

KLAMFLEX

PIPE COUPLINGS (PTY) LTD

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TECHNICAL MANUAL



COUPLE WITH CONFIDENCE

The **Largest Manufacturer** of Pipe Couplings, Flange Adaptors, Stepped Couplings and Dismantling Joints in the **Southern Hemisphere**.
Still Coupling since 1962.



ISSUE: 1108

TECHNICAL DATA

KLAMFLEX couplings and flange adaptors can be manufactured to suit almost any pipe outside diameter or flange drilling.

Information given in our catalogue generally only refers to couplings for standard size pipe. Couplings and flange adaptors are manufactured to suit all standard pipe sizes. Where couplings are required for pipes in non-standard sizes and material or where standard outside diameters are not exact, e.g. GRP and AC pipe, details of the actual pipe OD's and tolerance should be stated for consideration by **KLAMFLEX** Pipe Couplings.

Design consideration should be given to the surface finish of pipe materials. By its very nature the **KLAMFLEX** coupling system relies upon good surface contact of the sealing rings, and consideration must be given to pipe end preparation on pipes with naturally rough or uneven surface finish. Where surface dressing is required to remove weld beading, care must be taken not to overdress the pipe end causing pitting or flat spots. In general the recommendations of SABS 719-1971 and BS 534-1990 section 15 ensures a satisfactory surface finish.

Ovality, especially in larger diameter pipes, can frequently be rectified either by jacking out, if the ovality is severe, or by rounding out by selective bolt tightening to give a uniform annular gap. Care must be taken when jacking so that internal finish is in no way damaged. N.B. Pipes which have local stiffening near the ends are sometimes impossible to correct for ovality.

Most rigid and semi-rigid pipe materials can be joined with **KLAMFLEX** couplings, e.g. steel, grey and ductile iron, asbestos cement, uPVC, GRP, concrete, etc. Some materials such as GRP need special consideration due to the structural strength of the material.

If in doubt of the suitability of **KLAMFLEX** couplings for use on your pipe, contact Pipe Couplings.

KLAMFLEX couplings can be used on both above and below-ground pipes but different design criteria apply. The following sections give some guidance on how to get the best use from Klamflex couplings.



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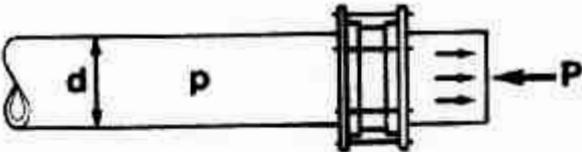
WORKING PRESSURE

Working Pressure: This varies with coupling size and material used. Generally working pressure is up to 2/3rds of the maximum test pressure shown in the schedules of dimensions in our catalogue. Couplings are pressure rated to appropriate pipe standards in common use. For higher pressures, special couplings can be supplied.

KLAMFLEX couplings and flange adaptors for cast iron mains, carrying water, sewage or gas are suitable for the pressures for which the pipes are normally supplied. Generally flange adaptors are suitable for the pressure ratings of the flange to which they are connected. The pressure ratings stated in this catalogue are hydrostatic test pressures.

Pipelines under pressure are subject to forces which tend to separate the component parts. Flexible pipelines, e.g. those jointed with **KLAMFLEX** couplings, are particularly subject to forces acting at bends, tees or blank ends. Buried pipelines can generally be restrained by means of anchor blocks at abrupt changes of direction, with the minor forces at each straight joint being restrained by soil friction. With above ground pipelines, it is necessary to take full account of the thrusts produced by internal pressure and where required to restrain them with thrust blocks, anchorage or tie bars.

In the simple case of pressure acting on a blank end, the force **P** necessary to prevent pipe separation is given by:



d = pipe o.d. (Mm) p = internal pressure (N/mm²)
is given by: -

$$P = p \times \frac{d^2}{4} \text{ Newtons}$$

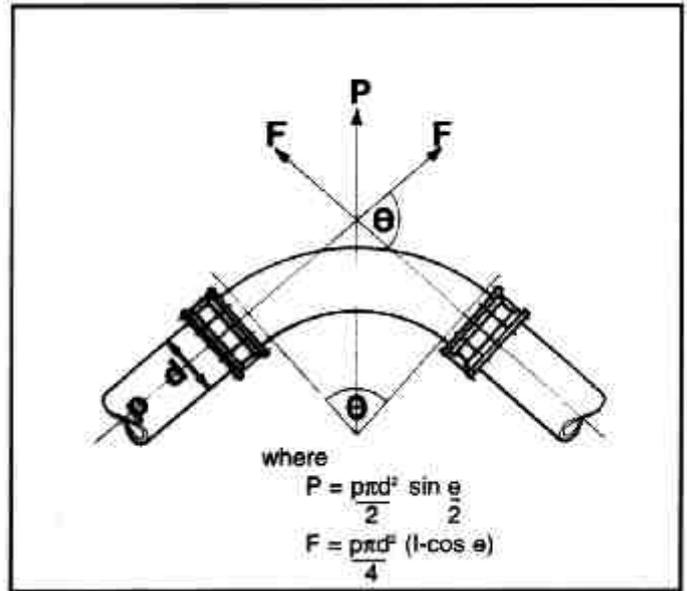
$$P = \frac{p \times d^2}{4}$$

Where d = pipe OD
 p = internal pressure

Example: $d = 508\text{mm OD}$
 $p = 16 \text{ bar} = 1.6 \text{ N/mm}^2$
Then $P = \frac{1.6 \times 508^2}{4} =$
 $324293 \text{ N} = 324.3 \text{ kN} =$
 33.07 tonnes

KLAMFLEX couplings are **NOT DESIGNED TO RESIST END LOAD** due to pressure forces and therefore such forces must normally be resisted by other means. At very low pressures however, friction between coupling and pipe may be sufficient in certain cases.

