

# Environmental Product Declaration



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019 for:

## Wood Particleboard

from

**TOKYO BOARD INDUSTRIES CO., LTD. SAKURA PLANT**



Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
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*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at [www.environdec.com](http://www.environdec.com)*






## General information

### Programme information

<b>Programme:</b>	The International EPD® System
<b>Address:</b>	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
<b>Website:</b>	<a href="http://www.environdec.com">www.environdec.com</a>
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<b>Accountabilities for PCR, LCA and independent, third-party verification</b>
<b>Product Category Rules (PCR)</b>
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): <i>Construction Products, 2019:14, version 1.2.5</i>
PCR review was conducted by: <i>The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat <a href="http://www.environdec.com/contact">www.environdec.com/contact</a></i>
<b>Life Cycle Assessment (LCA)</b>
LCA accountability: <i>Tokyo Board Industry Co., Ltd.</i>
<b>Third-party verification</b>
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: <input checked="" type="checkbox"/> EPD verification by individual verifier Third-party verifier:  <i>Mamoru Yanagisawame, (Japan Gas Appliances Inspection Association)</i> Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

## Company information

Owner of the EPD: Tokyo Board Industry Co., Ltd. <https://www.t-b-i.co.jp/>

Contact: t-b-i@t-b-i.co.jp

Description of the organisation: Tokyo Board Industry Co., Ltd. started production of particleboards in April 1984. We are the first particleboard manufacturer in Japan, who has used exclusively forest resources in industrial and general wastes as raw materials since 1991, which would otherwise be incinerated or used for landfill.

The Sakura Plant of Tokyo Board Industry Co., Ltd. started operations in October 2017 and received JIS A 5908:2015 certification, a Japanese industrial standard for particleboard, in July 2018.

Product-related or management system-related certifications: ISO 14001:2015, PEFC--COC.

Name and location of production site(s): Tokyo Board Industry Co., Ltd. Sakura Plant  
653-16 Nishimikado, Sakura-shi, Chiba-ken 285-0074, JAPAN

## Product information

Product name: Wood Particleboard

Product identification: The table below shows the classification by flexural strength and water resistance.

Bending strength	Classification	Symbol①	Bending strength
	Type 13	13	13.0 N/mm <sup>2</sup> or more in both longitudinal and transverse directions
	Type 18	18	18.0 N/mm <sup>2</sup> or more in both longitudinal and transverse directions

Water resistant	Classification	Symbol②	Main applications
	Regular	REG	Furniture, Cabinets, etc.
	Water resistant 1	MR1	Construction (beds, walls, fields), Millwork components, etc.
	Water resistant 2	MR2	Building substrate material (floors, walls, baseboards), Millwork components, etc. that require high water resistance.

The result of the environmental performance index displays the average of 8 sets of bending strength, water resistance, and thickness as follows.

No.	bending strength ①	water resistance ②	Thickness(mm)
I	13	REG	15 23 23.5 24 28 30
II	13	REG	20 25
III	13	REG	10 12
		MR1	15
IV	13	REG	18
V	18	MR1	20 30 31
VI	18	MR1	9 12 18 25
VII	18	REG	24.8
VIII	18	MR1	22
		MR2	9 11.8

Product description: Particleboards are wood products, made of small chips of timber, lumber, and wood. First, the wooden materials are crumbled into chips. The chips are bonded with glues, and then compressed into boards by a thermal compressor.

Particleboards are used in various places in our daily life, such as frames of integrated kitchen systems or subflooring. They have been well utilized in the field of construction, building materials, furniture, and woodworking industries.

UN CPC code: 31431

Geographical scope: The geographical scope of this EPD is Japan.

## LCA information

Functional unit: 1m<sup>3</sup> of particleboard

Reference service life: No reference service life relevant.

Time representativeness: The calculation is made on the basis of the data collected from April 2022 to March 2023.

