Guidelines for Plumbing

1. For all buildings desired water pressure at all fittings shall be minimum of 100 Kpa(1.0 bar) for CASA /ASPIRATION and 150kPA (1.5 bar) for Hi End/Luxury . The standard fixture pressures should not exceed 2.5 bar (max. 3.5 bar for luxury and hi-end residential). We will have to ensure that the selected CP sanitary fixtures are suitable for this kind of pressure. It needs to be ensured that flexible connectors can withstand the design pressure with factor of safety as 1.5. All CP fittings shall be operational at 1.0/1.5 bar system pressure (Standard Rain shower/bath tub/Jacuzzi will suffice. However for special requirements in case of Spa/Gym/KCA to be taken as per fixture requirement). In addition to these requirements CP fittings shall have built in low water flow devices such as aerators.

2. Where gravity based system is used, a separate terrace loop and a booster pump set may be needed for the domestic water down takes for the floors which fall within 12 m of the bottom of water tank. Boosting shall not be required for flushing water down takes wherever cistern tanks are used.
3. Where Hydro-pneumatic system is used, no boosting & terrace looping is required for any line.
4. Maximum working pressure in the water transfer riser should not exceed 12 bar.
5. The Water hammering of the plumbing line shall be evaluated during design phase and water hammer arrestors shall also be included in the BOQ.
6. Following piping systems are to be used:

Type of Pipe	**Low-Rise (<=30 m)**	**Mid-rise (30 m – 70 m)**	**High-rise (70 m – 150 m)**	**Very High Rise (150 m+)**
Vertical Transfer Pipes OR Hydro-pneumatic systems	a)Uptake(Transfer) : CPVC b) Hydro pneumatic: GI Class B (medium duty)	GI Class B (medium duty) – With welded joints.	GI Class C(heavy duty)pipes with combination of welded joints and Grooved Flexible fittings @ Every 3 Floors.	GI Class C (heavy duty) pipes with Grooved Flexible joints intermediate pressure break tanks to be provided at intermediate mechanical floor, to restrict the pressure.

				Vertical pipe length shall not exceed 100 m.
Down take Pipes	Indian uPVC* schedule 40 /CPVC	Domestic CPVC, Grey Water uPVC*# schedule40. PRV to be used to moderate pressures so that design pressure ratings of water heaters and CP ware at any point is not exceeded and pipeline pressure is kept below <=4 bar.	Domestic CPVC, Grey Water uPVC*# schedule 40. PRV's are needed to moderate pressure to the values not exceeding rated design pressures of water heaters and CP ware at any point . For above 150 m height buildings down take shall be taken from intermediate break tank provided at intermediate mechanical floor, to restrict the pressure.	

All fittings including valves should be capable of withstanding pressure which is 1.5 x the design pressure in the pipes in that relevant segment of the building. While selecting pipes / fittings, appropriate de-rating factor w.r.t. temperature to be taken care of.

7. * It is presumed that Indian UPVC pipes can be used only for test pressure not exceeding 8 bar. Pressure rating of fittings needs to be verified as these would normally limit working pressures in the lines. Schedule 80 fittings to be used. uPVC pipes should not be used for any hot water application and for terrace ring or external application subject to direct sunlight. All isolation valves at terrace shall be FULL BORE brass/SS ball valve up to dia 50mm. CPVC/UPVC valves at terrace/exposed areas shall be avoided.

To avoid cross connection between domestic and grey water risers and distribution piping it is recommended to change pipe material to uPVC schedule 40.

** GI pipes with combination of welded joints & Grooved Flexible fittings to be used

wherever necessary to compensate for Building Sway movement, seismic consideration & column shortening.

Cost ladder: Indian UPVC sch40 < CPVC < GI with welded joints < GI with grooved fittings < International-standard UPVC < PB.

GI pipes are cheaper than CPVC for sizes65 mm and above. It is recommended to use CPVC pipes size 50 mm & below and GI class -B for size 65mm and above. GI class B/C piping shall be used for terrace looping and exposed piping.

CPVC shall be used for hot water piping. uPVC should not be used for hot water.

CPVC piping & fittings to be used for internal piping for toilets/kitchen. uPVC schedule40 piping & schedule 80 fittings to be used for grey water inside toilet.