At a bend there is a force **F** tending to pull the end outwards. This can result in axial forces **F** acting to separate the bend from the straight pipe at each **KLAMFLEX** coupling:



There must be sufficient anchorage to resist either **P** or both forces **F** e.g. in a buried system a thrust block may resist **F**, and above ground, sets of tie rods at each coupling would resist **F**.

IT IS IMPORTANT TO APPRECIATE THE MAGNITUDE OF THE END THRUSTS WHICH CAN RESULT FROM INTERNAL PRESSURE IN A PIPELINE.

EXPANSION AND CONTRACTION

Each **KLAMFLEX** coupling will accommodate maximum pipe movement of 10mm and each flange adaptor 5mm. This is achieved by deformation of the sealing ring, not by a sliding action of the ring on the pipe and will cater for expansion and contraction resulting from temperature variations experienced under normal atmospheric conditions.

The resistance to pipe end separation offered by couplings is dependant upon the number of variable installation factors such as pipe surface, pipe tolerance, coupling component tolerances, etc, and is thus different for every case.

For complete safety it is advisable to assume that the worst conditions prevail for each installation.

CARE MUST BE TAKEN TO MAINTAIN SETTING GAPS WITHIN THE LIMITS GIVEN ON PAGE 5

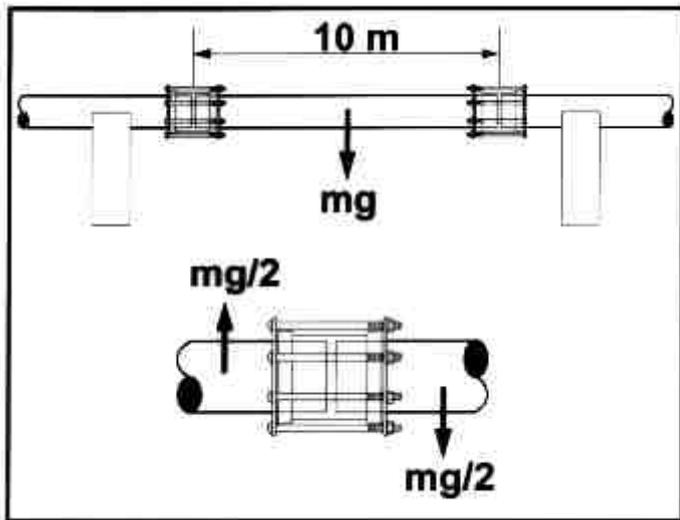
TEMPERATURE

The recommended maximum operating temperature for Klamflex products is 90°C when standard EPDM gaskets are used. Please contact Klamflex Pipe Couplings for higher operating temperatures. If temperature fluctuations occur further re-tightening of the bolts may be required.

For this reason where maintenance free operation is required, Klamflex couplings are not recommended for central heating systems, which do not operate at constant temperatures.

SHEAR STRENGTH

Couplings up to DN 1500mm are normally capable of withstanding a shear force corresponding to the weight applied by a 10m length of coupled pipe that is full of water, i.e. a length of pipe suspended between two couplings. Rangers are not suitable for this duty and the pipe should be supported to prevent sagging.



RECOMMENDED BOLT TORQUE

Couplings up to 324mm OD M12 bolts - 65-80Nm
Couplings over 324mm OD M16 bolts - 80-120Nm

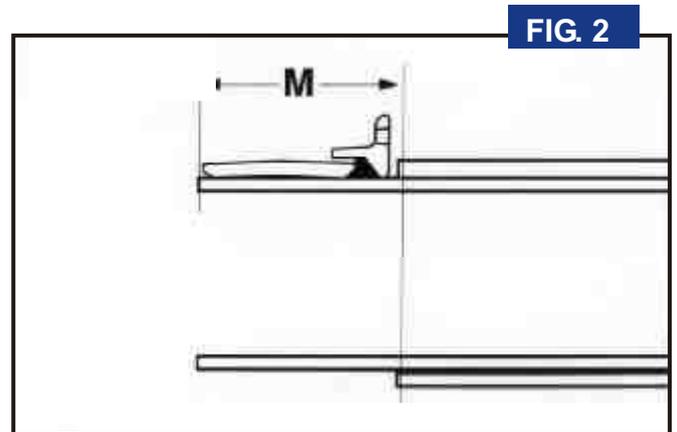
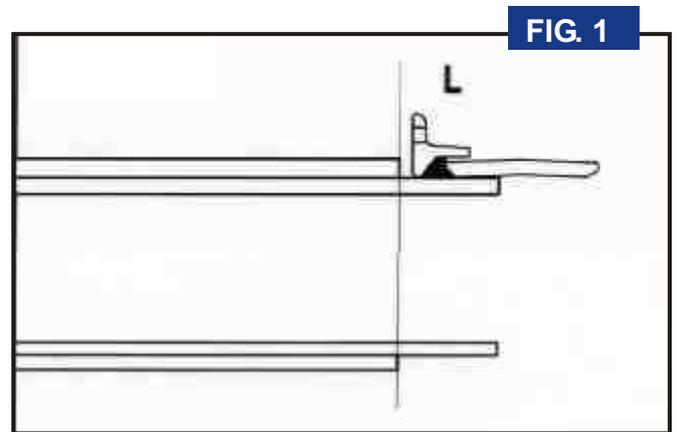
These torque figures relate to 16 bar working pressure.