Database(s) and LCA software used: Ecoinvent 3.6, SimaPro 9.4.0.2

Description of system boundaries: Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D)

Results of the environmental performance indicators: For each indicator, declare the average results of the included products

System diagram:

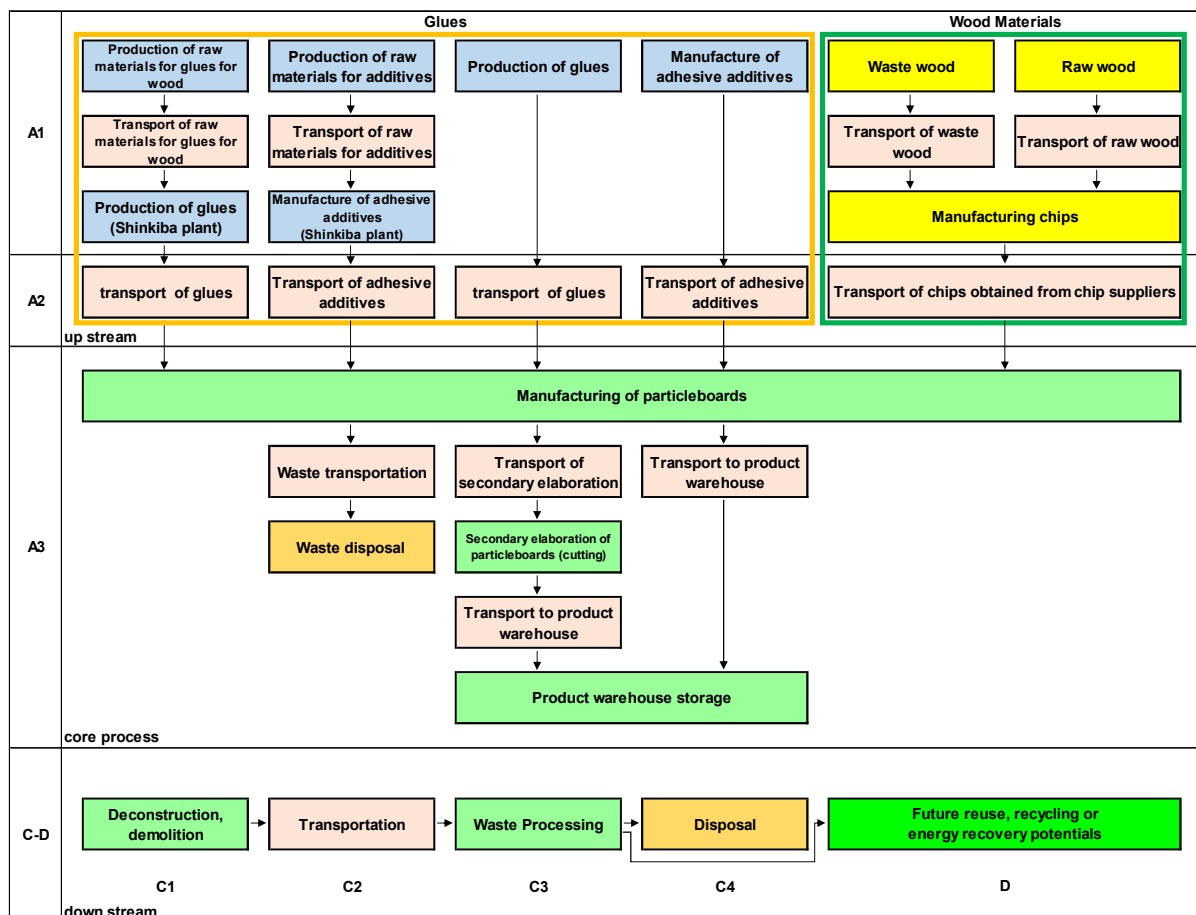


Figure 1- System diagram

Cut-off rules: Data collection includes major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process of more than 1% of the total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of the energy usage or mass.

Allocation rules: The survey makes assignments based on physical properties (mass, volume, etc.) according to EN 15804.

Climate impacts of the energy sources behind the electricity grids: 191g CO<sub>2</sub> eq./kWh.

Information about the scenario: The end-of-life modelling is based on the most realistic scenario and uses average values for wood waste treatment in the Tokyo metropolitan area of Japan.

