Environmental Product Declaration

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

Multi-layer fiber-reinforced pipes

Tubi Fiber T da Ø20 mm a Ø125mm, Fiber COND da Ø32mm a Ø315mm, Fiber LIGHT da Ø125mm a Ø250mm, UV RES da Ø20mm a Ø315mm e FIRE RES da Ø20mm a Ø125mm.

from

AQUATECHNIK GROUP SPA – MAGNAGO

Product category rules (PCR): *PCR 2019:14 (v1.11)*

Geographical area: The services are calculated with reference to the Aquatechnik plant - Magnago (MI). The market is international.

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-05040
Publication date:	2021-11-09
Valid until:	2026-11-08

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.

Programme information

Programme:	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): *PCR 2019:14 Construction products and construction services (v1.11)* PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: SGS Italia S.p.A. via Caldera, 21, 20153 – Milano T +39 02 73 931 - www.it.sgs.com *Accreditation certification n 006H* Accredited by: *ACCREDIA*
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

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Company information

EPD owner: Aquatechnik Group S.p.A – Via P.F. Calvi, 40– Magnago (MI)

Reference person: Gabriele Depinto gabriele.depinto@aquatechnik.it
Technical support: SpinLife S.r.l – Spinoff dell'Università di Padova, via Morgagni 30, Padova

Description of the organization: Aquatechnik S.p.a (hereinafter referred to as Aquatechnik) produces and distributes systems for water-sanitary, heating, air-conditioning and compressed air systems that can be used in civil and industrial sectors. The production sites, located in Magnago (MI), include a series of departments for the various manufacturing processes: injection molding, extrusion and tube coating, PUR foaming, assembly of special pieces (manifolds). The company is completed with the laboratories and the research center, which, together with a high level of automation, ensure high quality and production standards.
Aquatechnik was born in the early Eighties, after a long experience of the current president and founder Lino Petenà in the hydrothermal-sanitary sector, with the aim of introducing on the market a new system of pipes and fittings for plant engineering in plastic material as an alternative to the traditional galvanized pipe. Immediately, the introduction of the fusio-technik welding system met with great success and already in 1984 the company had to expand its facilities to adapt to the levels of marketing achieved. The first headquarters will be about 1000 m2 located in Busto Arsizio. At the beginning of the 90s, Educational Centers were created to disseminate their systems through meetings aimed at installers and technicians in the sector and the company moved to Magnago (MI), where it still resides. In the new millennium Aquatechnik asserted itself with a patented connection system between multilayer pipes and PPSU fittings: the safety system. Presented in a first brass-plastic version (safety-metal) and later with a connection entirely in plastic material (PPSU).

Figure 1: Aquatechnik S.p.A production plant

Name and location of the production site: Aquatechnik S.p.A – Via P.F. Calvi, 40– Magnago (MI)

Product information

Product Name: **Fiber-reinforced multilayer tubes**

Products description:

3-layer piping (PP-RCT, PP-GF20% and PP-R) made of polymeric material used in the civil or industrial sector for water-sanitary systems.

The family of multilayer pipes includes Fiber T pipes from Ø20mm to Ø125mm, Fiber COND from Ø32mm to Ø315mm, Fiber LIGHT from Ø125mm to Ø250mm, UV RES from Ø20mm to Ø315mm and FIRE RES from Ø20mm to Ø125mm.

The product chosen as a reference is Fibert T as it is the most sold in the reference year of the study.

All environmental performance indicators have been calculated taking as a reference the smaller, larger and / or intermediate diameter of Fiber T pipes, Fiber COND, Fiber LIGHT, UV RES and FIRE RES. The values differ from each other by less than 10% with reference to the impacts of the representative product.

UN CPC code: 36320

Geographical area: Italy

The performances were calculated with reference to the Aquatechnik plant - Magnago (MI). The reference market is international.

