

PART B

ETHEKWINI WATER SERVICES

TECHNICAL SPECIFICATION

FOR

PART B – WS.7545

WATERWORK GATE VALVES AND RSV VALVES

CONTRACT WS.7545

WATERWORK GATE VALVES

PART AA : PROJECT/TECHNICAL SPECIFICATION

AA.A.1 SCOPE OF CONTRACT

This specification covers 50mm to 400mm diameter gate valves.

Resilient seal valves will be considered for Class 16 valves for water reticulation only.

The new standard water reticulation valve will be a **double flanged** Class 16 valve and shall be drilled to SABS 1123 table 16.

In addition, this contract also covers double flanged gate valves for trunk mains and scour valves for working pressures from 1.6 to 2.5 MPA (16 to 25 bar). **Resilient seal valves will NOT be considered for trunk mains and scour valves.**

QUANTITIES

These quantities are given purely for the information of tenderers and in order to establish an estimated total contract price for the purpose of furnishing security. The successful tenderer shall, however, be bound to supply whatever quantity or quantities the Council may actually require during the period of contract, irrespective of the extent to which the total quantity or quantities ordered may be in excess of, or below the estimated quantity or quantities. In this regard, the attention of tenderers is directed to Clause 7 (7) of the General Conditions of Contract (Goods/Services).

AA.A.3 SUPPORTING SPECIFICATIONS

With reference to Clause PC.2.1, the latest copy of SABS 664 - Cast Iron Gate Valves for Waterworks is the 2009 edition. Where in conflict, the requirements contained in this specification shall take precedence over the above-mentioned specifications.

AA.A.4 VALVE GLAND PACKING

Clause PC.5.1.2 and PC.5.1.4 of Part 'PC': Departmental Specification for Class 10 Cast Iron Gate Valves for Waterworks is hereby deleted and shall be replaced with the following clause:

P.C.5.1.2 For all gate valves excluding resilient seal gate valves, gland packing shall be provided and shall be "Chesterton 1724, Starchem Style 500 Gland Packing, Packing Style 16000 pure PTFE fibre, Klinger Style 545 Valve Packing " or approved by eThekweni Water and Sanitation Services. Gland packing shall be held in position by 'T' headed removable bolts fitted with brass, bronze or gunmetal nuts.

AA.A.5 GATE VALVE

The maximum height of all gate valves supplied under this contract shall be 1.0 from the centre line of the valve bore to the top of the cap for Class 16 cast iron gate valves.

AA.A6 COMPLIANCE WITH SPECIFICATION

Appendix 1 has been included in this document to facilitate adjudication of tender submissions. Tenderers are to complete and sign Appendix 1 IN FULL, indicating compliance with the technical specification or alternatively listing ALL technical divergences where the offered valves do not comply with the requirements of the specification. All supporting technical data sheets and dimensioned drawings shall be supplied with the tender.

Failure to provide the above information or to complete Appendix 1 may render the tender submission inadmissible for adjudication.

Resilient seal valves and wedge gate valves for waterworks shall be constructed according to **SANS 664-1,2&3 : 2009** edition 1 and shall bear the **SABS mark**. All manufacturers must be in compliance and **SANS 9001 / ISO 9001** accredited.

AA.A7 PC. 5 CONSTRUCTION

Clause PC.5.1.1 of Part 'PC': Departmental Specification for Class 10 Cast Iron Gate Valves for Waterworks shall be amended by deleting the first sentence of the Clause.

The following clause shall be added to Clause PC5.1.1:

"The gland fitting into the stuffing box shall have a trim fit. The edge of the gland that confines the top packing face within the stuffing box shall be machined to be free of sharp edges and sized so that the full face of the packing can be compressed evenly", note Clause P.C.5.

AA.A8 CORROSION PROTECTION

Tenderers are to note schedule 1 (items 1 to 11) , the valve finish for Class 16 and 25, Double Flanged Gate Valves for trunk mains and scours shall be a Solvent Based Epoxy System as per the specification under Item 3 Clause 4,4 of the Technical Specification for Double Flanged Gate Valves (PN16 and PN 25).

Schedule 2 (items 12 to 19) for Class 16 Resilient Seal Gate Valves for water reticulation, shall be fusion bonded epoxy powder coating system as per the attached specification under item 4.

AA.A.9 TESTING

A full specification test including the performance test on Resilient Seal Valves for full Compliance with the requirements of SABS 664:1999 must have been carried out on a sample valve (e.g. 100mm dia.) and approved prior to tender consideration. Clause P.C.7.1. of Part 'PC' : Departmental Specification for Class 10 Cast Iron Gate Valves and Technical Specification of the Departmental Specification for Double Gate Valves (PN16 and 25) for Waterworks shall be clarified in that every valve shall be tested.

A copy of the full specification including the performance test must be submitted with the tender.

AA.A.10 INSPECTION AFTER MANUFACTURE

EThekwini Water Services shall inspect one valve per batch delivered to our Materials Management Store, 17 Electron Road, Springfield and carry out tests as detailed in Table 1, 2 and 3 of the attached specification under Item 5 "Corrosion Protection of Valves".

