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**PSL MEDIUM-PRESSURE PIPELINES (SABS 1200 L)**

**PSL 1 SCOPE**

Add to Clause 1.1 "Drawings numbered L1, L2 and L3 are withdrawn and replaced by the Construction Drawings."

**PSL 2 INTERPRETATIONS**

**PSL 2.1 References**

\*PSL 2.1.3 Drawings

Drawings numbered L1, L2 and L3 are withdrawn and replaced by the Construction Drawings.

**PSL 3 MATERIALS**

**PSL 3.1 General**

Pipes for water mains shall be

PVC-U Class 9 pipes complying with the requirements of SABS 966.

Subject strictly to the requirements of Clause 3.1 pipes may be offloaded and strung out in the servitude.

All pipes, specials and valves arriving on site shall be marked clearly with the item number appearing in the Bill of Quantities. Furthermore, the nuts, bolts, washers, and other ancillary equipment for each individual item shall be kept separate in a bag which shall also bear the respective reference number of that item. The cost of such marking will be held to have been included in the rates tendered for the items.

The Contractor shall satisfy the Engineer that the manufacturers' recommendations for transporting, handling, stacking, storing, and installing pipes, pipe fittings, sealing rubbers etc. are being followed. The Engineer shall be given the opportunity to inspect all materials immediately prior to installation and shall have the right to reject any materials which, in his opinion, have suffered damage which may impair the long term durability or strength of said items.

Pipes and specials shall be protected against damage during all stages of manufacture, delivery, storage, and handling. The ends of all steel pipes and specials shall be protected against denting. Steel pipes shall be transported and stacked in such a manner that the pipe barrel is not deformed by more than 2% of its diameter. Dents which cause a protrusion of more than 1 mm on the inside of the steel special, may result in the special being rejected.

**PSL 3.3 Cast iron pipes, fittings and specials**

Cast iron specials shall be used with PVC-U mains, and shall be provided with standard couplings, unless otherwise specified or shown on the drawings.

All cast iron fittings and specials shall be class 16 and shall be coated according to PSL 3.9.1.

Add: " All cast iron fittings to be lined with cement mortar or coated with Rilsan or fusion-bonded epoxy".

**PSL 3.4 Steel pipes, fittings, and specials**

**PSL 3.4.1 General**

Steel pipes and fittings shall comply with SS304 and have a minimum thickness of 4.5mm.

The steel pipes shall be manufactured exclusively at the works of such manufacturers as may be approved by the Engineer and at only one works unless otherwise agreed by the Engineer in writing.

All steel pipes and specials shall be clearly marked with the grade and thickness of the steel, the series number of the pipe or special, the item number in the Bill of Quantities, the nominal diameter and the working pressure.

If applicable, the drilling pattern shall be stamped on all flanges.

### **PSL 3.7 Other types of pipes**

#### **PSL 3.7.1 PVC-U Pipes**

In addition to Clause 3.7.1, solvent welded joints or fittings shall not be used.

#### **\*PSL 3.7.3 Specials for PVC-U pipes**

All specials (except flanges) shall be suitable for working pressure of not less than 1,600kPa.

Standard specials such as tees, flange adaptors, reducers etc. for PVC-U pipelines shall be fabricated from cast iron. Unless otherwise shown on the drawings, all bends shall be PVC-U.

### **PSL 3.8 Jointing materials**

#### **PSL 3.8.3 Flanges and accessories**

Flanges shall comply with SABS 1123 and have a minimum working pressure of 1,600kPa. Holes shall be drilled to Table 1600/3 of SABS 1123.

Any item of pipework or special or valve, of which the flanges are incorrectly drilled, will be rejected. The reaming of bolt-holes to oversized dimensions to enable a particular item to fit will not be allowed.

All flanges shall be provided complete with bolts, nuts and washers compliant with SABS 135, and 2mm thick rubber insertions. The insertion piece shall cover the full face of the flange between the ID and OD.

### **PSL 3.9 Corrosion protection**

All bolts, nuts and washers within water retaining structures or exposed to water shall be fabricated from stainless steel.

#### **PSL 3.9.1 CI Pipes**

Cast iron pipes, specials, valves and hydrants shall be fusion bonded epoxy coated in accordance with Clause 3.9.2.2(b)(4) as amended by PSL 3.9.2.2(b)(4).

#### **PSL 3.9.2 Steel pipes and specials**

All steel pipes and specials shall be stainless steel 304.

#### **PSL 3.9.6 Corrosive Soil**

All buried flanged joints, saddles, bolts and nuts shall be protected by means of Denso paste and then wrapped to give a covering of at least three layers of Denso impregnated tape or other means of inhibiting corrosion approved by the Engineer. Denso tape must be carefully moulded over the paste and fitting to expel all air pockets.

### **PSL 3.10 Valves**

Delete the contents of this Clause and replace by:

“Two types of valves are acceptable:

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- a) Wedge gate type valve,  
b) Resilient seal gate type valve.