Table 1: Technical data of the product family being analyzed

Poduct	Diameter	SDR	Thermal conductivity at 20 ° C [W/mK]	Coefficient of expansion [mm / mK]
Fiber T	20	7,4	0,190	0,035
Fiber T	125	7,4	0,190	0,035
Fiber Cond	32	11	0,190	0,035
Fiber Cond	315	11	0,190	0,035
Fiber Light	125	17,6	0,190	0,035
Fiber Light	250	17,6	0,190	0,035
UV res	20	7,4	0,190	0,035
UV res	160	11	0,190	0,035
UV res	315	11	0,190	0,035
Fires	20	7,4	0,190	0,035
Fires	125	11	0,190	0,035

The SDR (Standard Dimensional Ratio) evaluated as the ratio between the external diameter of the pipe and its thickness.

LCA information

Declared unit: 1 kg of piping in multilayer polymeric material with a diameter of 20mm and a weight of 0.158 kg / m per meter.

Time representativeness: The primary data cover a period of 12 months, reference year 2019.

Used database and software: Ecoinvent 3.5 database; SimaPro software version 9.1.1.1.

System boundaries and process units excluded: The system boundaries include the mandatory modules A1, A2, A3, C1, C2, C3, C4 and D required by Standard EN 15804 (CEN, 2019), as reported in the following table according to a "from cradle to gate with module C1-C4 and module D" type application. It is emphasized that the construction, maintenance and decommissioning of infrastructures, understood as buildings, and the occupation of industrial land were not considered, since it is believed that their contribution to the environmental impact of the declared unit is negligible. The consumption of oils for machine maintenance and water treatment is included. It is also emphasized that the deployment, installation and maintenance phases are not included in the study.

The table below shows a detail of the modeling of the various modules.

Module	Scenario
A1	This unit groups together the impacts associated with the use of raw materials and the consumption of electricity, as well as the consumption of methane.
A2	This unit groups together the impacts associated with the transport of materials and packaging of the incoming finished product
A3	This unit groups together the impacts associated with the processing and treatment of waste for the finished product, as well as water consumption
C1	This phase includes the demolition of the pipeline in the construction having assumed a civil scenario. To uninstall 1 kg of hose, an uninstall time of 2 minutes is assumed using a demolition hammer with 600 Watt power.
C2	This phase includes the transportation of the discarded pipes. Average distance from the demolition site to the waste treatment is assumed to be 50km for landfill disposal, 150km for the recovery plant and 600km for the recycling plant. The transport was modeled with trucks 16 - 32 t, EURO 4
C3	This phase includes disassembly for recycling of the pipes.
C4	Disposal is the final stage in the life of the product. It is assumed that 53% of the PP is disposed of in landfills and 29% sent for incineration. The remainder is sent to the recycling plant.
D	This module contains the potential impacts and benefits related to the recycling of the product aimed at the production of a new tenant in the event that waste management takes place in an optimal way. The calculated value is excluded from the sum of the total impacts.

The criterion chosen for the initial inclusion of the input and output elements is based on the definition of a 1% cut-off level, in terms of mass, energy and environmental relevance. This means that a process has been neglected if it is responsible for less than 1% of the total mass, primary energy and total impact. However, all the processes for which the data are available have been taken into consideration, even if with a contribution of less than 1%.

The method chosen to evaluate the potential environmental impacts of the product subject of this study is the method provided by the standard EN 15804 (CEN, 2019).

Electricity modeling (Module A1): The modeling of electricity consumption in module A1 was carried out using the residual Italian national mix (using the AIB 2020 report as a data source. The breakdown of the energy sources used is shown

Source	Residual Mix 2019
Renewables Unspecified	0.80%
Solar	4.36%
Wind	1.10%
Hydro&Marine	2.05%
Geothermal	0.01%
Biomass	1.17%
Nuclear	9.02%
Fossil Unspecified	5.65%
Lignite	0.50%
Hard Coal	17.75%
Gas	55.89%
Oil	1.70%
TOTAL	100,00%

	Product Stage			Construction Stage		Use stage							End of life stage				Benefits beyond system boundaries
	Raw Materials Supply	Transport	Manufacturing	Transport to site	On site processes	Use	Maintence	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/Demolition	Transport	Waste processing	Disposal	Reuse/Recovery/Recycling
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	EU 27	EU 27	IT										EU 27	EU 27	EU 27	EU 27	EU 27
Specific data used	>90%																
Variation - products	< 10%																
Variation - sites	Not relevant																

ND=Non declared

Content statement

The product does not contain substances included in the "Candidate list of substances of very high concern (SVHC) for authorization" in a percentage greater than 0.1%.

