# British Precast Drainage Association

Publications from the British Precast Drainage Association (BPDA):

BPDA was formed in 2017 from the integration of the Concrete Pipeline Systems Association (CPSA) and the Box Culvert Association (BCA).

Information published by both CPSA and BCA will be rebranded and replaced as BPDA in due course.  New material will be branded BPDA.

All CPSA and BCA web traffic will be redirected to the new BPDA web site at www.precastdrainage.co.uk

# Concrete Pipeline Joint Integrity

Until the early 1960ôs sewerage pipelines were predominantly jointed using tarred yarn with a cement mortar fillet. To be successful, these joints greatly depended on the skill and diligence of the installer and when completed were totally rigid with no flexibility to allow for subsequent ground movement. With the late 1960ôs came the change from rigid joints to ôflexibleõ designed to accommodate straight draw, angular deflection and transverse shear load without leakage or failure of the joint. Originally using natural rubber, but quickly moving to synthetic compounds to safeguard against microbiological deterioration. The main criteria for development of joints are:-

- Leak tightness from both infiltration and exfiltration
- Ease and reliability of jointing on site
- Long term durability

Whilst the specified demands in the British Standards to which concrete pipe joints have to conform have always been set at a high level, the development and implementation of the European Standard BS EN 1916 : 2002, ôConcrete pipes and fittings, unreinforced, steel fibre and reinforcedõ introduced a ôDurabilityõ demand previously not included in National Standards.

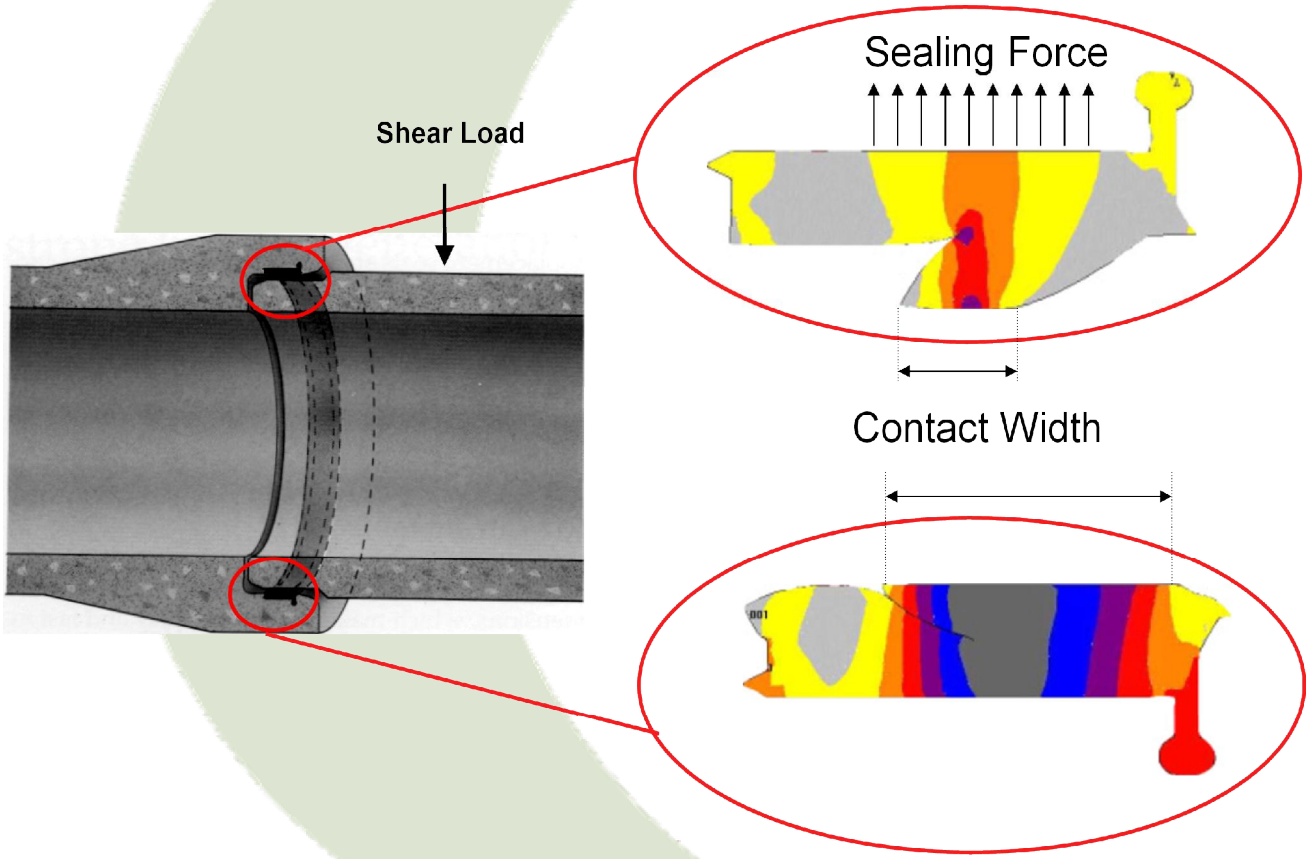
In fact Joint Durability is not addressed in any other Sewerage or Drainage pipe line standard for the UK.

