

**IRISH
AGRÉMENT
BOARD**



BUILDING PRODUCT CERTIFICATION

CERTIFICATE No. 01/0120

Bio-Crete, Delaney Concrete Limited, Clonroche, Co. Wexford, Ireland.

Tel: 053 9244767 Fax: 053 9244764

e-mail: info@biocrete.ie

Bio-Crete Wastewater & Sewage Treatment System

Systèmes de Traitement des Eaux Résiduaires. Abwasser Aufbereitung

The Irish Agrément Board is designated by Government to issue European Technical Approvals.

Irish Agrément Board Certificates establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2000**.

The Irish Agrément Board operates in association with the **National Standards Authority of Ireland (NSAI)** as the National Member of UEAtc.



PRODUCT DESCRIPTION

The Bio-Crete Wastewater & Sewage Treatment System for Single Dwellings is a combined aerobic/anaerobic system to serve a population equivalent of up to 10 persons. It is manufactured from a nylon fibre reinforced concrete, is rectangular in shape and has five operating zones. It is designed to treat all liquid wastewater from the household (bathroom toilet, kitchen and laundry). After treatment the clear liquid is discharged by gravity to a percolation area or pumped if a raised bed percolation system is required.

MANUFACTURE AND MARKETING

The product is manufactured and marketed by:

**Bio-Crete
Delaney Concrete Limited
Clonroche**

Co. Wexford, Ireland.

Tel: (053) 9244767 Fax: (053) 9244764

USE

The product is for use in sewage treatment systems and for sewage collection systems designed in accordance with BS 6297: 1983 *Code of practice for design and installation of small sewage treatment works and cesspools*, for the collection of domestic sewage.

1.1 ASSESSMENT

In the opinion of the Irish Agrément Board (IAB), Bio-Crete Wastewater & Sewage Treatment System for Single Dwellings is satisfactory for the purpose defined above, and meets the requirements of the Building Regulations 1997 to 2000 as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997 to 2000**Requirement:****PART D - MATERIALS AND WORKMANSHIP.**

D3 – Bio-Crete Wastewater & Sewage Treatment System for Single Dwellings as certified in this Irish Agrément Board Certificate, is composed of "proper materials" and is fit for its intended use (see Part 4 of this Certificate).

D1 – Bio-Crete Wastewater & Sewage Treatment System for Single Dwellings, used in accordance with this Irish Agrément Board Certificate, meets the requirements for materials and workmanship.

PART H - DRAINAGE AND WASTE DISPOSAL**H1 Drainage Systems:**

The Bio-Crete Wastewater & Sewage Treatment System for Single Dwellings is easily installed and incorporated with soil percolation to meet Building Regulation requirements.

H2 Septic Tanks:

The Bio-Crete Wastewater & Sewage Treatment System for Single Dwellings has been designed for use in wastewater treatment systems, for the collection and treatment of domestic wastewater when installed in accordance with the recommendations of BS 6297:1983: *Code of practice for design and installation of small sewage treatment works and cesspools* and the EPA wastewater treatment manual – *Treatment Systems for Single Houses*.

The quality of treated wastewater from Bio-Crete Wastewater & Sewage Treatment System for Single Dwellings exceeds that of the effluent from a septic tank and will meet the Building Regulation requirements.

Information on the design capacity, ventilation, safety and location requirements is given in this Irish Agrément Certificate (see sections 2.4, 3.2 and 4.6 of this certificate). The Bio-Crete Wastewater & Sewage Treatment System for Single Dwellings can be used in domestic situations where septic tank systems are not acceptable, where sites do not comply with the recommendations of S.R.6. 1991 *Septic Tank Systems Recommendations for Domestic Effluent Treatment and Disposal from a Single Dwelling House* and/or where septic tank systems have been known to fail.

2.1 DESCRIPTION

The Bio-Crete Wastewater & Sewage Treatment System for Single Dwellings is a combined aerobic/anaerobic system to serve a population equivalent of up to 10 persons. It is manufactured from a nylon fibre reinforced concrete, rectangular in shape, has a low profile design and has five operating zones. It is designed to treat all liquid wastewater from the household (bathroom, toilet, kitchen and laundry). After treatment the clear liquid is discharged to a percolation area either by gravity or pumping.

