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**National Technical Assessment
No. NTĮ-03-005:2023**

(Original version is in Lithuanian)

Trade name:	Koderus 2IN1
Manufacturer:	Koderus JSC Žirgų str. 19, Antezeriai, LT-14158 Vilnius District
General type of the construction product and its use:	Multi-layer self-supporting facade insulation and veture panel for the facades of newly constructed and renovated residential and non-residential buildings (veture set)
Location of production:	Koderus JSC Žirgų str. 19, Antezeriai, LT-14158 Vilnius District
Valid from:	12.07.2023
Valid until:	12.07.2028
This national technical assessment consists of:	22 pages, including 2 annexes

Annex to the present National Technical Assessment - Control Plan is not published to ensure confidentiality

I. LEGAL BASIS AND GENERAL TERMS AND CONDITIONS

1. This national technical assessment was issued by Inspekta JSC in accordance with the following:

- The Law on Construction of the Republic of Lithuania.
- The following technical construction regulations:
 - STR 1.01.04:2015 Assessment, verification and declaration of Constancy of Performance of construction products without harmonised technical specifications. Designation of testing laboratories and certification bodies. National technical assessments and designation and publication of technical assessment bodies.
 - STR 1.01.05:2007 Normative construction technical documents.
- Other documents:
 - Order No. D1-546 of the Minister of the Environment of the Republic of Lithuania as of 23 September 2021 on the appointment of Inspekta JSC to prepare and issue national technical assessments in the relevant areas of construction products.
 - Order No. 23-12V of the Head of Inspekta JSC on the approval of the national technical assessment No. NTĮ-03-005:2023 by Koderus JSC.

2. While preparing this national technical assessment, the requirements and provisions set out in the documents listed below were taken into account:

- STR 2.01.02:2016 Design and certification of energy efficiency of buildings.
- STR 2.04.01:2018 Building partitions. Walls, roofs, windows and exterior access doors.
- STR 2.05.03:2003 Fundamentals of designing building structures.
- LST EN 1990 Eurocode. Fundamentals of structural design.
- LST EN 1990:2004/NA:2010 Eurocode. Fundamentals of structural design.
- LST EN 1990:2004/A1:2006/NA:2012 Eurocode. Fundamentals of structural design.
- ETAG 016-1 (issue of November 2003) Composite light weight panels. Part 1. General.
- ETAG 016-3 (issue of February 2005) Composite light weight panels. Part 3. Specific aspects related to self-supporting composite light weight panels for use in external walls and vetures.
- EAD 040914-00-0404 (issue of November 2018) Vecture kits. Prefabricated units for external wall insulation and their fixing devices.

3. The manufacturer is responsible for ensuring that the performance of the self-supporting multi-layer facade insulation and veture panels supplied to the market, as well as their fastening components, meet the requirements set out in this technical assessment.

4. This national technical assessment cannot be applied to manufacturers that are not listed on the title page of this national technical assessment.

5. This national technical assessment cannot be applied while using materials or components with different (worse) characteristics than those specified in the national technical assessment.

6. This national technical assessment can be declared invalid only by Inspekta JSC in accordance with the established procedure.

7. Reproduction or other copying and distribution (including electronic distribution) of this national technical assessment is possible only in its entirety. Reproduction and distribution in parts is possible only with the written consent of Inspekta JSC. The reproduced and distributed part must be clearly marked by indicating the identification number of the national technical assessment and the product trade name.

8. The original version of the national technical evaluation was issued in the Lithuanian language by the technical assessment body. Translations into other languages must be clearly marked.

II. TECHNICAL ASSESSMENT CONDITIONS/

1. Product Definition and Intended Use

1.1. Product Definition

This national technical assessment is intended for multi-layer self-supporting facade insulation and veture panels and a set of materials used for their installation (hereinafter referred to as a veture set).

The veture set consists of:

- Multilayer self-supporting facade insulation and veture panels Koderus 2IN1.
- Cement adhesive for gluing panels to the base.
- Screws for attaching panels to the base for additional panel fastening.
- Set of sealing joints between panels, consisting of:
 - Sealing foam Penosil Fire Rated Gunfoam B1 187 (manufacturer Wolf Group OU, Estonia).
 - Sealant Penosil Premium FireStop Silicone (manufacturer Wolf Group OU, Estonia).
 - Expanded polyethylene profile Bostik Bottningslist (manufacturer Bostik AB, Sweden).

Panels Koderus 2IN1 consist of a heat-insulating polystyrene foam layer and an external concrete veture layer which are connected to each other while manufacturing panels.

Panels f are produced with and without steel perforated mounting strips for additional mechanical fastening to the base:

- Panels Koderus 2IN1 — B - ... are manufactured without steel perforated mounting strips.
- Panels Koderus 2IN1 — B/MFh, - ... are manufactured with three steel perforated mounting strips and are designed for mounting the panels with the long edge horizontally.
- Panels Koderus 2IN1 — B/MFv ... are manufactured with two steel perforated mounting strips and are designed for mounting the panels with the long edge vertically.

An overview of the panels with the main dimensions is given in Annex 1.

In general, the manufacturer assembles and puts on the market a complete veture set.

In some cases, while mounting the veture kit, the Customer can use the screws he purchased for the mechanical fastening of the panel to the base. However, in such a case, the Customer assumes full responsibility for compliance of the performance of these screws with this national technical assessment.

The specification of materials and components used for the manufacture and installation of panels is given in Annex 1.

The range of standard panels is presented in Table 1.

Table 1. Koderus 2IN1 panel range

Geometric dimensions of the panel	Potential value, mm																	
	Nominal length of the panel	1000																
Nominal width of the panel	500; 250; 150																	
Thickness of the thermal insulation layer	100			150			200			250			270			300		
Thickness of the concrete veture layer	10	14	18	10	14	18	10	14	18	10	14	18	10	14	18	10	14	18
Nominal panel thickness	110	114	118	160	164	168	210	214	218	210	214	218	280	284	288	310	314	318

In addition, for each individual building, panels of non-standard dimensions are produced separately, which are necessary for veture the building facade (edge panels, panels for forming the edges of openings, etc.).

All panels produced by the manufacturer and installed finish sets ensure the essential characteristics, which are indicated in Table 2.

