Schedule of permissible materials

March 2019
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Introduction

SW Services Ltd ("SW") provides a list of approved materials available from its standard asset list ("SAL") of approved suppliers that SW requires that all Contractors directly engaged by SWs and/or Self-lay Providers adhere to in delivering new/replacement assets in SW’s region of supply.

A Contractor / SLP is not restricted to procuring materials from SW’s list of approved suppliers as it may use an alternative supplier when it can demonstrate to SW that materials are of the exact same standard and specification as those listed in this Schedule, subject to:

- Whereas a supplier may satisfy Regulation 31 in respect of supplying an alternative and similar Permissible Material to those SW obtains and installs from its approved suppliers, SW requires that materials installed relative to the installation of mains and services are of a consistent design and construction standard for Health and Safety and Operational considerations in particular.

This is particularly applicable to preferred pipe material and diameters, water mains fittings, service pipe fittings, meters, meter chambers, fitting chambers, covers and frames.

- A Contractor / SLP shall be required to provide SW a list of all materials and products intending to be used to comply with Regulation 31 before commencement of any work (typically this could be provided at a pre-start meeting).

Following completion of all work and forming part of SW’s commissioning process the list of materials and products shall be updated and reconciled and any change in the previously provided list of materials and products shall be issued to SW as part of the handover and work commissioning completion documentation.

Therefore, if alternative materials or suppliers are used without our written approval (prior to work starting and/or materials being installed), SW reserve the right to not accept commissioning of the mains/services until all non-compliant materials have been replaced to SW’s satisfaction.
Polyethylene (PE) pipe (water mains and services)

Description and compliant standard

The design of any pipeline system, and the subsequent selection of pipeline material, requires an understanding of the operation, pressure, ground conditions, and the nature of the fluid that is to be conveyed. The selection of an appropriate pipeline material is hence specific to each project. The Contractor shall ensure that the design procedure adopted is appropriate for the Material selected.

The WRc document IGN 4-32-18 gives additional information on the choice of pressure ratings of polyethylene pipes and IGN 4-37-02 gives guidance for design against surge and fatigue.

a) Outside diameters of 110, 160 and 200mm are permitted where required for slip-lining installations, but the designer shall gain approval from SW if proposing to use them as these sizes are not a standard that we typically install in our region of supply or may accept.

b) Compliant with the “UKWIR Guidance for the Selection of Water Pipes to be used in contaminated Land Assessment Guidance” – see link under; a full ground investigation report, quantitative risk assessment, remediation strategy and verification report shall be issued to SW in accordance with this document.

Link to the above document: https://www.water.org.uk/guidance/contaminated-land-assessment-guidance/

Pipe Material selection:

Our preference is to use high-performance polyethylene (HPPE) material for all water mains and services. Non-PE pipe shall only be installed as an alternative material when it has been approved by SW.

PE pipe is classified and dealt with as a flexible pipe. This classification suggests that the pipe cross section is likely to fail as a result of cross sectional deformation, or ovalisation, and is at risk of a complete buckling collapse. Preventing failure is achieved by designing a bedding and pipe surround that has the characteristics that enable it to structurally support the pipe. PE pipes pressure rating is related to a factor known as the Standard Dimension Ratio (SDR), the ratio of the diameter of the pipe to the wall thickness.

All pipes must be marked with PN and SDR codes. PE100 pipe to be dark blue and PE80 pipe to be light blue.

SW’s default requirement for pressure rating of PE100 pipe is SDR17 (pressure rating 10 bar) for pipe diameters in excess of 90mm or, where specified and appropriate to the installation, SDR11, pressure rating 16 bar); and for diameters of 63mm and less SDR11 (pressure rating 12.5 bar)

Pipe Jointing:

- Our specified requirement for jointing of potable water PE pipes, including bends and tees (flanged spigot or all spigot) is that they be butt-fused and the pipes shall be externally de-beaded (no requirement to internally de-bead) and be in accordance with WIS 4-32-08: 2016: issue 4.

