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Gr 8
This specification covers the general construction requirements for sewerage systems including connecting sewers, manholes, and the like, but excluding sewer rising mains, pump stations, treatment works, and ancillary works.

NOTE: The standards referred to in the specification are listed in Appendix A.

2. INTERPRETATION

2.1 SUPPORTING SPECIFICATIONS. Where this specification is required for a project, the following specifications shall inter alia, form part of the contract document:

a) Project specification;

b) SABS 1200 A or SABS 1200 AA, as applicable;

c) SABS 1200 D or SABS 1200 DA, as applicable;

d) SABS 1200 UB;

e) SABS 1200 G or SABS 1200 GA, as applicable;

f) SABS 1200 LB.

Where the project necessitates the construction of a rising main, SABS 1200 L shall also form part of the contract document.

2.2 APPLICATION. This specification contains clauses that are of general application to sewer construction. Interpretations and variations of this specification are set out in Portion 2 of the project specification which precedes this specification in a contract document.

2.3 DEFINITIONS. For the purposes of this specification the definitions given in the applicable of the specifications listed in 2.1 and the following definitions shall apply:

Expansion pipe joint. A pipe joint that allows relative longitudinal movement between adjacent pipes without the occurrence of fracture or leakage.

Flexible pipe joint. A pipe joint that allows relative angular (radial) and longitudinal movements between adjacent pipes without the occurrence of fracture or leakage.

Rigid pipe joint. A pipe joint that allows no relative movement between adjacent pipes without the occurrence of fracture or leakage.

2.4 ADDITIONAL ABBREVIATIONS. For the purposes of this specification the abbreviations given in the applicable of the specifications listed in 2.1 and the following abbreviations shall apply:

AC : Asbestos cement

CI : Cast iron

PVC : Polyvinyl chloride

uPVC : Unplasticized polyvinyl chloride

3. MATERIALS

3.1 PIPES, FITTINGS, AND PIPE JOINTS

3.1.1 Vitrified Clay Pipes

3.1.1.1 Subject to the provisions of 3.1.1.2, vitrified clay pipes and fittings shall comply with the relevant requirements of SABS 559, shall have suitable approved flexible joints, and shall bear the standardization mark of the SABS.

3.1.1.2 Where required in terms of the project specification or where so scheduled, vitrified clay pipes shall, notwithstanding the requirement for crushing strength given in SABS 559, have a crushing strength of at least 45 kN per metre of bearing surface.

3.1.2 Reinforced Concrete Pipes. Reinforced concrete pipes shall comply with the applicable requirements of SABS 677 for SI type pipes of the class specified in the project specification or scheduled, and shall have been manufactured from dolomitic aggregate. In addition, the cover to reinforcement on the inside face of each pipe, additional to the cover of 6 nun specified in SABS 677, shall be as follows:

a) Pipes of nominal diameter up to and including 1 050 nun - at least 15 nun;

b) Pipes of nominal diameter over 1 050 nun - at least 20 nun.

Joins shall be rubber ring or other approved flexible joints.

3.1.3 AC Pipes. AC sewer pipes shall comply with the relevant requirements of SABS 819 and shall have suitable approved flexible joints. AC specials and fittings shall have a crushing strength that is equal to or better than that of the pipes to which they are coupled and shall otherwise comply with the relevant requirements of SABS 819.

3.1.4 Pitch-Impregnated Fibre Pipes. Pitch-impregnated fibre pipes and couplings shall comply with the relevant requirements of SABS 921 and shall have suitable approved flexible joints.

3.1.5 uPVC Pipes. uPVC pipes shall comply with the relevant requirements of SABS 791 and shall have suitable approved flexible joints.

3.1.6 Non-cellular Rubber Joint Rings. Rubber joint rings shall comply with the relevant requirements of Part I of SABS 974.

3.1.7 Flexible Joints. Flexible joints shall be such that, when a joint is tested in accordance with Subclause 4.4 of Section LD of Part 3 of SABS 0120, there shall be no sign of leakage in any of the tests.

3.2 ALTERNATIVE MATERIALS FOR PIPES, FITTINGS, AND JOINTS. Should the Contractor propose to use pipes and fittings of materials other than those referred to in 3.1, he shall submit for approval detailed specifications including full details of the types of joints and specials he proposes to use with such pipes and fittings. The Contractor shall not use such pipes or fittings until he has obtained written approval for their use from the Engineer.
Sewers

3.3 RISING MAINS. The relevant requirements for materials of SABS 1200 L shall apply if a rising main forms part of the sewerage system.