AA.A.11 RSV GATE VALVE SPECIFICATION

This specification replaces all clauses supporting Resilient Seal Valves in Part 'PC' Departmental specification for Class 10 cast iron valves for waterworks and where in conflict with SABS 664: 2009, otherwise the valves shall generally be manufactured in accordance to SABS 664: 2009. Where the

specification calls for the supply of Class 10 rated gate valves and the manufacturer manufactures these valves to a Class 16, these valves will be acceptable.

Material and Design

The valve shall be Class 16 with a non-rising spindle. The valve shall be anti-clockwise closing when viewed from above.

Dimensions of flanged valves shall be in accordance to SANS 664 – 1 : 2009 edition 1, table 1. Column 2, short pattern only PN16, 25 for face to face dimensions.

The face to face dimensions shall comply to SABS 664:2009 except for 400mm dia valves.

The body and bonnet material shall be spheroidal graphite or ductile iron.

Clause PC.3.1 of Part 'PC' Departmental Specification for Clause 10 Cast Iron Gate Valves for waterworks is amended.

The clause "either shall have a 12.7mm lead on the tread of the spindle" shall be deleted.

The minimum strength torque (MST) for valves of DN 50 up to DN 400 shall not be less than 180Nm.

Gate

The gate shall be manufactured from spheroidal graphite or ductile iron and be fully encapsulated with nitrile/EPDM rubber (internally and externally).

Where applicable the gate guides shall be fully nitrile/EPDM rubber encapsulated in order to prevent damage to the internal paint coating of the valve, especially that on the body guides.

Wedge Nut/Spindle Nut

The nut must be rigidly fixed onto the wedge, and can be either a "replaceable" or "fixed" type,

If the "fixed" type is used, then the nut shall be manufactured to CZ 132 and BS 2872/2874, free of dezincification (the minimum tensile strength to be 450 N/mm²).

Guides

The wedge shall be supported by guides in the valve body, and no metal to metal contact between the wedge and guides shall be acceptable.

Rubber

All rubber shall be ozone stabilised and UV - resistant.

Valve Spindle

The spindle shall be manufactured from high tensile stainless steel.

Spindle Cap

The spindle cap can be fixed from the side using a bolt or if the spindle cap is fixed from the top, then the bolt shall be countersunk and protected by means of a cap or wax in order to prevent the ingress of dirt.

Stem/Spindle Sealing

This section specifies two types of sealing mechanisms, the “maintenance” and “maintenance free” type.

The “maintenance” valve shall be fitted with “primary” and “secondary” set of seals and shall have provision for the replacement thereof while the valve is under pressure.

Should the stuffing box be held in position with the use of fasteners, the fasteners shall be either hot dip galvanised or stainless steel.

The “maintenance free” valve that does not have the facility of replacing the “primary” and “secondary” seals under pressure shall be considered if the valve carries a minimum of 10 year replacement warranty. A copy of which must be submitted with the tender.

Thrust Collar

The thrust collar shall either be an integral part of the stem or it must be fixed into the valve body. The collar must be strong enough to withstand the maximum operating torque and to prevent the spindle from being forced back into the valve bonnet.

Mating of Body and Bonnet

The body shall be fastened to the bonnet with bolts.

The use of studs and allen-type screws shall be acceptable subject to the following design.

All bolting shall be of stainless steel or hot dip galvanised, and shall be suitable for operation with a normal hexagonal “Allen Key”.

The bolting system shall be counter sunk, and the bolt cavities shall be covered with a waterproof wax resin or an approved equivalent in order to prevent the ingress of dirt.

The bonnet gasket shall prevent leakage or seepage and must withstand the test pressure of the valve.

Double Flanged Ends

Double flanged valves for RSV Gate Valves shall be drilled off centre in accordance with S.A.B.S 1123 Table 16.

Coating

The valve shall be fusion bonded epoxy powder system as per attached specification under Item 5 and blue in colour.

Testing

See Clause AA.A.9.

Valve Cap

The valve cap that conforms to Figure 5 of SABS 664 -1:2009.

PACKING

All valves shall be suitably crated or individually wrapped where applicable in order to protect the rubber gate from the elements and to prevent damage during transit.

DEPARTMENTAL SPECIFICATION FOR CAST IRON GATE VALVES

CLASS 10

PART "PC"

1. SCOPE

This specification covers the material and constructional requirements for cast iron gate valves (75 - 300mm nominal bores) for the control of water in waterworks applications for working pressures of 1,0 mPa. (10 bar/1 000 kPa).

2. INTERPRETATIONS

2.1 Supporting Specifications

The following standards are referred to in the specification :

S.A.B.S 664-1999 : Cast Iron Gate Valves for Waterworks as published by General Notice 463 dated 1982-07-09.

S.A.B.S 1223-1985 : Fibre-cement pressure pipes and couplings as published by General Notice 2328 dated 1985-10-18.

Where in conflict, the requirements contained in this specification shall take precedence over the latest version of S.A.B.S 664-1999.

