

Environmental product declaration, blowing wool, INVISIBLE® Acoustic Ceilings Ltd



Product:	Blowing wool, used for wall and flat roof insulation
Producer:	INVISIBLE® Acoustic Ceilings Ltd, Ahertajankuja 1 A ESPOO
Year of manufacture:	2018
Functional unit	A functional unit has not been defined when the blowing wool can be used in a variety of applications. The declared unit is 1kg of the packaged product.
Method	The environmental declaration complies with the EN 15804:2012 + A1:2014 standard and the RTS PCR methodological guidelines. Environmental declarations of construction products might not be comparable with each other if they do not comply with this European EN standard.
EPD coverage	Concerns the manufacturing of blowing wool in three manufacturing plants (Kouvola, Kiiminki and Ylistaro)
Calculated by:	VTT
Date	31.01.2020
Additional information:	From the manufacturer

Yleissääntöinä on noudatettu eurooppalaisen standardin [A1> EN 15804 <A1] vaatimuksia ^a	
Kansainvälisen standardin EN ISO 14025:2010 mukainen [A1> ilmoituksen ja tiedon riippumaton varmennus <A1]	
<input type="checkbox"/> sisäinen <input checked="" type="checkbox"/> ulkoinen	
(b) Kolmannen osapuolen varmentamisen on suorittanut: Tarja Häkkinen	
^a	Tuoteryhmäsäännöt
^b	Kolmannen osapuolen varmentaminen on vapaaehtoista yrityksiltä yrityksille suunnatuissa ympäristöselosteissa; pakollista kuluttajille suunnatuissa ympäristöselosteissa (katso standardin EN ISO 14025:2010 kohta 9.4).

Product description

This environmental declaration concerns the manufacturing of blowing wool in the three manufacturing plants of Ekovilla Oy: Kuusankoski, Kiiminki and Ylistaro. The result has been calculated using production data from the calendar year 2018; the data is based on the average quantities of the manufacturing plants. The manufacturing plants' dispersion of production is not considered meaningful, and therefore the results signify the average results of the three plants.

The Ekovilla blowing wool is made from recycled newsprint, magnesium sulphate and boric acid. The product can be used as thermal insulation and additional thermal insulation for flat roofs, walls and ground/intermediate floors.

Table 1 Technical data	
Installation density, kg/m ³	28-55
Thermal conductivity, λ , W/mK	0.038
Technical lifespan, years	50 years (manufacturer's estimate)
Technical approval	Eta/CE certified

Scope of the environmental declaration

This environmental declaration covers the product stage, servicing and maintenance of the installation, repairs, dismantling, reuse, waste recovery in material recycling, energy recovery from waste, and waste disposal. The environmental declaration is valid "from cradle to grave" and covers the entire life cycle of the product, i.e., the information modules A1...C4, as well as the information module D beyond the life cycle (the reuse, recovery and net impact of recycling after the life cycle).

The production and product data is based on the "actual" production data collected from the manufacturing plants by the manufacturer. The calculation of additive production was done using the EcoInvent database (EcoInvent 3.5 from 2018), ELCD database for fuel procurement (EU15, PE INTERNATIONAL, Germany) and an up-to-date environmental profile for electricity (based on the calculations of VTT, according to the 2018 production and imports). The environmental profile for transportation is based on VTT's Lipasto unit emission database (average transportation equipment in 2018) to which the emissions from fuel procurement, according to the requirements of the life cycle assessment, were always added.

Product stage (A1-3)

The product stage covers all the raw materials, packaging materials and transportation, as well as the production process of the blowing wool. The servicing of manufacturing machines was not considered in the assessment due to its low importance.

The blowing wool manufacturer collaborates with a collection organisation for recycled paper and has therefore had control over the origin of the paper. According to the blowing wool manufacturer, increasing amounts of recycled paper are collected from the local area. The recycled paper has been assumed to be waste and no environmental effects have been attributed to its production.

In 2018, a mineral-based binding agent was used for dust-binding during the manufacturing process of the blowing wool. Out of the three factories manufacturing the blowing wool, this was only used in Kiiminki. The amount of dust binding agent used was 0.36% of the manufacturing process of the entire product, and its impact on the end product is insignificant. Therefore, the usage of the dust binding agent was excluded from the calculations in this assessment. According to the methodology, material flow quantities of 1% or under may be excluded.

Mixed waste and recoverable combustion waste are generated during the manufacturing of the blowing wool. Waste disposal is considered at the final stage of the life cycle (module C).

