

TECHNICAL BULLETIN

November 2016

Joint shear performance of **FRCPIPES**.

FRCPIPES has conducted a review of various pipe joints with regards to the ability to withstand shear forces applied as a result of differential stresses across a pipe joint. These forces may be due to settlement of embankment fill, forces applied during construction or natural ground movement.

A review of international standards revealed a number of key documents, British standard BS 1916:2002, Australian Standard AS 1741-1991 and American ASTM C497M.

The methods adopted by the various standards apply a force to one side of the pipe joint, whilst the adjacent side is supported. The pipes are filled with water for some tests but not all. The objective of this report is to establish a reference for joint shear performance for **FRCPIPES** joints.

The international standards vary in terms of the accepted minimum joint performance, with the minimum value deriving from the British Standard of 30N/mm of nominal diameter.

In most situations, shear of the pipe joints is unlikely to be encountered provided the pipes are correctly installed. In situations where either subsidence or soil movement is to be expected, an evaluation of the likely forces experienced by the pipe should be undertaken.

RCPA manufactures the **FRCPIPES** rebate joint and **FRCPIPES+** collared joint. All pipe joint testing has been done using a pair of offset loading blocks, shaped to fit the outside diameter of the pipe.

Pipes are restrained to prevent longitudinal movement, but without restricting shearing movement at the joint.

Results are calculated to give a measure of N per mm of internal pipe diameter, in accordance with the standards mentioned above.



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SHEAR FORCE RESISTANCE – N/MM OF PIPE DIAMETER
(AVERAGE OF TESTS CONDUCTED TO DATE)

Pipe Size/Class	FRCPIPES	FRCPIPES+
225/2	41	105
300/2	42	83
375/2	34	115
450/2	47	127
525/2	48	153
600/2	54	135
675/2	56	133
750/2	63	119
AVERAGE	53	121

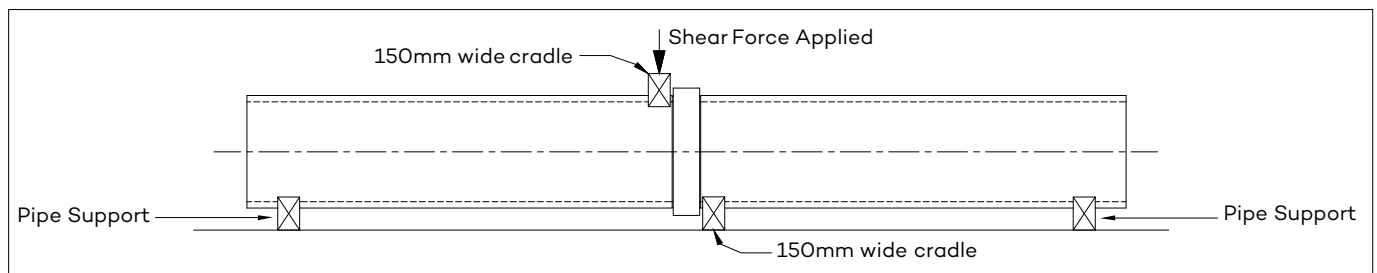
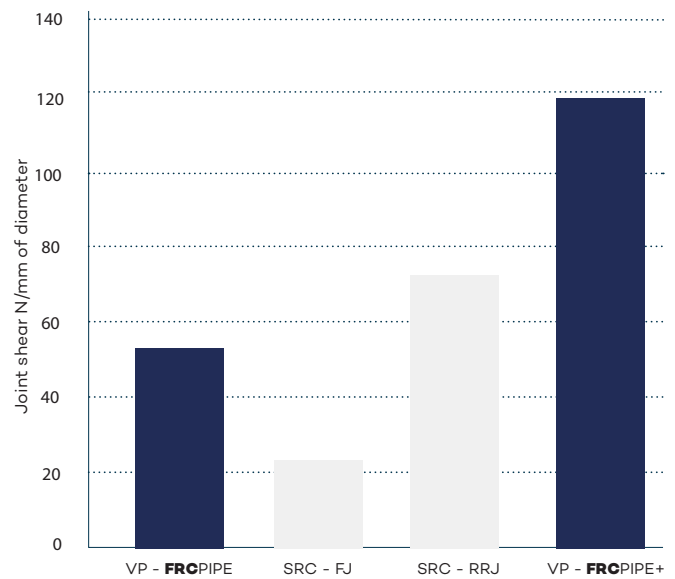
In an updated publication which appeared around 2000, the CPAA published test results for a 450mm SRC pipe in both flush joint and rubber ring joint. The results are below.

SHEAR FORCE RESISTANCE – N/MM OF PIPE DIAMETER
(FROM CPAA FACT SHEET)

Pipe Size/Class	Flush Joint	Rubber Ring Joint
450 (not stated)	23	72

It is apparent from these published results that the **FRCPIPE+** joint shear strength far exceeds that of the SRC rubber ring joint, however more extensive testing must be conducted before definitive parallels can be drawn. The CPAA publication also recommends that a minimum shear load of 25N/mm of internal diameter should be achieved as a general benchmark value.

In normal service conditions, the **FRCPIPE** joint provides adequate resistance to inground shear forces. For more demanding applications where large forces are expected across pipe joints, the **FRCPIPE+** collared joints provides a high strength joint able to withstand shear loads applied in service conditions.



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