The inlet and outlet pipes are 110mm diameter and the internal pipework system is constructed from 19mm diameter PVC-U except for the air supply for the sludge return which is a 10mm flexible pipe. The air blower is fitted in a chamber which is attached to the concrete cover of the system. The control unit for the system is located in the dwelling being served by the system.

**Table 1. Bio-Crete Wastewater Treatment System
— basic information**

Capacity (litres)	Total 4900
Primary Tank (litres)	2600
Aeration (twin zone) litres	1080
Clarifier (litres)	1040
Population served	10
Weight (kg)	4930
Inlet invert pipe depth	± 80 mm on entry of sewer pipe
Tank bottom	1580 mm below invert
Outlet pipe depth below invert of inlet	50 mm
Overall width (mm)	1200
Overall length (mm)	3400
Overall height (mm)	1930
Discharge pump rating (required for raised percolation only)	300W

Ancillary Items:

Pre assembled plumbing
Airpump
Diffusers
Media
In-house control unit
Distribution Box
Sump pump (required for raised percolation bed only)
Air hose
Sealants
SS Anchors
SS Hose clips
Connections and internal tee's
PVC-U inlet and outlet sockets
PVC-U underground drain pipes and fittings
Distribution chamber
Connection to vitrified clay pipes (where required)
Connections and ventilating pipes

The waste treatment is carried out in five stages in the various sections of the system as follows:

Section 1 is a septic settlement and sludge storage zone where normal anaerobic reduction in biochemical oxygen demand (BOD) takes place. It is fitted with baffles and a scum board.

Section 2 is an active biological aeration zone for treatment of residual solids and further reduction in BOD.

Section 3 is a further active biological aeration zone which effects nitrification and the conversion of ammonia to nitrate. Oxygen is fed to Sections 2 and 3 using fine bubble diffusers.

Section 4 is a clarification zone where the converted activated sludge/solids are allowed to settle out and the clear liquid discharged. The settled activated sludge is continually re-circulated by airlift to the primary chamber.

Section 5 is an anoxic zone designed to encourage denitrification by heterothopic bacteria. Disposal to the irrigation system is normally by gravity but may also be pumped where this is deemed necessary.

The Bio-Crete Wastewater Treatment System is designed for below ground installation and the tank is supplied with removable covers to permit inspection and maintenance. A schematic layout of the system is shown in figure 1.

The system is supplied with float switch operated alarms that indicate both pump failure and high water level.

2.2 MANUFACTURE

The Bio-Crete tank unit is rectangular in shape and is manufactured in a single pour from nylon fibre reinforced concrete and the cover is manufactured from conventional reinforced concrete. When the tank is cured the divider walls are inserted, chemically sealed and mechanically anchored. All plumbing joints are mechanically abraded and solvent sealed. Pre jig cut media are assembled at the works and the cover fitted and sealed. The air pump is fitted in the cover with its air hoses and stainless steel hose clips. The concrete tank is checked by visual inspection and the plumbing assemblies are live tested under working pressure before installation in the tank.

Quality Control

Quality control includes industry standard cube testing, wall thickness checks on concrete components, and the checking of bought-in components against specification. Each completed unit is inspected before delivery.

2.3 DELIVERY, STORAGE AND MARKING

The tanks are completed ready for delivery at the manufacturer's works. The Bio-Crete Wastewater Treatment System must be lifted with slings at the points recommended by the manufacturer. Off-loading must be carefully supervised using chains, steel cables or lifting bars rated in excess of 5 tonnes. Lifting equipment should be selected by taking into account the unit weight, dimensions and the distance of lift required. The weight of each unit empty is given in

