

R10

Rainwater drainage systems

To be read with preliminaries/ general conditions.

16 PVC-U gutters

1. **Standard:** To the relevant parts of BS EN 607 and BS EN 1462, Kitemark certified.
2. **Manufacturer:** Contractor's choice
 - 2.1. **Product reference:** Black UPVC
3. **Recycled content:** Manufacturer's standard
4. **Profile:** Half round
5. **Nominal size:** 125 mm
6. **Colour:** Black
7. **Brackets:** Galvanized steel top rafter type
 - 7.1. **Fixings:** Stainless steel screws
 - 7.1.1. **Size:** As recommended by manufacturer
8. **Accessories:** Stop ends
9. **Fixing:** Galvanized steel top rafter brackets at 900 mm centres

35 PVC-U pipework

1. **Standard:** To BS EN 12200-1, Kitemark certified
2. **Manufacturer:** Contractor's choice
 - 2.1. **Product reference:** Black PVC-U
3. **Recycled content:** Manufacturer's standard
4. **Section:** Round
5. **Nominal sizes:** DN 110
6. **Colour:** Black
7. **Brackets:** PVC-U clips, black
 - 7.1. **Fixings:** Stainless steel screws
 - 7.1.1. **Size:** As recommended by manufacturer
8. **Accessories:** Rainwater shoes
9. **Fixing:** *Black PVC-U clips plugged and screwed to brickwork at 1800 mm centres.*

50 Installation generally

1. **Electrolytic corrosion:** Avoid contact between dissimilar metals where corrosion may occur.
2. **Discharge of rainwater:** Complete, and without leakage or noise nuisance.
3. **Components:** Obtain from same manufacturer for each type of pipework and guttering.
4. **Allowance for thermal and building movement:** Provide and maintain clearance as fixing and jointing proceeds.
5. **Fixings and fasteners:** As section Z20.
6. **Protection**

- 6.1. Fit purpose made temporary caps to prevent ingress of debris.
- 6.2. Fit access covers, cleaning eyes and blanking plates as the work proceeds.

65 Gutters laid level

1. **Setting out:** Level and as close as practical to roof.
2. **Joints:** Watertight.
3. **Roofing underlay:** Dressed into gutter.

70 Pipework

1. **Fixing:** Securely, plumb and/ or true to line with additional supports as necessary to support pipe collars, particularly at changes in direction.
2. **Cut ends of pipes and gutters:** Clean and square with burrs and swarf removed.

92 Gutter test

1. **Preparation:** Temporarily block all outlets.
2. **Testing:** Fill gutters to overflow level and after 5 minutes closely inspect for leakage.

Ω End of Section

R11

Above ground foul drainage systems

To be read with preliminaries/ general conditions.

3 Design

1. Design: Complete the design of the above ground foul drainage system
2. Standards: To BS EN 12056-1 and BS EN 12056-2, and in accordance with BS EN 12056-2 National Annexes NA-NG.
 - 2.1. System type to BS EN 12056-2: System III.
3. Proposals: Submit drawings, technical information, calculations and manufacturers' literature.

11 Plastics branch pipework

1. [Materials and standards](#): MUPVC or PVC-C to BS EN 1566-1, Kitemark certified

21 PVC-U soil/ vent pipework and wc branches

1. [Standard](#)
 - 1.1. To BS EN 1329-1, Kitemark certified; or
 - 1.2. To BS 4514, Kitemark certified.

31 Cast iron pipework – flexible couplings

1. [Standard](#): To BS EN 877.

45 Air admittance valves

1. [Standard](#): To BS EN 12380 or Agrément certified.
2. [Minimum air flow rate](#): To BS EN 12056-2.
3. [Position](#): Vertical.
4. [Unheated locations](#): Fit manufacturer's insulating cover.

