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Date of Authorization  
BMEC Authorization  
BMEC Application

July 25, 2002  
BMEC# 02-04-275  
#A2002-07

Date of Amendment  
BMEC Application

January 29, 2004  
#A2003-10

\* Denotes January 29, 2004 amendment

Date of Amendment  
BMEC Application

April 28, 2005  
#A2005-06

\*\* Denotes April 28, 2005 amendment

Date of Amendment  
BMEC Application

March 29, 2007  
#A2007-02

◆ Denotes March 29, 2007 amendment

Date of Revision

March 29, 2012

+ denotes March 29, 2012 revision

## AUTHORIZATION REPORT - BIODIFFUSER™: Bio 2, Bio 3, and ARC 24 Chamber Systems

### + 1. Applicant

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### 3. Description

- ◆ BioDiffuser™: Bio 2, Bio 3, and ARC 24 Chamber Systems (“BioDiffuser™ Chambers”) are intended for use in a sewage system in lieu of absorption trenches constructed of stone and distribution pipe.
- ◆ The Bio 2, Bio 3 and ARC 24 Chamber Systems are formed from injection moulded polyolefin and are connected end-to-end using a built-in latch.

The Bio 2 model chambers have an actual bottom width of 381 mm and an actual height of 302.3 mm. The BioDiffuser™ Chambers are closed at the ends of a trench with snap-on end plates. The Bio 3 model chambers have an actual bottom width of 558 mm and an actual height of 302.3 mm. The side walls of both models are louvered and extend to a height of 239.4 mm, of which 57% is open.

- ◆ The ARC 24 model chamber has an actual bottom width of 571.4 mm and an actual height of 304.3 mm. The ARC 24 Chamber is closed at the ends of a trench with snap-on end plates. The ARC 24 Chamber has a length of 1524 mm. The side walls of the ARC 24 Chamber is louvered and is 54% open.

### 4. Authorization Requested

The applicant sought authorization for use of the BioDiffuser™ Chambers as an alternative to the construction of stone and distribution pipe in as required by Section 8.7. of the Building Code. The applicant requested that the BioDiffuser™ Chambers be used to replace stone and distribution pipe in absorption trenches and filter beds that are:

- i. gravity fed,
- ii. “dosed” (non-pressurized distribution system) and,
- iii. pressurized.

Note: For the purposes of this authorization, “dosed” means a system in which effluent is pumped to the leaching bed either by pump or siphon, but the effluent is not pressurized within the leaching bed.

### 5. Assessment

Reports and assessments provided by the applicant show that if the BioDiffuser™ Chambers are designed, performance tested, installed and maintained in accordance with the limitations in the manufacturer's instructions and the conditions stated in this authorization, a level of performance will be provided as required by the Building Code, for absorption trenches in soil, in leaching bed fill or in a filter bed, whether gravity fed, pressurized or “dosed”.

Reports submitted and reviewed:

1. International Association of Plumbing and Mechanical Officials, "Materials and Property Standards for Plastic Leaching Chambers", IAPMO PS 63-99a.
2. Certificate of Listing, IAPMO Research and Testing, Inc. dated June 2002.
3. ADS: Products Notes: Product Note 3.121A: Re: BioDiffuser™: Bio 2 and Bio 3 Chamber, Installation Guidelines, dated August 10, 2000.
4. BioDiffuser™: Bio 2 and Bio 3 Leaching Bed Chamber Drawings.
5. BioDiffuser™: Bio 2 and Bio 3 Leaching Bed Chamber Specifications Data Sheet.
6. Letter of approval from the Illinois Department of Public Health, dated March 5, 2001.
7. Letter of approval from the State of Maine: Department of Human Services, Division of Health Engineering, dated March 9, 2001.
8. Letter of approval from the State of New Hampshire: Department of Environmental Services, dated April 5, 2001.
9. Letter of approval from the Ohio Department of Health, dated September 21, 2000.
10. Letter of approval from the State of New York: Department of Health, dated January 8, 2001.
11. Letter of approval from the State of Washington: Department of Health, dated April 6, 2001.
12. Letter of approval from the Commonwealth of Kentucky: Cabinet for Health Services, Department for Public Health, dated February 19, 2001.
13. Letter of approval from the State of Oklahoma: Department of Environmental Quality, dated November 29, 2000.
14. Letter of approval from the Florida Department of Health, dated July 17, 2001.
15. Letter of approval from the State of Tennessee: Department of Environment and Conservation, dated October 9, 2001.
16. Letter of approval from the Commonwealth of Massachusetts: Department of Environmental Protection, dated March 3, 2001.

