



SNS COLLEGE OF TECHNOLOGY

Coimbatore – 641 029

An Autonomous Institution



DEPARTMENT OF CIVIL ENGINEERING

23CEB204 – ENVIRONMENTAL ENGINEERING

III YEAR / V SEMESTER

UNIT 1 : SOURCES, QUALITY AND DEMAND OF WATER

Topic 2 :Types of demand



UNIT 1 :SOURCES, QUALITY AND DEMAND OF WATER



1. Importance and necessity of water supply Engineering – Sources of water – Suitability of water –Choice of source
2. **Types of demand – Computation of quantity of water**
3. Fluctuation in demand –Factors affecting demand
4. Population forecast
5. Population forecast - Methods
6. Impurities in water– Collection of water sample
7. Physical test
8. Chemical test
9. Biological test and Standards of quality of water



Water demand

The water demanded by a people of community for their daily uses, is known a water demand for a water supply scheme.

Engineer's first duty of planning a water supply scheme is to evaluate the amount of water available and the amount of water demanded by the public.



COMPUTATION OF WATER DEMAND



The quantity of water required for municipal uses for which the water supply scheme has to be designed requires following data:

$$\text{Quantity} = \text{Per capita demand} \times \text{Population (litres/capita/day)}$$



PER CAPITA DEMAND



PER CAPITA DEMAND: It is the annual average amount of daily water required by one person .

- It is expressed in litres/capita/day.
- If , Q = total quantity of water required by a town per year in litres
- P = Population of town
- Per capita demand = $Q / P * 365$
- The per capita demand of the town depends on various factors and will vary according to number and type of commercial places in the town, types of industries etc



FACTORS AFFECTING PER CAPITA DEMAND



Climatic
conditions

Living
standard

Quality

Size of the city

Pressure

Cost of water

System of
sanitation

Industrial and
commercial
activities

Water charging
method



TYPES OF WATER DEMAND



Domestic water demand

Industrial water demand

Institution and commercial water demand

Demand for public uses

Fire demand

Water required to compensate losses in wastes and thefts



TYPES OF WATER DEMAND



DOMESTIC WATER DEMAND

- The quantity of water required in the houses for drinking, bathing, cooking, washing etc is called domestic water demand
- As per IS: 1172-1963, under normal conditions, the domestic consumption of water in India is about 135 litres/day/capita.
- In developed countries this figure may be 350 litres/day/capita

The details of the domestic consumption are

- | | |
|---------------------------|-----------|
| a) Drinking ----- | 5 litres |
| b) Cooking ----- | 5 litres |
| c) Bathing ----- | 55 litres |
| d) Clothes washing ----- | 20 litres |
| e) Utensils washing ----- | 10 litres |
| f) House washing ----- | 10 litres |

135 litres/day/capita



HIGH CLASS VS LOW CLASS



Use	Consumption in litres per head per day (High class people)	Consumption in litres per head per day (Low class people)
Drinking	5	5
Cooking	5	5
Bathing	75	55
Washing clothes	25	20
Washing of utensils	15	10
Washing and cleaning of houses and residences	15	10
Lawn watering and gardening	15	—
Flushing of water closets, etc.	45	30
TOTAL	200	135



TYPES OF WATER DEMAND



INDUSTRIAL DEMAND

- The water required in the industries mainly depends on the type of industries, which are existing in the city.
- The quantity of water demand for industrial purpose is around 20 to 25% of the total demand of the city.
- Industrial water demand – 40 litres/capita/day

Per Capita demand

- 450 l/h/day for high scale industrial zones
- 50 l/h/day for small scale industrial zones.



TYPES OF WATER DEMAND



INSTITUTION AND COMMERCIAL DEMAND

Universities, Institution, commercial buildings and commercial centers including office buildings, warehouses, stores, hotels, shopping centers, health centers, schools, temple, cinema houses, railway and bus stations etc comes under this category.

S.No.	Type of Building	Construction per capita per day Litres
1.	(a) Factories where bathrooms are required to be provided	45
	(b) Factories where no bathrooms are required to be provided	30
2.	Hospitals (including laundry) per bed	
	(a) No. of beds not exceeding 100	340
	(b) No. of beds exceeding 100	450
3.	Nurses homes and medical quarters	135
4.	Hostels	135
5.	Offices	45
6.	Restaurants (per seat)	70
7.	Hotel (per bed)	180
8.	Cinema concert hall and theatres (per seat)	15
	Schools	
	(a) Day Schools	45
	(b) Boarding schools	135
9.	Garden, sports grounds	3.5 per sq. m.
10.	Animals/vehicles	45



TYPES OF WATER DEMAND



DEMAND FOR PUBLIC USE

- Quantity of water required for public utility purposes such as for washing and sprinkling on roads, etc comes under public demand.
- To meet the water demand for public use, provision of 5% of the total consumption is made designing the water works for a city.

Domestic purpose -----	135 litres/c/d
Industrial use -----	40 litres/c/d
Public use -----	25 litres/c/d
Fire Demand -----	15 litres/c/d
Losses, Wastage and thefts -----	55 litres/c/d

Total : 270 litres/capita/day	



TYPES OF WATER DEMAND



FIRE DEMAND

Fire may take place due to faulty electric wires by short circuiting, fire catching materials, explosions, bad intension of criminal people or any other unforeseen mishappenings.

Formula to find water demand for fire

$$Q=3182 \sqrt{p}$$

Where 'Q' is quantity of water required in litres/min

'P' is population of town or city in thousands

Domestic purpose -----	135 litres/c/d
Industrial use -----	40 litres/c/d
Public use -----	25 litres/c/d
Fire Demand -----	15 litres/c/d
Losses, Wastage and thefts -----	55 litres/c/d

Total : 270 litres/capita/day	



TYPES OF WATER DEMAND



LOSES AND WASTES

- All the water, which goes in the distribution, pipes does not reach the consumers. The following are the reasons
- Losses due to defective pipe joints, cracked and broken pipes, faulty valves and fittings.
- **Losses due to, consumers keep open their taps of public taps even when they are not using the water and allow the continuous wastage of water**
- **Losses due to unauthorised and illegal connections**

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Industrial use -----	40 litres/c/d
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Fire Demand -----	15 litres/c/d
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Total : 270 litres/capita/day	



Assessment

1. The average quantity of water (in lpcd) required for domestic purposes according to IS code is _____

- a) 100
- b) 120
- c) 70
- d) 135

Answer: d

2. The average consumption of water required in factories in lpcd is _____

- a) 10-15
- b) 20-30
- c) 30-45
- d) 70-80

Answer: c



Assessment

3. In which type of water demand, minimum average consumption of water takes place?

- a) Domestic water demand
- b) Industrial water demand
- c) Institutional and commercial water demand
- d) Fire demand

Answer: d

Note: The minimum average water consumption takes place in fire demand. It accounts to 1lpcd which is very less but this water is required in very less duration



References

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Thank You