46 Grease traps and converters

1. [Standards](#): In accordance with BS EN 1825-1 and to BS EN 1825-2 and Kitemark or Agrément certified

50 Installation generally

1. [Standards](#): To BS EN 12056-5.
2. [Components](#): From same manufacturer for each type of pipework.
3. [Electrolytic corrosion](#): Avoid contact between dissimilar metals where corrosion may occur.
4. [Plastics and galvanized steel pipes](#): Do not bend.
5. [Allowance for thermal and building movement](#): Provide and maintain clearance as fixing and jointing proceeds.
6. [Concealed or inaccessible surfaces](#): Decorate before starting work specified in this section.
7. [Protection](#)

7.1. **Purpose made temporary caps:** Fit to prevent ingress of debris.

7.2. **Access covers, cleaning eyes and blanking plates:** Fit as the work proceeds.

8. **Drainage from appliances:** Quick, quiet and complete, without blockage, crossflow, backfall, leakage, odours, noise nuisance or risk to health.
9. **Access:** Provide access fittings in convenient locations to permit cleaning and testing of pipework.

60 Fixing pipework

1. **Pipework:** Fix securely plumb and/ or true to line. Fix discharge stack pipes at or just below socket collar or coupling.
2. **Branches and low gradient sections:** Fix with uniform and adequate falls to drain efficiently.
3. **Externally socketed pipes and fittings:** Fix with sockets facing upstream.
4. **Additional supports:** Provide as necessary at junctions and changes in direction.
5. **Vertical pipes:** Provide a load bearing support not less than every storey level. Tighten fixings as work proceeds so that every storey is self-supporting.
6. **Wall and floor penetrations:** Isolate pipework from structure, e.g. with pipe sleeves.
 - 6.1. **Masking plates:** Fix at penetrations if visible in the finished work.
7. **Expansion joint sockets:** Fix rigidly to the building.
8. **Fixings:** Allow the pipe to slide.
9. **Cut ends of pipes:** Clean and square with burrs and swarf removed.

65 Electrical continuity

1. **Joints in metal pipes with flexible couplings:** Make with clips (or suitable standard pipe couplings) supplied for earth bonding by pipework manufacturer to ensure electrical continuity.

66 Identification of internal foul drainage pipework

1. **Markings:** To BS 1710.
2. **Type:** Integral lettering on pipe wall, self-adhesive bands or identification clips.
3. **Locations:** At 500 mm centres, junctions and both sides of slabs, valves, appliances, bulkheads and wall penetrations.

69 Installing air admittance valves

1. **Position:** Vertical, above flood level of highest appliance served and clear of insulation materials (other than the manufacturer's insulating cover).
2. **Connection to discharge stack:** Allow removal for rodding, e.g. ring seal.
3. **Roof spaces and other unheated locations:** Fit manufacturer's insulating cover.

70 Pipework airtightness test

1. **Preparation**
 - 1.1. **Open ends of pipework:** Temporarily seal using plugs.
 - 1.2. **Test apparatus:** Connect a 'U' tube water gauge and air pump to pipework via a plug or through trap of an appliance.



2. [Testing](#): Pump air into pipework until gauge registers 38 mm.
3. [Required performance](#): Pressure of 38 mm is to be maintained without loss for at least three minutes.

72 Pre-handover checks

1. [Temporary caps](#): Remove.
2. [Permanent blanking caps, access covers, rodding eyes, floor gratings and the like](#): Secure complete with fixings.

74 Submittals

1. [Manufacturer's instructions for grease traps](#): Handover at completion.

Ω End of Section

R12

Below ground drainage systems

To be read with preliminaries/ general conditions.

3 Existing drains

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

11 Pipes, bends and junctions – Clay – Flexible joints

1. **Material and standard:** Vitrified clay to BS EN 295-1, Kitemark-certified.

14 Pipes, bends and junctions – PVC-U – solid wall

1. **Standard:** To BS EN 1401-1, with flexible joints.
2. **Application area code:** UD.

17 Lower part of trench – general

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

18 Type of subsoil

1. **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.

19 Formation for beddings

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

21 Laying pipelines

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

22 Jointing pipelines

1. **Connections:** Durable, effective and free from leakage.
2. **Junctions, including to differing pipework systems:** With adaptors intended for the purpose.

