

TEST REPORT

No. : SHIN170601927CCM

Date : Aug. 24, 2017

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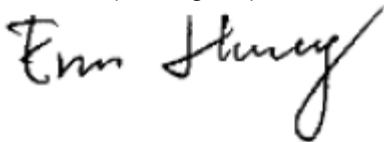
CUSTOMER NAME: LG HAUSYS
ADDRESS: 10 GOOKJEGEUMYOONG-RO, YEONGDEUNGPO-GU, SEOUL 150-876, KOREA

Sample Name : LG UNITE
Product specification : 2.0mm*2m*20m
Manufacturer : LG Hausys

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

Test Required : Please see the next page(s)
Test Method : Please see the next page(s)
Date of Receipt : Jun. 20, 2017
Testing Start Date : Jun. 20, 2017
Testing End Date : Aug. 24, 2017
Test result(s) : For further details, please refer to the following page(s)
(Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

Signed for
SGS-CSTC Standards Technical
Services (Shanghai) Co., Ltd.



Erin Huang
Authorized signatory



SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Testing Center Commercial Construction Material Laboratory

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Summary of Result(s):

No.	Test Item	Test Method	Test Result	Conclusion
1	Overall thickness	ISO 24346:2006	2.06mm	/
2	Mass per unit area	ISO 23997:2007	3190g/m ²	/
3	Residual indentation	ISO 24343-1:2007	0.10mm	/
4	Dimensional stability and curling after exposure to heat	EN ISO 23999:2012	See result	/
5	Flexibility	ISO 24344:2008 method A	See result	/
6	Thermal conductivity	EN 12664:2001	0.053 W/(m·K)	/
	Thermal Resistance		0.040 (m ² ·K)/W	/
7	Staining and resistance to chemicals	ISO 26987:2008	See result	/
8	Width	ISO 24341:2006	2006mm	/
9	Phthalates Content	With reference to EN 14372:2004	See result	/
10	Colour Fastness To Light	ISO 105-B02:2014	Grade: 6	/
11	Effect of a castor chair	EN 425:2002	No visible damage	/
12	Wear resistance	EN 660-2:1999+A1:2003 and EN 649:2011	Fv=1.1mm ³ /100revolutions	T
13	Dynamic coefficient of friction	EN 13893:2002	0.43	/
14	Reaction to fire	EN 13501-1:2007+A1:2009	Classification: B _{fl} -s1	/
15	Impact sound reduction index	ISO 10140-1:2016 Annex H & ISO 717-2:2013	L _{n,w} = 74dB, ΔL _w = 4dB, C _{1,r} = -13dB, C _{1,Δ} = 3dB	/



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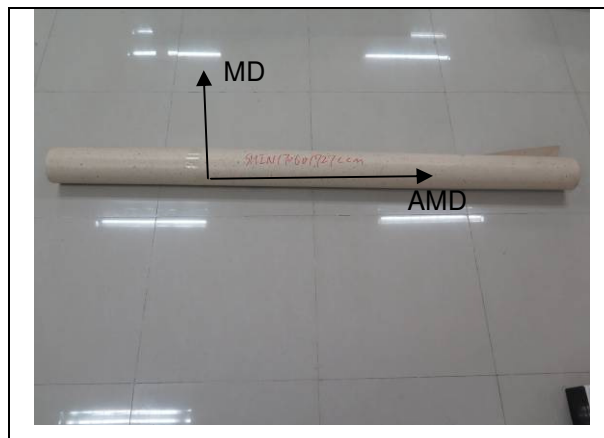
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Note: Pass : Meet the requirements;
Fail : Does not meet the requirements;
/ : Not Apply to the judgment.

Original Sample Photo(s):



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1. Test item: Overall thickness

Test method: ISO 24346:2006

Test condition:

Specimen: 2000mm×100mm×2mm, 2pcs

Lab environmental condition: 23±2°C, 50±5%RH

Test result:

Test item	Test Result		
	Individual value		Average value
Overall thickness (mm)	2.04	2.07	2.06

Note: Test specimens were cut from original sample.

