Government of Nepal
DUDBC

Japan International
Cooperation Agency

Day : 1

Session : 01-06

Sanitary Design Requirements and the Checklists

NBC 208:2003 & Construction Management Guideline 2074

(Level-up Training)

The Project for

Promotion of Nepal National Building Code Compliance for Safer Building Construction

JICA EXPERT TEAM

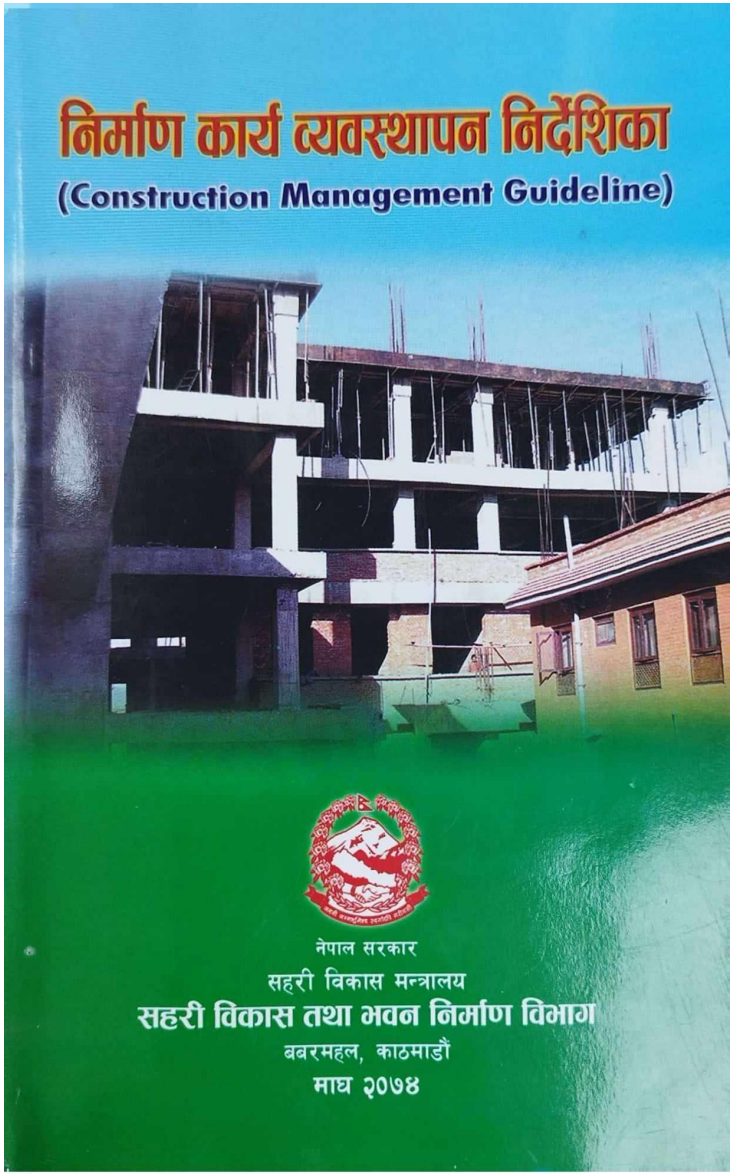
NBC 208:2003 & Construction Management Guidelines

NEPAL NATIONAL BUILDING CODE

NBC 208 : 2003

SANITARY AND PLUMBING DESIGN REQUIREMENTS

Government of Nepal
Ministry of Physical Planning and Works
Department of Urban Development and Building Construction
Babar Mahal, Kathmandu, NEPAL
Reprinted : 2064



Outline

- Sanitary Checklist
  - Underground water Tank
  - Overhead water Tank
  - Fire Hydrant System
  - Fixtures
  - Rainwater Disposal
- Basic information about Sanitary Desing

Sanitary Checklist

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Forms for
NBC 208: 2003: Sanitary and Plumbing Design Requirements
(In Case of many units, fill up the form for main unit only)

Description	Design Capacity		Water consumption per capita per day as per submitted design		Water storage Capacity		Remarks
	Capacity	Units	Per capita	Units	Capacity	Units	
1. Underground Water Tank							
1.1) Auditorium		person		Litres		**Litres**	
1.2) Hospital including laundry per bed							
a) Number of beds <100 Bed		Bed.		Litres			
b) Number of beds >100 bed		Bed.		Litres		**Litres**	
1.3) Office building		person		Litres		**Litres**	
1.4) Residential building		person		Litres		**Litres**	
2. Overhead water tank for Lavatory							
2.1) Residential Building		User		Litres		**Litres**	
2.2) Auditorium / Office Building		W.C.		Litres		**Litres**	
2.3) Hospital		Urinal		Litres		**Litres**	
		W.C.		Litres		**Litres**	
3. Fire Hydrant System. Hospital / Auditorium (Indoor)							
3.1) No of floors		Floor					
3.2) Floor area		m^2		**wet risers**			
3.3) Capacity of wet riser for underground water tank				**Litres**			
Description	**Design Capacity**		**Fixtures per capita**		**Fixtures provided as per submitted design**		**Remarks**
	Capacity	**Units**	**Nos.**	**Units**	**Nos.**	**Units**	
4. Fixtures							
4.1) Office Building							
i) Gents Toilet		Users					
a) Water closet				Users		**Nos.**	
b) Urinal				Users		**Nos.**	
c) Basin				Users		**Nos.**	
ii) Ladies Toilet		Users					
a) Water closet				Users		**Nos.**	