17. Technical Background Information Memo relating to the BioDiffuser™ Chambers, dated June 17, 2002.
- \*\* 18. Engineers Letter Report, dated February 3, 2005.
- \*\* 19. Report “Chamber Equivalency”, dated November 24, 2004.
- \*\* 20. “Evaluation of Soil Infiltration Rates for Septic Tanks Effluent as Affected by Aggregate-Free versus Aggregate-Laden Infiltrative Surfaces” Lowe and Siegrist, dated September 17, 2001.
- \*\* 21. “Surface Failure rates of Chamber and Traditional Aggregate-Laden Trenches in Oregon” Small Flow Quarterly, Fall 2002, Volume 3, Number 4, King.
- \*\* 22. “Hydraulic and Purification Behaviours and their Interaction During Wastewater Treatment in Soil Infiltration Systems” Vol., 35, No 4, pp. 953-964, 2001.
- \*\* 23. State of Oregon, Department of environmental Quarterly, July 22, 2003  
“Advanced Drainage Systems: BioDiffuser 2 Chamber System.
- ◆ 24. Specification Sheet “ARC 24 Chamber Specifications”, dated December 2006.
- ◆ 25. Drawings labelled “ARC 24-11”.
- ◆ 26. Zukun Plan Specification Sheet “ARC 24 Specification Sheet”, dated November 27, 2006.
- ◆ 27. NSF Final Report “H-10 Load Testing of the Arc 24 Chamber to IAPMO Standard PS 63-2005”, dated January 8, 2007.
- ◆ 28. NSF Final Report “ARC 24 Chamber under Six Inches of Cover”, dated January 8, 2007.
- ◆ 29. Zukun Plan Drawing Sheets.
- ◆ 30. Letter of approval from the State of Alabama Department of Public Health, dated December 11, 2006.
- ◆ 31. Letter of approval from the Illinois Department of Public Health, dated January 11, 2007.
- ◆ 32. Van Harten Engineers Letter Report, dated January 22, 2007.
- ◆ 33. Arc™ BioDiffuser Leachfield Chamber “ARC 24 BioDiffuser Leaching Chamber Specification and Features, dated January 10, 2007.

- ◆ 34. ARC 24 BioDiffuser Leaching Chamber Installation Procedures, dated January 10, 2007.
- ◆ 35. Excerpt of the ADS's Quality Control Manual, Chapter 2.
- ◆ 36. Excerpt of the ADS's Quality Control Manual, Forms.

## 6. Authorization

The BioDiffuser™ Chambers: Bio 2 and Bio 3 are authorized for use in sewage systems within the scope of Part 8 of the Building Code, as an alternative to stone and distribution pipes in absorption trenches and in filter beds, when installed in accordance with the manufacturer's recommendations and the Specific Terms and Conditions of this Authorization.

- ◆ The ARC 24 Chamber System (i.e. "BioDiffuser(s)™") is authorized for use in sewage systems within the scope of Part 8 of the Building Code, as an alternative to stone and distribution pipes in absorption trenches and in filter beds, when installed in accordance with the manufacturer's recommendations and the Specific Terms and Conditions of this Authorization.

### A. Specific Terms and Conditions

1. This Authorization is valid only for BioDiffusers™: Bio 2, Bio 3 and ARC 24 Chamber Systems.
2. The BioDiffusers™ shall be manufactured to AASHTO Standard H-10 loading.
- \*\* 3. Except as permitted by Condition 4. below, when the Bio 2, the Bio 3 and ARC 24 Chamber Systems are installed in lieu of distribution piping and stone, the length of the chamber system shall satisfy the requirements of Article 8.7.3.1. of the Building Code.
- \*\* 4. Except as provided by Condition 4.(a) below, when the Bio 3 or the ARC 24 Chamber System is installed in lieu of distribution piping and stone in an absorption type trench leaching bed, the length of the chamber specified in Sentence 8.7.3.1.(2) of the Building Code, is permitted to be reduced such that it is calculated based on the formula  $L = QT/300$ , where

L	the total length of the Bio 3, or the ARC 24 Chamber Systems
Q	the total daily design sanitary sewage flow

T the design percolation time

- (a) A reduction to the chamber length is not permitted when,
  - (i) installed in soils with a percolation time of 6 min/cm or less,
  - (ii) combined with any other reduction, or
  - (iii) the width of the chamber bottom is less than 500 mm (20").
  
- 5. When the BioDiffuser™ Chambers are installed in lieu of distribution piping and stone, the leaching beds must satisfy the general construction requirements specified in Articles 8.7.2.1., 8.7.4.2. and 8.7.5.3.
  
- 6. The minimum clearance distances required by Article 8.2.1.6. for distribution piping shall be met by the BioDiffuser™ Chamber Systems.
  
- \* 7. When installed in lieu of distribution piping and stone in absorption trenches, the trenches for the BioDiffuser™ Chambers shall be:
  - (a) approximately the same length and not more than 30 m in length,
  - (b) a minimum width of 500 mm,
  - (c) at least 600 mm and not more than 900 mm in depth,
  - \*\* (d) except as provided by 7.(h) below, centred at least 1600 mm,
  - (e) at least 900 mm at all points on the bottom of the trench, above the high ground water table, rock or soil with a percolation time greater than 50 minutes, and
  - (f) backfilled, after installation of the BioDiffuser™ Chambers, with leaching bed fill, so as to ensure that after the leaching bed fill settles, the surface of the leaching bed will not form any depressions.
  - (g) backfilled with a soil that does not contain heavy clay, silt or debris, and is manually compacted along the sides of the chamber to provide lateral support.
  - \*\* (h) centred at least 2400 mm apart when the Bio 3 or the ARC 24 Chamber is installed as an in-ground system at a reduced length, as it is permitted by Condition 4. of this Authorization.

