Environmental Product Declaration

In accordance with ISO 14025 for

ENTRON *blue* A – PA6.6 Granules

from

ENNEATECH AG

EPD registration number:	S-P-02933
Publication date:	2021-02-16
Revision date	2022-02-28
Version:	2
Valid until:	2025-02-14

1 Programme Information

Programme and operator	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
Product category rules (PCR)	Plastics in primary forms – UN CPC 347
PCR review was conducted by	Technical Committee of the International EPD® System
Independent third-party verification of the declaration and data, according to ISO 14025:2006	☐ EPD process certification ☒ EPD verification
Third party verifier	Andreas Ciroth GreenDelta GmbH Kaiserdamm 13, 14057 Berlin Germany
Approved by	The International EPD® System
Life cycle assessor	Alexander Boeth bregau olt GmbH Mary-Astell-Straße 10 28359 Bremen

Disclaimer

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Update of Enneatech EPD

The Enneatech EPD was first published in 2021. As Enneatech just changed the company logo, this EPD update only contains editorial changes. This EPD is valid until 2025.

2 Company Information

Owner of the EPD	ENNEATECH AG Schmiedestraße 34 26629 Großefehn Germany www.enneatech.com info@enneatech.com
Description of the organisation	ENNEATECH AG is a plastics recycling company in northern Germany. As a manufacturer of sustainable, technical plastics, ENNEATECH is one of the leading polymer specialists on the European market and sells its products internationally. Its range of products includes polyamide (PA) granules made in-house, customized compounds and innovative polyamide fiber products.
Name and location of production site	Holtmeedeweg 2 26629 Großefehn Germany

3 Product Information

Material Information	
Trade Name	ENTRON *blue* A
Article Number	e.g. 17100, 17181
UN CPC code	347 – Plastics in primary forms.
Product description	The product ENTRON *blue* A is a PA 6.6 granule consisting of 100% secondary materials. It serves as a base material for the downstream industries.
Geographical scope	Global
Polymer	Polyamide 6.6
Colour	multi-coloured, black
Granules	unfilled, reprocessed
PA 6.6 CAS No.	32131-17-2
Monomers	Hexamethylenediamine & Adipic Acid
Classification GHS	not dangerous
Compliance RoHS	fulfilled

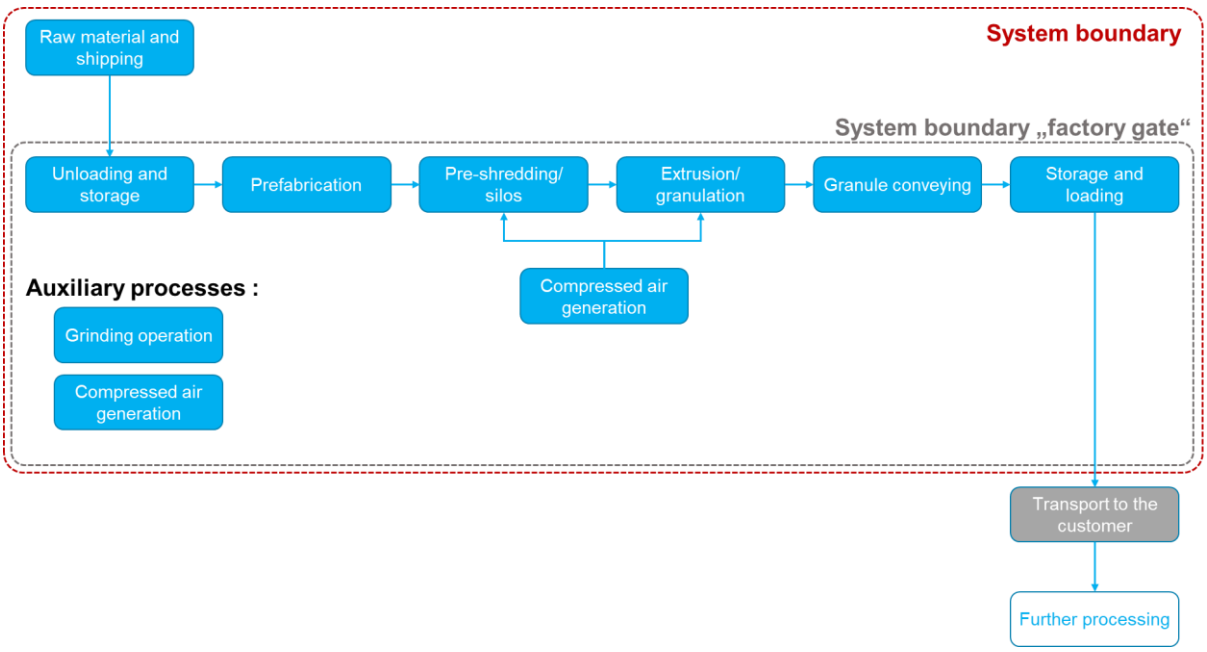
Product Properties		Article Number	
		17100	17181
Relative Viscosity	*1% - 25 °C (Sulfuric Acid)*	2,7 - 3,2	2,5 - 3,0
Viscosity Number	*0.5% - 25 °C (Sulfuric Acid)*	150 - 188	134 - 173
Ash Content	*650 °C (Muffle Furnace)*	< 0,5 %	
Moisture Content	*140 °C (Loss in Weight)*	< 0,3 %	
Extraction Content		< 1,5 %	
Density	*23 °C*	1,13 - 1,14 g/cm³	
Melting Temperature	*30-300 °C* *DSC*	255 - 265 °C	

