

It's not magic.
It's not an illusion.
It's called **Bentofix®**



Bentofix®

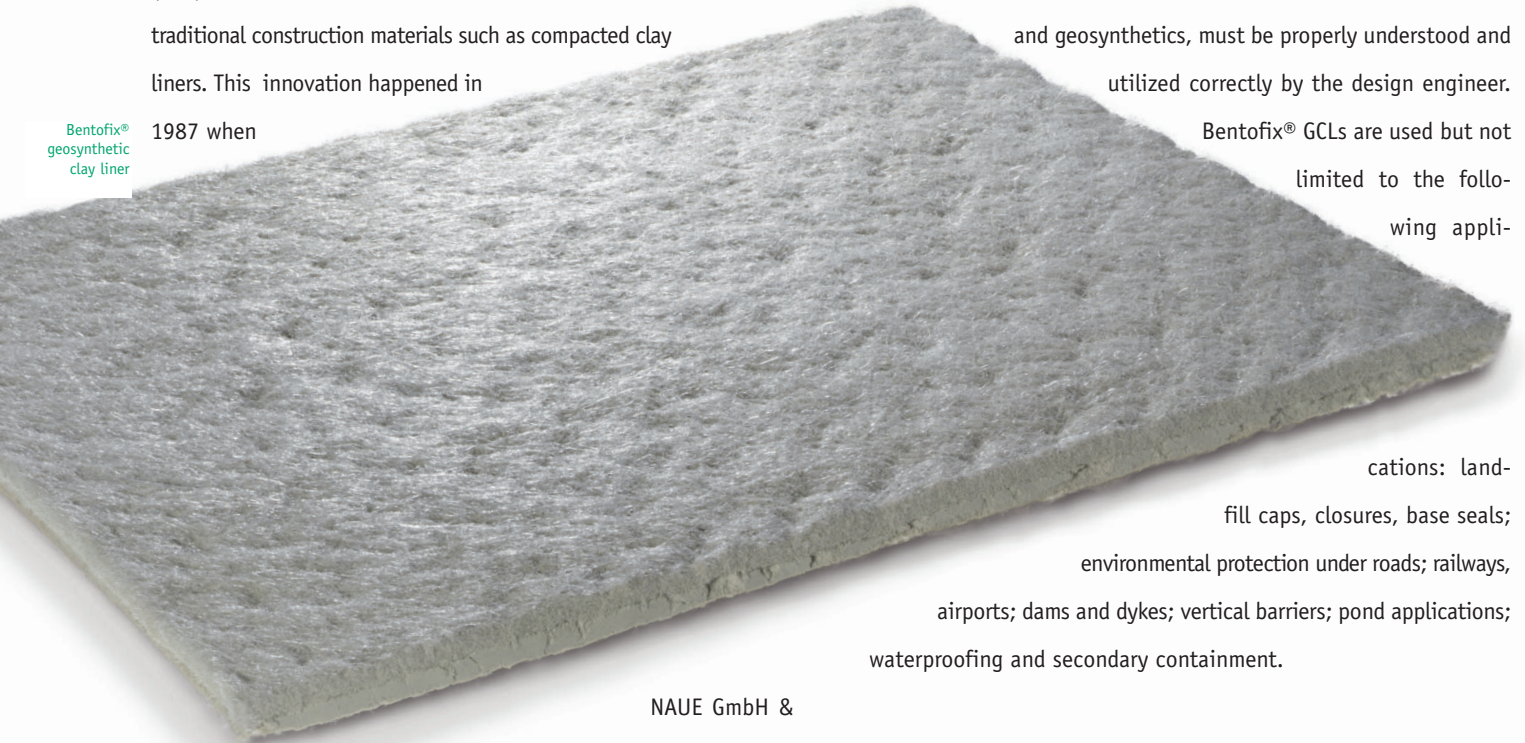
is a needle-punched reinforced geosynthetic clay liner (GCL) with two geotextile layers encapsulating a layer of sodium bentonite for sealing applications.

