



## INFORME No.: 102898-2 (M1)

<b>CLIENTE:</b>	DERIVADOS ASFÁLTICOS NORMALIZADOS, S.A.
<b>PERSONA DE CONTACTO:</b>	Laura Zahonero García
<b>DIRECCIÓN:</b>	Polígono Industrial Sector 9 19290 FONTANAR (Guadalajara)
<b>OBJETO:</b>	Emisión de VOCs y clasificación según el esquema AgBB 2021
<b>MUESTRA ENSAYADA:</b>	Muestra Ref. «DANOPREN PR100 (482008)-Ref DAN-3676-A» Ensayado en representación de productos idénticos de menor grosor
<b>FECHA DE RECEPCION:</b>	04.11.2022
<b>FECHAS DE ENSAYO:</b>	09.01.2023 a 16.02.2023
<b>FECHA DE EMISIÓN:</b>	06.03.2023
<b>FECHA DE EMISIÓN (M1):</b>	18.05.2023



Blanca Ruiz de Gauna  
Jefe Laboratorio de Materiales de  
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Unidad Lab Services

\* Este informe anula y sustituye al informe 102898-2. El motivo de dicha modificación es que se añade una nota aclaratoria.

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## CARACTERISTICAS DE LAS MUESTRAS

Con fecha 04.11.2022 se recibió en Fundación Tecnalia R&I por parte de la empresa “**DERIVADOS ASFÁLTICOS NORMALIZADOS, S.A.**” una muestra referenciada como<sup>(1)</sup>:

- «DANOPREN PR100 (482008)-Ref DAN-3676-A», fecha fabricación 03/10/22  
Ensayado en representación de productos idénticos de menor grosor

## ENSAYOS SOLICITADOS

Los ensayos solicitados son los siguientes:

- ◆ Ensayo de emisión de VOC's (Compuestos orgánicos volátiles) según la norma EN 16516 para establecer una clasificación según los criterios establecidos en el esquema “Health-related Evaluation of Emissions of Volatile Organic Compounds (VVOG, VOC and SVOC) from Building Products” del comité para la evaluación de aspectos de salud de los productos de la construcción (AgBB 2021). Los ensayos se han realizado en el laboratorio acreditado “eco-INSTITUT” cuyo informe original se adjunta como Anexo I.

## ENSAYOS REALIZADOS

El ensayo se ha realizado en una cámara con las siguientes condiciones, según la norma ISO 16000-9:

- Condiciones de la cámara de ensayo
  - Volumen: 0,125m<sup>3</sup>
  - Temperatura y humedad relativa: 23°C al 50% HR.
  - Presión: atmosférica
  - Renovación del aire: 0,5 h<sup>-1</sup>
  - Velocidad del aire: 0,3 m/s

La determinación de las emisiones de VOC's se realiza según indica la norma EN 16516 y las analíticas según la norma ISO 16000-6:2006 para VOC's (El límite de detección de las técnicas empleadas es de 1 µg/m<sup>3</sup>) y según la norma ISO 16000-3 para aldehídos y cetonas (siendo el límite de detección para aldehídos y cetonas de 2 µg/m<sup>3</sup>).



## RESULTADOS

Los resultados de Compuestos orgánicos volátiles (VOCs) obtenidos tras 3 días se resumen en las siguientes tablas:

**Tabla I**

No.	Substancia	Nº CAS.	RT [min] Tiempo de retención	Concentración + (aire cámara ensayo) Substancias $\geq 1$ $\mu\text{g}/\text{m}^3$ 3 días [ $\mu\text{g}/\text{m}^3$ ]	Equivalente tolueno Substancias $\geq 5$ $\mu\text{g}/\text{m}^3$ 3 días [ $\mu\text{g}/\text{m}^3$ ]	Clasificación CMR	LCI AgBB 2021 [ $\mu\text{g}/\text{m}^3$ ]	Valor R
<b>4</b>	<b>Mono-alcoholes alifáticos (n-, iso-,cyclo-) y dialcoholes</b>							
4-1	Etanol	64-17-5	4.13	200	6	III5		
4-6	1-Butanol	71-36-3	6.29	1	<5		3000	0.00
4-10	2-etil-1-hexanol	104-76-7	14.08	18	15		300	0.06
4-16.3	1-Decanol	112-30-1	19.47	1	<5		1700	0.00
<b>6</b>	<b>Glicoles, Éteres de glicol, Ésteres de glicol</b>							
6-3	Éter monobutílico de etilenglicol (2-butoxi-etanol)	111-76-2	11.34	1	<5	Grupo 3	1600	0.00
<b>7</b>	<b>Aldehídos</b>							
7-20	Acetaldehído	75-07-0		2	n.d.	Carc. 1B Muta. 2	300	0.01
<b>9</b>	<b>Ácidos</b>							
9-1	Ácido acético	64-19-7	4.94	3	<5		1200	0.00
<b>10</b>	<b>Ésteres</b>							
10-12	Acetato de 2-etilhexilo	103-09-3	16.51	16	15		350	0.05
10-16	Acrilato de 2-etilhexilo	103-11-7	18.31	52	50	Grupo 2B	380	0.14
<b>13</b>	<b>Otras sustancias identificadas además de la lista de LCI</b>							
	Hexametildiclorotrisiloxano (D3)	541-05-9	9.03	3	<5			
	Formamida	75-12-7	6.52	4	<5	Repr. 1B		
	m/z 45 78*		6.52	1	<5			
	m/z 57 70 83*		18.49	6	6			
	m/z 73 45 101*		23.41	3	<5			

+ Sustancias identificadas y calibradas, sustancias calculadas específicamente.

++ Clasificación según el reglamento (EC) N° 1272/2008: Categorías Carc. 1A, 1B y 2, Muta. 1A, 1B y 2, Repr. 1A, 1B y 2, TRGS 905: K1A, K1B, K2, M1A, M1B, M2, R1A, R1B, R2, IARC: Grupo 1, 2A, 2B y 3 DFG (Lista MAK): Categoría III1 a III5

\* Sustancias no identificadas, calculadas como equivalente de tolueno referenciadas como los fragmentos másicos representativos expresados como relación masa/carga (m/z)

n.d.: no determinado



**Tabla II**

Componentes carcinógenos, mutagénicos y tóxicos para la reproducción*	Concentración tras 3 días [µg/m³]	SER <sub>a</sub> [µg/m².h]
CMR 1: VOC (incl. VVOC y SVOC) clasificados como: <ul style="list-style-type: none"> <li>- Reglamento (EC) No. 1272/2008 en las siguientes categorías: Carc. 1A y 1B, Muta. 1A y 1B, Repr. 1A y 1B;</li> <li>- TRGS 905: K1A, K1B, M1A, M1B, R1A, R1B;</li> <li>- IARC: Grupo 1 y 2A;</li> <li>- DFG (lista MAK): Categorías III1, III2</li> </ul> (Suma)	<b>4</b>	<b>5</b>
C 1: VOC (incl. VVOC y SVOC) clasificados como: <ul style="list-style-type: none"> <li>- Reglamento (EC) No. 1272/2008 en las siguientes categorías: Carc. 1A u. 1B;</li> <li>- TRGS 905: K1A, K1B</li> </ul> (Suma)	<b>&lt;1</b>	<b>&lt;1.3</b>

**Tabla III**

TVOC, Compuestos Orgánicos Volátiles Totales	Concentración tras 3 días [µg/m³]	SER <sub>a</sub> [µg/m².h]
Suma de VOC según DIN EN 16516	<b>86</b>	<b>110</b>
Suma de VOC según AgBB 2021	<b>92</b>	<b>120</b>
Suma de VOC según eco-INSTITUT-Label	<b>110</b>	<b>140</b>
Suma de VOC según ISO 16000-6	<b>120</b>	<b>150</b>

**Tabla IV**

TSVOC, Compuestos Orgánicos Semivolátiles Totales	Concentración tras 3 días [µg/m³]	SER <sub>a</sub> [µg/m².h]
Suma de SVOC según DIN EN 16516	<b>&lt;5</b>	<b>&lt;6.3</b>
Suma de SVOC sin LCI según AgBB 2021	<b>&lt;5</b>	<b>&lt;6.3</b>
Suma de SVOC sin LCI según eco-INSTITUT-Label	<b>&lt;1</b>	<b>&lt;1.3</b>
Suma de SVOC con LCI según AgBB 2021	<b>&lt;5</b>	<b>&lt;6.3</b>

**Tabla V**

TVVOC Compuestos Orgánicos Muy Volátiles Totales	Concentración tras 3 días [µg/m³]	SER <sub>a</sub> [µg/m².h]
Suma de VVOC según AgBB 2021	<b>6</b>	<b>7.5</b>
Suma de VVOC según eco-INSTITUT-Label	<b>200</b>	<b>250</b>

\* Excluyendo el formaldehído (Carc. 1B) debido a que se asume un "valor límite práctico" por el que no se prevé un riesgo carcinogénico significativo (ver Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air). En el caso de una evaluación de emisión toxicológica se necesita un análisis individual de la concentración de formaldehído. En opinión del comité para los valores guía de aire interior (Ausschuss für Innenraumrichtwerte) de la Agencia Federal de Medioambiente, no debería excederse, tampoco para un periodo corto de tiempo, la concentración de 0.1 mg formaldehído/m³ de aire interior, basada en la medida durante media hora (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103-016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).





