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Ontario
Building Materials Evaluation Commission
Commission d'évaluation des matériaux de construction

BMEC AUTHORIZATION: 20-03-395
Eljen™ GSF System

Date of Authorization: **October 28, 2020**
Date of Expiry[1]: **October 28, 2025**

1. Applicant

Eljen Corporation (represented by
Enviro-STEP Technologies Inc.)
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USA 06095

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Fax: 860 610-0427
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2. Manufacturing Facility

Eljen GSF Modules
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USA 06095

Engineering and Design
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3. Authorization

The Eljen™ GSF System primarily consists of a septic tank, an effluent filter, distribution piping, the Eljen GSF A42 modules, an anti-siltation fabric (ELJG101), Specified Sand, and sampling device. The Eljen™ GSF System can be installed in-ground, partially raised, or fully raised.

The Eljen™ GSF System is authorized as a combined treatment and dispersal system. This authorization is not an approval for the use of the Eljen™ GSF System as a treatment unit, where treatment units are permitted for use with Class 4 sewage

1 This Authorization expires on the date shown. It is the responsibility of Authorization holders to make a complete application considering the time for review and complexity of the new application.

systems.

Reports and assessments provided by the Applicant demonstrate that if the Eljen™ GSF System is manufactured, designed, constructed, installed, and maintained in accordance with the manufacturer's instructions and limitations, and the specific terms and conditions stated in this authorization, the use of Eljen™ GSF System shall be deemed to not be a contravention of Division B, Article 8.6.2.2. "Other Treatment Units" and 8.7. "Leaching Beds" of Division B of the Ontario Building Code.

All other requirements pertaining to the manufacture, design, construction, installation, and maintenance are subject to the requirements of the Ontario Building Code, and subject to the following terms and conditions contained in Sections 4 and 5 below.

4. Specific Terms and Conditions

1.0 Definitions

The following words or phrases used in this Authorization have the following meanings for the purposes of this Authorization:

1.1 Raised or Partially Raised means a sewage system in which any part of the system is above the natural ground elevation.

1.2 Vertical Separation means the depth of unsaturated soil below the system, as measured from the bottom of the Eljen™ GSF Specified System Sand, at the minimum 150 mm depth below the Eljen™ GSF A-42 modules, to a limiting layer such as a high groundwater table, bedrock, or native soil with a percolation time (T) less than 1 min/cm or greater than 50 min/cm.

2.0 System Requirements

2.1 There are seven (7) main components to the Eljen™ GSF System:

2.1.1 Septic tank;
2.1.2 Effluent filter;
2.1.3 Distribution system;
2.1.4 Eljen™ GSF A-42 modules;
2.1.5 Anti-siltation filter fabric (ELJG101);
2.1.6 Eljen™ Specified Sand (Specified Sand), and
2.1.7 Sampling device.

2.2 All raw sewage shall enter into a septic tank sized in accordance with Article 8.2.2.3. "Septic Tanks" of Division B, of the Ontario Building Code.

2.3 The effluent filter shall meet the requirements of Article 8.6.2.1. "Septic Tank Systems" of Division B of the Ontario Building Code and shall be connected to the outlet of the septic tank.

2.4 The septic tank effluent shall be distributed to each row of Eljen™ GSF A-42 modules with a perforated PVC pipe centred over the modules, and this pipe shall be secured over the middle of each module using a U-shaped clamp. The distribution system may include a distribution box, flow equalizers, a combination of distribution valves and distribution box, or a low pressure or pressurized distribution system.

2.5 The Eljen™ GFS A-42 Module

2.5.1 The Eljen™ GFS A-42 module consists of a cuspated plastic core and corrugated geotextile fabric shaped as an accordion to form a mattress 1200 mm long x 600 mm wide x 175 mm high.

