

Energite® III/ Fitch® Universal Module Systems



The Easy-To-Install Inertial Barrel Systems



**ENERGY ABSORPTION
SYSTEMS, INC.**

A Quixote Company

INSTALLATION

General Information

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Important Introductory Notes

Proper installation of the Energite® III/Fitch® Universal Module Systems is essential to assure maximum performance. Take the time to review the installation instructions and product limitations thoroughly before performing necessary work. Do not attempt to install any crash cushion without the proper plans and installation manual from the manufacturer.

If you need additional information or have questions about the Energite® III/Fitch® Universal Module Systems, please call Energy Absorption Systems' **Customer Service Department at 1-888-32-ENERG.**

System Overview

The Energite® III/Fitch® Universal Module Systems are non-redirective, easy-to-install crash cushions consisting of a number of sand-filled polyethylene or polypropylene plastic modules that are installed in a specific geometric array in front of a hazard.

Each module of the Energite® III System consists of a one-piece barrel, a lid, and in some cases, a cone insert. The cone insert is used to adjust the sand height or center-of-mass and the overall weight of the barrel. The barrel's weight requirement is determined by its place within the array.

Each module of the Fitch® Universal Module consists of one set of walls, one core, one lid and four zip strips. These components will make any weight module 90, 180, 320, 640, 960 kg (200, 400, 700, 1400 and 2,100 lb) required.

The Energite® III/Fitch® Universal Module System modules are available in 90, 180, 320, 640 and 960 kg (200, 400, 700, 1400 and 2,100 lb) sizes. Refer to Figures 1A/B and 2A/B.

Crash Performance

When installing the Energite® III/Fitch® Universal Module Systems, it is important to understand how the system functions during impact. The Energite® III/Fitch® Universal Module Systems break up during impact. As the impacting

vehicle passes through the array, its speed is slowed by transfer of its momentum to the sand, allowing for safe, steady deceleration. Sand and plastic parts from the system will scatter in the direction of impact.

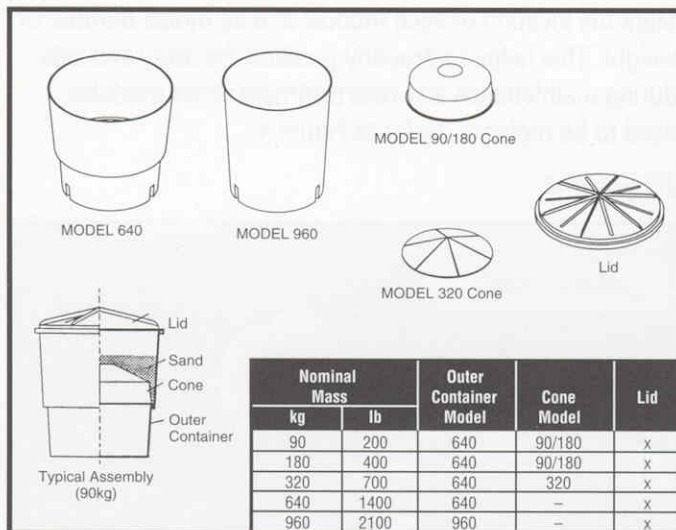
The Energite® III/Fitch® Universal Module Systems do not redirect errant vehicles away from the hazard during angle impacts and therefore should not be used if angle impacts are expected.

