

Wastewater Management Range



MODULUS
modular wastewater treatment systems





The objective of this brochure is to introduce you to our range of Modulus Sewage Treatment Systems and also to provide background and general info for future owners and users of our Modulus Systems to help ensure that you chose the right Modulus system and that once installed it works satisfactorily for many many years.

Much of the technical information and background advise given is taken from British Water Codes of Practice and Flows and Loads documents which are supported by the Enviroment Agencies throughout England, Wales and Northern Ireland and SEPA in Scotland.

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Introduction

When taking a bath, using the washing machine or flushing the toilet few people stop to consider what happens to the wastewater and sewage. It simply goes down the drain or waste pipe and is no longer of any concern. But if the drains lead to a small wastewater treatment system then it is worth understanding what happens next to the sewage. If not then there is a risk that the safe and efficient operation of the treatment plant could be reduced with the risk of polluting the local environment and even facing possible prosecution as a result.

What is sewage?

Sewage is made up not of just the organic waste from toilets but also the chemicals and waste water from everyday activities such as washing, cleaning, cooking and washing clothes and dishes. The sewage from bathrooms, kitchens and toilets collects in a series of drains and flows into a sewer. In most households or commercial premises the sewage flows away through the sewers and is treated at a large-scale sewage treatment works, however, connection to a sewer is not always possible.

Options

For houses and premises in remote or isolated locations where no mains drainage is available other options, such as cesspools or septic tanks, have traditionally been used but now the use of a package sewage treatment plant is increasingly preferred. Cesspools do not “treat” the sewage in any way and have to be emptied regularly. Although septic tanks provide some partial treatment of the sewage the final effluent needs to be discharged through a network of specialised drains called a drainage field in which treatment of the sewage continues. It is vital a sufficient area of land is available, that ground conditions (permeability, groundwater level, etc) are suitable so that water logging does not occur and that the site is away from watercourses and sources of drinking water and dwellings. Where these requirements are not met and if there are other regulatory restrictions, and this is increasingly so, then a package sewage treatment plant is the appropriate option. A correctly designed and installed package treatment plant will be able to meet the stringent standards now being set by the regulations.

Owners' responsibilities

The owner of any non-mains sewage treatment system will require a “discharge permit” (EA) or “authorisation” (SEPA) or “consent to discharge” (NIEA) from the local environmental regulator before the system can be installed. The environmental regulators are for England and Wales the Environment Agency (EA, formerly called the National Rivers Authority), for Scotland the Scottish Environment Protection Agency (SEPA) and for Northern Ireland the Northern Ireland Environment Agency (NIEA). Users of treatment systems have a responsibility under the relevant water related legislation to ensure that the systems meet the standards set by the regulators. A correctly designed and installed system will provide a final effluent for discharging that meets these requirements. Once the system is commissioned and operating efficiently the environmental regulator may sample the discharge from the system to check that it meets the agreed standards. The environmental regulator also has the right to review and vary the discharge requirements that it sets. **It is therefore essential to regularly maintain and service the system to make sure it is running efficiently.**





Do's & Don'ts

There are many straight forward actions that the user can take to ensure that the system gives a satisfactory performance in treating the sewage and safely discharging the treated effluent to the environment.

These Do's and Don'ts offer simple and practical guidance to help achieve just that and get the best from your Modulus Sewage Treatment Systems .



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Do

- Think before putting anything down the sink , toilet or drains .
- Tell guests/visitors/staff that the drains do not flow into mains drainage but into a specialist sewage treatment system and tell them how to avoid harming it
- Use cleaning products little and often so the system isn't over loaded.
- Spread clothes washing through out the week and use the same washing and dishwasher liquid detergents and other cleaning products as being consistent will help the bacteria in the system to work more efficiently, as if the products in the sewage do not vary widely the bacteria can adapt to remove a wide range of products but as this can take a while the operation of the treatment system will be more consistent if the variability of the sewage is minimised.
- Use liquid cleaners for clothes washing and for dishwashers.
- Separately dispose of sanitary towels, tampons, disposable nappies, baby wipes, cotton wool, incontinence pads, etc. and not down the toilet.
- Take out a maintenance and service contract.

