Incomat®

Geosynthetic concrete mattress system for hydraulic engineering

HUESKER
Ideas. Engineers. Innovations.

The geosynthetic concrete mattress system

The perfect symbiosis of geotextile and concrete

The Incomat geotextile concrete mattress has been used successfully as erosion protection or surface sealing applications in hydraulic engineering since the early 1960s. Incomat concrete mattresses consist of two high-tensile synthetic fabric layers that are connected to each other by regularly arranged spacers or ties. The cavity between the fabric layers is filled on site with fluid concrete. Depending on the product, a permeable or impermeable concrete covering with a specific mattress thickness can be produced. During the course of continuous development, HUESKER has successively expanded its product portfolio and range of applications. Incomat can be used for slope and bed stabilisation, bank and coastal protection, canal sealing, berth protection and pipeline encasement.

Outstanding system features

- Globally unique production technology with incorporation of vertical ties
- Very high dimensional stability during concrete filling
- Fast construction thanks to efficient filling process
- Low filling shrinkage reduces material usage by up to 35 %
- Different mattress thicknesses can be produced
- Very high dimensional stability during filling
- Production of panels of up to 10,000 sqf possible
- Connection via factory-fitted industrial zippers

Lower CO_2 emissions

Coherent system for the greatest possible filling heights

No further formwork required

Underwater installation of concrete

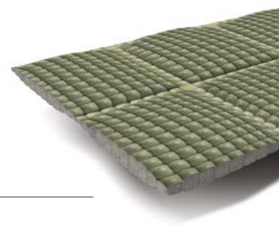
A strong product family

Incomat Standard bio LINE
State of the art cover lining and erosion control with concrete mattresses
Page 4-5

Incomat Pro
Premium product for waterproofing and erosion control solutions
Page 6-7

Incomat Pipeline Cover bio LINE
The fast and efficient pipeline protection system to protect pipelines against buoyancy and external impacts
Page 8-9

Incomat Flex
The permeable cushion mattress with predetermined breaking lines, designed for high hydraulic loads
Page 10-11



Incomat Filterpoint
The permeable concrete mattress for stable bases and low hydraulic loads
Page 12-13

Incomat Crib
Easily vegetated concrete mattress for erosion protection, ideally suited for overflow sections
Page 14-15

Proven performance
BAW-approved cover lining for beds and embankments within waterways in accordance with EAO (2002)
Sealing system recognized by the DWA for hydraulic engineering in accordance with information paper DWA-M 512-1
Environmentally safe in accordance with the requirements of data sheet M Geok E 2016 and the Federal Soil Protection Ordinance (BBodSchV)
Tested in accordance with the guidelines for the hygienic assessment of elastomers in contact with drinking water (Elastomer guideline)

Incomat Standard

Constant thickness for the best possible performance

Wherever a constant concrete thickness or an impermeable concrete mattress is used for erosion protection or sealing, Incomat Standard is the product of choice. The unique production method with vertically arranged web ties, ensures a unique dimensional stability of the geotextile cover.

The dimensional stability guarantees a constant concrete cross-section even under difficult installation conditions, e.g. with uneven bases or underwater applications. The adaptability of the concrete mattress system gives it a clear edge over all conventional concrete solutions. Through custom-fabrication, the mattress can also be made to accommodate penetrations and complex geometrics.

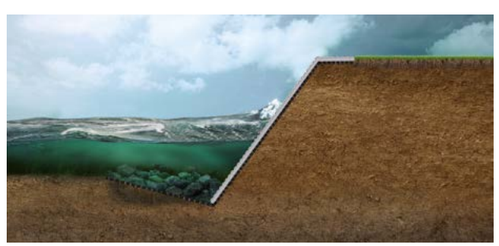
Incomat Standard enables the installation of a concrete lining under water and on steep slopes. The additional erosion protection function makes Incomat Standard the ideal product for canal refurbishment and basin linings, as there is no need for protective layers or multi-layer system structures.

