

# Environmental Product Declaration



## FORTA-FI®



ASTM INTERNATIONAL

According to  
EN 15804 + A2  
ISO 14025

## 1. General Information

**Manufacturer Name:** FORTA – 100 Forta Drive Grove City, PA 16127-6399 USA

**Program Operator:** ASTM International  
100 Barr Harbor Drive  
West Conshohocken, PA  
19428-2959, USA

**Declaration Number:** EPD XXX

**Reference PCR:** EN 15804 + A2

**Date of Issuance:** XX, 2024

**End of Validity:** XX, 2029

**Product Name:** FORTA-FI<sup>®</sup>

**EPD Owner:** FORTA

**Declared Unit:** 1 kg of FORTA-FI<sup>®</sup>

**EPD Scope:** Cradle-to-gate (A1, A2, and A3)

**Prepared By:** WAP Sustainability Consulting

**Verification:** EN 15804 + A2 serves as the core PCR. Independent verification of the declaration according to ISO 14025 and EN 15804 + A2.

internal       external

**LCA Reviewer and EPD Verifier:** Timothy S. Brooke  
ASTM International



## 2. Product Information

### 2.1 Company Description

FORTA is a Grove City, PA., based company that supplies high quality synthetic reinforcement fibers to the global construction market. These fibers aim to reduce project costs by simultaneously extending the life of the asphalt and shortening the construction time. These reinforcement fibers are tested through research and development.

### 2.2 Product Description

The declared product is FORTA-FI<sup>®</sup> (shown in Figure 1), a high tensile strength synthetic fiber blend for asphalt. The mix of aramid and polyolefin fibers is designed to enhance your current mix design. Aramid fibers will not melt in the asphalt mix and are known for their strength and durability in both high and low temperatures.



Figure 1: FORTA-FI<sup>®</sup> product visual representation.

### 2.2 Technical Data

Table 1 provides physical property data for FORTA-FI<sup>®</sup>.

Table 1: Technical Data	
Property	Value
Materials	Polyolefin/Aramid
Appearance	Yellow fibers
Specific Gravity	0.91/1.44

### 3. LCA Calculation Rules

#### 3.1 Declared Unit

The declared unit is 1 kg of FORTA-FI<sup>®</sup> produced at FORTA's manufacturing facility.

#### 3.2 System Boundary

The system boundary for this study is limited to a cradle-to-gate focus. (see also Table 4):

- **A1 Raw material supply:** Extraction, handling, and processing of input materials.
- **A2 Transportation:** Transportation of all input materials from the suppliers to the gate of the manufacturing facility.
- **A3 Manufacturing:** The preparation processes of FORTA's manufacturing facility. This phase also includes the operations of the manufacturing facility and all process emissions that occur at the production facility.

#### 3.3 Estimates and Assumptions

All significant foreground data was gathered from the manufacturer based on measured values.

#### 3.4 Cut-off Criteria

The cut-off criteria for all activity stage flows considered within the system boundary conform with EN 15804 + A2: 2019 Section 6.3.6. Specifically, the cut-off criteria were applied as follows:

- All inputs and outputs for which data are available are included in the calculated effects and no collected core process data are excluded.
- A one percent cut-off is considered for renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process. The sum of the total neglected flows per module does not exceed 5% of all energy consumption and mass of inputs.
- All flows known to contribute a significant impact or to uncertainty are included.
- The cut-off rules are not applied to hazardous and toxic material flows – all of which are included in the life cycle inventory.

No material or energy input or output was knowingly excluded from the system boundary.

#### 3.5 Background Data and 3.6 Data Quality

Data was gathered for the primary material and energy inputs used in production for calendar year 2022. Table 3 describes each LCI data source for raw materials (A1), transportation (A2) and the core manufacture process (A3). Table 3 also includes a data quality assessment on the basis of the technological, temporal, and geographical representativeness.

