

Test report

-Translation-

Document No.: (1103/530/21 - H) – Hir of August 26, 2022

Customer: Knauf Ltd. & Partner
EW2 Ataq Industrial Zone
Plot No. 258:268 & 290:302
Suez
EGYPT

Order Date: Aug. 01/2021

Order Ref.: Purchase Order Number 4502505045-L95

Order received: Nov. 11, 2021

Subject: Initial type testing of gypsum plasterboards acc. to EN 520

Test basis: DIN EN 520:2009

Samples received: March 22, 2022

Sampling: By the client

Sample identification: **Gypsum plasterboard type 12.5 GKB-H2**

Test date: April 18, 2022 – August 23, 2022

This Test report covers 5 pages, incl. cover sheet, and 2 annexes.

This document is the translated version of Prüfbericht 1103/530/21-H dated 2022/08/26. The legally binding text is the aforementioned German Prüfbericht (Test Report).



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1 Background

With the letter of Aug. 01/2021, Knauf Ltd. & Partner from Suez, Egypt, commissioned MPA Braunschweig to perform tests for determination of the material properties of the gypsum plasterboards according to EN 520.

This test report describes and analyses the performed tests.

Mean values established on the basis of the test results are listed in the summary of the test report.

2 Test material

The client himself had removed the board material to be tested from his production lot. The board material was marked on its rear side. The material arrived at the MPA Braunschweig test laboratory on March 22, 2022 and was then stored in the laboratory so that it was protected against atmospheric influence.

Members of the MPA Braunschweig staff removed specimens of the required dimensions from the board material for the different tests and stored these specimens in conditioned atmospheres until their mass remained constant.

The board material of **type 12.5 GKB-H2** is a gypsum plasterboards, 12.5 mm thick, which is made from gypsum and cartoon with reduced water absorption.

3 Board material testing; preparation; testing proper; evaluation

3.1 Board marking

On their rear sides, the gypsum plasterboards were marked with the following black inscription:



Fig. 1 Rear face marking on the boards, **type 12.5 GKB-H2**.



Fig. 2 Side-face marking on the boards, type 12.5 GKB-H2.

3.2 Testing dimensions and edge profiles according to DIN EN 520

Dimensions

The gypsum plasterboards have the nominal dimensions 1,200 mm wide, 3,000 mm long and 12.5 mm thick. The accepted tolerances are 0 to - 4 mm for the width; 0 to - 5 mm for the length; and ± 0.5 mm for the thickness.

Dimensional testing produced the following mean values, see annex:

- Width: 1,199 mm
- Length: 2,998 mm
- Thickness: 12.2 mm

All dimensions are thus within the accepted tolerances.

Squareness

The requirements for squareness are complied with. The accepted tolerance for this board is 3.0 mm. Actual deviations were for the plasterboard 0.27 mm on an average, see annex.

Taper profile

When measuring tapered edges, each reading must remain within the following limits:

- Taper depth: between 0.6 mm and 2.5 mm
- Taper width: between 40 mm and 80 mm

These conditions are complied with (taper depth: 42 mm to 43 mm, taper width: 1.46 mm to 1.56 mm). For details, see annex.

3.3 Testing for bending strength according to DIN EN 520 and DIN 18180

For determining bending strength, the MPA Braunschweig staff prepared the specimens so that the specifications in DIN EN 520 were complied with, and the specimens were then stored in a drying cabinet at 40 °C until their mass remained constant. A hydraulic bending test machine with a maximum

load of 20 kN was used for testing the bending strength. The specimens were placed on the parallel supports (spaced 350 mm) of the test machine so that the specimens, which had been cut along the longitudinal axis of the board, came to rest on the supports with their faces pointing downwards, while the faces of the specimens cut across the longitudinal axis pointed upwards. The test load was applied at a rate of 250 N/min in the middle between, and in parallel with the supports. The deformation in the middle of the specimens was recorded with a displacement sensor.

