

BUILD



A MAGAZINE FROM LECA®

A new Africa
made with Leca® → 4

Upgrading the marina
with Leca® aggregates → 16

Leca® blocks in the new
airport terminal → 20

Leca® prevents
instability in roads → 32



WELCOME TO OUR WORLD



Welcome to a world premiere. The magazine BUILD, which you now hold in your hands, is the first issue of a magazine from the International Leca organization. Within,

you will find examples of our business and a selection of applications in which Leca is currently used. When comparing the 12 countries from which we operate, you will see that the use of Leca varies considerably from country to country.

We believe that you as a player in the construction industry will enjoy and benefit from seeing what is happening outside of the country you operate in. The construction industry is becoming more open, and increasingly international. We have much to learn from each other.

In this first edition of BUILD you will see examples of applications you might not associate with Leca at all, but that might inspire you to think in new ways. Here are some examples:

In Norway, Leca blocks are used for fire protection of valuable wooden buildings. In Spain the Leca aggregate is used to insulate in solar factories. Finns are building roofs with the insulating Leca aggregate and blocks. In Poland the Leca gravel is used to remove the stench of pigs and to build green roofs. In Denmark Leca contributes both to the construction of a marina and a railway line, while in Sweden and England highways are built upon this lightweight aggregate, Leca. We could go on.

We will continue to go on in upcoming issues of BUILD. Until then, we hope that you take the time to browse through this magazine and obtain ideas to build in new and exciting ways. With Leca, a material with huge opportunities.

Good reading!

Torben Dyrberg
Managing Director
Leca International



PROTECTING THE WOODEN HOUSES

NORWAY Stavanger's famous wooden houses are unique listed buildings. Leca firewalls are important to protect the buildings, and reduce damage in the event of fire.

Text & photos: Gaute B. Iversen

Stavanger is known for many things including the unique wooden buildings around Vågen. The wooden houses of Stavanger are Europe's largest collection of protected wooden buildings, comprising more than 8,000 buildings. A fire would spread rapidly, and could leave large areas of the neighbourhood in ruins.

"It is incredibly tight here. We've had to dismantle parts of the neighbouring building to make space for our building," says Ole Mjåtveit of T. Haga Maskin (Haga Machines), who were responsible for constructing the six-apartment town house.

Remain standing after a fire

The building itself is constructed from steel and concrete. The firewall against the neighbouring building is made of Leca Isoblokk 25. In the event of fire, the building should be able to

burn and collapse without the firewall collapsing.

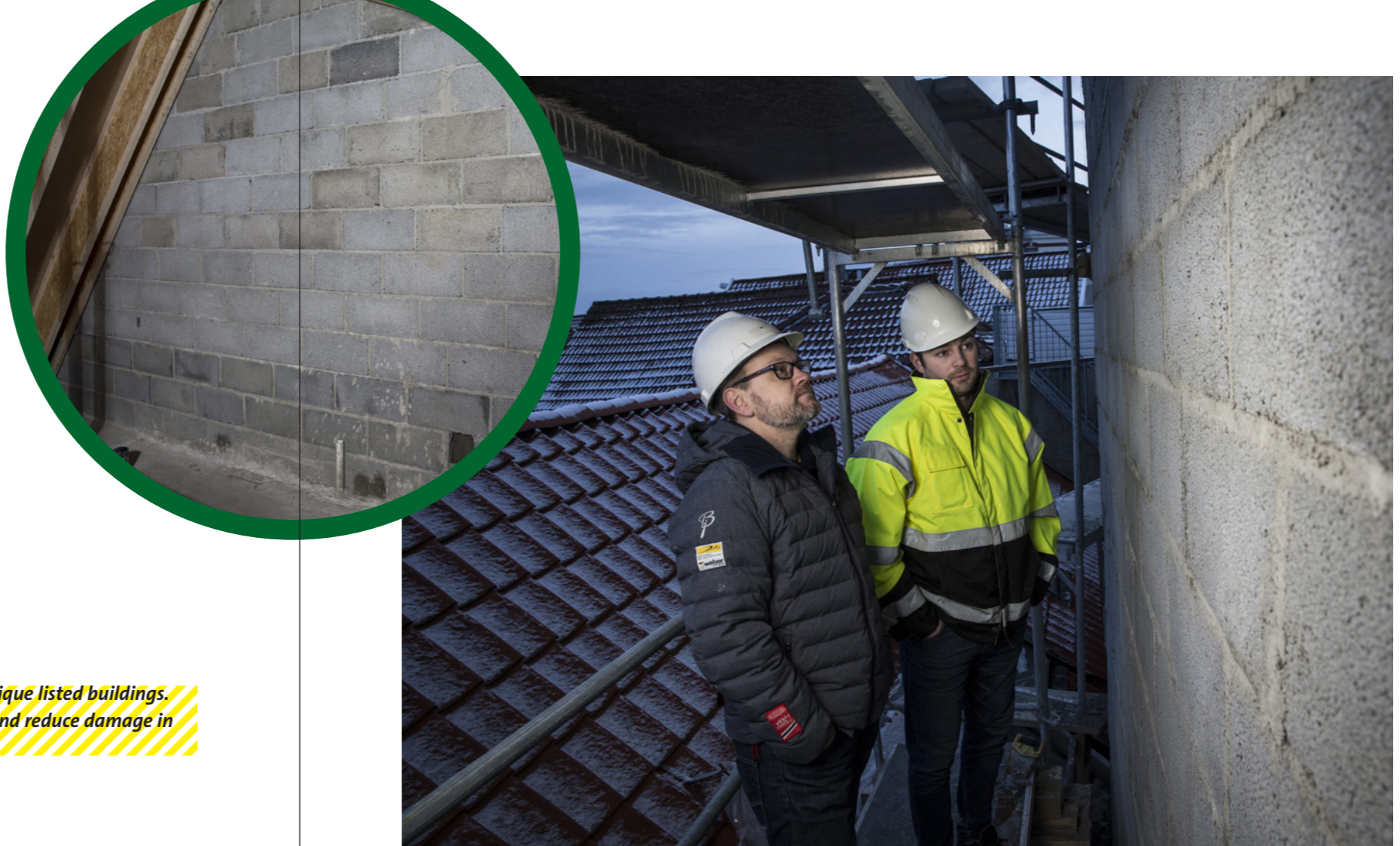
"It isn't anchored to the building, and should remain standing after a fire. The wall should contain the fire for 30 minutes before it eventually spreads to the other side," he explains.

On the ground floor the gap between the buildings is so tight that the blocks had to be plastered before they were laid. The firewall is 14 metres high at its tallest point.

"The façade itself will be finished with so-called barn cladding, a standing timber cladding that will blend in with the surrounding wooden buildings," says Mjåtveit.

300 m²

The wall is 300 m² in total, and T. Haga Maskin (Haga Machines) have received valuable assistance from



Leca's technical department to find the solutions they have used.

"We've had a lot of contact with the people in the technical department. The cramped space, and the fact that we had limited access, means that we've sought help to be sure that the solutions meet the requirements," he says.

The intent is for the new building to be finished and ready to move in during the spring.

The wall is 14 metres at its highest point, and will in theory remain standing even if the building burns down.

