



Pipe Stiffness (PS), Ring Stiffness Constant (RSC) and Flexibility Factor (FF)

for

Buried Gravity Flow Pipes

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Foreword

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The purpose of this technical note is to provide general information on resistance to ring bending for buried, gravity flow pipes.

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PIPE STIFFNESS CHARACTERISTICS FOR BURIED GRAVITY FLOW PIPES

Various measures have been used to characterize a pipe's resistance to ring (hoop) deflection. In the U.S., these measures include:

- Flexibility Factor (FF) as defined in AASHTO Bridge Design Specification Section 18,
- Pipe Stiffness (PS) as defined in ASTM D2412, and
- Ring Stiffness Constant (RSC) as defined in ASTM F894.

These measures characterize the pipe's resistance to ring deflection when subjected to a short-term parallel plate load. The purpose of PPI Technical Note-19 is to advise on the applicability of these measures for comparing and classifying plastic pipes.

The first commonly used measure for pipe deflection resistance was "pipe stiffness" (PS). Designers found it easy to assign a minimum PS value in their specifications for plastic pipes. However, for larger diameter pipes, the validity of PS as a product specification requirement has been questioned because:

- (1) It was discovered that given the same handling and installation forces larger diameter pipes require much lower "pipe stiffness" for proper installation than do smaller diameter pipes.
- (2) It was found that there was a trade-off between pipe material strain capacity and "pipe stiffness". Pipes made from strain-limited plastics such as glass-reinforced thermoset resin required greater stiffness to resist localized deflections than that required for pipes made from thermoplastic materials having high strain capacity.