



Environmental Product Declaration

According to the EN 15804 +A2

Accoya® wood

Scope of the declaration

Type of the EPD is Cradle to gate, modules A1-3

According to the EN 15804 + A2

The LCA was carried out by Agrodome B.V.

Based on production data from Accsys Technologies

Release Date: 14 February 2022

Validity for: 5 years

Functional unit: 1 m³



Goal and Target Group

Goal

This declaration covers the environmental effects throughout the lifetime of the product: Accoya® wood.

Target audience

The EPD can be used for building or building part level assessments by designers, architects, constructors, developers etc. The EPD is made for business-to-business communication and can be used for business-to-consumer communication purposes.

Product description

Accoya® wood is made of Radiata Pine (species) from New Zealand. The sawn wood is transported to Arnhem where it is acetylated. The acetylation process increases the stability and reduces the impact of natural elements significantly. For this reason warranties are provided up until 50 years, with an expected service life of a minimum of 60 years. During acetylation, the hydroxyl groups within the wood are replaced by acetyl groups, which are more chemically stable and attract less moisture. Minimal acetic anhydride or acetic acid residue is present in the final product (<0.5%), making Accoya® a non-toxic material, resulting in wood that can be burned/processed similarly to unmodified wood.

Accoya® wood is a modified wood product, which means it can be used in various circumstances. The wood can be made in various dimensions, depending on the application and demands of the end-user. It is recommended to use stainless steel fasteners in accordance with EN 10088-1, for example fasteners made of A2 or A4 stainless steel.

Accoya® wood is certified as FSC® mix (minimal 70% FSC® and the rest controlled wood) and Cradle to Cradle® Gold among other certificates. Please consult the website for an up-to-date overview of the sustainability credentials. <https://www.accoya.com/uk/sustainability/ecolabels-acquired/>

Composition Accoya®, generic

Material	Share
Radiata Pine	99,9 %
Acid	< 0,1 %

Technical data Accoya® wood

Durability	Class I (EN 350)
Density	average 515 kg / m ³ , on delivery
Fire resistance class	C (ASTM E84); D (EN14915)
Heat transfer (λ)	0,12 W/m·K (EN 12667)
Bending strength	40 N/mm ² (EN 408)
Flexibility	8800 N/mm ² (EN 408)

Hardness (Janka) Harness (Brinel)	side 4100 N, end grain 6600 N (ASTM D143) 2,4 kgf/mm ²
Shrink (wet to 65% RH at 20 °C) Shrink (wet to oven dry)	Radial 0.4% Tangential 0.8% Radial 0.7% Tangential 1.5%
Equilibrium moisture content	3 - 5% at 65% relative humidity, 20 °C

LCA calculation rules

Declared unit

Accoya® wood

Accoya® is made from acetylated Radiata pine, which originated from sustainably managed forest, expressed in 1 m³

Name	Value	Unit
Declared unit	1,00	m ³
Weight	515	kg/FU

Reference Service Life

The service life specified by the manufacturer is 60 years for the correct application of the product and the maintenance schedule recommended by the manufacturer.

There is no post-consumer take-back program. Considering the longevity of Accoya®, the company has not been in existence long enough for this type of initiative. Accsys, the producer of Accoya® wood has a pre-consumer offcuts take-back reuse scheme in place, which collects offcuts to be reprocessed into another product. This is not included in the calculations.

Biogenic carbon storage

Biogenic carbon storage during the lifetime of Accoya® sheet pile is calculated according to the EN16449, and with 1 kg biogenic carbon as equivalent to 44/12 kg of CO₂:

$$802.4 \text{ kg CO}_2\text{eq/m}^3 = 218,64 \text{ C/m}^3$$

Comparability

A comparison or evaluation of EPD data is only possible if all datasets have been made in accordance with EN 15804 and the same product-related standard properties and modules have been taken into account.

System boundaries

The LCA study was created for "Cradle to Gate" according to the modules below and are the basis for calculations or can be used for further calculations. All declared values relate to the specified declared unit. According to the European standard EN 15804 +A2

The environmental performance of building materials is categorized in four modules corresponding to

different lifecycle phases in the building material; Modules A (production of materials and construction), B (use phase), C (end-of-life phase of the building) and D (loads and benefits outside the system boundary).