3. MATERIALS

3.1 Constructional Requirements

The valve shall be class 10 with a non-rising spindle. Both a resilient seal or wedge gate type will be acceptable and either shall have a 12,7mm lead on the thread of the spindle.

The valve shall be anti-clockwise closing when viewed from above.

3.2 Materials

Metallic materials used in the manufacture of each component of a valve shall be of quality at least equal to that of the material given in Table D-1(a) or D-1(b) of Appendix D of S.A.B.S. 664.

4. PLANT

Not applicable to this specification.

5. CONSTRUCTION

5.1 Design and Operation

5.1.1 The stuffing box shall be a separate component that is fastened to the bonnet with bolts.

The use of studs and Allen-type screws shall be unacceptable.

5.1.2 Where gland packing is used it shall be held in position by 'T' headed removable bolts fitted with brass, bronze or gunmetal nuts.

5.1.3 All valves shall be fitted with valve caps in accordance with Figure F2 of S.A.B.S. 664.

5.1.4 All resilient seal gate valves fitted with gland seals shall have provision for the re-packing of the gland while the valve is under pressure. The gland seals shall be one piece assemblies housing all the necessary seals. This will not be necessary for wedge gate valves.

5.1.5 All valves will have either a flanged or spigotted end connection as specified in Part "AA" : Project Specification. Where flanged end connections are specified the flanges shall be drilled off-centre in accordance with the following extract from the Durban Corporation

Waterworks Drilling Table :

| <u>SIZE OF VALVE</u> | <u>DIAMETER OF BOLT CIRCLE</u> <u>(± 1mm)</u> | <u>NO. OF BOLT HOLES</u> | <u>NOMINAL DIAMETER OF BOLTS</u> |
|----------------------|--|------------------------------|--|
| 75 | 146 | 4 | 16 |
| 100 | 178 | 4 | 16 |
| 150 | 235 | 8 | 16 |
| 200 | 292 | 8 | 16 |
| 250 | 356 | 8 | 20 |
| 300 | 406 | 12 | 20 |

The back of each flange shall be spot faced over an area large enough to accommodate

the washer and nut freely. Where spigotted end connections are specified the outside diameter shall match that of a C.O.D. type Class D fibre cement pressure pipe in accordance with S.A.B.S. 1223-1985.

5.2 Position Indicators

Position indicators will not be required.

5.3 Finish

After inspection, wedge gate valves shall be bitumen coated internally and externally with "Ravenal" or similar approved in accordance with the manufacturer's application instructions and resilient seal valves shall be epoxy coated internally and externally with "Cupon Hotcote" or similar approved in accordance with the manufacturer's application instructions.

5.4 Packing

Notwithstanding clause 4.1 of S.A.B.S 664, it will not be necessary to seal the body ends for transportation.

5.5 Indentification Plate Markings

A metal indentification plate will not be required.

6. **TOLERANCES**

Not applicable to this specification.

7. **TESTING**

7.1 Test Certificates

Inspection and testing of valves shall be carried out in accordance with clause 5 of S.A.B.S 664. Samples used for the inspections and tests shall be selected in accordance with appendix C to S.A.B.S 664. Test certificates will be required and shall be submitted to

eThekwini Water and Sanitation Services.

7.2 Witnessing of Tests

Unless otherwise specified in Part "AA" : Project Specification, tests may be witnessed by a nominated representative and eThekwini Water and Sanitation shall be given 3 weeks advance notice of testing so that the necessary arrangements can be made.

7.3 Gate Efficiency Test

A working pressure of 1,0MPa is to be assumed for the purposes of the gate efficiency test.

7.4 Samples and Descriptive Matter

The Tenderer's attention is drawn to the fact that in terms of section 11 (1) of the City of Durban's Waterworks Bylaws all valves must be approved. It is therefore in the interests of valve suppliers to ensure that samples of their products are submitted to eThekweni Water and Sanitation at regular intervals for approval.

Tenderers shall submit with their tenders a copy of the manufacturer's specification for the valves offered supported by illustrated pamphlets of brochures and drawings showing all leading dimensions of the valves offered.

**TECHNICAL SPECIFICATION
FOR DOUBLE FLANGED GATE VALVES
(PN 16 AND 25)**

1 **SCOPE**

This specification covers the material and constructional requirements for double flanged gate valves for the control of water in waterworks applications for working pressures from 1.6 to 2,5 Mpa (16 to 25 bar).

2. **INTERPRETATION**

2.1 **Supporting Specifications**

The valves shall be manufactured in accordance with S.A.B.S 664-1999: Cast Iron Gate Valves for waterworks or S.A.B.S. 191 Cast Steel Gate Valves, as far as is applicable. Where in conflict, the requirements contained in this specification shall take precedence over the above-mentioned specifications.

Reference to S.A.B.S standard specifications shall be deemed to be references to the latest issues of the relevant specifications as published by general Notice 463 dated 9 July 1982.

2.2. **Application**

The valves shall be used in the following applications:

- (a) In trunk mains supplying water to service reservoirs; and
- (b) As scour valves on water mains.

The basic requirements for applications (a) and (b) shall use PN 16 or 25 valves and shall be capable being used in terminal positions. The number, size, class and type of valves required shall be as detailed in the Schedule of Quantities.