Sanitary Checklist

Description	Design Capacity		Fixtures per capita		Fixtures provided as per submitted design		Remarks
	Capacity	Units	Nos.	Units	Nos.	Units	
4. Fixtures							
4.2) Auditorium							
i) Public Toilet (Gents Toilet)		Users					
a) Water closet				Users		Nos.	
b) Urinal				Users		Nos.	
c) Basin				Users		Nos.	
ii) Ladies Toilet		Users					
a) Water closet				Users		Nos.	
iii) Staff (Ladies/ Gents) toilet		Users					
a) Water closet				Users		Nos.	
4.3) Hospital indoor patient ward							
i) For Ladies and Gent Toilet		Users					
a) Water closet				Users		Nos.	
b) Wash basin				Users		Nos.	
c) Bath (Shower)				Users		Nos.	
d) Cleaner (Kitchen) Sink				Users		Nos.	
5.Rainwater disposal							
a) Roof area		m^2					
b) Roof type							
c) Coefficient of runoff							
d) Average rainfall in the area				mm			
e) Diameter of Pipe used				mm			
f) Roof area covered by one pipe				m^2			
e) No. of pipes required						Nos.	

Underground Water Tank

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1.1) Auditorium		person		Litres		**Litres**	
1.2) Hospital including laundry per bed							
a) Number of beds <100 Bed		Bed.		Litres			
b) Number of beds >100 bed		Bed.		Litres		**Litres**	
1.3) Office building		person		Litres		**Litres**	
1.4) Residential building		person		Litres		**Litres**	
2. Overhead water tank for Lavatory							
2.1) Residential Building		User		Litres		**Litres**	
2.2) Auditorium / Office Building		W.C.		Litres		**Litres**	
2.3) Hospital		Urinal		Litres		**Litres**	
		W.C.		Litres		**Litres**	
3. Fire Hydrant System. Hospital / Auditorium (Indoor)							
3.1) No of floors		Floor					
3.2) Floor area		m^2		**wet risers**			
3.3) Capacity of wet riser for underground water tank				**Litres**			
Description	**Design Capacity**		**Fixtures per capita**		**Fixtures provided as per submitted design**		**Remarks**
	Capacity	**Units**	**Nos.**	**Units**	**Nos.**	**Units**	
4. Fixtures							
4.1) Office Building							
i) Gents Toilet		Users					
a) Water closet				Users		**Nos.**	
b) Urinal				Users		**Nos.**	
c) Basin				Users		**Nos.**	
ii) Ladies Toilet		Users					
a) Water closet				Users		**Nos.**	

For this we use tableA1 (water demand table)

Underground water tank

1. Water Supply Requirements for Buildings :

The water supply requirement for buildings (excluding fire fighting need) should be based on following:

Table- A 1

S.N	Type of Buildings	Minimum requirement per head per day
1	Apartment Buildings	100 lit
2	Auditorium (per seat)	15 lit
3	Hospitals (including laundry) per bed	
	a) Number of beds <100	340 lit
	b) Number of beds >100	450 lit
4	Cold Storage	45 lit
5	Buildings Higher than 4-Storey Commercial & Industrial)	45 lit
	Recommended	
6	Residences	100 lit
7	Office	45 lit
8	Hostels (including quarters for nurses etc.)	100 lit
9	Hotels (per bed)	100 lit
10	Restaurants (per seat)	50 lit
11	Schools and colleges	
	a) Day schools	15 lit
	b) Boarding Schools	100 lit
12	Cinemas, Theatre Halls, Concert hall (per seat)	15 lit
13	Factories	
	a) With bathing facilities	45 lit
	b) Without bathing facilities	30 lit
14	Terminal Stations (Bus and Railways)	15 lit
15	Airports (Internations)	70 lit
16	Airports (Domestic)	20 lit

2.1.Underground Water Tank

Example #:

Calculate underground water requirement for a 150 bed hospital.

