Water Supply in Buildings

Calculations - Domestic

Water Supply in Buildings

Exercise 1: Simplified Pipe Sizing Calculations

Step 1.
Determine the building occupancy and design population for the building

Step 2.
Draw a schematic of the water layout pipework.

Step 3.
Identify the draw-off points on the schematic layout.

Step 4.
Select the pipe type (material) for above and below ground installation.

Step 5.
Number the cold and hot pipe lengths within the schematic layout starting at the last draw-off point/s within the layout.

Step 6.
Assign the appropriate loading units to each draw-off point in the schematic layout.

Step 7.
Determine the loading units for each numbered length of the COLD water pipework within the schematic layout by starting at the last draw-off point/s and adding the draw-off loading units served by the related pipe length.

Step 8.
Assign pipe sizes to each numbered length of pipework within the schematic layout based on the loading units calculated and the pipe type selected in step 4 starting at last draw-off point.

Step 9.
Repeat steps 6 – 8 for HOT water pipework to point of connection to hot water heater.

Step 10.
Check for variations in loading units where HOT water pipework connects to COLD water pipework and redetermine loading units as necessary.

Step 11.
Reassign pipe sizes to each affected numbered length of pipework as identified in step 10 based on the loading units calculated and the pipe type selected in step 4 starting at last adjusted numbered length of water pipework.

Step 12.
Complete schematic layout to show pipe sizes and pipe type/s.

Step 13.
Calculate the probable flow demand from the Total Loading Units where -
1 loading unit (LU) ≡ draw-off flow rate Q_A of 0.1 l/s.

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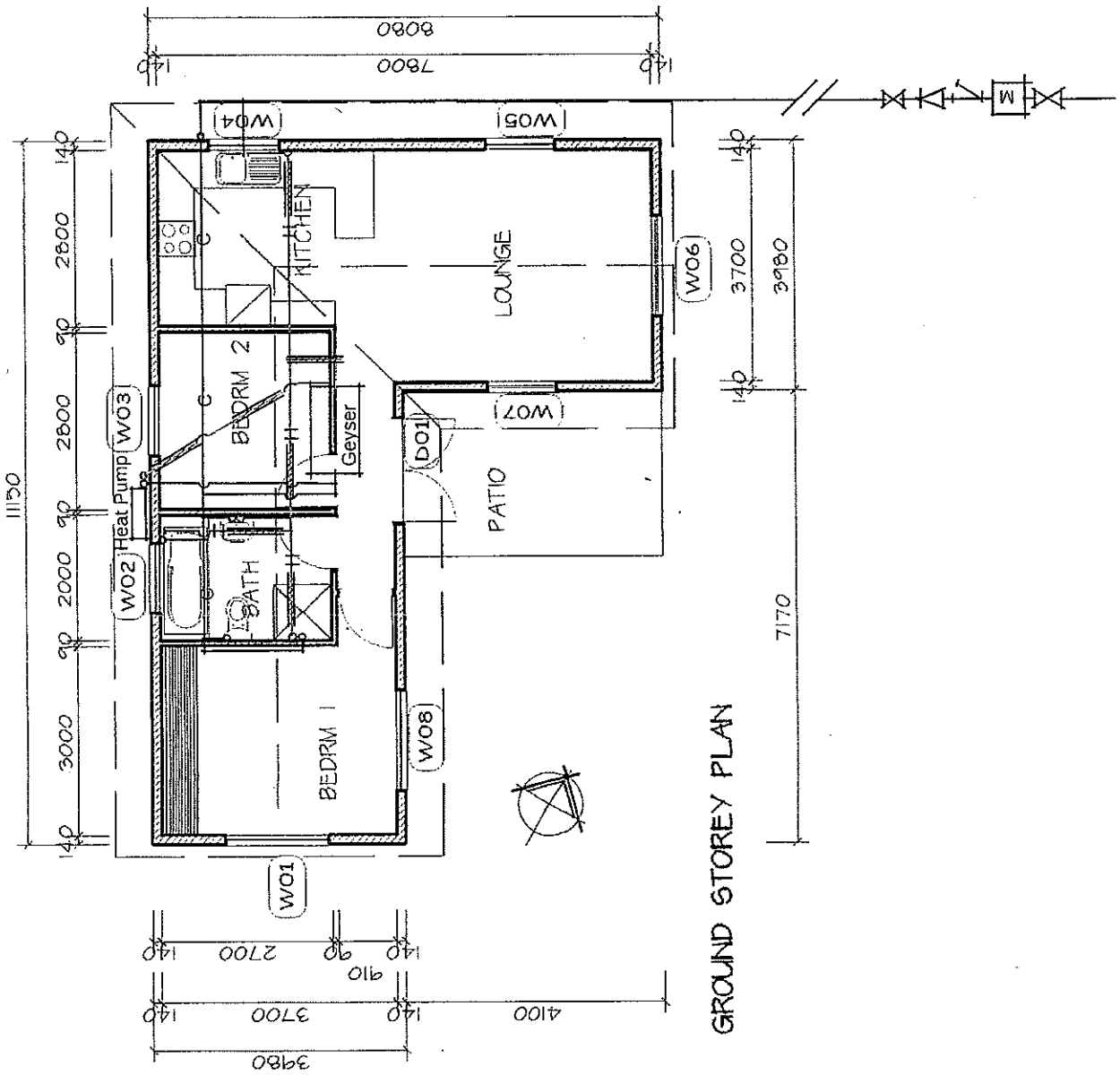
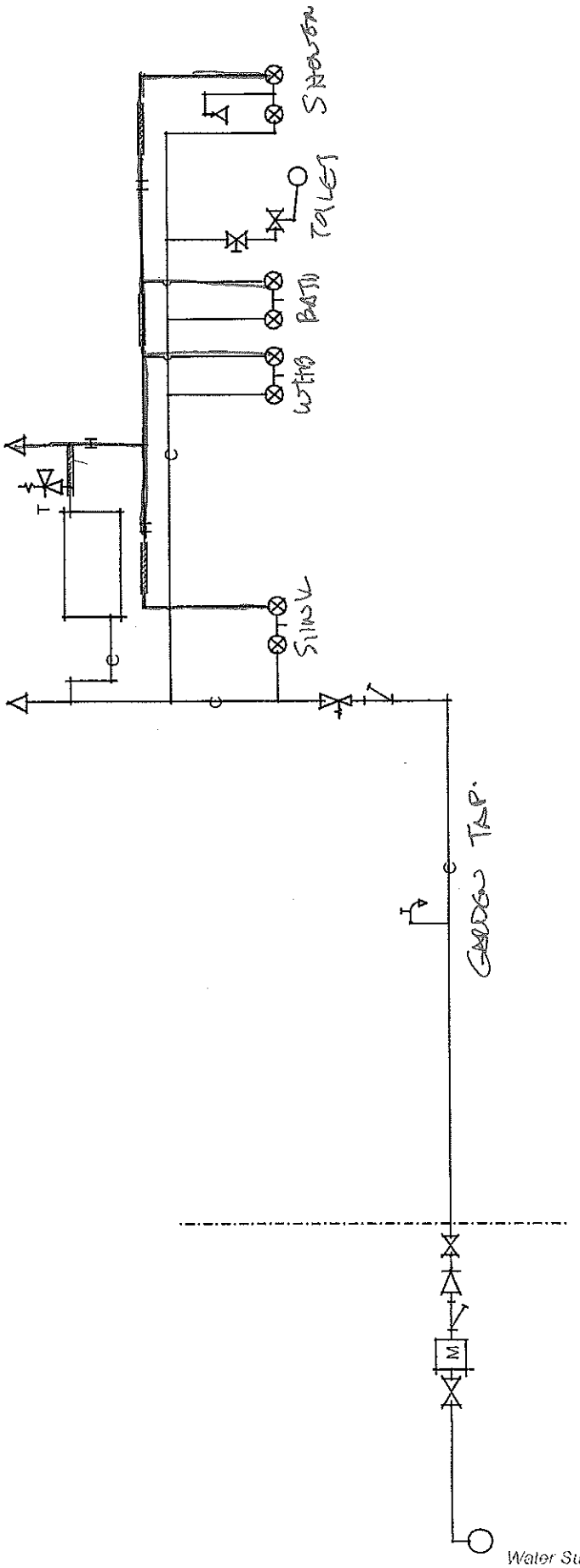
Exercise 1: Plan Layout



