natureplus
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# The green alternative for drywall construction

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Bundesministerium für Wirtschaft und Energie
aufgrund eines Beschlusses des Deutschen Bundestages

Lemix®
Die Marken-Lehmplatte

# Contents

**The oldest building material in the world**
in its state-of-the-art modern form ..... 4

**Ecological? Naturally!**
100% natural, fully efficient ..... 8

**Install. Feel good.**
And have a clear conscience at the end ..... 10

**Built with Lemix®**
New timber and masonry buildings, renovations and refurbishments ..... 12

**Freedom for modern architecture**
Reinbeckhallen reference project in Berlin ..... 16

**On the safe side in terms of building physics**
Nothing to stand in the way of the planning process and installation ..... 18

**Sound, water vapor, strength – top class values**
Good, excellent, better than required ..... 20

**Outstanding fire protection**
Lemix® is non-flammable ..... 22

**Lemix® There's no easier way.**
Technical data for processing ..... 26

**Processing**
Quick guide to processing ..... 28

**300 years of experience**
Mastered all challenges ..... 30

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# The oldest building material in the world in its state-of-the-art modern form

Clay is a gift of nature. Over thousands of years, people have used clay for healthy construction techniques - until it was almost completely replaced by industrial building materials.

Lemix® brings the advantages of clay to drywall construction as a light-weight and fast construction method for the 21st century. With the precision and quality of the first industrially produced clay panel.

Lemix® is a modern clay panel for interior construction and can be used in the same way as conventional plasterboard. Lemix® is ecological, perfectly suitable for biological building and compostable.

**Healthier living with Lemix®**

- made of natural, locally sourced raw materials
- stores heat in winter, protects from heat in summer
- ensures perfect regulation of the room temperature and a comfortable indoor climate
- regulates the air humidity and therefore protects against mold
- allows water vapor to permeate and is therefore also suitable for wet rooms in residential buildings
- neutralizes air pollutants
- absorbs odors
- provides particularly good sound insulation due to its high bulk density
- non-flammable
- does not release any harmful gases
- is sustainable as it is compostable and 100% recyclable

**Simple planning and building with Lemix®**
**The latest generation of clay panels**

- is the ideal dry construction solution for interior construction in timber and masonry houses and for renovation (also of listed half-timbered houses, for example)
- offers creative freedom to planners and architects
- is manufactured in automated plants, in a primary energy- and resource-saving way
- has high mechanical strength due to jute fabric backing
- provides high dimensional accuracy and improved edge formation
- ensures shorter assembly times by reducing the need for complex leveling layers or delicate bonding points

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“We really care very much about the health of our family. Is Lemix® a healthy, ecological building material?”

Yes, cbecause Lemix® is one hundred percent natural. The clay panel is therefore also particularly suitable for people who want to live in healthy homes.

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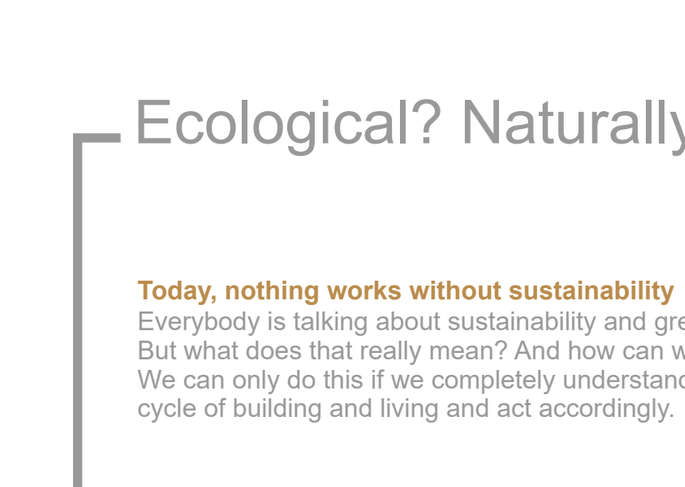
# Ecological? Naturally!

In cooperation with the BUND Naturschutz (German environmental protection organization), we have created a new park for dragonflies at the edge of our clay pit.

