SINTEF Technical Approval

TG 20624

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Valid until 01.03.2026
Provided listed on www.sintefcertification.no

SINTEF confirms that

BauderPIR insulation boards

has been found to be fit for use in Norway and to meet the provisions regarding product documentation given in the regulation relating to the marketing of products for construction works (DOK) and regulations on technical requirements for building works (TEK), with the properties, fields of application and conditions for use as stated in this document

1. Holder of the approval

Bauder AS
Lindebergsvegen 1
2016 Frogner
Norway
www.bauder.no

2. Product description

BauderPIR are insulation boards made of rigid polyisocyanurate (PIR), see Fig. 1.

BauderPIR FA (Fig. 1a) has black aluminium facing on both sides and rebate edges. It is available in thicknesses 60-240 mm.

BauderPIR FA TE (Fig. 1b) has the same core as BauderPIR FA and comes with straight edges. It has an aluminium facing on both sides, with a grit pattern printed in on the top facing. BauderPIR FA TE is available in thicknesses 20-240 mm.

BauderPIR FA Gefälle (Fig. 1c) has the same core as BauderPIR FA and comes with 2 % or 1.6 % gradient and thicknesses $30 \leq t \leq 190$ mm.

BauderPIR T (Fig. 1d) has straight edges, no facing and is available in thicknesses 20-400 mm with or without gradient.

BauderPIR M (Fig. 1e) has a mineralised glass fibre facing on both sides, comes with straight edges and in thicknesses 20-240 mm.

BauderPIR KOMPAKT (Fig. 1f) has straight edges, no facing and is available in thicknesses 100-160 mm, with or without gradient.

The boards are normally supplied with dimensions shown in Table 1.

3. Fields of application

BauderPIR insulation boards can be used thermal insulation in compact roofs with or without pedestrian traffic and terraces. An overview of the application area for the different types of BauderPIR insulation boards is given in Table 3.

BauderPIR insulation boards can be used as thermal insulation in compact roofs and terraces of buildings in Risk class 1-6 in Fire class 1, 2 and 3 according to regulations on technical requirements for building works (TEK) with guidance document. The insulation must be used as shown in Fig. 2-12, and according to the conditions and principles stated in Chapter 6 Special conditions for use and installation.

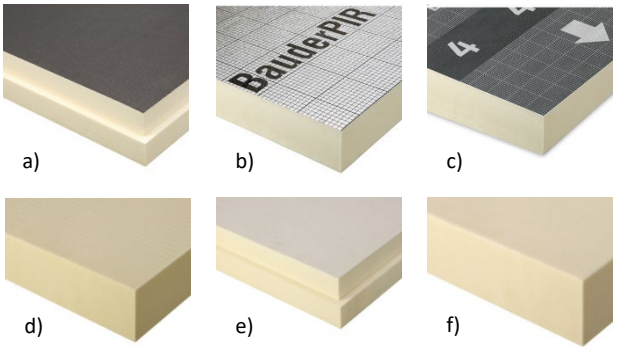

Fig. 1
Polyisocyanurate (PIR) insulation boards.
Figure: Bauder AS

Table 1
Dimensions and tolerances of BauderPIR insulation boards

Property	Test method EN	Value	Tolerance	Unit
Length				
- BauderPIR FA	822	2400	± 10	mm
- BauderPIR FA TE		1200	± 7,5	
- BauderPIR FA Gefälle		1200	± 7,5	
- BauderPIR T		1200	± 7,5	
- BauderPIR M		1200	± 7,5	
- BauderPIR Kompakt		600	± 5	
Width				
- BauderPIR FA	822	1200	± 7,5	mm
- BauderPIR FA TE		600	± 5	
- BauderPIR FA Gefälle		1200	± 7,5	
- BauderPIR T		800	± 5	
- BauderPIR M		600	± 5	
- BauderPIR Kompakt		600	± 5	
Thickness	823		Class T2 acc. EN 13165	mm
- BauderPIR FA		60-240	< 50 / ± 2	
- BauderPIR FA TE		20-240	50-70 / ± 3	
- BauderPIR FA Gefälle		30-190	> 75 / +5, -3	
- BauderPIR T		Project		
- BauderPIR M		40-240		
- BauderPIR Kompakt		100-160		
Squareness	824	≤ 5		mm/m
Flatness	825	≤ 10		mm
Density	-	ca. 30	-	kg/m³