3. **MATERIALS**

3.1 **Materials**

The bodies of the valves shall be manufactured from cast iron (which for the purpose of this specification can include Meehanite), cast steel or spheroidal graphite iron of Grade 420/12 to BS 2789.

The valve trim for all applications shall be either stainless steel - Grade 316S 15 to BS970 : Part 4 or aluminium bronze - Grade AB 1 or AB2 to BS 1400. Where scour valves are required as in application (b) the gate seating ring shall be either deposited type or fixed to gate with grub screws or pins of stainless steel- Grade 316S15 to BS 970: Part 4 or gun metal- Grade LG2 to BS 1400.

3.2 Gland Packing

Resilient seal gate valves will **not** be acceptable.

For all gate valves, gland packing shall be provided and shall comply with the technical specification for gland packing.

The use of multiple "O" ring spindle seals will be acceptable for all gate valves, provided they are fitted with back seals that permit the replacement of spindle seals under pressure.

Gland packing shall be Chesterton 1724", Starchem Style 500 Gland Packing, Packing Style 16000 pure PTFE fibre, Klinger Style 545 Valve Packing" or similar approved by Durban Metro Water Services. Gland packing shall be held in position by "T" headed removal bolts fitted with brass, bronze or gunmetal nuts.

Alternative designs to the "T" headed removable bolts will be considered only if the design facilitates the repair of a leaking gland through the removal of the packing retaining mechanism from the above via entry through valve access cover, without removing the valve from the system of excavating to expose the bolts to be removed. Proof of such a design capability shall be submitted with the tender.

If "O"-ring seals are used to seal the valve shaft, the valve shall be designed in such a way as to allow the use of packing as a seal in the event of future leakage. This may be effected by the removal of spacer rings above the "O"-ring seal which may then be removed to allow the packing of the shaft.

3.3 Jointing

All gate valves for use in applications type (a) and (b) shall be double flanged and supplied complete with all necessary bolt, nuts, washers, "Klinger" gasket insertions and slip-on type matching flanges. The matching flanges shall be coated with a weldable primer (Plascon PA 10 Etching Primer or similar approved) to a minimum dry film thickness of 25 micrometers. The bolts, 2 washers per bolt and nut shall be Grade 4.6, ordinary bolts and hot dip galvanised. All jointing materials and matching flanges shall be mounted onto each valve on delivery.

All flanges manufactured from cast iron shall be machined flat and use full face gaskets. Flanges manufactured from cast steel may have machined raised faces, but are to be supplied with ring gaskets.

4. CONSTRUCTION

4.1 Design and Operation

The valves shall be provided with a non-rising spindle, having stub acme or trapezoidal form threads with a lead of 12, 7mm. The valves shall be anti-clockwise closing when viewed from above.

All valves shall be fitted with valve caps in accordance with Figures F2 of S.A.B.S 664.

The design of the valves shall be such that cast iron sections are not subject to excessive tension by the tightening of connecting bolts as can happen when the faces of the bonnet and stuffing box flanges are not fully machined for a full faced gasket. Bolts must be used to fasten the stuffing box to the bonnet and the bonnet to the valve body. The use of studs and Allen-type screws shall be unacceptable. The use of "O" rings gaskets shall be acceptable provided the joint exhibits no tendency to movement.

Notwithstanding the requirements of Clause 3.3.3. of S.A.B.S. 664 and Clause 3.3.34 of S.A.B.S. 191, the gland shall be held in position by "T" headed removable bolts fitted with brass bronze or gunmetal nuts. The bolts shall not be less than 12mm in diameter for the smaller valves and increases in size in proportion to the size of the valves.

The gland fitting into the stuffing box shall have trim fit. The edge of the gland that confines the top packing face within the stuffing box shall be machined to be free of sharp edges and sized so that the full face of the packing can be compressed evenly.

The valves shall be capable of being easily operated by one man against the maximum unbalanced pressure and the total effort required to operate the valve shall not exceed 400 Newtons (i.e. A simultaneous push-pull of 200 Newton each) on the ends of a tee key 900mm long resulting in a maximum torque of 180Nm.

In order to comply with the above requirements it has been found that the following are normally necessary for larger sizes of valves:

- (a) Class 16 (PN16) valves in sizes 200mm, 250mm and 300mm should be fitted with ball thrust collars; and
- (b) Class 25 (PN25) valves in size 200mm should be fitted with either ball thrust collars or spur gears, while 250mm and 300mm sizes should be fitted with both ball thrust collars and 3 to 1 gears.

While other forms of anti-friction devices may be acceptable it is the tenderer's responsibility to ensure that the required torque is not exceeded. The tenderer shall state the spur gear ratio offered and whether valves are fitted with ball thrust bearing, together with the minimum torque required to operate the valves against the working pressure.