8. Following piping systems are to be used for Drainage vertical stacks/

	Low-Rise (<=30 m)	**Mid-rise (30 m – 70 m)**	**High-rise (70 m – 150 m)**	**Very High Rise (150 m+)**
Soil/Waste/Storm water Stacks – Express Stack	Indian origin UPVC SWR Type B	Indian origin UPVC SWR Type B with velocity breaker at mid height of the building.	Indian Origin UPVC (Class 3) with velocity breakers at every 1/3 height of the building. Maximum no of velocity breaker upto 110mm dia SWR type B to be limited to 2nos for each stack	UPVC (Class 3) Indian Origin with velocity breakers at every 20 floors.
Separate Soil/Waste/Storm water Stacks – Bottom Floor/Floors	Indian origin UPVC SWR Type B for Bottom 1 Floor	Indian origin UPVC SWR Type B for Bottom 1 Floor	Indian origin uPVC class 3 for Bottom 3 Floor for 160mm dia and above for 110mm Dia SWR type B.	Indian origin uPVC class 3 for Bottom 3 Floor

Soil/Waste/Storm water Stacks – Bottom Floor of Express Stack and Transfer pipe in Podium.	Indian origin UPVC SWR Type B.	Cast Iron – Spun Pipes with drip Seal or HDPE PE100 as per IS 14333.	Cast Iron – Spun Pipes with drip Seal or HDPE PE100 as per IS 14333.	Cast Iron – Spun Pipes with link Seal or HDPE PE100 as per IS 14333.
Vent Stacks	Indian origin UPVC SWR Type A	Indian origin UPVC SWR Type A	Indian Origin UPVC SWR Type A	Indian UPVC SWR Type A
Internal Drainage piping	Indian Origin uPVC SWR Type B	Indian Origin uPVC SWR Type B	Indian Origin uPVC SWR Type B	Indian Origin uPVC SWR Type B

9. Under-slung piping is preferable for toilets/kitchen in order to avoid sunken slabs and expedite construction cycle. Where feasible in overall design, the plumbing shafts may be located in such a manner that the outlet of EWC trap can be directly connected to vertical down takes in the shaft, thereby saving acoustic under slung pipes for EWC. Where the under-slung piping occurs in bathrooms/ habitable area directly above one another, and false ceilings are provided, only soil pipes need to be low noise uPVC or PP to reduce noise created by flushing of water. Vertical Drainage stacks located inside the building with dry wall partition shall be of LOW NOISE uPVC/PP material.
10. Two separate water supply lines to be provided for water supply:
    a. Domestic water –Kitchen, utility areas, basins &showers, health faucet in toilets.
    b. Flushing – For flush tanks, irrigation (with treatment) & cooling towers (if applicable)
11. In case of separate waste pipe, a Gully trap/P- trap should be provided at the ground/below ground level before the waste enters the horizontal drainage system. This Gully Trap/Filter should be easily accessible for regular maintenance.

12. As far as possible no tanks should be located below building footprint so as to enable the building construction to progress with minimal excavation – in case there is surplus space in the building footprint on account of structural reasons (deep strata, parking levels etc.), same can be considered for use as underground water tanks as long as there is no/minimal additional excavation due to this. In developments with multiple underground water tanks, it is necessary to ensure that the water supply pressure from the municipal connection is virtually equal at all UG tanks. In order to ensure this, the water distribution system has to be devised in a loop (any other solution which ensures equitable water supply to all UG tanks is also acceptable).

13. All water supply systems (and for that matter, all other utilities like STP, Electric substations) can be combined within a set of buildings which are likely to form a society or have the same usage (viz. either all residential, all office, all retail etc.). This may also be combined for all the buildings within a given location, even if these are of different usage and/or different societies, if there is significant cost saving and subject to approval from Director-Operations. For such cases, Automatic tank filling mechanism to be considered with centralized Pumps and solenoid/Motorized valves with Level Switch for tank filling.
14. Fire tanks and domestic water tanks should be co-located, Equalization line (between domestic tanks) and Overflow line (between Fire and Domestic) to be connected externally with Valve in order to facilitate isolation of each partition of tank for maintenance and cleaning.