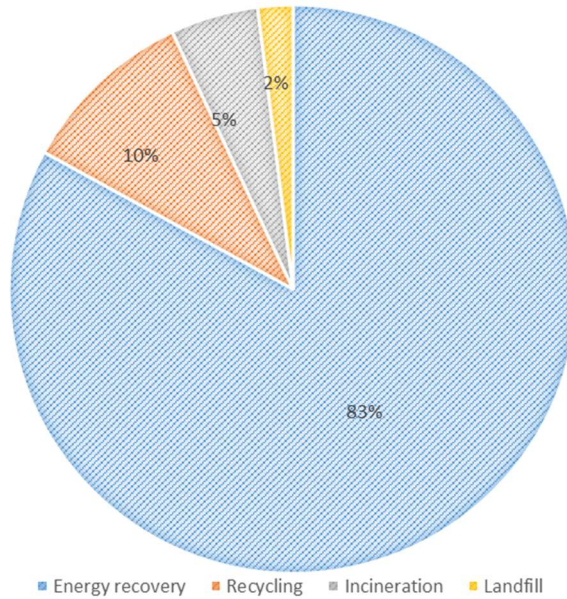


Figure 2- End of life modelled scenario.

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	JP	JP	JP	ND	ND	ND	ND	ND	ND	ND	ND	ND	JP	JP	JP	JP	JP
Specific data used	100%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

## Content information

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Waste wood	628	0	100
Glues	51.4	0	0
Water	57.75	0	0
TOTAL	730	0	73
Packaging materials	Weight, kg	Weight-% (versus the product)	
*1 PP	0.05	0.007	
*1 Metal	0.01	0.001	
*1 Total	0.06	0.008	
*2 PE	0.06	0.008	

\*1 and \*2 are used depending on the customer's request.



## Results of the environmental performance indicators

### Mandatory impact category indicators according to EN 15804

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq.	4.44E+02	1.81E+00	2.52E-02	1.42E-02	1.78E-01	-3.19E-02
GWP-biogenic	kg CO <sub>2</sub> eq.	-1.15E+03	1.16E-04	1.45E-05	1.15E+03	1.25E-04	-1.15E+02
GWP-luluc	kg CO <sub>2</sub> eq.	4.67E-01	3.27E-05	1.57E-05	1.96E-06	2.90E-05	-1.50E-05
GWP-total	kg CO <sub>2</sub> eq.	-7.08E+02	1.81E+00	2.52E-02	1.15E+03	1.78E-01	-1.66E-01
GWP-GHG <sup>1</sup>	kg CO <sub>2</sub> eq.	4.28E+02	1.80E+00	2.49E-02	1.40E-02	1.73E-01	-3.16E-02
ODP	kg CFC 11 eq.	5.82E-05	3.81E-09	5.03E-09	1.24E-09	1.79E-08	-5.25E-09
AP	mol H <sup>+</sup> eq.	2.26E+00	4.83E-04	7.63E-05	5.65E-05	1.02E-02	-1.06E-04
EP-freshwater	kg P eq.	1.02E-01	1.76E-05	2.53E-06	1.78E-06	2.50E-05	-3.45E-06
EP-marine	kg N eq.	6.29E-01	3.08E-04	1.43E-05	9.16E-06	4.80E-03	-1.89E-05
EP-terrestrial	mol N eq.	4.26E+00	2.45E-03	1.55E-04	9.78E-05	5.58E-02	-2.04E-04
POCP	kg NMVOC eq.	1.43E+00	5.95E-04	5.79E-05	3.00E-05	1.47E-02	-7.15E-05
ADP-minerals&metals*	kg Sb eq.	6.05E-03	1.08E-07	1.50E-07	7.78E-09	4.25E-07	-1.36E-07
ADP-fossil*	MJ	6.95E+03	3.97E-01	3.61E-01	1.87E-01	2.33E+00	-4.46E-01
WDP	m <sup>3</sup>	1.80E+02	3.34E-02	1.57E-03	5.14E-03	4.25E-01	-4.99E-03

