1.0 Pipe Material Requirements

Scottish Water has approved the use of Polyethylene Barrier Pipe systems as adoptable assets within the Standards and Specifications in April 2008.

Polyethylene water pipelines can be affected by certain chemicals in contaminated land. These may be harmful to the pipe material but also cause taste and odour problems after permeating through the pipe wall. Where pipe work is to be laid in land potentially contaminated which can include 'brownfield' and 'greenfield' sites', polyethylene pipe incorporating an impermeable aluminium layer is an alternative material for construction.

Water Industry Specification (WIS) 4-32-19 published in November 2007 is the standard for polyethylene barrier pipe systems.

Within the requirements of WIS 4-32-19 Scottish Water has assessed the water quality implications of available pipe systems and laying techniques. The following barrier pipe systems and jointing techniques are approved for use as adoptable infrastructure assets.

- Barrier Pipe Systems must comply with Regulation 33 of "The Public Water Supplies (Scotland) Regulations 2014.
- Barrier Pipe Systems must comply with WIS 4-32-19.
- Both Type A and Type B pipe systems as defined in WIS 4-32-19 are approved by Scottish Water.
- The following joint systems are approved by Scottish Water:-
  - Mechanical (fluid) compression joint system - (Redman type or approved equal)
  - Mechanical fittings with full end loading bearing (WIS 4-24-01 Type 1) – GPS type fittings or approved equal

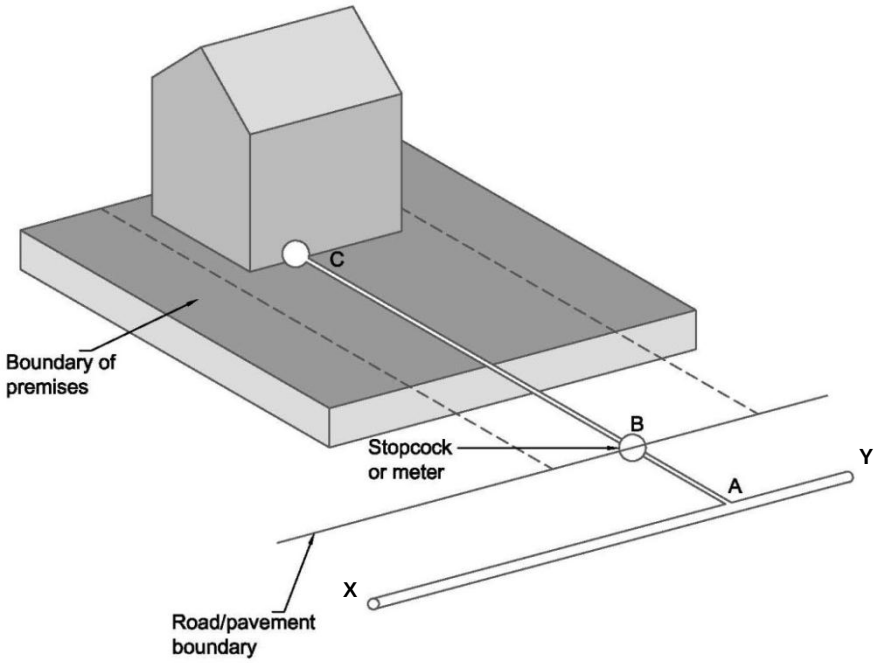
The use of barrier pipe must provide a complete Barrier System incorporating barrier pipe, proprietary jointing system, service pipe work and appropriate tapping tees for service connections. The full barrier pipe system must provide full barrier protection and meet the requirements of WIS 4-32-19 without the need for external wrapping

All polyethylene (PE) pipe work systems installed in contaminated land must comply with the requirements of WIS 4-32-19 and all related National or European standards. In addition all materials likely to come in to contact with potable water must comply with the requirements of Regulation 27 of The Water Supply (Water Quality) (Scotland) Regulations 2001.

Approval for use of barrier pipe materials in accordance with the Regulations is mandatory.

1.1 Water Mains and Service Pipework Compatability

All water mains and service pipework materials must be supplied from an complaint single source manufacturer to provide an overall acceptable system approach as shown on diagram below:-



PIPEWORK	OWNERSHIP	JOINTING
X – Y Water Main	Scottish Water	Proprietary jointing techniques (Mechanical / Fluid) as supplied by the pipe manufacturer
A – B Communication Pipe	Scottish Water	Tapping Tees and Mechanical Compression Fittings as supplied by the pipe manufacturer
B – C Supply Pipe	Property Owner	Mechanical Compression Fittings as supplied by the pipe manufacturer
Internal Plumbing	Property Owner	

2.0 WIS 4-32-19 Compliant Barrier Pipe Products

WIS 4-32-19 specifies the materials and physical / mechanical performance for barrier pipe systems using polyethylene pipes with aluminium barrier layer for potable water supply in contaminated land together with associated fittings and joints in nominal sizes from 25mm service pipe work up to and including 630mm mains pipe work.

