3.19 Gullies

Gullies are required generally, for the collection of surface water from roofs and impervious areas, for discharge into a drainage system. They should be provided for impervious or paved areas at a minimum rate of one gully per 200m^2. In the selection of gully locations, care should be taken to ensure that ponding would not occur.

Subject to the limitations specified in this clause, gullies for road drainage should be provided in accordance with Table 3.6.

The maximum length of roadway contributing to a gully should be 70m. At sag curves, two gullies side by side, with separate connections to the surface water sewer, should be provided at the lowest point.

At junctions, where a blocked gully could cause ponding, additional gullies with separate connections to the surface water sewer should be provided, as required by the local authority.

TABLE 3.6 Maximum paved areas contributing to road gullies.

Gradient	Paved Area (m^2)
1/180	180
1/150	210
1/100	255
1/80	285
1/60	320
1/40 (or steeper)	390

Gullies for the collection of roof water and for the drainage of small paved areas should be clayware, complying with the requirements of BS 65. Other types of gully may be used, subject to approval. Rainwater downpipes should either discharge over an open gully fitted with a grating, or be connected to the back inlet of a back inlet gully. The maximum distance from finished ground to the bottom of the gully, should be 600mm.

Gullies for the drainage of roadways and large paved areas should be precast concrete, complying with the requirements of BS 5911: Part 230, or may consist of a chamber constructed of 100mm solid blockwork and having a 150mm in situ concrete flor, with minimum internal dimensions of 450mm x 300mm x 750mm. The outlet from the gully should be 150mm diameter, set a minimum of 375mm above the floor of the chamber. The class of gully grating required for various locations, is the same as that given for manhole covers and frames in Table 3.5. The type of gully is subject to approval.

Gully gratings in roads should be set with the direction of the openings at right angles to the direction of traffic.

Gullies connected to a drain or sewer carrying foul water should be trapped.

3.20 Testing of Sewers & Drains

Sewers and drains should be tested by one or other of the following methods:

1. Water Test: Foul sewers and drains should be tested for a minimum of 30 minutes, under a head not less than one metre of water over the crown at the high point and not more than 2.5m of water over the crown at low points of the line under test. The pipeline should stand for two hours after filling, to allow for absorption, topping up as necessary, before commencing the test proper. The rate of water loss should not exceed one litre per hour, per metre diameter, per metre run of pipe. The maximum allowable loss of water per 30 minutes, per 100m run of pipe, for various pipe diameters, should be as shown in Table 3.7.

   Surface water sewers and drains should be tested for a minimum of 30 minutes and the test head of water should be not less than one metre over the crown at the high point and not more than two metres over the crown at low points of the line under test. Acceptance criteria should be as for foul sewers and drains, unless otherwise approved.

   Where either foul or surface water sewers or drains fail the appropriate test, remedial works should be subject to approval.

TABLE 3.7 Maximum allowable water loss in litres, per 100 metres of pipe, in 30 minutes

Pipe Diameter (mm)	Maximum allowable loss (litres)
100	5
150	7.5
225	11.25
300	15

2. Air Test: Air should be pumped into the section of sewer or drain under test, until a pressure of 100mm of water is indicated on a U-tube connected to the system. The pipeline should stand for a period of five minutes, to permit air pressure stabilisation, before commencing the test proper. Care should be taken that temperature changes of the air in the pipe during the test, do not distort the test results. The air pressure should not fall to less than 75mm head of water during the test period of five minutes, without further pumping.

Failure to pass an air test should not be taken as conclusive. When failure occurs, a water test, as specified in 1. above should be undertaken. Acceptance or rejection of the line under test should be based on the results of this water test.

3.21 Manhole Infiltration

Infiltration tests should be carried out on manholes after backfilling, when the ground water adjacent to the manhole is at its highest level.

The maximum infiltration should not exceed one litre per hour, per square metre of internal surface area of the whole of the manhole. Notwithstanding this requirement, any visible leaks should be repaired as approved.

3.22 Cleaning of Sewers & Drains

At the time of completion of the development works, the developer should ensure, to the satisfaction of the local authority, that all sewers and drains within the site are clean and free from obstructions. Some local authorities require the developer to provide sewer condition surveys, by approved contractors, which would include internal inspections using closed circuit television equipment. The results may be recorded on diskette, tape, or compact disc. The developer should ascertain the local authority's requirements in this regard.

Section 4: Water Supply

4.1 Supply

Water is normally supplied by the Local Authority and points of supply should be ascertained in consultation with the Local Authority.

4.2 Watermain Pipes

Watermain pipes should have a minimum nominal pressure classification of 9 bar. The following pipes may be used:

1. PVC-U pipes, in accordance with the requirements of the Provisional Specification of the Department of Local Government for Unplasticized PVC Pipes for Cold Water Supply.
2. Ductile iron pipes, fittings and accesories, to the requirements of IS EN 545.
3. Polyethylene pipes, type 50, to the requirements of IS 135.
4. Fibre-cement pressure pipes, to the requirements of IS EN 512.

Fittings and specials should be subject to approval.

4.3 Service Pipes

Service pipes should be minimum 12mm internal diameter and should be one of the following types, unless otherwise approved:

1. Annealed copper pipe, to the requirements of IS EN 1057.
2. Polyethylene pipe, type 32, heavy gauge, to the requirements of IS 134.
3. Polyethylene pipe, type 50, to the requirements of IS 135.

Fittings and specials should be subject to approval.

4.4 Watermain Pipe Size and Layout

Watermain pipe size and layout should be designed in consultation with the Local Authority. However, the following general design criteria should apply:

1. The minimum pipe nominal diameter should be 100mm.
2. House connections should not be taken across roads.
3. Watermains should be looped. Where the Local Authority approves the use of dead ends, a duck foot hydrant should be provided at the dead end.
4. Watermains should preferably be laid under footways, or grass margins.
5. No pipe, cable, conduit, or other service should be laid longitudinally over the line of a watermain.

