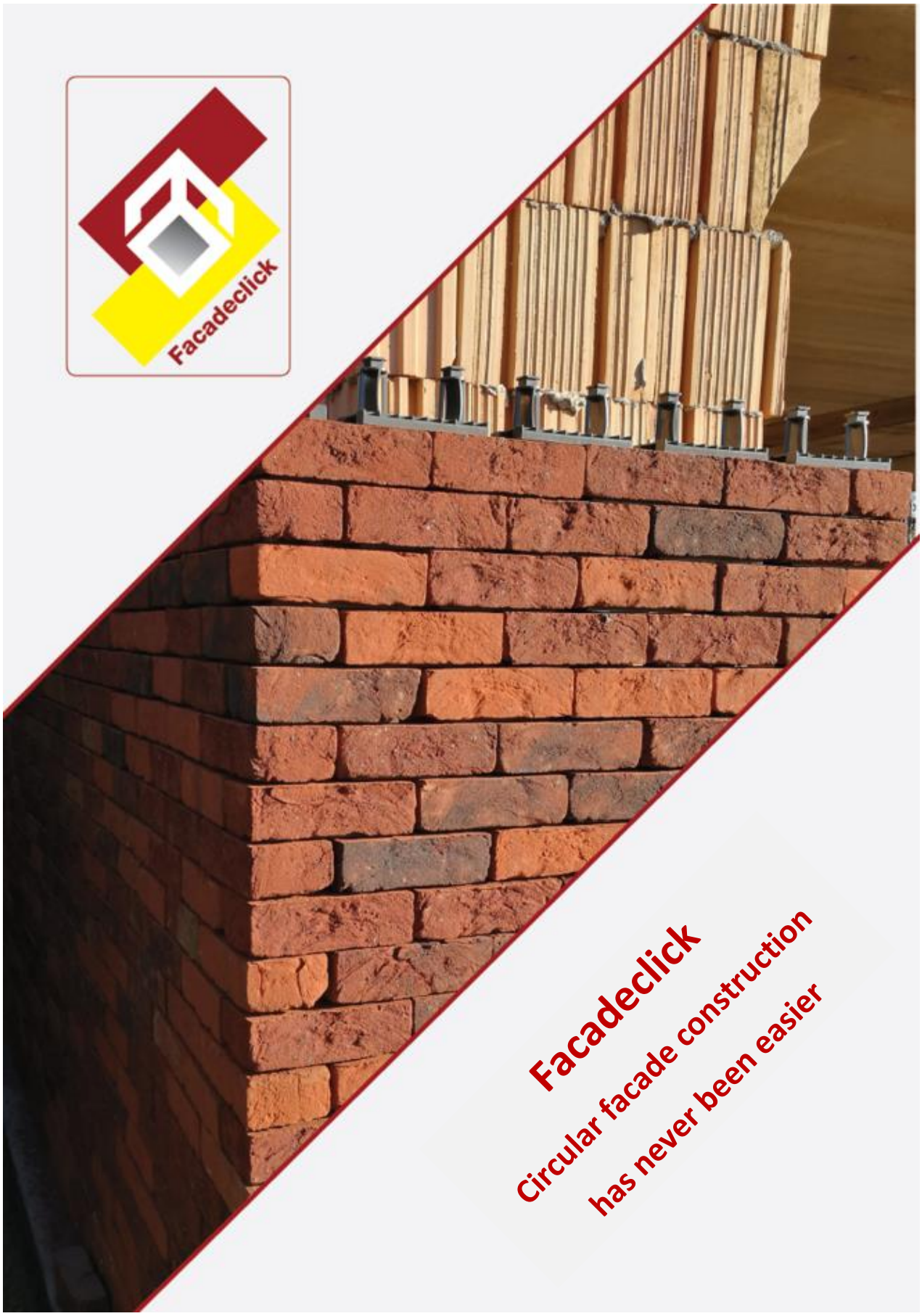

Facadeclick
Facadeclick
Circular facade construction
has never been easier

Facadeclick: easy and circular

Today's world is rapidly changing and we have come a long way with our recycle and reuse habits. However, our current construction methods are still far from sustainable. The building industry has a huge impact on the global materials consumption and is amongst the largest contributors for waste. If we want to minimise our ecological footprint and reduce construction waste – keeping in mind the size and growth rate of the industry – we should be aiming at circular building.

Circular construction is based on the principles of the circular economy: a circular economy is one that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times, generating as little waste as possible and optimising resources for both people and the environment.

Facadeclick now offers a patented product that combines traditional facade brickwork – a construction material that has already been used for centuries and has proven its durability – with an innovative HDPE connector that will allow for recovery and reuse of the brickwork.

Facadeclick is not a revolution, but rather an evolution towards sustainable, circular construction.

Facadeclick combines all the positive features of traditional brickwork with a unique click system, making facade construction fast, easy and above all circular.

Thanks to Facadeclick circular facade construction has never been easier.

Tecnical support
Jasper Vandenbempt
Jasper@facadeclick.be
+32 (0)498 90 68 61

Table of contents

1 Properties and advantages of Facadeclick

SIMPLICITY

Facing bricks are simply clicked together by using HDPE connectors. No mortar or glue is required.