#### Acronyms

GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

<sup>1</sup> The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

\* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

### Additional environmental impact indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	1.68E-05	2.57E-09	1.48E-09	1.90E-10	8.85E-08	-1.42E-09
IRP	kgBq U235 Aquiv.	3.06E+01	9.68E-04	1.65E-03	1.34E-03	4.00E-03	-2.38E-03
ETP-fw	CTUe	1.79E+04	9.29E+00	3.59E-01	1.23E-01	2.10E+00	-3.99E-01
HTP-c	CTUh	3.54E-06	2.43E-10	1.32E-11	5.28E-12	9.97E-09	-1.52E-11
HTP-nc	CTUh	3.48E-05	4.38E-08	3.09E-10	6.69E-11	1.74E-09	-3.16E-10
SQP	Pt	1.36E+03	1.86E-01	1.74E-01	3.11E-02	9.14E-01	-1.73E-01

#### Acronyms

PM = Potential incidence of disease due to PM emissions; IRP = Potential Human exposure efficiency relative to U235; ETP-fw = Potential Comparative Toxic Unit for ecosystems ; HTP-c = Potential Comparative Toxic Unit for humans - cancer effects; HTP-nc = Potential Comparative Toxic Unit for humans - non-cancer effects; SQP = Land use related impacts/Soil quality

### Resource use indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	3.12E+02	9.24E-03	5.91E-03	8.36E-03	3.22E-02	-1.10E-02
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.12E+02	9.24E-03	5.91E-03	8.36E-03	3.22E-02	-1.10E-02
PENRE	MJ	4.22E+04	1.68E+00	1.03E+00	1.14E+00	1.03E+01	-1.70E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	4.22E+04	1.68E+00	1.03E+00	1.14E+00	1.03E+01	-1.70E+00
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m <sup>3</sup>	2.55E+01	2.49E-03	3.64E-04	7.83E-04	4.57E-02	-8.67E-04

#### Acronyms

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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water



## Waste indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	2.60E-01	1.78E-05	2.68E-05	6.16E-06	2.65E-04	-2.76E-05
NHWD	kg	1.02E+02	7.83E-01	1.18E-02	2.98E-03	3.65E+01	-1.24E-02
RWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Acronyms HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed

## Output flow indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	6.77E-01	0.00E+00	0.00E+00	7.30E+01	0.00E+00	0.00E+00
MER	kg	3.27E+02	0.00E+00	0.00E+00	6.06E+02	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Acronyms CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

## Information on biogenic carbon content

Results per functional or declared unit	
BIOGENIC CARBON CONTENT	Unit
Biogenic carbon content in product	kg C 2.37E+02
Biogenic carbon content in packaging	kg C 6.50E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>.

## Additional information

Information about recycling: The product itself can be recycled repeatedly as raw material for particleboards. For this purpose, plastic resin, non-ferrous metal, cloth, paper etc. should be removed from the product. In recycling the particleboard used for furniture or woodworking such as frames of integrated kitchen system, case goods, plastic resin, non-ferrous metal, surface material, should be removed. When the particleboard used for construction and/or building material e.g, subflooring, is recycled, plastic resin, non-ferrous metal and height adjusters should be removed.

Japanese standards equivalent to EN Standard: For the testing method of formaldehyde, Japanese standards are applied, and EN Standard is not applicable to this product because the horizontal standards for measurement of the release of formaldehyde from construction products using harmonized test methods according to the provisions of the respective technical committees for European product standards are not available.

EN 312 is applied in the EU market, but JIS A1460, which is an equivalent standard to EN312, is applied in the Japanese market.

Japanese Standard	EN Standard
JIS A 5908	EN312, 1350-1
JIS A 1460	EN120, 717-1

\*Desiccator method is used.

(Products are distributed and used only in the Japanese market)

Other information: Since the product is mostly made from wood, avoid the handling near the fire. In order to lengthen the life of the product, avoid the use in high-humidity environment.

