

Regulation DD-9.0: Drainage

- 9.1 Domestic Drainage
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9.1 Domestic Drainage

- 9.1.1 Drains and sewers must be of durable material and construction watertight under working and test conditions (including resistance to the entry of groundwater and rainwater). Nothing should project in the pipes line, joints or fittings to cause an obstruction. The internal diameter of any soil drain shall not be less than 100 mm.
- 9.1.2 The layout of the drainage system should be kept simple. Changes of direction and gradient should be minimized and as easy as practicable. Access points should be provided only if blockages could not be cleared without them.
- 9.1.3 Drains shall be laid in straight lines without changes of direction or gradient. The Maximum distance between inspection chambers shall be 30 meters. Inspection chambers shall be provided at every point of change of direction.
- 9.1.4 If inspection chambers & manholes are in agricultural land, manhole covers should be raised 75 mm above the natural ground level.
- 9.1.5 All tanks for reception or disposal of sewage from any building shall be adequately vented and impervious to liquid either internally or externally.
- 9.1.6 Top inspection chambers shall be adequately vented to fresh air. Any soil ventilation pipe within 5 meters (measured horizontally) from any window shall extend to not less than 1 meter above the window head.
- 9.1.7 No amendment or variation shall be introduced on the drainage design after the issuing of the relevant building permit, except after obtaining the appropriate authorization, even if such variations were technically acceptable.
- 9.1.8 Design and installation of small sewage treatment plants shall comply with BS 6297 or an equivalent standard approved by the Authority.
- 9.1.9 Internal drainage system of buildings shall be provided with ventilating pipes as appropriate. Size of such pipes shall be adequate for application. Under no circumstances their inner diameter shall be less than 5 cm in case of inner connections and 8 cm in case of vertical ducts. They shall be fitted vertically and lifted up to a height of not less than 1 meter above the highest opening in the building and a horizontal distance of not less than 2 meters.
- 9.1.10 Working & regular drainage pipes buried under ground shall be made up of robust material. Pipe connections shall be air tight free from any leakage or any obstacles inside the pipes & shall be capable of resisting a minimum pressure of 3 meter of water.
- 9.1.11 An inspection chamber shall be fitted at each point where the direction of drainage pipes changes or at which the degree of slope changes or at junction of a branch and main line.
- 9.1.12 No inspection chambers shall be constructed inside roofed buildings except in shafts, service rooms, car sheds and adequately ventilated corridors. Such chambers shall be of dry type. Drainage pipes which extend underneath flooring and inside walls shall be protected from any external works or against settlement of floors.
- 9.1.13 All inspection chambers shall be dug within the plot limits.

- 9.1.14 All basement levels shall be provided with appropriate means & ways for drainage & filtration of water such as sand separation rooms, pumps, grease traps, etc. In case of grease traps are not required in the current proposed design; arrangements shall be made in order to allow fitting them whenever required.
- 9.1.15 Drainage pipes shall not pass through columns, beams, foundations and electrical rooms except if the authority permits that in which case pipes shall pass through pre arranged openings to be shaped in advance prior to pouring concrete, pipes shall also be provided with the necessary flexible joints.
- 9.1.16 Commercial & industrial waste shall not be drained into the public drainage network except with the approval of the Authority. Such approval shall not be granted except if the appropriate facilities for preliminary processing of such waste have been provided.
- 9.1.17 Heated water at temperature exceeding 37 degrees Celsius shall not be drained into the public drainage network except after cooling it.
- 9.1.18 No plumbing works shall proceed on site except after obtaining a building permit from the Authority.
- 9.1.19 Material selected in the design for plumbing works shall confirm to standard specifications laid down by the authority.
- 9.1.20 The invert level of the external drainage system shall be determined by the consultant taking into consideration the drainage connection level to match the FIC. In no case the depth of last manhole shall be less than 1200 mm.
- 9.1.21 The depth of first manhole shall be at least 450 mm.
- 9.1.22 Where gravity drainage is impracticable, a pumping system will be needed. However the drainage connection level of FIC shall be maintained as 1200 mm.
- 9.1.23 Where foul water drainage is to be pumped, the effluent receiving chamber should be sized to contain 24-hour inflow to allow disruption in service. The minimum daily discharge of foul drainage should be taken as 150 litres per head per day for domestic use. For other types of buildings, the capacity of the receiving chamber should be based on the calculated daily demand of the water intake for the building. In all pumped systems the controls should be so arranged to optimize pump operation
- 9.1.24 Slopes for horizontal runs shall be as follows: for 100 mm — 1:60 for 150 mm — 1:90 for 200 mm — 1:120.
- 9.1.25 Manholes and access chambers shall be laid out according to consultant's scheme, covers provided shall be suitable for the loads they are subjected to, and in accordance with BSEN.124:1994.
- 9.1.26 Sitting of access points – access should be provided at the following points:
- On or near the head of each drain run,
 - At a bend and at a change of gradient,
 - At a change of pipe size, and