2. Test item: Mass per unit area

Test method: ISO 23997:2007

Test condition:

Specimen: 100mm×100mm×2mm, 5pcs

Lab environmental condition: 23±2°C, 50±5%RH

Test result:

Test item	Test result					Average value
	Individual value					
Mass per unit area (g/m ²)	3120	3240	3260	3130	3210	3190

Note: Test specimens were cut from original sample.



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3. Test item: Residual indentation

Test method: ISO 24343-1:2007

Test condition:

Specimen: 100mm×100mm×2mm, 3pcs

Diameter of indenter: 11.30mm

Total force: 500N

Maintain time: 150min

Recovery time: 150min

Lab environmental condition: 23±2°C, 50±5%RH

Test result:

Test Item	Test Result			
	Individual value			Average value
Residual indentation (mm)	0.11	0.10	0.09	0.10

Note: Test specimens were cut from original sample.



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4. Test item: Dimensional stability and curling after exposure to heat

Test method: EN ISO 23999:2012

Test condition:

Specimen: 240mm×240mm×2mm, 3pcs

Heating temperature: 80°C

Heating time: 6h

Lab environmental condition: 23±2°C, 50±5%RH

Test result:

Test Item	Test result		
Dimensional stability and curling after exposure to heat	Dimensional change (%)	Manufacturing direction	Average value: 0.20 Maximum value: 0.32
		Across-manufacturing direction	Average value: 0.05 Maximum value: 0.10
	Curling (mm)	0	

Note: Test specimens were cut from the original sample.

5. Test item: Flexibility

Test method: ISO 24344:2008 Method A

Test condition:

Specimen: 250mm×50mm×2mm, 6pcs (3pcs in each direction)

Lab environmental condition: 23±2°C, 50±5%RH

Test result:

Test item	Test result
Flexibility	7mm mandrel, no cracking

Note: Test specimens were cut from the original sample.



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6. Test item: Thermal conductivity and Thermal Resistance

Test method: EN 12664:2001

Test condition:

Specimen: 300mm×300mm×2.1mm, 1pc

Density: about 1524kg/m³

Mean temperature: 23°C

Temperature difference: 10°C

Lab environmental condition: 23±2°C, 50±5%RH

Test result:

Test Item	Test Result
Thermal conductivity	0.053 W/(m·K)
Thermal Resistance	0.040 (m ² ·K)/W

Note:

1. The test result can not be compared with other results obtained from different test conditions, and should not be cited to the use condition directly.
2. Test specimens were cut from the original sample.



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7. Test item: Staining and resistance to chemicals

Test method: ISO 26987:2008

Test condition:

Specimen: 100mm×100mm×2mm, 3pcs (1pc for each substance)

Duration of contact: 2h

Lab environmental condition: 23±2°C, 50±5%RH

Test result:

No.	Test substance (specified by client)	Index
1	40% m/m, Sodium hydroxide	1
2	50% m/m, Sulfuric acid	1
3	84 Disinfectant	1

Note:

1. Test specimens were cut from the original sample.
2. Interpretation and presentation of results.

Index	Effect of test after cleaning / abrasion
0	Not affected
1	Slight
2	Moderate
3	Severe



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8. Test item: Width

Test method: ISO 24341:2006

Test condition:

Specimen: 200mm×2000mm×2mm, 1pc

Lab environmental condition: 23±2°C, 50±5%RH

Test result:

Test Item	Test Result			
	Individual value			Average value
Width (mm)	2006	2006	2006	2006

Note: Test specimens were cut from the original sample.



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9. Test item: Phthalates Content

Sample description: Colorful solid piece

Test Method: With reference to EN 14372:2004, analysis was performed by GC-MS.

