

European Technical Assessment ETA-03/0050

fermacell® Gypsum Fibreboards



Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-03/0050
of 25 March 2022

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

fermacell Gypsum fibre boards - "fermacell Gipsfaser-
Platte", "fermacell Vapor", "fermacell Gipsfaser-Platte
greenline"

Product family
to which the construction product belongs

Gypsum fibre boards for planking and lining of building
components

Manufacturer

James Hardie Europe GmbH
Bennigsen Platz 1
40474 Düsseldorf
DEUTSCHLAND

Manufacturing plant

Werk 1, Werk 2, Werk 3, Werk 4, Werk 5

This European Technical Assessment
contains

11 pages including 2 annexes which form an integral part
of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

EAD 070006-00-0504

This version replaces

ETA-03/0050 issued on 31 January 2020

The European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and shall be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may only be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction shall be identified as such.

This European Technical Assessment may be withdrawn by the issuing Technical Assessment Body, in particular pursuant to information by the Commission in accordance with Article 25(3) of Regulation (EU) No 305/2011.

Specific part

1 Technical description of the product

"fermacell Gipsfaser-Platte", "fermacell Vapor" und "fermacell Gipsfaser-Platte greenline" are special building boards made of gypsum and cellulose fibres. The "fermacell Vapor" additionally has a paper-faced functional layer and the "fermacell Gipsfaserplatte greenline" in contrast is coated. If individual characteristics concerned all previously mentioned building products at the same time, the boards are hereinafter referred as fermacell Gypsum fibre boards.

They are produced with a range of thickness between 10 mm and 30 mm.

Length and width of the boards are at least 500 mm.

The edges of fermacell Gypsum fibre boards are sharp edged or formed, e.g. "fermacell Trockenbau-Kante" (TB-Kante). The "fermacell TB"- edge consists of a 40 mm board, to the edge of the board running flattening, whereby the largest reduction of the nominal thickness of the board is 2,5 mm. At the edge is additionally one chamfer.

"fermacell Gipsfaser-Platte" corresponds to type GF-W2 and type GF-I (see Annex 2, clause A.2.10 and A.2.4)

2 Specification of the intended use in accordance with the applicable European Assessment Document

"fermacell Gipsfaser-Platte", "fermacell Vapor" and fermacell Gipsfaser-Platte greenline" are used for planking (structural) and lining (non-structural) of building components. They are used both as loadbearing and as stiffening boards.

"fermacell Gipsfaser-Platte", "fermacell Vapor" and fermacell Gipsfaser-Platte greenline" are used in service classes 1 and 2 in accordance with EN 1995-1-1¹.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of "fermacell Gipsfaser-Platte", "fermacell Vapor" and fermacell Gipsfaser-Platte greenline" of at least 50 years. 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.

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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Bending strength	See Annex 2
Shear strength	See Annex 2
Compression strength	See Annex 2
Tension strength	See Annex 2
Mechanical characteristics at increased moisture content	No performance assessed
Racking strength and stiffness	No performance assessed

¹ EN 1995-1-1:2004+A1:2008+A2:2014 Eurocode 5; Design of timber structures; Part 1-1: General - Common rules and rules for building

Essential characteristic	Performance
Density	See Annex 2
Creep and duration of load	See Annex 2
Dimensions	See Annex 2
Dimensional stability	See Annex 2
Surface hardness	See Annex 2
Embedment strength	See Annex 2
Head pull-through resistance	See Annex 2
Structure and cohesion of the core at high temperature	Type F in accordance with EN 520 ²
Static ductility	See Annex 2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	
"fermacell Gipsfaser-Platte" and "fermacell Gipsfaser-Platte greenline"	Class A2-s1, d0 in accordance with EN 13501-1 ³
"fermacell Vapor"	No performance assessed

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Water vapour permeability – water vapour transmission	See Annex 2
Water absorption of board surface	See Annex 2
Water absorption of board	No performance assessed

3.4 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Hard body impact	See Annex 2

3.5 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
Thermal conductivity	See Annex 2
Coefficient of thermal expansion	No performance assessed

² EN 520:2004+A1:2009

³ EN 13501-1:2018

Gypsum plasterboards - Definitions, requirements and test methods

Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

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

In accordance with EAD No. 070006-00-0504 the applicable European legal act is: [95/467/EC(EU)].