Required Tools

Before leaving for your site, be sure you have the following tools required for Energite® III/Fitch® Universal Module Systems installation:

1. Sand truck
2. Paint (to mark barrel locations on pavement)
3. Shovel
4. Broom
5. Hammer and Nails (if required)
6. Drill and Expansion Bolts (if required)

Figure 1A—Energite® III



Energite III System Components

Site Preparation/Foundation

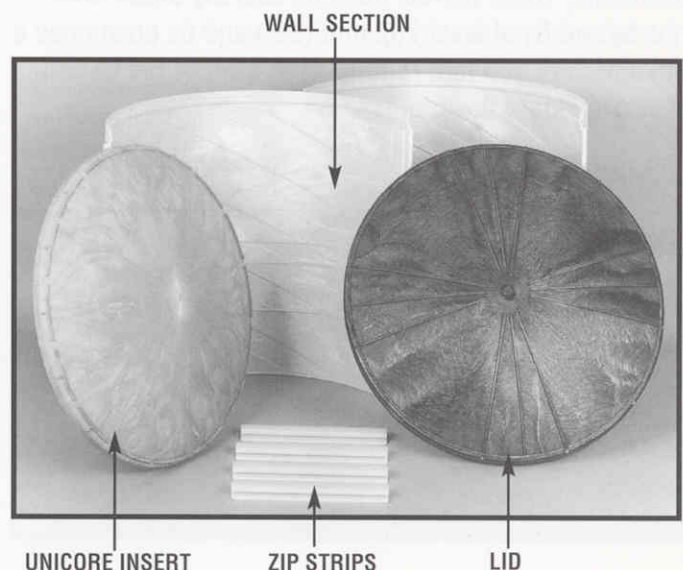
The Energite® III/Fitch® Universal Module Systems can be installed on concrete or asphalt surfaces at sites with a maximum grade (lateral and longitudinal) of 5%. If the grade is greater than 5%, the site will require grading before installation can begin.

All curbs and raised islands should be removed. Where this is not possible, a maximum of 100 mm (4") high is recommended. The site must also be clear of debris and snow.

Inspect Shipment

Before installing the Energite® III/Fitch® Universal Module Systems, check the inventory of parts against the shipping list supplied with the unit. Make sure that all parts have been received. In addition, verify that you have the array specifications provided by the manufacturer and responsible agency.

Figure 1B—Fitch® Universal Module System



For Customer Service call
1-888-32-ENERG

Installation

Installation Procedures

Caution: The Energite® III/Fitch® Universal Module Systems array should be designed by a qualified engineer. Improper placement could result in excessive “G” levels for errant vehicles and possible injuries to occupants.

The Energite® III/Fitch® Universal Module Systems should be assembled in the order of the steps to follow.

1) Place traffic control devices

Place traffic control devices to protect your crew and motorists.

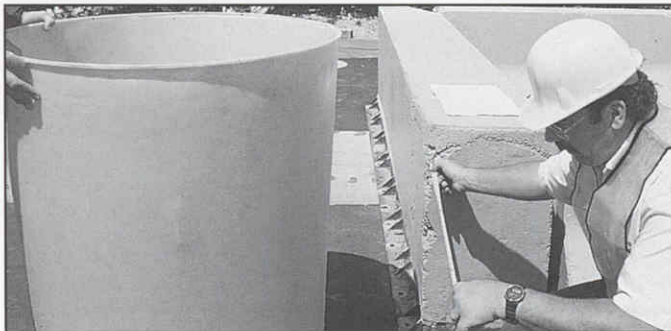
2) Review array specifications

Carefully review the array specifications provided by a qualified engineer.

3) Take measurements

Take measurements to properly position the first row of barrels (closest to the hazard) according to the specifications. These barrels must be laterally offset from the hazard by at least 762 mm (30") and be positioned a minimum of 305 mm (one-foot) in front of the hazard. Refer to Figure 2.

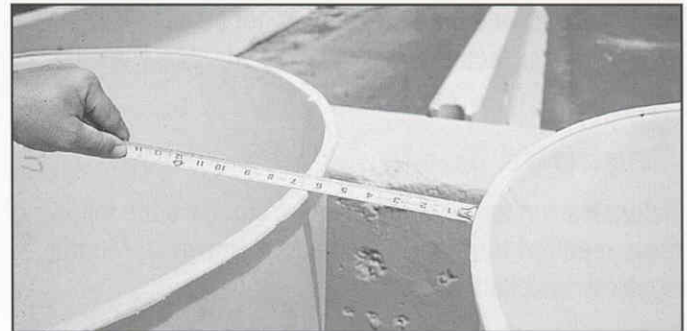
Figure 2



4) Position the barrels

Position the barrels with approximately 152 mm (6") of space between them (measured at the top of the barrel) according to the array specifications. Refer to Figure 3.

