NUPI INDUSTRIE ITALIANE S.p.A.

ENVIRONMENTAL PRODUCT DECLARATION

Product names:

POLYPROPYLENE *PRE-INSULATED PIPES* FOR HOT AND CHILLED WATER TYPE NIRON ALL PRO

Site Plants:

Castel Guelfo (BO)

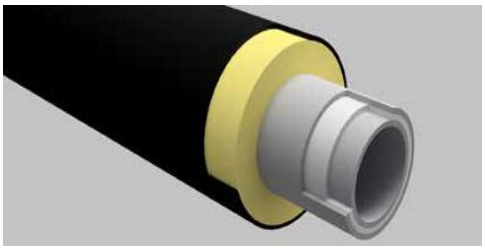
Busto Arsizio (VA)

in compliance with ISO 14025 and EN 15804+A2:2019

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration Number	2026PCALLPRO
Registration Number	EPDITALY1358

Issue Date	15/09/2026
Valid to	15/09/2031





General information

EPD OWNER:	Nupi Industrie Italiane S.p.A., Piazza San Marco n. 1, 20121 – Milano (MI) Italy
PLANT INVOLVED in the declaration:	Castel Guelfo: Via dell'Artigianato n. 13 - 40023 Castel Guelfo di Bologna (BO), Italy Busto Arsizio: Via Stefano Ferrario n. 8, Z.I. Sud-Ovest - 21052 Busto Arsizio (VA) Italy
SCOPE OF APPLICATION:	This Environmental Product Declaration (EPD) is valid for ALL PRO pipes, type polypropylene only and glass fiber reinforced. The type of declaration is related to an average product produced partly in Castel Guelfo (primary pipe) and partly in Busto Arsizio (polyurethane foam process). The type of declaration is related to an average pipe product. The life cycle assessment is representative of the product introduced in the declaration for the given system boundaries.
PROGRAM OPERATOR:	EPDITALY, via Gaetano De Castillia 10, 20124 Milano, Italia.
INDIPENDENT CHECK:	This declaration has been developed referring to EPDItaly, following the General Programme Instruction; further information and the document itself are available at: www.epditaly.it. EPD document valid within the following geographical area: Italy and other countries according to sales market conditions. CEN standard EN 15804 served as the core PCR (PCR ICMQ-001/15 rev.3.2; 03/11/2025). PCR review was conducted by Daniele Pace. Contact via info@epditaly.it Independent verification of the declaration and data, according to EN ISO 14025:2010. Third party verifier: ICMQ SpA, via De Castillia, 10 20124 Milano (www.icmq.it) ☐EPD process certification (Internal)☑ EPD verification (External) ***Accredited by: Accredia***
CPC CODE:	3632 - Tubes, pipes and hoses, and fittings therefor, of plastics
CORPORATE CONTACT:	info@nupinet.com
TECHNICAL SUPPORT:	Sphera https://www.sphera.com

COMPARABILITY:	Environmental product declarations published within the same product category, but from different programs, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804+A2.
ACCOUNTABILITY:	Nupi Industrie Italiane S.p.A relieves EPDItaly from any non-compliance with environmental legislation. The EPD owner will be responsible for the information and supporting evidence; EPDItaly declines all responsibility for the manufacturer's information, data and results of the life cycle assessment.
REFERENCE DOCUMENT:	This declaration has been developed following the EPDItaly Program Regulations and Annexes of EPDItaly, available at www.epditaly.it.
PRODUCT CATEGORY RULES (PCR):	PCR ICMQ-001/15 rev.3.2 – 03/11/2025 EN 15804+A2:2019 is the framework reference for PCRs. UNI EN 16904:2025
EPD PROJECT REPORT	2026_06_09_medio ALL PRO

Company

OUR MISSION – FOR OVER 50 YEARS

Cutting edge solutions for any kind of installation

The primary goal of Nupi Industrie Italiane S.p.A. corporate strategy is not only the production of systems that meet performance requirements and comply with the use for which they are intended, but above all general customer satisfaction. Producing better and faster are goals that technology makes more and more compatible.

In 2022, Nupi Industrie Italiane S.p.A. celebrated its 50th anniversary! In October 2015, it took over from Nupigeco S.p.A., founded in October 2008 from the merger of NUPI S.p.A. and GECO System S.p.A., to form a single large company. Combining their many years of experience and constant growth, the two firms decided to create a new flexible and advanced company, ready to play its role to satisfy the demands of the market whilst being environmentally astute.

The goal was to combine the expertise in the development and production of piping systems for plumbing, industrial applications, gas, irrigation and heating, with the experience in the production of polymer pipes specifically dedicated to oil, chemical and petrochemical fields.







Management System and Certifications

Nupi Industrie Italiane S.p.A. submits its management and production systems to external audits performed by third party certification bodies.
Audit frequency depends on the procedure established by the specific standard and by each certification body. Nupi Industrie Italiane S.p.A. is certified in compliance with the standards for quality (EN ISO 9001), environment (EN ISO 14001) and Health and Safety of workers (ISO 45001).
Thanks to the synergy between the phases of research, production, quality control and after-sales service, the company obtained several international quality company and product certifications.

UNI EN ISO 9001
UNI EN ISO 14001
ISO 45001



MANAGMENT QUALITY UNI EN ISO 9001:2015

POLICY ENVIRONMENTAL UNI EN ISO 14001:2015

SAFETY AT WORK UNI ISO 45001:2018

Product Certifications

The company leadership is based on these solid foundations in a competitive and high technology industry such as plastics processing. A record that NUPI Industrie Italiane S.p.A. maintains thanks to high quality products and constant attention to customers' needs through an efficient after-sales service, a precise and timely technical assistance and installers' training.
NUPI products are of high quality, complying with regulations and conforming to the most stringent standards and certifications schemes. The full updated list is available on the website: www.nupiindustrieitaliane.com.