Advantages

- Vertically arranged web ties enable maximum filling heights
- Constant thickness even on uneven surfaces
- Low hydraulic roughness compared to conventional concrete mattresses
- Minimal filling shrinkage ensures high adaptability
- Coherent system allows use as the sole sealant

Canals

Berth protection



Slope protection

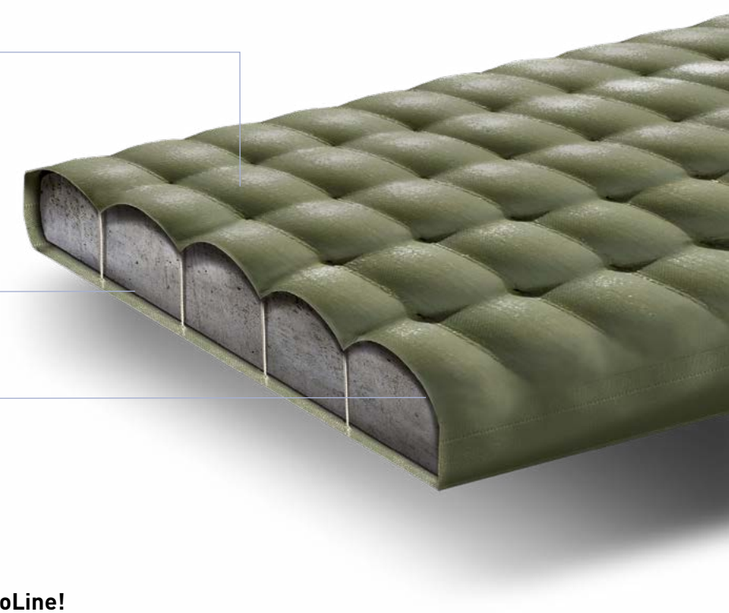
Stormwater holding and storage basins

Structure and function in detail

Geotextile formwork mattress
Polyethylene (PE) and Polyamide (PA) double woven with integral ties

Vertical ties
Spacers; project-specific lengths (1.5 to 22 in); give the mattress maximum form stability, ensuring a constant concrete layer thickness

Concrete fill
Fluid concrete; easy filling via factory-fitted filling aids (e.g. filler necks)



Incomat Standard now also available as bioLine!
Sustainable erosion and pipeline protection

Incomat bio is the concrete mattress made from bio-based raw materials, developed for ecologically sensitive construction projects in water and pipeline construction.

Discover **Incomat bio** products

Incomat Standard	
Function	Erosion protection and/or lining
Material	Polyethylene (PE) and polyamide (PA)
Manufactured thickness	1.5 to 22 in
Environmental performance	Classed as harmless under M Geok E 2016 (Guidance Paper on the Use of Geosynthetics in Earthworks for Roadbuilding Projects) and BBodSchV (German Federal Soil Protection and Contaminated Sites Ordinance) Tested to German guideline for hygienic assessment of elastomers in contact with drinking water (Elastomer Guideline)
Customized configuration	Mattress thickness, filling devices, stitched into large panels, factory prefabrication possible, zipper connection

Incomat Pro

Technological premium product

When sealing and erosion protection are required under particularly demanding conditions, Incomat Pro sets new standards. As the latest development within the Incomat product line, this system stands out with a unique combination of technical performance and a more sustainable design.

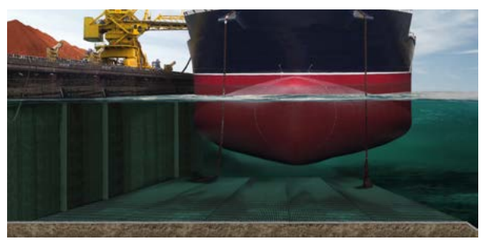
Thanks to filling heights of up to 11.5 feet and a 95 % increase in tensile strength, Incomat Pro is ideal for projects where high demands are placed on rapid construction progress. The product is also ideally suited for complex installation situations. The improved web construction provides additional stability and enables even concrete distribution – even on uneven ground or underwater installations.

The reduced area shrinkage optimizes the use of materials, which not only conserves resources but also significantly increases the cost-effectiveness of the overall project.