- Mechanical joints and/or electro-fusion joints shall not be accepted by SW except in exceptional site specific circumstances (i.e. to circumvent an obstruction or when a specialised anchor joint is
required). Any such exception shall only be accepted when SW has agreed its use prior to works commencing where if so provided it shall be given in writing.

- SW shall not normally accept electro-fusion joints routinely between pipe lengths on a pipeline and this includes for jointing on bends, where the expectation is that long radius or flanged bends be used (depending on site specific constraints).

- The only exception to the above shall be relative to Polyethylene pipes up to and including 225mm outside diameter for straight lengths (sticks) and up to and including 180mm outside diameter for coils; shall be when SW accepts jointing using electrofusion couplers where butt fusion is not practicable due to specific site constraints only that prevent butt-fusion joints.

For instance if two coils to be joined are drilled the frictional resistance may preclude butt fusion and electrofusion would be the most appropriate jointing method. However, best practice is to design the installation of pipework such that jointing mainly corresponds with valving, tee’s, other fittings, in general; where flanged pipework will be inevitably be present.

The use of coiled pipe does not therefore provide an automatic entitlement for the use of electro-fusion in all instances as such is to be assessed on a case by case basis, as in most instances proper design and up front planning can minimise such jointing).

- Electrofusion jointing is not permitted above 180mm outside diameter on coiled pipe or above 225mm outside diameter on straight lengths (sticks).

- All jointing using Electrofusion couplers and butt fusion welding shall comply with the provisions of WIS 4-32-08 for workmanship and materials unless any provisions are superseded by BS EN 13067:2012 in which case the latter shall apply.

- All welders shall submit certification of passing examinations following accredited training to the provisions of BS EN 13067:2012 prior to commencement of welding and at any time as requested by SW and such evidence shall be approved by SW prior to undertaking welding using electrofusion materials.

**Electro-fusion Joints:** Data from calibrated proprietary equipment to record each weld’s location and all relevant attributes related to the quality of each weld shall be recorded and provided to SW by means of a printed report provided for each electro-fusion joint and its location pin-pointed on an as-laid drawing of the installation completed.

**Electro-fusion couplers:** are to be coloured blue when the use of these couplers is approved as stated above.

**Electro-fusion tees for service connections:**

Electro-fusion top tees (for service connections not exceeding 63mm OD pipe or ID equivalent) shall not be accepted without prior written approval from us, which shall typically only be considered relative to a service connection required to be made to a non-standard diameter main or to a PE 315mm main (which is not a trunk main).
Pipe Protection (Barrier Pipe):

The Contractor shall use an approved pipe material in all cases of contaminated land and also ensure all joints and bolts are also protected by an approved shrink wrap or a high density bitumen tape (not petroleum based). This can be generally defined as follows:

- Contaminated ground is any non-inert material which requires removal from the Affected Property to tip and/or landfill site; or

- Contaminated land and the requirement for pipe protection (Barrier Pipe and protection of joints and bolts) shall comply with the Contaminated Ground Assessment Guidance published by Water Uk January 2014 and any later versions thereof.

- As a minimum requirement the Manufacturers recommendations shall be followed at all times in respect of ensuring a fully integrated pipe protection system (including all joints). If fitting or joints that are supplied by a Manufacturer other than the one supplying the pipe the Contractor / SLP shall provide a risk assessment to SW to demonstrate how the minimum equivalent level of pipe protection shall be provided.

Specification and notes

Distribution mains

- HPPE – PE100 *SDR17 (10bar), dark blue in colour.
- Fittings shall conform to WSIS 4-32-17

All joints and bolts shall be protected by suitable and approved wrapping. Resistivity surveys must be undertaken to determine corrosion potential and, as a result, the external protection required.

