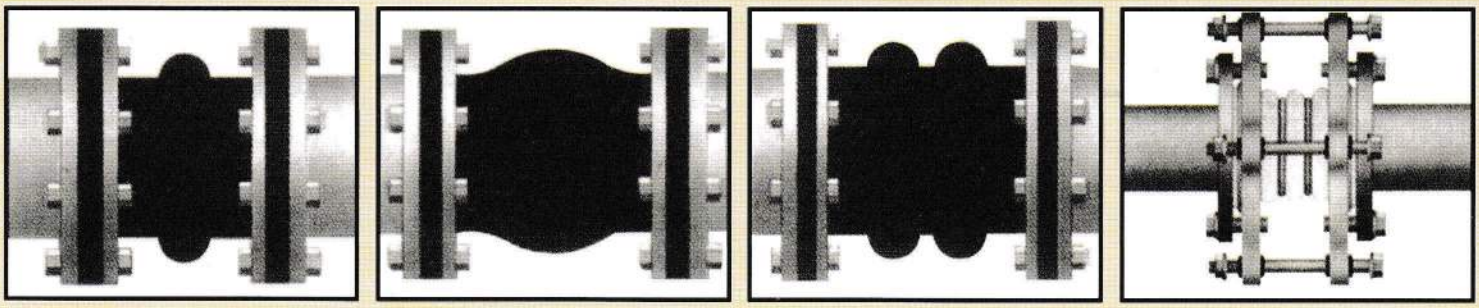
IAF

151085

TOPFLEX®
EXPANSION
RUBBER JOINT

TOPFLEX-RUGAVAL EXPANSION RUBBER JOINT

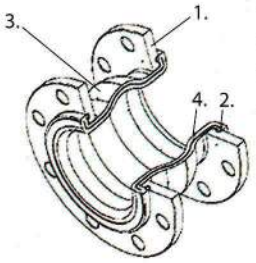
A Specialist for
RUBBER EXPANSION JOINT



TOPFLEX Series TS
SINGLE -SPHERE CONNECTORS

TOPFLEX-RUGAVAL SERIES TS and SERIES TT are designed for tough demanding industrial applications as:- found in Air Conditioning-Heating and Ventilating Systems, Chemical-Petrochemical and industrial Process Piping Systems, Power Generating Systems, Marine Service, Pulp & Paper System, Water-Wastewater Sewage and Pollution Control Systems. Installed next to mechancial equipment or between the anchor point of piping system, specify the TOPFLEX-RUGAVAL SERIES TS and SERIES TT to:

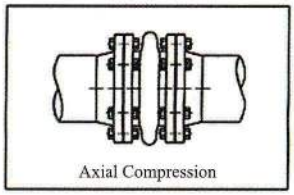
(1) Absorb pipe/Movement/Stress.
(2) Decrease Systems Noise.
(3) Isolate Vibration
(4) Compensate alignment/offset.
(5) Eliminate Electrolysis.
(6) Protect Against Start up/Surge Forces.

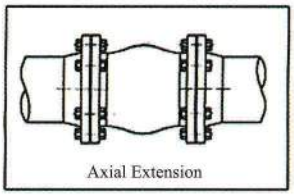


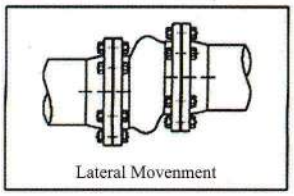
1. Flange
2. Wire
3. Elastomer
4. Reinforcing Fat

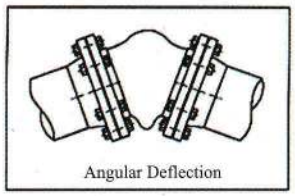
ITEM	PART	MATERIAL
1	Flanges	SS41 (changeable)
2	Wire	Carbon Steel Wires Strand
3	Elastomer	Special Synthetic Rubber
4	Reinforcing Fabric	Synthetic Fiber