The system to be applied is: 3

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 25 March 2022 by Deutsches Institut für Bautechnik

Anja Dewitt
Head of Section

beglaubigt:
Vössing

Annex 1 Specification of intended use

A.1.1 Loading

Only for static and quasi-static load (not relevant to fatigue).

A.1.2 Installation

The installation of building components manufactured with fermacell Gypsum fibre boards can take place in accordance with the Annexes as well as EN 1995-1-1¹, EN 1995-1-2² and EN 1993-1-1³.

The reaction to fire class A2-s1, d0 is only verified if "fermacell Gipsfaser-Platte" and "fermacell Gipsfaser-Platte greenline" are butt-jointed or the gap is filled and closed with jointing materials for Gypsum fibre boards. Joint filler materials class A1 or A2-s1,d0 as defined in EN 13501-1⁴ are used which are regulated in accordance with EN 13963-1⁵.

A.1.3 Connectors

As connectors for the fermacell Gypsum fibre boards with the substructure zinc-coated and/or stainless nails, screws or staples in accordance with EN 14592⁶ or European Technical Assessments are used under consideration of the following conditions:

- Nails which have diameters of $2,0 \text{ mm} \leq d \leq 3,1 \text{ mm}$ and diameters of nail heads which have at least $d_h \geq 4,6 \text{ mm}$.
- The characteristic tensile strength of nails is at least 600 N/mm^2 .
- Staples which have wire diameters of $1.5 \text{ mm} \leq d \leq 2.02 \text{ mm}$. The back width b_R of the staples is $b_R > 9 \text{ mm}$. Minimum tensile strength of the wire of staples is $f_u \geq 800 \text{ N/mm}^2$.
- The screws which have an outside diameter of the screw thread of $d \geq 3,5 \text{ mm}$ and a diameter of screw head of $d_h \geq 7,0 \text{ mm}$

The distances of the connectors from the unstressed edge of the fermacell Gypsum fibre boards are at least $4 \cdot d$, from the stressed edge at least $7 \cdot d$.

If a TB-Kante is implemented at fermacell Gypsum fibre boards, the distances of the connectors from the unstressed edge are at least $7 \cdot d$, from the stressed edge at least $10 \cdot d$.

A.1.4 Durability

The moisture content of the fermacell Gypsum fibre boards tested in accordance with EN 322⁷ in normal climate ($20 \text{ °C}/65 \text{ %}$ humidity), ranges between 1.0 % and 1.5 % . In this case the boards have been dried by 40 °C to mass constancy.

1	EN 1995-1-1:2004+A1:2008+A2:2014	Eurocode 5: Design of timber structures; Part 1-1: General – Common rules and rules for buildings
	EN 1995-1-2:2004+AC:2009	Eurocode 5: Design of timber structures; Part 1-2: General – Structural fire design
3	EN 1993-1-1:2005 + A1:2014	Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings
4	EN 13501-1:2018	Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
5	EN 13963-1:2005	Jointing materials for gypsum plasterboards, Definitions, requirements and test methods
6	EN 14592:2008+A1:2012	Timber – Dowel-type fasteners - Requirements
7	EN 322:1993	Wood-based panels; determination of moisture content

fermacell Gypsum fibre boards - "fermacell Gipsfaser-Platte", "fermacell Vapor", "fermacell Gipsfaser-Platte greenline"

Specification of intended use
Loading, installation, connectors and durability

Annex 1

Annex 2 Specification of essential characteristics

A.2.1 Characteristic strength and mean stiffness values as well as the characteristic value of density of fermacell Gypsum fibre boards

Table 1: Characteristic strength and mean stiffness values as well as the characteristic value of density of "fermacell Gipsfaser-Platte", "fermacell Vapor" and "fermacell Gipsfaser-Platte greenline"