4.5 Watermain Class

The Local Authority should determine the class of pipe to be used, having regard to the maximum in-service operating pressure.

4.6 Pipe Cover

Watermain pipes should have a minimum cover of 900mm. Service pipes should have a minimum cover of 600mm.

4.7 Pipe Laying

Maximum trench width should be the pipe diameter plus 600mm. Pipes should be laid on a 50mm bed of fine grained material, consisting of sand, gravel or soil, passing a 10mm sieve.

(Where pipes are laid on rock, bedding material depth should be increased to 100mm). Similar material should be placed around and over the pipe for a cover of 100mm. (Pipes laid under roads should have cover materials increased to 150mm). Selected fill, free from stones greater than 25mm in size, rubbish, tree roots, vegetable matter, or lumps of clay greater than 75mm in size, should be used to fill the next 300mm.

4.8 Pipe Jointing

Joints should be formed by an approved method, recommended by the manufacturer. Elastomeric sealing rings, where used, should comply with the requirements of BS 2494.

4.9 Marker Tape

An approved marker tape containing a tracer wire, should be affixed to the top surface of all watermains.

4.10 Pipe Anchorage

Concrete anchor blocks should be provided on watermains at dead ends, tees, bends of curvature greater than $22^{1}/_{2}^{0}$ and at both sides of a sluice valve chamber. Anchor blocks should encase the pipe in concrete (Class E, Clause 1502, Specification for Roadworks), to a minimum thickness of 150mm all round and should be a minimum length of 750mm.

4.11 Sluice Valves

Sluice valves should be provided such that houses can be isolated in groups of not more than 40 houses and should comply with the requirements of BS 5163. The depth of the sluice valve spindle cap below finished ground level should not exceed 300mm.

4.12 Hydrants

Hydrants should be provided such that no house is more than 46 metres from a hydrant. Hydrants should be of the screw-down type in compliance with the requirements of BS 750. Hydrant outlets should comply with the Chief Fire Officer's requirements. The depth of the hydrant outlet below finished ground level, should not exceed 200mm.

4.13 Air Valves

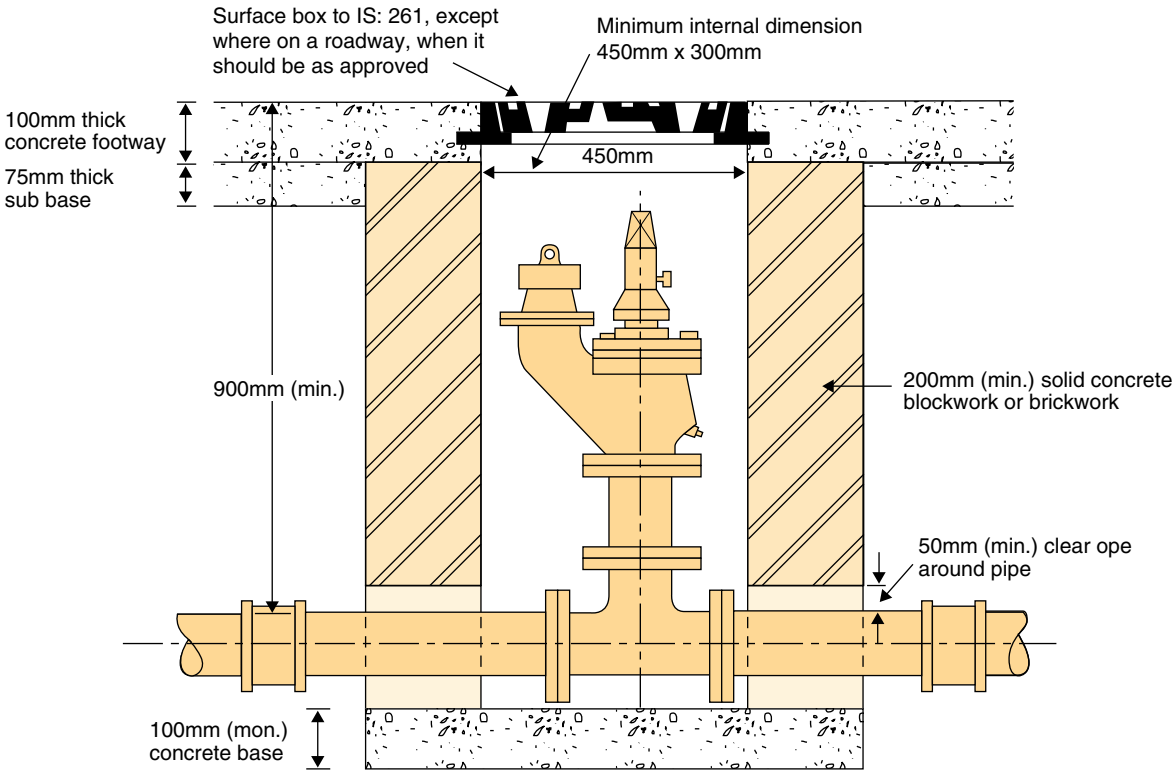
Air valves in compliance with the requirements of BS 5159, may be required at summits on watermains. The locations and types of such valves are subject to the approval of the Local Authority.