Table 2
Product properties of BauderPIR insulation boards for flat roofs

Property	Test method EN	Class / level EN 13165		Unit
		Declaration of performance[1)]	Control limit[2)]	
Compressive strength - BauderPIR FA - BauderPIR FA TE - BauderPIR FA Gefälle - BauderPIR T - BauderPIR M - BauderPIR Kompakt	826	 CS (10/Y)120 CS (10/Y)120 CS (10/Y)120 CS (10/Y)120 CS (10/Y)120 CS (10/Y)150	 CS (10/Y)120 CS (10/Y)120 CS (10/Y)120 CS (10/Y)120 CS (10/Y)120 CS (10/Y)150	-
Dimensional stability at specified temperature and humidity	1604	DS(70,90)3 DS(-20,-)2	DS(70,90)3 DS(-20,-)2	-
Tensile strength - BauderPIR FA - BauderPIR FA TE - BauderPIR FA Gefälle - BauderPIR T - BauderPIR M - BauderPIR Kompakt	1607	 TR40 TR40 TR40 TR100 TR80 TR100	 TR40 TR40 TR40 TR100 TR80 TR100	-
Thermal conductivity λD - BauderPIR FA - BauderPIR FA TE - BauderPIR FA Gefälle	12667	0,022	0,022	W/(mK)
Thermal conductivity λD - BauderPIR T - BauderPIR M - BauderPIR Kompakt	12667	20 ≤ t ≤ 79 = 0,027 80 ≤ t ≤ 119 = 0,026 120 ≤ t = 0,025	20 ≤ t ≤ 79 = 0,027 80 ≤ t ≤ 119 = 0,026 120 ≤ t = 0,025	W/(mK)
Reaction to fire	13501-1	E	E	-

[1)] Manufacturers Declaration of Performance, DoP
[2)] Control limit show values product has to satisfy during internal factory production control and audit testing.

Table 3
BauderPIR insulation boards for flat roofs

Product name	Area of application
BauderPIR FA	Large lightweight industrial roofs, residential buildings
BauderPIR FA Gefälle	Large lightweight industrial roofs, residential buildings and terrace insulation
BauderPIR FA TE	Terrace insulation
BauderPIR T	Insulation for flat roofs with or without slope
BauderPIR M	Big and small areas, handy dimensions
BauderPIR KOMPAKT	Infiltration-proof insulation with or without slope

The solutions with BauderPIR insulation boards on load-bearing steel sheets or concrete decks shown in Fig. 2-11 can be used if the load-bearing structure itself has documented fire resistance (R).

BauderPIR insulation boards can be used as insulation over load-bearing wood-based structures (including cross laminated timber elements) in compact roofs and terraces, see fig. 12, provided that the load-bearing structure has documented fire resistance (REI).

When using BauderPIR on roofs and terraces with risk of fire spread between fire compartments, for example less than 8 m distance between buildings, or buildings with terraces and roofs at different height levels, the fire safety must be documented by the responsible enterprise for the project. Exception for small buildings with only one fire compartment where there is no risk of spread to or from other fire compartments.

For other applications than stated above, the safety in case of fire must be documented by specific analytical fire design.

4. Properties

The product characteristics of BauderPIR insulation boards are shown in Table 2.

Reaction to fire
BauderPIR insulation boards have class E according to EN 13501-1.

Fire resistance
Fig. 2-12 shows the principles for how the Bauder PIR insulation can be used. Fire resistance of the load-bearing structures is not assessed by SINTEF and is not part of the approval.

Documentation of fire resistance for specific load-bearing structures can be requested Bauder AS.

Spread of fire
Results from fire tests show that there is low risk of an escalating fire due to the BauderPIR insulation, and low risk of unacceptable horizontal and vertical flame spread in the insulation material. Several fire safety assessments have been carried out.

5. Environmental aspects

Substances hazardous to health and environment
BauderPIR insulation boards contains no hazardous substances with priority in quantities that pose any increased risk for human health and environment. Chemicals with priority include CMR, PBT or vPvB substances.

Effect on indoor environment
BauderPIR insulation boards is not regarded as emitting any particles, gases or radiation that have a perceptible impact on the indoor climate, or to have any significant impact on health.

