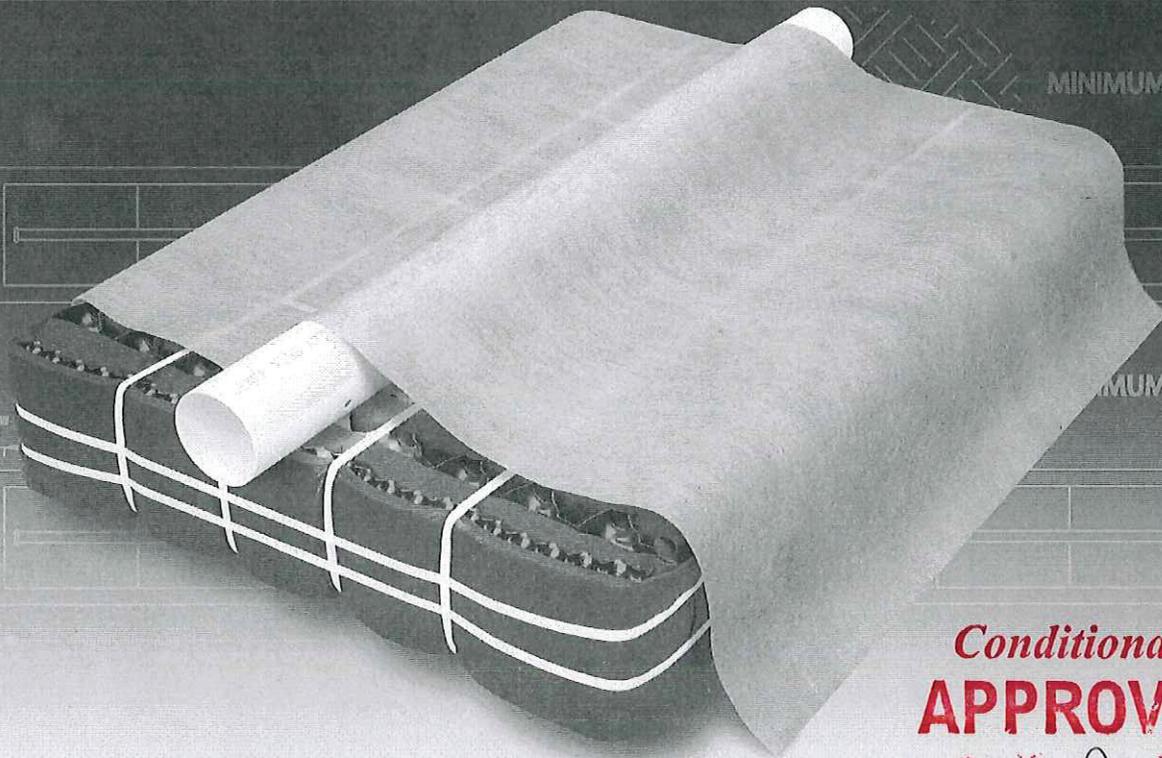




Geotextile Sand Filter

# Wisconsin GSF Product Specifications



*Conditionally*  
**APPROVED**

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## Glossary of Terms

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<b>A42 Module</b>	48" x 24" x 7" (L x W x H)
<b>B43 Module</b>	48" x 36" x 7" (L x W x H)
<b>Bio-Matt™ fabric</b>	Proprietary filter fabric within the Geotextile Sand Filter Modules upon which the primary biomat layer forms.
<b>Cover Fabric</b>	The geotextile cover fabric (provided by manufacturer) that is placed over the GSF modules.
<b>Cusped Core</b>	The rigid plastic core of the GSF module. It separates the geotextile fabric and creates downward infiltration channels and upward aeration channels to provide primary filtration and biological treatment of the septic effluent. The curvilinear shape of the cuspatations offers increased treatment surface area and greater effluent storage.
<b>Design Flow</b>	The estimated peak flow that is used to size a GSF system is 150 gallons per day per Bedroom.
<b>GSF</b>	The Eljen Geotextile Sand Filter Modules and the 12-inch sand layer at the base and 18 inches along the sides of the modules.
<b>GSF Module</b>	The individual module of a GSF system. The module is comprised of a cusped plastic core and corrugated geotextile fabric.
<b>LTAR</b>	Long Term Acceptance Rate (LTAR) is the average equilibrium absorption rate for effluent in a system, usually expressed in gallons per day per square foot. It should not be confused with the soil loading rate that is used by regulatory officials in their regulations.
<b>Specified Sand</b>	To ensure proper system operation, the system <b>MUST</b> be installed using ASTM C33 Sand.  ASTM C33 sand will have less than 10% passing the #100 Sieve and less than 3% passing the # 200 sieve. Ask your material supplier for a sieve analysis to verify that your material meets the required specifications.