EPD Goal and scope

The entire life cycle of the product is considered (Type of EPD: cradle to grave and module D) and the modules described below are declared in this EPD:

*Modules **A1-A3** include those processes that provide energy and material input for the system (A1), transport up to the factory gate of the plant (A2), manufacturing processes as well as waste processing and emissions to air (A3).*

*Module **A4** includes the transport from the production site to the customer or to the point of installation of the products.*

*Module **A5** considers only packaging waste processing (recycling, incineration, disposal).*

*Module **B1** considers the use of the installed product. During the use of plastic piping systems, a scenario of zero impact is considered.*

*Module **B2** includes the maintenance of the product. A scenario of zero impact is considered.*

*Modules **B3-B4-B5** are related to the repair, replacement and refurbishment of the products. If the products are properly installed no repair, replacement or refurbishment processes are necessary. A scenario of zero impact is then considered.*

*Modules **B6-B7** consider energy use and operational water to operate building systems. No operational energy or water use are considered. A scenario of zero impact is then considered.*

*Module **C1** considers deconstruction, including dismantling or demolition of the product from the building.*
For products installed inside buildings a scenario of zero impact is considered.

*Module **C2** considers transportation of the discarded piping system to a recycling or disposal process.*

*Module **C3** considers waste processing for products sorting, recycling and incineration.*

*Module **C4** includes all waste disposal processes, including pre-treatment and management of the disposal site.*

*Module **D** includes benefits from all net flows in the end-of-life stage that leave the product boundary system after having passed the end-of-waste stage. Benefits from packaging incineration (electricity and thermal energy) are declared within module D.*

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

X = modules included in the study

The emission factor for the electricity used in A3 is 0.2010 KgCO2eq/kWh.

The type of EPD is “cradle to grave and module D” and it is an average EPD for the product ALL PRO pipes produced in NUPI INDUSTRIE ITALIANE S.p.A. plant located in Castel Guelfo (BO) for the extrusion process and in the Busto Arsizio plant for the PUR foam process. All data refer to the 2024 production and sales.

According to the PCR ICMQ-001/15 rev. 3.2 the LCA study and the relative EPD, is “cradle to grave and module D”. Modules included are A1, A2, A3, A4, B, C and D. All manufacturing activities and packaging/auxiliary’s production are in module A3, while energy production and input materials are in A1. Transport to clients (A4) is included together with end-of-life scenarios (benefits and loads included according to D module).

The declaration is a Type 3 EPD (product EPD based on a qualified LCA-Tool) according to /REGULATIONS OF THE EPDItaly PROGRAMME 6/.

Geographical validity: EU+GLO

Time Representativeness: The primary data cover a period of 12 months, reference 2024.

Database: MLC Database 2024.2

NUPI LCA Tool v.5 25.01.2025: The LCA model is created using the Sphera LCA for Expert (previously GaBi Professional) Software system for life cycle engineering, developed by Sphera. The /MANAGED LCA CONTENT (GABI DATABASES)/ provides the life cycle inventory data for several of the raw and process materials obtained from the background system.

EPD realized by means of a validated algorithm:
In 2019 NUPI Industrie Italiane S.p.A. implemented and certified a Process for EPD generation by using an algorithm that has been validated and certified by ICMQ S.p.A., in agreement with EPDItaly’s requirements. The process is based on an automatic data collection from different manufacturing plants that have been integrated, verified and validated in compliance with internal procedures. The validated algorithm allows the automatic calculation of the indicators reported into the current EPD coming from an LCA model implemented into the NUPI LCA process tool.
In 2025, after the five years period of validity, the NUPI LCA tool has been updated and validated by ICMQ S.p.A. The LCA tool enables the creation of partly verified LCA results for pipes, fittings and piping systems produced by NUPI.

Product description

Detailed product description

ALL PRO NIRON is the innovative PRE-INSULATED pipe and fitting system that is ideally suitable for applications in areas where the heat loss reduction is essential. This product range was specifically designed for networks for the distribution of hot fluids.

The reliability and outstanding physical mechanical properties of the materials used, together with ease of installation, allow installers to overcome many problems when installing heat distribution and conditioning

systems. Furthermore, the compactness of the preinsulated electrofusion fittings supplied with the range provides the system with greater versatility for aerial and underground installations, thus drastically reducing

installation times.

The NIRON CLIMA Beta primary pipes and the polyethylene jacket pipes are extruded in Castel Guelfo plant. The insulation is made in the Busto Arsizio plant.

Preinsulation process is used to preserve the thermal energy of the conveyed fluid by the use of a PUR (Polyurethane) layer between a carrier pipe and a jacket pipe.

The PUR is produced by the mixing of Polyol and Isocyanate in a specific ratio by the use of a machine mixing the components and injecting them in the interstice between the jacket pipe and the carrier pipe. The two pipes are maintained centred by the use of dedicated spacers.

Production processes description

PIPE EXTRUSION (Castel Guelfo)

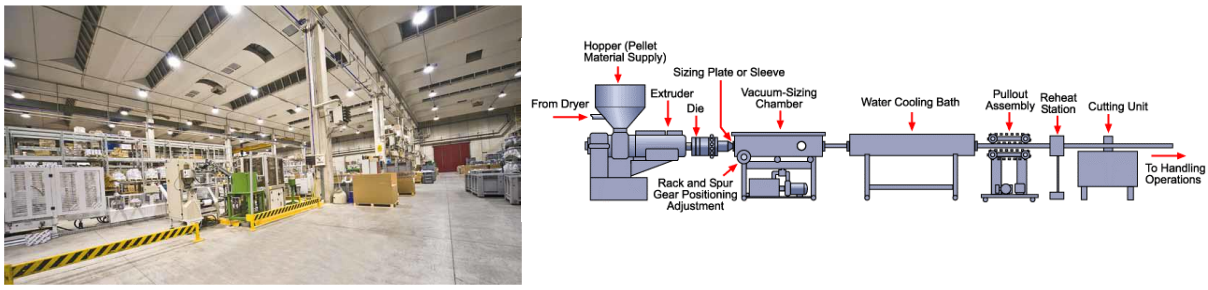


Figure 1 Pipes extrusion process

Nupi Industrie Italiane S.p.A. manufactures both solid wall (monolayer) plastic pipes, in diameter sizes ranging from 16 mm to 1000 mm, and coextruded multilayer (from two to five layers) pipes.

