

TFI Report 452039-12

Reaction to fire test

For the classification according to EN 13501-1:2010

Customer

LG Hausys Ltd.
One IFC, 20 Yeouido-gong, Yeongdeungpo-gu
150-876 Seoul
SOUTH KOREA

Product

resilient floor covering
Medistep Allroad

Responsible at TFI

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This report includes 3 pages and 4 annexes.

Aachen, 22 December 2015

Dr. Jens-Christian Winkler

authorized manager

The present document is provided with a qualified electronic signature and is valid without autograph signature.



This report only applies to the tested specimens and has been established to the best of our knowledge. Only the entire report shall be reproduced. Under no circumstances, extracts shall be used. Furthermore, we apply the "General Terms and Conditions for the Execution of Contracts" of the Textiles & Flooring Institute GmbH, also with regard to the order execution.

1 Transaction

| | |
|------------------------|---|
| Test order | Reaction to fire test for construction products according to EN ISO 11925-2:2010 and EN ISO 9239-1:2010 |
| Order date | 18 November 2015 |
| Your reference | Choi, Dan Bi |
| Product designation | Medistep Allroad |
| TFI sample number | 15-11-0188 |
| Date of manufacture | not specified |
| Date of sample receipt | 16 November 2015 |
| Sampling performed by | Customer |

2 Product Specification

cf. annex KT

3 Results

Ignitability of products subjected to direct impingement of flame according to EN ISO 11925-2:2010

| | |
|------------------|---------------|
| Ignition | yes |
| Flame tip | ≤ 150 mm |
| Burning droplets | not relevant |

Burning behaviour using a radiant heat source according to EN ISO 9239-1:2010

| | |
|---|--------------------|
| Average critical heat flux [kW/m ²] | 10.4 |
| Integrated smoke density [% x min] | 247 |
| Adhesion | none |
| Substrate according to EN 13238:2010 | fibre cement board |

This test report is the basis for a classification report according to EN 13501-1:2010.

The test results relate to the behaviour of the test specimens of a construction 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 construction product in use.

4 Annexes

| | |
|--|--------------|
| Photographs | F 452039-12 |
| Ignitability ^a | KB 452039-12 |
| Characteristics of the construction product ^a | KT 452039-12 |
| Reaction to Fire ^a | RP 452039-12 |

The annexes marked ^a are based on tests accredited in accordance with EN ISO/IEC 17025.

Annex F - Photographs

1 Transaction

| | |
|---------------------|------------------|
| Product designation | Medistep Allroad |
| TFI sample number | 15-11-0188 |
| Testing period | 14 December 2015 |

2 Test Method / Requirements

-not specified-

3 Results

3.1. Specimen 1, in production direction



3.2. Specimen 2, in production direction



3.3. Specimen 3, in production direction



3.4. Specimen 4, cross production direction



Annex KB - Ignitability

1 Transaction

Product designation Medistep Allroad
 TFI sample number 15-11-0188
 Testing period 14 December 2015

2 Test Method / Requirements

EN ISO 11925-2:2010 Part 2 Ignitability of products subjected to direct impingement of flame
 Substrate according to EN 13238:2010 Fibre cement board
 Type of fixation Loosely laid
 Conditioning Conditioning to constant mass according to EN 13238:2010
 Type of ignition Surface ignition
 Ignition time [s] 15
 Deviation from the standard -none-

3 Results

| Parameter | Specimen no. | | | | | |
|--|-------------------------|-------------------------|-------------------------|----------------------------|----------------------------|----------------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Orientation to the direction of production | in production direction | in production direction | in production direction | cross production direction | cross production direction | cross production direction |
| Ignition of the specimen | yes | yes | yes | yes | yes | yes |
| Flame tip (moment [s]) | <150 mm (n.r.) | <150 mm (n.r.) | <150 mm (n.r.) | <150 mm (n.r.) | <150 mm (n.r.) | <150 mm (n.r.) |
| Maximum flame height [mm] (moment [s]) | n.r. | n.r. | n.r. | n.r. | n.r. | n.r. |
| Burning droplets | no | no | no | no | no | no |
| Ignition of the filter paper | no | no | no | no | no | no |

Observations: - none -

Annex KT – Characteristics of the construction product

1 Transaction

| | |
|---------------------|------------------|
| Product designation | Medistep Allroad |
| TFI sample number | 15-11-0188 |
| Testing period | 04 December 2015 |