The mean values of the collapse loads are:

Longitudinal direction (L) = 554 N (Minimal requirement 550 N, all 3 samples fulfilled)

Transverse direction (T) = 227 N (Minimal requirement 210 N, all 3 samples fulfilled)

The mean values of the deflection are:

Longitudinal direction (L) = 9.9 mm

Transverse direction (T) = 2,1 mm

3.4 Testing for water absorption according to DIN EN 520 (surface)

For the water absorption test (surface), six samples (125 mm x 125 mm; each ± 1.5 mm) were cut from the gypsum plasterboard **type 12.5 GKB-H2**. Three of these samples were used for testing the face and the other for testing the rear side. Immediately before the test, the samples were conditioned until a temperature of (23 ± 2) °C and a relative air humidity of (50 ± 5) % were reached. The samples were then weighed and placed on the Cobb unit, with the side to be tested facing upwards. The ring was filled with water (temperature of (23 ± 2) °C) up to a level of 25 mm above the surface tested. This set-up was then stored for $2 \text{ h} \pm 2 \text{ min}$. After that the water was poured off, the sample was removed, dabbed dry with blotting paper and weighed again.

The test results show that the board meets water absorption class H1 requirements for both sides. The acceptable water absorption rate is less than 180 g/m^2 (front view, actual value: 116 g/m^2 , back view, actual value: 112 g/m^2). Detailed results of this test are shown in the annex.

3.5 Testing for water absorption according to DIN EN 520 (board)

For the water absorption test (board), three samples (300 mm x 300 mm; each ± 1.5 mm) were cut from the gypsum plasterboards and stored acc. DIN EN 520. The samples were then weighed and placed in a water bath of (23 ± 2) °C for $2 \text{ h} \pm 2 \text{ min}$. After removal of the bath, the water was stripped off, the samples were weighed again. Results are given in the annex as percentage increase (Mass-%) of the complete board.

The water absorption of the board is 3,56 mass-% (average of 3 samples). The board complies the requirements of class H1 (≤ 5 mass-%).

4 Summary

The Materials Testing Institute MPA Braunschweig was commissioned by Knauf Ltd. & Partner from Suez, Egypt, to perform tests for determination of the material properties of their **type 12.5 GKB-H2** plasterboard material.

The mean values of the material properties were determined on the basis of tests performed in compliance with DIN EN 520. Results are listed in Table 1 below.

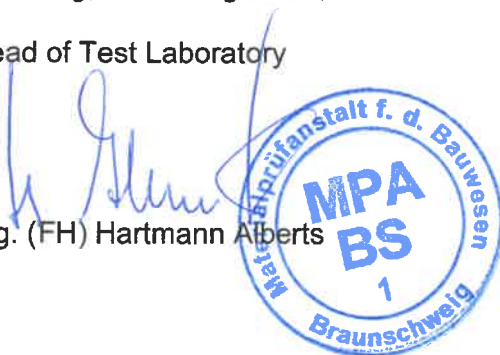
Table 1 Overview of properties.

Type of board		type 12.5 GKB-H2
Board thickness	[mm]	12.5
Dimensions	[mm]	1,199 × 2,998 × 12.2
Edge profile	[mm/m]	Squareness 0.27
	[mm]	Taper width 42 mm to 43 mm
	[mm]	Taper depth 1.46 mm to 1.56 mm
Collapse load parallel with the fibre	[N]	554
Collapse load perpendicular to the fibre	[N]	227
Weight per unit area (Gypsum)	[kg/m ²]	10,0
Water absorption (board)	[Mass-%]	3,56 , H1
Water absorption (surface)	[g/m ²]	116 (front view)
		112 (back view)

Braunschweig, dated August 26, 2022

Ass. Head of Test Laboratory

Dipl.-Ing. (FH) Hartmann Alberts



Engineer in charge

i.A.

Dipl.-Ing. Sandra Hirschfeld

Client: **Knauf Egypt**

Document No: **1103/530/21**

Boardtype: **H2**

Nominal size: **3000** x **1200** x **12,5** mm³

Checker: **Schwarz**

Date of sampling : **09.03.22**

End-face marking: **Knauf Gypsum Board H2-EN 520 AK 12.5 x 1200 x 3000 mm** manufactured according to **EN 520 A2-s1, d0** Made in **Egypt**, 17:31 16.12.21 Test material received: **22.03.22**

dimensions in as-required:

board number:	length			width			thickness												average value [mm]	
	1 [mm]	2 [mm]	3 [mm]	1 [mm]	2 [mm]	3 [mm]	1 [mm]	2 [mm]	3 [mm]	4 [mm]	5 [mm]	6 [mm]	7 [mm]	8 [mm]	9 [mm]	10 [mm]	11 [mm]	12 [mm]		
1	2997	2998	2998	1199	1199	1199	12,3	12,3	12,4	12,3	12,4	12,3	12,2	12,2	12,2	12,3	12,3	12,3	12,3	12,3
2	2998	2998	2998	1199	1199	1199	12,3	12,2	12,2	12,2	12,2	12,2	12,2	12,2	12,2	12,2	12,2	12,2	12,2	12,2
3	2997	2997	2998	1198	1199	1199	12,2	12,3	12,2	12,3	12,3	12,3	12,2	12,2	12,2	12,2	12,2	12,2	12,2	12,2
average value:			2998			1199														12,2