Solution

Number of beds are more than 100, So

Minimum water requirement per head per day- 450 Ltr [3b]

Total quantity of water required = 150 Bed x 450 Ltrs

=67,500 Ltrs

We need to construct the underground tank having capacity 67,500 Ltrs

Underground Water Tank

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Description	Design Capacity		Water consumption per capita per day as per submitted design		Water storage Capacity		Remarks
	Capacity	Units	Per capita	Units	Capacity	Units	
1. Underground Water Tank							
1.1) Auditorium		person		Litres		**Litres**	
1.2) Hospital including laundry per bed							
a) Number of beds <100 Bed		Bed.		Litres			
b) Number of beds >100 bed	150	Bed.	450	Litres	**67500**	**Litres**	24 hr storage
1.3) Office building		person		Litres		**Litres**	
1.4) Residential building		person		Litres		**Litres**	
2. Overhead water tank for Lavatory							
2.1) Residential Building		User		Litres		**Litres**	
2.2) Auditorium / Office Building		W.C.		Litres		**Litres**	
2.3) Hospital		Urinal		Litres		**Litres**	
		W.C.		Litres		**Litres**	
3. Fire Hydrant System. Hospital / Auditorium (Indoor)							
3.1) No of floors		Floor					
3.2) Floor area		m^2		**wet risers**			
3.3) Capacity of wet riser for underground water tank				**Litres**			
Description	**Design Capacity**		**Fixtures per capita**		**Fixtures provided as per submitted design**		**Remarks**
	Capacity	**Units**	**Nos.**	**Units**	**Nos.**	**Units**	
4. Fixtures							
4.1) Office Building							
i) Gents Toilet		Users					
a) Water closet				Users		**Nos.**	
b) Urinal				Users		**Nos.**	
c) Basin				Users		**Nos.**	
ii) Ladies Toilet		Users					
a) Water closet				Users		**Nos.**	

Filled using above calculation

Design consideration for Underground Tank

1. Should be at least 16 ft. 5 inches (5m) away from Septic Tank and Soak Pit.
2. Should not be in construct in water logged area. Tank cover should be higher than ground level.
3. The size of the underground water tank should be designed so that it can supply the Average daily demand for 12 to 24 hrs for residential building.
4. The slab of the tank should be designed so that it can bear the probable load over it.
5. Should be leakage proof so that there will be no leakage if tank is full and no seepage if tank is empty.

Overhead Water Tank

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1.1) Auditorium		person		Litres		**Litres**	
1.2) Hospital including laundry per bed							
a) Number of beds <100 Bed		Bed.		Litres			
b) Number of beds >100 bed		Bed.		Litres		**Litres**	
1.3) Office building		person		Litres		**Litres**	
1.4) Residential building		person		Litres		**Litres**	
2. Overhead water tank for Lavatory							
2.1) Residential Building		User		Litres		**Litres**	
2.2) Auditorium / Office Building		W.C.		Litres		**Litres**	
2.3) Hospital		Urinal		Litres		**Litres**	
		W.C.		Litres		**Litres**	
3. Fire Hydrant System. Hospital / Auditorium (Indoor)							
3.1) No of floors		Floor					
3.2) Floor area		m^2		**wet risers**			
3.3) Capacity of wet riser for underground water tank				**Litres**			
Description	**Design Capacity**		**Fixtures per capita**		**Fixtures provided as per submitted design**		**Remarks**
	Capacity	**Units**	**Nos.**	**Units**	**Nos.**	**Units**	
4. Fixtures							
4.1) Office Building							
i) Gents Toilet		Users					
a) Water closet				Users		**Nos.**	
b) Urinal				Users		**Nos.**	
c) Basin				Users		**Nos.**	
ii) Ladies Toilet		Users					
a) Water closet				Users		**Nos.**	

For the we use table A2

Overhead Water Tank

Table-A 2

Type of Building	*Unit*	*Unit storage*
1. Apartments (Domestic use)	Residence	360 lit
2. Auditoriums	WC	500lit
3. Hospitals	Urinal	150 lit
	WC	300 lit
4. Cold Storage	Urinal	75 lit
	WC/Urinal	300
5. Buildings more than 4 Stories (Commercial & Industrial)	Residental	360 lit

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Recommended		
i) Dwelling Units	Resident	360 lit
ii) Hostels	,,	360 lit
iii) Hotels	,,	135 lit
iv) Commercial Building without canteen	Head	50 lit
v) Commercial Building with canteens	Head	70lit
vi) Restaurants	Meal	12lit
vii) Day Schools	Head	12 lit
viii) Boarding Schools	Resident	90 lit
ix) Nurse's Hostels and Medical quarter	Resident	135 lit
Flushing Purpose		
i) For tenants having common convenience	WC	500 lit
ii) For residential premises other than (i)	WC	270 lit
	Additional WC in the same flat	180 lit
iii) For factories and workshops	WC	500 lit
	Urinal seat	180 lit
iv) For cinema halls, public	WC	500 lit
Assembly halls etc.	urinal seat	350lit

Overhead Water Tank

Example #:

Calculate size of overhead tank required for an apartment building for 4 residence.

Solution

Number of residents – 4

Unit Storage per Residence – 360 Ltrs.

Minimum requirement = 4 x 360 Ltrs.