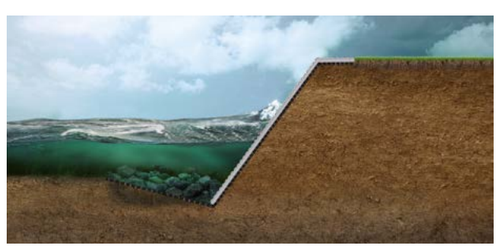
Advantages

- Increased tensile strength of up to 50 kN/m (225 lbf) ensures safe filling
- Improved web construction enables filling heights of up to 11.5 ft
- Increases the efficiency of the construction project and reduces costs
- Reduced surface shrinkage ensures material savings of up to 35 %

Canals



Berth protection



Slope protection

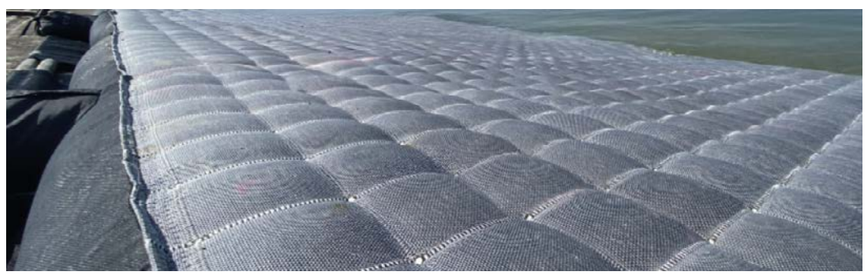
Stormwater holding and storage basins

Structure and function in detail

Geotextile formwork mattress
Polyester (PET) and polypropylene (PP) with spacers

Vertical ties
Spacers; project-specific lengths (1.5 to 22 in); give the mattress maximum form stability, ensuring a constant concrete layer thickness

Concrete fill
Fluid concrete; easy filling via factory-fitted filling aids (e.g. filler necks)



Find out more **about Incomat**

Incomat Pro	
Function	Erosion protection and/or lining
Material	Polyester (PET) and polypropylene (PP)
Manufactured thickness	1.5 to 22 in
Customized configuration	Mattress thickness, filling devices, stitched into large panels, factory prefabrication possible, zipper connection

Incomat Pipeline Cover

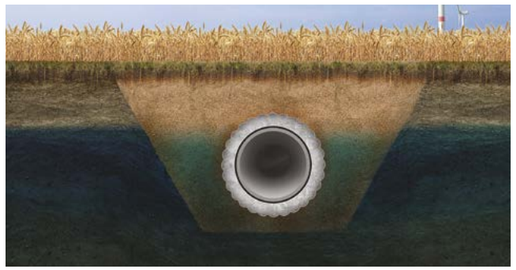
Revolutionary pipe encasement system

Incomat Pipeline Cover (IPC) can be used wherever pipelines require protection against mechanical impacts or buoyancy uplift. The IPC system sets itself apart from concrete encasements installed with conventional formwork systems through its fast, efficient application.

The prefabrication of the geotextile formwork at the factory eliminates the need for time-consuming formwork on site. Furthermore, the fast assembly of the tailor-made elements and the optimized concreting process enables rapid construction progress. Pipe bends or different pipe diameters can be easily encased with the appropriate pre-planning and fabrication.

Advantages

- Mechanical and buoyancy protection
- No formwork required on the construction site
- Factory prefabrication for precisely fitting encasements
- Trouble-free installation at pipeline bends
- No impairment of the cathodic corrosion protection



Pipe encasements

Incomat IPC now also available as bioLine!
Sustainable erosion and pipeline protection

Incomat Pipeline Cover bio is the concrete mattress made from bio-based raw materials, developed for ecologically sensitive construction projects in water and pipeline construction.