The raw materials used to manufacture plastic pipes are supplied in pellets (provided in bulk transporter, octabins or bags), both as natural resin or finished compound. Resin is pneumatically conveyed from the bulk transporters to silos at the plant site. The resin is then transferred from the silos to the pipe extruder by a vacuum transfer system.

The pipe extrusion line consists of the extruder, die, cooling systems, puller, printer, saw and take-off equipment. The function of the extruder is to heat, melt, mix, and convey the material to the die, where it is shaped into a pipe. The extruder is used to heat the raw material and then force the resulting melted polymer through the pipe extrusion die. The pipe extrusion die supports and distributes the homogeneous polymer melt around a solid mandrel, which forms it into an annular shape for solid wall pipe.

The dimensions and tolerances of the pipe are determined and set during the sizing and cooling operation. The sizing operation holds the pipe in its proper dimensions during the cooling of the molten material. During vacuum sizing, the molten material is drawn through a sizing tube or rings while its surface is cooled enough to maintain proper dimensions and a circular form. The outside surface of the pipe is held against the sizing sleeve by vacuum. After the pipe exits the vacuum sizing tank, it is moved through a second vacuum tank or a series of spray or immersion cooling tanks.

The puller must provide the necessary force to pull the pipe through the entire cooling operation. Pipes are marked at specific intervals through ink jet or hot marking with tape machines.

Technical data

SERVICE PIPE – NIRON CLIMA – POLYPROPYLENE PIPE REINFORCED WITH FIBERGLASS

NIRON BETA CLIMA

Pipes made of polypropylene composed of three layers with an inner layer that includes fiberglass. The inner and outer layer are made of β PP-RCT (random copolymer polypropylene with modified crystallinity β-nucleate). This raw material shows improved resistance to higher temperatures and guarantees excellent chemical resistance to chlorine free ions and disinfection treatments (resistant up to 4.3 ppm NaClO). The intermediate layer is composed of heterophasic PP-RCT containing a defined percentage of fiberglass which guarantees the containment of the linear thermal expansion of the pipeline. The intermediate layer including fiberglass makes the product more dimensionally stable to thermal shocks.

THERMAL INSULATION – RIGID POLYURETHANE FOAM (PUR)

The primary pipe insulation is made of rigid polyurethane foam compliant with EN 253, completely free from ozone-depleting substances (ODP=0), HCFCs and HFCs. The foam is obtained from the reaction of polyol and isocyanate; the blowing agent mixture used has a Global Warming Potential (GWP) lower than 10 and does not contain SVHCs (Substances of Very High Concern) listed in the REACH candidate list.

Thermal conductivity of PUR:

- λ = 0.027 W/mK at 50°C
- λ = 0.022 W/mK at 10°C

Its closed-cell structure ensures dimensional stability, resistance to water absorption, compression and settling, maintaining high thermal performance over time even with reduced insulation thickness compared to other insulating materials.

End-of-life management: composite product not recyclable through domestic waste collection systems; must be brought to a recycling center or, in professional contexts, disposed of as special waste through authorized companies.

CASING PIPE (HDPE)

The layer of polyurethane insulation is protected by a jacket pipe (casing pipe) made of High

Density Polyethylene (HDPE) according to EN 253 Standard.

NIRON ALL PRO pipes are designed to fully exploit the characteristics of the materials used to make them and offer high performance standards that allow them to be used for the conveyance of hot & cold water.

Technical data

The table below, taken from EN ISO 15874 for Polypropylene pipes for cold and hot water, demonstrates the fields of use and the corresponding operating pressures and temperatures guaranteed for this system.

ALL PRO pipes are compliant with class 1 and 2 and 5 combined with the dedicated design pressure of 4, 6, 8 or 10 bars.

Table 1 — Classification of service conditions

Application class	**Design temperature, T_D**	Time,t at T_D	T_{max}	**Time,** t, **at** T_{max}	T_{mal}	**Time at** T_{mal}	**Typical field of application**
	°C	years	°C	years	°C	h	
1 [a]	60	49	80	1	95	100	Hot water supply (60 °C)[b]
2 [a]	70	49	80	1	95	100	Hot water supply (70 °C)
4 [c]	20	2,5	70	2,5	100	100	Underfloor heating and low temperature radiators
	Followed by						
	40	20					
	Followed by						
	60	25					
	Followed by (see next column)		Followed by (see next column)				
5 [c]	20	14	90	1	100	100	High temperature radiators
	Followed by						
	60	25					
	Followed by						
	80	10					

Base materials/ancillary materials in the functional/declared unit

Material		Piping system
Polypropylene granulate	Base	72.7 %
Polypropylene with fiber glass	Base	12.4 %
High density Polyethylene	Base	8.2 %
Isocyanate	Base	3.6 %
Polyol	Base	2.6 %
Pigments for Polypropylene	Ancillary	0.4 %
TOTAL		100%

Description of functional/declared unit

In this EPD an average pipe is considered. The pipe diameters range considered in the data collection includes a size range from DN 32 to DN 355, with different wall thickness (SDR 7.4, 9, 11, 17). It has been considered a declared unit of 1 kg of ALL PRO pipes.

Products Distribution

For ALL PRO pipes no packaging has been accounted for, being it a very small quantity per kg of pipe.

Reference service life

ALL PRO pipes are regarded as having 50 years RSL independent of their material according to /UNI EN 16904:2025/.

End of life

After the demolition and deconstruction phase, the EU specific EoL scenario for PUR has been chosen (45 % incineration, 55% landfill).

