

**ARCHITECTURAL GFRC
LINCRETE
SELF-DECLARATION ACC. TO DIN EN ISO 14021**

Holder of the declaration: Lindner Isoliertechnik & Industrieservice GmbH | Bahnhofstrasse 29 | 94424 Arnstorf | Germany

Content of the declaration: Product information
Certification system DGNB
Certification system LEED
Certification system BREEAM
Circular Economy

PRODUCT INFORMATION

Green Building Statement

We already consider all relevant aspects of sustainability during the development phase of our products. In this connection we act as one of the specialists within the range of sustainable building since many years. Supported by our internal technical department "Green Building" we ensure the sustainability target of your building project.

Product description

Glass-fibre reinforced concrete LinCrete

Glass-fibre reinforced concrete (GFRC) is a type of fibre-reinforced concrete containing alkali-resistant glass fibres. By adding reinforcement to the concrete using short discrete glass fibres that are uniformly distributed and randomly oriented, the resilience, impact resistance and tensile strength of the concrete is increased allowing for the production of more filigree and thin-walled elements compared to concrete produced with conventional methods. The character of fibre-reinforced concrete changes with varying concretes, fibre materials, geometries, distribution, orientation, and densities. For the architectural GFRC elements, Lindner uses spray-technologies for the production as these provide for an efficient manufacturing regarding raw material and energy consumption among other advantages for the final product.

Application area

LinCrete products offer a wide scope of application such as linings in subway stations, facade claddings, suspended ceilings, roofing etc. The environmental product declaration is related to LinCrete cladding elements.

Base material

Base material per kg GFRC		
System components	Material	Weight proportion (%)
Silica sand (crystal sand)	Graded size 0.1 – 1.2 mm	~ 39.1
Cement	Cement CEM I 52,5 R	~ 39.1
Water	Process water acc. to DIN EN 1008	~ 11.7
Alkali-resistant glass fibres	AR glass fibres	~ 4
Superplasticizer	Superplasticizer	~ 2
Colour pigments	Colour pigments (powdered)	~ 2
Curing accelerator agent	Curing accelerator agent	~ 2

*data sheets available on request

Material explanation

Silica sand

The crystal quartz sands used for LinCrete are characterised by a high SiO₂ content exceeding 97 MA .-% as well as their rounded grain shape, light, uniform colour, monocrystalline structure, and its purity (free of organic impurities). The use of modern processing technology and modern quality and environmental management ensures high quality with the best possible consideration for our environment.

Cement

Cement is a hydraulically hardening building material. It consists of a mixture of finely ground, non-metallic, inorganic components and is generally produced in accordance with: DIN EN 197-1, DIN EN 14216, or in Germany also in accordance with DIN 1164, parts 10, 11 and 12.

Water

The water used for the production of LinCrete is process water that is commercially available at the production site. The water characteristics with regard to the usability for the production of GFRC are generally stipulated by DIN EN 1008.

Alkali-resistant glass fibres

Alkali-resistant glass fibres provide for exceptional results in terms of compressive and flexural strength due to their high resistance to the fundamentally high alkalinity of cement, leading to a strong yet light end product. Lindner uses high quality fibers with a high minimum content of zirconium oxide for the production of LinCrete.

CERTIFICATION SYSTEM DGNB

Not listed characteristics do not apply to this product.

 **Environmental Quality**

ENV 1.1 Building life cycle assessment

Project-specific eco-balance data can be issued contemporary.
 In this context an additional expenditure of time and cost shall be considered if applicable.

ENV 1.2 Local environmental impact

Components	Weight proportion (%)	VOC	GISCODE	Other
Silica sand (crystal sand)	~ 39.1	-	-	-
Cement	~ 39.1	-	ZP 1	-
Water	~ 11.7	-	-	-
Alkali-resistant glass fibres	~ 4	-	-	-
Colour pigments	~ 2	-	-	-
Superplasticizer	~ 2	-	-	-
Curing accelerator agent	~ 2	-	-	-
Total	100	-		

„-“ for „not relevant“ according to DGNB 2018

Up to quality level 4 can be achieved.

ENV 1.3 Sustainable resource extraction

The product LinCrete contains no timber-based materials. Therefore, a FSC / PEFC proof is not required.

ENV 2.2 Potable water demand and waste water volume

During the production of LinCrete products we pay attention to reduce the water demand to the actually required extent. No waste water is generated with the production of LinCrete products.