Service pipes

- Pipe work range 25mm – *63mm inclusive is to be PE80, light blue in colour.
- If pipework in contaminated ground: barrier pipe (e.g. “Protecta-Line”) or depending on circumstances copper (BSEN 1057 / 1996).

*any alternative (SDR rating or material type) shall be agreed with SW.

Service pipe connections

- Not accepted: PE electro-fusion tapping saddles (see also above titled paragraph).
- Accepted: gunmetal tapping saddles. (See also above: Electro-fusion tees).
- All tapping saddles shall be to BS2789 grade 500/7 and capable of withstanding pressures of up to 16bar.
- Meter carriers and other integral fittings in a boundary box shall be WRAS approved i.e. gunmetal or brass. See also chambers (boundary box) below.
- All service pipe fittings shall be protected against contamination, i.e. brass, copper, and/or gunmetal.
• All service pipe fittings shall be WRAS approved and all service pipe connection joints (couplers) shall solely be those that are supplied from a Supplier on SW’s SAL.

• Joints/couplers for joints on service pipe (especially those connecting the pipe to a boundary box / meter chamber) shall only be accepted from those supplied by the Suppliers listed in SW’s SAL as the joints available from these Suppliers provide a proven construction standard required by SW for a future resilient water system network.

Ductile iron (DI) pipe (water mains and services)

Description and compliant standard

When the use of DI pipe has been approved by SW. In these circumstances:

DI pipe requires lining and coatings to be in accordance with the requirements of Civil Engineering Specification for the Water Industry (CESWI), * SW’s Technical Standards Manual (“TSM”) (specifically section MED 4001) – and BS EN 545 (covering requirements for internal lining and external protection). * A copy of SW’s MED 4001 can be provided on request.

Ductile iron pipes are classified under BS EN 1295 as being semi-rigid. This classification means that DI pipes are flexible enough to redistribute some of the overburden pressure to the side fill, yet stiff enough to avoid buckling failure.

Embedment classifications S1 – S5, B1, B2 and D at a minimum density of 85% proctor are considered as being suitable for DI pipelines. The code encourages the inclusion of bending stress as an imposed load when determining the pressure rating of the pipe (from C25 to C40). With DI pipe, this poses no immediate problems as the yield stress is approximately 420 MPa.

SW permits the use of DI pipe from suppliers on its Standard Asset List (“SAL”). All pipe systems must be designed and installed as per the manufacture’s recommendations as a minimum, and comply with all requirement of SW’s TSM.

Pipe Jointing: pipelines constructed from ductile iron can be joined by push-fit, mechanically anchored flexible systems; or, by flanges such that thrust blocks may be eliminated wherever space is limited, ground conditions are unsuitable, or the presence of existing services or risk of disturbance for future services, renders thrust blocks unsuitable. Flanges should not be used for below ground applications due to lack of flexibility and propensity to allow leakage from pulled joints or breaks in the pipeline.

Pipe Protection: DI pipe requires lining and coatings in accordance with the requirements of CESWI, SW’s Technical Standards Manual (“TSM”) and specifically section MED 4001. Coatings need to be selected in accordance with the CESWI and SW’s TSM. Resistivity surveys must be undertaken to determine corrosion potential and, as a result, the external protection required.

Where ground conditions, such as contaminated ground are encountered, then additional protection to the pipe will be required, such as factory-applied tape wrapping. DI pipe shall be protected in aggressive ground conditions and particularly when resistivity is >750ohm.cm.
Specification and notes

- All joints are to be wrapped in an approved shrink wrap or a high density bitumen tape (not petroleum based).

Valves

Description and compliant standard

Gate Valves: “sluice valves” shall be left-hand closing (anti-clockwise) resilient seat gate type valve. In no circumstances will right-hand close valves be accepted.

For sluice valves installed on water mains typically 450mm dia. or greater, the valve is to include an integral bypass (to reduce pressure differentials).

