

**Disclaimer**

This sheet is intended for designers, specifiers and other members of construction project teams wishing to reuse this building material or product. It is part of a collection of sheets aimed at bringing together the available information to date that is likely to facilitate the reuse of building materials and products.

This sheet has been produced by Rotor vzw/asbl within the framework of the Interreg FCRBE project - Facilitating the Circulation of Reclaimed Building Elements, supported by the entire project partnership. Sources of information include the experience of reclamation dealers and involved project partners, lessons learned from exemplary projects, available technical documentation, etc.

The sheets have been produced between 2019 and 2021. As the reclamation sector is evolving, some information, notably regarding pricing and availability, may change over the time. When the text refers to European standards, it is up to the project team to refer, if necessary, to their national implementations and local specificities.

It is important to note that the information presented here is not exhaustive or intended to replace the expertise of professionals. Specific questions are always project related and should be treated as such.

The complete collection of sheets (including the introductory sheet) is freely available from different reference websites (a.o. opalis.eu, nweurope.eu/fcrbe, futureuse.co.uk).

Non-exhaustive directories of dealers in reclaimed building materials are available on www.opalis.eu and www.salvoweb.com.

Interreg FCRBE partnership: Bellastock (FR), the Belgian Building Research Institute / BBRI (BE), Brussels Environment (BE), the Scientific and Technical Center of Building / CSTB (FR), Confederation of Construction (BE), Rotor (BE), Salvo (UK) and University of Brighton (UK).

The information contained in this document does not necessarily reflect the position of all the FCRBE project partners nor that of the funding authorities.

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Material description

Clay pavers (also called “paving bricks” or “clinkers”) are a fairly common exterior cladding material in Western Europe (mainly the Netherlands, Germany and northern Belgium).

These pavers are particularly suitable for reuse. A study carried out in the Netherlands in 2009 and commissioned by brick manufacturers estimated the percentage of clay pavers reused by municipalities and individuals to be 90%. The reasons for this impressive rate are in particular the very high resistance of the pavers, their relative ease of disassembly and their ability to age well.

Although they are similar to building bricks, they differ from them in their production mode and their properties. Clay pavers generally consist of a mixture of clays (primary and secondary), volcanic rocks and/or grog, to which are optionally added natural pigments. These ingredients are mixed with water, kneaded, shaped, dried and then cooked at a temperature of 1,100 to 1,200° C. The finished product is very hard with low porosity, which is ideal for exterior paving. The pavers are resistant to extreme frost, pressure, wear and aggressive substances.

Clay pavers are considered to be very durable. They can easily retain their original properties for over a century - and sometimes even several centuries. As their laying method is traditionally reversible (laying on a sand bed), they are commonly recovered for reuse. This practice is very common in the Netherlands, where it is not uncommon to find suppliers of reclaimed pavers (who sometimes supplement their offer with new pavers).

Until the beginning of the 20th century, clay pavers were sometimes considered as a by-product from the production of masonry bricks (called “ordinary”) in traditional kilns. These ensured an uneven distribution of heat so that a batch of bricks loaded at the same time showed different degrees of firing. The most fired elements and therefore the hardest were then reserved for exterior paving applications. Subsequently, with the expansion of motorised traffic, specific kilns were designed to industrially produce clay pavers.

Clay pavers should not be confused with the ordinary bricks used in the construction of walls (less hard and more porous), nor with their concrete counterparts (also sometimes called “clinkers” made from concrete and cement). The latter can be recognised by the presence of aggregates in the mass of the paver. In this document, only clay pavers are discussed, although several principles also apply to the reuse of other paving materials.

There are a great many models of reclaimed clay pavers, which sometimes reflect historical regional specific features. Several criteria make it possible to distinguish them:

→ *Production mode - form*

- *Moulded pavers*: pavers are formed separately by moulding the clay using a mechanical press. The upper and lower faces sometimes differ in terms of their texture (the upper face may be slightly more sanded or rough). This is a very common type in continental Europe.
- *Extruded pavers*: clay is pressed through a mould into a continuous mass and cut into regular sized pieces. The finish of extruded pavers is generally smooth on all sides. They are less porous due to the higher proportion of primary clay used in their manufacture. This is a very common type in Germany and in the United Kingdom.