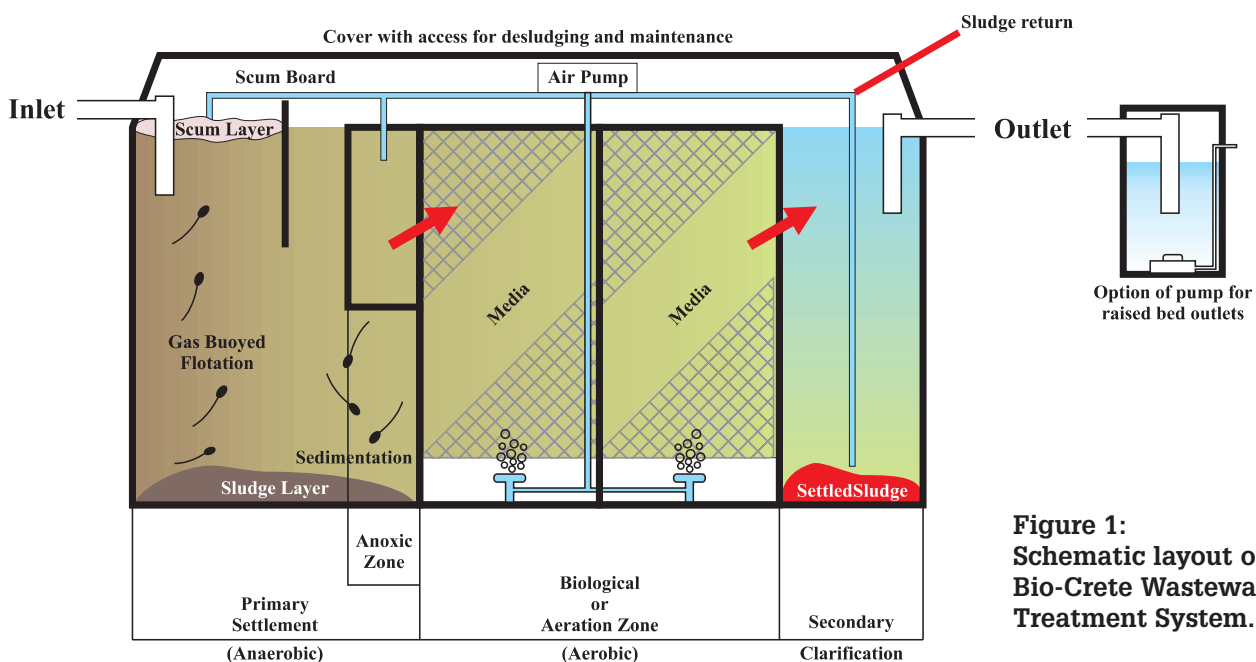


Figure 1:
Schematic layout of the Bio-Crete Wastewater Treatment System.

Table 1 and should conform with the requirements of the Safety Health and Welfare at Work Act, 1989. The manufacturer's instructions must be followed to avoid damage to the tanks during off-loading and placing in the excavation. A crane or other suitable lifting equipment must be employed. It is the manufacturer's policy to deliver and install each unit using factory transport complete with a lifting crane.

The product bears the manufacturer's name, labels denoting the inlet and outlet, a list of all the items supplied, installation and operating instructions, the product specification code, serial number and the inspection date. An external label indicates the IAB identification mark incorporating the certificate number.

2.4 INSTALLATION PROCEDURE

2.4.1 GENERAL

Delaney Concrete Limited provide a service for the design, site survey and installation of Bio-Crete Wastewater Treatment System units. They will also advise clients of the installation requirements, or provide supervision of installations carried out by others.

Electrical connections to the Bio-Crete Wastewater Treatment System from the control box must be carried out by a competent qualified person using material suitable for the purpose.

Electrical connections must be in strict accordance with the manufacturers instructions and must comply with The National Rules For Electrical Installations (ETCI), published by the 'Electro-Technical Council of Ireland (Document No. ET101 : 2000).

The electrical control panel is located in the dwelling served by the unit. However, electric cables to the unit must be protected from accidental damage by a suitable conduit or other means of protection.

The Bio-Crete Wastewater Treatment System must not be installed in areas liable to localised flooding without adequate protection as specified by the manufacturers.

Also storm water drainage from the dwelling must be excluded from the unit.

It is essential to take precautions to prevent damage by site traffic.