No special techniques or qualifications are necessary to start using Facadeclick.

UNDER ALL WEATHER CONDITIONS

Perfectly straight and level brick facades can be constructed under all weather conditions.

AESTHETIC PERFECTION

The final result is a flawless brick façade with a running bond structure that will give a beautiful appearance to your building.

FASTER THAN TRADITIONAL METHODS

The Facadeclick fast track construction system allows for rapid facade building, reducing labour costs.

DURABILITY

The pressure resistance of the wall and the tensile strength of the wall ties and anchors is substantially higher compared to traditional masonry (pressure resistance: 11 N/mm² ←→ 5 N/mm²; tensile strength: 60 kg ←→ 30 kg).

PERFECT INSULATION

Perfect wall cavity insulation is obtained by injecting insulation beads.

CIRCULAR AND SUSTAINABLE

The system is circular: by using the HDPE connectors constructing a wall is just as easy as taking it apart.

The wall cavity insulation beads are biodegradable.

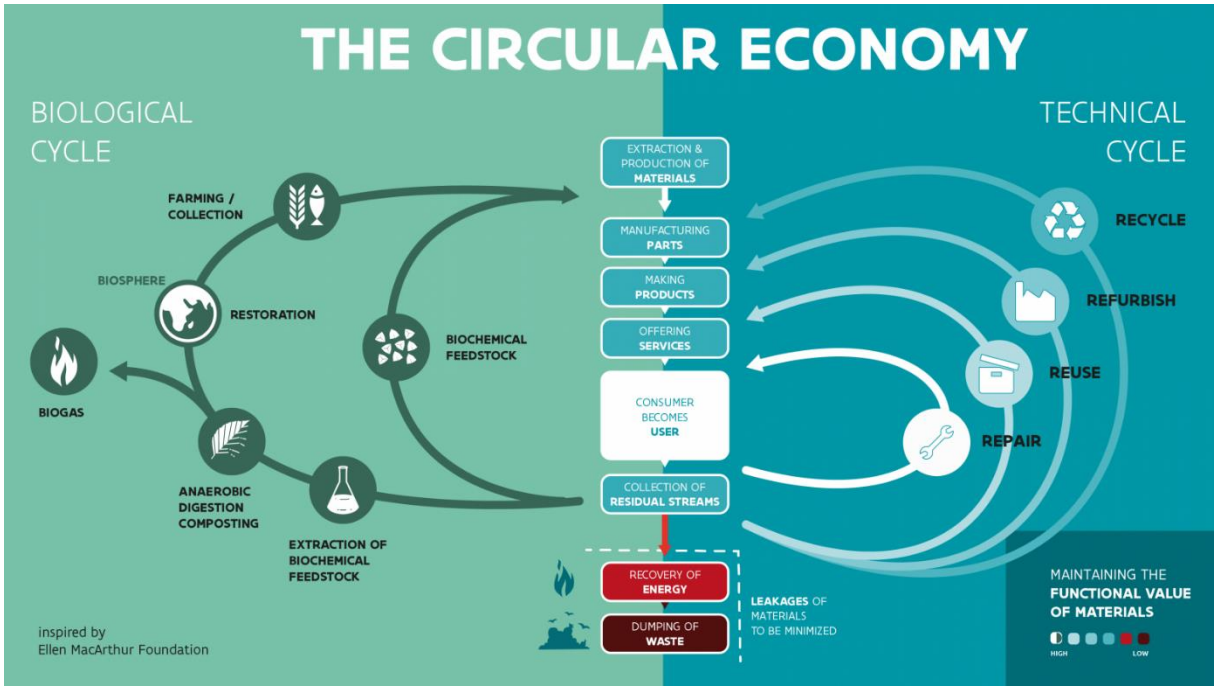
NO EFFLORESCENCE

Because no glue or mortar is required efflorescence is a thing of the past.

2 Facadeclick and circular construction

In a circular economy a number of strategies are applied to ensure that materials and products can be held in repetitive loops, maintaining them at their highest possible intrinsic value to the economy and using them as sustainably as possible. This means products can easily be repaired, upgraded, disassembled or transformed into new products. Materials are recycled, recyclable, bio-based or biodegradable.

A circular economy aims to keep materials and products at their highest utility and value at all times. Nothing can go to waste.



3 The Facadeclick-components

The pictures below give an overview of the Facadeclick products that are necessary to start building a jointless brickwork facade.

Facing brick

HDPE connector

Wall cavity insulation

Wall tie (in T-slot)

Anchor

Screw

3.1 Facing brick

The facing bricks are of the type ‘waaldikformaat’ (WDF) and come in two sizes: +/- 213 x 105 x 65 mm or +/- 645 x 105 x 65 mm.
The header size to be taken into account is 108 mm (3 mm head joint).

3.2 HDPE connector

Dimensions: length 166.5 mm (+1/-2.5), width 73 mm (+0.5/-2), centre insert height 108 mm (+2/-5).
Weight: 93 gr (+3/-3).
Material: HDPE (high-density polyethylene).