Table 2. Essential characteristics of panels and clothing sets

Characteristics	Value	Test/calculation method
Flammability class	B-s1, d0	LST EN 13501-1:2019
Self-weight resistance	Guaranteed	LST EN 1991-1-1:2004/NA:2011
Design wind load when panel bonding area is 60%	≥ 12 kPa	STR 2.04.01:2018, STR 2.05.04:2003, LST EN 1990, LST EN 1-1-1991, LST EN 1-4-1991
Bonding strength of the panel to the base (characteristic value)	≥ 40 kPa	EAD 040914-00-0404, Annex F
Shear strength of the panel glued to the base (characteristic value)	≥ 20 kPa	LST EN 12090
Panel resistance in tension perpendicular to the plane (characteristic value)	≥ 40 kPa	LST EN 1607
Panel shear strength (characteristic value)	≥ 20 kPa	LST EN 12090
Impact resistance	Category 1 (See section 5.5.1)	ISO 7892, STR 2.04.01:2018, EAD 040914-00-0404, Appendix L
Moisture status of the veture set	Requirements are met (see section 5.4.1)	LST EN ISO 13788:2013, STR 2.01.02:2016
Thermal resistance of panels	See section 5.7.1	-
Waterproofness of the veture set	1000 Pa	LST EN 12865, method A
Resistance to horizontally concentrated load (ladder support test)	Resistance to horizontal concentrated load is ensured	EAD 040914-00-0404, Appendix K
The veture is resistant to hydrothermal effects	Resistance to the effects of 80 heating-casting cycles is ensured	EAD 040914-00-0404, Appendix D
Frost cold resistance of the veture	Resistance to the effects of 100 freeze-thaw cycles is ensured	LST EN 772-22:2019, EAD 040914-00-0404, Appendix D

This national technical assessment is only applicable to panels Koderus 2IN1 produced by the manufacturer specified in the national technical assessment. For other auxiliary elements of the veture kit that are necessary for the installation of these panels, such as adhesives, sealing materials, this national technical assessment is only applicable to determine the minimum requirements for these auxiliary elements.

1.2. Intended use

The panels are designed for the insulation and renovation of the external walls of new, reconstructed, and renovated residential and non-residential buildings.

The specific use of the panels depends on the construction technical regulations, other legal acts, in individual cases on the customer's special requirements, specific climatic conditions and must be specified in the project documentation in each case.

Sets of panels Koderus 2IN1 veture are self-supporting structures.

The panels are glued to the base with cement adhesive. Panels Koderus 2IN1 — B/MF_h and Koderus 2IN1- B/MF/ additionally use a mechanical fastening of the panels through a specially designed steel perforated

mounting strips but this mechanical fastening is not considered when determining the mechanical durability of the installed panels.

In order to ensure that the finish is watertight and to protect the panels from soaking, the points of connection between the panels are hermetically sealed during their installation (see Annex 1, Figure P1.2).

The serviceability of the veture kit has been tested at a design wind load (S_{ds}) of up to 12 kPa.

The construction of the veture sets is intended for installation on a base made of concrete, masonry and other bases that ensure sufficient mechanical durability of the veture to be fixed.

The design of the veture kit is not intended to ensure the tightness of the building. The tightness of the base on which the veture set is attached must meet the requirements of Section X of STR 2.01.02:2016 Building energy efficiency design and certification.

This technical assessment is based on the assumption that these panels have an economically feasible useful life of 50 years, provided that the product is properly installed, operated and maintained. The concept of economically feasible useful life should not be understood as a guarantee provided by the manufacturer. The economically feasible useful life of the product is the period during which there is a purposeful use of the product, maintaining its operational characteristics that meet the major requirements of the building, taking into account the costs required for its maintenance, renovation and repairs.

2. References

In this technical assessment, the provisions of other publications are given by dated and undated references. These references are made at the appropriate places in the text and a list of publications is given in this section.

If a dated reference is made, then the latest changes and corrections related to this technical evaluation are valid only when they are included in this technical evaluation as annexes or supplements. Where references are undated, the most recent edition of the document (including amendments) is to be applied.

This National Technical Assessment contains references to the documents listed below:

STR 1.01.04:2015 Assessment, verification and declaration of constancy of performance of construction products without harmonised technical specifications. Designation of testing laboratories and certification bodies. National technical assessments and designation and publication of technical assessment bodies.

STR 2.01.02:2016 Design and certification of energy efficiency of buildings.

STR 2.04.01:2018 Building enclosures. Walls, roofs, windows and exterior access doors.

STR 2.05.03:2003 Fundamentals of designing building structures.

STR 2.05.04:2003 Impacts and loads.

LST EN 206:2013+A2:2021 Concrete. Specification, performance, manufacture and compliance.

LST EN ISO 717-1:2021 Acoustics. Assessment of sound insulation of structural partitions and its parts. Part 1. Isolation of airborne sound.

LST EN 772-22:2019 Test methods for masonry products. Part 22. Determining the resistance of ceramic masonry products to freezing and thawing.

LST 1428-17:2016 Concrete. Test methods. Part 17. Determination of cold resistance by unilateral freezing and thawing.

LST EN 1607:2013 Construction thermal insulation products. Determination of tensile strength perpendicular to surfaces.

LST EN ISO 1798:2008 Flexible porous polymeric materials. Determination of tensile strength and missing elongation.

LST EN 1990:2004 Eurocode. Fundamentals of structural design.

LST EN 1990:2004/NA:2010 Eurocode. Fundamentals of structural design.

LST EN 1990:2004/A1:2006/NA:2012 Eurocode. Fundamentals of structural design.

LST EN 1991-1-1:2004 Eurocode 1. Effects on structures. Part 1-1. General effects. Densities, self-weight, and building use loads.

LST EN 1991-1-1:2004/NA:2011 Eurocode 1. Exposure on structures. Part 1-1. General effects. Densities, self-weight, and building use loads.

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LST EN 1991-1-4:2005 Eurocode 1. Effects on structures. Part 1-4. General effects. Wind effects.

LST EN 1991-1-4:2005/NA:2012 Eurocode 1. Effects on structures. Part 1-4. General effects. Wind effects.

LST EN ISO 4042:2022 Fasteners. Electrochemical coating systems.

ISO 7892:1988 Vertical building elements. Impact resistance tests. Impact bodies and general test procedures.

LST EN ISO 6946:2017 Building components and elements. Thermal resistance and heat transfer coefficient. Calculation methods.

LST EN ISO 7390:2004 Construction of buildings. Connection products. Determination of seal flow resistance.

LST EN ISO 10211:2017 Thermal bridges of building structures. Heat fluxes and surface temperatures. Detailed calculations.

LST EN 10346:2015 Fully hot metallized flat steel products for cold moulding. Technical feed conditions.

LST EN ISO 10456:2008 Construction materials and products. Hygrothermal properties. Procedures for determining tabular design values and declared and design thermal values.

LST EN ISO 10563:2017 Buildings and engineering structures. Sealants. Determination of change in mass and volume.

LST EN ISO 10683:2018 Fastening details. Non-electrolytic flake zinc coating systems.

LST EN 12090:2013 Construction thermal insulation products. Determining shear behaviour.

LST EN 12390-3:2019 Hardened concrete tests. Part 3. Compressive strength of specimens.

LST EN 12667:2002 Thermal properties of building materials and products. Determination of thermal resistance by the protected hot panel and heat flow meter methods. Products of high and medium thermal resistance.

LST EN 12865:2002 Hygrothermal characteristics of building components and parts. Determination of resistance of external wall systems to oblique rain under conditions of pulsating air pressure.

LST EN 13163:2012+A2:2017 Construction thermal insulation products. Factory-made polystyrene foam (EPS) products. Specification.