**TABLE 1: SPECIFIED SAND SIEVE REQUIREMENTS**

ASTM C33 SAND SPECIFICATION		
Sieve Size	Sieve Square Opening Size	Specification Percent Passing (Wet Sieve)
3/8 inch	9.52 mm	100
No. 4	4.76 mm	95 - 100
No. 8	2.38 mm	80 - 100
No. 16	1.19 mm	50 - 85
No. 30	590 µm	25 - 60
No. 50	297 µm	5 - 30
No. 100	149 µm	0 - 10
No. 200	75 µm	0 - 3

# GSF System Description

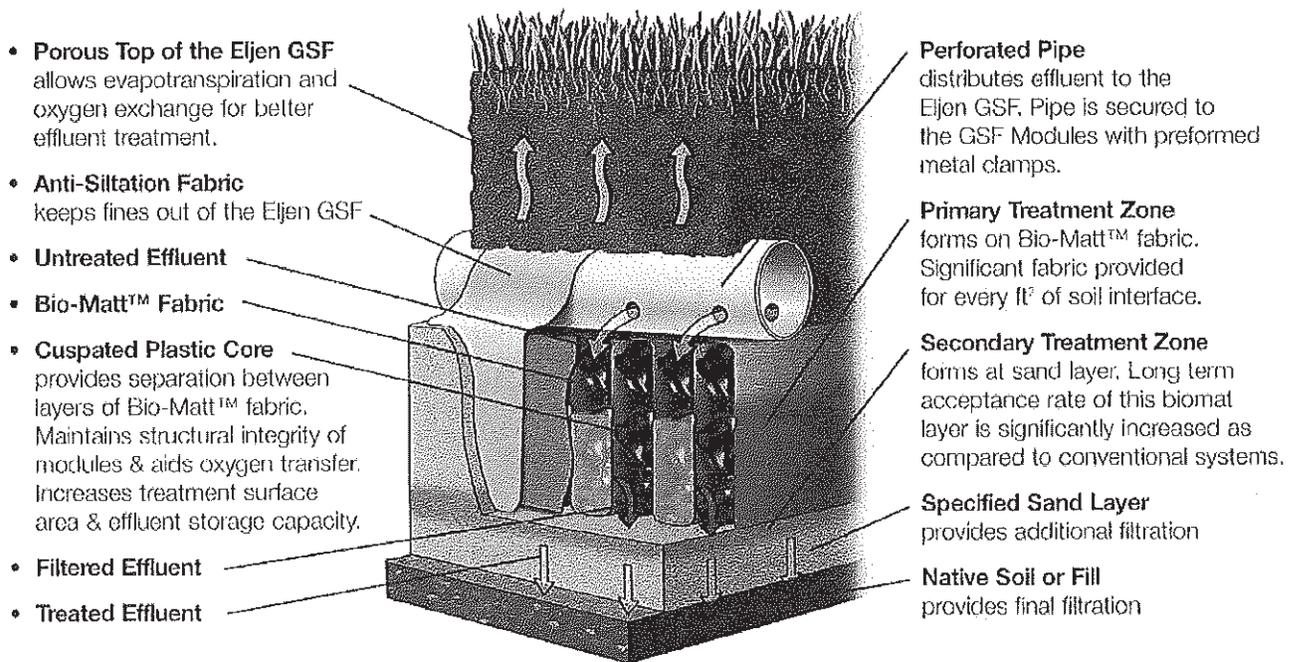
## Primary Treatment Zone

- Perforated pipe is centered above the GSF module to distribute septic effluent over and into corrugations created by the cuspated core of the geotextile module.
- Septic effluent is filtered through the Bio-Matt fabric. The module's unique design provides increased surface area for biological treatment that greatly exceeds the module's footprint.
- Open air channels within the module support aerobic bacterial growth on the modules geotextile fabric interface, surpassing the surface area required for traditional absorption systems.
- An anti-siltation geotextile fabric covers the top and sides of the GSF module and protects the Specified Sand and soil from clogging, while maintaining effluent storage within the module.