 **Economic Quality**

ECO 1.1 Life cycle costs

Lindner LinCrete cladding elements are manufactured to the highest international standards. LinCrete elements can be expected to remain durable for 50 years or more (acc. to BBSR table, code no. 335.511, issue 02/2017, published by the Federal Institute for Research on Building, Urban Affairs and Spatial Development).

ECO 2.1 Flexibility and adaptability

Depending on customer requirements, a cladding made up of LinCrete elements can be designed in such a way that every panel can be individually demounted, moved or replaced. The GFRC elements can possibly be reused depending on the requirements of the alternative use.

ECO 2.2 Commercial viability

LinCrete products are continuously adapted to the current market demands.

 **Sociocultural & Functional Quality**

SOC 1.2 Indoor air quality

In general, Lindner LinCrete products are made of purely mineral materials containing no emissions of e.g. VOC or formaldehyde.

 **Sociocultural & Functional Quality****SOC 1.3 Acoustic comfort**

Perforated LinCrete cladding elements in combination with acoustically effective backing can achieve sound absorption values up to 0.60 depending on the type of execution. The values are tested in a reverberation room in accordance with ISO 354 and rated in accordance with DIN EN ISO 11654. Non-perforated LinCrete elements can be realised as noise barriers.

SOC 1.4 Visual comfort

LinCrete cladding elements can be furnished with a large variety of shapes and surfaces, e.g. as back-ventilated facade cladding, providing a unique recognition factor for the building envelope and thus contributing significantly to a cityscape's particular design.

SOC 1.7 Safety and security

Building products made of LinCrete in combination with appropriate fasteners can contribute in many respects to the building's safety and security measurements. Using individual mould design and construction, sharp edges that might lead to injuries can be avoided. Furthermore, there is a wide variety for product customisation allowing for LinCrete products that prove their tested resistance against impact loads (fall protection), seismic loads or the forces occurring during an explosion.

SOC 2.1 Design for all (Accessibility)

LinCrete products can be customised in many ways. Therefore, they can be adapted to fulfil all requirements of the generally accepted rules of technology. Thereby the architect or authorised expert in charge are supported during planning and execution phase of the project.

 **Technical Quality****TEC 1.5 Ease of cleaning building components**

LinCrete elements can be cleaned with water and mild cleaning agents which are customary in the trade. For strong soiling on exterior surfaces, high-pressure cleaning instruments can be used. Additionally, LinCrete elements can be furnished with an anti-graffiti coating system facilitating the cleaning of stubborn contamination from spray and other paints. The respective instructions on cleaning are to be observed.

TEC 1.6 Ease of recovery and recycling

LinCrete elements are produced on a project-specific basis and therefore in such a way that they can be installed on site with as little waste as possible. Waste that cannot be avoided on site is put into recycling processes by means of waste management facilities. Every GFRC element can be demounted and replaced in a non-destructive manner. Material recycling of GFRC elements is possible in small proportions as recycled aggregate for the production of similar products or to the full extent in other business fields, e.g. for road construction.

TEC 1.7 Immissions control

Lindner GFRC elements can be realised as noise barriers. Thus they can be used to reduce noise pollution on busy streets and on building facades.

 **Process Quality****PRO 1.5 Documentation for sustainable management**

User-, maintenance- and cleaning guidelines and instructions are created to the usual extent and are available upon request.

PRO 2.1 Construction site / construction process

The compliance with project-related requirements regarding a low-waste, low-noise and low-dust construction site as well as all measures regarding soil- and ground water protection are ensured by specialised in-house departments. An appropriate verification can be produced and implemented on request by specialist staff. Due to the delivery of finished GFRC elements that do not have to be processed on site, the product contributes to a noise-free and dust-free site.

PRO 2.2 Quality assurance of the construction

If required, data sheets for the used products and components can be provided.

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CERTIFICATION SYSTEM LEED

Not listed characteristics do not apply to this product.

 **Sustainable Site**

Construction Activity Pollution Prevention

The compliance with project-related requirements of an ESC plan is ensured by specialised in-house departments. A complete ESC plan can be produced and implemented on request by specialist staff.

 **Materials and Resources**

Construction and Demolition Waste Management Planning

Waste that cannot be avoided on site will be preferentially returned to recycling processes via waste management companies. A complete CWM plan can be issued and implemented by the specialists on request.

