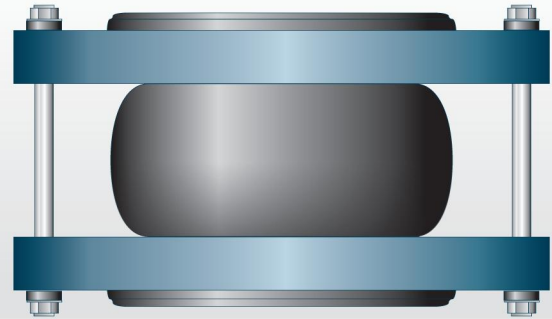


DESIGN CONDITIONS

Max. Working Pressure	16 Bar
Burst Pressure	>30 Bar
Vacuum Rating	600mm WG
Temperature Range	Up to 110°C
Test Pressure	24 Bar
Bellows (outer)	EPDM, hot water resistant
Bellows (inner)	EPDM, ozone proof, warmth resistant
Reinforcement	High tensile synthetic fabric
Flanges	Carbon steel, zinc plated



GENERAL INFORMATION

This range of expansion joints is comprised of an EPDM single sphere moulded bellows, with high tensile synthetic reinforcement and steel wire reinforced faces. With carbon steel galvanised flanges which are free to rotate around the bellows axis, this feature facilitates installation and the construction ensures that all inner surfaces that contact the flow media, are EPDM rubber. These expansions joints are also fitted with adjustable tie bar assembly which are seated on noise absorbing rubber top hat washers. These rubber bellows are used to absorb vibration and attenuate noise caused by reciprocation plant such as pumps, chillers and air handling units. They are also used to compensate for small amounts of axial, lateral and angular pipework movements. Suitable for use of chilled water and heating systems, but **not suitable** for drinking water, cooling water with oil containing additives, oily compressed air or permanent effect of steam. Recommendations contained in our literature on correct installation of rubber expansion joints should be followed. These rubber bellows are restrained by means of tie-bars and therefore only require minimal guiding by intermediate anchors and/or guides. When operating at elevated temperatures the maximum operating pressure should be derated; refer to the pressure/temperature chart on the last page of this document. Vacuum rating is based on the unit being installed at its neutral length; the unit should not be extended on installation.

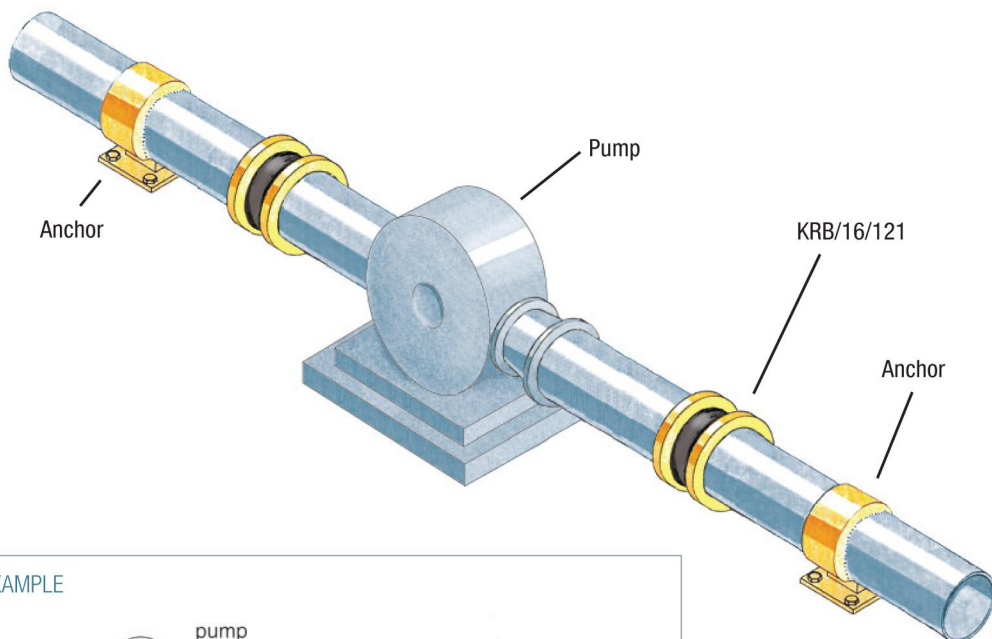
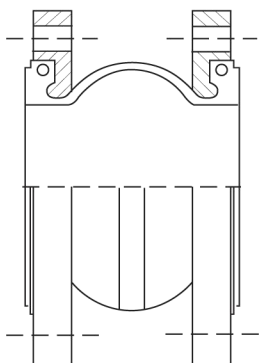
NOMINAL SIZE	PART NUMBER	NEUTRAL LENGTH	AXIAL COMPRESSION	AXIAL ELONGATION	LATERAL DEFLECTION	EFFECTIVE AREA
mm		mm	mm	mm	+/-mm	+/- deg
20	KRB/0020/16/122	130	9	6	9	2
25	KRB/0025/16/122	130	10	6	10	2
32	KRB/0032/16/122	130	10	7	11	2
40	KRB/0040/16/122	130	12	7	12	2
50	KRB/0050/16/122	130	12	8	12	2
65	KRB/0065/16/122	130	12	15	12	2
80	KRB/0080/16/122	130	12	15	12	2
100	KRB/0100/16/122	130	12	15	12	2
125	KRB/0125/16/122	130	12	15	12	2
150	KRB/0150/16/122	130	12	15	12	2
200	KRB/0200/16/122	130	12	15	12	2
250	KRB/0250/16/122	130	12	15	12	2
300	KRB/0300/16/122	130	12	15	12	2

