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European Technical Assessment

ETA 23/0445
of 29.12.2023



General part

| Technical Assessment Body issuing the ETA: ITeC | |
|--|---|
| ITeC has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment) | |
| Trade name of the construction product | Kit Glasroc® X external wall system |
| Product family to which the construction product belongs | Kits for non-load bearing mineral board external wall systems |
| Manufacturer | SAINT-GOBAIN PORTUGAL SA Rua da Carreira Branca Zona Industrial de Taboeira 3800 055 Aveiro (Portugal) |
| Manufacturing plant(s) | According to Annex N kept by ITeC. |
| This European Technical Assessment contains | 35 pages including 9 annexes which form an integral part of this assessment. |
| This European Technical Assessment is issued in accordance with Regulation (EU) 305/2011, on the basis of | EAD 090120-00-0404 <i>Kits for non-load bearing mineral board external wall systems. July 2018.</i> |

General comments

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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Specific parts of the European Technical Assessment

1 Technical description of the product

This ETA refers to the kit Glasroc® X for external wall systems.

This kit consists of eight rendering systems (different combinations of base-coats and finishing coats), the Glasroc® X board (gypsum boards with fibrous reinforcement) as external-board, the internal boards (gypsum boards according to EN 520) and their board-fixings (for galvanized steel subframe).

Kit components are given in table 1.1 related with Glasroc® X external wall systems components.

Detailed information and data of all the components are given in the annexes of this ETA.

Table 1.1: External wall system components.

| Assembled system layer | Glasroc® X external wall systems | Technical description |
|---|--|-----------------------|
| Rendering systems (only for Use 1 according to clause 1.2) | FC: Finishing coat | Annex 2 |
| | P: Primer | |
| | BC: Base-coat | |
| | M: Reinforcement mesh | |
| External layer | EB: Glasroc® X board | Annex 3 |
| | E-Fix: Glasroc® X board-fixings | Annex 6 |
| | WPL: Flexible sheet for waterproofing (optional) (*) | |
| Internal layer | Gypsum boards Placo®, Rigips, British Gypsum & Gyproc | Annex 4 |
| | I-Fix: Internal board-fixings | Annex 4 |
| External subframe (single or double wall) | E-GSF: Galvanized steel C/U-profiles (*) | Annex 5 |
| Internal subframe (double wall) | I-GSF: Galvanized steel C/U-profiles | |
| Other | Fixings between the substrates and the supporting structure (*) | Annex 5 |
| | Thermal insulation (*) | Annex 6 |

(*) These components are not part of the kit but of the assembled system. They are not supplied by the kit manufacturer; however, they are available on the market, and they have to meet the specifications indicated in this ETA (see Annex 5 and Annex 6).

The flexible sheet for waterproofing may be used on the assembled systems depending on the climatic conditions of the works where the system is installed; however, both, the thermal insulation and the fixings between the subframes and the supporting structure are always needed for the execution of the assembled systems and they should be chosen accordingly following the specifications given in this ETA. In the case of the fixings, the supporting structure material and the resistance required due to wind load (shear strength) must be considered.

Other elements of the external walls that neither are part of the kit nor of the system are:

- Internal finishings (e.g., renderings, primers, paints and tiles).
- External finishings¹ (bonded and/or mechanically fixed) in case of the Use 2, used as substrate walls (see clause 1.2).
- Windows and doors.

¹ The exterior finishings are not part of the kit, however, the generic exterior finishings provided for the substrate walls are described in Annex 9.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

Kit for Glasroc® X external wall systems is to be used as:

- Use 1: Complete external wall² systems in non-ventilated façades when the kit includes the rendering system.
- Use 2: Substrate wall³ systems in ventilated and non-ventilated façades when the kit does not include the rendering systems.

This ETA covers the kits for family 1 and family 3 (for galvanized steel subframes) according to table 1.1 of EAD 090120-00-0404 as shown in Annex 1.

The provisions made in this European Technical Assessment are based on an assumed working life of at least 25 years for the kits. The indications given on the working life cannot be interpreted as a guarantee given by the producer but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

Glasroc® X external wall systems are made of non-load bearing construction components. They do not contribute directly to the stability of the building on which they are installed, but they may contribute to its durability by providing enhanced protection from the effect of weathering.

Glasroc® X external wall systems subframes are interrupted by the structural floors, those external wall systems that are not interrupted by the structural floors (continuous subframes fixed to the front of the structural floors such as in curtain walling) are not covered by this ETA.

Construction details are given in Annex 7.

² Non load-bearing complete building envelope.

³ Substrate of exterior finishings (bonded and/or mechanically fixed). In this case, the assessment as complete building envelope (with exposition to external weather conditions) is not part of this ETA.

3 Performance of the product and reference to the methods used for its assessment

The assessment of kit for Glasroc® X external wall systems for the intended use was performed following EAD 090120-00-0404 *Kits for non-load bearing mineral board external wall systems*.

Table 3.1: Summary of the performance (see also detailed performances in relevant annexes).

| Basic Works Requirement | EAD clause | Essential characteristic | Performance | |
|--|---|--|---|------------------|
| | | | Use 1 | Use 2 |
| Product: | Kit for Glasroc® X external wall system | Intended use: | Use 1: Complete external wall systems in non-ventilated façades when the kit includes the rendering system. | |
| | | | Use 2: Substrate wall systems in ventilated and non-ventilated façades when the kit does not include the rendering systems. | |
| BWR 2 Safety in case of fire | 2.2.1 | Reaction to fire | See table A1.1.3 | See table A1.2.3 |
| | 2.2.2 | Resistance to fire | See table A1.1.3 | See table A1.2.3 |
| | 2.2.3 | Façade fire performance | Not assessed | |
| | 2.2.4 | Propensity to undergo continuous smouldering | Not assessed | |
| BWR 3 Hygiene, health and the environment | 2.2.5 | Watertightness (protection against driving rain) | See table A1.1.3 | Not assessed |
| | 2.2.6 | Water absorption | See table A1.1.3 | Not relevant |
| | 2.2.7 | Water vapour permeability | See table A1.1.3 | Not relevant |
| | 2.2.8 | Condensation risk | Not assessed | |
| | 2.2.9 | Air permeability | See table A1.1.3 | See table A1.2.3 |
| | 2.2.10 | Content, emission and/or release of dangerous substances | Not assessed | |
| BWR 4 Safety and accessibility in use | 2.2.11 | Wind load resistance | See clause 3.1 | |
| | 2.2.12 | External eccentric vertical load resistance | Not relevant | See table A1.2.3 |
| | 2.2.13 | Internal eccentric vertical load resistance | Not assessed | |
| | 2.2.14 | Internal horizontal linear static load resistance | See table A1.1.3 | See table A1.2.3 |
| | 2.2.15 | External impact resistance | See table A1.1.3 | See table A1.2.3 |
| | 2.2.16 | Internal impact resistance | See table A1.1.3 | See table A1.2.3 |
| | 2.2.17 | Resistance to horizontal point loads | Not assessed | Not relevant |
| | 2.2.18.1 | Bond strength | See table A1.1.3 | Not relevant |
| | 2.2.18.2 | Bending strength of the board | See table A1.1.3 | See table A1.2.3 |
| | 2.2.18.3 | Embedding/Shear strength | See table A1.1.3 | See table A1.2.3 |
| BWR 5 Protection against noise | 2.2.19 | Airborne sound insulation | Family 1: Not assessed. Family 3: See clause 3.2 | |
| | 2.2.20 | Sound absorption | Not assessed | |
| BWR 6 Energy economy and heat retention | 2.2.21 | Thermal resistance | See Annex 8 | |
| | 2.2.22 | Thermal inertia | Not assessed | |
| | 2.2.23 | Heat capacity | Not assessed | |
| Aspects of durability | 2.2.24.1 | Accelerated ageing behaviour | See table A1.1.3 | See table A1.2.3 |
| | 2.2.24.2 | Cracking strength due to board deformation | Not assessed | Not relevant |
| | 2.2.24.3 | Dimensional stability by humidity | See table A1.1.3 | See table A1.2.3 |
| | | Dimensional stability by temperature | See table A1.1.3 | See table A1.2.3 |
| | 2.2.24.4 | Moisture content | Not assessed | |
| | 2.2.24.5 | Corrosion | Not assessed | |
| 2.2.24.6 | UV radiation resistance | Not assessed | | |

Complementary information:

Requirements with respect to the mechanical resistance and stability of non-load bearing parts of the works are not included in the Basic Works Requirement *Mechanical resistance and stability* (BWR 1) but are treated under the Basic Works Requirement *Safety and accessibility in use* (BWR 4).

3.1 Wind load resistance

The wind load resistance of the kits has been assessed according to clause 2.2.11 of EAD 090120-00-0404.

Tables A1.1.3 and A1.2.3 in Annex 1 gives the wind load resistance obtained in the tests carried out for Glasroc® X external wall systems with galvanized steel external subframe.

In addition, table 3.1 gives the wind load resistance for other different assembled systems considering the subframe components specifications given in Annex 5.

Table 3.1: Wind load resistance for kits with galvanized steel non-slotted C/U-profiles as external subframe.

| Span between (mm) | | Q (kN/m ²) (*) | Failure limit condition |
|-------------------|--------------------------|----------------------------|--|
| Vertical profiles | Structural floors, L (m) | | |
| 400 | 2,70 | < 1,30 | L/250 displacement in the vertical profile |
| | 3,00 | < 0,95 | |
| | 3,50 | < 0,60 | |
| 600 | 2,70 | < 0,90 | L/250 displacement in the vertical profile |
| | 3,00 | < 0,65 | |
| | 3,50 | < 0,40 | |

(*) Calculated values using simple beam uniformly distributed load formulas including safety factors $\gamma_Q = 1,50$; $\gamma_m = 1,10$. Values for the weakest galvanized steel external subframe (width 75 mm, thickness 1 mm). Span between board-fixings is 250 mm .

In other configurations of the assembled system (other subframe components), the wind load resistance may be calculated according to:

- Maximum tension of the vertical profiles, see elastic limit of profile material in Annex 5.
- Maximum deflection of the vertical profiles, L/250.
- Resistance of the external-board and its connection with the subframe. See Annex 3.
- This calculated wind load value should not be greater than the maximum resistance given in tables A1.1.3 or A1.2.3 of Annex 1.

3.2 Airborne sound insulation

The airborne sound insulation is to be assessed by means of the following characteristics:

- Airborne sound insulation of the assembled system defined in table 3.2, according to clause 2.2.19.1 of EAD 090120-00-0404.
- Airflow resistivity of the assembled system thermal insulation according to clause 2.2.19.2 of EAD 090120-00-0404. Airflow resistivity has not been assessed.

Table 3.2: Airborne sound insulation test results.

| Test | Specimen | Thickness (mm) | Mass per unit area (kg/m ²) | Results |
|---------------------------|-----------------------------|----------------|---|------------------------------------|
| Airborne sound insulation | Double wall (*) Family 3 | 165,5 | 43,6 | $R_w (C; C_{tr}) = 63 (-2; -5)$ dB |

R_w = weighted sound reduction weighted index.

(*) Double wall configuration: Glasroc® X board with joint treatment without rendering system. Galvanized steel external subframe 75 mm width, 1 mm thickness, span 400 mm, thermal insulation MW 65 mm thickness, 20 kg/m³ density. Galvanized steel internal subframe 48 mm width, 0,6 mm thickness, span 400 mm, thermal insulation MW 45 mm. Elastic joint in the subframes perimeter. Two internal boards (IB1) with joint treatment.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the decision 2003/640/EC, as amended of the European Commission⁴, the systems of AVCP (see EC delegated regulation (EU) No 568/2014 amending Annex V to Regulation (EU) 305/2011) given in the following table apply.

Table 4.1: Applicable AVPC system.

| Product | Intended use | Level or class | System |
|---|------------------------|---------------------------------|--------|
| Kits for non-load bearing mineral board external wall systems | Complete external wall | not subject to fire regulations | 2+ |
| | | subject to fire regulations | 3 |
| | Substrate wall | not subject to fire regulations | 2+ |
| | | subject to fire regulations | 4 |

5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

All the necessary technical details for the implementation of the AVCP system are laid down in the *Control Plan* deposited with the ITeC⁵, with which the factory production control shall be in accordance.

Issued in Barcelona on 29 December 2023

by the Catalonia Institute of Construction Technology.



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Technical Director, ITeC

⁴ 2003/640/EC – Commission Decision of date 4 September 2003, published in the Official Journal of the European Union (OJEU) L226/21 of 10/09/2003.

⁵ The *Control Plan* is a confidential part of the ETA and is only handed over to the notified certification body involved in the assessment and verification of constancy of performance.