Test Item(s)	CAS NO.	Limit	Unit	MDL	Result
Dibutyl Phthalate (DBP)	84-74-2	0.1	%	0.003	ND
Benzylbutyl Phthalate (BBP)	85-68-7	0.1	%	0.003	ND
Bis-(2-ethylhexyl) Phthalate (DEHP)	117-81-7	0.1	%	0.003	ND
Diisononyl Phthalate (DINP)	28553-12-0 /68515-48-0	0.1	%	0.01	ND
Di-n-octyl Phthalate (DNOP)	117-84-0	0.1	%	0.003	ND
Diisodecyl Phthalate (DIDP)	26761-40-0 /68515-49-1	0.1	%	0.01	ND

Remarks:

- (1) 1 mg/kg = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

Notes:

DBP, BBP, DEHP Reference information: Entry 51 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006 (previously restricted under Directive 2005/84/EC):

- i) Shall not be used as substances or in mixtures, in concentrations greater than 0.1 % by weight of the plasticised material, in toys and childcare articles.
- ii) Toys and childcare articles containing these phthalates in a concentration greater than 0.1 % by weight of the plasticised material shall not be placed on the market.



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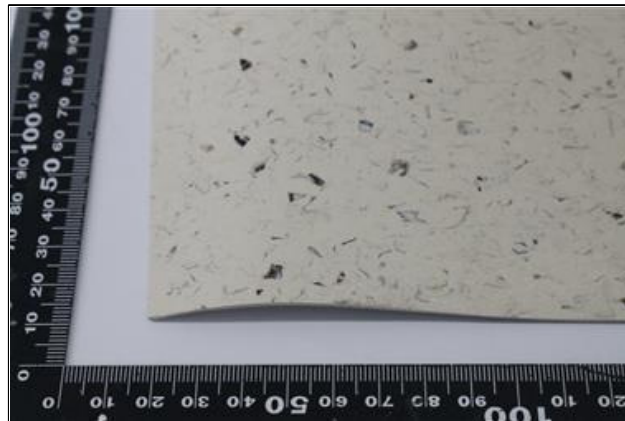
Please refer to Regulation (EC) No 552/2009 to get more detail information

DINP, DNOP, DIDP Reference information: Entry 52 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006 (previously restricted under Directive 2005/84/EC).

- i) Shall not be used as substances or in mixtures, in concentrations greater than 0.1 % by weight of the plasticised material, in toys and childcare articles which can be placed in the mouth by children.
- ii) Such toys and childcare articles containing these phthalates in a concentration greater than 0.1 % by weight of the plasticised material shall not be placed on the market.

Please refer to Regulation (EC) No 552/2009 to get more detail information.

Sample photo:



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10. Test item: Colour Fastness To Light

Sample description: in beige

(ISO 105-B02:2014; use Xenon arc lamp, exposure cycle A1, no flip-flop mode was used)

Comparison upto blue

wool reference 6

Grade (Bluewool Std)

6

Sample Photo:



11. Test item: Effect of a castor chair

Sample description: See photo

Test method: EN 425:2002

Test condition:

Cycles: 25000

Load: 90kg

Test result: No visible damage



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12. Test item: Wear resistance

Test method: EN 660-2:1999+A1:2003 and EN 649:2011

Test condition: Weigh the specimens to an accuracy of ± 0.1 mg after conditioning. Load each wheel with a weight of (1 ± 0.01) kg. The flow of abrasive is (21 ± 3) g/min. Abrade one specimen during 5000 revolutions, with a break for weighing after each cycle of 1000 revolutions, and then test the two remaining specimens. If, however, the first specimen is abraded through before 5000 revolutions, discard it and test the two remaining specimen in cycles of 200 revolutions stopping the test after 2000 revolutions or when the specimen is abraded through.

Calculate the average mass loss. F_m , in milligrams per 100 revolutions for each specimen as follows:

$$F_m = \frac{F_{tot}}{n} \times 100$$

Calculate the loss of volume for each specimen for 100 revolutions as follows:

$$F_v = \frac{F_m}{\rho}$$

Requirement of EN 649:2011:

Characteristic	Requirements for wear group			
	T	P	M	F
Volume loss $F_v(\text{mm}^3)/100\text{revolutions}$	$F_v \leq 2.0$	$2.0 < F_v \leq 4.0$	$4.0 < F_v \leq 7.5$	$7.5 < F_v \leq 15.0$

Test result:

Test result	Wear group
$F_v = 1.1 \text{mm}^3/100\text{revolutions}$	T



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13. Test item: Dynamic coefficient of friction

Test method: EN 13893:2002

Test condition:

Specimen thickness: 2.02mm

Testing speed: 0.20m/s

Test result: 0.43

Note: All test specimens were cut from the sample.