LST EN 13501-1:2019 Classification of construction products and structural elements according to fire resistance. Part 1. Classification according to fire response test data.

LST EN 13501-2:2016 Classification of construction products and building elements according to fire resistance. Part 2. Classification according to fire resistance test data, excluding ventilation equipment.

LST EN ISO 13788:2013 Hygrothermal characteristics of building components and elements. Internal surface temperature to avoid critical surface moisture and condensation in cracks. Calculation methods.

LST EN ISO 16283-1:2014/A1:2018 Acoustics. On-site measurement of sound insulation of buildings and building elements. Part 1. Isolation of airborne sound.

LST EN ISO 16535:2019 Construction thermal insulation products. Determination of long-term water absorption by immersion.

LST EN 17333-2:2020 Description of single-component foams. Part 2. Expansion characteristics.

LST EN 17333-4:2020 Description of single-component foams. Part 4. Mechanical resistance.

LST EN ISO 29465:2022 Construction thermal insulation products. Determination of length and width.

LST EN ISO 29466:2023 Construction thermal insulation products. Thickness setting.

LST EN ISO 39469:2023 Construction thermal insulation products. Determining crushing behaviour.

LST EN ISO 29470:2020 Construction thermal insulation products. Determination of apparent density.

LST EN ISO 29787:2019 Construction thermal insulation products. Determination of short-term water absorption by partial immersion.

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EAD 040914-00-0404 (November 2018) Vecture kits — Prefabricated units for external wall insulation and their fixing devices.

3. Concepts and Definitions

The following terms and definitions are used in this National Technical Assessment:

3.1 **Base** means the outer wall of the building, which meets the requirements of mechanical strength and rigidity and air tightness, to which Koderus 21N1 panels are attached.

3.2 **Mechanical fastening devices** refers to elements for additional fastening of panels Koderus 21N1 to the base.

3.3 **Characteristic value** is a probable value for which less than 5% of all possible strength values are lower.

3.4 **Vecture set** means a set consisting of the thermal insulation panel and its fastening devices, such as adhesives, fastening devices and sealing materials. The term used in this national technical assessment corresponds to the term 'vature kit' in EAD 040914-00-0404.

4. Marks and Abbreviations

The following symbols and abbreviations are used in this national technical assessment:

S_{ds} refers to design wind load, kPa;

λ_D means declared thermal conductivity coefficient, W/(m•K);

λ_{ds} is design value of heat conductivity coefficient, W/(m•K);

R means thermal resistance, (m²•K)/W.

Other symbols and abbreviations used in this national technical assessment are taken from the referenced technical specifications.

5. Product Performance and Its Testing Methods

This national technical assessment establishes requirements for multi-layer self-supporting facade insulation and decoration panels and additional elements of the vecture kit for their installation, defining the performance related to the essential characteristics of the building, the test and calculation methods for determining this performance, which is necessary to confirm the suitability of the product for use according to the intended purpose.

When supplying the vecture kits to the market, the manufacturer must specify the minimum requirements for fastening the structure to the base. Before installing the structure, the characteristic value of the bonding strength of the panels to the base must be determined by natural tests. The obtained actual characteristic value of adhesion to the base must not be lower than the specified minimum required value for fastening the structure of the vecture set (see Section 5.2.2).

5.1. Accuracy of Geometric Dimensions and Shape

The requirements for the accuracy of the geometric dimensions and shape of the panels are presented in Table 5.1.1.

Table 5.1.1. Tolerances of flat geometric dimensions and shape

Geometric parameter	Allowable deviation	Control method
Nominal panel dimensions (length and width)	+1/-3 mm	Measurement accuracy - 1 mm. Measured in three places - at the edges of the panel and in the middle. Evaluation is based on the arithmetic mean of all measurements.
Panel thickness	± 3 mm	Measurement accuracy - 1 mm. Measured in three places from both long sides of the panel, at the edges and in the middle of the border. Evaluation is based on the arithmetic mean of all measurements.
Thickness of the thermal insulation (EPS) layer	± 3 mm	Measurement accuracy - 1 mm. Measured in three places from both sides of the panel,

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		borders at the edges and in the middle, Evaluation is based on the arithmetic mean of all measurements.
Perpendicularity	± 6 mm	Measurement accuracy - 1 mm. Diagonals are measured. Evaluation is based on the difference of the diagonals.
Edge straightness	± 3 mm / 1 m	Measurement accuracy - 1 mm. All edges are measured. Measurement length - 1 m.
Flatness	± 6 mm	Measurement accuracy - 1 mm. Measured in the middle of the diagonal.

5.2. Mechanical resistance and stability

Multi-layer facade insulation and vesture panels Koderus 21N1 are self-supporting panels.

The main performance characteristics of the mechanical resistance and stability of the panels and their attachment to the base are related to the bearing capacity of the panels glued to the base under wind load and self-weight.

Calculations of the mechanical resistance characteristics of gluing panels Koderus 21N1 to the base were performed in accordance with STR 2.04.01:2018, STR 2.05.04:2003, LST EN 1990:2004, LST EN 1990:2004/NA:2010, LST EN 1991-1-1:2004/NA:2011, LST EN 1991-1-4:2005, LST EN 1991-1-4:2005/NA:2012.

The calculated bearing capacity of the glued panels was tested under the conditions that:

- The characteristic value of the strength of gluing the panels to the base is at least 40 kPa.
- The gluing area of the panels is not less than 60% (the method of gluing is given in Annex 1, see Figure P1.3).

Vesture of Koderus 21N1 panels can be installed on all types of building foundations, such as masonry, reinforced concrete slabs, lightweight concrete, etc.

When installing the panels, it is necessary to ensure a close support of the panel along the entire contour of the panel, ensuring that the supporting contour of the panel will be tight to prevent air circulation between the base of the wall and the panel.

This national technical assessment does not cover the base structure of the building to which the panels are attached.

5.2.1. Wind load resistance of the vesture kit

The wind load resistance of the panels and their gluing is determined by calculations to be 12 kPa.

5.2.2. Self-weight resistance of the vesture kit

The self-weight resistance of the glued vesture set determined by calculations is ensured at a vesture set weight of 48 kg/m².

5.2.3. Resistance of gluing the panel to the base in tension perpendicular to the plane

The minimum required strength of gluing the panel to the base in tension perpendicular to the plane, ensuring the wind load resistance specified in Section 5.2.1 and the installation conditions specified in Section 9, is 40 kPa (characteristic value).

The strength of the panel adhesion to the base is determined according to the methodology specified in EAD 040914-00-0404, Annex F.

5.2.4. Shear strength of the panel and its adhesion to the base

The minimum required shear strength of the panel and its adhesion to the base, ensuring the self-weight resistance specified in Section 5.2.2 and the installation conditions specified in Section 9 is 20 kPa (characteristic value)

The shear strength of the panel and its adhesion to the base is determined according to the methodology specified in LST EN 12090.

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5.2.5. The strength of the panel in tension perpendicular to the plane

The minimum required strength of the panel in tension perpendicular to the plane, ensuring the wind load resistance specified in Section 5.2.1 and the installation conditions specified in Section 9, is 40 kPa (characteristic value).