ANNEX 1 - GLASROC® X EXTERNAL WALL SYSTEMS

A1.1 – COMPLETE EXTERNAL WALL SYSTEMS

Table A1.1.1: Description of Glasroc® X external wall systems – Family 1.

| | | | |
|---|---|-----------------------|-------------|
| | Family 1 – single wall without internal horizontal profile | | |
| | Use 1: Complete building envelope in non-ventilated façades Release scenario with respect to dangerous substances: IA2: Indirect contact to indoor air. S/W2: Product with indirect contact to soil, ground- and surface water. Subframe material: Galvanized steel. | | |
| <ol style="list-style-type: none"> 1. Finishing coat. 2. Primer. 3. Base-coat and reinforcement mesh. 4. External-board and joint treatment. 5. Flexible sheet for waterproofing (optional). 6. Subframe and thermal insulation. 7. Two internal-boards and joint treatment. | System main components: | | |
| | Rendering system | See Annex 2 | |
| | External layer | Glasroc® X board | See Annex 3 |
| | | External board-fixing | |
| | Internal layer | Gypsum board (x 2) | See Annex 4 |
| | | Internal board-fixing | |
| | External subframe (*) | See Annex 5 | |
| | Flexible sheet for waterproofing (*) | See Annex 6 | |
| Thermal insulation (*) | | | |
| Fixings between the subframes and the substrate (*) | See Annex 5 | | |
| (*) These components are not part of the kit but of the assembled system. They are not supplied by the manufacturer; however, they are available on the market and they have to meet the specifications indicated in the respective annexes. | | | |

Table A1.1.2: Description of Glasroc® X external wall systems – Family 3.

| | | | |
|--|---|-----------------------|-------------|
| | Family 3 – double wall without intermediate board | | |
| | Use 1: Complete building envelope in non-ventilated façades Release scenario with respect to dangerous substances: IA2: Indirect contact to indoor air. S/W2: Product with indirect contact to soil, ground- and surface water. Subframe material: Galvanized steel. | | |
| <ol style="list-style-type: none"> 1. Finishing coat. 2. Primer. 3. Base-coat and reinforcement mesh. 4. External-board and joint treatment. 5. Flexible sheet for waterproofing (optional). 6. External subframe and thermal insulation. 7. Internal subframe and thermal insulation. 8. Two internal-boards and joint treatment. | System main components: | | |
| | Rendering system | See Annex 2 | |
| | External layer | Glasroc® X board | See Annex 3 |
| | | External board-fixing | |
| | Internal layer | Gypsum board (x 2) | See Annex 4 |
| | | Internal board-fixing | |
| | External subframe (*) | See Annex 5 | |
| | Internal subframe (*) | | |
| | Flexible sheet for waterproofing (*) | See Annex 6 | |
| | Thermal insulation (*) | | |
| Fixings between the subframes and the substrate (*) | See Annex 5 | | |
| (*) These components are not part of the kit but of the assembled system. They are not supplied by the manufacturer; however, they are available on the market and they have to meet the specifications indicated in the respective annexes. | | | |

Complete non-load bearing external wall systems

Glasroc® X external wall systems with rendering

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Table A1.1.3: Performance for Glasroc® X external wall systems. Families 1 and 3.

| Nr | Essential characteristic | Kit for Glasroc® X external wall systems relevant configuration | Performance | | | |
|---|---|---|---|------------------------------|----------------------------|-----------------------------|
| Basic Works Requirement 2: Safety in case of fire | | | | | | |
| 1 | Reaction to fire (external surface) | Glasroc® X board (EB1) as external-board and rendering system (Var1 to Var8) | B-s1,d0 | | | |
| | Reaction to fire (internal surface) | Internal gypsum boards (IB1 to IB5) | A2-s1,d0 | | | |
| 2 | Resistance to fire | PPF (fire resistant wallboard) internal boards (IB1) and mineral wool thermal insulation (simple and double wall) | EI 90 (o ↔ i) | | | |
| | | Other internal boards (IB2 to IB5) | Not assessed | | | |
| 3 | Façade fire performance | | Not assessed | | | |
| 4 | Propensity to undergo continuous smouldering | | Not assessed | | | |
| Basic Works Requirement 3: Hygiene, health and the environment | | | | | | |
| 5 | Watertightness (protection against driving rain) | Glasroc® X (EB1) as external-board, any rendering system (Var1 to Var8) with and without flexible sheet of waterproofing (WPL1 to WPL3) | 1350 Pa without water penetration | | | |
| 6 | Water absorption by capillarity | Glasroc® X (EB1) as external-board and rendering system (Var1 to Var3) | without ageing | (3 min) kg/m ² | (1 h) kg/m ² | (24 h) kg/m ² |
| | | | after hygrothermal cycles | 0,12 | 0,19 | 0,42 |
| | | Glasroc® X (EB1) as external-board and base coat (BC1) | without ageing | 0,02 | 0,01 | 0,07 |
| | | | after hygrothermal cycles | 0,01 | 0,01 | 0,09 |
| | | Glasroc® X (EB1) as external-board and rendering system (Var4 to Var6) | without ageing | 0,11 | 0,04 | 0,33 |
| | | | after hygrothermal cycles | 0,11 | 0,02 | 0,20 |
| | | Glasroc® X (EB1) as external-board and base-coat (BC2) | without ageing | 0,10 | 0,12 | 0,59 |
| | | | after hygrothermal cycles | 0,13 | 0,13 | 0,53 |
| | | Glasroc® X (EB1) as external-board and rendering system (Var7 & Var8) | without ageing | 0,02 | 0,04 | 0,26 |
| | | | after hygrothermal cycles | 0,02 | 0,02 | 0,10 |
| | | Glasroc® X (EB1) as external-board and base-coat (BC3) | without ageing | 0,17 | 0,09 | 0,51 |
| after hygrothermal cycles | 0,28 | | 0,48 | 0,61 | | |
| Water permeability (water column) | | | Not assessed | | | |
| Water absorption of the board | Glasroc® X (EB1) | | < 100 g/m ² in 2 h (partial immersion) < 5% (total immersion) | | | |
| | Internal gypsum boards (IB1- to IB5) | | Not assessed | | | |
| Watertightness of the breather membrane | Flexible sheet for waterproofing (WPL1 to WPL3) | | Not assessed | | | |
| 7 | Water vapour permeability of the rendering system | Var1 to Var8 on Glasroc® X (EB1) | Not assessed | | | |
| | Water vapour permeability of the boards | Glasroc® X (EB1) | $\mu = 18,2$ | | | |
| | | Internal gypsum boards without vapour control (IB1 to IB4) | $\mu = 10$ (dry) / 4 (wet) | | | |
| | | Vapour control internal gypsum boards (IB5) | Sd = 1500 m | | | |
| | Water vapour permeability of the thermal insulation | Mineral Wool | Not assessed (thermal insulation is not a kit component) | | | |
| Water vapour permeability of the breather membrane | Flexible sheet for waterproofing (WPL1 to WPL3) | | Not assessed (flexible sheet for waterproofing is not a kit component) | | | |
| 8 | Condensation risk | | Not assessed | | | |

Complete non-load bearing external wall systems**Glasroc® X external wall systems with rendering****Annex A1.1**

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| Nr | Essential characteristic | Kit for Glasroc® X external wall systems relevant configuration | Performance | | | | |
|---|--|---|--|----------------------------|------------------------------|-------------|--|
| 9 | Air permeability | Glasroc® X (EB1) with rendering system | Class A4 0,00 m ³ /m ² ·h at 50 Pa; < 1,50 m ³ /m ² ·h at 100 Pa to 600 Pa | | | | |
| 10 | Content, emission and/or release of dangerous substances | | Not assessed | | | | |
| Basic Works Requirement 4: Safety and accessibility in use | | | | | | | |
| 11 | Wind load resistance | Glasroc® X board (EB1) with 600 mm span between vertical profiles. | 1500 Pa; $\delta \leq L/250$ See also clause 3.1 | | | | |
| | | Glasroc® X board (EB1), with 400 mm span between vertical profiles 1 mm thickness. | 1800 Pa; $\delta \leq L/250$ See also clause 3.1 | | | | |
| | | Glasroc® X board (EB1), with 400 mm span between vertical profiles 75 mm width and 2 mm thickness. | 2300 Pa; $\delta \leq L/250$ See also clause 3.1 | | | | |
| | | Glasroc® X board (EB1), with 400 mm span between vertical profiles 100 mm width and 2 mm thickness. | 2600 Pa; $\delta \leq L/250$ See also clause 3.1 | | | | |
| 12 | External eccentric vertical load resistance (for Use 2) | | Not relevant | | | | |
| 13 | Internal eccentric vertical load resistance | | Not assessed | | | | |
| 14 | Internal horizontal linear static load resistance | | 1,93 kN/m (at 40 mm deflection) | | | | |
| 15 | External impact resistance | Glasroc® X (EB1) with rendering system, external galvanized steel external subframe with minimum width 75 mm, minimum thickness 1 mm and maximum span between vertical profiles 600 mm. | Resists (Category I): - Hard body 0,5 kg, 3 J - Hard body 1,0 kg, 10 J - Soft body 3,0 kg, 60 J - Soft body 50,0 kg, 400 J | | | | |
| 16 | Internal impact resistance | Double internal-board (IB1 to IB5), galvanized steel internal subframe minimum width 48 mm width, minimum thickness 0,6 mm with maximum span 600 mm. | Resists (Category III): - Hard body 0,5 kg, 6 J - Hard body 1,0 kg, 10 J - Soft body 50,0 kg, 120 J - Soft body 50,0 kg, 300 J - Soft body 50,0 kg, 500 J - Soft body 50,0 kg, 900 J | | | | |
| 17 | Resistance to horizontal point loads (for Use 1) | | Not assessed | | | | |
| 18 | Bond strength | Glasroc® X (EB1) as external-board and rendering system (Var1 to Var3) | without ageing | Mean (R _m) MPa | Min. (R _{min}) MPa | Rupture (*) | |
| | | | after hygrothermal cycles | 0,32 | 0,26 | 100% CP | |
| | | | after freeze-thaw cycles | 0,27 | 0,21 | 100% CP | |
| | | Glasroc® X (EB1) as external-board and base-coat (BC1) | without ageing | Not relevant | | | |
| | | | after hygrothermal cycles | 0,24 | 0,21 | 100% CP | |
| | | Glasroc® X (EB1) as external-board and rendering system (Var4 to Var6) | without ageing | 0,18 | 0,15 | 100% CP | |
| | | | after hygrothermal cycles | 0,23 | 0,19 | 100% CP | |
| | | Glasroc® X (EB1) as external-board and base-coat (BC2) | without ageing | Not relevant | | | |
| | | | after hygrothermal cycles | 0,20 | 0,17 | 100% CP | |
| | | Glasroc® X (EB1) as external-board and base-coat (BC3) | without ageing | 0,23 | 0,19 | 100% CP | |
| | | | after hygrothermal cycles | 0,28 | 0,21 | 100% CP | |
| | | Glasroc® X (EB1) as external-board and rendering system (Var7 to Var8) | without ageing | Not relevant | | | |
| | | | after hygrothermal cycles | 0,23 | 0,17 | 100% CP | |
| | | Glasroc® X (EB1) as external-board and base-coat (BC3) | without ageing | 0,35 | 0,27 | 100% CP | |
| after hygrothermal cycles | 0,32 | | 0,21 | 100% CP | | | |
| 19 | Bending strength of the board | Glasroc® X (EB1) | Longitudinal | 8,4 MPa | | | |
| | | | Transversal | 6,5 MPa | | | |
| Complete non-load bearing external wall systems | | | Annex A1.1 | | | | |
| Glasroc® X external wall systems with rendering | | | of European Technical Assessment ETA 23/0445 | | | | |

