ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

UPONOR AQUAPEX

DIAMETER RANGE 1/4” – 3”

UPONOR CORPORATION

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Uponor Corporation
Address	Äyritie 20, 01510 Vantaa, Finland
Contact details	info@uponor.com
Website	www.uponor.com

PRODUCT IDENTIFICATION

Product name	Uponor AquaPEX Natural
Product number /reference	F1021250, F1021500, F1022000, F1022500, F1023000, F1040250, F1040500, F1040750, F1041000, F1052000, F1060500, F1060625, F1060750, F1061000, F1061250, F1061500, F1062000, F1062500, F1063000, F1090375, F1100500, F1100750, F1101000, F1120375, F1120500, F1120625
Place(s) of production	5925 148th Street West Apple Valley, MN 55124, USA

Jukka Seppänen
RTS EPD Committee Secretary

Laura Apilo
Managing Director

EPD INFORMATION

EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	Rakennustietosäätiö RTS Building Information Foundation RTS Malminkatu 16 A 00100 Helsinki http://cer.rts.fi
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the RTS PCR (Finnish version, 26.8.2020) is used.
EPD author	Dr. Qian Wang, Uponor Corporation
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Verification date	17.01.2022
EPD verifier	Silvia Vilčeková, Silcert, s.r.o
EPD number	RTS_163_22
Publishing date	January 20, 2022
EPD valid until	January 20, 2027

PRODUCT INFORMATION

PRODUCT DESCRIPTION

Uponor AquaPEX pipe is a cross-linked polyethylene PEX-a pipe. Uponor AquaPEX tubing is used primarily in hot and cold potable water distribution systems. Uponor AquaPEX tubing is used in hydronic heating applications where the system contains no ferrous corrodible components or where any ferrous components are isolated from tubing

PRODUCT APPLICATION AND TECHNICAL SPECIFICATIONS

Uponor AquaPEX white pipe is used for hot and cold domestic potable-water distribution and residential fire safety as well as radiant heating/cooling and hydronic piping systems containing no ferrous corrodible components or where ferrous components are isolated from the piping.

PRODUCT STANDARDS

Codes:

International Plumbing Code, International Mechanical Code, International Building Code, International Residential Code, Uniform Plumbing Code, Uniform Mechanical Code, National Building Code of Canada, National Plumbing Code of Canada, National Standard Plumbing Code

Standards:

NSF/ANSI-14, NSF/ANSI-61, NSF/ANSI-372, ASTM F876, ASTM F877, ASTM F2023, CSA B137.5

PHYSICAL PROPERTIES OF THE PRODUCT

Cross-linked polyethylene PEX manufactured using the PEX-a Midas method:

Temperature and Pressure ratings:

200°F (93°C) at 80 psi (551 kPa)
180°F (82°C) at 100 psi (689 kPa)
73.4°F (23°C) at 160 psi (1,103 kPa)
½", ¾", 1", 1¼", 1½" and 2" Uponor AquaPEX white only:
120°F (49°C) at 130 psi (896 kPa)

Linear expansion rate: 1.1"/10°F/100 ft. (27.94 mm/5.56°C/30.48 m)

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at www.uponor.com

PRODUCT RAW MATERIAL COMPOSITION

Material	Amount %	Usability			Origin
		Renewable	Non-renewable	Recycled	
High Density Polyethylene (HDPE)	99,05	-	x	-	USA
Others	0,95	-	X	-	USA, EU
Total	100%				

Material	Amount %	Origin
Metals	-	-
Stone-based materials (minerals)	-	-
Fossil materials	100	USA, EU
Bio-based materials	-	-

SUBSTANCES, REACH - VERY HIGH CONCERN

Products do not contain any REACH SVHC substances in amounts greater than 0, 1% (1000 ppm). Declaration of Conformity, According to the REACH regulation https://www.uponor.com/legal-information/reach

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

The product is manufactured from high density polyethylene, a crosslinking additive and stabilizers. The materials are mixed after which the mix is fed into an extruder where the material melts, flows through tooling that forms the pipe profile, and is cross-linked. The cross-linked pipe is calibrated to the correct dimension, cooled and coiled. In a subsequent operation, the pipe is cut to length, coiled and packaged.

