

Health & Life Sciences Below Ground Drainage NBS Specification

University of Reading

Project Number: 60441574
1459939-ACM-XX-XX-SP-C-XXXX-00002
Revision C1

March 2018

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
C1	15/03/2018	Construction issue	BU	Bahadır Uyduran	Associate Director

Distribution List

# Hard Copies	PDF Required	Association / Company Name

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R12 – Below Ground Drainage

To be read with Preliminaries/ General conditions.

GENERAL

110 BELOW GROUND DRAINAGE SYSTEM

- Surface water and rainwater drainage sources:
 - Linear drainage channels;
 - One piece gullies and covers; and
 - Rainwater downpipes (nonsiphonic), as section R10.
- Foul drainage sources: Discharge stack and branch pipes, as section R11.
- Land drainage sources: None .
- Pressure relief drainage sources: None .
- Pipes, bends and junctions:
 - Clay - flexible joints;
 - Plastics - structured wall; and
 - PVC-U - solid wall
 - Stainless steel.
- Accessories:
 - Connectors - saddle;
 - Flexible couplings; and
 - Root barriers.
- Manholes, inspection chambers, traps, and separators:
 - Inspection chambers - plastics;
 - Manholes and inspection chambers - concrete; and
 - Oil and petrol separator units - plastics.
- Accessories:
 - Manhole channels and branches - conventional;
 - Manhole channels and branches - preformed plastics;
 - Manhole steps;
 - Sealing for concrete manholes - bituminous strips; and
 - Vortex flow control units.
- Disposal: To sewers.
- Accessories – general:
 - Access covers and frames;
 - Access covers and frames - precast concrete seatings; and
 - Concrete.

135 PRIVATE PACKAGED PUMPING STATIONS AND PRESSURE PIPELINE SYSTEM TO RAINWATER HARVESTING SYSTEM

- Foul drainage sources: Below ground pipelines.
- Private packaged pumping stations: As section R18.
 - Control panel type: Internal, wall mounted.
 - Location: Refer to M&E Engineer's drawings.
 - Distance from tank: 10 m.
 - Accessories: Access covers and frames and Access covers and frames - precast concrete seatings.
- Pressure pipes, bends and junctions: Polyethylene, as section R18.
 - Accessories: None.
- Disposal: To header tank.

PRODUCTS

311 ADAPTORS TO CLAY DRAINAGE

- Material and standard: Polypropylene to BS EN 295-1 and Kitemark certified.
- Type: To suit pipe sizes.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.

312 ADAPTORS TO PLASTICS DRAINAGE

- Material and standard: Plastics to BS 4660 and Kitemark certified or to BS EN 1401-1 and Kitemark certified.
- Type: To suit pipe sizes.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.

315 ONE PIECE GULLIES AND COVERS- ROAD

- Standards: To BS EN 1253-1, -2, -3, -4 and -5; or
 - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
 - Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
 - Concrete: To BS 5911-6 and Kitemark certified, or Agrément certified.
 - Plastics: To BS 4660 and Kitemark certified, or Agrément certified.
 - Polypropylene: To BS EN 1852-1.
- Material: Plastics.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Sizes: 900 x 450 mm.
- Outlet sizes: DN 150.
- Covers:
 - Product reference: Contractor's choice.
 - Type: Hinged grating.
 - Material: Ductile cast iron.
 - Sizes: 360 x 310 mm.
 - Loading grades to BS EN 124: C250.
- Silt buckets: None.
 - Product reference: N/A.

316A ONE PIECE GULLIES AND COVERS- PAVED AREAS

- Standards: To BS EN 1253-1, -2, -3, -4 and -5; or
 - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
 - Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
 - Concrete: To BS 5911-6 and Kitemark certified, or Agrément certified.
 - Plastics: To BS 4660 and Kitemark certified, or Agrément certified.
 - Polypropylene: To BS EN 1852-1.
- Material: Plastics.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Sizes: 450 x 225 mm.
- Outlet sizes: DN 100.
- Covers:
 - Product reference: Contractor's choice.
 - Type: Hinged grating.
 - Material: Ductile cast iron.
 - Sizes: 150 x 150 mm.
 - Loading grades to BS EN 124: C250.
- Silt buckets: None.
 - Product reference: N/A.

