KRT® Geocell (Cellular Confinement System) is a high quality erosion control and soil stabilization material with a three-dimensional honeycomb structure. The system provides fast, economical and long lasting solutions for soil stabilization applications and hydraulic structures, while preventing earth loss due to water and wind in general purpose sloping surfaces.

KRT® Geocell, produced by first quality polymer strips with special additives with innovative ultrasonic welding technology, provides excellent protection and reinforcement on the applied surface. While the perforated structure of the material allows fast drainage of water, the textured surface of the cells allow the filling material to be reliably held even at high slopes. Cells can be filled with different materials (sand, gravel, soil, concrete) according to the purpose of use. Cell heights vary between 50-200 mm depending on project requirements.

Thanks to high quality raw materials, KRT® Geocell can function safely for decades without being damaged in the nature.
**Retaining Walls**

KRT® Geocell can be filled with vegetative soil and stabilizing material to build green walls. Flexi retaining walls, which can be constructed using geogrid reinforcement, perform well against earthquake as opposed to conventional reinforced concrete walls.

1. Depending on the height of the wall, geogrid reinforcement can be used at the determined type and length at each level.
2. A spring irrigation system can be formed on the front of the wall.
3. The material to be used inside the cells must be high quality engineering fill.
4. At each stage, the KRT material should be compacted with a vibrating cylinder / compactor.

**Erosion Control**

KRT® Geocell protects steep slopes against erosion and landslides. The system, which protects the material inside the cell, provides a natural and safe protection against erosion by allowing safe root development and vegetation.

1. In the crushed stone fill applications, a separation geotextile should be used under the geocells.
2. In steep slope applications, it is recommended to use tendons for fixing.
3. Slope stability should be checked before the application.
4. In steep applications an anchorage ditch should be built for safety.

**Hydraulic Structures**

KRT® Geocell provides economical and safe solutions for hydraulic structures such as open channels, dam structures, shoreline protection structures and lagoons. Cellular confinement system that can be filled with soil, crushed stone and concrete protects the structures against destructive effects of water.

1. In the crushed stone fill applications, a separation geotextile should be used under the geocells.
2. If there is a membrane on the slope surface, it is recommended to use tendons for fixing.
3. Slope stability should be checked before the application.
4. In channel applications and steep slopes an anchorage ditch should be built for safety.

**Soil Stabilization**

KRT® Geocell provides superior ground reinforcement under roads, railways, airfields, access roads, sidewalks and parking areas. The system reduces the base thickness to be used and provides a significant economical cost of filling.

1. The material to be used inside the cells must be high quality engineering fill.
2. The infill material should be compacted with a vibrating cylinder / compactor.
3. A separation geotextile should be used under the geocells.

**Hand Tools**

- Hammer
- Shovel
- Driller
- Vibrating Plate Compactor

**Infill Materials**

- **Erosion Control**
  - Vegetative Soil
  - Vegetative Soil & Crushed Stone
  - Crushed Stone

- **Soil Stabilization & Retaining Walls**
  - Mechanical Fill
  - Crushed Stone

- **Hydraulic Structures**
  - Vegetative Soil
  - Vegetative Soil & Crushed Stone
  - Crushed Stone

- **Concrete**

**Geocell Cellular Confinement System**

- KRT® Geocell for Soil Stabilization and Erosion Control
- KRT® Geocell for Retaining Wall

H: 50-150-200 mm
S M L

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WELDING DISTANCE
The distance between two welding points of the cell. The cell size increases as the welding distance increases.

CELL SIZE
It is the transverse (A) and longitudinal (B) inner distances of the opened cell. If the slope or load on the cell increases, the cell size is reduced.

CELL HEIGHT
It is determined by the height of the material to be filled into the cell. As the slope increases, the height of the cell also needs to be increased.

STRIP THICKNESS
It is the strip thickness of the cell walls. Increasing the thickness of the strips increases the tensile strength of the strips.

Welding distances (W) and cell dimensions (AxB) given above belong to our standard products. According to project specifications KRT® Geocell can be manufactured to desired welding distance from 300 mm to 800 mm and to strip thickness of up to 2.0 mm.

<table>
<thead>
<tr>
<th>Welding Distance (W)</th>
<th>Cell Width (A)</th>
<th>Cell Length (B)</th>
<th>Cell Height (H)</th>
<th>Strip Thickness (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>330 mm</td>
<td>210 mm</td>
<td>245 mm</td>
<td>50/75/100/150/200 mm</td>
<td>1.3 - 2.0 mm</td>
</tr>
<tr>
<td>450 mm</td>
<td>250 mm</td>
<td>260 mm</td>
<td>50/75/100/150/200 mm</td>
<td>1.3 - 2.0 mm</td>
</tr>
<tr>
<td>450 mm</td>
<td>280 mm</td>
<td>340 mm</td>
<td>50/75/100/150/200 mm</td>
<td>1.3 - 2.0 mm</td>
</tr>
<tr>
<td>500 mm</td>
<td>340 mm</td>
<td>365 mm</td>
<td>50/75/100/150/200 mm</td>
<td>1.3 - 2.0 mm</td>
</tr>
<tr>
<td>600 mm</td>
<td>390 mm</td>
<td>425 mm</td>
<td>50/75/100/150/200 mm</td>
<td>1.3 - 2.0 mm</td>
</tr>
<tr>
<td>600 mm</td>
<td>420 mm</td>
<td>460 mm</td>
<td>50/75/100/150/200 mm</td>
<td>1.3 - 2.0 mm</td>
</tr>
<tr>
<td>700 mm</td>
<td>480 mm</td>
<td>520 mm</td>
<td>50/75/100/150/200 mm</td>
<td>1.3 - 2.0 mm</td>
</tr>
</tbody>
</table>