Manufacturing flowchart

The packaging of the product varies as a function of the pipe diameter and coil length. There are four primary packaging approaches. In this LCA the data that an average packaging is taken into account

-Stretch wrap film around each individual coil, then multiple coils are placed in a corrugated cardboard box which rests on a wood pallet. Each coil has a label and each box has several additional labels. Stretch wrap film around each individual coil, then a shrink film bag around each individual coil, multiple coils are then placed on a wood pallet, and finally a plastic film or "hood" that encapsulates and attaches the stack of coils to the wood pallet. Each coil has a label and each hooded stack of coils has several additional labels.

-Stretch wrap film around each individual coil, each coil is then placed in a corrugated cardboard box, then multiple boxed coils are stacked on a wood pallet, then plastic bands wrap around the stack of boxes and the pallet to join the boxes together and to the pallet, and finally the stack of boxes are wrapped with film to further stabilize and protects the palletized stack of boxed coils. Each box has a label and the entire stack receives several additional labels.

-Bundles of 20 foot lengths of straight pipe placed in a poly bag and then multiple poly bags of pipe placed in a woven transport bag.

TRANSPORT (A4)

Transportation impacts occurring from final product's delivery to construction site cover direct exhaust emissions of fuel, environmental impacts of fuel production, as well as related infrastructure emissions.

INSTALLATION (A5)

Environmental impacts from installation into the building (A5) include the product installation losses, emissions of energy use in installation and generation of waste at the construction site.

PRODUCT END OF LIFE (C1-C4, D)

Since the consumption of energy and natural resources is negligible for disassembling of the end-of-life product, the impacts of demolition are assumed zero (C1). After ca 50 years of service life the collected product is assumed to be sent to the closest treatment facilities (C2). 99% of the end-of-life product is assumed to be sent to recycling and incineration facilities (C3). Only 1% of the end-of-life product and the ash generated in the incineration facility are sent to

landfill (C4). Due to the recycling and incineration potential of PEX, the end-of-life product is converted into recycled PE and energy (D).

LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2020

DECLARED AND FUNCTIONAL UNIT

Declared unit	1 kg of pipe
Mass per declared unit	1 kg

BIOGENIC CARBON CONTENT

Product's biogenic carbon content per declared unit

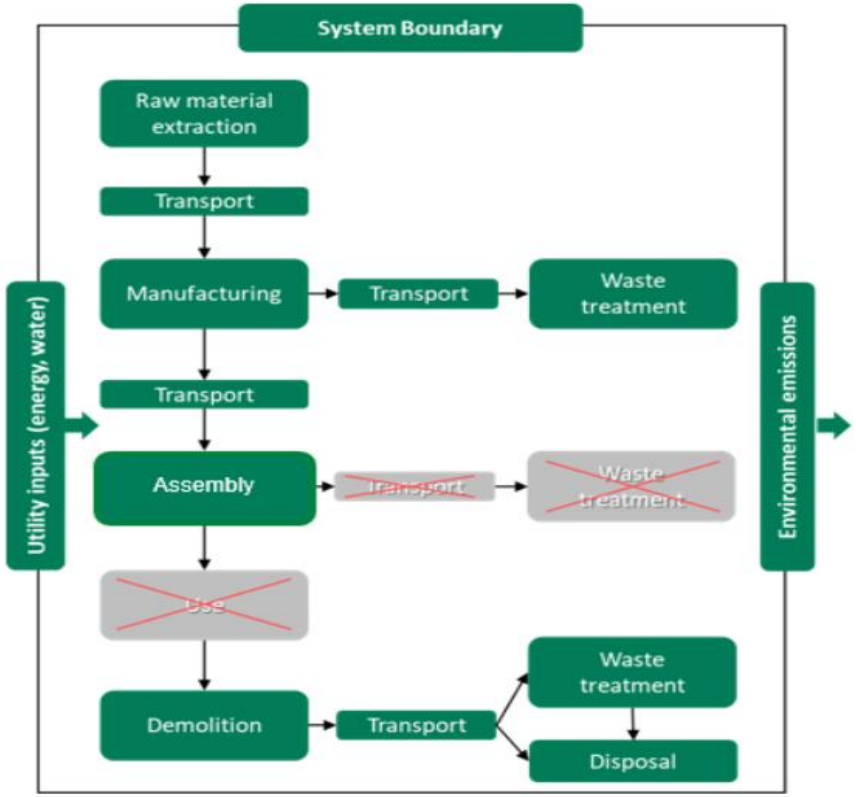
Biogenic carbon content in product, kg C	-
Biogenic carbon content in packaging, kg C	0,0348