3. **Cut ends of pipes:** Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets.
4. **Joining or mating surfaces:** Clean and, where necessary, lubricate immediately before assembly.
5. **Allowance for movement:** Provide and maintain appropriate clearance at ends of spigots as fixing and joining proceeds.
6. **Joining material:** Do not allow to project into bore of pipes and fittings.

23 Class D bed

1. **Trench bottom:** Excavate slightly shallower than final levels.
2. **Trimming:** By hand to accurate gradients. Replace overdig with compacted soil.
3. **Pipes:** Rest uniformly on barrels, adjust to line and gradient. Do not use hard packings under pipes.
4. **Backfilling**
 - 4.1. **Material:** Protective cushion of selected fill.
 - 4.2. **Depth:** 150 mm (250 mm for adoptable sewers) above crown of pipe.
 - 4.3. **Compaction:** By hand in 100 mm layers.

25 Class F bedding

1. **Granular material:** Contractor's choice
 - 1.1. **Sizes:** To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008).
2. **Bedding**
 - 2.1. **Material:** Granular, compacted over full width of trench.
 - 2.2. **Thickness (minimum):** 50 mm for sleeve jointed pipes, 100 mm for socket jointed pipes. Where trench bottom is uneven, increase thickness by 100 mm.
3. **Pipes:** Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
4. **Backfilling**
 - 4.1. **Material:** Protective cushion of selected fill.
 - 4.2. **Depth:** 150 mm (250 mm for adoptable sewers) above crown of pipe.
 - 4.3. **Compaction:** By hand in 100 mm layers.

27 Class P support

1. **Granular material:** Contractor's choice
 - 1.1. **Sizes:** To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008).
2. **Bedding**
 - 2.1. **Material:** Granular, compacted over full width of trench.
 - 2.2. **Thickness (minimum):** 100 mm.
3. **Pipes:** Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
4. **Support**
 - 4.1. **Material:** Granular.
 - 4.2. **Depth:** To slightly above crown of pipe.
 - 4.3. **Compaction:** By hand.

5. Backfilling

5.1. Material and depth

5.1.1. Protective cushion of selected fill to 300 mm above crown of pipe; or

5.1.2. Additional granular material, to 100 mm above crown of pipe.

5.2. Compaction: By hand in 100 mm layers.

29 Class Q surround

1. Granular material: Contractor's choice

1.1. Sizes: To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008).

2. Bedding

2.1. Material: Granular, compacted over full width of trench.

2.2. Thickness (minimum): 100 mm.

3. Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.

4. Surround

4.1. Material: Granular.

4.2. Depth (minimum): To 75 mm above crown of pipe.

4.3. Compaction: By hand.

5. Flexible filler

5.1. Laying: Continuously over completed surround before laying protection slabs.

6. Protection slabs

6.1. Material: Concrete.

6.1.1. Type: Reinforced.

6.2. Thickness: 100 mm

6.3. Minimum bearing: 300 mm.

7. Backfilling: Soil or topsoil as appropriate.

31 Class W surround

1. Timing: Excavate trench after hardcore has been laid and compacted.

2. Granular material: Contractor's choice

2.1. Sizes: To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008)

3. Bedding

3.1. Material: Granular, compacted over full width of trench.

3.2. Thickness (minimum): 100 mm.

4. Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.

5. Surround

5.1. Material: Granular.

5.2. Depth: To 100 mm above crown of pipe.

5.3. Compaction: By hand.

6. Backfilling

- 6.1. **Material:** Hardcore as section D20, or granular.
- 6.2. **Depth:** Up to slab formation.
- 6.3. **Compaction:** In 300 mm (maximum) thick layers.

35 Class X bedding and surround

- 1. **Bedding**
 - 1.1. **Granular material:** Contractor's choice
 - 1.1.1. **Size:** 4/10 to BS EN 13242.
 - 1.2. **Depth:** 75 mm.
- 2. **Width (minimum):** 100 mm wider than pipe.
- 3. **Surround**
 - 3.1. **Granular material:** Contractor's choice
 - 3.1.1. **Size:** To BS EN 13242
 - 3.2. **Depth:** Compact to 150 mm above crown of pipe.

