

BUILD

Leca[®]

A MAGAZINE FROM LECA[®]



New slab transforms construction → 4

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PROBLEMS ARE MEANT TO BE SOLVED



Judging by the projects in this issue of BUILD, Leca is a real problem solver. Leca lightweight aggregate (LWA) in particular is extremely versatile in many applications. Within the latest issue of Build there are some fascinating and varied real life examples throughout Europe of the problems that Leca LWA has been instrumental in solving.

The Newlands Bridge in England was an old bridge in desperate need of repair with severe settlement issues. Leca LWA provided the core properties required for resolving this issue for the bridge engineers that alternative material could not provide. The unit weight, drainage advantages and speed of installation made the selection of Leca LWA simple for the engineers.

In Sandefjord, Norway, residents had a long-standing issue with traffic noise from a nearby road. Due to the poor ground conditions, traditional noise embankments were not an option. Fortunately, the lightweight properties of Leca LWA was ideal for this application and the noise embankments could be fully developed.

Thousands of old Norwegian houses are affected by out of date and ineffective drainage systems. Increasingly, homeowners solve this problem by digging and blowing Leca LWA next to the wall. The result is excellent drainage and low pressure against the basement wall.

In Spain, Atletico Madrid developed its new stadium, visited by 72,000 people each weekend, where the access roads needed to handle both heavy traffic and difficult ground conditions. Leca LWA provided the solution which resolved both challenges with ease (in Spain they use the trademark Arlita) and was chosen as the obvious problem solving material.

In conclusion: if you have a problem with a structural or geotechnical project, contact us. We have the products, the solutions and the expertise to help you. We hope you enjoy this issue of Build.

Torben Dyrberg
Managing Director Leca International

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BORROWED FROM NATURE, OUR SUSTAINABLE STORY...

Leca® LWA and Leca® blocks are mainly known for their functional benefits, with a long history which dates back to more than 75 years, Leca® Lightweight Aggregate is actually more modern than ever – and a highly resource efficient material within infrastructure, housing and water management projects.

Leca Lightweight Aggregates (LWA) has been around since the 1940's. And although the product has been developed further since then, it is basically still the same product: expanded clay. This special and purposeful material is highly suitable for many building requirements due to its numerous and unique properties; All-in-One aggregate, used Everywhere. But Leca LWA has some very positive «side effects» regarding environmental issues including resource efficiency and a sustainable long lasting life-time. Environmental and sustainable issues which were probably not the main focus 75 years ago, are certainly a concern today in the modern world.

Resourcefulness from cradle to grave – and resourceful in between!

To make this simple, we transform 1m³ of freshly excavated clay into 5m³ of lightweight construction material. Through this highly resourceful return ratio of 1:5, we feel that our production positively impacts the full life circle of a natural resource, from cradle to grave. By combining the All-in-One features such as being durable, strong, lightweight, water absorbent and recyclable, Leca® products are benefiting the environment, limiting resource requirements and improving our living and working conditions. We believe that LECA® LWA has a positive effect on every stage of the product lifecycle from Production, Transport, Building, Living to Recycling. This strong lightweight and inert aggregate can be used everywhere, and can be re-used / re-cycled - and even be returned back to the Earth. We like to call it 'Borrowed from Nature'.

This is not just another nice story on sustainability, we are actually doing it!



Production

Simple ideas often last longer. LECA® LWA is basically made of freshly excavated clay, and produced through pre-treatment and high temperatures. 1m³ of fresh clay produces 5m³ of durable, natural aggregate. To be used in anything from flower pots to structural concrete bridge elements in harsh Northern seas. Focus on a resourcefully efficient production process is always maintained with the attention on producing as little waste as possible in the process. Strict quality control is in place in all our production plants to deliver high quality products with minimal environmental impact.



Transport

Being a lightweight natural aggregate, transportation is easier and leaves a smaller carbon foot print than alternative heavy aggregates. Increased capacity for trucks means fewer trucks on the road, in the city centres and in delicate countrysides. Did you know that one truck of LECA® LWA equals four trucks of sand and gravel? This is good for our climate – reducing CO₂ emissions considerably, reducing transport costs for everyone and saving time for project completion.



Building

If your building material weighs less, it makes life for construction workers onsite easier. Lifting a LECA® Block weighing a few

kilograms is manageable, but lifting a block made from alternative material which could weigh up to four times more is certainly more difficult. Not only is LECA® LWA lightweight but you can pneumatically blow them into place with our blowing vehicles when access is narrow and difficult; Fast, Easy and Flexible.



Living

Identifying LECA® LWA is difficult at first sight, when looking at a house, a road or a bridge, BUT we are there; in the ground, in the walls or on the rooftop. Leca® LWA can be identified through the amazing properties which are gained for example, when used in homes, Leca® LWA offers high levels of thermal and acoustic comfort and contributes to improved energy performance. This helps to reduce the carbon footprint, reduces energy bills considerably and provides long lasting comfort for the home.



Re-use / Re-cycle

Leca® LWA is a unique and natural product which has a life cycle which is not linear, but is actually circular. Moreover the simplicity of the natural inert clay aggregate means that it can return back to nature. LECA® LWA is essentially not ours; we just borrow the environmentally friendly solution from nature, utilizing its many features to build for the future and its sustainable properties mean that we can simply return it back to Nature.



NEW SLAB TRANSFORMS CONSTRUCTION

Text: Alexander Wulff/ abeo
Photos: Erik Mårtensson/NCC + abeo

DENMARK *Low weight and high design flexibility are among the benefits of a new concrete slab from Denmark. The secret: combining normal and LWA concrete.*

In Denmark, the company Abeo has had great success with using a Leca lightweight aggregate (LWA) based concrete for a new type of precast slab called the SL-Deck. In fact, the LWA concrete accounts for almost 50% of the new SL-Decks.

“In traditional concrete slabs, the same strong concrete is used for the entire element. In the SL-Deck, the strong concrete is only used where it is of benefit to the structure. The rest of the slab consists of a lightweight aggregate concrete,” says Abeo’s Technical Manager, Morten Rasmussen, and continues:

“In this way, we exploit both the strength of reinforced concrete and the low weight and fantastic insulating properties of lightweight aggregate concrete. The result is a light and flexible deck that can span a longer distance and is cheap to transport and install. In addition, the combination with Leca LWA concrete provides exceptionally high sound and fire insulation properties.”



The flexible SL-Deck was the optimal solution for the crooked angles and narrow space for the build.