3.4 BEDDING. The requirements for bedding of SABS 1200 LB shall apply.

3.5 MANHOLES, CHAMBERS, ETC.

3.5.1 Bricks. Bricks shall be obtained from an approved manufacturer and shall be either general purpose (special) burnt clay bricks that comply with the applicable requirements of SABS 227, or Class S14 calcium silicate bricks that comply with the applicable requirements of SABS 285. The Contractor shall submit to the Engineer samples of the bricks that he intends using in the construction of the Works (see Subclause 3.1 of SABS 1200 A or SABS 1200 AA, as applicable). The samples of bricks that are approved will be retained by the Engineer.

3.5.2 Precast Concrete Sections. Precast concrete sections shall comply with the applicable requirements of SABS 1294. Sectional spun concrete cylinders shall have been manufactured from dolomitic aggregate where so required in terms of the project specification, and shall comply with the requirements for pipes of SC type and Class A of SABS 677. Joints between cylinders shall be of the interlocking self-centring type. The joints shall be sealed in an approved manner to form a watertight joint (see Drawing LD-5).

3.5.3 Prefabricated AC Manholes. If prefabricated AC manholes are permitted in terms of the project specification, they shall comply with the applicable requirements.

3.5.4 Concrete. Except as required in 3.5.2 and except that only dolomitic aggregate shall be used where so required in terms of the project specification, concrete shall comply with the requirements of SABS 1200 GA or SABS 1200 G, as applicable.

3.5.5 Sand. Sand shall be clean pit sand or, if so required in terms of the project specification, dolomitic sand, and shall be free from clay and other impurities and, if so directed, shall be properly screened and washed.

3.5.6 Mortar. Mortar for brickwork and plasterwork shall be composed of one part of cement to three parts of sand by volume.

3.5.7 Step Irons. Step irons shall comply with the applicable requirements for malleable CI step irons of BS 1447 and shall be of length suitable for fixing in brick, cast-in-situ concrete, prefabricated asbestos cement, or precast concrete, as applicable.

3.5.8 Manhole Covers and Frames. Manhole covers and frames shall comply with the applicable requirements of SABS 558, and except where other types are scheduled, shall be of Type 2A in the case of manholes in roads and other areas subject to road-traffic loads, and of Type 4 in the case of manholes in areas not subject to such loads.

3.6 MARKER POSTS. Marker posts shall comply with the applicable requirements of the project specification.

4. PLANT

4.1 PIPE HANDLING AND RIGGING EQUIPMENT. The plant and rigging equipment used by the Contractor for the handling and placing of pipes shall be of the type recommended by the pipe manufacturer and such that at no time during operations covered by the specification is any pipe shell overstressed.

4.2 SETTING OUT. The apparatus used for the line, level, and positional control of pipelaying shall be accurate, sturdy, and in good working order. The Contractor may use any acceptable device for such control, including a device incorporating one or more laser beams.

4.3 TESTING. In addition to the pumps, gauges, storage tank, tools, plugs, bracing, and fittings necessary for the tests required in terms of Clause 7, the Contractor shall provide suitable equipment for the location of faults up to the date of issue of the final certificate.

5. CONSTRUCTION

5.1 TRENCH BOTTOM. The trench bottom shall be prepared as specified in SABS 1200 DB. Trenches shall be kept sufficiently dry to allow proper and safe bedding, laying, and jointing of pipes and kept dry until the pipeline has passed the required tests and construction of the selected fill blanket over the pipes has been completed.

5.2 LAYING AND BEDDING

5.2.1 Preliminary Inspection. Each pipe and fitting shall be thoroughly cleaned out and carefully examined for damage immediately before laying. The onus of detecting damaged pipes and fittings before installation shall be on the Contractor. Should any damaged pipe or fitting be found in the sewer after it has been laid, the damaged item shall be removed and replaced at the Contractor's expense.

5.2.2 Alignment. Pipes shall be laid on the specified bedding cradle true to designated line and level, and the bedding shall be placed and compacted in accordance with the applicable requirements of Subclause 5.2 of SABS 1200 LB. Designated invert levels shall take precedence over design depths shown on drawings. The completed sewer shall have no bends or undulations except where shown on the drawings or as directed. AC pipes that have any deviation from straightness (see SABS 819), shall be so laid that preference is given to level over line.

5.2.3 Method. The method of laying and bedding shall be such that:
   a) barrels of pipes bear evenly on the bedding for their full length;
   b) no packing is used under the barrels; and
   c) no socket or coupling bears on the bedding.
Where the slope of a pipe is greater than 1 in 10, anchor blocks shall be constructed to the details shown on Drawing LD-1.