37 Class Y surround

- 1. **Timing:** Excavate trench after hardcore has been laid and compacted.
- 2. **Blinding**
 - 2.1. **Material:** Concrete.
 - 2.2. **Thickness (minimum):** 25 mm.
 - 2.3. **Width:** Full width of trench.
 - 2.4. Allow to set before proceeding.
- 3. **Pipes**
 - 3.1. **Temporary support:** Folding wedges of compressible board. Prevent flotation.
 - 3.2. **Clearance under pipes (minimum):** 100mm.
 - 3.3. Adjust pipes to line and gradient.
- 4. Surround, cast integrally with slab.
 - 4.1. **Material:** Concrete of same mix as slab.
 - 4.2. **Width (minimum):** External diameter of pipe plus 200 mm.
- 5. **Extent of surround:** To within 150 mm of nearest flexible joint.

39 Class Z surround

- 1. **Blinding**
 - 1.1. **Material:** Concrete.
 - 1.2. **Thickness (minimum):** 25 mm.
 - 1.3. **Width:** Full width of trench.
 - 1.4. Allow to set before proceeding.
- 2. **Pipes**
 - 2.1. **Temporary support:** Folding wedges of compressible board. Prevent flotation.

2.2. **Clearance under pipes (minimum):** 100 mm.

2.3. Adjust pipes to line and gradient.

3. Surround

3.1. **Material:** Concrete.

3.2. **Depth:** To 150 mm above crown of pipe.

3.3. **Width:** Full width of trench.

4. Vertical construction joints

4.1. **Location:** At face of flexible pipe joints.

4.2. **Material:** 18 mm thick compressible board precut to profile of pipe.

4.3. **Socketed pipes:** Fill gaps between spigots and sockets with resilient material to prevent entry of concrete.

41 Concrete surround for pipe runs near foundations

1. **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):
 - 1.1. **Trenches less than 1 m from foundations:** Top of concrete surround not lower than bottom of foundation.
 - 1.2. **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.

44 Bends at base of soil stacks

1. **Bedding:** Do not impair flexibility of pipe couplings.
 - 1.1. **Material:** Concrete.

47 Direct connection of ground floor wcs to drains

1. **Drop from crown of WC trap to invert of drain (maximum):** 1.3 m
2. **Horizontal distance from the drop to a ventilated drain (maximum):** 6 m.

49 One piece gullies

1. **Standards:** To BS EN 1253-1, -2, -3, -4 and -5; or
 - 1.1. **Cast iron:** To BS 437 and Kitemark-certified, or Agrément-certified.
 - 1.2. **Clay:** To BS EN 295-1 and Kitemark-certified, or Agrément-certified.
 - 1.3. **Concrete:** To BS 5911-6 and Kitemark-certified, or Agrément-certified.
 - 1.4. **Plastics:** To BS 4660 and Kitemark-certified, or Agrément-certified.
 - 1.5. **Polypropylene:** To BS EN 1852-1.

50 One piece gullies and covers

1. **Standards:** To BS EN 1253-1, -2, -3, -4 and -5; or
 - 1.1. **Cast iron:** To BS 437 and Kitemark-certified, or Agrément-certified.
 - 1.2. **Clay:** To BS EN 295-1 and Kitemark-certified, or Agrément-certified.
 - 1.3. **Concrete:** To BS 5911-6 and Kitemark-certified, or Agrément-certified.
 - 1.4. **Plastics:** To BS 4660 and Kitemark-certified, or Agrément-certified.

- 1.5. [Polypropylene](#): To BS EN 1852-1.