Left: **The building was awarded** «Best residential development» by MIPIM in 2015.

Right: **A mock-up of the SL-Deck** showing the built-up of the LWA concrete in the slab.



Suitable for residential projects

In Denmark, Abeo has delivered SL-Decks for a wide range of different projects, among others NCC’s project «Krøyer’s Square», with COBE as architects, which won a MIPIM-award in Cannes for the «World’s Best Residential Building Project», and also Skanska’s «Øresund Beachpark».

The SL-Deck has been developed to bridge the gap between standardized precast slabs and more flexible filigree and in-situ slabs in primarily residential projects, e.g. SL-Decks can have balconies mounted directly

to the slabs and enable numerous built-in solutions such as cast-in installations for bathrooms. Furthermore, the SL-Decks provide highly effective sound insulation while their low weight properties enables production of up to 3-meter wide slabs, thereby significantly reducing installation costs.

International expansion

Approaching 100,000 m² installed in Denmark, Abeo has started licensing the SL-Deck to precast concrete producers outside Denmark.

Project details

- Project** Krøyer’s Square
- Client** NCC Bolig
- Architect** COBE, Vilhelm Lauritzen Architects
- Specifier** OBH Rådg. Ingeniører A/S
- Contractor** NCC Construction Danmark A/S
- Leca products** Leca LWA in SL-Decks



SUSTAINABLE HOUSING CONSTRUCTION USING LECA® BLOCKS FOR HOUSING INVESTORS

FINLAND Nuorisosäätiö (the Youth Foundation) has already utilised Leca® Blocks to build hundreds of rental apartments, as well as creating comfortable living environments reflecting the economic lifecycle.

Text: Sampsa Heilä

Photos: Thomas Lennartz / Weber & Sami Hämäläinen / Pro Film Ltd.

As a major developer Nuorisosäätiö, who develop purpose built rental apartments for first time buyers, consider their block apartment buildings to be competitive and economic based on their construction and low maintenance costs. The most significant new apartment building project comprises of 140 apartments in Pellaslaakso, Espoo, which is also the largest block project in Finland.

Low-maintenance costs

“It’s even quicker to build apartment blocks using Leca Blocks than elements, as the delivery times for elements have been extended greatly, whilst Leca Blocks can be received directly from existing stock. A quicker completion time is an advantage, both for tenants and for Nuorisosäätiö as the developer. This project will recoup its costs very quickly.” says Raul Pihlflyckt of Nuorisosäätiö, Project Manager for the Pellaslaakso project.

Modern, polyurethane insulated Leca Blocks are a great material for apartment developments as they are easy to maintain through having fundamental properties such as being moisture free, energy efficient and durable.

“The apartment blocks and their rendered façades are functional and good looking, whilst maintenance costs are also reasonable.” says Raul Pihlflyckt.

“From the very beginning, we have developed all our housing projects with Leca Blocks in mind through purchasing land, organizing permits and plans, and managing the construction. The housing investors’ organization have been interested in the apartment block project and our approach in building and designing them.” says Jukka Lehtonen, Development Director at Basso Building Systems Oy.

Successful Co-operation

According to Raul Pihlflyckt, Nuorisosäätiö has been pleased with Basso’s building and design approach for this project.

“Basso-Kivitalo knows its business. For us, it has been an effective approach for them to take complete control and responsibility for the apartment projects. We do not have to get into the details of contracting agreements and, for getting involved in ordering thermal heating, separately from everything else. Basso’s way of working in the construction of blocks of apartments makes it all much easier for us as a client.” says Pihlflyckt.



Modern, polyurethane insulated Leca Sandwich Blocks were used in the outer walls and the gangways were made of Leca Shuttering Blocks.



The colorful facades stand out very well from its environment.



Leca facts

Facility Apartment blocks

Location Espoo, Finland

Developer Nuorisosäätiö

Main Contractor Basso Building Systems Ltd.

Architect Architectural firm Antti Heikkilä Ltd.

Leca products Leca Lex Foundation blocks, Leca Design Sandwich blocks, Leca EasyLex, Leca shuttering blocks, Leca Sandwich shuttering blocks

So far the largest Leca Block project in Finland was completed in 2017.



TROUBLED BRIDGE SETTLEMENT ISSUES RESOLVED

UNITED KINGDOM

Leca Lightweight Aggregate (LWA) fixes a major bridge defect in the UK thanks to its lightweight, free draining and speed of installation properties.



Leca LWA provided the essential ingredient in resolving a serious bridge engineering issue.



Leca LWA was considered to be one of the ideal materials, as it only weighs a quarter of the weight of traditional soils.

Leca facts

Facility Newlands Bridge UK

Application 4400m³

Consulting Engineer Coffey Geotechnics

Contractor: PBS NE LTD

Leca products 10-20mm

Troubled Bridge

Newlands Bridge was constructed in 1992 and carries the A645 link road over the River Aire and forms part of the Drax link road between Goole and the Drax Power Station.

After the bridge and approach embankments were built, a number of defects developed in the structure and the road pavement. The

approach embankments had settled substantially. Due to the excessive settlement (up to 750 mm), movement joints were closed, bearings were distressed, and cracking of the abutment patching was observed.

Depth

“The depth of excavation required to achieve the required decrease of effective overburden pressure

depended on the unit weight of the lightweight fill material to be used. Leca Lightweight Aggregate (LWA) 10-20mm was selected as a lightweight fill.” Explains Sangmin Lee Senior Geotechnical Engineer at Coffey Geotechnics.

The challenges faced by the engineers relating to the overburden pressure was resolved thanks to the

fundamental properties of Leca LWA. Particularly when constructed over weak sub-soils or voids, this method has been proven to cut overall construction costs considerably. Key fundamental properties of Leca LWA include being lightweight in nature, reducing the pressure to the rear walls, free draining advantages, natural compaction, speed of installation and the reduction in construction

time – thus reducing periods of road closures in a busy area of the UK.

Ideal Material

Sangmin Lee Senior Geotechnical Engineer at Coffey Geotechnics says that “Leca LWA was considered to be one of the ideal materials, as it only weighs a quarter of the normal soils. It also has an advantage in construction, as it is similar to granular mate-

rials and is easy to handle.”

Job Done

Since the completion of the remedial works, there have been no signs of bridge movement and no embankment settlement has been reported. Leca LWA provided the essential ingredient in resolving a complex bridge engineering issue.