4.14 Stopcocks

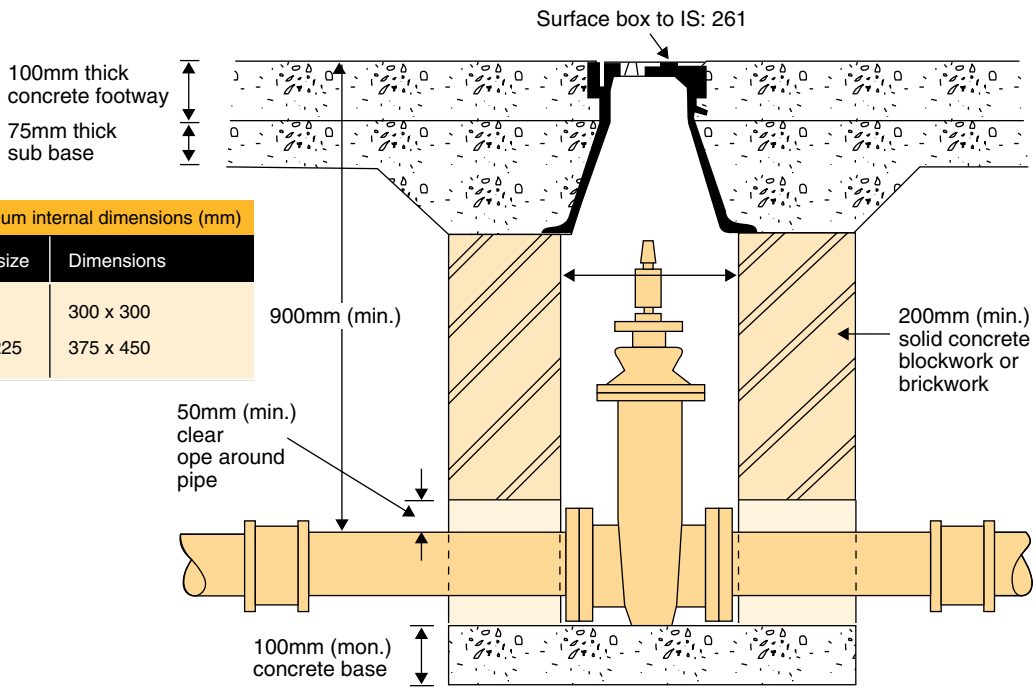
A stopcock, complying with the requirements of BS 1010: Part 2, should be provided on each service pipe, in the footway immediately outside the boundary of each house. The top of the stopcock spindle should be 300-450mm below finished footway levels.

4.15 Valve Chambers

Chambers for sluice valves, air valves, hydrants and stopcocks should be as shown on Figures 4.1 and 4.2. Precast or in situ concrete may also be used, subject to approval.



(1) Hydrants (or Airvalves)



Minimum internal dimensions (mm)	
Pipe size	Dimensions
<150	300 x 300
150-225	375 x 450

(2) Sluice Valves

not to scale

FIGURE 4.1: HYDRANT, AIRVALVE & SLUICE VALVE CHAMBERS

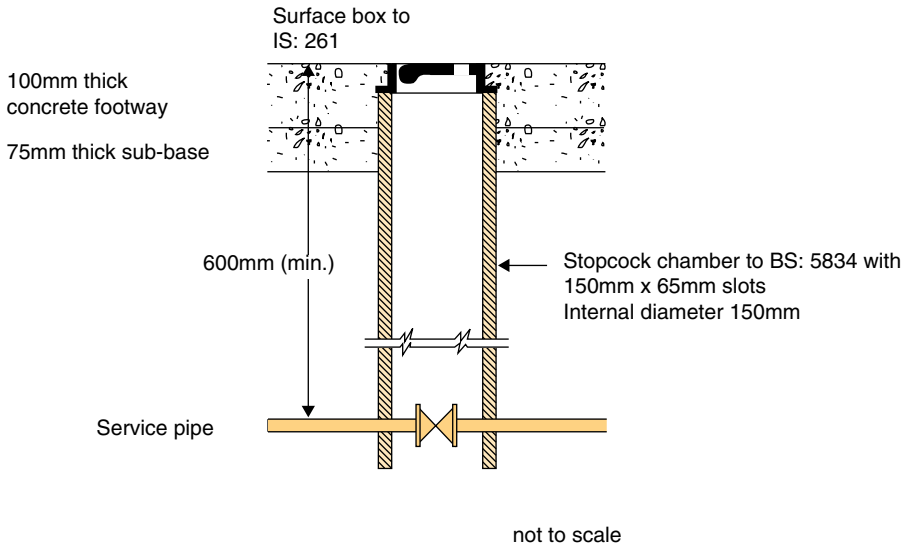


FIGURE 4.2: STOPCOCK CHAMBER

4.16 Surface Boxes

Hydrant, sluice valve, air valve and stopcock chambers should be provided with cast iron surface boxes in compliance with the requirements of IS 261. Surface boxes for roadways and areas accessible to wheeled traffic should be subject to approval.

Surface boxes should be bedded in mortar on the chamber walls and where the chamber is located other than on a footway, driveway or roadway, should be surrounded by 150mm concrete, 100mm in depth (Class E, Clause 1502, Specification for Roadworks).

4.17 Indicator Plates and Marker Posts

The location of hydrants, air valves and sluice valves should be shown by indicator plates positioned to the approval of the Local Authority.

Hydrant plates should comply with the requirements of BS 3251. They should show the diameter of the watermain in millimetres on the upper part of the plate and the distance of the marker from the hydrant on the lower part of the plate, as set out in Figure 4.3. All characters should be black and the remainder of the front face should conform to colour reference No.309 (canary yellow) of BS 381C.

Sluice valve and air valve plates should be in cast iron, measuring 200mm x 200mm. They should have the letters SV or AV as appropriate, cast in relief. The plates should have a background in black bitumastic paint, with the letters in white enamel.

Indicator plates may be fixed to solid boundary walls. Where marker posts are used they should be constructed in accordance with Figure 4.3 and should be located as an inset to the rear of the footway.