Superimposed loads from vehicles etc. should not be permitted within a distance equal to the depth of excavation, unless suitable structural reinforcement is provided. A suitable fence should be erected to prevent vehicles and farm animals from approaching too close to the unit.

The Bio-Crete Wastewater Treatment Unit may be installed buried up to 2m below ground level (modular risers are available when the unit is installed at depths below 1m). The excavation must be large enough for easy placement of the unit, to permit subsequent backfilling and to allow timbering and sheeting as required to meet The Safety, Health and Welfare at Work Act, 1989.

The units may be bedded on firm excavated ground or where necessary onto concrete, which is haunched up

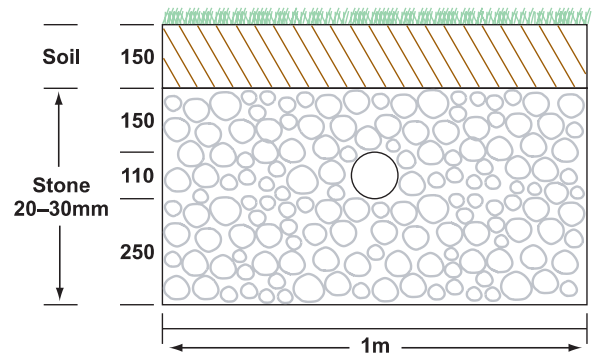


Figure 2: Showing a cross-section through a percolation trench.

around the base of the unit. The concrete must be of sufficient thickness (minimum 150mm) and grade 25N to ensure that the unit is adequately supported with due regard to sub-soil conditions and loads imposed by the Bio-Crete Wastewater Treatment System when full. (Care must be taken to eliminate voids). All water and boulders must be removed from the excavation before installation of the unit. When installed the top flange must be level .

The backfill must be carefully consolidated around the Bio-Crete unit with all large stones/boulders removed to ensure even transfer of ground loads and to prevent localised stress concentrations. The Bio-Crete Wastewater Treatment System should be ballasted while backfilling with water keeping the water level just above the backfill level as work progresses.

Pipe Connections

The tank is connected to 110mm PVC-U pipes as required at the inlet and outlet. For other types of pipe such as vitrified clayware etc. suitable adapters are used with short lengths of PVC-U pipe as necessary. A short length of pipe with flexible joints must be used adjacent to the Bio-Crete Wastewater Treatment System, to allow for differential movement between the tank unit and adjacent pipe runs.

2.4.2 LOCATION

The Bio-Crete Wastewater Treatment System location should be chosen so that adequate access is available for site installation and subsequent maintenance and desludging of the unit. Desludging should be carried out by means of a desludging tanker which requires access to within 10m of the unit, whilst maintaining appropriate separation distances from the Bio-Crete Wastewater Treatment System unit and the effluent percolation system given in Table 2. Ventilation must be provided in accordance with the Building Regulations 1997 to 2000.

2.4.3 TREATED WASTEWATER DISPOSAL

General Principles

The Bio-Crete Wastewater Sewage Treatment System for single dwellings produces treated water, (BOD 20mg/l, suspended solids < 30mg/l), which is more easily absorbed into soil strata than septic tank effluent.

Table 2

FEATURE	MINIMUM SEPARATION (m)	
	Bio-Crete	Irrigation Area
Dwelling served	7 ⁽¹⁾	10 ⁽³⁾
Adjacent dwelling	7 ⁽¹⁾	10 ⁽³⁾
Wall	3 ⁽¹⁾	3
Road	4 ⁽¹⁾	4
Site boundary	3 ⁽¹⁾	3
Potable water source	10	30—100 ⁽²⁾
Watercourse	10	10

(1) The depth of excavation to accommodate the Bio-Crete Unit must be taken into account when determining this distance. The separation distance should be such that the excavation does not undermine adjacent buildings, roads or walls. This distance should be not less than 1.5 times the excavation depth.

(2) The separation distance should be not less than 30 metres except in the case of very free draining soils or gravels, where a minimum distance of 40 metres should be maintained. The irrigation area should be down hill of any nearby well. Where this is not possible, a separation distance of at least 100 metres must be maintained.