		Thickness of boards [mm]							
		10	12,5	15	18	22	25	28	30
Characteristic strength values									
Perpendicular to the plane of the board [N/mm²]									
Bending	$f_{m,k}$	4,6	4,4	4,4	4,3	4,1	4,1	3,7	3,1
Shear	$f_{v,k}$	1,9	1,8	1,7	1,6	0,7	0,6	0,6	0,6
Compression \perp to the plane	$f_{c,90,k}$	7,3							6,9
In plane of the board [N/mm²]									
Bending	$f_{m,k}$	4,3	4,2	4,1	4,0	4,0	4,0	3,7	3,7
Tension	$f_{t,k}$	2,5	2,4	2,4	2,3	2,2	2,2	1,8	1,4
Compression	$f_{c,0,k}$	8,5							7,9
Shear	$f_{v,k}$	3,7	3,6	3,5	3,4	3,1	3,1	3,1	3,1
Mean stiffness values									
Perpendicular to the plane of the board [N/mm²]									
Modulus of elasticity	$E_{m, mean}$	3800				3000			
Shear modulus	G_{mean}	1600				600			
Compression modulus of elasticity \perp to the plane	$E_{c, perp}$	800				500			
In plane of the board [N/mm²]									
Bending modulus	$E_{m, mean}$	3800				3000			
Tension modulus	$E_{t, mean}$	3800				3700			3400
Compression modulus	$E_{c, mean}$	3800				3500			3000
Shear modulus	G_{mean}	1600							
Characteristic value of density [kg/m³]									
Density	ρ_k	1150							

The value of bending strength perpendicular to the board plane, tested as given in EN 15283-2+A1⁸, clause 5.6 meets the following minimum requirements:

$$f_{m, mean} \geq 5,8 \text{ N/mm}^2 \text{ for thickness of boards } t \leq 18 \text{ mm and}$$

$$f_{m, mean} \geq 5,0 \text{ N/mm}^2 \text{ for thickness of boards } t > 18 \text{ mm}$$

⁸ EN 15283-2:2008+A1:2009

Gypsum boards with fibrous reinforcement- Definitions, requirements and test methods - Part 2 - Gypsum fibre boards

fermacell Gypsum fibre boards - "fermacell Gipsfaser-Platte", "fermacell Vapor", "fermacell Gipsfaser-Platte greenline"

Specification of essential characteristics
Characteristic strength and stiffness values as well as the value of density

Annex 2.1

The density of fermacell Gypsum fibre boards, tested in accordance with EN 15283-2+A1⁹, clause 6.3, is at least 1000 kg/m³ and does not exceed 1250 kg/m³.

A.2.2 Creep and duration of load

Table 2: Modification factor k_{mod}

Class of load action duration	service class 1	service class 2
permanent	0,20	0,15
long	0,40	0,30
average	0,60	0,45
short term	0,80	0,60
very short	1,10	0,80

The deformation parameters for service class 1 and 2 are:

$$k_{def, Nkl. 1} = 3 \text{ and}$$

$$k_{def, Nkl. 2} = 4.$$

A.2.3 Dimensions and dimensional stability

The thickness of "fermacell Gipsfaser-Platte", "fermacell Vapor" and "fermacell Gipsfaser-Platte greenline" is between 10 mm and 30 mm.

Length and width of the boards are at least 500 mm.

Dimensional tolerances are 0/-4 mm for nominal width of boards, 0/-5 mm for nominal length and ± 0.2 mm for nominal thickness of boards. They correspond to board type C1 in accordance with EN 15283-2+A1.

The relative change in length for fermacell Gypsum fibre boards with thicknesses 10 mm to 18 mm, tested in accordance with EN 318¹⁰ for swelling is $\delta_{l_{65,85}} = 0.33$ mm/m. The relative change in length for fermacell Gypsum fibre boards for shrinkage is $\delta_{l_{65,30}} = -0.31$ mm/m.

A.2.4 Surface hardness

fermacell gypsum fibre boards with increased surface hardness, tested in accordance with EN 15283-2+A1, section 5.11, comply with type GF-I if the diameter of the indentation is ≤ 15 mm.