2 Test Method / Requirements

| | |
|-------------------|---|
| EN ISO 24346:2012 | Resilient floor coverings - Determination of total thickness |
| EN ISO 23997:2012 | Resilient floor coverings - Determination of mass per unit area |
| Deviation | -none- |

3 Results

| Parameter | Manufacturer's data | TFI results |
|--|---------------------|------------------------------|
| Use surface | PVC | not tested |
| Construction | homogeneous | homogeneous |
| Structure | PUR Treated | flat |
| Pattern | -none- | tonal effect without pattern |
| Colour of the use surface | -none- | beige, light beige |
| Type of delivery | sheet | sheet |
| Total thickness [mm] | 2.0 | 2.04 |
| Total mass per unit area [g/m ²] | 2950 | 2980 |

Annex RP – Reaction to Fire

1 Transaction

| | |
|---------------------|------------------|
| Product designation | Medistep Allroad |
| TFI sample number | 15-11-0188 |
| Testing period | 14 December 2015 |

2 Test Method / Requirements

| | |
|---------------------------------------|--|
| EN ISO 9239-1:2010 Part 1 | Determination of the burning behaviour using a radiant heat source |
| Substrate according to EN 13238:2010 | Fibre cement board |
| Adhesion | -none - |
| Joint according to EN ISO 9239-1:2010 | No |
| Conditioning | Conditioning to constant mass according to EN 13238:2010 |
| Deviation | -none- |

3 Results

cf page 2 - 5

Annex RP - Burning behaviour

Sample designation 15-11-0188

Sample

Sample No.: 1
Direction: in production direction

Observation

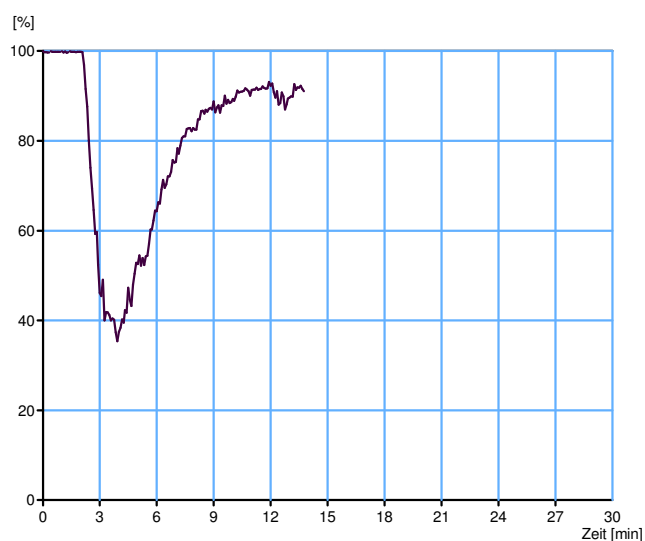
| | |
|--|--------|
| molten/singed during pre-radiation up to | 250 mm |
| buckled/contracted from pilot flame area up to | 400 mm |
| penetration of flame through substrate | - |
| transitory flaming | - |
| blistering | - |
| glowing, after flame has extinguished | - |

Results

| Position | Time | Heat Flow |
|----------|---------|----------------------|
| [mm] | [min:s] | [kW/m ²] |
| 50 | 02:27 | 12.18 |
| 100 | 03:14 | 11.28 |
| 150 | 04:27 | 10.38 |
| 200 | - | - |
| 250 | - | - |
| 300 | - | - |
| 350 | - | - |
| 400 | - | - |
| 450 | - | - |
| 500 | - | - |
| 550 | - | - |
| 600 | - | - |
| 650 | - | - |
| 700 | - | - |
| 750 | - | - |
| 800 | - | - |
| 850 | - | - |
| 900 | - | - |
| 950 | - | - |
| 1000 | - | - |

| Time | Position | Heat Flow |
|---------|----------|----------------------|
| [min:s] | [mm] | [kW/m ²] |
| 10:00 | 150 | 10.38 |
| 20:00 | - | - |
| 30:00 | - | - |

Smoke density



| | |
|----------------------------------|-------|
| CHF [kW/m ²] | 10.38 |
| HF_30 [kW/m ²] | 0.00 |
| Smoke density integral [%*min] | 290.9 |
| Flame extinguished after [min:s] | 13:47 |
| max. burnt distance [mm] | 150 |
| max. light attenuation [%] | 64.6 |

