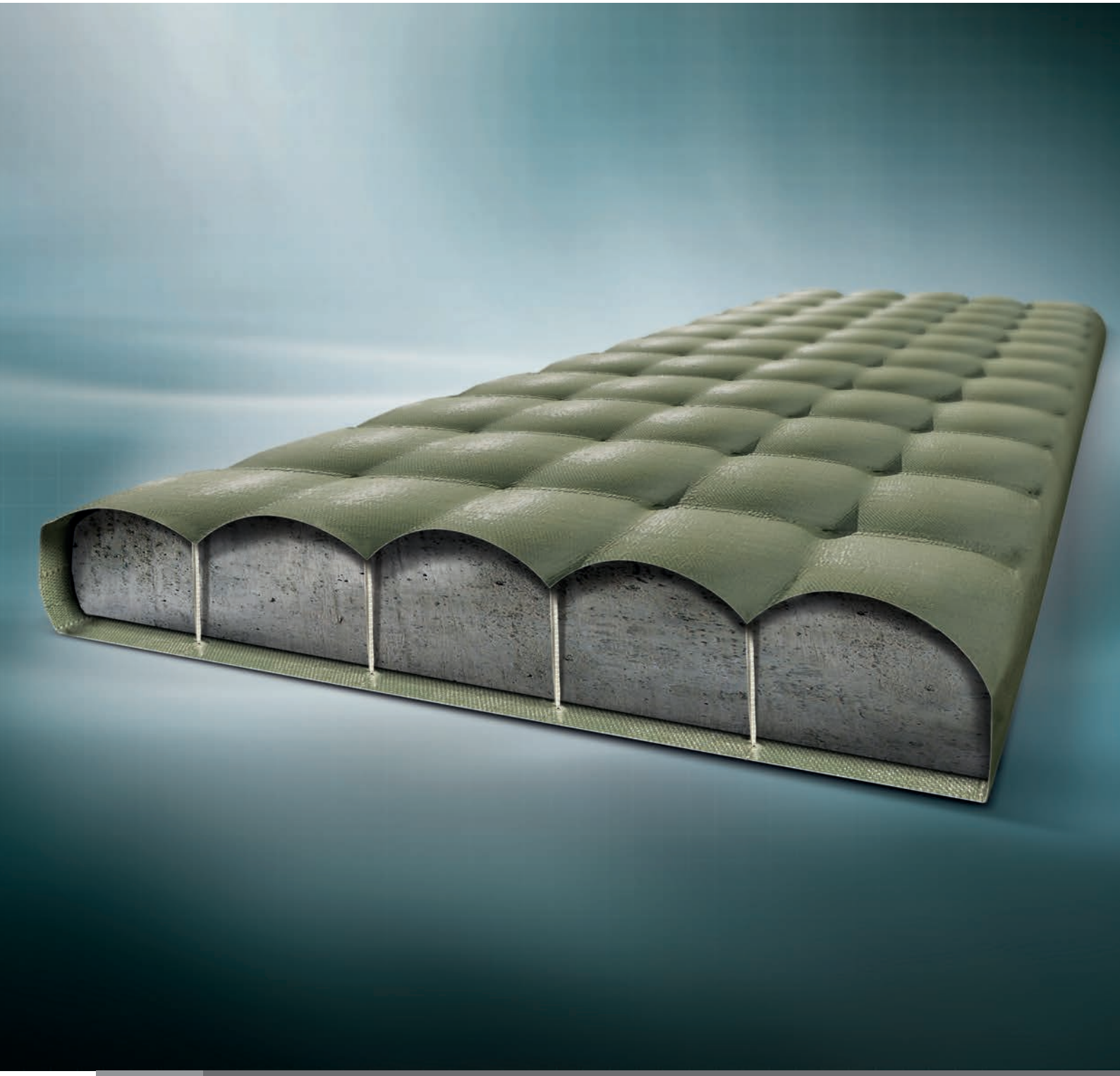


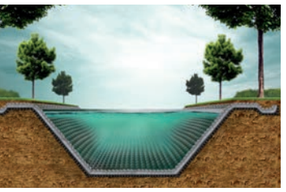
Incomat®

Geosynthetic Concrete Mattress System for Hydraulic Engineering

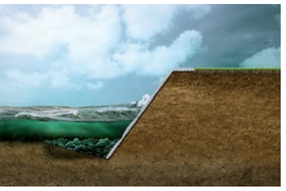
HUESKER
Ideen. Ingenieure. Innovationen.