Valves shall comply with the requirements of SABS 664 1989 as amended, and shall bear the SABS quality mark. A test certificate as per Clause 3.5.20 of compliance with SABS 664 will be acceptable.

Valves shall display the following features;

- A minimum of 250 microns coating of fusion bonded epoxy or Rilsan Nylon 11.
- Class 16
- Anti-clockwise closing
- Non-rising spindle type with cap.
- May have spigotted, socketted or flanged end connections. When flanged valves are specified, the drilling shall be to Table 16/11 of BS 4504".
- In the case of resilient seal valves, valve gates shall be fully EPDM rubber lined, internally and externally and the spindle shall be Grade 316 Stainless Steel or equivalent with a double o-ring seal."

#### **\*PSL 3.10.3 Air valves**

25mm and 50mm (where scheduled) double acting air valves "Ventomat RBX or RGX" (or similar, approved), suitable for a working pressure of 1 600 kPa, shall be used.

Each air valve or air valve branch shall be fitted with a separate brass gate valve that closes clockwise, and, if required, an extension pipe.

#### **PSL 3.11 Manholes and surface boxes**

##### **PSL 3.11.6 Surface boxes**

All cast-iron surface boxes for valves and hydrants shall be fitted with chains as per SABS 558.

#### **PSL 5 CONSTRUCTION**

##### **PSL 5.1 Laying**

###### **PSL 5.1.3 Keeping pipelines clean**

In addition to the requirements of Clause 5.1.3, the Contractor shall ensure that both ends of all pipes and specials strung out above ground along the line of the trench are closed by means of an adequately fixed plastic cap or other approved material, in order to prevent the ingress of foreign material.

Unless otherwise directed by the Engineer, the Contractor shall, when filling the pipeline with water for the first time, use suitable pipe pigs driven by a flush of water to aid the cleaning of all sections of the pipeline(s). If necessary, the pig shall be passed through a section more than once. If necessary, the Contractor shall install special temporary fittings in the pipeline for the insertion and recovery of the pigs. Such temporary fittings shall be removed after the pipeline has been cleaned to the satisfaction of the Engineer. The Contractor shall satisfy the Engineer that every pig inserted into the pipeline is recovered after use.

###### **PSL 5.1.4 Depths and cover**

Water pipelines shall be laid to the levels indicated on the drawings. Where no such levels are provided, the following cover shall be provided:

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Water mains under roads	:	Minimum cover of 1.0m measured from the finished road level to the crown of the pipe. Maximum cover of 1.25m
Water mains elsewhere	:	Minimum cover 750mm, maximum cover 1.25m
Erf connections	:	Minimum cover 450mm, maximum cover 600mm

#### **PSL 5.1.4.3 Minimum clearance between services**

Where the minimum clearance between services would be less than that specified in Clause 5.1.4.3, the water main shall be laid beneath the service crossed, at an invert level which allows for the clear space as specified. The water main shall be laid horizontally at this level for a distance of at least 1.0 m on either side of the centreline of the service crossed and the transition to the specified cover levels obtained as specified in Clause 5.1.4.2.

The Contractor may, at his own expense, increase the cover levels by a maximum of 200 mm. No decrease in cover level or clear space between pipe barrels as specified will be permitted unless otherwise instructed by the Engineer in writing.

#### **PSL 5.6 Valve and hydrant chambers**

Delete the references to drawings L1, L2 and L3 in Clauses 5.6.1 and 5.6.2 and replace with “the construction drawings”.

Surface boxes shall be painted with two coats of white (valves) or bright yellow (hydrants) oil paint on an approved undercoat.

Markers for valves, fire hydrants and water pipelines are to be supplied and installed by the Contractor at each valve, hydrant and bend on main pipelines. The markers shall be manufactured in accordance with the drawings.

#### **PSL 5.7 Manholes**

##### **PSL 5.7.1 General**

In order to avoid damage to pipes due to differential movement where the pipes enter chambers or other structures, all pipes built, cast or grouted into such structures shall be provided with flexible connections to the details shown on the drawings.

##### **PSL 5.10 Disinfection of pipelines**

Notwithstanding the requirements of Clause 5.10, the Contractor shall disinfect the pipelines before connecting into the reticulation.

##### **\*PSL 5.11 Connection into existing main**

Where shown on the drawing or ordered, the Contractor shall cut into the existing water main and connect in the new main.

Before commencing the excavation of pipe trenches in the vicinity of a proposed connection, the Contractor shall excavate for, expose, survey and record the position and level of the connection point on the existing water main.

The Contractor shall be responsible, through the Engineer, for liaison with the Municipality (or relevant authority) to arrange for turning off the water in order to carry out the connection. These arrangements shall be made at least 5 working days prior to the proposed connection date so that affected consumers can be notified in advance.

The Contractor may cut into the existing water main only after he has received a written instruction from the Engineer to do so.

Before the connection is made, the new pipes must be laid to within 2.0m of the connecting point, and must be temporarily blanked off, anchored, tested and disinfected.