Materials

Table 2: Summary of the quantity of raw material in the product. The data refer to 1 m of pipe.

Raw materials	Min [%]	Max [%]
Polipropilene	61,21%	67,52%
Polipropilene rinforzato con fibra di vetro	29.94%	35.21%
Additivi	2,49%	5,49%

Packaging

Distribution: The finished product packaging consists of a low density polyethylene (LLDPE) plastic bag weighing 0.020 kg and two polyethylene caps affixed to the ends of the tube itself with a total weight of 0.026 kg.

Environmental performance - Potential environmental impact

The values below relating to the FIBER T 20mm product are shown below.

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	Total	D
GWP-total	kg CO_2 eq	4,00E+00	1,93E-01	2,35E-01	1,41E-01	2,93E-02	0,00E+00	8,26E-01	5,43E+00	-5,67E-01
GWP-fossil	kg CO_2 eq	3,87E+00	1,93E-01	2,15E-01	1,41E-01	2,93E-02	0,00E+00	8,26E-01	5,27E+00	-5,32E-01
GWP-biogenic	kg CO_2 eq	1,42E-01	5,48E-05	1,98E-02	2,25E-05	8,40E-06	0,00E+00	1,08E-04	1,62E-01	-3,66E-02
GWP-luluc	kg CO_2 eq	6,85E-04	5,71E-05	2,84E-05	1,19E-05	8,63E-06	0,00E+00	1,02E-05	8,02E-04	2,80E-05
ODP	kg CFC_{11} eq	2,74E-07	4,44E-08	1,52E-09	3,17E-08	6,78E-09	0,00E+00	8,20E-09	3,67E-07	-5,13E-08
AP	mol H^+ eq	2,81E-02	6,23E-04	8,02E-04	9,04E-04	1,50E-04	0,00E+00	2,83E-04	3,08E-02	-5,13E-03
EP-freshwater	kg P eq	7,64E-04	1,57E-05	1,39E-05	6,43E-06	2,37E-06	0,00E+00	3,78E-06	8,06E-04	-9,90E-05
EP-freshwater	kg PO_4^{3-}eq	2,34E-03	4,81E-05	4,28E-05	1,97E-05	7,28E-06	0,00E+00	1,16E-05	2,47E-03	-3,04E-04
EP-marine	kg N eq	3,38E-03	1,42E-04	1,42E-04	3,64E-04	5,04E-05	0,00E+00	3,12E-04	4,39E-03	-4,43E-04
EP-terrestrial	mol N eq	7,68E-02	1,57E-03	1,45E-03	4,00E-03	5,55E-04	0,00E+00	1,23E-03	8,56E-02	-1,59E-02
POCP	kg NMVOC eq	1,25E-02	5,42E-04	7,40E-04	1,12E-03	1,57E-04	0,00E+00	3,54E-04	1,54E-02	-1,44E-03
ADP – mineral&metals*	kg Sb eq	2,92E-06	5,82E-07	4,28E-08	4,68E-08	8,78E-08	0,00E+00	8,65E-08	3,76E-06	3,60E-08
ADP – fossil*	MJ	9,81E+01	2,95E+00	5,65E+00	2,03E+00	4,51E-01	0,00E+00	5,64E-01	1,10E+02	-1,24E+01
WDP*	m^3 world eq. depriv.	1,27E+00	2,02E-02	9,06E-02	1,09E-02	3,07E-03	0,00E+00	1,71E-02	1,41E+00	-1,45E-01
GWP GHG	kg CO_2 eq	3,90E+00	1,93E-01	2,28E-01	1,41E-01	2,93E-02	0,00E+00	8,26E-01	5,32E+00	-5,37E-01