Annex RP - Burning behaviour

Sample designation 15-11-0188

Sample

Sample No.: 2
 Direction: in production direction

Observation

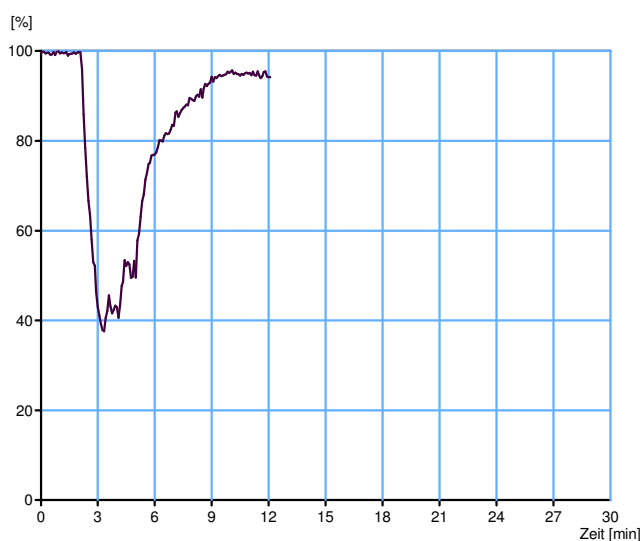
| | |
|--|--------|
| molten/singed during pre-radiation up to | 200 mm |
| buckled/contracted from pilot flame area up to | 500 mm |
| penetration of flame through substrate | - |
| transitory flaming | - |
| blistering | - |
| glowing, after flame has extinguished | - |

Results

| Position | Time | Heat Flow |
|----------|---------|----------------------|
| [mm] | [min:s] | [kW/m ²] |
| 50 | 02:29 | 12.18 |
| 100 | 03:01 | 11.28 |
| 150 | - | - |
| 200 | - | - |
| 250 | - | - |
| 300 | - | - |
| 350 | - | - |
| 400 | - | - |
| 450 | - | - |
| 500 | - | - |
| 550 | - | - |
| 600 | - | - |
| 650 | - | - |
| 700 | - | - |
| 750 | - | - |
| 800 | - | - |
| 850 | - | - |
| 900 | - | - |
| 950 | - | - |
| 1000 | - | - |

| Time | Position | Heat Flow |
|---------|----------|----------------------|
| [min:s] | [mm] | [kW/m ²] |
| 10:00 | 144 | 10.49 |
| 20:00 | - | - |
| 30:00 | - | - |

Smoke density



| | |
|----------------------------------|-------|
| CHF [kW/m ²] | 10.49 |
| HF_30 [kW/m ²] | 0.00 |
| Smoke density integral [%*min] | 228.5 |
| Flame extinguished after [min:s] | 12:05 |
| max. burnt distance [mm] | 144 |
| max. light attenuation [%] | 62.4 |

Annex RP - Burning behaviour

Sample designation 15-11-0188

Sample

Sample No.: 3
 Direction: in production direction

Observation

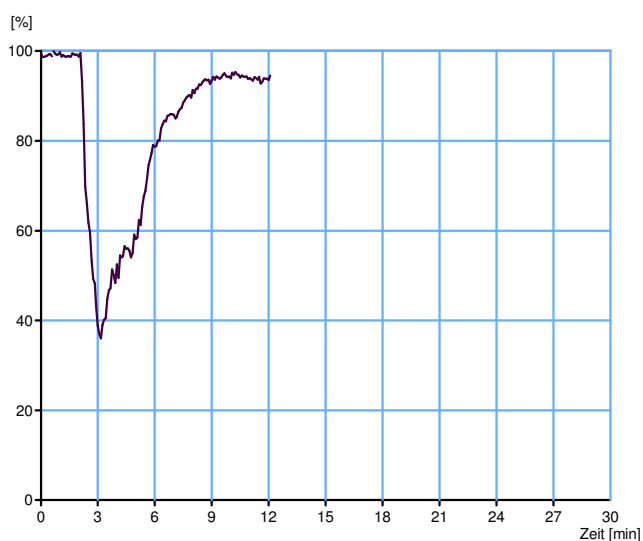
| | |
|--|--------|
| molten/singed during pre-radiation up to | 200 mm |
| buckled/contracted from pilot flame area up to | 450 mm |
| penetration of flame through substrate | - |
| transitory flaming | - |
| blistering | - |
| glowing, after flame has extinguished | - |