Don't

- Spring clean and use large amounts of cleaners and chemicals in one day.
- Have a “washing day” – spread the washing throughout the week.
- Use household bleach and other strong chemicals indiscriminately. The plant will not work properly as bleach kills of friendly bacteria(biomass growth).
- Keep changing the brands of household cleaners and washing powders.
- Tip bottles of medicine, mouth wash, etc. down the toilet .
- Put sanitary towels, tampons, disposable nappies, baby wipes, cotton wool, incontinence pads, etc. down the toilet.
- Over flush the toilet unnecessarily. Use a water saving flush if it's fitted
- Pour fat , grease or fatty gravy's or cooking or oil from the chip pan or directly from down the sink or drains.
- Use the waste disposal unit like a rubbish bin, use it sparingly if at all.
- Pour garden chemicals or car engine oil down the drains.

Impact of domestic equipment on your plant

Water softeners

To minimise the quantity of laundry detergents used it will be best to find out how hard the water is and to adjust the dosage accordingly. To help minimise the quantity of detergents used (soaps and household cleaning agents as well) – and save money – a separate water softener could be installed. As with all equipment, when using water softeners the manufacturers' instructions should be followed, especially as regards sizing, operation and installation. All domestic and commercial water softeners involve a salt regeneration process and salt in high concentrations can be harmful to biological treatment systems. When the softener regenerates a concentrated salt solution is used and there is a possibility that this could affect the performance of the sewage treatment system. However, if the softening equipment is correctly sized and installed and the treatment system is designed and sized correctly, with the knowledge that a water softener will discharge into it, then there should not be a problem with the treatment system and it should perform satisfactorily.

Waste disposal units

Depending on how frequently they are used, they can add a considerable extra load to the treatment system from the macerated vegetable wastes and other degradable organic material. It would be preferable to compost the vegetables peelings (it is cheaper and more environmentally friendly) and dispose of non-vegetable waste via another route.

Chemicals and products to be avoided

At all times there should be a cautious and careful use of all substances, chemicals and cleaning products within the home and wherever drains flow into the sewage treatment system. The manufacturers' use instructions should always be closely followed. The following products can all significantly and adversely affect the operation and efficiency of sewage treatment systems and so putting them down the sink, toilets or drains should be avoided if at all possible:

- External cleaning agents and disinfectants
- Cooking oil or melted fat e.g. from a grill tray or chip pan
- Medicines & mouthwashes
- Dairy waste
- Motor oils, antifreeze or other car products
- Garden chemicals such as pesticides, preservatives, weed
- Weedkillers or fertilisers
- DIY products such as paints, white spirit, paint thinners and
- Other solvents, glue
- Swimming pool water

This list cannot be totally comprehensive or exhaustive - just be careful and cautious before discarding any chemicals into the system - if in any doubt always responsibly dispose of it elsewhere.

Don't tip medicine, mouth wash etc. down the toilet Where cleaning agents are used for hygienic reasons obviously follow the use instructions but if possible spread out their use so that small amounts enter the treatment system at any one time, eg clean toilets on separate days rather than all on the same day. Select and use the most appropriate cleaning product bearing in mind the impact that it may have on the treatment system.



If you have an existing sewage treatment system and are considering replacement.

The law regarding discharges of domestic sewage effluent from septic tanks and sewage treatment plants has changed. Now under the Environment Agency's new Environmental Permitting Regulations, from the 6th April 2010 anyone intending to discharge 5 cubic metres per day or less to surface waters or 2 cubic metres per day or less to ground may be eligible for an exemption and will need to register before they commence making the discharge.

If correctly located, designed and installed, your existing system may provide many years of service, but must be properly maintained to reduce the risk of pollution. In many areas, dischargers will be eligible to register for a free exemption from having a permit. However discharges in areas at significant risk of damage from septic tank and treatment plant effluents will require a permit from the Environment Agency. Discharge consents or groundwater permits will automatically become an environmental permit when the new regulations come into force. Those people who currently hold a water discharge consent or groundwater permit will not have to re-apply. Those people who are unable to comply with the conditions for registration may need to apply for a full permit under the EPR or find an alternative method for effluent disposal

How to register

In April 2010 the Environment Agency will introduce a free system for registering exemptions. To be acceptable for registration, the occupier of the land on which an exempt small sewage effluent discharge is to take place must notify us of the relevant particulars relating to that discharge.

Information required includes:

- The name and address of the occupier
- Details of the location of the activity
- A description of the small sewage effluent discharge (including whether the equipment is new or is an existing installation)
- Agreement to comply with and abide by the conditions of registration



There will only be a need to register any septic tank or sewage treatment plant once. We may refuse to register a discharge where the activity will adversely affect the environment or human health. In such cases you will need to discuss your options with your local Environment Agency office. You may be able to apply for a permit.

