



ENVIRONMENTAL PRODUCT DECLARATION

Conforms to ISO 21930

 **SANTALUZIA** 70 anos

Recycled Polystyrene Profile

Declaration code
M04813-0002-01-15

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Fundação Vanzolini



ENVIRONMENTAL PRODUCT DECLARATION

Manufacturer

Indústria e Comércio de Molduras Santa Luzia Ltda
Endereço: Rodovia SC 108, km 317, nº 3.019
São Januário – Braço do Norte – Santa Catarina.
CEP 88.750-000

Code

M04813-0002-01-15
Validade
February 5, 2019



Product Category

Finishing Profiles

The profile is an existing linear element meant to protect the finishing of walls and also act as a decorative article.

Product description

Recycled Polystyrene Profile

Recycled polystyrene profiles are linear elements meant to protect the finishing of walls and also act as a decorative article. This line of profiles includes baseboards, crown moldings, trims, chair rails and wainscotings. Santa Luzia's profiles have high performance due to their resistance to humid environments and termites. The bars are fitted with finishing and fixed with the aid of screw sleeves and silicon glue.

The declaration contains

- Product definition
- Details and origin of inputs
- Description of the products manufacturing process
- Life Cycle Assessment Results
- Relevant information about comfort and health

Validity

This Declaration entitles the owner to bear the RGM seal of the Vanzolini Foundation.

It applies only to the products referred to in the declaration, for a period three years from the date of issue. The holder of the Declaration (manufacturer) is responsible for the details of the documentation on which the assessment is based.

February 5, 2016

JJA FERREIRA
Director of Certification

Prof. MSc. Laércio Kutianski Roméiro
Verifier

This declaration and the regulations on which it is based have been checked and are in accordance with ISO 14025 e ISO 21930.



MANUFACTURER: Indústria e Comércio de Molduras Santa Luzia LTDA
 PRODUCT CATEGORY: Finishing Profiles
 PRODUCT: Recycled Polystyrene Profile

Declared Unit: linear meter

Functional Unit (kg): 1,000kg of polystyrene profile packed and ready for shipment.

Reference Flow (parts): 150,027 pieces

Environmental Impact (per declared Unit)

Environmental Impact

Impact Category	Unit	Potential Impacts
<i>Climates Changes</i>	kg CO ₂ eq.	3,31
<i>Ozone Layer Depletion</i>	kg CFC ⁻¹¹ eq.	2,73E-07
<i>Land Acidification</i>	kg SO ₂ eq.	1,13E-02
<i>Freshwater Eutrophication</i>	kg P eq.	6,10E-04
<i>Marine Eutrophication</i>	kg N eq.	7,41E-04
<i>Human Toxicity</i>	kg 1,4-DB eq.	0,62
<i>Photochemical Oxidation Formation</i>	kg NMVOC	1,04E-02
<i>Particulate Matter Formation</i>	kg PM10 eq.	4,96E-03
<i>Terrestrial Eco toxicity</i>	kg 1,4-DB eq.	2,79E-03
<i>Freshwater Eco toxicity</i>	kg 1,4-DB eq.	1,84E-02
<i>Marine Eco toxicity</i>	kg 1,4-DB eq.	1,86E-02
<i>Ionizing Radiation</i>	kobo U235 eq.	0,43
<i>Occupation of Farmable Water</i>	m ² a	0,42
<i>Occupation of Urban Areas</i>	m ² a	2,36E-02
<i>Transformation of Land</i>	m ²	2,53E-03
<i>Water Depletion</i>	m ³	61,67
<i>Metal Depletion</i>	kg Fe eq.	0,113
<i>Fossil Depletion</i>	kg oil eq.	1,32
<i>Accumulated Energy Demand</i>	MJ	63,22

Recyclable Product: Yes

Recycled Content: 96%

Due to the characteristics of the material, polystyrene profiles have low thermal expansion and low weight variation with respect to water absorption. These products have the characteristic of propagating flame, and the VOC's content is of 2.87 g/L.