**Tabla VI**

<b>Suma de otros Compuestos Orgánicos Volátiles (VOC)</b>	<b>Concentración tras 3 días [µg/m³]</b>	<b>SER<sub>a</sub> [µg/m².h]</b>
Suma de otros VOC sin LCI según AgBB 2021 (suma)	<b>6</b>	<b>7.5</b>
Suma de otros VOC sin LCI según eco-INSTITUT-Label (suma)	<b>17</b>	<b>21</b>
CMR 2: VOC (incl. VVOC y SVOC) correspondientes a las categorías: <ul style="list-style-type: none"> <li>- Reglamento (EC) No. 1272/2008: Categoría Carc. 2, Muta. 2, Repr. 2;</li> <li>- TRGS 905: K2, M2, R2;</li> <li>- IARC: Grupo 2B;</li> <li>- DFG (lista MAK): Categorías III3</li> </ul> (Suma)	<b>54</b>	<b>68</b>
Compuestos sensibilizantes categorizados como: <ul style="list-style-type: none"> <li>- DFG (lista MAK): Categoría IV;</li> <li>- Reglamento (EC) No. 1272/2008: sensibilización cutánea, sensibilización respiratoria</li> <li>- TRGS 907</li> </ul> (Suma)	<b>52</b>	<b>65</b>
Terpenos bicíclicos (suma)	<b>&lt;1</b>	<b>&lt;1.3</b>
C9 - C14: Alcanos / Isoalcanos expresado como equivalentes de decano (Suma)	<b>&lt;1</b>	<b>&lt;1.3</b>
C4-C11 aldehídos, acíclicos, alifáticos (Suma)	<b>&lt;2</b>	<b>&lt;2.9</b>
C9-C15 Bencenos alquilados (Suma)	<b>&lt;1</b>	<b>&lt;1.3</b>
Cresoles (Suma)	<b>&lt;1</b>	<b>&lt;1.3</b>

**Tabla VII**

<b>Valor de riesgo para evaluación de LCI</b>	<b>Valor R</b>
Valor R según eco-INSTITUT-Label	<b>0.25</b>
Valor R según AgBB 2021	<b>0.24</b>
Valor R según regulación belga	<b>0.24</b>
Valor R según EU-LCI	<b>0.25</b>

Nota:

Los valores de R pueden variar debido a los distintos requisitos de las distintas guías. Los compuestos carbonílicos de cadena corta (C1-C5) se cuantifican mediante HPLC según DIN ISO 16000-3:2013-01. Por lo tanto, no se dan equivalentes de tolueno para los COV. Estas sustancias se toman en consideración mediante su calibración específica de sustancias a través de la suma de COV según la norma DIN EN 16516:2020-10. Sin embargo, para los COV, la calibración específica de la sustancia se realiza mediante HPLC, mientras que el TVOC se calcula utilizando el equivalente de tolueno determinado mediante Tenax según la norma DIN EN 16516:2020-10.



Los resultados de Compuestos orgánicos volátiles (VOCs) obtenidos tras 28 días se resumen en las siguientes tablas:

**Tabla VIII**

No.	Substancia	Nº CAS.	RT [min] Tiempo de retención	Concentración + (aire cámara ensayo) Substancias $\geq 1$ $\mu\text{g}/\text{m}^3$ 28 días [ $\mu\text{g}/\text{m}^3$ ]	Equivalente tolueno Substancias $\geq 5$ $\mu\text{g}/\text{m}^3$ 28 días [ $\mu\text{g}/\text{m}^3$ ]	Clasificación CMR	LCI AgBB 2021 [ $\mu\text{g}/\text{m}^3$ ]	Valor R
<b>1</b>	<b>Hidrocarburos aromáticos</b>							
1-25	Estireno	100-42-5	11.28	1	<5	Grupo 2A	250	0.00
<b>4</b>	<b>Mono-alcoholes alifáticos (n-, iso-, cyclo-) y dialcoholes</b>							
4-1	Etanol	64-17-5	3.67	240	15	III5		
4-6	1-Butanol	71-36-3	6.24	1	<5		3000	0.00
4-10	2-etil-1-hexanol	104-76-7	14.02	3	<5		300	0.01
<b>9</b>	<b>Ácidos</b>							
9-1	Ácido acético	64-19-7	4.91	6	<5		1200	0.01
<b>10</b>	<b>Ésteres</b>							
10-12	Acetato de 2-etilhexilo	103-09-3	16.45	2	<5		350	0.01
10-16	Acrilato de 2-etilhexilo	103-11-7	18.24	6	<5	Grupo 2B	380	0.02
<b>13</b>	<b>Otras sustancias identificadas además de la lista de LCI</b>							
	Hexametildiclotrisiloxano (D3)	541-05-9	8.97	6	<5			

+ Substancias identificadas y calibradas, substancias calculadas específicamente.

++ Clasificación según el reglamento (EC) N° 1272/2008: Categorías Carc. 1A, 1B y 2, Muta. 1A, 1B y 2, Repr. 1A, 1B y 2, TRGS 905: K1A, K1B, K2, M1A, M1B, M2, R1A, R1B, R2, IARC: Grupo 1, 2A, 2B y 3 DFG (Lista MAK): Categoría III1 a III5

\* Substancias no identificadas, calculadas como equivalente de tolueno referenciadas como los fragmentos másicos representativos expresados como relación masa/carga (m/z)

n.d.: no determinado



**Tabla IX**

Componentes carcinógenos, mutagénicos y tóxicos para la reproducción*	Concentración tras 28 días [µg/m³]	SER <sub>a</sub> [µg/m².h]
CMR 1: VOC (incl. VVOC y SVOC) clasificados como: <ul style="list-style-type: none"> <li>- Reglamento (EC) No. 1272/2008 en las siguientes categorías: Carc. 1A y 1B, Muta. 1A y 1B, Repr. 1A y 1B;</li> <li>- TRGS 905: K1A, K1B, M1A, M1B, R1A, R1B;</li> <li>- IARC: Grupo 1 y 2A;</li> <li>- DFG (lista MAK): Categorías III1, III2</li> </ul> (Suma)	1	<1.3
C 1: VOC (incl. VVOC y SVOC) clasificados como: <ul style="list-style-type: none"> <li>- Reglamento (EC) No. 1272/2008 en las siguientes categorías: Carc. 1A u. 1B;</li> <li>- TRGS 905: K1A, K1B</li> </ul> (Suma)	<1	<1.3

**Tabla X**

TVOC, Compuestos Orgánicos Volátiles Totales	Concentración tras 28 días [µg/m³]	SER <sub>a</sub> [µg/m².h]
Suma de VOC según DIN EN 16516	<5	<6.3
Suma de VOC según AgBB 2021	12	15
Suma de VOC según eco-INSTITUT-Label	25	31
Suma de VOC según ISO 16000-6	40	50

**Tabla XI**

TSVOC, Compuestos Orgánicos Semivolátiles Totales	Concentración tras 28 días [µg/m³]	SER <sub>a</sub> [µg/m².h]
Suma de SVOC según DIN EN 16516	<5	<6.3
Suma de SVOC sin LCI según AgBB 2021	<5	<6.3
Suma de SVOC sin LCI según eco-INSTITUT-Label	<1	<1.3
Suma de SVOC con LCI según AgBB 2021	<5	<6.3

**Tabla XII**

TVVOC Compuestos Orgánicos Muy Volátiles Totales	Concentración tras 28 días [µg/m³]	SER <sub>a</sub> [µg/m².h]
Suma de VVOC según AgBB 2021	15	19
Suma de VVOC según eco-INSTITUT-Label	240	300

\* Excluyendo el formaldehído (Carc. 1B) debido a que se asume un "valor límite práctico" por el que no se prevé un riesgo carcinogénico significativo (ver Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air). En el caso de una evaluación de emisión toxicológica se necesita un análisis individual de la concentración de formaldehído. En opinión del comité para los valores guía de aire interior (Ausschuss für Innenraumrichtwerte) de la Agencia Federal de Medioambiente, no debería excederse, tampoco para un periodo corto de tiempo, la concentración de 0.1 mg formaldehído/m<sup>3</sup> de aire interior, basada en la medida durante media hora (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103 -016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).