The top of the valve spindle is to be positioned between 200mm – 300mm of the cover level of the chamber cover.

Air valves: shall be installed in chambers that are able to drain or where this is not possible the air vent must be at a level higher than water could rise to in order to prevent potential contamination.

Specification and notes

- Valves are to be compliant with BSEN1563.
- Internal and externally protected by blue fusion-bonded epoxy powder coating.

Fire Hydrants

Description and compliant standard

All new fire hydrants shall be of the through-bore type. Fire hydrants are to be installed on mains with and internal diameter of 80mm or greater. Washouts installed on mains of internal diameter less than 80mm are not used as fire hydrants.

Hydrants shall be centralised in the chamber and aligned vertically so that the operation of the spindle and installation of a standpipe by the fire authority is not compromised. All hydrants shall comply with BS750 2006 and be of the 2.5 inch stainless steel London round thread design defined by BS750, and shall be right-hand (clockwise) closing.

All hydrants shall be rated at 16bar continuous operating pressure. The design flow capacity shall not be less than 2,000 litres/minute at a constant pressure of 1.7bar at the outlet.

All nuts and bolts incorporated into a hydrant assembly shall be of a corrosion resistant material or else coated according to WIS 4-52-03.
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Specification and notes

- Are owned by the local fire authority once commissioned. SW maintains under an agreement with the fire authority.
- Covers and frames: shall comply with BS750. There shall be two prising inserts and lifting keyholes in a permanent non-rock design C&F, with a single lid only (i.e. not split).
- The chamber shall have a minimum clear opening of 230mm x 380mm and the sections shall be of pre-cast concrete or (when approved by SW) of an equivalent recycled composite material.

Mains fitting chambers, covers and frames

Description and compliant standard

Chambers: shall comprise of pre-cast concrete sections.

- For sluice valves installed on water mains typically 450mm diameter or greater with an integral bypass the chamber size shall have a clear opening of 900mm x 600mm.
- For sluice valves without an integral bypass the chamber dimension shall have a clear opening of 230mm x 230mm.

Covers and frames

- On chambers of dimension 230mm x 230mm a cover of 225 x 225 clear opening (see drawing A81945.1201, SW Design Guide for SLPs)
- On chambers of dimension 430mm x 280mm a cover of 380 x 230 clear opening (see drawing A819545.1202, SW Design Guide for SLPs)
- Chambers of dimension 600mm x 900mm shall be capable of single man lift covers, of a slide out design.

Specification and notes

Valves on SW's existing water supply distribution network shall not be operated by SLPs, but by SW only, and in accordance with SW’s Water Manual – Distribution (“WM-D”) (document 366). The following covers and frames are from SW's SAL supplier, which is currently Wrekin (wrekinproducts.com).

1. Surface Box GRADE B 135 X 135 X 75MM Solid Top C&F Hinged W (25MM) 215MM base Cust Ref FC00201
2. 6in x 6in DI Frame & Cover Badged ‘SV’
3. 15in x 9in DI Cover & Frame Badged 'Meter'
4. 9in x 9in DI Cover & Frame for Meter
5. 15in x 9in DI Cover & Frame Badged 'FH' Grade 'A'
6. 600mm x 450mm x 75mm DI Cover & Frame LD D125
7. 15in x 9in DI Cover & Frame Badged 'WO' Grade 'A'
8. 15in x 9in DI Cover & Frame Badged 'AV' Grade 'A'
9. 15in x 9in DI Cover & Frame Badged 'SV' Grade 'A'
10. 600 x 450 x 100mm DI Frame & Cover 'WATER' HD
11. 900 X 600 X 100MM OPT-EMAX D400 COVER & FRAME
12. 900 x 600 x 100mm DI Cover & Frame
Boundary box (meter) chamber (non-contaminated ground)

Description and compliant standard

Single, double and multiple port manifolds can be used. The boundary box (sealed type) must be able to incorporate a manifold meter with 1.5 inch tread, stop-tap and non-return valve. All boundary boxes must have height and slope adjustment capabilities.