For transport from the installation site to the treatment site (C2), the considered distances were:

- incineration = 150 km
- recycling = 500 km (as per the most recent updated PCR EN 16904)
- landfilling = 50 km

LCA results – Environmental impacts per declared unit

The tables below show the environmental impacts results of 1 kg of ALL PRO preinsulated pipes.

Additional environmental impact indicators have been calculated and included in the project report but are not declared according to /EN 15804+A2:2019/ chapter 7.2.3.2.

CORE ENVIRONMENTAL IMPACT INDICATORS												
	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP - total [kg CO_2 eq.]	1,70E+00	1,47E-01	2,73E-01	2,12E+00	4,27E-02	0,00E+00	0,00E+00	0,00E+00	9,12E-03	1,23E+00	1,63E-02	-4,29E-01
GWP- fossil [kg CO_2 eq.]	1,69E+00	1,44E-01	2,70E-01	2,10E+00	4,27E-02	0,00E+00	0,00E+00	0,00E+00	9,10E-03	1,23E+00	1,62E-02	-4,28E-01
GWP - biogenic [kg CO_2 eq.]	5,31E-03	4,19E-04	3,15E-03	8,88E-03	3,93E-05	0,00E+00	0,00E+00	0,00E+00	2,16E-05	3,00E-05	4,96E-05	-1,73E-03
GWP - LULUC [kg CO_2 eq.]	2,42E-04	2,44E-03	6,28E-06	2,69E-03	5,54E-06	0,00E+00	0,00E+00	0,00E+00	1,18E-06	3,17E-05	5,96E-05	-3,73E-05
ODP [kg CFC-11 eq.]	5,03E-12	2,14E-14	3,84E-14	5,09E-12	5,35E-15	0,00E+00	0,00E+00	0,00E+00	1,14E-15	2,45E-13	5,33E-14	-3,46E-12
AP [mol of H+ eq.]	3,48E-03	2,18E-04	6,59E-05	3,76E-03	5,04E-05	0,00E+00	0,00E+00	0,00E+00	1,23E-05	3,31E-04	9,68E-05	-4,27E-04
EP - freshwater [kg P eq.]	2,07E-06	6,21E-07	3,99E-08	2,73E-06	1,13E-08	0,00E+00	0,00E+00	0,00E+00	2,40E-09	5,40E-08	9,28E-06	-6,48E-07
EP - marine [kg N eq.]	1,01E-03	8,20E-05	2,93E-05	1,12E-03	1,90E-05	0,00E+00	0,00E+00	0,00E+00	4,86E-06	1,23E-04	2,08E-05	-1,33E-04
EP - terrestrial [mol of N eq.]	1,08E-02	9,69E-04	3,33E-04	1,21E-02	2,14E-04	0,00E+00	0,00E+00	0,00E+00	5,46E-05	1,70E-03	2,29E-04	-1,43E-03
POCP [kg NMVOC eq.]	4,38E-03	2,17E-04	8,81E-05	4,69E-03	5,55E-05	0,00E+00	0,00E+00	0,00E+00	1,33E-05	3,25E-04	6,67E-05	-3,79E-04
ADPe [kg Sb eq.]*	6,37E-07	1,27E-08	3,64E-08	6,86E-07	1,15E-09	0,00E+00	0,00E+00	0,00E+00	2,45E-10	2,15E-09	1,07E-09	-3,46E-08
ADPf [MJ]*	5,89E+01	1,91E+00	6,98E-02	6,09E+01	5,70E-01	0,00E+00	0,00E+00	0,00E+00	1,21E-01	4,09E-01	2,73E-01	-7,56E+00
WDP [m^3 world equiv.]*	2,49E-01	2,25E-03	8,85E-02	3,40E-01	1,08E-04	0,00E+00	0,00E+00	0,00E+00	2,29E-05	1,17E-01	2,09E-03	-4,25E-02

Caption: GWP - total = global warming potential; GWP - fossil = global warming potential (fossil fuel only); GWP - biogenic = global warming potential (biogenic); GWP - luluc = global warming potential (land use only); ODP = ozone depletion; AP = acidification terrestrial and freshwater; EP - freshwater = eutrophication potential (freshwater); EP - marine = eutrophication potential (marine); EP- terrestrial = eutrophication potential (terrestrial); POCP = photochemical ozone formation; ADPE = abiotic depletion potential (element), ADPF = abiotic depletion potential (fossil) WDP = water scarcity.

*The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator according to EN 15804+A2:2019 chapter 7.2.3.2.

LCA results – Resource use per declared unit

RESOURCE USE												
	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE [MJ]	4,18E+00	1,65E-01	2,41E-02	4,37E+00	4,17E-03	0,00E+00	0,00E+00	0,00E+00	8,88E-04	1,17E-01	4,13E-02	-2,32E+00
PERM [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	0,00E+00	0,00E+00	0,00E+00
PERT [MJ]	4,18E+00	1,65E-01	2,41E-02	4,37E+00	4,17E-03	0,00E+00	0,00E+00	0,00E+00	8,88E-04	1,17E-01	4,13E-02	-2,32E+00
PENRE [MJ]	1,68E+01	1,91E+00	6,98E-02	1,88E+01	5,70E-01	0,00E+00	0,00E+00	0,00E+00	1,21E-01	1,99E+01	2,73E-01	-7,56E+00
PENRM [MJ]	4,21E+01	0,00E+00	0,00E+00	4,21E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,95E+01	0,00E+00	0,00E+00
PENRT [MJ]	5,89E+01	1,91E+00	6,98E-02	6,09E+01	5,70E-01	0,00E+00	0,00E+00	0,00E+00	1,21E-01	4,09E-01	2,73E-01	-7,56E+00
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	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	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	0,00E+00	0,00E+00	0,00E+00
FW [m^3]	7,17E-03	1,84E-04	2,08E-03	9,43E-03	4,56E-06	0,00E+00	0,00E+00	0,00E+00	9,70E-07	2,77E-03	6,25E-05	-1,78E-03