**Tabla XIII**

Suma de otros Compuestos Orgánicos Volátiles (VOC)	Concentración tras 28 días [µg/m³]	SER <sub>a</sub> [µg/m².h]
Suma de otros VOC sin LCI según AgBB 2021 (suma)	<5	<6.3
Suma de otros VOC sin LCI según eco-INSTITUT-Label (suma)	6	7.5
CMR 2: VOC (incl. VVOC y SVOC) correspondientes a las categorías: <ul style="list-style-type: none"> <li>- Reglamento (EC) No. 1272/2008: Categoría Carc. 2, Muta. 2, Repr. 2;</li> <li>- TRGS 905: K2, M2, R2;</li> <li>- IARC: Grupo 2B;</li> <li>- DFG (lista MAK): Categorías III3</li> </ul> (Suma)	6	7.5
Compuestos sensibilizantes categorizados como: <ul style="list-style-type: none"> <li>- DFG (lista MAK): Categoría IV;</li> <li>- Reglamento (EC) No. 1272/2008: sensibilización cutánea, sensibilización respiratoria</li> <li>- TRGS 907</li> </ul> (Suma)	6	7.5
Terpenos bicíclicos (suma)	<1	<1.3
C9 - C14: Alcanos / Isoalcanos expresado como equivalentes de decano (Suma)	<1	<1.3
C4-C11 aldehídos, acíclicos, alifáticos (Suma)	<2	<2.9
C9-C15 Bencenos alquilados (Suma)	<1	<1.3
Cresoles (Suma)	<1	<1.3

**Tabla XIV**

Valor de riesgo para evaluación de LCI	Valor R
Valor R según eco-INSTITUT-Label	<b>0.04</b>
Valor R según AgBB 2021	<b>0.02</b>
Valor R según regulación belga	<b>0.02</b>
Valor R según EU-LCI	<b>0.03</b>

Nota:

Los valores de R pueden variar debido a los distintos requisitos de las distintas guías.

Los compuestos carbonílicos de cadena corta (C1-C5) se cuantifican mediante HPLC según DIN ISO 16000-3:2013-01.

Por lo tanto, no se dan equivalentes de tolueno para los COV. Estas sustancias se toman en consideración mediante su calibración específica de sustancias a través de la suma de COV según la norma DIN EN 16516:2020-10. Sin embargo, para los COV, la calibración específica de la sustancia se realiza mediante HPLC, mientras que el TVOC se calcula utilizando el equivalente de tolueno determinado mediante Tenax según la norma DIN EN 16516:2020-10.







Evaluación de resultados:

El producto denominado

- «DANOPREN PR100 (482008)-Ref DAN-3676-A»  
Ensayado en representación de productos idénticos de menor grosor

se ha ensayado y se evalúa en base a los criterios de ensayo del esquema “Health-related Evaluation of Emissions of Volatile Organic Compounds (VVOC, VOC and SVOC) from Building Products” del comité para la evaluación de aspectos de salud de los productos de la construcción (AgBB 2021):

<b>Tabla XV. Evaluación de resultados</b>			
Parámetro de ensayo	Resultado	Requisito	Cumplimiento (Si/No)
Tiempo de medida: 3 días después de introducir el producto en la cámara			
Suma VOC (C6-C16) <sup>(2)</sup>	0.092 mg/m <sup>3</sup>	≤10 mg/m <sup>3</sup>	Si
Suma sustancias carcinógenas (EU cat. 1A y 1B)	≤0.01 mg/m <sup>3</sup>	≤0.01 mg/m <sup>3</sup>	Si
Tiempo de medida: 28 días después de introducir el producto en la cámara			
Suma VOC (C6-C16) incluyendo SVOCs con LCI <sup>(2)</sup>	0.012 mg/m <sup>3</sup>	≤1.0 mg/m <sup>3</sup>	Si
Suma SVOC sin LCI (C16-C22) <sup>(2)</sup>	<0.005 mg/m <sup>3</sup>	≤0.1 mg/m <sup>3</sup>	Si
Valor R-Wert (adimensional)	0.02	≤1	Si
Suma de VOC sin LCI	<0.005 mg/m <sup>3</sup>	≤0.1 mg/m <sup>3</sup>	Si
Suma sustancias carcinógenas (EU cat. 1A y 1B)	<0.001 mg/m <sup>3</sup>	≤0.001 mg/m <sup>3</sup>	Si

<sup>(2)</sup> Para la suma de VOC (C6-C16) y SVOCs (C16-C22) solo se consideran sustancias ≥5µg/m<sup>3</sup>



# **ANEXO**

Tecnalia Research & Innovation  
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Spain

## Test Report No. 57950-A001-AgBB-L

<b>Test objective:</b>	<b>Evaluation according to AgBB scheme 2021</b>
<b>Article designation according to order:</b>	<b>DANOPREN PR100 (482008) - Ref DAN-3676-A</b> Tested as a representative for identical products with lower thickness
<b>Sample/batch according to order:</b>	<b>no information</b>
<b>Sampling by:</b>	DERIVADOS ASFALTICOS NORMALIZADOS SA-DANOSA, Pol. Ind. Sector 9, 19290 Fontanar, Guadalajara, España
<b>Date of sampling:</b>	04/11/2022
<b>Location of sampling:</b>	DERIVADOS ASFALTICOS NORMALIZADOS SA-DANOSA, Pol. Ind. Sector 9, 19290 Fontanar, Guadalajara, España
<b>Date of production:</b>	no information
<b>Date of report:</b>	16/02/2023
<b>Number of pages of report:</b>	20
<b>Testing laboratory:</b>	eco-INSTITUT Germany GmbH, Köln
<b>Test objective fulfilled:</b>	

Note:

The test results in the report refer exclusively to the test sample submitted by the manufacturer. The report is not permitted to be used in product and company advertising. The report may be published in full as technical documentation on the Internet with the written consent of eco-INSTITUT Germany GmbH. eco-INSTITUT Germany GmbH has recommended that the manufacturer repeats the test after 3 years at the latest. More information at [www.eco-institut.de/en/advertising](http://www.eco-institut.de/en/advertising)