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	
☒	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	D
																☐

For Accoya® wood, the modules A1-3 have been examined.

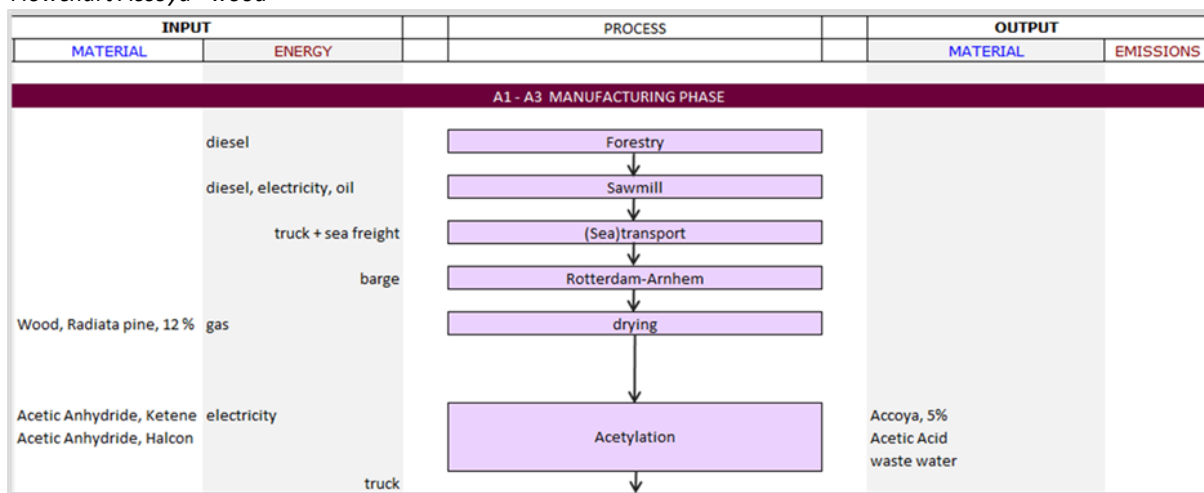
Allocations

Within the SimaPro-process, economic allocation has been applied between Accoya® -wood and the co-product acetic acid.

Production process

The production process is summarized in the flowcharts. The production process of Accoya® wood is with the module A1-3.