This is available as a download from www.wis-ign.org

Two types of pipe construction / design are available:-

- Type A – Where the aluminium layer and outside polyethylene layer are regarded as non-stress bearing. This is a standard PE pipe with an external aluminium layer encapsulated with an additional external layer of PE. Has a slightly larger external diameter than standard PE pipe.
- Type B – Pipes where one or more polyethylene layers and aluminium layer are stress bearing. Has an aluminium barrier encapsulated within main body of a standard PE pipe.

Scottish Water only approves the use of Mechanical Jointing/ Fittings, as detailed in Clause 1.0, which are full barrier fittings available for pipe sizes 90 to 180mm dia and to suit SDR and PE classifications. This arrangement provides exceptional permeation resistance for entire pipe systems and eliminates the need for any external wrapping.

As part of each manufacturer pipe systems, proprietary mechanical compression fittings are available for service pipe work in sizes 25mm to 63mm. Tapping tees are also available suitable as part of barrier pipe systems.

All pipe work has external brown stripes for identification as a multi-layer structured pipe in accordance with National Joint Utilities Group (NJUG) regulations.

All polyethylene barrier pipe systems, within the site, must comply with WIS 4-32-19 and be supplied from a single manufacturer. Barrier pipe installed using composite materials from more than one manufacturer is NOT acceptable and such pipe work will NOT be permitted to connect to the public water infrastructure system.

3.0 Water Quality Benefits

WIS 4-32-19 provides the focus on the quality of product testing and compliance and provides the necessary national standard for maintaining water quality. Utilising proprietary mechanical jointing system and service tapping tees provides a high level of pipe system confidence and security of water supply.

Due to the typical layout of carriageways/footpaths and service strips which are used to locate water mains, barrier pipe will provide an alternative material for construction. This will provide flexibility in site laying techniques and can deliver effective engineering solutions.

The inclusion of a barrier pipe system in the Standards and Specifications supports and compliments Scottish Water's Distribution Operations Maintenance Strategy (DOMS) policy.

For more information on polyethylene barrier pipe systems contact:-

Martin Faulds on 07875 879689 or martin.faulds@scottishwater.co.uk

Iain MacDonald on 01383 848270 or iain.macdonald@scottishwater.co.uk

4.0 Fittings for Private Mains

Scottish Water have assessed polyethylene barrier pipe systems when installed as a private main and the requirements for acceptable pipe fitting suitable for connection to the public water infrastructure system.

In order to provide due diligence and meet Scottish Waters duty of care, all private water mains must be pressure tested and disinfected in accordance with Water for Scotland, Hygiene Code of Practice and DOMS procedures. This is also a mandatory requirement of the Scottish Water Byelaws 2004.

Private water mains must also comply with WIS 4-32-19 and be supplied from a single manufacturer. Barrier pipe installed using composite materials from more than one manufacturer is NOT acceptable and such pipe work will NOT be permitted to connect to the public water infrastructure system.

For private mains **ONLY** butt-fusion and electrofusion jointing system will be acceptable where manufacturers recommendations are followed and in accordance with WIS 4-32-19. Such joints and pipe fittings MUST be suitably protected externally using an aluminium tape wrapping followed by a proprietary waterproof petrolatum tape applied in accordance with manufacturer recommendations.

All private mains will require a double check valve to be installed in line at the boundary directly before connection to the public water main.

5.0 Reference Documents

1. Guidance for Installation of Water Mains and Fittings. *(Reference – UKWIR 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield site'.)*

2. Appendices E, F and G of the UKWIR *'Guidance for the selection of water supply pipes to be used in Brownfield sites'.*

3. BS10175 (2001) Investigation of Potentially Contaminated Sites a code of practice.

4. CIRIA (1993) A guide to stage working practices for contaminated sites, W S Atkins, Funders report/cp/9.

5. Environment Agency - Contaminated Land Exposure Assessment www.environmentagency.gov.uk

6. Scottish Waters Distribution Operations Maintenance Strategy Documents *(Not an exhaustive list, refer to Scottish Water Intranet for full list):-*

DOM-WN-PRC-00000314 COMMISSIONING DECOMMISIONING WATER MAINS
DOM-WI-PRC-00000202 GUIDANCE OF WATER MAINS AND FITTINGS
DOM-WI-WIN-00000201 PREVENTION OF CONTAMINATION DURING CONSTRUCTION
DOM-WI-WIN-00000202 COMMISSIONING MAINS
DOM-WI-WIN-00000203 ACTIONS FOLLOWING COMMISSIONING FAILURURE
DOM-WI-WIN-00000204 CONNECTION TO THE LIVE NETWORK
DOM-WI-WIN-00000206 LAYING OF MAINS IN POTENTIALLY CONTAMINATED GROUND

7. Water for Scotland – A TECHNICAL SPECIFICATION FOR DEVELOPERS IN SCOTLAND

8. Scottish Water Byelaws