Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

THREADED TEE FEMALE – Ø25,00 mm

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-05036
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

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 15804:2012+A2:2019.

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.

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).

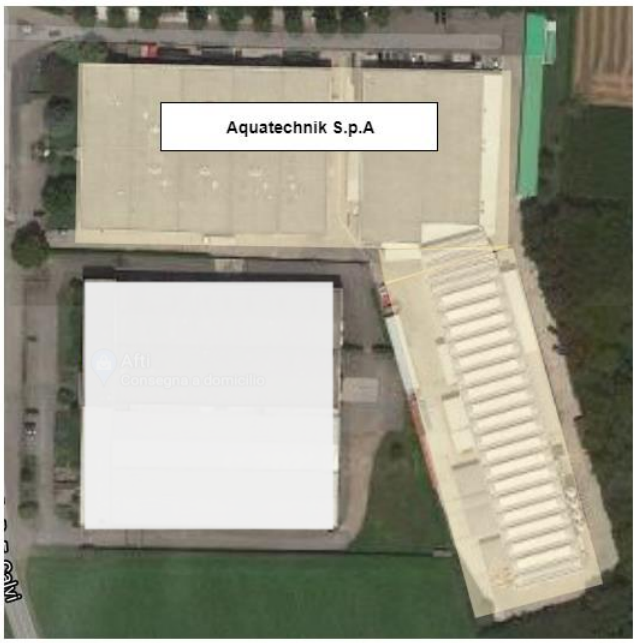

Figure 1: Aquatechnik S.p.A production plant

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

Products information

Product Name: **Threaded Tee Female - Ø 25mm (cod. 68011)**

Product description:
Fitting made of polymeric material with brass insert used in the civil or industrial sector for water-sanitary systems.

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]
Threaded Tee Female	25	5	0,190	0,035

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

LCA information

Declared unit: 1 kg of piping in multilayer polymeric material with a diameter of 20mm and a weight of 0,085 kg.

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 fitting in the construction having assumed a civil scenario. To uninstall 1 kg of fitting, 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 fittings. 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 fittings.
C4	Disposal is the final stage in the life of the product. It is assumed that 53.11% of the polypropylene is sent to landfill while 28.60% for incineration. As for brass, on the other hand, 3% sent to landfill and 2% to incineration.
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 2020
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	Not relevant																
Variation - sites	Not relevant																

ND=Non declared

Content statement

The product contains substances included in the "Candidate list of substances of very high concern (SVHC) for authorization" in a percentage higher than 0.1%.

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

Raw materials	Threaded Tee Female [%]
PP-RCT	54,12
Brass	45,88

Packaging

Distribution: The finished product packaging consists of a low density polyethylene (LLDPE) plastic bag weighing 0.060 kg and a cardboard box weighing 0.400 kg.

Environmental performance - Potential environmental impact

The values below relating to the THREADED TEE FEMALE 25mm product are shown below.