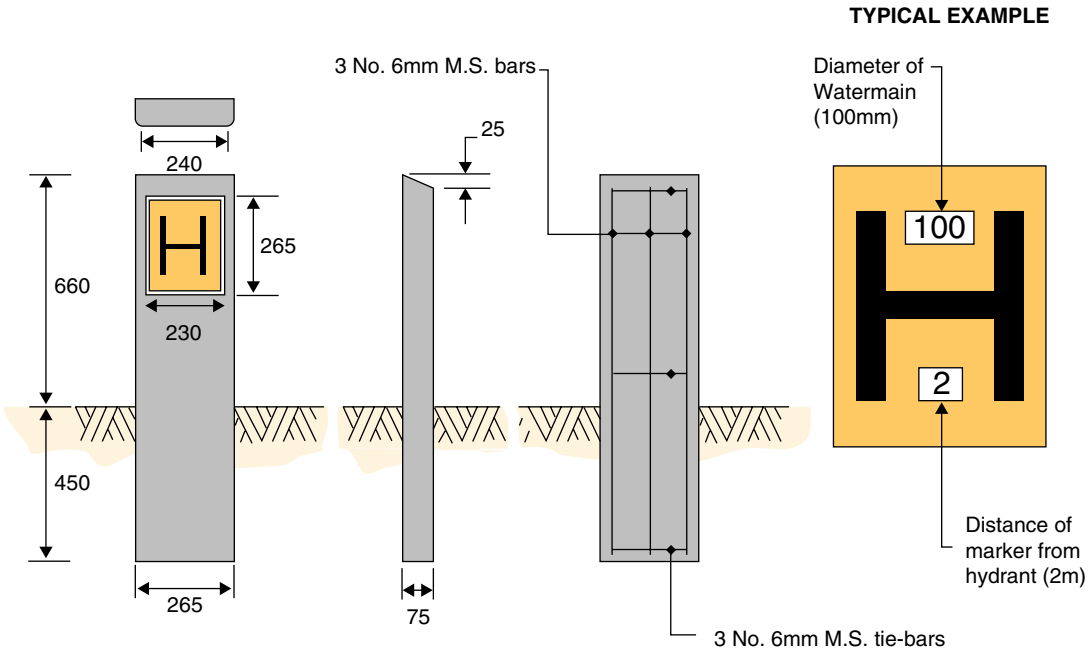


FIGURE 4.3: CONCRETE MARKER POST

4.18 Testing and Sterilisation

All watermains should be hydraulically tested after laying, for a period of between 1 and 24 hours as approved, at a test pressure of 1.5 times the specified class pressure. The pipeline should be adequately anchored or restrained, during the test.

A test pump, with stopcock, water tank and pressure gauge, is connected to the watermain and operated until the gauge shows the required test pressure. (If it is considered necessary, the calibration of the pressure gauge should be validated just prior to the test.) The amount of water in the tank is noted at the beginning of the test period. An hour later, gauge pressure is inspected and if it has fallen, test pressure is restored by means of the pump. This process is repeated at hourly intervals, during the test period. The total quantity of water pumped to maintain the pressure during the test is termed "the apparent leakage".

The apparent leakage should not normally exceed 0.11 litres, per millimetre of nominal pipe diameter, per kilometre of length, per 24 hours.

An alternative test procedure may be approved, in consultation with the Local Authority.

Should pipelines fail this test, remedial works should be to the approval of the Local Authority.

On completion of the final test, pipelines should be thoroughly flushed-out. The system should be sterilised in sections, by allowing water containing at least 10 parts per million residual chlorine to stand in the mains and service pipes, for at least two hours. The system should again be thoroughly flushed-out, on completion of sterilisation.

Care should be exercised in flushing out the sterilised watermains, that the draining liquid does not cause environmental damage.

Section 5: Public Lighting

5.1 Introduction

Public Lighting for Housing Areas may be provided by the Electricity Supply Board (ESB), or a private Contractor, subject to the requirements of the local authority and the ESB. Some local authorities have adopted specific standards for Public Lighting and Developers who intend to employ private Contractors on public lighting projects, should consult with the local authority, before finalising the design.

5.2 Standards

Public Lighting scheme equipment and installation should conform to the requirements of:

- National Rules for Electrical Installations ET 101/1991 and Amendments, published by the Electro Technical Council of Ireland (ETCI)
- National Rules for Electrical Installations ET 102/1993, Section 714, External Lighting Installations, published by ETCI
- National Rules for Electrical Installations, Section 533 1.1.1, with regard to Cartridge Fuses for A.C. Circuits, published by ETCI
- IS EN 40-1: 1992, Lighting Columns, Definitions and Terms
- IS EN 55015: 1993, Limits and Methods of Measurement of Radio Disturbance Characteristics of Electrical Lighting and Similar Equipment
- IS EN 60238: 1993, Edison Screw Lampholders
- IS EN 60598-2-3: 1994, Luminaires for Road and Street Lighting
- IS EN 60922: 1992, Ballasts for Discharge Lamps - General and Safety Requirements
- IS EN 60923: 1992, Ballasts for Discharge Lamps - Performance Requirements
- IS EN 60928: 1997, Auxiliaries for Lamps. A.C. Supplied Electronic Ballasts for Tubular Flourescent Lamps - General and Safety Requirements
- IS EN 60929: 1993, A.C. Supplied Electronic Ballasts for Tubular Flourescent Lamps - Performance Requirements
- IS EN 61000-3-2: 1995, Electromagnetic Compatibility (EMC). Part 3: Limits - Section 2: Limits for Harmonic Current Emissions (Equipment Input Current $\leq$ 16A per Phase)
- IS EN 61048: 1993, Capacitors for Use in Tubular Fluorescent and Other Discharge Lamp Circuits - General and Safety Requirements

- IS EN 61049: 1994, Capacitors for Use in Tubular Flourescent and Other Discharge Lamp Circuits -Performance Requirements

- IS EN 61184: 1995, Bayonet Lampholders

- IS EN ISO 9001: 1994, Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation and Servicing

- IS EN ISO 9002: 1994, Quality Systems - Model for Quality Assurance in Production, Installation and Servicing

- BS 729: 1971(1994), Specification for Hot Dipped Galvanized Coatings on Iron and Steel Articles

- BS 1361: 1971(1986), Specification for Cartridge Fuses for A.C. Circuits in Domestic and Similar Premises