LECA® HOUSE IN WIELKOPOLSKA

POLAND More and more private investors tend to decide to build their houses with expanded clay. One of them is Joanna, who is sharing her experience with us on the way she built her house using Leca® Lightweight Aggregate (LWA) technology.

Why expanded clay?

– I have always dreamt of having a house built of natural materials, and I have always tried to live a healthy, environmentally-friendly life in harmony with nature. Prior to project commencement, I did some research on the available building technologies from the point of view of my own needs and expectations, and I took some financial considerations into account as well.

Your first encounter with expanded clay?

– In the geotechnical industry where I am employed, I have been involved with expanded clay a number of times, and I was aware of the wide range of possible applications. When I found out about the technical aspects of this

building material and made my house building cost estimates, I took a decision to build it with expanded clay.

How did your building contractors cope with it?

– The building team we hired to build our house was recommended to us as a very reliable one. And, despite the fact that it was their first encounter with expanded clay blocks, they faced no difficulties at all while building walls using this kind of material. The blocks were delivered in full on time with HDS trucks, so there were no unloading problems. The initial stage of the building works (brick and block structure) was completed incredibly fast. It only took two years for me to move into a beautiful brand new house.

Did you face any problems?

– While building the house, there were no problems with the expanded clay. Our building contractors recommended this material; they stressed that it did not cause any difficulties for them. On the contrary, these lightweight blocks made their work easier. Our neighbours, on the other hand, who still seem to be accustomed to red brick or hollow brick houses, would ask us with curiosity: “Oh dear, what kind of material is that?”

What are your heating costs?

– On the whole, I am satisfied with the building technology I have chosen. Our house is gas-heated using a condensing boiler. Additionally, we have a fire place with water jacket, and a water

A house built of natural, ecological materials was Johanna's dream.



Joanna works as a geotechnical engineer and a mother.



The initial stage of the building was completed incredibly fast.

heating system using evacuated tube solar collectors. Our total monthly heating costs for a 230 m² house, even in very cold winter conditions, have never been more than 100 Euro (420 PLN).

– In the Winter time, we keep the temperature at 22-23°C. We like our house to be warm. We have noticed that our house tends to lose heat very slowly. For instance, at night, when wood is still burning in our fire place, there is no need for the gas-fired stove to be switched on all through the night. In the Summer, on the other hand, when it is very hot, it feels quite comfortable inside the house. Although we have many windows on the southern side, it is always pleasantly cool inside.



The Leca® Advisor carried out temperature checks The building was checked using infrared camera inspection. Tests were performed both indoors and outdoors. The temperature of the Leca BLOK hollow brick walls was uniform over their entire area, and wall corners showed no changes in temperature either. Generally speaking, the expanded clay concrete used to build our walls turned out to be a very effective material in terms of temperature stability, which, we hope, will provide for cost-effective heating of the building, even in extremely cold periods.

Leca facts
Building A one-family house
Location Wielkopolska, Poland
Products Leca BLOK and hollow bricks
Leca advisor Tadeusz Kaczmarek



The finished Leca LWA lightweight filling and layers on it.



Leca® LWA is delivered quickly and directly to the desired location.

THE MOST ECONOMICAL SOLUTION WITH LECA® LIGHTWEIGHT AGGREGATE FILLING

Text: Sampsa Heilä
Photos: Sampsa Heilä

FINLAND In Klaukkala, Nurmijärvi, Leca® lightweight aggregate (LWA) has been used in the improvement of the Klaukkalantie road and in the prevention of settlement for the site of a new travel centre.



The layer of Leca LWA is easily compacted by driving over it with a tracked excavator.

“The project uses almost 8000m³ of Leca Lightweight Aggregate (LWA) as a lightweight filling for improving the Klaukkalantie road, as well as the construction site of a new travel centre.” says Site Manager Mikko Parkkinen, the project’s main contractor for Graniittirakennus Kallio Ltd.

Precise work and planning

Leca LWA is delivered to the worksites from the Kuusankoski factory in large

loads up to 140m³. The Leca LWA is levelled on location, using machine controlled excavators to obtain the predefined layer thickness.

“We use a machine control with all excavators, as it speeds up and refines the work.” says Mikko Parkkinen.

“The thickness of the Leca LWA layer varies in different sections from 30 centimetres to a full metre. At any point, the machine operator can view the lower and upper surface of the Leca LWA and other layers accurately through a 3D model on the cabin display screen, therefore measurement rods are no longer required.” states foreman Mikko Teikari from Graniittirakennus Kallio.

According to Teikari, the phases of ground work by heavy machines need to be carefully planned, as the landscape for the project was pre-

viously fields with a bedrock about 25m down with mostly soft and compressible clay.

Flexible material

Geoplanner Minna Koistinen from Ramboll Finland Ltd. states that Leca LWA has been used to manage settlement in areas that do not require heavier and more expensive foundation reinforcement methods, such as pile slabs or stabilisation.

“Leca LWA is particularly well suited to geotechnical construction, in areas where support is required for large fields or road construction.” says Minna Koistinen.

Leca LWA is used, for example, at the site of the Klaukkalantie road improvement and in the adjacent transitional structures of pile slabs.

According to the Head of Department

at Ramboll, Kari Mönkäre, a particular challenge of the site related to its very poor soil conditions and high-grade infra construction to the centre of Klaukkala.

“A great deal of coordination of the various work stages at the worksite is required, but at the same time, in geotechnical planning, one must always be ready to make changes to the plans, if necessary. Leca LWA is a flexible material that makes it easy to make the necessary changes to the designs and implementation as the project progresses.” says Kari Mönkäre.

Leca facts

- Facility** Klaukkalantie road and travel center
- Location** Klaukkala, Finland
- Main contractor** Graniittirakennus Kallio Ltd.
- Specifier** Ramboll Ltd.
- Leca products** Leca aggregate 4-32 mm



LECA® STOPS TRAFFIC NOISE IN SANDEFJORD



After removing the top layer, a geotextile is installed before laying the Leca Lightweight Aggregate in it. The geotextile is covering the Leca like a pillow that is finally covered with heavier masses and soil.

Leca Lightweight Aggregate is installed in embankments in order to achieve noise reduction for residents in the nearby residential area. The light weight property means that it does not create settlements in the area



Jørgen Andersen, construction manager at Kaare Mortensen AS

Leca facts

Project Ringveien in Sandefjord, Norway

Project owner Statens vegvesen

Contractor Kaare Mortensen AS

Leca products Lightweight Aggregate

NORWAY When the missing stretch of Ringveien in Sandefjord was finally being built, Leca Lightweight Aggregate was used to build noise barriers for the residential areas.