→ *Production mode - baked*

- *“Old baked”*: traditionally, pavers were baked in brick ovens heated with wood and charcoal. As the heat distribution in the oven was not uniform, this led to variations in the properties of the pavers resulting from the same firing (porosity, hardness, colours, etc.).
- *Modern baking, or “New baked”*: contemporary pavers are mainly produced in industrial tunnel kilns, capable of ensuring a more uniform distribution of the firing temperature. Therefore, recent pavers have more uniform properties (but not necessarily better) than their predecessors.

The terms “Old baked” and “New baked” are not scientific terms. Rather, they are trade names, the use of which may vary from one supplier to another. Sometimes, newly produced clay pavers are also referred to as “Old baked” and, vice versa, there are “New baked” clay pavers on the reuse market. In case of doubt, ask your supplier for more information about the origin of the elements.

→ *Appearance*. Depending on the model and the degree of wear, reclaimed clay pavers have a smooth, rough, slightly sanded or more textured appearance. Edges are straight, rounded or blunt, with or without chamfers. Some recent pavers are hammered on purpose to mimic natural wear and give them a rustic appearance. They should not be confused with genuinely reclaimed pavers! So-called “draining” pavers have growths of a few millimetres on the edges (called crosspieces or spacers) to maintain a systematic gap and allow the infiltration of rainwater. Reclaimed clay pavers may have paint residues (such as road markings). Slight traces of residual mortar or sand may also remain.



Reclaimed clay pavers



Reclaimed concrete pavers



Reclaimed masonry bricks



Clink !

Did you know? The word "clinker" is derived from the clear sound that clay pavers make when they collide.

→ **Colours.** The color of clay pavers is determined by the composition of the clay, the firing temperature and the possible presence of mineral additives. The colours often have brown, red, purple and yellow tones.

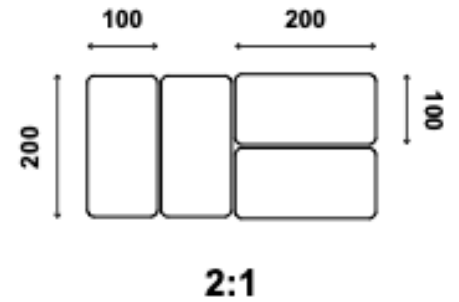
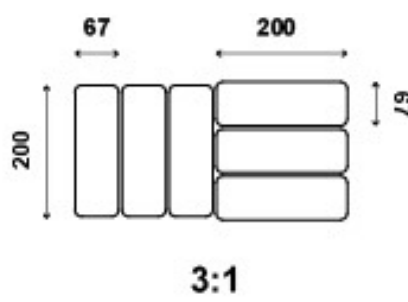
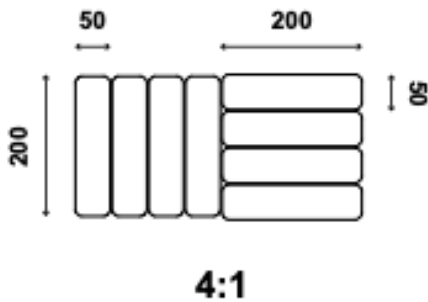
→ **Formats.** There are many formats of reclaimed clay pavers, depending on the original application and regional specificities. Indicatively, *Table 1* shows some common paver formats on the reclamation market (mainly in Dutch-speaking regions). It must be noted that the exact dimensions may differ slightly from the values below. There are sometimes other less common formats (e.g. square, long, etc.)