- BS 3676: Part 1: 1989, Switches for Household and Similar Fixed Electrical Installations - Specification for General Requirements

- BS 5489: Part 1: 1992, Road Lighting - Guide to the General Principals

- BS 5489: Part 3: 1992, Road Lighting - Code of Practice for Lighting for Subsidiary Roads and Associated Pedestrian Areas

- BS 5649: Parts 2 to 9: 1997, Lighting Columns

- BS 6346: 1989, Specification for PVC-insulated Cables for Electricity Supply

5.3 Minimum Illuminance Levels

The minimum standard of illuminance that should be considered acceptable, can be provided by the installation of either:

- 55W SOX side-entry lanterns at 34±3m spacing, with 6m mounting height and 0.7 metre outreach,

- 70W SONT side-entry lanterns at 34±3m spacing, with 6m mounting height and 0.7 metre outreach.

A staggered arrangement of lanterns is to be preferred for the lighting of roads with a footway on either side, but a single side arrangement may be used, provided that the lighting criteria are met.

It should be noted that the 55W SOX lanterns are more energy efficient and cost effective than the 70W SONT alternative and are accordingly preferable whenever it is feasible to specify them.

The recommend spacing (34 $\pm$ 3m) is for a 6m roadway with a 2m footway on either side, where vehicular traffic and public use are solely associated with adjacent properties. Should conditions be otherwise, advice should be sought on the appropriate standard and spacing.

Other lanterns may be used, subject to approval by the ESB and the local authority.

5.4 Lighting Columns and Brackets

The lighting column manufacturer should preferably be registered with and certified by the National Standards Authority of Ireland, for the design and manufacture of lighting columns and accessories, under their quality assurance schedule to IS EN ISO 9001 and IS EN ISO 9002.

Columns should be manufactured to BS 5649 (including any amendments), or equivalent and also to the Department of Transport's interim design rules, which augment the requirements of BS 5649: Part 6: 1982(1997). Lighting columns and brackets should generally be of tubular, or octagonal steel construction, with a minimum wall thickness of 3mm and should comply with the requirements of BS 5649: Part 3: 1982. Columns, brackets and steel fittings should be protected against corrosion by hot-dip galvanizing, in accordance with BS 729: 1971(1994).

Mill test certificates may be required for the column and bracket steel sections.

Octagonal columns should be 7m long, of folded steel, gradually tapered at a constant rate from the base and terminating with a dimension of 68mm across flats at the top.

Columns with a tubular cross-section should be 7m long, with a base minimum diameter of 140mm and a shaft minimum diameter of 76mm. The base length should be 3m. The junction of the base and shaft sections should be a swaged and welded joint.

The base should be fitted with a cable entry opening, 180 x 60mm, with the top of the opening 700mm from the base end, together with a compartment door and welded-in frame. The top of the compartment door and frame assembly should be 2700mm from the base end and in line with the cable entry opening. The door should be weatherproof to IP 33 (IEC classification system) and should be secured by two recessed locking mechanisms requiring a female triangular key of 10mm side. An earthing connection should be provided within the base compartment. The fastening screw for this connection should be of stainless steel.

The bracket assembly should be manufactured in accordance with Figure 5.1, with the bracket arm inclined 5^0 above the horizontal. The bracket should be fitted with an anti-rotation device, when fitted to a tubular column.

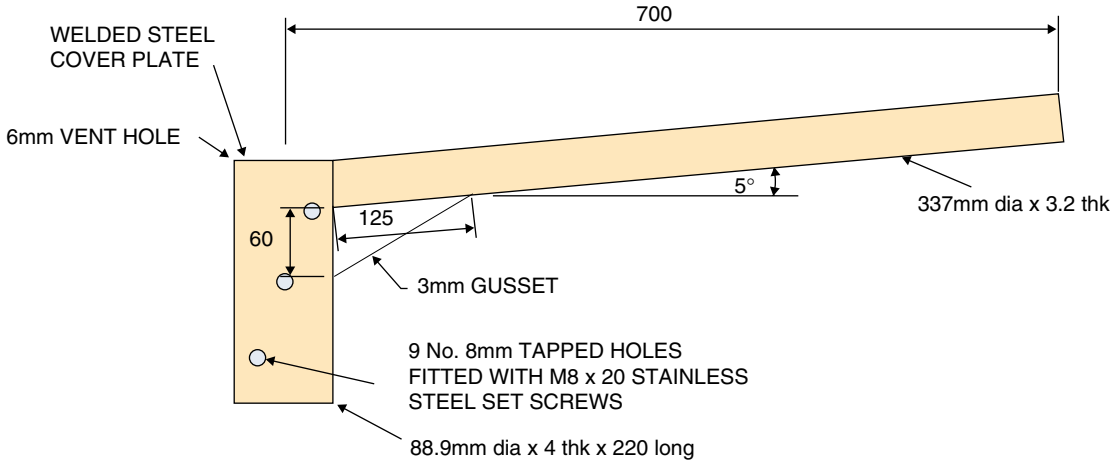


FIGURE 5.1: LIGHTING COLUMN BRACKET

The column and bracket should carry a permanent identification mark, indicating the manufacturer and the year of manufacture.

5.5 Lanterns

Lanterns should comply with the requirements of IS EN 60598-2-3: 1994, and BS 5489: Part 3: 1992.

The lantern should be constructed from injection moulded or die-cast aluminium alloy, GRP, or other suitable corrosion-resistant materials. The lower portion of the lantern should consist of a single piece bowl. The earthing screw, hinges, grub screws and bowl clips or springs should be fabricated from a corrosion-resistant material. Alternatively, the lantern optical compartment may consist of a single piece sealed reflector/bowl unit.

The bowl should be constructed from an ultraviolet stabilised polycarbonate, which is specially toughened, so as to be vandal resistant.

