ArmorFlex®

Articulating Concrete Block Revetment System

Unearthing better results.
ArmorFlex®

ASTM-validated system lets you design with confidence

ArmorFlex is in a class by itself.
Developed for high-scour, high-flow applications, the ArmorFlex Articulated Concrete Block (ACB) revetment system meets all four standards established by the American Society for Testing and Materials (ASTM) at the time of their 2016 update. ASTM standards help ensure industry brings only the highest quality products to the public.

ArmorFlex is a flexible interlocking matrix of machine-compressed cellular concrete blocks. Each block is a uniform size and is formed with ducts, through which cables run to form connections with other blocks in the matrix. This “mat” design makes it easy to transport to site, lift into place and position.

ArmorFlex comes in several block classes (based on weight, height and a broad range of flow dynamics), can be open or closed-cell and is capable of facilitating vegetation if desired for the project site’s planned uses and aesthetics.

ArmorFlex and ASTM: Understanding the Nilex Advantage

With over 12,000 standards in use around the world, ASTM defines product quality and performance excellence. The organization was founded in 1898 and is driven by the voluntary consensus contributions of the world’s top technical experts. Products must meet certain protocols to achieve an ASTM standard.

The four standards involved in testing and evaluating ACBs are:
• Materials and manufacture (ASTM D-6684)
• Hydraulic stability testing methods (ASTM D-7277)
• Analysis of this test data (ASTM D-7276)
• Installation practices (ASTM D-6884).

These standards help ensure the best products are in place to protect private and public infrastructure, and ultimately, public safety. They provide designers with a recognized method to compare different systems, allowing them to design with confidence. They can rest assured the materials they’re using are suitable for the project, using third-party, unbiased design and testing criteria.

ASTM standards reflect the values and practices Nilex was built on and follows everyday. We strive to provide the best solution for each situation and each client. ArmorFlex armors sites with unsurpassed ACB scour erosion protection in hydraulic flows, with an extensive lifespan, providing true value for the investment.
Features

With stringent ASTM validation and long-standing proven ACB design methods, ArmorFlex brings design certainty to projects. The Quality Assurance / Quality Control of a manufactured product brings additional predictability to projects.

ArmorFlex is a low-profile hard armor suitable for new construction and infrastructure retrofits. It’s also an alternative to rip-rap, gabions, structural concrete and other heavy-duty erosion protection systems. Due to the increasing cost and scarcity of local rock, its permanence (life-cycle costs) also provides significant savings for many project owners. The ease of installation of a connected matrix also helps reduce overall project costs.

ArmorFlex is also safer to install than rock alternatives. It removes the risk of pinch-points between the rocks, can be installed on site with stationary equipment and requires less on-site machinery overall.

Combining the best aspects of lightweight blankets with the strength and performance of rigid liners, ArmorFlex is:

- Cost effective
- Easy to install
- Vegetation supportive
- Wave and high-scour resistant
- Stable
- Permeable
- Frost resistant
- Suitable for underwater installation

Form and Function

Total block surface area can be as high as 20% open, allowing ground water drainage and helping to eliminate hydrostatic pressure behind the mat. Combined with geotextile, ArmorFlex keeps soil on site and can be made to encourage vegetation.

Each interior block in an ArmorFlex mat is interlocked by six other blocks, giving the system excellent stability.

Applications

The features, quality materials and flexibility of ArmorFlex make it well-suited to a wide range of sites and applications, including:

- Channel and ditch lining
- Liner ballast and protection
- Riverbank protection
- Pipeline protection
- Dam crests and spillways
- Weir and overflow channels
- Dikes and levy protection
- Reservoir slope protection
- Boat ramps
- Low level crossings
- Lake shoreline protection
- Bridge abutment protection
Installation

1. Site Preparation
It's important to properly level installation sites to allow for the mats’ close contour. This preparation step is easily achieved with conventional construction equipment, keeping costs down.

Typical applications utilize nonwoven geotextile to hold soil fines in place. The geotextile can be applied directly on the ground or can be fastened to the underside of the blocks in the field, so both are installed in one step. Some applications require aggregate or a geocomposite for drainage. This should be laid prior to placing ArmorFlex.

2. Delivery & Unloading
ArmorFlex arrives on site as a series of pre-assembled mats stacked on a flat-bed trailer. They are easily unloaded using a crane, forklift or hydraulic excavator. Staging at site is efficient and requires minimal laydown space. Project coordinators can get a lot of material to site in minimal time, especially compared to alternatives like rock rip-rap, which requires many truckloads and large staging piles. The elimination of haul trips means safer project delivery as well as a reduction in emissions-related environmental impacts.

3. Installation
A variety of lifting beams can be used to remove the ArmorFlex mats from the delivery truck and for placement on the ground. Nilex can arrange for a suitable device. Once the end loops of the mat wires are secured to the beam, the ground crew can easily lower the mats into place; many installations are completed in a single workday. The mats must be carefully placed to ensure they are properly abutting. Adjoining mats can also be connected using high compressive strength concrete.

4. Finishing Details
Careful detailing is key to a successful ArmorFlex installation. Nilex works with the owner, designer or contractor to ensure proper finish detailing. Anchor trenches, side trenches, toe trenches, mat joints, transition to adjoining treatments, anchoring and backfill/overburden are all considered. Where ArmorFlex is to be vegetated, additional details are considered to ensure sustainable growth. Nilex can assist with all adjoining product and treatment details.
High-scour and high-flow situations are common along natural waterways and man-made drainage channels. Proper subgrade preparation is crucial before installation of ArmorFlex mats. The double-taper edges and interlocking shape allow the mats to maintain close contour with the landscape.

Once installed, the mats readily support vegetation, which provides stability through the root network and improves aesthetic appeal. The mats can be anchored temporarily using wooden stakes, anchored permanently using ground anchors and cables, or can be removed and reused elsewhere.
ArmorFlex® Block Specifications (gross area for all types is 0.165 m² / 1.77 ft²)

<table>
<thead>
<tr>
<th>Block Class</th>
<th>Cell type</th>
<th>% open</th>
<th>Dimensions, L x W x H cm</th>
<th>Dimensions, L x W x H inches</th>
<th>Block Weight kg</th>
<th>Block Weight lbs</th>
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<td>40</td>
<td>Open</td>
<td>20%</td>
<td>44.1 x 39.3 x 12</td>
<td>17.4 x 15.5 x 4.75</td>
<td>26.7 - 29</td>
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<td>17.4 x 15.5 x 6</td>
<td>41.3 - 45.4</td>
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<td>17.4 x 15.5 x 8.75</td>
<td>52.2 - 56.2</td>
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<td>17.4 x 15.5 x 7.5</td>
<td>50.1 - 54.9</td>
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Tapered blocks (below) are designed for higher flow conditions

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Imperial measurements govern; metric conversions are not intended for design purposes
Think Nilex

Nilex is a leader in the geosynthetics industry, providing innovative solutions to support the unique challenges of civil, resource and environmental construction projects. Our engineered, technically advanced materials and construction techniques are used in road building, Mechanically Stabilized Earth (MSE) solutions for grade changes, erosion and sediment control, water management and containment.

With over 39 years of experience, a long-standing commitment to the environment and highly qualified staff, Nilex delivers the products and technologies that give clients an economic advantage with environmental benefit.

Simply stated, it's a better way of building.