A.2.5 Embedment strength

The characteristic value of the embedment strength for fermacell gypsum fibreboards is determined in accordance with equation (1):

$$f_{h,1,k} = 7 \cdot d^{-0,7} \cdot t^{0,9} \quad [\text{N/mm}^2] \quad (1)$$

with d = nominal diameter of the connector [mm]

t = thickness of board [mm]

(In the range of the TB-Kante the reduced board thickness is to be set.)

⁹ EN 15283-2:2008+A1:2009 Gypsum boards with fibrous reinforcement - Definitions, requirements and test methods - Part 2-Gypsum fibre boards

¹⁰ EN 318:2002 Wood-based panels – Determination of dimensional changes associated with changes in relative humidity

fermacell Gypsum fibre boards - "fermacell Gipsfaser-Platte", "fermacell Vapor", "fermacell Gipsfaser-Platte greenline"

Specification of essential characteristics
Creep and duration of load, dimension and dimensional stability, surface hardness and embedment strength

Annex 2.2

A.2.6 Head pull-through resistance

Table 3: Characteristic values of head pull-through resistance $F_{ax,head,k}$ of fermacell Gypsum fibre boards for board thicknesses 10 mm - 30 mm

Board thicknesses t in (mm)	10	12,5	15	18	22	25	28	30
$F_{ax,head,k}$ in (N)	500	900	1100	1300	1500	1800	2000	2000

Reduction of the values given in Table 3 if:

- width of staple back $b_R \leq 11$ mm:
 $F_{ax,head,k} = \text{table value} \cdot b_R / 11$ (mm)
- board thicknesses $t \geq 22$ mm and diameter of the head $d_h < 5.5$ mm:
 $F_{ax,head,k} = \text{table value} \cdot d_{h, exist.} / 5.5$

A.2.7 Load-bearing capacity of the fasteners on shear

The characteristic value of the load-bearing capacity of fasteners for each shear joint $F_{v,Rk}$ can be determined simplified in accordance with equation (2) (the reduced panel thickness is applied in the area of the TB-Kante):

$$F_{v,Rk} = A \cdot \sqrt{2 \cdot M_{y,Rk} \cdot f_{h,1,k} \cdot d} \quad [\text{N}] \quad (2)$$

with $M_{y,Rk}$ = characteristic value of the yield moment of the fastener [Nmm]

A = Factor set out in Table 4

$f_{h,1,k}$ = characteristic value of embedment strength of fermacell Gypsum fibre boards

Table 4: Factor A

Fastener	Board thickness t	Factor A
Nails	10 mm – 30 mm	0,7
Screws	10 mm – 30 mm	0,9
Staples	10 mm – 18 mm	0,7
	22 mm – 30 mm	0,6

If the board thickness t is smaller than $7d$, $F_{v,Rk}$ is reduced in the ratio $t / 7d$.

If the characteristic load-bearing capacity $F_{v,Rk}$ is determined for boards with TB-Kante, for staples connections with demand perpendicular to edge of the board the characteristic load-bearing capacity, $F_{v,Rk}$ is reduced in ratio 1.5: d . For nailed connections the characteristic load-bearing capacity R_k is always reduced in ratio 2.5: d by a thickness of the board $t \leq 12.5$ mm and a nail diameter $d > 2.5$ mm.

In case of single shear connections with predominantly short-term loading parallel to the edge of the gypsum fibreboard, the determined characteristic load carrying capacity $F_{v,Rk}$ may be increased by a proportion $\Delta F_{v,Rk}$ as follows:

$$\Delta F_{v,Rk} = \min \{ 0,5 \cdot F_{v,Rk} ; 0,25 \cdot F_{ax,Rk} \}$$

There is no increase in the load-bearing capacity by the proportion $F_{v,Rk}$ in case of nail connections with $d \geq 2.8$ mm and panel thicknesses $t \geq 22$ mm.

fermacell Gypsum fibre boards - "fermacell Gipsfaser-Platte", "fermacell Vapor", "fermacell Gipsfaser-Platte greenline"