The strength of the panel in tension perpendicular to the plane is determined by the methodology specified in LST EN 1607.

5.3. Fire safety

5.3.1. Flammability

Tests were carried out to determine the flammability class of the installed panels (installed veture set) according to LST EN 13501-1:2019.

The flammability class of the installed veture set is determined as B-s1, d0.

The specified flammability class is valid under the following conditions:

- Panels are glued on a base with the following characteristics:
 - Flammability class is at least A2-s1,d0 according to LST EN 13501-1.
 - Density is at least 450 kg/m³.
 - Thickness is at least 12.5 mm.
- Coating of the concrete veture layer with the coat Rocksil CE must not exceed 50 g/m².
- Panels are glued with cement adhesives where the content of organic substances does not exceed 15%.
- Seams between the panels are sealed as specified in the relevant flammability classification protocols (see Annex 1, Figure P1.2).

Note. Other conditions ensuring the flammability class are given in the relevant flammability classification protocols.

5.3.2. Fire resistance

This property was not identified during the preparation of the national technical assessment.

5.4. Hygiene, health and environmental protection

5.4.1. Water vapour permeability and moisture resistance

After performing the calculations of the moisture status of the veture set in accordance with the requirements of LST EN ISO 13788:2013 and STR 2.01.02:2016, it was determined that the veture set ensures sufficient moisture maintenance according to the application specified in Section 1.2:

- In the cold season, moisture may accumulate on the outer side of the polystyrene foam near the veture concrete layer but its amount will not exceed the maximum allowed amount ($U_{max} = 0.15$ kg/kg) and will evaporate in the warm season.

5.4.2. Water impermeability

The water permeability of the panel structure and panel interconnections (assembled veture kit) was tested according to LST EN 12865:2002 by applying method A.

The specimen was subjected to 80 heating-pouring cycles (see Section 5.4.3) prior to determining watertightness.

It was determined that the construction of the panelled barrier ensures its watertightness at a pressure difference of 1,000 Pa.

The specified level of water tightness is ensured when the panel interconnections are sealed as specified in Annex 1 (see Figure P1.2).

5.4.3. Resistance to hydrothermal effects

The panel was tested for resistance to hydrothermal effects according to the methodology specified in EAD 040914-00-0404, Annex D. The sample was subjected to 80 heating-casting cycles:

- Raising the panel surface temperature to 70°C and 2 hours. storage at 10±30%RH.
- Spraying the panel surface with water at a temperature of 15°C, water quantity 1 l/(m²-min), duration 1 hour.
- 2-hour drainage.

After the hydrothermal exposure, visually visible surface damage and signs of delamination of the panel layers were tested.

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During the test, it was found that the panel is resistant to hydrothermal effects, that is, there were no visible signs of surface damage or delamination of the panel layers after hydrothermal exposure.

5.4.4. Cold resistance

The panel was tested for cold resistance in accordance with LST EN 772-22:2019. The specimen was subjected to 100 freeze-thaw cycles.

After exposure to cold resistance, visually visible surface damage and signs of delamination of the panel layers were checked.

During the test, it was found that the panel is resistant to the effects of 100 cycles of freezing and thawing, i. e. there were no visible signs of surface damage or delamination of the panel layers after the specified exposure.

5.4.5. Hazardous materials

The release of harmful and dangerous substances has not been determined and is not declared.

5.5. Safety of use

5.5.1. Impact resistance

The impact resistance of the outer surface of the panel is ensured by the impact resistance of the finishing concrete layer. The impact resistance of the outer surface of the panel was determined and evaluated by performing an impact resistance test according to ISO 7892 under the following test conditions:

- During the impact resistance test with a solid body, the panel is subjected to an impact energy of 10 J;
- When performing the impact resistance test with a soft body, subjecting the panel to an impact energy of 700 J.

Tests have shown that the outer surface of the panel meets impact resistance category I according to STR 2.04.01:2018.

5.5.2. Resistance to horizontal concentrated load

The test verified the resistance of the panel to a horizontal concentrated load (ladder support test) using the methodology specified in EAD 040914-00-0404, Annex K. The specimen was subjected to a concentrated load of 500 N through two (25x25x5) mm support blocks placed at a distance of 440 mm from each other (*simulating the load from a supported ladder on which personnel stand*).

During the test, it was found that the panel has no visible damage or residual deformation after exposure, that is, the panel is resistant to the effects of horizontal concentrated load.

5.6. Noise protection

5.6.1 Air sound insulation

During the tests, the air sound insulation index of the panel Koderus 2IN1 - B/MF - 1000x500x310/10/300 - ... was determined as $R_w (C;C_{tr}) = 34 (-1;-3)$ dB.

The air sound insulation index is determined and declared based on the results of the tests performed in accordance with LST EN ISO 10140-2, LST EN ISO 16283-1 and assessed in accordance with LST EN ISO 717-1.

5.7. Energy saving and heat preservation

5.7.1. Thermal resistance

The thermal resistance values of the panels, after additionally evaluating the influence of the anchors used for the installation of the panels, are calculated according to the requirements of LST EN 6946:2017, LST EN ISO 10211:2017 and STR 2.01.02:2016.

The corresponding thermal properties of individual components are taken from LST EN ISO 10456:2008 and manufacturers' performance declarations.

Calculations were made under the following assumptions:

- Concrete vesture layer $\lambda_{ds} = 1.15$ W/(m•K);
- Perforated installation tapes:
- Panel Koderus 2IN1 – B/MF_h... is fixed with three mounting tapes.
- Panel Koderus 2IN1 – B/MF_v... is fixed with two mounting tapes.
- $\lambda_{ds} = 5$ W/(m•K)
- Thermal insulation layer of polystyrene foam layer:
- $\lambda_{ds} = 0.039$ W/(m•K)

- $\lambda_{ds} = 0.037 \text{ W/(m}\cdot\text{K)}$
- $\lambda_{ds} = 0.033 \text{ W/(m}\cdot\text{K)}$
- $\lambda_{ds} = 0.032 \text{ W/(m}\cdot\text{K)}$

The thermal resistance values of the panels are given in Table 5.7.1.

Table 5.7.1. Thermal properties of panels

Coefficient of design thermal conductivity of the thermal insulation layer, $\lambda_{ds} = \text{W/(m}^2 \cdot \text{K)}$	Thermal insulation layer thickness, mm	Thermal resistance, R [(m ² ·K)/W]	
		Panel type	
		Koderus 2IN1 - B - ...	Koderus 2IN1- B/MF - ...
0.039	100	2.55	2.50
	150	3.85	3.65
	200	5.10	4.80
	250	6.40	5.95
	270	6.90	6.40
	300	7.70	7.05
0.037	200	5.40	5.05
	250	6.75	6.25
	270	7.30	6.70
	300	8.10	7.40
0.033	100	3.00	2.90
	150	4.55	4.30
	200	6.05	5.65
	250	7.55	6.95
	270	8.15	7.45
	300	9.10	8.20
0.032	200	6.25	5.80
	250	7.80	7.15
	270	8.45	7.65
	300	9.35	8.40

5.8. Durability

The design of the panels and the durability characteristics of the components used to make them ensure that the wear of the panels during the economically feasible useful life will be insignificant and without affecting the main operational indicators, if the building is used according to the purpose specified in Section 1.2.