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INTRODUCTION

This document was prepared in compliance with the guidelines of **standards ISO 14025 (Environmental label and declarations – Type III** environmental declarations – Principles and procedures) and ISO 21930 (Sustainability in building construction – Environmental declaration of building products).

Any use of the information contained herein, in whole or in part, must be accompanied at least by a complete reference to the original declaration, made in the following manner: “Full title, author, date”.

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Rod. SC 108 km 317, N# 3019

São Januário – 88750 000

Braço do Norte – SC – Brasil



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READING GUIDE

Information that allows for a better reading of the Environmental Declaration

Functional unit (FU)

The FU is intended to allow for the comparison of products and their alternatives and to serve as a reference unit to which the data collected must relate for the preparation of an EPD – Environmental Product Declaration based on the LCI.

Declared Unit (DU)

Quantity of a construction product for use as a reference unit in an EPD – Environmental Product Declaration, based on LCA, to express the environmental information required in the information modules.

Therefore, for this environmental declaration we will be using the Declared Unit (UD) as the reference unit, since it is based on the Manufacturing information module.

Product Category Rules (PCR)

Specific set of rules, requirements and guidelines for the preparation of type-III environmental declarations for one or more product categories.



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1. Company Description

1.1 Company name

Industria e Comercio de Molduras Santa Luzia Ltda

1.2 Place of Production

Rod. SC 108 km 317, N# 3019 - São Januário – 88750 000 - Braço do Norte
– SC – Brasil

2. Technical Information

2.1 Tax Information

Corporate Taxpayer ID (CNPJ): 75.821.546/0001-02

State Corporate Registration: 250,871,521

2.2 Environmental Information

Environmental Operating License – FATMA No. 7528/2012

2.3 Standardization

Routine assays were performed in-house and some tests were carried out by the IPT – National Institute of Technology and UNESC.

2.4 Suppliers

Recycled Polystyrene

Distance between supplier and Santa Luzia: 4.457km

Transportation of the raw material: via waterway until Itajaí (diesel-fueled vessel) and by road from Itajaí to Santa Luzia (diesel-fueled truck)

Recycled Polystyrene

Distance between supplier and Santa Luzia: 330km.



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Transportation of the raw material: by road from Joinville to Santa Luzia (diesel-fueled truck)

Recycled Polystyrene

Distance between supplier and Santa Luzia: 871km.

Transportation of the raw material: by road from Indaiatuba to Santa Luzia (diesel-fueled truck)

Recycled Polystyrene

Distance between supplier and Santa Luzia: 4.457km.

Transportation of the raw material: via waterway (diesel-fueled vessel) and by road from Itajai to Santa Luzia (diesel-fueled vessel)

Recycled Polystyrene

Distance between supplier and Santa Luzia: 4.457km.

Transportation of the raw material: via waterway (diesel-fueled vessel) and by road to Santa Luzia (diesel-fueled vessel)

Recycled Polystyrene

Distance between supplier and Santa Luzia: 330km.

Transportation of the raw material: by road from Itajai to Santa Luzia (diesel-fueled vessel)

Pigments

Distance between supplier and Santa Luzia: 40km.

Transportation of the raw material: by road to Santa Luzia (diesel-fueled truck)

Extrusion Additives

Distance between supplier and Santa Luzia: 50km.

Transportation of the raw material: by road to Santa Luzia (diesel-fueled truck)



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Virgin Polystyrene

Distance between supplier and Santa Luzia: 400km.

Transportation of the raw material: by road to Santa Luzia (diesel-fueled truck)

Steel for tools

Distance between supplier and Santa Luzia: 10km.

Transportation of the raw material: by road to Santa Luzia (gasoline-fueled truck)

Maintenance Oil

Distance between supplier and Santa Luzia: 10km.

Transportation of the raw material: by road to Santa Luzia (gasoline-fueled truck)

PPE

Distance between supplier and Santa Luzia: 15km.