Building Life Cycle Impact Reduction

Lindner LinCrete products are manufactured to the highest international standards and therefore are designed for a high longevity. GFRC is expected to remain durable for minimum 50 years (acc. to BBSR table, 335.511, issued 02/2017, published by the Federal Institute for Research on Building, Urban Affairs and Spatial Development).

Building Product Disclosure and Optimization – Environmental Product Declaration

Furthermore, project-specific eco-balance data can be issued contemporary. In this context an additional expenditure of time and cost shall be considered if applicable.

Building Product Disclosure and Optimization – Sourcing of Raw Materials

Components	Weight proportion (%)	Recycling content (%)		Production site
		Pre-Consumer	Post-Consumer	
Silica sand (crystal sand)	~ 39.1	0	0	Kolkwitz
Cement	~ 39.1	~ 7	0	Kolkwitz
Water	~ 11.7	0	0	Kolkwitz
Alkali-resistant glass fibres	~ 4	0	0	Kolkwitz
Colour pigments	~ 2	-	-	Kolkwitz
Superplasticizer	~ 2	-	-	Kolkwitz
Curing accelerator agent	~ 2	-	-	Kolkwitz
Total	100		1.4	

The product LinCrete contains no timber-based materials. Therefore, a FSC / PEFC proof is not required.

Building Product Disclosure and Optimization – Material Ingredients

As manufacturer of products Lindner fulfils the obligations towards the EU chemical directive „REACH“ and created its own REACH declaration.

The aim of the **REACH** regulation (Registration, Evaluation and Authorization of **CH**emicals) is to capture materials produced and used in the EU and to determine and record their impact on health and environment.

Construction and Demolition Waste management

The compliance with project-related requirements regarding low-waste, low-noise and low-dust site as well as measures for soil and ground water protection are ensured by specialised in-house departments. An appropriate verification can be created and implemented on request by specialist staff. Due to the delivery of finished GFRC elements that do not have to be processed on site, the product contributes to a noise-free and dust-free site. The packaging is selected project-related to produce as little waste as possible.



Indoor Environmental Quality

Minimum Acoustic Performance

Lindner GFRC elements can be realised as noise barriers. Thus they can be used to reduce noise pollution on busy streets and on building facades improving the well-being of people and nature.

Low Emitting Materials

In general, Lindner LinCrete products are made of purely mineral materials containing no emissions of e.g. VOC or formaldehyde.

Construction Indoor Air Quality Management Plan

The compliance with project-related requirements of an IAQ plan is ensured by specialised in-house departments. A complete IAQ plan can be produced and implemented on request by specialist staff.

Indoor Air Quality Assessment

In general, Lindner LinCrete products are made of purely mineral materials containing no emissions of e.g. VOC or formaldehyde.

Daylight

By using special coating systems or applying metal sheet as top surface, Lindner GFRC elements can be furnished in such a way to fulfill requirements on high light reflection suitable for daylight control.

Acoustic Performance

Perforated LinCrete cladding elements in combination with acoustically effective backing are suitable for the improvement of room acoustics. Depending on the type of execution, sound absorption values up to α_w 0.60, resp. NRC 0.70 can be achieved. The values are tested in a reverberation room in accordance with ISO 354 and rated in accordance with DIN EN ISO 11654 resp. ASTM C 423. Non-perforated LinCrete elements can be realised as noise barriers.

CERTIFICATION SYSTEM BREEAM

Not listed characteristics do not apply to this product.

**Management****Man 02 Life cycle cost and service life planning**

Lindner products have a long life expectancy (due to the raw materials, production processes and high production quality). Moreover, certain products can systematically be dismantled and reused after small processing (Circular Economy). GFRC elements can be expected to remain durable for minimum 50 years (acc. to BBSR table, code no. 335 211, state 02/2017, published by the Federal Institute for Research on Building, Urban Affairs and Spatial Development).

Man 03 Responsible construction practices

All companies of the Lindner Group meet the requirements of an environmental management system. For ISO 14001, ISO 50001, SCC** and OHSAS certified companies within the Lindner Group, additional specific environmental and safety objectives are defined in conjunction with the annual management review. The implementation of environmental protection and the relevant legal regulations are defined in the Lindner internal guideline "Environmental Protection".

**Health and Wellbeing****Hea 01 Visual comfort**

By using special coating systems or applying metal sheet as top surface, Lindner GFRC elements can be furnished in such a way to fulfill requirements on high light reflection suitable for daylight control.