Caption: PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non renewable primary energy 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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

LCA results – Output flows and waste categories per declared unit

WASTE CATEGORIES AND OUTPUT FLOWS												
	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD [kg]	1,81E-08	7,33E-11	1,46E-08	3,28E-08	2,07E-11	0,00E+00	0,00E+00	0,00E+00	4,41E-12	2,50E-10	6,75E-11	-4,70E-09
NHWD [kg]	2,20E-02	3,13E-04	3,65E-03	2,60E-02	5,93E-05	0,00E+00	0,00E+00	0,00E+00	1,26E-05	4,55E-02	5,48E-01	-3,69E-03
RWD [kg]	4,33E-04	3,49E-06	4,60E-06	4,41E-04	9,07E-07	0,00E+00	0,00E+00	0,00E+00	1,93E-07	2,00E-05	3,85E-06	-5,12E-04
EEE [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	0,00E+00	0,00E+00	0,00E+00
EET [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	0,00E+00	0,00E+00	0,00E+00
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	0,00E+00	0,00E+00	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	2,33E+00	0,00E+00	0,00E+00
MFR [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	4,49E+00	0,00E+00	0,00E+00

.Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

LCA results – Biogenic carbon content of product and packaging per declared unit

Biogenic carbon content of product and packaging	
Biogenic carbon content in product [kg]	0,00E+00
Biogenic carbon content in packaging [kg]	0,00E+00

Assumptions and approximations

Where possible, a conservative approach has been adopted, overestimating burdens to prove irrelevance. In other cases, proxy data were selected based on scientific experience, in order to improve the accuracy of the model. Where it was not possible to know the precise composition of materials in the supply chain (due to commercial or industrial confidential suppliers' reasons or due to missing datasets), these have been approximated with LCIs of similar materials, estimated by the combination of available dataset or reconstructed with literature data.

1. Where potential benefits from energy recovery in A5 and C modules are considered, for rest of world countries (other than Europe) these are calculated based on the European grid mix.
2. Wastes deriving from extraordinary maintenance activities have not been considered.
3. Some components produced by third party companies come to NUPI with their own packaging. This packaging is not accounted for in this study.
4. In case of CCHP system in place as electricity is produced only for internal use, no electricity is sent to national grid.
5. Internal transports between production sites have not been considered
6. A European scenario has been considered for end of life scenarios.

Cut off criteria

EN 15804+A2:2019 requires that where there are data gaps or insufficient input data for a unit process the cut-off criteria shall be 1% of renewable and non-renewable primary energy usage and 1% of the total mass of this unit process. It can be concluded that the total sum of neglected material flows does not exceed 5% of mass, energy or environmental relevance. On the other hand, impacts generated from the machinery and facilities itself are neglected. This is in accordance with ISO14040/44 (2006).

In this study, the only aspects that have been omitted are the polyamide strips for packaging and the plastic spacers use to keep the primary pipe in a central position, as they are <1% of their respective unit processes.

Data quality

The data quality can be considered as good. The LCA model has been checked and most relevant flows were considered. Technological, geographical and temporal representativeness is good.

Examination period

Primary data collected in the context of this study refer to 2024.

Allocation of background data

In general, the allocation principles used in standard Sphera LCA for Expert (previously GaBi Professional) datasets are explained within Sphera LCA for Expert (GaBi)-Documentation (MANAGED LCA CONTENT (GABI DATABASES)).

Scenarios and additional technical information

- **Module A1** includes the manufacture of primary materials which are required for the pipes manufacturing. The datasets for the primary basic materials already include their upstream process. The energy demand is also considered.

- **Module A2** includes the transports of the basic materials to the pipes producer. Fuel use is also included in the transport sub-plans. Truck-trailer, Euro 6 A-C, 20 - 28t gross weight / 12.4t payload capacity , Container ship, 5,000 to 200,000 dwt payload capacity, deep sea and Rail transport cargo - average, average train, gross tonne weight 1,000t / 726t payload capacity are used as standard processes in the model.
- **Module A3** includes the production of pipes, auxiliaries and packaging materials. In this module are also considered emissions to air, production of wastes and their treatment (such activities refer to NUPI Industrie Italiane S.p.A. direct activities. Primary data have been used for (such as plastic extrusion for pipes production and insulating foam consumption and emissions/wastes).
- **Module A4** takes into account the transport to the final customer/distributor or construction site. The distribution scenario is taken from the c-PCR EN 16904 and shown below:

Means of transport	GaBi transport dataset	Weighted Average distance [km]
Truck	Truck, Euro 5, > 32 t/ 22% utilization factor	300

- **Module C1** (Deconstruction / demolition)- As generic scenario for the demolition of piping system, it is considered that it is mainly demolished together with the construction of the building. During the demolition of a building a significant amount of energy is used. This energy is mainly used to break inert waste streams, such as concrete and brick, and only a very little, insignificant part could be allocated to the piping system. Therefore, the impact of the deconstruction/demolition stage allocated to the piping system can be considered as zero.

- **Module C2, C3** (sorting, recycling and incineration with energy recovery) and C4 (landfilling) consider the end of life scenarios of the product, considering all components. The percentages to the given scenarios have been taken from /UNI EN 16904:2025/ as shown below:

  45 % incineration, 55% landfill, typical for products made of PUR foam.

  For transport from the installation site to the treatment site, reference can be made to the document /TEPPFA EOL SCENARIO/ where it is stated that:
  • incineration = 150 km
  • recycling = 500 km
  • landfilling = 50 km

- **Module D** consists of loads and benefits beyond the system boundaries.

Other additional environmental information

Emissions to indoor air:

No direct emissions at the building site. Nupi Industrie Italiane S.p.A confirms that the ALL PRO pipes do not contain any substances mentioned on the REACH-list.

Emissions to soil and water:

No direct emissions at the building site. Nupi Industrie Italiane S.p.A confirms that ALL PRO pipes do not contain any substances mentioned on the REACH-list.