Atle Thu from Leca and Ole Mjåtveit from T. Haga Maskin (Haga Machines) have collaborated on the project. "We've received good help from Leca to find the right solutions," says Mjåtveit.

The gaps between buildings are so tight that the Leca blocks had to be plastered before they were laid.

Leca facts

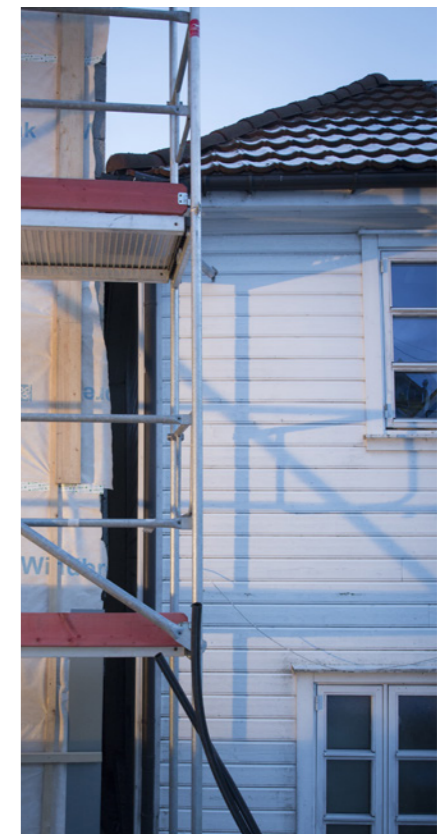
Facility Stavanger Apartment building

Location Stavanger, Norway

Client, contractor and masonry
T. Haga Maskin (Haga Machines)

Leca products Leca Isoblokk 25 cm

Weber products Weber Grey Coatings, Weber Fiber Coatings, Weber ready-mixed mortar M5

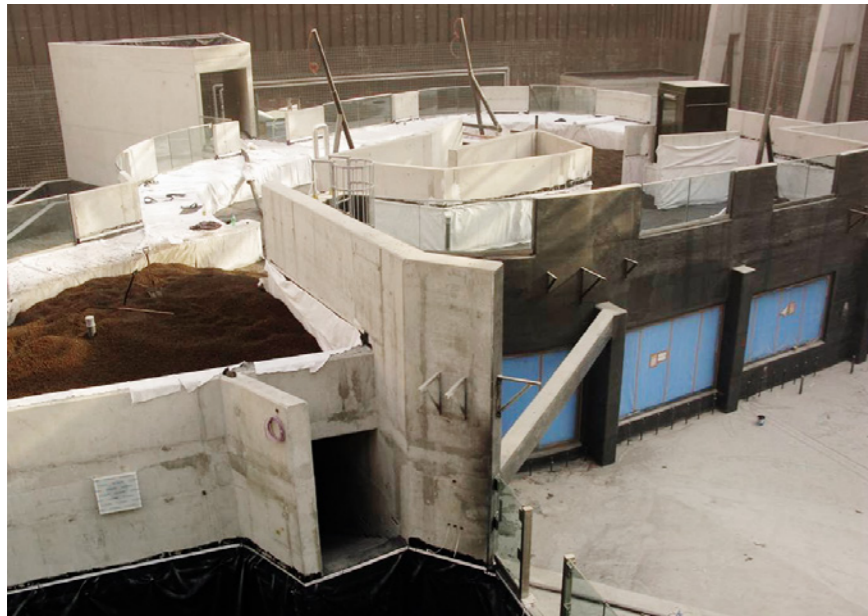




AN AFRICAN TOUCH IN A POLISH ZOO

POLAND *The Wrocław Zoo has opened the Africarium. The facility was built using expanded clay, a material that also provides adequate conditions for African fauna.*

Photo: Zoo Wrocław



Laying out the Leca KERAMZYT drainage layer (left), using a pump (right)

The facility is 160 m long, 54 m wide and 15 m high, with a cubature exceeding 184,000 m³. The building has three storeys, including one underground level. The amount of water circulating in the Africarium total 15 million litres, the equivalent of 6 Olympic-sized swimming pools.

“The pools will be inhabited by penguins and African fur seals. The indoor pools are populated by sharks, manatees, hippopotamuses, otters and various fish of the African waters,” says Marta Forbes, landscape architect at Jadorna Studio Projektowania Zieleni.

Amazing fauna

Strolling through the grounds you encounter different African ecosystems. “We can visit the Congo river jungle, explore the beaches of the Red Sea and admire the African swamps,” adds Marta Forbes.

In a project like this it is very important to ensure adequate drainage in the facility.

“Expanded clay is the best material for this purpose; in combination

with drainage pipes, it provides each plant with an adequate amount of water,” emphasises Marta Forbes.

Practical green roofs

Owing to the structure of the building, the majority of plants will be planted on roofs, forming a so-called

Expanded clay is the best material for this purpose

“green roof”. Roof-top gardens are not only beautiful but they support rainwater management and protect against temperature fluctuations.

“A light and durable expanded clay drainage is very important in this situation. Before it is laid out, a leak-proof and effective hydro-insulation

needs to be provided,” says Forbes. In the case of the Africarium, EPDM membrane was placed on a layer of geotextile and then heat sealed.

“We protect the hydro-insulation with geotextile, place drainage mats and cover them with a layer of expanded clay, which works best in this case. It is an excellent absorbent, which drains excess water from the structure,” explains Robert Polański from the contractor Ogrody Pro.

Minimises roof load

“Expanded clay is ideal for roof gardens because it minimises the roof load. It can be applied using a pump, which considerably speeds up the installation. Overall Leca is much easier to use than other materials,” adds Polański.

The Africarium is a unique place, and the technologies applied there will also work in smaller-scale projects. It is worth considering the advantages of green roofs before planning the construction of residential apartment blocks, or even single-family houses.



Be sure to visit the Africarium in Wrocław (above)

Leca KERAMZYT drainage layer covered with vegetation (left)

Leca facts

Facility Afrykarium at Wrocław Zoo

Location Wrocław, Poland

Application 600 m³

Architect Jadorna Studio Projektowania Zieleni

Contractor Ogrody Pro

Leca products

Leca KERAMZYT 10–20

Leca KERAMZYT 4–10 R



REDUCES ODOUR

POLAND *To reduce the emission of gases from manure at a pig farm, a huge lagoon cover made of Leca KERAMZYT was used.*

These slurry lagoons are located on a farm in Krąplewice in northern part of Poland. The farm belongs to AGRI Plus – one of the largest pig-fattening companies in Poland.

The farm in Krąplewice houses 10 main slurry lagoons ranging in size from 40 m × 30 m to 100 m × 30 m plus a reserve lagoon 70 m × 70 m. The total surface area of all lagoons is 24,100 m² or 2.41 hectares and combined they have a volume of 23,000 m³.

Floating lagoon covers made from Leca KERAMZYT are used to reduce the emission of gases (mainly ammonia) from liquid manure.

The expanded clay floating covers can be applied in any outdoor basin intended for storing liquid manure (slurry), for example in open surface basins or in open, deepened basins (including lagoons).

15 cm thick

Leca KERAMZYT is deposited in bulk onto the surface of the liquid manure. In order to ensure efficient protection against the emission of gasses, a 15 cm ± 5 cm thick layer of expanded clay should be used and liquid manure should be discharged into the basin under the expanded clay cover.