Hea 02 Indoor air quality

In general, Lindner LinCrete products are made of purely mineral materials containing no emissions of e.g. VOC or formaldehyde.

Hea 05 Acoustic performance

Perforated LinCrete cladding elements in combination with acoustically effective backing are suitable for the improvement of room acoustics. Depending on the type of execution, sound absorption values up to α_w 0.60, resp. NRC 0.70 can be achieved. The values are tested in a reverberation room in accordance with ISO 354 and rated in accordance with DIN EN ISO 11654. Non-perforated LinCrete elements can be realised as noise barriers.

Hea 18 Volatile organic compounds (only existing buildings)

In general, Lindner LinCrete products are made of purely mineral materials containing no emissions of e.g. VOC or formaldehyde.

**Materials****Mat 01 Life cycle impacts**

We can provide product-specific data for the assessment of the building. Due to the long-life cycle of LinCrete GFRC elements, Lindner guarantees a reuse of products over the whole useful life.

Mat 03 Responsible sourcing of construction products

Lindner GFRC elements are made from materials containing recycled content. Local suppliers are preferred. The company Lindner is certified according to the environmental management system according to DIN EN ISO 14001.

Mat 06 Material efficiency

LinCrete elements are produced on a project-specific basis and therefore in such a way that they can be installed on site with as little waste as possible. Waste that cannot be avoided on site is put into recycling processes by means of waste management facilities.

 **Waste****Wst 01 Construction waste management**

LinCrete elements are designed and produced tailor-made to match the individual project requirements and therefore minimizing processing waste during their installation on site. Waste that cannot be avoided on site is put into recycling processes by means of waste management facilities.

Due to the controlled assembly in the factory, unnecessary sources of error can be avoided.

A complete CWM plan can be issued and implemented by the specialists on request.

Wst 06 Functional adaptability (non-residential only)

Lindner products have a long life expectancy (due to the raw materials, production processes and high production quality). Moreover, certain products can systematically be dismantled and reused after small processing (Circular Economy). GFRC elements can be expected to remain durable for minimum 50 years (acc. to BBSR table, code no. 335 211, state 02/2017, published by the Federal Institute for Research on Building, Urban Affairs and Spatial Development).

LinCrete is a product featuring good reuse and further use possibilities.

Lindner products are designed in a way that they can be easily dismantled without any damages what enables to easy changes of the use of the building.

 **Pollution****Pol 05 Reduction of noise pollution**

Perforated LinCrete cladding elements in combination with acoustically effective backing are suitable for the improvement of room acoustics. Depending on the type of execution, sound absorption values up to α_w 0.60, resp. NRC 0.70 can be achieved. The values are tested in a reverberation room in accordance with ISO 354 and rated in accordance with DIN EN ISO 11654. Non-perforated LinCrete elements can be realised as noise barriers.