**Table 2: Secondary Data Sources and Data Quality Assessment**

**A1: Raw Material Inputs**

Inputs	LCI Data Source	Geography	Year	Data Quality Assessment
<b>Polyolefin</b>	Ecoinvent 3.9.1: Polypropylene, granulate {GLO}  market for polypropylene, granulate   Cut-off, U	Global	2022	<b>Technology:</b> good <b>Time:</b> very good Data is <5 years old <b>Geography:</b> good
<b>Aramid</b>	Ecoinvent 3.9.1: Nylon 6 {RoW}  market for nylon 6   Cut-off, U	Global	2022	<b>Technology:</b> good <b>Time:</b> very good Data is <5 years old <b>Geography:</b> good

**A2: Transportation**

Inputs	LCI Data Source	Geography	Year	Data Quality Assessment
<b>Trucking</b>	USLCI: Transport, combination truck, average fuel mix/US	US	2018	<b>Technology:</b> very good <b>Time:</b> good Data is <10 years old <b>Geography:</b> very good
<b>Rail</b>	USLCI: Transport, train, diesel powered/US	US	2018	<b>Technology:</b> very good <b>Time:</b> good Data is <10 years old <b>Geography:</b> very good

**A3: Manufacturing**

Energy	LCI Data Source	Geography	Year	Data Quality Assessment
<b>Electricity</b>	Ecoinvent 3.9.1: Electricity, high voltage {NPCC, US only}  market for electricity, high voltage   Cut-off, U	Global	2022	<b>Technology:</b> very good <b>Time:</b> very good Data is <5 years old <b>Geography:</b> very good
<b>Natural Gas</b>	USLCI: Natural gas, combusted in industrial boiler/US	Global	2018	<b>Technology:</b> very good <b>Time:</b> good Data is <10 years old <b>Geography:</b> good.
<b>Cardboard Sheets</b>	USLCI: Corrugated board box {US}  market for corrugated board box   Cut-off, U	US	2022	<b>Technology:</b> very good <b>Time:</b> very good Data is <5 years old <b>Geography:</b> very good.

<b>Pallets</b>	USLCI: Dry rough lumber, at kiln, US SE NREL /US Packaging	US	2018	<b>Technology:</b> very good <b>Time:</b> good Data is <10 years old <b>Geography:</b> very good.
<b>Water</b>	Ecoinvent 3.9.1: Tap water {GLO}  market group for tap water   Cut-off, U	Global	2014	<b>Technology:</b> very good <b>Time:</b> good Data is <10 years old <b>Geography:</b> good.
<b>Wastewater</b>	Ecoinvent 3.9.1: Wastewater, average {RoW}  market for wastewater, average   Cut-off, U	Global	2022	<b>Technology:</b> very good <b>Time:</b> very good Data is <5 years old <b>Geography:</b> good.
<b>Waste</b>	Ecoinvent 3.9.1: Inert waste, for final disposal {RoW}  treatment of inert waste, inert material landfill   Cut-off, U	Global	2022	<b>Technology:</b> very good <b>Time:</b> very good Data is <5 years old <b>Geography:</b> good.

**3.7 Period under Review**

Data was gathered for the primary material and energy inputs used in the production for calendar year 2022.

**3.8 Allocation**

FORTA produces multiple products. Since the primary data for manufacturing was only available on a facility level, the environmental load among the products produced is allocated according to its mass. For waste that is recycled, the ‘recycled content approach’ was chosen. The recycling of waste generated by the product system is cut off.

**3.9 Comparability**

This LCA was created using industry average data for upstream materials. Data variation can result from differences in supplier locations, manufacturing processes, manufacturing efficiency and fuel types used.

**4. LCA Results**

Life cycle impact assessment (LCIA) is the phase in which the set of results of the inventory analysis – the inventory flow table – is further processed and interpreted in terms of

environmental impacts and resource use inventory metrics. Tables 4 and 5 below summarize the LCA results for the cradle-to-gate (A1-A3) product system.