Showroom of a supplier of reclaimed clay pavers © VSB Sierbestrating

Table 1: Dimensions of the most common reclaimed clay paver formats.

| Format | Length x width (mm) | Thickness (mm) | Number of pieces per square metre |
|------------------|-------------------------|----------------|-----------------------------------|
| Waal format | ~ 200 × 50 (ratio 4:1) | ~ 60 to 90 | ~ 100 (laying flat) |
| Thick format | ~ 200 × 67 (ratio 3:1) | ~ 60 to 90 | ~ 73 (laying flat) |
| Pebble format | ~ 200 × 100 (ratio 2:1) | ~ 50 to 90 | ~ 50 (laying flat) |
| Rijntjes format | ~ 180 × 45 | ~ 60 to 90 | ~ 120 à 145 (laying on the edge) |
| Ijseltjes format | ~ 160 × 40 | ~ 60 to 70 | ~ 135 à 160 (laying on the edge) |



Waal format, mix of colours © Rebricks



Thick format, red © Rebricks



Pebble format, red © Rebricks



Material reclamation

In the vast majority of cases, clay pavers are easily recovered. For reuse on the same site, it is possible to carry out on-site sorting, and cleaning operations, as far as conditions allow (especially in terms of space). Most of the time, the pavers are dismantled by a specialized company which can also take care of delivering batches ready for laying. These professionals are able to ensure the smooth running of the following operations:

→ *Preliminary research and dismantling tests.*

These make it possible to verify the feasibility and profitability of the removal. An "expert eye" generally makes it possible to estimate the reuse potential during an on-site visit or based on photos and technical information relating to the pavers' original manufacturer, the model and dimensions. It may be useful to collect information relating to the original roadway in order to corroborate certain characteristics of the material (see § "Characteristics and fitness for use").

The type of bedding and the joint characteristics are the main factors which affect the ease of dismantling. In general, the pavers are laid on a bed of sand with sand joints (flexible laying), a wholly reversible laying method. However, the presence of cement or asphalt mortar (rigid laying) can complicate removal.

It should also be ensured that the pavers have not been contaminated. Three types of contamination can be checked:

- Ground or paver foundation contamination (such as asbestos, tar, petroleum on old industrial sites) likely to impact the pavers.
- Contamination of the pavers' upper surface, for example by oil, tar, paint, thermoplastics, etc. This type of contamination is visually manifest. Often, contaminated pavers are marked before removal, in an attempt to separate them from "sound" pavers. However, limited oil pollution is sometimes admissible (see § "Hazardous substances and precautions").

- Contamination due to leaching of pavers. In rare cases, it can happen that certain old pavers release polluting substances from which they are made. To check this, laboratory analysis may be required. Sometimes specialists and/or local authorities can also provide more information on this. Research carried out in the Amsterdam region has, for example, shown that no paver exhibits a form of contamination likely to prevent its reuse in outdoor conditions (see also § "Hazardous substances and precautions").

→ *Removal.* During disassembly, the main point of attention is to make sure to maintain a certain uniformity of the batches. In practice, attention is mainly focused on the format of the pavers and less on the colour. There is little risk of material deterioration during disassembly. Pavers laid on a sand bed are usually removed mechanically using a hydraulic shovel fitted with a riddle bucket. During this step, the pavers are shaken to remove much of the sand and soil residue. At the end of this operation, the sandy and earthy fraction remaining on the pavers only represents about 3% of the mass of the pavers. In the rare cases where the pavers have not been placed on a bed of sand, it may be necessary to carry out a specific manual cleaning to remove the mortar remains (laying bed and/or joints).

→ *Treatment.* Apart from rough cleaning and quality sorting, reclaimed clay pavers generally do not undergo any treatment. Cleaning can be carried out on site or at a specialists. The batches of disassembled pavers are usually handled on conveyor belts. Sorting criteria vary depending on the supplier. In general, broken or deteriorated clay pavers are discarded (the loss rate is estimated at 10-15%). Pavers in good condition are sorted by format. Sorting by colour is not systematic. It essentially depends on the uniformity of the original batch. As a rule, the more uniform a batch of cleaned and sorted reclaimed pavers, the higher its selling price. Often, specialist suppliers combine batches of pavers that are similar but have different origins.

If there are nevertheless reasons to doubt the quality of a batch, or if the pavers have not been properly cleaned/shaken, a specific sorting can also be carried out based on a check:

- *visual:* the pavers are inspected and the items showing significant damage are rejected. Pavers can be irregular but must have at least one face in good condition. When paint, mortar or asphalt remains are present on the surface of a paver, the opposite face must be in good condition. The presence of mosses or lichens on the surface indicates a high porosity which must be taken into account for the future application.
- *auditive:* to check that the clay pavers are intact, solid and non-porous, they can be knocked together or tap them with a hard object. Clear, reverberating sound means their structural integrity has not been compromised.
- *mechanical:* the pavers are rubbed to check the porosity. A paver that is peeling is usually deemed too porous.