5.8.1. Cold resistance

During the test in accordance with LST EN 772-22:2019, it was found that the panel is resistant to the effects of 100 cycles of freezing and heating, i. e. there were no visible signs of damage to the outer surface of the panel or delamination of the panel layers after the specified exposure.

5.8.2. Resistance to hydrothermal effects

During the test in accordance with the methodology specified in section of Annex D of EAD 040914-00-0404, it was determined that the panel is resistant to the effects of hydrothermal heating and casting for 80 cycles, i. e. there were no visible signs of damage to the outer surface of the panel and delamination of the panel layers after the specified exposure.

5.8.3. Corrosion resistance of steel mounting tapes

Perforated mounting tapes used for panel fastening are coated with a 2 gr/m² hot-melt zinc coating.

6. Assessment and verification of constancy of performance

6.1. System for assessment and verification of constancy of performance

The system for assessment and verification of constancy of performance is presented in Table 6.

Table 6. The system of panel assessment and verification of constancy of its performance

Product/products	Intended use	Assessment and verification system
Multi-layer self-supporting facade insulation and veture panels	For facades of newly constructed and renovated residential and non-residential buildings	1, 3
System 1: See construction technical regulation STR 1.01.04:2015, paragraph 11. System 3: See construction technical regulation STR 1.01.04:2015, paragraph 13.		

6.2. Obligations for the manufacturer and bodies performing third-party tasks in the assessment and verification of constancy of performance of the construction product

The manufacturer must justify the conformity of the manufactured panels (veture set) with the requirements of the following national technical assessment:

- Initial type tests.
- Production control.

The breakdown of performance assessment and verification tasks is given in Table 7.

Table 7. Breakdown of performance assessment and verification tasks

Tasks		Scope of the task
Tasks for the manufacturer	Initial type tests	see Section 6.2.1.1
	Internal production control according to Control Plan ¹⁾	see Section 6.2.1.2
Tasks for a third-party laboratory	Initial type tests	see Section 6.2.2.1
Tasks for the certification body	Assessment of initial type tests	see Section 6.2.3.1
	Initial inspection of production and internal production control	see Section 6.2.3.2
	Continuous monitoring and evaluation of internal production control	see Section 6.2.3.3

¹⁾ — *The Control Plan is the confidential part of this national technical assessment, which was prepared and handed over to the manufacturer by the technical assessment institution Inspekta JSC. The Control Plan is not published. The Control Plan is kept with the manufacturers and technical certification body – Inspekta JSC.*

After choosing another body (other than Inspekta JSC) for inspection and certification of internal production control, the manufacturer must submit a Control Plan to this body.

Once the performance assessment and verification have been completed, the manufacturer prepares a declaration of performance.

6.2.1. Tasks for the manufacturer

6.2.1.1. Initial type tests

The results of the initial type tests must be recorded, submitted for verification and kept for at least 10 years after the date of the last product to which they apply following launching.

The tests shall be carried out using the test methods and methodologies specified in this national technical assessment. In case of uncertainty, the selection of the test method must be coordinated with the technical assessment body.

The scope of initial type tests carried out by the manufacturer is given in Table 8.

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Table 8. Scope of initial type tests performed by the manufacturer

Performance	Method of testing or assessment
Accuracy of the geometric dimensions and shape of the panel (paragraph 5.1)	Manufacturer's method
Water vapour permeability and resistance to moisture (paragraph 5.4.1)	Calculations according to LST EN ISO 13788, STR 2. 01.02:2016
Hazardous materials (paragraph 5.4.5)	Declaration based on compliance with the documents of component manufacturers
Thermal resistance (paragraph 5.7.1)	Calculations according to LST EN ISO 6946, LST EN ISO 10211, STR 2.01.02:2016

In the event of changes in the production process, in the materials or components used, as well as in the production control system, which have or may have an effect on the declared performance or their its constancy, new type tests must be carried out.

6.2.1.2. Internal production control

The internal production control system must be legalised and documented. The internal production control system must include the production process and production control actions ensuring that the product put on the market meets the requirements of this national technical assessment and the declared performance. This internal production control shall include:

- Control of obtained materials and components according to the provided Control Plan. This control must ensure that the components of the veture set not produced by the product manufacturer meet the requirements of this national technical assessment.
- Control of the production process according to the Control Plan, determining the frequency of inspections and tests together with the parameters or required criteria. Adequacy of technological and measuring equipment must be ensured. Actions to be taken when test parameters or criteria are not met must be provided.
- Control and testing of the manufactured product according to the Control Plan, determining the frequency of control and/or testing of the manufactured product, sampling methods, taking into account the provisions of this national technical assessment and the declared performance of the product. Actions to be taken when controlled parameters or criteria are not met must be provided. The suitability of the control devices and test equipment used must be ensured.
- Management and control of storage of finished products, ensuring that non-compliant products are clearly identified. The procedure for handling non-accidental products must be documented.
- Traceability of the production process.

All of the above-mentioned internal production control elements, requirements and measures implemented by the manufacturer must be formalised in writing in the procedures.

The results of internal production control are recorded and evaluated. records shall include at least the following specified information:

- Registration and approval of suitability of materials and components.
- Technological process control results.
- The results of the control of the manufactured product and, if applicable, a comparison with the requirements.
- Product marking and date of manufacture.

The conclusion on the suitability of panels must be made after evaluating the results of materials and components, technological process, control of finished production, and initial type tests.

Records must be submitted to the certification body during initial internal production control and ongoing surveillance.

6.2.2. Tasks for a third-party laboratory

6.2.2.1. Initial type tests

The scope of initial type testing performed by the third-party laboratory is provided in Table 9.

The manufacturer is responsible for providing the appropriate samples and information to the testing laboratory.

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Table 9. Scope of initial type tests performed by a third-party laboratory

Performance	Method of testing or assessment
Impact resistance of the vesture (p. 5.5.1)	Test according to ISO 7892. Evaluation of the result according to STR 2.04.01:2018.
Vesture resistance under horizontal concentrated load (p. 5.5.2)	EAD 090062-00-0404, Annex F methodology
Water impermeability of the vesture set (p. 5.4.2)	LST EN 12865, Method A
Resistance to hydrothermal effects (p. 5.4.3)	EAD 040914-00-0404, Annex D methodology
Frost resistance (p. 5.4.4)	LST EN 772-22
The resistance of the vesture set under horizontal load	EAD 040914-00-0404, Annex K methodology
Air sound insulation index	LST EN ISO 10140-2, LST EN ISO 16283-1, LST EN ISO 717-1

The results of the initial type tests must be recorded, submitted for verification and kept for at least 10 years after the last marketing date of the product to which they apply.

