

LEED V4: 2016 Declaration

Product Data for Certification Knauf Danoline acoustical materials for ceilings and walls

These products are manufactured and supplied by:

KnaufDanoline A/S,
Kloevermarksvej 6,
9500 Hobro,
Denmark
[www. Knauf.dk](http://www.Knauf.dk)

In connection with LEED approval v4 of the above, KnaufDanoline A/S makes the following declaration for use in achieving LEED credits.

Hobro, December 2017

A handwritten signature in black ink, appearing to read 'Erik Ipsen', with a stylized flourish at the end.

Erik Flink Ipsen
Head of R&D, Knauf Danoline

LEED V4 2016 credit opportunities using Knauf Danoline acoustic solutions:

The opportunities for Knauf Danoline gypsum-based, acoustic wall and ceiling solutions to contribute to earning credits are found in the following V4 LEED Categories:

For the following LEED Rating systems:

- **New Construction and Major Renovation**
- **Schools New Construction and Major Renovation**
- **Core and Shell Development**
- **Commercial interiors**

Materials and resources

| LEED Credit Category Code | Definition | KraftDanoline products contribution | Contributes towards |
|---|---|---|----------------------------|
| 1.Materials and resources (MR) Building life cycle impact reduction | Materials that last for long time without missing its basic properties. | The Knauf Danoline have been on the market more than 60 years, tests have showed that the material have the same properties today like when it have been installed. This means that the material can be moved to another destination and still have the same properties. | 5 |
| 2.Materials and resources (MR) Building product disclosure and optimization (EPD) | Properties that shows the environmental impact from production and transportation | Third party verified Environmental Product Declaration (EPDs) is available on line for Knauf Danoline products. | 2 |
| 3.Materials and resources (MR) Building product disclosure and optimization – sourcing of raw materials | Do our raw materials positive or negative effect the naturel | The amount of virgin material is today less than 1%- 99% of the Knauf Danoline plasterboard is recyclable. The gypsumcore is based on 88 % FGD gypsum, which are an symbiosis of smoke cleaning by making energy, and 20 % recycled gypsum, coming from collection stations, and 1 % recycled paper. | 2 |

| | | | |
|---|---|--|----------|
| 4.Materials and resources (MR) Building product disclosure and optimization – material ingredence | Products which are on dangerous list can affect the human being, and affect cancer, allergic reactions or like. | All the materials which is used do not contain any parts which are on the a dangerous REACH list In our design manual is a demand that the product can be recycled , this means all materials can be reused or composed | 2 |
| 5.Materials and resources (MR) Construction and demolition waste management | Do the material goes to landfill or can it be reused | The processing of boards gives waste, just as on building sites. To service the building sites there are collection stations, which are crushing down the materials, the crystallise part (as plaster, silicate glue) goes back in the production, the organic part (as cardboard, paint) is used for composing foodstuff. Production waste are used in the same way.in our intern system. | 2 |

Indoor Environment Quality

| | | | |
|---|--|--|----------|
| 2. Indoor Environment Quality (IAQ) Low Emitting Materials | To reduce the concentration of VOC that can damage the human health productivity and the environment. Walls and ceilings release of VOC can affect the air qualities | Knauf Danoline products is classified E1 as low Emitting materials (rapport 585109 attached) | 3 |
| 4. Indoor Environment Quality (IAQ) Indoor Air quality Assessment | To reduce emitting from other materials the ceiling and wallboards are mixed in materials that have an air cleaning effect, which have a good effect on rooms with human concentrated. | The gypsumcore is with built in air cleaning properties by using Zeolite known as Cleaneo effect | 2 |
| 9.Indoor Environment Quality (IAQ) Acoustic performance | To provide workplaces and classrooms that promote well-being productivity and communicate through effective acoustic design | The product Knauf Danoline have high performance acoustic properties (see homepage) | 1 |



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Emission test of Contur Cleaneo Acoustic Ceiling Panels for M1 classi- fication

Knauf A/S

585109-2

April 2014

Prepared by Helene Klinker

Wood Technology/Indoor Environment

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1. Test order

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Request: Knauf A/S
Kløvermarksvej 6
DK-9500 Hobro

Responsible person: Erik Ipsen

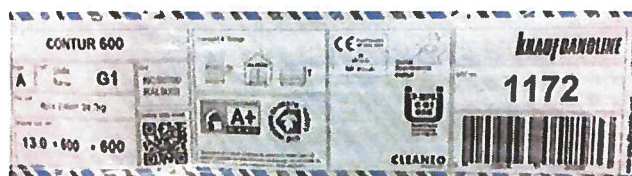
Assignment: Emission measurements for the emission classification of acoustic ceiling panels according to "M1 Classification of Building Materials: Protocol for Chemical and Sensory Testing of Building Materials", Technical Research Centre VTT, Finland. Version 01.01.2014.