4.2 Double Flanged Ends

Double flanged valves of Classes 16 and 25 for applications (a) and (b) shall be drilled off centre in accordance with the appropriate pressure tables in S.A.B.S. 1123 steel pipe flanges or B.S.4504: Part 1 Flanges and Bolting for Pipes, Valves and Fittings except that where M27 and M33 bolts are specified in B.S. 4504, M24 and M30 bolts, respectively, shall be used. The back of each flange shall be spot faced over an area large enough to accommodate freely the washer and nut.

The bolts, 2 washers per bolt and nut shall be Grade 4.6, ordinary bolts and hot dip galvanised. All jointing materials and matching flanges shall be mounted onto each valve on delivery.

4.3 Position Indicators

Position indicators will not be required.

4.4 Finish

After inspection, wedge gate valves shall be bitumen coated internally and externally with "Ravenal" or similar approved in accordance with the manufacturer's application instructions.

4.5 Identification Plate Markings

The bodies of all valves shall have the manufacturer's name, trade name, or trade mark, size of valve, class of valve, and trim of valve cast in. On all flanged valves the following number of 3mm wide by 3mm deep grooves shall be cut into one flanged edge at top dead centre: PN 16(PN16) - 2 No.; PN 25(PN25) - 3 No.

4.6 Packing

Notwithstanding clause 4.1 of S.A.B.S. 664, it will not be necessary to seal the body ends for transportation.

5. TOLERANCES

Not applicable to this specification.

6. TESTING

6.1 Test Certificates

Inspection and testing of valves shall be carried out in accordance with clause 5 of S.A.B.S 644. Samples used for this inspection and tests shall be selected in accordance with appendix C to S.A.B.S. 644. Test certificates will be required and shall be submitted to Durban Metro Water Services.

6.2 Witnessing of Tests

Unless otherwise specified in Part "AA". Project Specification tests may be witnessed by a nominated representative and Durban Metro Water Services shall be given 3 weeks advance notice of testing so that the necessary arrangement can be made.

6.3 Gate Efficiency Test

A value equal to the maximum allowing working pressure is to be assumed for the purpose of the gate efficiency test.

6.4 Samples and Descriptive Matter

The Tenderer's attention is drawn to the fact that in terms of section 11 (1) of the Durban Transitional Metro Council Waterworks Bylaws all valves must be approved.

It is therefore in the interest of valve suppliers to ensure that samples of their products are submitted to Durban Metro Water Services at regular intervals for approval.

Tenderers shall submit, with their tenders a copy of the manufacturer's specification for the valves offered, supported by illustrated pamphlets or brochures and drawings, showing all leading dimensions of the valves offered.

CORROSION PROTECTION OF VALVES

1. General Options

All valves shall be coated (external) and lined (internal) as specified hereunder.

1.2 Toxicity and Tainting of Conveyed Water

All products shall be approved by a recognised national body (SABS or similar) as suitable for use on potable water systems.

The cured material shall be chemically unaffected by free chlorine or chloramines in water in concentrations up to 10mg/l and to ozone concentration up to 5mg/l in water and by pH ranging from 4 to 10.

1.3 Tender Submissions

A comprehensive Quality Control Plan (QCP) shall be submitted with the tender. The QCP shall be based on the proforma given in Item 6. No change shall be made to the QC without the approval of the Engineer.

Failure to submit a QP with the minimum information required for tender purposes may disqualify the tenderer.

Prior to coating and lining application, the QP shall be approved by both Durban Metro Water Services and the Epoxy Supplier. The contractor will be responsible for obtaining such approval.

1.4 Inspection During Manufacture

Durban Metro Water Services reserves the right to insist upon inspection of valves following grit-blasting and following application of coating in the event of there being a problem with coatings or linings.

In the event that inspections are required, the contractor shall give Durban Metro Water Services 24 hours notice for inspection. All costs due to any delays for such inspections shall be to the Contractor's account.

Excessive coating build up in flange boltholes will not be permitted.

2 Surface Preparation

2.1 Substrate Condition

The surface shall be free of all weld splatter, slag and loose scale.

2.2 Degreasing

Valves shall be degreased by the use of water rinsable solvent degreaser such as that complies with SABS 1344 or, for use in enclosed systems, with SABS 1365.

After complete removal of oil or grease contamination, the valve shall be thoroughly washed with clean potable water to remove all residues. The surface shall be water break free. The valve shall then be allowed to dry.

Abrasive used for blast cleaning shall be free from oil or grease, as shall be the compressed air used in air blast cleaning.

2.3 Blast Cleaning

The valve shall be blast cleaned by air blast cleaning methods, then vacuum cleaned or blown off to achieve the following standards:-

Cleanliness shall be equal to SA 3 of Swedish Standard SIS 05 5900 when tested in accordance with SABS method 767.

The profile produced by blast cleaning shall be angular and shall have an average peak to valley height of 60 to 100 micrometers, when tested in accordance with SABS Method 772. Hackles shall be removed with coarse abrasive paper.

Residual dust and debris shall not exceed 0.2% when tested in accordance with SABS Method 769.

Water soluble salts shall not exceed 100mg/m² at any point when tested with the Weber-Reilly Reagent.

Any laminations revealed by blast cleaning shall be ground out and reblasted.

If grinding penetrates the body to a depth greater than 8% of the nominal wall thickness, the valve shall be rejected.