The small stretch of road that Kaare Mortensen AS is currently developing, has been a topic in Sandefjord since the 1970s. The stretch is the last

missing piece on Ringveien around Vestfoldbyen. The construction is already well under way. The noise embankment which sits next to the residential area that is located along the road is the first sign that the long-awaited road is now becoming a reality.

“To protect the residential area from noise from the new road,

large embankments have been built. If we were to use traditional materials, the weight would pose a serious problem due to the bad ground conditions. Therefore, we chose to use Leca Lightweight Aggregate (LWA) in the core mass.” explains Jørgen Andersen of Kaare Mortensen AS.

The Vestfold contractor has been

given the task of building the road and the embankments. On the other side of the road there is also an embankment to protect the surrounding cultural landscape.

1500 cubic meters

A total of over 1500m³ of Leca LWA is used. First, the top soil is removed. Then the Leca LWA is installed and wrapped in geotextile. On top the

embankments are covered with clay and soil before planting.

“The alternative to Leca LWA would have been to use clay in the embankments and natural stones for the road. But there was a risk that the bad subsoil would move because of the load. The light weight nature of Leca LWA reduces the risk of settlements. The construction of the road is about the

same as for the embankments.” he says.

When work on the road itself starts, it is estimated that about 2000 m³ of Leca LWA will be used in the structure. Around 300 meters of road will be built and 700 meters of new walkway and cycle paths. The road opens next year.



The Hyvinkää hospital extension will include a 2400 m² Leca LWA roof.

Leca Roof Covering Blocks are lifted beside piling place from which they are quickly installed.



Jouko Partanen (left), Leca Finland's experienced building expert and S-Katto's Pavel Nikolajev (right) at Hospital of Hyvinkää's roof site.

A RELIABLE ROOF FOR A HOSPITAL WITH LECA® LIGHTWEIGHT AGGREGATE

FINLAND The expansion of Hyvinkää Hospital will include a Leca® Lightweight Aggregate (LWA) roof covering up to 2400 m². Leca LWA also provides ventilation to the hybrid roof and assists the forming of inclines to roof drains.

Text: Sampsa Heilä
Photos: Sampsa Heilä & Jouko Partanen

Architectural Studio Kujala & Kolehmainen Ltd is responsible for the main planning of Hyvinkää Hospital's expansion project.

"The architectural design and a light rendering surface make the building look very impressive. The foundation of the building resembles a large letter X, where all the common services have been centralized within the central part of the frame," says Construction Architect Juhani Kujala.

"In the hospital building, it was important to ensure, in addition to

a highly functional premises, implementation of health and safety compliant structures were considered with the structural designer," says Juhani Kujala.

Easy to build

The main contractor for the hospital expansion is Peab Ltd.

"The building has a Leca LWA roof covering about 2400m². The roofing contract was implemented for us by S-Katto Ltd, who have great experience in making Leca LWA roofs," states the correspon-

ding Worksite Manager Petteri Laapio from Peab Ltd.

The roof was designed as a hybrid with 170 mm of polyurethane placed below a layer of approximately 550mm of Leca LWA.

"It was simple and easy to make the roof and produce the inclines from Leca LWA, as well as making the waterproofing base from light aggregate concrete roof tiles," says Petteri Laapio.

"We can almost complete a roof

covering of about 200m² in one go. We install the polyurethane insulation on the day before the delivery of the Leca LWA, which takes 4-5 hours. It then takes about nine hours to place the Leca LWA and roof tiles. The Leca LWA deliveries have arrived as planned, and the work has progressed well," says Pavel Nikolajev from S-Katto Ltd.

Safe solution

The Leca LWA layer also provides good roof ventilation, allowing possible moisture to be released from the eaves. It is especially important

for the hospital that the Leca LWA roof is a safe solution in terms of both moisture during working hours and during the lifetime of the building with equal importance placed on healthy indoor conditions.

"The frame depth with an expansion of 14 meters does not require low pressure fans, but the ventilation works well under the influence of wind pressure from one eave to the other. The bitumen membrane acting as a vapour barrier under the Leca LWA layer also serves as a temporary water barrier during the

installation work," says Area Sales Manager Jouko Partanen from Leca Finland Ltd.

Leca facts

Facility Hospital of Hyvinkää

Main contractor Peab Ltd.

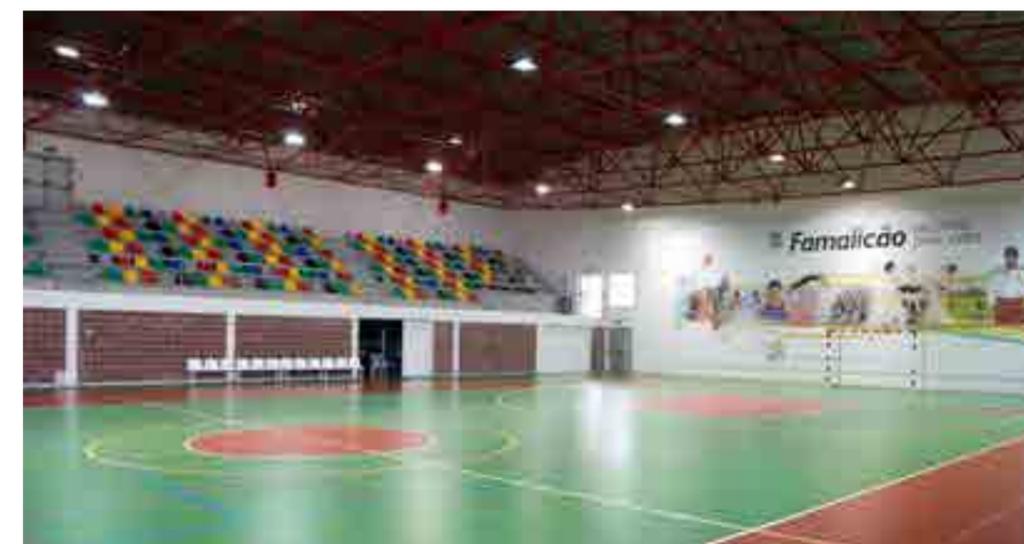
Roof contractor S-Katto Ltd.

Architect Architectural Studio Kujala & Kolehmainen Ltd.