**Today, nothing works without sustainability**
Everybody is talking about sustainability and green building. But what does that really mean? And how can we implement it? We can only do this if we completely understand the complex cycle of building and living and act accordingly.

**Saving primary energy and reducing CO2 emissions – a top priority at Lemix®**
We extract our raw materials gently and use energy efficiently. The clay is extracted locally in the region, with short transport routes to the production facilities. Compared to other wall-building materials, very little energy is required to prepare and process the clay.




The extraction site for our raw materials is very close to the production site.

**Lemix® neutralizes a pollutants and absc odors**
Clay absorbs pollutants dissolved in water vapor from the air. In your Lemix®-clad rooms you can take a deep breath and enjoy the feeling of pure air.

**Lemix® does not release any harmful gases**
And what happens to building materials if they ever burn? It all depends on the material. Toxic gases are often released in fire. That is why smoke poisoning is so common.
Lemix® is also special in this context. The natural building material is classified as non-flammable and does not release any harmful fumes.

Lemix® clay panels are compostable and 100% recyclable.

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# Install. Feel good.

Lemix® panels can be processed as easily as plasterboard in drywall construction. Despite their light-weight structure, they provide high storage capacity and regulate humidity. They are resistant to mold, odor-absorbing and offer extremely high sound insulation.

**Clear conscience at the end**

The clay panels are particularly unproblematic at the end of their life cycle. While other building materials have to be disposed of as hazardous waste, Lemix® can simply be disassembled. The unfired clay can be reused, at any time and any number of times.

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Lemix® is the first clay panel certified according to natureplus® and meets all the technical requirements of the LEHM e.V. umbrella association. Lemix® of course also complies with the recently published DIN 18948 for clay boards. The ideal natural construction material for ecological drywall construction.

DIN 18948

Clay as a building material is enjoying a renaissance, and with Lemix® it has arrived in the 21st century.

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# Built with Lemix®

**Lemix® is ideally suitable for renovation and refurbishment**

**Lemix® is the perfect match for comfortable, high-quality single-family houses made of wood or brick**

Lemix® clay panels are ideally suited for paneling interior walls, timber post and beam structures, drywall or slatted constructions, for ceiling cladding and for entire loft conversions. Also suitable for improving summer heat protection. They can also be ideally used as dry plaster panels, as facing shells or as installation walls.

Suitable for all indoor areas: Walls - ceilings - roof slopes - partition walls in timber frame construction, solid construction and for renovation.

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*Daniel Verhülsdonk, Architect in Berlin*

“For the Reinbeckhallen in Berlin we attached great importance to the materials, whose effect is a result of their material-specific feel and texture.”

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# Freedom for modern architecture

**Reinbeckhallen reference project in Berlin**
The Reinbeckhallen are a center for contemporary art in Berlin-Oberschöneweide. In an approximately 400 m² large and up to 12 m high part of the hall, two houses were set up as a "house within a house" concept. On the one hand, the original character of the industrial hall was to remain tangible, on the other hand, the concept had pragmatic reasons for the establishment of different heating zones in winter.

Right from the start, great importance was attached to sustainability and pollutant-free building materials, and materials were chosen whose effect is a result of their material-specific feel and texture. The two houses were built in conventional timber frame construction on site. The external facades are covered with tongue-and-groove slats and clad with 22 mm thick clay panels. These are coated with a reinforced clay base coat and the black colored top coat. Coloring of the clay is achieved through iron oxide; the surface is merely smoothed without further treatment. Clay panels and clay plaster not only create a healthy, pleasant room climate, but also contribute to balanced room acoustics.

Courtesy of Grubert Verhülsdonk, Architects.
Studio Merk & Mark, Berlin
Photographer Mark von Wardenburg

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# On the safe side in terms of building physics

### Nothing to stand in the way of the planning process and installation

Clay has outstanding building physics properties, which is why it has therefore been considered a healthy and ecologically particularly valuable building material for thousands of years. We have optimized it for today's world. If you prefer a modern lightweight construction, consistently sustainable and environmentally compatible buildings, and if you want to enjoy complete and utter planning freedom, then Lemix® is a first-class alternative. Lemix® clay panels are dry and used in the same way as gypsum plasterboards for all purposes of interior finishing construction. They also have excellent properties for indoor climate and acoustics.