329 PIPES, BENDS AND JUNCTIONS - SUPPLY

- Pipes and fittings: From same manufacturer for each pipeline.

336A PIPES, BENDS AND JUNCTIONS - CLAY - FLEXIBLE JOINTS: FOUL WATER

- Material and standard: Vitrified clay to BS EN 295-1, Kitemark certified.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Sizes: DN 100 and DN 150.
- Crushing strength (minimum): FN 40.
- Jointing type: Polypropylene sleeve
 - Jointing compound: SBR.

337A PIPES, BENDS AND JUNCTIONS - CLAY - FLEXIBLE JOINTS: LABORATORY DRAINAGE

- Material and standard: Vitrified clay to BS EN 295-1, Kitemark certified.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Sizes: DN 100 and DN 150.
- Crushing strength (minimum): FN 40.
- Jointing type: Polypropylene sleeve
 - Jointing compound: EPDM.

344A PIPES, BENDS AND JUNCTIONS - PLASTICS - STRUCTURED WALL: SURFACE WATER

- Standard: To BS EN 13476-1 and -2 or -3, Kitemark or Agrément certified.
 - Supplementary requirements: Puncture resistance, jetting resistance and longitudinal bending to requirements of WIS 4-35-01, issue 2.
- Material: PE.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Recycled content: As supplied.
 - Sizes:
 - DN 100;
 - DN 150;
 - DN 225; and
 - DN 300.
- Jointing type: Double spigot.
 - Jointing compound: Nitrile

345A PIPES, BENDS AND JUNCTIONS - PLASTICS - STRUCTURED WALL: FOUL WATER

- Standard: To BS EN 13476-1 and -2 or -3, Kitemark or Agrément certified.
 - Supplementary requirements: Puncture resistance, jetting resistance and longitudinal bending to requirements of WIS 4-35-01, issue 2.
- Material: PE.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Recycled content: As supplied.
 - Sizes: DN 100 and DN 150.
- Jointing type: Double spigot.
 - Jointing compound: SBR

346 PIPES, BENDS AND JUNCTIONS - PVC-U - SOLID WALL TO FOUL WATER

- Standard: BS EN 1401-1 with flexible joints.
 - Class: SN4 or SN8.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Recycled content: As supplied.
- Sizes: DN 100.
- Application area code: UD.

347A PIPES, BENDS AND JUNCTIONS - PLASTICS - SOLID WALL LABORATORY DRAINAGE

- Manufacturer: Durapipe.
 - Product reference: Vulcathene.
- Recycled content: As supplied.
 - Sizes: DN 100 and DN 150.
- Jointing type: Double spigot.
 - Jointing compound: SBR

349A PIPES, BENDS AND JUNCTIONS - STAINLESS STEEL TO AUTOCLAVE CONNECTIONS

- Standard: To BS EN 1124-1 and -2.
 - Material: Grade 304.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Sizes: DN 100.
- Jointing type: Spigot and socket.
 - Jointing compound: EPDM

357 CONNECTORS - SADDLE

- Standards:
 - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
 - Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
 - Concrete: To BS 5911-6 and Kitemark certified, or Agrément certified.
 - Plastics: To BS 4660 and Kitemark certified, BS EN 13598-1 or Agrément certified.
- Material: To match pipe materials.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Sizes: To suit pipe sizes.

359 FLEXIBLE COUPLINGS

- Standard: To BS EN 295-4 or WIS 4-41-01 and Kitemark certified, or Agrément certified.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.

373 ROOT BARRIERS

- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.