Waste treatment/recycling
BauderPIR insulation boards shall be sorted as residual waste. The product shall be delivered to an authorized waste treatment plant for energy recovery.

Environmental declaration
No environmental declaration (EPD) has been worked out for BauderPIR insulation boards.

6. Special conditions for use and installation

Fire safety conditions
Fig. 2-12 show examples of approved use of BauderPIR insulation boards in compact roofs and terraces. For all solutions shown in the figures, the fire resistance, and the load-bearing capacity during fire for the roof or terrace must be part of the structural design, including necessary protection of the load-bearing steel sheets (Fig. 2-5). The required fire resistance for building elements with load bearing and/or fire separating function in case of fire shall be determined according to the current building regulations (TEK) for each building project.

The use of products named BauderPIR in this approval includes all type of boards specified in Table 1.

Preconditions:
- The roof covering on top of BauderPIR must have fire classification B_{ROOF}(t2) *based on fire testing according to CEN/TS 1187 test 2 with the relevant variant of* BauderPIR insulation as underlay.
- Observations from fire tests have shown that the risk of horizontal fire spread in BauderPIR is small. A slow and limited horizontal fire spread should still be taken into account.
- To prevent fire spread, BauderPIR must be installed in at least two layers with staggered joints. In cases where BauderPIR is installed in a single layer, rebated boards must be used.
- On roof structures with profiled steel sheets, concrete elements (hollow block core or DT elements) or in-situ concrete, BauderPIR may be used without having to protect the underside with non-combustible insulation (A2-s1,d0). See the examples shown in Fig. 2, 6 and 8.
- On roof structures with profiled steel sheets, concrete elements (hollow block core or DT elements) or in-situ concrete, BauderPIR may be used without having to protect the top side with non-combustible insulation (A2-s1,d0) and without dividing the insulation into smaller areas of max. 400 m² with non-combustible insulation (A2-s1,d0) between. See the examples shown in Fig. 2, 6 and 8. Protection of top or bottom side or dividing of the insulation into smaller areas, is also not necessary when used on wood-based structures, see fig. 12.
- BauderPIR can be used towards and around roof openings (as well as smoke ventilators and entrance of daylight) without the need to replace the insulation with non-combustible insulation (A2-s1,d0). See Fig. 7.
- In cases where a roof structure of load-bearing steel sheets has parapets or adjacent walls/facades with combustible materials, a 600 mm wide barrier of 30 mm stone wool insulation with a minimum density of 150 kg/m³ must be placed under the BauderPIR insulation towards the wall. Parapet with combustible materials must be protected on the roof side with minimum 30 mm stone wool insulation with a minimum density of 110 kg/m³, mounted on a plate of plywood with a minimum thickness of 15 mm. See Fig. 4.
- In cases where a concrete roof structure has parapets made with combustible materials, these must be protected on the roof side with 50 mm stone wool insulation with a minimum density of 110 kg/m³, mounted on a plate of plywood with a minimum thickness of 15 m. It is not necessary to install a 600 mm wide barrier of 30 mm stone wool insulation with a minimum density of 150 kg/m³ under the BauderPIR insulation towards the wall. In cases were adjacent walls/facades made with combustible materials, the roof side must be protected with non-combustible external cladding and two layers of GU gypsum boards with thickness 9 mm or similar as under-cladding/wind barrier on the wall. See Fig. 9.
- An alternative to protecting the walls/parapets is to replace the insulation with non-combustible insulation in a width of 600 mm along the wall/parapet.
- Gaps between concrete elements must be filled with for example concrete if they are over 50 mm wide. Gaps narrower than 50 mm do not need to be sealed or covered, see Fig. 8.
- Above fire separating walls the BauderPIR insulation does not have to be replaced with non-combustible insulation, see Fig. 5.
- On roofs with load-bearing profiled steel sheets, the profiles must be filled with non-combustible insulation (A2-s1,d0) on both sides of fire separating walls. See Fig. 5. If the profiles of the steel sheets are perpendicular to the wall, the non-combustible insulation must extend 600 mm out from the wall on each side to prevent leakage of smoke and gas.
- When fire walls or section walls project at least 500 mm above roofs with load-bearing profiled steel sheets or concrete slabs, and the wall is made of or covered with non-combustible materials, BauderPIR can be used on the roof. BauderPIR does not have to be replaced with non-combustible insulation (A2-s1,d0) along the wall. See Fig. 10.
- In roofs where other combustible insulation materials are used (e.g. partially renovated roofs), combustible insulation must be separated from BauderPIR with minimum 600 mm wide non-combustible insulation (A2-s1,d0).
- Penetrations in the roof construction and junctions between building elements must be designed such that the protection of the insulation and the fire resistance of the element, is not reduced. For more information on penetrations see SINTEF Building Research Design Guide 520.342 *Branntetting av gjennomføringer.*