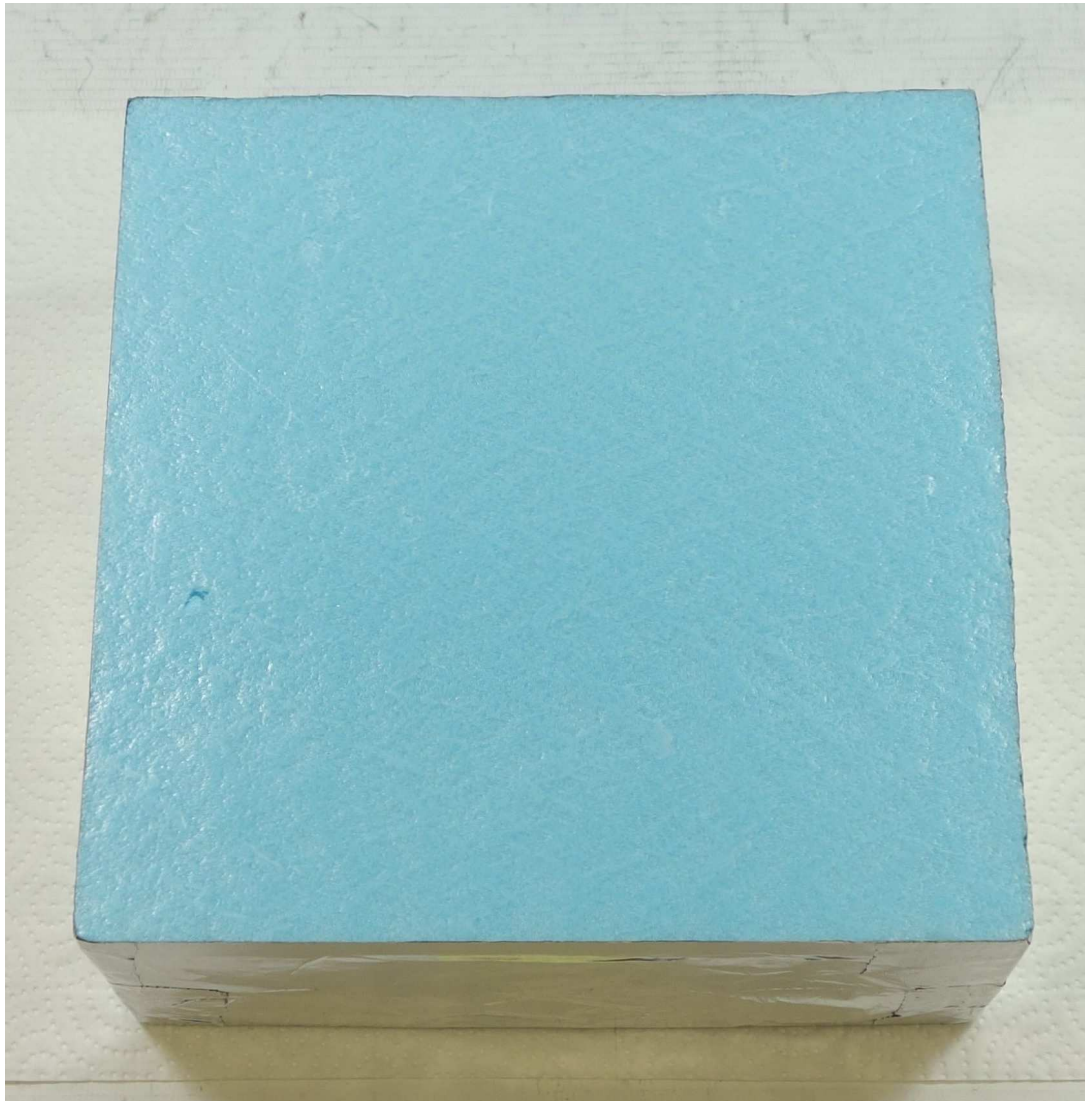


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## Sample View

Internal sample number (assigned by the laboratory)	Article designation according to order	Sample/batch number according to order	Receipt of sample	Condition upon delivery	Type of sample
57950-A001	DANOPREN PR100 (482008) - Ref DAN-3676-A	no information	21/12/2022	without objection	Thermal insulation for flat roofs, both conventional and inverted. Thermal insulation for residential and commercial floors with overloading.



57950-A001

## Statement of conformity with AgBB 2021

The sample with the internal sample number 57950-A001 has been tested on behalf of **Tecnia Research & Innovation**. The article description according to the order is **DANOPREN PR100 (482008) - Ref DAN-3676-A**.

This evaluation is based on the test criteria of the scheme “Health-related Evaluation of Emissions of Volatile Organic Compounds (VVOC, VOC and SVOC) from Building Products” of the Committee for Health-Related Evaluation of Building Products (AgBB 2021).

The results documented in the test report were evaluated as follows.<sup>1</sup>

Test parameter	Result	Requirement	Requirement hold [yes/no]
<b>Emission analysis</b>			
<b>Measurement time: 3 days after test chamber loading</b>			
Sum VOC (C6-C16) <sup>1)</sup>	0.092 mg/m <sup>3</sup>	≤ 10 mg/m <sup>3</sup>	yes
Carcinogenic substances, cat. 1A and 1B acc. to Regulation (EC) No. 1272/2008 (and TRGS 905) (per substance)	≤ 0.01 mg/m <sup>3</sup>	≤ 0.01 mg/m <sup>3</sup>	yes
<b>Measurement time: 28 days after test chamber loading</b>			
Sum VOC (C6-C16) including SVOC with LCI <sup>1)</sup>	0.012 mg/m <sup>3</sup>	≤ 1.0 mg/m <sup>3</sup>	yes
Sum SVOC without LCI (C <sub>16</sub> -C <sub>22</sub> ) <sup>1)</sup>	< 0.005 mg/m <sup>3</sup>	≤ 0.1 mg/m <sup>3</sup>	yes
R-value (dimensionless)	0.02	≤ 1	yes
Sum VOC without LCI	< 0.005 mg/m <sup>3</sup>	≤ 0.1 mg/m <sup>3</sup>	yes
Carcinogenic substances, cat. 1A and 1B acc. to Regulation (EC) No. 1272/2008 (and TRGS 905) (per substance)	≤ 0.001 mg/m <sup>3</sup>	≤ 0.001 mg/m <sup>3</sup>	yes

<sup>1)</sup> For sum VOC (C<sub>6</sub>-C<sub>16</sub>) and sum SVOC (C<sub>16</sub>-C<sub>22</sub>) only substances ≥ 5 µg/m<sup>3</sup> are considered.

<sup>1</sup> If a measurement result that slightly exceeds the specification is assessed as “not fulfilled”, this is based on the agreement of the “shared risk of measurement uncertainty (shared risk approach)”. According to this, the probability that the statement is correct is ≥ 50 %. Similarly, a result slightly below the specification value also only has a probability of ≥ 50 % of being compliant. I.e., the risk of making a false negative statement regarding the fulfilment of the specification is just as high as the risk of making a false positive statement (more information at [https://www.eco-institut.de/en/2019/07/measurement\\_uncertainty/](https://www.eco-institut.de/en/2019/07/measurement_uncertainty/)).



## Summary statement of conformity with AgBB 2021

The sample with the internal sample number 57950-A001, article description according to order: **DANOPREN PR100 (482008)** - Ref **DAN-3676-A**, meets the emission requirements of the AgBB scheme.

Cologne, 16/02/2023

A handwritten signature in black ink, appearing to read 'M. A. Dobaj'.

Marc-Anton Dobaj, M.Sc. Crystalline Materials  
(Project management)

# Laboratory report

## 1 Emission analysis

### Test method

DIN EN 16516:2020-10 | Testing and evaluation of the release of dangerous substances;  
determination of emissions into indoor air

### A001, Preparation of test sample

Date: 09/01/2023  
Sample preparation: not applicable  
Masking of backside: yes  
Masking of edges: yes, 100 %  
Relationship of unmasked edges to surface: not applicable  
Loading reference unit: area-specific [m<sup>2</sup>]  
Dimensions: 20 cm x 20 cm [thickness: 100 mm]

### A001, Test chamber conditions according to DIN EN ISO 16000-9:2008-04

Chamber volume: 0.100 m<sup>3</sup>  
Temperature: 23 °C ± 1 °C  
Relative humidity: 50 % ± 1 %  
Air pressure: normal  
Air: cleaned  
Air change rate: 0.5 h<sup>-1</sup>  
Air velocity: 0.3 m/s  
Loading: 0.4 m<sup>2</sup>/m<sup>3</sup>  
Specific air flow rate: 1.25 m<sup>3</sup>/(m<sup>2</sup> · h)  
Starting time of the test (t<sub>0</sub>): 09/01/2023  
Air sampling: 3 days after test chamber loading  
28 days after test chamber loading

### Analytics

Aldehydes and ketones | DIN ISO 16000-3:2013-01  
Limit of quantification: 2 µg/m<sup>3</sup>  
Volatile organic compounds | DIN ISO 16000-6:2022-03  
Limit of quantification: 1 µg/m<sup>3</sup> (1,4-Cyclohexanedimethanol, Diethylene glycol,  
1,4-Butanediol: 5 µg/m<sup>3</sup>)  
Note for analysis: not specified



## 1.1 Sample A001, Volatile organic compounds after 3 days

### Test objective:

Volatile organic compounds (VOC), test chamber, air sampling 3 days after test chamber loading

### Test result:

Internal sample number: | 57950-A001

No.	Substance	CAS No.	RT [min]	Concentration+ calib. substances ≥ 1 µg/m³ uncalib. substances ≥ 1 µg/m³ DNPH ≥ 2 µg/m³ [µg/m³]	Toluene- equivalent substances ≥ 5 µg/m³ [µg/m³]	CMR Classifi- cation++	LCI AgBB 2021 [µg/m³]	R-value
<b>4</b>	<b>Aliphatic mono alcohols (n-, iso-, cyclo-) and dialcohols</b>							
4-1	Ethanol	64-17-5	4.13	200	6	III5		
4-6	1-Butanol	71-36-3	6.29	1	< 5		3000	0.00
4-10	2-Ethyl-1-hexanol	104-76-7	14.08	18	15		300	0.06
4-16.3	1-Decanol	112-30-1	19.47	1	< 5		1700	0.00
<b>6</b>	<b>Glycols, Glycol ethers, Glycol esters</b>							
6-3	Ethylene glycol monobutyl ether (2-Butoxyethanol)	111-76-2	11.34	1	< 5	Group 3	1600	0.00
<b>7</b>	<b>Aldehydes</b>							
7-20	Acetaldehyde	75-07-0		2	n. d.	Carc. 1B Muta. 2	300	0.01
<b>9</b>	<b>Acids</b>							
9-1	Acetic acid	64-19-7	4.94	3	< 5		1200	0.00
<b>10</b>	<b>Esters</b>							
10-12	2-Ethylhexyl acetate	103-09-3	16.51	16	15		350	0.05
10-16	2-Ethylhexyl acrylate	103-11-7	18.31	52	50	Group 2B	380	0.14
<b>13</b>	<b>Other identified substances in addition to LCI list</b>							
	Hexamethylcyclotrisiloxane (D3)	541-05-9	9.03	3	< 5			
	Formamide	75-12-7	6.52	4	< 5	Repr. 1B		
	m/z 45 78*		6.52	1	< 5			