Exercise 1: Schematic Water Layout



Exercise 2: Hot Water Calculations

Step 1.
Determine the building occupancy and design population for the building

Step 2.
Identify the appropriate type of occupancy in Table 5 of SANS 10252-1 based upon the building occupancy determined in step 1.

Step 3.
Calculate the total daily hot water demand for the building.

Hot Water Heating – Electric Heater

Step 4.
Calculate the hot water storage volume required at 60 °C including provision for an assumed 20% heat loss in the hot water storage system.

Step 5.
Calculate the net heater power required to heat the volume of water determined in step 4.

Step 6.
Determine the size of the hot water storage system (geyser) based on the hot water storage capacity and net heater power calculated in step 4 & 5.

Hot Water Heating – Heat Pump

Step 7.
Draw a schematic of the water layout pipework.

Step 8.
Calculate the output of the heat pump necessary to satisfy the requirements of SANS 10400 XA2 for the total hot water demand calculated in step 3.

Step 9.
Calculate the required flow rate of the circulation pump to ensure the required water flow rate through the heat pump calculated in step 8.

Step 10.
Determine the size of the heat pump based on the heat pump output and flow rate calculated in step 8 & 9.

Hot Water Heating – Instantaneous

Step 11.
Calculate the size of an instantaneous hot water generation plant (gas type) to heat the water for a kitchen sink for a design flow rate of 10 L/m.