Incomat IPC bio
discover more

Simple installation process

1 Fixing to pipe section

2 Zipping-up of IPC Panels

3 Concreting via filler neck

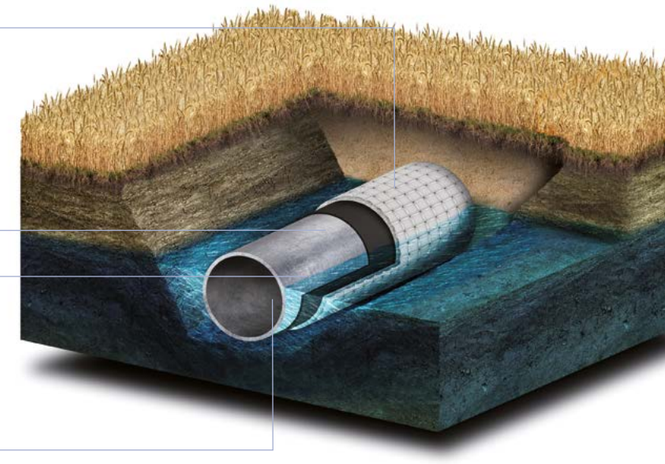
Structure and function in detail

Geotextile formwork mattress
Modified Incomat mattress with factory-fitted industrial zips for rapid pipe encasement

Vertical ties
Spacers; project-specific adaptation; maximize dimensional stability of the mattress, ensuring a constant concrete cover

Concrete fill
Fluid concrete; easy filling via factory-fitted filler necks

Protective nonwoven (optional)
Optional incorporation of nonwoven as an additional protective layer



Find out how Incomat protects underwater pipelines:

Incomat Pipeline Cover	
Function	Protection against external impacts, buoyancy uplift
Material	Standard (PE and PA), Pro (PET and PP), bio
Length of individual units	3.3 feet to a maximum of 16.4 feet (concreting sections)
Customized configuration	Mattress length/width/thickness, filler neck, possible factory prefabrication

Incomat Flex

Revetment for high hydraulic loads

Incomat Flex is used wherever hydraulic loads require a permeable mattress with a higher dead weight. The production method is also based on the unique vertical tie principle, so mattresses can be produced in thicknesses of up to 22 in.

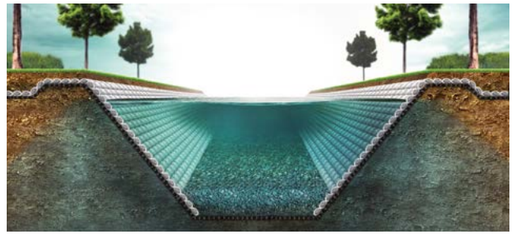
Incomat Flex consists of interconnected elements (cushions) that are connected to each other by integral connection strips. The tapered profile at the strip positions creates a hinge zone or plane of weakness for crack concentration. Woven filter points at the strip intersections allow the relief of any hydrostatic pressure accumulating behind the revetment. The tapered connection strips provide the mattress with a degree of two-dimensional flexibility to accommodate any settlement in the base or underflow below the mattress.

Advantages

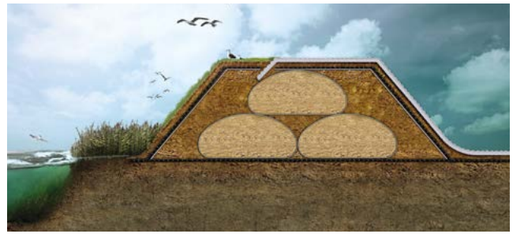
- Effective erosion protection for high hydraulic loads
- Adaptable to settlement movements
- Vertical ties for maximum filling heights
- Constant thickness even on uneven surfaces
- Reduction of pore water pressure below the concrete mattress guaranteed