= 1,440 Ltrs

Should be Used Nearest of 1,440 Lit, which is available in Market 1500 liters

Overhead Water Tank

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1.1) Auditorium		person		Litres		Litres	
1.2) Hospital including laundry per bed							
a) Number of beds <100 Bed		Bed.		Litres			
b) Number of beds >100 bed		Bed.		Litres		Litres	
1.3) Office building		person		Litres		Litres	
1.4) Residential building		person		Litres		Litres	
2. Overhead water tank for Lavatory							
2.1) Apartment(domestic use)	4	Residence	360	Litres	1440	Litres	Provide 1500
2.2) Auditorium		W.C.		Litres		Litres	
2.3) Hospital		Urinal		Litres		Litres	
		W.C.		Litres		Litres	
3. Fire Hydrant System: Hospital / Auditorium (Indoor)							
3.1) No of floors		Floor					
3.2) Floor area		m^2		wet risers			
3.3) Capacity of wet riser for underground water tank				Litres			

Description	Design Capacity		Fixtures per capita		Fixtures provided as per submitted design		Remarks
	Capacity	Units	Nos.	Units	Nos.	Units	
4. Fixtures							
4.1) Office Building							
i) Gents Toilet		Users					
a) Water closet				Users		Nos.	
b) Urinal				Users		Nos.	
c) Basin				Users		Nos.	
ii) Ladies Toilet		Users					
a) Water closet				Users		Nos.	

Filled using above calculations

OVERHEAD STORAGE TANK

Consideration During Construction:

- Modern fixtures requires a minimum head of 5m for proper operation.
- Sometimes if that head is not available top floor metal stand is used for increasing head (or pumps can be used for increasing pressure)
- Tank shall be properly ventilated, by providing air vent
- Tank made by fabricating steel shall be painted inside and outside for preventing corrosion.

Fire Hydrant System

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	Capacity	Units	Per capita	Units	Capacity	Units	
1. Underground Water Tank							
1.1) Auditorium		person		Litres		**Litres**	
1.2) Hospital including laundry per bed							
a) Number of beds <100 Bed		Bed.		Litres			
b) Number of beds >100 bed		Bed.		Litres		**Litres**	
1.3) Office building		person		Litres		**Litres**	
1.4) Residential building		person		Litres		**Litres**	
2. Overhead water tank for Lavatory							
2.1) Residential Building		User		Litres		**Litres**	
2.2) Auditorium / Office Building		W.C.		Litres		**Litres**	
2.3) Hospital		Urinal		Litres		**Litres**	
		W.C.		Litres		**Litres**	
3. Fire Hydrant System. Hospital / Auditorium (Indoor)							
3.1) No of floors		Floor					
3.2) Floor area		m^2		**wet risers**			
3.3) Capacity of wet riser for underground water tank				**Litres**			

For this we use tableA3

Description	Design Capacity		Fixtures per capita		Fixtures provided as per submitted design		Remarks
	Capacity	Units	Nos.	Units	Nos.	Units	
4. Fixtures							
4.1) Office Building							
i) Gents Toilet		Users					
a) Water closet				Users		**Nos.**	
b) Urinal				Users		**Nos.**	
c) Basin				Users		**Nos.**	
ii) Ladies Toilet		Users					
a) Water closet				Users		**Nos.**	

Fire Hydrant System

Table- A 3

Sn		Requirement				
		Water supply			Pump capacity	
	Type of building occupancy	Type of installation	Undergro und static tank	Terrace tank	Near underground tank	At the terrace level
1	Residential building a) lodging or room houses dormitories & hotels. (No provision is needed for dormitories housing less than 25 person .					
	*upto 15 mtr. In height.	Nil	50000 ltr.	Nil	Nil	Nil
	* above 15 m. height but not exceeding 24 m.	One wet riser cum down comer per 1000 m.sq. floor area. The riser shall be fully automatic in operation.	100000 ltr.	Nil	2400 lit/min at pressure not less than 0.3 N/mm.sq. (3kg./cm.sq) at the topmost hydrant	Nil

Fire Hydrant System

2	One or two family private dwelling & apartment houses (flat) i) Upto 15 m. height ii) Above 15 m. height but not exceeding 24 m.	Nil One wet riser cum down comer with a provision of fire service inlet at only ground level per 1000 m.sq. floor area.	Nil 50000Ltr.	Nil Nil	2400 lit/min at pressure not less than 0.3 N/mm.sq. (3kg./cm.sq) at the topmost hydrant	Nil Nil
3	Educational & Institutional building i) Up to 15 m. height ii) Above 15 m. in height but not exceeding 24 m.	Nil One wet riser cum down comer per 1000-m. sq. floor area.	50000 ltr 50000 ltr	Nil Nil	Nil 2400 lit/min at pressure not less than 0.3 N/mm.sq. (3kg./cm.sq) at the topmost hydrant	Nil Nil
4	Storage & Hazardous. Buildings. i) Upto 15 m. height	One wet riser com down comer per 1000 m. sq. floor area. The riser shall be fully automatic in operation.	100000 ltr	Nil.	1800 ltr/minute at pressure not less than 0.3 N/mm.sq. (3kg./cm.sq.) at the topmost hydrant.	Nil.
	ii) Above 15 m. in height but not exceeding 24 m.	One wet riser com down comer per 100 m. sq. floor area. The riser shall be fully automatic in operation.	100000 ltr	NIL	2400 ltr/minute at pressure not less than 0.3 N/mm.sq. (3kg./cm.sq.) at the toppest hydrant.	Nil