3.3 Wall cavity insulation

For wall cavity insulation we recommend HR++ Termoparels (EPS insulation beads), made by the company Termokomfort. These insulation beads have an ATG certification (national technical approval in Belgium) for cavity insulation. They do not form a breeding ground for micro-organisms or fungi, and they do not affect other building elements. They are mould and rot-proof, non-flammable and permanently water-repellent.

Performance characteristics:

- Thermal conductivity: 0.037 W/m.K.
- Water vapor diffusion resistance factor: 1-2 µ
- Contribution to fire propagation: class 1 (NEN 6065+w97)
- Flame spread: class 1 (NEN 6065+w97)
- Flashover: class 1 (NEN 6065+w97)
- Smoke density (DL; h; max): 5.8 m (NEN 6066+w97)
- Fire classification: A1; non-combustible (NBN S 21-203:1980)

3.4 Wall tie

In case the inner wall is built with bricks that have integrated T-shaped slots the wall ties can be inserted and anchored in the inner wall by simply pushing the wall tie into the T-shaped slot and twisting it 90 degrees. The length of the cavity wall ties can vary based on the desired cavity thickness.

The wall tie diameter is 4 mm. The ties are made of stainless steel/Inox 304 (MX3). The real tensile strength at 5 mm extension of the 90° hook from the HDPE connector is at least 83 kg.

3.5 Anchor

In case the inner walls do not have integrated T-shaped slots wall ties can still be used by affixing anchors to the inner walls. These anchors will enable you to use the Facadeclick wall ties.

Diameter: 94 mm.
Weight: 34 g.
Material: HDPE (high-density polyethylene).

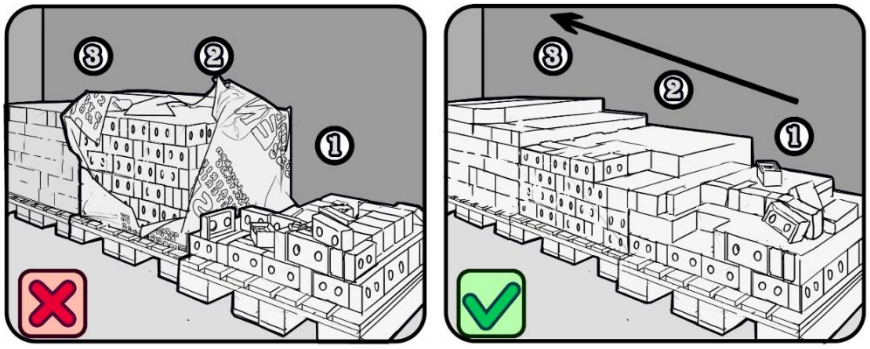
3.6 Screw

In case the courses above do not generate sufficient pressure to compress the HDPE connectors – for instance underneath a window frame – a screw can be used.

4 The Facadeclick step-by-step approach

Proceed through the following easy steps to build a Facadeclick facade.

STEP 1: mixing the facing bricks

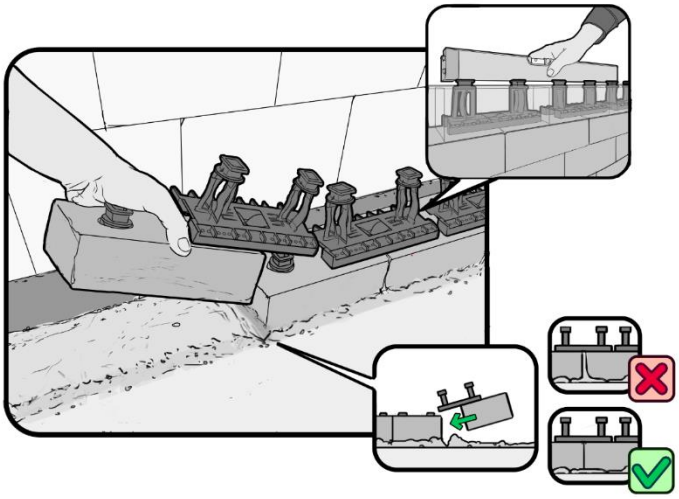


It is advised to mix bricks from several packs concurrently (with a minimum of 3 packs at any given time). The bricks must be collected diagonally from the packs. Open a new series of packs when the first ones run out and start mixing in the new packs. In this way you can avoid colour banding or shading in the brickwork. Should you run out of bricks then make sure to keep enough bricks from the first delivery aside so you can mix them in with the new delivery.

STEP 2: laying the first course

Laying the first course of bricks has to be done correctly as this course will serve as the base for the entire facade and will therefore determine the final result.

- The first course must be level in both directions.
- The bricks of the first course are to be laid in mortar as shown in the pictures (right).
- Header size 108 mm (3 mm head joint).