Online : Registration can be completed via our website; people will need to provide the name and address of the property and the 12-figure National Grid reference of the discharge point.

Post : Paper registration forms will be available from the Environment Agency for those people unable to register online. They also need to provide a map indicating the discharge point (on a 1:2500 scale); maps can be obtained directly from Ordnance Survey or from its agents.

After 6 April 2010, anyone intending to discharge to surface waters will need to register before they commence making the discharge. Those who have already made a discharge should register as soon as possible after 6 April 2010. Anyone discharging - or intending to discharge to groundwater using a drainage field or infiltration system on land will need to register by 1 January 2012. It is illegal to discharge sewage effluent without either a registration or a permit. If the E.A. find septic tanks or treatment plants that discharge, and which should be registered, they will advise the user of the need to register and may take further enforcement action if necessary. Operators of registered sewage treatment systems will be required to properly maintain their systems and to keep records for a period of at least five years.

For more information about water quality exemptions conditions, please visit : www.environment-agency.gov.uk/business/topics/water/117481.aspx or contact your local E.A. office for advise.



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Nowhere are our innovation and design credentials more evident than in our Modulus range of wastewater treatment systems.

The origins of the design are based on larger municipal sewage works that you can see in major cities and towns. Having 3 main treatment module's

- Primary Settlement Module
- Biozone or Aeration Module
- Final treatment or Polishing Module



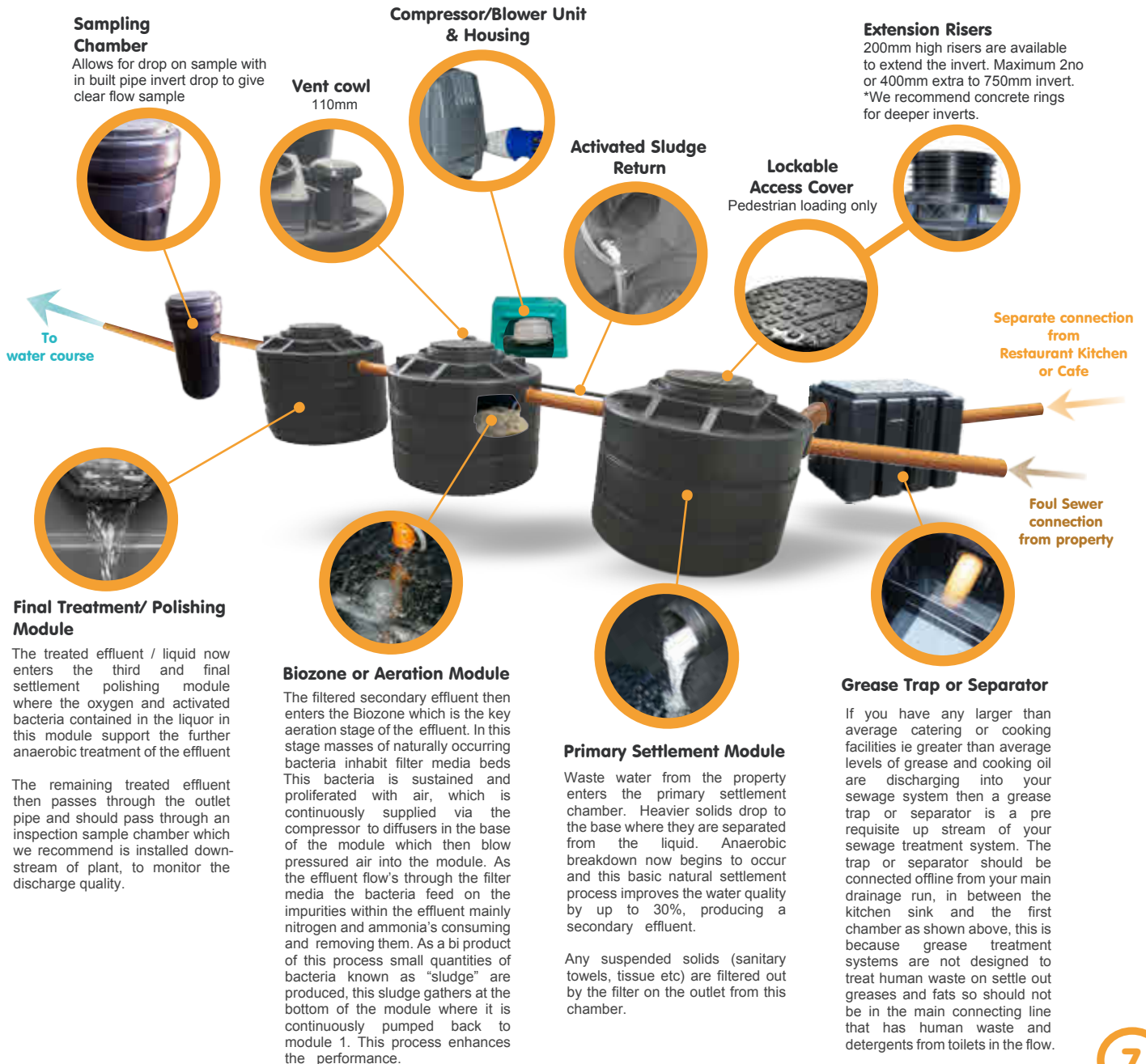
Designed and sized in accordance with British Water's code of practice - 'Flows and Loads' (see page 7 of this brochure). The design is ideally suited to serve a range of applications from small domestic residences to small communities and commercial properties.