All data are approximate values and correspond to our knowledge. The data were measured based on random samples and do not release the manufacturer from own examinations corresponding to his applications.

4 LCA Information

Declared unit	1000 kg of PA 6.6 granules
Reference service life	A reference service life is not applicable for this product category
Time representativeness	The information underlying this EPD is taken from the reference year 2019, taking into account inputs and outputs for the whole calendar year.
Database(s) and LCA software used	All the background data relevant for modelling were taken from the GaBi professional database – service pack 41, (update 2020). The software GaBi was used in version 10.0.0.71.
Description of system boundaries	cradle-to-gate (Modules A1-A3) Upstream processes include the extraction of resources as well as all relevant transport processes. All energetic input flows (electricity, fuels) and water consumption to the upstream processes are considered. All emissions to air, water and soil and treatment of waste and wastewater generated are considered. Core processes include all processing steps as well as all transports within the factory gate. In the downstream, the treatment of the associated waste is taken into account until the end of the waste status. In addition, the treatment of the wastewater generated is included.
Excluded lifecycle stages	The life cycle stages after the factory gate were excluded, as ENTRON *blue* A MC is a base material whose life cycle and disposal depend to a large extent on further processing. It is not possible to make appropriate assumptions in this respect.
More information	https://enneatech.com

System diagram



5 Content Declaration

5.1 Product

As it is a base material, the product is made of 100% polyamide 6.6. The recycled content is 100 % (post-industrial recycled content).

5.2 Packaging

Because the product is transported primarily in silo trucks, packaging materials are not required and are therefore not considered in this EPD.

6 Environmental Performance

The following information on environmental effects is based on the requirements of EN 15804:2012+A2:2019 for an impact assessment using characterization factors specified in that standard.

6.1 Potential environmental impact

Parameter	Unit	A1-A3
Global Warming Potential total (GWP)	kg CO2-eq.	2.85E+02
Global Warming Potential fossil (GWP-fossil)	kg CO2-eq.	2.77E+02
Global Warming Potential biogenic (GWP-biogenic)	kg CO2-eq.	4.96E+00
Global Warming Potential luluc (GWP-luluc)	kg CO2-eq.	3.32E+00
Stratospheric ozone depletion potential (ODP)	kg CFC-11-eq.	4.13E-11
Acidification potential of soil and water (AP)	mol H+-eq.	3.08E+00
Eutrophication potential freshwater (EP-freshwater)	kg PO4-eq.	5.18E-03
Eutrophication potential marine (EP-marine)	kg N-eq.	8.70E-01
Eutrophication potential terrestrial (EP-terrestrial)	mol N-eq.	9.39E+00
Formation potential of tropospheric ozone (POCP)	kg C2H4-eq.	2.27E+00
Potential for abiotic depletion of non-fossil resources (ADPE)	kg Sb-eq.	5.03E-04
Potential for abiotic depletion of fossil fuels (ADPF)	MJ	2.72E+03
Water scarcity (WDP)	m^3 world eq. deprived	3.48E+01