SYSTEM BOUNDARY

The scope of the EPD is "cradle to gate with options, module A4, modules C1-C4 and module D". The modules A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A4 (Transport), A5 (Installation) as well as C1 (Deconstruction/ demolition), C2 (Transport at end-of-life), C3 (Waste processing), C4 (Disposal) and D (benefits and loads beyond the system boundary) are included in the study.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	x	X	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	MNR	MNR	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.



CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and RTS PCR. Excluded modules are use stage modules (B1-B7), which are not mandatory according to the RTS PCR. The study does not exclude any hazardous materials or substances.
The study includes all major raw material and energy consumption.

All inputs and outputs of the unit processes which data are available for are included in the calculation. There is no neglected unit process more than 1% of total mass and energy flows. The total neglected input and output flows do also not exceed 5% of energy usage or mass. The life cycle analysis includes all industrial processes from raw material acquisition to production, distribution and end-of-life stages.
The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

As it is impossible to collect all energy consumption data separately for each product produced in the plant, data is allocated. Allocation is based on annual production rate and made with high accuracy and precision.

The values for 1 kg of the product, which is used within this study is calculated by considering the total product weight per annual production. In the factory, several kinds of pipes are produced; since the production processes of these products are similar, the annual production percentage is taken into consideration for allocation. According to the ratio of the annual production of the declared product to the total annual production at the factory, the annual total energy consumption and generated waste per the declared product are allocated. Subsequently, the product output fixed to 1 kg and the corresponding amount of product is used in the calculations. Besides, since the formulation of the product is certain, raw materials in the product do not need to be allocated considering the total annual production. The amounts of raw materials and packaging materials are given as per the formulations in Uponor's internal Bills of Material and the purchased amounts from the respective suppliers.

This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs. All estimations and assumptions are given below:

• Module A4: The transportation distance is defined according to RTS PCR. As installation places are located across the different states in USA, an average transportation distance from the production plant is assumed to be 1741 km based on sales history. Transportation method is lorry. According to Uponor transportation doesn't cause losses as products are packaged properly. Also, volume capacity utilisation factor is assumed to be 1 for the nested packaged products.

• Module A5: Due to a big variety of installation sites across USA, industry average values for energy and material consumption as well as generated waste during assembly are used in the study (TEPPFA, 2019).

• Module C1: The impacts of demolition stage are assumed zero, since the consumption of energy and natural resources for disassembling of the end-of-life product is negligible.

• Module C2: It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed to have the same weight as the declared product. After ca 50 years of service life (TEPPFA, 2018) all of end-of-life product is assumed to be collected from the demolition site. Since there is no follow up procedure, transportation distance to the closest disposal area is estimated as 50 km and the transportation method is assumed to be lorry, which is the most common.

• Module A2, A4 & C2: Vehicle capacity utilization volume factor is assumed to be 1 which means full load. In reality, it may vary but as the role of transportation emission in total results is small and so the variety in load assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by transportation companies to serve needs of other clients.

• Module C3: It is assumed that 63% of the end-of-life product is recycled and 36% is incinerated. The assumption is based on Municipal Waste Statistics (Finland, 2018), REPIPE's project (2018) and Uponor's own experience with mechanical and chemical

recycling of PEX scrap at its factories and re-using it in production as well as the increasing number of commercial facilities and efficient practices for recycling of PEX (Thunman H. et al, 2019) across Europe.

• Module C4: The remaining 1% of the end-of-life product is sent to landfill along with the generated ash during the incineration.

• Module D: Due to the recycling and incineration processes the end-of-life product is converted into a recycled PE raw material and energy (CHEMIK 2013, 67, 5; Energy Recovery from Waste Incineration, 2017).