No.	Substance	CAS No.	RT	Concentration+	Toluene-equivalent	CMR Classification++	LCI AgBB 2021	R-value
			[min]	calib. substances ≥ 1 µg/m³ uncalib. substances ≥ 1 µg/m³ DNPH ≥ 2 µg/m³ [µg/m³]	substances ≥ 5 µg/m³ [µg/m³]		[µg/m³]	
	m/z 57 70 83*		18.49	6	6			
	m/z 73 45 101*		23.41	3	< 5			

+ identified and calibrated substances, substance specific calculated

++ classification according to Regulation (EG) N° 1272/2008: Categories Carc. 1A, 1B and 2, Muta. 1A, 1B and 2, Repr. 1A, 1B and 2, TRGS 905: K1A, K1B, K2, M1A, M1B, M2, R1A, R1B, R2; IARC: Group 1, 2A, 2B and 3, DFG MAK-list: Kategorie III1 to III5

\* unidentified substances, calculated as toluene equivalent reported with significant mass fragments as mass-to-charge ratio (m/z)

n. d.: not determined

<b>Carcinogenic, mutagenic, and reproductive toxic components*</b>	<b>Concentration after 3 days [µg/m³]</b>	<b>SERa [µg/(m² · h)]</b>
CMR 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B; TRGS 905: K1A, K1B, M1A, M1B, R1A, R1B; IARC: Group 1 and 2A; DFG (MAK list): Categories III1, III2 (sum)	4	5
C 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EG) Nr. 1272/2008: Category Carc. 1A u. 1B; TRGS 905: K1A, K1B (sum)	< 1	< 1.3

<b>TVOC, Total volatile organic compounds</b>	<b>Concentration after 3 days [µg/m³]</b>	<b>SERa [µg/(m² · h)]</b>
Sum of VOC according to DIN EN 16516	86	110
Sum of VOC according to AgBB 2021	92	120
Sum of VOC according to eco-INSTITUT-Label	110	140
Sum of VOC according to DIN ISO 16000-6	120	150

<b>TSVOC, Total semi volatile organic compounds</b>	<b>Concentration after 3 days [µg/m³]</b>	<b>SERa [µg/(m² · h)]</b>
Sum of SVOC according to DIN EN 16516	< 5	< 6.3
Sum of SVOC without LCI according to AgBB 2021	< 5	< 6.3
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 1.3
Sum of SVOC with LCI according to AgBB 2021	< 5	< 6.3

<b>TWVOC, Total very volatile organic compounds</b>	<b>Concentration after 3 days [µg/m³]</b>	<b>SERa [µg/(m² · h)]</b>
Sum of VVOC according to AgBB 2021	6	7.5
Sum of VVOC according to eco-INSTITUT-Label	200	250

\*Excluding formaldehyde and acetaldehyde (Carc. 1B) due to an assumed "practical threshold" under which a significant carcinogenic risk is no longer to be expected (see Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air and protocol of the 11th meeting of 'Ausschusses für Innenraumrichtwerte' (AIR), 11/2020). In the case of a toxicological emission assessment, a single-substance analysis of the concentrations is necessary.

In the opinion of the committee for Indoor Air Guide Values (Ausschuss für Innenraumrichtwerte) of the Federal Environment Agency, the concentration of 0.1 mg formaldehyde/m³ indoor air, based on a measurement period of half an hour, should not be exceeded, also for a short time (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103 -016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).

Other sums of VOC	Concentration after 3 days [µg/m³]	SERa [µg/(m² · h)]
VOC without LCI according to AgBB 2021 (sum)	6	7.5
VOC without LCI according to eco-INSTITUT-Label (sum)	17	21
CMR 2: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 2, Muta. 2, Repr. 2; TRGS 905: K2, M2, R2; IARC: Group 2B; DFG (MAK list): Category III3 (sum)	54	68
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	52	65
Bicyclic Terpenes (sum)	< 1	< 1.3
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	< 1	< 1.3
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	< 2	< 2.9
C9 - C15 Alkylated benzenes (sum)	< 1	< 1.3
Cresols (sum)	< 1	< 1.3

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.25
R-value according to AgBB 2021	0.24
R-value according to Belgian regulation	0.24
R-value according to EU-LCI	0.25

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TWOC, TSVOC and R-value may result in different values.  
 Short-chain carbonyl compounds (C1-C5) are quantified via HPLC acc. to DIN ISO 16000-3:2013-01. Therefore, no toluene equivalents are given for VVOC. These substances are taken into concern by means of their substance specific calibration via the sum of VVOC acc. to DIN EN 16516:2020-10. For VOC however, the substance specific calibration takes place via HPLC whereas the TVOC is calculated using the toluene equivalent determined via Tenax acc. to DIN EN 16516:2020-10.

## 1.2 Sample A001, Volatile organic compounds after 28 days

### Test objective:

Volatile organic compounds (VOC), test chamber, air sampling 28 days after test chamber loading

### Test result:

Internal sample number: | 57950-A001

No.	Substance	CAS No.	RT [min]	Concentration+ calib. substances ≥ 1 µg/m³ uncalib. substances ≥ 1 µg/m³ DNPH ≥ 2 µg/m³ [µg/m³]	Toluene- equivalent substances ≥ 5 µg/m³ [µg/m³]	CMR Classifi- cation++	LCI AgBB 2021 [µg/m³]	R-value
<b>1</b>	<b>Aromatic hydrocarbons</b>							
1-25	Styrene	100-42-5	11.28	1	< 5	Group 2A	250	0.00
<b>4</b>	<b>Aliphatic mono alcohols (n-, iso-, cyclo-) and dialcohols</b>							
4-1	Ethanol	64-17-5	3.67	240	15	III5		
4-6	1-Butanol	71-36-3	6.24	1	< 5		3000	0.00
4-10	2-Ethyl-1-hexanol	104-76-7	14.02	3	< 5		300	0.01
<b>9</b>	<b>Acids</b>							
9-1	Acetic acid	64-19-7	4.91	6	< 5		1200	0.01
<b>10</b>	<b>Esters</b>							
10-12	2-Ethylhexyl acetate	103-09-3	16.45	2	< 5		350	0.01
10-16	2-Ethylhexyl acrylate	103-11-7	18.24	6	< 5	Group 2B	380	0.02
<b>13</b>	<b>Other identified substances in addition to LCI list</b>							
	Hexamethylcyclotrisiloxane (D3)	541-05-9	8.97	6	< 5			

+ identified and calibrated substances, substance specific calculated

++ classification according to Regulation (EG) N° 1272/2008: Categories Carc. 1A, 1B and 2, Muta. 1A, 1B and 2, Repr. 1A, 1B and 2, TRGS 905: K1A, K1B, K2, M1A, M1B, M2, R1A, R1B, R2; IARC: Group 1, 2A, 2B and 3, DFG MAK-list: Kategorie III1 to III5

\* unidentified substances, calculated as toluene equivalent reported with significant mass fragments as mass-to-charge ratio (m/z)

n. d.: not determined

Carcinogenic, mutagenic, and reproductive toxic components*	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
CMR 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 1A and 1B, Muta. 1A and 1B, Repr. 1A and 1B; TRGS 905: K1A, K1B, M1A, M1B, R1A, R1B; IARC: Group 1 and 2A; DFG (MAK list): Categories III1, III2 (sum)	1	< 1.3
C 1: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EG) Nr. 1272/2008: Category Carc. 1A u. 1B; TRGS 905: K1A, K1B (sum)	< 1	< 1.3

TVOC, Total volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VOC according to DIN EN 16516	< 5	< 6.3
Sum of VOC according to AgBB 2021	12	15
Sum of VOC according to eco-INSTITUT-Label	25	31
Sum of VOC according to DIN ISO 16000-6	40	50

TSVOC, Total semi volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of SVOC according to DIN EN 16516	< 5	< 6.3
Sum of SVOC without LCI according to AgBB 2021	< 5	< 6.3
Sum of SVOC without LCI according to eco-INSTITUT-Label	< 1	< 1.3
Sum of SVOC with LCI according to AgBB 2021	< 5	< 6.3

TWOC, Total very volatile organic compounds	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
Sum of VVOC according to AgBB 2021	15	19
Sum of VVOC according to eco-INSTITUT-Label	240	300

\*Excluding formaldehyde and acetaldehyde (Carc. 1B) due to an assumed "practical threshold" under which a significant carcinogenic risk is no longer to be expected (see Federal Institute for Risk Assessment (2006): Toxicological evaluation of formaldehyde and Federal Environment Agency (2016): Reference value for formaldehyde in indoor air and protocol of the 11th meeting of 'Ausschusses für Innenraumrichtwerte' (AIR), 11/2020). In the case of a toxicological emission assessment, a single-substance analysis of the concentrations is necessary.

