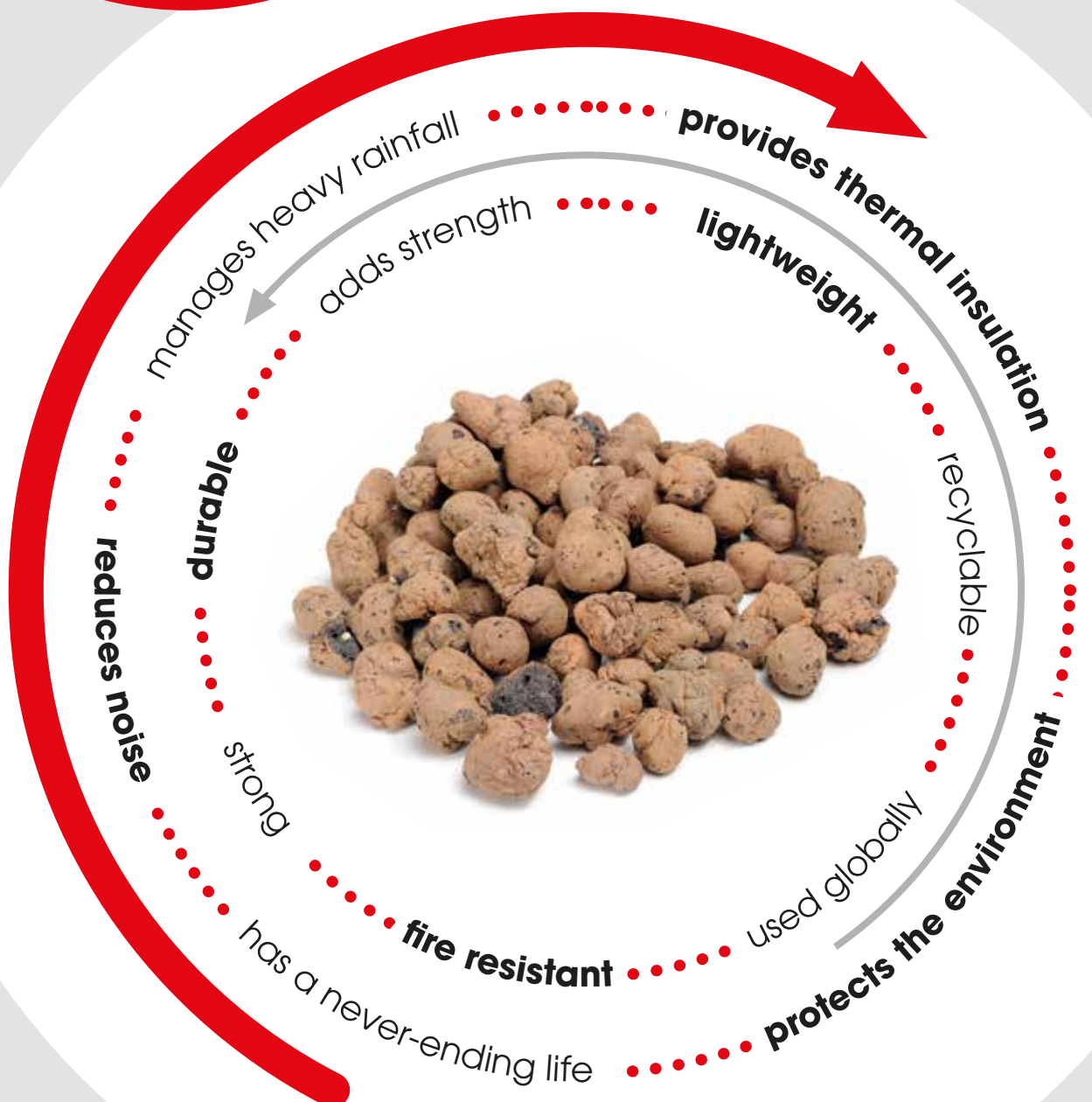


Expanded clay

A versatile material that's perfectly suited to the circular economy



Introduction

Expanded clay is a durable, natural material that is used in a wide range of applications, from lightweight structural concrete, to masonry blocks, road and railway embankments, insulation in buildings and infrastructure, as well as growing media for flowers and plants. It has excellent thermal, acoustic and fire-resistant properties, is long-lasting and endlessly reusable and recyclable. Many of its characteristics make it ideally suited to the circular economy, including:

- sustainable sourcing
- lightness
- durability
- reuse and recyclability

Sustainable sourcing

Clay is extracted from pits which are located close to manufacturing plants, and up to five cubic metres of high quality expanded clay are produced from each cubic metre of raw material. Because expanded clay is widely available and no rare elements are used, the industry does not contribute to the depletion of the earth's precious resources. Its low weight means fewer trucks and fewer journeys, thus reducing the carbon impact of transportation.

Clay pits are carefully developed to protect habitats and maintain biodiversity. Former pits are restored and rehabilitated to preserve biodiversity and create new natural habitats. As a result, no abandoned industrial zones are created by the manufacture of expanded clay.

Lightness

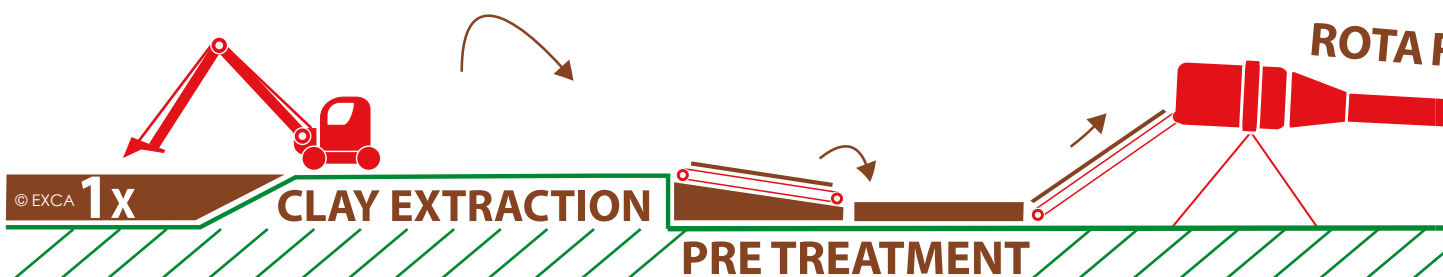
Expanded clay is a lightweight material with a volume which is up to five times greater than the natural clay it is formed from. Using expanded clay saves energy and reduces CO₂ emissions in the construction and transport sectors. Its low weight means trucks that transport it use less fuel than when moving heavier materials, reducing the carbon impact of transportation.

Durability

Expanded clay is a durable and stable product. None of its essential characteristics, such as its strength, thermal resistance or fire resistance, become degraded. It is robust and has good resistance to general wear and tear.

What is the circular economy?

The circular economy aims to **minimise waste** and make the most of resources through **reuse** and **recycling**. The goal is to keep resources in use for as long as possible, generating **maximum value** from them, before **recovering** and **reusing** as many elements as possible when they come to the end of their service life.



Reuse

Loose expanded clay can be endlessly reused, provided it is not contaminated. For example, expanded clay which has been used as a filling in roads and other projects can be recovered and used in new projects such as road fillings and bridge abutments. Expanded clay used as thermal insulation in roofs can also be reconditioned and incorporated into new roofs, or used for other purposes in new or existing buildings. EXCA's members are exploring a wide range of take-back and e-commerce options to improve the rate of reuse of expanded clay even further.