2.4 Handling of Cleaned Valve

After cleaning, the valve surface shall not be contaminated in any way. Operators shall wear clean gloves and all surfaces in contact with the valve surface shall be clean and free from oil, grease, grit, dirt and other contamination.

2.5 Chemical Treatment

Chemical pre-treatment of the blast cleaned pipe may be applied provided that:-

- The process to be used is approved by the Engineer in writing.
- The process is applied in a manner and in such quantities as specified by the manufacturer of the process.

2.6 Corrosion Protection of Flanges

The mating face of flanges shall be masked and left uncoated. All runs or drips of epoxy shall be removed from the mating faces of the flanges and the flange profiling shall be clearly visible over the entire flange face.

The mating flange face shall then receive one coat of rust inhibitor (Plascon Rustrix 84 or equal approved).

Care shall be exercised to ensure that after application of all coatings there are no runs or drips and that the flange profiling is clearly visible over the entire flange face.

Excessive coating build up in flange bolt holes that could snag bolts will not be permitted.

3. Solvent Based Epoxy Coating System

3.1 Materials

The materials shall comply with SABS 1217 - 1984 Type 1A solvent borne chemically cured epoxies.

The following proprietary products are acceptable to Durban Metro Water Services:

Carboline 891.

Plascogard KSIR 88

Sigmaguard EHB.

AESECOTE 330.

The applied coating and lining shall comply with the requirements of **Table 1** and with the relevant product data sheet.

3.2 Dry Film Thickness

Solvent Borne Epoxy (Type I A)

Coating : 350 microns ± 50 microns

Lining : 250 microns ± 50 microns

The number of coats to achieve these coating thicknesses will be addressed in the Quality Control Plan (Item 6.)

3.3 Repair of Small Areas of Mechanical Damage

This procedure describes the method of repair for small areas of mechanical damage to the coating film. Three repairs per square metre of valve coating will be permitted. In the event that more repairs are required, the coating will be rejected and the entire valve shall be prepared for re-coating.

- Thoroughly degrease the affected area and surround, by washing with water - rinsable solvent or detergent to achieve a water break free surface. Rinse the washed area with running clean potable water and allow to dry.
- Remove any loose or cracked paint, by suitable mechanical means such as grinding or sanding. If the metal substrate is exposed, clean to rough bright metal during this process. Be sure not burnish or polish the metal substrate if sanding is the selected method, as this may result in poor adhesion.
- Thoroughly roughen the paint surface to minimum of 100mm radius around the areas treated as above, feathering the coating towards the outer perimeter of the repair. Brush off any dust formed.
- Immediately apply a coat of the original coating (repair kits available in small packages) to the prepared area, in accordance with the original coating specification. Build up with successive coats to achieve required total dry film thickness, observing application and curing conditions as stated on the relevant product data sheet.
- On completion a 10mm halo of feathered sound coating should be evident around the entire repair.
- Holiday testing of all repairs shall comply with the original Coating Specification.

4 Fusion Bonded Epoxy Powder Coating System

4.1 Heating of the Valve

Heating of the valve shall be effected by heat soak in an oven provided that:-

- The valve surface is not contaminated by fumes, soot deposition, acid deposits or other harmful contamination.
- The valve surface is not discoloured by excessive heat.
- The surface temperature of the valve is uniform and does not vary by more than + 5 degrees Celsius from optimum coating temperature when measured immediately prior to coating. Valve temperature shall not exceed 275 degrees Celsius at any point.
- Infra red pyrometers for measurement of pipe temperature shall be calibrated by thermocouple, heat sensitive crayon or other approved method.

4.2 Requirements in respect of Fusion Bonded Epoxy Powder

4.2.1 Approval of Supplier

The epoxy coating shall be a fusion bonded epoxy powder coating , Interpon PCL 331, Vedoc V PC 2001 or similar approved

To obtain approval, the supplier shall provide manufacturer's test results in writing that demonstrate that the powder is capable of meeting the requirements specified in Table 2

4.3 Approval of Batches

The Contractor shall satisfy himself as to the suitability of the powder in terms of the requirements of Table 2 prior to commencement of coatings.

Before commencing work, the contractor shall furnish Durban Metro Water Services with documentation indicating that the proposed Epoxy Powder will comply with requirement of Table 2

4.4 Application of Coating

4.4.1 Method of Application

Powder shall be applied by electrostatic spray guns.

Powder shall pass through a magnetic separator (which shall be regularly cleaned) in order to remove any iron or steel particles.

Powder reclaimed from the spray booth shall not be mixed with virgin powder.

The specified thickness shall be achieved in one application. In the event of thickness being less than the minimum specified the coating shall be removed and the valve shall be reblasted and recoated to comply with the specification.

4.4.2 Handling of Coated Valve

Until the coating has cured, the valve shall be handled in such a manner to ensure that the coating is not damaged and remains blemish free.