### Lemix® preserves wood

Clay has a very low equilibrium moisture content. This has a positive effect on adjacent materials: When wood and other organic materials are surrounded by clay, they are dehumidified and kept dry. Fungi and insects stand no chance of getting a foothold in them. Which can be seen in centuries-old half-timbered houses.

### Comparison of the storage capacity of a lightweight clay board or plasterboard with Lemix® clay panels

The specific heat capacity of a material indicates how much energy (heat or cold) must be added/removed from a material in order to heat/cool 1 kg of this material by 1 Kelvin (1 degree Celsius).
Together with water vapor adsorption, the specific heat capacity of building materials is largely responsible for a pleasant indoor climate. Particularly with clay boards, high density and the associated high weight per square meter provide the typical "comfortable ambient climate".
Examples for the storage capability:

| | Bulk density Kg/m³ | Specific heat capacity c J/kgK | Panel thickness mm | Panel weight kg/m² | Stored energy per unit area kJ/Km² |
|---|---|---|---|---|---|
| **Lemix® clay panel** | **1450** | **1100** [1] | **22** | **32** | **35,5** |
| | | | 16 | 23 | 25,3 |
| Lightweight clay board | 700 | 1450 [1] | 22 | 15 | 21,8 |
| | | | 14 | 10 | 14,5 |
| Plasterboard GKB | 680 | 960 [2] | 12,5 | 8,5 | 8,2 |

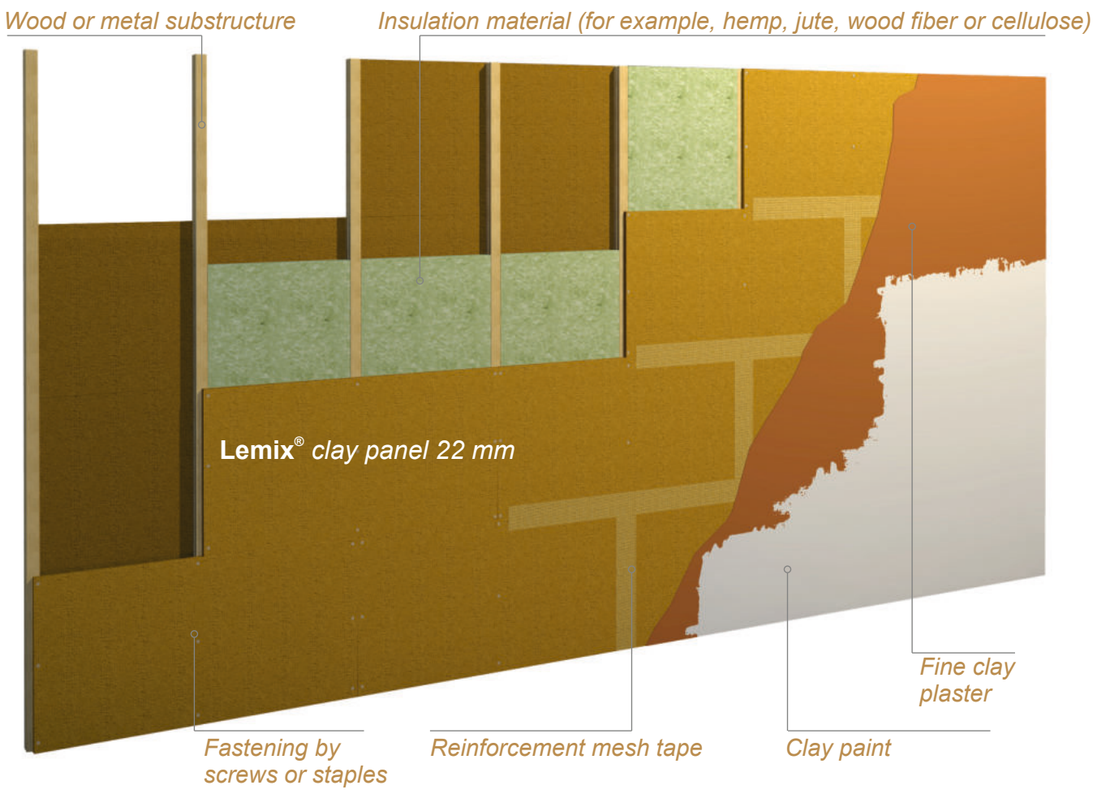
[1] acc. to “Lehmbauregeln” (Clay Building Rules) [2] acc. to “Gipsdatenbuch” (Plaster Data Book)