6.2 Use of resources

Parameter	Unit	A1-A3
Renewable primary energy as an energy carrier (PERE)	MJ	1.03E+04
Renewable primary energy for material use (PERM)	MJ	0.00E+00
Total renewable primary energy (PERT)	MJ	1.03E+04
Non-renewable primary energy as an energy carrier (PENRE)	MJ	2.72E+03
Non-renewable primary energy for material use (PENRM)	MJ	2.90E+04
Total non-renewable primary energy (PENRT)	MJ	3.17E+04
Use of secondary materials (SM)	kg	1.01E+03
Renewable secondary fuels (RSF)	MJ	0.00E+00
Non-renewable secondary fuels (NRSF)	MJ	0.00E+00
Use of freshwater resources (FW)	m^3	4.57E+00

6.3 Waste production and output flows

Parameter	Unit	A1-A3
Waste categories		
Hazardous waste to landfill (HWD)	kg	7.97E-01
Non-hazardous waste disposed (NHWD)	kg	3.03E+01
Disposed radioactive waste (RWD)	kg	1.35E-01
Output categories		
Components for Reuse (CRU)	kg	1.33E+00
Materials for recycling (MFR)	kg	0.00E+00
Materials for energy recovery (MER)	kg	2.39E+01
Exported electric energy (EEE)	MJ	1.19E+01
Exported thermal energy (EET)	MJ	2.77E+01

6.4 Additional Impact Categories and Indicators

Parameter	Unit	A1-A3
Potential incidence of disease due to PM emissions (PM)	Incidence of disease	4.73E-05
Potential Human exposure efficiency relative to U235 (IR)	kBq U235-eq.	1.15E+01
Eco-toxicity, freshwater (ETP-fw)	CTUe	3.19E+03
Human toxicity, cancer effects (HTP-c)	CTUh	2.20E-07
Human toxicity, non-cancer effects (HTP-nc)	CTUh	3.65E-06
Potential soil quality index (SQP)	dimensionless	7.49E+03

7 Additional Information

The secondary PA 6.6 is produced based on a load-free raw material and a relatively low-CO_2 electricity mix is used. Therefore, the significance of other influences on the carbon footprint increases. This is particularly the case for distributive transports, whose GWP share depends to a large extent on the distance to the respective customer.

Using the following formula, the GWP from distribution transports can be approximated by the quantity ordered and the delivery distance.

$$GWP_T = GWP_M + GWP_T$$

$$GWP_T = \frac{D * M * 100\%}{U} * \frac{0{,}0472}{1000}$$

GWP_T: Total global warming potential (kg CO2 eq.)

GWP_M: Global warming potential from manufacturing phase (kg CO2 eq.)

GWP_T: Global warming potential from transport processes (kg CO2 eq.)

D: Transport distance in km

M: Transported mass in kg

U: Truck utilization in %

8 References

The International EPD System	General Programme Instructions of the International EPD® System. Version 3.01
The International EPD System	Product category rules (PCR) CPC347 - Plastics in primary forms PCR2010:16, version 3.01
DIN EN ISO 14025	Environmental labels and declarations – Type III environmental declarations – Principles and procedures; 2011-10
DIN EN ISO 14040	Environmental management - Life cycle assessment – Principles and framework (ISO 14040:2006); 2009-11
DIN EN ISO 14044	Environmental management – Life cycle assessment – Requirements and guidance (ISO 14044:2006 + Amd 1:2017); 2018-05
DIN EN 15804	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products; German version EN 15804:2012+A2:2019
GaBi	Software und Datenbank zur ganzheitlichen Bilanzierung, LBP (Chair of Building Physics) University of Stuttgart and thinkstep AG, Leinfelden Echterdingen, 1992 - 2020
UN CPC	United Nations Department of Economic and Social Affairs Statistics Division: Central Product Classificateion (CPC), version 2.1