| Nr | Essential characteristic | Kit for Glasroc® X external wall systems relevant configuration | Performance |
|---|---|--|--|
| | | Internal-boards (IB1 to IB5) | See table A4.2 |
| 20 | Embedding/Shear strength | Glasroc® X (EB1) and screw (EFix1) Ø4,8 mm ($a_{edge} \geq 15$ mm) | $F_m = 461$ N; $F_c = 309$ N |
| 21 | Pull-through resistance | Glasroc® X (EB1) and screw (E-Fix1) Ø4,8 mm ($a_{edge} \geq 15$ mm). Galvanized steel profile minimum thickness 1 mm. | $F_m = 392$ N; $F_c = 292$ N |
| | Pull-out resistance | | |
| 22 | Resistance of profiles | Galvanized steel subframes profiles | Not assessed (subframe profile is not a kit component) |
| Basic Works Requirement 5: Protection against noise | | | |
| 23 | Airborne sound insulation | Family 1 (single wall) | Not assessed |
| | | Family 3 (double wall) | See clause 3.2 |
| | Airflow resistivity of the thermal insulation | Mineral wool | Not assessed (thermal insulation is not a kit component) |
| 24 | Sound absorption | Internal gypsum boards (IB1 to IB5) | Not assessed |
| Basic Works Requirement 6: Energy economy and heat retention | | | |
| 25 | Thermal resistance | Assembled system configurations given in Annex 8 | See Annex 8 |
| | | Other assembled system configurations | Not assessed |
| 26 | Thermal inertia | | Not assessed |
| 27 | Heat capacity | | Not assessed |
| Aspects of durability | | | |
| 28 | Accelerated ageing behaviour | Hygrothermal behaviour | No defects (see also points 6 & 18 in this table) |
| | | Freeze thaw behaviour | Not relevant. Water absorption < 0,50 kg/m ² |
| | | Combined hygrothermal and freeze thaw behaviour | Not assessed |
| 29 | Cracking strength due to board deformation | | Not assessed |
| 30 | Dimensional stability by humidity. Expansion (30 % to 90 %) | Glasroc® X (EB1) | 0,031 % |
| | Linear thermal expansion | Glasroc® X (EB1) | 0,008 mm/m·°C |
| | | Galvanized steel subframes | $\alpha = 12 \mu\text{m}/\text{m}\cdot\text{K}^{-1}$ for $T \leq 100$ °C |
| 31 | Moisture content | Glasroc® X (EB1) | Not assessed |
| 32 | Corrosion | Board-fixing | See table A3.3 |
| | | Galvanized steel subframe | Not assessed (subframes are not kit components) |
| 33 | UV radiation resistance | Flexible sheet for waterproofing (WPL1 to WPL3) | Not assessed (flexible sheet for waterproofing is not a kit component) |
| (*) CP = Cohesive rupture in the Glasroc® X Board. | | | |

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|--|---|
| Complete non-load bearing external wall systems | Annex A1.1 of European Technical Assessment ETA 23/0445 |
| Glasroc® X external wall systems with rendering | |

A1.2 – SUBSTRATE WALL SYSTEMS

Table A1.2.1: Description of Glasroc® X external wall systems – Family 1.



| | | | |
|---|--|--------------------------------------|-------------|
|  | Family 1 – single wall without internal horizontal profile | | |
| | Use 2: Substrate of exterior finishings in ventilated and non-ventilated façades Release scenario with respect to dangerous substances: IA2: Indirect contact to indoor air. S/W2: Product with indirect contact to soil, ground- and surface water. Subframe material: Galvanized steel. | | |
| <ol style="list-style-type: none"> 1. External-board and joint treatment. 2. Flexible sheet for waterproofing (optional). 3. Subframe and thermal insulation. 4. Two internal-boards and joint treatment. | System main components: | | |
| | External layer | Glasroc® X board | See Annex 3 |
| | | External board-fixing | |
| | Internal layer | Gypsum board (x 2) | See Annex 4 |
| | | Internal board-fixing | |
| | | External subframe (*) | See Annex 5 |
| | | Flexible sheet for waterproofing (*) | See Annex 6 |
| | | Thermal insulation (*) | |
| | Fixings between the subframes and the substrate (*) | See Annex 5 | |
| (*) These components are not part of the kit but of the assembled system. They are not supplied by the manufacturer; however, they are available on the market and they have to meet the specifications indicated in the respective annexes. | | | |

Table A1.2.2: Description of Glasroc® X external wall systems – Family 3.

| | | | |
|--|--|--------------------------------------|-------------|
|  | Family 3 – double wall without intermediate board | | |
| | Use 2: Substrate of exterior finishings in ventilated and non-ventilated façades Release scenario with respect to dangerous substances: IA2: Indirect contact to indoor air. S/W2: Product with indirect contact to soil, ground- and surface water. Subframe material: Galvanized steel. | | |
| <ol style="list-style-type: none"> 1. External-board and joint treatment. 2. Flexible sheet for waterproofing (optional). 3. External subframe and thermal insulation. 4. Internal subframe and thermal insulation. 5. Two internal-boards and joint treatment. | System main components: | | |
| | External layer | Glasroc® X board | See Annex 3 |
| | | External board-fixing | |
| | Internal layer | Gypsum board (x 2) | See Annex 4 |
| | | Internal board-fixing | |
| | | External subframe (*) | See Annex 5 |
| | | Internal subframe (*) | |
| | | Flexible sheet for waterproofing (*) | See Annex 6 |
| | Thermal insulation (*) | | |
| | Fixings between the subframes and the substrate (*) | See Annex 5 | |
| (*) These components are not part of the kit but of the assembled system. They are not supplied by the manufacturer; however, they are available on the market and they have to meet the specifications indicated in the respective annexes. | | | |

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Glasroc® X external wall systems without rendering

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Table A1.2.3: Performance for Glasroc® X external wall systems. Families 1 and 3.

| Nr | Essential characteristic | Kit for Glasroc® X external wall systems relevant configuration | Performance | | | |
|---|--|---|---|-----------------|--------------------------------------|------------------------------------|
| Basic Works Requirement 2: Safety in case of fire | | | | | | |
| 1 | Reaction to fire (external surface) | Glasroc® X (EB1) | A1 | | | |
| | Reaction to fire (internal surface) | Internal gypsum boards (IB1 to IB5) | A2-s1,d0 | | | |
| 2 | Resistance to fire | PPF (Fire resistant wallboard) internal boards (IB1) and mineral wool thermal insulation (simple and double wall) | EI 90 (o ↔ i) | | | |
| | | Other internal boards (IB2 to IB5) | Not assessed | | | |
| 3 | Façade fire performance | | Not assessed | | | |
| 4 | Propensity to undergo continuous smouldering | | Not assessed | | | |
| Basic Works Requirement 3: Hygiene, health and the environment | | | | | | |
| 5 | Watertightness (protection against driving rain) | | Not assessed. For use with watertight exterior-finishing. | | | |
| 6 | Water absorption by capillarity | | Not relevant. | | | |
| | Water permeability (water column) | | Not relevant. | | | |
| | Water absorption of the boards | Glasroc® X (EB1) | < 100 g/m ² in 2 h (partial immersion) < 5% (total immersion) | | | |
| | | Internal gypsum boards (IB1- to IB5) | Not assessed | | | |
| Watertightness of the breather membrane | | Flexible sheet for waterproofing (WPL1 to WPL3) | Not assessed | | | |
| 7 | Water vapour permeability of the boards | Glasroc® X (EB1) | $\mu = 18,2$ | | | |
| | | Internal gypsum boards without vapour control (IB1 to IB4) | $\mu = 10$ (dry) / 4 (wet) | | | |
| | | Vapour control internal gypsum boards (IB5) | Sd = 1500 m | | | |
| | Water vapour permeability of the thermal insulation | Mineral Wool | Not assessed (thermal insulation is not a kit component) | | | |
| Water vapour permeability of the breather membrane | | Flexible sheet for waterproofing (WPL1 to WPL3) | Not assessed (flexible sheet for waterproofing is not a kit component) | | | |
| 8 | Condensation risk | | Not assessed | | | |
| 9 | Air permeability | Glasroc® X (EB1) with a bonded exterior finishing (e.g., ETICS) | Class A4 0,00 m ³ /m ² ·h at 50 Pa; < 1,50 m ³ /m ² ·h at 100 to 600 Pa | | | |
| | | Glasroc® X (EB1) without a bonded exterior finishing (e.g., cladding kit) | Not assessed | | | |
| 10 | Content, emission and/or release of dangerous substances | | Not assessed | | | |
| Basic Works Requirement 4: Safety and accessibility in use | | | | | | |
| 11 | Wind load resistance | Glasroc® X board (EB1) with 600 mm span between vertical profiles. | 1500 Pa; $\delta \leq L/250$ See also clause 3.1 | | | |
| | | Glasroc® X board (EB1), with 400 mm span between vertical profiles 1 mm thickness. | 1800 Pa; $\delta \leq L/250$ See also clause 3.1 | | | |
| | | Glasroc® X board (EB1), with 400 mm span between vertical profiles 75 mm width and 2 mm thickness. | 2300 Pa; $\delta \leq L/250$ See also clause 3.1 | | | |
| | | Glasroc® X board (EB1), with 400 mm span between vertical profiles 100 mm width and 2 mm thickness. | 2600 Pa; $\delta \leq L/250$ See also clause 3.1 | | | |
| 12 | External eccentric vertical load resistance (for Use 2) | Assembled system with galvanized steel external subframe vertical profile thickness ≥ 2 mm | Mechanically fixed bracket (e.g., cladding system) | $F_{md1} = 329$ | $F_{md3} = 1290$ $F_{cd3} = 1077$ | $F_{mu} = 9368$ $F_{cu} = 3579$ |
| | | | Mechanically fixed plastic punctual fixing (e.g., ETICS) | $F_{md1} = 5,5$ | $F_{md3} = 13,7$ $F_{cd3} = 8,3$ | $F_{mu} = 92,7$ $F_{cu} = 77,0$ |
| | | Other vertical profile external subframe thickness | Not assessed | | | |
| Substrate non-load bearing external wall systems | | | Annex A1.2 of European Technical Assessment ETA 23/0445 | | | |
| Glasroc® X external wall systems without rendering | | | | | | |

| Nr | Essential characteristic | Kit for Glasroc® X external wall systems relevant configuration | Performance |
|---|---|---|--|
| 13 | Internal eccentric vertical load resistance | | Not assessed |
| 14 | Internal horizontal linear static load resistance | | 1,93 kN/m (at 40 mm deflection) |
| 15 | External impact resistance | Glasroc® X (EB1) with rendering system, external galvanized steel external subframe with minimum width 75 mm, minimum thickness 1 mm and maximum span between vertical profiles 600 mm. | Resists: - Soft body 3,0 kg, 60 J - Soft body 50,0 kg, 400 J |
| 16 | Internal impact resistance | Double internal-board (IB1 to IB5), galvanized steel internal subframe minimum width 48 mm width, minimum thickness 0,6 mm with maximum span 600 mm. | Resists (Category III): - Hard body 0,5 kg, 6 J - Hard body 1,0 kg, 10 J - Soft body 50,0 kg, 120 J - Soft body 50,0 kg, 300 J - Soft body 50,0 kg, 500 J - Soft body 50,0 kg, 900 J |
| 17 | Resistance to horizontal point loads (for Use 1) | | Not relevant |
| 18 | Bond strength | | Not relevant. |
| 19 | Bending strength of the board | Glasroc® X (EB1) | Longitudinal 8,4 MPa Transversal 6,5 MPa |
| | | Internal-boards (IB1 to IB5) | See table A4.2 |
| 20 | Embedding/Shear strength | Glasroc® X (EB1) and screw (EFix1) Ø4,8 mm ($a_{edge} \geq 15$ mm) | $F_m = 461$ N; $F_c = 309$ N |
| 21 | Pull-through resistance | Glasroc® X (EB1) and screw (E-Fix1) Ø4,8 mm ($a_{edge} \geq 15$ mm). Galvanized steel profile minimum thickness 1 mm. | $F_m = 392$ N; $F_c = 292$ N |
| | Pull-out resistance | | |
| 22 | Resistance of profiles | | Not assessed (subframe profile is not a kit component) |
| Basic Works Requirement 5: Protection against noise | | | |
| 23 | Airborne sound insulation | Family 1 (single wall) | Not assessed |
| | | Family 3 (double wall) | See clause 3.2 |
| | Airflow resistivity of the thermal insulation | Mineral wool | Not assessed (thermal insulation is not a kit component) |
| 24 | Sound absorption | Internal gypsum boards (IB1 to IB5) | Not assessed |
| Basic Works Requirement 6: Energy economy and heat retention | | | |
| 25 | Thermal resistance | Assembled system configurations given in Annex 8 | See Annex 8 |
| | | Other assembled system configurations | Not assessed |
| 26 | Thermal inertia | | Not assessed |
| 27 | Heat capacity | | Not assessed |
| Aspects of durability | | | |
| 28 | Accelerated ageing behaviour | Hygrothermal behaviour | No defects, but the flexible waterproofing sheet is needed. |
| | | Freeze thaw behaviour | Not relevant |
| | | Combined hygrothermal and freeze thaw behaviour | Not assessed |
| 29 | Cracking strength due to board deformation | | Not relevant |
| 30 | Dimensional stability by humidity (30 % to 90 %) | Glasroc® X (EB1) | 0,031 % |
| | Linear thermal expansion | Glasroc® X (EB1) Galvanized steel subframe | 0,008 mm/m·°C $\alpha = 12 \mu\text{m}/\text{m}\cdot\text{K}^{-1}$ for $T \leq 100$ °C |
| 31 | Moisture content | Glasroc® X (EB1) | Not assessed |
| 32 | Corrosion | Board-fixing | See table A3.3 |
| | | Galvanized steel subframe | Not assessed (subframes are not kit components) |
| 33 | UV radiation resistance | Flexible sheet for waterproofing (WPL1 to WPL3) | Nor assessed (flexible sheet for waterproofing is not a kit component) |