5.2.4 Cutting. Pipes shall be so cut as to obtain a clean end.

5.2.5 Pipes of Different Materials. Pipes and fittings of different materials shall be jointed only with special adaptors recommended by the pipe manufacturer(s).
5.3 SEMI-TO BE KEPT CLEAN. All pipe openings shall be sealed by the Contractor to ensure that no water, stones, or other foreign matter enters the sewer during or after laying.

5.4 CONNECTIONS TO MANHOLES. The sewer shall be so jointed to the pipes built into manholes that there are two flexible joints on either side of each manhole as shown on Drawing LD-2.

5.5 RISING MAINS. The relevant requirements for construction of SABS 1200 L shall apply if a rising main forms part of the sewerage system.

5.6 MANHOLES, INSPECTION CHAMBERS, ETC.

5.6.1 General. Manholes and inspection chambers shall be constructed as follows:

a) Manholes on main sewers of diameter 600 mm and less: Of precast concrete or brick;

b) Manholes on main sewers of diameter over 600 mm: Of brick;

c) Inspection chambers and the like: Of precast or cast-in-situ concrete, brick, or AC;

d) Flexible joints, channel layouts, covers, frames, and step irons: In accordance with the relevant details shown on Drawings LD-2, LD-3, LD-4, LD-5, or other drawings, as applicable;

e) All parts of CI manhole covers, frames, fittings, and step irons not in contact with mortar surfaces shall be thoroughly cleaned and painted with two coats of approved bituminous paint or approved epoxy paint.

5.6.2 Benching

5.6.2.1 Where a pipe enters a manhole, it shall be thoroughly caulked into the wall and a 440 mm thick brick surround shall be built integral with the rest of the wall in order to ensure a watertight joint between the pipe and the manhole.

5.6.2.2 Concrete for benching shall be prescribed mix 20 with 13 mm chips. Semicircular channels and fittings, suitable for the type of pipe laid, shall be placed in position simultaneously with the concrete benching and embedded in it true to grade, level, and line.

5.6.2.3 The benching and sloping surfaces of the manhole floor shall be rendered in 20 mm thick 1:3 cement mortar and finished smooth and true with a steel trowel and rounded at corners and edges.

5.6.3 Step Irons. Step irons shall be accurately built into the straight of the wall as shown on Drawings LD-3 and LD-5 at 300 mm centres and staggered regularly right and left in truly vertical rows spaced at 200 mm centres horizontally. No slings shall be attached to step irons, nor shall step irons be used in any way for lifting.

5.6.4 Brick Manholes

5.6.4.1 Each brick manhole shall be built to the details shown on the relevant drawing(s) or as shown for the applicable type on Drawing LD-3. The walls shall be constructed in an approved bond comprising header and stretcher courses with the fair face on the inside. No false headers shall be built in and only whole bricks shall be used except where closures are required to form bond. The bricks shall be well soaked in water immediately before being laid, and the course of bricks last laid shall be well wetted before fresh bricks are laid upon it. All walls shall be carried up regularly so that no part of the walling is more than 1.3 m higher than any adjoining wall.

5.6.4.2 Joints shall be flushed up solid at every course throughout the whole width of each course, which shall be laid on a solid bed of mortar of thickness not exceeding 10 mm, and, if plaster is required (see 5.6.4.3), the joints shall be cut out to form a key as the work proceeds for the extent of the area to be plastered.

5.6.4.3 The walls of a manhole, if so required in terms of the schedule, drawings, or project specification, shall be plastered internally and steel-trowelled to a smooth and true surface free of sharp edges and corners. The thickness of plaster shall not be more than 10 mm and not more than 15 mm. All salient angles and arrises shall be slightly rounded, and all internal angles shall be finished true, square, and smooth.

5.6.4.4 The building-in of pipes entering each sewer manhole chamber and the benching of the floor and the bedding and grading of channels shall be as specified for precast concrete manholes (see 5.6.2 and Drawing LD-5). The channel layout shall be as shown on the relevant detail of Drawing LD-4 or other drawing(s), as applicable.

5.6.4.5 Covers and frames shall be grouted solidly onto the shafts. The Engineer will direct how concrete surrounds are to be finished off to suit surrounding surfaces.

5.6.5 Precast Concrete Manholes. Each precast concrete manhole shall be constructed in accordance with the applicable details shown on Drawing LD-5.