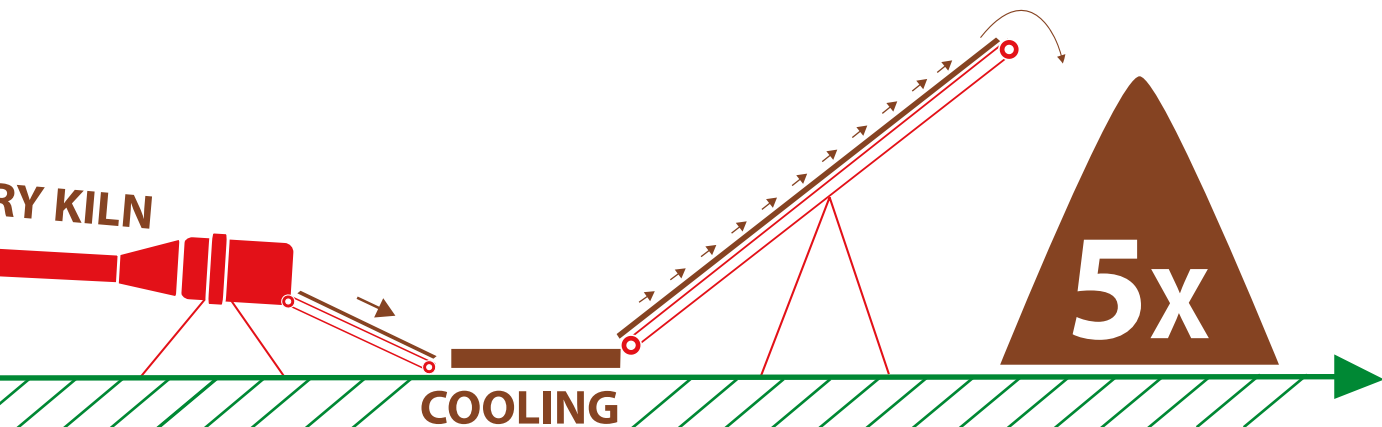
Recycling

Expanded clay is ideally suited to recycling, and the main requirement for successful recycling is good planning. Most recycled expanded clay comes from demolition sites, and recent EU guidelines on construction and demolition waste recommend a pre-demolition audit followed by segregation of materials on site. Recycled expanded clay can be used as a lightweight filling or backfill, or incorporated into new buildings. It is also increasingly used in concrete. Recycling reduces the need for new raw materials, offsetting the environmental impact of mining and blasting.

When products such as expanded clay blocks are manufactured, a small amount of scrap material is sometimes generated. The scraps are routinely gathered and can then be crushed, sieved and recycled into new blocks.



Lightweight insulating concrete containing expanded clay was used in Italy's Triennale Design Museum. The porous nature of the expanded clay granules gives excellent thermal and acoustic insulation, keeping loading low.



Examples

Supplying water to help nourish growth

Expanded clay that has been removed from roofs is delivered to Ralf Ajalin Oy's Pihamaa division which has a soil station in Vantaa. The clay is crushed and becomes an important element in the manufacture of roof soil. "Roof soil has been processed for longer and is a more valuable product than normal soil," says Olli Mannerjoki from Ralf Ajalin Oy. "Expanded clay allows the soil to be much lighter, so that roof structures are not placed under excess loads. The main role of expanded clay in roof soil is to make the soil light, as well as to improve the movement of water in the growth base, which facilitates access to water for plants."



