

White paper: Coated Vandersanden bricks

In mid-2017, the first production line (Spouwen S3) was fitted with an automated coating line, to apply an invisible water-repellent coating to the visible brick faces. The other plants were then equipped with automated coating lines at Spouwen S5, followed by Lanklaar and Hedikhuizen. From mid-2020 onwards, all Vandersanden Stock (Handform) facing bricks, which are susceptible to contamination have been produced with this invisible water-repellent coating.



Why does Vandersanden coat its bricks?

In recent decades, stained brickwork facades have been an increasing problem. They are either fouled by salt, soot, algae or other usually innocent substances, or by calcium or gypsum, which are more persistent. While these deposits do not damage the quality of the brick technically speaking, they are not very aesthetically pleasing.

Various studies have been carried out over the years to find the cause of persistent calcium or salt fouling, with the most recent doctoral study at KU Leuven, Belgium, demonstrating that it is largely due to the mortars used between the bricks. These mortars have been developed significantly over time with a view to workability, curing time and cost price reduction. The effects that the leaching of substances has on quality were not discovered until later, often only becoming visible after many years.

A highly absorbent brick is more subject to leaching of substances, as it will saturate during rainy weather and draw substances from the mortar. When a brick dries out, the substances are drawn out to the face of the brick resulting in deposits on the face of the wall.

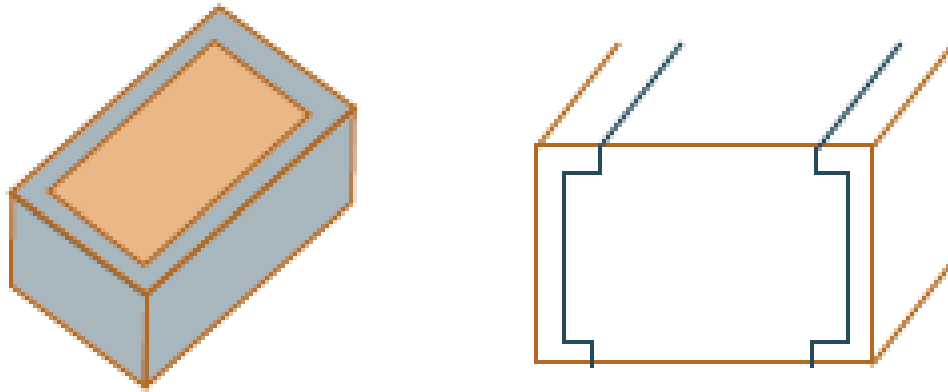
Various studies are being carried out to improve mortars. The leaching of calcium and gypsum deposits is a complex issue with a number of influencing factors.

The appearance of deposits and staining on the face of the brickwork is a serious concern for Vandersanden, whose core values include sustainability and craftsmanship. This is why we decided to take action and develop a product that performs independently of the type of mortar and method of construction, to ensure consistent quality, which will be aesthetically pleasing for many years.

This entailed considerable financial investment, which not only realised a commercial objective for Vandersanden, but also aimed to protect the brick industry by improving the image of brick. In doing so, Vandersanden also accepts its social responsibility to help safeguard a future role for bricklaying and associated trades.

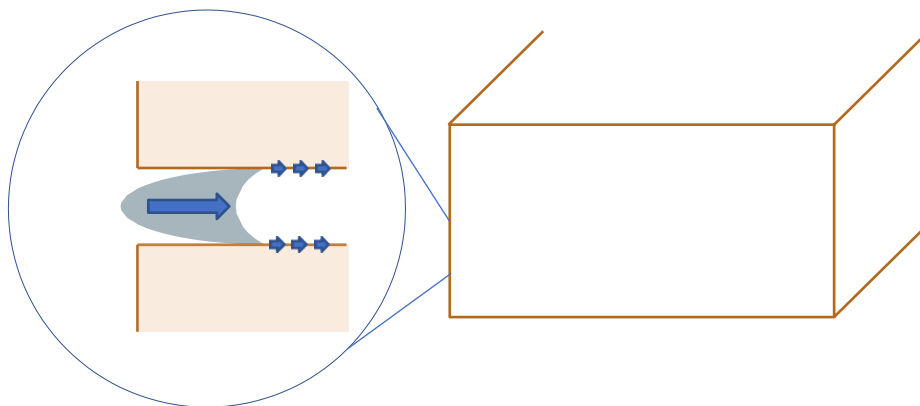
How are Vandersanden bricks coated?

In an automated process, the stretcher and header faces of the brick are coated with a water-repellent layer. This coating penetrates approximately 5-10 mm into the brick. The bed faces (top and bottom) are not coated, so that the bricks can still be laid traditionally on a bed of mortar. However, the coating is taken 10-20 mm around the brick, onto the bed faces.