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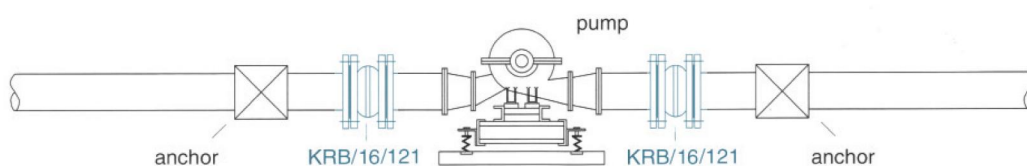
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A TYPICAL APPLICATION OF A SINGLE SPHERE RUBBER EXPANSION JOINT

PLAN VIEW FOR A FLANGED SINGLE SPHERE EXPANSION JOINT



PLAN VIEW OF A TYPICAL APPLICATION EXAMPLE



The correlation between working temperature and pressure can be found on our temperature correction chart (see last page).

INSTALLATION INFORMATION

Storage

Rubber joints should always be stored in a cool, dry & clean environment away from direct sunlight.

Inspection

Rubber joints should be inspected thoroughly prior to installation for any signs of internal or external damage. The sealing face should always be clean and free of any debris.

Selection

Always check that the correct selection of rubber joints has been made for the application and service required. Refer to the appropriate Thermosel data sheet showing the relevant temperature/pressure correlation chart.

Mating flanges

It is essential that the correct mating flanges are used when installing rubber bellows. The recommended flanges are full bore weld neck (see Figure 1) as these require no additional gaskets. If a flange is used having a different

sealing face diameter, a gasket must be used to prevent any sharp edges cutting into the rubber face, which could destroy the integrity of the bellows. The gasket must reach the internal bore of the rubber bellows (see Figure 2). Alternatively the gap on a slip on type flange could be filled and ground flush (see Figure 3).

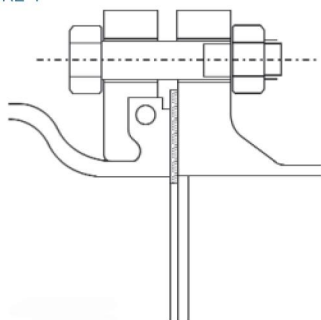
Misalignment

Rubber bellows should be installed at their neutral length. The gap between the mating flanges should be within ± 5 mm axial or ± 5 mm laterally of the neutral length. Refer to appropriate Thermosel data sheet for installation lengths. Any adjustments should be carried out on the pipework prior to installation of the rubber bellows.

