

Connecting polymer pipes to manholes, chambers and other structures (rocker pipes)

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Protecting pipelines

Where a drain or sewer passes through a structure (e.g. manhole, inspection chamber, footing, wall), it is reasonable to expect some differential settlement between the pipeline and the structure.

The design needs to allow sufficient flexibility in the pipeline near the structure to avoid damage or misalignment due to movement. This might be achieved by choosing a flexible pipe or, where rigid pipes are used, inclusion of a short-length pipe (a 'rocker' pipe) with additional flexible joints in the pipeline. Polymer pipes are sufficiently flexible that shear loads can be accommodated without using rocker pipes. In extreme cases, stabilisation of the soil around the structure may be required to limit ground movement.

Slightly different terminology and ways of presenting the requirement to protect pipelines are used in the various UK documents for designing and constructing adoptable foul and surface water drains and sewers, highway drainage and building drainage (i.e. the Design and Construction Guide, Sewers for Adoption, Sewers for Scotland, Sewers for Adoption for Northern Ireland, Specification for Highway Works, Building Regulations Approved Documents and Building Standards Technical Handbooks and so on), but the intended outcome is the same.

A clear and accessible explanation of best practice which is consistent with these documents has therefore been included in BS EN 752: 2017 *'Drain and sewer systems outside buildings. Sewer system management.'*

The BPF Pipes Group and its members recommend that the guidance in the National Annex to BS EN 752:2017 is followed.

The full guidance can be found in clause NA.6.4.4.5 of the National Annex. The key points are reproduced overleaf, together with information on the specifications applicable to polymer pipes.

Best practice guidance

On specifying the interface between a structure and a pipe, BS EN 752:2017 advises:

- Expect some differential settlement between the pipeline and structure which may lead to high shear loads on the pipe built into the structure.
- Materials such as polyethylene and polypropylene can be sufficiently flexible to accommodate these shear loads without using rocker pipes and with no detrimental effect on the structural performance of the pipe.
- For other pipe materials, a short-length pipe (a 'rocker' pipe) should be laid between the structure and the full-length pipe to isolate this pipe from movements caused by differential settlement. The first flexible joint should be as close to the face of the structure as practicable, and the recommended maximum length of a rocker pipe is given.
- For special cases, such as where large settlements due to poor soil might be expected or for very large diameter pipes, additional short-length (rocker) pipes might be needed or greater angular performance at pipe joints specified.

Standards for polymer piping systems

The use of the correct standard for purchasing products which are suitable for their intended application ensures ease of installation and a long service life. Pipes to the following standards are sufficiently flexible to accommodate shear loads without using rocker pipes.

BS EN 13476 *Plastics piping systems for non-pressure underground drains and sewers-Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE).*

- Part 1 *General requirements and performance characteristics*
- Part 2 *Specifications for pipes and fittings with smooth internal and external surface and the system, Type A*
- Part 3 *Specifications for pipes and fittings with smooth internal and profiled external surface and the system, Type B*

BS EN 1401-1 *Plastics piping systems for non-pressure underground drainage and sewerage. Unplasticized poly(vinyl chloride) (PVC-U): Specifications for pipes, fittings and the system*

BS EN 12666-1 *Plastics piping systems for non-pressure underground drains and sewer. Polyethylene (PE): Specifications for pipes, fittings and the system*

BS EN 1852-1 *Plastics piping systems for non-pressure underground drainage and sewerage. Polypropylene (PP): Specifications for pipes, fittings and the system*

Note: BS 9295:2020 *Guide to the structural design of buried pipes* also includes guidance on this topic but interprets best practice differently. It is inconsistent with the UK documents mentioned above. To avoid confusion, BPF Pipes Group and its members recommend that BS EN 752:2017 is taken as the lead document and BS 9295:2020 (Clause A.10.3) is not to be used for this purpose.