Annex I - Products specific weight table

Items Code	description	Weight Kg/m)
27TNIRCLNPTT9017B57	pipe NIRON CL D.90 SDR 17 preinsulated T/T BR 5,7m	4,19
27TNIRCLNPTT9011B6	pipe NIRON CL D.90 SDR 11 preinsulated T/T BR 6m	5,30
27TNIRCLNPTT7511B6	pipe NIRON CL D.75 SDR 11 preinsulated T/T BR 6m	4,84
27TNIRCLNP329B58	pipe NIRON CL D.32 SDR 9 preinsulated BR 5,8m	1,48
27TNIRCLNPTT5011B6	pipe NIRON CL D.50 SDR 11 preinsulated T/T BR 6m	2,39
27TNIRCLNP3273B58	pipe NIRON CL D.32 SDR7,3 preinsulated BR 5,8m	1,48
27TNIRCLNP409B58	pipe NIRON CL D.40 SDR 9 preinsulated BR 5,8m	1,54
27TNIRCLNPTT28017B6	pipe NIRON CL D.280 SDR 17 preinsulated T/T BR 6m	27,07
27TNIRCLNPTT20017B57	pipe NIRON CL D.200 SDR 17 preinsulated T/T BR 5,7m	19,03
27TNIRCLNPTT20011B6	pipe NIRON CL D.200 SDR 11 preinsulated T/T BR 6m	19,11
27TNIRCLNPTT16017B57	pipe NIRON CL D.160 SDR 17 preinsulated T/T BR 5,7m	10,40
27TNIRCLNPTT16017B2	pipe NIRON CL D.160 SDR 17 preinsulated T/T BR 2m	10,28
27TNIRCLNP4073B58	pipe NIRON CL D.40 SDR 7.3 preinsulated BR 5,8m	1,66
27TNIRCLNPT9011B3	pipe NIRON CL D.90 SDR 11 preinsulated BR 3m	5,34
27TNIRCLNPT9011B1	pipe NIRON CL D.90 SDR11 preinsulated BR 1m	4,59
27TNIRCLNPT9011	pipe NIRON CL D.90 SDR 11 preinsulated T/CODOLO	5,25
27TNIRCLNPT7511B3	pipe NIRON CL D.75 SDR 11 preinsulated BR 3m	14,70
27TNIRCLNPT6311B1	pipe NIRON CL D.63 SDR 11 PREISOL. T/CODOLO L=1m	2,25
27TNIRCLNPT6311B05	pipe NIRON CL D.63 SDR 11 PREISOL. T/CODOLO L=0.5m	1,10
27TNIRCLNPT6311	pipe NIRON CL D.63 SDR 11 preinsulated T/CODOLO	2,65
27TNIRCLNPT5011	pipe NIRON CL D.50 SDR 11 preinsulated T/CODOLO	2,38
27TNIRCLNPT20011	pipe NIRON CL D.200 SDR 11 preinsulated T/CODOLO	18,94
27TNIRCLNPT16017B05	pipe NIRON CL D.160 SDR 17 PREIS. T/CODOLO L=0.5m	4,53
27TNIRCLNPT16011B05	pipe NIRON CL D.160 SDR11 preinsulated BR 0,5m	5,42
27TNIRCLNPT16011	pipe NIRON CL D.160 SDR 11 preinsulated T/CODOLO	14,01
27TNIRCLNPT12511	pipe NIRON CL D.125 SDR 11 preinsulated T/CODOLO	8,69
27TNIRCLNPT11011	pipe NIRON CL D.110 SDR 11 preinsulated T/CODOLO	8,05
27TNIRCLNP909LB116	pipe NIRON CL D.90 SDR9 preinsulated BR 11,6m	5,06
27TNIRCLNP4011B58	pipe NIRON CL D.40 SDR 11 preinsulated BR 5,8m	1,72
27TNIRCLNP909	pipe NIRON CL D.90 SDR 9 preinsulated BR 6,1m	5,05
27TNIRCLNP6317B58	pipe NIRON CL D.63 SDR 17 preinsulated BR 5,8m	2,02
27TNIRCLNP9073B4	pipe NIRON CL D.90 SDR7.3 preinsulated BR 4m	5,52
27TNIRCLNPTT5011B5	pipe NIRON CL D.50 SDR11 preinsulated T/T BR 5,8m	2,06
27TNIRCLNPTT5011B58	pipe NIRON CL D.50 SDR11 preinsulated T/T BR 5,8m	2,06