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	Total	D
GWP-total	kg CO_2 eq	8,51E+00	1,42E-01	1,12E-01	1,41E-01	5,91E-02	0,00E+00	4,49E-01	9,41E+00	-3,82E-01
GWP-fossil	kg CO_2 eq	8,01E+00	1,42E-01	9,12E-02	1,41E-01	5,91E-02	0,00E+00	4,49E-01	8,89E+00	-3,61E-01
GWP-biogenic	kg CO_2 eq	5,21E-01	4,02E-05	2,11E-02	2,25E-05	1,69E-05	0,00E+00	1,35E-04	5,43E-01	-1,51E-02
GWP-luluc	kg CO_2 eq	3,91E-03	4,22E-05	2,59E-04	1,19E-05	1,74E-05	0,00E+00	6,28E-06	4,25E-03	-5,67E-03
ODP	kg CFC_{11} eq	8,02E-07	3,26E-08	5,79E-09	3,17E-08	1,37E-08	0,00E+00	4,96E-09	8,91E-07	-7,07E-08
AP	mol H^+ eq	2,02E-01	4,09E-04	3,14E-04	9,04E-04	3,01E-04	0,00E+00	1,69E-04	2,04E-01	-3,33E-03
EP-freshwater	kg P eq	2,81E-02	1,16E-05	2,48E-05	6,43E-06	4,78E-06	0,00E+00	2,39E-06	2,81E-02	-8,26E-05
EP-freshwater	kg PO_4^{3-}eq	8,61E-02	3,55E-05	7,61E-05	1,97E-05	1,47E-05	0,00E+00	7,35E-06	8,63E-02	-2,54E-04
EP-marine	kg N eq	1,70E-02	7,83E-05	1,19E-04	3,64E-04	1,02E-04	0,00E+00	1,74E-04	1,78E-02	-3,38E-04
EP-terrestrial	mol N eq	2,93E-01	8,70E-04	8,66E-04	4,00E-03	1,12E-03	0,00E+00	7,30E-04	3,01E-01	-9,51E-03
POCP	kg NMVOC eq	4,24E-02	3,31E-04	2,33E-04	1,12E-03	3,16E-04	0,00E+00	2,08E-04	4,46E-02	-2,09E-03
ADP – mineral&metals*	kg Sb eq	1,59E-03	4,30E-07	9,25E-08	4,68E-08	1,77E-07	0,00E+00	5,26E-08	1,59E-03	-5,78E-07
ADP – fossil*	MJ	1,49E+02	2,17E+00	1,21E+00	2,03E+00	9,08E-01	0,00E+00	3,47E-01	1,56E+02	-1,00E+01
WDP*	m^3 world eq. depriv.	2,65E+00	1,49E-02	2,84E-02	1,09E-02	6,18E-03	0,00E+00	9,78E-03	2,72E+00	-1,25E-01
GWP GHG	kg CO_2 eq	8,15E+00	1,42E-01	1,05E-01	1,41E-01	5,91E-02	0,00E+00	4,49E-01	9,04E+00	-3,71E-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	4,60E+00	1,58E-02	3,68E-02	9,17E-03	6,54E-03	0,00E+00	1,08E-02	4,68E+00	-9,27E-02
PERM	MJ	4,28E+00	7,30E-03	3,97E-01	2,57E-03	3,02E-03	0,00E+00	1,72E-03	4,69E+00	-1,98E-01
PERT	MJ	8,88E+00	2,31E-02	4,34E-01	1,17E-02	9,56E-03	0,00E+00	1,25E-02	9,37E+00	-2,91E-01
PENRE	MJ	1,28E+02	2,17E+00	9,26E-01	2,03E+00	9,08E-01	0,00E+00	3,47E-01	1,34E+02	-1,00E+01
PENRM	MJ	2,11E+01	0,00E+00	2,88E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,14E+01	0,00E+00
PENRT	MJ	1,49E+02	2,17E+00	1,21E+00	2,03E+00	9,08E-01	0,00E+00	3,47E-01	1,56E+02	-1,00E+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	6,58E-02	3,97E-04	7,76E-04	2,78E-04	1,65E-04	0,00E+00	2,36E-04	6,76E-02	-2,97E-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	6,47E-04	1,38E-06	1,01E-06	9,04E-07	5,73E-07	0,00E+00	3,13E-07	6,52E-04	-1,01E-05
NHWD	kg	7,73E-01	1,04E-01	3,20E-02	2,21E-03	4,28E-02	0,00E+00	3,29E-01	1,28E+00	3,41E-03
RWD	kg	3,65E-04	1,47E-05	2,50E-06	1,41E-05	6,14E-06	0,00E+00	2,33E-06	4,05E-04	-2,89E-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	2,73E-03	0,00E+00	6,30E-02	0,00E+00	0,00E+00	2,28E-01	0,00E+00	2,93E-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	1,49E+00

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

Information on biogenic carbon content

The Threaded Tee Female 25mm product contains 0 kgC per kg of fitting, while the content in the packaging is equal to 4,55E-02 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

EPD®

www.environdec.com