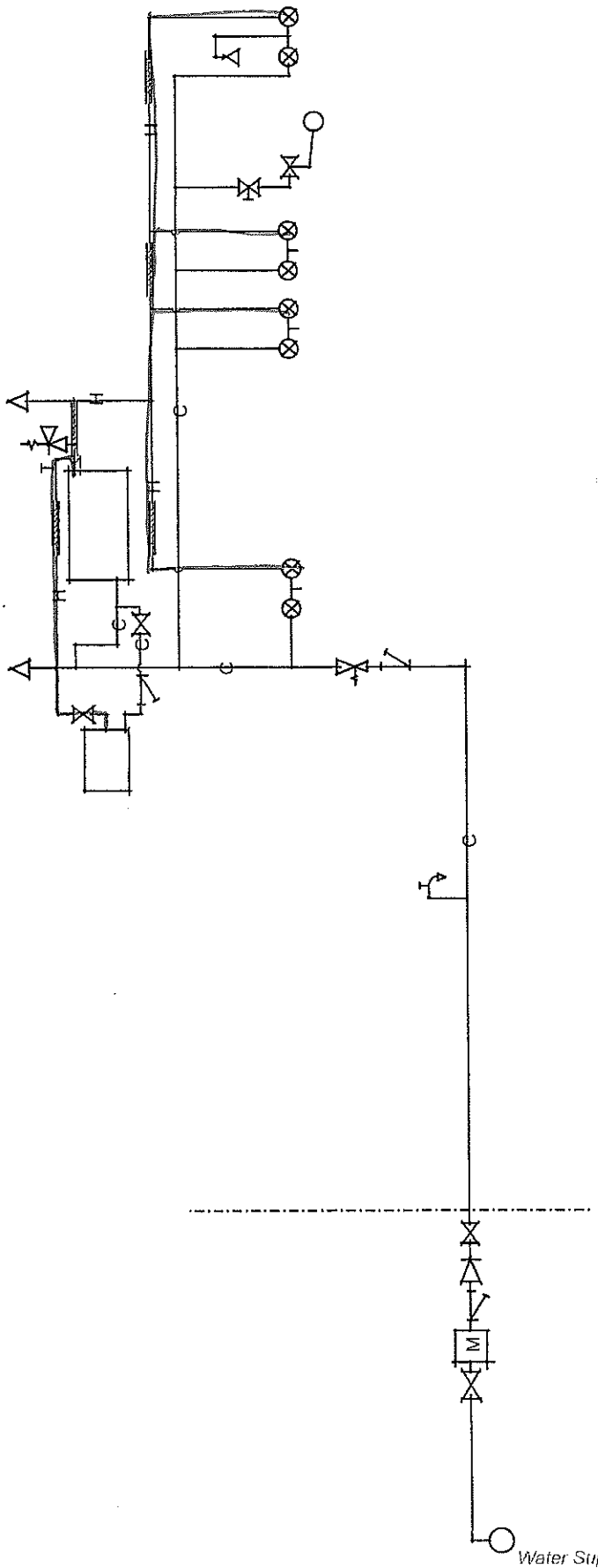
Hot Water Heating – Solar

Step 12.
Draw a schematic of the water layout pipework.

Step 13.
Calculate the solar energy input required for a solar hot water heater to heat the daily total hot water demand of the hot water system calculated in step 3 and storage tank with suplementary heating.

Step 14.
Calculate the area of the solar collector required to heat the daily hot water demand based on the required solar energy calculated in step 13 and supplemental heating provided.

Exercise 2: Schematic Water Layout - Heat Pump



Exercise 3: Emergency Water Storage (Non-fire-fighting purposes)

Building Occupancy: Office
Size: 250 m²

Step 1.
Determine the design population of the building.

Step 2.
Determine the daily water demand of the building.

Step 3.
Calculate the minimum emergency water storage capacity required for the premises.

CLASSIFICATION = G1

Persons 1 per 15 M²

250 ÷ 15 = 17 persons

TABLE 8

10 - 12 l per capita storage 8 - 6 l per capita

(250 ÷ 10 × 7 = 175 l) 0,1 kW / capita

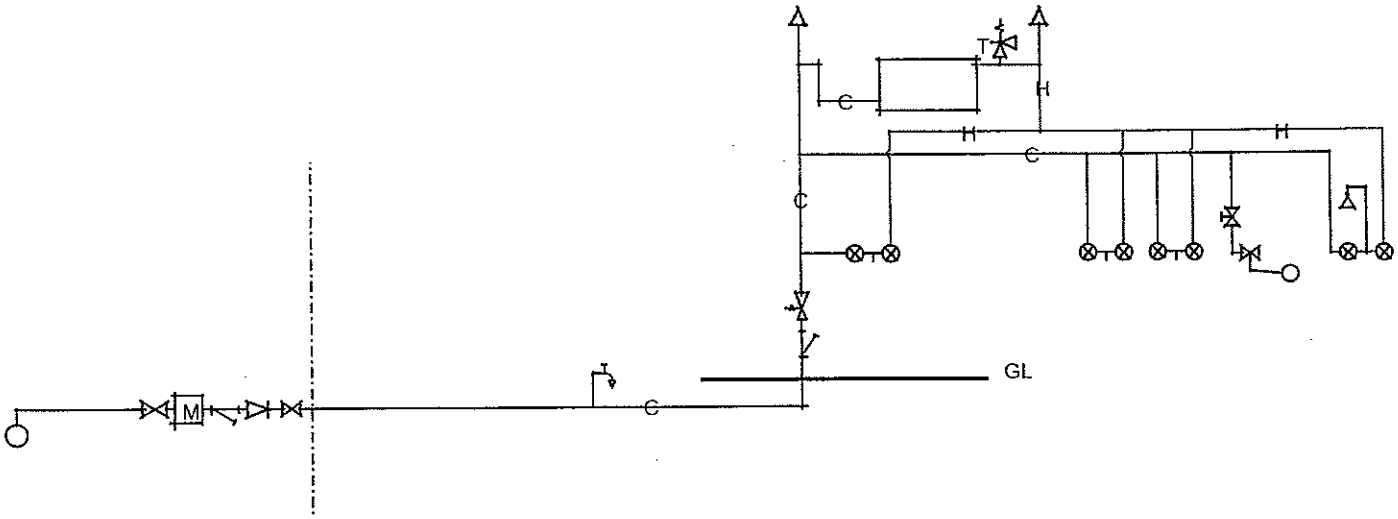
17 × 10 = 170 l

= 345 l

Exercise 4: Pipe sizes (In-house installations, mains-fed type 3 WH)

Step 1.

Determine the pipe sizes of an in-house installation provided with a pressure control valve of 400kPa and with a mains-fed type 3 water heater.