4.4.3 Quenching of the Coated Valve

Quenching of the valve with clean water is permitted provided that the coating is fully cured and complied in all respects with the requirements of the specification

4.4.4 Requirements of Cured Fusions Bonded Epoxy Powder Coating

The cured fusion bonded epoxy powder coating shall meet the requirements specified in Table 3

APPENDIX 1

1. All valves offered under this enquiry meet/do not meet * the requirements of the Technical Specification

* Tenderer to delete

SIGNED: _____ DATE: _____

2. If valves offered do not comply with the requirements of the Technical Specification, the following technical divergences are listed below:

| ITEM NO. | DESCRIPTION OF TECHNICAL DIVERGENCE | SUPPORTING DOCUMENTATION PROVIDED (YES / NO) |
|----------|-------------------------------------|--|
| | | |

SIGNED: _____ DATE: _____

PRO FORMA

Quality Control Plan

Solvent Based Epoxy Coating System

| ESSENTIAL INFORMATION TO BE FURNISHED BY TENDERER | |
|--|--|
| Proposed Product | |
| Address & Telephone No. of Supplier | |
| Contact Person | |
| Name of Body which has approved Product for use on Potable Water Systems | |
| Coating Applicator | |
| Address & Telephone No. of Coating Applicator | |
| Contact Person | |
| Application Method (e.g Airless Spray) | |
| | |

PRO FORMA

Solvent Based Epoxy Coating System

| QUALITY CONTROL PLAN | | | |
|----------------------|---|------------------------|-------------|
| NO | ITEM | STANDARD (CLAUSE REF.) | OBSERVATION |
| 1 | Valve Description | | |
| 2 | Valve Serial No. | | |
| 3 | Surface Preparation | | |
| | <input type="checkbox"/> Substrate Condition | Corrosion Protection | |
| | <input type="checkbox"/> Degreasing | Corrosion Protection | |
| | <input type="checkbox"/> Blast Cleaning | Corrosion Protection | |
| | <input type="checkbox"/> Chemical Treatment | Corrosion Protection | |
| 4 | Corrosion Protection of Flanges | Corrosion Protection | |
| 5 | No. of Coats | No. | No. |
| 6 | Minimum Overcoat Time | Hr. | Hr. |
| 7 | Maximum Overcoat Time | Hr. | Hr. |
| 8 | Minimum Temperature | °C | |
| 9 | Maximum Humiture | | |
| 10 | Coating Performance | | |
| | <input type="checkbox"/> Visual | Table 1 | |
| | <input type="checkbox"/> Dry Film Thickness (min) | Table 1 | |
| | <input type="checkbox"/> Dry Film Thickness (max) | Table 1 | |
| | <input type="checkbox"/> Electrical Insulation | Table 1 | |
| | <input type="checkbox"/> Degree of cure | Table 1 | |

SIGNED: eThekwini Water Services:

Contractor:

Epoxy Supplier:

The contractor shall obtain approval of the QCP from eThekwini Water Services and the EpoxySupplier before commencing work.

PRO FORMA

Fusion Bonded Epoxy Coating System

| QUALITY CONTROL PLAN | | | |
|----------------------|--|------------------------|-------------|
| NO | ITEM | STANDARD (CLAUSE REF.) | OBSERVATION |
| 1 | Valve Description | | |
| 2 | Valve Serial No. | | |
| 3 | Surface Preparation | | |
| | <input type="checkbox"/> Substrate Condition | Corrosion Protection | |
| | <input type="checkbox"/> Degreasing | Corrosion Protection | |
| | <input type="checkbox"/> Blast Cleaning | Corrosion Protection | |
| | <input type="checkbox"/> Chemical Treatment | Corrosion Protection | |
| 4 | Corrosion Protection of Flanges | Corrosion Protection | |
| 5 | Heating of Valve | Corrosion Protection | |
| 6 | Coating Performance | | |
| | <input type="checkbox"/> Visual | Table 3 | |
| | <input type="checkbox"/> Coating Thickness | Table 3 | |
| | <input type="checkbox"/> Electrical Insulation Defects | Table 3 | |
| | <input type="checkbox"/> Impact Resistance | Table 3 | |
| | <input type="checkbox"/> Degree of cure | Table 3 | |

SIGNED: eThekweni Water Services:

Contractor:

Epoxy Supplier:

The contractor shall obtain approval of the QCP from eThekweni Water Services and the Epoxy Supplier before commencing work.

PRO FORMA

Quality Control Plan

Fusion Bonded Epoxy Powder Coating System

| ESSENTIAL INFORMATION TO BE FURNISHED BY TENDERER | |
|---|--|
| Powder Supplier | |
| Powder Brand Name | |
| Address & Telephone No. of Supplier | |
| Contact Person | |
| Name of Body which has approved Product for use on Potable Water Systems | |
| Coating Applicator | |
| Address & Telephone No. of Coating Applicator | |
| Contact Person | |
| | |

Before commencing work the Contractor shall furnish eThekweni Water and Sanitation with documentation indicating that the proposed epoxy powder will comply with the requirements of Table 2 of this Specification.