Alignment

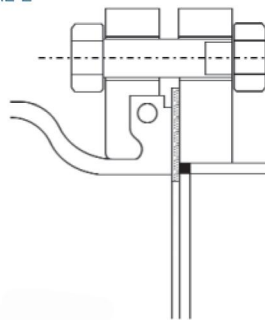
Take care not to damage the sealing face of the rubber bellows when installing between the gap left in the pipework. Also make sure that the rubber sealing face is correctly seated into the specially machined flanges of the rubber bellows.

FIGURE 1



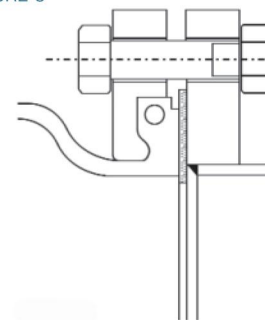
Full bore weld neck

FIGURE 2



Slip on mating gasket

FIGURE 3



Slip on mating with weld ground flush

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Bolts

The bolts should always be inserted from the bellows side as shown in Figures 1-3. This will prevent any damage during service. Bolts should never be overtightened due to the rubber sealing face, as this can cause the joints to leak. Tighten opposite bolts to get uniform pressure distribution all round. See Figure 5 for appropriate torque settings on new rubber bellows.

NOTE: Due to the nature of rubber, the bolts will need retightening 24 hours after installation.

Tie-bars

If you are using rubber bellows with integral tie-bars, ensure that the nuts are tight and tie-bar lengths are evenly distributed. If it is necessary to remove any tie-bars for ease of installation then always ensure that the rubber top hat washers, steel washers and nuts have been replaced in the correct orientation. Check tie-bars remain tight prior to any pressure test. Do not loosen tie-bars in service as this may cause damage to any associated equipment.

FIGURE 4 - TWIN SPHERE UNIONS

Keep contact surface clean before assembly

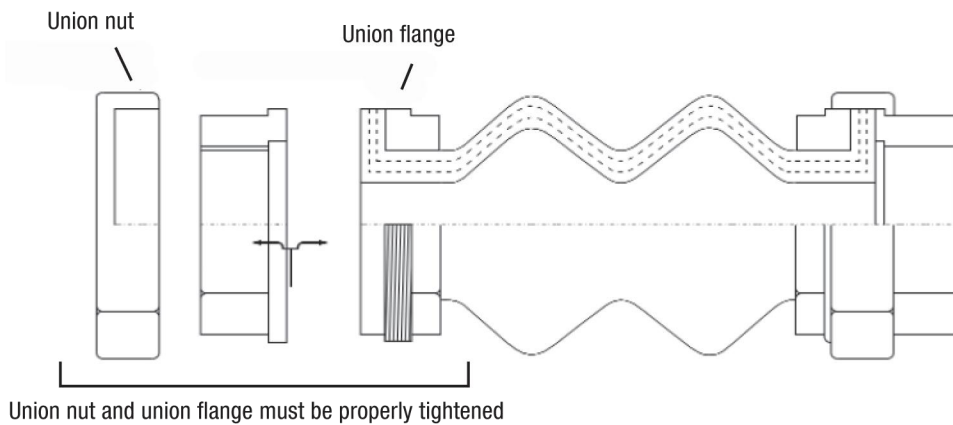


FIGURE 5 - TORQUE SETTINGS

Nominal Bore (mm)	32	40	50	65	80	100	125	150	200	250	300
Torque Settings (Nm)	10	10	12	15	22	14	17	28	66	56	74