Construction details
Construction details must follow the principles shown in Fig. 2-5 for roofs with load-bearing profiled steel sheets, in Fig. 6-10 for concrete structures, and in Fig. 11-12 for terraces.
For use in apartment buildings with covered terraces a specific fire safety design is required for each building to prevent fire spread to neighbouring apartments.

For other details and information not described in this document, see SINTEF Building Research Design Guide 520.339 *Bruk av brennbar isolasjon i bygninger*.

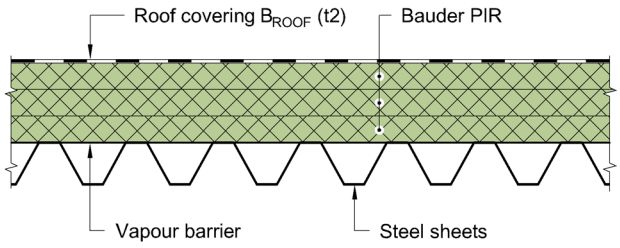

Fig. 2
BauderPIR insulation boards on load-bearing steel sheet roofs.

- No requirement for protection of the insulation on top or below.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- The roof structure can be used in Fire class 1 and 2 provided the roof has documentation for the required fire resistance (R).

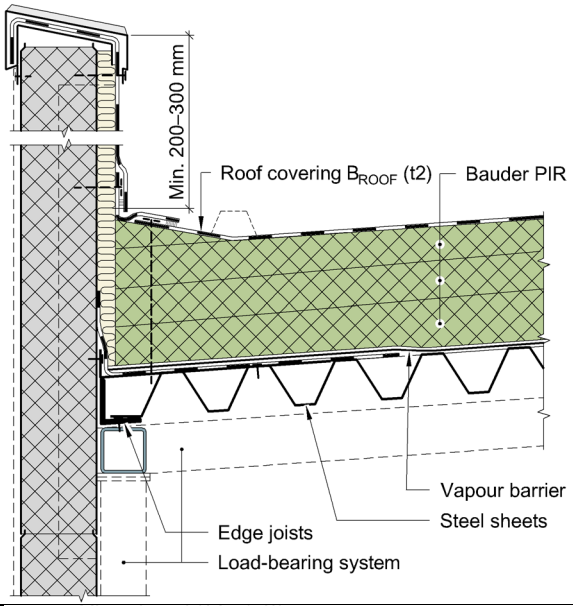

Fig. 3
BauderPIR insulation boards on load-bearing steel sheet roofs towards walls or parapets of sandwich elements with stone wool insulation (non-combustible materials) core or PIR elements approved for this field of application (e.g. FM-Global 4880).

- No requirement for protection of the insulation on top or below.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- No requirement for replacement with non-combustible insulation towards non-combustible walls and parapets.
- The structure can be used in Fire class 1 and 2 provided the roof has documentation for the required fire resistance (R).

NB!
The vertically installed mineral wool sheet on the parapet shall absorb temperature movement in the sandwich element and reduce thermal bridges. See more details on connections between steel sheet roofs and sandwich wall panels in *TPF Informerer nr. 12* at www.tpf-info.org.