The examples showed that a **Lemix® clay panel** has **60% more storage capacity than** a **lightweight clay board** of the same wall thickness.

### Warm in winter, cool in summer

Clay belongs to the group of heavy building materials and is therefore a good heat accumulator. It is particularly useful for drywall construction, because traditionally here there is an uphill battle as the lightweight construction only has a small storage mass. Using Lemix® with its very high heat storage capacity for such scenarios, you can create an incomparable room climate and help to ideally regulate humidity. Similar to a solid brick, clay absorbs the heat evenly and slowly releases it again. Consequently, Lemix® stores heat in winter and protects from overheating in summer.

### Structure of a Lemix® partition wall

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# Outstanding fire protection

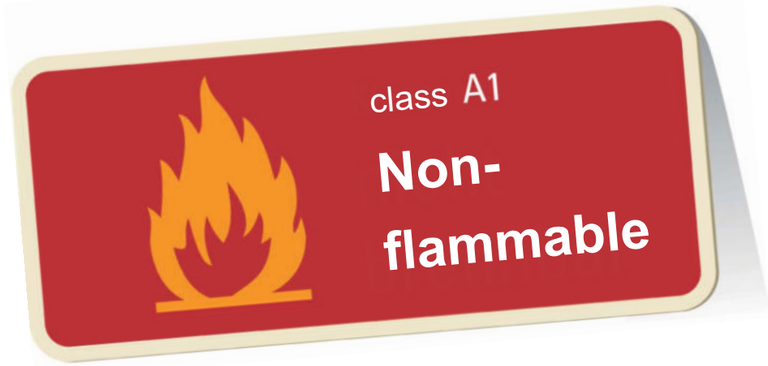
**Lemix® is non-flammable**
The fire behavior of Lemix® clay panels was tested in accordance with DIN EN 13823. According to DIN EN 13501-1 the highest classification A1 was achieved.

***Fire protection test arrangement 1:***
*Wooden wallboard construction 60 × 60 mm*
*with jute insulation of 60 mm*
*paneled with Lemix® 22 mm on both sides*
*total wall thickness approx. 11 cm*
***Fire resistance duration EI45 (=F30)***

***Fire protection test arrangement 2:***
*Wooden wallboard construction 60 × 80 mm*
*with jute insulation of 80 mm*
*paneled with Lemix® 22 mm on both sides*
*total wall thickness approx. 13 cm*
***Fire resistance duration EI90 (=F90)***

***Fire protection test arrangement 3:***
*Wooden wallboard construction 60 × 80 mm*
*with jute insulation of 80 mm*
*paneled with double layers of Lemix® 16 mm on both sides total wall thickness approx. 15 cm*
***Fire resistance duration EI120 (=F120)***

*In addition, it was proved that double-layered paneling of walls with Lemix® 16 mm has achieved a fire resistance duration of 30 min (F30).*



It cannot be hot enough for our clay panels. In fire resistance tests, a wooden wallboard construction with Lemix® achieved a fire-resistance of 120 minutes.

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# Sound, water, strength – top-class values

**Lemix® provides particularly good sound insulation**
Sound insulation primarily correlates with mass, which is why clay is the ideal building material for good sound insulation values due to its high bulk density.

With clay panels, the clay content of the panels is important. The Lemix® clay panels have a bulk density of 1.450 kg/m³.