How does water transport in traditional (uncoated) bricks work?

A highly absorbent brick is a product with a lot of pores, both large and small. The body of a brick acts rather like a sponge. Water is drawn by capillary action into the pores within the body of the brick.



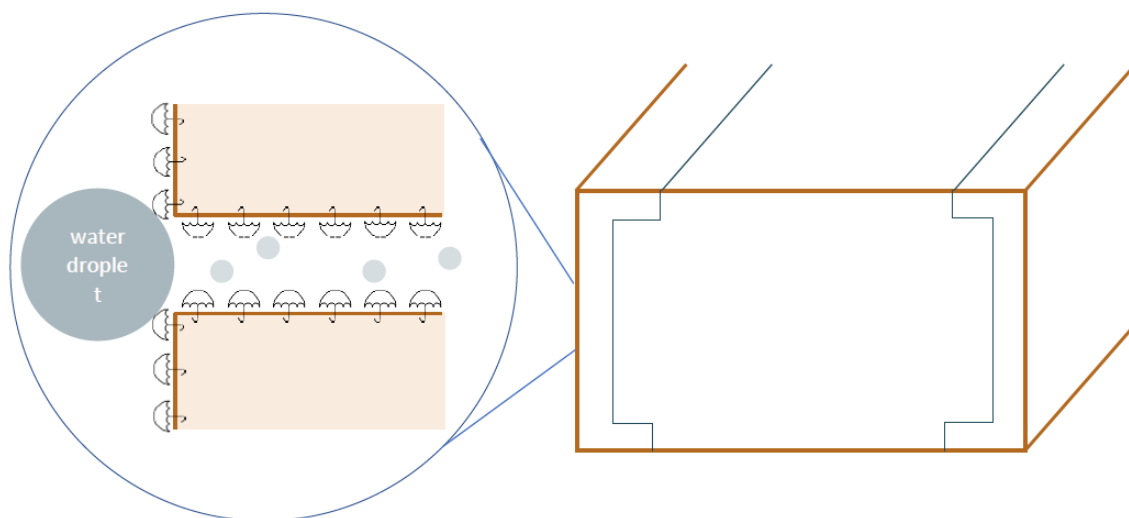
The large pore structure of these bricks ensures that they can never freeze and break into pieces, even when they are saturated with water, as there is always sufficient space for the water to expand when it turns into ice.

How does water transport in coated bricks work?

A coated brick has exactly the same pore structure as an uncoated brick. The number of pores and their size remain the same. However, the 5-10 mm coated layer will not absorb any water, the pores are covered with the water repellent coating and water droplets cannot be absorbed.

As the pores remain open, the bricks retain their resistance to frost.

Moisture in the uncoated part of the brick can leave the brick through the uncoated bed faces or as water vapour through the coated stretcher and header faces of the brick. After all, water vapour droplets are smaller than water droplets and able to migrate through coated pores.



Why are coated bricks less susceptible to fouling?

Deposits from external sources, such as soot, dust or algae, cannot fully adhere to the water-repellent stretcher and header faces of the bricks and will rinse off more quickly and easily when it rains.

Deposits emanating from the body of the brick or mortar, will be blocked behind the coated layer on the stretcher and header faces of the brick. This has the additional effect of causing gypsum efflorescence in the core of the brick, partially clogging the pores and provides an additional barrier against outward leaching of deposits through the coated faces of the brick.

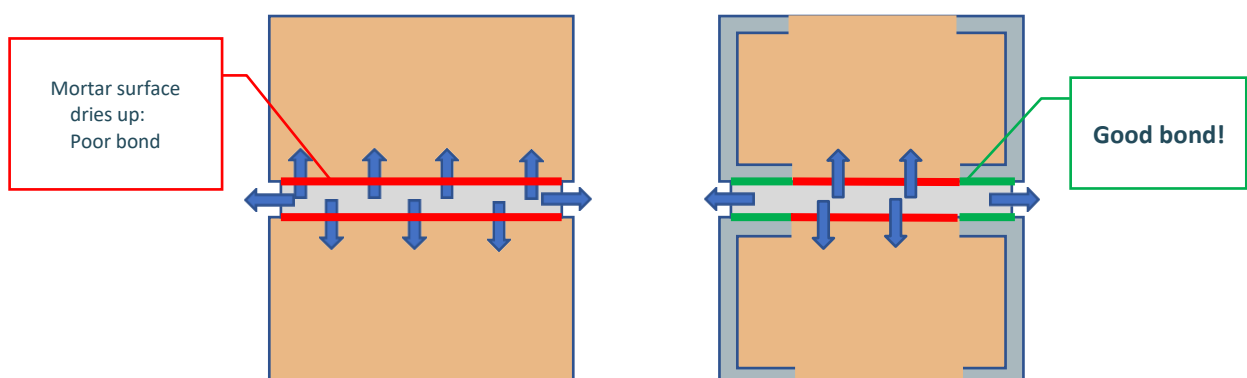
How to build using coated bricks?