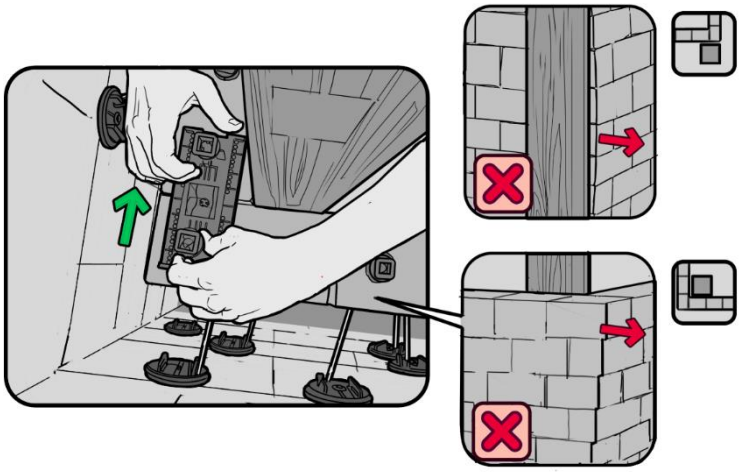


Push a connector into a new brick and then firmly push connector and brick into an already laid brick and into the mortar. This way bricks will always be properly spaced and aligned. Check the connector for a tight fit and check whether there is any mortar between the bricks: should there be any mortar between the bricks the head joint might become too wide.

STEP 3: clicking the HDPE connectors

When clicking connectors into place it is advised to check the following:

- Is the connector secured tightly? This can be determined by moving the connector left and right. If it does not snap out of position the connector is placed correctly.
- Place masonry profiles on all wall ends. Because clicking new connectors into place will cause some movement a wall without masonry profiles can become out of plumb.



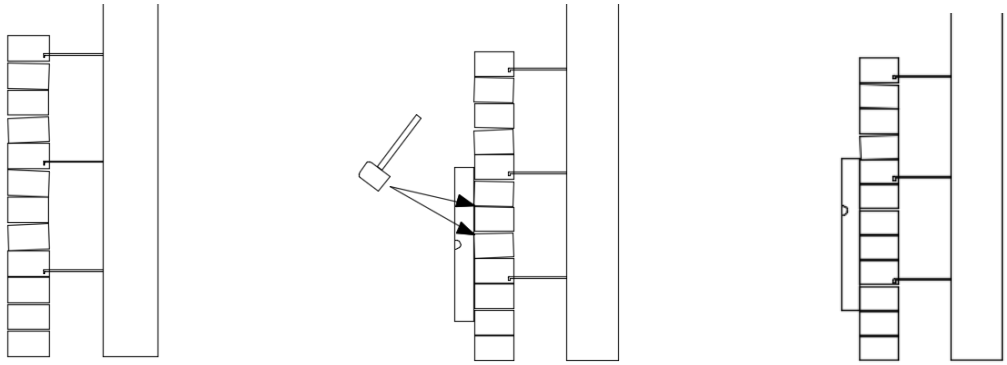
- Always click connectors into place by sliding them away from the masonry profiles. In this way the profiles themselves will not move during connector placement.

Beware of any rough edges, irregularities or imperfections at the bottom of bricks (remove if necessary). Should a brick not be level in both directions after placement onto a connector the imperfections are too big and need to be removed.

STEP 4: aligning the wall

Facadeclick works according to the principle that the courses on top will push down on the courses below to form a solid facade.

To build a wall: every 4 courses wall ties are placed between the inner wall and the facade (with a minimum of 8 ties/m²). These wall ties and a brick line will help you keep these courses level as you lay new bricks. The courses that do not have any wall ties – and therefore might not be level – then have to be aligned by using a spirit level and a rubber mallet.

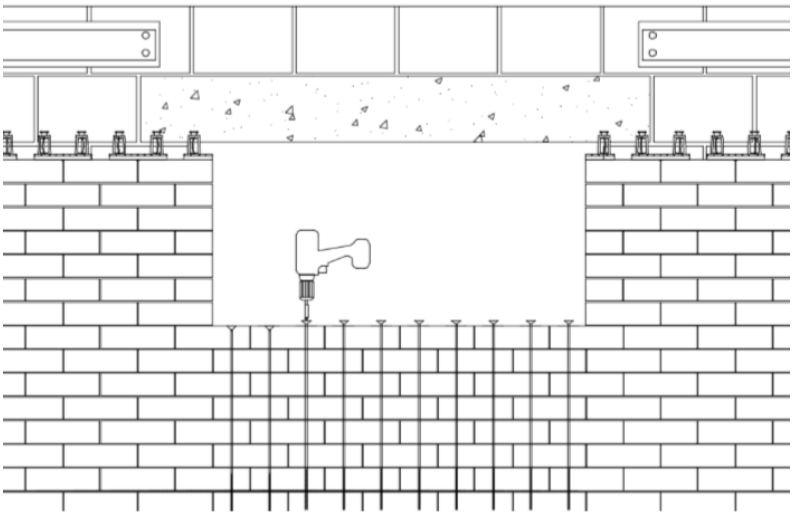


STEP 5: placing the screws

In case the courses above do not generate sufficient pressure to compress the HDPE connectors – for instance underneath a window frame – a screw can be used.

Place screws at the bottom of window openings. Screws are usually placed when the facade has reached a height of 7-8 courses.