The tests must be carried out using the test methods and methodologies specified in this national technical assessment. In case of uncertainty, the selection of the test method must be coordinated with the technical assessment body.

In the event of changes in the production process, in the materials or components used, as well as the production control system, which have or may have an effect on the declared performance or its constancy, new type tests must be performed.

6.2.3. Tasks for the certification body

6.2.3.1 Evaluation of initial type tests

The results of tests and assessments evaluated during the preparation of this national technical assessment are used as initial type tests. In the event of changes in the production process, in the materials or components used, as well as in the production control system, which have or may have an effect on the declared performance or its constancy, new type tests must be performed.

The scope of new initial type tests evaluated by the certification body is provided in Table 10.

Table 10. Initial type tests assessed by the certification body

Performance	Test/Evaluation Method
Flammability class of the vesture set (p. 5.3.1)	LST EN 13501-1
Wind load resistance of the vesture set (p. 5.2.1)	STR 2.04.01:2018, STR 2.05.04:2003, LST EN 1990:2004, LST EN 1990:2004/NA:2010, LST EN 1991-1-1:2004/NA:2011, LST EN 1991-1-4:2005, LST EN 1991-1-4:2005/NA:2012
Resistance of the vesture set under the exposure of the self-weight (p. 5.2.2)	STR 2.04.01:2018, STR 2.05.04:2003, LST EN 1990:2004, LST EN 1990:2004/NA:2010, LST EN 1991-1-1:2004/NA:2011, LST EN 1991-1-4:2005, LST EN 1991-1-4:2005/NA:2012

6.2.3.2. Initial inspection of production and internal production control

The certification body, in the initial inspection of the production plant and internal production control, in accordance with the requirements of this national technical assessment and the Control Plan, must make sure that the production plant (employees and equipment) and internal production control ensure the declared performance and its constancy, and the internal production control complies with this national technical assessment and control plan requirements.

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6.2.3.3 Continuous monitoring and assessment of internal production control

The frequency of internal production control supervision and assessment performed by the certification body must be at least once a year.

Through continuous supervision and assessment of internal production control, the certification body must make sure that the production company (employees and equipment) and internal production control ensure the declared performance and its constancy, and internal production control meets the requirements of this national technical assessment and Control Plan.

Supervision and assessment of internal production control must be carried out in accordance with the Control Plan.

In cases where the provisions of the national technical assessment and the Control Plan are no longer fulfilled, the validity of the certificate of constancy of performance must be terminated.

6.3. Certificate of constancy of performance and declaration of performance

After the manufacturer fulfils the requirements set out in this national technical assessment, the certification body will issue a certificate of constancy of performance. This certificate must contain the following information:

- Name and address of the certification body.
- Number of the certificate of constancy of performance.
- Name, address and place of production of the manufacturer.
- Product, its types, and intended purpose of use.
- Provisions which the product complies with - the mark of this national technical assessment.
- Validity period and terms and conditions of the certificate, if necessary.
- The name and position of the person authorised to sign the certificate.

The manufacturer must prepare a declaration of performance, which must contain information in accordance with the requirements of STR 1.01.04. In the performance declaration, all performance characteristics specified in Table 8, Table 9 and Table 10 must be declared.

7. Marking and labelling

7.1 The nominal designation of the panel consists of a group of alphanumeric symbols that identify the unique type of panel.

The form of the conventional marking of the panel:

Panel trade name - TB - LxBxt/t_c/t_{EPS} R - ASK - DK - RAL_XXX - NTI-03-005:2023

where:

brand name of the panel - Koderus 2IN1;

TB means panel mounting method:

- B, when the panel is only glued (made without perforated installation tapes used for additional fastening).
- B/MF_h, when the panel is glued and additionally fixed through perforated mounting tapes (made with mounting tapes used for additional fixing), installing the panel in a horizontal direction.
- B/MF_v, when the panel is glued and additionally fixed through perforated mounting tapes (made with mounting tapes used for additional fixing), installing the panel in a vertical direction.

LxB_{xt}/t_c/t_{EPS} means nominal dimensions of the panel in mm (L - length, B - width, t - total thickness of the panel).

R refers to thermal resistance of the panel (m²·K)/W.

ASK means impact resistance category.

DK is flammability class.

RAL_XXX is identification of the colour of the panel veture surface.

NTI-03-005:2023 is the designation of this national technical assessment.

7.2. Each Koderus 2IN1 panel supplied to the market must be identified in order to ensure their traceability to the place of manufacture and the date of manufacture before installation. To this end, the manufacturer must label the products or provide identifying information in the accompanying documents so that, if necessary, internal production control records, which are mandatory according to the requirements provided in this national technical assessment, can be reviewed.

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The marking on the product must be durable and resistant to normal wear and tear.

The labelling must include the following information:

- Manufacturer's name or trade mark and address.
- Product marking (see p. 7.1).
- Date of manufacture.
- Mark of this national technical assessment.

Accompanying documents must include instructions for transporting, storing and installing the panels or indicate where this information can be found publicly posted.

Figure 1 provides an informative example of labelling.

UAB Koderus, Žirgų str. 19, Antezeriai, LT-14158 Vilnius District	Manufacturer's name and address
NTI-03-005:2023	National technical assessment mark
Multi-layer self-supporting facade insulation and decoration panel Koderus 2IN 1 — B/MF _h , - 1200x600x 108/8/100 - R - I - B-s1,d0 - RAL_XXX - NTI-03-005:2023	Product type and designation
-.-.2023	Date of manufacture

Figure 1. Informative example of product labelling

8. Assumptions on the basis of which the performance of the construction product was evaluated

This national technical assessment is issued on the basis of:

- The results of calculations and type tests indicated in Table 6.2.2.1, Table 6.2.2.1 and Table 6.2.3.1, confirming the suitability of the panels (veture set) according to the specified purpose of use.
- Internal production control used by the manufacturer, which ensures the values of the declared performance and its constancy.

The results of the calculations and tests obtained during the technical evaluation are kept by the manufacturer. Copies of calculations and test reports are stored in the technical evaluation body.

Changes that may affect the performance of the panels (veture set) and their production process must be reported to Inspekta JSC before their implementation. The technical assessment institution Inspekta JSC will decide whether these changes will affect the validity of the national technical assessment or whether additional assessment and/or change of national technical assessment will be necessary.

8.1. Production

The production process is carried out in dry and heated rooms. All necessary materials and components are stored internally ensuring the required conditions for the quality of these materials and components. The products are manufactured in accordance with the provisions of this national technical evaluation, using the manufacturing method that was identified during the internal production control inspection and the preparation of the Control Plan and as determined in the manufacturer's technical documentation. The production process of the component parts of the set is carried out in accordance with the technological requirements applicable to the production of these components.

Veture sets must be assembled in accordance with the provisions of this national technical assessment, which were determined after the analysis of the initial type test results, taking into account the internal production control system used by the manufacturer on the basis of the harmonised Control Plan.

