

fermacell

Gypsum fibre boards

European Technical Assessment

Validity: unlimited

fermacell[®]



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 May 2018

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

Fermacell GmbH
Düsseldorfer Landstraße 395
47259 Duisburg
DEUTSCHLAND

Manufacturing plant

plant 1, plant 2, plant 3, plant 4, plant 5

This European Technical Assessment
contains

10 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 14 August 2013

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Specific part

1 Technical description of the product

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

They are produced with a range of thickness between 10 mm and 25 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 broad, 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.2.8 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 according to 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 1995-1-1:2010-12 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

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 according to EN 13501-1 ²
"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

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

²

EN 13501-1:2007+A1:2009

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

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 May 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Baumann

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 according to the Annexes as well as EN 1995-1-1¹ in conjunction with the respective national annex and EN 1993-1-1².

The reaction to fire class A2-s1, d0 is only verified if "fermacell Gipsfaser-Platte" and "fermacell Gipsfaser-Platte greenline" are butt-jointed or filled with jointing materials for Gypsum fibre boards and closed. Joint filler materials class A1 or A2-s1,d0 according to EN 13501-1³ are used which are regulated in accordance with EN 13963-1⁴.

A.1.3 Connectors

As connectors for the fermacell Gypsum fibre boards with the substructure zinc-coated and/or stainless nails, screws or staples 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 $\geq 1.8 d$.
- The characteristic tensile strength of nails is at least 600 N/mm^2 .
- Staples which have wire diameters $d \geq 1.5 \text{ mm}$. The back width b_R of the staples is $6 d \geq b_R \geq 12 \text{ mm}$.
- The screws which have an outside diameter of the screw thread $d \geq 3.5 \text{ mm}$.

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 according to EN 322⁵ in normal climate ($20 \text{ }^\circ\text{C}$ / 65 \% humidity), ranges between 1.0 and 1.5 \% . In this case the boards have been dried by $40 \text{ }^\circ\text{C}$ 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
2	EN 1993-1-1:2005 + AC:2009	Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings
3	EN 13501-1:2007+A1:2009	Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
4	EN 13963-1:2005	Jointing materials for gypsum plasterboards, Definitions, requirements and test methods
5	EN 322:1993	Wood-based panels; determination of moisture content

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Specification of intended use	
Loading, installation, connectors and durability	

Annex 2 Specification of essential characteristics

A.2.1 Characteristic strength and stiffness values of fermacell Gypsum fibre boards

Table 1: Characteristic strength and stiffness values of "fermacell Gipsfaser-Platte", "fermacell Vapor" and "fermacell Gipsfaser-Platte greenline" in N/mm²

Type of stress		Thickness of boards in mm				
		10	2,5	15	18	25
Characteristic strength values						
Perpendicular to the plane of the board						
Bending	$f_{m,k}$	4,6	4,3	4,0	3,6	3,0
Shear	$f_{v,k}$	1,9	1,8	1,7	1,6	1,4
Compression	$f_{c,90,k}$	7,3				
In plane of the board						
Bending	$f_{m,k}$	4,3	4,2	4,1	4,0	3,8
Tension	$f_{t,k}$	2,5	2,4	2,4	2,3	2,1
Compression	$f_{c,0,k}$	8,5				
Shear	$f_{v,k}$	3,7	3,6	3,5	3,4	3,2
Stiffness values						
Perpendicular to the plane of the board						
Modulus of elasticity	$E_{m,mean}$	3800				
Shear modulus		1600				
Compression Modulus of elasticity \perp to the plane	$E_{c,perp}$	800				
In plane of the board						
Bending, Tension, Compression Modulus of elasticity	$E_{m,t,c,mean}$	3800				
Shear modulus	G_{mean}	1600				
Value of density (in kg/m³)						
Density	ρ_k	1150				

For bending strength perpendicular to the board plane, tested according to EN 15283-2+A1⁶, clause 6.3 the following minimum value is required:

$$f_{m,test} \geq 5,8 \text{ N/mm}^2$$

⁶ EN 15283-2:2008+A1:2009 Gypsum boards with fibrous reinforcement- Definitions, requirements and test methods - part 2-Gypsum fibre boards

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Specification of essential characteristics

Characteristic strength values and stiffness values

Annex 2.1

The density of fermacell Gypsum fibre boards, tested according to EN 15283-2+A1⁷, 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

Table 3: Deformation parameters k_{def}

Class of load action duration	service class 1	service class 2
permanent	3,0	4,0
long	2,0	2,5
average	1,0	1,25
short term	0,35	0,5

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 25 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 according to EN 318 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 surface hardness, tested according to EN 15283-2+A1, Clause 5.11, are marked as type GF-I, if the diameter of indentation is ≤ 15 mm.