After manufacture, the blowing wool is packaged in plastic packaging. Ekovilla uses both recycled plastic packaging material that can be recovered after use and non-recoverable plastic. These calculations are based on the assumption that all plastic packaging material is incinerated.

The carbon content of the raw material used for manufacturing the blowing wool has been taken into account in the calculations. This assessment is based on the bibliographical reference (Nors, M., 2009).

Raw material to be used for manufacturing the blowing wool is transported with a full trailer truck. For the purposes of the calculations, it is assumed that all loads are full and the transportation takes place by road.

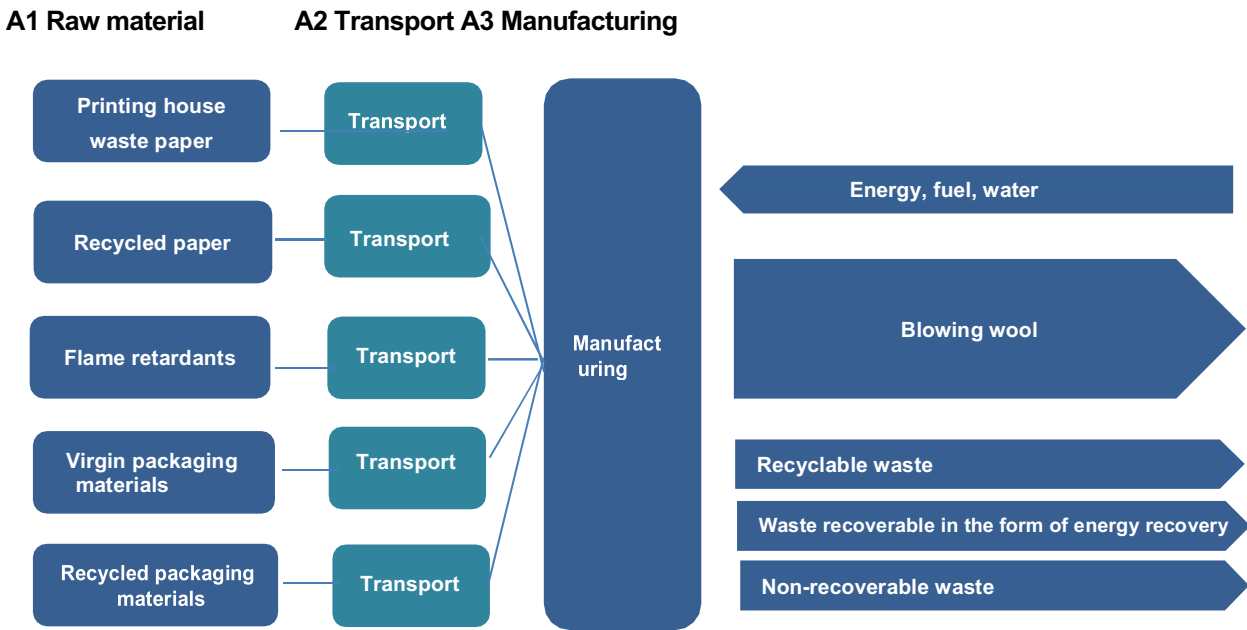


Image 1 Simplified blowing wool manufacturing process.

Construction stage (A4-5)

The packaged end product is transported to the construction site. Insulation materials are light, and transport capacity is therefore a significant factor. The blowing wool is transported in a full-trailer truck. The average load factor used in the calculations is 45.4% (a truck weighing 40 tons can hold 18.144 tons of blowing wool).

At the construction site, the blowing wool is installed mechanically. No waste is generated during the installation process.

Use stage (B1-7)

According to the manufacturer, it can be assumed that the product will not need servicing or maintenance during its 50-year lifespan under normal conditions. Therefore, the environmental impact of the B stages is 0.

End-of-life stage (C1-4) and beyond stage (D).

After the end-of-life stage of the building's life cycle, a vacuum can be used to remove the blowing wool from the structure that is to be demolished, and the product can be reused in another building. The end-of-life

stage is based on the assumption that all of the used product is 100% reusable. The information modules of the end-of-life stage include the following processes:

- C1 - Demolition stage. The suction of the blowing wool out of the structure has been taken into account in the assessment (energy consumption and efficiency of the vacuum).
- C2 - Transport. Includes the transportation of packaging waste to the incineration plant, transportation of mixed waste to disposal, transportation of energy waste to the incineration plant, transportation of removed product to the intermediate storage facility.
- C3 - Waste processing.
 - The processing of energy waste and packaging waste at the incineration plant.
 - The biogenic carbon content transferred to the next product system during recycling is also included at this stage and converted into CO₂ when, according to EN16485:2014, the impact of biogenic CO₂ on the GWP during the life cycle of the product must be 0.
- C4 - Disposal. Landfill disposal of mixed waste.