Water Supply in Buildings - Tables

Table 1 - Design Population (Reg. A21)	
1	2
Class of occupancy of room or storey or portion thereof	**Population**
A1, A2, A4, A5	Number of fixed seats or 1 person per m^2 if there are no fixed seats
E1, E3, H1, H3, H4	2 persons per bedroom
E4	16 persons provided that the total number of persons per room is not more than 4
H5	16 persons per dwelling unit provided that the total number of persons per room is not more than 4
G1	1 person per 15 m^2
J1, J2, J3, J4	1 person per 50 m^2
C1, E2, F1, F2	1 person per 10 m^2
B1, B2, B3, D1, D2, D3	1 person per 15 m^2
C2, F3	1 person per 20 m^2
A3, H2	1 person per 5 m^2

Table 1: Source : NB&BS Act, No. 103 of 1977

Table 2 - Minimum water storage capacity required		
1	2	
Category of premises	**Minimum storage required**	
Boarding schools, children's homes or residential nurseries	4 h to 8 h demand	Recommended amounts are shown.
Commercial premises, including offices and shops	4 h to 8 h demand based on gross floor area	
Educational institutions	4 h to 8 h demand for the design population of the building	
Hotels, boarding houses, motels and nurses' homes	4 h to 8 h demand per bed space	
Hospitals, clinics, nursing homes	24 h demand for every bed the building is designed to accommodate	
All other buildings where continuous water supply is required, i.e. hairdressers	4 h demand per day	
Multiple storeys that exceed 25 m inheight above the lowest ground level abutting on such building	8 h demand per dwelling unit	
Old-age homes	8 h demand per capita	

Table 2: Source : SANS 10252-1

4. Solar water heater – Solar energy requirement

$$H = (V \times C \times \Delta T) / \eta$$

where

H = solar energy required, (kJ/d);
V = hot water demand, (L/d);
C = specific heat of water (4,2 kJ/L °C);
ΔT = required temperature rise of water, (°C);
η = percentage efficiency of absorber.

5. Solar water heater – Absorber area

$$A = H / S$$

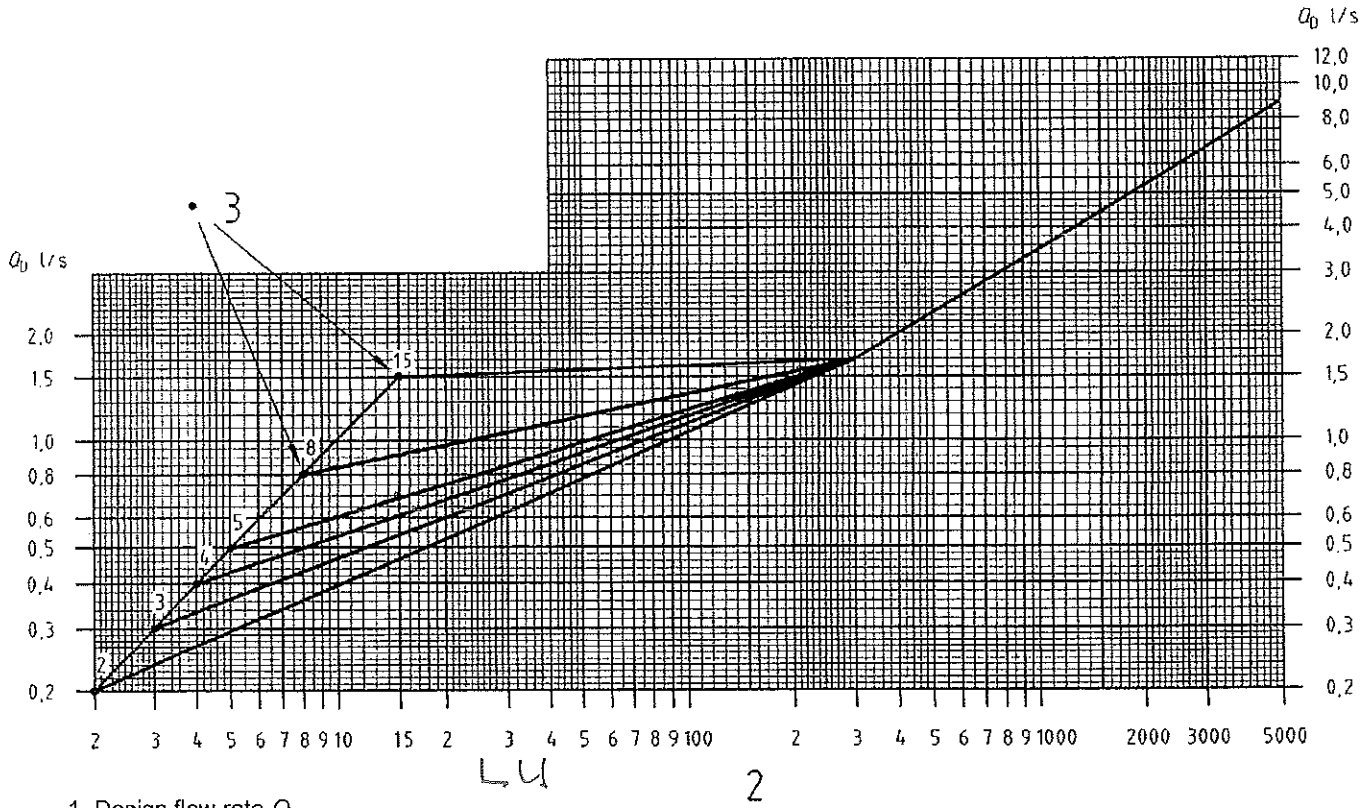
where

A = absorber area, (m^2);
H = solar energy required, (kJ/d);
S = mean available solar irradiance, ($kJ/m^2/d$).