Allowable Movements


Axial Compression


Axial Extension

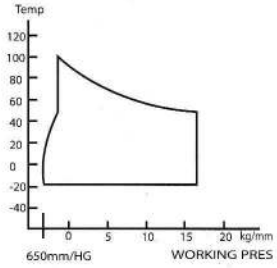

Lateral Movenment

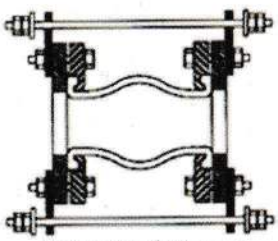

Angular Deflection

			American (2)					German (3)				
Item No.	Size I.D.	F ϕ	L	Compression	Extension	Lateral	Angular	L	Compression	Extension	Lateral	Angular
TS-01	1 inch (25mm)	60mm	6"	1/2"	3/8"	1/2"	15°	130mm	12mm	9mm	12mm	15°
TS-01Q	1-1/4 inch (32mm)	68mm	6"	1/2"	3/8"	1/2"	15°	130mm	12mm	9mm	12mm	15°
TS-01H	1-1/2 inch (40mm)	68mm	6"	1/2"	3/8"	1/2"	15°	130mm	12mm	9mm	12mm	15°
TS-02	2 inch (50mm)	86mm	6"	1/2"	3/8"	1/2"	15°	130mm	12mm	9mm	12mm	15°
TS-02H	2-1/2 inch (65mm)	105mm	6"	1/2"	3/8"	1/2"	15°	130mm	12mm	9mm	12mm	15°
TS-03	3 inch (80mm)	115mm	6"	1/2"	3/8"	1/2"	15°	130mm	12mm	9mm	12mm	15°
TS-04	4 inch (100mm)	150mm	6"	5/8"	3/8"	1/2"	15°	130mm	14mm	9mm	14mm	15°
TS-05	5 inch (125mm)	179mm	6"	5/8"	3/8"	1/2"	15°	130mm	14mm	9mm	14mm	15°
TS-06	6 inch (150mm)	210mm	6"	5/8"	3/8"	1/2"	15°	130mm	14mm	9mm	14mm	15°
TS-08	8 inch (200mm)	260mm	6"	5/8"	3/8"	1/2"	15°	130mm	14mm	9mm	14mm	15°
TS-10	10 inch (250mm)	320mm	8"	5/8"	1/2"	3/4"	15°	130mm	14mm	9mm	14mm	15°
TS-12	12 inch (300mm)	367mm	8"	3/4"	1/2"	3/4"	15°	130mm	16mm	9mm	16mm	15°
TS-14	14 inch (350mm)	408mm	8"	1"	1/2"	3/4"	15°	-	-	-	-	-
TS-16	16 inch (400mm)	472mm	8"	1"	1/2"	3/4"	15°	-	-	-	-	-
TS-18	18 inch (450mm)	522mm	8"	1"	1/2"	3/4"	15°	-	-	-	-	-
TS-20	20 inch (500mm)	570mm	8"	1"	1/2"	3/4"	15°	-	-	-	-	-
TS-24	24 inch (600mm)	689mm	10"	1"	1/2"	3/4"	15°	-	-	-	-	-

OPERATING CONDITIONS

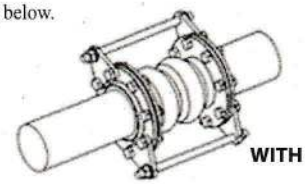
Size I.D.	1" ~ 12" 25 mm ~ 300 mm		14" ~ 24" 350 mm ~ 600 mm	
	PSIG	kPa	PSIG	kPa
Working Pressure	228	1,569	114	785
Burst Pressure	854	5,884	342	2,353
Vacuum Rating	650 mm/Hg			
Temperature	-20°C ~ 100°C / -4 F° ~ 212°F			




WITH CONTROL RODS

Control rods must be installed when pressure (test surge, operating, starting a pump, etc.) exceeds the rating below.