- d. At a junction unless each run can be cleared from an access point.
- 9.1.27 Acute angle connections shall not be allowed within junction manholes.
- 9.1.28 At a manhole the tops of all sewers should be at the same level so that the pipes of smaller diameter are not flooded when the bigger pipes are running full.
- 9.1.29 Backdrop shall be provided when the level difference between incoming and main sewer is considerable.
- 9.1.30 An inspection chamber/manhole/gully trap constructed in covered area shall be dry type and provided with recessed double seal type cover.
- 9.1.31 For any manhole located in garage, driveway or other traffic areas shall be provided with heavy duty covers.
- 9.1.32 Wherever there is a sewage network, the developer is required to connect into it, the charges for which will be according to the tariff available with EHS-Trakhees-PCFC department. These charges may be revised from time to time and the developer is advised to contact EHS-Trakhees-PCFC department to obtain the latest tariff. In case such network is not available, the developer is required to construct a holding tank. (Refer to Environmental Control Rules and Requirements).
- 9.1.33 Under no circumstances shall the drainage of private buildings be connected to the public drainage network without notifying & obtaining prior approval from the authority. Only the department concerned may perform such connection.
- 9.1.34 Provision for future connection to drainage network system shall be provided. Where connection of facility drainage is done by the infrastructure consultant/contractor/others, the submissions shall include a detailed note from such consultants/ contractors on the provision of infrastructure drainage/sewerage/effluent.
- 9.1.35 FIC shall be constructed in close proximity with the compound wall and opposite to Authority chamber/manhole and the cover should 'be ductile iron with 6mm thick GRP push fit sealing plate, this manhole shall have only one incoming connection and work by gravity only.
- 9.1.36 In case the sewage is to be connect to the DM sewage network the proposal shall be made in accordance to DM regulation outside the plot PCFC/ DP World boundary (plot limit). Within the facility the PCFC regulations shall be followed. The maximum depth of FIC shall be 1200 mm.
- 9.1.37 Minimum requirement for manhole venting shall be the provision of vent pipe to first and last manholes of drainage line and these vent pipes shall be taped 100 mm below cover level.
- 9.1.38 Materials selection shall be in accordance to BSEN 12056-2:2000 (Gravity drainage system inside building, sanitary pipe work, layout & calculation).
- 9.1.39 All internal piping shall be PVC to BS 4514 except waste piping which shall be to BS 5255. All under ground piping shall be to BS 4660.
- 9.1.40 The sitting of any manhole shall be kept away from underground water tank by a distance not less than the depth of the water tank.
- 9.1.41 The drainage pipes shall be made not to run through electric rooms or electric sub-stations.

- 9.1.42 Direct connection of waste system from a floor trap to a floor trap shall not be permitted.
- 9.1.43 All point of discharge into the system should be fitted with trap (e.g. a water seal trap) to prevent foul smell from entering the building. Under working and test conditions traps should retain a minimum seal of 25 mm of water or equivalent as per the BS 6297.
- 9.1.44 No drain pipes shall be cast into an RCC structural element without prior approval from EHS-Trakhees-PCFC and CED.
- 9.1.45 To allow the drain pipes to pass through any structural element in building, a cast iron sleeve is first fitted within the structural element. For such a by pass, the sleeve shall offer a tolerance of at least 10 mm for ease of installation of the pipe. The gap between the pipe and the sleeve shall then be filled with suitable sealant.
- 9.1.46 Underground pipe line with top of pipe less than 600 mm below FFL shall be provided with concrete of 150 mm thick around to protect the pipe.
- 9.1.47 All inspection chambers/manholes should be built on bed of cement concrete 1:4:8 the thickness of the concrete shall be 100 mm for manholes up to 1000 mm deep and 200 mm for depths above 1000 mm.
- 9.1.48 Bedding and Backfilling – the choice of bedding and backfilling depends on the depth at which the pipes are to be laid and the size and strength of the pipes (details may be referred in BS6297)
- 9.1.49 Where manhole / inspection chambers are constructed below ground water table , complete construction shall be either in water proofed RCC or in GRP.
- 9.1.50 All main line channels shall be located in the centre of the manholes.
- 9.1.51 Benching of incoming branches should be inclined towards the main direction of flow.
- 9.1.52 Diameter of semi—circular channel in the bottom of manhole shall be equal to that of the incoming sewer diameter.
- 9.1.53 The benching in inspection chamber/ manholes should have smooth surface cement plaster.
- 9.1.54 The manhole schedule shall be arranged in the manner shown below the manhole Invert Level (IL), Cover Level (CL) depth and distance between manholes shall be referenced from GMC , FIC using datum and all units shall be in is system. The same table shall be incorporated in the drainage setting out drawing.
- 9.1.55 Sewage holding tank shall be constructed according to BS 6297.
- 9.1.56 Soak ways for sewage are not permitted in the PCFC areas of jurisdiction. Holding tanks capacity shall be calculated as minimum 150 litres/person/day for 7 days. The tank shall not be located in the 5.5meters set-back/vehicular access area. If located in this area, the road and tank construction shall be of sufficient standard for use of road by fire tenders, heavy vehicles and manhole shall be of heavy duty type.
- 9.1.57 To prevent overflowing of the waste water holding tank, level indicator with warning light, buzzer and breaching pipe for pumping out shall be provided.