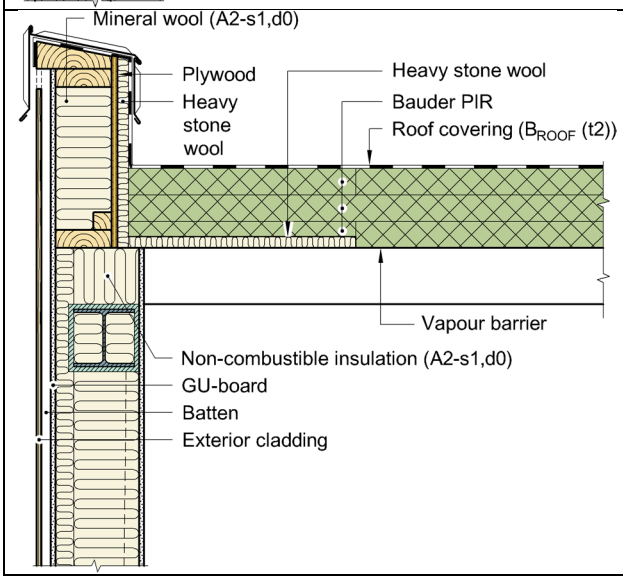

Fig. 4
Roof structure with load-bearing profiled steel sheets, insulated with BauderPIR insulation towards parapets and walls/ facades with combustible materials, such as wood.

- BauderPIR insulation boards must be protected on the underside towards the wall with a 600 mm wide barrier of 30 mm stone wool insulation with minimum density 150 kg/m^3.
- No requirement for protection of the insulation on top.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- Parapets with combustible materials must on the roof side be protected with minimum 50 mm stone wool insulation with minimum density 110 kg/m^3, mounted on a plywood board with minimum thickness of 15 mm.
- The structure can be used in Fire class 1 and 2 provided the roof has documentation for the required fire resistance (R).

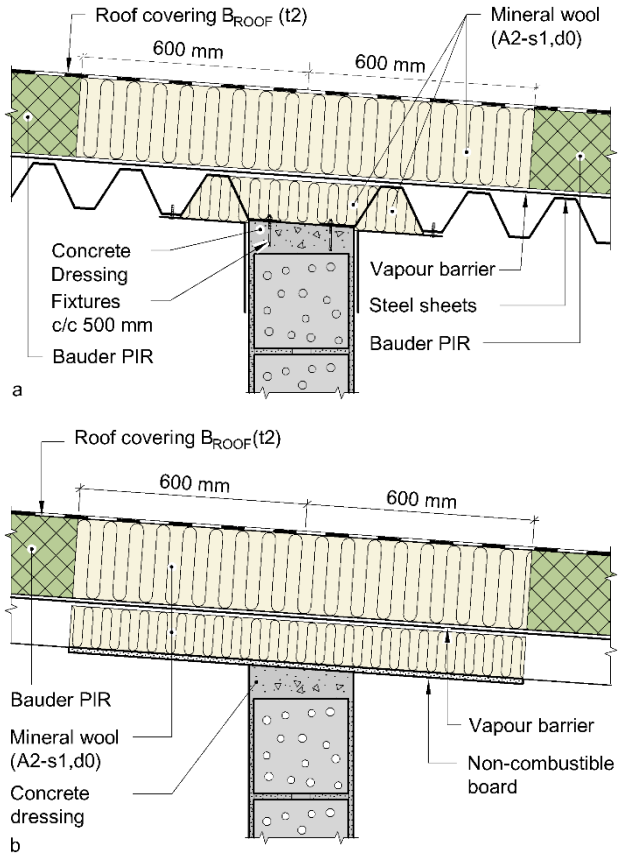

Fig. 5a and 5b
Fire cell limiting wall terminated under roof with load-bearing profiled steel plates insulated with BauderPIR insulation boards.

- No requirement to cover the insulation on the upper or lower side.
- No requirement for division of insulation into sub-areas of maximum 400 m2.
- The slab ceiling must be broken over the wall, i.e. slabs should not be continuously passed over the scheme.
- The profiles on both the top and bottom sides of the plate must be filled with non-combustible insulation (A2, s1,d0).
- If the steel plate profiles are perpendicular to the wall, non-combustible insulation must be mounted 600 mm wide out from the wall on both sides of the profiles to prevent leakage of smoke and fire gases.
- The insulation does not need to be replaced with non-combustible insulation above the wall.
- The structure can be used in fire classes 1 and 2 provided that the roof structure has documented fire resistance (R).

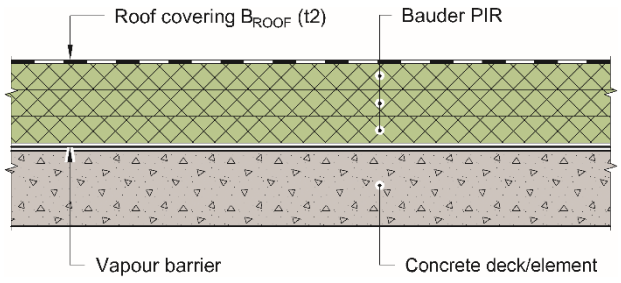

Fig. 6
BauderPIR insulation boards on concrete decks.