As explained above, the bed faces of a coated brick are not treated, which means that the bricklaying properties of the brick are unchanged. These bed faces will be sufficiently absorbent.

It would be expected that a highly absorbent brick provides a good bond with the mortar but tests have shown that this isn't always the case. If the quality of the mortar is poor, the brick will readily absorb the mixing water present in the mortar, resulting in the mortar on the bed face of the brick drying up too quickly and not allowing the mortar to cure sufficiently. This is also referred to as "burning" of the mortar.

The mortar on the coated part of the bed faces cannot dry up. Tests indicate that the bond on this surface is much stronger. So the Vandersanden coated bricks combine the two features referred to above: The core absorbs, so that the brick does not shift during bricklaying and the coated edges provide additional bond.

This also applies to the pointing. All of the mortar is between the coated part of the bed faces and will not lose moisture to the brick. This increases the quality of the joint and does not have any negative effect on the bond.



What requirements have to be met when laying coated bricks?

A traditional high absorbent brick is a very tolerant product. That means that it can be used in the worst kind of conditions (cold, frost, rain), in the worst possible manner (using far too much mixing water), with the worst possible products (poor mortar quality) and yet have a fairly good end result. But this does not mean that the resulting wall is of a good quality. Because of this great tolerance, highly absorbent bricks are a popular product for bricklayers, but any problems (Lime leaching, gypsum efflorescence) only become visible later. Coated bricks provide an excellent, long-term appearance when stored and laid on site in accordance with good practice.

Vandersanden recommends the following good practice points on the storage of bricks and construction on site.

1. Coated bricks must be stored in a dry and covered place.

If a highly absorbent brick gets wet, it will rapidly lose the water from all sides, which means they are rapidly ready for use. Coated bricks can only lose water through the bed faces (and water vapour through the coated faces of the brick). As such, coated bricks if saturated will retain water longer. A wet brick is heavier, which means the wall cannot be built as high while the mortar cures, to prevent the possibility of collapse. A wet coated brick loses most of its water through the bed faces, which makes the fresh mortar even wetter and increases the risk of collapse.



The coated bricks can, of course, also be laid while slightly moist. In warm, summery conditions, this is even advisable.

2. The quantity of mixing water for the mortar must be limited.

If the mortar is mixed on site (rather than factory produced) the quantity of mixing water for the mortar must be limited.

Bricklayers have a tendency to add more water than necessary to a mortar mix to make it easier to work with. While this does not improve the quality of the mortar, it does not cause any problems with uncoated high absorption bricks.

But with coated bricks, the risks are the same as mentioned under Point 1. Mortar that is too wet is not as strong. As coated bricks absorb less water from the mortar, the mortar will remain wet longer, creating a risk of collapse after only a few courses. Where mixing mortar on site, bricklayers need to be aware of the potential problems associated with adding too much water to the mix. These instructions may differ per manufacturer and product and are always available on request. For powdered mortar, the amount of mixing water is always stated on the bag.



For the record: using less mixing water for cement-based products always has a less negative (or even positive) effect on the final quality of the cement/mortar than using too much mixing water.

3. Water absorption of coated bricks

The type of mortar used depends on the initial rate of water absorption i.e. the suction rate of the brick (IRA class) of the brick. Uncoated Stock (Handform) bricks have an IRA class of 2 to 4, with class 4 comprising the highest initial rates of water absorption.

The type of mortar used for coated bricks requires a dual approach:

- The core of the brick is not treated and has the same water absorption of an uncoated brick.
- The coated visible sides of the brick are water-repellent and have an initial rate of water absorption of 0%.

If the initial rate of water absorption is determined using the standard (EN771-1:2011 – 5.3.8), this produces an average of the above, as a result of which coated bricks are 1 class below a similar uncoated brick.

The technical information sheet for the brick will list the IRA of both the coated and uncoated brick.

Coated products can be identified by the "C" in the top left of the CE label on the packaging, which is also stated on the order form.

It is important, therefore, to first verify whether the bricks are coated or not and adjust the mortar to the corresponding IRA class, as indicated on the technical information sheet.

Please note: if bricks are used for special purposes and the coated bricks are laid on their side, so that a coated face becomes a bed face, the mortar must be adjusted for this water-repellent surface.