ENVIRONMENTAL IMPACT DATA

Note: additional environmental impact data may be presented in annexes.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	2,33E0	1,07E-1	4,14E-1	2,85E0	4,46E-1	2,01E-1	MND	MND	MND	MND	MND	MND	MND	0E0	6,62E-3	3,05E-1	1,67E-3	-9,79E-1
GWP – fossil	kg CO_2e	2,31E0	1,07E-1	4,06E-1	2,82E0	4,5E-1	6,44E-2	MND	MND	MND	MND	MND	MND	MND	0E0	6,62E-3	2,32E-1	1,58E-3	-1,07E0
GWP – biogenic	kg CO_2e	1,2E-2	6,33E-5	8,06E-3	2,02E-2	2,76E-4	1,36E-1	MND	MND	MND	MND	MND	MND	MND	0E0	3E-6	7,27E-2	8,81E-5	8,8E-2
GWP – LULUC	kg CO_2e	7,13E-4	3,79E-5	2,31E-4	9,82E-4	1,59E-4	4,32E-5	MND	MND	MND	MND	MND	MND	MND	0E0	2,44E-6	2,57E-4	1,13E-7	1,68E-4
Ozone depletion pot.	kg CFC_{-11}e	5,89E-8	2,44E-8	1,63E-8	9,96E-8	1,03E-7	7,71E-9	MND	MND	MND	MND	MND	MND	MND	0E0	1,45E-9	2,94E-8	6,22E-11	-9,74E-8
Acidification potential	mol H^+e	8,3E-3	4,41E-4	1,7E-3	1,04E-2	1,86E-3	2,87E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,77E-5	1,18E-3	2,44E-6	-6,69E-3
EP-freshwater[2)]	kg Pe	3,99E-5	9,4E-7	1,2E-5	5,28E-5	3,89E-6	1,7E-6	MND	MND	MND	MND	MND	MND	MND	0E0	6,61E-8	6,72E-6	8,82E-8	-2,8E-5
EP-marine	kg Ne	1,42E-3	1,3E-4	3,31E-4	1,89E-3	5,49E-4	8,1E-5	MND	MND	MND	MND	MND	MND	MND	0E0	8,04E-6	3,96E-4	8,39E-7	-1,23E-3
EP-terrestrial	mol Ne	1,58E-2	1,44E-3	3,83E-3	2,11E-2	6,07E-3	8,53E-4	MND	MND	MND	MND	MND	MND	MND	0E0	8,89E-5	3,5E-3	6,43E-6	-1,57E-2
POCP ("smog")	kg NMVOCe	7,72E-3	4,51E-4	1,41E-3	9,58E-3	1,91E-3	2,91E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,78E-5	1,15E-3	2,24E-6	-6,11E-3
ADP-minerals & metals	kg Sbe	2,07E-5	2,66E-6	6,78E-6	3,01E-5	1,12E-5	1,28E-6	MND	MND	MND	MND	MND	MND	MND	0E0	1,61E-7	4,78E-6	2,27E-9	-7,66E-6
ADP-fossil resources	MJ	8,17E1	1,63E0	9,23E0	9,25E1	6,87E0	8,32E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	3,85E0	4,79E-3	-6,35E1
Water use[1)]	m^3e depr.	1,62E0	5,89E-3	2,73E-1	1,9E0	2,44E-2	2,06E-2	MND	MND	MND	MND	MND	MND	MND	0E0	4,09E-4	7,8E-2	2,1E-4	-9,32E-1

1) GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. 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. 3) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO_4e.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	6,88E-8	8,23E-9	1,77E-8	9,48E-8	3,48E-8	6,19E-9	MND	MND	MND	MND	MND	MND	MND	0E0	5,04E-10	1,77E-8	3,32E-11	-4,54E-8
Ionizing radiation[3)]	kBq U235e	5,45E-2	7,07E-3	7,71E-3	6,93E-2	3E-2	2,86E-3	MND	MND	MND	MND	MND	MND	MND	0E0	4,12E-4	9,93E-3	1,9E-5	-4,18E-3
Ecotoxicity (freshwater)	CTUe	1,27E1	1,28E0	1,49E1	2,89E1	5,37E0	1,79E0	MND	MND	MND	MND	MND	MND	MND	0E0	8,45E-2	5,32E0	1,78E-2	-1,62E1