Removing pavers using a riddle bucket
© VSB Sierbestrating



In principle, reclaimed clay pavers do not undergo any further treatment. Sometimes they are brushed or rinsed manually or mechanically before or during the palletising process. Recently, in the Netherlands, fully automated cleaning lines are used to clean/wash the pavers, to check that they do not have dimensional deviations and to package them directly on pallets using specific equipment, so that they can be replaced mechanically (see § "Applications and laying").

Pavers that break during disassembly and cleaning are largely unusable for reuse. However, it is possible to keep a small amount of half pavers for the joints and angles, depending on the type of assembly planned during their re-installation. Some professional suppliers are also able to deliver these intermediate sizes (e.g. $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$).

→ **Storage and packaging.** Unsorted clay pavers are generally stored in bulk in outdoor silos. Once sorted, the pavers are again stored and delivered in bulk or packaged on pallets or in big bags.

Ready-to-install pavers are clearly identified and labelled in uniform batches. They are usually sold per m². Most suppliers are able to provide a technical sheet showing the characteristics of the pavers (format, nominal dimensions and tolerances, colour, appearance, intended applications) as well as their origin.

It is advisable to involve specialised professionals to ensure the smooth running of these operations.



Pallet and big bag storage © Opalis (VSB Sierbestrating)



Bulk storage © Opalis (VSB Sierbestrating)



Bulk storage of reclaimed clay pavers © Tuinmaterialen Meynen



Applications and laying

Reclaimed pavers are mainly used as modular elements for exterior paving, for applications subject to moderate stress (pavements, pedestrian areas, squares, alleys, etc.) or more intense (roads suitable for motor vehicles, car parks, etc.). They are also suitable for civil engineering applications such as retaining walls, quays, stairs, etc., as well as interior flooring and roof terraces.

In general, the laying of reclaimed clay pavers does not differ from that of new equivalent pavers. The choice of a type of paver depends on the stresses specific to the intended use: expected traffic, climatic conditions, noise level, permeability of the pavement, town planning rules, etc. The pavement as such is not everything. The laying technique envisaged also contributes greatly to meeting the expected requirements - in particular, and not exclusively, according to the type of foundation and the laying layer (sand, stabilised sand or mortar), the jointing, the equipment, the nature of the blocking elements, drainage, impurities, etc. Likewise, the quality of the laying can make all the difference between a floor covering that meets expectations and a covering that does not (for example, in terms of flatness). It is up to the designer/specifier to rely on national regulations, in accordance with professional standards and the technical standards in force in this field (in particular the European standard for exterior paving EN 1344).

Think reversible!

Certain laying methods complicate or even prevent the recovery of pavers. This is particularly the case with rigid laying, involving mortars and hydraulic binders. In this sense, as soon as possible and with comparable performance, it is preferable to favour a flexible laying (flexible base bed, sand bed and sand joints). Carried out in accordance with professional standards, this laying method is very resistant to stress, is easily repaired and does not cause damage such as lifting or cracking.

The setting influences the aesthetics of the covering, its ease of laying and the number of cuts required for its realization. Certain setting, such as diagonal, herringbone and randomly matched, offer better resistance to motorised traffic (resistance to braking, acceleration and turning traffic).

The presence of a chamfer or spacer studs helps limit damage to the edges in heavy traffic. On the other hand, they are not recommended for surfaces subject to the passage of trolleys with wheels (such as shopping centres).

Reclaimed pavers are usually laid with the old side (that is, the side that was visible in the original application) up, to bring out the patina. It is also possible to invert or alternate the faces.

The following characteristics can be described and specified when drafting the technical requirements related to the delivery of a batch of reclaimed clay pavers:

→ **Batch composition.** The batch consists of same model pavers (format, colour, with or without spacers, with or without chamfer, etc.). In most cases, professional suppliers offer batches of uniform pavers, but from different origins.