2. Test Specimen

Product type: Ceiling panels.

Products name: Contur Cleano Perf. G1

Label:



Production date: 2013 week 49

Shipping date: 2013.12.20

Description of packaging and transport: The test material was delivered in original packages and transported directly from assignor to the test laboratory.

Product received at the testing laboratory: 2013.12.27

Test specimen preparation: The test specimens were prepared as resilient and rigid materials. Laboratory cut edges were sealed by aluminium tape.

Test period started: 2014. 01.10

Conditions during ageing: Post production at ambient temperature.
Storage at test laboratory at 18-23 °C.

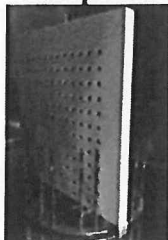
Emission sampling: 2014.02.07

3. Chamber technique

3.1 Climate chamber conditions for TVOC, VOC, Formaldehyde and Ammonia

| | |
|-------------------|------------------------------------|
| Climate chamber | 113 L polished stainless steel |
| Temperature | 23°C ± 1°C |
| Relative humidity | 50 ± 5% RH |
| Air change rate | 0.5 ± 0.05 h ⁻¹ |
| Air velocity | 0.1 – 0.3 m/s |
| Panel load | 0.4 m ² /m ³ |

Test specimen in chamber:



3.2 Chamber Conditions for Sensory Evaluation

| | |
|----------------------|---|
| Climpaq | 200 L glass |
| Temperature | 23°C ± 1°C |
| Relative humidity | 50 ± 5% RH |
| Outlet air flow rate | 0.9 L/s |
| Panel load | 0.65 m ² corresponding to a surface area of 12 m ² ceiling in a model room of 30 m ³ with and air change of 2 h ⁻¹ (NT Build 482) |

4. Emission sampling and analytical methods

| | Method | Absorbent | Sampling volume | Quantification/Analysis method | Detection limit |
|---|---|------------------------------------|-----------------|---|------------------------|
| VOC and E Cat. 1A or 1B carcinogens | ISO 16000-9 | Tenax TA | 3-6 L | GC-MS Quantified with pure reference standards, and as toluene equivalents | 1 µg/m ³ |
| Formaldehyde | ISO 16000-3 | DNPH coated silicagel | 58 L | HPLC-DAD Calibrated with pure ref. standards | 1 µg/m ³ |
| Ammonia | 4430 (Eu- rofans) | Sulphuric acid coated silicagel | 25 L | Spectrophotometry | 0.03 mg/m ³ |
| Sensory evalua- tion | Sensory evaluation of acceptance of the air was performed according to NT Build 482 from the test specimen in a Climpaq with an outlet air flow rate of 0.9 l/s through a funnel, using an untrained panel. | | | | |

5. Results

5.1 Specific emission rates (SER)

| TVOC C ₆ -C ₁₆ mg/(m ² h) | Formaldehyde mg/(m ² h) | Ammonia mg/(m ² h) | Carcinogens C ₆ -C ₁₆ mg/(m ² h) |
|---|---------------------------------------|----------------------------------|--|
| 0.083 | 0.006 | < 0.03 | < 0.002 |

5.2 Standard room concentration (Ceiling)

| TVOC C ₆ -C ₁₆ mg/m ³ | Formaldehyde mg/m ³ | Ammonia mg/m ³ | Carcinogens C ₆ -C ₁₆ mg/m ³ |
|---|-----------------------------------|------------------------------|--|
| 0.066 | 0.0045 | < 0.03 | < 0.001 |

6. Single VOCs C₆-C₁₆ the emission of which exceed 0.005 mg/(m²h)

| RT (min) | Compound | CAS | SER (mg/(m ² h)) |
|-------------|-----------------------------|------------|--------------------------------|
| 6.89 | 2-Butanone (MEK) | 78-93-3 | 0.030 |
| 23.69 | Alpha-pinene | 80-56-8 | 0.006 |
| 33.43 | Butyldiglycol | 112-34-5 | 0.013 |
| 34.97 | Dipropyleneglycolbutylether | 29911-28-2 | 0.010 |

7. Single VOCs outside the frame C₆-C₁₆. Emission exceeding 0.005 mg/(m²h)

| RT (min) | Compound | CAS | SER mg/(m ² h) |
|-------------|----------|-----|------------------------------|
| na | na | na | na |

8. Measurement uncertainty

| | |
|-----------------------------|----------|
| SER _{Formaldehyde} | +/- 15 % |
| SER _{TVOC} | +/- 20 % |
| SER _{NH3} | +/- 20 % |

9. Sensory evaluation (odour)

The results from the sensory evaluation are shown in Appendix 2. The mean average value is +0.47 and the evaluation of the odour is thus: Acceptable.