Results

| Position | Time | Heat Flow |
|----------|---------|----------------------|
| [mm] | [min:s] | [kW/m ²] |
| 50 | 02:28 | 12.18 |
| 100 | 03:01 | 11.28 |
| 150 | 05:00 | 10.38 |
| 200 | - | - |
| 250 | - | - |
| 300 | - | - |
| 350 | - | - |
| 400 | - | - |
| 450 | - | - |
| 500 | - | - |
| 550 | - | - |
| 600 | - | - |
| 650 | - | - |
| 700 | - | - |
| 750 | - | - |
| 800 | - | - |
| 850 | - | - |
| 900 | - | - |
| 950 | - | - |
| 1000 | - | - |

| Time | Position | Heat Flow |
|---------|----------|----------------------|
| [min:s] | [mm] | [kW/m ²] |
| 10:00 | 153 | 10.33 |
| 20:00 | - | - |
| 30:00 | - | - |

Smoke density



| | |
|----------------------------------|-------|
| CHF [kW/m ²] | 10.33 |
| HF_30 [kW/m ²] | 0.00 |
| Smoke density integral [%*min] | 221.6 |
| Flame extinguished after [min:s] | 12:05 |
| max. burnt distance [mm] | 153 |
| max. light attenuation [%] | 64.0 |

Annex RP - Burning behaviour

Sample designation 15-11-0188

Sample

Sample No.: 1

Direction: cross production direction

Observation

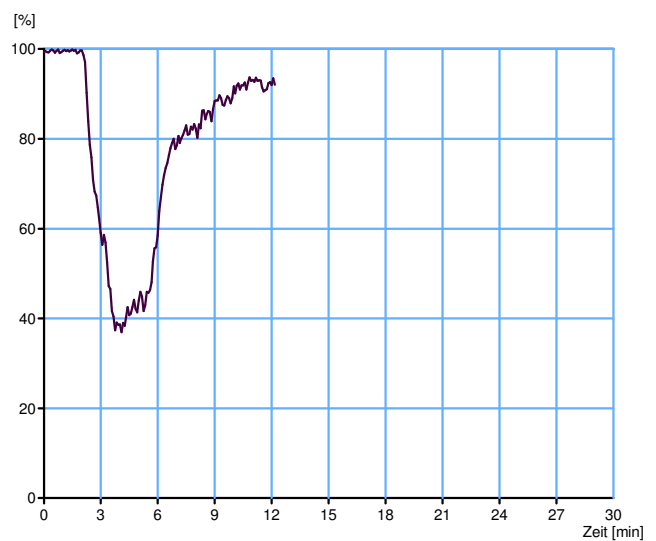
| | |
|--|--------|
| molten/singed during pre-radiation up to | 320 mm |
| buckled/contracted from pilot flame area up to | 450 mm |
| penetration of flame through substrate | - |
| transitory flaming | - |
| blistering | - |
| glowing, after flame has extinguished | - |

Results

| Position | Time | Heat Flow |
|----------|---------|----------------------|
| [mm] | [min:s] | [kW/m ²] |
| 50 | 02:20 | 12.18 |
| 100 | 04:09 | 11.28 |
| 150 | - | - |
| 200 | - | - |
| 250 | - | - |
| 300 | - | - |
| 350 | - | - |
| 400 | - | - |
| 450 | - | - |
| 500 | - | - |
| 550 | - | - |
| 600 | - | - |
| 650 | - | - |
| 700 | - | - |
| 750 | - | - |
| 800 | - | - |
| 850 | - | - |
| 900 | - | - |
| 950 | - | - |
| 1000 | - | - |

| Time | Position | Heat Flow |
|---------|----------|----------------------|
| [min:s] | [mm] | [kW/m ²] |
| 10:00 | 140 | 10.56 |
| 20:00 | - | - |
| 30:00 | - | - |

Smoke density



| | |
|----------------------------------|-------|
| CHF [kW/m ²] | 10.56 |
| HF_30 [kW/m ²] | 0.00 |
| Smoke density integral [%*min] | 276.0 |
| Flame extinguished after [min:s] | 12:05 |
| max. burnt distance [mm] | 140 |
| max. light attenuation [%] | 63.0 |