8.2. Projecting

The panel veture set is installed according to the working project of the building where it will be used. During the design, the following must be taken into account:

- Bearing capacity requirements.
- Fire safety requirements.
- Special health and environmental protection requirements.

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- Safety of use.
- Noise protection.
- Energy saving.

During the preparation of this national technical assessment, the thermal resistance of the panels was calculated according to the requirements of LST EN ISO 6946:2017, LST EN ISO 10211:2017 and STR 2.01.02:2016.

The veture elements of corner edges, parapet and other similar parts are not considered in this national technical evaluation but the manufacturer provides in the installation project the possible typical options for installing the veture kit in the specified parts of the building in order to ensure the appropriate performance and declared performance of the installed veture kit. The designer must coordinate such solutions with the manufacturer on a case-by-case basis.

9. Assembly, installation, assembly

9.1. Assembly

It is the manufacturer's responsibility to provide adequate information on panel installation. The panels must be installed according to the installation instructions provided by the manufacturer.

The installation instructions must contain the following information:

- Installation method and necessary tools.
- Fastening of products to the base.
- The construction of the panel interconnection unit.
- Technical description of all materials and components to be used for installation.
- Drawings of standard and special connections and units.

Before starting the installation, it must be ensured that the panels are not damaged during transportation and storage. Damaged and deformed panels cannot be installed.

When additional elements are installed on the surface of the panels, the load caused by them must be transmitted directly to the base of the wall through additional supports attached to the base.

9.2. Requirements for the base

This national technical assessment does not set requirements for the material and performance of the base on which the panels will be installed.

Before starting to install the panels, the installer must:

- Check the unevenness of the geometric dimensions and shape of the existing base, assessing the influence of the unevenness of the base on the thickness of the adhesive.
- Check the bonding strength by using tests (determine the characteristic resistance of the panel to being torn from the base). The tear-off resistance (characteristic value) of gluing the panel to the base shall not be lower than 40 kPa.

10. Instructions for packaging, transportation, storage, use, maintenance and repair

10.1. Packaging, transportation and storage

The manufacturer must prepare the instructions for the transport and storage of the panels.

During transportation, storage and installation, the panels must be protected from the harmful exposure of the atmosphere.

Panels must not be lifted and stored in such a way that they can be damaged.

10.2. Use, maintenance and repairs

It is the manufacturer's responsibility to provide appropriate information with each shipment regarding the use of the panels, including general information and specific installation drawings and construction details.

If it is necessary to change or repair the structure, this can only be done in accordance with the installation instructions. In other cases, changes are possible only with the written consent of the manufacturer.

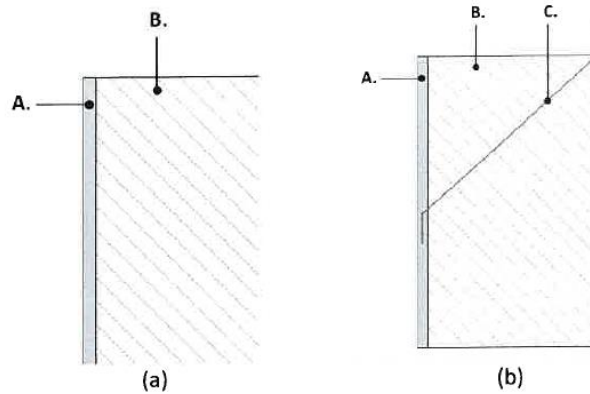
Adequate regular maintenance may be required to ensure the performance of the panels over an economically feasible service life. In this case, the maintenance steps and frequency must be specified in the maintenance instructions provided by the manufacturer.

P1.1 General view of panels and main geometric dimensions

This Annex provides an overview of the panels, basic dimensions, component information, installation diagrams and units.

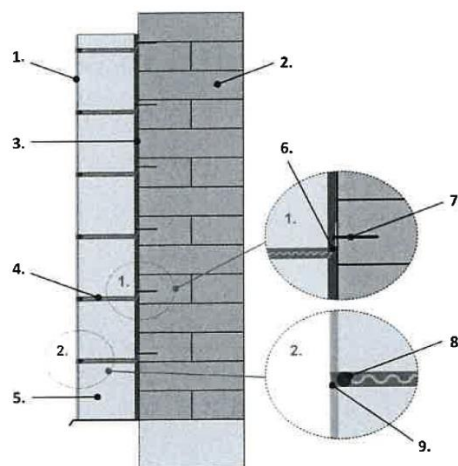
A general view of the panels is provided in Figure P1.1.

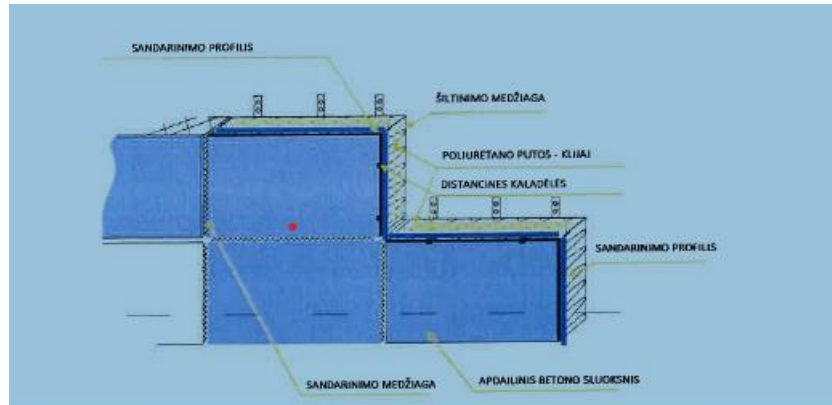
The panel fastening and interconnection units are presented in Figure P1.2 and Figure P1.3.



Mark	Description of the component
A	Concrete vesture layer (see Annex 2, section P.2.1)
B	Thermal insulation layer of expanded polystyrene foam (see Annex 2-4, section P.2.2). Requirements for essential properties of polyurethane foam panel are determined in the Control Plan.
C	Perforated mounting tape for additional panel fastening (see Annex 2, section P.2.3)

Fig. P1.1. General view and components of Koderus 21N1 panels:
 a) panel Koderus 21N1 - B - ... b) panel Koderus 21N1 — B/MF ...





where:

- 1— Concrete veneer layer
- 2— Wall of the existing building
- 3— Cement adhesive for gluing panels to the base
- 4— Sealing foam Penosil Fire Rated Gunfoam B1 187 (manufacturer Wolf Group OU, Estonia)
- 5— Panel heat-insulating layer of expanded polystyrene foam
- 6— Installation tape for additional fastening of the panel to the base
- 7— Fastening element
- 8— Expanded polyethylene sealing profile Bostik Bottningslist (manufacturer Bostik AB, Sweden)
- 9— Sealing sealant Penosil Premium FireStop Silicone (manufacturer Wolf Group OU, Estonia)

Fig. P1.2. A general view of the Koderus 21N1 panel mounting and interconnecting units and components



Note. The adhesive is applied to the panel around the entire perimeter of the panel with a tape of approximately 5 cm wide. Four to six palm-sized points of adhesive mass are placed in the middle of the panel. The glue is distributed in such a way that it covers at least 60% of the panel area. The thickness of the adhesive layer is selected in such a way as to smooth out the unevenness of the base. The thickness of the adhesive layer cannot exceed 25 mm.