## Secondary Treatment Zone

- Effluent drips into the Specified Sand layer and supports unsaturated flow into the native soil. This Specified Sand/soil interface maintains soil structure, thereby maximizing the available absorption interface in the native soil. The Specified Sand supports nitrification of the effluent, which reduces oxygen demand in the soil, thus minimizing soil clogging from anaerobic bacteria.
- The Specified Sand layer also protects the soil from compaction and helps maintain cracks and crevices in the soil. This preserves the soil's natural infiltration capacity, which is especially important in finer textured soils, where these large channels are critical for long-term performance.
- Native soil provides final filtration and allows for groundwater recharge.

FIGURE 1: GSF SYSTEM OPERATION



## Testing and Performance

GSF Modules were subjected to independent third-party testing in accordance with NSF/ANSI Standard 40 Protocol. Three different methods of distribution were tested:

- Pressure Distribution
- Lift Pump/Gravity Demand Dosed Distribution
- Gravity Distribution

The data and detailed reports for each system tested were reviewed by NSF in accordance with NSF/ANSI Standard 40 Protocol and the Pennsylvania Department of Environmental Protection Technical Verification Program. This independent review validates the performance data listed below for Demand Dosed, Pressure Dosed, and Gravity systems.

### Testing Arrangement & Common Factors:

#### Common Factors for all tested systems listed in Table 2:

- A42 modules: (L x W x H) 48" x 24" x 7" plus Specified Sand.
- Six modules per bedroom at 150 gal/day, 18 modules total for three bedrooms per house equals 450 gal/day.
- Standard distribution pipe with orifices at the 4 & 8 o'clock position,
- 12 inches of Specified Sand base extending 6 inches at either edge of the modules.

#### Lift Pump/Gravity Demand Dosed System:

- 1000 gal septic tank – 500 gallon pump chamber to distribution box.
- Dial-a-flow fittings set level to deliver effluent into each of the three rows of laterals via a 4-inch perforated distribution pipe with orifices at the 4 & 8 o'clock position.
- A non-perforated pipe connects the distal end to the end of other rows.

#### Time Pressure Dosed System:

- 1000 gal septic tank – 500 gal pump chamber – 1.25" low-pressure pipe (LPP) or other diameter as required.
- LPP placed inside a 4-inch perforated distribution pipe with orifices at 12 o'clock, at least one drain hole per line at 6 o'clock.
- The 4-inch perforated pipe orifices are placed at the 4 & 8 o'clock positions with the end of pipe capped

#### Gravity System Trench Design:

- 1000 gal septic tank–gravity to distribution box.
- Dial-a-flow fittings set level to deliver influent into three individual trenches.
- Perforated distribution pipe with orifices at the 4 & 8 o'clock positions with the end of pipe capped.

**TABLE 2: TESTING RESULTS**

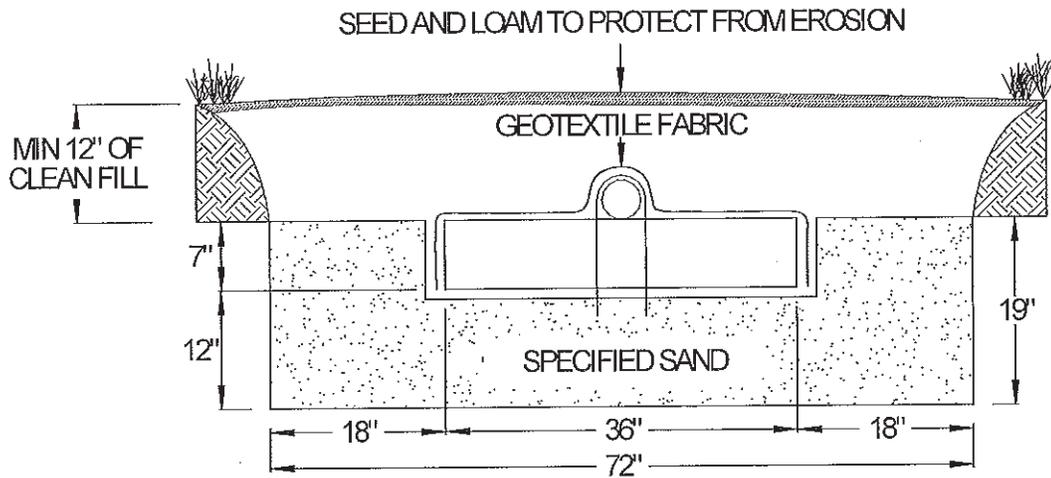
GSF Modules Treatment Performance NSF Standard 40 Protocol Wastewater Influent Median Characteristics: CBOD 180 mg/L & TSS 180 mg/L		
<b>Demand Dosed</b>		
	CBOD (mg/L)	TSS (mg/L)
Mean	2	2.7
Median	1	2.5
Min Value	1	2.5
Max Value	7.2	7