GWP-total: Global Warming Potential total; **GWP-fossil**: Global Warming Potential fossil; **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 Exceedence; **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 Exceedence; **POCP**: Formation potential of tropospheric ozone; **ADP-minerals&metals**: Abiotic depletion potential for non fossil resources*; **ADP-fossil**: Abiotic depletion for fossil sources potential*; **WDP**: Water (user) deprivation potential, deprivation-weighted water consumption*. **The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

Potential incidence of disease due to PM emissions (PM), Potential Human exposure efficiency relative to U235 (IRP), Potential Comparative Toxic Unit for ecosystems (ETP-fw), Potential Comparative Toxic Unit for humans (HTP-c), Potential Comparative Toxic Unit for humans (HTP-nc) and Potential soil quality index (SQP) are not declared (ND) in this document.

Use of resources

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	Total	D
PERE	MJ	1,29E+00	2,14E-02	9,50E-02	9,17E-03	3,24E-03	0,00E+00	1,41E-02	1,43E+00	-7,70E-02
PERM	MJ	1,53E+00	9,90E-03	7,65E-02	2,57E-03	1,50E-03	0,00E+00	2,48E-03	1,62E+00	-2,21E-01
PERT	MJ	2,82E+00	3,13E-02	1,71E-01	1,17E-02	4,74E-03	0,00E+00	1,66E-02	3,06E+00	-2,98E-01
PENRE	MJ	6,35E+01	2,95E+00	2,75E+00	2,03E+00	4,51E-01	0,00E+00	5,64E-01	7,22E+01	-1,24E+01
PENRM	MJ	3,46E+01	0,00E+00	2,90E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,75E+01	0,00E+00
PENRT	MJ	9,81E+01	2,95E+00	5,65E+00	2,03E+00	4,51E-01	0,00E+00	5,64E-01	1,10E+02	-1,24E+01
SM	kg	0,00E+00	0,00E+00	0,00E+00	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	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	0,00E+00	0,00E+00	0,00E+00
FW	m3	3,17E-02	5,39E-04	2,16E-03	2,78E-04	8,19E-05	0,00E+00	4,00E-04	3,52E-02	-3,13E-03

PERE: Use of renewable primary energy excluding resources used as raw materials; **PERM**: Use of renewable primary energy resources used as raw materials; **PERT**: Total use of renewable primary energy; **PENRE**: Use of non-renewable primary energy excluding 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; **SM**: Secondary material; **RSF**: Renewable secondary fuels; **NRSF**: Non-renewable secondary fuels; **FW**: Net use of fresh water.

Production of waste and outflows

Waste production

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	Total	D
HWD	kg	6,84E-05	1,88E-06	5,28E-07	9,04E-07	2,84E-07	0,00E+00	5,23E-07	7,25E-05	-1,57E-05
NHWD	kg	1,08E-01	1,41E-01	2,85E-02	2,21E-03	2,12E-02	0,00E+00	5,63E-01	8,63E-01	1,85E-02
RWD	kg	1,39E-04	1,99E-05	1,68E-06	1,41E-05	3,05E-06	0,00E+00	3,72E-06	1,82E-04	-1,88E-05

HWD: Hazardous waste disposed; **NHWD**: Non-hazardous waste disposed; **RWD**: Radioactive waste disposed.

Outgoing flows

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	Total	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	6,32E-02	0,00E+00	0,00E+00	1,83E-01	0,00E+00	2,46E-01	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,76E+00

CRU: Components for reuse; **MFR:** Material for recycling; **MER:** Materials for energy recovery; **EE:** Exported energy.

Information on biogenic carbon content

The Fiber T 20mm product contains 0 kgC per kg of tube, while the content in the packaging is equal to 1.20E-03 kgC per kg of tube.