Geosynthetic Concrete Ma ttress system

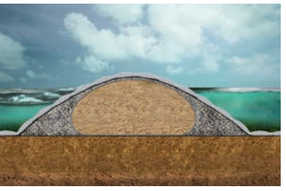
Perfect Symbiosis of Geotextiles and Concrete



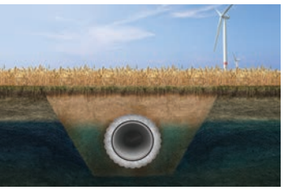
Canals



Bank protection



Groynes and breakwaters



Pipelines

Incomat concrete mattress

The Incomat geotextile concrete mattress has been used successfully in hydraulic engineering applications for erosion control or as a cover lining since the early 1960s. Incomat mattresses comprise two high-tensile synthetic woven layers connected by a regular arrangement of ties. The void between the two woven layers is filled in-situ with fluid concrete. Various models are available for the installation of permeable or impermeable concrete revetments with a customised mattress thickness. Continuous refinements have seen a steady expansion of HUESKER's product portfolio and the associated range of applications. Uses of Incomat include slope protection, bed, bank and coastal protection, canal linings and pipeline covers.

System features

- Globally unique manufacturing method with incorporation of vertical ties
- Very high dimensional stability when filled
- Efficient concreting cycles with minimum downtime
- Extremely high adaptability to existing base
- Production of panels up to 1,000 qm possible
- No formwork required
- Connection by means of factory-fitted industrial zips
- Range of mattress thicknesses
- Custom-design to suit any geometry
- Underwater installation possible

Simple installation principle

1 Preparation of formation

2 Spreading out of panels

3 Filling of panels with fluid concrete/mortar

A strong product family

Incomat Standard

State-of-the-art cover lining and erosion control with concrete mattresses.

Incomat Pipeline Cover

Efficient, quick-to-install system to protect pipelines against buoyancy, uplift and external impacts.

Incomat Flex

Permeable cushion mattress with built-in hinge zones, designed for high hydraulic loads and settlement-prone bases.

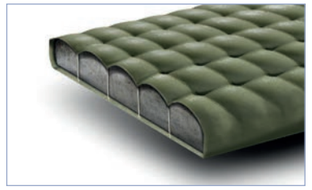
Incomat Filterpoint

Permeable concrete mattress for stable bases and low hydraulic loads.

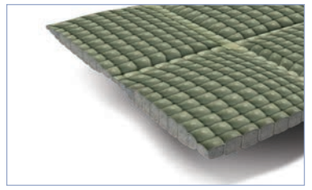
Incomat Crib

Plantable concrete mattress for erosion control, ideal for bank protection above permanent water line or for standing waterbodies.

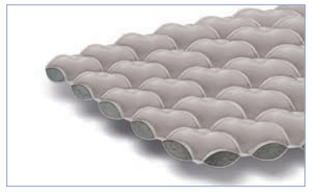
Cover linings
Protection against buoyancy or uplift
Erosion control