10. Evaluation summary

| Parameter | Emission 28 days (mg/m ² h) | Requirement (mg/m ² h) |
|--------------|---|--------------------------------------|
| TVOC | 0.083 | < 0.20 |
| Formaldehyde | 0.006 | < 0.05 |
| Ammonia | < 0.03 | < 0.03 |
| Carcinogens* | < 0.001 | < 0.005 |
| Odour | Acceptable | Is not odorous |

* The emission of carcinogenic compounds belonging to category 1A or 1B in Annex VI to Regulation (EC) No 1272/2008.

Based on chemical analyses and sensory evaluation the product can obtain the M1 Emission Class for Building Materials.

Results of the testing and statement of the applied methods are stated on pages 2-6 and they only concern the tested specimens. Extracts from the report may only be published, if the laboratory has approved the extract.

Date/place: 2014.04.14, Danish Technological Institute, Wood Technology, Taastrup



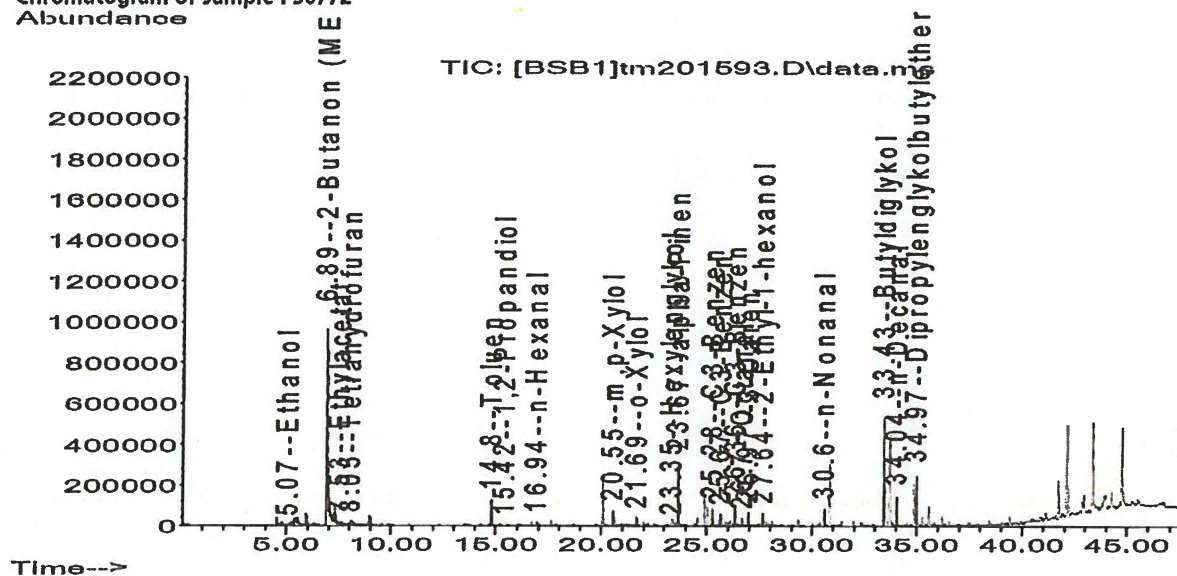
Helene Klinke
Test responsible



Lis Winther Funch
Consultant

Appendix 1 Chromatogram GC-MS

Chromatogram of sample P36772
Abundance



Appendix 2

Sensory Evaluation (acceptability) after 28 days

Sample no.: 585109-2
Description: Contur Cleaneo Perf. G1
Test Date: 07-02-2013
Panel size: 15 untrained panellists
Comments: 0.65 m² in Climpaq

| N | Sample Acceptability |
|---------------------------------|----------------------|
| 1 | 0,9 |
| 2 | 0,2 |
| 3 | -0,3 |
| 4 | 0,8 |
| 5 | 0,7 |
| 6 | 1 |
| 7 | 0,1 |
| 8 | 0,8 |
| 9 | -0,5 |
| 10 | 1 |
| 11 | 0,1 |
| 12 | 0,9 |
| 13 | 0,7 |
| 14 | 0,1 |
| 15 | 0,5 |
| Median | 0,70 |
| Mean | 0,47 |
| 90 % confidence interval | 0,48 |



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Emission test of Tectopanel Cleaneo Acoustic Ceiling Panels for M1 classi- fication

Knauf A/S

585109-1

April 2014

Prepared by Helene Klinke

Wood Technology/Indoor Environment

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| 8. Measurement uncertainty | 5 |
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1. Test order

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Request: Knauf A/S
Kløvermarksvej 6
DK-9500 Hobro

Responsible person: Erik Ipsen

Assignment: Emission measurements for the emission classification of acoustic ceiling panels according to "M1 Classification of Building Materials: Protocol for Chemical and Sensory Testing of Building Materials", Technical Research Centre VTT, Finland. Version 01.01.2014.