Leca-products Leca LWA 8-20 mm, Leca Roof Covering blocks



COMFORT AND AESTHETICS IN ONE BLOCK



Soundconfort Leca is a lightweight block of Leca Lightweight Aggregate (LWA) with acoustic absorption, specially designed for use in school buildings, sports pavilions or acoustic barriers.



PORTUGAL Acoustic comfort and moisture are two major challenges in sports buildings. In Terras de Vermoim, the solution was the use of the Soundconfort Leca block in the cladding of the walls of the Municipal Pavilion.

Soundconfort Leca® block: the right choice

The Municipal Pavilion of Terras de Vermoim, in Vila Nova de Famalicão, Portugal, is used by schools and amateur groups to practice various sports activities. Pereira Magalhães, the architect responsible for the design, aware that the “common problems of these buildings are the acoustic conditions and moisture”, sought advice from professionals who were able to present him a viable solution.

The recommended choice was the Soundconfort Leca block: a lightweight block of Leca Lightweight Aggregate (LWA) with acoustic absorption, specially designed for use in school buildings, sports and multipurpose pavilions or acoustic barriers. Its cut-out structure, combined with the characteristics of the Leca concrete, allows the reduction and control of noise levels, promoting greater acoustic comfort. All these characteristics combined with an impeccable aesthetic - it is

a block with an uncoated finish - contributed to the success of the construction.

Exceeded Expectations

“We bet on this solution, in the sense of absorbing the sound and in order to make the space more comfortable. We also chose this block for its pleasant aesthetic texture. And, actually it created a great result! People feel good in the pavilion. It has exceeded expectations!” says Architect Pereira Magalhães.

José Machado, responsible for the maintenance of the building, corroborates and confirms that “there is no noise as in other pavilions. This has perfect conditions and all the people

who visit it, realise that in terms of acoustics it is a different pavilion.”

In addition to the highlighted features, the Soundconfort Leca block

also offers other advantages such as: reduction of maintenance costs, quick and easy application, good mechanical strength and excellent fire resistance.



José Machado, responsible for the maintenance of the building



Pereira de Magalhães, architect responsible for the project

Leca facts

Client Municipality of Vila Nova de Famalicão

Architect Pereira de Magalhães

Products Soundconfort Leca Blocks



Text: Sampsa Heilä

Photos: Sami Hämäläinen / Pro Film Ltd, Nora Lamberg & Sampsa Heilä

INDIVIDUAL SMALL URBAN HOUSES WITH LECA® BLOCKS

FINLAND A magnificent townhouse complex was built in Helsinki to accommodate eight families. The buildings were constructed using Leca® Blocks, opening out towards the surrounding landscape in a fanlike arrangement.

In the year old detached house's spacious living quarters, a floor-to-ceiling window wall opens onto the magnificent park view.

"The architect has succeeded very well in fitting individual homes for eight families, along with their own small yards, into a compact plot, so that the buildings form an integrated and aligned entity," says a resident.

Why Leca® Blocks?

The families chose 380 mm thick Leca Sandwich Blocks as the main frame material from a range of available frame options on the market.

"One important factor was that the Leca block is slim in relation to its good thermal insulation properties. For example, fire and moisture

safety, good sound insulation and air tightness, as well as flexibility in production and logistics – clear advantages in block construction," the resident explains.

The complex is made up of four detached and two semi-detached buildings designed by Architect Hannes Häkkinen.

Compact urban building

"At this location, the desired architecture would have been very difficult and expensive to implement, for example, as a wood construction. The advantages of a stone house include its longevity, maintenance free properties and very good resale value," says Häkkinen.



The complex formed by four detached and two semi-detached buildings was designed by architect Hannes Häkkinen.



“Leca Sandwich Blocks have an effective U-value, relative to the wall thickness and, therefore, it has been possible, when creating the compact plots in an urban family house construction, to obtain about 10 cm additional space between the buildings.” says Tero Kallio, Managing Director of Stoneware Ltd., and foundation and frame contractor in the project.

“We concluded that the benefits provided by a Leca block construction would be more cost-effective and more flexible than with pre-fabricated elements. Everything went well with Leca Blocks. This is compact urban living in a great location with such a spectacular connection to nature that, at times, it seems to be unreal.” says a resident of his own family’s experiences of their first year of residence.



A floor-to-ceiling high window walls opens gorgeous park view.



The families chose 380 mm thick Leca Sandwich Blocks as the main frame material.

The houses are located on the edge of a magnificent green belt.

Leca facts

Facility Urban townhouse complex

Location Helsinki, Finland

Frame contractor Stoneware Ltd

Architect Hannes Häkkinen

Leca products Leca Basic blocks, Leca Sandwich blocks, Leca partition wall blocks



HISTORIC SQUARE CAREFULLY RESTORED

Prins Jørgens Gård (Prince Jørgen's yard) in Copenhagen, Denmark, is a historic site named after the brother of the Danish King Christian the 5th. In 1670, Christian the 5th ordered the demolition of an older building and the construction in its place of a stable building for his brother's use.

The stable was demolished a long time ago, and today you can enter Christiansborg Palace, Christiansborg

Castle Chapel, Thorvaldsen's Museum and the Danish Supreme Court via the square.

Unique geotechnical conditions

The geotechnical conditions of Prins Jørgens Gård are special because the square is situated partly on Slotsholmen (The Castle Islet), partly on islets of more than 200-year-old waste and partly on old marine deposits.

These conditions and increased traffic loads led to the restoration of the site in 1984 because the surfacing of the square showed signs of settlement and cracks, and it had not been renovated since 1926-28.

A load compensation solution using Leca Lightweight Aggregate (LWA) 10-20 was chosen for the restoration of the square. Approx 1 metre of the surface was dug out and substituted

DENMARK *The restoration was initiated due to signs of settlement and cracks in the pavement. Leca® lightweight filling was part of the lasting solution!*

with 30-60 cm Leca LWA. The layer thickness was determined on the basis of the subsurface conditions and the expected traffic load.

A symphony of materials

On top of the Leca LWA a 20 cm reinforced concrete slab has been cast on geotextile. The construction has been finished with 40 mm cement-stabilised gravel and granite from the Danish island of Bornholm.

Right: «The restoration of the square were thorough»

Left: Today the square is widely used and houses among others the beautiful Thorvaldsen's Museum.