2.5.2 The Eljen™ modules are placed end to end to create a row or rows.

2.5.3 The Eljen™ GSF A-42 modules shall not be cut.

2.6 Anti-Siltation Filter Fabric (ELJG101)

2.6.1 No substitution of the ELJG101 anti-siltation filter fabric shall be permitted.

2.6.2 The anti-siltation filter fabric shall be spread lengthwise over the perforated PVC pipe, and down the sides of the Eljen™ GSF A-42 modules.

2.6.3 The anti-siltation filter fabric shall drape vertically over the pipe and must neither block the holes nor be stretched from the top of the pipe to the outside edge of the modules.

2.6.4 The anti-siltation filter fabric shall be secured using the Specified Sand along the sides of the modules.

2.6.5 When the modules within a row are spaced apart, the fabric shall be cut and allowed to drape over and protect the ends of each module; the anti-siltation filter fabric shall not be a continuous run from end to end.

2.7 The Eljen™ GSF System Specified Sand (Specified Sand) and Imported Sand

2.7.1 All Eljen™ GSF System configurations require Specified Sand to be located below and to the sides of each Eljen™ GSF module, as detailed in 2.7.2.

2.7.2 The Specified Sand shall be provided to ensure a minimum of:

- 150 mm under the modules,
- 150 mm beside each Eljen™ GSF module,
- 150 mm around the perimeter and end of each row, and
- be the same height as the Eljen™ GSF modules, with a depth of 330 mm, and
- meet the sand requirements set out in ASTM C33 "Standard Specification for Concrete Aggregates", as set out in Table 2.7.

Table 2.7.

Eljen™ GSF Specified Sand Requirements *Excerpt from ASTM C33 "Standard Specification for Concrete Aggregates*		
Sieve Size	**Sieve Square Opening**	**Specification % Passing**
0.375"	9.5 mm	100.0
#4	4.75 mm	95.0 – 100.0
#8	2.36 mm	80.0 – 100.0
#16	1.18 mm	50.0 – 85.0
#30	600 µm	25.0 – 60.0
#50	300 µm	5.0 – 30.0
#100	150 µm	0.0 – 10.0
#200	75 µm	0.0 – 5.0

2.7.3 A sieve analysis shall be requested from the material supplier to confirm that the system sand meets the requirements listed above.

2.7.4 Provided that the minimum amount of Specified Sand is provided around each module, either imported sand or Specified Sand must be used to fill in the area between the rows of Eljen™ GSF modules and to cover the complete dispersal bed. The total thickness of imported sand/specified sand shall be a minimum of 330 mm.

2.7.5 The imported sand must have a percolation time of between 6 and 10 min/cm and not have more than 5% fines passing through a 0.0074 mm (No. 200) sieve.

2.7.6 For each Eljen™ GSF System project, the system installer is to receive a copy of both the sieve analyses for the Specified Sand and imported sand (if used) and these results are to be available upon request to the Chief Building Official/Principal Authority and the operator.

2.8 The sampling device consists of geotextile fabric, sampling pan, effluent receptacle, and sampling port. A minimum of one sampler is to be provided in a low-pressure distribution system and a minimum of two samplers are to be provided in a gravity or pump to gravity distribution system. In gravity systems, one sampler is placed under the first module and a second one is located near the end of the same row.

3.0 Design

Vertical Separation

3.1 A vertical separation of at least 600 mm must be maintained unless the native soil has a T greater than 6 min/cm and less than or equal to 50 min/cm, in which case a vertical separation of at least 450 mm must be maintained.

3.2 Where the native soil cannot provide for the entire required vertical separation, Specified Sand or imported sand may be provided to achieve the required vertical separation.

3.3 When the native soil has a T of 50 min/cm or greater, the Eljen™ GSF System shall be raised or partially raised.

Number of Eljen™ GSF A-42 Modules Required

3.4 Each Eljen™ GSF A-42 Module has the capacity to treat 95 L per day.

3.4.1 The formula to determine the number of Eljen™ GSF modules required is: Q/95.

Where: Q is the total daily design sanitary sewage flow in litres.