Pursuant to the Technical Approval of the Institute of Technology and Life Sciences, Leca KERAMZYT 10–20 mm R has been approved for use as “Floating expanded clay cover” in livestock farming facilities.

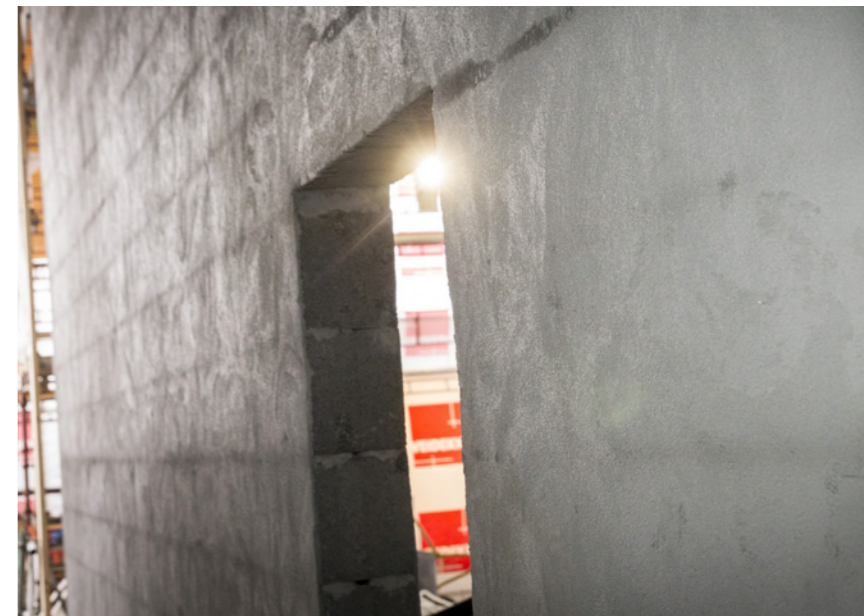
To reduce the emission of mainly ammonia gasses from manure, a thick cover layer of Leca KERAMZYT was filled into the lagoon.

The Leca cover will float on top of the slurry and help reduce emission.



Leca facts

- Facility** Livestock farm
- Year** 2014
- Aggregate** Leca KERAMZYT budowlany L
- Application** 180 m³



ICECOLD MASONRY

NORWAY When the temperature creeps well below freezing, laying Leca blocks becomes more difficult.

For bricklayers in Norway laying Leca blocks in temperatures well below freezing is just another day at work. The biggest problem is, of course, that the water in the mortar freezes instead of hardening.

“When the water in the mortar freezes, ice crystals form making the mortar uneven, rough and harder to use,” says Arne Fjellhammer, a mason with decades of experience with cold bricklaying.

The project is located in Sørenga which is a busy region of the Norwegian capital situated on the coast of the Oslo Fjord. Over the past few years this area has seen a lot of development with Leca being used in many varied applications.

Leca preferred

The Leca blocks were used to construct walls to serve as fire barriers

in both the parking and commercial areas on the ground floor of the development. The blocks were chosen to be used in this application as they can withstand a lot of physical impact.

The usual, but expensive, method to battle the freezing temperature is to cover up the building site and warm it up to at least five degrees Celsius.

“When working with Leca walls and facades where the mortar is visible, covering and warming up the wall is the only way to get a nice result and a fine hardened mortar”, he explains.

Colour change

On Leca walls where the mortar will be hidden under plaster, an easier and more affordable solution is to add an additive to the mortar. Weber Anti-

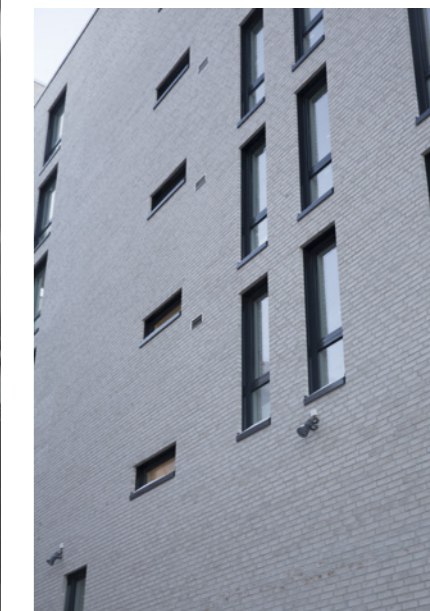
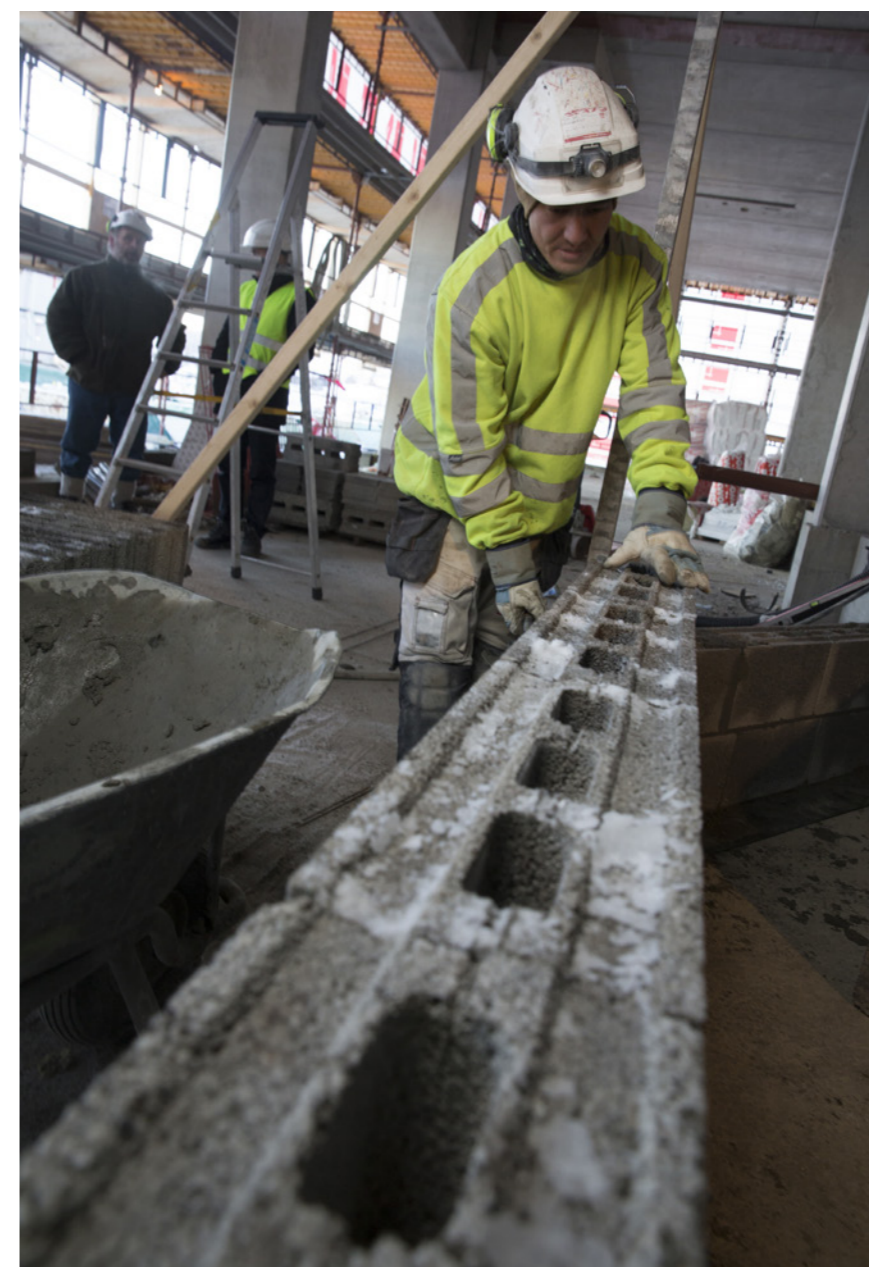
freeze makes it possible to lay bricks down to minus 15 degrees Celsius.