Size I.D.	1" ~ 4" 25mm ~ 100mm	5" ~ 10" 125mm ~ 250mm	12" ~ 14" 300mm ~ 350mm	16" ~ 24" 400mm ~ 600mm
PSIG	150	135	90	45
kPa	1,035	931	621	310


WITH CONTROL RODS

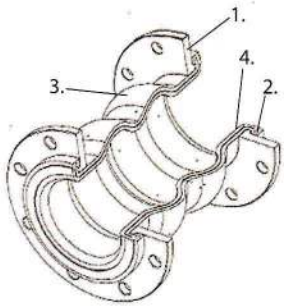
TOPFLEX Series TT

TWIN-SHPHERE CONNECTORS (WITH FLANGES)

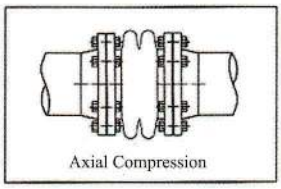
RUGAVAL

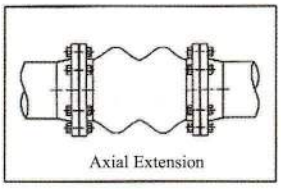
ITEM	PART	MATERIAL
1	Flanges	SS41 (Changeable)
2	Wire	Carbon Steel Wires Strand
3	Elastomer	Special Synthetic Rubber
4	Reinforcing Fabric	Synthetic Fiber

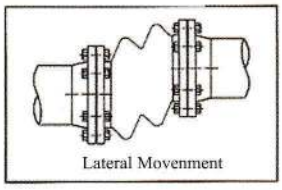
1. Flange
2. Wire
3. Elastomer
4. Reinforcing Fat
Twin-Sphere

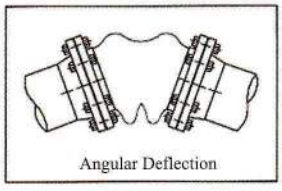


Allowable Movements


Axial Compression


Axial Extension

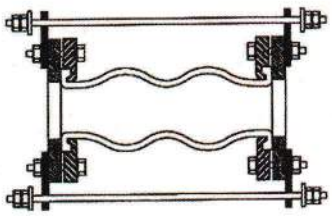

Lateral Movenment


Angular Deflection

Item No.	Size I.D.	L	Fϕ	Compression	Extension	Lateral	Angular
TT-101H	1-1/2 inch (40 mm)	175mm	68mm	50mm	30mm	45mm	35°
TT-102	2 inch (50 mm)	175	86	50	30	45	35°
TT-102H	2-1/2 inch (65 mm)	175	105	50	30	45	35°
TT-103	3 inch (80 mm)	175	115	50	30	45	35°
TT-104	4 inch (100 mm)	225	150	50	35	40	35°
TT-105	5 inch (125 mm)	225	179	50	35	40	35°
TT-106	6 inch (150 mm)	225	210	50	35	40	35°
TT-108	8 inch (200 mm)	325	260	60	35	35	30°
TT-110	10 inch (250 mm)	325	320	60	35	35	30°
TT-112	12 inch (300 mm)	325	367	60	35	35	30°
TT-114	14 inch (350 mm)	350	408	50	40	30	20°
TT-116	16 inch (400 mm)	350	472	50	40	30	20°
TT-118	18 inch (450 mm)	350	522	50	40	30	20°
TT-120	20 inch (500 mm)	350	570	50	40	30	20°
TT-124	24 inch (600 mm)	350	570	50	40	30	20°

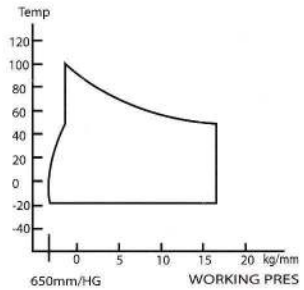
OPERATING CONDITIONS

Size I.D.	1" ~ 12" 25 mm ~ 300 mm		14" ~ 24" 350 mm ~ 600 mm	
	PSIG	kPa	PSIG	kPa
Working Pressure	228	1,569	114	785
Burst Pressure	854	5,884	342	2,353
Vacuum Rating	650 mm/Hg			
Temperature	-20°C ~ 100°C / -4 F°~ 212°F			


WITH CONTROL RODS

Installed with control rods to prevent internal pressure and motion by over limit usage and vacuum for dropping.
Control rods and Reinforcing Ring unit must be installed when pressure (test surge, Operating, starting a pump, etc.) exceeds he rating below:

Size I.D.	1-1/2" ~ 4" 25mm ~ 100mm	5" ~ 10" 125mm ~ 250mm	12" ~ 14" 300mm ~ 350mm	16" ~ 24" 400mm ~ 600mm
PSIG	150	135	90	45
kPa	1,035	931	621	310



