Plumbing Design Guidelines

A. Consumption

1. Residential * - (per person)

		Cold Water	Flush Water
Zone 1	Re-settlement	227 litre/day	68 litre/day
Zone 2	General residential building, house ownership private sector, etc.	295 litre/day	68 litre/day
Zone 3	Deluxe building, more than two bathrooms	386 litre/day	68 litre/day
Zone 4	Bungalow, low density building	386 litre/day	68 litre/day

* H.K. Water Authority's Guidelines
Hours of usage - 18 hrs
Peaking factor - 3.0

2. Hotel

Combined Cold & Hot Water (per day) : -

In general, overall say		1100	litre/room
breakdown :	washing	250	litre/guest
	laundry	150	litre/room, including staf
#	catering	say 100	litre/guest
	cleansing	50	litre/room
	staff	200	litre/person
Hot water only, overall say		800	litre/room
breakdowon :	washing	150	litre/guest
	laundry	70	litre/room, including staff
#	catering	say 60	litre/guest
	cleansing	20	litre/room
	staff	100	litre/person
Flushing :	Guest	78	litre/guest
	Staff	65	litre/staff
	Urinal	5	litre per flush, frequency a 5 minutes

Hours of usage - 16 hrs
Peaking factor - 3.0
Population : - 1.75 guest per room
1 staff per room

Catering, staff 15 to 18 litre per meal
guest 20 to 40 litre per meal

For submission to EPD, take $0.5m^3$ per m^2 per day, peak flow = 3.0

3. Office

Cold water 55 litre/capita/day
Flush water 68 litre/capita/day

Hours of usage - 11 hrs
Peaking factor - 2.5

4. Other Types of Buildings

In general, daily consumption to be determined case by case. Use I.O.P. "Loading Unit" to calculate peak flow. For school, sport centre, cinema, exhibition centre, etc. double the peak flow. For barber's shop, taps in full use.

B. Water Tanks

General : -

1. For tanks larger than $1m^3$, use two compartments.
2. For tanks fed by ballvalve, use double ballvalves.
3. Provide strainer inside the tank for the outlet.
4. Where there are cold feed serving hot water system, locate cold feed outlet slightly, say 50mm, higher than the cold water outlet.
5. Overflow pipe level should be lower than the inlet pipe level.
6. Arrange connection to avoid water flow/wave to disturb ball float.
7. Locate manhole near to the ballvalve.
8. Advise Architect to provide tile for potable tank. if possible, provide tile for F.W. tank as well.
9. Avoid using vertical tank outlet. If it is unavoidable, add a tee fitting inside the tank to convert it.

Storage : -

Flush water for all types of building, cold water -	45 litre/point

residential : -

Direct Supply	Nil
Gravity Tank Supply	90 litre/flat
Additional	450 litre per first 10 flats

Hotel (hot & cold combined) : -

Single room	45 litre/room
Double room	68 litre/room

Catering : -

Restaurant	22.5 litre/9.5m^2 nett area 900 litre minimum
Canteen	9 litre/meal.first 100 meals 6.75 litre/meal.next 500 meals 4.5 litre/meal.next

Other Types of Building : -

1. As per Water Authority's recommendation.
2. For industrial building, base on daily consumption.
3. As per Water Authority's internal practice note.
4. In general, base on 45 litre per point for either cold water or flush water.

Separate Tank

Provide separate tank for

1. Laundry
2. Kitchen
3. Slop sink and bidet
4. Cleansing water
5. Fountain or pool
6. A/C water
7. Any other area consuming large amount of water of different nature.

C. Water Meter

1. Water meter should be grouped together as far as practicable and locate at easily accessible position.

2. For residential building, meter should be 8 nos. per group.

3. Provide detection meter position for C.W., FW and F.S. water incoming main.

4. Provide means to indicate incoming main location.

5. Meter must be installed in exposed manner.

D. System Pressure

At outlet point : -

Cold & Hot Water - Minimum 10M (for office)
Minimum 15M (general)
Maximum 50M
Ideal range 20M to 40M

Flush Water - Minimum 6M
Maximum 45M

System : -

Cold & Hot Water - 75M
Flush Water - 60M

Laundry or Kitchen : -

General - 25M minimum
Specific - Refer to laundry or kitchen equipment

E. Pump Capacity

Water Pump	:	Peak flow x 125% for commercial building Peak flow x 115% for residential building only
Soil & Waste Pump	:	Peak infill rate x 125%, minimum 6 l/sec.
Swimming Pool & Fountain Circulating Pump	:	Pool turnover rate x 110%
Hot Water Circulating Pump	:	Rate to recover heat loss x 150%
Booster System	:	Use multi-pump to a achieve large flow. Maximum flow for each pump 7 l/sec.
Waste Water Pump	:	Peak infill rate x 125%

F. Valve Provision

1. Valve at H/L tee off from riser/dropper of each floor serving more than 2 areas.
2. At a position (at L/L) serving a group of draw-off points.
3. At bottom of each riser.
4. At top of each dropper.
5. Globe valve and check valve for hot water return pipe at the top of H.W. riser or bottom of H.W. dropper.
6. PRV must be provided in duplicate. By-pass not required.
7. Group valve together if possible.
8. Check valve at cold feed pipe.
9. Locate valve at easily accessible position.
10. A.A.V. at horizontal distribution main.
11. A.A.V. at top riser.