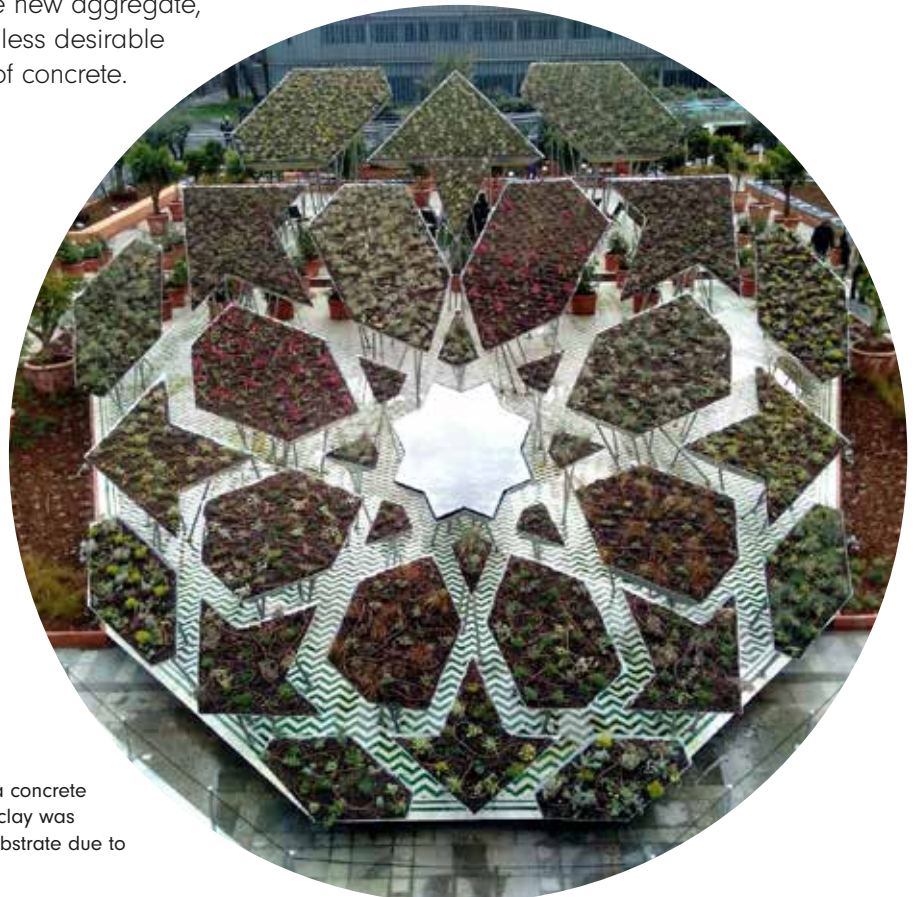
Recycling of ultra-light weight concrete building blocks

During concrete block production, some sub-standard products are inevitably produced. In the large-scale production of building blocks, about 0.5% typically become unsuitable for sale and are removed from the production line for reprocessing. Sub-standard blocks are collected on-site over a period of months until significant quantities are available. At that stage, crushing and sieving equipment is used to crush them down to a suitable size and grade of raw material.

It isn't possible to reprocess the blocks back to the properties and grades in the original concrete mix, as sands, cements and expanded clay aggregate gets incorporated. Instead, a new grade and type of raw material is produced and to take advantage of it a new concrete mix is designed to complement the physical characteristics of the reprocessed material.



In-house reprocessing of sub-standard products means there is tight control over the final properties of the new aggregate, ensuring it is free from contamination with less desirable elements such as brick or denser grades of concrete.



The Jardin Éphémère in Paris successfully transformed a concrete space into a haven of freshness and green. Expanded clay was used in the garden as a drainage layer beneath the substrate due to its ability to retain moisture.

Examples

Road construction

Lightweight expanded clay can be excavated from the ground where it was originally placed and reused in other locations. During the development of a new residential area outside Gothenburg in 2008, a new road was needed. Expanded clay was dug up from another location near the city and used to construct the road. Similarly, when an interchange was being rebuilt in Kungälv near Gothenburg in 2017, about 500 cubic metres of expanded clay was dug up and reused when the new road was built.