*Sound insulation values for partition walls made of Lemix® according to DIN EN ISO 10140-2*

***Sound insulation test arrangement 1:***
*Wooden wallboard construction 60 × 80 mm*
*with jute insulation of 80 mm*
*paneled with Lemix® 22 mm and plastered on both sides*
*total wall thickness approx. 13 cm*
***sound insulation value 52 dB***

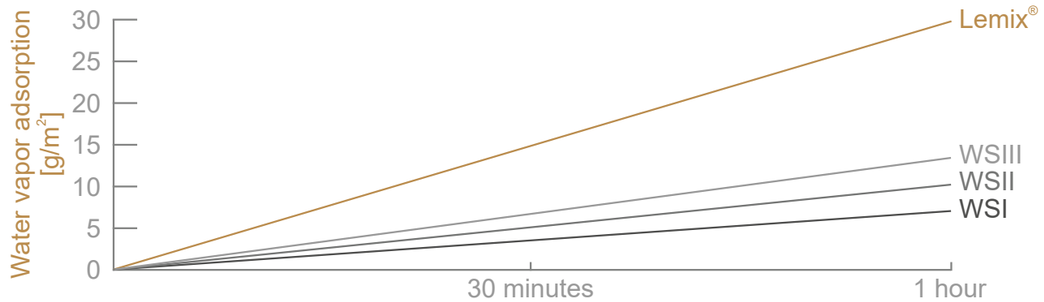
*For comparison, a plastered brick wall with a total thickness of 14.5 cm and a raw density of 1.0 kg/dm³ achieves a sound insulation value 45 dB.*

***Sound insulation test arrangement 2:***
*Wooden wallboard construction 60 × 80 mm*
*with jute insulation of 80 mm*
*paneled with double layers of Lemix® 16 mm on both sides*
*total wall thickness approx. 15 cm*
***sound insulation value 56 dB***

*For partition walls in residential buildings, the requirement is 53 dB, for example.*

**Lemix® complies with DIN 18948**
Standards create a uniform compliance basis and verifiable evidence. This gives security to both planners and processors. The new DIN 18948 of December 2018 defines the requirements, testing and marking of clay panels. It also defines the acceptable components of clay panels. Lemix® complies with DIN 18948 and provides the security of being a "real" clay panel.

**Water vapor adsorption in the highest category WSIII**
One measure of the moisture-regulating properties of clay panels is water vapor adsorption, i.e. the ability to absorb a certain amount of moisture in a certain period of time. Clay panels complying with DIN 18948 must absorb at least 7.0 g/m² per hour. Lemix® clay panels are capable of absorbing more than 13 g/m² during this time and can therefore be included in the higher water vapor adsorption class WSIII.




**Lemix® is stable**
The mechanical properties of clay panels are regulated in the new DIN 18948. The surface tensile strength is important here in order to provide sufficient support for a coating with clay plaster, for example. According to the standard, the adhesive strength of the surface should be at least 0.1 N/mm². Lemix® clay panels have more than twice the surface tensile strength and thus guarantee safe coating.

Lemix® also meets and exceeds the requirements for surface hardness. When measuring the surface hardness, a 50 mm steel ball is dropped onto the clay panel and the resulting indentation is measured. If it is smaller than 15 mm, the panel may be classified as a clay panel with increased surface hardness. It goes without saying that Lemix® panels provide increased surface hardness.

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“We are down-to-earth tradesmen. Quality, ecology, reliability and fast processing are important for us. Lemix® is the right material for us”

*Egon and Rainer Frick from Frick GmbH in Eichstegen, Baden-Württemberg. The Fricks build innovative timber houses with a patented wall system. Made of natural building materials which can be almost completely recycled to nature: Walls of wood, insulation of straw, completely paneled with clay panels on the inside, heating panels of clay.*
*Junior Rainer Frick is the German Carpenter Champion 2019 (Deutscher Meister der Zimmerer 2019).*

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# Lemix®. There's no easier way.

**Easy to set up.**
**No complex leveling layers.**
**No delicate bonding points.**

Especially in older buildings, the substructure often is undulated and uneven. It makes work hard when using wet plasters. Not so with Lemix®. Complex leveling layers are not necessary here. The wooden slats comprising the substructure are not only used for fastening the clay panels - they also compensate for any unevenness.