FIGURE 6 - UNRESTRAINED SYSTEM APPLICATION

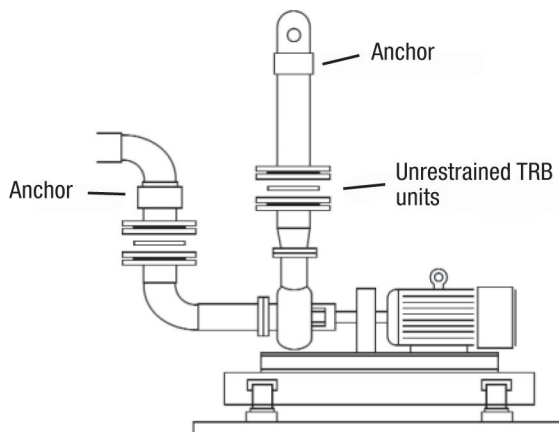
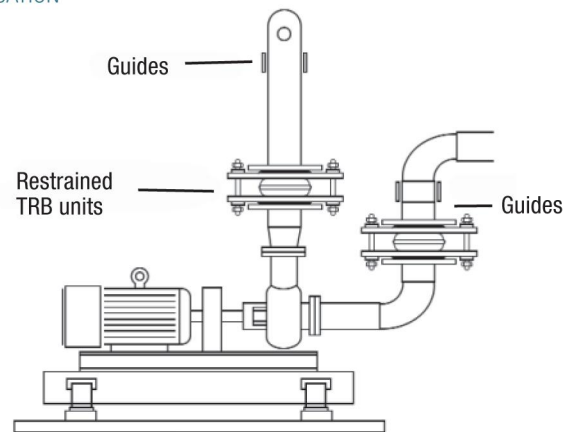


FIGURE 7 - RESTRAINED SYSTEM APPLICATION



MAINTENANCE

If installed correctly the rubber bellows should give many years of trouble free service. However periodic inspection of the joints for signs of any deterioration, should be included on any maintenance schedule. If hairline cracks become apparent, this is a sign that the joints are nearing the end of their service life and should be replaced at the nearest opportunity.

Do not paint rubber bellows as this may reduce service life.

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HANDLING RECOMMENDATIONS

General storage

Storage of the majority of products based on vulcanised rubber for a certain period inevitably causes some degree of change in the physical properties of the stored products. These changes may result from one particular factor or from a combination of factors as follows: oxygen; ozone; light; heat and humidity.

By storing Thermosel flexible connections in accordance with the following recommendations the effects of these factors may be minimised

Protective measures

Storage area requirements:

Cool: Optimum temperature is 10°C. It must not drop below 0°C, it is advisable to rewarm the joint carefully before handling to prevent a risk of damage.

Relatively dry: Maintain a relative humidity between 45% and 70% as excessive dryness is harmful to the rubber. Temporary deviations are OK, but prolonged exposure to a dry atmosphere could accelerate deterioration of the rubber.

Slight ventilation: Ventilation should be as consistent and gentle as possible, avoiding any draughts.

Heating: Heat sources should be insulated, or if this is not possible the rubber units must be stored a good distance from these heat sources.

Lighting: During storage the units must not be exposed to sunlight or other light sources rich in ultraviolet.

Cleanliness: It is advisable to clean the room thoroughly before storing Thermosel flexible connections. Oil, greases and chemicals must not be stored in the same area or should at least be kept separate.

Storage precautions

To restrict the deterioration of Thermosel flexible connections we recommend storing them away from ozone-generating sources.

It is advisable to store them in such a way that they are not in contact with the ground.

Thermosel expansion joints should be laid flat on a level surface to prevent deformation or warping.

Under the above optimum conditions Thermosel flexible connections can be stored for a maximum period of 3 years. Metallic constituents such as tierods and bolts are to be stored with the units in their original packaging.

SAFETY RECOMMENDATIONS

Inspection prior to Start-up or Pressure Test

Expansion joints are usually considered to be non-repairable items and generally do not fall into the category for which maintenance procedures are required. However, immediately after the installation is complete a careful visual inspection should be made of the entire piping system to ensure that there is no evidence of damage, with particular emphasis on the following:

- 1 Are anchors, guides, and supports installed in accordance with the system drawings?
- 2 Is the proper expansion joint in the proper location?
- 3 Are the flow direction and pre-positioning of the expansion joint correct?
- 4 Have all of the expansion joint shipping devices been removed?
- 5 If the system has been designed for gas, and is to be tested with water, has provision been made for proper support of the additional dead weight load on the piping and expansion joint? Some water may remain in the bellows convolutions after the test. If this is detrimental to the bellows or system operation, means should be provided to remove this water.
- 6 Are all guides, pipe supports and the expansion joints free to permit pipe movement?
- 7 Has any expansion joint been damaged during handling and installation?