    Sewage Line manhole covers exposed to rain shall be Ductile Iron double sealed. In case domestic water tank is below car parking slot or driveway, FRP manhole covers with double seal is to be used. No up stand is required for such manholes (preference is to avoid Domestic/Fire water tanks manholes in the driveway or car parking). Domestic water tank capacity (total capacity on ground + terrace + any other levels) should be equal to 1.5 day storage. In case of township projects (> 25 towers), about 20% of this overall capacity may be aggregated in Central Storage (GSR/ESR). (Note: raw water tank for receiving tanker / bore well / open well water has to be created separately with capacity of 50 – 100 cu. m.).
15. All developments essentially have a bulk municipal meter at the domestic water inlet to the plot, following scheme of additional sub meters shall be followed on all projects.
    a. Nodal check meter to be installed in series with the Municipal main meter.

b. Sub meters at the water inlet of all domestic/fire UGT
c. Sub meter at the tanker water inlet
d. If the UGT is feeding water to multiple buildings:
    i. a sub meter shall be deployed at the header feeding a particular building
    ii. if there is a terrace header feeding connected buildings, then a sub meter shall be installed before each OHT inlet
    iii. in case of OHTs equalised on terrace, the sub meters shall be installed at the outlet of the UGT (before branching of booster and gravity loop)
e. KCAs (clubhouse (ex. Swimming pool), sports arenas, swimming pools, etc.) shall also be sub metered

16. Applicable commercial spaces (offices, retails, schools, etc.) which are provided with Domestic and Flushing Water supply shall also be sub metered.
    a. In case of Supremus sub meters may be avoided in each offices, by having a sub meter at each of the main downtakes at the terrace
17. Treated water supply shall also be metered, as follows:
    a. Main meter at the STP treated water tank outlet
    b. Sub meter at excess discharge to nallah
    c. Sub meters at all the UGTs in such a way to ensure clear distinction between following consumption heads:
        i. Flushing
        ii. Irrigation
        iii. HVAC
            1. make up (if applicable)
            2. blow down/bleed off line for cooling towers
        iv. Water bodies (if applicable)
18. All metering shall be such that for each type of use, the society and federation consumptions can always be separately monitored.
19. In addition to the above, wherever additional water recovery in the form of rain water holding, condensate recovery, etc. are deployed, a sub meter shall be installed at the incoming of the UGT where the water is being collected.
20. A flow meter shall be installed at the STP sewage transfer pump outlet line to know the total sewage incoming to the STP.

21. Water consumption logs shall be available on projects (responsibility: respective HFM teams) a.) Permanently owned and maintained by Lodha, or b.) temporarily maintained by Lodha (until society is handover) to achieve following data:
    a. Domestic water consumption (total)
    b. Domestic water consumption (per capita)
    c. Domestic water line losses
    d. Treated water generation (total)
    e. Treated water excess (total)
    f. Treated water line losses
    g. Flushing water consumption (total)
    h. Flushing water consumption (per capita)
    i. Irrigation water demand (total)
    j. Irrigation water demand (per square meter of irrigated land)
    k. HVAC make up consumption (total)
    l. HVAC make consumption (per TR of cooling)
    m. Water bodies consumption (total)
    n. Condensate recovery (total)
22. The above numbers shall be benchmarked with the policy water demand factors, basis which:
    a. the demand factors may be adjusted in the policy as per actual numbers
    b. remedial action may be taken to contain the numbers within policy
23. The type of meters shall generally be mechanical type, except following which shall be smart meters:
    a. Palava – UGT inlets - Domestic and Flushing
    b. The utility of the smart meters shall be to catch the anomaly, and the mechanical meters can be manually read while detecting the problem
    c. Decision about converting the mechanical meters to smart meters shall be reviewed in June 2019.
24. All meters shall be located, as follows:
    a. all UGT inlet meters in any residential development shall be accessible from the federation area
    b. Downstream sub meters for analysis purpose can be kept within Society area
    c. All individual tenant meters in the commercial premises shall be accessible from building common area

d. Containment for control/DATA cables to be provided to enable cabling from ELV contractor.