FIRE FIGHTING PROVISION

Some provisions in code

- Separate domestic tank and fire tank
- Quality of water should be such that no sprinkle is clogged
- The capacity of fire tank should be such that, storage should last for 90-120 minutes at normal pumping rate of 2400 lit/min
- No part of the floor is more than 6 meters from the nozzle when nozzle is fully extended.
- A pressure of 3kg/cm2 should be available at top hydrant outlet.

2.3.Fire Fighting Provision

Example #:

Calculate Capacity of wet riser for 6 stories apartment building having average floor area 1500 sqm and height 18m.

Solution:-

Number of floor – 6, Average Floor Area =1500 sqm

No. of Wet Riser= 2 (From Table)

Pump Capacity= 2400 ltr/m

Time of Storage Capacity = 90-120 Minutes (Assumed 90 Minutes)

Capacity of Wet Riser for under gound water Tank

=Pump Capacity X Time of Storage Capacity

=2400X90

=216000 Ltrs

Fire Hydrant System

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1.2) Hospital including laundry per bed							
a) Number of beds <100 Bed		Bed.		Litres			
b) Number of beds >100 bed		Bed.		Litres		**Litres**	
1.3) Office building		person		Litres		**Litres**	
1.4) Residential building		person		Litres		**Litres**	
2. Overhead water tank for Lavatory							
2.1) Residential Building		User		Litres		**Litres**	
2.2) Auditorium / Office Building		W.C.		Litres		**Litres**	
2.3) Hospital		Urinal		Litres		**Litres**	
		W.C.		Litres		**Litres**	
3. Fire Hydrant System. Hospital / Auditorium (Indoor)							
3.1) No of floors	6	Floor	Required	Wet riser			18m high > 15 m
3.2) Floor area	1500	m^2	**2**	**wet risers**			>1000m^2
3.3) Capacity of wet riser for underground water tank			**216000**	**Litres**			2400x9

Description	Design Capacity		Fixtures per capita		Fixtures provided as per submitted design		Remarks
	Capacity	Units	Nos.	Units	Nos.	Units	
4. Fixtures							
4.1) Office Building							
i) Gents Toilet		Users					
a) Water closet				Users		**Nos.**	
b) Urinal				Users		**Nos.**	
c) Basin				Users		**Nos.**	
ii) Ladies Toilet		Users					
a) Water closet				Users		**Nos.**	

Filled using above calculations

Fitments Requiremet

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1.2) Hospital including laundry per bed							
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1.3) Office building		person		Litres		**Litres**	
1.4) Residential building		person		Litres		**Litres**	
2. Overhead water tank for Lavatory							
2.1) Residential Building		User		Litres		**Litres**	
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		W.C.		Litres		**Litres**	
3. Fire Hydrant System. Hospital / Auditorium (Indoor)							
3.1) No of floors		Floor					
3.2) Floor area		m^2		**wet risers**			
3.3) Capacity of wet riser for underground water tank				**Litres**			

Description	Design Capacity		Fixtures per capita		Fixtures provided as per submitted design		Remarks
	Capacity	Units	Nos.	Units	Nos.	Units	
4. Fixtures							
4.1) Office Building							
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a) Water closet				Users		**Nos.**	
b) Urinal				Users		**Nos.**	
c) Basin				Users		**Nos.**	
ii) Ladies Toilet		Users					
a) Water closet				Users		**Nos.**	

For this we use table B1 to B13

Fitments Requiremet

Description	Design Capacity		Fixtures per capita		Fixtures provided as per submitted design		Remarks
	Capacity	Units	Nos.	Units	Nos.	Units	
4. Fixtures							
4.2) Auditorium							
i) Public Toilet (Gents Toilet)		Users					
a) Water closet				Users		Nos.	
b) Urinal				Users		Nos.	
c) Basin				Users		Nos.	
ii) Ladies Toilet		Users					
a) Water closet				Users		Nos.	
iii) Staff (Ladies/ Gents) toilet		Users					
a) Water closet				Users		Nos.	
4.3) Hospital indoor patient ward							
i) For Ladies and Gent Toilet		Users					
a) Water closet				Users		Nos.	
b) Wash basin				Users		Nos.	
c) Bath (Shower)				Users		Nos.	
d) Cleaner (Kitchen) Sink				Users		Nos.	
5.Rainwater disposal							
a) Roof area		m^2					
b) Roof type							
c) Coefficient of runoff							
d) Average rainfall in the area				mm			
e) Diameter of Pipe used				mm			
f) Roof area covered by one pipe				m^2			
e) No. of pipes required						Nos.	