PIPE END PREPARATION

Dimension 'L' is the length from the ends of the pipes which must be rounded where necessary to meet the tolerance required. It is also the amount of "Clearance" to permit coupling assembly, and applies equally for coupling sleeves with centre register, without centre register or with locating plug.

For distance 'L' the pipe must be free from any peaks, flats, depressions, roll marks, weld beads or any other such defects likely to affect the seal. See fig.1

Where it is necessary to slide the coupling completely onto one pipe end, the wrapping must be cut back on site for minimum distance "M". For closing connections, only coupling sleeves without register or with locating plugs may be used. See fig.2



Coupling Dia.	Sleeve Length	Distance L for normal coupling assembly	Distance M for closing connections
326mm -	83mm	102mm	152mm
326mm -	102mm	102mm	152mm
326mm +	178mm	150mm	254mm

LATERAL DISPLACEMENT

Lateral displacement between two pipes to be joined cannot be accommodated by a single coupling. Two couplings must be used and a small centre piece of pipe may be allowed to articulate the take up displacement.

Method of calculating length of the centre pipe.

Pipe nominal diameter (mm)	Minimum Length (mm)
Up to 457mm OD	Displacement Y x 10
Over 457mm to 610mm OD	Displacement Y x 12
Over 610mm to 762mm OD	Displacement Y x 15
Over 762mm to 1219mm OD	Displacement Y x 20
Over 1219mm to 1829mm OD	Displacement Y x 30
Over 1829mm OD	Displacement Y x 60

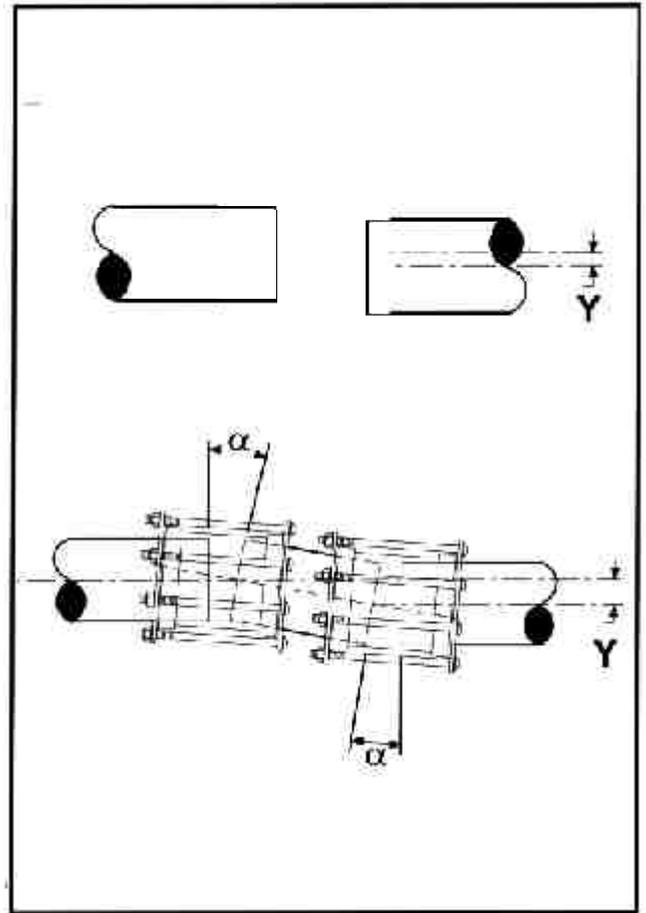
EXAMPLE

Pipe OD=762mm

Lateral displacement to be accommodated = 180mm

Minimum closing length = $180 \times 15 = 2700\text{mm}$

N.B. For **KLAMFLEX** flange adaptors these lengths must be doubled.