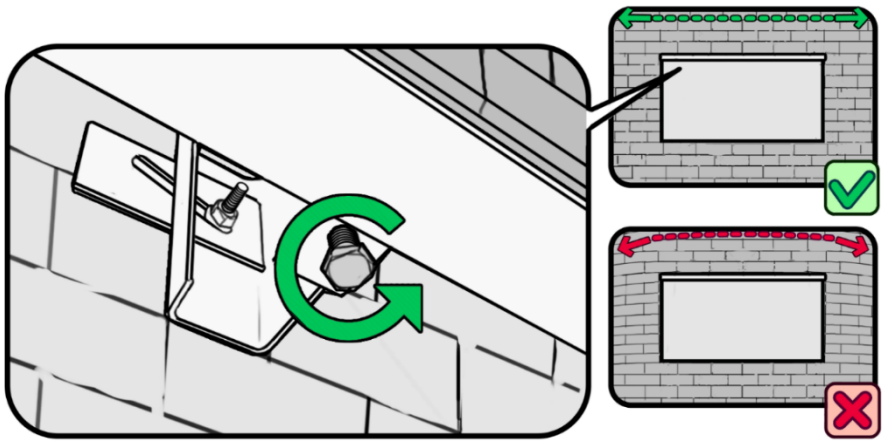
Tighten screws by screwing them through the provided holes in the HDPE connectors. The courses below the window opening should be pulled together until all joint are perfectly aligned.



STEP 6: affixing the masonry support systems

Using Facadeclick components also requires using the Facadeclick masonry support systems. These can still be adjusted after a load has been placed on them.

Affix the masonry support system at the top of the window opening. Place connectors on top of the support. Continue building at least 8 more courses. To allow for perfect brick alignment in the courses above the window opening an adjustment screw needs to be tightened or loosened.



4.1 Further clarification cavity wall design

Building a Facadeclick wall does not differ greatly from building a traditional wall. First the inner walls are erected, then the facade. As a final step insulation beads are blown into the wall cavity. This can be done before or after installing windows and doors.

Facadeclick does not require a weather-resistant barrier that drains water from the wall cavity to the weep vents. The facade has an open structure so there is no need to have any vents at all. The wall is insulated by means of blowing HR++ Termoparels insulation beads into the wall cavity. The beads have a specially developed bead size distribution that will allow moisture to drain down in the cavity without compromising insulation levels. Rainwater will run down the first centimetres of insulation and back out again. The insulation material has no hygroscopic properties so it will not allow moisture to penetrate to the inner cavity leaf.

There is no need to place additional damp-inhibiting foil to prevent rising damp as the HDPE connectors between the courses will prevent bricks from touching (see Appendix 4).

4.2 Further clarification of the wall ties and anchoring

The stainless steel wall ties are attached in two easy steps. First the ties are attached to the inner wall. This can be done by either pushing them into the provided T-slots (picture below) or attaching them to anchors that have been affixed to the inner wall (picture right).

As a second step the wall ties have to be hooked into one of the holes that are to be found over the entire length of the connectors. Because wall ties can be hooked into any of the many holes it is easy to pull in or push out part of the brickwork, enabling proper alignment of the facade.

5 Technical specifications

5.1 Pressure resistance

The pressure resistance of a Facadeclick facade is twice as high compared to a traditional brick and mortar wall (see Appendix 2).

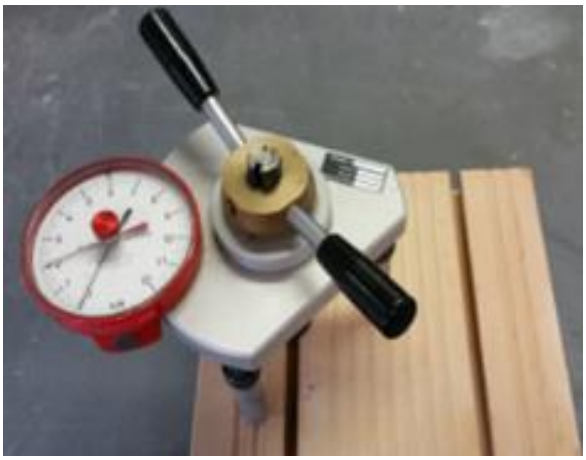
Pressure resistance brick and mortar: 5 N/mm².
Pressure resistance Facadeclick: 11 N/mm².

5.2 Tensile strength

Anchoring wall ties in a T-slot: the wall ties are capable of withstanding bigger compressive and tensile forces than traditional mortar joints.

When building a traditional wall – using wall ties and mortar – the mortar surrounding a wall tie will give in at a force of 25 kg/wall tie.

When anchoring wall ties in a T-slot both wall tie and T-slot will only yield at a tensile force of 83 kg.



The characteristic resistance using T-slots is 83 kg.

Anchoring wall ties using inner wall anchors: the inner wall anchor will only yield at a tensile force of 50 kg.

The characteristic resistance using inner wall anchors is 50 kg.

5.3 Insulation

To insulate the cavity wall we use HR++ Termoparels (EPS insulation beads), made by the company Termokomfort.