“The problem with adding anti-freeze is that you get different colour nuances in hardened mortar. That is not desirable in many situations,” says Fjellhammer.

As long as the wall is going to be plastered the colour change or the coarse mortar is not a problem. The plaster will cover up the blemishes.

“But, it is of course important that the plastering is carried out at the right temperature. At least five degrees Celsius, to get a good result,” he reminds us.

Laying Leca-blocks in the cold is not an art when you know the tricks. Stian Jørgensen and Gulam Shah Sarwary with the contractor Veidekke in Oslo build a Leca wall in minus 15 degrees Celsius.



Leca facts

Facility Sørenga, Oslo

Developer Veidekke eiendom and Reitan Eiendom

Contractor Veidekke AS

Architect LPO Arkitekter

Leca products Leca universalblokk 15 cm, Leca universalblokk 20 cm, Leca lettveggblokk

Weber products Weber Murmørtel M5, Weber antifreeze



LECA® IN SOLAR POWER PLANTS

SPAIN Spain is one of the sunniest countries in Europe and is taking advantage of this by installing thermal solar power plants.

Geotechnical applications of Leca aggregates are well known. The most typical ones, with some variations, are fillings over structures and settlement control. New applications are not usual and when they occur, they are based on some of these concepts.

SG Weber Spain has been working intensively with contractors and technical consultants for almost ten years in order to develop new and important applications

Renewable

Spain is taking advantage of the sunny climate by installing thermal solar power plants. The principle is that hundreds of large mirrors collect the solar radiation. Oil is then heated

with this energy and thereafter water is heated to produce vapour, which powers a turbine, generating electrical energy.

This new renewable energy source was well supported by the government and many companies invested in this energy source.

20 plants

For the first time, Leca aggregates have been applied at Andasol plant located in the south of Spain. In an extension of 1,5 x 1,3 km² per plant, thousands of mirrors are waiting for solar radiation. During the night, power production cannot stop and a salt solution at 400 °C stores heat to continue normal power supply.

This salt is in a liquid state inside a metallic tank. The tank is supported by an ARLITA LECA SOLAR filling. From the results of the first use, contractors and consultants appeared to be very encouraged. Since 2006 a total of 20 plants have followed Andasol plant. The last five plants have been constructed in Morocco and South Africa.

Leca facts

Facility The Andasol plant in Spain
Contractors Sener, Cobra, OHL, TSK, Acciona, Abengoa
Leca products ARLITA LECA SOLAR II

Leca® is a registered trademark owned by Saint-Gobain



SKY TOWER IN WROCLAW

POLAND Sky Tower is one of the tallest office and residential buildings in Poland and Europe. The 50 storeys and 212 metres high building is located in Wrocław (in south-west Poland).

The low buildings adjacent to the main high-rise building have green roofs with a drainage layer made from Leca KERAMZYT.

The expanded clay drainage is designed to drain away excessive rainwater. At the same time, the aggregate stores part of the water, to give it away to the grass and plants growing on the roofs, thus reducing the frequency of irrigation.

Besides acting as a drainage, Leca KERAMZYT supports the roof's heat insulation and forms its fire protection.

Leca facts

Facility Sky Tower building
Location Wrocław
Date of execution 2011
Agregate Leca® KERAMZYT 10-20 R
Application 300 m³ as green roof drainage

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LECA® SAVING TIME ON THE MARSH

UK The need for an innovative ground engineering solution for a major UK reclamation scheme led to the largest-ever single use of Leca lightweight aggregate.

Nine shiploads of Leca aggregates were used in Phase 2 of the West Marsh Renaissance project at Grimsby for the client – P&O Developments Ltd, paving the way for a comprehensive mixed use development including residential.

Principal Contractor for the infrastructure works was Norwest Holst Construction Ltd, based from their Derby office. Leca aggregates were specified as general bulk fill material for earthworks to an elevated section of new adoptable highway that crosses an existing railway line, to facilitate access to the development site.

Early stages

During the early stages of design development and early contractor involvement, Leca aggregates were identified as a potentially suitable

alternative material than traditional granular imported material for the embankments. Detailed design development and assessment of alternative methods confirmed the suitability for this application.

The lightweight alternative solution was required due to poor ground conditions consisting of saturated marshes with low bearing capacities at the location of the new highway alignment and bridge position and the proximity to the existing “live” railway line which it crosses.

Limit surcharge

In order to limit surcharging of the existing ground conditions below the highway alignment within acceptable levels, Leca aggregates were assessed and specified by White Young Green Consulting Engineers of Manchester, in consultation with

Norwest Holst and adopting highway authority North East Lincolnshire County Council.

The choice follows the success of a smaller highways project near Gloucester involving Norwest Holst. Some 45,000 m³ of Leca aggregates were stockpiled at Grimsby Docks for call-off in deliveries by 60 m³ articulated tippers, which will make the five-minute journey to site as required.

During the project, the elevated approach embankments for the new bridge required approximately 20,000 m³ of Leca aggregates to the south side and a further 25,000 m³ to the northern embankment which is part founded on existing landfill. The embankments are being formed using compacted aggregates wrapped with geotextiles to avoid migration of the underlying subsoils and capping layers.

Nine ships delivered in to port – The Leca aggregates were shipped in to Grimsby Port located 5 minutes drive from site, increasing the site’s daily volume intake.

Feeling the weight – Leca aggregates as a value-engineered solution revealed it to be a cost-effective option, providing weight reduction of approximately 75% when compared to conventional crushed fill.



Cost-effective solution

The import of the material to the northern embankment has been carefully managed between Norwest Holst and Leca to comply with embargo periods for deliveries along the only access to the site. Consultation between all parties has been ongoing to ensure the efficient delivery of the material whilst complying fully with the requirements of the highways authority.

An evaluation of Leca aggregates as a value-engineered solution revealed it to be a cost-effective option, providing weight reduction of approximately 75 per cent when compared to conventional crushed fill. It also requires fewer deliveries to achieve the same volume and, consequently, reduced programme time.

Leca facts

Client P&O Developments

Specifier White Young Green, Manchester

Contractor Norwest Holst Construction Ltd, Derby

Adopting Highway Authority North East Lincolnshire Council

Leca products Leca aggregates



During the install, 1,200 m³ of Leca aggregates were placed at the eastern piers. The large volume of aggregates were simply placed and tracked using the on site excavator. (left and opposite, top left).