Slope protection

Breakwaters

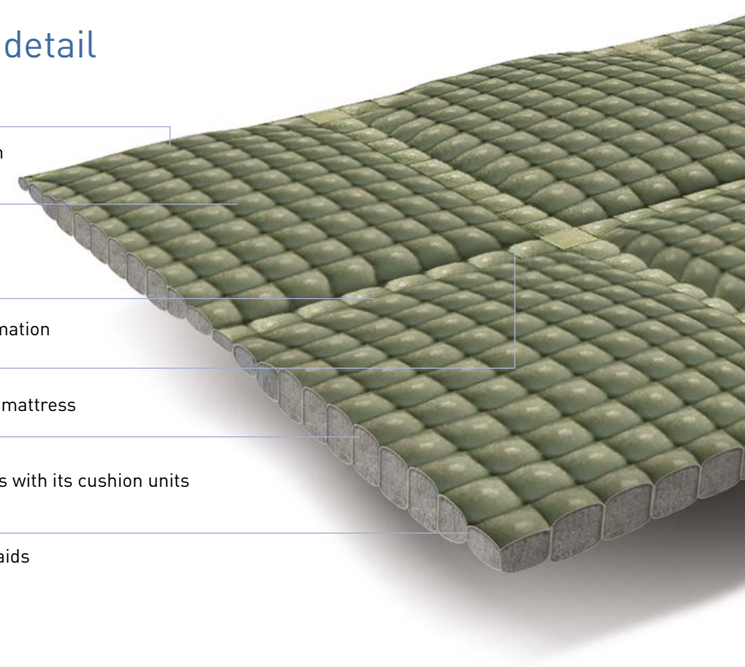


Canals



Dams and dikes

Structure and function in detail



Geotextile formwork mattress
Polyethylene (PE) and polyamide (PA) double woven

Cushion units
Mattresses available in different weights through variation of thickness and surface area

Connection strips
Zones for crack width concentration and hinge formation

Filterpoints
Allow relief of excess pore water pressures behind mattress

Vertical ties
Spacers maximize dimensional stability of mattress with its cushion units

Concrete fill
Fluid concrete; easy filling via factory-fitted filling aids (e.g. filler necks)

Find out everything you need to know about Incomat's wide range of applications in our videocast:

Incomat Flex	
Function	Erosion protection for heavy hydraulic loads
Material	Polyethylene (PE) and polyamide (PA)
Mattress thickness	3 to 22 in
Environmental performance	Harmless according to data sheet M Geok E 2016 and Federal Soil Protection Ordinance (BBodSchV)
Customized configuration	Cushion dimensions, mattress thickness, filling devices, stitched into large panels, factory prefabrication possible, zipper connection

Incomat Filterpoint

Permeable revetment for low hydraulic loads

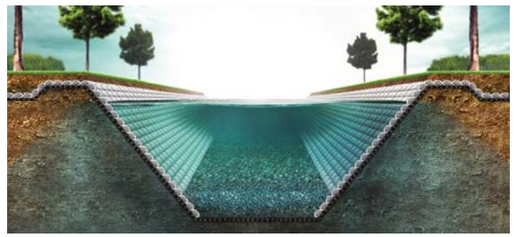
Incomat Filterpoint is the ideal erosion control solution for applications subject to low hydraulic loads requiring a water-permeable concrete mattress. The mattress consists of a two-layer woven fabric, with the two woven layers joined together by a regular arrangement of woven-in filterpoints. The in-situ concreting process ensures that the mattress adapts to the base profile, thereby lowering the risk of void formation below the revetment.

Incomat Filterpoint is normally specified as an alternative to rockfill, pitched stone or conventional concrete slab revetments on account of its lower cost and superior performance. Incomat Filterpoint acts in conjunction with the concrete to create a highly efficient, permeable revetment suitable for strong bases and low hydraulic loads.

Advantages

- Evenly distributed filterpoints
- Erosion protection for still waters and above the water level
- Reduction of the pore water pressure below the concrete mattress
- More cost-effective than rip-rap, pitched stone or concrete slab, revetments
- Variable concrete thicknesses can be produced by adjusting the filterpoint pattern
- Can be used as a protective and ballast layer for plastic waterproofing membranes

Slope protection



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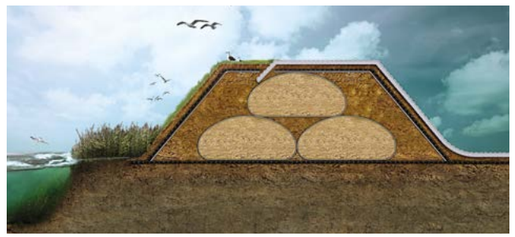