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Glasroc® X external wall systems without rendering

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ANNEX 2 - RENDERING SYSTEMS COMPONENTS

| Characteristic | | Types | | | | | | | |
|--|------------------------|------------|------------|-----------|------------|------------|-----------|-----------|-----------|
| | | Var1 | Var2 | Var3 | Var4 | Var5 | Var6 | Var7 | Var8 |
| Generic components | Finishing coat (FC) | FC1 | FC2 | FC3 | FC1 | FC2 | FC3 | FC4 | FC5 |
| | Primer (P) | P1 | | | | | | P3 | P2 |
| | Base-coat (BC) | BC1 | | | BC2 | | | BC3 | |
| | Reinforcement mesh (M) | M1 | | | | | | | |
| Range of application thickness (mm) | | 5,0 – 8,2 | 5,0 – 8,2 | 3,5 – 6,2 | 5,0 – 8,2 | 5,0 – 8,2 | 3,5 – 6,2 | 4,5 – 6 | 4,5 – 6 |
| Mass per square meter (kg/m ²) | | 7,5 – 11,6 | 6,8 – 10,5 | 4,7 – 7,8 | 7,5 – 11,6 | 6,8 – 10,5 | 4,7 – 7,8 | 6,8 – 9,7 | 6,8 – 9,7 |
| PCS _s -value (i) | (MJ/kg) | ≤ 1,73 | ≤ 1,84 | ≤ 1,84 | ≤ 2,29 | ≤ 2,29 | ≤ 2,62 | ≤ 2,62 | ≤ 2,62 |
| | (MJ/m ²) | ≤ 44,6 | ≤ 42,8 | ≤ 42,8 | ≤ 53,5 | ≤ 50,9 | ≤ 51,2 | ≤ 51,2 | ≤ 51,2 |
| Reaction to fire | | B-s1,d0 | | | | | | | |
| Water absorption by capillarity (kg/m ²) (i) | after 3 min. (ii) | 0,11 | 0,11 (iv) | 0,11 | 0,04 | 0,12 (iv) | 0,12 | 0,013 | 0,013 |
| | after 1 h. (iii) | 0,04 | 0,04 (iv) | 0,04 | 0,03 | 0,19 (iv) | 0,19 | 0,026 | 0,033 |
| | after 24 h. (iii) | 0,29 | 0,33 (iv) | 0,33 | 0,12 | 0,42 (iv) | 0,42 | 0,201 | 0,253 |
| Bond strength (MPa) (i) | Mean | 0,33 | 0,32 (iv) | 0,32 | 0,23 | 0,23 (iv) | 0,30 | 0,28 | 0,28 |
| | Minimum | 0,29 | 0,29 (iv) | 0,29 | 0,19 | 0,19 (iv) | 0,23 | 0,25 | 0,21 |
| | Cohesive rupture | 100% | 100% (iv) | 100% | 100% | 100% (iv) | 100% | 100% | 100% |
| Thermal conductivity - λ _{23/80} W/(m·K) (i) | | ND | ND | ND | ND | ND | ND | ND | ND |
| Thermal resistance - R _{23/80} (m ² ·K/W) (i) | | ND | ND | ND | ND | ND | ND | ND | ND |
| (i) Rendering system applied on the Glasroc® X board (EB1). (ii) Values from initial immersion. (iii) Values from 3 minutes immersion. (iv) Rendering system variant not tested. Maximum values have been defined. (v) Rendering system variant not tested. Minimum values have been defined. ND = Not defined by the manufacturer. | | | | | | | | | |

| Generic component | Code | Trade name | Reference |
|---------------------------------|------|---|-------------|
| Finishing coat | FC1 | webertene classic L (Spain) - webercote acrylcover M (Italy) - webertene stilo /cromasil (others) | EN 15824 |
| | FC2 | webertene classic XL (Spain) - webercote acrylcover G (Italy) - webertene geos (others) | EN 15824 |
| | FC3 | webertene advance S (Spain) - webercote siloxcover F (Italy)- webertene micro (others) | EN 15824 |
| | FC4 | webertene advance M (Spain) - webercote siloxcover R (Italy) - webertene habitat (others) | EN 15824 |
| | FC5 | webercote acrylcover R (Italy) | EN 15824 |
| Primer (before render or paint) | P1 | webertene primer (CS plus) | EN 1062-1 |
| | P2 | RA13 (Italy) | EN 1062-1 |
| | P3 | RC14 (Italy) | EN 1062-1 |
| Base-coat | BC1 | webertherm base | EN 998-1 |
| | BC2 | webertherm flex B | EN 15824 |
| | BC3 | webertherm AP 60 TOP F | EN 998-1 |
| Reinforcement mesh | M1 | webertherm mesh 160 | ETA 13/0392 |

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| Characteristics | Reference | FC1 | FC2 | FC3 | FC4 | FC5 |
|---|-----------------------------|--|--|--|--|--|
| Trade name | --- | See table A2.2 | See table A2.2 | See table A2.2 | See table A2.2 | See table A2.2 |
| Generic type | EN 15824 | (*) | (*) | (*) | (*) | (*) |
| Range of application thickness (mm) | --- | 2,0 – 3,0 | 2,5 – 3,0 | 1,0 – 2,0 | 1,5 – 2,0 | 1,5 – 2,0 |
| Coverage (kg/m ² per 1 mm thickness) | --- | ≤ 1,6 | ≤ 1,7 | ≤ 1,5 | ≤ 1,4 | ≤ 1,5 |
| Particle size (%) | A.4 of EAD 090120-00-0404 | 1,5 | 2,5 | 0,8 | 1,2 | 1,2 |
| Weight (kg) as delivery | --- | 25 ± 0,5 per bucket (paste) | 25 ± 0,5 per bucket (paste) | 25 ± 0,5 per bucket (paste) | 25 ± 0,5 per bucket (paste) | 25 ± 0,5 per bucket (paste) |
| Density of hardened mortar (kg/m ³) | A.3.3 of EAD 090120-00-0404 | 1700 - 1800 | 1750 - 1850 | 1750 - 1850 | 1750 - 1850 | 1700 - 1800 |
| Static modulus of elasticity at break (MPa) | A.7 of EAD 090120-00-0404 | 0,51 | 0,46 | 0,33 | ND | ND |
| Tensile strength at break (MPa) | | > 0,9 (on plaster); > 0,3 (following EN1542) | > 0,9 (on plaster); > 0,3 (following EN1542) | > 0,7 (on plaster); > 0,3 (following EN1542) | > 0,7 (on plaster); > 0,3 (following EN1542) | > 0,9 (on plaster); > 0,3 (following EN1542) |
| Elongation at break (%) | | 2,50 | 3,14 | 0,93 | ND | ND |
| Water absorption (kg/m ² .h ^{0,5}) | EN 1062-3 | W2 | W2 | W2 | W2 | W2 |
| Water vapour permeability, Sd (m) | EN ISO 7783 | V2 Sd ≥ 0,14 Sd < 1,40 | V2 Sd = 0,25 | V1 Sd = 0,11 | V1 Sd = 0,11 | V2 Sd = 0,25 |
| Dry extract – paste (%) | A.5 of EAD 090120-00-0404 | 80 - 89 | 80 - 89 | 80 – 89 | 80 – 89 | 80 – 89 |
| Ash content (%) at 450 °C | A.6.1 of EAD 090120-00-0404 | 76 - 80 | ND | 74 - 78 | 75 - 79 | 76 - 80 |
| Organic content (%) | --- | 11 - 12 | 11 - 12 | 11 - 12 | 11 - 12 | 11 - 12 |
| PCS _S -value (MJ/kg) | EN ISO 1716 | ≤ 3,10 | ≤ 3,10 | ≤ 3,10 | ≤ 2,50 | ≤ 2,50 |
| Reaction to fire | EN 13501-1 | A2-s1,d0 | A2-s1,d0 | A2-s1,d0 | A2-s1,d0 | A2-s1,d0 |
| Thermal conductivity λ _{10,drv(p=50%)} (W/m·K) | EN 1745 | 1,17 | 1,10 | 1,00 | 1,10 | 1,13 |

ND = Not defined by the manufacturer.
 (*) Renders and internal plasters based on organic binders.
 "----" = not applicable.

| Characteristics | Reference | P1 | P2 | P3 |
|--|-----------------------------|---|---|---|
| Trade name | --- | webertene primer (CS Plus) | RA13 (Italy) | RC14 (Italy) |
| Generic type | EN 1062-1 | Aqueous dispersion of synthetic resins resistant to alkalis | Aqueous dispersion of synthetic resins resistant to alkalis | Aqueous dispersion of synthetic resins resistant to alkalis |
| Range of application thickness (mm) | --- | ≤ 0,2 | ≤ 0,05 | ≤ 0,05 |
| Coverage (kg/m ² per 1 mm thickness) | --- | ≤ 0,5 | ≤ 0,5 | ≤ 0,5 |
| Density of delivered product – liquid (kg/m ³) | A.3.1 of EAD 090120-00-0404 | 1550 ± 95 | 1000 ± 50 | 1150 ± 50 |
| Dry extract – liquid (%) | A.5 of EAD 090120-00-0404 | 65 ± 3 | 52 ± 5 | 10.4 ± 3 |
| Ash content (%) at 450 °C | A.6.1 of EAD 090120-00-0404 | 50 ± 2 | 14 ± 2 | 2 ± 1 |
| PCS _S -value (MJ/kg) | EN ISO 1716 | 6,68 | ND | ND |

ND = Not defined by the manufacturer.
 "----" = not applicable.

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| Characteristics | | Reference | BC1 | BC2 | BC3 |
|---|-------------------|--|--|--|--|
| Trade name | | --- | webertherm base | webertherm flex B | webertherm AP 60 TOP F |
| Designation | | EN 998-1 | GP – General purpose rendering/plastering mortar | --- | GP – General purpose rendering/plastering mortar |
| | | EN 15824 | --- | Renders and internal plasters based on organic binders | --- |
| Range of application thickness (mm) | | --- | 3 – 6 | 3 – 5 | 3 -4 |
| Coverage (kg/m ² per 1 mm thickness) | | --- | ≤ 1,5 | 1,5 – 2,0 | 1,5 – 2,0 |
| Density of delivered product (kg/m ³) | | EN 1015-6 or A.3.1 of EAD 090120-00-0404 | 1200 – 1400 (powder) | 1700 ± 170 (paste) | 1300 – 1400 (powder) |
| Weight per bag (kg) as delivery (dry mortar) | | --- | 25 ± 1 | --- | 25 ± 0,25 |
| Water-product ration | | --- | 5,5 – 6,5 litres per bag (25 kg) | --- | 5,0 – 5,5 litres per bag (25 kg) |
| Particle size (%) | | A.4 of EAD 090120-00-0404 | ≤ 1,0 | ≤ 0,5 | ≤ 0,6 |
| Density of hardened mortar (kg/m ³) | | EN 1015-10 | 1300 - 1500 | 1100 - 1300 | 1350 - 1450 |
| Water absorption (kg/m ² .min ^{0,5}) | | EN 1015-18 | W2 (≤ 2) | --- | W2 |
| Water vapour resistance factor, μ | | EN 1015-19 | ≤ 10 | ND | ≤ 30 |
| Flexural strength (MPa) | | EN 1015-11 | ≥ 2,0 | --- | ≥ 2,0 |
| Compressive strength (MPa) | | | ≥ 3,5 (CSIII) | --- | ≥ 10,0 (CSIV) |
| Static modulus of elasticity at break (MPa) | | A.7 of EAD 090120-00-0404 | < 7000 | 10,1 | 7000 |
| Elongation at break (%) | | | --- | 2 | --- |
| Shrinkage - 28 d (mm/m) | | A.7.1 of EAD 090120-00-0404 | < 2 | --- | --- |
| Dry extract – paste (%) | | A.5 of EAD 090120-00-0404 | --- | 81,5 ± 4,0 | --- |
| Ash content (%) at 450 °C | | A.6.1 of EAD 090120-00-0404 | 90 ± 1 | 86,5 ± 1,3 | 95,5 – 96,5 |
| PCS _s -value (MJ/kg) | | EN ISO 1716 | 0,59 | 2,35 | 0,2 (referred to the similar product but with a 1,4 mm grain size) |
| Water absorption by capillarity (kg/m ²) (*) | after 3 min. (**) | Annex E of EAD 090120-00-0404 | 0,10 | 0,02 | 0,170 |
| | after 1 h. (***) | | 0,12 | 0,01 | 0,082 |
| | after 24 h. (***) | | 0,59 | 0,07 | 0,501 |
| Bond strength (MPa) (*) | Mean | EN 1015-12 | 0,24 | 0,30 | 0,35 |
| | Minimum | | 0,21 | 0,21 | 0,27 |
| | Cohesive rupture | | 100% | 100% | 100% |
| (*) Base-coat applied on the Glasroc® X board (GX). | | | | | |
| (**) Values from initial immersion. | | | | | |
| (***) Values from 3 minutes immersion. | | | | | |
| ND = Not defined by the manufacturer. | | | | | |
| "---" = not applicable. | | | | | |

