

**Guidance on sizing of Package Sewage Treatment Plants****Purpose**

BCA technical guidance notes are for the benefit of its members and the construction industry to provide information, promote good practice and encourage consistency of interpretation for the benefit of our clients. They are advisory in nature, and in all cases the responsibility for determining compliance with the Building Regulations remains with the building control body concerned.

This guidance note is based upon information available at the time of issue and may be subject to change. The Approved Documents should be consulted for full details in any particular case.

Introduction

Part H1 of the Building Regulations 2010 requires that an adequate system of drainage should be provided to carry all foul water from a building to a range of outlets which are set in order of priority -

- A public sewer
- A private sewer connecting to a public sewer
- A septic tank which has an appropriate form of secondary treatment or another wastewater treatment system
- A cesspool

This guidance note provides information to assist in the sizing of self contained package sewage treatment plants for multi occupancy sites where no connection to either a foul or private sewer is possible.

Key Issues

It is important to size package sewage treatment plant correctly in order for it to function efficiently.

Manufacturers of package sewage treatment plants helpfully provide an indication of the population size that each individual unit will serve. However, these figures are for indicative purposes only and each unit should be designed on an individual basis depending on the individual characteristics of the scheme.

Information on sizing can be found in the British Water Code of Practice 'Flows and Loads – 3, Sizing Criteria, Treatment Capacity for Sewage Treatment Systems. (BW-FL3)

This document is available for download from:

http://www.britishwater.co.uk/publications/Publications_and_Technical_Guides.aspx

The use of BW-FL3 will help promote the design and installation of appropriately sized sewage treatment systems and reduce the problems associated with undersized systems causing environmental contamination.

Where the design population exceeds **50 persons**, BCB's will require that the design of the package sewage treatment plant should be carried out by a suitably qualified engineer.

Guidance

BW-FL3 contains a table of loadings that apply to domestic dwellings, with criteria given for flow (litres), biochemical oxygen demand (BOD) (grams) and Ammonia (Grams).

The loading values given for standard domestic residential developments are as follows:

Flow – 180 litres per person / activity / day
BOD – 60 grams per person / activity / day
Ammonia – 8 grams per person / activity / day

In order to determine the correct size sewage treatment plant the design population first needs to be calculated.

The following criteria are given in BW-FL3 to determine the design population:

- A treatment system for a single house with **up to and including 3 bedrooms** shall be designed for a minimum population (P) of 5 people.
- The size of a treatment system for a single house with more than 3 bedrooms shall be designed by **adding 1 P for each additional bedroom** to the **minimum single house value of 5 P**, eg:
 - house with 3 bedrooms = **minimum 5 P system**
 - house with 4 bedrooms = **minimum 6 P system (5+1)**
 - house with 6 bedrooms = **minimum 8 P system (5+3).**
- For groups of small 1 and 2 bedroom houses or flats
 - flat with 1 bedroom = **allow 3 P**
 - flat with 2 bedrooms = **allow 4 P**
- A treatment system serving a group of houses shall be designed by adding together the P values for each house calculated independently, eg:
 - for a group of two houses (3 and 4 bedrooms, respectively) the system shall be for a minimum of 11 P (5+6)
- **If the calculated total P for a group of houses exceeds 12 P then some reduction may be made** to allow for the balancing effects on daily flow of a group of houses (round UP not down)
 - **Where the total is 13-25 P** multiply the total by 0.9 to give an adjusted P value, e.g. if there are four four-bedroom houses the total P will be 24 P (4 x 6) and the adjusted P will be 22 P (24 x 0.9 = 21.6)
 - **Where the total is 26-50 P** multiply the total by 0.8 to give an adjusted P value, e.g. if there are four three-bedroom houses and three four-bedroom houses the total P will be 38 P (4 x 5 and 3 x 6) and the adjusted P will be 31 P (38 x 0.8 = 30.4)
- These are minimum recommended population (P) loads, they should not be modified downwards, upward modification may be necessary because of particular characteristics of each property or groups of properties.
- The above assessments of population (P) should be used for both existing and new properties,

Example of sizing of a package sewage treatment system for a residential development using BW-FL3

A residential development of 6 houses, comprising 1 no 5 bedroom, 3 no 4 bedroom and 2 no 3 bedroom houses. Using the guidance above, determine the design population as follows:

House with 5 bedrooms = **minimum 7 P (5+2) x 1 house = 7P**
 House with 4 bedrooms = **minimum 6 P (5+1) x 3 houses = 18P**
 House with 3 bedrooms = **minimum 5 P x 2 houses = 10P**

Initial Design Population = **7P+18P+10P = 35P**

As the Initial Design Population is within the range **26-50P a correction value** to allow for the balancing effects on daily flow of a group of houses of **0.8** can be applied.

The total design population is therefore:

35P X 0.8 = 28P

In order to determine the correct size sewage treatment plant the design population is multiplied by the values in the table of loads from BW-FL3 for domestic dwellings as follows:

Domestic dwellings – standard residential		
Flow – 180 litres per person / activity / day	BOD – 60 grams per person / activity / day	Ammonia – 8 grams / per person / activity / day
28X180 = 5040 litres	28x60 = 1680 grams	28X8 = 224 grams

When specifying and choosing a sewage treatment plant the above values should be checked with the manufacturer to ensure the package treatment plant chosen can meet the total predicted flows and loads. Manufacturers and many specialist suppliers offer technical advice including advice on design population, flows and loads and package sewage treatment plant sizing and it is recommended that this advice is sought when package sewage treatment plant are being specified for individual developments. The above BW-FL3 guidance is considered helpful in determining a headline check of package sewage treatment plant sizing and is the minimum information that NHBC Building Control will expect to be provided to justify package sewage treatment plant where they are proposed on residential developments.

Final discharge of effluent

In addition to the correct sizing of package sewage treatment plant, careful consideration also needs to be given to the final discharge from the plant which may be to a properly designed, sited and sized drainage field. It is likely that the written consent of the Environment Agency (EA) will be required and the EA should always be consulted before deciding on this option. A check should always be made of any restrictions made by the EA and the local planning authority. The exact area of land required for the drainage field will be determined by a percolation test. A competent person should carry this out.

Alternatively, if it is not possible to discharge to a drainage field it may be possible to discharge to a watercourse, coastal waters or to a surface water sewer. The receiving waters must be able to dilute the effluent so that it does not harm the environment. It is likely that the written consent of the EA will be required. If this option is chosen the EA should always be consulted. If it is proposed to discharge to a surface water sewer, it is likely that the consent of the sewer provider will be required, normally the local water authority.

The consent from the EA will set quality and volume limits. It is important therefore to seek advice from the EA on the likely effluent quality standard required before ordering the plant so that assurances can be obtained from the manufacturer that the plant will comply with these standards.

The BCB will require a copy of the written consent of the EA for the discharge arrangements where a package sewage treatment plant is proposed.

Further information on discharge from sewage treatment plant can be found in the EA document:

[Treatment and disposal of sewage where no foul sewer is available: PPG4](#)

Further guidance on siting of package sewage treatment plant and design and siting of drainage fields can be found in Section H2 of Approved Document H2 available for download from:

<http://www.planningportal.gov.uk/buildingregulations/approveddocuments/parth/approved>