Project manager and engineer Benjamin Bjerg Pedersen, Per Aarsleff A/S, general contractor on the project in close dialogue with the engineer Knud Mortensen, Leca (opposite, top right).

One early October morning at the modernized and expanded Fredericia marina (opposite, bottom).



A NEW MARINA

DENMARK *In the ambitious renovation and modernization of Fredericia Marina Leca aggregates have played a central role in solving a problem with a soft area below the marina.*

Leca aggregates are used as light-weight filling in an area of the eastern piers where boats in the marina are pulled up by crane when they are cleaned, repaired overwinter.

Because of the optimum access conditions to the marina the LWA has been transported there by truck with about 100 m³ at a time, tipped from the truck – and then spread out at the site, with hydraulic excavator.

As the ground below the marina is soft, the specifier on the project Rambøll Denmark A/S, chose to use a light filling material.

For this task, the choice fell on Leca lightweight aggregate, which is an effective material for this type of task, and it is also known from many other port construction projects around Denmark and the world.

Attractive marina

The modernization of Fredericia Marina aims to create an attractive marina environment with modern facilities for both sailors and citizens of Fredericia. The project was started in April 2011 and was completed in 2014.

The renovation project includes, among other things, a larger and deeper inner harbor, making room for both large sailing vessels and smaller amateur sailing boats, a new way down to the new wooden bridge, a new harbor house and a new clubhouse.

At the same time, a new jetty along the Little Belt, facilities for mast crane, new bunkers and new sidewalks, roads and new street lighting were constructed.

Leca facts
Facility Fredericia Marina
Location Denmark
Leca products Leca aggregates





It is actually a really good material to work with

LIGHT RAIL BUILT ON LIGHTWEIGHT FILL

DENMARK In Denmark's first light railway, Leca lightweight filling has been used in the bridge ramps of the bridge going through Egådalen north of Aarhus.

Denmark's first light railway – Aarhus Light Rail – is being built as first stage of a network of light rails that will link the towns and districts in the Aarhus area closer together and make it easier for commuters to get to and from work.

In total the light rail will be about 110 kilometers long and have 50 stops. The new stretch from Aarhus Central Station to Lystrup, where the lightweight filling has been used, consists of 12 kilometers of new light rail track.

The track is going through an area where the underground consists of "lax clay" as Søren Steen Møller, geotechnician at COWI, explains it. The "lax clay" combined with a high ramp with a large dead load would cause unacceptable settlement, this required an alternative solution.

Low density

Already at an early stage, Leca A/S has been in contact with both the specifier and contractor explaining about properties of the products, experiences with the solution, delivery options and how to build in the material at site.

The solution was a lightweight filling and the Leca aggregates were primarily chosen because of the low density of the product. The contractor – a consortium of Dan Jord A/S and Per Aarsleff A/S – built up the sides of the ramp with subsoil and filled the core with Leca aggregates.

Easy to move

The Leca aggregates were tipped off by truck and leveled out with a bulldozer. Because of the low density the dozer had no problems moving the material.

"It is actually a really good material to work with," as Jørgen Laursen from Dan Jord A/S remarked.

All participants have been happy with the solution and the project has run as planned. The completion of the light railway is scheduled for 2017 when Aarhus is European Capital of Culture.



The area ready for the final build-up of the light rail (above centre).

The core of Leca aggregates is levelled between the sides of subsoil (above right).

Søren Steen Møller, COWI, chose a Leca lightweight filling solution to avoid differentiated settlements (left top).

The light rail bridge where the ramps are built with a core of Leca aggregates (left centre).

We had the opportunity of inviting stakeholders in geotechnics to visit the site, which led to some good discussions (left bottom).



Leca facts

Client Aarhus Light Rail

Contractor Consortium of Dan Jord A/S and Per Aarsleff A/S

Specifier COWI

Leca products Leca aggregates



NEW TERMINAL AT FLESLAND



The new terminal at Flesland Airport in Bergen is ready for more than 6 million yearly passengers

Huge amounts of Leca blocks have been used in the inner walls of the terminal, especially in the technical areas of the building.



NORWAY Lighter blocks make quite a difference when you have to deploy nearly 100 pallets of Leca block in a week, as is the case at the new terminal at Flesland.

Text & photos: Gaute B. Iversen

The existing terminal at Flesland airport in Bergen was originally intended to serve 2.8 million passengers. The number of passengers using the airport has now reached 6 million, and a new terminal is under construction. The new terminal lies a stone's throw from the old one, and will open in 2017. Construction has been underway for nearly two years, and the Celco Murer- og Flisefirma (Celco Masonry and Tiling Company) has been responsible for the masonry work on the terminal.

4500 m²

“There’s been a lot of bricking over the last five months. The scale of the project and the quantity of material involved has been the biggest challenge,” says Arve Nylund, Project Manager at Celco Murer- og Flisefirma (Celco Masonry and Tiling Company).

In just a few months the company has constructed 4,500 m² of Leca block walls up to eight metres tall. In total, the new terminal will be 63,000 m², almost three times larger than the current terminal.



The new blocks with tongue-and-groove made it easier for Tomas Urban and Roman Lewandowski to achieve a good result.

We really appreciate the work Leca has done to reduce the weight of the blocks. It has significantly reduced the burden on our bricklayers

“There are lots of long walls of up to 100 metres. Some of the walls have pillars to immure, which have presented challenges when it comes to expansion joints,” he explains.

Lighter blocks

With such large quantities and different types of Leca blocks in production at the same time logistics have been important, with warehouse space a constant challenge. During the most hectic periods, 50 pallets were being delivered twice a week.

“There were over 20 tons of mortar a week. With such large quantities in such a short time, we really appreciated the work Leca has done

to reduce the weight of the blocks. It has significantly reduced the burden on our bricklayers,” says Nylund.

The new tongue-and-groove blocks have also made it easier to achieve a good result, and a wall that’s easy to plaster.

“The new blocks can be laid quickly, and because they’re finer they give a smoother surface that’s easier to plaster,” he says.

Going forward, he and his colleagues in Celco Murer- og Flisefirma (Celco Masonry and Tiling Company) will be laying 17,000 m² of tiles in the public areas, and 4,000 m² in the toilets and changing rooms.

