

"TELESCOPIC PIPE JOINT"

This invention relates to a pipe joint, which can be used (a) to repair a break or other damage to a pipe (e.g. a stormwater or sewer pipe) or (b) to provide for expansion and contraction of the pipe, thereby compensating for earth movements and temperature changes.

Pipe joints incorporating "O"-ring seals are known. These have been suitable for use as expansion joints only, and have not been usable to repair damage to pipes. Similarly, repair joints, wherein a bridging length of pipe is fixed between two sections of a broken pipe are known. Such repair joints are not slidably adjustable.

In areas such as South Australia, which are subject to significant earth movements caused by changes in temperature, drying out of the earth etc., there is a need for an expansion joint which can be used on drainage and sewer pipes. There is also a need for an expandable pipe joint which can be used to repair breaks or other damage to drainage or sewer pipes. The pipe joint of the present invention successfully addresses both these needs.

According to the invention, a pipe joint is provided which comprises:

- (a) an outer sleeve which is a first length of pipe of greater diameter than either of two pipes to be joined, said outer sleeve having a pre-moulded or "O"-ring seal on its inner surface adjacent one end thereof and an annular stop on its inner surface adjacent the other end thereof; and
- (b) an inner sleeve which is a second length of pipe having an annular stop on its outer surface adjacent one end thereof, the outer diameter of said second length of pipe being substantially identical to the inner diameter of said pre-moulded or "O"-ring seal;

said inner and outer sleeves being slidably engageable, the limits of their relative movement being determined by the positioning of the stopped end of said inner sleeve within said outer sleeve.

5 The pipe joint of the invention is illustrated in the accompanying drawings:

Fig. 1 is a cross-sectional view of the pipe joint,

10 Fig. 2 is an end view of the pipe joint,

Figs. 3 and 4 are perspective views of the pipe joint,

Fig. 5 is a perspective view of the inner sleeve,

15 Fig. 6 is a cut-away perspective view of the outer sleeve,

and Figs. 7 and 8 are cross-sectional and cut-away views, respectively, of another embodiment of the pipe joint.

20 The pipe joint of Figs 1-6 is suitable for use in relation to stormwater pipes. Pipe joint 10 comprises a female member (outer sleeve) 11 and a male member (inner sleeve) 12. Female member 11 may be a length of 100-140 mm (outer diameter) PVC pipe, whereas male member 12 may be a length of 80-110 mm
25 (internal diameter), 85-120 mm (outer diameter) PVC pipe. Alternatively, the outer diameter of female member 11 may be 170-190 mm, and the dimensions of male member 12 may be 140-160 mm (internal diameter), 150-170 mm (outer diameter). Preferred figures within these ranges are:

	Inner diameter of male member 12 (in mm)	Outer diameter of male member 12 (in mm)	Outer diameter of female member 11 (in mm)
5 Example A	90	90	110
Example B	100	110	128
Example C	150	160	180

10 Other suitable dimensions and materials will be obvious to those skilled in the art. For example, other plastics and non-corroding metals may be used. Length "A", as marked on Fig. 1, may be varied to suit various applications. In Figs 1-6, the seal 13 consists of a pre-moulded or "O"-ring rubber seal 14 in
 15 a retainer 15, and is attached at one end of female member 11. Retainer 15 is preferably constructed as a two-piece plastic moulding. Stop 16, at the other end of female member 11, is preferably made of plastic or rubber. A similar stop 17 encircles one end of male member 12.

20 Stop 16 has three functions:-

- (a) It is a reducing bush to the diameter of the male member 12 (90 mm, in one embodiment; 110 mm in another embodiment).
- 25 (b) It forms a positive stop for male member 12, due to interaction with the other stop 17, thereby limiting relative movement of the male and female members (12 and 11, respectively).
- 30 (c) It can be used to directly mate with the end of a suitable sized (90 mm diameter or 110 mm diameter, respectively, in these embodiments) pipe.

The pre-moulded or "O"-ring seal 14 allows the male and female members to move relative to each other, whilst still ensuring a fluid-tight seal. Operation of the pipe joint is improved by the use of a suitable lubricant, which does not rot rubber, in conjunction with pre-moulded or "O"-ring seal 13.

Unlike previously known expansion joints, the present pipe joint cannot come apart in use. Stop 17 on male member 12 cannot be moved past the pre-moulded or "O"-ring seal retainer 15, and therefore inhibits over-extension.

For use as a repair joint, pipe joint 10 is contracted; i.e. the end of male member 12 which is encircled by stop 17 is moved towards stop 16 of the female member 11. Pipe joint 10 is then positioned between the ends of two sections of pipe to be joined. Next, pipe joint 10 is expanded to fit the gap between the two sections of pipe. Stop 16 is firmly attached, e.g. by gluing, to one section of pipe. If that pipe section is of smaller diameter than the inner diameter of stop 16, an appropriately sized reducing bush is used. Male member 12 is attached to the other section of pipe by conventional means (e.g. T-piece junction or socket).

For use as an expansion joint, pipe joint 10 is similarly inserted into a pipe line. The relative positions of the male and female members, at the time of inserting the joint, will be dependent on prevailing environmental conditions, e.g. reactivity of the soil and/or temperature. At moderate reactivity and/or temperature, the pipe joint should be inserted in a median condition, with stop 17 approximately midway between pre-moulded or "O"-ring seal retainer 15 and stop 16. This will allow for either expansion or contraction of the joint.