Human toxicity, cancer	CTUh	6,07E-10	3,6E-11	3,71E-10	1,01E-9	1,52E-10	1,28E-10	MND	MND	MND	MND	MND	MND	MND	0E0	2,2E-12	3,37E-10	2,17E-13	-2,1E-10
Human tox. non-cancer	CTUh	1,42E-8	1,46E-9	5,57E-9	2,12E-8	6,15E-9	1,41E-9	MND	MND	MND	MND	MND	MND	MND	0E0	8,94E-11	5,18E-9	5,13E-12	-8,76E-9
SQP	-	5,44E-1	1,81E0	1,22E0	3,57E0	7,66E0	4,72E-1	MND	MND	MND	MND	MND	MND	MND	0E0	1,09E-1	2,55E0	1,65E-2	8,5E-1

4) SQP = Land use related impacts/soil quality.5) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy	MJ	1,37E0	2,25E-2	8,68E0	1,01E1	9,76E-2	3,89E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,13E-3	1,64E-1	1,02E-4	-9,36E0
Renew. PER as material	MJ	0E0	0E0	2,34E-1	2,34E-1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	-3,03E-1
Total use of renew. PER	MJ	1,37E0	2,25E-2	8,92E0	1,03E1	9,76E-2	3,89E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,13E-3	1,64E-1	1,02E-4	-9,66E0
Non-re. PER as energy	MJ	2,65E1	1,63E0	4,41E0	3,26E1	6,87E0	8,32E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	3,85E0	4,79E-3	-2,83E1
Non-re. PER as material	MJ	5,52E1	0E0	4,82E0	6E1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	-3,52E1
Total use of non-re. PER	MJ	8,17E1	1,63E0	9,23E0	9,25E1	6,87E0	8,32E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	3,85E0	4,79E-3	-6,35E1
Secondary materials	kg	5,05E-3	0E0	7,79E-4	5,83E-3	0E0	1,3E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	7,64E-1
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	5,88E-3	3,08E-4	4,78E-3	1,1E-2	1,3E-3	7,37E-4	MND	MND	MND	MND	MND	MND	MND	0E0	1,89E-5	9,25E-4	5,3E-6	-5,87E-3

6) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	5,12E-2	1,75E-3	2,33E-2	7,62E-2	7,15E-3	4,62E-3	MND	MND	MND	MND	MND	MND	MND	0E0	1,3E-4	0E0	1,28E-5	-8,87E-3
Non-hazardous waste	kg	1,77E0	1,41E-1	5,39E-1	2,45E0	5,94E-1	1,08E-1	MND	MND	MND	MND	MND	MND	MND	0E0	8,81E-3	0E0	1,86E-2	1,47E-1
Radioactive waste	kg	4,52E-5	1,11E-5	7,18E-6	6,35E-5	4,7E-5	3,73E-6	MND	MND	MND	MND	MND	MND	MND	0E0	6,54E-7	0E0	2,85E-8	-2,91E-6

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	1,56E-1	1,56E-1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	6,3E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	9,19E-3	9,19E-3	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	3,6E-1	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	2,33E0	1,07E-1	4,14E-1	2,85E0	4,51E-1	2,01E-1	MND	MND	MND	MND	MND	MND	MND	0E0	6,62E-3	3,05E-1	1,67E-3	-9,79E-1
ADP-minerals & metals	kg Sbe	2,07E-5	2,66E-6	6,78E-6	3,01E-5	1,12E-5	1,28E-6	MND	MND	MND	MND	MND	MND	MND	0E0	1,61E-7	4,78E-6	2,27E-9	-7,66E-6
ADP-fossil	MJ	8,17E1	1,63E0	9,23E0	9,25E1	6,87E0	8,32E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	3,85E0	4,79E-3	-6,35E1
Water use	m^3e depr.	1,62E0	5,89E-3	2,73E-1	1,9E0	2,44E-2	2,06E-2	MND	MND	MND	MND	MND	MND	MND	0E0	4,09E-4	7,8E-2	2,1E-4	-9,32E-1
Secondary materials	kg	5,05E-3	0E0	7,79E-4	5,83E-3	0E0	1,3E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	7,64E-1
Biog. C in product	kg C	N/A	N/A	0E0	0E0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biog. C in packaging	kg C	N/A	N/A	3,48E-2	3,48E-2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

