

5	WATER USE	5.P PREREQUISITE	
		WU P2 MINIMUM WATER SAVING PERFORMANCE	
	EXCLUSIONS	None.	
	OBJECTIVE	Reduce the consumption of fresh (potable) water through the application of water saving devices that have proven performance and reliability.	
	REQUIREMENT	Demonstrate that the use of water efficient devices leads to an estimated aggregate annual saving of 10%.	
	ASSESSMENT	<p>Given the paucity of available data for Hong Kong and variability of circumstances for different buildings and uses, BEAM seeks to provide flexibility in the assessment by:</p> <ul style="list-style-type: none"> allowing Clients to submit justification for the award of credits, or using the pro-forma calculation method described below. <p>Calculation shall be provided to determine the reduction of water consumption in the project space compared with a similarly occupied space whose water fittings and appliances conform to a baseline performance. Project teams may use the template as a point of reference when performing their calculations.</p> <p>The calculation takes into account the number of occupants, male to female ratio, and the number of operational days per annum. This information must be supplied by the Client and may be stated in the design brief or Owner's Project Requirements (OPR).</p> <p>Water use is based either on a 'per operation' basis or as the product of flow rate and operation time. The default assumptions for the calculation procedure are given in Appendix 8.6.</p> <p>Number of water devices installed and frequency of use must be the same for both the baseline and project case. Clients must provide the manufacturers' specifications for the performance of installed water devices.</p> <p>The Client shall submit a report that:</p> <ul style="list-style-type: none"> details all installed devices and their water consumption rate or discharge volume; and details devices installed to reduce the potential wastage of water due to unnecessary operation of taps, etc; <p>The submitted report shall contain the following information:</p> <ul style="list-style-type: none"> number of operational days per annum; number of occupants; and male to female ratio. <p>There should be two sets of tables, one for the project space, and one for the base line space.</p> <p>In the table, each type of water using device shall be listed and all data used shall be referenced to the source. The calculation shall include water taps for bath, basin, pantry, kitchen, and also shower heads, and exclude water closets, urinals, water features, appliances and irrigation. There should be separate entries for water use in male and female facilities. Tabular data should be similar to the following format:</p>	<p>1</p> <p>2 3 4</p> <p>5</p> <p>6</p> <p>7</p> <p>8</p> <p>9</p>

Water consumption of flow devices (faucets, showers, etc):

Device/ equipment	Rated Flow rate	Duration of each operation	Daily Number of Uses	Daily Water Use
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Water consumption of utensil washing operation by hand:

Device/ equipment	Water Use per operation or cycle	Daily number of operations	Daily Water Use
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The calculations can be summarised as follows:

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	Project case	Baseline case
Estimated total daily consumption (litres)		
Estimated total annual consumption (litres)		
Estimated annual savings (litres) and percentage:		

Where it can be demonstrated that the provision of equipment meets the intent, the requirement shall be fulfilled. Confirmation of the award of credits shall take into account the appropriateness of the data used and the estimated percentage of potable water saved.

BACKGROUND

Hong Kong differs from most other places in the world because most buildings have a saltwater flushing supply rather than using potable water. Therefore the scope for potable water reductions may be more limited here than elsewhere. Locally, neither the quantification of water use nor the potential for savings has been addressed in the research literature. Nevertheless, evidence from other countries suggests that reductions in water use may be achieved through the use of water efficient devices and automatic controls.

For the majority of projects, a limited amount of hand washing and perhaps some manual dish washing will take place in the pantry. It is not the intention to include water used for washing food or produce (required for hygiene), nor water used for coffee making machines, etc.

There is an increasing availability of devices and plumbing fixtures which have demonstrated an ability to save water over the lifetime of the system if installed and maintained properly. Flow rates can be controlled to reduce excessive discharge at taps, faucets and showers without detriment to the quality of water delivery. Substantial evidence shows that the use of water-efficient plumbing fixtures conserves water [1]. A number of studies in the U.S. have measured the impact of installing water-efficient plumbing fixtures through sophisticated sensors, before and after comparisons of water bills, or other means. Although the results varied, the studies generally concluded that low-flow fixtures are effective in saving water.

High efficiency devices include low flow rate faucets or faucets with aerated flows. However it must demonstrate that the actual quantity of water is reduced per standard operation (e.g. in the case of hand

1 United States General Accounting Office. Report to Congressional Requesters. Water Infrastructure. Water-Efficient Plumbing Fixtures Reduce Water Consumption and Wastewater Flows. GA RCED-00-23. August 2000.

8.6 ASSUMPTIONS AND BASELINES FOR WATER CONSUMPTION

NUMBER OF WORKING OR OPERATIONAL DAYS The number of operational days per annum (Nop) shall be obtained from the design brief or Owner's Project Requirement (OPR) document.

The number of non-operational days is equal to $365 - Nop$.

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The same values of operational and non-operational days will be used for both the project space and the base line space.