Text: Jesper Ketelsen/Leca Denmark
Photo: Lasse Bech Martinussen

Leca facts

Client The Danish Ministry of Transport, Building and Housing

Contractor Zacho Lind

Geotechnical solution The Danish Geotechnical Institute/GEO

Architect: Wohlert Architects

Product 1,430 m³ of Leca 10-20 mm was used for the project.



As a **Lightweight Backfill** the Leca LWA was placed within the Ramwall system

STABILITY FOR THE LONDON RAIL

UNITED KINGDOM The use of Leca® Lightweight Aggregate provides the solution for a 200m London Rail embankment with limited access on a busy rail line.

Engineers for Transport for London were tasked with providing the structural stability and lightweight solution for one of the busiest rail lines in London. Leca Lightweight Aggregate (LWA) was installed as a lightweight backfill which was placed within a RAM WALL system, stabilising the embankment walls along a 200m stretch of the Acton Town to Chiswick Park London Underground.

Embankment Instability

Phil Richardson of Innovative Support Systems Ltd. explains that “Deterioration of the embankment was compromising the stability of the wall and it was deemed necessary to re-grade the slope to reduce and transfer weight directly above whilst at the same time creating a walk way to access the line-side services.”

Under Pressure

The problem facing the Transport for London was that the railway embankment was situated directly behind residential property in a busy area of London and alternative aggregate was proving to be dangerously problematic due to the heavyweight pressure – causing potential major long term structural issues. Leca LWA’s



Stabilizing the embankment walls along a 200 meter stretch of the Acton Town to Chiswick Park for the London Underground.

Deterioration of the embankment was compromising the stability of the wall alongside a busy station.

fundamental lightweight properties solved this issue with ease.

Systems UK.

“In order to accomplish this in an exceptionally constrained site with very limited access. RAM WALL was used alongside Leca LWA which was selected because of its ability to be constructed in difficult locations to a variable geometry.” Explains Phil Richardson of Innovative Support

Thanks to Leca LWA’s free draining and lightweight nature, the facility to be pneumatically delivered, and the ability to also be delivered in small lightweight bags – Leca LWA provided the perfect innovation and solution to this rail issue.



The railway embankment was situated directly behind a residential area in a busy area of London.

Leca LWA provided the perfect innovation and solution to this rail issue



Leca facts

- Client** London Underground
- Location** Acton Station, London
- Contractor** Clancy Docwra
- Consultant** Amery Construction
- Application** 1700m³
- Leca products** 10-20mm



EFFICIENT INSULATION AND DRAINAGE OF OLD FOUNDATIONS

NORWAY There are tens of thousands of older single family houses in Norway where the drainage has expired and that would also benefit from additional insulation. Such as this old house in Drammen. When the old wall was to be drained and insulated, pneumatically blowing of Leca Lightweight Aggregate (LWA) was the best option.

The house in Drammen is old and the foundation is a dry stacked stone wall. When the owner wanted to improve the drainage and add insulation to the wall, they faced many challenges.

“There was no mortar at all, the wall was only dry stacked. When we began to work on it, the clay poured out.

We chose to grout it, without any rendering. Thus it became challenging to install the insulation properly,” says Per Kåre Hilleren of HI-MA AS, who did the groundwork.

Blown in place

The house is on a slope and hard to access using machines. At the same

time, the contractor was afraid that the rock masses would damage the geotextile and plastic sheets.

“The detached house was affected by moisture intrusion and vermin. So it was necessary to do something. We wanted a solution that both insulated and drained the foundation,”

he says. The Leca LWA was pneumatically blown in place with a hose, a method that is very efficient. In less than half an hour, over 35 cubic meters of Leca LWA was pneumatically blown in place where the contractor wanted it.



Leca LWA gives excellent drainage and insulation

The house was affected by moisture intrusion and vermin. The stacked wall was grouted before Platon plastic sheets and Leca LWA was applied

In less than half an hour, over 35 cubic meters of Leca LWA was blown in place



Per Kåre Hilleren in HI-MA AS.

Project details

Project Single family house in Drammen, Norway

Contractor HI-MA AS

Leca products Leca Iso 10-20



SUSTAINABLE AND DURABLE WITH THE LECA® SKALMUR CONCEPT

SWEDEN The Leca® Skalmur concept makes the working process quick and easy - something which Göteborgs Fasadputs AB benefits from utilising. We visited the construction site of Kv. Tjädern in Kungsbacka when the work was still ongoing...

Text: Malin Pumpkin
Photos: Wilda Nilsson



The mason from Göteborgs Fasadputs AB manually drags the mortar box along the line of Leca Block 90. We are on the fourth floor of one of the two houses being built in Kungsbacka outside Gothenburg. Anchor elements are angled and one after another the blocks are lifted into place. In the

next masonry band, reinforcement is put in place before the procedure is repeated.

Fredrik Dahl is the company's CEO and he appreciates the shell wall concept.

"It is a long-term solution for the

contractor and for the builder. For those who work hard with the products, it is an advantage that they are easy to use. Ergonomic building concepts create obvious benefits." says Fredrik Dahl.

The working environment is extre-

mely important at a construction site, and although conditions are constantly improving, there are still some factors that can make work difficult for the employees in the long run.

Easy and very little waste

"Our builders enjoy getting a nice wall that's good to put rendering on. It is first great to get a straight wall and then it's fun to begin work on. Of course, the first masonry band must be done properly, but with a stable foundation you can build high and quickly." says Fredrik Dahl.

As in all construction, you can really suffer throughout the project if you don't do a proper job from the start, in this case when you lay the first stone. If done correctly, the result becomes a durable facade that is not sensitive to heat, cold or moisture.

"Then there will be very little waste at the end, which is good for us and good for the environment." says Fredrik Dahl, and continues:

"We like to be at the forefront, to try new solutions and provide feedback and constructive criticism. Our dialogue with Leca is good and we wouldn't mind taking part in more of these kinds of projects."

Simplified work process with the shell wall concept

With Leca Skalmur, it is possible to work with a long term view, creating solid buildings and credible stakeholders. The concept is based on recognised and proven building materials, it is a good foundation for rendering and the result is a facade that lasts a very, very long time.

In order to keep to the timetable, it is important that the work is done smoothly. The Leca Block has a tongue and groove design that makes fitting of the masonry easier, and with the shell wall concept, the different working teams can also work more independently, as the concept reduces the interdependency between different crafts. The carpenters can do their work and then the builders can do their part independently of the carpenters, as there is an air space between the wooden wall and the masonry. Less coordination is required and the work process becomes smoother.