In the opinion of the committee for Indoor Air Guide Values (Ausschuss für Innenraumrichtwerte) of the Federal Environment Agency, the concentration of 0.1 mg formaldehyde/m³ indoor air, based on a measurement period of half an hour, should not be exceeded, also for a short time (Bundesgesundheitsblatt 2016 · 59: 1040-1044 DOI 10.1007 / s00103 -016-2389-5 © Springer-Verlag Berlin Heidelberg 2016).

Other sums of VOC	Concentration after 28 days [µg/m³]	SERa [µg/(m² · h)]
VOC without LCI according to AgBB 2021 (sum)	< 5	< 6.3
VOC without LCI according to eco-INSTITUT-Label (sum)	6	7.5
CMR 2: VOC (incl. VVOC and SVOC) with the following categorisations: Regulation (EC) No. 1272/2008: Category Carc. 2, Muta. 2, Repr. 2; TRGS 905: K2, M2, R2; IARC: Group 2B; DFG (MAK list): Category III3 (sum)	6	7.5
Sensitising compounds with the following categorisations: DFG (MAK list): Category IV; Regulation (EC) No. 1272/2008: skin sensitising, respiratory sensitising; TRGS 907 (sum)	6	7.5
Bicyclic Terpenes (sum)	< 1	< 1.3
C9 - C14 Alkanes / Isoalkanes as dekane-equivalent (sum)	< 1	< 1.3
C4 - C11 Aldehydes, acyclic, aliphatic (sum)	< 2	< 2.9
C9 - C15 Alkylated benzenes (sum)	< 1	< 1.3
Cresols (sum)	< 1	< 1.3

Risk value for assessment of LCI	R-value
R-value according to eco-INSTITUT-Label	0.04
R-value according to AgBB 2021	0.02
R-value according to Belgian regulation	0.02
R-value according to EU-LCI	0.03

Note:

Due to different requirements in the respective guidelines, the calculation of TVOC, TWOC, TSVOC and R-value may result in different values. Short-chain carbonyl compounds (C1-C5) are quantified via HPLC acc. to DIN ISO 16000-3:2013-01. Therefore, no toluene equivalents are given for VVOC. These substances are taken into concern by means of their substance specific calibration via the sum of VVOC acc. to DIN EN 16516:2020-10. For VOC however, the substance specific calibration takes place via HPLC whereas the TVOC is calculated using the toluene equivalent determined via Tenax acc. to DIN EN 16516:2020-10.

Cologne, 16/02/2023



Michael Stein, Dipl.-Chem.  
(Laboratory Management)

Remark: It is not permitted to publish extracts of this report and the comments on the first page of this report apply.



# Appendix

## Sampling sheet

Produktprüfung Product testing  
 Zertifizierung Certification  
 Beratung Consulting

# 57950-001



### Sampling Sheet\*

<b>Testing laboratory</b>	eco-INSTITUT Germany GmbH Schanzenstr. 6-20, D-51063 Cologne Germany Tel. +49 (0)221 - 931245-0 Fax +49 (0)221 - 931245-33	<b>Sampler</b> (Name, Company, Phone number)	Same as manufacturer.
<b>Name of manufacturer / distributor at place of sampling</b> (Address / Stamp)	DERIVADOS ASFALTICOS NORMALIZADOS SA-DANOSA Pol. Ind. Sector 9 19290 FONTANAR, GUADALAJARA, ESPAÑA	<b>Customer/ Invoice recipient</b> (if different from manufacturer)	TECNALIA CIF: G48975767 Parque Científico y Tecnológico de Bizkaia C/Geldo, Edificio 700 E-48160 Derio (Bizkaia) Spain

<b>Product name</b>	DANOPREN PR100 (482008) - Ref DAN-3676-A	<b>Product type</b> (e.g. parquet, floor covering)	- Thermal insulation for flat roofs, both conventional and inverted. - Thermal insulation for residential and commercial floors with overloading.
<b>Model / programme / series</b>	--	<b>Batch</b>	--
<b>Article number</b>	--	<b>Production date of batch</b>	--

<b>Samples are taken from</b>	<input type="checkbox"/> current production <input checked="" type="checkbox"/> storage	<b>Sampling date</b>	04.11.22
<b>Storage location before sampling</b>	<input type="checkbox"/> in production <input checked="" type="checkbox"/> storage <input type="checkbox"/> other	<b>Storage conditions before sampling</b>	<input type="checkbox"/> open <input checked="" type="checkbox"/> packaged
<b>Storage location:</b>	Manufacturer location	<b>Packaging material:</b>	Plastic

<b>Special features</b> (possible negative effects through emissions at place of sampling (e.g. benzine, exhaust fumes), unclarities, questions etc.)	Application rate:
---	-------------------

<b>Validation</b>	
Hereby the signer affirms the accuracy of the above-mentioned statements. The sample was chosen, sampled and packaged according to the sampling guidelines.	
Date: 20.12.22	Signature: (Company stamp)



\* Please take one sampling sheet for each sample! The sampling instruction must be strictly maintained.

<b>Order</b>	Reference from Tecnalia: 102898
<b>(Please insert quote number, or - if not available, please enter the desired analysis)</b>	Test required: 04724+02181+02183 official order: SPC22-11561 / PC22-

eco-INSTITUT Germany GmbH / Schanzenstrasse 6-20 / Carlswerk Kupferzug 5.2 / D-51063 Köln / Germany  
 Tel. +49 221.931245-0 / Fax +49 221.931245-33 / eco-institut.de / Geschäftsführer: Dr. Frank Kuebart  
 HRB 17917 / USt-ID: DE 122653308 / Raiffeisenbank Frechen-Hurth, IBAN: DE60370623651701900010, BIC: GENODE33HAN





## List of calibrated Volatile Organic Compounds (VOC)

### Aromatic hydrocarbons (31)

Benzene<sup>4</sup>  
1,2,3-Trimethylbenzene  
1,2,4-Trimethylbenzene  
1,3,5-Trimethylbenzene  
1-Isopropyl-2-methylbenzene  
1-Isopropyl-4-methylbenzene  
1,2,4,5-Tetramethylbenzene  
Ethylbenzene  
n-Propylbenzene  
Isopropylbenzene (Cumene)  
1,3-Diisopropylbenzene  
1,4-Diisopropylbenzene  
n-Butylbenzene  
1-Propenylbenzene (beta-Methylstyrene)  
Toluene  
2-Ethyltoluene  
Vinyltoluene  
o-Xylene  
m-/p-Xylene  
Styrene  
Phenylacetylene  
2-Phenylpropene (alpha-Methylstyrene)  
4-Phenylcyclohexene  
1-Phenylcyclohexane  
1-Phenyldecane<sup>2</sup>  
1-Phenylundecane<sup>2</sup>  
Indene  
Naphthalene  
1-Methylnaphthalene  
2-Methylnaphthalene  
1,4-Dimethylnaphthalene

### Aliphatic hydrocarbons (23)

2-Methylpentane<sup>1</sup>  
3-Methylpentane<sup>1</sup>  
Methylcyclopentane  
n-Hexane  
Cyclohexane  
Methylcyclohexane  
1,4-Dimethylcyclohexane  
n-Heptane  
2,2,4,6,6-Pentamethylheptane  
n-Octane  
n-Nonane  
n-Decane  
n-Undecane  
n-Dodecane  
n-Tridecane  
n-Tetradecane  
n-Pentadecane  
n-Hexadecane  
Decahydronaphthalene  
1-Octene  
1-Decene  
1-Dodecene  
4-Vinylcyclohexene

### Terpenes (12)

delta-3-Carene  
alpha-Pinene  
beta-Pinene  
alpha-Terpinene  
Longipinene  
Limonene  
Longifolene  
Isolongifolene  
beta-Caryophyllene  
alpha-Phellandrene  
Myrcene  
Camphene

### Aliphatic alcohols and ether (18)

Ethanol<sup>1</sup>  
1-Propanol<sup>1</sup>  
2-Propanol<sup>1</sup>  
2-Methyl-1-propanol  
1-Butanol  
tert-Butanol  
1-Pentanol  
1-Hexanol  
Cyclohexanol  
2-Ethyl-1-hexanol  
1-Heptanol  
1-Octanol  
1-Nonanol  
1-Decanol  
1,4-Cyclohexandimethanol  
4-Hydroxy-4-methyl-pentan-2-one  
(Diacetone alcohol)  
Methyl-tert-butyl ether (MTBE)<sup>1</sup>  
Tetrahydrofuran (THF)