As KRT® engineering team please contact us so that we can offer you the safest and most economical Geocell for your project.

WHICH KRT® GEOCELL?
Choosing the right parameters and cell size in Geocell cellular confinement system applications is very important in terms of both safety and reducing project costs.

WHY KRT® GEOCELL?

- High Quality Materials
  KRT® Geocell is manufactured from the highest quality materials. Cells reinforced with specially added polymers serve safely even in the most difficult natural conditions.

- Excellent Welding Strength
  KRT® Geocell has a special ultrasonic welding system with superior strength that does not break even under extreme loads.

- Textured Cell Wall
  The specially designed textural frictional surface prevents the loss of material in the cell by increasing the adhesion of the cell wall and the fill material.

- Perforated Cell Wall
  The increased perforated structure permits rapid drainage of water between cells and propagation of the plant root system.

KRT® Geocell provides high erosion protection even in the most steep slopes with its high weld and tensile strength.

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KRT® cellular confinement system protects a number of engineering structures, such as highway and railway side slopes, containment dikes and levees, abutments against erosion and landslides. Even on extremely sloped surfaces, the system prevents the valuable material on the slope surface from being lost due to environmental factors (rain, water, wind etc.)

The cell size and cell height are determined according to the slope height and slope to be applied. The type of infill material to be used has also an important influence on cell size selection.

- Allows aesthetic landscape applications.
- Prevents the loss of material on the slope surface.
- Increases slope stability by regulating water intake from the surface.
- Protects the root system of plants and provides safe vegetation.

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Erosion Control

» Cut or Fill Embankment Slopes
» Shoreline Revetments
» Containment Dikes and Levees
» Landscape Applications
» Landfill Linings and Covers
» Abutment Protection
» Highway and Railway Side Slopes
» Dams and Spillways
» Vegetated Channel Structures
Weathering erosion is the removal of valuable vegetative soil by water and the transport of soil particles through small cracks. As abrasion and decomposition increase, or as the flow rate of water increases, the gutters deepen and expand.

KRT® Geocell significantly increases the performance of slopes against erosion by controlling the flow of water and the migration of fill material inside the cells.

In slopes that are not suitable for planting, the cells are filled with colored stones to provide a permeable and aesthetic appearance.

- **ROOT PROTECTION** (VEGETATIVE SOIL)
  Reinforces root systems and directs hydraulic flows over the top of cells, with the cells acting as a series of check dams.

- **GRANULAR PROTECTION** (CRUSHED STONE)
  Improves the performance of granular filled slopes by controlling the migration of fills that would otherwise be initiated by hydraulic and gravitational forces.

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KRT® Geocell forms a three-dimensional load support system that significantly increases the load bearing capacity of the underlying subgrade soil.

Each cell confines the soil, preventing lateral spreading and increasing base stiffness. Both soil interaction with the cell walls and passive resistance developed between adjoining cells increases vertical shear resistance of the infill material. When filled with granular infill, KRT® Geocell can reduce base course thickness by as much as 50%.

- **Significantly minimizes surface rutting.**
- **Increases load bearing capacity of the soil.**
- **Allows fast and controlled soil compaction.**
- **Controls shearing and lateral movement of the coarse infill material.**
- **Distributes loads laterally and reduces vertical deflection.**
With the use of KRT® Geocell, vehicle and pedestrian loads are distributed over a larger area instead of a direct contact point. Thanks to the superior confinement effect of the system, the load concentration on the base decreases significantly. Due to the high drainage capacity of the material, settlements are reduced dramatically.

KRT® Geocell system performs well in protecting the underground utilities and buried pipelines. The geocell layer can reduce the spread and intensity of shear strain under the footing, tending to reduce both soil surface settlement and pipe deflection.

KRT® Geocell
Flexi KRT® Geocell retaining walls manufactured using the KRT® Cellular Confinement System are green retaining structures that do not require concrete and mold, are perfectly compatible with nature and are extremely resistant to earthquake.

Flexi KRT® Geocell walls can easily reach the height that conventional retaining walls (stone, reinforced concrete) can not reach. The system allows for construction flexibility and provides aesthetics through a completely vegetated face.