(3) These are minimum permissible distances. However, where the site permits, irrigation areas should be located at greater distances from the dwelling. Also where practicable on sloping sites the irrigation area should slope from the dwelling.

The choice of disposal method will be largely determined by the percolation characteristics of the site soil which can be quantified by various criteria notably the “T” value resulting from a percolation test, as set out in SR6: 1991.

There are three possible methods for disposal of the treated wastewater

- Sub-Surface percolation, or
- Raised percolation bed, or
- Discharge to surface water, either directly or following a polishing filter. (A licence must be obtained from the relevant local authority if this option is chosen).

In the event of the site failing the “T” test it may be necessary to construct a raised percolation area.

In any event a site suitability report including a detailed visual inspection of the site, inspection of a trial hole for soil profile, depth of water table, and percolation value, should be carried out together with local knowledge as

appropriate. This report should be used to ascertain the size and type of percolation area required.

The results of this assessment will enable the selection of the most suitable method for disposing of the final treated effluent, having regard to soil type, percolation characteristics, water table level and other factors. The disposal method will be either to sub-surface percolation, raised percolation area or direct to surface waters by licence. This licence should be obtained from the relevant local authority. Reference should also be made to the following publications:

(a) Wastewater Treatment Manual – *Treatment Systems for Single Houses* published by the EPA.

(b) *Ground Water Protection Responses for On-Site Wastewater Systems for Single Houses* published by EPA/DOELG/GSI (2001).

Guidance for sizing of the percolation area is set out in Table 3. Treated wastewater is discharged from the Bio-Crete Wastewater Treatment System by gravity or by pumping if a raised bed facility is required.

(a) Sub-surface percolation

Where sub-surface irrigation is to be used the extent of the treated wastewater disposal area will be based on the results of percolation tests.

The treated wastewater discharges, by gravity, into a network of perforated 110mm diameter pipes laid in stone filled trenches (see Fig. 2 and Fig. 3). The objective is to spread the treated wastewater as evenly as possible over the required land area, thus minimising the possibility of the ground becoming over-saturated.

The discharge from the Bio-Crete Wastewater Treatment System has minimal suspended solids and is, therefore, much more readily absorbed than septic tank effluent. The extent of the irrigation system may be determined by the site assessment, taking into account the soil type and percolation test results, as well as the population to be served. The values listed in Table 3 are given for guidance only, the layout and size of the percolation area should be established on the basis of the results of a site survey carried out by a competent person.

The percolation area will be equivalent to the linear pipe length as shown in Table 3.

Trenches are generally 450-1000mm wide with the pipes laid on 250mm of clean 15-25mm stone and covered with a polyethylene or geo-textile soil barrier. Layout of

Table 3: Guidance for sizing of percolation area (in linear metres of percolation pipe)

Estimated maximum number of people in the house based on number of bedrooms	Required length of trench in (m) for “T” values 21-50* (loading at 25 l/m ² .d)		Required length of trench in (m) for “T” values 5-20†† (loading at 50 l/m ² .d)	
	Trench width		Trench width	
(2 persons per bedroom)	450mm	1m	450mm	1m
4	64	29	32	14
6	96	43	48	22
8	128	58	64	29
10	160	72	80	36

†† For percolation values “T” <5

* For percolation values “T” >50

} consult the manufacturer for details of the percolation area required.

the trenches will be determined by site topography, the overall fall of the pipes should be not more than 1 in 200. The pipes should be at least 1 metre above the highest water table level, fissured rock strata or impermeable soil layer.

(b) Raised percolation bed

Where the irrigation pipes have to be above existing ground level: e.g. thin topsoils and/or rock or water table close to the surface, a raised or banked-up irrigation system may be suitable. In this situation a pumped discharge would be required (see Figure 3).

(c) Discharge to a watercourse

Where poor soil percolation or other factors make a subsurface irrigation system impractical; discharge to a watercourse may be considered. This will require a licence from the relevant local authority, setting the minimum acceptable discharge quality. The treated wastewater is filtered through a layer of sand or topsoil before passing to the watercourse.

Inspection access to all treated wastewater irrigation systems should be provided at the end of the percolation system via a suitably constructed inspection chamber.