### Aromatic alcohols (phenoles) (8)

Furfuryl alcohol  
Benzyl alcohol  
Phenol  
2-Phenylphenol (oPP)  
BHT (2,6-Di-tert-butyl-4-methylphenol)  
o-Cresol  
m-/p-Cresol  
4-Chloro-3-methylphenol (Chlorocresol)

### Glycols, Glycol ether, Glycol ester (49)

Ethyleneglycol (Ethan-1,2-diol)  
Propylenglycol (Propane-1,2-diol)  
Diethylene glycol  
Dipropylene glycol  
Neopentyl glycol  
Hexyleneglycol  
Ethylidiglycol  
Ethylene glycol monobutyl ether  
Diethylene glycol methyl ether  
Diethylene glycol monobutyl ether  
Diethylene glycol phenyl ether  
Dipropylene glycol-dimethyl ether  
Dipropylene glycol mono-n-butyl ether

Dipropylene glycol mono-tert-butyl ether  
Dipropylene glycol monomethyl ether  
Dipropylene glycol mono-n-propyl ether  
Tripropylene glycol monomethyl ether  
Triethylene glycol dimethyl ether  
1,2-Propylene glycol dimethyl ether  
1,2-Propylene glycol-n-propyl ether  
1,2-Propylene glycol-n-butyl ether  
Butyl glycolate  
2-Methoxyethanol  
2-Ethoxyethanol  
2-Methylethoxyethanol  
2-Propoxyethanol  
2-Hexoxyethanol  
2-(2-Hexoxyethoxy)ethanol  
2-Phenoxyethanol  
1-Methoxy-2-propanol  
2-Methoxy-1-propanol  
1-Ethoxy-2-propanol  
1-tert-Butoxy-2-propanol  
3-Methoxy-1-butanol  
1,4-Butanediol  
1,2-Dimethoxyethane  
1,2-Diethoxyethane  
1-Methoxy-2-(2-methoxy-ethoxy)ethane  
Ethylene carbonate  
Propylene carbonate  
2-Methoxy-1-propyl acetate  
Diethylene glycol monomethyl ether acetate  
2-Methoxyethyl acetate  
2-Ethoxyethyl acetate  
2-Butoxy ethyl acetate  
Dipropylene glycol monomethyl ether acetate  
Propylene glycol diacetate  
Texanol  
TXIB (Texanol isobutyrate)

### Aldehydes (26)

Formaldehyde<sup>1,3,4</sup>  
Acetaldehyde<sup>1,3,4</sup>  
Propanal<sup>1,3</sup>  
Butanal<sup>1,3</sup>  
3-Methyl-1-butanal  
Pentanal  
Hexanal  
2-Ethylhexanal  
Heptanal  
Octanal  
Nonanal  
Decanal  
Propenal (Acrolein)<sup>1,3</sup>  
Isobutenal (Methacrolein)<sup>3</sup>  
2-Butenal<sup>3</sup>  
2-Pentenal<sup>3</sup>  
2-Hexenal  
2-Heptenal  
2-Octenal

2-Nonenal  
2-Decenal  
2-Undecenal  
Ethanedial (Glyoxal)<sup>1,3</sup>  
Glutaraldehyde  
Furfural  
Benzaldehyde

**Ketones (14)**

Acetone<sup>1,3</sup>  
1-Hydroxyacetone  
Ethylmethylketone<sup>3</sup>  
Methylisobutylketone  
3-Methyl-2-butanone  
Cyclopentanone  
2-Methylcyclopentanone  
Cyclohexanone  
2-Methylcyclohexanone  
2-Hexanone  
2-Heptanone  
Acetophenone  
Isophorone  
Benzophenone<sup>2</sup>

**Acids (11)**

Acetic acid  
Propionic acid  
Pivalic acid  
Butyric acid  
Isobutyric acid  
n-Valeric acid  
n-Caproic acid  
2-Ethylhexanoic acid  
n-Heptanoic acid  
n-Octanoic acid  
Neodecanoic acid

**Esters and Lactones (31)**

Methyl acetate<sup>1</sup>  
Ethyl acetate<sup>1</sup>  
Vinyl acetate<sup>1</sup>  
Propyl acetate  
Isopropyl acetate  
2-Methoxy-1-methylethyl acetate  
n-Butyl acetate  
Isobutylacetate  
2-Ethylhexyl acetate  
n-Butyl formate

Methyl acrylate  
Methyl methacrylate  
Butyl methacrylate  
Ethyl acrylate  
n-Butyl acrylate  
2-Ethylhexyl acrylate  
Hexanediol diacrylate  
Dipropylene glycol diacrylate  
Dimethyl succinate  
Dimethyl glutarate  
Dimethyl adipate  
Dibutyl fumarate  
Dibutyl maleate  
Diisobutyl succinate  
Diisobutyl glutarate  
Butyrolactone  
Dimethyl phthalate  
Diethyl phthalate<sup>2</sup>  
Dipropyl phthalate<sup>2</sup>  
Dibutyl phthalate<sup>2</sup>  
Diisobutyl phthalate<sup>2</sup>

**Chlorinated hydrocarbons (17)**

Dichloromethane<sup>1</sup>  
Trichloromethane (Chloroform)<sup>4</sup>  
Tetrachloromethane  
1,2-Dichloroethane<sup>4</sup>  
1,1,1-Trichloroethane  
2-Chloropropane  
1,2,3-Trichloropropane<sup>4</sup>  
Trichloroethene<sup>4</sup>  
Tetrachloroethene  
trans-1,3-Dichloropropene<sup>4</sup>  
cis-1,3-Dichloropropene<sup>4</sup>  
Chloroprene<sup>4</sup>  
1,3-Dichloro-2-propanol<sup>4</sup>  
Chlorobenzene  
1,4-Dichlorobenzene  
alpha-Chlorotoluene<sup>4</sup>  
alpha,alpha,alpha-Trichlorotoluene<sup>4</sup>

**Cyclic siloxanes (5)**

Hexamethylcyclotrisiloxane (D3)  
Octamethylcyclotetrasiloxane (D4)  
Decamethylcyclopentasiloxane (D5)  
Dodecamethylcyclohexasiloxane (D6)  
Tetradecamethylcycloheptasiloxane (D7)

**Others (41)**

1,4-Dioxane<sup>4</sup>  
1,2-Dibromoethane<sup>4</sup>  
2-Nitropropane<sup>4</sup>  
2,3-Dinitrotoluene<sup>4</sup>  
2,4-Dinitrotoluene<sup>4</sup>  
2,6-Dinitrotoluene<sup>4</sup>  
3,4-Dinitrotoluene<sup>2,4</sup>  
o-Anisidine<sup>4</sup>  
o-Toluidine<sup>4</sup>  
4-Chloro-o-toluidine<sup>4</sup>  
5-Nitro-o-toluidine<sup>2</sup>  
Acrylonitrile<sup>1,4</sup>  
2,2'-Azobisisobutyronitrile  
Tetramethylsuccinonitrile  
Azobenzene<sup>2,4</sup>  
Caprolactam  
Furan<sup>1,4</sup>  
2-Methylfuran  
2-Pentylfuran  
Methenamine  
Triethylamine  
2-Butanonoxime<sup>4</sup>  
Triethyl phosphate  
Tributyl phosphate<sup>2</sup>  
5-Chloro-2-methyl-4-isothiazolin-3-one (CIT)  
2-Methyl-4-isothiazolin-3-one (MIT)  
2-n-Octyl-4-isothiazolin-3-one (OIT)<sup>2,4</sup>  
Formamide  
Dimethylformamide (DMF)  
Acetamide  
N-Nitrosopyrrolidine<sup>4</sup>  
N-Methyl-2-pyrrolidone  
N-Ethyl-2-pyrrolidone  
N-Butyl-2-pyrrolidone  
Aniline  
4-Chloroaniline<sup>4</sup>  
2-Nitroanisole<sup>4</sup>  
Cyclohexyl isocyanate  
p-Cresidine<sup>4</sup>  
Diethyl sulfate<sup>4</sup>  
Epichlorohydrin<sup>4</sup>