401 INSPECTION CHAMBERS - PLASTICS

- Standard: To BS EN 13598-1, BS EN 13598-2 or Agrément certified.
- Diameter: 450 mm.
- Manufacturer: Contractor's choice.
- Bases:
 - Product reference: Contractor's choice.
- Shaft units:
 - Product reference: Contractor's choice.
- Access covers and frames:
 - Product reference: Contractor's choice.
- Loading grades to BS EN 124: C250.

407 MANHOLES AND INSPECTION CHAMBERS - CONCRETE

- Standards:
 - To BS 5911-3 and BS EN 1917 and Kitemark certified; or
 - To BS 5911-4 and BS EN 1917.
- Manufacturer: Contractor's choice.
- Shape: Circular.
- Sizes: DN 1200 and DN 1500.
- Cement type and content: To BS 5911-1 and BS EN 1916.
- Chamber sections:
 - Product reference: Contractor's choice.
 - Jointing type: Bituminous strips.
- Cover slabs:
 - Product reference: Contractor's choice.
 - Thickness: 175 mm.
 - Loading grades to BS EN 124: C250.
 - Openings: To suit access covers.
- Steps: Required in chambers over 900 mm deep.
- Vortex flow control unit: Required.

421 OIL AND PETROL SEPARATOR UNITS - PLASTICS

- Standards: To Environment Agency PPG 3 and BS EN 858-1, with oil level alarm.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Type: Class 1 and Full retention.
- Size: NS 10.
- Inlet pipe size: DN 150.
- Outlet pipe size: DN 150.
- Accessories:
 - Access covers and frames; and
 - Oil probe and alarm.

433 MANHOLE CHANNELS AND BRANCHES - CONVENTIONAL

- Material: To suit pipe materials.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.

435 MANHOLE CHANNELS AND BRANCHES - PREFORMED PLASTICS

- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.

437A VORTEX FLOW CONTROL UNITS.

- Manufacturer: Contractor's choice.
 - Product reference: Agrément certified.
 - Material: Stainless steel.
 - Drain down secondary outlet pipe: Integral.
 - Control type: Disc valve.
 - Operation: From surface.
- Flow Rate: 5.0 l/s
Design Head: 1.50 m

439 MANHOLE STEPS

- Standard: To BS EN 13101.
- Type: D.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Material: Plastics coated steel.

444 SEALING FOR CONCRETE MANHOLES - BITUMINOUS STRIPS

- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.

464 MODULAR STORMWATER ATTENUATION UNITS.

- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Unit size: nominal 20.0 x 8.5 x 1.2 m, plus 11.5 x 7.0 x 0.4 m rainwater harvesting storage.
- Tank capacity/ size (minimum): 186.2 cu.m, plus 30.0 cu.m rainwater harvesting storage.

468 PRECAST CONCRETE COVER SLABS

- Standard: To BS 5911-3 and BS EN 1917 and Kitemark certified.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Size: Refer to manhole schedules.
- Openings: 600 x 600 mm (minimum).

471 ACCESS COVERS AND FRAMES: TO ROADS

- Standard: To BS EN 124.
- Types: Double triangular non-rock.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Material: Ductile cast iron.
- Finishes: Self finish.
- Sizes: 600 x 600 mm.
- Loading grades to BS EN 124: D400.
- Edging trims: Not required.
- Accessories: Locking bolts.

472A ACCESS COVERS AND FRAMES: TO PAVING

- Standard: To BS EN 124.
- Types: Recessed covers to accept paving.
- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.
- Material: Steel.
- Finishes: Self finish.
- Sizes: 600 x 600 mm.
- Loading grades to BS EN 124: D400.
- Edging trims: Not required.
- Accessories: Locking bolts.

473 ACCESS COVERS AND FRAMES - PRECAST CONCRETE SEATINGS

- Standards: To BS 5911-3 and BS EN 1917 and Kitemark certified.
- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.
- Opening sizes: To suit access covers.