Requirements of Solvent Based Epoxy

| No. | Property | Requirement | Test Method | Frequency |
|-----|-------------------------------|---|--|-------------------------------------|
| 1 | Visual | The lining shall be smooth, free from excessive runs, sags, orange peel, occlusions or other visible defects. | Use an experienced observer. | Each Valve. |
| 2 | Coating Thickness | Minimum : 200 microns Maximum : 500 microns | SABS Method 141 | Minimum 6 readings/valves per batch |
| 3 | Electrical Insulation Defects | Nil defects when tested at 90 Volts 2 Megaohms | SABS 1217 - Section 8:12 | One valve per batch |
| 4 | Degree of Cure | No softening or discolouration | 20 double rubs with cotton wool swab soaked in MEK | One valve per batch |
| 5 | Adhesion | Destructive testing not recommended | | |

TABLE 1

QUALIFICATION REQUIREMENTS OF EPOXY POWDER

| NO. | PROPERTY | REQUIREMENT | TEST METHOD |
|-----|---------------------------------|---|--|
| 1 | I.R Spectrogram | For reference against Contract supplies | Potassium Bromide disc |
| 2 | Thermal Characteristics | For reference against contract supplies Delta H (Enthalpy) Delta H (Enthalpy) Tg1 and Tg2 (Glass transition temperatures uncured and cured) to be supplied | Differential Scanning Calorimetry 20E C/min scan rate |
| 3 | Gel Time at 180EC | For reference against contract supplies | Hot plate |
| 4 | Sieve analysis | Sieve sized in micrometres Zero retained on 500. Not more than 1% retained on 250 | Mechanical agitated stack of sieves |
| 5 | Dielectric Strength | Not less than 30kV/mm | SABS 1217. Section 8.10 |
| 6 | Cathodic Disbonding | Total disbonded area not exceed 20mm dia after 30 days. Current flow not to exceed 5 mA | AST< G8. Method B - Magnesium Anode - 20EC 7mm diameter holiday |
| 7 | Accelerated Cathodic Disbonding | Total disbonded area not to exceed 12mm diameter inclusive of artificial holiday | Impressed current -3,5 volts potential at 75EC for 48 hours 3mm diameter holiday |
| 8 | Adhesion (Hot water Soak) | Disbonded length not to exceed 5mm from point of V | Immerse in water at 75EC 48h. Remove and make V-cut at 30E angle. Test adhesion when cooled to 25EC |
| 9 | Flexibility Test | No electrical insulation defects after bending | Bend at 0E to 2% strain |
| 10 | Impact Resistance | No electrical insulation defects after impact | ASTM G14 but using flat panel clamped firmly to a rigid base such as 12mm thick flat steel, impacted at 2 Joules |

NOTE: Tests 5-10 are carried out on 6mm thickness steel test panels, blast cleaned, prepared, coated and cured in accordance with the powder manufacturer's recommendations.

TABLE 2

QUALIFICATION REQUIREMENTS OF CURED FUSION BONDED EPOXY POWDER COATING

| NO. | PROPERTY | REQUIREMENT | TEST METHOD | FREQUENCY |
|------------|-------------------------------------|---|--|-----------------------------|
| 1 | Visual | Smooth glossy or semi glossy finish, free from excessive runs, sags, orange peel, occlusions or other visible defects | Use an experienced observer | Each Valve |
| 2 | Coating Thickness | Min. 200 Max. 500 microns | SABS Method 141. | Minimum 6 readings/valve |
| 3 | Electrical Insulation Defects | Nil defects at 3500 Volts. For conditions for repair see Clause 3.3 | SABS 1217 Section 8.12.2 | One Valve per batch |
| 4 | Impact resistance | No defects at 2 Joules | SABS 1217 Section 8.7 | Random 5 % of valves |
| 5 | Degree of cure: Dynamic Test | No softening or discolouration | 20 double rubs with cotton wool swab soaked in MEK | One Valve per batch |

TABLE 3

SUPPLY, DELIVERY AND OFF LOADING OF WATERWORK GATE VALVES AND RSV VALVES

QUESTIONNAIRE 1

This questionnaire forms part of the tender documents and must be completed in its entirety.

Failure to complete this questionnaire may preclude the tender from acceptance.

1. Are your prices **firm** for the duration of the contract ? _____

2. If not, state method of price adjustment. _____

3. Company name: _____

4. (a) Is this a cc, (Pty) Ltd, Partnership, Sole Trader, Joint Venture - (T tick) :-

| | |
|-------------------|--------------------------|
| (i) cc | <input type="checkbox"/> |
| (ii) (Pty) Ltd | <input type="checkbox"/> |
| (iii) Partnership | <input type="checkbox"/> |
| (iv) Sole Trader | <input type="checkbox"/> |
| (v) Joint Venture | <input type="checkbox"/> |

(b) If (iii), (iv) or (v) name of partners or owner must be stated below.

5. Are you a registered VAT Vendor? _____

If so, please state VAT Number - _____

NAME AND ADDRESS OF TENDERER :- (Firm=s Name)

SIGNATURE

NAME OF SIGNATORY IN BLOCK LETTERS

CAPACITY OF SIGNATORY

TELEPHONE NUMBER : _____

FAX NUMBER : _____

DATE : _____