| Table A2.6: REINFORCEMENT MESH. | | | |
|--|------------------|--|--------|
| Characteristics | Reference | M1 | |
| Trade name | --- | webertherm mesh 160 (webertherm RE160) | |
| Designation | ETA 13/0392 | R 131 A101 | |
| Generic type | | Glass fibre reinforcing mesh | |
| Thickness (mm) | | 0,52 ± 0,20 | |
| Mass per unit area (g/m ²) | | 160 ± 5 | |
| Ash content (%) at 625 °C | | A.6.2 of EAD 090120-00-0404 | 82 ± 1 |
| Organic content (%) | ETA 13/0392 | 20 ± 4 | |
| Mesh size (mm) | | 3,5 x 3,8 | |
| Tensile strength (N/mm) | | without ageing | ≥ 36 |
| | | after conditioning | ≥ 20 |
| | residual (%) | ≥ 50 | |
| Elongation (%) in standard conditions | | 3,8 | |
| PCS _s -value (MJ/kg) | EN ISO 1716 | 4,49 | |
| ND = Not defined by the manufacturer. "---" = not applicable. | | | |

ANNEX 3 – EXTERNAL LAYER

| Generic component | | Code | Trade name | Reference |
|---------------------------------------|-------------------------------|------------|---------------------------------|-------------|
| External board | | EB1 | Glasroc® X board | EN 15283-1 |
| Joint filler for Glasroc® X board | | EJF1 = BC1 | webertherm base | EN 998-1 |
| | | EJF2 = BC2 | webertherm flex B | EN 15824 |
| | | EJF3 = BC3 | webertherm AP 60 TOP F | EN 998-1 |
| Joint tape for Glasroc® X board | | EJT1 = M1 | webertherm mesh 160 (cut 10 cm) | ETA 13/0392 |
| External board-fixings | for galvanized steel subframe | E-Fix1 | Glasroc® X external wall fixing | EN 14566 |
| ND = Not defined by the manufacturer. | | | | |

| Characteristics | | Reference | EB1 |
|--|-----------------------------------|-------------|--------------------------|
| Trade name | | --- | Glasroc® X board |
| Designation | | | GM-FH1 |
| Thickness (mm) | | EN 15283-1 | 12,5 ± 0,7 |
| Width (mm) | | | ≤ 1200 |
| Length (mm) | | | ≤ 3000 |
| Density (kg/m ³) | | EN 520 | 832 - 944 |
| Mass per unit area (kg/m ²) | | --- | 10,4 – 11,8 |
| Breaking load (N) | Longitudinal | EN 15283-1 | ≥ 540 |
| | Transversal | | ≥ 210 |
| Board fixing pull-thorough design load (N) | | | ≥ 300 |
| Water absorption | Partial (g/m ² in 2 h) | EN 15283-1 | < 100 |
| | Total (%) | | < 5 |
| Water vapour resistance factor, μ | | EN 15283-1 | 18,2 |
| Dimensional stability by humidity | | EN 12467 | < 0,005 |
| Linear thermal expansion (mm/m.°C) | | EN 14581 | 0,008 |
| PCS _s -value (MJ/kg) | | EN ISO 1716 | 2,99 |
| Reaction to fire | | EN 13501-1 | A1 |
| Thermal conductivity (W/(m·K)) | | EN 10456 | 0,30 |
| Board fixings distance range (mm) | | --- | Between 150 mm to 250 mm |
| ND = Not defined by the manufacturer. “---” = not applicable. | | | |

| Characteristics | | Reference | E-Fix1 |
|-------------------------|--|------------|--|
| Trade name | | --- | Glasroc® X external wall fixing |
| Generic type | | EN 14566 | Drywall self-drilling screw for steel profile thickness up to 2,4 mm |
| Designation | | | Class 48/TSD |
| Diameter x length (mm) | | | 4,2 x 25 |
| Head diameter (mm) | | | 11,0 |
| Pin shape | | | Drill point |
| Material type | | | --- |
| Reaction to fire | | EN 13501-1 | A1 |
| “---” = not applicable. | | | |

ANNEX 4 - INTERNAL LAYER

| Generic component | Code | Trade name | Reference |
|--|--------|--|-----------|
| Gypsum internal-board without vapour barrier | IB1 | Placo®, Rigips, British Gypsum & Gyproc Fire resistant wallboards. | EN 520 |
| | IB2 | Placo®, Rigips, British Gypsum & Gyproc standard wallboards. | |
| | IB3 | Placo®, Rigips, British Gypsum & Gyproc moisture resistant wallboards. | |
| | IB4 | Placo®, Rigips, British Gypsum & Gyproc Habito wallboards. | |
| Gypsum internal-board with vapour barrier | IB5 | Placo®, Rigips, British Gypsum & Gyproc vapour control wallboards. | EN 14190 |
| Joint filler for gypsum internal-boards | IJF1 | Placo® Rigips, British Gypsum & Gyproc Air drying jointing compound. | EN 13963 |
| | IJF2 | Placo® Rigips, British Gypsum & Gyproc setting jointing compound. | |
| Joint tape for gypsum internal-boards | IJT1 | Placo® Rigips, British Gypsum & Gyproc paper-tape. | |
| Gypsum internal board-fixings | I-Fix1 | Placo® Rigips, British Gypsum & Gyproc TTPC. | EN 14566 |

| Characteristics | | Reference | IB1 | | IB2 | | IB3 | IB4 | IB5 |
|--|----------------------|-------------------|------------------------|-----------|---------------|-----------|---------------|---------------|---------------|
| Trade name | | --- | See tabe A4.1 | | See tabe A4.1 | | See tabe A4.1 | See tabe A4.1 | See tabe A4.1 |
| Designation | | EN 520 / EN 14190 | I-D-F | | A | | H1 | D-F-I-R | --- |
| Thickness | Board (mm) | | 12,5 | 15,0 | 12,5 | 15,0 | 12,5 | 12,5 | 12,5 |
| | Aluminium sheet (µm) | | --- | --- | --- | --- | --- | --- | 8 |
| Width (mm) | | | 1200 | | | | | | |
| Length (mm) | | 2000-3000 | | 2000-3000 | | 2000-3000 | 2400-3000 | 2500-3000 | |
| Mass per unit area (kg/m ²) | | 12,0 | 14,5 | 8,1 | 9,7 | 10,0 | 12,2 | 8,1 | |
| Apparent density -dry (kg/m ³) | | 960 | | 648 | | 800 | 976 | 648 | |
| Paper grammage (g/m ²) | | EN ISO 536 | ≤ 220 | | ≤ 220 | | ≤ 220 | ≤ 220 | ≤ 220 |
| Aluminium density (kg/m ³) | | EN 12524 | --- | | --- | | --- | --- | 2700 |
| Flexural breaking load longitudinal direction (N) | | EN 520 | 500 | 650 | 500 | 650 | 550 | 1000 | 550 |
| Flexural breaking load transversal direction (N) | | | 210 | 250 | 210 | 250 | 210 | 400 | 210 |
| Reaction to fire | | EN 520 / EN 14190 | A2-s1,d0 | | | | | | |
| Thermal conductivity (W/(m·K)) | | EN ISO 10456 | ≤ 0,25 | | | | | | ≤ 160 |
| Water vapour diffusion coefficient | | | µ = 10 (dry) / 4 (wet) | | | | | | Sd = 1500 m |
| Specific heat capacity (J/kg·K) | | | 1000 | | | | | | |
| Water absorption total immersion (%) | | EN 520 | ND | ND | ≤ 5 | ND | ND | ND | |
| Water absorption partial immersion (g/m ²) | | EN 520 | ND | ND | < 180 | ND | ND | ND | |
| ND = Not defined by the manufacturer. | | | | | | | | | |

Gypsum internal boards and ancillary components
Technical description

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| Table A4.3: JOINT FILLER FOR GYPSUM INTERNAL BOARDS. | | | |
|--|-----------------------|---|---|
| Characteristics | Reference | IJF1 | IJF2 |
| Trade name | --- | Placo® Rigips, British Gypsum & Gyproc SN | Placo® Rigips, British Gypsum & Gyproc PR |
| Designation | EN 13963 | 3A | 3B |
| Reaction to fire | EN 13963 / EN 13501-1 | A2-s1d0 | A1 |
| Flexural strength | EN 13963 | ND | ND |
| ND = Not defined by the manufacturer. “---” = not applicable. | | | |

| Table A4.4: JOINT TAPE FOR GYPSUM INTERNAL OR INTERMEDIATE BOARDS. | | |
|---|------------------|---|
| Characteristics | Reference | IJT1 |
| Trade name | --- | Placo® Rigips, British Gypsum & Gyproc paper-tape |
| Generic type | EN 13963 | ND |
| Width (mm) | | 50 |
| Thickness (mm) | | ND |
| Mass (g/m) | --- | ND |
| ND = Not defined by the manufacturer. “---” = not applicable. | | |

| Table A4.5: FIXINGS FOR INTERNAL-BOARDS. | | |
|---|------------------|---|
| Characteristics | Reference | I-Fix1 |
| Trade name | --- | Placo® Rigips, British Gypsum & Gyproc TTPC |
| Generic type | EN 14566 | Drywall drilling screw for steel profile thickness up to 1,0 mm |
| Designation | | Class 48/TMN |
| Diameter x length (mm) | | 3,5 x (L ≥ 25) |
| Head diameter (mm) | | 8,0 |
| Pin shape | | Normal point |
| Material type | | Steel with covering phosphated |
| Reaction to fire | EN 13501-1 | A1 |
| “---” = not applicable. | | |

ANNEX 5 - SUBFRAMES

A5.1 EXTERNAL SUBFRAME COMPONENTS (Family 1 & Family 3)

These components are not part of the kit but of the assembled system. They are not supplied by the kit manufacturer, however, they are available on the market and they have to meet the specifications indicated in the subsequent table.

| Components | | GSF1 | |
|---|--|---|---|
| Vertical profile | Shape | C-profile | |
| | Galvanized steel type | DX51D (1.0226) or greater resistance steel | |
| | Corrosion protection | + Z275 or greater galvanized covering | |
| | Minimum dimensions | Thickness (mm) | ≥ 1,0 |
| | | Web width (mm) | ≥ 73,5 |
| | | Flange width (mm) | ≥ 47 |
| | Minimum cross-section (mm ²) | ≥ 175 | |
| | Minimum moment of inertia | I _{xx} (cm ⁴) | ≥ 16,4 |
| I _{yy} (cm ⁴) | | ≥ 4,8 | |
| Span between two vertical profiles (mm) | 400 or 600 | | |
| Horizontal profile (rail) | Shape | U-profile | |
| | Galvanized steel type | DX51D (1.0226) + Z275 or higher galvanized covering | |
| | Minimum dimensions | Thickness (mm) | ≥ 0,7 |
| | | Web width (mm) | ≥ 75 |
| | | Flange width (mm) | ≥ 40 |
| Minimum cross-section (mm ²) | ≥ 107 | | |
| Fixings between the horizontal profile (rail) and the supporting structure | Generic type | The fixings between the horizontal profile (rail) and the supporting structure must be chosen taking into account the structure material (e.g. normal concrete, cracked concrete, steel structure, etc.) and also the minimum specifications indicated in this table. | |
| | Minimum diameter (mm) | ≥ 6,0 | |
| | Material (*) | Stainless steel (A2 or A4) or galvanized steel. | |
| | Minimum pull-out strength (**) | Greater than the reaction due to dead load and wind load. | |
| | Minimum shear strength | Greater than the reaction due to wind load. | |
| | Other | Reference | The fixings between the horizontal profile (rail) and the supporting structure may be CE marked according to an ETA on the basis of the relevant EAD as long as this CE marking is mandatory in the Member State where the kit is used. |
| Serviceability | | The serviceability conditions such as load directions, material of supporting structure (concrete type, steel type, etc.), minimum distance to edges, etc. must be taken into account. | |
| (*) The fixing material must guarantee the electrochemical compatibility between the different materials. | | | |
| (**) Minimum pull-out strength must be guaranteed on substrate material. | | | |