Use 2 port and/or 6 port manifold boxes when the number of service pipes converging at an accepted location number is in excess of two services.

Specification and notes

- For single service: the SW-preferred box (available from SW’s SAL Supplier) is the ‘Matrix Below Ground Boundary Box Sealed Telescopic Plastic Raised Manifold’, Class 1.S.C.
  
  and/or

- when the box is sited where vehicular traffic will pass over the Box, the Grade B Trafficable Surface Box.
- For twin-port manifolds, the SW-preferred box (available from SW’s SAL Supplier) is currently: “ATPLAS” 1/4T Raised Twin 25mm In/Out Meter Box + MB601297 Water Surface Box adjuster.
- For 6-port manifolds: “ATPLAS” Below Ground Boundary Box Rigid Plastic Base 6 Port Multi-Manifold.

Boundary box (meter) chamber (contaminated ground)

Description and compliant standard

Boundary boxes (sealed type) used on contaminated sites shall comply with WIS-4-37-01, be watertight and shall have gunmetal connection fittings that are able to accept either “Protecta-Line” or plastic coated copper pipes. All internal parts (i.e. meter carrier, ferrule) shall be made of brass; and 2-6 port service manifolds shall be made up from brass and copper and, when applicable, be sited in a suitably-sized chamber comprised of pre-cast concrete sections (or approved composite recycled alternative).

Specification and notes

The SW-preferred box (available from SW’s SAL Supplier) is currently the “EBCO Below Ground Boundary Box Sealed Telescopic Gunmetal Base Manifold”.

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**Meters**

**Description and compliant standard**

Separate individual meters are a requirement for all domestic and commercial properties. Meters shall be installed at, or as close as practical, to the boundary of the public highway.

Where services are to be installed in areas of high density developments, the use of two, four and six port manifold meter arrangements is preferred, minimising the total length of communication pipes. See also the SW Meter Location and Installation Guide.

In order of precedence, SW’s preference is that all meters are installed externally in an appropriate chamber, and only installed internally when an external installation is not possible or practicable (and this determination is to be discussed and agreed). Wall mounted external meter boxes are currently not accepted by SW.

**Internal meters:** are to be 15mm or 20mm diameter unless otherwise agreed by SW. All meters shall be installed in accordance with the manufacturer’s instructions depending on flow through the pipe etc, and in accordance with the following order of precedence:

1. Concentric Gladiator meter (screw in type, with internal manifold): see the SW Meter Location and Installation Guide for details of a typical internal meter detail. Note: the above installation of a screw in concentric Gladiator meter is subject to the installation maintaining an adequate flow of water to the customer’s premises as otherwise the following installation applies;

2. 15mm inline meter see the SW Meter Location and Installation Guide for details of a typical internal meter detail.

The Contractor can either directly source or provide the meter chambers and/or meters, or else SW will provide these (at a reasonable cost from its SAL Supplier) for collection on an agreed date from an SW office or depot.

**Specification and notes**

The SW preferred meters (automated read) - available from SW’s SAL Supplier are currently:

**Supplier:** Arad Metering Services, 21 Marys Lane, Burghill, Hereford, HR4 7QL

**Type:** Automated Meter Reading (AMR) type screw in concentric 15mm or 20mm meter (Supplier ref: F389-10); and as listed under,

1. ARAD – 15mm 3G inline meter (equivalent pipe diameter 0.5 inch)
2. ARAD – 20mm 3G inline meter (equivalent pipe diameter 0.75 inch)
3. ARAD – 25mm (TAGUS) inline meter (equivalent pipe diameter 1 inch)
4. ARAD – 40mm inline meter (equivalent pipe diameter 1.5 - 2 inch)
5. ARAD – 15mm 3G Gladiator concentric (screw-in type)