Incomat Standard



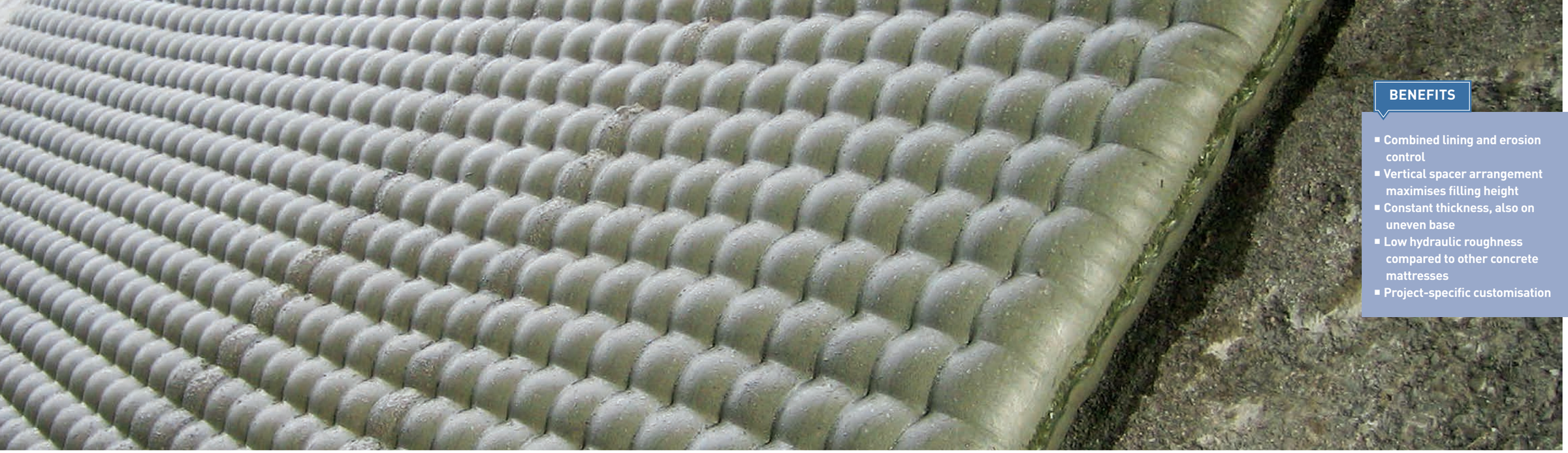
Incomat Flex



Incomat Filterpoint

Incomat Crib

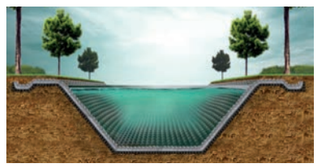
Proven performance
Cover lining for waterway beds and slopes recognised by BAW (German Federal Waterways Engineering and Research Institute) under EAO (Recommendations for the use of lining systems on beds and banks of waterways; 2002)
Lining system recognised by DWA (German Association for Water, Wastewater and Waste) for hydraulic engineering under guidance paper DWA-M 512-1
Classed as environmentally 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)



BENEFITS

- Combined lining and erosion control
- Vertical spacer arrangement maximises filling height
- Constant thickness, also on uneven base
- Low hydraulic roughness compared to other concrete mattresses
- Project-specific customisation

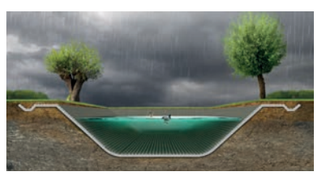
Incomat Standard



Canals

Bed protection

Slope protection



Stormwater holding and storage basins

Constant thickness cross-section for perfect lining performance

Incomat Standard is the product of choice for erosion control or lining solutions that require a constant thickness concrete cross-section or impermeable concrete mattress. The unique manufacturing method, involving the incorporation of vertical ties, gives the geotextile encasement a dimensional stability that is unmatched worldwide.