FITMENTS REQUIREMENTS

For Office buildings (Including buildings higher than 4 stories): (Table B1, NBC 208)

S.N.	FITMENTS	FOR MALE PERSONNEL	FOR FEMALE PERSONNEL
i	Water-closets (WC)	1 for every 25 persons of part thereof	1 for every 15 persons of part thereof
ii	Ablution taps	1 in each water-closet, 1 water tap with draining arrangement shall be provided for every 50 person or part thereof in the vicinity of water-closet and urinals	1 in each water-closet
iii	Urinals	Nil, up to 6 persons 1 for 7-20 persons; 2 for 21-45 persons; 3 for 46-70 persons; 4 for 71-100 persons From 101 to 200 persons add at the Rate of 3 percent From over 200 persons add at the rate of 2.5 percent.	
iv	Wash basins	1 for every 25 persons of part thereof	
v	Drinking water fountains	1 for every 100 persons with a minimum of one on each floor	

FITMENTS REQUIREMENTS

- **Factories:** Table B2, NBC 208
- **Auditoriums, Cinemas, Concert halls and Theatres:** Table B3, NBC 208
- **Art Galleries, Libraries and Museums:** Table B4, NBC 208
- **Hospital** : Table B5, B6, B7, NBC 208
- **Hotels** : Table B8, NBC 208
- **Restaurants** : Table B9, NBC 208
- **Schools and Educational Institutions** : Table B10, NBC 208
- **Hostels**: Table: B11, NBC 208
- **Warehouses, Fruit and Vegetable markets**: B12, NBC 208
- **Sanitary requirements for large stations and airports**: B13, NBC 208

PLUMBING DESIGN & PRACTICE

Requirement of Numbers of WC, Urinal & Basins for types of Buildings

Example 5: For Office Building

If, Numbers of User of Males = 200 person

Water-Closet = 1 for every 25 persons (Ref. Table-B-1)

Urinal = 4 for 71-100 persons and From 101 to 200 persons add at the Rate of 3 percent (Ref. Table-B-1)

Wash Basin = 1 for every 25 persons (Ref. Table-B-1)

Solution,

Min. Requirement Numbers of WC = Number of Male User ÷ 25 person
= 200÷ 25 =8 Numbers

Min. Requirement Numbers of Urinal = 4 + 3% of 100 Users = 4+3 = 7 Numbers

Min. Requirement Numbers of Basin = Number of Male User ÷ 25 person
= 200÷ 25 =8 Numbers

PLUMBING DESIGN & PRACTICE

If, Numbers of User of Females = 150 person

Water-Closet = 1 for every 15 persons (Ref. Table-B-1)

Wash Basin = 1 for every 25 persons (Ref. Table-B-1)

Solution,

Min. Requirement Numbers of WC = Number of Female ÷ 15

= 150 ÷ 15 =10 Numbers

Min. Requirement Numbers of Basin = Number of Female ÷25

= 150 ÷ 25 =6 Numbers

Fitments Requiremet

kdj lws ljj /Ofkfdfdx?
-v_;ofgo/LBhfQg ; DjlQv
; DjlQvt kdj lws j f k/fdz{ft faf6 e/fpg'kg]
Forms for
NBC 208: 2003: Sanitary and Plumbing Design Requirements
(In Case of many units, fill up the form for main unit only)

Description	Design Capacity		Water consumption per capita per day as per submitted design		Water storage Capacity		Remarks
	Capacity	Units	Per capita	Units	Capacity	Units	
1. Underground Water Tank							
1.1) Auditorium		person		Litres		**Litres**	
1.2) Hospital including laundry per bed							
a) Number of beds <100 Bed		Bed.		Litres			
b) Number of beds >100 bed		Bed.		Litres		**Litres**	
1.3) Office building		person		Litres		**Litres**	
1.4) Residential building		person		Litres		**Litres**	
2. Overhead water tank for Lavatory							
2.1) Residential Building		User		Litres		**Litres**	
2.2) Auditorium / Office Building		W.C.		Litres		**Litres**	
2.3) Hospital		Urinal		Litres		**Litres**	
		W.C.		Litres		**Litres**	
3. Fire Hydrant System. Hospital / Auditorium (Indoor)							
3.1) No of floors		Floor					
3.2) Floor area		m^2		**wet risers**			
3.3) Capacity of wet riser for underground water tank				**Litres**			
Description	**Design Capacity**		**Fixtures per capita**		**Fixtures provided as per submitted design**		**Remarks**
	Capacity	**Units**	**Nos.**	**Units**	**Nos.**	**Units**	
4. Fixtures							
4.1) Office Building							
i) Gents Toilet	200	Users					
a) Water closet			1 per 25	Users	**8**	**Nos.**	
b) Urinal			4 per 100+ 3% from 100-200+2.5% over 200	Users	7	**Nos.**	
c) Basin			1 per 25	Users	**8**	**Nos.**	
ii) Ladies Toilet		Users					
a) Water closet				Users		**Nos.**	