8 Is any expansion joint misaligned? This can be determined by measuring the joint overall length, inspection of the convolution geometry, and checking clearance at critical points on the expansion joint and at other points in the system.

9 Are the bellows and other movable portions of the expansion joint free of foreign objects?

Inspection during and immediately after pressure test

WARNING: Extreme care must be exercised while inspecting any pressurised system or component

A visual inspection of the system should include the following:

- 1 Evidence of leakage or loss of pressure.
- 2 Distortion or yielding of anchors, expansion hardware, the bellows and other piping components.
- 3 Any unanticipated movement of the piping due to pressure.
- 4 Evidence of instability in the bellows.
- 5 The guides, expansion joints, and other movable parts of the system should be inspected for evidence of binding.
- 6 Any evidence of abnormality or damage should be reviewed and evaluated by competent design authority.

Periodic Inservice Inspection

WARNING: Extreme care must be exercised while inspecting any pressurised system or component.

- 1 Immediately after placing the system in operation, a visual inspection should be conducted to insure that the thermal expansion is being absorbed by the expansion joints in the manner for which they were designed.
- 2 The bellows should be inspected for evidence of unanticipated vibration.
- 3 A program of periodic inspection should be planned and conducted throughout the operating life of the system. The frequency of these inspections should be determined by the service and environmental conditions involved. Such inspections can pinpoint the more obvious potential problems such as external corrosion, loosening of threaded fasteners, and deterioration of anchors, guides and other hardware. It must be understood that this inspection programme, without any other backup information cannot give evidence of damage due to fatigue, stress corrosion or general internal corrosion. These can be the cause of sudden failures and generally occur without any visual or audible warning.
- 4 When any inspection reveals evidence of malfunction, damage or deterioration, this should be reviewed by competent design authority for resolution. Additionally, any changes in the system operating conditions such as pressure, temperature, movement, flow, velocity, etc that may adversely affect the expansion joint should be reported to, and evaluated by, a competent design authority.

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DESIGN STANDARDS

All standard units are designed to Thermosel® standard formulae which have been verified by tests witnessed by independent testing authorities.

The designs also conform to the requirements of the internationally recognised standard E.J.M.A. (Expansion Joint Manufacturers Association) and the British Standard Code of Practice for selection joints for use in pressure systems.

Pearwalk Engineering Ltd is represented on the British Standard Committee responsible for the preparation of the latter.

QUALITY

It is our policy to maintain our product reliability and company service to industry at the highest level compatible with realistic costs.

The quality control and manufacturing procedures as specified on our website www.pearwalkengineering.com meet the requirements of all major company, national and international quality standards.

SURVEY SOCIETIES

Thermosel® units are acceptable to all National and International Survey Societies. Pearwalk Engineering has received either type approval or is approved by individual societies as a manufacturer of bellows expansion joints in accordance with the societies' Conditions of Survey and Witness of Tests during the course of manufacture.

Copies of type approval certificates are available upon request. An additional charge will be made for certification covering survey society approval on individual units which are not type approved.

ORDERING

The purchase order for standard units must identify the type of unit required by reference to the ordering code as follows:

Typical Part number: SAF/0100/16/001/NP16/150

Unit description / Nominal bore / Pressure rating / Type Number / End fittings / Lateral Movement (Double units only).

The unit price for standard units will be quoted on the current price list. Flange details must be stated on the purchase order in addition to the ordering code.

TEMPERATURE CORRECTION CHART

The bellows expansion joints listed in the data sheets are suitable for their nominal pressure ratings for temperatures up to 120°C. For temperatures above this, their pressure ratings will be reduced as follows:

Operating Temperature (°C)	Operating pressure (bar)
Ambient	16
60	10
70	7.5
90	6.0
110	4.0

ALTERNATIVE COMPONENTS OR MATERIALS

Where the operating or environmental conditions exceed the limits specified for the standard unit range or where special end fittings are required, alternative units can be designed and supplied.