7) Biog. C in product = Biogenic carbon content in product

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data sources & quality	All electricity consumed is provided from renewable energy (wind & solar) Data Sources: Electricity production, wind, 1-3mw turbine, onshore (Reference product: electricity, high voltage), USA 2019 Electricity production, solar thermal parabolic trough, 50 mw (Reference product: electricity, high voltage), USA 2019
Electricity CO2e / kWh	0.0118 kg CO2e / kWh; 0,049 kg CO2e/kWh
Heating Fuels data source & quality	Data source: Heat and power co-generation, biogas, gas engine (Reference product: electricity, high voltage), USA 2019
Heating Fuel (Natural Gas) CO2e/kWh	0.24 kg CO2e / kWh
Propane data source & quality	Data source: Natural gas, burned in gas motor, for storage (Reference product: natural gas, burned in gas motor, for storage), Norway 2019
Propane CO2e/MJ	0.0598 kg CO2e / MJ

Transport scenario documentation

Scenario parameter	Value
A4 specific transport CO2e emissions, kg CO2e / tkm	0.13
A4 average transport distance, km	1741
Transport capacity utilization, %	100
Bulk density of transported products, kg/m^3	-
Volume capacity utilisation factor for nested packaged products	1

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	1
Collection process – kg collected with mixed waste	-
Recovery process – kg for re-use	-
Recovery process – kg for recycling	0,63
Disposal (total) – kg for final deposition	0,0186
Scenario assumptions e.g. transportation	End-of-life product is transported 50km with an average lorry

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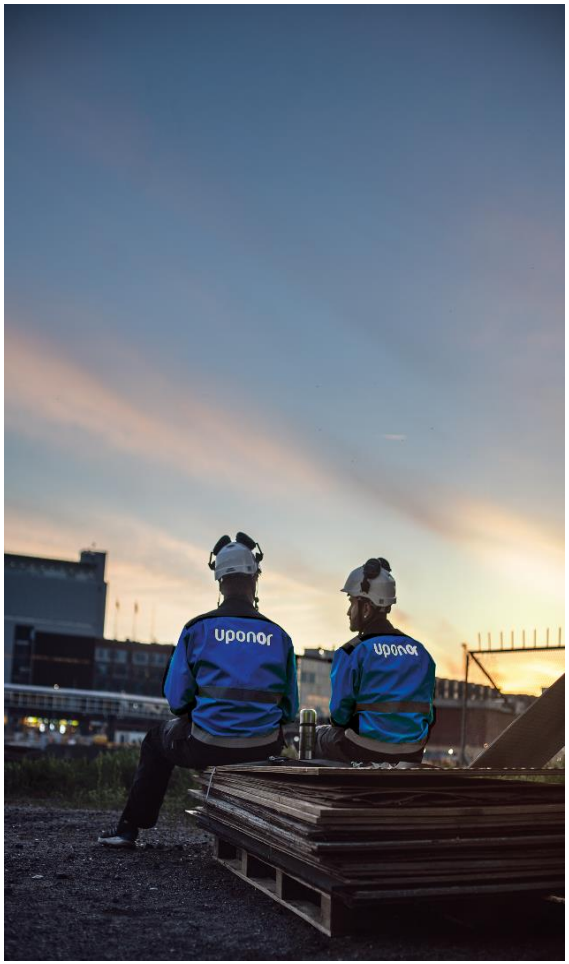

ABOUT THE MANUFACTURER

Uponor is rethinking water for future generations. Our offering, including safe drinking water delivery, energy-efficient radiant heating and cooling and reliable infrastructure, enables a more sustainable living environment. We help our customers in residential and commercial construction, municipalities and utilities, as well as different industries to work faster and smarter. We employ about 3,800 professionals in 26 countries in Europe and North America. Over 100 years of expertise and trust form the basis of any successful partnership. This is the basis, on which they can build, in a literal and metaphorical sense. We create trust together with our partners: Customers, prospective customers and suppliers. We establish this with shared knowledge, quality and sustainable results.

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Uponor Corporation
EPD author	Dr. Qian Wang, Uponor Corporation, www.uponor.com
EPD verifier	Silvia Vilčeková, Silcert, s.r.o
EPD program operator	Rakennustietosäätiö RTS Building Information Foundation RTS Malminkatu 16 A 00100 Helsinki http://cer.rts.fi
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Plumbing Products, Components, Equipment and Systems

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with EN 15804, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The background report (project report) for this EPD

Why does verification transparency matter? Read more online.