The thermal conductivity of these beads is 0.037 W/m.K.

This means that we require an insulation thickness of 15 cm to achieve a U-value of 0.22W/m².K, keeping in mind a wall design with an inner wall (0.32 W/m.K), insulation (0.037 W/m.K) and a brick facade (0.69 W/m.K). This U-value is within EPB standards (U < 0.24 W/m².K)

Water resistance of an insulated Facadeclick wall, in accordance with NEN 2778:2015: during and after completion of a water spray test - where a test wall was subjected to 96 hours of cyclic spraying and a maximum water pressure of 450 Pa – no leaks or moisture spots were observed on the inner wall surface.

Also, the determined moisture content of the samples taken did not exceed the hygroscopic equilibrium moisture content for any sample. It can therefore be concluded that the Facadeclick facade in combination with the HR++ Termoparels insulation beads can be considered watertight up to 450 Pa, in accordance with the test standard NEN 2778:2015.

Test were conducted at the University of Ghent by Prof. Dr. Ir. Arch. N. Van Den Bossche.

Appendix 1: Tension tests

Tension test on HDPE connector according to NBN 846-5

CONNECTON

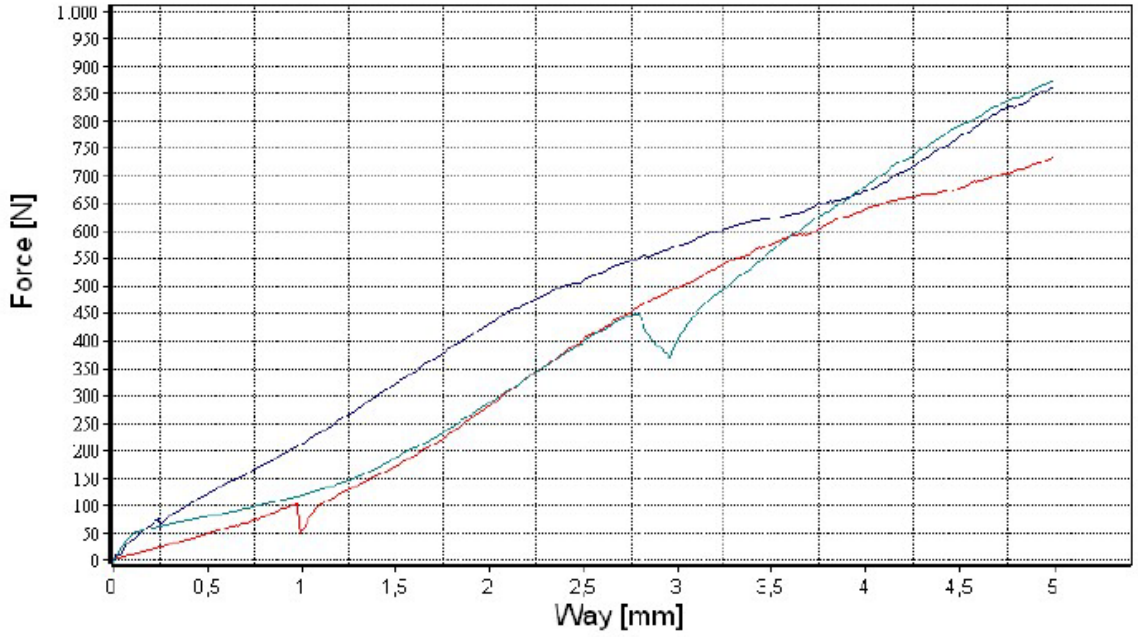
Report 6/04/2017

Project:

Order No:
Part No:
Customer: Connecton

Tester: Facadeclick 4mm
Method: Tension test
Execution date: 6/04/2017 13:44:02

Chart:



Results:

Nom	Force [N] ,max.	Way [mm] ,max.
(1)	736,32	5,00
(2)	862,70	5,00
(3)	875,15	5,00
Mean	824,72	5,00
Std. Dev.	76,81	0,00