Table 3 - Draw-off flow-rates Q_A , minimum flow-rates at draw-off points Q_{min} and loading units for drawoff points			
1	2	3	4
Draw-off point	**Q_A**	**Q_{min}**	**Loading units**
	l/s	l/s	
Washbasin, handbasin, bidet, WC-cistern	0,1	0,1	1
Domestic kitchen sink, washing machine, dish washing machine, sink, shower head	0,2	0,15	2
For non domestic appliances check with manufacturer.			
Urinal flush valve	0,3	0,15	3
Bath domestic	0,4	0,3	4
Taps (garden/garage)	0,5	0,4	5
Non domestic kitchen sink DN 20, bath non domestic	0,8	0,8	8
Flush valve DN 20	1,5	1,0	15

Table 3: Source : EN 806-3

Fig. 1 Design flow rate Q_D in l/s for standard installations in relation to total flow rate Q_T in LU



1. Design flow rate Q_D
2. Total flow rate Q_T in LU
3. Example of highest single value LU

STOP 13

Table 4a - Hot-dip galvanised steel

Max. load	LU						6		16	40	160	300	600	1600
Highest value	LU						4		15					
DN							15		20	25	32	40	50	65
d_i	mm						16		21.6	27.2	35.9	41.8	53	68.8
Max length of pipe	m						10		6					

Table 4b - Copper

Max. load	LU	1	2	3	3	4	6	10	20	50	165	430	1050	2100
Highest value	LU			2			4	5	8					
d_a x s	mm	12 x 1.0			15 x 1.0			18 x 1.0	22 x 1.0	28 x 1.5	35 x 1.5	42 x 1.5	54 x 2	76,1 x 2
d_i	mm	10			13			16	20	25	32	39	50	72.1
Max length of pipe	m	20	7	5	15	9	7							

Table 4c - Stainless steel

Max. load	LU				3	4	6	10	20	50	165	430	1050	2100
Highest value	LU						4	5	8					
d_a x s	mm				15 x 1.0			18 x 1.0	22 x 1.0	28 x 1.5	35 x 1.5	42 x 1.5	54 x 2	76,1 x 2
d_i	mm				13			16	20	25	32	39	50	72.1
Max length of pipe	m													

Table 4d- PE-X (Crosslinked polyethylene)

Max. load	LU	1	2	3	4	5	8	16	35	100	350	700	
Highest value	LU												
d_a x s	mm	12 x 1.7		16 x 2.2			20 x 2.8	25 x 3.5	32 x 4.4	40 x 5.5	50 x 6.9	63 x 8.6	
d_i	mm	8.4		11.6			14.4	18	23.2	29	36.2	45.6	
Max length of pipe	m	13	4	9	5	4							

Table 4e- PB (Polybutylene)

Max. load	LU	1	2	3	3	4	6	13	25	55	180	500	1010	
Highest value	LU			2			4	5	8					
d_a x s	mm	12 x 1.3			16 x 1.5			20 x 1.9	25 x 2.3	32 x 3	40 x 3.7	50 x 4.6	63 x 5.8	
d_i	mm	9.4			13.0			16.2	20.4	26	32.6	40.8	51.4	
Max length of pipe	m	20	7	5	15	9	7							

Table 4f- PP (Polypropylene)

Max. load	LU	1	2	3	3	4	6	13	30	70	200	540	970	
Highest value	LU			2			4	5	8					
d_a x s	mm	16 x 2.7			20 x 3.4			25 x 4.2	32 x 5.4	40 x 6.7	50 x 8.4	63 x 10.5	75 x 12.5	
d_i	mm	10.6			13.2			16.6	21.2	26.6	33.2	42	50	
Max length of pipe	m													

Table 4: Source : EN 806-3

Table 4g – PVC-C (Cholrinated polyvinyl chloride)														
Max. load	**LU**				**3**	**4**	**5**	**10**	**20**	**45**	**160**	**420**	**900**	
Highest value	LU						4	5	8					
d_a x s	mm				16 x 2.0			20 x 2.3	25 x 2.8	32 x 3.6	40 x 4.5	50 x 5.6	63 x 6.9	
d_i	mm				12.0			15.4	19.4	24.8	31	38.8	49.2	
Max length of pipe	m				10	6	5							

Table 4h - PEX/AL/PE-HD resp. PE-MD/AL/PE-HD Polyethylene/Aluminium/Polyethylene High Density Polyethylene Medium Density/Aluminium/Polyethylene High Density														
Max. load	**LU**				**3**	**4**	**5**	**6**	**10**	**20**	**55**	**180**	**540**	**1300**
Highest value	LU						4	5	5	8				
d_a x s	mm				16 x 2.25/ 16 x 2			18 x 2	20 x 2.5	26 x 3	32 x 3	40 x 3.5	50 x 4	63 x 4.5
d_i	mm				11.5/ 12.0			14	15	20	26	33	42	54
Max length of pipe	m				9	5	4							

Table 4 cont.: Source : EN 806-3

Table 5 - Daily water demand for occupancies (excl. garden use)	
1	2
Occupancies	**Hot & Cold demand**
Boarding schools[a], children's homes and residential nurseries	135 L to 200 L per capita
[a] *Excluding kitchen but including laundry.*	
Educational institutions	40 L to 50 L per capita
Kitchens (full meal preparation)	8 L to 12 L per meal prepared
Multiple dwelling units, such as flats	300 L to 400 L per dwelling
Hotels, boarding houses, motels and nurses' homes:	
with resident staff	200 L to 300 L per bed
without resident staff	200 L to 250 L per bed
Commercial premises:	
shops (staff only)	14 L to 18 L per 10 m^2 gross floor area
superstores, such as hypermarkets and warehouses	125 L per WC pan, or per 600 mm width of slab urinal
offices with canteens	10 L to 15 L per 10 m^2 gross floor area
offices without canteens	7 L to 10 L per 10 m^2 gross floor area
Clinics, hospitals, nursing homes and old-age homes	450 L to 550 L per bed
Factory ablutions	100 L to 200 L per capita