Typical variations include choice of material for the membranes and end fittings, multi-ply membrane construction and alternative end fittings such as screwed pipe ends, vee flanges or swivel flanges.

Please discuss your special requirements with our sales engineers.

RESERVATIONS

We reserve the right:

- in the interest of design improvement to alter the design specification without prior notice.
- to invoice at prices ruling at date of dispatch

FURTHER INFORMATION

For further information about Thermosel® products please visit our website at www.pearwalkengineering.com

Below is our list of standard parts:

UNIT DESCRIPTION

APS - Axial Pipe End Screwed
SAP - Single Axial Pipe End
SAPV - Single Axial Pipe End (Victaulic)
SAF - Single Axial Flanged
DAP - Double Axial Pipe End
DAF - Double Axial Flanged
DUP - Double Universal Pipe End
DUF - Double Universal Pipe End
SAV - Single Axial Van-Stone
DAV - Double Axial Van-Stone
STF - Single Tied Flanged
STP - Single Tied Pipe End
STPV - Single Tied Pipe End (Victaulic)
DTF - Double Tied Flanged
DTP - Double Tied Pipe End
DHF - Double Hinge Flanged
DHP - Double Hinge Pipe End
SHF - Single Hinge Flanged
SHP - Single Hinge Pipe End
SGF - Single Gimbal Flanged
SGP - Single Gimbal Pipe End
DGF - Double Gimbal Flanged
DGP - Double Gimbal Pipe End
SMP - Single Multi-Ply Pumpflex
SMT - Single Multi-ply Pumpflex Tied
TRB - Thermosel Rubber Bellow
MFS - Metallic Flexible Hose with Swivel Ends
HEX - Heat Exchanger Joint

TYPE NUMBERS:

001 - Carbon steel fittings no internal sleeve
002 - Carbon steel fittings single internal sleeve
003 - Carbon steel fittings telescopic internal sleeves
004 - Carbon steel fittings single internal sleeve, telescopic external sleeves
005 - Carbon steel fittings single internal sleeve, telescopic external sleeves
006 - Carbon steel fittings telescopic internal sleeves, telescopic external sleeves
007 - Carbon steel fittings no internal sleeve, shroud
008 - Carbon steel fittings single internal sleeve, shroud
009 - Carbon steel fittings telescopic sleeves, shroud
010 - Stainless steel fittings no internal sleeve
011 - Stainless steel fittings single internal sleeve
012 - Stainless steel fittings telescopic internal sleeves
013 - Stainless steel fittings no internal sleeve, telescopic external sleeves
014 - Stainless steel fittings single internal sleeve, telescopic external sleeves
015 - Stainless steel fittings telescopic internal sleeves, telescopic external sleeves
016 - Stainless steel fittings no internal sleeve, shroud
017 - Stainless steel fittings single internal sleeve, shroud
018 - Stainless steel fittings telescopic internal sleeves, shroud
020 - Twin Sphere Union (Neoprene)
021 - Single Sphere Flanged (Neoprene)
022 - Single Sphere Flanged Tied (Neoprene)
030 - Galvanised Fittings (fixed male & swivel female)
120 - Twin Sphere Union (E.P.D.M.)
121 - Twin Sphere Flanged (E.P.D.M.)
122 - Twin Sphere Flanged Tied (E.P.D.M.)

END FITTINGS:

PN6 - Drilled
PN16 - Drilled
PN25 - Drilled
PN40 - Drilled
BS10A - BS10 Table A
BS10D - BS10 Table D
BS10E - BS10 Table E
BS10F - BS10 Table F
BS10H - BS10 Table H
ASA150
ASA300
JIS 5k - Drilled
JIS 10K - Drilled
JIS 16K - Drilled
JIS 20K - Drilled

NOMINAL BORE:
0015 - 4000 mm

PRESSURE RATINGS:
2.5 bar
10 bar
16 bar
25 bar

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