Tension test on inner wall anchor according to NBN 846-5

USER LOGO

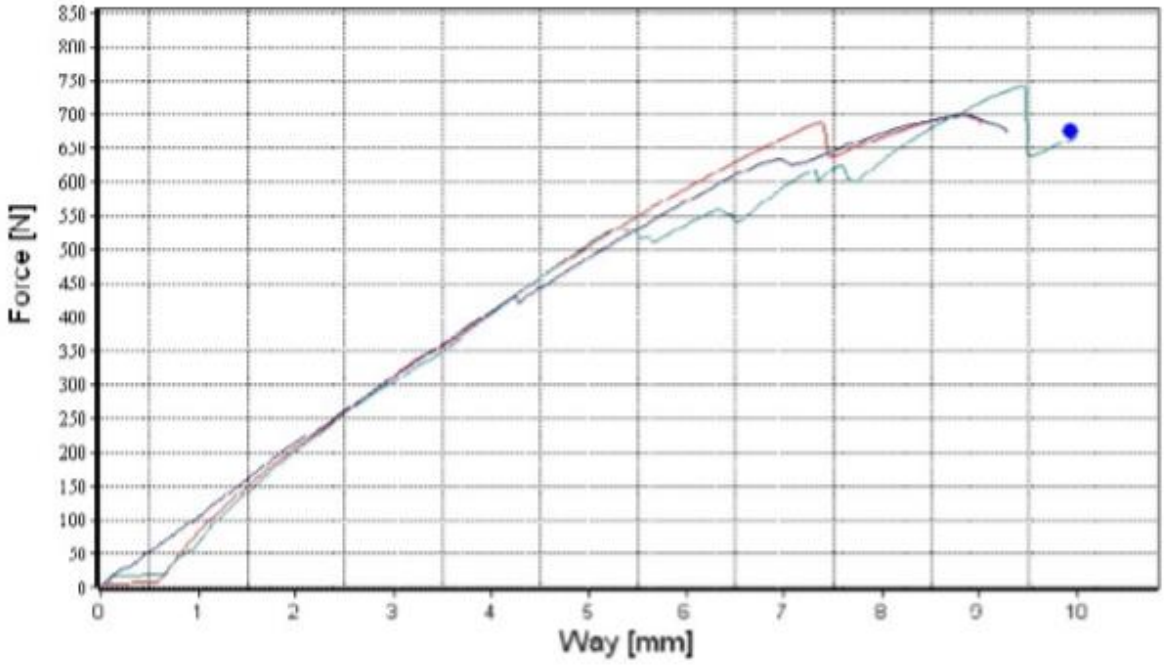
Report *Speed Building System* 27/08/2018

Project:

Order No:
Part No:
Customer: Connecton

Tester: PP 30% glasvezel
Method: Tension test
Execution date: 27/08/2018 9:35:59

Chart:



Results:

Nom	Force [N] ,max.	Way [mm] ,max.
(1)	699,31	8,83
(2)	697,85	8,81
(3)	741,75	9,43
Mean	712,97	9,02
Std. Dev.	24,94	0,35

Appendix 2: Pressure resistance

Pressure resistance comparison of a Facadeclick brick and connector facade compared to a traditional brick and mortar facade.

Test outcome pressure resistance of connector: average 11 N/mm².
Test outcome pressure resistance of mortar (M5): 5 N/mm².

Load increments during test: 0.10 N/mm²s x 20 495.44 mm² = 2.05 kN/s.

Pressure resistance test on a traditional brick and mortar facade			
Sample number	Maximum achieved force F (kN) before cracking	Surface subjected to force A_c (mm²)	Pressure resistance of the mortar: f = F/A (N/mm²)
1	81.6	20 349.10	4.01
2	105.2	20 677.03	5.08
3	117.1	20 723.67	5.65
4	121.0	20 366.03	5.94
~~5~~	~~39.0~~	~~20 364.92~~	~~1.92~~
Average pressure resistance of the mortar (N/mm²)			5.17

It must be noted that the mortar used in the above-mentioned samples was of the type M5. On the day the tests were performed the mortar was 10 days old.

Load increments during test: 0.20 N/mm²s x 6 594.10 mm² = 1.32 kN/s.

Pressure resistance test on a Facadeclick brick and connector facade			
Sample number	Maximum achieved force F (kN) before deformation	Surface subjected to pressure A_c (mm²)	Pressure resistance of the connector: f = F/A (N/mm²)
1	57.2	6 603.752	8.66
2	93.2	6 587.381	14.15
3	68.5	6 597.689	10.38
Average pressure resistance of the HDPE connector (N/mm²)			11.06

Based on the results of the pressure resistance tests we can see that traditional mortar (M5) will start to crack at an average pressure of 5.17 N/mm². One observation is that traditional mortar will crack faster than the facing bricks themselves.

The connectors will deform at an average pressure of 11.06 N/mm². This is more than twice the average pressure resistance of traditional mortar (M5).

Appendix 3: Termokomfort and water resistance

Water resistance

Test set-up: water resistant up to a water pressure of 450 Pa, in accordance with NEN 2778:2015.

During and after completion of a water spray test - where a test wall was subjected to 96 hours of cyclic spraying and a maximum water pressure of 450 Pa – no leaks or moisture spots were observed on the inner wall surface.

Also, the determined moisture content of the samples taken did not exceed the hygroscopic equilibrium moisture content for any sample. It can therefore be concluded that the Facadeclick facade in combination with the HR++ Termoparels insulation beads can be considered watertight up to 450 Pa, in accordance with the test standard NEN 2778:2015.