REFERENCE

1. Elastomer Materials - Neoprene, Butyl, Nitrile, EPDM, Hypalon, SBR, Natural rubber for your specifications.
2. Flange drilling - JIS, DIN, ANSI, BS and other standard drilling for your specifications.
3. Applicable fluids - water, warm water, seawater, weak acids, alkalis, etc.
4. 1 PSIG = 14.25 kg/cm^2

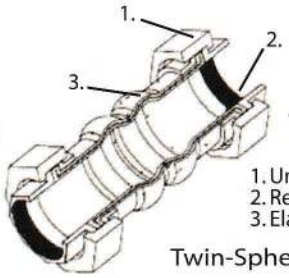
TOPFLEX Series TU
TWIN-SPHERE CONNECTORS
(WITH UNION THREADS)

RUGAVAL

ITEM	PART	MATERIAL
1	UNION	FB 32
2	Reinforcing Cloth	Nylon Fabric
3	Elastomer	Synthetic Rubber

TOPFLEX - RUGAVAL SERIES TU is designed for supply/distribution pipeline service or to connect piping to specific equipment applicatioon such as: Pumps, Chillers, Cooling, Cooling Towers, Compressors, Blowers, Fans Absorption Machines, etc. Installed next to mechanical equipment or between the anchor points of piping system, specify the **TOPFLEX-RUGAVAL SERIES TU** to:

(1) Absorb Pipe/Movement/Stress.
(2) Decrease Systems Noise.
(3) Isolate Vibration.
(4) Compensate alignment/offset.
(5) Eliminate Electrolysis.
(6) Protect Against Start up/Surge Forces.



1. Union Threads
2. Reinforcing Fabric
3. Elastomer

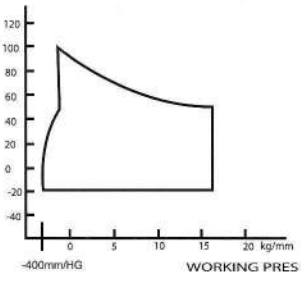
Twin-Sphere Union

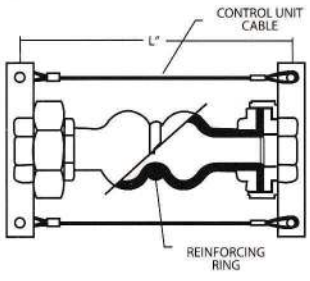
The **TOPFLEX - RUGAVAL SERIES TU** is engineered for tough, demanding industrial and commercial application, as found in Air Conditioning-Heating and Ventilating Systems, Chemical - Petrochemical and industrial Process Piping Systems, Power Generating Plants, Steel Mills, Marine Service, Pulp & Paper Systems, Water-Wastewater Sewage and Pollution Control Systems.

Item No.	Size I.D.	L	Compression	Extension	Lateral	Angular
TU 1/2	1/2 inch (15 mm)	203mm	22mm	6mm	22mm	30°
TU 3/4	3/4 inch (20 mm)	203	22	6	22	30°
TU 1	1 inch (25 mm)	203	22	6	22	25°
TU 1-1/4	1-1/4 inch (32 mm)	203	22	6	22	25°
TU 1-1/2	1-1/2 inch (40 mm)	203	22	6	22	20°
TU 2	2 inch (50 mm)	203	22	6	22	15°
TU 2-1/2	2-1/2 inch (65 mm)	225	22	6	22	12°
TU 3	3 inch (80 mm)	225	22	6	22	10°

OPERATING CONDITIONS

Size I.D.	1/2" ~ 3" 15 mm ~ 80 mm	
	PSIG	kPa
Working Pressure	228	1,569
Burst Pressure	711	4,905
Pressure Rating	90	621
Vacuum Rating	400 mm/Hg	
Temperature Range	-20°C ~ 100°C / -4°F ~ 212°F	





Control unit cable and Reinforcing ring must be installed when pressure (test surge, operating, starting a pump, etc.) exceeds the rating.

REFERENCE

1. Elastomer Materials - Neoprene, Butyl, Nitrile, EPDM, Hypalon, SBR, Natural rubber for your specifications.
2. Union - Standard item employs BS UNION with materials FB 32 and FCD 40. Also can supply ANSI, DIN and other standard.
3. Applicable fluids - water, warm water, seawater, weak acids, alkalis, etc.
4. 1 PSIG = 14.25 kg/cm^2

Table 1 : This list of elastomers is used in TOPFLEX RUGAVAL RUBBER EXPANSION JOINTS, is only a general guide. Special elastomer compounds producted by member manufacturers may have different properties.