483 CONCRETE

- Standard: To BS 8500-2.
- Concrete: Designated, GEN 3.

496 GRANULAR MATERIAL – NATURAL

- Standards: To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008).
- Supplier : Contractor's choice.
- Recycled content: Contractor's choice.
- Size: Dependent on location – see Execution clauses in this section, and in sections R16, R17 and R18, if used.

EXECUTION

610 STRIPPING OUT

- Extent of stripping out: Refer to drawings.
- Exposed ends of existing drainage to be abandoned: Seal with concrete.

611 EXISTING DRAINS

- Setting out: Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against drawings. Report discrepancies.
- Protection: Protect existing drains to be retained and maintain normal operation if in use.

613 EXCAVATED MATERIAL

- Turf, topsoil, hardcore, etc: Set aside for use in reinstatement.

616 SELECTED FILL FOR BACKFILLING

- Selected fill: As-dug material, free from vegetable matter, rubbish, frozen soil and material retained on a 40 mm sieve.
- Compaction: By hand in 100 mm layers.

623 LOWER PART OF TRENCH – GENERAL

- Trench up to 300 mm above crown of pipe: Vertical sides, width as small as practicable.
- Width (minimum): External diameter of pipe plus 300 mm.

625 LOWER PART OF TRENCH - TRANSITION DEPTH

- Trench widths up to 300 mm above crown of pipe (maximum):
 - DN 100 pipelines more than 6.0 m deep: 600 mm.
 - DN 150 pipelines more than 5.4 m deep: 700 mm.
 - DN 225 pipelines more than 4.0 m deep: 800 mm.
 - DN 300 pipelines more than 2.9 m deep: 900 mm.

631 TYPE OF SUBSOIL

- General: Where type of subsoil at level of crown of pipe differs from that stated for the type of bedding, surround or support, give notice.

635 FORMATION FOR BEDDINGS

- Timing: Excavate to formation immediately before laying beddings or pipes.
- Mud, rock projections, boulders and hard spots: Remove. Replace with consolidated bedding material.
- Local soft spots: Harden by tamping in bedding material.
- Inspection of excavated formations: Give notice.

641 PIPES AT DIFFERENT LEVELS IN COMMON TRENCH

- Subtrench: Permissible provided soil of step is stable and unlikely to break away.
 - Subtrench not permissible: Trench depth as required for lower pipe. Increase thickness of bedding to upper pipe as necessary.
- Lower pipe: Backfill with compacted granular material to at least half way up higher pipe.
- Clear horizontal distance between pipes (minimum):
 - Pipes up to DN 700: 350 mm.
 - Pipes exceeding DN 700: 500 mm.

667 CLASS S SURROUND

- Type of subsoil: Clay, sandy clay - firm .
- Trench width up to 300 mm above crown of pipe (maximum):
 - DN 100 nominal pipe size: 600 mm.
 - DN 150 nominal pipe size: 700 mm.
 - DN 225 nominal pipe size: 800 mm.
 - DN 300 nominal pipe size: 900 mm.
- Granular material: Natural.
 - Sizes: To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008).
- Bedding:
 - Material: Granular, compacted over full width of trench.
 - Thickness (minimum): 50 mm for sleeve jointed pipes, 100 mm for socket jointed pipes. Where trench bottom is uneven, increase depth by 100 mm.
- Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
- Initial testing before placing surround: Not required.
- Surround:
 - Material: Granular.
 - Depth: To 50 mm above crown of pipe.
 - Compaction: By hand in 100 mm layers.
- Backfilling:
 - Material: Protective cushion of selected fill.
 - Depth: 150 mm (250 mm for adoptable sewers) above crown of pipe.
 - Compaction: By hand in 100 mm layers.