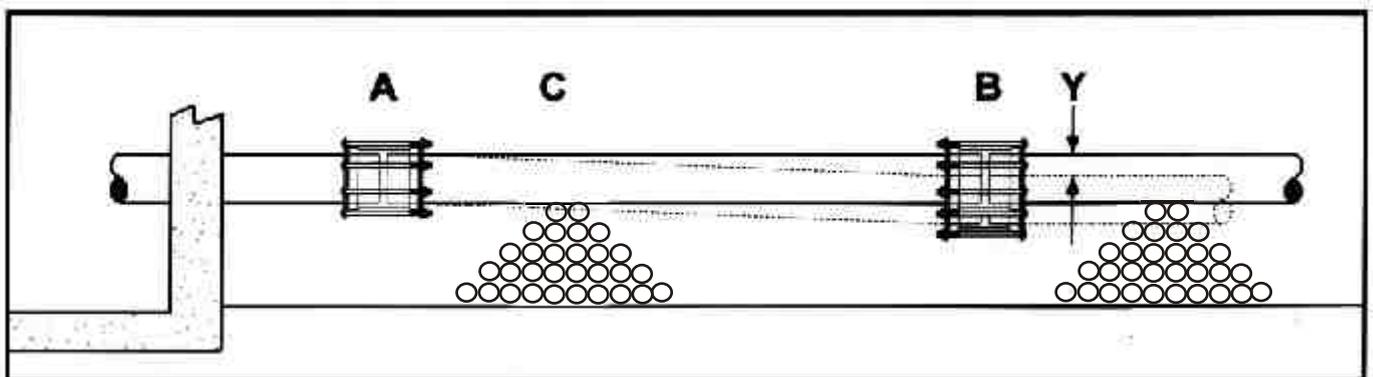


GROUND SETTLEMENT

Ground settlement e.g. where a pipe leaves an underground structure, can be accommodated by a pair of **KLAMFLEX** couplings.

All pipe trenches are of necessity excavating below the invert to allow for pipe bedding. Where this bedding is to be flexible, e.g. granular fill, some settlement of the pipe will inevitably occur when it is backfilled. To relieve pipe

stresses, coupling **A** should be installed as close to the structure as possible. Coupling **B** permits pipe **C** to angulate, taking up settlement **Y**. The length of pipe **C** is determined as in above diagram, though its structural strength in bending must be considered.



SETTING GAPS

It is generally desirable that adjacent pipe ends do not make contact with each other in service. If there is insufficient gap, particularly on above ground pipes, the pipeline will tend to buckle as temperatures increase. We recommend maximum safe accumulated gaps which should not be exceeded in service. Also given are recommended setting gaps which allow for expansion and contraction or angularity in service.

Consideration of actual temperature movement or deflection conditions may lead to different initial setting gaps.

Where locating plugs are used, the setting gap should be increased by 9,5mm for sizes up to 324mm OD and 12,5mm for sizes above 324mm OD to avoid contact with the plugs.

TABLE 1

COUPLING SIZE	SLEEVE LENGTH	RECOMMENDED SETTING		MAX ACCUM GAP
		COUPLINGS	FLANGE ADAPTORS	
≤ 50	83mm	14mm		25,5mm
> 50	102mm	19mm	19mm	38mm
≤ 300	102mm	19mm	19mm	38mm
> 300	178mm	38mm	32mm	76mm
≤ 1800	178mm	38mm	32mm	76mm
> 1800	178/254mm	57mm	32mm	114mm

THE MAXIMUM DIMENSIONS ABOVE MUST NOT BE EXCEEDED UNDER ANY CIRCUMSTANCES

PRODUCT STORAGE

Products must be stored in a cool dark place below 20 degrees centigrade, store away from direct sunlight, electrical discharges and sparking electric motors. Always store sealing rings in an unstressed condition, never hang even for a short time.

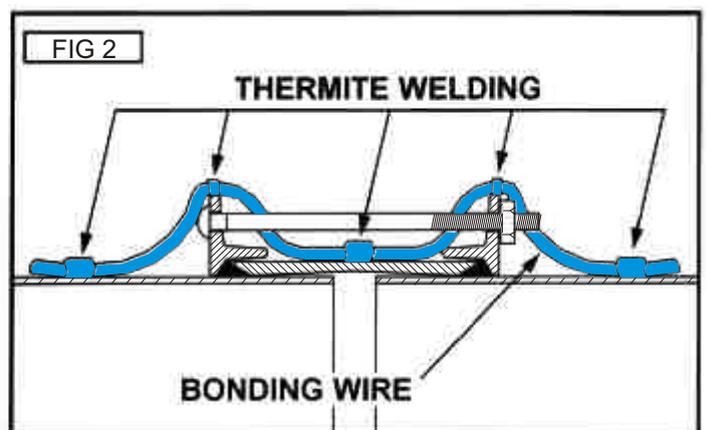
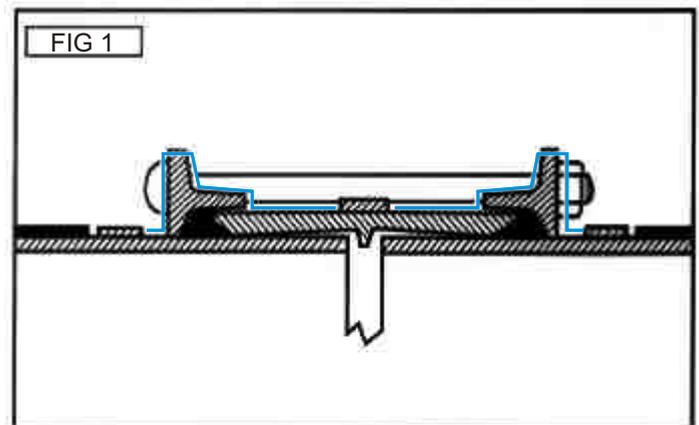
CATHODIC PROTECTION

The rubber sealing gasket incorporated into the **KLAMFLEX** coupling interrupts the flow of current from pipe to pipe. To counter this problem a wire or copper strap can be connected to the two pipes via the coupling.

Fig.1 The strap is welded to the pipes, without cathodically protecting the coupling.