Rating scale code :

7 - Outstanding 6 - Excellent 5 - Very good 4 - Good 3 - Fair to good 2 - Fair 1 - Poor to Fair 0 - Poor x - Not Suitable

MATERIAL DESIGNATION	ANSI/ASTM D1418-77	CR	IR	IIR	NBR	CSM	EPDM
	ASTM D-2000 SAE J-200	BC, BE	AA	AA	BF, BK, CH	CE	BA, CA, DA
COMMON NAME Chemical Group Name		NEOPRENE Chloroprene	NATURAL RUBBER Polyisoprene, Synthetic	BUTYL Isobutene-Isoprene	BUNA-N/NITRILE Nitrile-Butadiene	HYPALON Chloro-Sulfonyl-polyethylene	EPDM Ethylene-Propylene-Diene-Terpolymer
ELASTOMER PHYSICAL AND CHEMICAL PROPERTIES COMPARISON							
OZONE		5	0	6	2	7	7
WEATHER		6	2	5	2	6	6
SUNLIGHT		5	0	5	0	7	7
OXIDATION		5	4	6	4	6	6
HEAT		4	2	5	4	4	6
COLD		4	5	4	3	4	5
FLAME		4	0	0	0	4	0
TEAR		4	5	4	3	3	4
ABRASION		5	6	4	4	4	5
IMPERMEABILITY		4	4	2	6	4	4
DYNAMIC		2	2	2	5	2	5
REBOUND-HOT		5	6	5	4	4	6
REBOUND-COLD		4	6	0	4	2	6
COMP. SET		2	4	3	5	2	4
TENSILE STRENGTH		4	6	4	5	2	5
DIELECTRIC STR.		5	6	5	0	5	7
ELE. INSULATION		3	5	5	1	3	6
WATER ABSORP.		4	5	5	4	4	6
RADIATION		5	6	4	5	5	7
SWELLING IN OIL		4	0	0	5	4	0
ACID, DILUTE		6	3	6	4	6	6
ACID, CONC.		4	3	4	4	4	4
ALIPHATIC HYDRO.		3	0	0	6	3	0
AROMATIC HYDRO.		2	0	0	4	2	0
OXYGENATED HYDRO.		1	4	4	0	1	6
LACQUERS		0	0	3	2	0	3
OIL & GASOLINE		4	0	0	5	4	0
ALKALI, DILUTE		4	x	4	4	0	6
ALKALI, CONC.		0	x	4	0	4	6
ANIMAL & VEG. OIL		4	x	5	5	4	5
CHEMICAL		3	3	6	3	6	6
WATER		4	5	5	4	5	5

Table 2 : Guide of Manufacturing Materials and Applications

TOPFLEX RUGAVAL attach a brief remark on applications as well as distinguishing colors. The color may be modified as required.

Material	Color	Max. Temp.	Application
NEOPRENE (CR)	WHITE	80°C / 176°F	Offering similar qualities to natural rubber with increased ozone resistance.
EPDM	RED	120°C / 248°F	Specially for : Higher temperature and ozone resistance, Hot water, Vapour, Alkalis, Ester, Ketones, Weak Acids (except Nitric Acid), not suitable with oil based corrosion protection agents or other oil products.
NITRILE (NBR)	YELLOW	90°C / 194°F	Resistant to many hydrocarbons, alkalis, salt solutions, butane, propane and acetylene gas, fats, oils and hydraulic fluid, weak acids (except Nitric Acid).
HYPALON (CSM)	GREEN	80°C / 176°F	Strong or concentrated acids (except Nitric Acid) and alkalis.
BUTYL (IIR)	GRAY	130°C / 266°F	Offers weather, ozone, impermeability resistance. Also offers excellent dissolvent resistance.
NBR / NR	WHITE	70°C / 158°F	Offers high abrasion and moderate chemical resistance. Such as Drinking-water or Food.