**Lemix® is excellently suited for the cladding of interior insulation**

Interior insulation is a very sensitive system in terms of building physics, but often the only way to achieve modern insulation standards. The high storage mass and the moisture-regulating properties of clay building materials complement the insulating materials perfectly. With Lemix®, such insulation can be easily and safely clad.

**Also as dry plaster board - the ideal thing**

Clay panels can also be used as dry plaster panels. They are glued to flat surfaces which must be dry, solid, dust-free and clean. Usually a mortar or adhesive bed is used over the full surface.

## Technical data for processing

| | | |
|---|---|---|
| Panel size | 62,5 x 125 cm | |
| Panel thickness | 16 mm | 22 mm |
| Panel weight per piece | approx. 18 kg | approx. 25 kg |
| Panel weight per $m^2$ | approx. 23 kg | approx. 32 kg |
| Pallet contents | 60 pieces<br>= 46,9 $m^2$ | 40 pieces<br>= 31,2 $m^2$ |
| Article number | 17 000 2016 | 17 000 2022 |
| Single panel | 0,781 m²/panel | |
| Bulk density class | 1,6 | |
| Bulk density | approx. 1.450 kg/m³ | |
| Sound insulation values | Up to 56 dB for a clay partition wall of 15 cm in thickness | |
| Dimensional accuracy | MHK II<br>Permissible deviations:<br>Nominal length l: ± 4mm<br>Nominal width w: ± 4mm<br>Rectangularity r: 3 mm<br>Nominal thickness t: + 1/ -3 mm<br>Evenness e: 3 mm | |
| Thermal conductivity | λ = 0,353 W/mK | |
| Specific heat capacity | $C_p$ approx. 1,1 J/kgK | |
| Building material class | A1 (non-flammable) according to DIN EN 13501-1:2010-01 | |
| Vapor diffusion resistance | μ = 5/10 | |
| Structure | With jute fabric backing | |
| Edge shape | Blunt edge | |
| Equilibrium moisture content | 2-3% according to relative humidity | |
| Surface hardness | ≤ 15 mm panel with increased surface hardness | |
| Bending tensile strength | ≥ 1,2 N/mm² | |
| Surface tensile strength | ≥ 0,1 N/mm² | |
| Fastening and attachment | gluing, stapling, screwing | |
| Fixing material | Clay board screws, corrosion-protected (phosphated/galvanized) screws with retaining plates, broad back staples | |
| Substructure<br>Wall<br>Ceiling | <br>Flat substructure<br>Flat substructure | <br>Profile spacing max. 31,25/62,5 cm<br>Profile spacing max. 31,25 cm |
| Lemix® clay panels can be glued, stapled or screwed to full-surface and solid surfaces. | | |
| Lemix® clay panels comply with DIN 18948 of December 2018. | | |
| All standard substructures used for drywall construction are suitable for Lemix® clay panels. | | |

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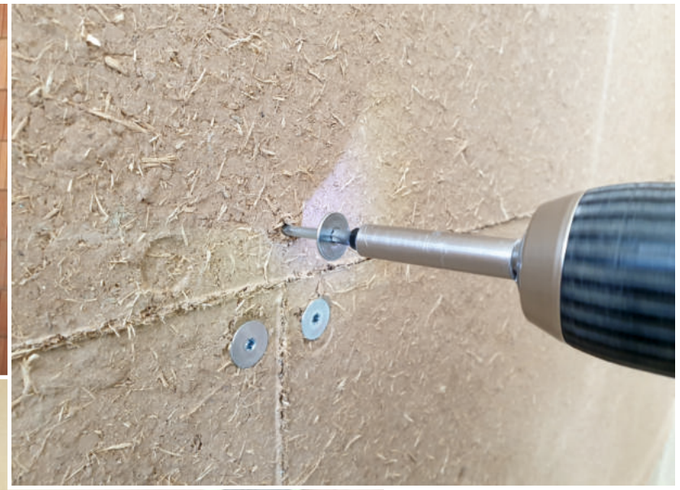
# Processing

**Processing Lemix® is very easy.
And nothing new either.**
It works exactly as one is accustomed to from the drywall construction with building boards. Lemix® panels can be easily cut and shaped to size. Using a jigsaw or a handheld circular saw or also using a cutting wheel. Clay panels are always arranged in a bonding pattern with an offset.
Even with electrical/HVAC installations there are no big differences, they can be placed behind the clay panels as usual. For holes, as are required for cavity sockets, you use a compass saw. For attachment of light-weight objects, the use of cavity dowels is recommended. For heavier objects, such as kitchen cabinets, substructures are required. As is usually the case in drywall construction.