Sample Photo:



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14. Test item: Reaction to fire

I. Test conducted

This test was conducted as per EN 13501-1:2007+A1:2009 Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests. And the test methods as following:

1. EN ISO 9239-1:2010 Reaction to fire tests for floorings —Part 1: Determination of the burning behaviour using a radiant heat source.
2. EN ISO 11925-2:2010 Reaction to fire tests — Ignitability of building products subjected to direct impingement of flame — Part 2: Single-flame source test.

II. Details of classified product

Sample description	LG UNITE
Color	Beige
Thickness	About 2.0 mm
Mass per unit area	About 3.2 kg/m ²

Mounting and fixing:

Fibre cement board, with its density approximate 1800kg/m³, thickness approximate 9mm, is as the substrate. The test specimens are fixed mechanically to the substrate. No joint.

III. Test results

Test method	Parameter	Number of tests	Results
EN ISO 9239-1	Critical flux (kW/m ²)	3	≥11
	Smoke (%×minutes)		127.7
EN ISO 11925-2 Exposure = 15 s	F _s ≤ 150 mm	6	YES



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IV. Classification and direct field of application

This classification has been carried out in accordance with EN 13501-1:2007+A1:2009.

a) Classification

The product, LG UNITE, classification is as following,

Fire behaviour		Smoke production	
B _{fl}	—	s	1

Reaction to fire classification: B_{fl}—s1

Remark: The classes with their corresponding fire performance are given in annex A.

b) Field of application

This classification for the submitted sample is valid for the following end use condition:

- With all substrates classified A1 and A2
- With mechanically fixing
- No joint

This classification is valid for the following product parameters:

- Characteristics as described in § II of this test report.

Statement: The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

Warning:

This classification report does not represent type approval or certification of the product.

The test laboratory has, therefore, play no part in sampling the product for the test, although it holds appropriate references to the manufacturer's factory production control that is aimed to be relevant to the samples tested and that will provide for their traceability.



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Annex A

Classes of reaction to fire performance for floorings

class	Test methods	Classification	Additional classification
A1 _{fl}	EN ISO 1182 ^a and	$\Delta T \leq 30^\circ\text{C}$, and $\Delta m \leq 50\%$, and $t_f = 0$ (i.e. no sustained flaming)	-
	EN ISO 1716	$\text{PCS} \leq 2.0\text{MJ/kg}$ ^a and $\text{PCS} \leq 2.0\text{MJ/kg}$ ^b and $\text{PCS} \leq 1.4\text{MJ/m}^2$ ^c and $\text{PCS} \leq 2.0\text{MJ/kg}$ ^d	-
A2 _{fl}	EN ISO 1182 ^a or	$\Delta T \leq 50^\circ\text{C}$, and $\Delta m \leq 50\%$, and $t_f \leq 20\text{s}$	-
	EN ISO 1716	$\text{PCS} \leq 3.0\text{MJ/kg}$ ^a and $\text{PCS} \leq 4.0\text{MJ/m}^2$ ^b and $\text{PCS} \leq 4.0\text{MJ/m}^2$ ^c and $\text{PCS} \leq 3.0\text{MJ/kg}$ ^d	-
	EN ISO 9239-1 ^e	Critical flux ^f $\geq 8.0\text{kW/m}^2$	Smoke production ^g
B _{fl}	EN ISO 9239-1 ^e and	Critical flux ^f $\geq 8.0\text{kW/m}^2$	Smoke production ^g
	EN ISO 11925-2 ^h Exposure = 15s	$F_s \leq 150\text{mm}$ within 20 s	-
C _{fl}	EN ISO 9239-1 ^e and	Critical flux ^f $\geq 4.5\text{kW/m}^2$	Smoke production ^g
	EN ISO 11925-2 ^h Exposure = 15s	$F_s \leq 150\text{mm}$ within 20 s	-
D _{fl}	EN ISO 9239-1 ^e and	Critical flux ^f $\geq 3.0\text{kW/m}^2$	Smoke production ^g
	EN ISO 11925-2 ^h Exposure = 15s	$F_s \leq 150\text{mm}$ within 20 s	-