IT'S CALLED BENTOFIX®

Nonwoven geotextiles are engineered for specific functions, such as containment, filtration, protection and separation. Combining geosynthetics and other materials, such as encapsulating sodium bentonite clay between geotextiles to create a geosynthetic clay liner (GCL), has produced composite materials that greatly out-perform traditional construction materials such as compacted clay liners. This innovation happened in

1987 when

Bentofix®
geosynthetic
clay liner



NAUE GmbH & Co. KG invented and patented the first needle-punched GCL: Bentofix®.

Bentofix® GCLs are part of an important trend toward the combined use of geosynthetics and clay materials in barrier applications as a stand alone liner system or synergistically with geomembranes to maximise liner system efficiency. The advance of needle-punched Bentofix® enabled not only the rapid, safe production of GCLs but a quick, cost effective and safe installation even on steep slopes. The friction coefficient of the bentonite clay used in GCLs was no longer of concern because of the needle-punching process for the manufacturing of Bentofix® GCLs. With this new manufacturing process the shear stress was securely transferred through the low frictional bentonite to the highly engineered encapsulating geotexti-

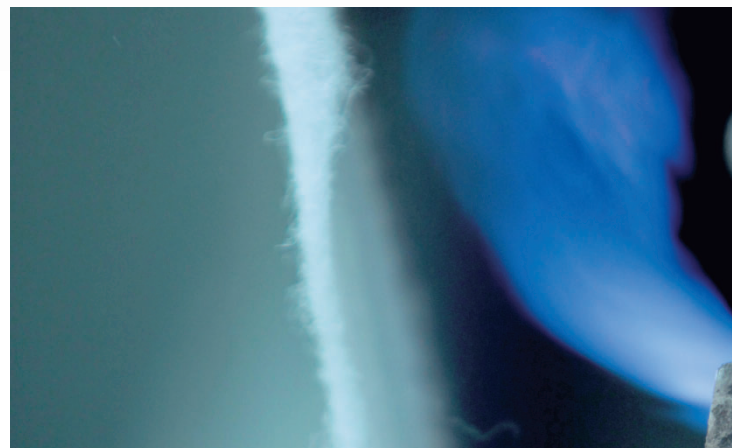
le components, ensuring long-term shear resistance. When hydrated with fresh water, the bentonite swells to form a low permeability layer with an hydraulic conductivity equivalent or better than a thick compacted clay liner. In the case of Bentofix® GCLs, they perform significantly better than compacted clay liners in applications such as landfill capping. Like all construction products, GCLs and geosynthetics, must be properly understood and utilized correctly by the design engineer.

Bentofix® GCLs are used but not limited to the following appli-

cations: landfill caps, closures, base seals; environmental protection under roads; railways, airports; dams and dykes; vertical barriers; pond applications; waterproofing and secondary containment.

SMARTER DESIGN - BENTOFIX® Thermal Lock

A proprietary heat-treating process - the Thermal Lock process - is used to modify and more permanently lock the needle-punched fibres



Bentofix®

Not magic. Not an illusion. Just advantages!

into place. Properties of Thermal Lock and needlepunching include increased internal shear resistance, excellent interface friction values and long-term creep resistance for steep slope applications. Further known benefits of the classic Bentofix® GCL are the high-quality and durability of its components that make Bentofix® robust and safe: a perfect, self-sealing barrier.

THE NEXT PHASE FOR BENTOFIX® GCLs

The strongly bonded geotextiles hold a GCL's bentonite layer in place and improve the composite material's durability and performance, however, gas can flow through in the first phase of an application if the bentonite is not yet hydrated; or desiccation can influence the performance of the GCL's bentonite layer. This is not an issue for every installation, but is for some, e.g. waterproofing in areas where radon gas occurs, applications with low confining stresses, or with ponds, lagoon, and canal applications. NAUE GmbH & Co. KG's most recent GCL development - Bentofix® X, a polyolefin polymer-coated GCL - which exemplifies how modifications to GCL product design can be made to anticipate the special challenges of a particular site. Bentofix® X is a needle-punched GCL comprised of a uniform layer of powder sodium bentonite that is encapsulated between a slit-film woven and a staple-fibre nonwoven geotextile. The woven fabric is coated with a low-permeability polymer polyolefin coating to achieve an immediate barrier prior to hydration. Bentofix® X is an advance for GCLs in some specific applications.