Type and source of data

In choosing the data to be used for the LCA study, primary data collected at Aquatechnik through a campaign of measurements were privileged. The primary data cover a period of 12 months, from January 2019 to December 2019 and concern:

- the transport of incoming materials for the production of the analyzed products (distance traveled, type of fuel, Euro class of vehicles, flow rate);
- raw materials used (quantity and type);
- the production process of multilayer pipes and fittings at Aquatechnik (mass balance and energy consumption);
- waste produced at Aquatechnik (quantity and destination);
- electricity consumption for both technological and office uses;
- consumption of LPG for the production of heat in the offices;
- consumption of chemical products such as bleach for cleaning the cooling water of the closed-cycle system.

In the event that primary data or models for calculating such data were not available, secondary data obtained by consulting internationally recognized databases were used, preferring where possible the use of the most up-to-date ones. The secondary data in particular concern:

- The combustion processes of vehicles: emissions, maintenance, use of the road network, fuel consumption (data sets Ecoinvent version 3.5);
- Operating machines: emissions (Ecoinvent 3.5 data sets);
- Electricity: distribution network, losses (Ecoinvent 3.5 data sets);

- The productions of the materials used (Ecoinvent 3.5 data sets).
- the supply of LPG for heating the offices;
- the water supply for the cooling system.

It should also be noted that the extrusion and molding processes do not give rise to particularly significant gaseous emissions.

Data proxies are less than 10% as required by the program rules.

References

- General Programme Instructions of the International EPD® System. Version 3.01
- Construction Products and construction services 2019:14 version 1.11 valid until 2024-12-20
- European Residual Mixes. Results of the calculation of Residual Mixes for the calendar year 2019. AIB, 2020

Standard

- ISO 14040:2006/Amd 1:2020 Environmental management - Life cycle assessment - Principles and framework – Amendment 1
- ISO 14044:2006/Amd 2:2020 Environmental management — Life cycle assessment — Requirements and guidelines — Amendment 2
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction works

Internal documents

- Aquatechnik 2020. Catalogo Fusio-Technik
- Studio di Life Cycle Assessment di 11 tubi e 5 raccordi in polipropilene in vari diametri di Aquatechnik S.p.A - Report LCA Revisione n. 03 del 22/10/2021

Annex

Table 3: List of products compatible with this document for the piping range

Commercial name	Diameter [mm]	Product code
Fiber T	20	61358
Fiber T	25	61360
Fiber T	32	61362
Fiber T	40	61364
Fiber T	50	61366
Fiber T	63	61368
Fiber T	75	61370
Fiber T	90	61372
Fiber T	110	61374
Fiber T	125	61376
Fiber Cond	32	61462U
Fiber Cond	40	61464U
Fiber Cond	50	61466U
Fiber Cond	63	61468U
Fiber Cond	75	61470U
Fiber Cond	90	61472U
Fiber Cond	110	61474U
Fiber Cond	125	61476U
Fiber Cond	160	61478U
Fiber Cond	200	61480U
Fiber Cond	250	61482U
Fiber Cond	315	61484U
Fiber Light	125	61476UZ
Fiber Light	160	61478UZ
Fiber Light	200	61480UZ
Fiber Light	250	61482UZ
Fiber Light	315	61484UZ
Fiber Light	355	61486UZ
Fiber Light	400	61488UZ
UV res	20	61358SR
UV res	25	61360SR
UV res	32	61362SR
UV res	40	61364SR
UV res	50	61366SR
UV res	63	61368SR
UV res	75	61370SR

Commercial name	Diameter [mm]	Product code
UV res	90	61372SR
UV res	110	61374SR
UV res	125	61376SR
UV res	160	61478SR
UV res	200	61480SR
UV res	250	61482SR
UV res	315	61484SR
Fires	20	61358FR
Fires	25	61360FR
Fires	32	61462FR*
Fires	40	61464FR*
Fires	50	61466FR*
Fires	63	61468FR*
Fires	75	61470FR*
Fires	90	61472FR*
Fires	110	61474FR*
Fires	125	61476FR*
Fires	32	61462FR
Fires	40	61464FR
Fires	50	61466FR
Fires	63	61468FR
Fires	75	61470FR
Fires	90	61472FR
Fires	110	61474FR
Fires	125	61476FR

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