GSF Modules Treatment Performance NSF Standard 40 Protocol Wastewater Influent Median Characteristics: CBOD 180 mg/L & TSS 190 mg/L		
<b>Timed Pressure Dosed</b>		
	CBOD (mg/L)	TSS (mg/L)
Mean	2.6	2.7
Median	2.2	2.5
Min Value	1	2.5
Max Value	14	9

GSF Modules Treatment Performance NSF Standard 40 Protocol Wastewater Influent Median Characteristics: CBOD 180 mg/L & TSS 180 mg/L		
<b>Gravity</b>		
	CBOD (mg/L)	TSS (mg/L)
Mean	8	7.4
Median	7.6	5
Min Value	1	2.5
Max Value	18	55
TSS 2.5mg/L = sample was below detection limits CBOD 1.0mg/L = sample was below detection		

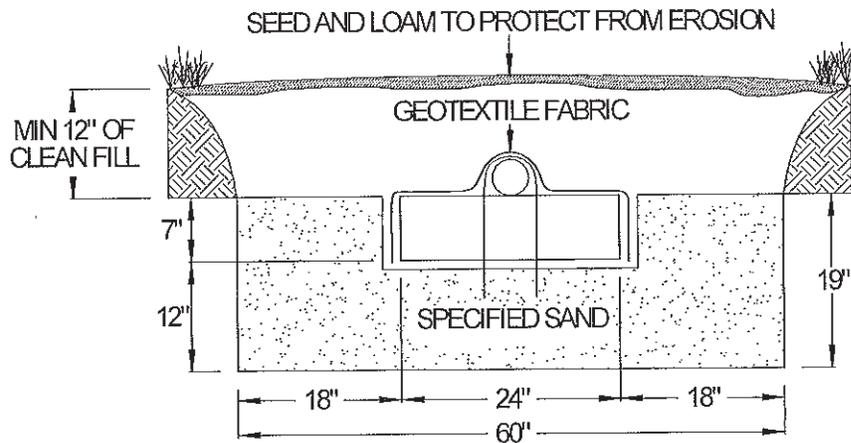
## 1.0 Design and Installation

FIGURE 2: TYPICAL WISCONSIN B43 GSF CROSS SECTION



B43 MODULE (L x W x H) 48" x 36" x 7"

FIGURE 3: TYPICAL WISCONSIN A42 GSF CROSS SECTION



A42 MODULE (L x W x H) 48" x 24" x 7"

**All Systems are Required to Have a Minimum of:**

- 18 inches of Specified Sand is at the edges of the GSF module.
- 6 inches of Specified Sand is at the beginning and end of each GSF Trench.
- 12 inches of Specified Sand is directly below the GSF module.
- Minimum 12 inches of native soil fill above the module.

## 1.0 Design and Installation

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**1.1 SPECIFIED SAND SPECIFICATION FOR TRENCH SYSTEMS:** The first 12 inches of sand immediately under, between rows and around the perimeter of the GSF system must meet **ASTM C33 SPECIFICATIONS, WITH LESS THAN 10% PASSING A #100 SIEVE AND LESS THAN 3% PASSING A #200 SIEVE.** Please place a prominent note to this effect on each design drawing. See Table 1 for more information on the sand and sieve specifications.

**1.2 CONNECTIONS AND FITTINGS:** Connections of lines to tanks and distribution boxes must be made using watertight mechanical seals. Use of any grouting material is not permitted.

**1.3 PLACING GSF MODULES:** The "White Stripe" on the GSF modules indicates the top of the module and is not intended to indicate the location of the distribution pipe. With the white stripe facing up, all rows of GSF modules are set level, end to end on the Specified Sand layer. No mechanical connection is required between modules.