Items Code	description	Weight Kg/m)
27TNIRCLNP9017	pipe NIRON CL D.90 SDR17 preinsulated BR 6,1m	4,56
27TNIRCLNP9011LB116	pipe NIRON CL D.90 SDR11 preinsulated BR 11,6m CUT-BACK 330mm	4,65
27TNIRCLNP509B58	pipe NIRON CL D.50 SDR 9 preinsulated BR 5,8m	2,10
27TNIRCLNP9011B4	pipe NIRON CL D.90 SDR 11 preinsulated BR 4m	4,70
27TNIRCLNP9011B12	pipe NIRON CL D.90 SDR 11 preinsulated BR 12,2m	5,28
27TNIRCLNP9011B1	pipe NIRON CL D.90 SDR11 preinsulated BR 1m	4,39
27TNIRCLNP9011	pipe NIRON CL D.90 SDR 11 preinsulated BR 6,1m	5,27
27TNIRCLNP759LB116	pipe NIRON CL D.75 SDR9 preinsulated BR 11,6m	4,44
27TNIRCLNP5073B58	pipe NIRON CL D.50 SDR 7.3 preinsulated BR 5,8m	2,29
27TNIRCLNP759	pipe NIRON CL D.75 SDR 9 preinsulated BR 6,1m	4,46
27TNIRCLNP5011B58	pipe NIRON CL D.50 SDR 11 preinsulated BR 5,8m	2,31
27TNIRCLNPTT6311B58	pipe NIRON CL D.63 SDR 11 preinsulated T/T BR 5,8m	2,33
27TNIRCLNP639B58	pipe NIRON CL D.63 SDR 9 preinsulated BR 5,8m	2,46
27TNIRCLNP7517	pipe NIRON CL D.75 SDR 17 preinsulated BR 6,1m	4,20
27TNIRCLNP6311B58	pipe NIRON CL D.63 SDR 11 preinsulated BR 5,8m	2,68
27TNIRCLNP7511B4	pipe NIRON CL D.75 SDR 11 preinsulated BR 4m	4,23
27TNIRCLNP7511B05	pipe NIRON CL D.75 SDR 11 preinsulated BR 0,5 m	1,68
27TNIRCLNP7511	pipe NIRON CL D.75 SDR 11 preinsulated BR 6,1m	4,88
27TNIRCLNP639LB116	pipe NIRON CL63 PREISO BR 11,6m CUT-BACK 33	2,46
27TNIRCLNP6373B58	pipe NIRON CL D.63 SDR7,3 preinsulated BR 5,8m	2,71
27TNIRCLNP639	pipe NIRON CL D.63 SDR 9 preinsulated BR 6,1m	2,46
27TNIRCLNP7517B58	pipe NIRON CL D.75 SDR 17 preinsulated BR 5,8m	3,84
27TNIRCLNP6373B4	pipe NIRON CL D.63 SDR7.3 preinsulated BR 4m	2,72
27TNIRCLNP6373	pipe NIRON CL D.63 SDR7.3 preinsulated BR 6,1m	2,74
27TNIRCLNP9017B58	pipe NIRON CL D.90 SDR 17 preinsulated BR 5,8m	4,12
27TNIRCLNP6311LB116	pipe NIRON CL D.63 SDR11 preinsulated BR 11,6m	2,27
27TNIRCLNP6311B6	pipe NIRON CL D.63 SDR 11 preinsulated BR 6m	2,68
27TNIRCLNP759B58	pipe NIRON CL D.75 SDR 9 preinsulated BR 5,8m	4,46
27TNIRCLNP6311B4	pipe NIRON CL D.63 SDR 11 preinsulated BR 4m	2,31
27TNIRCLNP6311B12	pipe NIRON CL D.63 SDR 11 preinsulated BR 12,2m	2,69
27TNIRCLNP6311	pipe NIRON CL D.63 SDR 11 preinsulated BR 6,1m	2,68
27TNIRCLNP509LB116	pipe NIRON CL D.50 SDR9 preinsulated BR 11,6m	2,10
27TNIRCLNP7573B58	pipe NIRON CL D.75 SDR7,3 preinsulated BR 5,8m	4,84
27TNIRCLNP509	pipe NIRON CL D.50 SDR 9 preinsulated BR 6,1m	2,11
27TNIRCLNP9011B58	pipe NIRON CL D.90 SDR11 preinsulated BR 5,8m	4,85
27TNIRCLNP5073B4	pipe NIRON CL D.50 SDR 7,4 preinsulated BR 4m	2,28
27TNIRCLNP5073	pipe NIRON CL D.50 SDR7.3 preinsulated BR 6,1m	2,32
27TNIRCLNP7511B58	pipe NIRON CL D.75 SDR 11 preinsulated BR 5,8m	4,88

Items Code	description	Weight Kg/m)
27TNIRCLNP5011B4	pipe NIRON CL D.50 SDR 11 preinsulated BR 4m	2,02
27TNIRCLNP5011B12	pipe NIRON CL D.50 SDR 11 preinsulated BR 12,2m	2,48
27TNIRCLNP5011B1	pipe NIRON CL D.50 SDR 11 preinsulated BR 1m	1,87
27TNIRCLNP5011	pipe NIRON CL D.50 SDR 11 preinsulated BR 6,1m	2,31
27TNIRCLNP409LB116	pipe NIRON CL D.40 SDR9 preinsulated BR 11,6m	1,54
27TNIRCLNP9073	pipe NIRON CL D.90 SDR7.3 preinsulated BR 5,8 m	5,55
27TNIRCLNP409	pipe NIRON CL D.40 SDR 9 preinsulated BR 6,1m	1,55
27TNIRCLNP11017B58	pipe NIRON CL D.110 SDR 17 preinsulated BR 5,8m	6,21
27TNIRCLNP4073	pipe NIRON CL D.40 SDR7.3 preinsulated BR 6,1m	1,62
27TNIRCLNP9073B58	pipe NIRON CL D.90 SDR7,3 preinsulated BR 5,8m	6,55
27TNIRCLNP4011B4	pipe NIRON CL D.40 SDR 11 preinsulated BR 4m	1,49
27TNIRCLNP4011B05	pipe NIRON CL D.40 SDR11 preinsulated L=0.5m	0,64
27TNIRCLNP12517B58	pipe NIRON CL D.125 SDR 17 preinsulated BR 5,8m	6,58
27TNIRCLNP11011B58	pipe NIRON CL D.110 SDR11 preinsulated BR 5,8m	7,08
27TNIRCLNP329LB116	pipe NIRON CL 32preinsulated BR 11,6m	1,39
27TNIRCLNP1109B58	pipe NIRON CL D.110 SDR9 preinsulated BR 5,8m	7,67
27TNIRCLNP329B4	pipe NIRON CL D.32 SDR 9 preinsulated BR 4m	1,42
27TNIRCLNP329B05	pipe NIRON CL D.32 SDR9 preinsulated L=0.5m	0,59
27TNIRCLNP12511B58	pipe NIRON CL D.125 SDR 11 preinsulated BR 5,8m	7,71
27TNIRCLNP3273	pipe NIRON CL D.32 SDR 7,3 preinsulated BR 6,1m	1,80
27TNIRCLNPTT12511B58	pipe NIRON CL D.125 SDR11 preinsulated T/T BR 5,8m	7,92
27TNIRCLNP11073B58	pipe NIRON CL D.110 SDR7,3 preinsulated BR 5,8m	8,36
27TNIRCLNP12573B58	pipe NIRON CL D.125 SDR7,3 preinsulated BR 5,8m	10,43
27TNIRCLNP16017B58	pipe NIRON CL D.160 SDR 17 preinsulated BR 5,8m	11,61
27TNIRCLNP25073B6	pipe NIRON CL D.250 SDR7,4 preinsulated BR 6m	31,78
27TNIRCLNP25073B12	pipe NIRON CL D.250 SDR7,4 preinsulated BR 12m	32,10
27TNIRCLNP16011B58	pipe NIRON CL D.160 SDR11 preinsulated BR 5,8m	12,12
27TNIRCLNP25011LB116	pipe NIRON CL D.250 SDR11 preinsulated BR 11,6m	25,23
27TNIRCLNP1609B58	pipe NIRON CL D.160 SDR9 preinsulated BR 5,8m	13,34
27TNIRCLNP25011	pipe NIRON CL D.250 SDR 11 preinsulated BR 6,1m	25,79
27TNIRCLNP16073B58	pipe NIRON CL D.160 SDR 7,3 preinsulated BR 5,8m	16,55
27TNIRCLNP202811B116	pipe NIRON CL D.200/280 SDR11 preinsulated BR 11,6m	17,45
27TNIRCLNP20017B58	pipe NIRON CL D.200 SDR17 preinsulated BR 5,8m	18,57
27TNIRCLNP2009B58	pipe NIRON CL D.200 SDR 9 preinsulated BR 5,8m	19,07
27TNIRCLNP25017B58	pipe NIRON CL D.250 SDR 17 preinsulated BR 5,8m	20,75
27TNIRCLNP20011B12	pipe NIRON CL D.200 SDR 11 preinsulated BR 12,2m	0,00
27TNIRCLNP1609LB116	pipe NIRON CL D.160 SDR9 preinsulated BR 11,6m	13,16
27TNIRCLNP20011B58	pipe NIRON CL D.200 SDR11 preinsulated BR 5,8m	21,61
27TNIRCLNP20289B58	pipe NIRON CL D.200/280 SDR 9 preinsulated BR 5,8m	21,88