Table 5: Source : SANS 10252-1

Table 6 – Appliances (Ave. Hot & Cold consumption)	
1	2
Appliances (Domestic & Commercial)	**L/operation**
Bath	80 – 90
Bidet	6 – 8
Clothes washing machine	60 – 180
Dishwashing machine	3 – 70
Domestic waste disposal unit	10 – 15[a]
Shower	3 – 6[a]
Wash-hand basin	4 – 8
WC flushing valve (normal flush)	8 – 10
Appliances (Domestic)	**L/day/person served**
Car washing and garden use	3 – 6
Drinking, food preparation and cooking	18 – 22
Laundry	10 – 15
Personal washing and bathing	20 – 30
Washing dishes	8 – 12
WC flushing	32 – 40
Appliances (Office Installations)	**L/day/person served**
Hand washing: normal taps	8 – 15
Hand washing: spray taps	3 – 7
Urinal flushing: 24 h day	10 – 18
Urinal flushing: 8 h day	4 – 6
WC flushing: no urinals provided	12 – 18
WC flushing: urinals provided	4 – 6

[a]Per minute

Table 6: Source : SANS 10252-1

Table 7 – Occupancy - Operating periods	
1	2
Occupancy	**Operating period**
	h
Schools, kitchens, hostels, flats, offices, shops	12
Hotels, clinics	15
Factory ablutions	24

Table 7: Source : SANS 10252-1

Table 8 – Demand, storage and heater power – Hot water			
1	2	3	4
Occupancy	**Total demand - hot water**	**Storage volume @ 60 °C**	**Heater power[a]**
			[a]Direct electrical heating elements only
Clinics	120 to150 L/bed/d	30 to 35 L/bed/d	1.5 kW/bed/d
Colleges and schools:			
Day school	10 to 12 L/capita/d	5 to 6 L/capita	0.1 kW/capita
Boarding school[b]	50 to 115 L/capita/d	25 to 50 L/capita	0.5 to 0.8 kW/capita
[b]Excluding the kitchen but including the laundry.			
Dwelling houses:[c]			
Low rental	80 to 115 L/capita/d	100 to 150 L/unit	2 to 3 kW/unit
Medium to high rental	115 to 140 L/capita/d	40 to 50 L/capita	2 to 5 kW/unit
[c]Storage normally a minimum of 115 L with a 4 h heat-up period.			
Factories:			
Staff	10 to 20 L/capita/d	5 to 7 L/capita/d	0.1 kW/capita
Ablutions	30 to 60 L/capita/d	30 to 60 L/capita/d	1.5 to 2 kW/capita
Flats (blocks):			
Low rental	65 to 75 L/capita/d	20 to 25 L/capita	2 to 3 kW/unit
Medium to high rental	115 to 140 L/capita/d	25 to 35 L/capita	2 to 5 kW/unit
Hospitals:			
General	130 to 140 L/bed/d	25 to 30 L/bed/d	1 to 1.5 kW/bed
Infectious	220 to 230 L/bed/d	40 to 50 L/bed/d	1.5 to 2 kW/capita
Infirmaries	65 to 75 L/capita/d	20 to 25 L/capita/d	0.9 to 1.2 kW/capita/d
Infirmaries w/ laundry	85 to 95 L/capita/d	25 to 30 L/capita/d	1 to 1.4 kW/capita/d
Maternity	220 to 230 L/bed/d	30 to 35 L/bed/d	1.5 to 2 kW/bed
Mental	85 to 95 L/capita/d	20 to 25 L/capita/d	1 to 1.4 kW/capita/d
Nurses' homes	120 to 130 L/capita/d	40 to 50 L/capita/d	1 to .5 kW/bed
Hostels	80 to 120 L/capita/d	30 to 35 L/capita/d	0.8 to 1.1 kW/capita/d
Hotels:			
w/ resident staff	120 to 140 L/bed/d	50 to 70 L/bed/d	0.9 to 1.2 kW/bed
w/out resident staff	100 to 120 L/bed/d	40 to 60 L/bed/d	0.8 to 1.1 kW/bed
Kitchens: Full meal preparation	5 to 7 L/meal	5 to 6L/meal	0.1 kW/meal
Offices:			
w/ canteens	25 to 28 L/capita/d	20 to 25 L/capita/d	0.5 kW/capita
w/out canteens	10 to 12 L/capita/d	5 to 7 L/capita/d	0.1 kW/capita
Shops (staff only)	10 to 12 L/capita/d	5 to 6 L/capita	0.1 kW/capita
Sports pavilions (participants only)	30 to 40 L/capita/d	30 to 40 L/capita/d	1.5 to 2 kW/capita

Table 8: SANS 10252-1

Table 9 - Generic Geyser Capacity		
1	2	3
Geyser Capacity	**Element Capacity**	**Reheat Time @ 40 °C**
L	kW	h
50	2	1.16
100	2	2.32
150	3	2.32
200	4	2.32
250	4	2.9

Table 9: Source : Kwikot Domestic Product Specification Data

Table 10 - Generic Heat Pump Capacity	
1	2
Heat Pump Capacity	**Pump Flow Rate**
kW	L/h
3.0	85
3.5	75
4.7	110
5.5	110
6.5	150
7.0	150

Table 10: Source : Kwikot & Sirac Domestic Product Specification Data

Table 11 - Minimum Water Storage Capacity for Occupancies		
1	2	
Occupancies	**Minimum storage required**	
Boarding schools, children's homes or residential nurseries	4 h to 8 h demand	*Recommended amounts are shown.*
Commercial premises, including offices and shops	4 h to 8 h demand based on gross floor area	
Educational institutions	4 h to 8 h demand for the design population of the building	
Hotels, boarding houses, motels and nurses' homes	4 h to 8 h demand per bed space	
Hospitals, clinics, nursing homes	24 h demand for every bed the building is designed to accommodate	
All other buildings where continuous water supply is required, i.e. hairdressers	4 h demand per day	
Multiple storeys that exceed 25 m in height above the lowest ground level abutting on such building	8 h demand per dwelling unit	
Old-age homes	8 h demand per capita	