5.6.6 The Laying and Jointing of Channels in Manholes. The sockets of channels shall be filled in with 1:2 cement mortar and the space between the channels finished off with the same mortar. Where two spigot ends abut, they shall have a layer of 1:1 cement mortar under the joint, and the space between the ends shall be filled with 1:1 cement mortar worked in and neatly finished off.

5.7 CONCRETE CASING TO PIPES. Where pipes are to be encased in concrete, they shall be encased in concrete of the specified grade (or prescribed mix) and thickness. The lower part of the encasement shall be constructed in the manner specified for Class A bedding in Subclause 5.2.1(a) of SABS 1200 LB, and expansion joints in the upper part shall coincide with those in the lower part (see Drawing LD-6). Once the sewer has been tested and approved, the pipes shall be surrounded with concrete as specified above. No earthfilling over the concrete shall be commenced until at least 2 d after the concrete has been placed or until the concrete has reached a strength of at least 15 MPa.

5.8 THE RAISING OR LOWERING OF EXISTING MANHOLE COVERS. Where an existing manhole is required to be raised or lowered, the work shall be so carried out that the finished manhole complies with the applicable requirements of 5.6. Where practicable, the same cover shall be used, which shall, on completion of a manhole in a road reserve, be flush with the surface of the finished road, shoulder, or sidewalk, as the case may be.
5.9 Connecting sewers

5.9.1 Location and Details. Connecting sewers of the diameter scheduled or shown on the drawings shall be laid from junctions provided in the main sewers to the position and to the depth shown on the drawings or required in terms of the project specification. The construction details of direct and sloping drop connections shall be in accordance with Drawing LD-7 or Drawing LD-8, as applicable.

5.9.2 Marker Posts. If marker posts are scheduled, the Contractor shall place them to mark the position of the end of each future pipe connection in the manner specified in the project specification.

5.9.3 Recording Location. In addition to placing any marker required, the Contractor shall record the following data and, at the time of recording, shall make the data available to the Engineer to enable him to check the accuracy of the record:
   a) The name of the street;
   b) the number of the plot or erf;
   c) the location measurements of the end of the erf connection in relation to the nearest boundary peg(s);
   d) the depth of the invert at the end of the connection;
   e) a description of the boundary peg(s) (i.e. the peg(s) from which the location measurements were taken);
   f) the distance between the end of the connection and the plot boundary line, the position of the junction on the main sewer, and all such information as the Engineer may require to compile "as built" drawings;
   g) the size of the connection.

On completion of the Contract, or from time to time, as directed, the records shall be handed to the Engineer.

5.10 Action to be Taken During and After Testing. The Contractor shall make good any defects that may be found while the sewer is under test and after that the tests shall be repeated at his expense until the sewer is found to comply with the specification.

After the sewer has passed the tests all access lids shall be properly sealed with bitumen or by any other approved method that will ensure that they are watertight.

6. Tolerances

6.1 General. Tolerances will be determined on the basis of permissible deviations from designated location, alignment, grades, and levels (see 5.2.2). The Contractor shall construct each of the various parts of the works within the limits set out in 6.2-6.5 inclusive. Manholes and chambers at junctions will be subject to permissible deviations which differ from those required for other manholes and for the sewer between the junctions.

6.2 Overall Centre-Line Control and Manhole Locations. The permissible deviation of the location in plan of the centre line of the sewer from the designated location shall be ± 300 mm. This location will be treated as the control point for the purpose of locating intersections whether for manholes or inspection chambers. Such manholes or chambers shall be constructed at the meeting points of intersecting pipelines subject only to such deviation as can be tolerated by the junction channels or specials. The permissible deviation in location along the centre line for manholes and chambers not situated at control points shall be plus or minus half a pipe length.

6.3 Manhole Invert Levels. The permissible deviation from the designated level of the invert at each manhole shall be ± 50 mm but, should the fall between any two successive manholes be less than 90% of that specified, the said permissible deviation shall be reduced to a value such that the fall is at least 90% of that specified.

6.4 Alignment and Grade Between Manholes. Subject to the permitted manufacturing tolerances applicable to the pipes being laid,
   a) the line of the pipe invert shall at no place between control points at successive manholes (see 6.2 and 6.3)
      1) deviate from a straight line between the said control points by more than 5% of the nominal diameter of the pipe; or
      2) be lower than at any other place closer to the lower manhole;
   b) there shall be no steps at the junctions between successive pipes.

6.5 Manholes and Chamber Structures. The dimensions of the walls and roof of each manhole and chamber structure shall conform to the dimensions specified, subject to the tolerances laid down for concrete structures in SABS 1200 G or SABS 1200 GA, as applicable.