676 CLASS Y SURROUND

- Type of subsoil: Clay, sandy clay - firm .
- Timing: Excavate trench after hardcore has been laid and compacted.
- Blinding:
 - Material: Concrete.
 - Thickness (minimum): 25 mm.
 - Width: Full width of trench.
 - Allow to set before proceeding.
- Pipes:
 - Temporary support: Folding wedges of compressible board. Prevent flotation.
 - Clearance under pipes (minimum): 100 mm.
 - Adjust pipes to line and gradient.
- Initial testing before placing surround: Required.
- Surround, cast integrally with slab:
 - Material: Concrete of same mix as slab.
 - Width (minimum): External diameter of pipe plus 200 mm.
- Extent of surround: To within 150 mm of nearest flexible joint.

678 CLASS Z SURROUND COVER < 750 mm

- Type of subsoil: Clay, sandy clay - firm.
- Blinding:
 - Material: Concrete.
 - Thickness (minimum): 25 mm.
 - Width: Full width of trench.
 - Allow to set before proceeding.
- Pipes:
 - Temporary support: Folding wedges of compressible board. Prevent flotation.
 - Clearance under pipes (minimum): 100 mm.
 - Adjust pipes to line and gradient.
- Initial testing before placing surround: Required.
- Surround:
 - Material: Concrete.
 - Depth: To 150 mm above crown of pipe.
 - Width: Full width of trench.
- Vertical construction joints:
 - Location: At face of flexible pipe joints.
 - Material: 18 mm thick compressible board precut to profile of pipe.
 - Socketed pipes: Fill gaps between spigots and sockets with resilient material to prevent entry of concrete.

680 CONCRETE SURROUND FOR PIPE RUNS NEAR FOUNDATIONS

- Class Z surround: Provide in locations where bottom of trench is lower than bottom of foundation and as follows (horizontal clear distance between nearest edges of foundations and pipe trenches):
 - Trenches less than 1 m from foundations: Top of concrete surround not lower than bottom of foundation.
 - Trenches more than 1 m from foundations: Top of concrete surround not lower than D mm below bottom of foundation, where D mm is horizontal distance of trench from foundation, less 150 mm.

683 LAYING PIPELINES

- Laying pipes: To true line and regular gradient on even bed for full length of barrel with sockets (if any) facing up the gradient.
- Ingress of debris: Seal exposed ends during construction.
- Timing: Minimize time between laying and testing.

685 JOINTING PIPELINES

- Connections: Durable, effective and free from leakage.
- Junctions, including to differing pipework systems: With adaptors intended for the purpose.
- Cut ends of pipes: Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets.
- Jointing or mating surfaces: Clean and, where necessary, lubricate immediately before assembly.
- Allowance for movement: Provide and maintain appropriate clearance at ends of spigots as fixing and jointing proceeds.
- Jointing material: Do not allow to project into bore of pipes and fittings.

687 CONCRETE SURROUND FOR CROSSOVERS

- Class Z surround: Provide where two pipelines (other than plastics pipes) cross with less than 300 mm separation.
 - Extent, on both pipes: 1 m centred on the crossing point, and beyond as necessary to come within 150 mm of nearest flexible joints.

689 PIPELINES PASSING THROUGH STRUCTURES

- Pipelines that must be cast in or fixed to structures (including manholes, catchpits and inspection chambers): Provide 600 mm long rocker pipes adjacent to the external face of the structure (or both faces where appropriate, e.g. walls to footings), with flexible joints at both ends.
 - Distance to rocker pipe from structure (maximum): 150 mm.
- Provision for movement for pipelines that need not be cast in or fixed to structures (e.g. walls to footings):
 - Rocker pipes as specified above; or
 - Openings in the structures to give 50 mm minimum clearance around the pipeline. Closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin.

691 BENDS AT BASE OF SOIL STACKS

- Type: Nominal 90° rest bends.
 - Radius to centreline of pipe (minimum): 200 mm.
- Height of invert of horizontal drain at base of stack below centreline of lowest branch pipe (minimum): 450 mm.
- Bedding: Do not impair flexibility of pipe couplings.
 - Material: Concrete.