Transportation of the raw material: by road to Santa Luzia (diesel-fueled truck)

Polishing Rolls

Distance between supplier and Santa Luzia: 40km.

Transportation of the raw material: by road to Santa Luzia (gasoline-fueled truck)

Ink

Distance between supplier and Santa Luzia: 70km.

Transportation of the raw material: by road to Santa Luzia (diesel-fueled truck)

Plastic Film for packaging

Distance between supplier and Santa Luzia: 400km.

Transportation of the raw material: by road to Santa Luzia (diesel-fueled truck)



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Tags

Distance between supplier and Santa Luzia: 5km.

Transportation of the raw material: by road to Santa Luzia (gasoline-fueled truck)

PVC Strips

Distance between supplier and Santa Luzia: 560km.

Transportation of the raw material: by road to Santa Luzia (diesel-fueled truck)

Cardboard Boxes

Distance between supplier and Santa Luzia: 40km.

Transportation of the raw material: by road to Santa Luzia (diesel-fueled truck)

Styrofoam Shim

Distance between supplier and Santa Luzia: 180km.

Transportation of the raw material: by road to Santa Luzia (diesel-fueled truck)

Certifications

Green Seal Certificate 2014 – Chico Mendes Institute



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3. Product Characterization

3.1 Product Definition

Recycled Polystyrene profiles are coatings elements used to providing a finishing element between walls and floors. It features high performance due to its resistance to humid environments and termites. The bars are shipped ready for final finishing and secured with screw sleeves and silicone glue.

3.2 Definition of the Functional Unit (FU) or Declared Unit.

The FU was defined per unit of mass (1 ton of profile). We chose this unit because of the possibility of comparing the results (based on the same FU) for different profiles produced by Santa Luzia.

The FU is intended to allow for the comparison of products and their alternatives and to serve as a reference unit to which the data collected must relate for the preparation of a Life Cycle Inventory (LCI). The table below summarizes the definitions related to the FU.

Elements for definition of the functional unit of the LCA

Product features	<i>Serve as finishing, coating, protection and aesthetic decotation for walls, among others</i>
Feature relevant to LCA	<i>Wall coating</i>
Functional Unit	<i>1,0 ton of packed polystyrene profile ready for shipment</i>
Complementary Functional Unit	<i>1,0 linear meter of polystyrene profile with mass of 974 g·m⁻¹</i>
Product Performance	<i>Covers 360.066 meters of wall</i>
Flow Reference	<i>150.027 pieces of polystyrene profile</i>



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The FU was defined as a unit of mass because it allows for a comparison of the results (based on the same FU) with those for different profiles produced by Santa Luzia.

However, the product category rule (PCR) of the Vanzolini Foundation in principle indicates that the declared unit (equivalent to the FU) be per linear meter of product.

3.3 Data used to calculate the functional unit or declared unit

Quantity of products and complementary products contained in the DU. The reference flow adopted for the Life Cycle Assessment (LCA) of the product is of 1.0 linear meter of polystyrene profile with a mass of 974 g/m.

This requires

- 1200.41 g of recycled EPS (of which 974 g is the DU, 201.8 g are process returns and 24.5 g are losses);
- 53.9 g of virgin PS;
- 16.81 g of additives;

Accessory materials

- 50.12 g/m nitrocellulose lacquer ink and container solvent

Package (type and amount);

- 16.35 g/m of film for packaging the bars
- 0.076 g/m of stickers
- 0.635 g/m PVC strips for the closing of boxes
- 73.80 g/m of cardboard boxes for packaging
- 1.89E-03 g/m of Styrofoam for internal protection

This does not include the use stage, and therefore the consumption of glue, screw sleeves and nails required for installation is not considered.



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4. Technical Compliance

Thermal Expansion

Average amount: 0.15% variation per 25C.

Mass variation

Average amount: 0.82%

The weight variation of the products determined by testing was of 0.82%. This variation does not alter the characteristics of the product.

Size variation

Does not occur due to water absorption.