G. Pipe Flow Velocity

Control pipe flow velocity

Water pumped pipe	1.5 M/Sec to 2.2 M/Sec
Drainage pumped pipe	1.3 M/Sec to 2.0 M/Sec
Water main distribution	1.2 M/Sec to 1.8 M/Sec
Branch pipe	1.0 M/Sec to 1.5 M/Sec
Connection sanitary fixtures	0.5 M/Sec to 1.0 M/Sec
Drainage gravity pipe	1.0 M/Sec to 2.0 M/Sec (half full)

H. Hot Water Heat Recovery

1. Determine peak flow rate (in hour).
2. Determine duration of peak hour.
3. Effective hot water storage = 90% calorifier storage.
4. Residue temperature after peak period should not be less than 5^{o} C below designed temperature.

I. Miscellaneous Provisions

1. Water hammer absorber close to the pump discharge.
2. Pressure vessel for booster system.
3. Locked casing or lockable tap for tap for cleansing.
4. Air vent at all tank outlet pipe or at top of dropper.
5. Hot Water Open Vent pipe must be extended at least 1.5M above the tank water level before it connect back to the tank.
6. No piping is allowed inside electrical room.
7. Avoid running pipes inside shop area.

J. Drainage Piping

1. No connection at bottom of stack (hydraulic jump area) i.e. 1M at vertical portion, 12D at horizontal portion.

2. Provide vent connection before and after hydraulic jump area.

3. Provide vent connection at the 1st manhole which has the longest flow distance to the last manhole.

4. Provide vent connection for every last manhole.

5. Vent pipe should never slope down.

K. Sump Pit

1. Locate valve outside the pit where practicable.

2. Pump capacity = peak inflow x 125%.

3. Pump operation cycle should be less than 10 times per hour.

4. Provide stand-by pump except pit for dewatering seepage water.

5. Provide emergency power supply except pit for dewatering seepage water.

6. Provide rubbish chamber at the upstream side where influent contains a lot of solid particles.

7. Provide hook at the pump chamber ceiling.

8. Provide overflow alarm.

L. Interceptors

* Kitchen Interceptor

Consumption	0.5 m^3/m^2 kitchen area per day
Duration of Peak	Depending on nature of food shop
Peaking factor	3.0
Retention Time	20 minutes

Petrol Interceptor

* One standard interceptor for every 150 nos. of all kinds of carpark

* EPD's internal practice

M. Rain Water Run Off

1. Pipe sizing for roof drainage, use 700mm^2 of pipe internal area for every 10m of horizontal roofed-over surface.

2. Minimum size 65mm diameter.

3. Rain water pipe for verandah or balcony can be as small as 40mm diameter.

4. For U/G drainage where Government's storm water connection is smaller than as calculated in item (1) above, use rain water run-off calculation using 150mm rainfall intensity.

5. Square shape pipe is not allowed.

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$$T = \frac{Qc}{q(a-q)}$$

T, total time required for one pump cycle. s/cycle

c, effective volume, ℓ

Q, pump flow, ℓ/s

q, in flow, ℓ/s

续表

序号	建筑物名称及卫生设备设置标准	单位	生活用水量标准(最高日)(L)	小时变化系数	每日使用时间(h)	备注
5	公共浴室					
	有淋浴器	每一顾客每次	100～150	2.0～1.5	8～10	
	有淋浴器、浴池、浴盆和理发	每一顾客每次	80～170	2.0～1.5	8～10	
	有淋浴、浴盆和桑拿	每一顾客每次	(200～300)	2.0～1.5	8～10	
6	理发室	每一顾客每次	10～25	2.0～1.5	8～10	包括洗毛巾用水
7	洗衣房	每千克干衣	40～80	1.5～1.0	8	
8	餐饮业					
	营业餐厅	每一顾客每次	15～20 (25～50)	2.0～1.5	10～12	
	职工食堂	每一顾客每次	10～15 (15～25)	2.5～2.0	8～10	
9	幼儿园、托儿所					
	有住宿	每一儿童每日	50～100	2.5～2.0	24	
	无住宿	每一儿童每日	25～50	2.5～2.0	24	
10	商场	每一顾客每次	1～3	2.5～2.0	10～12	
11	菜市场冲洗地面用水	每平方米每次	2～3	2.5～2.0	8～10	
12	办公楼	每人每班	30～60	2.5～2.0	8	不包括食堂洗衣房用水
13	中小学校(无住宿)	每学生每日	30～50	2.5～2.0	10	不包括食堂洗衣房用水
14	高等学校(有住宿)	每学生每日	100～200	2.0～1.5	24	不包括食堂、洗衣房用水

15	电影院	每一观众每场	3～8	2.5～2.0	4～6	
16	剧院、俱乐部、礼堂					
	观众	每一观众每场	10～20	2.5～2.0	4～6	
	演职员	每人每场	(40)	2.5～2.0	4～6	
17	体育场、体育馆					
	运动员淋浴	每人每次	50	2.0	4～6	
	观众	每一观众每场	3	2.0	4～6	
	运动场草地	每平方米每分钟	0.15	1.0	2	
	跑道冲洗	每平方米每次	2～3	2.0		
	工作人员	每人每场	(25)	2.0	4～6	
18	游泳池					
	游泳池补充水(露天)	每日占池水容积	10%～15%	1.0		
	游泳池补充水(室内)	每日占池水容积	3%～5%	1.0		
	运动员淋浴					
	游泳前	每人每次	(20)	2.0		
	游泳后	每人每次	60	2.0		
	观众	每观众每场	3	2.0		
19	公共建筑服务人员	每人每班	(25)	2.5	8	
20	旅馆式公寓	每人每日	(300～400)	2.0	24	