695 BACKDROP PIPES OUTSIDE MANHOLE WALLS

- Excavation beneath backdrop pipe: Backfill.
 - Material: Concrete.
- Pipe encasement:
 - Material: Concrete.
 - Thickness (minimum): 150 mm.

697 INSTALLING FLEXIBLE COUPLINGS

- Ends of pipes to be joined: Cut cleanly and square.
- Outer surfaces of pipes to be joined: Clean and smooth. Where necessary, e.g. on concrete or iron pipes, smooth out mould lines and/ or apply a cement grout over the sealing area.
- Clamping bands: Tighten carefully to make gastight and watertight seals.

699 CONNECTIONS TO SEWERS

- General: Connect new pipework to existing adopted sewers to the requirements of the adopting authority or its agent.

705 INITIAL TESTING OF PIPELINES

- Before testing:
 - Cement mortar jointing: Leave 24 h.
 - Solvent welded pipelines: Leave 1 h.
- Method: Block open ends of pipelines to be tested and pressurise. Air test short lengths to BS EN 1610.

711 TRENCH SUPPORTS

- Removal of trench supports and other obstacles: Sufficient to permit compacted filling of all spaces.

713 INSTALLING ROOT BARRIERS

- Root barrier installation: Full depth of excavation. Fit closely to trench wall nearest the tree.

715 BACKFILLING TO PIPELINES

- Backfilling above top of surround or protective cushion: Material excavated from trench, compacted in layers 300 mm (maximum) thick.
- Heavy compactors: Do not use before there is 600 mm (total) of material over pipes.

718 BACKFILLING OVER CONCRETE

- Minimum times from placing concrete:
 - Backfilling generally: 24 h.
 - Heavy compactors and traffic loads: 72 h.

720 BACKFILLING UNDER ROADS AND PAVINGS

- Backfilling from top of surround or protective cushion up to formation level: Granular sub-base material, laid and compacted in 150 mm layers.

732 TEMPORARY BRIDGES

- Trench bridges: As necessary to prevent construction traffic damaging pipes after backfilling.

734 INSTALLING ACCESS POINTS AND GULLIES

- Bedding:
 - Material: Concrete.
 - Thickness (minimum): 100 mm.
- Surround:
 - Material: Concrete.
 - Thickness (minimum): 100 mm.
 - Height: Full height.
- Backfilling:
 - Material: Granular - natural, size 4/10 to BS EN 13242, to 100 mm above crown of pipes, then selected fill.
 - Compaction: By hand in 100 mm layers.
- Setting out relative to adjacent construction features: Square and tightly jointed.
- Permissible deviation in level of external covers and gratings: +0 to -6 mm.
- Raising pieces (clay and concrete units): Joint with 1:3 cement:sand mortar.
- Exposed openings: Fit purpose made temporary caps. Protect from traffic.

741 INSTALLING INSPECTION CHAMBERS - PLASTICS

- Bedding:
 - Material: Concrete.
 - Thickness (minimum): 100 mm.
- Surround:
 - Material: Concrete.
 - Thickness (minimum): 100 mm.
- Backfilling: Granular material - natural, size 4/10 to BS EN 13242, to 100 mm above crown of pipes, then selected fill.
 - Compaction: By hand in 100 mm layers.
- Concrete collar:
 - Material: Concrete.
 - Thickness (minimum): 200 mm.
 - Width (minimum): 300 mm.
- Seating: Precast concrete seating rings.

743 INSTALLING CONCRETE MANHOLES

- Bases:
 - Material: Concrete.
 - Thickness (minimum): 225 mm.
- Surround:
 - Material: Concrete.
 - Thickness (minimum): 150 mm.
 - Height: Full height.
- Backfilling:
 - Material: Granular - natural, size 4/10 to BS EN 13242, to 100 mm above crown of pipes, then selected fill.
 - Compaction: By hand in 100 mm layers.