7. Testing

7.1 General

7.1.1 All acceptance tests shall be carried out in the presence of the Engineer and at such times and in such manner as the Engineer may direct.

7.1.2 Subject to the provisions of 7.1.5, no pipe joint or fitting shall be covered until the applicable of the tests given in 7.2 have been completed and the Engineer has
   a) given his written acknowledgement that the sewer or the specified section of it has passed the said tests; and
   b) authorized such covering.

7.1.3 The sewer or any section of it shall be inspected by the Contractor who, if he deems it ready to be tested, shall advise the Engineer of his intention to subject the sewer or the said section of it to the appropriate tests.
7.1.4 The sewer shall be tested in sections between manholes or chambers, as applicable, the section being tested being isolated from other sections by means of suitable plugs or stoppers that have been braced adequately.

7.1.5 Notwithstanding any acknowledgement by the Engineer in terms of 7.1.2, after backfilling and compaction have been completed, the Engineer may order that the sewer be retested to check that it has not been disturbed or damaged during backfilling.

7.1.6 The Contractor shall provide all labour and apparatus (including expansible plugs and flexible bags). The Engineer may order one of the following to be carried out on the sewer or any section of it:

a) an air test on pipes (other than concrete pipes) of all sizes; or
b) a water test in the case of pipes of diameter up to 750 mm; or
c) a visual internal inspection in the case of pipes of diameter greater than 750 mm.

7.1.7 The Contractor shall provide all labour and apparatus (including expansible plugs and flexible bag stoppers) that may be required for carrying out the tests.

7.1.8 All test results shall be recorded in the manner directed, whether or not the pipeline or section of pipeline has passed the test.

7.2 TESTS AND ACCEPTANCE/REJECTION CRITERIA

7.2.1 Air Test

a) Pipelines above the water table: An approved air testing machine shall be used to raise the gauge pressure in the section of the pipeline under test first to 3,75 kPa. After a 2 min stabilization period the pressure shall be reduced to 2,5 kPa. The machine shall then be switched off and the time taken for the pressure to drop from 2,5 kPa to 0,75 kPa shall be determined. The time taken shall be at least the applicable of the following values:

<table>
<thead>
<tr>
<th>Nominal diameter of pipe, mm</th>
<th>Minimum time (in min) taken from 2,5 kPa to 0,75 kPa</th>
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<tr>
<td>100</td>
<td>2</td>
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<td>750</td>
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b) Pipelines below the water table: An approved air testing machine shall be used to raise the gauge pressure in the section of the pipeline under test to 2,5 kPa above the static water pressure. After this pressure has been attained and the machine stopped, any change in pressure shall be noted. There shall be no discernible leakage for a period of at least 5 min.

7.2.2 Water Test. The section of the pipeline under test and, unless otherwise specified (see 7.2.6), the manhole chamber at the upper end of the said section shall be filled with water to such depth that every portion of the pipeline is subjected to a pressure of not less than 12 kPa and not more than 60 kPa. During the test there shall be no discernible leakage of water. An appropriate period, which shall be at least 10 min, shall be allowed for initial absorption, and the loss of water over the next 30 min shall be noted. The amount lost shall not exceed the applicable of the following rates per 100 m of pipeline per hour:

<table>
<thead>
<tr>
<th>Nominal diameter of pipe, mm</th>
<th>Loss rate, litres per 100 m per hour, max.</th>
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</thead>
<tbody>
<tr>
<td>100</td>
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<tr>
<td>150</td>
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<td>600</td>
<td>36</td>
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<tr>
<td>750</td>
<td>45</td>
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</table>

Should any section of the pipeline fail to pass the water test, a re-test will be permitted and, in such case, acceptance or rejection of the section shall be determined on the result of the re-test.

7.2.3 Rejection. In the case of AC, vitrified clay, and pitch-impregnated fibre pipes, failure under the air test will be deemed to be cause for rejection. After such rejection the Contractor may apply a water test to locate the source of failure, rectify the pipeline, and re-apply the air test. In the case of reinforced concrete, failure under the water test will be deemed to be cause for rejection.

7.2.4 Test of Connecting Sewers. Each connecting sewer shall be tested between its upper end and the junction at the main sewer. The upper end of the connection shall be kept securely closed with expanding plugs during the test. Where practicable the Contractor may test the main and connections simultaneously if he so wishes. On completion of the test, the upper end of the connection shall be permanently sealed as directed by means of a plug stopper suitable for the type of pipe.

7.2.5 Test of Rising Mains. After a rising main has been laid and the joints completed, the main shall be slowly charged with water, so that all air is expelled, and then tested in accordance with Subclause 7.3 of SABS 1200 L.