- No requirement for protection of the insulation on top or below.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- No requirement for special sealing of joints ≤ 50 mm to protect the insulation.
- The structure can be used in Fire class 1, 2 and 3 provided the roof has documentation for the required fire resistance (R).

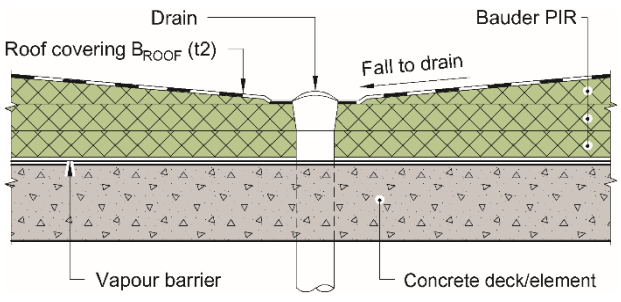

Fig. 7
BauderPIR insulation boards on concrete decks, with penetrations.

- No requirement for protection of the insulation on top or below.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- No requirement for special sealing of joints ≤ 50 mm to protect the insulation.
- No requirement to replace the insulation with non-combustible insulation around drains or openings.
- The structure can be used in Fire class 1, 2 and 3 provided the roof has documentation for the required fire resistance (R).

Penetrations in the roof must not reduce the fire resistance of the roof or damage the protection of the insulation, and solutions with documentation for the use must be chosen.

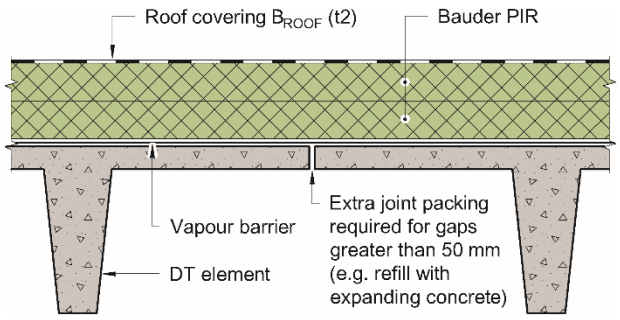

Fig. 8
BauderPIR insulation boards on concrete elements with small open joints.

- No requirement for protection of the insulation on top or below.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- No requirement for special sealing of joints ≤ 50 mm to protect the insulation.
- The structure can be used in Fire class 1, 2 and 3 provided the roof has documentation for the required fire resistance (R).

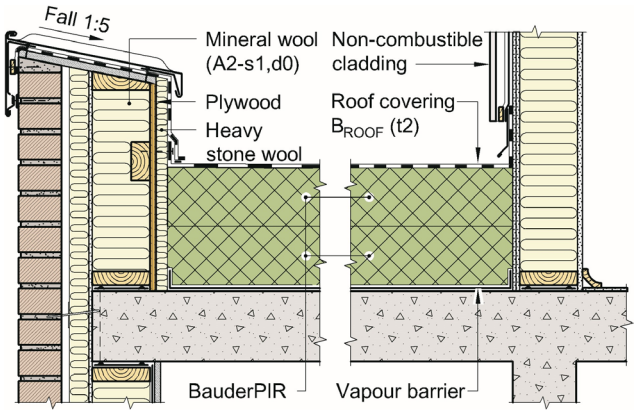

Fig. 9
BauderPIR insulation boards on concrete decks adjacent to parapets or walls/facades with combustible materials.

- No requirement to protect BauderPIR insulation boards on the underside towards the wall with 600 mm plate of stone wool insulation with minimum thickness 30 mm and minimum density 150 kg/m^3.
- No requirement for protection of the insulation on top.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- Parapets must be protected on the side facing the roof with stone wool with minimum thickness 50 mm and minimum density 110 kg/m^3, mounted on a plywood board with minimum thickness 15 mm.
- Adjacent external walls with combustible materials must be protected with 2 layers 9 mm Type GU gypsum boards and non-combustible external cladding.
- The structure can be used in Fire class 1 and 2 provided the roof has documentation for the required fire resistance (R).
- If the structure is made of concrete and runs continuously past the wall as shown in the figure to the right, the solution can also be used in fire class 3. It is provided that an analytical fire engineering design of the entire structure is carried out.