BS EN 1916 states:-
ñA joint assembly has to remain watertight throughout its working life and a significant factor in achieving this is that the physical characteristics of the installed seal are sustained at or above accepted levels. In particular, stress relaxation of the rubber causes a decrease with time of the stress imposed on the seal by the constant strain, so initial values of limiting criteria have been set high enough to ensure continued performance throughout the joints working life.ò

The requirement specifies:-

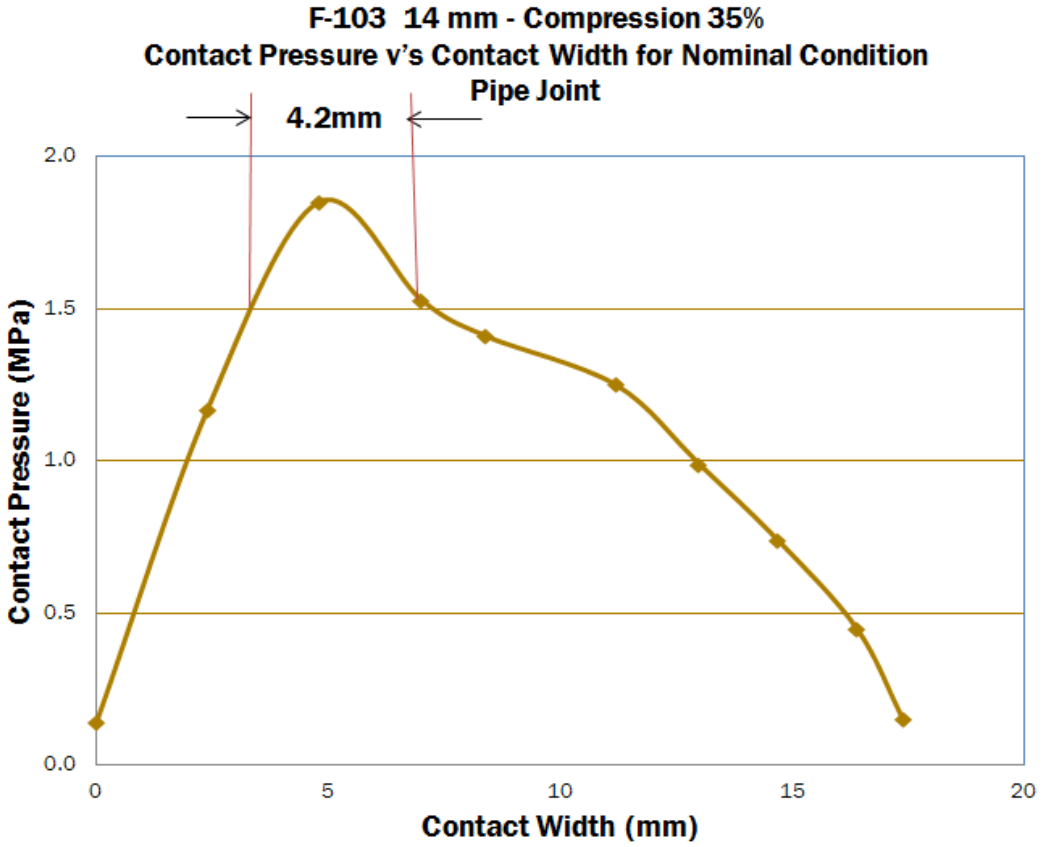
- A minimum seal contact width over which the seal is effective of > 50% of the nominal radial annular space (Joint Gap)
- A mean contact pressure over the contact width of > 0.15 MPa

These requirements must be achieved using the most ôunfavourableô combination of joint tolerance (maximum socket, minimum spigot) and after a transverse shear load of 30 x pipe DN in kN is applied.




The integrated seal pipe joints currently used in the majority of pipe joints not only achieve the 0.15 MPa mean sealing pressure requirement but actually achieve 0.49 MPa exceeding the minimum requirement by 325% !

This requirement is for the mean pressure across the contact sealing width. The graph below details the 14mm F103 seal used in the majority of pipe joints up to and including DN600. As with any joint design there is a higher contact pressure in the ćcentreô of the joint and if the contact pressure is plotted against the contact width, at nominal joint conditions > 4mm has a contact pressure > 1.5 MPa. This is the same for the joints in larger diameter pipes.




Allowing for up to 45% stress relaxation of the seal over time, this joint design together with the concrete pipe surrounding it will remain watertight in excess of 120 years.

**For further information please contact your usual supplier:**

**Buchan Concrete Solutions**
Tel: 01606 843 500
Web: www.buchanconcrete.com

**CPM Group**
Tel: 0117 981 2791
Web: www.cpm-group.com

**F P McCann**
Tel: 01530 240 000
Web: www.fpmccann.co.uk

**Milton Precast**
01795 425191
www.miltonprecast.com

**Stanton Bonna**
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