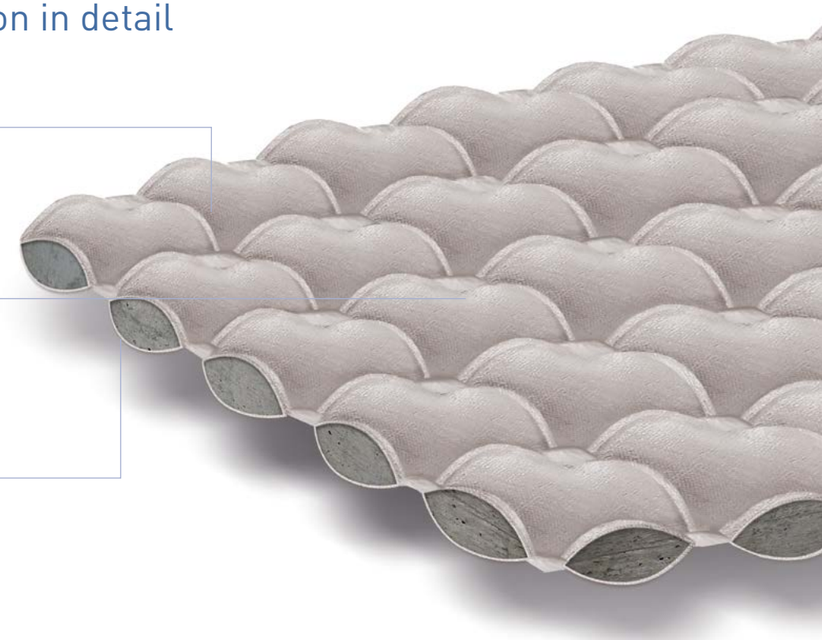
Overflow sections

Structure and function in detail

Geotextile formwork mattress
Polyester (PET) double woven with filterpoints

Filterpoints
Zones that allow relief of excess pore water pressure below mattress

Concrete fill
Fluid concrete; easy filling via factory-fitted filling aids (e.g.filler necks)



Find out how Incomat can be used after storm erosion events

Incomat Filterpoint	
Function	Erosion control for low hydraulic loads and stable base
Material	Polyester (PET)
Mattress thickness	Two standard types available in different thicknesses. Project-specific thicknesses also possible
Environmental performance	Harmless according to data sheet M Geok E 2016 and Federal Soil Protection Ordinance (BBodSchV)
Customized configuration	Mattress area, mattress thickness, filling devices, stitched into large panels, panel size, possible factory prefabrication, zipper connection

Incomat Crib

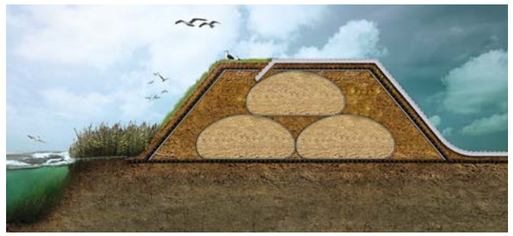
Plantable bank protection

Incomat Crib consists of a tubular grid which is filled with concrete. The rectangular interwoven areas within the system are left unfilled and after concreting, act as large-area filter points. These areas can then be filled with soil and subsequently vegetated.

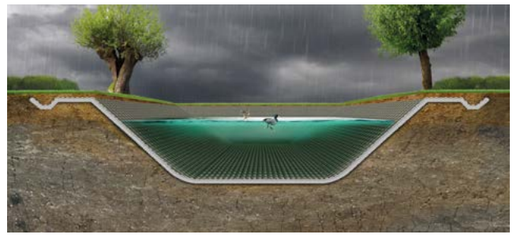
The main area of application for this tubular profiled mat is in securing overflow dam areas and lining flood relief systems. It can be used to secure river banks or watercourses in the zone between the high and low water marks or above the permanent water level. After planting, Incomat Crib provides a visually appealing and ecological means of erosion control.