**Transport aid**
With the transport aid you can carry the clay panels easier and faster.

**Assembly**
Lemix® clay panels are mounted in a bonding pattern, either vertically or horizontally. Screws with flat wafer heads or retaining plates are suitable for fixing them to the wall. Broad back staples are also a good alternative for wooden substructures.



**Screws**
The number of screws is important - depending on whether the Lemix® panels are to be mounted on the wall or ceiling. 9 screws are used per clay panel on walls and 15 on ceilings, depending on thickness and position. The exact number required can be easily found out: The Lemix® assembly instructions* include drawings which specify the exact number of required fastening points.
With disc head screws, keep at least 1.5 cm distance from the edge of the panel. If retaining plates are used, the screw can be placed directly in the joint for walls, but not for ceilings and roof slopes.

**Corrosion protection**
Corrosion-protected materials are ideal for fastening. For example 5 × 50 mm screws as well as retaining plates 36 mm in diameter and a perforation 6.8 mm in diameter, alternatively also appropriate flat wafer head screws. Corrosion protection is also necessary for fixings if something is to be hung in rooms with increased humidity, such as bathrooms or kitchens.

**Staples**
If the panels are to be stapled, tested broad back staples, 25 mm wide and 45 to 65 mm long, are required. Attention: Using such broad back staples, the panels can only be attached to walls, but not to ceilings or sloping surfaces.

The staples are aligned parallel with a d istance of at least 15 mm to the edge of the panel. It is also important to select the optimum number of fixing points for staples. The relevant information is also provided in the Lemix® assembly instructions*. A tip from a professional: Before stapling the first clay panels, give the stapler setting a quick test, and do the same for its pressure setting too.

* The complete assembly instructions are available for downloading in PDF format at www.lemix.eu

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# 300 years of experience

**Mastered all challenges**

300 years. This is how long the Hart family can trace back their history and roots. The family history is also the company history. The entrepreneurial spirit of the Harts is also more than 300 years old.

Whatever was in demand at the respective time: The Hart family produced it with skill and put it on the market with business acumen. Once in their clay workshop, later a clay-working factory, then in a pottery factory and another factory that produced stoneware products. Production was expanded to bricks, refractory clay bricks, flat bricks and Lemix®. The Hart family have reinvented themselves, their company and the processing of natural raw materials more than once.

Because no matter how good an idea may be at a certain time - the moment may come when it no longer works. Maybe it's not ideas that matter, it's attitude. The Hart family always had the courage to read the signs of the times and to tackle new things. To find new ways because the old ones were no longer viable.

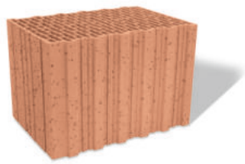
The future comes with innovation. The latest of these innovations is Lemix®. Like everything the Harts have dealt with in their history, the clay panels are made of natural raw materials. Three centuries of experience in the processing of rock and mineral raw materials, soils and clay. A solid story.

**1700** – Stoneware bottles

**1870** – Clinker

**1968** – Ceramic chimney pipes

**1970** – Poroton bricks



**1981** – Hafner refractory clay

**2008** – MULTIkeram

**2013** – Ceramic outer wall for chimney systems

**2014** – Lemix®

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# And now: Lemix®

**Your contact for sales:**

Hans-Peter Schatz
E-Mail: hschatz@hart-keramik.de

**Your contact for technical matters and application advice:**

Marina Günter
Tel.: +49 9233 7714-29
E-Mail: mguenter@hart-keramik.de

HART KERAMIK AG

Am Bergwerk 12
95706 Schirnding
Tel.: +49 9233 7714-0
Fax: +49 9233 7714-14
office@lemix.eu
www.lemix.eu

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