The lantern should be waterproof and dustproof by virtue of a non-porous self-sealing heat resisting gasket where applicable and should have a minimum protection of IP65.

The lanterns should have a three-prong twist lock NEMA socket to take an approved photo-electric control unit, suitably sealed with a weatherproof gasket and fixed to the lantern body with non-corrosive screws.

A fixed and fused terminal block, with clearly identified phase, neutral and earth connections, should be provided within the control gear compartment.

The lampholders on the SOX lanterns should be porcelain B.C., with stainless steel or phosphor bronze springs and nickle-plated plungers. Lampholders on the SONT lanterns should be of the E.S. type.

5.6 Fitting Out of Columns

A readily-detachable hardwood baseboard, measuring 400 x 80 x 20mm should be fitted in the base compartment of each column. The clearance between the baseboard and the inside face of the door when secured, should be not less than 100mm.

Each lantern should be individually protected with a suitable fuse in the column base.

Neutral blocks, or looping-in-blocks, should be of an approved grooved bore 63A type and should be fully insulated and solidly mounted on the baseboard.

Columns should be wired with a minimum 2.5mm^2 PVC/PVC stranded copper cable.

The internal electrical arrangement should be as shown in Figure 5.2.

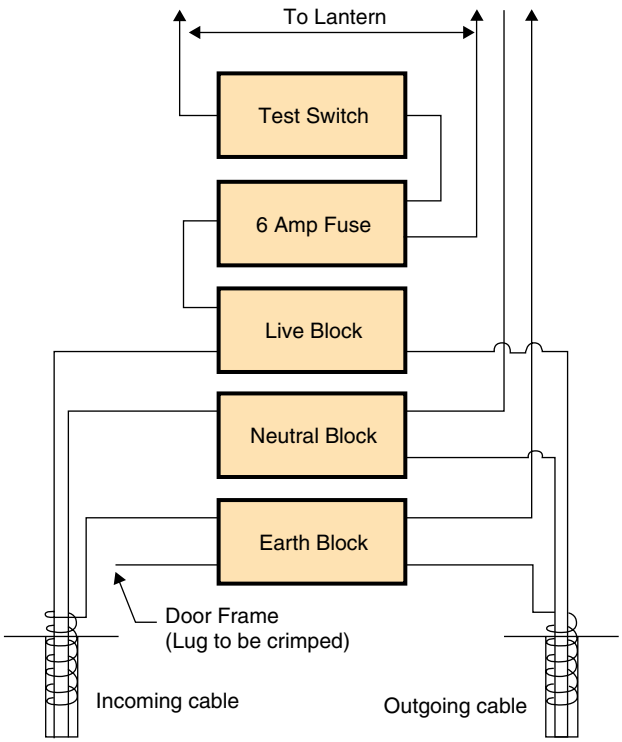


FIGURE 5.2: INTERNAL ELECTRICAL ARRANGEMENT PUBLIC LIGHTING COLUMN

5.7 Control

Switching of the Public Lighting system should be by approved solid state photo-electric switches, with each lantern being individually controlled. A 5A surface mounted switch, tested to BS 3676, should be provided in the base of each column, to facilitate daytime testing by short-circuiting the photo-electric switch.

Control gear for 55W SOX lanterns may be mounted over the lamp. In such instances, a metal reflector should be fitted between the lamp and the control gear. Control gear for 70W SONT lanterns should not be mounted over the lamp, but should be located in a separate compartment, sealed to a minimum of IP 43.

All lanterns should have an external ignitor in the control gear, which should be of the anti-cycling type.

Capacitors should be rated so as to give a corrected power factor of not less than 0.9 at 230V and should comply with the requirements of BS EN 61048: 1993 and BS EN 61049: 1993.

5.8 Auxiliary Public Lighting Micro Pillar

All columns should be supplied from an auxiliary Public Lighting micro pillar, located adjacent to the ESB section pillar. Not more than six columns may be supplied from any one circuit and not more than four circuits may be taken from any one auxiliary Public Lighting micro pillar.

The pillar should consist of a rectangular box of overall dimensions 600 x 150 x 150mm, with front and rear bottom extension plates 300mm long, for anchoring purposes. The pillar should be vented and fitted with a lift-out door, 445 x 142mm, fixed with two triangular headed locking screws onto a suitably tapped fixing plate, with a weathering strip all around. A key, operating both locks, should be provided with each pillar. The shell, door and extension plates should be 3mm thick mild steel and the entire unit should be hot dipped galvanized to BS 729. Ground level should be clearly marked on the unit.

An alternative pillar of similar design, offering additional features, may be offered for approval, prior to installation.

5.9 Fitting Out of Auxiliary Public Lighting Micro Pillar

A hardwood baseboard, measuring 440 x 140 x 20mm should be fitted in each pillar. A main earthing terminal should also be provided and all components should be securely mounted on the baseboard. The internal electrical arrangement should be as shown on Figure 5.3.

All outgoing circuits should be individually fused by means of a 20A HRC cut-out, capable of accommodating cable sizes up to 25mm^2. These fuses should be rated 16kA minimum rupturing capacity and should comply with BS 1361. The terminals of the cut-out should be of the grooved bore type.