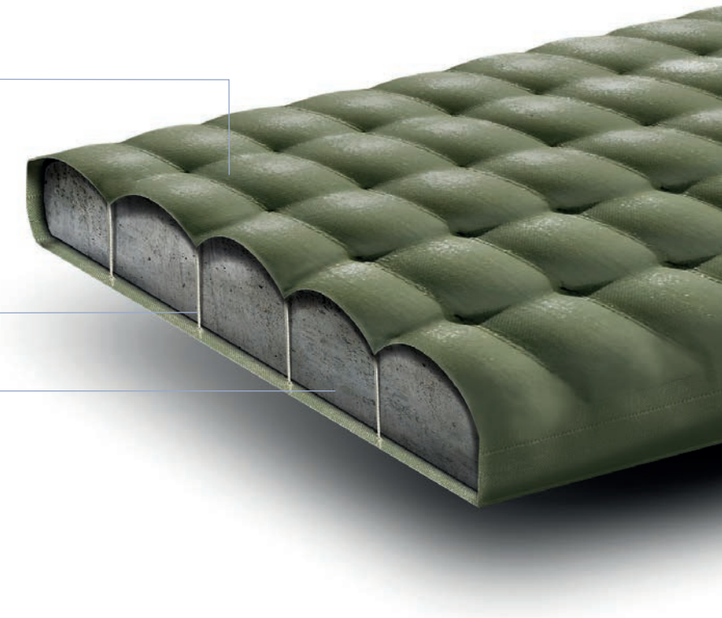
This dimensional stability guarantees a constant concrete cross-section even under difficult installation conditions, e.g. with uneven bases or underwater applications. The adaptability of the concrete mattress system gives it a clear edge over all conventional concrete solutions. Through custom-fabrication,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

Incomat Standard allows concrete linings to be installed under water and on steep slopes. Thanks to its additional erosion control function, the product is also ideal for canal refurbishment and basin lining projects as it allows designers to dispense with both protective layers and multi-layered constructions.

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

Vertical ties
Spacers; length adapted to project requirements (8 cm to 56 cm); maximise dimensional stability of mattress, thus ensuring constant concrete layer thickness

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

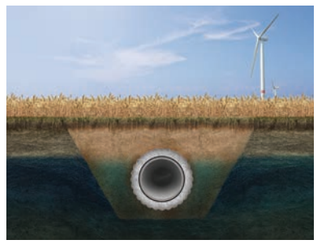


Incomat Standard	
Function	Erosion control and/or lining
Material	Polyethylene (PE) and polyamide (PA)
Manufactured thickness	8 cm to 56 cm
Environmental performance	Classed as harmless under M Geok E 2016 (Guidance Paper on the Use of Geosynthetics in Earthworks for Roadbuilding Projects) and BBodSchV (German Federal Soil Protection and Contaminated Sites Ordinance) Tested to German guideline for hygienic assessment of elastomers in contact with drinking water (Elastomer Guideline)
Customised configuration	Mattress thickness, filling devices, stitching together into large panels, possible factory prefabrication, zipper connection

BENEFITS

- No on-site formwork erection required
- High-precision factory prefabrication
- Trouble-free installation at pipeline bends
- Rapid filling
- Up to 5 m long concreting sections

Incomat Pipeline Cover



Pipe encasements

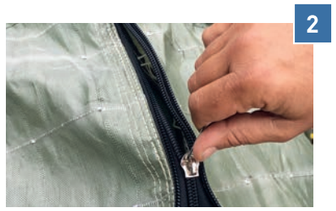
Revolutionary pipe encasement system

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.

Factory prefabrication of the geotextile formwork eliminates the need for any elaborate shuttering on site. The fact that the tailored units allow rapid assembly and optimise the concreting operation also helps to speed up the progress of the works. Furthermore, pipeline bends and varying pipe diameters can be readily accommodated by means of suitable planning and custom-manufacture.