4. Mortar laying

Mortar laying is the same as described above. Curing of the mortar used for coated bricks will be a little slower than with traditional bricks, which absorb the water from the mortar more quickly. Curing depends to a large extent on the weather conditions, and exact timings cannot be given. Tests have demonstrated that the difference is slight and does not come with noticeable loss of time.

5. Pointing (forming mortar joint profiles)

With coated bricks there is an additional consideration when forming mortar joint profiles (pointing): A freshly coated brick will have a water-repellent effect on the visible stretcher/header faces during the first few months. As a result, there may be droplets on the visible stretcher/header faces from rainwater or condensation. Vandersanden recommends that any droplets of moisture should be removed by wiping them away with a clean cloth or use of a blower, to prevent any salts and other substances which may cause staining moving onto the face of the mortar joints.



The repellent effect on the visible faces of the bricks will disappear after a few months. Vandersanden advises waiting 4 to 6 months before starting pointing work in order to overcome this problem.

It is also recommended to moisten the fresh pointing in the summer. This also applies to coated bricks, although we recommend this be done with care and using less water, as the bricks themselves no longer absorb water and all the water goes to the joints.

According to generally applicable instructions, fresh pointing must always be protected against rain. This is also true for coated bricks.

What are additional advantages of coated bricks?

Applying a hydrophobic layer on an existing brick wall costs about €10/m². Vandersanden has made considerable investments to guarantee a future for brickwork without increasing the price of bricks. This also safeguards a future for bricklayers and has benefits for the end user.

Coated bricks are mixed in our factories as part of the production process. However, Vandersanden still recommends mixing bricks on site from a minimum of 5 packs, to minimize the risk of differences in colour of the brickwork.

Overview of good site practice in when working with Vandersanden coated bricks

Vandersanden recommends working in accordance with established good practice bricklaying, which may vary between countries.

General:

- Facing bricks should always be stored and laid in dry conditions.
 - Opened packages are properly covered.
 - Stacked bricks must be protected from rain.
- The brickwork must be **protected** against cold, driving rain and wind.
- When laying bricks and during the curing process of the mortar, the ambient temperature should not be lower than 5°C and not higher than 30°C.
- Never work on frozen soil, soil that is thawing out, or when there is a risk of frost within 24 hours.

Traditional brickwork with designed factory produced mortar:

- The mortar used must be of good quality and meet the relevant standards for masonry mortars, in accordance with the IRA class for the brick used.
- The masonry mortar must be mixed in accordance with the manufacturer's instructions. **No extra water** must be added to make the mortar smoother. To prevent the coated bricks from shifting, **the prescribed quantity of water must be minimised**.
- Improved designed factory produced mortars and winter mortars can be used for low absorbent bricks, which cure more rapidly than traditional masonry mortar. Contact the relevant manufacturer for additional information.

Glued brickwork:

- No special requirements compared with traditional brickwork

Mortar with coated bricks:

- The amount of mixing water must be minimised, in accordance with the mortar product instructions.
- During the initial mortar curing period, the brickwork must be protected against rain and wind, both before and after application of the mortar.
- The drying period of the mortar may be a little longer than with facing bricks without hydrophobic layer. This difference is not significant.

Mortar pointing:

Vandersanden recommends complying with good practice guidance and mortar manufacturers' instructions:

The most important watchpoints from these instructions are reiterated below:

Preparation:

- Remove all dust and brick residue from the joints.
- For repointing provide for a joint depth of at least 10-15 mm.
- Any visible water droplets or a water film present on the exposed coated face must be removed prior to pointing. The droplets can be removed with a cloth or by means of a blower. Droplets may appear in damp conditions or when it rains or due to condensation at low temperatures.

Processing:

- Coated bricks are pointed in a traditional manner using traditional products. These include home-made mortars or factory produced mortars. Always follow the recommendations for selection of joint mortar and the manufacturers' processing instructions.
- Do not lay bricks in fresh mortar or point brickwork in wet conditions or freezing temperatures, or when rain or frost are expected in the first 48 hours after the pointing work.

Post-treatment:

- Protect the mortar pointing from drying out and rain for at least 48 hours.
- Drying out can be prevented by regularly spraying lightly with water. PLEASE NOTE! Coated bricks do not absorb water, which puts an added burden on the joints when they are sprayed. First test whether the joints have cured sufficiently to prevent them from eroding, and then spray the wall briefly several times a day.

Vandersanden recommends the use of joint mortars with a hydrophobic coating in order to produce an attractive end result with no deposits.

For questions or advice, contact Vandersanden technical support at inspiration@vandersanden.com.