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OCCUPANCY CONSIDERATIONS

The number of occupants shall be taken from the design brief, or owner's project requirements (OPR). If this data is not obtainable then, in the absence of any other data, the occupant space allowance shall be taken as $9 \text{ m}^2/\text{person}$. [1]

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The male:female ratio shall be determined from the design brief or OPR. If the data is not available then the default assumptions are as follows:

- In offices, the male to female occupancy ratio is 1:1 [2]
- In public places, the male to female occupancy ratio is 1:1.25 [2]

The same occupancy load shall apply to the project space and the baseline space.

WC WATER USE

The base line building will have a single flush WC (i.e. no low flush option) with a flushing volume of 7.5 litres per flush. [3] The water closet, cistern and flushing fitting shall be of compatible types.

For non-residential,

Males use the WC once per day. If a dual flush system is installed in the project space, it is assumed that the WC will be flushed using the high flush volume.

Females use the WC five (5) times per day. If a dual flush system is installed in the project space, it is assumed that the average flush volume is equal to the average of one full flush and four low volume flushes for both males and females.

For residential,

Residents use the WC five (5) times per day. If a dual flush system is installed in the project space, it is assumed that the average flush volume is equal to the average of one full flush and four low volume flushes for both males and females.

The flow rate of the water appliance shall be read as an absolute figure irrespective of the working pressure in predicting the water consumption.

WATER USE IN URINALS For the purposes of calculation, the baseline building would have urinals fitted with 4.5 litres flush and manual controls. The urinal would be

- 1 Hong Kong Buildings Department (1996), Code of Practice for the Provision of Means of Escape in Case of Fire, Building Authority, Hong Kong.
- 2 Buildings Department. Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers. PNAP No. ADV-28 Provision of Sanitary Fittings in Offices, Shopping Arcades and Department Store, Places of Public Entertainment and Cinemas, May 2005.
- 3 Buildings Department. Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers. PNAP No. APP-99 Flushing Volume for Flushing Cisterns.

flushed after every use. Each male employees use the urinal on average four (4) times per day.

The water use in the project building would be based on the same number of male employees each using the urinals four (4) times per day. The calculation shall consider the actual flushing strategy employed.

An estimate of the potential water savings is not able to be determined as it would be influenced by the number of male employees and the time interval of flushing.

HAND WASHING IN REST ROOMS

- Number of hand wash operations per occupant per day = 5
- Hand washing time = 10 seconds

For the baseline building, the tap flow rate is 8.3 litres/min [4]

Note that to obtain significant savings the project space would need to install automatic controls such as proximity sensors to reduce the tap operation time to less than the default assumption of 10 seconds per hand washing operation.

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WATER USE IN PANTRIES/ KITCHEN

For non-residential,

- Number of pantry tap operations per occupant per day = 1
- Baseline faucet flow rate = 8.3 litres/min [4]
- Duration of use = 15 seconds
- Utensil washing operation carried out by hand = 6 litres of water per operation

For residential,

- Number of use per resident per day = 4
- Baseline faucet flow rate = 8.3 litres/min [4]
- Duration of use = 60 seconds

SHOWERS

- Number of use of shower per occupant per day = 0.1 (for non-residential)
- Number of use of shower per resident per day = 1 (for residential)
- The baseline shower flow rate = 9.5 litres/min [4]
- Shower duration = 5 minutes (300 seconds)

OTHER APPLIANCES/ EQUIPMENT

Justification for capacities of appliance/equipment used in the benchmark building shall be provided by making reference to regulations, standards, guides and other publication published by various authorities.

Water Use

Q1. WU P1 & WU 1, Do I need to consider the water pressure indicated in the baseline figures for different water appliances when predicting the water consumption?

Q2. WU P1, Is water sample necessary to be taken from the supply point of WSD for water quality analysis under WU P1?

Q3. WU P1, WU P2/WU 1, For BEAM Plus New Buildings / Existing Buildings Version 1.1 and 1.2, is a conceptual plumbing sketch satisfactory for PA stage?

No. The BEAM Plus requirement stipulates Main Contract documentation shall be provided, that means for PA tender stage, Contract specification, Plumbing Schematic, Plumbing layout drawings shall be submitted.

The standard for the schematic drawings (including vertical plumbing line diagrams (VPLD)) and layout drawings shall be at least WSD submission standard.

The Applicant shall provide clear and concise substantiation for every credit claimed, the submission shall be explained, comprehensive, with pertinent information highlighted and fully cross-referenced to all written submission. For example:

- Under the WU P1 - Water Quality Survey criteria should include the narrative, quality test parameters, the WSD standard plumbing schematic drawing and layout plans highlighting the water sampling locations, and clearly cross referenced to the submission;
- Under WU P2/WU 1 - Annual Water Consumption should include a descriptive narrative for the water saving philosophy, WSD standard plumbing schematic drawing (s) and plumbing layout drawings, highlighting tanks, pump(s), PRV(s), flow controllers, mpd level, operating pressure per floor, primary piping routes, and cross-referenced with all equipment schedules, sample technical catalogues, and calculations.

Conceptual documentation, and outline sketch type information does not meet the criteria. (Released on 25 June 2015).

Q4. WU 5, For BEAM Plus New Buildings Version 1.2, how is WU 5 applied to different building types?

Q5. WU 5, For BEAM Plus New Buildings Version 1.1, how is WU 5 applied to different building types?