→ **Format.** The dimensions of the pavers must be uniform. Batches of old pavers may have dimensional variations compared to the standard dimensions described in § "Material description". Slight variations in dimension between pavers within the same batch are also common for older pavers. In general, professional suppliers often make batches as uniform as possible. The dimensional tolerance will be determined by the designer/specifier according to the laying constraints, possibly in consultation with a supplier. Some batches are sometimes made up of pavers of unequal length.

Note that the pavers can be laid on their edge or flat. For laying methods requiring half-pavers or other adjustment pieces, it is necessary to specify the dimensions (such as $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$) and the desired quantities.

Mechanical laying!

For the past ten years in the Netherlands, regulations have made the mechanical laying of pavers for public works compulsory in most circumstances. These measures were taken in view of the frequent replacement of certain coverings and the arduous nature of the work. In order to be able to mechanically lay the pavers, it is often necessary to pre-palletise the pavers according to the desired setting, which leaves practically no chance for small dimensional deviations or staggered shapes. Therefore, this principle is unsuitable for the most irregular pavers (often the oldest pavers). For public works, it is therefore recommended that the contracting authority agrees on this subject with the suppliers.

→ **Colour and appearance.** Variations in colour and appearance are frequent. In the case of reclaimed clay pavers, these variations are mainly due to the production method and the origin of the batches. Palletized reclaimed pavers from professional dealers are generally mixed enough to obtain a good aesthetic result. In case of doubt, the pavers can be mixed again during placement. Since the pavers are not always sorted by colour, it is also possible to opt for a "mixed" surface made up of pavers of different colours. It is also possible to play with alternations, random or not, between the patinated faces and those not patinated.

→ **Condition.** In addition to traces of mortar and paint residues, reclaimed clay pavers may show minor alterations such as signs of surface wear, chips, craters, light flaking, stains, traces of paint, leftover moss, etc. These deteriorations can influence the technical and aesthetic performance of the pavers, as well as their re-installation, but do not constitute a major obstacle to reclamation (see § "Characteristics and fitness for use"). The designer/specifier should define the degree of imperfections tolerated with regard to the intended use and the laying conditions.



Design tip!

To increase the chances of meeting the offer available on the reclamation market, the designer/specifier can choose to split large surfaces into smaller quantity batches (for example, by providing different setting and patterns on the surface to be paved).

→ **Quantity:** Some suppliers may include surplus when the product is delivered if they are not able to guarantee the absolute uniformity of the characteristics mentioned above. This surplus can also be applied in the case of an on-site salvage scenario. To limit the risk of not finding the model, special attention should be paid to the quantities ordered. It is generally advisable to provide a reserve stock of pavers in order to carry out subsequent repairs.

Most professional suppliers are able to ensure that delivered batches meet these requirements. Most of the reclaimed building materials are sold as is. The conditions of sale may however contain special guarantees specific to the material. Some suppliers are able to indicate the origin of the material and/or provide documentation on the product purchased (for more information, see the introductory sheet).



Renovation of pavement with reclaimed clay pavers, Bergen (NL), 2020 © Stone Base



Designing a square with reclaimed clay pavers, Macharen (NL), 2020 © Stone Base



Designing a square with reclaimed clay pavers, Schijndel (NL), 2020 © Stone Base



Characteristics and fitness for use

The harmonised European standard EN 1344 establishes the relevant characteristics (according to the context) in order to determine the fitness for use of new clay pavers intended for indoor or outdoor use. Although detailed for new materials these characteristics may prove useful in considering the specific case of reclaimed pavers. Technical documentation from the original manufacturer, if available, can provide valuable information on material properties. Note that additional requirements are sometimes applicable on a national level.

Tip!