Fig.2 The strap is also welded to the coupling, providing cathodic protection

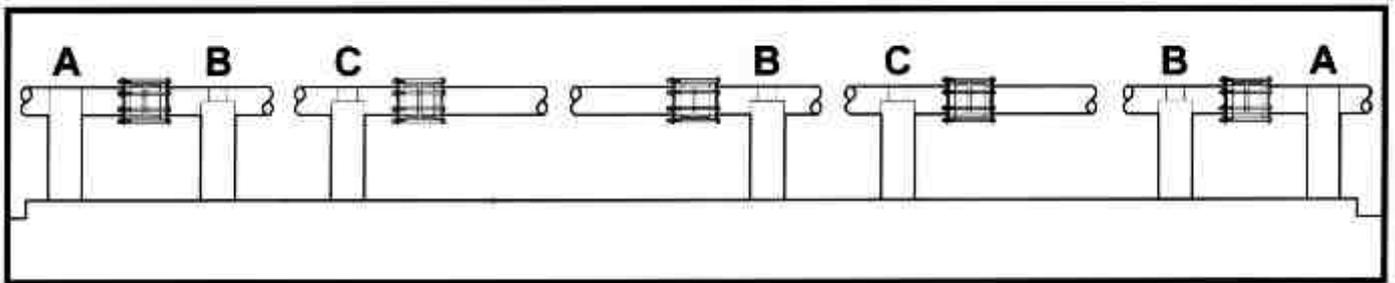
We recommend, for more detailed guidance, that contact should be made with one of the several companies specialising in cathodic protection. Bonding is equally applicable to both steel and iron pipes.



METHODS OF ANCHORING / SUPPORTING PIPES

Fig. 1

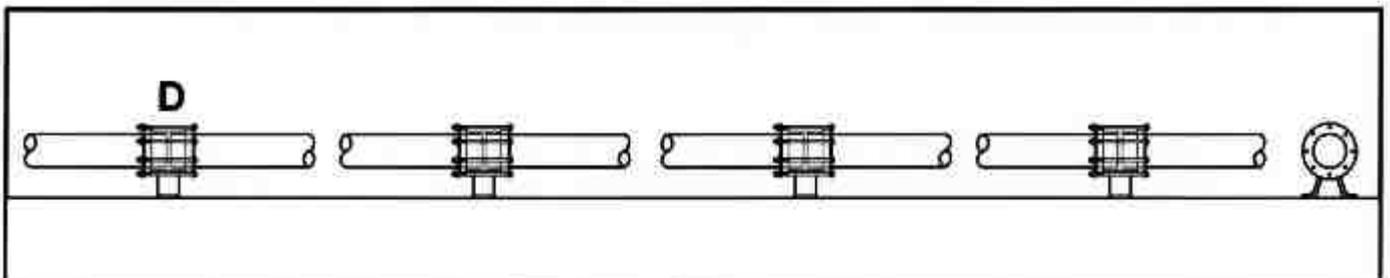
For anchoring and supporting pipes this method allows freedom of movement within the capabilities of the **KLAMFLEX** system, and controls the axial movement over a maximum of two couplings. If the free pipe moves to the full extent in one direction, the accumulated gap should be within the limits of one coupling. Clear pipe span not to exceed 10 metres



- A. Anchored to withstand resolved thrust at the ends of all straight runs.
- B. Intermediate anchor points strong enough to prevent creeping of the pipes.
- C. Guide supports with loose strap over the pipe otherwise cradles will be suitable, e.g. if the line is not straight, then all anchors and guides, A, B and C must be designed to withstand the resolved thrust but still allow longitudinal expansion of the pipes through the guide supports. Pipe should not be laid to the maximum deflection.

Fig. 2

Pipeline incorporating **KLAMFLEX** anchored couplings.



- D. **KLAMFLEX** anchored coupling.

FITTING INSTRUCTIONS

PRODUCTS UP TO 300mm N/B

KLAMFLEX Quickfit Couplings range in size from 60mm pipe OD to 326mm pipe OD and are supplied completely assembled and need only be placed on the correctly aligned pipes and fitted according to KLAMFLEX installation instructions. The unit should not be dismantled, fitting of KLAMFLEX Quickfit Flange Adaptors shall be conducted to the same procedure:

1. Ensure the pipe ends are correctly prepared. All surfaces with which gaskets come into contact are to be thoroughly cleaned immediately before coupling installation, thus allowing the gaskets to seal effectively. A distance of one centre sleeve length plus 50mm on each pipe end should be prepared to remove all loose rust, dirt and foreign matter. It is important that the pipe ends be smooth, concentric and within specified tolerances (SABS 719-1971 section 4, BS 534-1990 section 14).

2. Reference marks should be placed on the pipes to facilitate in centering the Quickfit Coupling over the gap between the pipes in accordance to KLAMFLEX setting gaps for each specific coupling.

3. A suitable gasket lubricant (such as soapy water) must be applied to the pipe ends and the accessible faces of the sealing rings, care must be taken to ensure the gaskets are clean. The KLAMFLEX Quickfit Couplings is pushed as a complete unit onto the pipe already in position.

4. The pipe ends shall be aligned leaving the appropriate gap. Adjustment of the trench bed may be necessary. The setting gap or distance between the pipe ends after coupling has been installed, (Pg: 5). These distances for straight couplings are tabulated in **table 1** (Pg: 5). Where locating plugs are used the gap should be increased by 9.5mm for sizes up to 326mm OD and 12.5mm for sizes above 326mm OD to avoid contact with plugs.