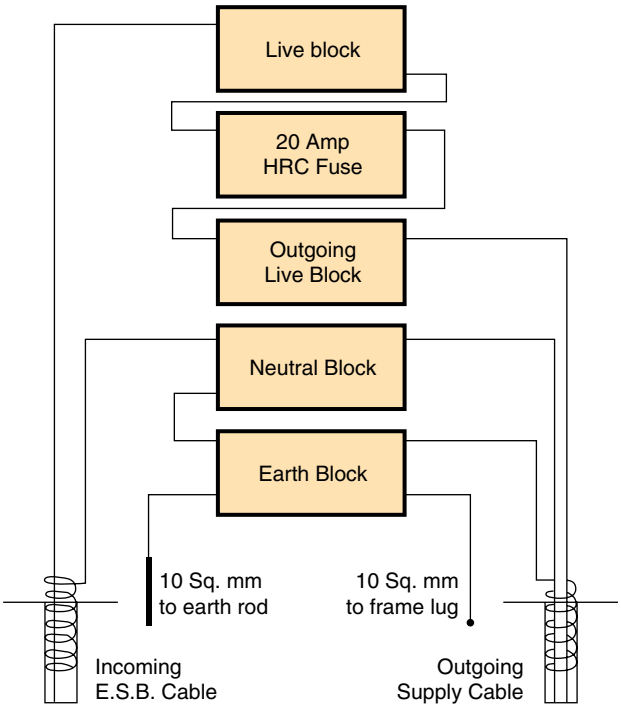


FIGURE 5.3: INTERNAL ELECTRICAL ARRANGEMENT AUXILIARY MICRO PILLAR

Where there is more than one outgoing service cable, a main circuit fuse should also be provided. It should be rated 30A and should otherwise be identical with the individual circuit fuses.

The Electrical Contractor should consult with the local ESB office on ESB interface requirements at the micro pillar.

A bituminous protective coating should be applied all around the extension plates and up to a level on the shell extending 100mm above the ground level marking.

The installed pillar should be embedded in concrete, Class E, Clause 1502, Specification for Roadworks.

The front of all Public Lighting micro pillars should display a high voltage warning sign (black on a yellow face), 100mm wide by 120mm deep, securely fixed to the pillar door, as shown in Figure 5.4.

FIGURE 5.4: HIGH VOLTAGE WARNING SIGN

5.10 Cable and Ducting

All cabling should be laid underground in 100mm PVC-U ducting with a wall thickness in the range 2.3-2.8mm. A minimum cover of 600mm to the ducting should be provided in grass margins. A minimum cover of 750mm to the ducting should be provided at road crossings. A spare duct should be laid across all aprons.

Two core cable with a separate earth return path should be used. Cables may be either

- 2 x 6mm^2 NYCY type to VDE specification 0271/5

or

- 3 x 6mm^2 PVC/SWA/PVC type to BS 6346:1989, with colours brown, blue and green-yellow.

Cable joints are not permitted. Cables should be looped from column to column on each circuit. If faults develop on cables prior to commissioning, the section of cable involved should be replaced.

A duct should be provided between the ESB section pillar and the auxiliary Public Lighting micro pillar.

5.11 Earthing

All auxiliary pillars should be earthed, using an earth electrode and the supply neutralised. The electrode should consist of a bare copper, or hot dipped galvanized steel rod/pipe of at least 16mm diameter, driven vertically into the soil for a length of at least 1200mm. If

difficulties arise in driving the vertical rod, due to underground services, a horizontal earth electrode may be installed as follows:

A straight length of at least 4.5m of either:

- 16mm diameter bare copper,
- 16mm diameter hot dipped galvanized steel rod,
- 25mm^2 cross-section bare copper,
- 25mm^2 cross section hot dipped galvanized steel rod,

buried in the soil to a depth of at least 500mm. The earthing lead should exit the pillar through the services cable entry opening.

The connection at the earth electrode should be accessible for inspection and should be protected against corrosion by a suitable waterproof tape. The connection should be enclosed in a galvanized steel box, with an inspection cover. After inspection, the connection should be buried underground.

A main earth terminal should be mounted on the pillar baseboard, with the following connections:

- 10mm^2 PVC cable from the earth terminal on the pillar, with a crimped lug connection to the pillar,

- 10mm^2 PVC cable from the earth electrode,

- 10mm^2 PVC cable from the neutral link.

A main earth terminal should be mounted on the baseboard fitted to each lighting column, with the following connections:

- 6mm^2 PVC cable from the earth terminal on the column, with a crimped lug connection to the column,

- 2.5mm^2 PVC cable from the lantern earth terminal.

The outer sheath of the incoming and/or outgoing service cable, should be connected to the main earth terminal, in the case of both the lighting column and the auxiliary micro pillar baseboards.

If PVC/SWA/PVC cables are used, the outer sheath should be terminated in an approved manner.

Earth continuity cables should be coloured yellow/green, in accordance with ETCI wiring rules. In the case of NYCY cables, appropriate yellow/green sleeving should be used.

5.12 Column Installation

Lighting column bases should be treated internally and externally with a bituminous preservative, for a distance of 1.25 metres from the end.

Where there is no grass verge, all columns should be located to the back of the footway.

The excavation for lighting columns should be a minimum of 500mm in diameter and 1.05 metres in depth.

Column erection should be in three stages as follows:

- Place 50mm of blinding concrete in the bottom of the excavation. Concrete should be Class E, Clause 1502, Specification for Roadworks.

- Erect column vertically and centrally on the blinding and surround the column with Grade 15.20 concrete, to a level 150mm below the service entry slot. Concrete should be Class 30/20, Clause 1501, Specification for Roadworks. In the case of tubular columns, an anti-rotation bar 15mm diameter should be installed.

- The final one metre of incoming and outgoing service cable up to the cable entry slot, should be protected by polyethylene piping, which should extend 30mm into the column. The cable should be kept level with the bottom of the entry slot, in order to avoid damage due to column settlement.

If any other services are exposed by the excavation, care should be taken not to encase them in the concrete surround. If necessary, an approved separating barrier should be used, in order to maintain service access.

Excavations should be free of water when pouring the concrete surround. Columns should be erected with the compartment door positioned on the side away from the direction of traffic flow and should be set back a minimum distance of one metre from the kerb edge. The installation should be completed by properly backfilling the excavation to ground level.