Determination of the Surface Spread of Flame Index

Average amount: 1,552, corresponding to class E of the test method (standard NBR 9442)

Volatile Organic Compound Analysis

Average amount: 2.87 g/L



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5. Contribution of the product for assessment of risks to health and quality of life inside buildings

5.1 Relevant information for assessing health risks

5.1.1 Contribution to the health quality of interior spaces

Not applicable

5.1.2 Contribution to the health quality of water

Not applicable

5.2 Contribution of the product to quality of life inside buildings

5.2.1 Characteristics of the products that contribute to the creation of hydrothermal comfort conditions in buildings.

Not applicable

5.2.2 Characteristics of the products that contribute to the creation of acoustic comfort conditions in buildings

Not applicable

5.2.3 Characteristics of the products that contribute to the creation of olfactory comfort conditions in buildings

The low water absorption inhibits the accumulation of moisture and fungi that proliferate odors.

5.2.4 Characteristics of the products that contribute to the creation of visual comfort conditions in buildings

The profiles can be painted in the consumer's preferred color, favoring proper comfort in the environment according to the need.



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6. Further product information included in the report

6.1 Manufacturing

6.1.1 Health of workers during manufacturing

Santa Luzia is concerned with the health of its employees, so it always reinforces the provision of the PPE required for each sector to all employees. It also holds periodic examinations (conducted occupational medicine physicians), and all sectors are monitored daily by Occupational Safety Technicians in order to minimize issues with ergonomics, repetitive efforts, loud noises, excessive dust and others.

6.1.2 Environmental concerns during manufacturing

The fact that Santa Luzia seeks a destination for the adequate disposal of polystyrene signals the company's commitment to the environment. The constant search for recycling processes that do less harm to nature with a focus on sustainability is one of the main objectives of Santa Luzia.

6.2 Construction

6.2.1 Procedures, recommendations and care

For a better-quality finish, the steps below must be followed. The recommendation is to fix the profiles with the T-Shaped screw sleeves sold by Santa Luzia.

- 1) Prepare the surface on which the product is to be fixed. It is very important that the surfaces be dry and free of dust, fungi, spackling, plasters and elevations. Use files or other materials to prepare such surfaces.
- 2) Obtain a template by cutting a 5cm piece from the profile to be fixed. Behind it, within the groove for engagement of the sleeve, make a hole running through from side to side.



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- 3) Using this template, place it exactly where the profile is to be fixed, and, with the aid of a pencil or sharp object, mark where the hole is to be made. Make on mark every 40cm. Then, drill the hole using a 6mm drill.
- 4) Place the T-shaped sleeve in the hole using a hammer. Then, introduce the headless nail in the sleeve. This will ensure the expansion of the sleeve inside the hole and afford greater firmness. Place it so that the holes are aligned for fixing the bars. It is not advised to use screws.
- 5) Remove the profile from the package. Cut the tips at 45° as needed, apply two continuous lines of Santa Luzia or silicone glue along the back of the bar, distant from the sleeve groove. To minimize possible cracks at the seams, we recommend using instant glue (such as Super Bonder®) on the top of the bars. Then, place the bar against the location in which is to be fixed site and press with your own hands until its fixates in the sleeves. For fastening on wood, one can use the sleeve by cutting off the part that would be placed inside the wall and secure it with a 12 x12 headed nail. For alignment at the seams, use a sleeve as a guide to ensure alignment of the two bars (so that the two are bars fixed in the same sleeve).

Note 1: In places where the wall cannot be pierced (e.g. when there are pipes in the area), you can use a small piece of double sided tape at every 40 cm with silicone glue, which will prevent the need to drill a hole for the sleeve.

Note 2: The cut must be made quickly to achieve higher quality.

Note 3: It is recommended to only cut at 45°.

6) For a better finish at junctions and between the wall and the bars, we recommend using the Santa Luzia Flex spackle or white leveling spackle (product sold in paint stores). Excess spackle must be cleaned with a damp cloth before drying. For color profiles, use the Santa Luzia Flex spackle indicated for each finish.