Simple installation process

1 Fixing to pipe section



2 Zipping-up of IPC Panels

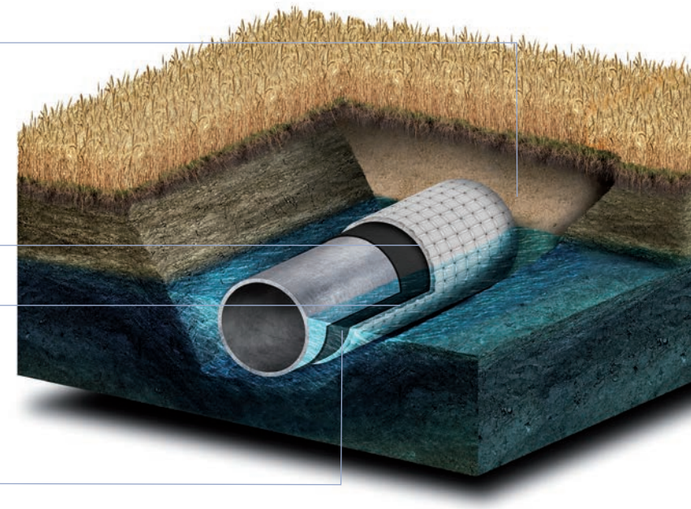
3 Concreting via filler neck

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

Vertical ties
Spacers; adaptable to project requirements; maximise dimensional stability of mattress, thus ensuring constant concrete cover

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

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

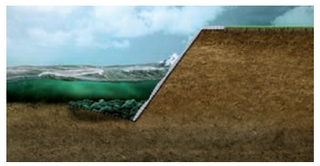


Incomat Pipeline Cover	
Function	Protection against external impacts, buoyancy and uplift
Material	Polyethylene (PE) and polyamide (PA)
Length of individual units	1 m to max. 5 m (concreting sections)
Environmental performance	Classed as harmless under M Geok E 2016 (Guidance Paper on the Use of Geosynthetics 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)
Customised configuration	Mattress length/width/thickness, filler necks, possible factory prefabrication

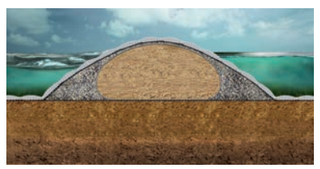
BENEFITS

- Permeable concrete mattress with large construction thickness
- Vertical tie arrangement maximises filling height
- Constant thickness, also on uneven base
- Relief of excess pore water pressures behind concrete mattress
- Project-specific customisation

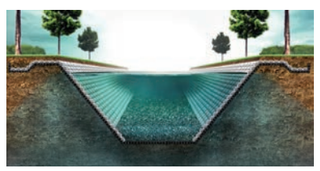
Incomat Flex



Slope protection



Breakwaters



Canals

Dams and dikes

Revetment for high hydraulic loads

Incomat Flex is used wherever the level of hydraulic loads demands a permeable mattress with a greater weight per unit area. Here too, application of the unique vertical tie principle in the manufacturing process allows the production of mattresses in thicknesses of up to 56 cm.

Incomat Flex consists of individual („cushion") units that are linked together by integral connection strips. The tapered profile at the strip positions creates a hinge zone or plane of weakness for crack concentration. Woven-in filterpoints 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.

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

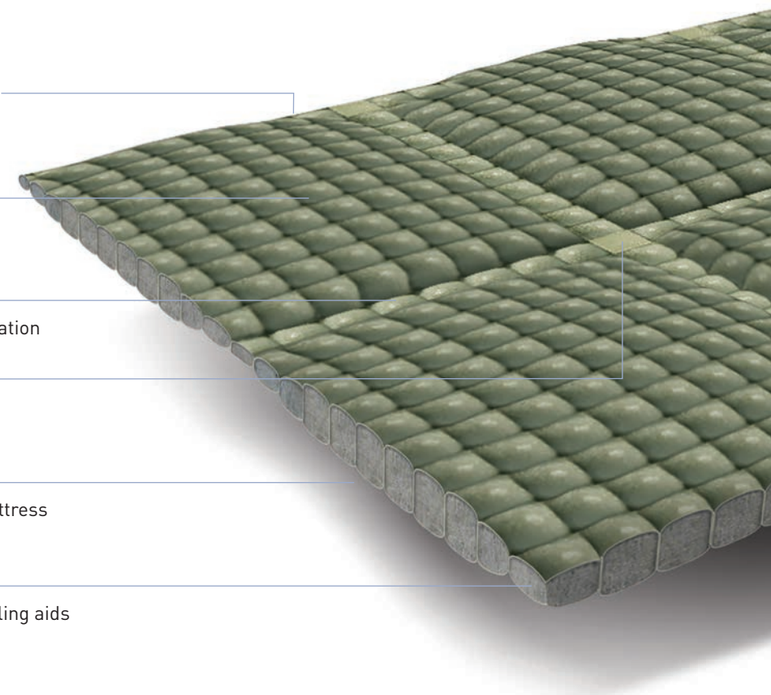
Cushion units
Mattresses available in different weights through variation of thickness and area