The impacts beyond the life cycle are considered in information module D. The end-of-life stage was based on the assumption that the blowing wool is 100% reusable, and therefore blowing wool that has already been used once replaces the manufacturing of new blowing wool.

Results

Table 2.a Environmental impact (life cycle stages A1-5)

Parameter and unit	A1	A2	A3	Total A1-3	A4	A5	Total A1-A5
GWP, kg CO ₂ e/kg*	0.065 +(-1.34) =-1.28*	0.016	0.006	-1.26	0.011	0.76e-03	-1.24
ADP elements, kg Sb e/kg	5.8e-04	6.8e-10	3.8e-05	6.2e-04	4.9e-10	1.5e-06	6.2e-04
ADP fossils, MJ /kg	1.1	0.24	0.072	1.4	0.17	8.4e-03	1.6
AP, kg SO ₂ e/kg	8.8e-04	7.0e-05	1.7e-05	9.6e-04	3.6e-05	2.7e-06	1.0e-03
ODP, kg CFC 11 e/kg	1.3e-08	3.4e-11	7.7e-10	1.4e-08	2.5e-11	4.6e-10	1.4e-08
EP, kg(PO ₄) ⁻³ e/kg	1.7e-04	1.5e-05	8.8e-06	1.9e-04	7.9e-06	5.3e-07	2.0e-04
POCP, kg C ₂ H ₄ e/kg	3.9e-05	4.7e-06	2.2e-06	4.6e-06	2.5e-06	1.2e-07	4.9e-05

ADP elements - Depletion of non-renewable mineral resources, ADP fossil fuels - Depletion of non-renewable energy resources, AP - Emissions that cause acidification of soil and water, ODP - Emissions of ozone-depleting substances, GWP - Emissions of greenhouse gases, EP - Emissions that cause eutrophication, POCP - Emissions of substances that create photochemical ozone.

*The GWP for the production of raw materials at stage A1 is 0.065 kg CO₂e/kg, and the biogenic carbon content of the raw materials converted into CO₂ is -1.34 kg CO₂/kg. The negative emission means the biogenic carbon content (converted into CO₂) that is transferred from the previous product system (recycled paper) to this system.

Table 2b. Environmental impact (life cycle stages B1-D)							
Parameter and unit	Total B1-7	C1	C2	C3	C4	Total C1-4	D
GWP, kg CO ₂ e/kg*	0	4.4e-09	3.1e-03	0.017	1.9e-03	0.022	-0.086
GWP, kg CO ₂ /kg (biogenic carbon as CO ₂) which is transferred to the next product system *	0	0	0	1.34		1.34	0
ADP elements, kg Sb e/kg	0	2.8e-11	1.4e-10	9.6e-07	4.3e-07	1.4e-06	-6.2e-04
ADP fossils, MJ /kg (LHV)	0	5.8e-08	0.048	2.0e-03	8.4e-04	0.051	-1.4
AP, kg SO ₂ e/kg	0	6.0e-12	1.0e-05	2.2e-06	3.9e-07	1.3e-05	-9.6e-04
ODP, kg CFC 11 e/kg	0	7.8e-16	7.0e-12	1.8e-11	1.2e-11	3.7e-11	-1.4e-08
EP, kg(PO ₄) ⁻³ e/kg	0	4.6e-12	2.3e-06	8.9e-07	2.4e-06	5.5e-06	-1.9e-04
POCP, kg C ₂ H ₄ e/kg	0	1.7e-12	7.2e-07	3.5e-08	5.0e-07	1.3e-06	-4.6e-05

* the biogenic carbon content to be transferred to the next product system during recycling, converted into CO₂, is 1.34 (assuming that the manufacturer uses 100% of the once used product in manufacturing a new product). According to EN16485:2014, the impact of biogenic CO₂ on the GWP during the product's life cycle is 0.