A5.2 INTERNAL SUBFRAME COMPONENTS (Family 3)

These components are not part of the kit but of the assembled system. They are not supplied by the kit manufacturer, however, they are available on the market and they have to meet the specifications indicated in the subsequent table.

| Components | | GSF2 | |
|---|--|---|---|
| Vertical profile | Shape | C-profile | |
| | Galvanized steel type | DX51D (1.0226) or greater resistance steel | |
| | Corrosion protection | + Z140 or greater galvanized covering | |
| | Minimum dimensions | Thickness (mm) | ≥ 0,6 |
| | | Web width (mm) | ≥ 46,5 |
| | | Flange width (mm) | ≥ 36 |
| | Minimum cross-section (mm ²) | ≥ 70 | |
| | Minimum moment of inertia | I _{xx} (cm ⁴) | ≥ 2,6 |
| I _{yy} (cm ⁴) | | ≥ 0,9 | |
| Span between two vertical profiles (mm) | 400 or 600 | | |
| Horizontal profile (rail) | Shape | U-profile | |
| | Galvanized steel type | DX51D (1.0226) + Z275 or higher galvanized covering | |
| | Minimum dimensions | Thickness (mm) | ≥ 0,55 |
| | | Web width (mm) | ≥ 48 |
| | | Flange width (mm) | ≥ 30 |
| Minimum cross-section (mm ²) | ≥ 59 | | |
| Fixings between the horizontal profile (rail) and the supporting structure | Generic type | The fixings between the horizontal profile (rail) and the supporting structure must be chosen taking into account the structure material (e.g. normal concrete, cracked concrete, steel structure, etc.) and also the minimum specifications indicated in this table. | |
| | Minimum diameter (mm) | ≥ 6,0 | |
| | Material (*) | Stainless steel (A2 or A4) or galvanized steel. | |
| | Other | Reference | The fixings between the horizontal profile (rail) and the supporting structure may be CE marked according to an ETA on the basis of the relevant EAD as long as this CE marking is mandatory in the Member State where the kit is used. |
| Serviceability | | The serviceability conditions such as load directions, material of supporting structure (concrete type, steel type, etc.), minimum distance to edges, etc. must be taken into account. | |
| (*) The fixing material must guarantee the electrochemical compatibility between the different materials. | | | |
| (**) Minimum pull-out strength must be guaranteed on substrate material. | | | |

ANNEX 6 - OTHER COMPONENTS

A6.1 – MINERAL WOOL THERMAL INSULATION

| Table A6.1.1: MINERAL WOOL THERMAL INSULATION. | |
|--|------------------|
| Generic component | Reference |
| Thermal insulation to be incorporated in the cavities of external and internal subframes (*) | EN 13162 |
| (*) Thermal insulation material must be rigid enough in order to prevent the downfall of the material. | |

| Table A6.1.2: MINERAL WOOL. | | |
|--|------------------|--|
| Characteristics | Reference | Value |
| Generic type | EN 13162 | Mineral Wool (MW) |
| Thickness (mm) | EN 823 | 70 or 90 (external subframe) 45 or 70 (internal subframe) |
| Density (kg/m ³) | EN 13162 | 20 |
| Short term water absorption by partial immersion (kg/m ²) | EN 1609 | < 1,0 |
| Long term water absorption by total immersion (%) | EN 12087 | < 5,0 |
| Reaction to fire | EN 15301-1 | A1 |
| Water vapour permeability - μ | EN ISO 10456 | $\mu = 1$ |
| Airflow resistivity (kPa·s/m ²) | EN 29053 | ≥ 5 |
| Sound absorption coefficient | UNE-EN ISO 354 | 0,60 - 1,0 |
| Thermal conductivity and thermal resistance - λ_D (W/(m·K)) | EN 13162 | $\leq 0,036$ |
| Specific heat capacity (J/kg·K) | EN ISO 10456 | 800 |
| Dimensional stability at 23°C & 90% RH | EN 1604 | $\Delta\epsilon d < 1,0$ |
| Durability | EN 13162 | Acceptable for reaction to fire and thermal conductivity |
| (*) The values indicated in Annex 9 are calculated with $\lambda_D = 0,036$ W/(m·K). | | |

A6.2 - FLEXIBLE SHEET FOR WATERPROOFING (OPTIONAL)

| Generic component | Code | Trade name | Reference |
|----------------------------------|-------|---------------------------------------|------------|
| Flexible sheet for waterproofing | WPL-1 | R.F sheet (Dupont™ Tyvek® 2066B) | EN 13859-2 |
| | WPL-2 | Standard sheet (Dupont™ Tyvek® 1060B) | |
| | WPL-3 | Standard sheet (Placotherm® Membrane) | |

| Characteristic | Reference | WPL-1 | WPL-2 | WPL-3 | |
|---|------------------------------|--|---------------------------------------|---------------------------------------|------------------------------|
| Trade name | --- | R.F sheet (Dupont™ Tyvek® 2066B) | Standard sheet (Dupont™ Tyvek® 1060B) | Standard sheet (Placotherm® Membrane) | |
| Generic type | EN 13859-2 | Water vapour permeable water barrier | | | |
| Thickness (mm) | EN 1849-2 | 0,175 | | 0,600 | |
| Mass per unit area (g/m ²) | | 68 ± 6 | 60 ± 5 | 130 ± 5 | |
| Reaction to fire | EN 13501-1 | B-s1,d0 | E | E | |
| Water vapour transmission – Sd (m) | EN ISO 12572 | ≤ 0,025 | | ≤ 0,020 | |
| Watertightness | EN 1928 (method A) | W1 | W1 | W1 | |
| Water column (m) | EN 20811 | 1,3 | 1,5 | 3,0 | |
| Maximum tensile strength (N) per 50 mm | EN 12311-1 | MD: 300 ± 50 XD: 300 ± 50 | MD: 310 ± 50 XD: 310 ± 50 | MD: 300 ± 50 XD: 280 ± 50 | |
| Elongation at maximum tensile strength (%) | | MD: 16 ± 5 XD: 18 ± 5 | MD: 17 ± 5 XD: 20 ± 5 | MD: 55 ± 5 XD: 35 ± 5 | |
| Resistance to tearing - nail shank (N) | EN 12310-1 | MD: 50 ± 20 XD: 50 ± 20 | MD: 55 ± 20 XD: 50 ± 20 | MD: 130 ± 20 XD: 150 ± 20 | |
| Artificial ageing by UV and heat (relative values: after/before aged) | Maximum tensile strength (%) | EN 1297 & EN 1296 EN 12311-1 | MD: 240 ± 50 XD: 240 ± 60 | MD: 80 XD: 80 | > 75% of the unaged value |
| | | Elongation at maximum tensile strength (%) | MD: 10 ± 4 XD: 12 ± 5 | MD: 70 XD: 70 | |
| | Watertightness | EN 1297 & EN 1296 EN 1928 (method A) | W1 | W1 | W1 |

MD = machine direction (longitudinal). XD = transverse (cross) direction.
 ND = Not defined by the manufacturer.
 "---" = not applicable.

Flexible sheet for waterproofing (optional)
 Technical description

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ANNEX 7 - CONSTRUCTION DETAILS

A7.1 – SINGLE WALL WITHOUT INTERNAL HORIZONTAL PROFILE (Family 1)

Legend for Family 1 kit (single wall):

1. Internal-board (x2).
2. External board Glasroc® X.
3. Vertical profile.
4. Horizontal profil (rail).
5. External board-fixing.
6. Internal board-fixing (one layer).
7. Internal board-fixing (two layers).
8. Thermal insulation panel.
9. Flexible sheet for waterproofing (optional).
10. Reinforcing profile.
11. Lintel profile.
12. Elastic joint.
13. Rendering system.
14. Dripping water profile.
15. Expansion joint profile.

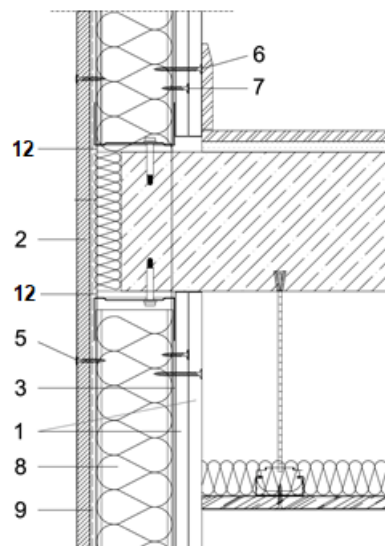


Figure A7.1.1: Connection with structural floor.

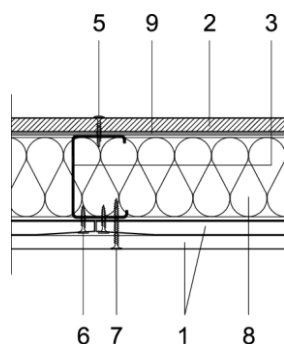


Figure A7.1.2: Horizontal cross-section.

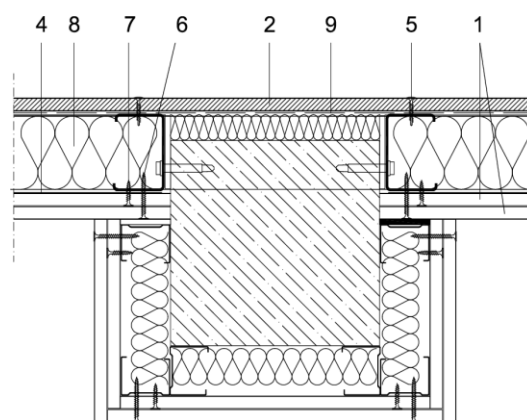


Figure A7.1.3: Connection with column.

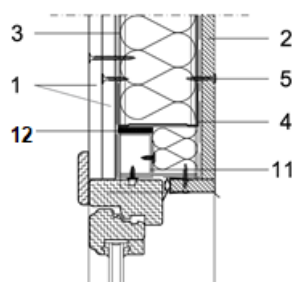


Figure A7.1.4: Lintel.

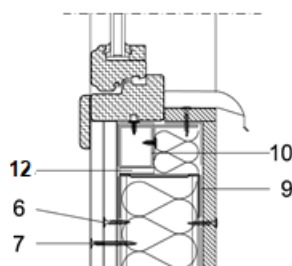


Figure A7.1.5: Sill.

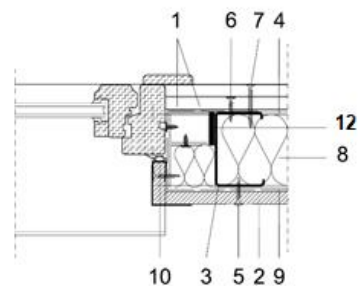


Figure A7.1.6: Jamb.

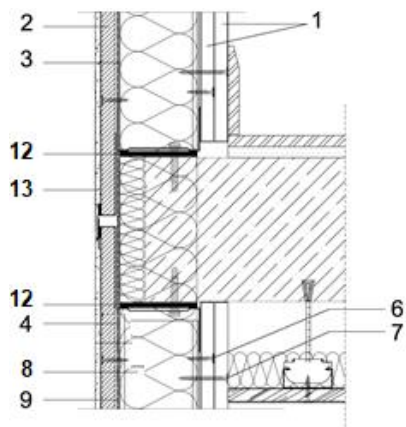


Figure A7.1.7: Control horizontal joint.

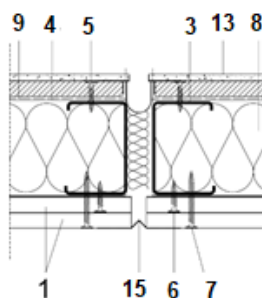


Figure A7.1.8: Expansion vertical joint.

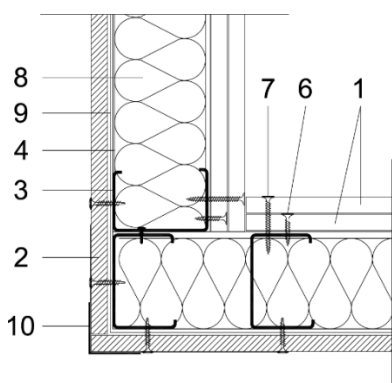


Figure A7.1.9: Convex corner.