Connection strips
Zones for crack concentration and hinge formation

Filterpoints
Allow relief of excess pore water pressures behind mattress

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

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

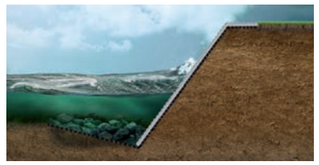


Incomat Flex	
Function	Erosion control under exposure to high hydraulic loads
Material	Polyethylene (PE) and polyamide (PA)
Mattress thickness	8 cm to 56 cm
Length of individual units	1 m to max. 5 m (concreting sections)
Environmental performance	Classed as harmless under M Geok E 2016 (Guidance Paper on the Use of Geosynthetics in Earthworks for Roadbuilding Projects) and BBodSchV (German Federal Soil Protection and Contaminated Sites Ordinance)
Customised configuration	Cushion sizes, mattress thickness, filling devices, stitching together into large panels, possible factory prefabrication, zipper connection

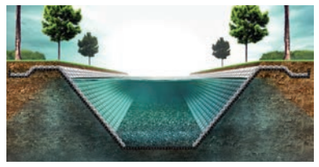
BENEFITS

- Permeable concrete mattress
- Regular distribution of filterpoints over wide area
- Relief of excess pore water pressures below concrete mattress
- More cost-effective than rip-rap, pitched stone or concrete slab revetments

Incomat Filterpoint



Slope protection



Canals

Overflow sections

Permeable revetment for low hydraulic loads

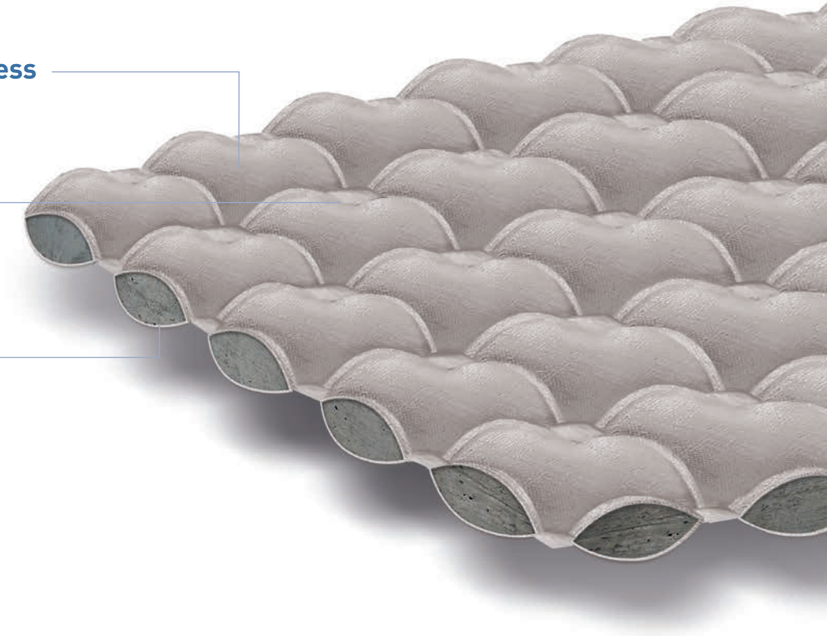
Incomat Filterpoint offers the ideal erosion control solution for applications subject to low hydraulic loads requiring a water-permeable concrete mattress. The mattress comprises a two-layer woven fabric, with the two woven layers joined together by a regular arrangement of woven-in filterpoints. The 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 rip-rap, 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.