747 INSTALLING OIL AND PETROL SEPARATOR UNITS

- Base:
 - Material: Concrete.
 - Thickness (minimum): 200 mm.
- Surround:
 - Material: Concrete.
 - Thickness (minimum): 150 mm.
- Backfilling: Granular material - natural, size 4/10 to BS EN 13242, to 100 mm above crown of pipes, then selected fill.
 - Compaction: By hand in 100 mm layers.
- Installation: Fill tank with water then encase tank and access shafts with concrete to fully support tank.
- Vent pipe termination: 2.4 m (minimum) above ground level.

750 INSTALLING VORTEX FLOW CONTROL UNITS

- Benching:
 - Material: Concrete.
 - Profile: Rise from manhole base to a level not lower than soffit of outlet pipe, then slope upwards at 10% towards soffit of inlet pipe.
 - Topping:
 - Material: Concrete.
 - Application: Before benching concrete has set, and with dense smooth uniform finish.
- Vortex flow control mounting block (cast in situ):
 - Material: Concrete.
 - Profile: Rise from manhole base vertically to provide plane surface for attachment of unit.
- Outlet pipe: Build in.
- Drain down secondary outlet pipe: Not applicable.

753 FIXING MANHOLE STEPS

- Fixing: Secure to chamber wall.
- Positioning: 300 mm vertical centres staggered 300 mm horizontally, with lowest step 300 mm (maximum) above benching and top step 450 mm (maximum) below top of cover.

755 JOINTING CONCRETE MANHOLE CHAMBER SECTIONS

- Jointing and sealing: Bituminous strips.
- Inner joint surface: Trim surplus jointing material extruded into chamber and point neatly.

757 LAYING CONVENTIONAL CHANNELS, BRANCHES AND BENCHING

- Main channel: Bed solid in 1:3 cement:sand mortar.
 - Branches: Connect to main channel at or slightly above invert level, but not higher than half channel level, so that discharge flows smoothly in direction of main flow.
 - Branches greater than nominal size 150 mm: Connect the branch soffit level with the main drain soffit.
 - Connecting angles more than 45° to direction of flow: Use three-quarter section channel bends.
- Benching:
 - Material: Concrete.
 - Profile: Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.
 - Topping:
 - Material: 1:3 Cement:sand mortar.
 - Application: Before benching concrete has set, and with dense smooth uniform finish.

773 INSTALLING ACCESS COVERS AND FRAMES

- Seating: Precast concrete.
- Bedding and haunching of frames: Continuously.
 - Material: 1:3 cement:sand mortar.
 - Top of haunching: 30 mm below surrounding surfaces.
- Horizontal positioning of frames:
 - Centred over openings.
 - Square with joints in surrounding paving.
- Vertical positioning of frames:
 - Level; or
 - Marry in with levels of surrounding paving.
- Permissible deviation in level of external covers and frames: +0 to -6 mm.

776 EXPOSED OPENINGS IN INSPECTION CHAMBERS, ACCESS POINTS, FITTINGS AND EQUIPMENT

- General: Fit purpose made temporary caps. Protect from site traffic.

COMPLETION

901 REMOVAL OF DEBRIS AND CLEANING

- Preparation: Lift covers to manholes, inspection chambers and access points. Remove mortar droppings, debris and loose wrappings.
 - Timing: Before cleaning, final testing, CCTV inspection if specified, and immediately before handover.
- Cleaning: Thoroughly flush pipelines with water to remove silt and check for blockages. Rod pipelines between access points if there is any indication that they may be obstructed.
- Washings and detritus: Do not discharge into sewers or watercourses.
- Covers: Securely replace after cleaning and testing.

903 TEMPORARY MEASURES

- Water used to stabilize tanks and the like during installation: Drain.