3.4.2 The number of Eljen™ GSF modules must be rounded up at all times.

Modules Spacing Requirements

3.5 The modules shall be placed level, within a row, with the white demarcation lines facing up and following a line.

3.6 When multiple rows are used, the Eljen™ GSF A-42 modules shall be spaced using the following criteria:

- The rows shall be spaced a minimum of 300 mm apart, calculated side to side.
- The rows shall start and finish with a minimum separation of 150 mm of Specified Sand.
- The modules should be centred where possible under the distribution pipe but in no case shall the distribution pipe be closer than 150 mm from side of the module as measured from the centre of the distribution pipe. The modules may be angled horizontally with respect to each other to follow site contours.

3.7 The modules shall be distributed evenly over the dispersal bed, subject to adjustment to ensure:

- minimum clearances are provided in accordance with OBC 8.2.1.6; and
- minimum separation distances are provided as required in 3.6.

Dispersal Surface

3.8 The area to be covered by the specified system sand/imported sand in the Eljen™ GSF modules shall be equal to or larger than the area determined by the formula:

$$A = QT/400$$

Where:

- A is the dispersal area in m^2
- T is the percolation time of the underlying native soil in min/cm to a maximum of 50, and
- Q is the total daily design sanitary sewage flow in litres.

3.8.1 Where the area determined using QT/400 is larger than that required by the minimum spacing required by 3.6 above, the Eljen™ GSF modules shall be spaced as detailed in 3.7 above.

3.8.2 The dispersal bed surface shall have the long dimension perpendicular to the direction in which effluent entering the soil will move horizontally.

Other

3.9 The Eljen™ GSF System shall be designed, installed, constructed, operated, and maintained using these criteria:

3.9.1 The Eljen™ GSF System shall comply with Article 8.7.2.1. of Division B, of the Ontario Building Code;

3.9.2 Where the Eljen™ GSF System is fed by gravity, each row shall not exceed a maximum length of 18 m;

3.9.3 Where the Eljen™ GSF System is fed by a low pressure system, each row shall not exceed a maximum length of 30 m;

3.9.4 All Eljen™ GSF Systems that are dosed by pumping shall use differential venting, and the venting shall be located at the far end of one of the Eljen™ GSF System rows;

3.9.5 Except when used with a “Low Pressure Distribution System”, Eljen™ GSF Systems that are dosed by pumping shall use a velocity reducer located in the distribution box;

3.9.6 The Eljen™ GSF System shall have a sampling device, for the purpose of sampling effluent, and it shall be installed as described in the “Eljen™ GSF System, Ontario: Design and Installation Manual”, dated September 2020;

3.9.7 The site shall be protected from erosion by proper grading, mulching, seeding, and runoff control;

3.9.8 No reduction in the size of the Eljen™ GSF System shall be permitted with the use of a treatment device beyond that of a septic tank;

3.9.9 The Eljen™ GSF System, measured from the centre of the perforated distribution pipes, shall meet the setback requirements outlined in Article 8.2.1.4. of Division B, of the Ontario Building Code;

3.9.10 The distances set out in Column 2 of Table 8.2.1.6.B. of Division B of the Ontario Building Code shall be increased by twice the height that the absorption bed is raised above the original grade;

3.9.11 The header line and distribution pipes in the Eljen™ GSF System are to be provided with a means of detection as detailed in Article 8.7.2.2. of Division B of the Ontario Building Code;

3.9.12 Except as provided in Item 3.9.13, the sides of the added absorption bed fill shall be sloped to ensure stability but shall not be steeper than one unit vertically to four units horizontally;

3.9.13 The side slope of the absorption bed fill may be increased up to one unit vertically to three units horizontally if measures are taken to prevent erosion and ensure stability of the absorption bed fill; and

3.9.14 The design and installation of an Eljen™ GSF System shall be carried out by a person competent in this field of work.