Leca facts

Facility Flesland Terminal T3

Client Avinor

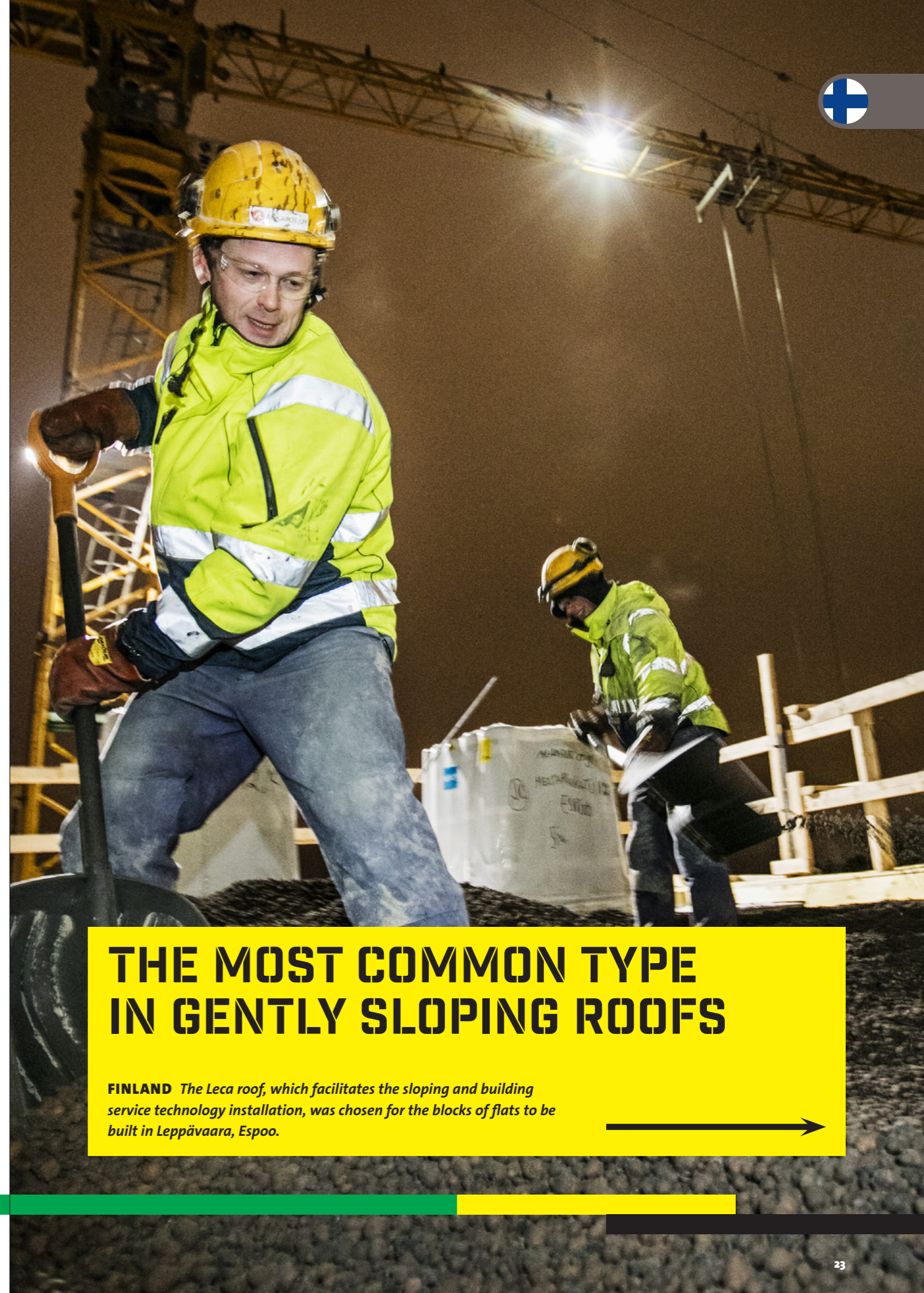
Main Contractor HENT

Architect Nordic Office of Architecture

Masonry Celco Murer- og Flisefirma (Celco Masonry and Tiling Company)

Leca products Leca Isoblokk 35 cm, Leca Basicblokk LSX 25, 20 and 15 cm

Weber products Weber readymixed mortar M5



THE MOST COMMON TYPE IN GENTLY SLOPING ROOFS

FINLAND The Leca roof, which facilitates the sloping and building service technology installation, was chosen for the blocks of flats to be built in Leppävaara, Espoo.





Leca aggregate is a natural, ventilating and safe thermal insulation. It is easy to cover the building service technology installations with Leca aggregate (page 23).

Instead of surface casting, Leca roofing blocks can be used as the mounting base for waterproofing membranes, as in this Ruufi Ltd's renovation in Espoo (left).



Leca lightweight aggregate is the only thermal insulation which can be reasonably fitted between pipes and ducts



Two professionals install the Leca aggregate roof thermal insulation and concrete slab casting on a normal block of flats in a day or two (above).

Leca facts

Builder Avara Koti Oy

Main contractor Jatke Uusimaa Oy

Roof contractor AL-Katot Oy

Architectural Designer
Architects HVM Oy

Structural engineer Teknokolmio Oy

Leca products used
Leca aggregate KS 820 and
Leca roofing block

Asunto Oy Mestarinkatu 12 in Lepävaara Espoo consists of three 6-storey housing units which will have Leca roofs.

“The gently sloping roof on a block of flats in practice means a Leca aggregate roof, because it is fast and economical to implement and because of its ventilating qualities it is safe to use,” says Tomi Vuorinen, Production Manager of AL-Katot.

The main contractor, Jatke Uusimaa Oy, chose AL-Katot Oy as the roofing contractor.

Natural solution

“There is more and more technology

in blocks of flats and their roofs and in practice Leca lightweight aggregate is the only thermal insulation which can be reasonably fitted between pipes and ducts. In blocks of flats, the roof is almost always a smooth concrete slab, and the roof drain slopes are easiest to do when Leca aggregate is used for thermal insulation on the slab,” Tomi Vuorinen says.

The most common roofing solution for blocks of flats in growing dense urban centres is the internal removal of water from gently sloping roofs. In most cases, the thermal insulation selected for sloping roofs is Leca aggregate, manufactured

from natural clay in Finland by Saint-Gobain Leca in the Kuusankoski factory. Around 25 million square metres of lightweight aggregate roofs have been made in Finland.

Quick to build

On lightweight aggregate roofs, a vapour barrier and the necessary building service technology must be installed on site casted concrete slab or prefabricated concrete slabs first. The Leca aggregate is lifted from the transport vehicle to the roof in a container connected to a tower or mobile crane and it is then levelled using a straightedge aligning with

the pre-installed spacer blocks sloping in the direction of the roof wells.

The base for the waterproofing membrane is made by pouring a thin, approx. 5 cm concrete slab on top of the lightweight aggregate. Leca roofing blocks made of lightweight aggregate concrete which function as thermal insulation can also be stacked as a base for the waterproofing membrane.

“This type of Leca aggregate roof for a block of flats is heat insulated in one or two days and the surface concrete is poured”, Tomi Vuorinen says.



CONSTRUCTED WITH LECA® SANDWICH BLOCKS

FINLAND The first of a nearly one hundred flats projects in Sipoo shows that the advantages of Leca block construction are even more evident in low-rise buildings.

Detached houses constructed using Leca blocks have a very high quality image. Managing Director Markus Wirtanen says that with professional execution quality three-storey multifamily housing units can be built using Leca blocks.

“We have honed our planning and production concept to be effective and have found that the total cost of blocks of flat constructed from Leca blocks is not any higher than in prefabricated construction. The overall schedule is the same, but Leca block construction offers a lot more flexibility, for example, with changes in jobs on the building site which will always occur in construction”, says Wirtanen.

Flexible modular parks

Many three-storey detached houses have been built using Leca blocks. Equally the flexibility of Leca blocks

suits blocks of flats, which these days are more small-scale and close to nature, according to Markus Wirtanen.

However, even greater flexibility and efficiency benefits can be achieved in professionally executed construction of blocks of flats than in the construction of detached housing.