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class	Test methods	Classification	Additional classification
E _{fl}	EN ISO 11925-2 ^h Exposure =15s	Fs≤150mm within 20 s	-
F _{fl}	No performance determined		

^a For homogeneous products and substantial components of non-homogeneous products.
^b For any external non-substantial component of non-homogeneous products.
^c For any internal non-substantial component of non-homogeneous products.
^d For the product as a whole.
^e Test duration = 30 min.
^f Critical flux is defined as the radiant flux at which the flame extinguishes or the radiant flux after a test period of 30 min, whichever is the lower (i.e. the flux corresponding with the furthest extent of spread of flame).
^g s1 = Smoke ≤ 750 % minutes;
s2 = not s1.
^h Under conditions of surface flame attack and, if appropriate to the end use application of the product, edge flame attack.

Sample photo:



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15. Test item: Impact sound reduction index

I. Test Method

ISO 10140-1:2016 Acoustics - Laboratory measurement of sound insulation of building elements - Part

1: Application rules for specific products Annex H

ISO 717-2:2013 Acoustics - Rating of sound insulation in buildings and of building elements - Part 2:

Impact sound insulation

II. Sample Details

Thickness	2mm
Surface density	3.1kg/m ²

III. Test condition

Ambient temperature	27.2°C	Relative humidity	70.3%
The source room Volume	125m ³	The receiving room Volume	100m ³
Description of test arrangement	Test area: 15m ² The test sample was laid on the 140mm thick prefabricated floor.		

II. Test result

Rating according to ISO 717-2:2013:

$L_{n,w} = 74\text{dB}$, $\Delta L_w = 4\text{dB}$, $C_{l,r} = -13\text{dB}$, $C_{l,\Delta} = 3\text{dB}$