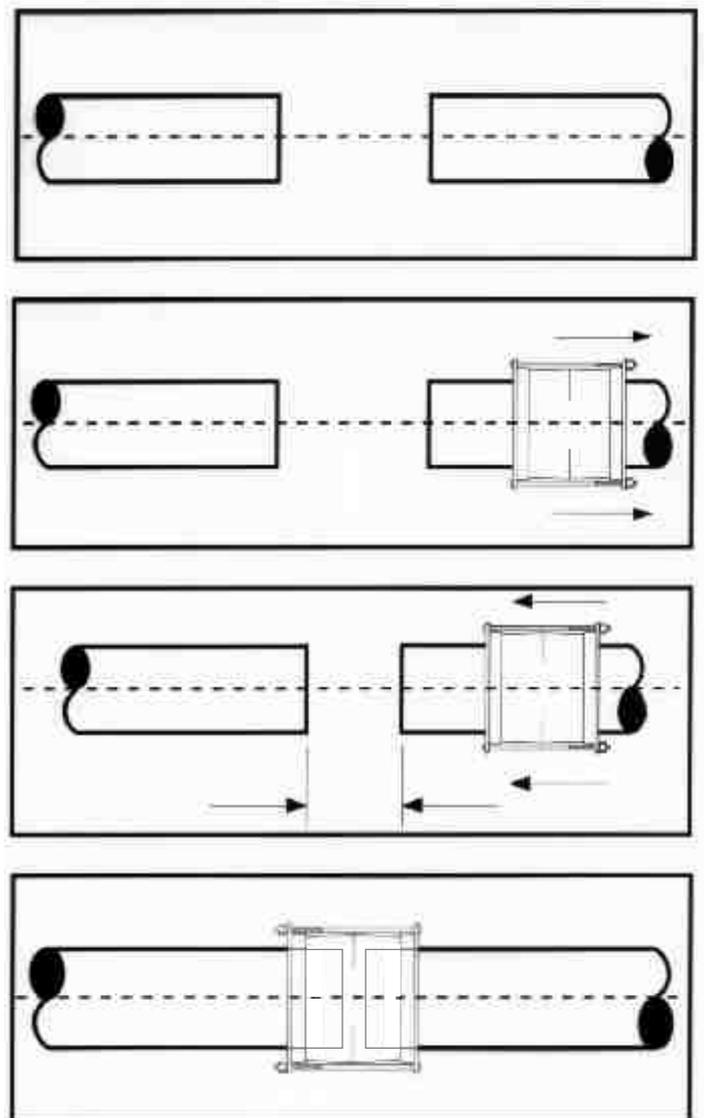
5. The centre sleeve shall then be moved into position, centred over the gap with reference to the marks made on the pipe ensuring the coupling is central over the gap.

6. As the bolts are already installed, the bolts need only be tightened to the KLAMFLEX recommended torque. To ensure correct end-ring seating and gasket compression, the bolts must be tightened in pairs at diametrically opposite positions in a circular sequence. Bolt up evenly giving nuts one or two turns at a time to the prescribed torque rating of 65 - 80Nm. The tightening sequence assures that the end-rings are pulled evenly to compress the gaskets uniformly and to maintain appropriate gap. The tightening of the bolts shall be repeated as many times as necessary to bring all fasteners to the required torque rating, so as to provide a

leakproof installation at the specified test pressure. If an effective sealing is not attained at the recommended torque, the coupling shall be loosened, realigned and the bolts re-torqued.

Torque ratings for **GRP** pipes are to be decided on after consultation with the specific **GRP** pipe supplier, as each supplier develops pipe with its own specific glass filament configuration.

Note: These specifications relate to product operating at 16 bar working pressure. Contact Klamflex for torque specifications at different working pressures.



FITTING INSTRUCTIONS

PRODUCTS ABOVE 300mm N/B

KLAMFLEX Unassembled Couplings are supplied for sizes above 326mm pipe OD. As the name suggests the couplings are supplied with sleeves, flanges, sealing rings and bolts unassembled. Fitting of **KLAMFLEX** Unfitted shall be conducted according to the following procedure.

1. Ensure the pipe ends are correctly prepared. All with which the gaskets come into contact are to be thoroughly cleaned immediately before coupling installation, thus allowing the gaskets to seal effectively. A distance of one centre sleeve length plus 50mm on each pipe end should be prepared to remove all loose rust, dirt and foreign matter. It is important that the pipe ends be smooth, concentric and within specified tolerances (SABS 719-1971 section 5, BS 534-1990 section 14). It is important that weld beads are ground flush maintaining correct surface profile.

2. Reference marks should be placed on the pipes to facilitate in centering the coupling sleeve over the gap between the pipes in accordance to **KLAMFLEX** setting gaps for each specific coupling (refer to table 1. Pg 5).

3. Larger-diameter pipe and couplings may become out of round in transportation and handling. Therefore it is normal to expect to use jacks, wedges, shims or other means to facilitate assembly of the coupling on the pipe ends.

4. The end rings shall be placed on the pipes.

5. A suitable gasket lubricant (such as soapy water) must be applied to the pipe ends and the sealing rings, care must be taken to ensure the gaskets are clean. The gaskets shall then be placed on the pipe ends with bevelled faces toward the centre sleeve.