The houses in Kv. Tjädern are built with a steel frame and prefabricated concrete partition walls. Carpenters started by making in fill walls and then the masons followed. In total, the wall will be 40 centimeters thick. From the home owners' association's perspective, the choice of building material facilitates future management. The façade becomes very durable and the maintenance needs are small in the process.

Close cooperation between material supplier, builder and contractor

The work has gone smoothly for all those involved, and together, the various parties have gained a good working method.

"The cooperation has worked very well." says Fredrik Dahl.

On the fourth floor of one house today's last Leca Block is fitted into place. The sun is setting in the sky and it's time to pack up. Tomorrow the façade of the first building will be rendered.



Less need for coordination thanks to the design of the concept

Leca facts

Object Kv. Tjädern

Location Kungsbacka

Builder Skogsalléns Fastighets-projektering AB

Contractor Ivar Kjellberg Byggnads AB

Sub contractor Göteborgs Fasadputs AB

Architect Klarblå arkitektkontor AB

Designer Epsilon Byggkonsult AB

Product 1200 sqm Leca Skalmur concept (Leca Block 90, Leca Skalmur Kramla, Leca Skalmur Beam and Leca Skalmur konsol NPL)



ARLITA® LIGHTWEIGHT FILLER USED IN THE METRO STATION AT ATLETICO MADRID'S NEW WANDA METROPOLITANO STADIUM

SPAIN In a large city such as Madrid, utilizing Arlita® lightweight filler for tunnels and subway stations is commonly used to allow for an increased level of traffic circulation without increased overloads. Arlita® lightweight fillers support traffic overloads, improve drainage, and reduce the risk of flooding in the streets.

For a football stadium visited by more than 72,000 people every weekend, the access roads are essential elements, which must be designed with special care to avoid problems of both settlement and durability. If, in addition to this, they must cross old buried infrastructures such as those of the subway, the difficulty is multiplied. This is the case for Wanda Metropolitano, the new football stadium in Madrid, Spain, in which Atlético de Madrid play their home games.

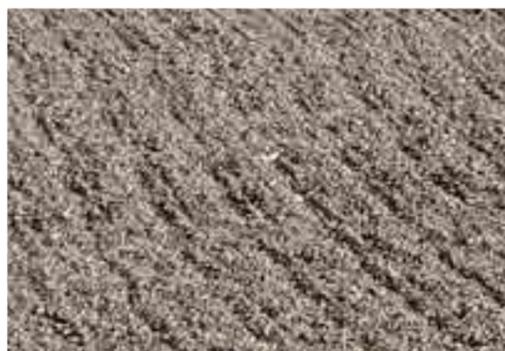
Since the 1990s, the use of Arlita as a lightweight filler has been a Metro Madrid standard. It has been used in many construction projects to protect buried structures from overload, due to its mechanical properties including resistance to difficult weather conditions, resistance to chemical attacks and its minimal weight (275 kg/m³). These types of solutions have been used by all big Spanish construction companies.

Arlita is an important partner in facing the challenges that appear in big cities in building new infrastructures and roads that cross urban areas with existing tunnels, parking and old building foundations. It allows for the execution of solutions that improve the quality of life and the transport options of the citizens. **The rapid delivery and installation was very important in the evolution of the project.**

The project that has developed FCC for the City of Madrid in the urbanized area near the Wanda Metropolitan Stadium required improved access to the compound, with the creation of new roads from Arcen-tales street, which inevitably crossed the tunnels and the metro station of «Estadio Metropolitano».



Leca® products are sold in Spain under the name Arlita®. Arlita is a trademark belonging to Leca International



Arlita facts

Client City of Madrid
Main contractor FCC Construcción S.A.
Installed volume 1.270 m³
Arlita products 10/20

Arlita after the compaction.



Final stage of the project.



Project manager Jaran Wood (Leca International) and PhD candidate Vladimir Hamouz (NTNU) poses in the crushed Leca during the construction of the water management test site. The field is situated at Høvringen by the Trondheimsfjord in Norway.



The fine Leca water detention material was levelled by plank and was not mechanically compacted.

During the next two years, data will be gathered from three, heavily instrumented test fields.

LECA® IN GREEN ROOFS CAN REDUCE STORM WATER AND FLOOD PROBLEMS

NORWAY In recent years storms, extreme weather and flooded streets have become commonplace. The city's piping systems aren't sufficiently efficient when the water pours in huge amounts in a short period of time. The storm water floods out into the streets and urban areas and accumulates pollution before it ends up in the drainage pipe or the sea.

Green roofs with Leca Lightweight Aggregate (LWA) can help reduce such flood problems. They have a great water detention effect, reducing drainage intensity and delay and retain water.

Klima 2050 is researching the effect
Klima 2050 is a Center for Research-Driven Innovation (SFI), headquartered in Trondheim. SINTEF Byggeforsk is hosting and managing the center. For a

long time, the solution to get rainwater away from the roof has been to lead it into gutters and pipes down to ground level. One of Klima 2050s research projects is how we can slow the water in its path to street level.

"The traditional method of storm water management has had two major challenges with climate change: there will be more extreme rainfall that overloads water and wastewater networks

in a short period of time. The second challenge is densification in urban areas and thus fewer natural areas that drains water." says researcher Berit Time in SINTEF.

The research project Høvringen can provide the answers

Planted roofs help to slow down the drainage by absorbing rainwater and releasing it slowly. The research project is being carried out at the Høvrin-

gen wastewater treatment plant in Trondheim. Here the roof is divided into three lanes of 90 square meters each to test three different roof solutions: Leca, planted sedum roof and plain roofing.

The experimental field is equipped with its own meteorological measurement station which measures temperature, wind and precipitation, and an advanced system for measuring the amount of water flowing into the drain from each of the three experimental fields. The station measures the entire throttle from drip to extreme rainfall. But its mainly the short-lived, intense rainfalls the project wants to provide solutions for.

With the project at Høvringen we will finally get good data on how water drainage on so-called blue-green roof solutions can be delayed. Concrete

knowledge has so far been inadequate.

Three different test fields

The first field that the Skjæveland Group and Leca Norway have created is a roof with a 20 cm delicate Leca LWA under permeable cover (coating stone), with wide joints filled with Leca LWA so that the water can filter through.

The other field is green and planted with succulent sedum that is widely used on green roofs. The third field has a traditional asphalt roofing. Numbers two and three are used as reference roofs.