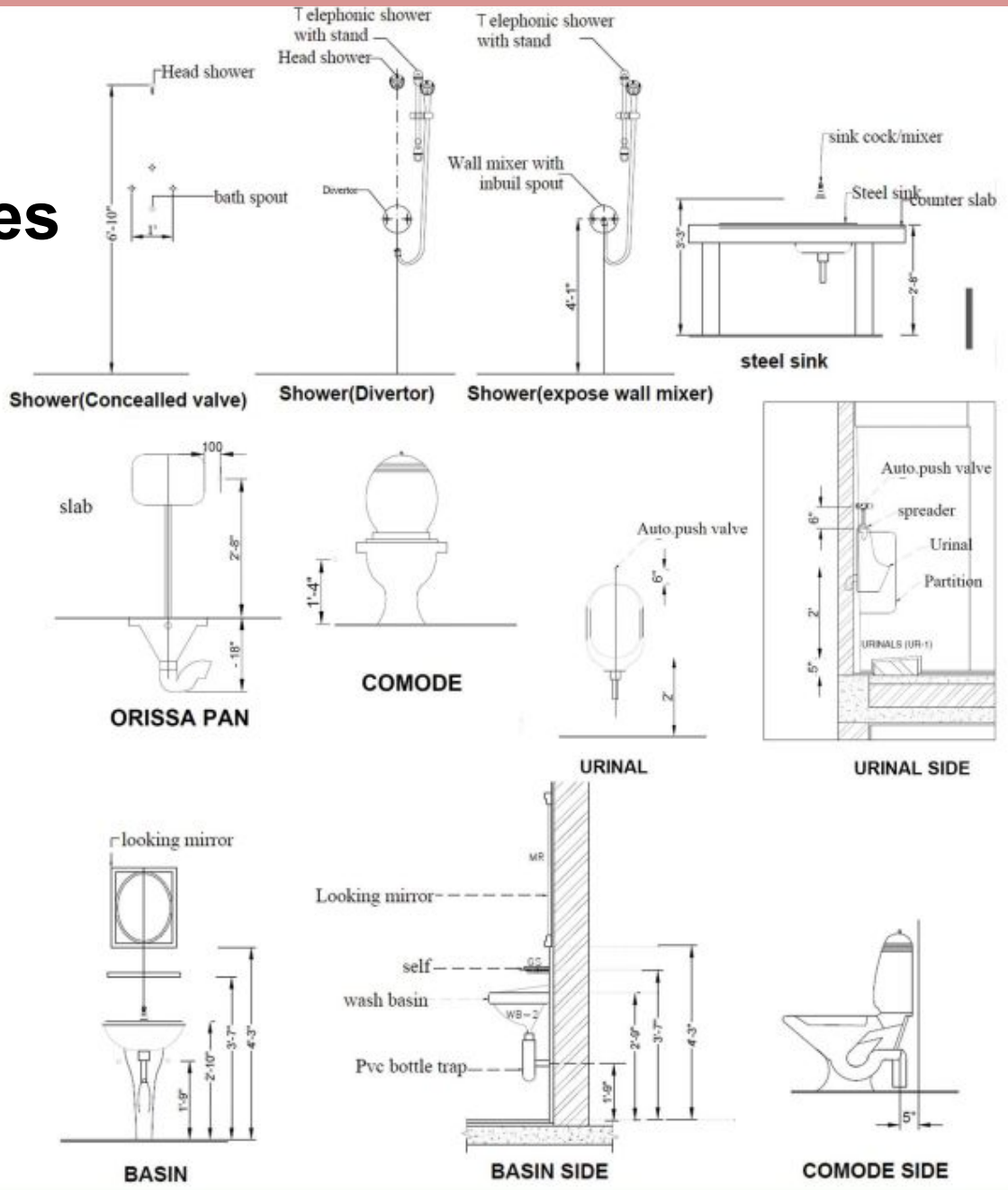
Filled using calculation above

Fitments Requiremet

Description	Design Capacity		Fixtures per capita		Fixtures provided as per submitted design		Remarks
	Capacity	Units	Nos.	Units	Nos.	Units	
4. Fixtures							
4.2) Auditorium							
i) Public Toilet (Gents Toilet)		Users					
a) Water closet				Users		Nos.	
b) Urinal				Users		Nos.	
c) Basin				Users		Nos.	
ii) Ladies Toilet		Users					
a) Water closet				Users		Nos.	
iii) Staff (Ladies/ Gents) toilet		Users					
a) Water closet				Users		Nos.	
4.3) Hospital indoor patient ward							
i) For Ladies and Gent Toilet		Users					
a) Water closet				Users		Nos.	
b) Wash basin				Users		Nos.	
c) Bath (Shower)				Users		Nos.	
d) Cleaner (Kitchen) Sink				Users		Nos.	
5.Rainwater disposal							
a) Roof area		m^2					
b) Roof type							
c) Coefficient of runoff							
d) Average rainfall in the area				mm			
e) Diameter of Pipe used				mm			
f) Roof area covered by one pipe				m^2			
e) No. of pipes required						Nos.	