Consideration of recycling: Materials used for the particleboards manufactured by Tokyo Board Industries Co., Ltd. are woodchips from demolition materials and classified as “Material Recycle” in the concept of wood cascading use. Forests play a specific and important role in the global carbon cycle by absorbing carbon dioxide during photosynthesis, storing carbon above and below ground. Burning recyclable wood out or using it for thermal recycling contributes to CO<sub>2</sub> release into the atmosphere and causes global warming (See Figure 3).The most efficient use of wood is to reuse or recycle the resource as many times as possible, desirably from larger units to smaller composites, and finally to only burn the wood waste, that cannot be recycled as thermal recycling. While cascading the forest-based resource, afforestation and proper forest management should be carried out. It could increase the carbon stored in wood and consequently minimize its contribution to greenhouse effects.

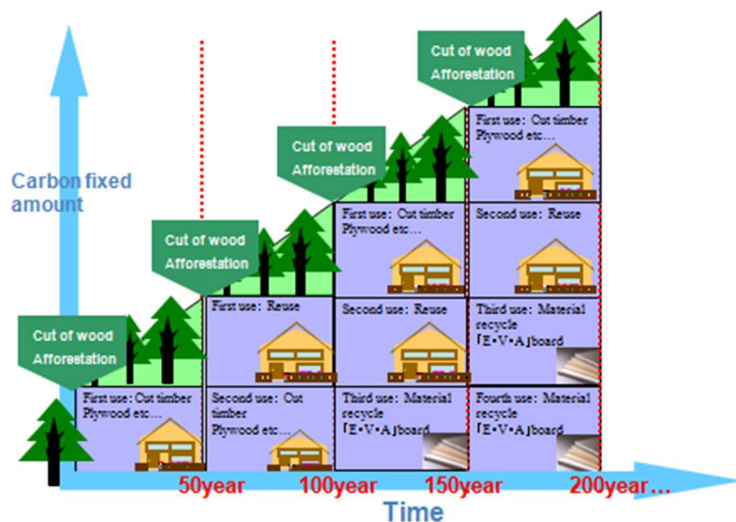


Figure 3- Recycling Model

\*Afforestation described in the model above is not covered by this EPD, for conducting the life cycle environmental impact assessment at the stage of the primary use. The rough wood described in the life cycle flow diagram are the materials with no market value and diverted from the waste stream, which is not a resource produced by the afforestation or forestry activities carried out to provide raw materials.

## Differences versus previous versions

2022-01-01 Version 1

2022-05-12 Version 2

EN 15804: This EPD has changed the reference to EN 15804 from EN 15804:2012+A1:2013 to EN 15804:2012+A2:2019. With this change, we added modules C1-C4 and D ratings, environmental indicators.

Data update: All data collected have been updated to April 2021-March 2022.

Database(s) and LCA software: The LCA software has been changed from self-developed software to SimaPro 9.4.0.2, (Ecoinvent 3.6).

2023-07-01 Version 3

Data update: All data collected have been updated to April 2022-March 2023.

2023-08-28 Version 3.1

Environmental performance index results: Each index declared the average result of the products involved.

2023-10-02 Version 3.2

Environmental performance index results: For GWP-biogenic calculation results, we balanced A1, A2, and C3.

2023-10-10 Version 3.3

Publication date, Revision date and Valid until: Revised publication date, revision date and valid until.

## Reference

Product Category Rules for Construction Products, PCR2019:14, 2022-11-01 (version 1.2.5)  
General Programme Instructions of the International EPD System. Version 4.0  
EN 15804:2012+A2:2019, Sustainability of construction works - Environmental Product Declarations  
– Core rules for the product category of construction products  
ISO 14025:2006 Preview Environmental labels and declarations - Type III environmental declarations -  
- Principles and procedures  
ISO 14040:2006 Environmental management - Life cycle assessment-Principles and framework  
ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines  
LCA Report (2022:ver.1)by Tokyo Board Industries Co., Ltd. Sakura Plant  
Ecoinvent Centre, [www.ecoinvent.org](http://www.ecoinvent.org)