- 9.1.58 Sewage tank should be constructed at least 3 meters away from any footing for a building or a boundary wall and should be constructed from solid block with a provision of proper insulation for the holding tank.
- 9.1.59 In case there is a need to construct these tanks at a distance less than 3 meters and more than 1 meter from adjacent footings the holding tank shall be structured from reinforced concrete with a provision of proper insulation to prevent any leakage from the tank.
- 9.1.60 If the sewage tank are to be founded at a lower level than that of adjacent footing they should be constructed first.
- 9.1.61 If sewage tank constructed from fibreglass material, the dimension shall be the same the thickness shall not less than 6 mm and it should be incased with proper protection solid blocks.
- 9.1.62 Proper insulation should be provided for foundations of buildings in such circumstances for protection against sulfates.
- 9.1.63 GRP sealing plate shall be provided for the last manhole before the sewage tank and the manhole for the future connection before the main sewer line.
- 9.1.64 In single stack system, separate ventilation for individual connections from the WC, floor trap, sink etc. should be provided. Any horizontal pipe longer than 1.5 meters from such fixtures shall be vented on the high side.
- 9.1.65 All commercial kitchens, communal kitchens & restaurants shall have heavy duty grease traps provided according to F&H Regulations.
- 9.1.66 For vehicle washing and service stations, oil interceptors and waste water treatment/recycling unit must be provided as per EHS Regulations.
- 9.1.67 Sufficient and suitable access points should be provided for clearing blockages from drain runs which cannot be reached by any other means. The setting, spacing and type of the access points will depend on the layout depth and size of the runs.
- 9.1.68 Access for clearing blockages – rodding point should be provided in discharge stacks to give access to any lengths of pipe which cannot be reached from any other part of the system. All pipes should be reasonably accessible for repair.
- 9.1.69 Rodding points in stacks should be above the spillover level of appliances.
- 9.1.70 All vertical stacks shall be provided with rodding eyes at junctions on every floor.
- 9.1.71 Access points should be carefully sited to allow the service entry for cleaning and testing.
- 9.1.72 All horizontal drainage pipes shall have rodding eyes at points of change of direction in pipes as required for effective maintenance.
- 9.1.73 Rodding eyes shall be provided where more than one WC is connected to a horizontal soil pipe.
- 9.1.74 Rodding eye is to be provided where the distance between one WC and stack or manhole is more than 5 meters.
- 9.1.75 The upper limit of stack loading shall not be more than a quarter full.

- 9.1.76 For buildings less than 20 stories height, appliances located on ground floor shall not be connected to vertical stack discharging at ground Level.
- 9.1.77 For buildings greater than 20 stories appliances located at ground floor and first floor shall be connected separately & directly to the inspection chamber, it shall not be connected to the same vertical stack that belong to the higher floors.
- 9.1.78 Connection from the appliances lines on any floor shall be in main pipe or vertical stakes only.
- 9.1.79 Communal and public toilets in industrial and commercial establishment dormitories and education institutes shall be furnished with Asian type WC in proportion of not less than 7:5 of total number of WC required. In addition public building/toilet shall have provision for toilet facilities for disabled persons.
- 9.1.80 All floor drain shall have minimum 75 mm deep seal.
- 9.1.81 Floor drains shall be provided in all garbage rooms in all floors and pump rooms and all garage rooms.
- 9.1.82 For all bends that are at base of stacks should be provided with a 45 to 90 degrees long radius type elbow.
- 9.1.83 Vent pipes from manholes and vertical stacks shall be extended above the roof, the end of which shall be fitted with vent cowls.
- 9.1.84 Typical outlet size (mm)