squareness and taper profile:

board number:	squareness			taper width				taper depth				average value [mm]
	Δ_1 [mm]	Δ_2 [mm]	R_w [mm/m]	1 [mm]	2 [mm]	3 [mm]	4 [mm]	1 [mm]	2 [mm]	3 [mm]	4 [mm]	
1	0,8	0	0,33	43	44	43	42	1,73	1,25	1,30	1,54	1,46
2	0,5	0,1	0,25	42	43	43	44	1,73	1,28	1,37	1,74	1,53
3	0,0	0,55	0,23	41	44	41	42	1,59	1,73	1,74	1,17	1,56
average value:			0,27									1,51

test equipment:

measuring tape: **BMI (Inv.-Nr. 5969)**
 slide gauge: **300 mm (MPA-186)**
 taper profile counter: **Maße Digital Messuhr 1075 (GPA-055)**
 scales: **Sartorius (P 34000 P, Inv.-Nr.: 040114055)**
Sartorius (Inv.-Nr.: 2320210027)
 climatic cabinet: **Halle I, EG, Heraeus (Car-Bus : DL 021 links)**
 Cobb-processor : **Halle I, Raum 006 (Car-Bus:DL 006)**



test material number:	weight per unit area, density, collapse load, deflection & modulus of elasticity:										water absorption:									
	length [mm]	width [mm]	weight air-dry [g]	weight dry 40° C [g]	weight per unit area [kg/m²]	effective span [mm]	collapse load FU [N]	deflection S _{max} [mm]	modulus of elasticity [N/mm²]	test material number & direction of testing	test period from time	test period to time	length [mm]	width [mm]	thickness [mm]	weight air-dry [g]	weight climate 23/50 [g]	weight wet after 2 hours [g]	water absorption [g]	water absorption [g/m²]
1 L	400	300	1186,4	1185,4	9,9	350	553	9,58	3200	1 front view	11:20	13:20	123	124	12,2	151,6	151,81	152,91	1,1	110
1 T	400	300	1199,6	1198,7	9,9	350	236	3,25	1900	1 back view	13:27	15:27	123	125	12,19	152,4	152,6	153,63	1,03	103
2 L	400	300	1190	1183,2	9,9	350	556	9,70	3400	2 front view	07:31	09:31	124	127	12,21	156	156,12	157,34	1,22	122
2 T	400	300	1203,3	1201,4	10,0	350	212	1,42	2800	2 back view	09:37	11:37	124	126	12,2	155,6	155,76	156,85	1,09	109
3 L	400	300	1184	1182,3	9,8	350	554	10,55	3200	3 front view	11:42	13:42	126	124	12,28	153,6	153,82	154,97	1,15	115
3 T	400	300	1195,2	1194,5	10,0	350	232	1,72	2600	3 back view	13:48	15:48	125	127	12,2	155,8	155,97	157,2	1,23	123
average value:					9,9													Average front:	1,16	116
																		Average back:	1,12	112

board number:	summary of test results											
	length [mm]	width [mm]	thickness [mm]	squareness R _w [mm/m]	taper profile width [mm]	taper profile depth [mm]	weight per unit area [kg/m²]	collapse load in longitudinal direction (L) [N]	collapse load in transverse direction (T) [N]	water absorption front view [g/m²]	water absorption back view [g/m²]	total [Masse%]
1	2998	1199	12,3	0,33	43,0	1,46	9,9	553	236	110	103	3,55
2	2998	1199	12,2	0,25	43,0	1,53	10,0	556	212	122	109	3,63
3	2997	1198	12,2	0,23	42,0	1,56	9,9	554	232	115	123	3,50
average value:	2998	1199	12,2	0,27	42,7	1,51	9,9	554	227	116	112	3,56
DIN EN 520 requirements	2994 bis 3000	1196 bis 1200	± 0,5 mm	no requirement	40 bis 80	0,6 bis 2,5	no requ.	≥ 550	≥ 210	water absorption class H1 (<5%)		
meet:	yes	yes	yes	—	yes	yes	—	yes	yes	yes	yes	yes