Can already see results

"It looks like the Leca LWA roof gives a significant water detention. The infrastructure is not dimensioned for large amounts of precipitation in a short period of time." says Per Møller-Pedersen, General Manager of Storm Aqua.





The placing of the permeable paving stones on the Leca is a part of the study.

“The project at Høvringen is a good example of how the cooperation in Klima 2050 makes it possible to develop solutions together. After getting the first results from Høvringen, Skjæveland Group has begun to produce a sample of a new type of coating stone that is easier and more suitable for roofs.” says Møller Pedersen.

Leca also cleans the water

The research findings can also be used to create storm water solutions in places other than roofs. Storm water is socio-economically stressful, because it becomes more expensive energy intensive to run waste water treatment plants.

“The material absorbs the water and deposits it gradually. In addition, Leca acts as a filter that removes contamination in sediments and loose nutri-

ents. The solution is used in drinking water treatment plants and sewage treatment plants. Part of the project is to look at the possibility of cleaning various types of overcrowding with Leca LWA.” says Project Manager Jaran Wood in Leca’s Development Department.

Could be applied to multi-use roof

Møller-Pedersen sees great opportunities in utilizing roof surfaces. The project at Høvringen shows how drainage currently used in industry and parking areas can also be used for roofing. There has been a lot of focus on clean green roofs, but he thinks the combination of roof where the gray is combined with the green and the blue can be an even better solution. Thus it will be possible to open new and attractive areas of use in urban areas.

“The traditional way to handle storm water is simply shifting water problems to a new place. We need to find solutions that allow for the most possible rainfall to be handled on its own site.” says Møller-Pedersen.

This is Klima 2050

Klima 2050 is a Center for Research-Driven Innovation (SFI), headquartered in Trondheim. SINTEF Byggeforsk is hosting and managing the center who among other things are researching long-term solutions for reducing societal risks related to climate change in the built environment as moisture protection of buildings, water management and blue-green solutions.

Klima 2050 is funded by the Research Council of Norway together with the partners in the consortium, where among others Leca Norway and Skjæveland Group are participants.



The gaps between the paving stone were filled with crushed Leca LWA to ensure unobstructed water flow.



The chosen Leca LWA was crushed and extra fine to maximize the effect of the water absorption in the material.

Leca facts

Project Klima 2050

Concept Testing of water detention on Blue Grey roof

Location Høvringen wastewater treatment plant, Trondheim, Norway

Construction by Leca, Multiblokk, NTNU and SINTEF

Product Leca 1,5-2,5 mm

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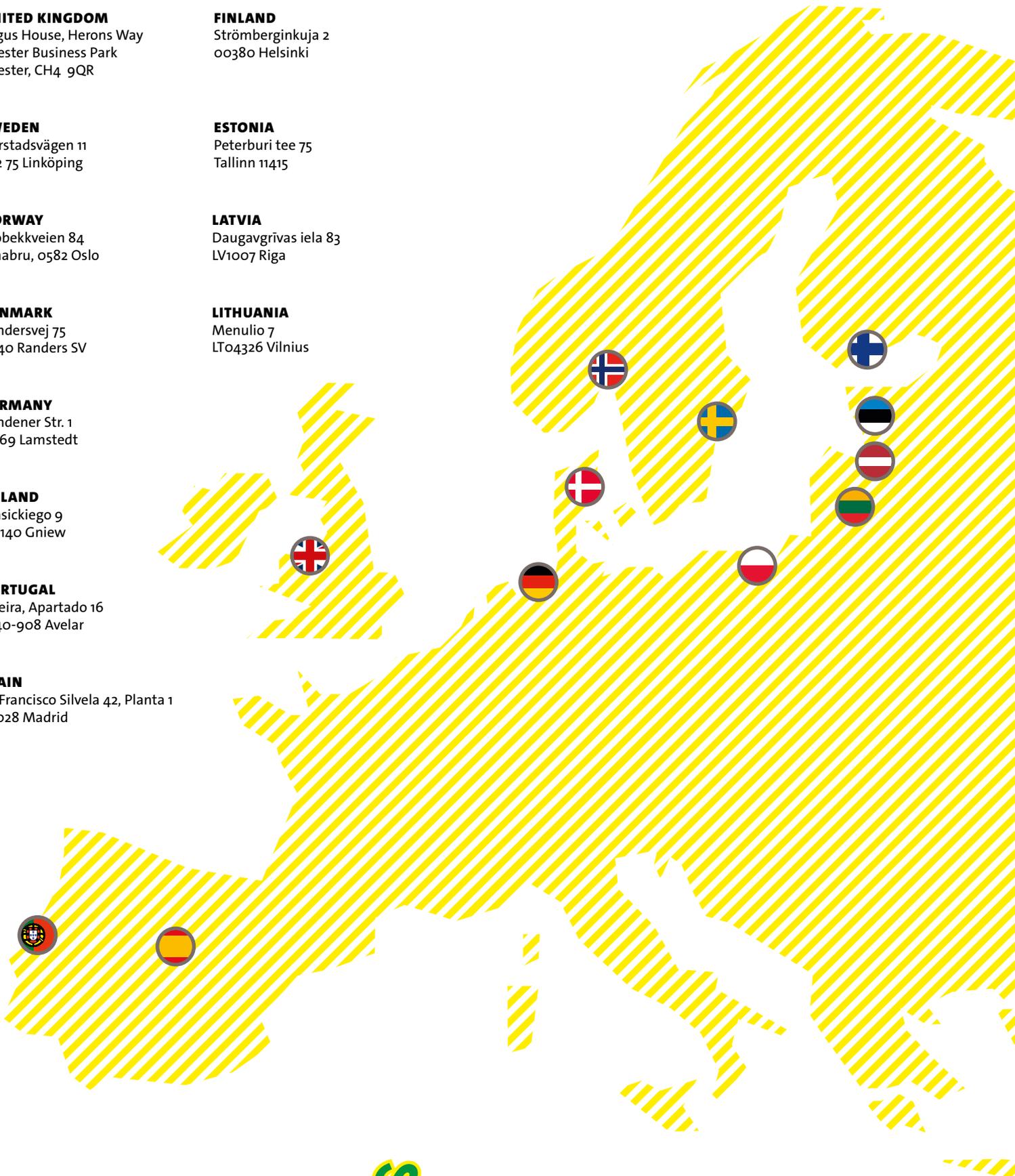
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