**1.4 DISTRIBUTION PIPE:** SDR-35 or equivalent is required. Place perforated pipe on top of GSF modules with holes at 4 and 8 o'clock. Secure pipe to GSF modules with provided wire clamps, one clamp per Eljen module. Furthermore, all piping must meet state and local regulations.

**1.5 COVER FABRIC:** Geotextile cover fabric is provided by Eljen Corporation for all GSF systems. It is placed over the top and sides of the module rows to prevent long term siltation and failure. **Cover fabric substitution is not allowed.** Fabric should drape vertically over the pipe and must not block holes in the distribution pipe or be stretched from the top of the pipe to the outside edge of the modules. "Tenting" will cause undue stress on fabric and pipe.

**1.6 BACKFILL & FINISH GRADING:** Complete backfill with a minimum of 12 inches of clean porous fill measured from the top of modules. Backfill exceeding 18 inches requires venting at the far end of the trench. Use well graded native soil fill that is clean, porous and devoid of large rocks. Do not use wheeled equipment over the system. A light track machine may be used with caution, avoiding crushing or shifting of pipe assembly. Divert surface runoff from the Effluent Disposal Area, (EDA). Finish grade to prevent surface ponding. Topsoil and seed system area to protect from erosion.

**1.7 ADDITIONAL FACTORS EFFECTING RESIDENTIAL SYSTEM SIZE:** Homes with expected higher than normal water usage may consider increasing the septic tank volume as well as incorporating a multiple compartment septic tank. Consideration for disposal area may be up-sized for expected higher than normal water use.

For example:

- Luxury homes, homes with a Jacuzzi style tubs, and other high use fixtures.
- Homes with known higher than normal occupancy.

**1.8 GARBAGE DISPOSALS:** The use of a garbage disposal is not recommended as they can cause septic system problems by generating an increased amount of suspended solids, grease and nutrients. Design drawings shall include a note "Garbage disposals shall not be used with this system".

However, if such units are proposed to be used, other measures should be taken to mitigate the increased nutrients to the field. Increasing the number of units used in the system or increasing the design flow would help. Please contact Eljen Corporation's Technical Department with any questions, 1-800-444-1359.

NOTE: Eljen recommends the use of septic tank outlet effluent filters on all systems, especially on those systems that a garbage disposal is installed, even if the tanks design capacity has been increased. Filters with higher filtration are recommended for systems with garbage disposals.

**1.9 WATER SOFTENER BACKWASH:** At no time should water softener backwash be disposed of in the septic system. Water softener backwash should be discharged to grade.

## 1.0 Design and Installation

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**1.10 SEPTIC TANKS:** Many designers are now specifying dual compartment tanks for all their systems. Eljen supports this practice as it helps to promote long system life by reducing TSS and BOD to the effluent disposal area.

**1.11 SEPTIC TANK EFFLUENT FILTERS:** Wisconsin approved effluent filters are required. Consult the regulations for further guidance. Filter manufactures require that filters be cleaned from time to time. Ask your installer or designer for specific cleaning requirements based on the type or make of the filter installed. Eljen requires the septic tank to be pumped every three years or as needed which would be a good time to check and conduct filter maintenance.

**1.12 SYSTEM VENTING:** It is required to vent all systems that are over 18" below finished grade.

**1.13 VERTICAL SEPARATION TO GROUND WATER OR LIMITING LAYER:** A minimum vertical separation of 24 inches of naturally occurring soil must be between the sand/soil interface and any limiting soil horizon.

**1.14 SIZING GSF SYSTEM FOR TRENCHES AND MOUNDS:**

**TABLE 3: SQUARE FOOT PER MODULE**

Square Foot per Module	
A42	20
B43	24

## **COMPANY HISTORY**

Established in 1970, Eljen Corporation created the world's first prefabricated drainage system for foundation drainage and erosion control applications. In the mid-1980s, we introduced our Geotextile Sand Filter products for the passive advanced treatment of onsite wastewater in both residential and commercial applications. Today, Eljen is a global leader in providing innovative products and solutions for protecting our environment and public health.

## **COMPANY PHILOSOPHY**

Eljen Corporation is committed to advancing the onsite industry through continuous development of innovative new products, delivering high quality products and services to our customers at the best price, and building lasting partnerships with our employees, suppliers, and customers.



*Innovative Environmental Products & Solutions Since 1970*

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