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier	Silvia Vilčeková, Silcert, s.r.o
EPD verification started on	14.12.2021
EPD verification completed on	17.01.2022
Approver of the EPD verifier	The Building Information Foundation RTS sr

Author & tool verification	Answer
EPD author	Qian Wang
EPD author training completion	15.09.2020

EPD Generator module	One Click LCA Pre-Verified EPD Generator for Plumbing Products, Components, Equipment and Systems
Independent software verifier	Anni Ovir, Rangi Maja OÛ
Software verification date	20.06.2020

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of

- the data collected and used in the LCA calculations,
- the way the LCA-based calculations have been carried out,
- the presentation of environmental data in the EPD, and
- other additional environmental information, as present

with respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance. I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards and the geographical area of the EPD to carry out this verification. I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Silvia Vilčeková, Silcert, s.r.o

ANNEX 1 : ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	2,13E0	1,06E-1	3,94E-1	2,63E0	4,46E-1	6,62E-2	MND	MND	MND	MND	MND	MND	MND	0E0	6,55E-3	1,32E0	1,18E-3	-4,51E0
Ozone depletion Pot.	kg CFC_{-11}e	5,81E-8	1,94E-8	1,5E-8	9,25E-8	8,21E-8	6,34E-9	MND	MND	MND	MND	MND	MND	MND	0E0	1,15E-9	1,49E-8	5,02E-11	-1,8E-8
Acidification	kg SO_2e	6,99E-3	2,31E-4	1,4E-3	8,62E-3	9,18E-4	2,16E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,01E-5	5,18E-4	1,26E-5	-2,97E-2
Eutrophication	kg PO_4^3e	1,69E-3	4,89E-5	5,92E-4	2,33E-3	1,91E-4	2,46E-4	MND	MND	MND	MND	MND	MND	MND	0E0	4,61E-6	5,68E-4	5,49E-5	-5,8E-3
POCP (“smog”)	kg C_2H_4e	7,01E-4	1,41E-5	1,3E-4	8,45E-4	5,93E-5	2,02E-5	MND	MND	MND	MND	MND	MND	MND	0E0	8,7E-7	4,12E-5	2,82E-7	-1,31E-3
ADP-elements	kg Sbe	2,07E-5	2,66E-6	6,78E-6	3,01E-5	1,12E-5	1,28E-6	MND	MND	MND	MND	MND	MND	MND	0E0	1,61E-7	3,02E-6	2,27E-9	-9,92E-6
ADP-fossil	MJ	8,17E1	1,63E0	9,23E0	9,25E1	6,87E0	8,32E-1	MND	MND	MND	MND	MND	MND	MND	0E0	9,88E-2	2,38E0	4,79E-3	-7,98E1

ENVIRONMENTAL IMPACTS – TRACI 2.1. / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	2,16E0	1,06E-1	3,98E-1	2,66E0	4,46E-1	6,64E-2	MND	MND	MND	MND	MND	MND	MND	0E0	6,54E-3	1,32E0	1,25E-3	-4,55E0
Ozone Depletion	kg CFC_{-11}e	7,23E-8	2,58E-8	1,85E-8	1,17E-7	1,09E-7	8,42E-9	MND	MND	MND	MND	MND	MND	MND	0E0	1,54E-9	1,95E-8	6,62E-11	-4,7E-8
Acidification	kg SO_2e	6,88E-3	3,84E-4	1,46E-3	8,72E-3	1,61E-3	2,58E-4	MND	MND	MND	MND	MND	MND	MND	0E0	2,42E-5	7,22E-4	2,13E-6	-2,83E-2
Eutrophication	kg Ne	5,35E-4	5,4E-5	1,54E-4	7,43E-4	2,28E-4	3,77E-5	MND	MND	MND	MND	MND	MND	MND	0E0	3,36E-6	1,25E-4	1,15E-6	-1,75E-3
POCP (“smog”)	kg O_3e	9,17E-2	8,25E-3	2,03E-2	1,2E-1	3,48E-2	4,77E-3	MND	MND	MND	MND	MND	MND	MND	0E0	5,1E-4	1,56E-2	3,69E-5	-2,76E-1
ADP-fossil	MJ	1,17E1	2,31E-1	1,22E0	1,32E1	9,8E-1	9,5E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1,39E-2	2,96E-1	6,47E-4	-7,49E0