As participating members of British Water's Package Treatment Plant focus group, we promote the continued development of British and European standards as well as the adoption of best practices in design, installation and maintenance.

Tested to the process requirements detailed in EN 12566:3 along with the required structural, water tightness and material tests, the Modulus remains at the forefront of pioneering design with low cost ownership and maintenance and offering a 50 year design life.



Illustration below details a typical Modulus installation. Plant shown is an M1





Flows & Loads

The table of Loadings detailed opposite was prepared by the British Water Package Sewage Treatment Plant Focus Group comprising all major manufacturers, suppliers and service companies of all types of small waste water treatment systems.

The Environment Agency, the Northern Ireland Environment Agency and the Scottish Environment Protection Agency support the use of this code of practice.

This table of loadings allows the total daily sewage load from properties to be calculated and it is recommended that all manufacturers and designers should use this table when sizing and designing non-mains sewage treatment systems.

The flows and loads values given represent current best knowledge within the UK but may change with time in line with per capita water use.

The user/purchaser should be made aware that there is a risk of poor performance from the equipment if loads are understated. The accuracy of the declared loads is of paramount importance. expected total load and the flow, considering both peak and total flow.

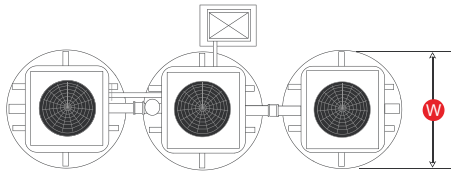
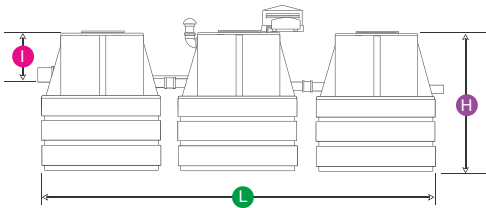
Guidance is provided to assist the user to identify the various sources of sewage, to consider the nature of the sewage to be treated and to make users aware of issues which may affect treat ability and system performance.

The table of loadings may be used to design all sizes of sewage treatment systems serving up to 1000 population.

Per person / activity / day (unless otherwise specified)

	FLOW (Litres)	BOD (Grams)	Ammonia as N (grams)
Domestic Dwellings			
Standard residential	180	60	8
Mobile home type caravans with full services	180	75	8
Industrial			
Office / Factory without canteen	50	25	5
Office / Factory with canteen	100	38	5
Open industrial site, e.g. construction, quarry, without canteen	60	25	5
*Full-time Day Staff	90	38	5
*Part-time Staff (4 hr shift)	45	25	3
Schools			
Non-residential with canteen cooking on site	90	38	5
Non-residential without a canteen	50	25	5
Boarding school (i) residents	200	75	10
(ii) day staff (inc. mid-day meal)	90	38	5
Hotels, Public Houses & Social Clubs			
Hotel Guests (Prestige hotels)	300	105	12
Hotel Guests (3H & 4H hotels)	250	94	10
Guests (Bedroom only – no meals)	80	50	6
Residential Training/Conference Guest (inclusive all meals)	350	150	15
Non residential Conference Guest	60	25	2.5
Drinkers 12 15 5			
Holiday camp chalet resident	227	94	10
Resident Staff 180 75 10			
Restaurants - Full Meals - luxury catering	30	38	4
- pre-prepared catering	25	30	2.5
- Snack Bars & bar meals	15	19	2.5
- Function Rooms including buffets	15	19	2.5
- Fast Food i.e. (roadside restaurants)	12	12	2.5
- Fast Food Meal (burger chain and similar)	12	15	4
Students (Accommodation only)	100	56	5
Amenity Sites			
Toilet Blocks (per use)	10	12	2.5
Toilet (WC) (per use)	10	12	2.5
Toilet (Urinal) (per use)	5	12	2.5
Toilet Blocks in long stay car parks/lorry parks (per use)	10	19	4
Shower (per use)	40	19	2
Golf Club	20	19	5
Local community sports club, e.g. squash, rugby & football	40	25	6
Swimming (A separate pool without an associated sports centre)	10	12	2.5
Health Club/Sports Centre	50	19	4
Tent sites	75	44	8
Caravan Sites :			
i) Touring not serviced	100	44	8
(ii) Static not serviced	100	44	8
(iii) Static fully serviced	180	75	8
Hospitals & Residential Care Homes			
Residential old people / nursing	350	110	13
Small hospitals	450	140	Assess
Large hospitals		Assess individually	
*Staff figures also apply to other applications			