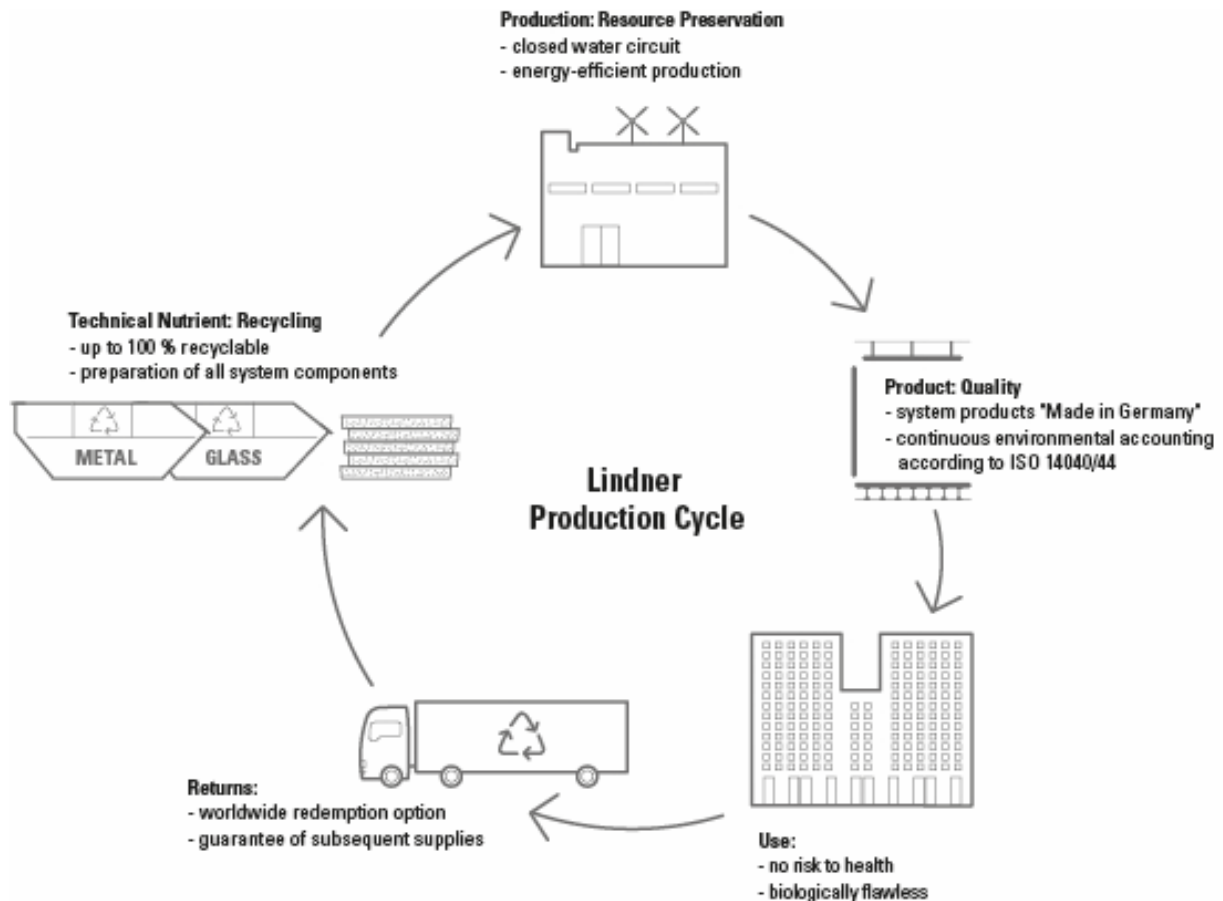


CIRCULAR ECONOMY

Information on Circular Economy

Due to the transfer of the Circular Economy thoughts we avoid waste, toxic substances and pollution. The technical cycle we are striving for, allows for a certain separation and reuse of materials. Environmental aspects already play a primary role when choosing our suppliers. Responsibility towards people and environment is as important for Lindner as the quality of the products. Due to this reason an environmental management system according to DIN EN ISO 14001 is established and mostly certified through the whole Lindner Group.

- + Protection of prospective generations and eco systems through care of natural resources
- + Security by choosing high-quality and contaminant-free materials
- + Health as supreme asset of humans
- + Safe environment for all building users





Material Health

The ingredients of LinCrete GFRC have to be secure and highly compatible for health and environment. Lindner develops GFRC products which are environmentally friendly and also healthy for humans, from the production up to the usage and reuse.

We do know the chemical substances of all materials and run an ongoing process to develop safer products. To meet all criteria according to sustainability and human health, system components were modified and also replaced.

In general, Lindner LinCrete products are made of purely mineral materials containing no emissions of e.g. VOC or formaldehyde.

Material Reutilization

Lindner LinCrete products can be recycled or further recovered.

Therefore, complete components can be reused or become available as raw material, after transferring to recycling processes.

Renewable Energy

Through eco-management certification and our in-house environmental accounting, the whole Lindner Group campaigns for a reduction of the ecological footprint of their own production processes by using less energy.

The share of renewable energy is currently around 37 %.

Increasing the share of renewable energy in our production sites is an ongoing process. The reduction of energy within the production sites is our main goal.

Water Stewardship

Only resource-conserving processes and production methods are used during the production of LinCrete products. Therefore, the fresh water consumption is reduced to a minimum. During the production of LinCrete, water is only used for the production of the GFRC elements and is therefore completely bound. Accordingly, no waste water is generated in the production.

Social Fairness

The most important corporate principle is the focus on the individual employee. For this reason the compliance rules "Our Values" for employees were defined. The Lindner Group supports a number of social projects, which are distributed in regional and nationwide areas. Therefore, the charitable "Hans Lindner Stiftung" was founded in 1991.

As a responsible manufacturer, Lindner is certified in accordance to the international environmental management standard ISO 14001. This standard supports our further development of managing scarce resources and the environment in general.