2. Test Specimen

Product type: Ceiling panels.

Products name: Tectopanel Cleaneo Perf. G1

Label:



Production date: 2013 week 49

Shipping date: 2013.12.20

Description of packaging and transport: The test material was delivered in original packages and transported directly from assignor to the test laboratory.

Product received at the testing laboratory: 2013.12.27

Test specimen preparation: The test specimens were prepared as resilient and rigid materials. Laboratory cut edges were sealed by aluminium tape.

Test period started: 2014. 01.10

Conditions during ageing: Post production at ambient temperature.
Storage at test laboratory at 18-23 °C.

Emission sampling: 2014.02.07

3. Chamber technique

3.1 Climate chamber conditions for TVOC, VOC, Formaldehyde and Ammonia

| | |
|-------------------|------------------------------------|
| Climate chamber | 113 L polished stainless steel |
| Temperature | 23°C ± 1°C |
| Relative humidity | 50 ± 5% RH |
| Air change rate | 0.5 ± 0.05 h ⁻¹ |
| Air velocity | 0.1 – 0.3 m/s |
| Panel load | 0.4 m ² /m ³ |

Test specimen in chamber:



3.2 Chamber Conditions for Sensory Evaluation

| | |
|----------------------|---|
| Climpaq | 200 L glass |
| Temperature | 23°C ± 1°C |
| Relative humidity | 50 ± 5% RH |
| Outlet air flow rate | 0.9 L/s |
| Panel load | 0.65 m ² corresponding to a surface area of 12 m ² ceiling in a model room of 30 m ³ with and air change of 2 h ⁻¹ (NT Build 482) |

4. Emission sampling and analytical methods

| | Method | Absorbent | Sampling volume | Quantification/Analysis method | Detection limit |
|-------------------------------------|---|---------------------------------|-----------------|---|----------------------|
| VOC and E Cat. 1A or 1B carcinogens | ISO 16000-9 | Tenax TA | 3-6 L | GC-MS Quantified with pure reference standards, and as toluene equivalents | 1 µg/m ³ |
| Formaldehyde | ISO 16000-3 | DNPH coated silicagel | 58 L | HPLC-DAD Calibrated with pure ref. standards | 1 µg/m ³ |
| Ammonia | 4430 (Eu-rofins) | Sulphuric acid coated silicagel | 25 L | Spectrophotometry | 30 µg/m ³ |
| Sensory evaluation | Sensory evaluation of acceptance of the air was performed according to NT Build 482 from the test specimen in a Climpaq with an outlet air flow rate of 0.9 l/s through a funnel, using an untrained panel. | | | | |

5. Results

5.1 Specific emission rates (SER)

| TVOC C ₆ -C ₁₆ mg/(m ² h) | Formaldehyde mg/(m ² h) | Ammonia mg/(m ² h) | Carcinogens C ₆ -C ₁₆ mg/(m ² h) |
|---|---------------------------------------|----------------------------------|--|
| 0.084 | 0.005 | < 0.030 | < 0.001 |

5.2 Standard room concentration (Ceiling)

| TVOC C ₆ -C ₁₆ mg/m ³ | Formaldehyde mg/m ³ | Ammonia mg/m ³ | Carcinogens C ₆ -C ₁₆ mg/m ³ |
|---|-----------------------------------|------------------------------|--|
| 0.067 | 0.004 | < 0.030 | < 0.001 |

6. Single VOCs C₆-C₁₆ the emission of which exceed 0.005 mg/(m²h)

| RT (min) | Compound | CAS | SER (mg/(m ² h)) |
|-------------|-----------------------------|------------|--------------------------------|
| 6.89 | 2-Butanone | 78-93-3 | 0.030 |
| 23.69 | Alpha-pinene | 80-56-8 | 0.006 |
| 33.43 | Butyldiglycol | 112-34-5 | 0.011 |
| 34.97 | Dipropyleneglycolbutylether | 29911-28-2 | 0.009 |

7. Single VOCs outside the frame C₆-C₁₆. Emission exceeding 0.005 mg/(m²h)

| RT (min) | Compound | CAS | SER mg/(m ² h) |
|-------------|----------|-----|------------------------------|
| na | na | na | na |

8. Measurement uncertainty

| | |
|-----------------------------|----------|
| SER _{Formaldehyde} | +/- 15 % |
| SER _{TVOC} | +/- 20 % |
| SER _{NH3} | +/- 20 % |

9. Sensory evaluation (odour)

The results from the sensory evaluation are shown in Appendix 2. The mean average value is +0.5 and the evaluation of the odour is thus: Acceptable.