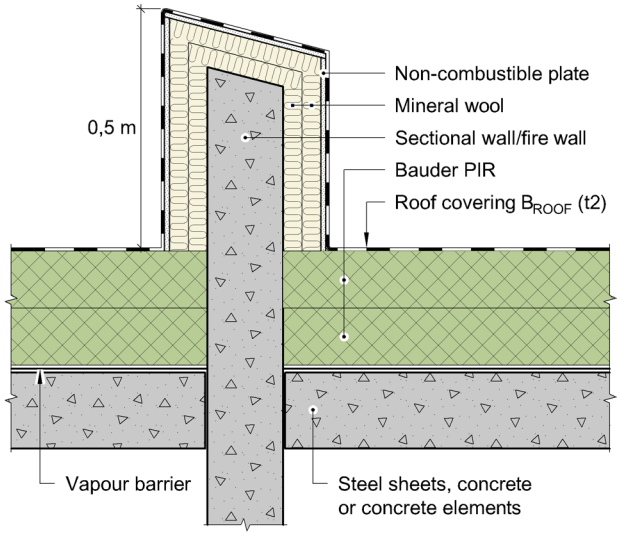

Fig. 10
BauderPIR insulation boards on concrete decks, with section or fire walls projecting 500 mm above roofs. Walls made of or covered with non-combustible materials.

- No requirement for protection of the insulation on the top or below.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- No requirement for replacing the insulation with non-combustible insulation 600 mm along the walls.
- The structure can be used in Fire class 1, 2 and 3 provided the roof has documentation for the required fire resistance (R).

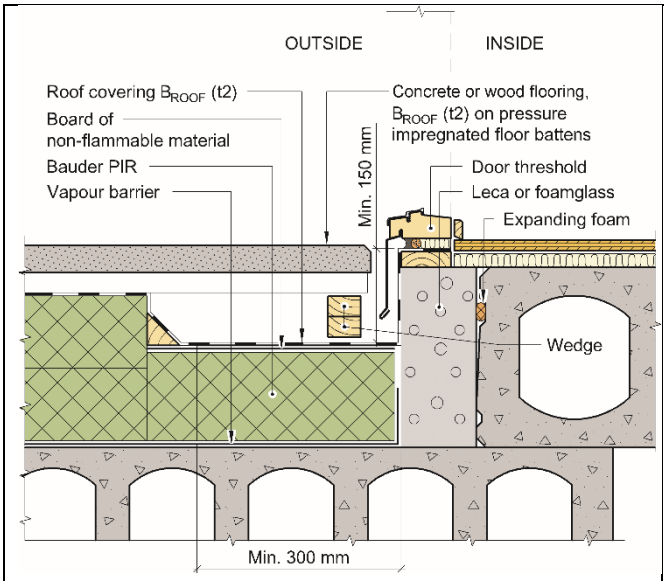

Fig. 11
Roof terraces with load-bearing hollow core concrete elements insulated with BauderPIR insulation boards, adjacent to walls/parapets with combustible materials and with terrace door.

- No requirement for protection of the insulation on top or below.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- As an alternative to protection of wall/parapet the insulation can be replaced with non-combustible insulation in width 600 mm along the walls.
- Regarding parapets or walls/facades, see Fig. 9.
- The structure can be used in fire class 1, 2 and 3 provided the roof has documentation for the required fire resistance (R).