Advantages

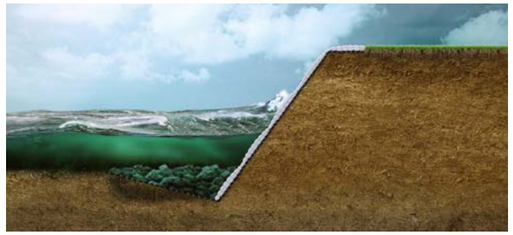
- Proven performance in overflow sections
- Erosion protection for watercourses above the permanent water level
- Eco-friendly erosion control
- Can be vegetated to integrate with the surroundings
- Scientifically validated erosion protection during overflow events
- Excellent system tightness allows it to be used as the sole sealant



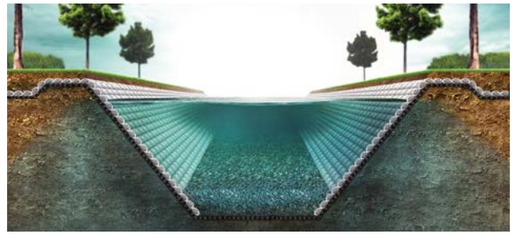
Overflow sections



Stormwater holding and storage basins



Slope protection



Canals

Structure and function in detail

Geotextile formwork mattress
Polyethylene (PE) and polyamide (PA) double woven

Large planting areas / filterpoints
Allow relief of excess pore water pressures below mattress and planting above water level

Tubular grid
Longitudinal and transverse geotextile braces arranged in grid pattern to ensure dimensional stability

Concrete fill
Fluid concrete; easy filling via factory-fitted filling aids (e.g. filler necks)

Find out how **Incomat Crib** can contribute to flood protection:

Incomat Crib	
Function	Erosion control for standing waters, above permanent water level, flood zones
Material	Polyethylene (PE) and polyamide (PA)
Mattress thickness	Two standard types available in different thicknesses
Environmental performance	Classed as harmless under M Geok E 2016 (Guidance Paper on the Use of Geosynthetics in Earthworks for Roadbuilding Projects) and BBodSchV (German Federal Soil Protection and Contaminated Sites Ordinance)
Customized configuration	Mattress dimension, mattress thickness, filter/planting area, filling devices, stitched into large panels, panel size, possible factory prefabrication, zipper connection

Project examples

Overflow section
Austria | Erosion protection in an overflow section using Incomat Crib.

Berth protection
Guatemala | slope and berth protection at the new port terminal of Puerto Quetzal using Incomat Standard.

Lining of a rainwater basin
Germany | Waterproofing of a rainwater basin using Incomat Standard.

Protection and buoyancy control
France | Ballasting and mechanical protection of a pipeline using Incomat Pipeline Cover.

Canal construction
Brazil | Lining of a canal bed using Incomat Flex.

Canal renovation
Germany | Lining of the Isar link canal using Incomat Standard geosynthetic concrete mattress.

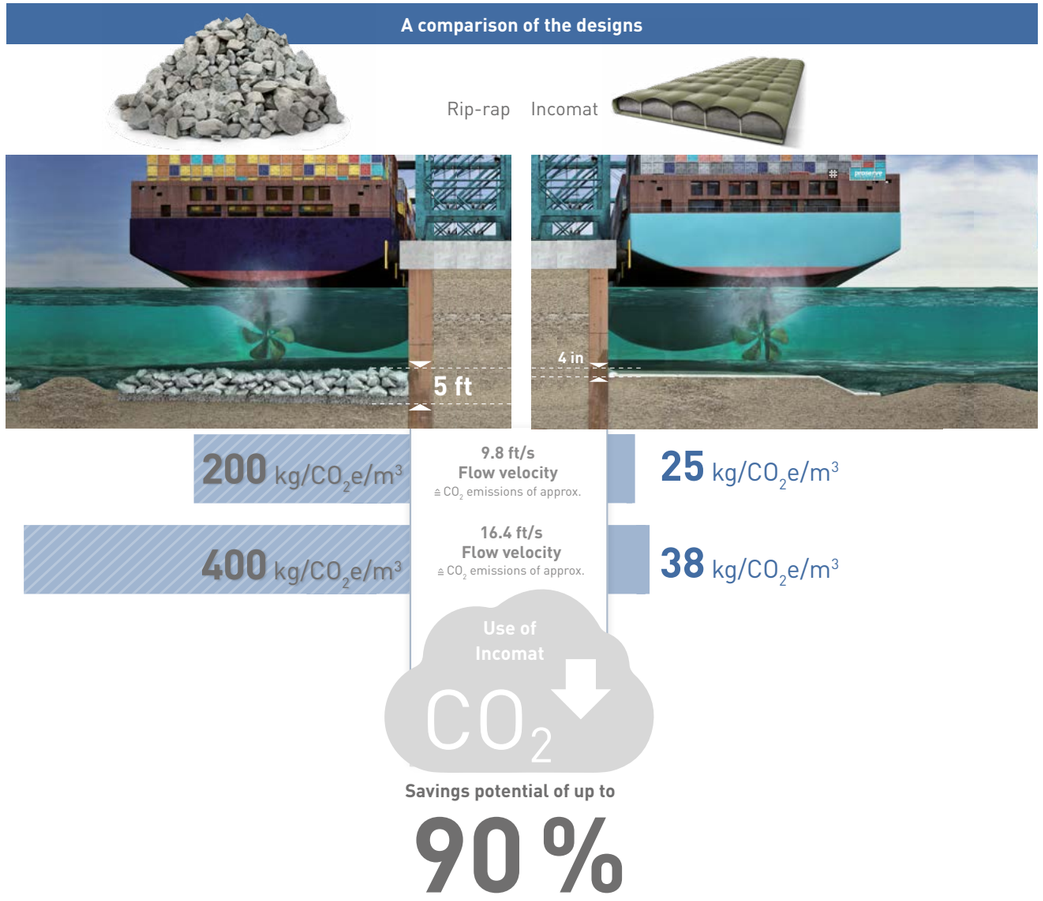
Erosion protection
Austria | Erosion protection of a overtopping spillway using Incomat Crib.