**Table 3: Description of the System Boundary (x: included in LCA; mnd: module not declared; mnr: module not reported)**

Product			Construction Installation		Use							End-of-Life				Benefits Beyond the System Boundary		
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
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	mnd	mnd	mnd	mnd	mnr	mnr	mnr	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd

Table 4: LCA Results per 1kg Forta-fi		
Indicator	Unit	A1-A3
<b>Mandatory Impact Category Indicators according to EN 15804 + A2</b>		
GWP-total	kg CO <sub>2</sub> eq.	3.69E+00
GWP-fossil	kg CO <sub>2</sub> eq.	3.73E+00
GWP-biogenic	kg CO <sub>2</sub> eq.	-4.04E-02
GWP-luluc	kg CO <sub>2</sub> eq.	1.30E-01
ODP	kg CFC 11 eq.	1.28E-01
AP	mol H <sup>+</sup> eq.	3.08E+00
EP-freshwater	kg P eq.	3.46E-04
EP-marine	kg N eq.	3.25E-03
EP-terrestrial	mol N eq.	3.25E-02
POCP	kg NMVOC eq.	1.25E-02
ADP- min.&metals	kg Sb eq.	9.42E-06
ADP-fossil	MJ	9.53E+01
WDP	m <sup>3</sup>	3.84E-01
<b>TRACI 2.1</b>		
AP	kg SO <sub>2</sub> eq.	3.38E-01
EP	kg N eq.	2.98E-01
GWPe	kg CO <sub>2</sub> eq.	3.74E+00
GWPi	kg CO <sub>2</sub> eq.	3.69E+00
ODP	kg CFC-11 eq.	1.14E-08
Reasources	MJ, surplus energy	0.00E+00
SFP	MJ, surplus energy	2.65E-02
<b>Resource Use Indicators</b>		
RPR <sub>E</sub>	MJ LHV	2.03E+00
RPR <sub>M</sub>	MJ LHV	0.00E+00
RPR <sub>T</sub>	MJ LHV	2.03E+00
NRPR <sub>E</sub>	MJ LHV	1.02E+02
NRPR <sub>M</sub>	MJ LHV	0.00E+00
NRPR <sub>T</sub>	MJ LHV	1.02E+02
SM	kg	0.00E+00
RSF	MJ	0.00E+00

Table 4: LCA Results per 1kg Forta-fi		
Indicator	Unit	A1-A3
NRSF	MJ	0.00E+00
RE	MJ	0.00E+00
FW	m <sup>3</sup>	2.88E+00
Waste and Output Flow Indicators		
HWD	kg	0.00E+00
NHWD	kg	6.74E-02
RWD	kg	3.00E+00
HLRW	kg	5.30E-10
ILLRW	kg	2.98E-09
CRU	kg	0.00E+00
MFR	kg	0.00E+00
MER	kg	0.00E+00
EEE	MJ	0.00E+00
EET	MJ	0.00E+00
Optional Environmental Indicators		
PM	Disease Incidences	1.44E-07
IR	kBq U235 eq.	3.94E-01
ET	CTUe	5.04E+00
HTC	CTUh	3.17E-10
HTnc	CTUh	8.07E-09
LU	Pt	2.37E+00

## 6. References

1. ASTM 2020 - ASTM Program Operator for Product Category Rules (PCR) and Environmental Product Declarations (EPDs) General Program Instructions v8, April 29<sup>th</sup>.
2. EN 15804:2012+A2:2019/AC:2021. European Committee for Standardization.
- 3.
4. ISO 21930: 2017 Building construction – Sustainability in building construction – Environmental declaration of building products.
5. ISO 14025: 2006 Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.
6. ISO 14044:2006/AMD 1:2017/ AMD 2:2020 - Environmental management - Life cycle assessment - Requirements and guidelines.
7. WAP Sustainability Consulting: 2023 - A Cradle-to-Gate Life Cycle Assessment of FORTA-FI<sup>®</sup> Manufactured by FORTA.
8. 14040:2006/AMD 1:2020 - Environmental management - Life cycle assessment - Principles and framework.