10. Evaluation summary

| Parameter | Emission 28 days (mg/m ² h) | Requirement (mg/m ² h) |
|--------------|---|--------------------------------------|
| TVOC | 0.084 | < 0.20 |
| Formaldehyde | 0.005 | < 0.05 |
| Ammonia | < 0.03 | < 0.03 |
| Carcinogens* | < 0.001 | < 0.005 |
| Odour | Acceptable | Is not odorous |

* The emission of carcinogenic compounds belonging to category 1A or 1B in Annex VI to Regulation (EC) No 1272/2008.

Based on chemical analyses and sensory evaluation the product can obtain the M1 Emission Class for Building Materials.

Results of the testing and statement of the applied methods are stated on pages 2-6 and they only concern the tested specimens. Extracts from the report may only be published, if the laboratory has approved the extract.

Date/place: 2014.04.14, Danish Technological Institute, Wood Technology, Taastrup



Helene Klinke
Test responsible

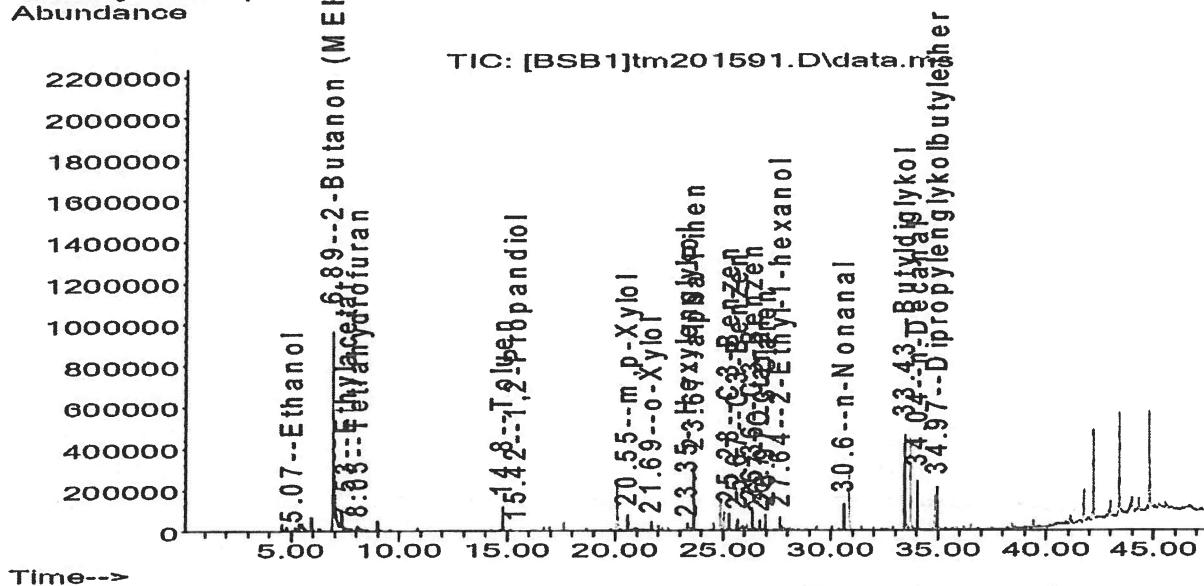


Lis Winther Funch
Consultant

Appendix 1

Chromatogram GC-MS

Chromatogram of sample P36770
Abundance



Appendix 2

Sensory Evaluation (acceptability) after 28 days

Sample no.: 585109-1
Description: Tectopanel Cleaneo Perf. G1
Test Date: 07-02-2013
Panel size: 15 untrained panellists
Comments: 0.65 m² in Climpaq

| N | Sample Acceptability |
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| 1 | 0,9 |
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| 12 | 0,9 |
| 13 | 0,7 |
| 14 | 0,1 |
| 15 | 0,5 |
| Median | 0,70 |
| Mean | 0,47 |
| 90 % confidence interval | 0,48 |