WC	100
Wash Basin	32
Kitchen Sink	40
Floor Drain	75
Bath Tub/Shower	40
Washing m/c	40
Balcony Drain	50

9.1.85 Ground + 7 stories stack sizes (mm) shall be as follows

Soil Pipe	100
Waste Pipe	100
Vent Pipe	75
Rain water pipe	100
Balcony drain pipe	50
A/C drain pipe	32

9.1.86 Above 7 stories stack sizes (mm) shall be as follows

Soil Pipe	150
Waste Pipe	150
Vent Pipe	100
Rain water pipe	100
Balcony drain pipe	50
A/C drain pipe	32

9.1.87 Urinals shall be connected to soil pipes.

9.1.88 Use of above ground sewage holding tank is not acceptable.

9.1.89 Sanitary pipe work and underground drainage used to collect grey water for recovery and re-use within the building should be designed in consultation with the consultant. All pipes carrying grey water for re-use should be clearly marked with the word "GREYWATER".

9.1.90 Drainage of paved area - Surface gradients should direct rain water draining from a paved area away from buildings. Where the levels would otherwise cause water to concentrate along the wall of a building, a reverse gradient should be created, for at least 500mm from the wall of the building, to divert the water away from the wall.

9.1.91 System test - Water and air tests shall be carried out after the pipes are installed and consultant certificate shall be submitted to EHS during the completion inspection.

9.1.92 Building drainage shall be designed and constructed in accordance with the requirements of BS 8301 or an equivalent standard approved by the Authority.

9.1.93 All installations shall be subject to testing in accordance with appropriate regulations.

9.2 Water Supply

- 9.2.1 Water supply installations shall comply with relevant British Standards or an equivalent standard approved by the Authority and the requirements of DEWA - Water Division and any connection charges shall be paid by the client/developer.
- 9.2.2 Water storage tanks, to relevant British Standards or an equivalent standard approved by the Authority, shall be provided with a minimum capacity of two days storage and additional storage required for fire fighting systems in accordance with EHS: Fire Department's requirements.
- 9.2.3 All water supply pipes shall be installed at least 1.0 m away from the sewer pipe line or sewage holding tank.
- 9.2.4 Clean & Safe Drinking water shall be provided with one point per 50 persons at the rate of 5 liters / person / day or as agreed with the Authority.
- 9.2.5 All potable fresh water tanks must be kept in good condition, cleaned and maintained regularly and properly as per EHS Requirements (Refer H, S&F Guidelines).
- 9.2.6 All external water taps should also be fitted with proper drainage system.

9.3 Rainwater Drainage

- 9.3.1 The system for carrying rainwater from a roof shall be adequate. The system shall carry the flow to an outlet, minimize the risk of blockage or leakage and be accessible for cleaning the blockages.
- 9.3.2 Every exposed roof, canopy or buildings shall be finished with a gradient of not more than 1 in 50 and not less than 1 in 70 in order to direct the rainwater to suitable channels, gutters, outlet or down pipes.
- 9.3.3 Every channel, gutter, outlet or down pipe shall be made of durable materials with suitable watertight joints of adequate size securely attached to the building fixed to a gradient of at least 1 in 90.
- 9.3.4 Rainwater shall not be discharged into the sewage holding tank, the authority's drainage system (where existing) or the adjacent plot.
- 9.3.5 All rainwater shall be either drained into a specially constructed soak away or into the approach road.
- 9.3.6 All surface water drainage shall be dispersed off to public road corridor and measures to prevent dispersal of surface water towards adjacent plots shall be provided.
- 9.3.7 Residual/waste water shall not be drained into the rainwater drainage network, whatever the reasons might be.
- 9.3.8 The drainage of roofs and paved areas shall be according to BS 6367.

- 9.3.9 Rain water pipes are not to be connected to sewer lines, they shall have free discharge above ground.
- 9.3.10 For all air wells, access doors should be provided at the lower level of the well.
- 9.3.11 For project having large rain catchments areas, rain water scheme shall be designed to BS 6367 and EHS approval.
- 9.3.12 Holding tank is to be provided for rain water as per DM Guideline.

9.4 A/C Drain

- 9.4.1 The A/C drains to be discharged into a properly designed soak pit or domestic drainage network.
- 9.4.2 Window a/c shall be provided with GRP trays having drainage facility.
- 9.4.3 All a/c & balcony drains shall be connected to waste pipe system via the nearest floor trap or waste stack.
- 9.4.4 Flexible polyethylene drain pipes shall not be used for a/c condensed drain piping.