“Leca sandwich blocks which are thermally insulated with polyurethane are extremely flexible modular ready-to-use parts, with which a high-quality, energy-efficient and humidity safe building can be built cost-effectively, whether it be a detached or row houses or blocks of flats.”

New projects

According to Markus Wirtanen, the experience with the blocks of flats built in Sipoo has been so encour-

aging that Basso-Kivitalo is launching extensive new projects with the same concept.

“We have just started a project consisting of 140 residential units in Pellas in Espoo. Two locations are nearing completion in Helsinki where there will be 16 and 21 residential units respectively. All of them are multifamily housing units, as in Sipoo. In addition to these, many other projects for blocks of flats and detached houses built with Leca blocks are beginning in the near future.”



The Sipoo multifamily housing project shows that high quality blocks of flats can be professionally executed and cost-effective using Leca blocks (above).

The residents feel that the blocks of flats are warm, welcoming and harmonious in appearance and that the façade rendering has been finely done (above).

In blocks of flats, in addition to conventional Leca sandwich blocks, also Leca shuttering sandwich blocks are used, which are convenient for stiffening the building (left).

Leca block construction is a combination of high quality and economical implementation. The schedule is the same as in prefabricated building, but there is greater flexibility (left).

Leca facts

Builder Nuorisosäätiö (Youth Foundation)

Main contractor Basso Building Systems Oy

Architect Architects Antti Heikkilä Oy

Structural engineer Engineering Firm Arto Leppänen Oy

Leca products used Leca Lex foundation blocks, Leca Design sandwich blocks, Leca EasyLex partition wall blocks, Leca shuttering blocks and shuttering sandwich blocks, Weber plasters, Varma rendering



LECA® IS GREAT

NORWAY Roger Munoz is a tiler, and has just built his first house using Leca. "It's great building with Leca. It's simple, fast and makes for a good house," he says.

Text & photo: Gaute B. Iversen

In the Tasta district of Stavanger, Harestad Bygg (Harestad Construction) have built two villas using Leca. The houses are well situated, with good views over the area towards Tasta centre.

"This is the first time I've built using Leca. I was surprised by how easily and fast it went," says Roger Munoz.

He has carried out much of the masonry work himself, in collaboration with Harestad Bygg (Harestad Construction). The outer walls are bricked using Leca Isoblokk 35. The two houses are 220 and 180 square metres respectively.

Warm houses

Munoz says that the Isoblokks were chosen because they are fast to work

with, and provide readily-insulated walls.

"The walls were very quickly finished. It was a simple matter of laying the blocks and smoothing both sides, then the outer walls were finished. Thanks to Leca Isoblokk we've got a house that requires very little energy for heating. They're warm, comfortable houses to be in," he says.

The inner floors and roof are wood, but all the interior walls are made of Leca Finblokk. The outer and inner walls are finished with silicate concrete sealer and dyed silicon resin plaster.

"We're very pleased with the result. Now that I've done it once, I already want to build a new house. With experience, you make fewer mistakes the next time," says Munoz.



Leca Isoblokk 35 cm was chosen for the two houses in Stavanger, Norway, because the blocks provide already-insulated outer walls.

First timer Leca builder Roger Munoz says it's great to build with the blocks. (opposite right)

They're warm, comfortable houses to be in



Leca facts

Facility Tasta detached houses

Client Marita Harestad / Roger Munoz

Architect Marita Harestad / Hus- og byggttegning (House and construction drawings)

Masonry Roger Munoz and Harestad Bygg (Harestad Construction)

Weber products Leca Isoblokk 35, Weber M5 ready-mixed mortar, dyed silicone resin plaster, Leca Finblokk 125



LECA® AGGREGATES SUPPORT EARTH REINFORCEMENT

UK Consulting engineers for a prestigious new canal footbridge devised an innovation solution combining Leca aggregates and geogrids to solve soil stabilisation and access challenges.

Designed for client English Partnerships, with Jackson Civil Engineering as main contractors, the new 22-metre span elliptical brick arch bridge, which echoes the style of Isambard Kingdom Brunel, presented the consulting engineers Pell Frischmann with major challenges due to unstable soils surrounding the canal plus the far bank of the canal being directly inaccessible to heavy plant.

The Leca aggregates' weight – typically 75% lighter than traditional crushed aggregates – met the requirement for lightweight bulk fill behind the bridge abutments and wing walls.

It also solved the challenge of “delivering” material to the eastern bank of the canal by enabling some 2,000 m³ of material to be pneumatically “blown” for 39 metres across the canal from the west bank to the point

of use. This resolved the access problem, minimising the need for trucking and spreading plant on the eastern bank and contributing to a reduction in contract costs as a result.

Piled abutments

While the bridge abutments are piled, the use of the lightweight fill reinforced soil structure allowed the wingwalls to be founded directly upon the existing ground without ground improvement or further piling.

Pell Frischmann's Project Engineer, Simon Griffiths, commented: “For these spans few of these solid brick arch footbridges have been built since the heyday of Isambard Kingdom Brunel, so it is entirely in keeping with the Grand Union Canal. It is also a first combination of Leca aggregates and the Tensar Wall System in

the UK, a solution that should have many applications in locations with poor non-loadbearing soil structures as it was at this site.

Besides easing access difficulties, the Tensar/Leca solution was ideal as it required minimal foundations thereby reducing the use of hard construction techniques.” Some 3,500 m³ of Leca aggregates, in 10–20 mm grade, was delivered in phases over a three-week period with material “blown” into position for the eastern side of the canal and the remaining 1,500 m³ tipped into position on the western bank.

Behind the wingwalls the material was placed in layers, combined with the geogrids to meet the specification for the Tensar Wall System. Minimal compaction was required.



Blowing it in – Some 2,000 m³ of Leca aggregates were pneumatically “blown” a distance of 39 m across the canal from the west bank to the point of use.

Leca facts

- Client** English Partnerships
- Specifier** Pell Frischmann
- Contractor** Jackson Civil Engineering
- Leca products** Leca aggregates

LECA® PREVENTS INSTABILITY IN ROADS

SWEDEN To prevent settlements and instability, Leca aggregates were used in construction and extension of highway and railroad in Sweden.



Leca facts

Project name Highway – railway E45

Volume 200,000 m² expanded clay
8–20 mm

Location Göteborg–Trollhättan, Sweden

Year 2009–2013

Contractor Veidekke, PEAB, SKANSKA,
NCC, ODEN

Designer WSP, Sweco, Tyréns

Owner/builder Trafikverket

Leca products Leca aggregates

New construction and extension of highway and railroad along the Göta Älv river has been built during the last years. The area is exposed to risk for settlements and instability along the river bank.

Both highway and railroad are built on top of deep clays. Installation of lime-cement columns in combination with light weight embankments has been a successful solution along some critical parts.

Strong material

Expanded clay is a light weight material which is light enough to reduce settlements and tensions in the underlying clay, but heavy enough not to cause buoyancy problems in case of flooding.

The material is also strong and can cope with cyclic loading in railway embankments. Together with expanded clay the number of lime cement columns could be reduced giving a cost effective solution.