Table 11: Source : SANS 10252-1

Table 12 – Solar Absorbers (Ave. Efficiencies)	
1	2
Absober Type	**Ave. Efficiency**
	%
Aluminium tube-in-strip	57
Commercial radiator	56
Low-cost unit: Galvanized steel	56
Low-cost unit: Fibreglass	56
Galvanized steel pipe framework on copper strips	55
Black polyethylene piping	54
Two corrugated galvanized steel sheets	51
Corrugated galvanized steel sheet on flat galvanized steel sheet	50
Copper tube-in-strip	59
Two flat steel plates	49
Fibre cement, insulated	44
Fibre cement, uninsulated	35

Table 12: Source : SANS 10252-1

Table 13 – Selected Cities - Climatic data			
1	2	3	3
City	**Average annual wet bulb temp.**	**Expected temperature of water in mains**	
	Based on weather data between the hours of 09:00 and 21:00 (13 h); information accuracy of ± 0,5 °C.	*From the city mains supply at ± 0,5 °C.*	
	°C	°C	
	°C	**Low**	**High**
Alexander Bay	15.5	*Information not available.*	
Beaufort West	13.5	13.0	32.5
Bloemfontein	12.0	8.5	24.0
Cape Town	15.0	13.0	28.0
Durban	19.0	*Information not available.*	
East London	16.5	15.0	24.0
George	*Information not available.*	*Information not available.*	
Johannesburg	12.0	11.0	21.5
Kimberley	13.0	*Information not available.*	
Port Elizabeth	15.5	15.0	24.5
Polokwane	14.0	*Information not available.*	
Pretoria	14.0	12.0	24.5
Richards Bay	20.0	18.0	27.0
Upington	14.5	13.5	33.5

Table 13: Source : SANS 10252-1

Table 14 - Mean daily hours of sunshine (January to December)												
1	2	3	4	5	6	7	8	9	10	11	12	13
City	Mean daily sunshine											
	h											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Alexander Bay	10.2	9.7	9.1	8.9	6.1	8.5	7.5	8.3	9.1	9.6	10.2	10.3
Bloemfontein	9.7	9.0	8.4	8.4	8.6	8.5	8.8	9.3	9.3	9.3	9.9	10.2
Cape Town	11.1	10.6	9.4	7.7	6.4	5.9	6.2	6.8	7.5	9.0	10.3	10.8
Durban	5.9	6.5	6.6	7.0	7.2	7.5	7.5	7.0	5.9	5.4	5.6	6.1
East London	7.2	7.3	6.7	7.3	7.5	7.8	8.1	7.5	7.3	6.7	7.4	7.8
Escourt	6.9	6.8	6.9	7.2	8.2	8.2	8.5	8.1	7.4	6.7	6.5	7.1
George	8.4	7.6	6.9	6.9	7.0	6.8	7.3	7.2	7.0	7.3	7.7	8.0
Johannesburg	8.0	7.9	7.6	8.1	8.9	8.9	9.4	9.4	9.1	8.6	8.1	8.3
Kimberley	10.3	9.5	8.7	8.9	8.9	8.8	8.4	9.7	9.5	9.8	10.2	10.4
Mafikeng	8.9	8.9	8.1	8.2	9.2	8.8	9.4	9.5	9.1	9.1	8.6	9.2
Polokwane	8.3	8.1	7.7	8.1	8.8	8.8	8.8	9.2	9.0	8.5	7.8	8.1
Port Elizabeth	8.6	8.0	7.4	7.3	7.1	6.9	7.3	7.6	7.2	7.5	8.3	9.0
Pretoria	8.5	8.3	8.2	8.4	9.1	9.1	9.3	9.7	9.4	8.9	8.5	8.7
Upington	11.6	10.8	9.6	9.5	9.3	9.0	9.6	9.9	10.1	10.6	11.4	11.7

Table 14: Source : SAWB WS46

Table 15 - Mean daily total solar irradiation available (Horizontal surfaces)												
1	2	3	4	5	6	7	8	9	10	11	12	13
City	Mean daily total solar radiation available											
	MJ/m^2											
	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Alexander Bay	30.2	27.4	23.2	18.6	15.1	13.0	13.2	16.7	21.4	25.8	29.6	30.4
Bloemfontein	26.9	24.7	21.1	17.7	14.7	13.4	14.4	17.8	21.9	24.7	27.4	28.6
Cape Town	29.0	25.7	21.5	15.2	10.8	9.1	9.7	12.5	17.5	22.4	27.3	29.1
Durban	20.6	19.8	17.9	14.6	11.9	11.1	11.6	13.6	15.4	17.4	18.8	20.9
Grootfontein (C)	28.3	23.3	20.6	16.8	13.6	12.2	13.4	16.4	21.0	25.0	27.7	30.0
Kimberley	26.5	25.5	20.9	17.7	14.2	12.6	13.7	17.7	21.6	25.7	27.8	28.9
Nelspruit	20.6	22.2	20.6	16.4	15.0	14.4	14.7	16.7	18.6	19.7	19.0	20.8
Polokwane	25.6	23.3	21.9	18.8	16.8	15.4	16.4	18.6	21.5	25.5	25.4	25.7
Port Elizabeth	25.0	22.9	18.5	14.2	11.1	9.7	10.5	13.1	16.8	20.9	24.7	25.9
Pretoria (Forum)	24.2	22.8	20.3	16.7	15.2	13.9	14.9	18.0	21.7	22.9	23.9	25.2
Pretoria (Lynwood)	23.7	22.0	20.1	17.6	15.1	14.2	15.0	18.1	20.7	22.1	23.7	23.9
Roodeplaat	24.7	23.1	20.8	16.8	15.2	13.8	14.9	17.8	21.3	23.1	24.1	25.2
Upington	25.9	26.2	22.1	18.3	15.2	13.7	14.4	17.8	21.7	25.5	29.0	27.1

Table 15: Source : SANS 10252-1

Table 16 - Recommended pipe sizes (In-house installations, mains-fed type 3 WH)		
1	2	3
Pipe	**WH Pressure ≤ 200 kPa**	**WH Pressure > 200 kPa[a]**
	[a]Pressure rating of pressure control valve controlling supply to water heater exceeds 200 kPa.	
	Recommended pipe size (average internal diameter)	
Branch from service pipe to water heater	Larger of 19 mm and the service pipe	Smaller of 19 mm and the service pipe
Cold water feed to first branch		
Hot water feed from water heater to first branch		
All other pipes		

Table 16: Source : SANS 10252-1

* Suitable
Governed by Dealer.