Further treatment

In some instances (e.g. proximity to a drinking water source), the wastewater may require 'polishing' before discharge to reduce coliform bacteria levels. A commonly used method is to pass the discharge through a stratified sand filter. The Bio-Crete Wastewater Treatment System discharge is pumped to the filter. Polishing filters can be provided on request as an additional item with the system

2.5 COMMISSIONING

Commissioning by a competent person should be carried out after installation and this service is available from the installer or designated service provider.



Figure 3. Section through a banked-up percolation trench.

PART 3 DESIGN DATA

3.1 GENERAL

The Bio-Crete Wastewater Treatment System is suitable for the collection and treatment of domestic sewage and should be installed in accordance with the manufacturer's instructions and to conform with the recommendations of BS 6297: 1983 *Code of practice for the design installation of small sewage treatment works and cesspools*. It is important that the loadings are based on the maximum population to be served.

Bio-Crete Wastewater Treatment System should be sited in accordance with the relevant Building Regulations.

Ground water and flood levels should always be below plant outlet level.

The discharge from the Bio-Crete Wastewater Treatment System must be to a suitable sub-soil percolation system, raised percolation bed, or watercourse to the requirements of the Local Authority.

The treated wastewater resulting from the sewage treated by the Bio-Crete Wastewater Treatment System will normally have the characteristics shown in Table 4 (i.e. suspended solids content less than 30 mg per litre and Biochemical Oxygen Demand (BOD) less than 20 mg per litre) provided that the hydraulic and BOD loadings are within the limits recommended by the manufacturer for the unit installed (180 litres per head per day and 60 grammes per head per day, respectively). Under certain unusual conditions the resulting wastewater may be in excess of this. This is normal for any biological sewage treatment process, and can be caused by unusual hydraulic or BOD loading, weather conditions, contamination by excessive quantities of (a) offal and grease, (b) household disinfectants, (c) detergents or poisoning of microbiological flora and fauna by other chemicals.

3.2 DESIGN BASIS

The relevant dimensions and capacities of the Bio-Crete Wastewater Treatment system covered by this Irish Agrément Board certificate are shown in Table 1.

System Alarm – Water level

All units are fitted with a warning device, connected to an alarm. This alarm system will be activated by a power surge, power failure or high water level within the unit.

A short period of acclimatisation must be allowed after commissioning of the unit before a full level of treatment can be expected. This period is generally a few weeks and is normal for any biological treatment plant.

3.2.1 WASTEWATER QUALITY

Table 4: Treated wastewater characteristics:

	Standard
pH	6 - 9
Biochemical Oxygen Demand	<20 mg/l
Suspended Solids	<30 mg/l
Ammonia	<10 mg/IN
Total Phosphorus	5mg/IP *
E. coli (by soil treatment or disinfection)	

* This number will depend on the use and quantities of detergents used in the dwelling served by the system and could result in a higher figure.

PART 4 TECHNICAL INVESTIGATIONS

4.1 ENVIRONMENTAL ASSESSMENT

The treated wastewater from a number of working installations has been comprehensively monitored for 12 months. The test results show that values stated for the parameters listed in Table 4 are consistently achievable over a range of operating conditions.

4.2 STRENGTH

The manufacturer's design has been assessed as satisfactory. The tank has adequate resistance to withstand impacts during handling and placing and should prove satisfactory when installed in accordance with this Certificate. The manhole covers are suitable for pedestrian traffic.

4.3 LIQUID WATER PENETRATION

The tank with its pipe connections, when correctly installed, has been assessed as fully capable of preventing seepage either into or from the surrounding soil. The pipe joints, when correctly made, will be watertight.

4.4 DURABILITY

The Bio-Crete Wastewater Treatment System when installed, used and maintained in accordance with the requirements of this Irish Agrément Board Certificate, will have a life in excess of 60 years in normal soil conditions. Sites with aggressive soil conditions such as landfill sites or sulphate bearing soils will require an appropriate cement type and content, reinforcement type and concrete strength as specified by the manufacturer.