52 Composite gullies

1. [Standards](#): To BS EN 1253-1, -2, -3, -4 and -5; or
 - 1.1. [Cast iron](#): To BS 437 and Kitemark-certified, or Agrément-certified.
 - 1.2. [Clay](#): To BS EN 295-1 and Kitemark-certified, or Agrément-certified.
 - 1.3. [Plastics](#): To BS 4660 and Kitemark-certified, or Agrément-certified.
 - 1.4. [Polypropylene](#): To BS EN 1852-1.

54 Access points – plastics

1. [Standard](#): To BS 4660 and Kitemark-certified, to BS EN 13589-1, or Agrément-certified.

58 Installation of access covers and frames

1. [Seating](#): Precast concrete
2. [Bedding and haunching of frames](#): Continuously.
 - 2.1. [Material](#): 1:3 cement:sand mortar
 - 2.2. [Top of haunching](#): 30 mm below surrounding surfaces.
3. [Horizontal positioning of frames](#)
 - 3.1. Centred over openings.
 - 3.2. Square with joints in surrounding paving.
4. [Vertical positioning of frames](#)
 - 4.1. Level; or
 - 4.2. Marry in with levels of surrounding paving.
5. [Permissible deviation in level of external covers and frames](#):: +0 to -6 mm.

62 Manholes and inspection chambers – concrete

1. [Standards](#)
 - 1.1. To BS 5911-3 and BS EN 1917 and Kitemark-certified; or
 - 1.2. To BS 5911-4 and BS EN 1917.

64 Inspection chambers – plastics

1. [Standard](#): To BS EN 13598-1, BS EN 13598-2 or Agrément-certified.

65 Manholes and inspection chambers – plastics

1. [Standard](#): To BS EN 13598-2

67 Design – Soakaway systems

1. [Design](#): Complete the design of the soakaway system in accordance with BRE Digest 365.
2. [Proposals](#): Submit drawings, technical information, calculations and manufacturers' literature.
3. [Maintenance requirements](#): Submit details.

69 Laying conventional channels, branches and benching

1. **Main channel:** Bed solid in 1:3 cement:sand mortar.
 - 1.1. **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.
 - 1.2. **Branches greater than nominal size 150 mm:** Connect the branch soffit level with the main drain soffit.
 - 1.3. **Connecting angles more than 45° to direction of flow:** Use three-quarter section channel bends.
2. **Benching**
 - 2.1. **Material:** concrete.
 - 2.2. **Profile:** Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then sloping upwards at 10% to walls.
 - 2.3. **Topping**
 - 2.4. **Application:** Before benching concrete has set, and with dense smooth uniform finish.

71 Laying preformed plastics channels, branches and benching

1. **Main channel:** Bed solid in 1:3 cement:sand mortar.
 - 1.1. **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.
 - 1.2. **Connecting angles more than 45° to direction of flow:** Use three-quarter section channel bends.
2. **Bedding:** 1:3 cement:sand mortar. Use clips or ensure adequate mechanical key.
3. **Benching**
 - 3.1. **Material:** Concrete.
 - 3.2. **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.
 - 3.3. **Topping**
 - 3.4. **Application:** Before benching concrete has set, and with dense smooth uniform finish.

79 Access covers and frames

1. **Standard:** To BS EN 124.

84 Testing and inspection

1. **Dates for testing and inspection:** Give notice.

85 Initial testing of pipelines

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

89 Water testing of manholes and inspection chambers

1. **Timing:** Before backfilling.

2. Standard

- 2.1. **Exfiltration:** To BS EN 1610.
- 2.2. **Method:** Testing with water (method W).
- 2.3. **Infiltration:** No identifiable flow of water penetrating the chamber.

91 Backfilling to pipelines

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

94 Backfilling under roads and pavings

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

97 Removal of debris and cleaning

- 1. **Preparation:** Lift covers to manholes, inspection chambers and access points. Remove mortar droppings, debris and loose wrappings.
 - 1.1. **Timing:** Before cleaning, final testing, CCTV inspection if specified, and immediately before handover.
- 2. **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.
- 3. **Washings and detritus:** Do not discharge into sewers or watercourses.
- 4. **Covers:** Securely replace after cleaning and testing.

Ω End of Section