COMPANY REFERENCE

Through continuously research, improve and develop to create productive engineering, **TOPFLEX RUGAVAL RUBBER** cooporate with Australia in adopting the latest technology to manufacture the Rubber Expansion Joints in Taiwan, which are superior to traditional products in quality and, characterized by economic, vibration and sound absorption, freedom from corrosion, small space requirement. High resistance to shock, easy to install, greater recovery from movement, freedom from embrittlement, eliminates electrolysis, to be used in Chemical Process Industry, HVAC, Marine, Pollution Abatement, etc. We are quite confident of our Rubber Expansion Joint products to satisfy you in competitive prices, high quality, prompt delivery and good service.

STANDARD WARRANTY

All merchandise sold by us is subject to this Standard Warranty. Our products are warranted to the original purchaser for one year from the date of sale to be free from defects arising from materials or manufacture. Our liability for breach of any or all warranties expressed or implied, is limited to refunding the invoice price of the product, or at our option, to the replacement of the product. **TOPFLEX** or **RUGAVAL INDUSTRIES SDN. BHD.** will no participate in or be responsible for any installation, labour or consequential costs arising from claims under warranty. The replacement of the product or the refund of the invoice price is the maximum liability of the Company. It is incumbent upon the user to apply the products strictly in accordance with approved Trade Practice, and any defect or failure arising from the misapplication, alteration, misuse or abuse or any other contributing factor beyond our control, automatically voids this warranty. This warranty is conditional upon any defective products being returned to the premises of **RUGAVAL INDUSTRIES SDN. BHD.** or their nominated agent with all freight and associated forwarding charges prepaid. The sale of our products under any other warranty or guarantee, expressed or implied, is not authorized by the Company.

FEATURES

◆ VIBRATION, SOUND AND SHOCK ABSORPTION

Noises, vibration of motor and compressor, water hammer, pumping impulses and water born noises can be absorbed. Also withstands surge pressures without shattering owing to their tensile strength.

◆ HIGHER BURST STRENGTH

Spherical shape is stronger than cylindrical shape or other configuration. Under pressure, TOPFLEX RUGAVAL joint is 4 times as strong as a cylindrical joint. Also our products are made of the most suitable materials resulting in burst pressures mush higher than those of other makes.

◆ GREATER RECOVERY FROM MOVEMENT

They will neither crack nor fracture under repeated flexing. They have a remarkable long life expectancy even under adverse conditions due to the finest grades of rubber and other materials used in their manufacture.

◆ WIDE SERVICE RANGE

They are made from chemical resistant elastomers such as Neoprene, Nitrile, Hypalon, and EPDM that ensures a product compatible with the fuild being pumped or piped. Operation up to 228 PSIG (1,569 kPa) or 16kg/cm^2 and -20°C to 100°C.

◆ FREE FROM CORROSION

They are made to withstand corrosive chemicals and can be supplied to resist acid fumes and ozone attack.

◆ SECURITY ASSURED IN USAGE

Special spherical design prevents the body of the coupling coming into contact with the bolt heads when subjected to high pressure and expansion. The robust coupling provide a sense of security as a result of the damage proof design.

◆ LOW DEFORMATION UNDER PRESSURE

Internal pressure is exerted in all directions distributing forces evenly over a large area. This results in very low deformation of the joints.

◆ SUITABLE FOR SUCTION AND DELIVERY

Because of the excellent moulding technique with its tough chemical fibre, the joints can satisfactorily withstand the suction and discharge. Vacuum rating can stand up to 650mm/Hg.

◆ GREATER MOVEMENTS ARE AVAILABLE

Four-way movements - axial compression and extension, Lateral movement and angular deflections provide a high level of installation flexibility.

USE IN

- ◆ Air conditioning system
- ◆ Air ducts
- ◆ Chemical lines
- ◆ Circulating water lines
- ◆ Compressor lines
- ◆ Paper stock lines
- ◆ Pump-suction and discharge
- ◆ Refrigeration lines
- ◆ Turbine to condenser
- ◆ Marine Installation
  - Air intake on Diesel engines
  - Ballast
  - Between scoop and condenser
  - Circulating lines to condenser
  - Fog foam lines
  - Fire and bilge pump lines
  - Forced draft
  - Overboard discharge
  - Sanitary system
  - Ventilation lines