1 VVOC

2 SVOC

3 Analysis acc. to DIN ISO 16000-3:2013-01 (DNPH)

4 Carcinogens, category 1A and 1B according to Regulation (EC) No 1272/2008 and TRGS 905

## Definition of terms

CAS No. (Chemical Abstracts Service)	International designation standard for chemical substances
CMR	VOCs, VVOCs and SVOCs classified as carcinogenic, mutagenic or toxic for reproduction according to Regulation (EC) No. 1272/2008, TRGS 905, IARC list and DFG (MAK list)
NIK / LCI	Lowest concentration of interest; substance-specific value for health assessment of emissions from products, indicated in $\mu\text{g}/\text{m}^3$
RT (retention time)	Total time required for an analyte to pass the column (time between injection and detection of the analyte)
R value	Sum of quotients of concentration and LCI value for all substances for which a LCI value is derived
R value according to AgBB	R-value for all substances $\geq 5 \mu\text{g}/\text{m}^3$ with LCI value, calculated according to the LCI list of the AgBB scheme
R-value according to Belgian regulation	R-value for all substances $\geq 5 \mu\text{g}/\text{m}^3$ with LCI-value, calculated according to the LCI-list of the Belgian regulation
R value according to eco-INSTITUT-Label	R-value for all substances $\geq 1 \mu\text{g}/\text{m}^3$ with LCI value, calculated according to the LCI list of the AgBB scheme
R value according to EU-LCI	R-value for all substances $\geq 5 \mu\text{g}/\text{m}^3$ with EU-LCI value, calculated according to the EU-LCI list of the European Commission
SER	Specific emission rate (see "Explanation of Specific Emission Rate SER")
Toluene equivalent	Concentration of a substance quantified by the TIC response factor of toluene (calculation of the concentration by comparing the integral of the substance with the integral of toluene)
VOC (volatile organic compound)	Organic compound eluting in the retention range from C6 (n-hexane) to C16 (n-hexadecane)
TVOC	Sum of the concentrations of all identified and unidentified volatile organic compounds eluting in the retention range from C6 (n-hexane) to C16 (n-hexadecane)
TVOC according to DIN EN 16516	Sum of all VOC $\geq 5 \mu\text{g}/\text{m}^3$ in the retention range C6 to C16, calculated as toluene equivalent (used i.a. for M1)
TVOC according to AgBB	Sum of all VOCs with LCI $\geq 5 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all VOCs without LCI $\geq 5 \mu\text{g}/\text{m}^3$ (as toluene equivalent) (used i.a. for the Blue Angel)
TVOC according to eco-INSTITUT-Label	Sum of all calibrated VOC $\geq 1 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all non-calibrated VOC $\geq 1 \mu\text{g}/\text{m}^3$ (as toluene equivalent) (used i.a. for natureplus)
TVOC according to ISO 16000-6	Total area of the chromatogram in the retention range C6 - C16 as toluene equivalent according to DIN ISO 16000-6, Annex A.1 item 3 (used i.a. for CDPH, BIFMA and the French VOC regulation)
TVOC without LCI according to AgBB	Sum of all VOCs without LCI $\geq 5 \mu\text{g}/\text{m}^3$ as toluene equivalent
TVOC without LCI according to eco-INSTITUT-Label	Sum of all calibrated VOCs without LCI $\geq 1 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all non-calibrated VOCs without LCI $\geq 1 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
VVOC (very volatile organic compound)	Organic compound eluting in the retention range $< \text{C6}$ (n-hexane)



TVOC	Sum of the concentrations of all identified and unidentified very volatile organic compounds eluting in the retention range < C6 (n-hexane)
TVOC according to AgBB	Sum of all VVOC with LCI $\geq 5 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all VVOC without LCI $\geq 5 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
TVOC according to eco-INSTITUT-Label	Sum of all calibrated VVOC $\geq 1 \mu\text{g}/\text{m}^3$ (substance-specific quantified) and all non-calibrated VVOC $\geq 1 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
SVOC (semi volatile organic compound)	Organic compound eluting in the retention range > C16 (n-hexadecane) to C22 (docosane)
TSVOC	Sum of the concentrations of all identified and unidentified semi volatile organic compounds eluting in the retention range > C16 (n-hexadecane) to C22 (docosane)
TSVOC according to DIN EN 16516	Sum of all SVOC $\geq 5 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
TSVOC without LCI according to AgBB	Sum of all SVOC without LCI $\geq 5 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
TSVOC with LCI according to AgBB	Sum of all SVOC with LCI $\geq 5 \mu\text{g}/\text{m}^3$ (quantified substance-specific)
TSVOC without LCI according to eco-INSTITUT label	Sum of all calibrated SVOC without LCI $\geq 1 \mu\text{g}/\text{m}^3$ (quantified substance-specific) and all non-calibrated SVOC without LCI $\geq 1 \mu\text{g}/\text{m}^3$ (as toluene equivalent)
TSVOC with LCI according to eco-INSTITUT-Label	Sum of all SVOC with LCI $\geq 1 \mu\text{g}/\text{m}^3$ (quantified substance-specific)

## Commentary on emission analysis

### Test method

Measurement of the volatile organic compounds takes place in the test chamber in conditions similar to those applying in practice. Standardized test conditions are defined for the test chamber regarding loading, air exchange, relative humidity, temperature, and incoming air, based on the type of test specimen and the required guideline. These conditions and the underlying standards are to be found in the section on test methods in the laboratory report.

Air samples are taken from the test chamber at defined points in time during the continuously running test. To this end, approximately 5 L of air are collected from the test chamber at an air flow rate of 100 mL/min on Tenax and approx. 100 L at an air flow rate of 0.8 L/min on silica gel coated with DNPH (2,4-dinitrophenylhydrazine).

After thermal desorption, the substances adsorbed on Tenax are analysed using gas chromatographic separation and mass spectrometric determination. The gas chromatographic separation is performed with a slightly polar capillary column of 60 m in length.

The substances derivatized with DNPH for the determination of formaldehyde and other short-chain carbonyl compounds (C1 - C6) are analysed using high-performance liquid chromatography (HPLC).

Over 200 compounds, including volatile organic compounds (C6 - C16), semi-volatile organic compounds (C16 - C22) and – insofar as possible with this method – also very volatile organic compounds (less than C6) are determined and quantified individually.

All other substances – insofar as is possible – are identified through comparison with a library of spectra. The quantification of these substances and non-identified substances is performed through a comparison of their signal area with the signal of toluene.

The determined substance concentrations are corrected using the recovery rate of the internal standard (toluene-d8). Identification and quantification of substances is carried out from a concentration (limit of quantification) of 1 µg per m<sup>3</sup> test chamber air or 2 µg/m<sup>3</sup> for DNPH-derivatised substances. In the case of highly loaded samples, the evaluation limit of non-calibrated substances is raised in some cases, as it is no longer possible to assign individual, small signals due to the large number of signals.

### Quality assurance

The eco-INSTITUT Germany GmbH is granted flexible scope of accreditation pursuant to DIN EN ISO/IEC 17025:2018-03. The accreditation covers the analytical determination of all volatile organic compounds, including the test chamber method.

In each analysis the analytical system is checked using an external standard based on the specifications in standard DIN EN 16516:2020-10. The stability of the analytical systems is documented based on the test standard using control charts.

Laboratory performance is assessed at least once a year in inter-laboratory comparisons by comparing the results with those obtained by other laboratories for identical samples.

A blank is run prior to introducing the test specimen into the test chamber to check for the possible presence of volatile organic compounds.

The expanded measurement uncertainty U for the analytical determination of all volatile organic compounds, including the test chamber method, is estimated to 41.7 %. The calculation is based on DIN ISO 11352:2013-03 (Nordtest).

## Explanation of Specific Emission Rate SER

Emission measurements are accomplished in test chambers under defined physical conditions (temperature, relative humidity, room loading, air change rate etc.).

Test chamber measurement results are directly comparable only if the investigations were accomplished under the same basic conditions.

If the differences of the physical conditions refer only to the change of air rate and/or the loading, the "SER" or "specific emission rate" can be used for comparability of the measurement results. The SER indicates how many volatile organic compounds (VOC) are released by the sample for each material unit and hour (h).

The SER can be calculated using the formula below for each proven individual component of the VOC from the data in the test report.

As material units the following are applicable:

l = unit of length (m)	relation between emission and length
a = unit area (m <sup>2</sup> )	relation between emission and surface
v = unit volume (m <sup>3</sup> )	relation between emission and volume
u = piece unit (unit = piece)	relation between emission and complete unit

From this the different dimensions for SER result:

length-specific	SER <sub>l</sub>	in µg/(m·h)
surface-specific	SER <sub>a</sub>	in µg/(m <sup>2</sup> ·h)
volume-specific	SER <sub>v</sub>	in µg/(m <sup>3</sup> ·h)
unit-specific	SER <sub>u</sub>	in µg/(u·h)

SER thus represents a product specific rate, which describes the mass of the volatile organic compound, which is emitted by the product per time unit at a certain time after beginning of the examination.

$$\text{SER} = q \cdot c$$

q	specific air flow rate (quotient from change of air rate and loading)
c	concentration of the measured substance(s)

The result can be indicated in milligrams (mg) in place of micro grams (µg), whereby 1 mg = 1000 µg.