UNIVERSITEIT GENT

FACULTEIT **INGENIEURSWETENSCHAPPEN EN ARCHITECTUUR**

Prof. N. Van Den Bossche
Vakgroep **Architectuur en Stedenbouw**
Onderzoeksgroep **Bouwfysica en Installaties**

Waterdichtheid van na-geïsoleerde wand Snel Bouw Systeem volgens NEN 2778:2015

Calculation U-value

U-value of cavity walls + correction wall ties

Instructions

Please enter data here

Step 1 / Lambda value of the brickwork

	Brickwork density (kg/m^3)	λ (W/mK)
Inner leaf	1050	0,32
Outer leaf	2000	0,69

Step 2 / Determination of the thermal resistance without correction

	Description material	Thickness (m)	λ (W/mK)	R	
Surface transfer coefficient interior				0,12987013	
Inner leaf	Inner wall brickwork	0,1	0,32	0,3125	
Insulation	EPS beads	0,15	0,036	4,166666667	
Outer leaf	Brickwork with HDPE connector	0,09	0,69	0,130434783	
Surface transfer coefficient exterior				0,04	
R total				4,78	m²K/W
U total				0,21	W/m²K

Step 3 / Correction wall ties

d	0,15	m	
α	0,8	(-)	
λ (wall tie)	50	W/mK	(for example: steel wall tie)
Number of wall ties/m²	5	m²	
Diameter wall tie	1,25664E-05	m²	

Uf	0,01				
U-value with correction				0,22	W/m²K

Appendix 4: Water penetration

Test set-up: two walls were built; one using Facadeclick bricks and one with mortar and an additional damp-inhibiting foil. The same types of bricks were used for both walls

FACADECLICK FACADE (HDPE CONNECTOR)	
Number of days	Weight (kg)
0	6078.8
1	6443.8
2	6767.6
5	6782.1
10	6808.4

TRADITIONAL FACADE (MORTAR AND FOIL)	
Number of days	Weight (kg)
0	7158.7
1	7483.7
2	7743.8
5	7901.9
10	8016.9

The data above shows that the weight of both walls increases in the first days, until the bricks in the lower courses are saturated. Between days 5 and 10 the weight in both walls increases only very little. We can therefore conclude that both damp-inhibiting foil and Facadeclick HDPE connectors ensure that the brickwork in the upper courses is not being saturated.

Appendix 5: Fire test

warringtonfiregent
global safety

Speed Building System Belgium
attn. Mr. Bernard Janssen
Pastoor Legrandestraat 61
3012 Wilsele
Belgium

Provisional certificate of the Reaction to fire test:
CLASSIFICATION REPORT NO. 19333C.

Dear Mr. Janssen,

Herewith we confirm that between 03/09/2018 and 12/09/2018 tests have been carried out in our laboratory according to the prescriptions in the European standard EN 13823 and EN ISO 11925-2, on *Facadeclick,* at the demand of your company.

We confirm, provisionally and with reservation, that the following results have been obtained:

B-s1,d0

These results apply exclusively to the test specimen/material as it will be described in detail in test reports No. 19333A, 19333B and classification report No. 19333C that will shortly be delivered to you. The test reports will allow you to verify the conformity with the test specimen/material.

This attestation has been drawn up on the basis of the measurements and observations registered during the test. Corrections to these data might prove necessary during the verification of the measures and the drafting of the final test report.

As soon as the test report is at your disposal, this attestation may no longer be used.

THE VALIDITY OF THIS ATTESTATION IS IN ANY CASE LIMITED TO SIX MONTHS.

Yours sincerely,

Niek De Pauw (Signature)
Project assistant
Gent
2018.09.20 11:09:04 +02'00'

Bart Sette (Signature)
General Manager
Gent
2018.09.20 11:41:50 +02'00'

For and on behalf of WFRGENT nv

This test confirmation letter has been drafted according to EGOLF agreement EGA 08rev2:2013 "Application note: clause 5.10 [5.10/1] – Types of test reports used in fire testing". Whilst the test information and results provided within this test confirmation letter were obtained from a test conducted fully in accordance with the standards EN ISO 11925-2, EN 13823 and EN 13501-1, the presentation of the results in this manner does not satisfy the requirements of those standards and EN ISO/IEC 17025:2017. Additionally it should be recognized that the results of the test might change during further analysis of the data during the completion of the full test report. The information provided in this test confirmation letter is valid for six months only or until the full test report is issued, whichever is earliest.
The authenticity of the electronic signatures is assured by Belgium Root CA.

Appendix 6: Technical specifications

Material

The different Facadeclick components:

a. Facing brick
b. HDPE connector
c. Wall tie and anchor
d. Screw
e. Wall cavity insulation by means of insulation beads

Application area: masonry, facade building.

Performance

Tensile strength wall tie: 824N/wall tie.
Pressure resistance: 11 N/mm².
U-value 15 cm insulation: 0.23W/m².K.

Uitvoering

Facing bricks of the type 'waaldikformaat' (WDF), laid in stretching bond, no glue or mortar required.

Bed joints: the visible joints are have a thickness of approximately 3 mm.
Mixing bricks: it is advised to mix bricks from several packs concurrently (with a minimum of 3 packs at any given time). The bricks must be collected diagonally from the packs. Make sure to also read the brick manufacturer's instructions on how to mix bricks.
Laying bricks: make sure to consider size tolerances in brickwork. It is also advised to order all required bricks in one batch as different production series may vary in colour shading.

This document is not binding and annuls all previous publications. The manufacturers of the various construction materials and building components reserve the right to change their product ranges and characteristics. The user must always ensure to have the most recent description text.