Versatile sealing applications with different GCL types and sodium bentonite

Can reduce construction costs by replacing compacted clay

Robust geotextiles encapsulate and contain the bentonite

Withstands differential settlement

Uniform peel strength provides multi-directional shear strength

Thermal Lock process increases internal shear strength and interface friction angles

Self-sealing overlaps available

Installation advantages with 4.85 m wide rolls

Quick and easy to install



BBA certified waterproofing systems (Bentofix® BFG 5000)

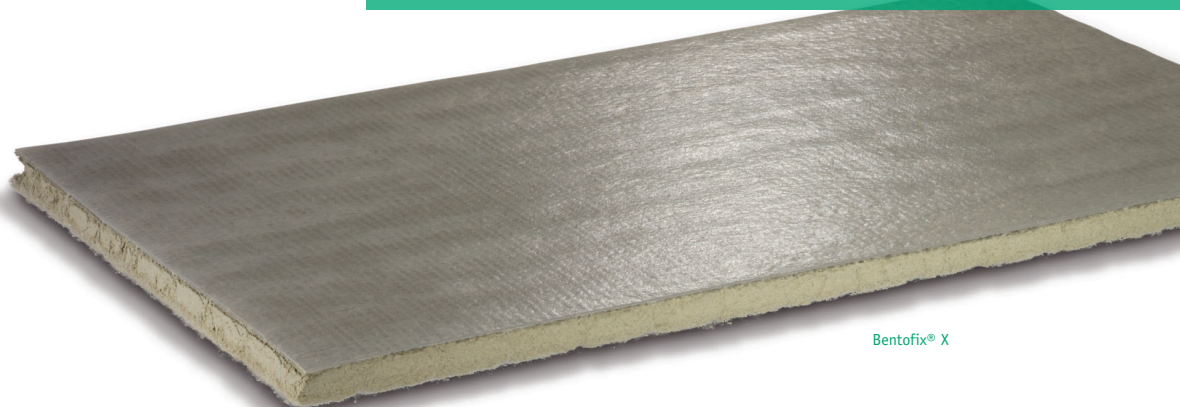
ISO 9001 certified

CE marked

Your sealing requirement ... Our solutions: Bentofix®, Bentofix® X, Carbofol® HDPE



Thermal Lock



Bentofix® X

Bentofix®

millions of m² installed all around the world.

Not magic. Best solutions.



Italy
Underground
waterproofing



Thailand
Waterproofing of
an airport hotel



Bali
Landfill base
sealing with
Bentofix®



Germany
Underwater
installation in a
canal lining
system



Canada
Mining
application



Estonia
Landfill capping
with Bentofix®
and Secudrain®



Saudia Arabia
Installation of
Carbofol®
over Bentofix®
GCL in a gold
mine




Germany
Sealing of
Airport runways



Japan
Flood
protection
dam



NAUE GmbH & Co. KG
Gewerbestrasse 2
32339 Espelkamp-Fiestel · Germany
Phone +49 5743 41-0
Fax +49 5743 41-240
E-Mail info@naue.com
Internet www.naue.com

 , Bentofix®, Carbofol® and Secudrain® are registered trademarks of NAUE GmbH & Co. KG.

The information contained herein is the best to our knowledge, true and accurate. There is no implied or expressed warranty.
© 2010 by NAUE GmbH & Co. KG, Espelkamp-Fiestel, Germany · All rights reserved. · Nr. 163 · Status 10.09.2010