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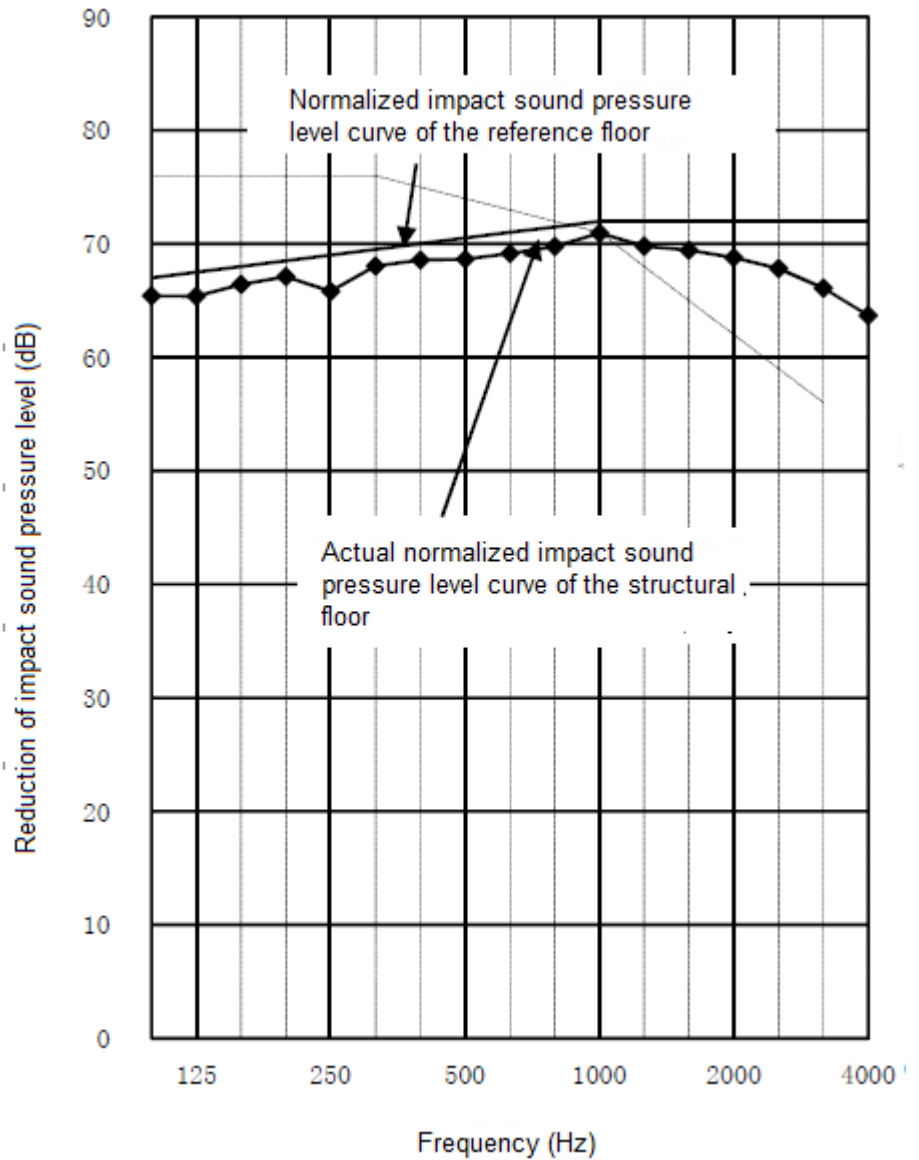
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f Hz	$L_{n,r,o,w}$ dB	$L_{n,r,w}$ dB	ΔL dB
100	67.0	65.4	1.6
125	67.5	65.4	2.1
160	68.0	66.4	1.6
200	68.5	67.1	1.4
250	69.0	65.8	3.2
315	69.5	68.0	1.5
400	70.0	68.6	1.4
500	70.5	68.7	1.8
630	71.0	69.2	1.8
800	71.5	69.8	1.7
1000	72.0	70.9	1.1
1250	72.0	69.8	2.2
1600	72.0	69.4	2.6
2000	72.0	68.8	3.2
2500	72.0	67.8	4.2
3150	72.0	66.1	5.9
4000	72.0	63.7	8.3



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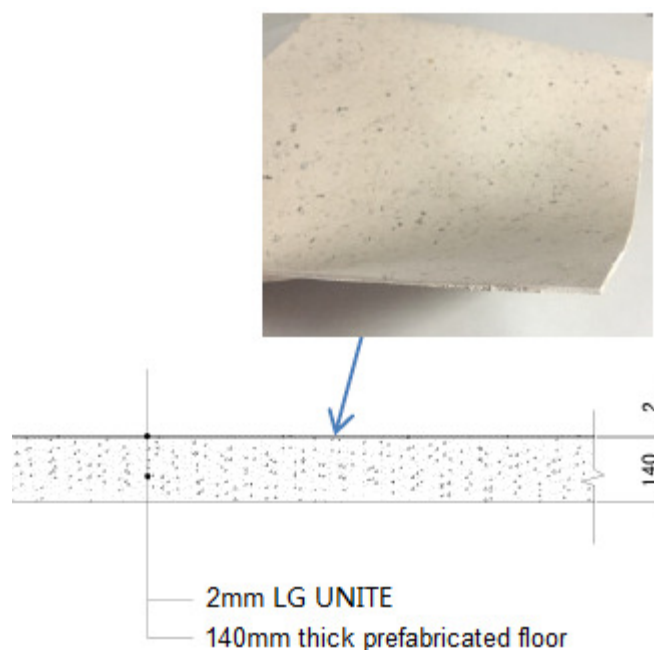
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Test schematic diagram:



Note: Test item 11-14 were performed by SGS other internal laboratory.

Note: Test item 15 was carried out by external laboratory assessed as competent.

***** End of report*****

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