

GUIDELINES FOR TREATED GREYWATER QUALITY - FOR RECYCLING OF GREYWATER FOR TOILET FLUSHING, GENERAL WASHING, IRRIGATION AND COOLING TOWER MAKE UP WATER

S.No	PARAMETERS	GUIDELINES FOR TREATED GREYWATER QUALITY – FOR RECYCLING OF GREYWATER FOR TOILET FLUSHING, GENERAL WASHING* & IRRIGATION*	GUIDELINES FOR TREATED GREYWATER QUALITY – FOR RECYCLING OF GREYWATER FOR COOLING TOWER MAKE UP
1	Odour	Non offensive	Non offensive
2	Colour	<15 (in hazen units)	<15 (in hazen units)
3	pH	6-9	6-9
4	Turbidity	<2 NTU	<2 NTU
5	Total Residual Chlorine	0.5 mg/ l to 2 mg/l	0.5 mg/ l to 2 mg/l
6	BOD ₅	<5 mg/l	<5 mg/l
7	Total coliform	<10 CFU / 100ml	<10 CFU / 100ml
8	<i>E.coli</i>	Non detectable / 100 ml	Non detectable / 100 ml
9	Total <i>Legionella</i> count	Not applicable	Non-detectable when tested using the latest ISO 11731, BS6068-4.12, or equivalent method that is able to test total <i>Legionella</i> count at or below 1000 CFU/Litre.
10	Standard Plate Count / Heterotrophic Plate count	Not applicable	Maximum 500 CFU/ml

***Note:**

Use of treated greywater for high pressure jet washing, irrigation sprinklers and general washing at markets and food establishments is not allowed to minimise risks and public health concerns.

SAMPLING REGIME FOR TREATED GREYWATER QUALITY – FOR RECYCLING OF GREYWATER FOR TOILET FLUSHING, GENERAL WASHING, IRRIGATION AND COOLING TOWER MAKE UP WATER

S/No.	Parameters	Sampling Frequency (Toilet Flushing, General washing & Irrigation)	Sampling Frequency (Cooling Tower Make up)
1	Odour	Non offensive at all times	Non offensive at all times
2	Colour	Monthly	Monthly
3	pH	Monthly	Continuous online
4	Turbidity	Monthly	Continuous online
5	Total Residual Chlorine	Continuous online	Continuous online
6	BOD ₅	Quarterly	Quarterly
7	Total coliform	Monthly	Monthly
8	<i>E .coli</i>	Monthly	Monthly
9	Total <i>Legionella</i> count	NA	Quarterly
10	Standard Plate Count / Heterotrophic Plate count	NA	Monthly

Note:

1. Necessary sampling points shall be installed (minimally at the treated greywater tank outlet) so that sampling can be done at the recommended sampling frequency above.
2. The testing of water samples shall be done by Singapore Accreditation Council (SAC)-SINGLAS accredited laboratories accredited for general water quality testing.

GREYWATER RECYCLING SYSTEM REQUIREMENTS

Public Health

- There shall be no reuse or recycling of black water (i.e. water from water closets, urinals, bidets) or kitchen wastes.
- The **treated** grey water:
 - i. shall be used strictly for non-potable use for the following applications:
 - flushing of water closet (WC)/Urinal
 - general washing (excluding high pressure jet washing and general washing at markets and food establishments)
 - irrigation (excluding irrigation sprinklers)
 - cooling tower make up water
 - ii. shall not contain harmful agents that cause infectious disease or endanger public health through human exposure by direct contact, ingestion, or inhalation.
- The water collection tank is to be mosquito-proof in accordance to the "Guidelines on Mosquito prevention in domestic rainwater collection system for non-potable uses". A copy of the Guideline is available at:
<http://www.nea.gov.sg/docs/default-source/training-knowledge-hub/guidelines-on-mosquito-prevention-in-domestic-rainwater-collection-system-for-non-potable-uses.pdf?sfvrsn=0>
- Equipment and devices for the conveyance, treatment, storage and use of the greywater shall be clearly labelled to show that the water in such equipment/devices is not for potable use. Pipes conveying greywater shall also be clearly labelled to show that the water being conveyed is not for potable use.
- The quality of the treated greywater shall not have any adverse impact on the environment and public health and the equipment, devices, pipes and materials with which the greywater comes into contact with. The treated greywater quality guidelines and sampling regime for greywater recycling systems are as above.

Potable Water Supply

- Alternatives such as back-up PUB water supply should be available in the event of power failure, overflows, equipment failure or maintenance shutdowns.

- For any PUB water back-up or make-up supply:
 - Double-check valves (complying with BS 5153) shall be installed after the service valve near the PUB water meter. It shall be ensured that there is no inter-connection between PUB water pipes and greywater pipes.
 - An air gap of at least 150mm shall be provided between the potable water inlet discharge point and top edge of the recycled greywater storage chamber.
 - PUB water supply to the premises shall be taken through a break tank installed near the PUB meter position.
 - Where the recycled greywater goes into a water closet (WC) flushing cistern which also receives PUB water supply, double-check valves (complying with BS 5153) shall be installed on the pipe supplying PUB water to the WC flushing cistern immediately after the service valve at the tee-off serving the flushing cistern.

- All water service work conveying PUB water shall be carried out by a licensed water service plumber in accordance with the Public Utilities (Water Supply) Regulations and the Singapore Standard CP48, Code of Practice for Water Services. A list of licensed water service plumbers can be found at:
<http://www.pub.gov.sg/general/watersupply/LicensedPlumbers/Pages/LicensedPlumbers.aspx>
r any PUB water back-up or make-up supply:

- All water fittings used for the conveyance, storage and use of PUB water shall comply with the standards and requirements stipulated by PUB. These stipulated standards and requirements for various water fittings can be found at:
<http://www.pub.gov.sg/general/watersupply/FittingsandStandards/Pages/FittingsandStandards.aspx>

Sanitary System

- Qualified Person of proposed development project shall submit the technical detailed plans showing the layout of the separate piping system for the collection of greywater to the greywater treatment unit and the sanitary piping systems for

disposal of used water to the public sewers, etc. and information, technical reports and documents as may be required through the Building Plan/Detailed Sanitary Plan submission process via Corenet e-submission or hardcopy (where necessary) to PUB.

Owners' Responsibilities

- Premises owners/developers are advised and reminded to:
 - Ensure that the greywater recycling system is designed and constructed in accordance with the requirements specified in the Technical Guide for Greywater Recycling System.
 - Ensure that the onsite greywater recycling system is operated and maintained appropriately according to system specifications/design.
 - Familiarise themselves with the type of system in place, the system's location, as well as its performance.
 - Ensure that the treated greywater quality guidelines can be met by the greywater treatment system in the premises.
 - Conduct regular maintenance and monitoring of the greywater recycling system
 - Take treated greywater samples at the recommended sampling frequency and keep proper records of the results to ensure that the treatment plant /system is working well without any water quality issues that may lead to public health concerns.

Greywater storage and cleaning practices

- Stored treated greywater shall be dosed with chlorine to maintain the required chlorine residual at all time. Stored greywater that does not conform to the required water quality shall be drain-off into the sanitary/sewerage system.
- Untreated greywater shall only be stored temporarily in the tank, for less than 24 hours.
- The greywater storage tanks shall be cleaned at least once annually.

For further information and requirements on greywater recycling, please email us at PUBone@singnet.com.sg