4.5 CLEANING AND MAINTENANCE

Cleaning and maintenance should be carried out in accordance with the Operation and Maintenance Instructions supplied by Delaney Concrete Ltd. The manufacturer also provides a maintenance contract.

Summary of maintenance instructions

The Bio-Crete Wastewater Treatment System is desludged by a suction tanker. Care must be taken to avoid damage by the hose nozzle. The primary settlement zone only must be desludged in accordance with the manufacturer's recommendation. For the average dwelling this may require cleaning once every 12 months.

4.6 SAFETY

4.6.1 SAFETY OF PERSONNEL

The tank cover is securely fixed to prevent unauthorised access. The cover must not be left off an unattended tank. Tanks are potentially dangerous, particularly when being desludged. Desludging must never be carried out alone. Tank entry should not be attempted except by trained personnel. Naked flames, which can cause explosions, must not be used in the vicinity at the tanks.

All Bio-Crete Wastewater Sewage Treatment systems should be located, positioned and marked to prevent superimposed loading or accidental impact by vehicles.

4.6.2 SAFETY OF SYSTEM

The Bio-Crete Wastewater Treatment System has a holding capacity of 1.8m³ to cater for breakdown. All Bio-Crete Wastewater Treatment units are fitted with a warning and alarm system. The alarm will be activated by a power surge, power failure or high water level within the unit.

4.7 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE

Watertightness.
Strength of covers.
Resistance of units to hydrostatic and ground pressure.
Resistance to flotation
Environmental performance

4.8 OTHER INVESTIGATIONS

- (i) Existing data on the history of use of previous installations.
- (ii) The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.
- (iii) Site visits were conducted to assess the practicability of an installation.
- (iv) A user survey and visits to established sites were conducted to evaluate environmental performance in use.
- (v) To date no failures of the product in use have been reported to the IAB.

5.1 CONDITIONS OF CERTIFICATION

The National Standards Authority of Ireland ("NSAI") following consultation with the Irish Agrément Board ("IAB") has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this certificate and in accordance with the manufacturer's instructions and usual trade practice. This certificate shall remain valid so long as:

- (a) the specification of the product is unchanged;
- (b) the Building Regulations, 1997 to 2000 and any other regulation or standard applicable to the product/process, its use or installation remain unchanged;
- (c) the product continues to be assessed for the quality of its manufacture and marking by NSAI;
- (d) no new information becomes available, which in the opinion of the NSAI would preclude the granting of the certificate;
- (e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.

5.2 The IAB mark and certification number may only be used on or in relation to products/processes in respect of which a valid certificate exists. If the certificate becomes invalid, the certificate holder must not use the IAB mark and certification number and must remove them from products already marked.

5.3 In granting this certificate, the NSAI makes no representation as to:

- (a) the presence or absence of patent rights subsisting in the product/process; or
- (b) the legal right of the certificate holder to market, install or maintain the product/process; or
- (c) whether individual products have been manufactured or installed by the certificate holder in accordance with the descriptions and specifications set out in this certificate.

5.4 This certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this certificate relating to the safe use of the certified product or process are preconditions to the validity of the certificate. However, the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act, 1989 or of any other current or future statute or current or future common law duty of care owed by the manufacturer or by the certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage, including personal injury, arising as a direct or indirect result of the use of this product or process.

5.7 Where reference is made in this certificate to any Act of the Oireachtas, regulation made thereunder, statutory instrument, code of practice, national standards, manufacturer's instructions or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this certification.

THE IRISH AGRÉMENT BOARD

This Certificate No. 01/0120 has been granted by the NSAI to Bio-Crete, Delaney Concrete Limited on behalf of The Irish Agrément Board.

DATE OF ISSUE: April 2001.

Signed: _____



Chief Executive, NSAI

Readers may check that the status of this Certificate has not changed by contacting the

Irish Agrément Board,
NSAI, Glasnevin, Dublin 9. Ireland.

Telephone: (01) 807 3800.
Telefax: (01) 807 3842.



BUILDING PRODUCT CERTIFICATION

**Irish Agrément Board,
NSAI,
Glasnevin,
Dublin 9.
Ireland.**

**Telephone: (01) 807 3800.
Telefax: (01) 807 3842.**