Flowchart Accoya® wood

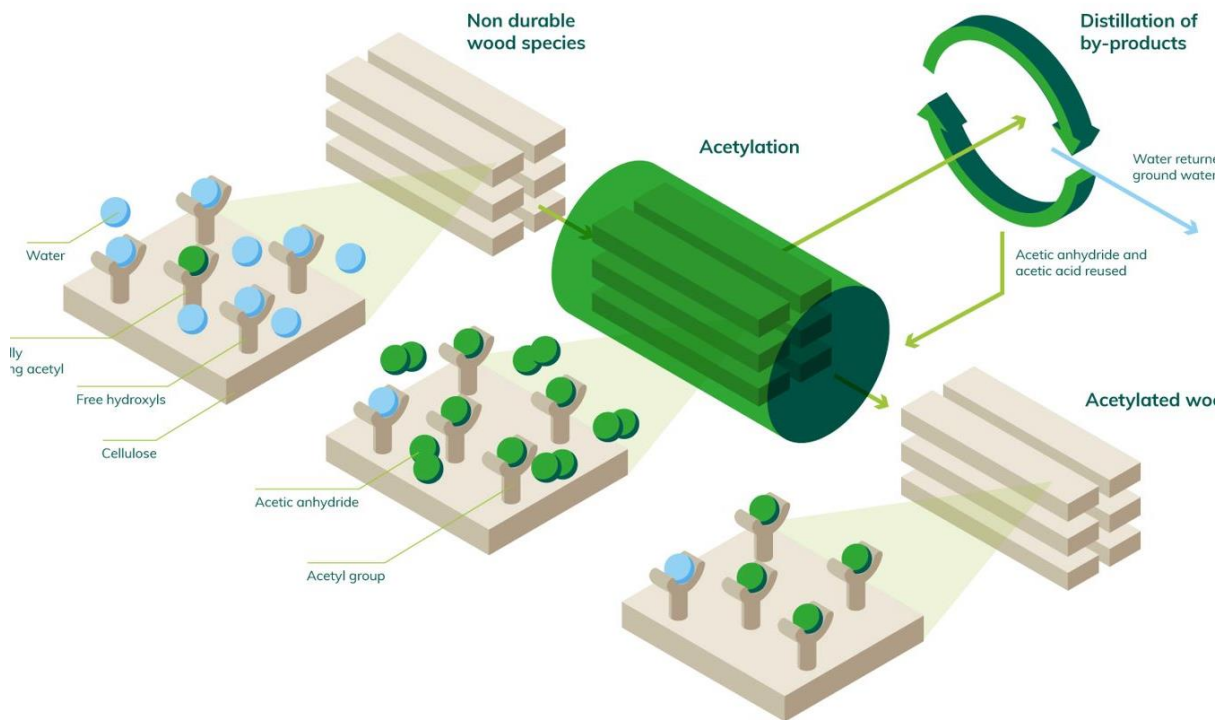


Explanation Flowchart and Life Cycle per phase

Description of production (A1-3)

The Radiata Pine is harvested, sawn to planks and dried in New Zealand. The wood is transported by ship from New Zealand to Rotterdam and then transported to the factory.

In the factory at Arnhem (NL), the planks are first selected for quality. Then acetylated, in a fully automated process. The acetic acid that is used, is coming from two different sources. During the acetylation process hydroxyl groups within the wood are replaced by acetyl groups, which are more chemically stable and attract less moisture.



After acetylation, the planks are transported to a warehouse or transported to the customers (building industry). Planks can be cut, planned, profiled and/or finger jointed and transported to the construction site by truck.

LCA results

Core Environmental Indicators per FU (m³) EN 15804 + amendment A2, Accoya® wood

Potential Environmental Impacts	Production			Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
GWP total (kg CO2 equiv/FU)	-1,31E+02	6,14E+01	1,97E+02	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
GWP fossil (kg CO2 equiv/FU)	5,55E+02	6,12E+01	1,94E+02	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
GWP biogenic (kg CO2 equiv/FU)	-6,87E+02	1,38E-01	3,21E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
GWP luluc (kg CO2 equiv/FU)	3,73E-01	4,61E-02	6,24E-02	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
ODP (kg CFC 11 equiv/FU)	1,22E-04	1,21E-05	1,79E-05	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
AP (mol H+ equiv/FU)	2,31E+00	1,60E+00	3,43E-01	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
EP - freshwater (kg P equiv/FU)	2,22E-02	5,07E-04	7,35E-03	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
EP - marine (kg N equiv/FU)	4,08E-01	4,02E-01	9,77E-02	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
EP - terrestrial (mol N equiv/FU)	4,49E+00	4,46E+00	8,68E-01	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

<i>POCP (kg NMVOC equiv/FU)</i>	1,67E+00	1,16E+00	2,45E-01	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>ADP Elements (kg Sb equiv/FU)</i>	9,14E-03	1,08E-04	5,89E-04	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>ADP fossil fuels (MJ/FU)</i>	1,49E+04	8,18E+02	2,95E+03	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>WDP (m³ water eq deprived /FU)</i>	1,13E+03	2,11E+00	-6,67E-01	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

GWP total = total Global Warming Potential (Climate Change); GWP-luluc = Global Warming Potential (Climate Change) land use and land use change; ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; WDP = water use (Water (user) deprivation potential, deprivation-weighted water consumption)

Additional Environmental Indicators per FU (m³) EN 15804 +A2, Accoya® wood

Additional Impact Categories	Production			Construction process		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
<i>PM (disease incidence)</i>	1,48E-05	2,40E-06	1,19E-06	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>IRHH (kg U235 eq/FU)</i>	2,77E+01	3,67E+00	5,79E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>ETF (CTUe/FU)</i>	1,58E+04	5,50E+02	1,76E+03	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>HTCE (CTUh/FU)</i>	3,12E-07	4,29E-08	4,04E-08	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