Channel lining
Italy | Sealing an irrigation channel using Incomat Standard.

Design comparisons

CO_2-optimized hydraulic engineering solutions with Incomat®

Surface sealing and erosion protection with concrete mattresses or rip-rap.
Design comparison with a concrete mattress and stone fill.



Result

In the riverbed, CO_2 emissions are generally lower with the use of concrete mattresses compared to armourstones. Even if the construction method with concrete mattresses construction with a specific emission value of 242 kg CO_2e/m^3 appears at first glance to have a higher CO_2 footprint than rip-rap with 160 kg CO_2e/m^3, this comparison falls short.

The decisive factor is the amount of material actually required to fulfill the structural requirements – especially at higher flow velocities. Revetments made of water blocks are significantly thicker compared to the coherent structure of a concrete mattress due to the verification of the failure of the individual block.

Additional savings potential can be achieved through the use of an optimized modified concrete mix that is specifically designed to reduce the CO_2 balance. Overall, the comparison shows that concrete mattresses are a potentially more advantageous alternative, not only from an ecological point of view.

HUESKER services

HUESKER services begin with providing the customer with initial advice and it ends with supporting the realization of the project on site. What we provide are safe, customized, ecologically sound and economically viable project solutions.

Engineering services

Technical consulting
We will recommend the appropriate product types for your specific requirements.

Technical design
Our engineers assist design practices by performing verifiable design calculations in accordance with international codes of practice.

Project-specific placement plans
We will prepare installation and placing recommendations plus installation diagrams.

International knowledge transfer
Best-practice solutions and techniques from our global network.

Documents

Certificates and approvals
Our products have numerous certifications and approvals that are issued, for example, by BAM, BAW, BBA, EBA, HPQ of DB AG und LAGA, IVG and SVG, depending on the product type.

Tender documents
We would be happy to provide you with proposals for your specification texts.

Technical guidelines
Adapted technical installation instructions will help you to install our products correctly.

Product services

Custom-designed product solutions
We will partner with you in developing custom-fabricated products to meet your particular requirements.

Alternative solutions
We will propose alternative design solutions as well as recommendations for adjustments and optimizations.

On-The-Spot

On-site instruction
When required, our application technicians can offer installation assistance related to the specifics of product installation.

Installation aids
We can offer you practical installation aids to facilitate the application of our products.

Training
Product and application specific instruction.

Incomat® is a registered trademark of HUESKER Synthetic GmbH.

HUESKER Synthetic is certified to ISO 9001, 14001 and ISO 50001.

CE DAkkS Deutsche Akkreditierungsstelle D-PL-19299-01-00 ivg.

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