Similarly, we can fill fixture requirement for other building as well

Details of Installation of Sanitary fixtures and fittings



Rainwater Disposal

Description	Design Capacity		Fixtures per capita		Fixtures provided as per submitted design		Remarks
	Capacity	Units	Nos.	Units	Nos.	Units	
4. Fixtures							
4.2) Auditorium							
i) Public Toilet (Gents Toilet)		Users					
a) Water closet				Users		Nos.	
b) Urinal				Users		Nos.	
c) Basin				Users		Nos.	
ii) Ladies Toilet		Users					
a) Water closet				Users		Nos.	
iii) Staff (Ladies/ Gents) toilet		Users					
a) Water closet				Users		Nos.	
4.3) Hospital indoor patient ward							
i) For Ladies and Gent Toilet		Users					
a) Water closet				Users		Nos.	
b) Wash basin				Users		Nos.	
c) Bath (Shower)				Users		Nos.	
d) Cleaner (Kitchen) Sink				Users		Nos.	
5.Rainwater disposal							
a) Roof area		m^2					
b) Roof type							
c) Coefficient of runoff							
d) Average rainfall in the area				mm			
e) Diameter of Pipe used				mm			
f) Roof area covered by one pipe				m^2			
e) No. of pipes required						Nos.	

This Can be Filled using Table C1 and C3

Rainwater Disposal

Surface Type	Coefficient of Run-off
a) Terrace, Hard paved surface:	0.90-0.95
b) Paved surface, roads:	0.85-0.90
c) Gravel paths, loosely paved walks, rocky surface	0.70-0.85
d) Brick paved, compacted ground, turf:	0.50-0.70
e) General ground	0.50-0.60
f) Natural ground, sloping ground:	0.20-0.50

TABLE C3 - SIZING OF RAINWATER PIPES FOR ROOF DRAINAGE

S.No	Dia of Pipe	Average rate of rainfall in mm/h					
1	2 (mm)	3	4	5	6	7	8
		50 mm	75 mm	100 mm	125 mm	150 mm	200 mm
Roof Area m^2							
i)	50	13.4	8.9	6.6	5.3	4.4	3.3
ii)	65	24.1	16.0	12.0	9.6	8.0	6.0
iii)	75	40.8	27.0	20.4	16.3	13.6	10.2
iv)	100	85.4	57.0	42.7	34.2	28.5	21.3
v)	125	-	-	80.5	64.3	53.5	40.0
vi)	150	-	-	-	-	83.6	62.7

2.5.Rainwater Disposal

Example #:

Calculate Numbers of Rainwater Pipe required for roof having length 50 m and width 20 m

Solution:

Area – 50X20 =1000 Sqm

For Roof coefficient of Runoff – 0.95

Area = 1000 Sqm X 0.95 = 950 sqm

Assumed Pipe size of 150mm dia with rainfall Ratio 150mm/hr

From Table, Area Covered by pipe 83.6 Sqm

Number of Pipe required= 950/83.6

=11.37 (Adopt 12 Nos of pipe)

Rainwater Disposal

Description	Design Capacity		Fixtures per capita		Fixtures provided as per submitted design		Remarks
	Capacity	Units	Nos.	Units	Nos.	Units	
4. Fixtures							
4.2) Auditorium							
i) Public Toilet (Gents Toilet)		Users					
a) Water closet				Users		Nos.	
b) Urinal				Users		Nos.	
c) Basin				Users		Nos.	
ii) Ladies Toilet		Users					
a) Water closet				Users		Nos.	
iii) Staff (Ladies/ Gents) toilet		Users					
a) Water closet				Users		Nos.	
4.3) Hospital indoor patient ward							
i) For Ladies and Gent Toilet		Users					
a) Water closet				Users		Nos.	
b) Wash basin				Users		Nos.	
c) Bath (Shower)				Users		Nos.	
d) Cleaner (Kitchen) Sink				Users		Nos.	
5.Rainwater disposal							
a) Roof area	1000	m^2					
b) Roof type	Hard Paved						
c) Coefficient of runoff			0.95				Area with Coeff: 950
d) Average rainfall in the area			150	mm/hr			
e) Diameter of Pipe used			150	mm			
f) Roof area covered by one pipe			83.6	m^2			
e) No. of pipes required					12	Nos.	950/83.6

This is filled using above calculation

Thank You