Table 3a. Resource usage, primary energy (life cycle stages A1-5)							
Parameter and unit	A1	A2	A3	Total A1-3	A4	A5	Total A1-5
Usage of renewable energy resources as energy, MJ/kg	0.12	3.2e-04	0.51	0.62	2.3e-04	5.5e-03	0.63
Usage of renewable energy resources as raw material, MJ/kg	0	0	0	0	0	0	0
Usage of renewable energy resources in total, MJ/kg	0.12	3.2e-04	0.51	0.62	2.3e-04	5.5e-03	0.63
Usage of non-renewable energy resources as energy, MJ/kg	1.5	0.23	0.077	1.8	0.17	0.051	2.0
Usage of non-renewable energy as raw material, MJ/kg	0.25	0	0	0.25	0	0	0.25
Usage of non-renewable energy in total, MJ/kg	1.8	0.2	0.077	2.1	0.17	0.051	2.3

Table 3b. Resource usage, primary energy (life cycle stages B1-D)							
Parameter and unit	Total B1-7	C1	C2	C3	C4	Total C1 - 4	D
Usage of renewable energy resources as energy, MJ/kg	0	1.1e-10	6.5E-05	5.5e-05	1.4e-04	2.6e-04	-0.62
Usage of renewable energy resources as raw material, MJ/kg	0	0	0	0	0	0	0
Usage of renewable energy resources in total, MJ/kg	0	1.1E-10	6.5E-05	5.5e-05	1.4e-04	2.6e-04	-0.62
Usage of non-renewable energy resources as energy, MJ/kg	0	6.1E-08	0.048	1.8e-03	1.1e-03	0.051	-1.8
Usage of non-renewable energy as raw material, MJ/kg	0	0	0	0	0	0	-0.25
Usage of non-renewable energy in total, MJ/kg	0	6.1E-08	0.048	1.8e-03	1.1e-03	0.051	-2.1

Table 4a. Resource usage, others (life cycle stages A1-5)							
Parameter and unit	A1	A2	A3	A4	A5	TotalA1-3	Total A1-A5
Usage of recycled material, kg/kg	0.90	0	0	0	0	0.90	0.90
Usage of renewable recycled fuel, MJ/kg	0	0	0	0	0	0	0
Usage of non-renewable recycled fuel, MJ/kg	0	0	0	0	0	0	0
Total use of water, m ³	4.5e-04	1.8e-03	2.6e-04	1.3e-03	5.5e-07	2.2e-03	3.5e-03

Table 4b. Resource usage, others (life cycle stages B1-D)							
Parameter and unit	Total B1-7	C1	C2	C3	C4	Total C1 - 4	D
Usage of recycled material, kg/kg	0	0	0	0	0	0	-0.90
Usage of renewable recycled fuel, MJ/kg	0	0	0	0	0	0	0
Usage of non-renewable recycled fuel, MJ/kg	0	0	0	0	0	0	0
Total use of water, m ³	0	4.9e-12	3.6E-04	5.4e-06	1.1e-06	3.6E-04	-2.2e-03

Table 5a. Waste categories (life cycle stages A1-5)

Parameter and unit	A1	A2	A3	A4	A5	Total A1-3	Total A1-A5
Hazardous waste, kg/kg	1.7e-05	0	5.7e-05	0	7.2e-09	7.4e-05	7.4e-05
Landfill waste, kg/kg	4.0e-05	9.6e-06	7.2e-03	6.8e-06	4.9e-05	7.3e-03	7.3e-03
Radioactive waste, kg/kg	3.6e-09	4.3e-07	1.4e-07	3.1e-07	6.6e-09	5.8e-07	8.9e-07

Table 5b. Waste categories (life cycle stages B1-D)

Parameter and unit	Total B1-7	C1	C2	C3	C4	Total C1 - 4	D
Hazardous waste, kg/kg	0	5.1e-13	0	2.4e-08	3.8e-09	2.8e-08	-7.4e-05
Landfill waste, kg/kg	0	1.5e-12	1.9e-06	3.1e-04	3.8e-03	4.1e-03	-7.3e-03
Radioactive waste, kg/kg	0	7.4e-14	8.7e-08	4.5e-09	7.5e-09	9.9e-08	-5.8e-07

Table 6a. Other environmental indicators (life cycle stages A1-5)

Parameter and unit	A1	A2	A3	A4	A5	Total A1-3	Total A1-A5
Components for reuse, kg/kg	0	0	0	0	0	0	0
Waste for material recycling, kg/kg	0	0	0	0	0	0	0
Waste for energy recovery, kg/kg	0	0	0.012	0	0	0.012	0.012
Recovered energy, MJ/kg	0	0	0	0	0	0	0

Table 6b. Other environmental indicators (life cycle stages A1-5)							
Parameter and unit	Total B1-7	C1	C2	C3	C4	Total C1 - 4	D
Components for reuse, kg/kg	0	0	0	0	0	0	0
Waste for material recycling, kg/kg	0	1.0	0	0	0	1.0	0
Waste for energy recovery, kg/kg	0	0	0	0	0	0	0
Recovered electricity, MJ/kg	0	0	0	0.042	0	0.042	0
Recovered heat, MJ/kg	0	0	0	0.082	0	0.082	0

References

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