25. Gravity based water supply systems are preferable to hydro-pneumatic systems, on account of lower capex and lower opex. However, in case of gravity based systems, it is to be ensured that sufficient pressure is available at the 2-3 habitable floors (within 9 mtrs height) immediately below any above ground water tank location (small booster pumps may be used for this purpose). This is necessary only where high pressure CP ware like rain shower or Jacuzzi area provided. In normal buildings, since overhead tanks are elevated by 1.5 and 2 meters and certain minimum water level is maintained in the tank by level controller, Terrace looping header for the booster shall be restricted to pipe dia of 65mm with 80% diversity on the total fixtures units. In cases where the toilet fixture units call for increase in pipe sizes, approval shall be sought from HOC/COO.
26. In case of a multi-wing / multi-building project in which some/all wings share the water supply and/or fire fighting tanks, it is to be examined as to what is more cost effective and the lowest cost option should be preferred:
    a. Separate water supply and fire fighting pumps (with their respective backups) for each wing.
27. Having software/sensor based system, which facilitates sharing of water supply and fire fighting pumps between wings (with limited backup for the pumps) and reduced capex for pumps. Level sensors with control panel to be provided for all type of tanks for control of the water level in the tank. Sleeve's required for installation to be undertaken during design and RCC construction.
28. Pumps and their back-ups to be provided as follows:
    b. Water supply (at all locations): For water supply transfer pumps with flow rate <30m^3/hr 1working+1assist+1standby (triplex) should be used as a cost saving option.
    c. Where rating of valves is PN25, maximum test pressure in the risers will be restricted to24bars. For higher pressures, valve rating has to be enhanced.
29. It has been observed that from time to time, our developments need additional water supply in the form of water-tankers. Water-Tanker inlet-points for domestic and flushing water (connected to the respective water tanks) must be provided for this purpose. They must be planned in such a manner that water tanker can easily

approach the same and while water tanker is standing, it does not impede regular vehicular traffic.Possibility of using breeching connection to decant water into fire tank should be checked and location of BC selected to facilitate the same..

30. All commercial projects having chilled water cooling system shall have condensate recovery at the AHUs, i.e. separate risers for condensate drain and AHU room drainage. The condensate riser shall be taken upto the HVAC make up water tank. Connection of FCU drain to the AHU condensate drain riser shall also be done where feasible.
31. Dedicated condensate riser is recommended in residential project also to avoid:
    a. Labour intensive chasing and making good works for concealed piping.
    b. Condensation issue on floor traps
32. If condensate riser is not feasible in a residential development then the mutlifloor/floor trap shall be insulated with 6mm nitrile rubber to avoid condensation issues.
33. If any common area (e.g. lift lobby, staircase) on a habitable / entrance floor is open viz. rain water can come in, adequate provisions for drainage need to be made, along with appropriate slope in the flooring. Weather protection chajja outside these openings as per 'Weather Protection Outside external openings' should be made.
34. For all AC's (whether for use by the unit or in common area), attention should be paid to how the water rejected by the machine will be drained. Similarly, in utility areas, it should be ensured that water supply outlet for washing machine and drain for the washing machine are co-located in a manner which would allow easy usage of the washing machine.
35. Flushing water storage where Treated waste water is used should not have common wall(s) with domestic or fire storage. Minimum 300mm separation to be provided.
36. Pressure requirements of the proposed CP and sanitaryware needs to be ascertained while designing the system to ensure sufficient minimum and maximum pressure.
37. For buildings with solar water system (as per MOEF requirements), hot water generated from system shall feed one toilet per apartment for top 5 floors. Incoming water supply to Solar water system should be taken from terrace domestic booster pump loop and down take shall be directly connected to the geyser with NRV, to enable that generated hot water is being utilised during working of solar system and during non working of solar system, geyser shall work normally on electricity . To

maintain equal pressure in other fixtures for the above toilets, it essential to feed domestic water from the booster terrace loop upto 5 floors. Thermostatic expansion valve shall be used for solar system in the hot water line to restrict the hot water temperature below 60 Deg C.

38. All internal riser floor penetrations shall be fire stopped (with 2Hrs/as per CFO NOC) material @ each floor.

Points below are Applicable only for mechanically ventilated toilets:

39. Following minimum shaft sizes shall be considered for central mechanically ventilated toilets

Type of service	**Low-Rise (<=30 m) mm x mm**	**Mid-rise (30 m – 70 m) mm x mm**	**High-rise (70 m – 150 m) mm x mm**	**Very High Rise (150 m+)# mm x mm**
Toilet shaft (includes central toilet extract duct +water supply & drainage pipes)	550 x1550* Clear	550 x1800* Clear	a) Single toilet 550 x1850* Clear b) Back to Back toilet 650x1850* Clear	a) Single toilet 550 x1850* Clear b) Back to Back toilet 650x1850* Clear