Figure 3



5) Trace its circumference

As each barrel is placed in its proper location, trace its circumference onto the pavement, then remove the barrel to allow for the next step.

6) Marking the location

Mark the location of each module and its model number or weight. This helps to properly position the array and aids during maintenance and refurbishment when modules need to be replaced. Refer to Figure 4.

Figure 4



7) Moving barrels into position

After the location of each module is marked on the pavement, place the barrels back into their proper positions. Move the barrels into position one row at a time while they are empty. Refer to Figure 5.

When Energite modules are placed on slopes or vibrating surfaces, the modules may be held into place on:

- Concrete by two expansion bolts through holes, 180 degrees apart in the bottom.
- Asphalt by four galvanized nails driven through the bottom, 90 degrees apart, 75 mm (3") from the outside wall of the barrel with full penetration.

For Fitch® Universal Modules, contact Energy Absorption Systems.

Figure 5

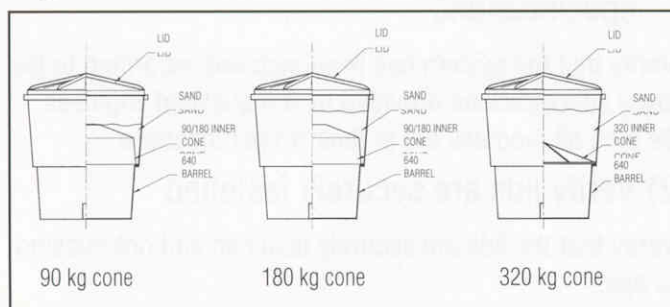


8) Placement of inner cones—Energite® III

Place the appropriate inner cones on the ledge inside the barrel for the 90, 180 and 320 kg (200, 400 and 700 lb) modules. (The 640 and 960 kg modules do not require a cone insert.) Refer to page 3 (Figure 1A) of this manual for a drawing and description of the module components).

Note: The same Energite® III cone is used for the 90 and 180 kg (200 and 400 lb) modules. Be sure that all cones are in the proper position. Refer to Figure 6A.

Figure 6A



Energite® III System

8A) Placement of inner cones – Fitch®

For a 200 lb. module place the Unicore on the top shelf (17"); fill to scribe mark (FILL TO HERE FOR 200#) resulting in a 7" sand depth and a 12" void at top.

For a 400 lb. module place the Unicore on the top shelf (17"); fill to the scribe mark (FILL TO HERE FOR 400#) resulting in a 10.5" sand depth and a 8.5" void at the top.

For a 700 lb. module place the Unicore on the second shelf from the top (14"); fill to the scribe mark (FILL TO HERE FOR 700#) resulting in a 16" sand depth and a 6" void at the top.

For a 1400 lb. module place the Unicore on the third shelf from the top (8.5"); fill to the scribe mark (FILL TO TOP FOR 1400#) resulting in a 27.5" sand depth and no void at top.

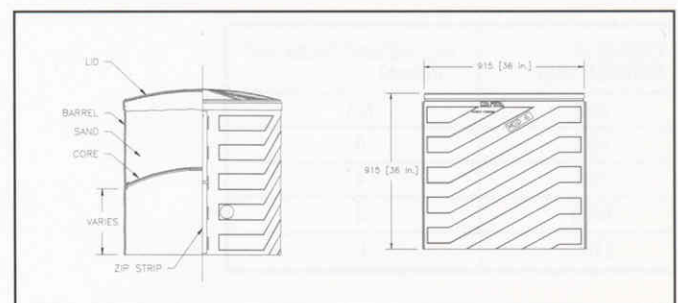
For a 2100 lb. module place the Unicore on the bottom shelf (.5"); fill to scribe mark (FILL TO TOP FOR 1400# + 2100#) resulting in a 35.5" sand depth and no void at the top.