921 FINAL TESTING OF PRIVATE GRAVITY DRAINS AND SEWERS UP TO DN 300

- Before testing:
 - Cement mortar jointing: Leave 24 h.
 - Solvent welded pipelines: Leave 1 h.
- Standard: To Building Regulations.
- Method: Contractor's choice.

941 WATER TESTING OF MANHOLES AND INSPECTION CHAMBERS

- Timing: Before backfilling.
- Standard:
 - Exfiltration: To BS EN 1610.
 - Method: Testing with water (method W).
Infiltration: No identifiable flow of water penetrating the chamber.

971 CCTV INSPECTION OF PRIVATE PIPELINES

- General: Carry out and record internal inspection using CCTV equipment.
 - Locations to be inspected: Foul and surface water drains.
- Illumination: Of adequate intensity.
- Recording: Provide continuous position recording, still photographs and stopping of the camera at any point.
 - Copy of videotape recording: Submit.

978 LIFTING KEYS

- Lifting keys: Supply suitable keys for each type of access cover.
 - Timing: At completion.

980 INSTRUCTIONS

- Manufacturer's user instructions: Submit for oil and petrol separator units.

R18 Pumping stations and pressure pipelines

To be read with Preliminaries/ General conditions.

PRODUCTS

305 BELOW GROUND DRAINAGE SYSTEMS - PRODUCTS

- Generally: As section R12.

310 PRIVATE PACKAGED PUMPING STATIONS

- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Pump impeller type: Vortex.
- Backup pump system: Not required.
- Non-return valve: Required.
- Outlet pressure pipe:
 - Material: Polyethylene.
 - Size DN 80.
- Access covers and frames: As section R12.
 - Loading to BS EN 124: C250.
- Accessories: Additional equipment and fittings necessary to complete the installation, including safety covers and chains, access equipment and tools.

320 PRESSURE PIPES, BENDS AND JUNCTIONS - POLYETHYLENE

- Standard: To BS EN 12201-1, -2 and -3, Kitemark certified.
- Material designation: PE 80.
Pipe standard dimension ratio (SDR): SDR 17.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Colour: Black.
- Sizes: DN 80.
- Jointing type: Contractors choice.

335 AIR RELEASE VALVES TO PRESSURE PIPELINES

- Manufacturer: Contractors choice.
 - Product reference: Contractors choice.
- Sizes: DN 100.

350 CABLE DUCTS FOR PRIVATE PACKAGED PUMPING STATIONS

- Material: Plastics.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Sizes: DN 100.

EXECUTION

605 BELOW GROUND DRAINAGE SYSTEMS - EXECUTION

- Generally: As section R12.

620 INSTALLING PRIVATE PACKAGED PUMPING STATIONS

- Base: Concrete (general).
 - Thickness: 200 mm.
- Surround:
 - Preparation: Temporarily fill tanks with water to prevent flotation.
 - Material: Concrete (general).
 - Height: As required by manufacturer to suit ground conditions.
- Backfill: Granular material - natural, size 4/10 to BS EN 13242.

630 ANCHORAGES TO PRESSURE PIPELINES

- Horizontal thrusts: Cast concrete cradle around half of pipe up to undisturbed trench side.
- Vertical or inclined thrusts: Clamp pipeline/ fitting to concrete block below with two 6 mm galvanized steel straps.
- Pipeline inclines greater than 16.5%: Cast concrete blocks across pipe and set blocks into undisturbed ground.

640 LAYING CABLE DUCTS

- Drawlines: Thread through during laying.

COMPLETION

910 WATER TESTING OF PRIVATE PRESSURE PIPELINES

- Standard: To BS EN 805.
 - Polyethylene pipes: Also in accordance with WRc 'Guide to testing of water supply pipelines and sewer rising mains'.
- Timing: 24 hours (minimum) after completion of joints and installation of anchorages.
- Completion: Commission pumping system, and check that operation of complete installation is satisfactory under normal working conditions