7.2.6 Watertightness of Manholes. Where so required in terms of the project specification manholes shall be tested, separately from the pipeline, for watertightness.
8. MEASUREMENT AND PAYMENT

8.1 GENERAL. Although measurement and payment for excavation and backfilling are covered in SABS 1200 LD and for bedding materials in SABS 1200 LB, the relevant items for sewers will be scheduled in the sewer section. The operation of constructing the bedding cradle and selected fill blanket round and over the top of the pipeline will be regarded as part of the pipe-laying operation.

8.2 SCHEDULED ITEMS

8.2.1 Supply, Lay, Joint, Bed (Class ...), and Test Pipeline ........................................... Unit: m

The pipeline will be measured linearly on slopes overall as laid. No deductions will be made for specials, but deductions will be made for the internal length of manholes. Separate items will be scheduled for pipes of different materials, diameters and, where relevant, classes, and for different classes of bedding and types of joints.

The rates shall cover the cost of providing the pipes and the cost of laying, bedding, jointing, making connections into manholes, and testing the pipeline.

8.2.2 Extra-Over Item 8.2.1 for Specials ....................................................... Unit: No.

Separate items will be scheduled for specials of each type and size.

The rates shall cover the cost of supplying, laying, bedding, jointing, and testing each special.

8.2.3 Manholes .......................................................... Unit: No.

Extra-Over Item 8.2.3 for Backdrops, etc. ..................... Unit: No.

Separate items will be scheduled for manholes, backdrops, and inspection chambers, etc., of each type and of each depth in increments of 0.5m.

8.2.5 Inspection Chambers, etc. .................................................. Unit: No.

Separate items will be scheduled for each type and each length of connecting sewer (to the nearest metre).

The rates shall cover the cost of all additional excavation in all materials, backfilling, bedding, disposal of surplus material, and the supply and laying of the Y-junction and the connection pipeline up to the erf boundary.

8.2.7 Encasing of Pipes in Concrete ................................................. Unit: m³

Separate items will be scheduled for each size of pipe and the strength or mix will be stated.

The volume will be computed from the dimensions shown on the drawings.

The rates shall cover the cost of encasing the pipe in concrete, the cost of formwork, if any, for encasing the pipe, and the cost of formwork to form flexible joints at 4m centres.

8.2.8 Anchor Blocks

Where all blocks are the same size or where detail drawings are provided of each size or type scheduled ............................................. Unit: No.

Where the blocks vary in size but the relationship between the area of formwork and the volume of concrete is reasonably consistent ............................................. Unit: m³

The rates shall cover the cost of all work necessary to complete the construction of an anchor block.

8.2.9 Marker Posts .................................................. Unit: No.

The rates shall cover the cost of manufacturing, installing, painting the identification marks, and submitting to the Engineer the records of all marker posts.

8.2.10 Permanent Plug Stoppers (Provisional) ................................. Unit: No.

The rates shall cover the cost of supplying and fitting plug stoppers at the ends of pipes, where so ordered.

8.2.11 Connection to Existing Sewer at ...... ................................. Unit: Sum

Details of such items together with a summary of the activities that the rate is to cover will be stated in the project specification.

8.2.12 Raising or Lowering of Existing Manholes ............................... Unit: No.

The rates shall cover the cost of removing the cover and frame, demolishing the top of the manhole if required, providing materials and labour for rebuilding the manhole to the designated new level, and setting and grouting the cover and frame to the correct level.
PREScribed MIX 20 Concrete
BEHIND SOCKET

SECTION

NOTE: SEE SUBCLAUSE 5.2.3.

SPACING OF ANCHOR BLOCKS

Drawing LD-1 - Anchor Blocks on Slopes
Steeper than 1:10
a) Details for AC Pipes

b) Details for Vitrified Clay Pipes

c) Details for Concrete Pipes

Value of X (for pipes of all types)

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Value of X (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0.5 to 0.8</td>
</tr>
<tr>
<td>150</td>
<td>0.5 to 1.6</td>
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<tr>
<td>200</td>
<td>0.5 to 1.6</td>
</tr>
<tr>
<td>250</td>
<td>0.5 to 1.6</td>
</tr>
<tr>
<td>275</td>
<td>0.5 to 1.6</td>
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<tr>
<td>375</td>
<td>1.0 to 2.0</td>
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<tr>
<td>400 to 500</td>
<td>1.0 to 2.0</td>
</tr>
</tbody>
</table>

Dimensions in millimetres

NOTE: SEE SUBCLAUSE 5.6.1.
SABS 1200 LD-1982
Sewers

FRAME TO BE SET IN 1:2 CEMENT MORTAR AND TO SUIT ROAD PROFILE WHERE APPLICABLE.