ANNEX 2: GWP TOTAL FOR A1-A3 STAGES PER AVAILABLE PART (CML / ISO 21930)

Part number	Part Name	Coil length (ft.)	Weight per 1ft (lbs)	Coil length (m)	Weight per 1m (kg)	Global Warming Potential total for A1-A3 stages (kg CO^2e)
F1021250	1 1/4" Uponor AquaPEX White, 300-ft. coil	300	0.353	91.44	0.526	1.274E+02
F1021500	1 1/2" Uponor AquaPEX White, 300-ft. coil	300	0.443	91.44	0.660	1.598E+02
F1022000	2" Uponor AquaPEX White, 300-ft. coil	300	0.682	91.44	1.015	2.458E+02
F1022500	2 1/2" Uponor AquaPEX White, 300-ft. coil	300	0.880	91.44	1.310	3.172E+02
F1023000	3" Uponor AquaPEX White, 300-ft. coil	300	1.280	91.44	1.905	4.614E+02
F1040250	1/4" Uponor AquaPEX White, 100-ft. coil	100	0.040	30.48	0.060	4.805E+00
F1040500	1/2" Uponor AquaPEX White, 100-ft. coil	100	0.060	30.48	0.089	7.211E+00
F1040750	3/4" Uponor AquaPEX White, 100-ft. coil	100	0.100	30.48	0.149	1.202E+01
F1041000	1" Uponor AquaPEX White, 100-ft. coil	100	0.200	30.48	0.298	2.403E+01
F1052000	2" Uponor AquaPEX White, 200-ft. coil	200	0.682	60.96	1.015	1.639E+02
F1060500	1/2" Uponor AquaPEX White, 300-ft. coil	300	0.060	91.44	0.089	2.163E+01
F1060625	5/8" Uponor AquaPEX White, 300-ft. coil	300	0.093	91.44	0.139	3.364E+01
F1060750	3/4" Uponor AquaPEX White, 300-ft. coil	300	0.113	91.44	0.169	4.085E+01
F1061000	1" Uponor AquaPEX White, 300-ft. coil	300	0.187	91.44	0.278	6.729E+01
F1061250	1 1/4" Uponor AquaPEX White, 100-ft. coil	100	0.340	30.48	0.506	4.085E+01
F1061500	1 1/2" Uponor AquaPEX White, 100-ft. coil	100	0.440	30.48	0.655	5.287E+01
F1062000	2" Uponor AquaPEX White, 100-ft. coil	100	0.682	30.48	1.015	8.195E+01
F1062500	2 1/2" Uponor AquaPEX White, 100-ft. coil	100	0.880	30.48	1.310	1.057E+02
F1063000	3" Uponor AquaPEX White, 100-ft. coil	100	1.280	30.48	1.905	1.538E+02
F1090375	3/8" Uponor AquaPEX White, 400-ft. coil	400	0.050	121.92	0.074	2.403E+01
F1100500	1/2" Uponor AquaPEX White, 500-ft. coil	500	0.055	152.4	0.082	3.316E+01
F1100750	3/4" Uponor AquaPEX White, 500-ft. coil	500	0.108	152.4	0.161	6.488E+01
F1101000	1" Uponor AquaPEX White, 500-ft. coil	500	0.186	152.4	0.277	1.117E+02
F1120375	3/8" Uponor AquaPEX White, 1,000-ft. coil	1000	0.044	304.8	0.065	5.287E+01
F1120500	1/2" Uponor AquaPEX White, 1,000-ft. coil	1000	0.054	304.8	0.080	6.488E+01
F1120625	5/8" Uponor AquaPEX White, 1,000-ft. coil	1000	0.086	304.8	0.128	1.033E+02

Stages A1-A3 include *Raw material extraction and processing*; *Transport to the manufacturer*, *Manufacturing*

For additional indicators, please refer to the previous tables in the document that represent 1kg of pipe. Multiply the results with weight/meter value and the respective pipe/coil length to receive the impact per part number.