**\*PSL 5.12 Maintenance and repairs during defects liability period**

Should leaks or defects develop during the Defects Liability Period they will be rectified by the Municipality at the Contractor's expense. This will include the cost of re-testing and subsequent disinfection.

**\*PSL 5.13 Markers for Fire Hydrants**

Markers for Fire Hydrants are to be supplied and placed by the Contractor.

**PSL 6 TOLERANCES**

**PSL 6.2 CONTROL POINTS**

Add: "Valves shall be located as indicated on the plan layout opposite the boundary peg of the erf, and to within a longitudinal tolerance of 100mm."

**PSL 6.3 Alignment (plan and level)**

Add to last sentence : ", provided this does not result in a reversal of the grade of the pipeline."

**PSL 7 TESTING**

**PSL 7.3 Standard hydraulic pipe test**

**PSL 7.3.1 Test pressure and time of test**

Testing of water mains shall be carried out after the installation of erf connections up to and including the meter assembly. The stopcock shall be open for the test and a temporary end cap shall be fitted to the outlet end of the assembly. The permissible leakage rate specified in Clause 7.3.3 shall be that applicable to the length of water main only, and the length shall therefore not include the length of erf connections.

The Contractor's test equipment shall be connected directly to the flange of a hydrant tee and not through the hydrant's screwed outlet, or through a specially adapted end cap, or a short length of pipe.

Notwithstanding Clause 7.3.1.2 and Clause 7.3.1.3, the test pressure for field testing shall be:

1.35MPa for Class 9 PVC-U , Class 10 HDPE pipes;

1.80MPa for Class 12 PVC-U and Class 12 HDPE pipes.

Delete Clause 7.3.1.4.

In addition to the requirements of Clause 7.3.1.5 water used to fill the reticulation and during testing shall be water drawn from the Municipal mains and transported in a clean container. Test sections shall be filled from the lowest point of the test section, by a suitably sized pump with sufficient head to lift the water to the highest point of the test section. Test sections may not be filled at the highest point of the test section. The bleeding off of air trapped within the reticulation shall only be carried out via the fire hydrants, erf connections or at the prescribed connection points to the existing reticulation by a bleeder system fitted to the end caps, or a bleeder system fitted to a short length, say 500mm, of a pipe included at the end of the new reticulation.

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## **PSL 8 MEASUREMENT AND PAYMENT**

### **PSL 8.1 General**

Notwithstanding Clause 8.1, no payment will be made for depths of excavation in excess of those specified or shown on the drawings, unless ordered in writing by the Engineer.

#### **PSL 8.2.1 Supply, lay and bed pipes complete with couplings**

In addition to Clause 8.2.1, the rates for supplying, laying and bedding pipes shall also cover:

- i. the cost of work covered by Clause 8.2.4,
- ii. cleaning and disinfecting the pipeline as specified in Clause 5.10 and PSL5.1.3 including the provision and removal of temporary fittings required for the insertion and recovery of the pigs,
- iii. testing the pipelines, including the supply of all water
- iv. the cost of testing in short sections in accordance with PSL7.3.1.

The rates for the supplying and laying of metal pipes shall include for the cost of corrosion protection as specified.

Notwithstanding Clauses 8.2.7 and 8.2.15, the rates for pipes, valves, specials and couplings shall also cover the cost of mortar lining and sheathing, mortar encasing, wrapping and all other corrosion protection as specified.

Up to a maximum of 75% of the measured lengths of pipes will be certified for payment until such lengths have successfully passed the field test.

#### **PSL 8.2.3 Supplying, fixing and bedding of valves**

Hydrants will be measured by number.

The rate shall cover the cost of the supply and installation of all materials from and including the tee (and its joints) on the main up to and including the hydrant outlet and a 0.2m length of flanged 100mm diameter steel pipe between the tee and the gate valve.

#### **PSL 8.2.11 Anchor/thrust blocks and pedestals**

Notwithstanding Clause 8.2.11 anchor/thrust blocks and pedestals will be measured by number of each type.

The rate shall cover the cost of excavation, concrete, formwork and steel reinforcement (allowing for 0.1t of high tensile steel per cubic metre of concrete).

#### **PSL 8.2.14 Manholes**

Where a pipe is to be built into an existing structure, the rate shall cover the cost of casting in the pipe with flexible couplings and cutting out and making good the hole.

#### **\*PSL 8.2.16 Connection(s) to existing water main**

Connections to existing pipework will be measured by number of connection points.

The rate shall cover the cost of locating, exposing and backfilling the water main, liaising with the Municipality (authority concerned) to arrange for turning off the water, cutting into the pipe, dealing with water, cutting pipes to fit, including turning if necessary, dealing with water, and the supply and fitting of long collar repair couplings to complete the connection and, if required, the temporary sealing and anchoring of pipe ends for testing purposes and subsequent removal of seals and anchors. The specials required to make the connection will be measured separately.

**\*PSL 8.2.17 Markers**

Valve, hydrant and pipeline markers will be measured by the number of each type.

The rate shall include for the cost of supply and installation of the markers in the verge as shown on the drawings.

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