6. The centre sleeve shall be placed on one pipe end.

7. The pipe ends shall be aligned leaving the appropriate gap (refer to table 1. Pg 5). Adjustment of the trench bed may be necessary. Where locating plugs are used, the setting gap should be increased by 9.5mm for sizes up to 326mm OD and 12.5mm for sizes above 326mm OD to avoid contact with the plugs.

8. The centre sleeve shall then be moved into position, centred over the gap with reference to the marks made on the pipe ensuring the coupling is central over the gap.

9. When the centre sleeve is properly placed, with the gap between the OD of the pipe and the ID of the centre sleeve distributed evenly the gaskets shall be moved into position with bevelled faces of the gaskets against the centre sleeve end. End-rings shall be moved into place behind the gaskets.

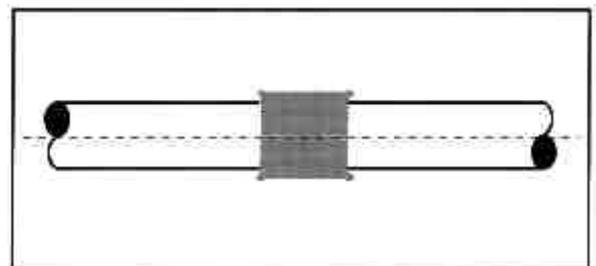
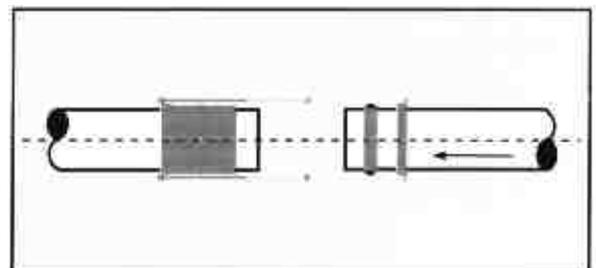
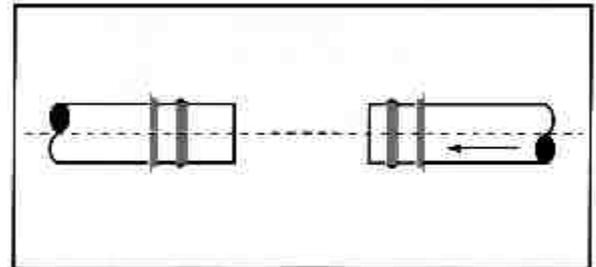
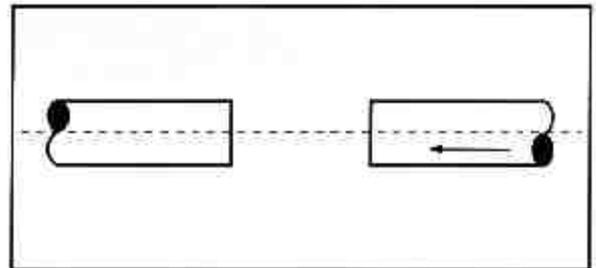
10. Bolts shall be installed in the end-rings holes and tightened to the **KLAMFLEX** recommended torque. To assure correct end-ring seating and gasket compression, the bolts must be tightened in pairs at diametrically

opposite positions in a circular sequence. Bolt up evenly giving nuts one or two turns at a time to the prescribed torque rating of 80 - 120Nm (M16 bolt).

The tightening sequence assures that the end-rings are pulled evenly to compress the gaskets uniformly and to maintain appropriate gap. The tightening of the bolts shall be repeated as many times as necessary to bring all fasteners to the required torque rating, so as to provide a leakproof installation at the specified test pressure. If an effective sealing is not attained at the recommended torque, the coupling shall be loosened, realigned and the bolts re-torqued.

Torque ratings for **GRP** pipes are to be decided on after consultation with the specific **GRP** pipe supplier, as each supplier develops pipe with its own specific glass filament configuration.

Note: These specifications relate to product operating at 16 bar working pressure. Contact Klamflex for torque specifications at different working pressures.



INSTALLING RANGER PRODUCTS



1

The coupling is supplied completely assembled.



6

Start assembling the coupling on one of the pipes to be joined.



2

Measure the length of the coupling and subtract setting gap



7

Complete the assembly to finger tight and position coupling on mark.



3

Divide the result of the above measurement by two and mark both pipes.



8

Insert the second pipe to the mark and start tightening.



4

Dissassemble the coupling and check all parts.



9

Tighten bolts - as per Klamflex manual - to recommended torque.



5

Apply a non-toxic soapy lubricant to the gasket area as shown.



10

Check gaskets on completed assembly for proper contact and deformations.

MATERIAL SPECIFICATIONS

COUPLINGS

Centre Sleeve		
Dedicated		
Up to 140mm OD	Ductile Iron	SABS 936:1969 Grade SG42 BS EN 1563:1997
Over 140mm OD	Rolled Steel	SANS 1431:1987 Grade 300 WA BS EN 10025:2004 Grade S275
Ranger		
Up to 300mm OD (315 -322)	Rolled Steel	SANS 1431:1987 Grade 300 WA BS EN 10025:2004 Grade S275
Over 300mm OD (incl. 322-340)	Ductile Iron	SABS 936:1969 Grade SG42 BS EN 1563:1997
End Ring		
Dedicated		
Up to 328mm OD	Ductile Iron	SABS 936:1969 Grade SG42 BS EN 1563:1997
Over 328mm OD	Rolled Steel	SANS 1431:1987 Grade 300 WA BS EN 10025:2004 Grade S275
Ranger		
Up to 600mm OD	Ductile Iron	SABS 936:1969 Grade SG42 BS EN 1563:1997