* service platform (RCC/M.S.) inside the shaft is required for maintenance.

considering intermediate mechanical floor within 120 metres height

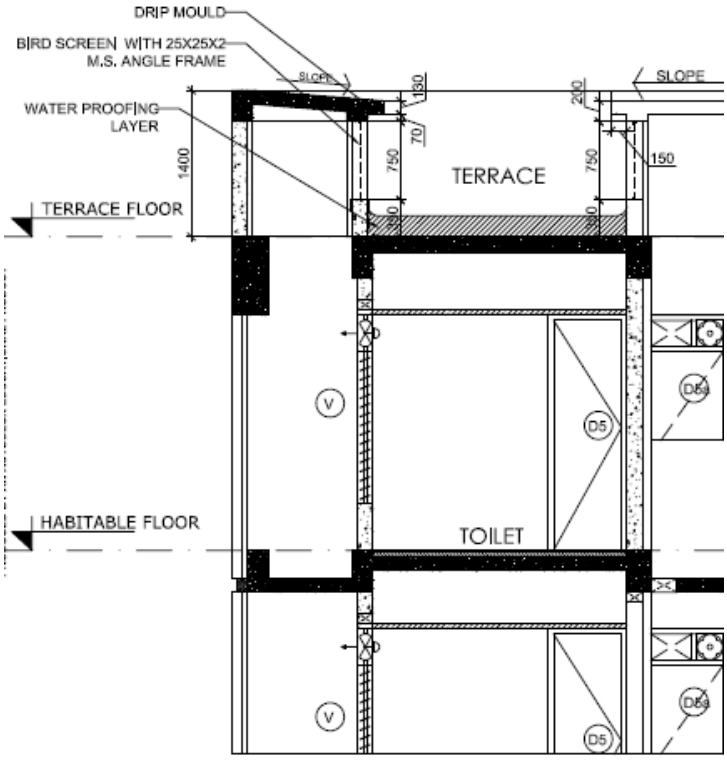
In case there are regulatory min. or max. sizes for such shafts, same shall be taken into account while finalized design.

40. All central ventilated shafts shall have access door for regular maintenance. The door size shall be of 900mm wide x 1200 mm ht. to be considered to access all services. Also the door to be positioned to access water supply valves and drainage pipe cleanouts. In case of multiple toilets served by the same shaft, access to shaft shall be required from any one toilet only.
41. All the PRV station shall have a bypass arrangement. Diaphragm type PRV instead of piston type PRV is recommended to be used in water distribution system, with a built in strainer or a strainer before the PRV.
42. During construction for all drainage outlet in bathroom/kitchen/utility drainage pipe shall be extended by 200 mm from the finished level during construction with

temporary PVC cap on of the pipe inlet to prevent the disposable of garbage in the pipes.(Imp this item to be included in BOQ for soil pipe and floor drain)

43. All internal (enclosed) service shafts (apartment/common area) shall be provided with floor drain (PVC) connected to the nearest floor trap/riser to mitigate leakage. Sleeves/Shafts opening to be closed with concrete and water proofing to be done.
44. Common drainage stacks for back to back toilets shall always be considered, if feasible.
45. Floor drain in FHC at each floor shall be connected to a separate uPVC drainage stack

46. Toilet ducts to be kept ventilated and yet closed using RCC slabs using RC (as per design) with a raised parapet @+1200mm above finished level. Refer below detail



DETAIL 1

47. In case of underslung piping, it shall be ensured that the piping of the toilet of the floor above shall be routed in the ceiling of a similar area (i.e. toilet for toilet) of the floor below. To ensure this is done without any challenges, the architects should be

advised to ensure that stacking of toilets is not changed / move around in a building with sunk slabs. If there is any change in plans such that the toilets do not stack up one below the other, following options shall be considered to ensure that toilet pipes do NOT pass through the non-toilet areas of the unit below:

a. Diverting the pipes to an adjacent / close by toilet.
b. Diverting the pipes through common areas (eg. Lobby) of the floor <not desirable>
c. Considering sunk slab for the floor above.

48. Similarly, for the toilet and kitchen pipes of the unit above a refuge area, the pipes shall go through the refuge and same shall be encased with false ceiling (in a manner which is not easily openable since refuge can be accessed by anybody).

49. Note: - This policy updation (Rev15) shall be implemented as per Architectural policy no 122.