COVER AND FRAME TYPE 2A OR TYPE 4 (AS APPLICABLE) IN SABS 558

PRESCRIBED MIX 20 CONCRETE

Section A-A

FRAME TO BE SET IN 1:2 CEMENT MORTAR AND TO SUIT ROAD PROFILE WHERE APPLICABLE.

PRESCRIBED MIX 20 CONCRETE

Section B-B

Type 1 Brick Manhole (Depth less than 2,25m)

R12 BARS AT 150 mm CENTRES BOTH WAYS

R12 BARS AT 150 mm CENTRES BOTH WAYS

Section A-A

Section B-B

Type 2 Brick Manhole (Depth 2,25-3,6m)

R12 BARS AT 150 mm CENTRES BOTH WAYS

R12 BARS AT 150 mm CENTRES BOTH WAYS

Section A-A

Section B-B

NOTE:
1. ALL PIPE CONNECTIONS TO MANHOLES TO HAVE FLEXIBLE JOINTS AS DETAILED ON DWG. LD-2.
2. BRICKWORK TO TYPES 1 AND 2 MANHOLES TO BE 220 mm
3. ALL BRICKWORK TO BE PLASTERED INTERNALLY AND EXTERNALLY WITH 13 mm 1:3 CEMENT MORTAR
4. BENCHING TO BE RENDERED IN 20 mm 1:3 CEMENT MORTAR.
5. STEP IRONS, IF REQUIRED BY PROJECT SPECIFICATION, TO BE PLACED AT 300 mm CENTRES AND STAGGERED LEFT AND RIGHT.
6. SEE SUBCLAUSE 5.6.1.

Dimensions in millimetres

Drawing LD-3 - Brick Manholes for Sewers
NOTE:
(1) FLEXIBLE JOINTS AS PER DWG. LD-2
(2) SEE SUBCLAUSE 5.6.1.

Oversize chamber where required to suit layout

Drawing LD - 4 - Typical Channel Layouts in Brick Manholes
### Chamber and Shaft Sections

<table>
<thead>
<tr>
<th>Type of Section</th>
<th>Nominal Dia., mm</th>
<th>Standard Length, mm</th>
<th>Wall Thickness, mm, Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamber</td>
<td>1000</td>
<td>250, 500, 1000</td>
<td>65</td>
</tr>
<tr>
<td>Chamber</td>
<td>1250</td>
<td>250, 500, 1000</td>
<td>75</td>
</tr>
<tr>
<td>Chamber</td>
<td>1500</td>
<td>250, 500, 1000</td>
<td>85</td>
</tr>
<tr>
<td>Chamber</td>
<td>1750</td>
<td>250, 500, 1000</td>
<td>95</td>
</tr>
<tr>
<td>Shaft</td>
<td>700 approx.</td>
<td>250, 500, 1000</td>
<td>55</td>
</tr>
</tbody>
</table>

### Reducer and Adaptor Slabs

<table>
<thead>
<tr>
<th>Type of Slab</th>
<th>Nominal Dia., mm</th>
<th>Thickness, mm, Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducer</td>
<td>1000</td>
<td>150</td>
</tr>
<tr>
<td>Reducer</td>
<td>1250</td>
<td>150</td>
</tr>
<tr>
<td>Reducer</td>
<td>1500</td>
<td>150</td>
</tr>
<tr>
<td>Reducer</td>
<td>1750</td>
<td>150</td>
</tr>
<tr>
<td>Adaptor</td>
<td>750</td>
<td>150</td>
</tr>
</tbody>
</table>

Dimensions in millimetres

Note: See Subclause 5.6.1.

Drawing LD - 5 - Precast Concrete Manhole for Sewer
15mm SOFTBOARD SPACER PLACED AGAINST SOCKET OF SAME SIZE AS CROSS-SECTION OF CONCRETE SURROUND

JOINT ANNULAR SPACE FILLED WITH CLAY OR OTHER MASTIC MATERIAL

a) Socket and spigot rigid pipe with flexible joints.