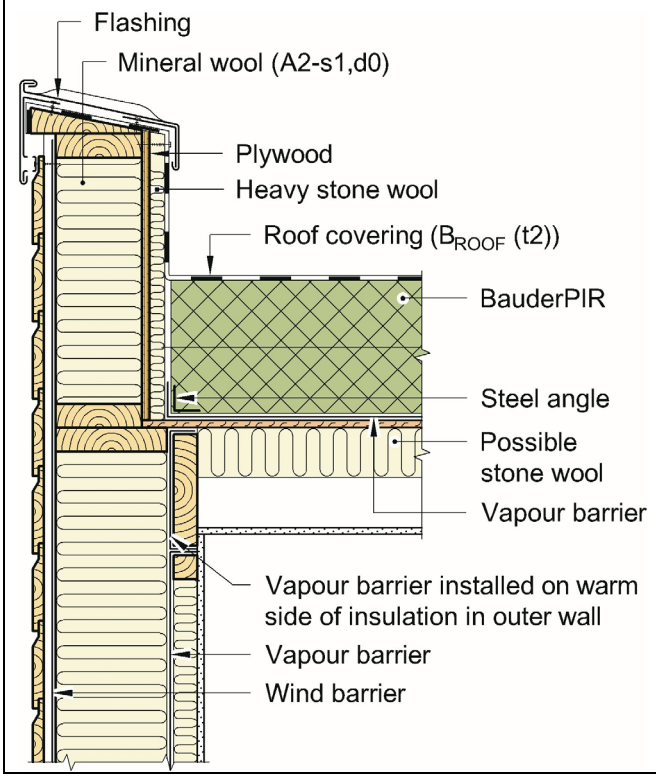

Fig. 12
Roof and terrace of wood structure or cross laminated timber with wooden board sheathing insulated with BauderPIR insulation boards, against adjacent parapet or wall/facade with combustible materials.

- No requirement for protection of the insulation on top or below.
- No requirement to protect BauderPIR insulation boards on the underside towards the wall with 600 mm plate of stone wool insulation with minimum thickness 30 mm and minimum density 150 kg/m^3.
- No requirement for dividing the insulation into smaller areas of max. 400 m^2.
- Parapets must be protected on the side facing the roof with stone wool with minimum thickness 50 mm and minimum density 110 kg/m^3, mounted on a plywood board with minimum thickness 15 mm.
- The structure can be used in fire class 1 and 2 provided the roof structure has documentation for the required fire resistance (R) and the supporting structure has fire resistance EI for fire load from below. Fire resistance EI must be at least as good as the fire resistance R of the supporting structure.

Installation
The insulation boards should be cut and installed in a way to avoid cavities in the insulation layer.

When the insulation is installed in several layers, boards with straight edges may be used if the boards are laid with staggered joints. When the insulation is installed in a single layer, boards with rebate joints should be used to avoid thermal bridges.

A vapour barrier must be installed as shown in Fig. 2-12. See SINTEF Building Research Design Guide 525.207 *Kompakte tak* for further information on installing the vapour barrier etc.

Furthermore, the installation guidelines from the manufacturer have to be followed.

Transport and storage
BauderPIR insulation boards should be stored and transported protected from moisture, open flames, and direct solar radiation.

7. Factory production control

BauderPIR insulation boards are produced by Paul Bauder GmbH & Co. KG in Germany at the following manufacturing plants:

- Werk Landsberg/Halle; Brehnaer Straße 10, 06188 Landsberg b. Halle
- Werk Stuttgart; Korntaler Landstraße 63, 70499 Stuttgart
- Werk Herten; Im Emscherbruch 15, 45699 Herten

The holder of the approval is responsible for the factory production control in order to ensure that BauderPIR insulation boards are produced in accordance with the preconditions applying to this approval.

The manufacturing of BauderPIR insulation boards is subject to continuous surveillance of the factory production control in accordance with the contract regarding SINTEF Technical Approval.

The manufacturers quality management system is certified by ESC Cert GmbH according to EN ISO 9001, certificate No. 70499/03-18_b, EN ISO 14001, certificate No. 70499/03-18_e and EN ISO 50001, certificate No. 70499/03-18_a.

8. Basis for the approval

The evaluation of BauderPIR insulation boards is based on reports owned by the holder of the approval.

Use of BauderPIR insulation boards deviates from pre accepted solutions given in the Norwegian Building Regulations (TEK17) with corresponding guidance document (VTEK17) and TPF informerer nr 6 with regards to covering flammable insulation. Approval is given on basis of fire testing and assessment of results given in report 2020:00767 dated 13.10.2020 by SINTEF

9. Marking

BauderPIR insulation boards are labelled with product name, article number, a code for the manufacturing plant and the date of manufacture. The manufacturers name is printed on the packaging.

BauderPIR insulation boards are CE-marked in accordance with EN 13165.

The approval mark for SINTEF Technical Approval TG 20624 may also be used.

10. Liability

The holder/manufacturer has sole product responsibility according to existing law. Claims resulting from the use of the product cannot be brought against SINTEF beyond the provisions of Norwegian Standard NS 8402

for SINTEF

Hans Boye Skogstad
Godkjenningsleder