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)

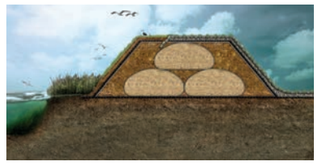


Incomat Filterpoint	
Function	Erosion control for low hydraulic loads and stable base
Material	Polyester (PET)
Mattress thickness	Two standard types available in different thicknesses
Environmental performance	Classed as harmless under M Geok E 2016 (Guidance Paper on the Use of Geosynthetics in Earthworks for Roadbuilding Projects) and BBodSchV (German Federal Soil Protection and Contaminated Sites Ordinance)
Customised configuration	Mattress area, mattress thickness, filling devices, stitching together into large panels, panel size, possible factory prefabrication, zipper connection

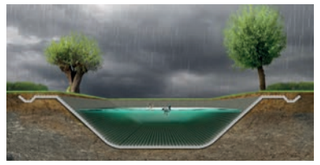
BENEFITS

- Eco-friendly erosion control
- Large planting areas or filterpoints
- Proven performance in overflow sections

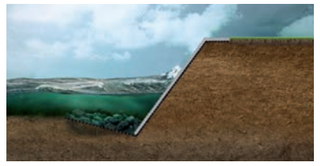
Incomat Crib



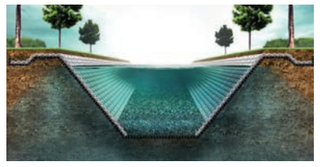
Overflow sections



Stormwater holding and storage basins



Slope protection



Canals

Plantable bank protection

Incomat Crib comprises a grid of tubular members that are filled with concrete. The intermediate rectangular recesses are left un-filled and, after concreting, act as large-area filterpoints. Alternatively, these areas can be filled with soil and subsequently vegetated.

The tubular-grid mattress is mainly used for bank protection. It is installed by lakes and watercourses in the intermediate zone between the high and low water marks or above the permanent water level. It can also be used to stabilise dam areas that are subject to overflow and to line spillways. After planting, Incomat Crib provides a visually appealing and ecological means of erosion control.

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)

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
Standard roll size	5 m x 200 m
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)
Customised configuration	Mattress area, mattress thickness, planting/filtration area, filling devices, stitching together into large panels, panel size, possible factory prefabrication, zipper connection

Application Examples

Embankment construction
Russia, 2011 – 2014, protection of side faces of highway embankment slopes by Kirovsky bridge in Volga and Samara river floodplains using Incomat Flex.

Bed protection
Guatemala, 2016, slope and bed protection at new Quetzal port terminal using Incomat Standard.

Pipeline Cover
France, 2014, durable protection and buoyancy prevention for Artère de l'Adour gas pipeline using Incomat Pipeline Cover system.

Canal refurbishment
Germany, 2015, lining of Isar link canal using Incomat Standard geosynthetic concrete mattress.

HUESKER Services

HUESKER Services begin with providing the customer with initial advice and end with supporting the realisation of the project on site. What we provide are safe, customised, ecologically sound and economically viable project solutions.

Engineering Services

- **Hydraulic engineering design**
  Our engineers assist design practices by performing verifiable design calculations in accordance with international codes of practice.
- **Technical consulting**
  We will recommend the appropriate product types for your specific requirements.
- **Project-specific placement plans**
  We will prepare installation and placing recommendations plus installation advice.
- **International knowledge transfer**
  Best practice solutions and techniques from our global network.

Documents

- **Certificates**
  Our products have numerous certifications that are issued, for example, by BAM, BAW, BBA, EBA, IVG and SVG, depending on the product type.
- **Installation guidelines**
  Technical guidelines will help you to ensure the best-practice installation of your product on site.
- **Tender documents**
  We would be happy to provide you with proposals for your specification texts.

Product Services

- **Custom-designed product solutions**
  We will assist 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 optimisations.

On-The-Spot

- **On-site instruction**
  Where 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**

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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