4.0 Installation Requirements

4.1 Information required by the Chief Building Official/Principal Authority as per Sentence 1.3.5.4.(1) of Division C of the Ontario Building Code shall be provided prior to the start of construction.

4.2 The Eljen™ GSF System shall be installed as per the manufacturer's installation instructions as found in the "Eljen™ GSF System, Ontario: Design and Installation Manual", dated September 2020.

4.3 The Eljen Corporation's installation manual, "Eljen™ GSF System, Ontario: Design and Installation Manual", dated September 2020, and a copy of this Authorization shall be placed on site and remain on site during the installation of the Eljen™ GSF System.

4.4 No person shall put into use or operate the Eljen™ GSF System unless the person has entered into an agreement whereby the servicing and maintenance of the Eljen™ GSF System and its related components will

be carried out by a person who is authorized by the manufacturer to service and maintain the Eljen™ GSF System according to Section 5.0.

5.0 Servicing, Operation and Maintenance

5.1 Conduct and record at least once during every twelve (12) month period, an inspection and servicing, as specified by the Applicant, Eljen Corporation and Enviro-STEP Technologies, "Eljen™ GSF System Maintenance Agreement – Ontario", dated September 2020.

5.2 Eljen Corporation or an authorized agent shall sample the effluent in accordance with the requirements of Sentence 8.9.2.4.(1) of Division B of the Building Code, as follows.

5.2.1 Once during the first twelve (12) months after the Eljen™ GSF System is put into use, and

5.2.2 Thereafter, at least ten (10) months and not more than eighteen (18) months after the previous sampling has been completed.

5.3 The concentration of $CBOD_5$ and suspended solids in the grab sample described in Section 5.2 above is deemed to comply with the Code requirements when neither exceed 20 mg/L.

5.4 If the results of a sample do not comply with 5.3, then the Chief Building Official/Principal Authority shall be informed by Eljen Corporation or an authorized agent and the course of action to remedy the problem shall be identified. The system shall be resampled within six (6) months of a non-compliant sample and the results are to be submitted to the Chief Building Official/Principal Authority.

5.5 Eljen Corporation or their agent shall retain records of the sampling test results for each Eljen™ GSF System received pursuant to the terms and conditions set out in Sections 5.2 and 5.4 above, for a period of ten (10) years and shall promptly forward copies of those records to the Chief Building Official/Principal Authority, when requested.

5. General Conditions

1. The use of the Eljen™ GSF System as described in Section 3. and the Specific Terms and Conditions set out in Section 4 must comply with:
   (a) the *Building Code Act, 1992,* (the "Act") as amended or re-enacted,
   (b) except as specifically authorized herein, the Ontario Building Code as amended or remade, and
   (c) all other applicable legislation.
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 specified in Section 1. shall promptly notify the BMEC of:
   (a) the failure of the Applicant to comply with any of the Specific Terms and Conditions set out in Section 4,

(b) the failure of the material, system or building design that is the subject matter of this Authorization to
    (i) comply with any of the Specific Terms and Conditions set out in Section 4, or
    (ii) provide a satisfactory level of performance in situ, or
(c) the occurrence of any of the events described in General Conditions 5.4.(a), (b), (e) or (f).

4. The BMEC may amend or revoke this Authorization at any time on its own initiative, or at the request of the Applicant specified in Section 1. Without restricting the foregoing, the BMEC may amend or revoke this Authorization where it determines that:
    (a) any change has been made to:
        (i) the name of the Applicant specified in Section 1,
        (ii) the address or other contact name information of the Applicant specified in Section 1,
        (iii) the ownership of the Applicant specified in Section 2,
        (iv) the manufacturing facilities specified in Section 2,
        (v) the material, system, or building design that is the subject matter of this Authorization, or
        (vi) a test method relevant to this Authorization,
    (b) the Applicant has failed to comply with any of the terms and conditions set out in this Authorization,
    (c) in the opinion of the BMEC, the use of the material, system or building design authorized herein provides an unsatisfactory level of performance in situ,
    (d) in the opinion of the BMEC, amendment or revocation of the Authorization is appropriate on the basis of potential danger to public health and safety,
    (e) the *Act* or Ontario Building Code has been amended, re-enacted or remade in a manner relevant to this Authorization,
    (f) this Authorization was issued on mistaken, false or incorrect information, or
    (g) a revision of an editorial nature is appropriate.