Specification of essential characteristics
Head pull-through resistance and load-bearing capacity of the fasteners on shear

Annex 2.3

A.2.8 Static ductility

The static ductility μ of the connection of fermacell gypsum fibre boards sharp-edged and wooden components for minimum edge distances of $a_{4,c} = 4d$ in accordance with Annex A.1.3 is given in Table 5:

Table 5: Static ductility μ of connections of fermacell Gypsum fibre boards with wooden components for selected fasteners

Fasteners	Thickness t	Length of the fasteners	Static ductility ratio ¹⁾
Nails in accordance with A.1.3 d = 2.1 mm	12.5 mm	≥ 40 mm	> 6
	15 mm	≥ 50 mm	
	18 mm		
Staples in accordance with A.1.3 d ≤ 1.6 mm	12,5 mm	≥ 45 mm	4
	15 mm	≥ 50 mm	
	18 mm	≥ 55 mm	
Staples in accordance with A.1.3 d ≥ 1.8 mm	12.5 mm	≥ 45 mm	> 6
	15 mm		
	18 mm		

1) as described in section 8.3, rule (3) of EN 1998-1:2010-12.

A.2.9 Water vapour permeability – water vapour transmission

The value of water vapour diffusion resistance of "fermacell Gipsfaser-Platte", tested in accordance with EN ISO 12572¹¹, is $\mu = 13$.

The s_d -value determined in accordance with EN ISO 12572 of "fermacell Vapor" with thicknesses 10 mm to 30 mm is $s_d = 3.1$ m (wet) or $s_d = 4.5$ m (dry).

A.2.10 Water absorption of board surface

fermacell Gypsum fibre boards, tested in accordance with EN 15283-2+A1¹², section 5.9, comply with type GF-W2, if the water absorption of board surface is ≤ 1500 g/m².

A.2.11 Hard body impact

The value of impact resistance of "fermacell Gipsfaser-Platte", tested in accordance with EN 1128¹³, is at least $IR = 11$ mm / (mm thickness of the board).

A.2.12 Thermal conductivity

The value of thermal conductivity λ of "fermacell Gipsfaser-Platte", tested in accordance with EN 12664¹⁴, is $\lambda \leq 0.32$ W/(mK).

For "fermacell Vapor" and "fermacell Gipsfaser-Platte greenline" no performance has been determined.

- | | |
|--|---|
| <p>¹¹ EN ISO 12572:2001</p> <p>¹² EN 15283-2:2008+A1:2009</p> <p>¹³ EN 1128:1995</p> <p>¹⁴ EN 12664:2001</p> | <p>Hygrothermal performance of building materials and products - Determination of water vapour transmission properties</p> <p>Gypsum boards with fibrous reinforcement - Definitions, requirements and test methods - Part 2: Gypsum fibre boards</p> <p>Cement-bounded particleboards - Determination of hard body impact resistance</p> <p>Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products of medium and low thermal resistance</p> |
|--|---|

fermacell Gipsfaserplatten - "fermacell Gipsfaser-Platte", "fermacell Vapor", "fermacell Gipsfaser-Platte greenline"

Anhang 2.4

Specification of essential characteristics
Static ductility, water vapour permeability – water vapour transmission, water absorption of board surface, hard body impact and thermal conductivity

A.2.13 Slip modulus of displacement

For the slip modulus K_{ser} per shear joint, the calculation values as a function of the mean density of the strength class of the used wood given in EN 1995-1-1¹ are recommended for dowel-type fasteners. In deviation from EN 1995-1-1¹, the calculation values for nails in non-predrilled woods are used for connections with screws.

fermacell Gipsfaserplatten - "fermacell Gipsfaser-Platte", "fermacell Vapor", "fermacell Gipsfaser-Platte greenline"

Specification of essential characteristics
Slip modulus of displacement

Annex 2.5

© 2022 James Hardie Europe GmbH

™ and ® denote registered and unregistered trademarks of
James Hardie Technology Limited and James Hardie Europe GmbH.

James Hardie Europe GmbH

Bennigsen-Platz 1
40474 Düsseldorf
www.fermacell.eu

04.22/st