- It has an aesthetic vegetated front face integrated with nature.
- Fits with horizontal and vertical geometry perfectly.
- Retaining walls with unlimited height can be manufactured.
- Its flexible structure provides excellent performance against earthquake.
- The system does not require concrete and mold.
In order to achieve desired front face angle of the wall, offsets are set with KRT® Geocell at each level of laying/compaction.

Levelling and drainage excavation are done according to the project. KRT® Geocell and other materials are installed on the wall line.

The front face cells are filled with crushed stone and vegetative soil in each step and compacted with vibrating plate compactor.

At each level of the compaction laying of geogrid and geocell is done with extensive care so that the geogrids are not damaged.

The application of the wall is completed when the laying and compacting process reaches the specified height. KRT® Geocell front cells are planted to create aesthetic natural look.

Flexi KRT® Geocell retaining walls constructed to ensure the stability of the steep slopes against the landslide can be manufactured with the method of laying geogrid reinforcements and compacting high quality filling material at every stage. Desired front face angle (α) of the wall can be achieved by setting offsets(s) at every stage with a prescribed distance.

The main components of the wall system are KRT® Geocell wall element, high quality fill material and geogrid reinforcements (if necessary).
Thanks to high drainage capacity of KRT® Geocell system with perforated cell walls, the flow of water is directed to the cell surface, preventing from erosion on the slope surface and on the channel bed.

KRT® Geocell offers a wide variety of flexible protection applications for hydraulic structures. The cellular confinement system provides stability and protection of channels exposed to erosive conditions ranging from low-to-high flows either intermittent or continuous.

The system greatly improves the hydraulic performance of conventional protection materials such as aggregate, rip-rap and vegetation by confining them within the cellular structure. KRT® Geocell system can be designed for specific site conditions based upon compatibility with local environmental, ecological and aesthetic requirements.

- Can be used in intermittent or continuous/low to high flow channels.
- Offers different infill alternatives depending on the flow conditions.
- Increases the performance of conventional protection materials.
- Reduced installation costs.

**INFILL MATERIALS**

- Vegetative Soil
- Crushed Stone
- Concrete

**HYDRAULIC STRUCTURES**

In areas with limited easements, Flexi KRT® Geocell retaining wall can be constructed by filling the cells with concrete or crushed stone.

- Stormwater Diversion or Containment
- Flow Channels
- Shore Protection
- Culvert Outfalls
- Dam Faces and Spillways
- Down Chutes
- Drop Structures
- Swales and Drainage Ditches
- Process Water Channels
- Storm Water/Waste Water Lagoons
- Geomembrane Protection

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PERFORATED • TEXTURED GEOCELL WALL

ADVANTAGES

- Perforations facilitate parallel slope drainage of the infilled cell. In saturated conditions, the removal of excess water increases infill friction, reducing down slope sliding forces, resulting in a more stable system.

- In vegetated systems, perforations allow roots to grow from cell-to-cell creating greater vegetative stability against short-term hydraulic events. Perforations also allow nutrients and microorganisms to pass through neighboring cells.

- Textured surfaced cells significantly increase the frictional resistance of the cell wall with the infill material. Frictional surface limits the movements and the loss of the infill materials due to freeze-thaw cycles, water and other eroding factors.

KRT® Geocell offers a great protection system in pond applications. Geocell filled with concrete creates a protective layer on the geomembrane against uplifting of water and erosion.

KRT® Geocell system greatly improves the hydraulic performance of conventional protection materials such as aggregate, rip-rap and vegetation by confining them within the three dimensional flexible cellular structure.

HYDRAULIC STRUCTURES

CONCRETE INFILL

RIGID PROTECTION

- A cost-effective alternative to traditional installed concrete lined channels.
  - Installation costs are dramatically reduced through elimination of costly forms and other construction techniques.
  - Increases the stability significantly in steep slopes where the flow rate is relatively high.
  - Can produce a flexible concrete slab for a low-friction armored channel lining.
  - Permits performance with subgrade movement without the potential cracking and undermining associated with poured-in-place concrete slabs.

CRUSHED STONE INFILL

PERMEABLE PROTECTION

- Performs well, allowing the use of different sizes for variances in flow velocities encountered from site to site.
  - Allow to use smaller diameter, less costly aggregate by confining and improving the performance of infill material.
  - Cost effective alternative to large rip rap or hard armoring protection.
  - Directs flow over the top cells; there by increasing the shear resistance of the fill.
  - Limits the movement of the aggregates due to the erosive effect of flow.

VEGETATIVE SOIL

PLANT ROOT PROTECTION

- Provides an aesthetically pleasing look and performs exceptionally well in applications with low to moderate flows.
  - Reinforces root zones and directs flow over the top cells; there by increasing the shear resistance of the fill.
  - Produced vegetative soil performs well where the flow is intermittent.
  - Prevents formation of cracks.
  - Compared to conventional methods, it offers a more aesthetically superior solution.

KRT® Geocell Geomembrane Protection Layer

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