Dated at Toronto this TBD

BUILDING MATERIALS EVALUATION COMMISSION

Leo Grellette
Chair, Building Materials Evaluation Commission

ATTACHED – “APPENDIX A – SUPPORTING INFORMATION”

Appendix A – Supporting Information

The following is a list of the documents that were submitted and reviewed, but were not limited to:

1. Letter Report, Gunnell Engineering Ltd., BMEC Application for the Eljen™ GSF System, dated March 11, 2020, 7 pages;
2. Application form, Building Materials Evaluation Commissions form for Eljen™ GSF System, dated February 14, 2020, 5 pages;
3. Authorization, BMEC Authorization 15-02-376, Eljen™ GSF System, amended January 26, 2017, 10 pages;
4. Manufacturer's Literature, Eljen Corporation "Combined Onsite Wastewater Treatment and Dispersal System", dated March 2020, 1 page;
5. Ontario Eljen™ GSF System Field Testing / Sampling 2017-2019, dated March 2020, 5 pages;
6. Test Report, MASSTIC, "Onsite Wastewater Technology Testing Report: Eljen™ GSF/A42", January 2014, 23 pages;
7. NSF Product and Service Listings for Eljen Corporation, current as of Aug. 26, 2019, 3 pages;
8. Evaluation Report, NSF/ANSI Standard 40 - Residential Wastewater Treatment Systems, GSF-AT-450 - Wastewater Treatment System, dated August 2015, 59 pages;
9. Letter Report, Enviro-Step Technologies, re: BMEC 2015-01: Eljen GSF™ System Response to BMEC July 10, 2015 Letter, dated July 10, 2015, 2 pages;
10. Manual, GSF ELJEN™ GSF SYSTEM, Ontario: Design and Installation Manual", dated March 2020, 41 pages;
11. Manual, GSF ELJEN™ GSF SYSTEM, Ontario Owner's Manual" dated 2020, 16 pages;
12. Sample Form, "Eljen GSF System Maintenance Agreement – Ontario", dated March 2020, 2 pages;
13. Procedure, Eljen Corporation, "Eljen™ GSF System – Maintenance Procedure", undated, one page;
14. List, Eljen Corporation Provincial and U.S. State Approvals, undated, 1 page;
15. Proposed 'Draft' BMEC 2020 Authorization – Eljen™ GSF System, undated, 10 pages;
16. Certification letter, Gunnell Engineering Ltd., re: Building Materials Evaluation Commission Certification Letter: Application for Eljen™ GSF System, dated February 27, 2020, 2 pages;
17. Authorization Letter, Eljen Corporation, re: Letter of Authorization – Eric Gunnell, P.Eng / Gunnell Engineering Ltd. Eljen™ GSF System BMEC Application, dated February 10, 2020, 1 page;
18. PowerPoint Presentation, Enviro-STEP Technologies, "Technical Presentation in Support of New BMEC Application", filename dated 2020, 28 pages;
19. Letter Report, Enviro-Step, re: BMEC 2020-02: Eljen™ GSF System, response to BMEC May 21, 2020 Letter, dated June 3, 2020, 4 pages;
20. Letter Report, Gunnell Engineering Ltd., BMEC 2020-02 Eljen™ GSF System, Eljen™ GSF System Supplemental Information, dated June 2, 2020, 1 page;