8. When installed in lieu of distribution piping and stone in filter beds, the lines of BioDiffuser™ Chambers shall be evenly spaced over the surface of the filter medium to which the sewage effluent is applied, and the filter bed shall meet the following requirements:
  - (a) the filter medium shall meet the requirements of Subsection 8.7.5. of the Building Code,
  - (b) the surface of the filter bed shall be at least 900 mm above the high ground water table, rock or soil with a percolation time greater than 50 minutes per centimetre as per Clause 8.7.3.2.(1)(e) of Building Code.
  
9. When used in gravity fed conditions, the BioDiffuser™ Chambers shall be installed in compliance with all the above-stated Specific Terms and Conditions and be:
  - (a) installed level over the length of the trench,
  - (b) securely connected, chamber to chamber, using the built-in latch,
  - (c) free of structural damage and used full length (not cut),
  - (d) equipped with end caps installed on both ends, and
  - (e) equipped with a built-in splash plate at the inlet end of each chamber line, to prevent soil scouring.
  
10. Where the sewage effluent is “dosed” to the leaching bed by pumps or a siphon, the BioDiffuser™ Chambers shall be installed to comply with all the above-stated Specific Terms and Conditions and:
  - (a) the effluent is pumped to a header line or distribution box prior to entering the chambers, and,
  - (b) a volume of effluent within the range of 3.5 - 8.0 litres per metre of BioDiffuser™ Chambers , must be pumped within a time period not exceeding 15 minutes, to meet the requirements of Sentence 8.6.1.3.(4).
  - \*\* (c) when the length of the Bio 3 or the ARC 24 Chamber is reduced, as permitted by Condition 4. of this Authorization, the distribution pipe shall be installed in the chamber, and extended the total length of the trench.



11. Where the sewage effluent is distributed through a pressurized system, the BioDiffuser™ Chambers shall be installed:
  - (a) to comply with Specific Terms and Conditions numbers 1. through 9. above, and,
  - (b) with a minimum 1½ (38 mm) diameter pipe extending over the entire length of each trench, and such pipe:
    - i. being specified by the manufacturer as acceptable for pressurized installations,
    - ii. having minimum 6 mm diameter orifices, spaced over its length to ensure even distribution of effluent,
    - iii. being supported in a manner as to ensure self-draining and prevent freezing of its contents,
    - iv. having clean-outs installed at the downstream end of each chamber line, to allow the system to be serviced, and,
    - v. receiving effluent from a treatment unit equipped with an effluent filter on the outlet, such effluent filter to be installed and sized in accordance with the manufacturer's recommendations.

**B. General Conditions**

1. The use of the BioDiffuser™ Chamber Systems must comply with the *Building Code Act, 1992* as amended or re-enacted from time to time and except as specifically authorized herein, with the Building Code as amended or remade from time to time.
2. A copy of this Authorization shall accompany each application for a building permit and shall be maintained on the site of the construction with the building permit.
3. The Applicant named in Part 1 hereof shall promptly notify the BMEC of:
  - (a) the failure of the Applicant, or of the material, system or building design that is the subject matter of this Authorization, to comply with any of the terms and conditions set out in 6. A. above; or
  - (b) the occurrence of any of the events described in Conditions 6. B. 4. (a) and (b) (ii) below.

4. The BMEC may amend or revoke this Authorization where it determines that:
- (a) any change has been made to:
    - i. the material, system or building design that is the subject matter of this Authorization;
    - ii. the address of the applicant specified in Part 1 of this Authorization; or,
    - iii. the ownership of the applicant specified in Part 1 of this Authorization.
  - (b) the use of the material, system or building design authorized herein;
    - i. does not comply with the *Building Code Act, 1992* or any relevant legislation as they may be amended or re-enacted from time to time; or
    - ii. provides an unsatisfactory level of performance, in situ.
  - (c) the Applicant, or the material, system or building design that is the subject matter of this Authorization, has failed to comply with any of the terms and conditions set out in this Authorization; or
  - (d) any Building Code provision relevant to this Authorization has been amended or remade.
5. Where the BMEC receives additional information concerning the material, system or building design authorized herein, the BMEC may review this Authorization and the BMEC may after the review amend or revoke this Authorization as in the opinion of the BMEC may be necessary.

Dated at Toronto this 29<sup>th</sup> day of March 2007.

## **BUILDING MATERIALS EVALUATION COMMISSION**

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Edward Link, P. Eng.  
Chair, Building Materials Evaluation Commission