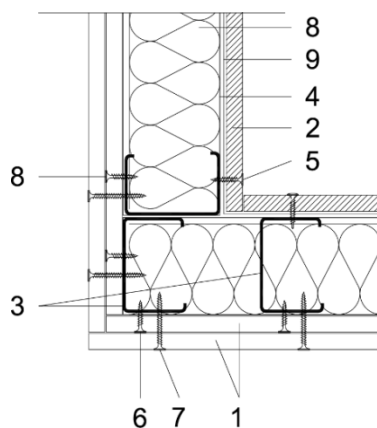


Figure A7.1.10: Concave corner.

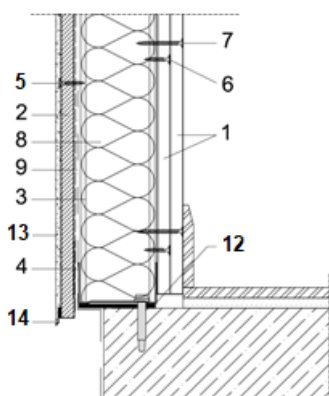


Figure A7.1.11: Base edge.

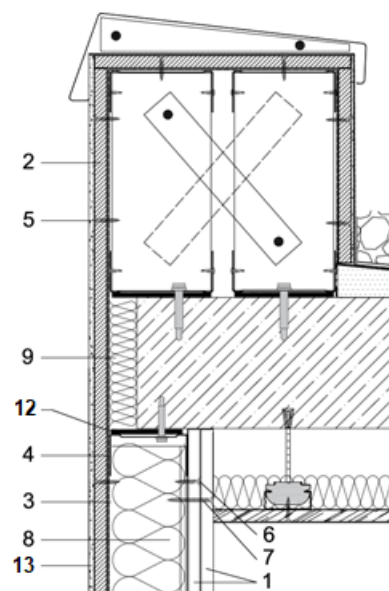


Figure A7.1.12: Roof edge.

A7.2 – DOUBLE WALL WITHOUT INTERMEDIATE BOARD (Family 3)

Legend for Family 3 kit (double wall):

1. Internal-board (x2).
2. External board Glasroc® X.
3. External vertical profile.
4. External horizontal profil (rail).
5. Internal vertical profile.
6. Internal horizontal profil (rail).
7. External board-fixing.
8. Internal board-fixing (one layer).
9. Internal board-fixing (two layers).
10. Thermal insulation panel.
11. Flexible sheet for waterproofing (optional).
12. Rendering system.
13. Expansion joint profile.
14. Reinforcing profile for corners.
15. Ancillary reinforcing profile.
16. Sealant.
17. Dripping water profile.

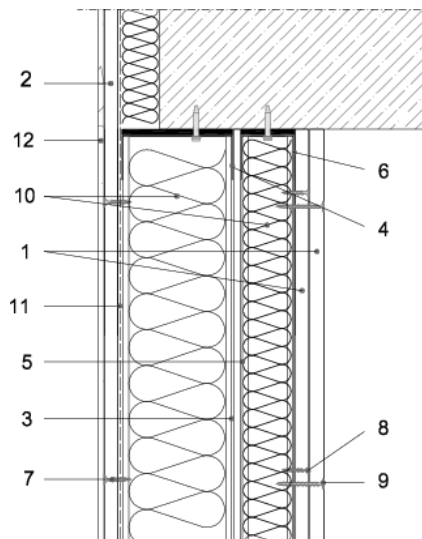


Figure A7.2.1: Connection with structural floor.

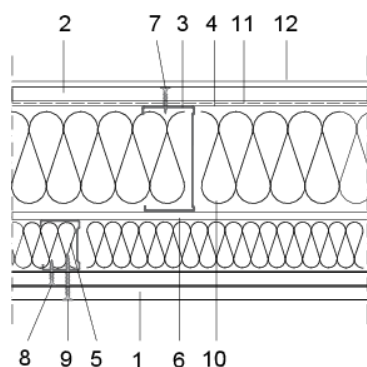


Figure A7.2.2: Horizontal cross-section.

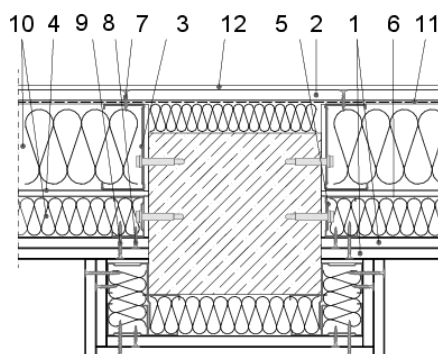


Figure A7.2.3: Connection with column.

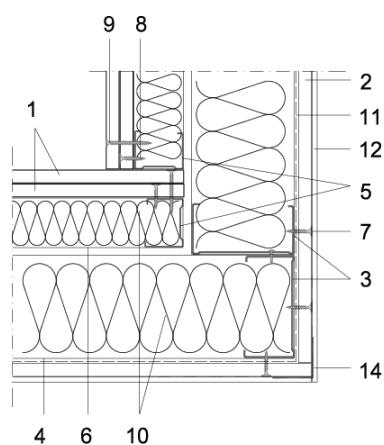


Figure A7.2.4: Convex corner.

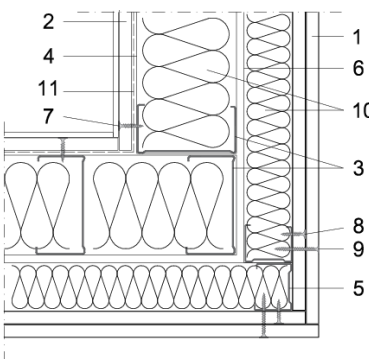


Figure A7.2.5: Concave corner.

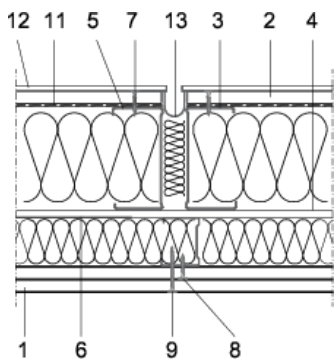


Figure A7.2.6: Control joint.

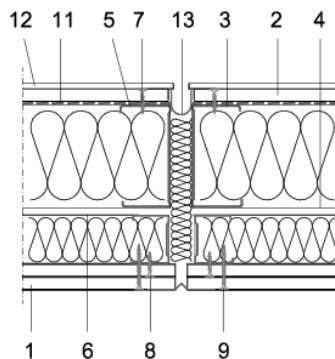


Figure A7.2.7: Expansion joint.

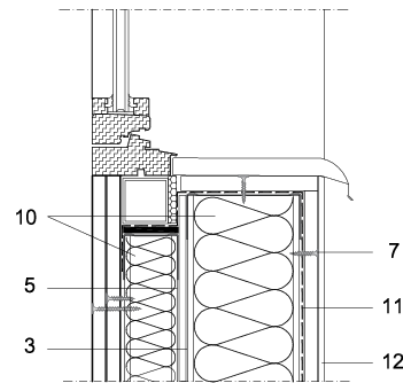


Figure A7.2.8: Sill.

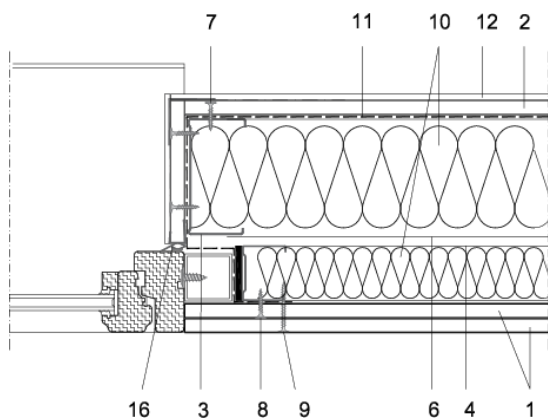


Figure A7.2.9: Jamb.

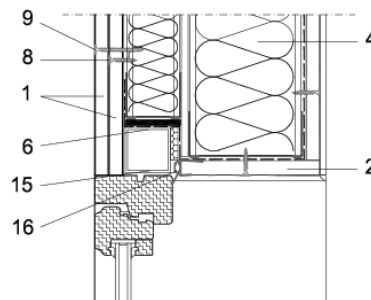


Figure A7.2.10: Lintel.

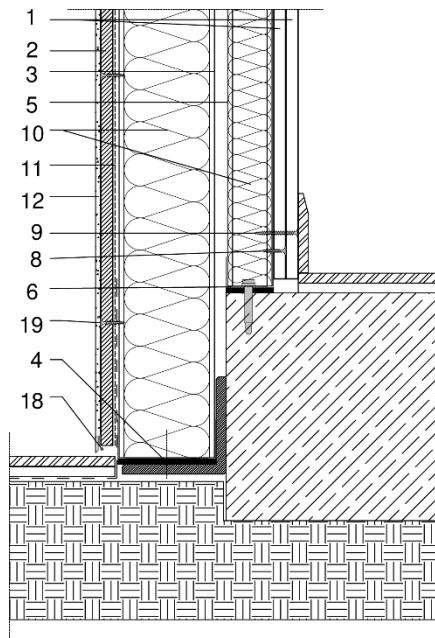


Figure A7.2.11: Base edge.

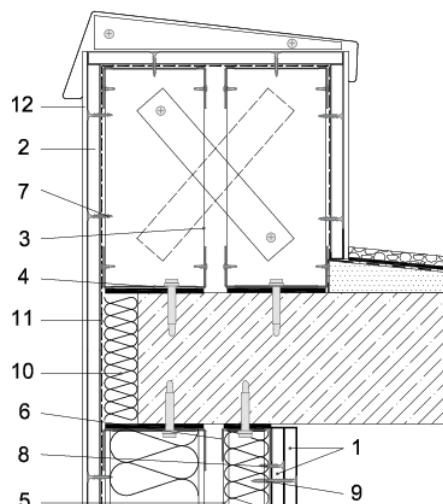


Figure A7.2.12: Roof edge.

ANNEX 8 – THERMAL TRANSMITTANCE AND f_{Rsi} VALUES

The following tables show the thermal transmittances and f_{Rsi} values for the representative configuration of assembled systems for Family 1 and Family 3.

These values have been calculated according to EN ISO 10211 and for the following boundary conditions and characteristics of components.

Boundary conditions:

- Exterior temperature: 2,6 °C
- Exterior relative humidity: 86 %
- Interior temperature: 20 °C
- Interior relative humidity: 55 %

A8.1 – SINGLE WALL WITHOUT INTERNAL HORIZONTAL PROFILE (Family 1)

| Component | Dimensions (mm) | λ (W/(m·K)) | μ | Reference | |
|----------------------------------|-----------------|---------------------|-------|--------------|--------------|
| Rendering system | 5,0 | 0,44 | 10 | EN ISO 10456 | |
| External board Glasroc® X | 12,5 | 0,30 | 66 | EN 15283-1 | |
| External subframe | C profile | C75x50x2 | 50 | ∞ | EN ISO 10456 |
| | | C100x50x2 | | | |
| | U profile | U75x50x0,7 | | | |
| | | U100x50x0,7 | | | |
| Thermal insulation (MW) | 75 | 0,038 | 1 | EN 13162 | |
| | 100 | | | | |
| Internal gypsum board Placo® PPH | 12,5 (x2) | 0,25 | 10 | EN ISO 10456 | |

| Cross-section | Subframe | Equivalent thermal transmittance U_{eq} (W/m ² ·K) (i) | Subframe thermal transmittance $U_{subframe}$ (W/m ² ·K) | Linear thermal transmittance, (W/m·K) | | Factor f_{Rsi} (ii) |
|---|----------------------------|---|---|---------------------------------------|--------------|-----------------------|
| | | | | Ψ_{ext} | Ψ_{int} | |
| Normal cross-section (i) | C75x50x2,0 600 mm span | 0,56 | --- | --- | | 0,74 |
| | C75x50x2,0 400 mm span | 0,63 | --- | --- | | 0,74 |
| | C100x50x2,0 600 mm span | 0,47 | --- | --- | | 0,75 |
| | C100x50x2,0 400 mm span | 0,54 | --- | --- | | 0,75 |
| Connection with structural concrete floor (iii) | All | --- | --- | 0,16 | 0,26 | 0,69 |
| Connection with column (iv) | All | --- | --- | 0,07 | 0,07 | 0,78 |
| Convex corner | All | --- | --- | 0,02 | 0,16 | 0,57 |
| Concave corner | All | --- | --- | 0,27 | 0,13 | 0,75 |

**Thermal transmittance and f_{Rsi} values
Glasroc® X non-load bearing external wall systems (Family 1)**

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Table A8.1.2: Thermal transmittance and f_{Rsi} values (Family 1).

| Cross-section | | Subframe | Equivalent thermal transmittance U_{eq} (W/m ² ·K) (i) | Subframe thermal transmittance $U_{subframe}$ (W/m ² ·K) | Linear thermal transmittance, (W/m·K) | | Factor f_{Rsi} (ii) |
|---------------------|-------------|----------|---|---|---------------------------------------|--------------|-----------------------|
| | | | | | Ψ_{ext} | Ψ_{int} | |
| Internal window (v) | Lintel | All | --- | 5,7 | 0,13 | 0,07 | 0,44 |
| | | | | 4,0 | 0,10 | 0,05 | 0,63 |
| | | | | 3,2 | 0,08 | | 0,69 |
| | | | | 2,2 | 0,07 | | 0,73 |
| | | | | 1,8 | | 0,06 | |
| | Window sill | All | --- | 5,7 | 0,17 | 0,03 | 0,49 |
| | | | | 4,0 | 0,13 | 0,04 | 0,65 |
| | | | | 3,2 | 0,12 | 0,05 | 0,70 |
| | | | | 2,2 | 0,10 | 0,06 | 0,71 |
| | | | | 1,8 | | 0,07 | 0,72 |
| | Jamb | All | --- | 5,7 | 0,21 | 0,15 | 0,37 |
| | | | | 4,0 | 0,18 | 0,14 | 0,57 |
| | | | | 3,2 | 0,17 | | 0,62 |
| | | | | 2,2 | | 0,15 | 0,65 |
| | | | | 1,8 | | | |

(i) Opaque areas values, including vertical profiles. Holes in the envelope are not considered. Surface thermal resistance are included.