MODULUS Range



M1	Hydraulic Flow (Litres/day)	1080
	BOD Loading (Grams/day)	360
I	Inlet Invert (mm)	350
H	Height (mm)	1100
L	Length (mm)	4200
W	Width (mm)	1260

M2	Hydraulic Flow (Litres/day)	1080
	BOD Loading (Grams/day)	360
I	Inlet Invert (mm)	500
H	Height (mm)	1610
L	Length (mm)	4200
W	Width (mm)	1260



M3	Hydraulic Flow (Litres/day)	2160
	BOD Loading (Grams/day)	720
I	Inlet Invert (mm)	500
H	Height (mm)	1610
L	Length (mm)	4200
W	Width (mm)	1260

M4	Hydraulic Flow (Litres/day)	3600
	BOD Loading (Grams/day)	1200
I	Inlet Invert (mm)	500
H	Height (mm)	2120
L	Length (mm)	4200
W	Width (mm)	1260

M5	Hydraulic Flow (Litres/day)	6300
	BOD Loading (Grams/day)	2100
I	Inlet Invert (mm)	500
H	Height (mm)	1920
L	Length (mm)	5200
W	Width (mm)	1560



M6	Hydraulic Flow (Litres/day)	9000
	BOD Loading (Grams/day)	3000
I	Inlet Invert (mm)	500
H	Height (mm)	1610
L	Length (mm)	7450
W	Width (mm)	2150

M7	Hydraulic Flow (Litres/day)	13500
	BOD Loading (Grams/day)	4500
I	Inlet Invert (mm)	700
H	Height (mm)	2350
L	Length (mm)	9500
W	Width (mm)	2150

M8	Hydraulic Flow (Litres/day)	18000
	BOD Loading (Grams/day)	6000
I	Inlet Invert (mm)	700
H	Height (mm)	2350
L	Length (mm)	9500
W	Width (mm)	2150



* Please Note : Modulus systems can be designed to handle loads up to 50,000 litres per day

Installation



MODULUS



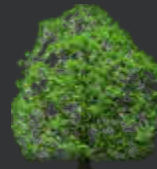
We recommend that in all ground conditions you install the Modulus in total concrete surround as detailed below.

1. Excavate a hole allowing for a minimum 150mm surround (sides and length) and a 150mm base slab.
2. Then pour a 150mm concrete base into the excavation and allowed to set and level.
3. The the three modules should be placed onto the concrete pad and all connections made.
4. Ensure the modules are level as they have a built in fall across the three modules.
5. Then fill all three modules with clean water through the manholes to the same level, around half way.
6. With the power connected check the compressor/blowers are working in the middle module so that bubbles are being created. Run the blower for around 30 minutes to check it and then switch off.
7. Pour concrete around the modules to the same level as the water inside and then allow to set.
8. Next fill all three modules to the top water level again using clean water and then a second concrete pour and level at 300mm from cover.
9. The excavation can be topped off with 300mm of top soil or stone if in garden or untrafficked area.
10. Ensure that the vent cowl attached to the middle chamber (circled in red below) is at least 100mm above finished surface level and has a free passage of air.
11. If other than pedestrian traffic then the system will need to be enclosed to prevent loading or a reinforced cover slab will need to be designed by a qualified engineer to support loading. In this case the plant will need a minimum of 600mm cover
12. Once installed your plant is ready to use and to ensure long term sustainability please ensure that the plant is serviced annually and desludged at least once a year.



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Moulding a sustainable future