Items Code	description	Weight Kg/m)
27TNIRCLNP16073	pipe NIRON CL D.160 SDR 7,3 preinsulated BR 6,1m	0,00
27TNIRCLNP25011B58	pipe NIRON CL D.250 SDR 11 preinsulated BR 5,8m	25,55
27TNIRCLNP16017	pipe NIRON CL D.160 SDR 17 preinsulated BR 6,1m	11,61
27TNIRCLNP16011LB116	pipe NIRON CL D.160 SDR11 preinsulated BR 11,6m	11,99
27TNIRCLNP7573	pipe NIRON CL D.75 SDR 7,3 preinsulated BR 5,8 m	28,07
27TNIRCLNP16011B12	pipe NIRON CL D.160 SDR 11 preinsulated BR 12,2m	13,73
27TNIRCLNP16011B116	pipe NIRON CL D.160 SDR 11 preinsulated BR 11,6m	12,24
27TNIRCLNP16011B05	pipe NIRON CL D.160 SDR11 preinsulated BR 0,5m	4,83
27TNIRCLNP16011	pipe NIRON CL D.160 SDR 11 preinsulated BR 6,1m	13,73
27TNIRCLNP1259LB116	pipe NIRON CL D.125 SDR9 preinsulated BR 11,6m	8,45
27TNIRCLNP2509B58	pipe NIRON CL D.250 SDR 9 preinsulated BR 5,8m	28,40
27TNIRCLNP31517B58	pipe NIRON CL D.315 SDR 17 preinsulated BR 5,8m	28,45
27TNIRCLNP12573	pipe NIRON CL D.125 SDR 7,3 preinsulated BR 6,1m	10,38
27TNIRCLNP250S11B58	pipe NIRON CL D.250 SDR11 preinsulated BR 5,8m	29,34
27TNIRCLNP909B58	pipe NIRON CL D.90 SDR9 preinsulated BR 5,8m	29,47
27TNIRCLNP12511B4	pipe NIRON CL D.125 SDR 11 preinsulated BR 4m	8,89
27TNIRCLNP12511B12	pipe NIRON CL D.125 SDR 11 preinsulated BR 12,2m	8,84
27TNIRCLNP12511B116	pipe NIRON CL D.125 SDR 11 preinsulated BR 11,6m	7,97
27TNIRCLNP12511	pipe NIRON CL D.125 SDR 11 preinsulated BR 6,1m	8,89
27TNIRCLNP1109LB116	pipe NIRON CL D.110 SDR9 preinsulated BR 11,6m	7,58
27TNIRCLNP31511B58	pipe NIRON CL D.315 SDR 11 preinsulated BR 5,8m	36,03
27TNIRCLNP1109	pipe NIRON CL D.110 SDR 9 preinsulated BR 6,1m	8,41
27TNIRCLNP35511B58	pipe NIRON CL D.355 SDR 11 preinsulated BR 5,8m	46,66
27TNIRCLNP11073	pipe NIRON CL D.110 SDR 7,3 preinsulated BR 6,1m	0,00
27TNIRCLNP1259B58	pipe NIRON CL D.125 SDR9 preinsulated BR 5,8m	48,62
27TNIRCLNP11011LB116	pipe NIRON CL D.110 SDR11 preinsulated BR 11,6m	7,03
27TNIRCLNP355S11B58	pipe NIRON CL D.355 SDR11 preinsulated BR 5,8m	50,44
27TNIRCLNP11011B4	pipe NIRON CL D.110 SDR11 preinsulated BR 4m	7,05
27TNIRCLNP11011B12	pipe NIRON CL D.110 SDR 11 preinsulated BR 12,2m	8,18
27TNIRCLNP11011	pipe NIRON CL D.110 SDR 11 preinsulated BR 6,1m	8,22

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