References

NATIONAL STANDARDS AUTHORITY OF IRELAND

IS 1: 1991	Portland Cement
IS 5: 1990	Aggregates for Concrete
IS 6: 1974	Concrete Sewer Pipes
IS 20: 1974	Concrete Building Blocks
IS 24: 1973	Test Sieves
IS 36: 1987	Bitumen Roofing Felts
IS 134: 1977	Polyethylene Pipe Type 32
IS 135: 1975	Polyethylene Pipe Type 50
IS 146: 1965	Pre-Cast Concrete Kerbs, Channels, Edgings and Quadrants
IS 261: 1984	Cast Iron Road Furniture
IS 325: 1995	Code of Practice for use of Masonry
IS 424: 1990	Unplasticized Polyvinylchloride (PVC-U) Pipes and Fittings for Buried Drainage and Sewage Systems - Specifications
IS EN 40-1: 1992	Lighting Columns, Definitions and Terms
IS EN 124: 1994	Gully Tops and Manhole Tops for Vehicular and Pedestrian Areas
IS EN 295: 1996	Vitrified Clay Pipes and Fittings and Pipe Joints for Drains and Sewers
IS EN 512: 1995	Fibre-cement Products - Pressure Pipes and Joints
IS EN 545: 1995	Ductile Iron Pipes, Fittings, Accessories and their Joints for Water Pipelines
IS EN 1057: 1996	Copper and Copper Alloys - Seamless, Round Copper Tubes for Water and Gas in Sanitary and Heating Applications
IS EN 10113: 1993	Hot-rolled Products in Weldable Fine Grain Structural Steels
IS EN 55015: 1993	Limits and Methods of Measurement of Radio Disturbance Characteristics of Electrical Lighting and Similar Equipment
IS EN 60238: 1993	Edison Screw Lampholders
IS EN 60598-2-3: 1994	Luminaires for Road and Street Lighting
IS EN 60922: 1992	Ballasts for Discharge Lamps - General and Safety Requirements
IS EN 60923: 1992	Ballasts for Discharge Lamps - Performance Requirements
IS EN 60928: 1997	Auxiliaries for Lamps. A.C. Supplied Electronic Ballasts for Tubular Flourescent Lamps - General and Safety Requirements
IS EN 60929: 1993	A.C. Supplied Electronic Ballasts for Tubular Flourescent Lamps - Performance Requirements
IS EN 61000-3-2: 1995	Electromagnetic Compatibility (EMC). Part 3: Limits - Section 2: Limits for Harmonic Current Emissions (Equipment Input Current $\leq$ 16A per Phase)
IS EN 61048: 1993	Capacitors for Use in Tubular Flourescent and Other Discharge Lamp Circuits - General and Safety Requirements
IS EN 61049: 1994	Capacitors for Use in Tubular Flourescent and Other Discharge Lamp Circuits - Performance Requirements
IS EN 61184: 1995	Bayonet Lampholders
IS EN ISO 9001: 1994	Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation and Servicing
IS EN ISO 9002: 1994	Quality Systems - Model for Quality Assurance in Production, Installation and Servicing

BRITISH STANDARDS INSTITUTION

BS 63: 1994	Road Aggregates
BS 65: 1991	Specification for Vitrified Clay Pipes, Fittings and Ducts, also Flexible Mechanical Joints for use solely with Surface Water Pipes and Fittings
BS 381C: 1996	Specification for Colours for Identification, Coding and Special Purposes
BS 729: 1994	Specification for Hot Dip Galvanized Coatings on Iron and Steel Articles
BS 750: 1984	Specification for Underground Fire Hydrants and Surface Box Frames and Covers
BS 812: 1995	Testing Aggregates
BS 1010: 1973	Specification for Draw-off Taps and Stopvalves for Water Services (Screw-down pattern)
BS 1199, BS 1200: 1996	Specifications for Building Sands from Natural Sources
BS 1247: 1991	Manhole Steps
BS 1361: 1986	Specification for Cartridge Fuses for A.C. Circuits in Domestic and Similar Premises
BS 1377: 1990	Methods of Test for Soils for Civil Engineering Purposes
BS 2494: 1990	Specification for Elastomeric Seals for Joints in Pipework and Pipelines
BS 2499: 1993	Hot-applied Joint Sealant Systems for Concrete Pavements
BS 3251: 1993	Specification. Indicator Plates for Fire Hydrants and Emergency Water Supplies
BS 3676: 1989	Switches for Household and Similar Fixed Electrical Installations
BS 4449: 1988	Specification for Carbon Steel Bars for the Reinforcement of Concrete
BS 4483: 1985	Specification for Steel Fabric for the Reinforcement of Concrete
BS 4987: 1993	Coated Macadam for Roads and Other Paved Areas
BS 5075: 1985	Concrete Admixtures
BS 5159: 1991	Specification for Cast Iron and Carbon Steel Ball Valves for General Purposes
BS 5163: 1991	Specification for Predominantly Key-operated Cast Iron Gate Valves for Waterworks Purposes
BS 5480: 1990	Specification for Glass Reinforced Plastics (GRP) Pipes, Joints and Fittings for use for Water Supply or Sewerage
BS 5489: 1996	Road Lighting
BS 5649: 1997	Lighting Columns
BS 5834: 1993	Surface Boxes, Guards and Underground Chambers for Gas and Waterworks Purposes
BS 5911: 1994	Precast Concrete Pipes, Fittings and Ancillary Products
BS 6346: 1989	Specification for PVC-insulated Cables for Electricity Supply
BS 6677: 1986	Clay and Calcium Silicate Pavers for Flexible Pavements
BS 6717: 1993	Precast Concrete Paving Blocks
BS 7533: 1992	Guide for Structural Design of Pavements Constructed with Clay or Concrete Block Pavers
BS 7668: 1994	Specification for Weldable Structural Steels
BS 8005: 1990	Sewerage
BS 8301: 1985	Code of Practice for Building Drainage

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ELECTRO TECHNICAL COUNCIL OF IRELAND

National Rules for Electrical Installations ET 101/1991 and Amendments
National Rules for Electrical Installations ET 102/1993, Section 714, External Lighting Installations

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