HTnCE (CTUh/FU)	9,37E-06	3,81E-07	8,19E-07	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
Land Use Related impacts (dimensionless)	1,88E+03	2,86E+02	2,51E+02	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; ETF = Ecotoxicity – freshwater; (potential comparative toxic unit)

PM = Particulate Matter (Potential incidence of disease due to PM emissions);

IRHH = Ionizing Radiation – human health effects (Potential Human exposure efficiency relative to U235);

Parameters describing resource use_per FU (m³) EN 15804 +A2, Accoya® wood

Resource Use	Production			Construction		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
PERE (MJ/FU, net calorific value)	5,89E+02	1,46E+01	1,98E+02	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
PERM (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
PERT (MJ/FU, net calorific value)	5,89E+02	1,46E+01	1,98E+02	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
PENRE (MJ/FU, net calorific value)	1,56E+04	8,68E+02	3,21E+03	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
PENRM (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

PENRT (MJ/FU, net calorific value)	1,56E+04	8,68E+02	3,21E+03	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
SM (kg/FU)	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
RSF (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
NRSF (MJ/FU, net calorific value)	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
FW (m ³ water eq/FU)	2,70E+01	9,25E-02	7,09E-01	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

PERE = use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

Environmental information describing output flows and waste categories per FU (m³) EN 15804 +A2, Accoya® wood

Waste Categories & Output Flows	Production			Construction process stage		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (kg/FU)	1,48E-02	1,01E-03	3,20E-03	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
Non-hazardous waste disposed (kg/FU)	4,12E+01	1,16E+01	5,87E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
Radioactive waste disposed (kg/FU)	2,72E-02	5,61E-03	5,51E-03	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA



<i>Components for reuse (kg/FU)</i>	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>Materials for recycling (kg/FU)</i>	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>Materials for energy recovery (kg/FU)</i>	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>Exported energy Heat (MJ/FU)</i>	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA
<i>Exported energy Energy (MJ/FU)</i>	0,00E+00	0,00E+00	0,00E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

Representativeness of the production process

Purchase of raw materials

Because Accsys does not have fixed suppliers for additional materials, fixing materials, spruce and foil, data from the Ecoinvent database, version 3.6 and the NMD database version 3.4 were used.

Data quality

Accsys has handed over the physical and digital documentation and drawings, as well as a material statement with the quantities of material required for the tested element.

Energy consumption of equipment required to manufacture the product under investigation is based on consumption figures for 2021.

With the exception of the manufacturing phase, standard values have been used where appropriate in accordance with Ecoinvent 3.6. This applies in particular to transport distances, processing in the waste phase and the choice of means of transport. Return transports loaded/unloaded are as per the manufacturer's instructions.

Production processes can change over time. The information used in this LCA of the production process of the element is based on measurements and observations from 2021 (energy, waste percentages, quantities net per element, production volume). Data from supplying companies are all of the most recent date possible.

Accountability

The LCA study was conducted by Agrodome B.V. in 2021.

The data provided by Accsys have been extensively discussed with Agrodome B.V.

The final version of the LCA study has been submitted to SGS for external peer review.

The LCA is carried out according to EN 15804 +A1 and +A2 in compliance with the standards from the ISO 14000 series: 14025, 14040 and 14044.

When calculating the environmental impact categories, Simapro, version 9.0.0.49 and environmental data from the Ecoinvent database, version 3.6 are used.

When making calculations in Simapro, the long-term effects (emissions that can occur after 100 years) are not taken into account. The effects of capital goods and infrastructural processes are included.

References

ISO 14040

ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044

ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

ISO 14025

ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A1

EN 15804+A1: 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

EN 15804+A2

EN 15804+A2: 2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

Sissy Verspeek and Fred van der Burgh, 2022

Background report EPD, Life cycle analysis, Accoya® wood - decking, cladding and sheet pile, Agrodome B.V. Wageningen, the Netherlands

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Declaration Agrodome B.V.

SGS Search B.V. has reviewed the background EPD report on the requirements for the EN 15804 +A2. The background report has been approved by Harry van Ewijk, SGS Search Ingenieursbureau B.V. on 4 February 2022.

Disclaimer

Comparisons based on the information from this report are only possible and valid if the starting points of the calculations and data collection are the same and if it concerns the same applications