If the performance is to be determined in the laboratory, a representative sample of the batch in question should be established. The number and dimensions of the samples to be taken depend on the type of test to be carried out. In order for the test results to be usable, the sampling procedure must be rigorous. A professional can assist you in this work to choose the samples and the tests to be carried out. The test procedures will be defined with regard to the previous and subsequent uses of the pavers.

| Characteristics | Comments |
|--|--|
| Dimensions (length, width, thickness) | <p>These characteristics are closely linked to the degree of wear of the pavers and the sorting quality. A visual or detailed examination of the batch is often sufficient to estimate them. The EN 1344 standard recommends that the tolerable deviation from the nominal dimensions cannot exceed $0,4 \sqrt{d}$ (where d corresponds to the manufacturing dimension. By extension, in the case of reuse, d can correspond to the average dimension of the batch) .</p> <p>In practice, the dimensional variations and the deviation from the mean can be estimated based on a sample of pavers placed end to end according to the dimension to be evaluated. Typically, newer, properly sorted paver batches will meet the dimensional requirements of most applications. For batches of old pavers, it is advisable to determine with the supplier the acceptable dimensional tolerance, depending on the application and the method of laying (see the box "Mechanical laying!").</p> |
| Density | <p>The density of clay pavers is generally greater than 1,700 kg/m³. This can be estimated simply by using scales and a measure, or it can be determined with precision in the laboratory.</p> |
| Porosity and water absorption | <p>Given their high density, the porosity of clay pavers is generally low enough to ensure that they are waterproof. This characteristic changes little over time and batches of old pavers generally maintain good properties in this regard. However, special attention should be paid to the condition of the pavers (see § "Material reclamation"). The precise assessment of porosity (or measurement of water absorption) can also be accurately determined through laboratory tests.</p> |
| Resistance to freezing/thawing (and de-icing salts) | <p>The source and condition of a batch of clay pavers can provide a useful guide to determining their resistance to freezing/thawing. The pavers in good condition that have been dismantled in an area subject to strong freeze/thaw cycles are likely to show good frost resistance. If there are any doubts, laboratory tests can confirm this. The same goes for resistance to de-icing salt.</p> |
| Transverse rupture strength | <p>This characteristic indicates the ability of the material to withstand loads. Loads can vary greatly depending on the application (e.g. static vs dynamic, pedestrian zone vs. carriageway). The transverse rupture strength depends on the thickness of the pavers. It is commonly accepted that pavers should be 80 mm thick or greater for heavily trafficked pavements. The use and type of stress therefore establish the required thickness and, by extension, the laying method. Some clay pavers can be laid in several directions, for example flat and on their edge. In practice, pavers with a height of less than 40 mm are laid on a bed of stabilized sand or a mortar bed, and not on a bed of loose sand. For pavers laid on a loose bed, the proportion between length and height must not be greater than 6 mm.</p> <p>Information on the original road system sometimes makes it possible to assess this characteristic (i.e. pavers in good condition coming from a street subjected to intensive traffic by heavy vehicles testify in a certain way to their good mechanical resistance). If necessary, a laboratory three-point bending test can provide an accurate measurement of the mechanical strength of the pavers.</p> |



| Characteristics | Comments |
|--|---|
| Wear resistance | This feature concerns the visible faces. An assessment of the wear conditions of the original road system (e.g. service duration, traffic density, etc.) coupled with a measurement of the dimensions of the pavers generally allow the wear of the material to be assessed. If necessary, the precise assessment of wear resistance can also be determined precisely through laboratory tests. |
| Slip resistance (and skid resistance) | <p>This feature influences the comfort and safety of users. It is determined by the texture of the pavers, their degree of wear and the characteristics of the joints (e.g. density, thickness, etc.). It may change over time under the influence of wear, the slope, the density of the joints and the climatic context (rain-fall).</p> <p>In general, reclaimed clay pavers with a rough appearance have sufficient slip resistance. In addition, during laying, the pavers may be slightly abraded by the grouting process. The in-depth assessment (by laboratory testing) of slip resistance is relevant when the work is intended for pedestrians and the skid resistance when the structure is intended for vehicular traffic.</p> |
| Fire resistance and performance | The nature and composition of the material satisfy the reaction to fire class A1 according to standard EN 13501-1. It is not necessary to check this requirement if the pavers do not contain more than 1% organic matter by mass (which is almost always the case due to the baking process) and if no protective coating is applied to the pavers. |