Green roofs

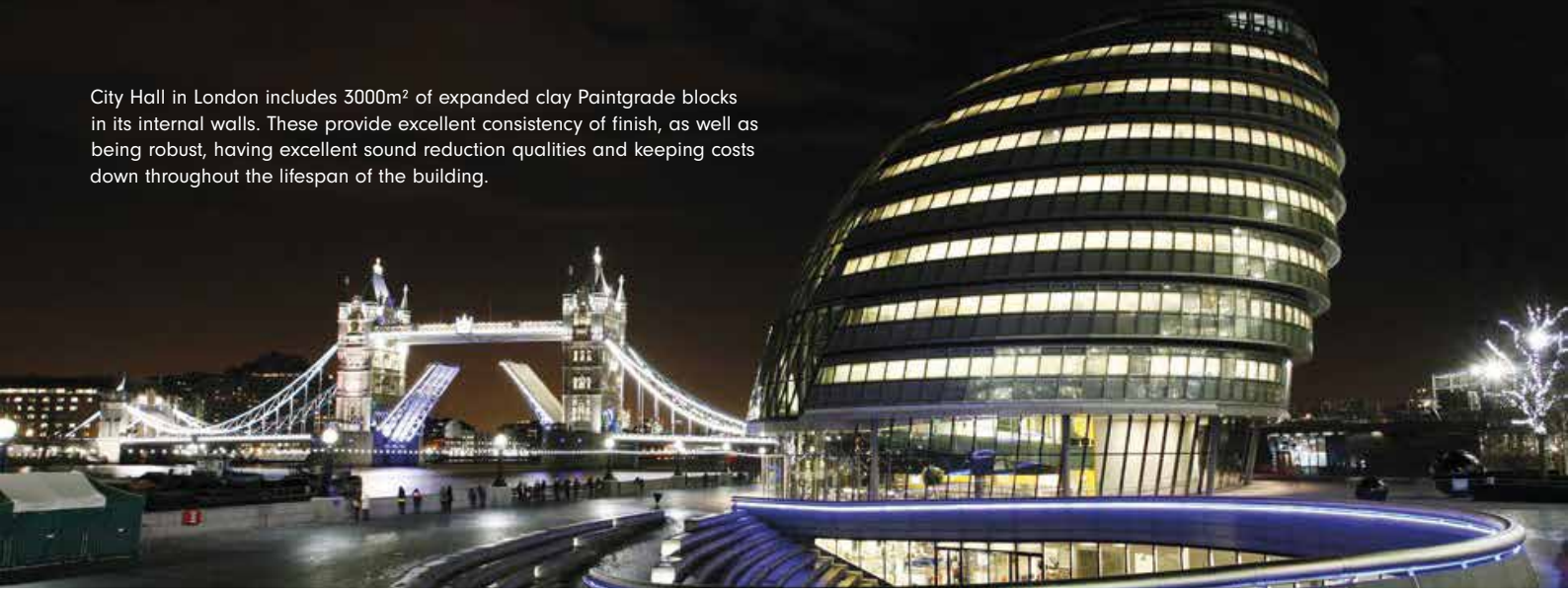
During roof renovations at a commercial building in Helsinki, expanded clay was removed and later converted for use as soil for green roofs. "During roof renovations, the old roof is dismantled and a layer of expanded clay aggregate, typically 400mm thick and acting as heat insulation, is removed and can be used as a raw material for manufacturing roof soil. A vapour barrier is installed onto hollow-core slabs, along with expanded clay and a 250mm layer of mineral wool. Expanded clay ensures adequate ventilation of the roof and is convenient for creating inclinations leading to roof drains," says Lasse Ruuskanen from Eristysmestari Oy, who supervised the renovation of a building in Herttoniemi, Helsinki.

During the work, expanded clay was removed from the roof and transported off-site by Anpe Oy. Hannu Pesola, Anpe Oy's managing director, explains. "The proportion of recycling is growing all the time and is at now at 7-8% for expanded clay. About 80% of recycled expanded clay is used for geotechnical purposes. The remaining 20% has other uses, including manufacturing roof soil, an application that is growing." The properties of expanded clay - such as its light weight, high compressive strength and thermal insulation - are retained, even when it is reused.

Above: During construction of the Hallandsåsen tunnel in Båstad, Sweden, 4,000 m³ of expanded clay was used to fill cavities in the surrounding bedrock following boring. Expanded clay is chemically inert and was chosen because it would not release any harmful substances into the ground water.



City Hall in London includes 3000m² of expanded clay Paintgrade blocks in its internal walls. These provide excellent consistency of finish, as well as being robust, having excellent sound reduction qualities and keeping costs down throughout the lifespan of the building.



Additional resources

For more information on how to decontaminate loose expanded clay recovered from diverse applications (both for use as lightweight fillings and as thermal insulation, in compliance with EN standards) please contact EXCA member companies directly.

About EXCA

EXCA is the European expanded clay association and represents the interests of all major expanded clay producers throughout Europe. With 11 member companies in 11 countries operating some 14 plants throughout Europe, EXCA represents more than 90% of the industry in Europe.

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