7) Profiles must be painted after installation.



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6.3 Eco management of the building

6.3.1 Power Management

Energy consumption occurs only at the time of installations, with the use of electric drill and saw.

6.3.2 Water management

Installation of the profiles does not require the use of water. After installation, water is used for cleaning with a damp cloth.

6.3.3 Care and Maintenance

Maintenance of the profiles can be achieved simply with a damp cloth moistened with water, ethanol, detergent or bleach. Exposure time of the profile to these products is of a maximum 10 minutes. Because they have low water absorption, recycled polystyrene profiles do not accumulate mold. Because it is polymer, it does not suffer from the action of pests such as termites, borers and other insects, thereby increasing the shelf life of the product.

Due to having a smooth, porosity-free finish, the period required between cleanings.

6.4 End of life

6.4.1 Deconstruction

Polystyrene profiles can be discarded and sent back to collection centers, from which they return to the company for reuse in the production process through the Reverse Logistics Policy implemented by Santa Luzia.

6.4.2 Processes and programs available for collection, processing and recycling

The profiles can return to the production process after being discarded. Through its reverse logistics policy, Santa Luzia receives the profiles back so they can be reused in the manufacture of new profiles. The sleeves and adhesive/silicon are removed. Santa Luzia has partnered with several recycling cooperatives spread



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throughout Brazil that send the PS they collect to be recycled and used by the company for the manufacture of new products.

6.4.3 Limitations

For proper recycling, the sleeves and glue must be removed. After that, the profiles are subject grinding, mixing, pelletizing and extrusion.



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7. Attachment: Inventory Data

7.1 Definition of the LCA (Life Cycle Assessment) system

7.1.1 Life cycle stages included

Outsourced Recycling of Pelletized Material:

1. Movement 1
2. Degassing
3. Movement 2
4. Grounding
5. Movement 3
6. Pelletizing
7. Movement 4
8. Transportation

Outsourced Recycling of Ground Material:

1. Logistics
2. Screening
3. Degassing
4. Movement 1
5. Grounding
6. Movement 2
7. Transportation

Outsourced Recycling of Degassed Material:

1. Logistics
2. Screening
3. Degassing
4. Movement 1



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5. Transportation

Recycling Plant III Santa Luzia

1. Logistics
2. Screening
3. Deposit
4. Degassing
5. Movement 1
6. Grounding
7. Movement 2
8. Transportation

Recycling at Santa Luzia headquarters (receives input from all previously described suppliers)

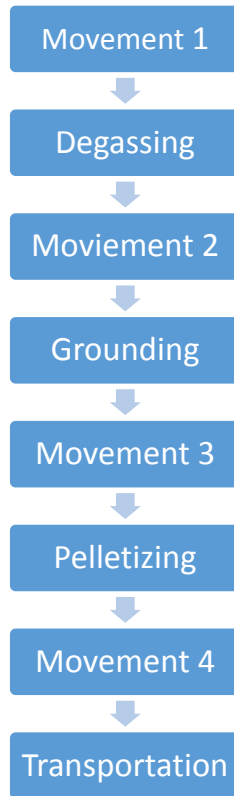
1. Reception (Mixture 1)
2. Pelletizing
3. Mixture 2
4. Preparation for Extrusion
5. Extrusion
6. Ripping
7. Polisher 1
8. Painting 1
9. Drying 1
10. Polisher 2
11. Painting 2
12. Drying 2
13. Packing
14. Stocking

7.1.2 Simplified chart of the stages included



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- Outsourced Recycling of Pellets:



- Outsourced Recycling of Ground Material:





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- Outsourced Recycling of Degassed Material:



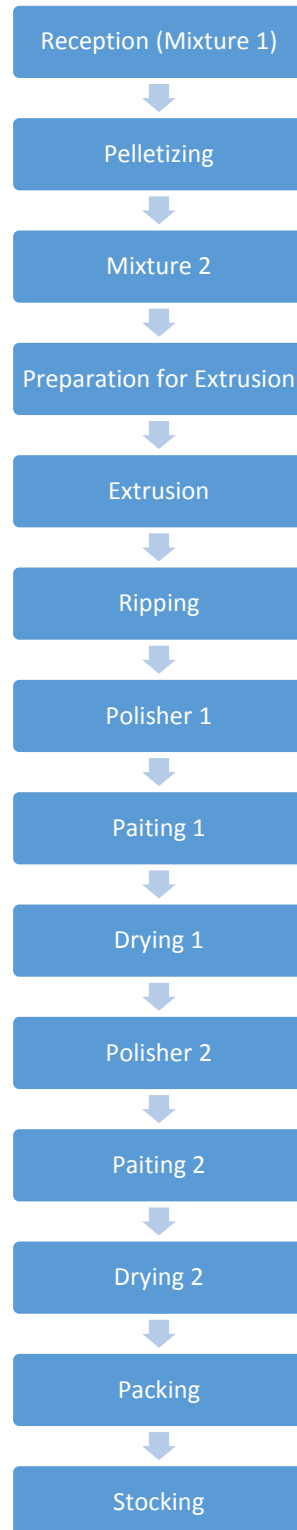
- Recycling at Santa Luzia Plant III:





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- Recycling at Santa Luzia Headquarters





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7.1.3 Assumptions and estimates

A few assumptions were made in order to create the LCA profile of polystyrene.

For example:

- In the definition of the secondary raw material acquisition stage, an average was estimated of the diverse sources from which the polystyrene is delivered to the company (recycling plant III, third party recycling, distances from suppliers etc.)
- In the case of raw materials coming from third-party recyclers, the way it is delivered to Santa Luzia (pelletized, ground, degassed).
- With regard to the recycling processes of outsourced partners in Santa Luzia Ltda. Plant III due to lack of more detailed knowledge of these processes.
- Regarding the environmental burden of expanded polystyrene (a by-product of another chain), its allocation procedure has been considered for this by-product. This approach is justified by the difficulty in collecting data for the modeling of different product systems (i.e. packages for refrigerators, electronics) that can generate Styrofoam as waste.
- For waste generated by internal elementary processes of the Santa Luzia factory (i.e. tearing), it was considered that those are fully reused in the product system, i.e. without losses.
- Ink composition was deemed to be the one described on the manufacturer's SDS.
- The table below describes other assumptions made.



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Assumptions of the LCA profile

Factory	Process	Assumption
Plant 1	1 e 2 Drying	50% evaporation of the solvent
	1 e 2 Painting	59% of ink weight is due to losses in the exhaust during the painting process
		23% of ink weight loss are in the form sludge
		On average 1.24% of the total mass entering the process is due to losses in the painting sectors that return for grinding on Plan III.
	Ripping	Particulate material (PS) generated during the cleaning of the machine is emitted to the atmosphere (0.0045% of the mass that enters the process).
		Dust residue from machining return for pelleting
	Extrusion	90% of the particulate material coming from the supply and transport of raw materials to the machine returns to the process. The remaining 10% are emitted to the atmosphere.
		Water resupply due to water evaporation.
		6% of the total weight are due to non-compliant pieces.
	Preparation Extrusion	For the LCI considered that only 10,01% of LDPE plastics bags are torn during the process.
		Dust deposited on the floor; 100% returns to the same process.
	Mixture 2	12.5% losses on big bags.
		Dust generated by the mixing process returns for pelleting.
	Pelletizing	Loss of 16.5% of the total weight entering the process resulting from the exchange of screens.
Dirt on screens (on average 1,300 screens/machine x 300g of dirt/screen x 8 machines) returns to the grounding process.		
Particulate matter is emitted to the atmosphere		
Considering 1.9% of residual moisture from the material that is released in vapor form		
Reception (Mistura 1)	Reception (Mixture 1) 0.032% of waste from raw material transports returns to the same process.	
Plant 3	Grounding	70% of the particulate matter emitted is recovered by sweeping and returns to the same process
		30% of the particulate matter emitted is lost into the atmosphere.
	Logistic U-III	Distance of transport from Amazonas Port to the Itajai Port and subsequent truck transport.