Table 17 – Max. dead-leg piping lengths from a storage heater, or from take-off point from a hot water circulation system to a terminal water fitting	
1	2
Internal pipe diameter	**Maximum pipe length**
mm	m
≤ 19	12
> 19 and ≤ 24	8
> 24	3

Table 17: Source : SANS 10252-1

Minimum Information for Design Purposes

The following information, as applicable, will need to be obtained from the owner of the premises or from the water supply authority (relevant water supplier) in order to undertake the design of a water layout for any building:

a) a plan of the site, showing contours, proposed and existing floor or terrace levels (all related to a datum level) and the location and description of any existing services on the site;

b) the intended function of the premises and the types of activities to be carried out thereon;

c) drawings of buildings, showing
   1) points that require water supply, and
   2) the proposed type of sanitary fixtures and apparatus;

d) a schedule of sanitary fixtures and apparatus that require a water supply;

e) the design population of the premises and the times that the premises will be occupied;

f) the quantity of water and the water pressures required;

g) the nature of the subsoil on the site;

h) the quality of the water obtainable from the supply mains;

I) the static and, where possible, residual pressures in the water supply mains;

j) water quantities and flow rates obtainable from the water supply main for the various types of water demand;

k) if applicable,
   1) a schedule of acceptable pipes and water fittings, and the size of the water meter,
   2) requirements for drawings, and other information that has to be submitted in order to obtain approval for the water installation,
   3) any special precautions to be taken for the crossing of any other services on the premises, and
   4) details of any existing connections and services;

l) the location of the point of connection to the water supply main, or of the communication pipe;

m) details on the metering of the water installation; and

n) if the owner has to connect the water installation to the water supply, the following details:
   1) if the installation is to be connected either to the mains or to the communication pipe, details about the size and the type (material) of piping; and
   2) if the installation is to be connected to a water meter, details about the size and type of outlet from the meter.

Content for Water Layouts

The minimum information to be shown on a water layout (domestic & fire) should include the following:

a) the position and size of the communication pipe(s) serving the premises;

b) details of the water meter to be installed;

c) details of any booster connections or pumping equipment installed;

d) the location and size of every water fitting (incl. fire equipment);

e) the layout, material and size of the water pipe(s) (above and below ground);

f) the position and material of insulation (where required) applied to pipes(s);

g) the location and capacity of every storage tank (for domestic or fire purposes);

h) the location and capacity of every water heater, heat pump, solar water heater and secondary storage (where applicable), etc.;

j) the pressure for which the installation has been designed; and

k) the position of overflows.

Water Supply Pressures

eThekwini Municipality

Minimum supply pressure is 25 m in a full pressure connection area.
A minority of areas have a supply pressure less than 25 m due to design or operational contraints.

Where on-site pressures are measured lower than 25 m it is advised to design for such lower pressure unless the water service provider confirms otherwise. It is also advised not to design for current available supply pressures as pressures are actively lowered in many areas to protect infrastructure.

Do not design a water layout based on pressures available during peak useage periods. Such designs may result in under designed layouts or performance of fittings less than effective.

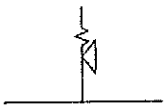
Other local authorities

For areas outside of the eThekwini Municipality – consult the local water service provider for details on available supply pressures.

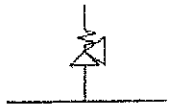
Do not design a water layout based on pressures available during peak useage periods. Such designs may result in under designed layouts or performance of fittings less than effective.

Water Supply in Buildings – Graphic Symbols

Dropper pipe (plan view, pipe cross-section)



Expansion control valve

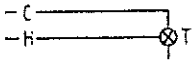


Expansion control valve
(incorporating vacuum relief)

Float valve

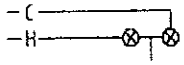
Isolating valve (screwed ends)
(manual control)

Lagged pipe

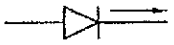


Mixer (thermostatically controlled)

Mixer (single manual control, single lever)

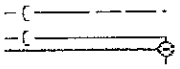


Mixer (two manual controls)

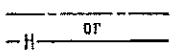


Non-return valve

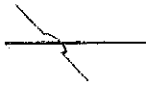
Normal direction of flow



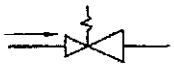
Pipe carrying cold water



Pipe carrying hot water



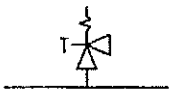
Pipe crossing (not connected)



Pressure control valve (PRV)

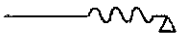
Pump

Riser pipe (plan view)



Temperature and pressure safety valve
(safety valve)

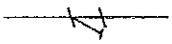
Shower (fixed)



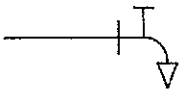
Shower (movable)

Stopcock

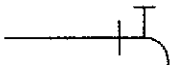
Storage water heater (domestic type)



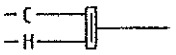
Strainer



Tap (external)



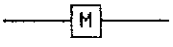
Tap (internal)



Thermostatic controller

Vacuum relief valve

Vacuum relief valve combined with
air release valve



Water meter