15mm SOFTBOARD SPACERS PLACED AGAINST COLLAR OF SAME SIZE AS CROSS-SECTION OF CONCRETE SURROUND

SPACE AROUND COLLARS BACKFILLED WITH COMPACTED SELECTED FILL MATERIAL

JOINT ANNULAR SPACE FILLED WITH CLAY OR OTHER MASTIC MATERIAL

b) Rigid pipe with rigid collar and flexible ring joints

5mm HARDBOARD OR PLYWOOD SPACERS PLACED UP AGAINST COLLAR ENDS TO FULL CROSS-SECTION OF CONCRETE SURROUND

SPACE AROUND COLLARS BACKFILLED WITH COMPACTED SELECTED FILL MATERIAL

c) Rigid pipe with flexible plastics sleeve joints

NOTE: SEE SUBCLAUSE 5.7.

Drawing LD - 6 - Concrete Encasement of Sewers at Flexible Joints
Diagrammatic Illustration of Elements in Design of Main Sewer to Accommodate House Connections

300mm Min. Cover at Head of Drain
150mm to Allow for Diameter and Thickness of Drain
Fall of House Drain at 1 in 60
Diameter of Main Sewer

Invert level of Main Sewer

ERF or Servitude Boundary

Min. Grade 1:60

Compacted Granular Material

Elevation

Sewer

45° Plain Junction

1/6 Bend

Connecting Sewer

All pipes and fittings shall be fitted with flexible joints

Plan

Note: See Subclause 5.9.1.

Drawing LD-7 - Connecting Sewers: Direct Connection
ERF CONNECTION POINT

CONNECTION SEWER

ONE OR MORE BENDS

COMPACTED GRANULAR MATERIAL ON SLOPES UP TO 30°

ERF OR SERVITUDE BOUNDARY

GLOBALLY UP TO 3000 mm

ELEVATION (a)

SEWER

1/8 BEND

PLAN

NOTE:
(1) ALL Pipes AND fittings SHALL BE PROVIDED WITH FLEXIBLE JOINTS
(2) SEE SUBCLAUSE 5.9.1.

ELEVATION (b)

Drawing LD - 8 - Connecting Sewers: Sloping Drop Connection
# APPENDIX A. APPLICABLE STANDARDS

Reference is made to the latest issues of the following standards:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>BS 1247</td>
<td>Manhole step irons</td>
</tr>
<tr>
<td>SABS 227</td>
<td>Burnt clay masonry units</td>
</tr>
<tr>
<td>SABS 285</td>
<td>Calcium silicate masonry units</td>
</tr>
<tr>
<td>SABS 558</td>
<td>Cast iron surface boxes and manhole and inspection covers and frames</td>
</tr>
<tr>
<td>SABS 559</td>
<td>Vitrified clay sewer pipes and fittings</td>
</tr>
<tr>
<td>SABS 677</td>
<td>Concrete non-pressure pipes</td>
</tr>
<tr>
<td>SABS 791</td>
<td>Unplasticized polyvinyl chloride (uPVC) sewer and drain pipes and pipe fittings</td>
</tr>
<tr>
<td>SABS 819</td>
<td>Asbestos cement sewer pipes</td>
</tr>
<tr>
<td>SABS 921</td>
<td>Rubber impregnated fibre pipes and couplings</td>
</tr>
<tr>
<td>SABS 974</td>
<td>Rubber joint rings (non-cellular)</td>
</tr>
<tr>
<td>SABS 1200 A</td>
<td>Joint rings for use in gas, water, sewer, and drainage systems</td>
</tr>
<tr>
<td>SABS 1200 AA</td>
<td>Civil engineering construction : General (small works)</td>
</tr>
<tr>
<td>SABS 1200 D</td>
<td>Civil engineering construction : Earthworks</td>
</tr>
<tr>
<td>SABS 1200 DA</td>
<td>Civil engineering construction : Earthworks (small works)</td>
</tr>
<tr>
<td>SABS 1200 DA</td>
<td>Civil engineering construction : Earthworks (pipe trenches)</td>
</tr>
<tr>
<td>SABS 1200 G</td>
<td>Civil engineering construction : Concrete (structural)</td>
</tr>
<tr>
<td>SABS 1200 GA</td>
<td>Civil engineering construction : Concrete (small works)</td>
</tr>
<tr>
<td>SABS 1200 L</td>
<td>Civil engineering construction : Low-pressure pipelines</td>
</tr>
<tr>
<td>SABS 1200 LD</td>
<td>Civil engineering construction : bedding (pipes)</td>
</tr>
<tr>
<td>SABS 1294</td>
<td>Precast concrete manhole sections and slabs</td>
</tr>
<tr>
<td>SABS 0120</td>
<td>Code of practice for use with standardized specifications for civil engineering construction and contract documents Part 3 : Guidance for design : Section LD</td>
</tr>
</tbody>
</table>