⁷ EN 15283-2:2008+A1:2009 Gypsum boards with fibrous reinforcement - Definitions, requirements and test methods - part 2-Gypsum fibre boards

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Specification of essential characteristics

Creep and duration of load, dimensions and dimensional stability, surface hardness

Annex 2.2

A.2.5 Embedment strength

The characteristic embedment strength of fermacell Gypsum fibre boards shall be determined according to 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 is the reduced board thickness to set)

The characteristic value of the load-bearing capacity of connecting devices for each shear joint R_k can be determined for board thickness $t \geq 7d$ (within the range of the TB-Kante is the reduced board thickness to set) simplifying according to equation (2):

$$R_k = 0.7 \cdot \sqrt{2 \cdot M_{y,k} \cdot f_{h,1,k} \cdot d} \quad (\text{N}) \quad (2)$$

with $M_{y,k}$ = characteristic value of the flow moment of the connecting device (Nmm).

If the board thickness t is smaller than $7d$, R_k is to be reduced in the relationship $t / 7d$.

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

By one set connections with predominantly short actions on structures parallel to the edge of the gypsum fiber board the determined characteristic load-bearing capacity R_k can be increased by a share ΔR_k as follows:

$$\Delta R_k = \min \{ 0,5 \cdot R_k; 0,25 \cdot R_{ax,k} \}$$

A.2.6 Head pull-through resistance

Table 4: Characteristic values of head pull-through resistance $R_{ax,head,k}$ of "fermacell Gipsfaser-Platte" for board thicknesses 10 mm to 25 mm

1	2	3	4	5
Board thickness t	10 mm	12.5 mm	15 mm	18 mm - 25 mm
$R_{ax,head,k}$	500 N	900 N	1100 N	1300 N

A.2.7 Water vapour permeability – water vapour transmission

The value of water vapour diffusion resistance of "fermacell Gipsfaser-Platte", tested according to EN ISO 12572⁸, is $\mu = 13$.

The s_d -value determined according to EN ISO 12572 of "fermacell Vapor" with thicknesses 10 mm / 18 mm is $s_d = 3.1$ m / 4.5 m.

For "fermacell Gipsfaser-Platte greenline" no performance has been assessed.

⁸ EN ISO 12572:2001 Hygrothermal performance of building materials and products - Determination of water vapour transmission properties

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Specifications of essential characteristics	
Embedment strength, head pull-through resistance, water vapour permeability/transmission	

A.2.8 Water absorption of board surface

The fermacell Gypsum fibre boards - "fermacell Gipsfaser-Platte", "fermacell Vapor", fermacell Gipsfaser-Platte greenline", tested in accordance with EN 15283-2+A1⁹, Clause 5.8, may be marked as Type GF-W2, if the water absorption of board surface is $\leq 1500 \text{ g/m}^2$.

A.2.9 Hard body impact

The value of impact resistance of "fermacell Gipsfaser-Platte", tested according to EN 1128¹⁰, is at least $IR = 11 \text{ mm}$ / mm thickness of the board.

A.2.10 Thermal conductivity

The value of thermal conductivity λ of "fermacell Gipsfaser-Platte", tested according to EN 12664¹¹, is $\lambda \leq 0.32 \text{ W/(mK)}$.

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

A.2.11 Partial safety factor

As partial safety factor of fermacell Gypsum fibre boards $\gamma_m = 1.3$ is recommended in absence of national regulations.

A.2.12 Slip modulus of displacement

As design data for the slip modulus of displacement for each shear joint K_{ser} of connecting devices k_{ser} as a function of density in according EN 1995-1-1¹² is recommended.

9	EN 15283-2:2008+A1:2009	Gypsum boards with fibrous reinforcement - Definitions, requirements and test methods - part 2-Gypsum fibre boards
10	EN 1128:1995	Cement-bounded particleboards - Determination of hard body impact resistance
11	EN12664:2001	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
12	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

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Specification of essential characteristics	
Hard body impact, thermal conductivity, partial safety factor, slip modulus of displacement	

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