FLANGE ADAPTORS

Flange Adaptor Body		
Dedicated		
Up to 140mm OD	Ductile Iron	SABS 936:1969 Grade SG42 BS EN 1563:1997
Over 140mm OD	Rolled Steel	SANS 1431:1987 Grade 300 WA BS EN 10025:2004 Grade S275
Ranger		
Up to 600mm (315-322mm)	Ductile Iron	SABS 936:1969 Grade SG42 BS EN 1563:1997
	Rolled Steel	SANS 1431:1987 Grade 300 WA BS EN 10025:2004 Grade S275
End Ring		
Dedicated		
Up to 328mm OD	Ductile Iron	SABS 936:1969 Grade Sg42 BS EN 1563:1997
Over 328mm OD	Rolled Steel	SANS 1431:1987 Grade 300 WA BS EN 10025:2004 Grade S275
Ranger		
Up to 600mm OD	Ductile Iron	BS EN 10025:2004 Grade FE430A BS EN 10025:2004
Table Flange		
	Steel Plate	SANS 1431:1987 Grade 300 WA BS EN 10025:2004 Grade S275

RUBBER COMPRESSION SEALING GASKET: MATERIAL

E.P.D.M	SABS 974:1986 related ISO 4633:1983 BS EN 681-1:1996 Nitrite sealing gaskets available on request.
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Certified Non Toxic for use on potable water distribution systems in accordance with BS 6920 (WRAS)

BOLTS: MATERIAL

LOW Carbon Unalloyed Steel	SABS 1143:1977 Grade 4.8 (8.8 for higher pressure) BS 970-1:1996
Hot Dipped Galvanised	SABS 763:1988 BS EN ISO 1461:1999
Electro Galvanised	BS EN 12329:2000/ BS EN 12330:2000
Stainless Steel	Available on request

NUTS: MATERIAL

LOW Carbon Unalloyed Steel	SABS 135:1991 BS 970-1:1996
Electro Galvanised	BS EN 12329:2000/ BS EN 12330:2000
Hot Dipped Galvanised	BS 729:1986

STUDS: MATERIAL

Carbon Steel	BS 970-1:1996
Stainless Steel	Available on request

LOCATING CENTER REGISTER

Removable Centre Register	Mild Steel Cadmium Plated
Fixed Centre Register	Mild Steel

HARNESS LUGS

Steel Plate	SANS 1431:1987 Grade 300 WA BS EN 10025:2004 Grade S275
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HARNESS / RESTRAINED FLANGE ADAPTOR TIE ROD BOLTS

Carbon Steel Bar	SANS 1431:1987 Grade 300 WA BS 970-1:1996 Grades 4.8 or 8.8 Dependant on Pressure
Coating	Uncoated or Electro-galvanised zinc to BSEN 12329:2000/ BSEN 12330:2000
Stainless Steel	Available on request

SPECIALISED COATINGS

Fusion Bonded Epoxy to SABS 1217:1984
Certified Non Toxic for use on potable water distribution systems in accordance with BS 6920 (WRAS)

PRODUCTS AVAILABLE FROM KLAMFLEX

RANGER COUPLINGS

Ranger products, in the form of wide range couplings and flange adaptors, are designed to join various outside diameters with the same or different nominal bore.

Because of the wide range tolerance on O.D. (Up to 23mm) a single RANGER coupling can connect steel, ductile iron, asbestos cement and other rigid pipe materials.

The ability of Ranger couplings to join dissimilar pipe materials is a bonus feature in both repair or permanent situations.

STEPPED COUPLINGS

Where pipe ends of different outside diameters have to be connected, stepped couplings can be provided. The range is extensive and covers a vast array of pipe sizes and materials. The joining of dissimilar materials, requiring different fastener torque values, is facilitated by the inclusion of a profile plate.

DEDICATED COUPLINGS

Klamflex straight couplings join pipes of the same outside diameter in the current production range from 50 - 3500mm.

The couplings can be manufactured to both imperial and metric dimensions in any size within the product range. Straight couplings are suitable for virtually all rigid pipe materials.

RANGER ADAPTORS

RANGER Flange adaptors facilitate the connection of plain ended pipe to flanged ancillary products, in the same range of outside diameters, and multi drilling flanges further simplify installation.

FLANGE ADAPTORS

Covering a similar range to the straight coupling, Klamflex Flange Adaptors are manufactured to join plain ended pipe to flanged valves, fittings, flow meters and pipes. Flange drillings are available to all international standards or to customer specifications.

JUNIOR COUPLINGS

A small bore range of couplings and tees in sizes from 15-50mm, specifically designed for use on plain ended steel service lines. Featuring cast and steel construction, Junior products are galvanised for long term corrosion protection. An

extremely simple jointing method which eliminates the need for on site pipe threading.

DISMANTLING JOINTS

A double flanged composite fitting, featuring a telescopic action between a flanged spigot and a flange adaptor, specially designed to provide longitudinal adjustment in flanged pipe systems. Dismantling joints also provide a simple method for the installation and removal of flanged valves, pumps, flow

meters and flanged pipework. Tie rods are provided for final anchoring and location and also double as flange jointing bolts reducing the number of these required.

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