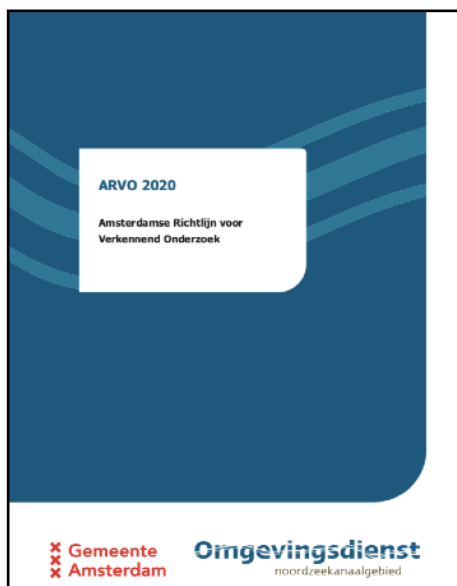
Hazardous substances and precautions

→ **Leaching.** In 2017, the city of Amsterdam commissioned a study on the leaching of clay pavers around its area. It appears that no unacceptable form of leaching was observed in the materials studied. The report concludes that as long as they are not contaminated from the outside, from a health and environmental point of view, all clay pavers present in their area and all pavers comparable in age, type and composition, can be reused.

→ **Oil contamination on the surface.** The city of Amsterdam also specifies that limited contamination of the surface by oil is acceptable (max 0.5 m² / soiled area). Other types of surface contamination are not allowed, regardless of the surface.

→ **Asbestos and tar.** Foundations contaminated with asbestos or tar can contaminate clay pavers.

Références



Environment Department of the North Sea Channel Region, "Making a contribution. A guide for the reuse of road materials in the municipality of Amsterdam", 29 March 2018. (in Dutch).
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"Reclamation rate of clay pavers in the Netherlands". Summary of the final report of the Royal Dutch Brick Manufacturers Association, 2009. (in Dutch).
<https://www.knb-keramiek.nl/media/2264/9v1632-samenvatting-eindrapport-30nov.pdf>



Availability

The professional market for reclaimed clay pavers is fairly developed. The quantities available may vary depending on the target audience of professional suppliers (individuals or municipalities).

As an indication, for batches of the same model of reclaimed clay pavers:

| | |
|------------|--------------------------|
| Frequent | < 100 m ² |
| Occasional | 100 → 500 m ² |
| Rare | > 500 m ² |

Find specialised businesses



Indicative prices (Excl. tax)

Random sampling of the reclamation market in Western Europe (Belgium, France, Great Britain and the Netherlands) made it possible to extract some indicative prices. These vary depending on the availability of the size and type of paver, as well as the degree of sorting. A sorted paver is often more expensive than an unsorted paver but is easier to place.

- *Waal format*: 20 - 60 €/m²
- *Thick format*: 20 - 40 €/m²
- *Pebble format*: 20 - 35 €/m²
- *Rijntjes format*: 35 - 60 €/m²
- *Ijseltjes format*: 60 - 120 €/m²

More pieces of small pavers are required to cover the same area. In addition, the laying cost will also be higher.



Automated cleaning and packaging process for reclaimed clay pavers. © NH Nieuws, 2018 (<https://www.youtube.com/watch?v=lmeWIMkRwoU>)

Embodied carbon (Cradle to gate - production A1-A3)

| | kg CO ₂ eq./m ² | kg CO ₂ eq./kg |
|---|---------------------------------------|---------------------------|
| OEKOBAUDAT database (DE) - Average dataset - Facing Bricks, Clay Pavers and Brick Slips * | 26.1 | 255.5 |
| NIBE database (NL) - Clay street pavers, thick format, lifespan 75 years * | 52.6 | 515.7 |

* Indicative values for 60 mm thick pavers with a density of 1700 kg/m³.



According to the sources, reusing 100 m² of reclaimed clay pavers prevents the production of ~ 2.610 to ~ 5260 kg of CO₂ equivalent related to the manufacture of new pavers (production phase only). This corresponds to the amount of emissions caused by a small diesel car travelling a distance of ~ 15.600 to ~ 31.500 km.