At high reactivity and/or temperature, the pipe line will be approaching maximum expansion. The pipe joint should be inserted in a contracted condition, with stop 17 located in the vicinity of stop 16. The pipe joint is then able to expand, to compensate for the contraction of pipes as reactivity and/or temperature falls. Conversely, at low reactivity and/or temperature, the pipe joint should be inserted in an expanded condition, with stop 17 located in the vicinity of pre-moulded or "O"-ring seal retainer 15. The pipe joint is joined into the pipe line as described above, with respect to repair joints.

The male and female members of the pipe joint together form a sealed unit which, as stated above, cannot be physically pulled apart. According to one embodiment of the invention, the pipe joint in fully contracted condition has a length of about 60 cm. expandable to a length of about 90 cm.

A further embodiment, which may be used in relation to either stormwater or sewer pipes, is depicted in Figs. 7 and 8. The facing edges 18 and 19 of annular stops 16 and 17, respectively, are tapered. Therefore, solids suspended in liquid flowing through the pipe joint are unlikely to be trapped between the stops.

The inner sleeve 12' is otherwise substantially the same as that depicted in Fig. 5, whereas stepped outer sleeve 11' also differs from that shown in Fig. 6 in having a different configuration for the seal retainer 15'. Seal 14' is pre-moulded and, in order to comply with Australian standards, has an approx. 8 mm face. This seal has been found to be more effective than an "O"-ring seal.

In an alternative embodiment, the pre-moulded or "O"-ring seal retainer 15 or 15' is attached to the outer surface of male member 12 or 12' (in place of stop 17) instead of to the inner surface of female member 11 or 11'.

27 10 82

- 6 -

Those skilled in the art will appreciate that the invention described herein is susceptible to variations and modifications other than those specifically described.

AP 10 33



- 7 -

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A pipe joint comprising:

(a) an outer sleeve which is a first length of pipe of greater diameter than either of two pipes to be joined, said outer sleeve having an "O"-ring seal on its inner surface adjacent one end thereof and an annular stop on its inner surface adjacent the other end thereof; and

(b) an inner sleeve which is a second length of pipe having an annular stop on its outer surface adjacent one end thereof, the outer diameter of said second length of pipe being substantially identical to the inner diameter of said "O"-ring seal;

said inner and outer sleeves being slidably engageable, the limits of their relative movement being determined by the positioning of the stopped end of said inner sleeve within said outer sleeve.

2. A pipe joint comprising:

(a) an outer sleeve which is a first length of pipe of greater diameter than either of two pipes to be joined, said outer sleeve having an annular stop permanently fixed on its inner surface adjacent each end thereof; and

(b) an inner sleeve which is a second length of pipe having an "O"-ring seal on its outer surface adjacent one end thereof, the outer diameter of said second length of pipe being substantially identical to the inner diameter of said annular stops;



said inner and outer sleeves being slidably engageable, the difference in diameter of said inner and outer sleeves being sufficiently great that the limits of their relative movement are determined by the positioning of the "O"-ring seal of said inner sleeve within said outer sleeve.

3. A pipe joint comprising:

(a) an outer sleeve which is a first length of pipe of greater diameter than either of two pipes to be joined, said outer sleeve having a pre-moulded seal on its inner surface adjacent one end thereof and an annular stop on its inner surface adjacent the other end thereof; and

(b) an inner sleeve which is a second length of pipe having an annular stop on its outer surface adjacent one end thereof, the outer diameter of said second length of pipe being substantially identical to the inner diameter of said pre-moulded seal;

said inner and outer sleeves being slidably engageable, the limits of their relative movement being determined by the positioning of the stopped end of said inner sleeve within said outer sleeve.

4. A pipe joint comprising:

(a) an outer sleeve which is a first length of pipe of greater diameter than either of two pipes to be joined, said outer sleeve having an annular stop permanently fixed on its inner surface adjacent each end thereof; and

(b) an inner sleeve which is a second length of pipe having a pre-moulded seal on its outer surface adjacent one end thereof, the outer diameter of said second length of pipe being substantially identical to the inner diameter of said annular stops;



said inner and outer sleeves being slidably engageable, the difference in diameter of said inner and outer sleeves being sufficiently great that the limits of their relative movement are determined by the positioning of the pre-moulded seal of said inner sleeve within said outer sleeve.

5. A pipe joint according to any one of the preceding claims, wherein each of said annular stops is made of plastic or rubber.

6. A pipe joint according to any one of the preceding claims, wherein said "O"-ring or pre-moulded seal is made of rubber.

7. A pipe joint according to claim 1 or claim 3, wherein the facing edges of the annular stops on said inner and outer sleeves are tapered.

8. A pipe joint according to any one of the preceding claims, wherein the outer sleeve has an outer diameter of 100-140 mm and the dimensions of the inner sleeve are 80-110 mm (inner diameter), 85-120 mm (outer diameter).

9. A pipe joint according to any one of claims 1 to 7 wherein the outer sleeve has an outer diameter of 170-190 mm and the dimensions of the inner sleeve are 140-160 mm (internal diameter), 150-170 mm (outer diameter).

10. A pipe joint according to any one of the preceding claims substantially as described herein with reference to the accompanying drawings.