No problems

There were no recorded problems after opening. The inhabitants of the area have now a safer road, better environment for residences and a substantial reduction in time for commuting to work. Effective installation and production could be achieved by a local intermediate stock pile, enabling contractors to get large volumes delivered on a short notice.



LECA® HOLDS THE MOUNTAIN UP

NORWAY During a crucial phase in the development of coal extraction on Svalbard, Leca was the only thing that could help the mining company Store Norske Spitsbergen Kulkompani AS move forward.

Text & photos: Gaute B. Iversen

Norway has been mining coal on Svalbard since the beginning of the 20th century. Store Norske Spitsbergen Kulkompani AS is a cornerstone of the local industry and the largest employer in Longyearbyen and on Svalbard.

“We entered a phase in the extraction process where we could not use wooden posts or beams to prop up the mineshafts, as we usually would. The wood would have contaminated the coal we were extracting from the mine,” says production manager Per Nilssen at Store Norske.

Raking it up

A tunnel had already been dug into the coal seam that was being mined. Now coal needs to be removed from the coalface at an angle that allows

the drilling machines to reach the end of the tunnel. Leca blocks are used to hold the roof up.

“When we break through the tunnel walls, there is always a danger of the roof collapsing. There are 200 posts along the tunnel walls that hold up the mountain as we break through,” Nilssen explained.

This means that the Leca blocks are also smashed during the process. The broken blocks end up in the coal that is extracted from the mine, but they do not contaminate the coal in the way wooden supports would.

“The posts are placed by hand, without mortar. We wanted blocks that were compact and could tolerate extreme pressure. The pressure on the posts can weigh as much as 200 tons,” he explains.

We are very pleased with our collaboration with Leca. They quickly came up with a special block that we could use for this purpose.



Special blocks

This method is familiar from other mines but has never previously been used in the mines on Svalbard. Store Norske was therefore on the lookout for suitable solutions, and eventually sent an enquiry to Leca.

“We did not have any blocks in our catalogue that matched Store Norske’s specifications, but we were quickly able to develop a suitable block. The block that was sent to Svalbard resembles a sound block, but is only 82 millimetres thick,” says Leca project engineer Anton Hultqvist.

Product development and production took place at record speed. The Svalbard blocks had been tested and produced in just a few weeks, and the first delivery was already en route by ship. A total of 26,000 blocks have been delivered, the equivalent of around 300 cubic metres.

Cutting out wood

The first breakthrough of the tunnel

wall took place at the end of February. The posts are stacked in a 75 cm² formation and can be up to 3,5 m in height.

“We are very pleased with our collaboration with Leca. They quickly came up with a special block that we could use for this purpose,” Nilssen explained.

Wooden supports have been used to keep mine roofs up for years. Store Norske’s experience with the Leca blocks has been so positive that they are considering replacing all wooden supports with these blocks.

“Leca blocks are a very strong competitor with wood in terms of handling and product specifications. It was important for us to get blocks that were consistent in quality and size, and that is what we have. Now we just want to gain more experience with the blocks before deciding what we will do in the future,” says production manager Per Nilssen at Store Norske Spitsbergen Kulkompani AS.

Specially made Leca Block helped stabilize the roof in the coal mine on Spitsbergen. As the huge mining machine chewed its way through the coal, the Leca blocks prevented the roof of the mine from collapsing.

Leca facts

Facility Svalbard coalmine

Client Store Norske Spitsbergen Kulkompani AS

Site Coal mines on Svalbard

Use Holding up the mountain to prevent the tunnel roof from collapsing during coal extraction

Leca products Specially manufactured Leca blocks

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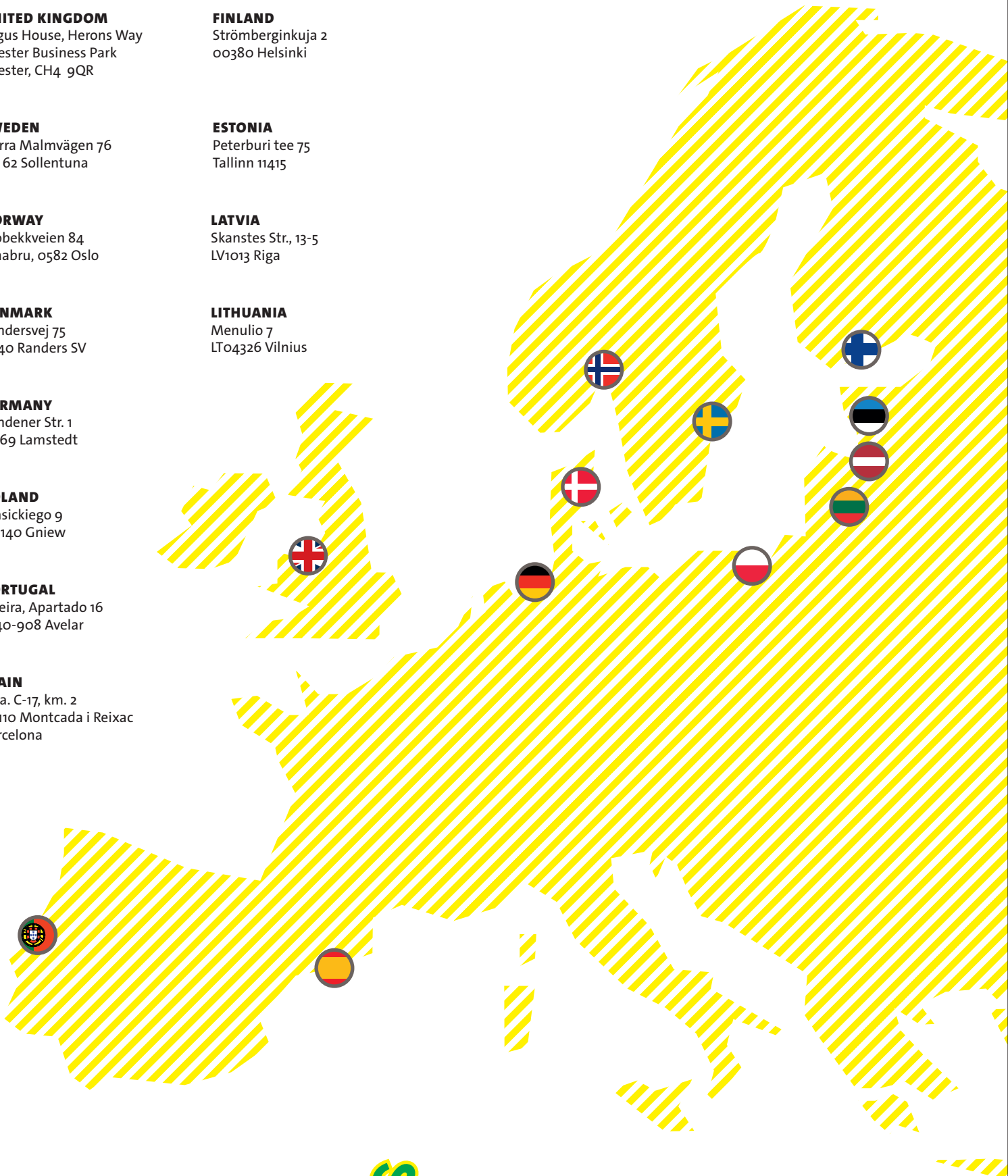
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