7.1.4 Flows Omitted

Lighting, administrative department, employee transportation, manufacturing of tools and forklifts.



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7.2 Data Source

7.2.1 Description of the main data

Manufacturing

Year: 2014

Technology Representativeness: Extruders

Source: Manufacturer

7.3 Traceability

7.3.1 Source of raw materials

Specified in item 2.4.

8 Attachment: Inventory Data

8.1 Consumption of natural resources

8.1.1 Consumption of natural energy resources and energy indicators as described in item 8.1.4

8.1.2 Water consumption

Water consumption in the Santa Luzia processes (per Declared Unit)

Factory	Process	L
Plant 1	Extrusion	0,0324
Plant	Pelletizing	0,035
Outsourced/ Pelletized	Pelletizing	0,0024
Total		0,3614

8.1.3 Energy consumption

Direct energy consumption per meter of profile

Factory	Process	kWh
Outsourced/Degassed	Screening	0,0002
Outsourced/Degassed	Degassing	0,0129
Subtotal		0,0131
Outsourced/Grouped	Screening	0,0009



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Outsourced/Grounded	Degassing	0,0634
Outsourced/Grounded	Grounding	0,0699
Subtotal		0,1342
Outsourced/Pelletized	Degassing	0,0066
Outsourced/Pelletized	Grounding	0,0089
Outsourced/Pelletized	Pelletizing	0,2973
Subtotal		0,3128
Plant III	Screening	0,0011
Plant III	Degassing	0,0011
Plant III	Grounding	0,0542
Subtotal		0,0563
Usina I	Pelletizing	4,3782
Usina I	Mixture2	0,010
Usina I	Extrusion Preparation	0,0014
Usina I	Extrusion	3,7715
Usina I	Tearing of bars	0,0016
Usina I	1º Polish of bars	0,0005
Usina I	1ª Painting of bars	0,0005
Usina I	1ª Drying of bars	0,0007
Usina I	2º Polish of bars	0,0005
Usina I	2ª Painting of bars	0,0005
Usina I	2ª Drying of bars	0,0007
Usina I	Profile packaging	0,00002
Subtotal		22,024
Total for life cycle		22,54

8.2 Emissions to air, soil and water

8.2.1 Emissions to atmosphere

Specified in item 8.3.1

8.2.2 Emissions to water

Not applicable

8.2.3 Emissions to soil

Not applicable

8.3 Waste Production

8.3.1 Waste recovered and disposed of



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Analysis of losses per stage of the life cycle of the PS profile (for 1.000 kg of profiles)