21. Letter Report, Gunnell Engineering Ltd., BMEC 2020-02 Eljen™ GSF System, Eljen™ GSF System Supplemental Information, dated August 25, 2020, 2 pages;
22. Letter Report, Enviro-Step, re: BMEC 2020-02: Eljen™ GSF System, response to BMEC August 20, 2020 Letter, dated August 23, 2020, 17 pages;
23. Manual, GSF ELJEN™ GSF SYSTEM, Ontario: Design and Installation Manual" dated August 2020, 38 pages;
24. Application form, Building Materials Evaluation Commissions form for Eljen™ GSF System updated first page, undated, 1 page;
25. Letter Report, Gunnell Engineering Ltd., BMEC Application for the Eljen™ GSF System, updated August 24, 2020, originally dated March 11, 2020, 7 pages;
26. Letter Report, Gunnell Engineering Ltd., BMEC 2020-02 Eljen™ GSF System, Eljen™ GSF System Supplemental Information, dated August 25, 2020, 2 pages;
27. Procedure, Eljen Corporation, updated "Eljen™ GSF System – Maintenance Procedure", undated, one page;
28. Sample Form, updated "Eljen™ GSF System Maintenance Agreement – Ontario", dated March 2020, 2 pages;
29. Manual, GSF ELJEN™ GSF SYSTEM, Ontario Owner's Manual" dated August 2020, 16 pages;
30. Ontario Eljen™ GSF System Field Testing / Sampling 2017-2019, dated March 2020, 5 pages;
31. Manufacturer's Literature, Eljen Corporation, Product Materials—Technical Specifications and Performance – GSF ELJ B101, undated, 1 page;
32. Manufacturer's Literature, Eljen Corporation, Product Materials—Technical Specifications and Performance – GSF ELJ G101, undated, 1 page;
33. Approvals from other Authority's Having Jurisdiction, 38 pages:
    a. Ontario
    b. Manitoba
    c. Saskatchewan
    d. Quebec (Commercial)
    e. British Columbia
    f. Alberta
    g. Nova Scotia
    h. Newfoundland
    i. Arizona
    j. Colorado
    k. Connecticut
    l. Indiana
    m. Massachusetts
    n. Minnesota
    o. New York
    p. Pennsylvania
    q. Rhode Island
    r. Virginia
    s. Wisconsin
34. Letter Report, Enviro-Step, re: BMEC 2020-02: Eljen™ GSF System, response to BMEC September 10, 2020 Letter, dated September 20, 2020, 8 pages;
35. Manufacturer's Literature, Eljen Corporation, Data Summary and Dimensions and Description of Test Unit, dated September 25, 2020, 2 pages;
36. Contract, BNQ Service Contract, File NO. 3490, dated December 12, 2018, 9 pages;
37. Test Sampling, BNQ Testing Site 04B, Compilation of Effluent Results, results from 2019-2020, 13 pages;

38. Test Sampling, BNQ Testing Site, Compilation of Influent Results, results from 2019-2020, 32 pages;
39. Test Sampling, Ontario Eljen™ GSF System Field Testing / Sampling 2017-2020, dated September 2020, 6 pages;
40. Letter Report, Gunnell Engineering Ltd., BMEC 2020-02 Eljen™ GSF System, Eljen™ GSF System Supplemental Information, updated August 25, 2020, 2 pages;
41. Manual, GSF ELJEN™ GSF SYSTEM, Ontario: Design and Installation Manual" dated September 2020, 38 pages;
42. Draft authorization, proposed 'Draft' BMEC 2020 Authorization – Eljen™ GSF System, amended September 20, 2020, 10 pages;
43. Letter Report, Gunnell Engineering Ltd., BMEC 2020-02 Eljen GSF System, Eljen™ GSF System Supplemental Information, updated September 24, 2020, 2 pages;
44. Video, Eljen Corporation, "Pan Pulling Sample";
45. Video, Eljen Corporation, "Sampling Pan"; and
46. Video, Eljen Corporation, "Sampling Pan Sand".