(ii) For normal cross-sections and singular points, minimum values are considered.

(iii) 30 cm structural concrete floor covered by 33 mm insulation and external board.

(vi) 20 cm concrete column covered by 25 mm insulation board and external board and a double plate internal layer with 40 mm insulation.

(v) Range of values for thermal transmittances between 1,80 W/m²·K and 5,70 W/m²·K.

“---” = not applicable.

A8.2 – DOUBLE WALL WITHOUT INTERMEDIATE BOARD (Family 3)

| Component | Dimensions (mm) | λ (W/(m·K)) | μ | Reference | |
|---|-----------------|---------------------|-------|--------------|--------------|
| Rendering system | 5,0 | 0,44 | 10 | EN ISO 10456 | |
| External.board Glasroc® X | 12,5 | 0,30 | 66 | EN 15283-1 | |
| External subframe | C profile | C75x50x2 | 50 | ∞ | EN ISO 10456 |
| | | C100x50x2 | | | |
| | U profile | U75x50x0,7 | | | |
| | | U100x50x0,7 | | | |
| Internal subframe | C profile | C48x36x0,6 | 50 | ∞ | EN ISO 10456 |
| | | C70x38x0,6 | | | |
| | U profile | C48x36x0,55 | | | |
| | | C70x38x0,55 | | | |
| Thermal insulation (MW) | 75 | 0,038 | 1 | EN 13162 | |
| | 100 | | | | |
| Internal gypsum board Placo®, Rigips, British Gypsum & Gyproc | 12,5 (x2) | 0,25 | 10 | EN ISO 10456 | |

| Cross-section | Subframe | Equivalent thermal transmittance U_{eq} (W/m ² ·K) (i) | Subframe thermal transmittance $U_{subframe}$ (W/m ² ·K) | Linear thermal transmittance, (W/m·K) | | Factor f_{Rsi} (ii) |
|--------------------------|---|---|---|---------------------------------------|--------------|-----------------------|
| | | | | Ψ_{ext} | Ψ_{int} | |
| Normal cross-section (i) | Ext:C75x50x1,0 / Int:C48x36x0,6 600 mm span | 0,38 | --- | --- | --- | 0,88 |
| | Ext:C75x50x2,0 / Int:C48x36x0,6 600 mm span | 0,40 | --- | --- | --- | 0,87 |
| | Ext:C75x50x1,0 / Int:C48x36x0,6 400 mm span | 0,44 | --- | --- | --- | 0,88 |
| | Ext:C75x50x2,0 / Int:C48x36x0,6 400 mm span | 0,46 | --- | --- | --- | 0,87 |
| | Ext:C75x50x1,0 / Int:C70x38x0,6 600 mm span | 0,35 | --- | --- | --- | 0,88 |
| | Ext:C75x50x2,0 / Int:C70x38x0,6 600 mm span | 0,35 | --- | --- | --- | 0,88 |
| | Ext:C75x50x1,0 / Int:C70x38x0,6 400 mm span | 0,41 | --- | --- | --- | 0,88 |
| | Ext:C75x50x2,0 / Int:C70x38x0,6 400 mm span | 0,42 | --- | --- | --- | 0,88 |
| | Ext:C100x50x1,0 / Int:C48x36x0,6 600 mm span | 0,35 | --- | --- | --- | 0,88 |
| | Ext:C100x50x2,0 / Int:C48x36x0,6 600 mm span | 0,36 | --- | --- | --- | 0,88 |
| | Ext:C100x50x1,0 / Int:C48x36x0,6 400 mm span | 0,40 | --- | --- | --- | 0,89 |
| | Ext:C100x50x2,0 / Int:C48x36x0,6 400 mm span | 0,44 | --- | --- | --- | 0,87 |
| | Ext:C100x50x1,0 / Int:C70x38x0,6 600 mm span | 0,32 | --- | --- | --- | 0,89 |
| | Ext:C100x50x2,0 / Int:C70x38x0,6 600 mm span | 0,33 | --- | --- | --- | 0,88 |
| | Ext:C100x50x1,0 / Int:C70x38x0,6 400 mm span | 0,37 | --- | --- | --- | 0,89 |
| | Ext:C100x50x2,0 / Int:C70x38x0,6 400 mm span | 0,40 | --- | --- | --- | 0,88 |

**Thermal transmittance and f_{Rsi} values
Glasroc® X non-load bearing external wall systems (Family 3)**

Annex A8.2
of European Technical
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| Cross-section | Subframe | Equivalent thermal transmittance U_{eq} ($W/m^2 \cdot K$) (i) | Subframe thermal transmittance $U_{subframe}$ ($W/m^2 \cdot K$) | Linear thermal transmittance, ($W/m \cdot K$) | | Factor f_{Rsi} (ii) | | |
|---|-------------|---|---|---|--------------|-----------------------|------|------|
| | | | | Ψ_{ext} | Ψ_{int} | | | |
| Connection with structural concrete floor (iii) | All | --- | --- | 0,11 | 0,17 | 0,94 | | |
| Connection with column (iv) | All | --- | --- | 0,19 | 0,19 | 0,94 | | |
| Convex corner | All | --- | --- | 0,07 | 0,16 | 0,96 | | |
| Concave corner | All | --- | --- | 0,02 | 0,11 | 0,95 | | |
| Internal window (v) | Lintel | All | --- | 5,7 | 0,28 | 0,17 | 0,91 | |
| | | | | 4,0 | 0,24 | | | |
| | | | | 3,2 | 0,23 | | | |
| | | | | 2,2-1,8 | 0,21 | 0,18 | | |
| | Window sill | All | --- | --- | 5,7 | 0,34 | 0,17 | 0,92 |
| | | | | | 4,0 | 0,27 | | |
| | | | | | 3,2 | 0,25 | | |
| | | | | | 2,2 | 0,23 | 0,18 | |
| | Jamb | All | --- | --- | 1,8 | 0,22 | | |
| | | | | | 5,7 | 0,30 | 0,20 | 0,90 |
| | | | | | 4,0 | 0,25 | 0,18 | 0,91 |
| | | | | | 3,2 | 0,24 | | |
| 2,2-1,8 | 0,22 | 0,19 | | | | | | |
| External window (v) | Lintel | All | --- | 5,7 | 0,08 | 0,15 | 0,96 | |
| | | | | 4,0 | 0,10 | | | |
| | | | | 3,2 | 0,11 | | | |
| | | | | 2,2 | 0,12 | | | |
| | Window sill | All | --- | --- | 1,8 | 0,13 | | |
| | | | | | 5,7 | 0,11 | 0,18 | 0,96 |
| | | | | | 4,0 | 0,12 | 0,17 | |
| | | | | | 3,2 | 0,13 | | |
| | 2,2 | 0,14 | | | | | | |
| | 1,8 | 0,15 | | | | | | |
| | Jamb | All | --- | --- | 5,7 | 0,14 | 0,21 | 0,96 |
| | | | | | 4,0 | | | |
| 3,2 | | | | | 0,15 | 0,19 | | |
| 2,2 | | | | | 0,16 | | | |
| 1,8 | 0,17 | | | | | | | |

(i) Opaque areas values, including vertical profiles. Holes in the envelope are not considered. Surface thermal resistance are included.

(ii) For normal cross-sections and singular points, minimum values are considered.

(iii) 30 cm structural concrete floor covered by 33 mm insulation and external board.

(iv) 20 cm concrete column covered by 25 mm insulation board and external board and a double plate internal layer with 40 mm insulation.

(v) Range of values for thermal transmittances between 1,80 $W/m^2 \cdot K$ and 5,70 $W/m^2 \cdot K$.

“---” = not applicable.

ANNEX 9 - DESIGN, INSTALLATION, MAINTENANCE AND REPAIR CRITERIA

A9.1 Design

The design of the non-load bearing external wall systems using the kits defined in this ETA should observe the following criteria:

- The assembled system design must be checked by calculation taking into account the mechanical characteristic values of relevant components (boards, profiles and fixings) in order to resist the actions (dead loads, wind loads, etc.) applying on the specific works. National safety factors must be used.
- The distances between vertical profiles must be 600 mm or 400 mm.
- The design must also accommodate specified thermal movements of components and also structural movements of the supporting structure without inducing damage to the assembled system or components.
- The assembled system design must be carried out following the standard construction details given in Annex 7. For specific conditions of the works, other solutions could be used taking into account the following aspects:
 - The weakest points of the façade are the connections with the openings (lintel, sill and jamb), the connections with the structural floors, and, in the case of the complete building envelope, the continuity and the complete application of the rendering system on the external board. Therefore, the design of these points requires special attention.
 - Flexible sheet of waterproofing is an optional component. However, in general, the use of flexible sheet of waterproofing in the assembled system is recommended by the ETA holder.
 - Vapour control sheet is an optional component that can be used to decrease risk of water condensation.
- Corrosion protection of subframe components must be chosen taking into account the category of corrosivity of the atmosphere (see EN ISO 9223) in which will be the works.
- Fixings between horizontal profiles (rails) and supporting structure must be chosen according to the supporting structure material and minimum resistance required due to, e.g. maximum wind load (shear strength).
- The assessment of risk of water condensation of the complete solution in the case of substrate wall systems (e.g. by means of EN ISO 13788) must distinguish between ventilated and non-ventilated façade.
- The assembled systems without rendering systems used as substrate wall may be used as the following generic exterior finishings and specifications:
 - Façade systems with mechanically fixed subframe, according to the relevant EAD, in which the supporting cladding devices (e.g. supporting brackets) must be fixed on the supporting structure of the building and must not be fixed on the substrate wall. Retaining devices (e.g. retaining brackets) may be fixed on the substrate wall subframe profiles considering the values for excentric vertical load and pull-out given in table A1.2.3 in clause A1.2 of Annex 1.
 - In the case of façade systems with open joints (in ventilated façades) the substrate wall must always include the flexible sheet for waterproofing.
 - Bonded exterior finishings (e.g. ETICS, tiles, etc.) shall be assessed considering the bonding performance on each exterior-board material.

A9.2 Installation

The installation of the non-load bearing external wall systems using the kits defined in this ETA should observe the following criteria:

- The installation of the kits must be carried out in accordance with ETA holder instructions and the design and drawings prepared for the specific works. It is the responsibility of the ETA holder to ensure that the information on these provisions is given to those concerned.
- Special attention is required for the installation of the weakest points of the façade (connections with the openings (lintel, sill and jamb), the connections with the structural floors, and, in the case of complete building envelope, the continuity and the complete application of the rendering system on the external board).
- The installation of the kits must be carried out by installation companies and by installation staff which have been trained and authorized by the ETA holder.

A9.3 Maintenance and repair

Maintenance of the assembled systems or kit components includes inspections on site, taking into account the following aspects:

- Regarding the rendering systems and boards: the appearance of any damage such as cracking, detachment, delamination, mould presence due to permanent moisture or permanent irreversible deformation.
- Regarding the subframe components: the presence of corrosion or presence of water accumulation.

When necessary, any repair to localised damaged areas must be carried out with the same kit components and following the repair instructions given by the ETA holder.