Note: Orient the zip strips towards oncoming traffic. A grazing impact now hits only side of the module. This leaves the zip strips and other side of the module intact, reducing cost of replacement parts and making for less clean-up. Refer to figure 6B.

9) Filling of barrels

Once the first row of module (last row in array) is in place, they can be filled with the proper level of sand using a sand-filled cement truck. Refer to Figure 7.

Figure 6B



Fitch® Universal Module System

Figure 7



The sand must conform to ASTM C-33 (washed concrete sand or equal). The level is indicated on the decal located on the inside of the module. Fill heights marked on the decal are based on a sand density of 1600 kg/m³ (100 pcf). For other densities, see the "Fill Height" charts in Figures 8 and 9.

Caution: During the filling process, it is very important that the modules are filled with the proper level of sand. Refer to Figures 8 and 9, which show the correct Fill Heights for the sand.

**Figure 8—Fitch® Universal Module
Proper Sand Levels**

FITCH UNIVERSAL MODULE (lbs)	FILL HEIGHT FROM TOP (inches)
200	12
400	8.5
700	6
1400	top
2100	top

**Figure 9—Energite® III
Proper Sand Levels**

ENERGITE MODULE (lbs)	FILL HEIGHT FROM TOP (inches)
200	8.5
400	5
700	4
1400	3
2100	0

Caution: If the modules are located where freezing temperatures might occur, mix the sand with 5% rock salt by weight to prevent the sand from freezing. Be sure the salt is evenly dispersed in the sand.

10) Lid placement

The lids can then be snapped firmly into place. After the first row is finished, the next row of modules can be positioned, filled, and the lids snapped on until all the rows are completed. Be sure the lids are snapped firmly into place to prevent water and debris from entering the barrels, which can adversely affect the system's performance.

Alternate Installation Option

- 1) The Energite III barrels feature a convenient one-piece design with a solid bottom. This allows the modules to be fully assembled and filled at a remote site and then transported to the installation site. The fully-assembled modules can be lifted on and off the truck using a crane and lifting device.
- 2) Barrels may be placed on 100 mm (4") maximum height pallets for temporary installations.

Checking the Assembled System

After installing an array, it is important to check the system before leaving the site:

1) Verify installation according to array specifications

Verify that the system has been installed according to the array specifications provided by the qualified engineer. Be sure all modules are in their proper locations.

2) Verify lids are securely fastened

Verify that the lids are securely fastened and not missing or ajar.

3) Clean up

Clean up any debris around the system that could cause ramping.

Limitations and Warnings

Limitations and Warnings

The Energite® III/Fitch® Universal Module Systems have been tested and evaluated per recommendations of the National Cooperative Highway Research Program (NCHRP) Report 350* for Test Level 3, non-redirective impact conditions. The Energite® III/Fitch® Universal Module Systems, as currently designed, with the proper array, are capable of decelerating and stopping light and heavy weight vehicles (820 to 2000 kg, 1810 to 4410 lbs) when impacted head-on or at angles from 0° to 15° and at 100 km/h (62 mph). Tests were conducted on slopes less than 5% and without curbs.

The Energite® III/Fitch® Universal Module Systems are non-redirective crash cushions and should be used appropriately.

Curbs may create a vehicle ramping condition which could cause an unsafe vehicle trajectory.

Impacts that exceed the design capabilities described may not result in acceptable crash performance as described in NCHRP 350 relative to structural adequacy, occupant risk and vehicle trajectory factors.

*Copies may be obtained from:

Transportation Research Board
National Research Council
2101 Constitution Avenue, NW
Washington, D.C. 20418



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