Factory	Process	Item	Amount (kg)	Destination
Outsourced/ Degassed	Screening	Other materials (PE, PP, PU)	27,629	Sales (allocation)
		Waste (screws, paper, etc.)	3,0699	Landfill
Outsourced/ Degassed	Screening	Other materials (PE, PP, PU)	135,794	Sales (allocation)
		Waste (screws, paper, etc.)	15,088	Landfill
	Grounding	Particulate Matter	0,049	Atmosphere
Outsourced/ Pelletized	Grounding	Sweeping wasting (byproduct)	0,015	Return to same process
		Particulate Matter	0,006	Atmosphere
	Pelletizing	Losses from Screen exchange-sludge	11,9992	Grounding (Outsourced/Pelletized)
		Screen dirt	1,2955	Grounding (Outsourced/Pelletized)
		Particulate Matter	0,208	Atmosphere
		Water vapor (piece)	1,381	Atmosphere
Plant 3	Screening	Other materials (PE, PP, PU)	155,918	Sales (allocation)
		Waste (screws, paper, etc.)	17,3242	Landfill
	Grounding	Sweeping wasting (byproduct)	0,089	Return to same process
		Particulate matter	0,038	Atmosphere
Plant 1	Reception (Plant 1)	Sweeping wasting (byproduct)	0,341	Return to same process
	Pelletizing	Water vapor (piece)	20,34	Atmosphere
		Particulate matter	3,06	Atmosphere
		Losses from Screen exchange-sludge	176,67	Grounding (Plant 3)
		Screen dirt	19,072	Grounding (Plant 3)
	Mixture 2	Mixture dust raw material	0,11	Pelletized (Plant 1)
	Preparation for extrusion (Mixer)	Process dust	2,213	Return to same process
	Extrusion	Non-compliant pieces	62,83	Grounding (Plant 3)
		Particulate matter	0,02	Atmosphere
	Tearing of bars	Machining dust – tearing	57,67	Pelletizing (Plant 1)
		Particulate matter	0,044	Atmosphere
	1ª Polish	Polishing waste	0,022	Landfill
	1ª Painting	Non-compliant pieces	11,36	Grounding (Plant 3)
		Ink losses in the exhaust	15,18	Atmosphere
		Paint sludge	5,92	Landfill
	1ª Drying	Ink evaporation	2,32	Atmosphere
2ª Polish	Polishing waste	0,022	Landfill	
2ª Painting	Non-compliant pieces	11,36	Grounding (Plant 3)	
	Ink losses in the exhaust	15,18	Atmosphere	
	Paint sludge	5,92	Landfill	
2ª Drying	Ink evaporation	2,32	Atmosphere	
Profile Packaging	Non-compliant pieces	1,77	Grounding (Plant 3)	
Subtotal loss (return/reuse)			676,136	-
Subtotal loss (disposal/emission)			107,512	-
Total			783,648	-



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8.3.2 Waste disposal

Waste is disposed in appropriate locations and described in the LCA report. Listed below are the quantities of waste generated for each linear meter of profile.

Waste disposal per linear meter of profile

Waste	kg	%
Machinery screens	1.323	34.4%
LDPE plastics bags torn	7,59E-04	19.7%
Tire	5,32E-04	13.8%
Maintenance Oil	4E-04	10.4%
Gears/Knives	2,36E-04	6.1%
Cloth gloves	1,84E-04	4.8%
Big Bags discarded	1,11E-04	2.9%
Rejects (ribbons and strings)	1,08E-4	2.8%
Polishing waste	4,28E-05	1.1%
Big Bags torn	3,79E-05	1.0%
Polishing rolls	2,72E-05	0.7%
Tow	2,24E-05	0.6%
Felt mask	2,04E-05	0.5%
Spatulas	1,85E-05	0.5%
Hearing protection	1,17E-05	0.3%
Filter (paper)	7,51E-06	0.2%
Cutters	4,32E-06	0.1%
Total	1.360,6	100.0

8.4 Scenario Simulation

The following table shows the comparison **between impacts of the recycled and virgin profiles.**

Comparison of raw material sources per linear meter. Recycled vs. Virgin.

Impact category	Unit	Raw material recycled profile	Raw material virgin profile
Climate changes	kg CO₂ eq.	3,309	4,916
Ozone Layer Depletion	kg CFC ⁻¹¹ eq.	2,73E-07	8,9E-08
Land acidification	kg SO ₂ eq.	0,011	0,015
Freshwater acidification	kg P eq.	6,1E-04	3,5E-04
Fossil Depletion	kg oil eq.	1,317	2,2
Accumulated Energy Demand	MJ	63,21	104,33



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8.5 Impacts generated by Plants I and III

Impacts generated by Plant I and III for the production of 1 meter of profile.

Impact category	Unit	Plant 1 + Plant 3
<i>Climates Changes</i>	kg CO ₂ eq.	2,893
<i>Ozone Layer Depletion</i>	kg CFC ⁻¹¹ eq.	1,97E-07
<i>Land acidification</i>	kg SO ₂ eq.	0,0093
<i>Freshwater acidification</i>	kg P eq.	5,64E-04
<i>Fossil Depletion</i>	kg oil eq.	0,969
<i>Accumulated Energy Demand</i>	MJ	47,38