The adhesive can be applied to the panel with a special profiling spatula.

Fig. P1.3. Method of gluing Koderus 21N1 panels to the base

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This annex contains the technical specifications of the components of the veture set.

P2.1. Concrete veture layer

Concrete according to LST EN 206 is used to form the concrete veture layer of the panel.

The essential characteristics of the concrete used are provided in Table LP2.1.1.

Table LP2.1.1. Technical specification of veture concrete layer

Characteristics	Required value	technical specifications
Identification mark	C30/37-XC4; XF1-F100(LT)	LST EN 206
Layer thickness	10 ± 2 mm 14 ± 2 mm 18 ± 2 mm	manufacturer's methodology
Concrete compressive strength class	C30/37	LST EN 12390-3
Cold resistance	F100	LST 1428-17:2016

P2.2. Thermal insulation layer

The thermal insulation layer of the panel is formed from expanded polystyrene foam according to LST EN 13163.

The essential characteristics of the used expanded polystyrene foam are provided in Table LP2.2.

Table LP2.2. Technical specification of used expanded polystyrene foam panels

Characteristics	Required value	Technical specifications
Thickness	50÷300 mm	LST EN ISO 29466
Thermal conductivity coefficient declared	0.030 W/(m•K) 0.031 W/(m•K) 0.035 W/(m•K) 0.037 W/(m•K)	LST EN 12667
Tensile strength perpendicular to the surface (characteristic value)	≥ 40 kPa	LST EN 1607
Compressive strength	≥ 80 kPa	LST EN ISO 29469
Creep strength (characteristic value)	≥ 20 kPa	LST EN 12090
Flammability class	E	LST EN 13501-1

P2.3 Steel perforated mounting strip

For additional fastening of the panel to the base, a perforated steel mounting tape is used, which is concreted into the concrete veture layer of the panel during the production of the panel (Figure P1.1).

An overview of the perforated galvanised steel mounting tapes used for panel production is provided in Figure P2.3.1.

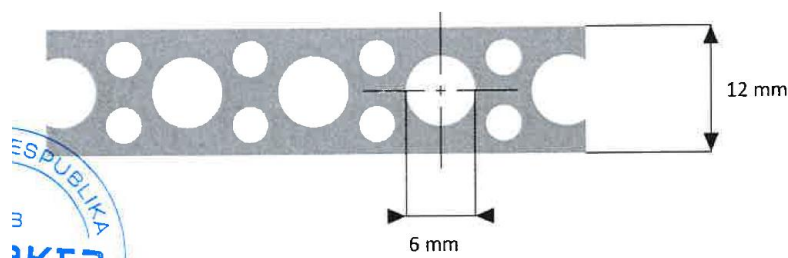


Fig. P2.3.1 — general view and main dimensions of perforated mounting tape

The technical specification of the perforated mounting tape is provided in Table LP2.3.1.

Table LP2.3.1. Technical specification for perforated mounting tape

Characteristics	Required value
Materiality (steel technical grade)	Steel DX51D+Z275 according to LST EN 10346
Main dimensions: - Width - Thickness	12-0.2 mm 0.5±0.05 mm
Durability: - Covering with molten zinc coating	≥ 275 g/m ²

P2.4 Adhesive for gluing panels to the base

Adhesive is used for gluing the panels to the base.

The technical specification of the adhesive used for fixing the panels to the base is provided in Table LP2.4.1.

Table LP2.4.1. Adhesive technical specification

Characteristics	Required value	Technical specifications
Identification: - Materiality	cement adhesive	-
The amount of organic matter	≤ 15%	-
Adhesion strength to polystyrene foam (characteristic value)	≥ 40 kPa	LST EN 1607 methodology
Adhesion strength with declared bases (characteristic value)	≥ 40 kPa	LST EN 1607 methodology

P2.5 Screws for mechanical fastening of panels to the base

Screws are used for additional mechanical fastening of the panels to the base.

The technical specification of the screws used is provided in Table LP2.5.1.

Table LP2.1.1. Technical specification of studs

Characteristics	Required value	Technical specifications
Dimensions (length, diameter)	Chosen depending on the existing base	-
The resistance of a screw screwed into the base to be pulled out of the base	No requirements	-
Durability: Covering with molten metal coating	≥ 5 µm	LST EN ISO 4042, LST EN ISO 10683

P2.6 Sealing foam Penosil Fire Rated Gunfoam B1 187

Sealing foam Penosil Fire Rated Gunfoam B1 187 (manufacturer Wolf Group OU, Estonia) is used for gluing the panels together.

The technical specification of the indicated sealing foams is provided in Table LP2.6.1.

Table LP2.6.1 Technical specification of sealing foam Penosil Fire Rated Gunfoam B1 187 (manufacturer Wolf Group OU, Estonia)

Characteristics	Required value	Technical specifications
Flammability class	B-s2,d0	LST EN 13501-1
Dimensional stability	≤ 1%	LST EN 17333-2
Tensile strength	≥ 95 kPa	LST EN 17333-4
Relative elongation in tensile	≥ 14%	LST EN 17333-4

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P2.7 Sealing profile Bostik Bottningslista

The expanded polyethylene profile Bostik Bottningslist (manufacturer Bostik AB, Sweden) is used to seal the seams between the panels.

The technical specification of the specified profile is provided in Table LP2.7.1.

Table LP2.7.1. Technical specification of sealing profile Bostik Bottningslist (manufacturer Bostik AB, Sweden)

Characteristics	Required value	Technical specifications
Materiality	Expanded polyethylene (PEF) with closed pores	-
Diameter	∅ 10 mm	LST EN ISO 29465
Density	30 kg/ m ³	LST EN ISO 29470
Tensile strength	0.4 N/ mm ²	LST EN ISO 1798
Compressive strength at 50% strain	0.11 N/ mm ²	LST EN ISO 29469
Water soaking, after 7 days soaking in water	≤ 2% vol.	LST EN ISO 29767
Thermal conductivity coefficient	0.036÷0.045 W/(K•m2)	LST EN 12667

P2.8 Sealant Penosil Premium FireStop Silicone

Sealant Penosil Premium FireStop Silicone (manufacturer Wolf Group OU, Estonia) is used to seal the seams between the panels.

The technical specification of the indicated sealant is provided in Table LP2.8.1.

Table LP2.8.1. Technical specification of sealant Penosil Premium FireStop Silicone (manufacturer Wolf Group OU, Estonia)

Characteristics	Required value	Technical specifications
Flammability class	B-s3,d0	LST EN 13501-1
Flow resistance	≤ 3 mm	LST EN ISO 7390
Change in volume	≤ 10%	LST EN ISO 10563