

Catalogue of recycled plastics & aluminium materials

from used beverage carton packages

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1. Introduction

Tetra Pak strives to make food safe and available, everywhere. Our packages play an important part in the intricate and delicate web that is the global food system, ensuring that millions of people have access to nutritious food, every day. The expansion of access to safe food is, however, facing many challenges, not the least in relation to the global climate crisis. In our endeavours to protect the planet, we have progressed in our development

of the world's most sustainable packaging – a carton that is made solely from responsibly sourced renewable or recycled materials, that is fully recyclable and carbon neutral.

We believe that collective action is key and to reach our goals, we have adopted a full life cycle approach.

More specifically, we are focusing on four areas for collaborative innovation:



1.

Maximising the use of renewable materials and sourcing them responsibly, in a way that protects biodiversity



2.

Minimising carbon impact of our own operations as well as the impact created by our value chain



3.

Enabling greater access to safe food while reducing food waste



4.

Driving an active agenda to develop sustainable recycling value chains



The following catalogue is part of the development of the sustainable recycling value chains, which are mentioned above. Our ambition is that all our packages are collected, recycled, and never become litter. To achieve that, we are working collaboratively across the recycling value chain to:

- Design for recycling
- Drive consumer awareness and engagement
- Support collection and sorting
- Expand recycling capacity and solutions
- Grow recycled material use and applications

By strengthening global carton recycling infrastructure, we can ensure that cartons are transformed into new raw material and products, keeping valuable resources in use to help build a circular economy. One of those valuable resources, is the protective layer in our packages, consisting of polyethylene and aluminium. This composite, also known as polyAl, can be recycled and used for multiple purposes.

The aim of this catalog is to give an overview of the companies that recycle polyAl, including the technical data of the polyAl material as well as examples of end use, which in turn should inspire the development of new products/ companies and increase the end use of recycled polyAl. Join us in the journey of cartons recycling and be part of the circularity transformation. Feel free to connect directly with the local teams listed on the projects.

To know more, you can visit our website: www.tetrapak.com/sustainability and read the Tetra Pak Sustainability Report.

2. Recycled materials and processing methods

2.1 Overview of polyAl recyclers and materials

Country	PolyAl Recycler	Grade	Output Capacity (MT/yr)	Melt Flow Index (MFI) (190°C, 2.16 kg)	End-use examples
EUROPEAN COUNTRIES					
Czech Republic	Plastigram	rLDPE (granules)	6.000	5,5	Compounding, Floor grids, Other injection moulding applications
Czech Republic, Poland	Plastigram	rLDPE + rAlu (granules)	6.000	21	Injection moulding applications
Czech Republic, Poland	Plastigram	rHDPE + rPP (regrind)	3.000	7,5	Injection moulding applications
Germany	Palurec	rLDPE + rAlu (granules)	6.000	3,4-3,8	Transport pallets, Floor grids, Roof tiles
Germany	Palurec	rHDPE + rPP (regrind)	1.500	N/A	Injection moulding applications
Germany	saperatec	rLDPE (granules)	8.000	3-5	Film applications including packaging
Germany	saperatec	rHDPE (regrind)	2.000	N/A	Thin wall injection molding applications
Italy	Ecorevive	rLDPE + rHDPE + rAlu (agglo)	6.000	5,5	Transport pallets, Urban furniture, Poles and panels, Floor tiles
Italy	Ecorevive	LDPE + rHDPE + rAlu (granules)	6.000	5,5	Injection moulding applications
Italy	Lucart	rLDPE + rHDPE + rAlu (granules)	6.000	11±2	Transport pallets, Flower pots
Italy	FiloAlfa	Filament for 3D printing	On request	N/A	3D printing applications, e.g. lamp
Italy	Ravago	rPP + rLDPE (Compound)	On request	20	Injection moulding applications, e.g. crates
Italy	Ecoplasteam	rLDPE + rAlu (granules)	6.000	2,9	Injection moulding, Extrusion, Rotomoulding
Netherlands	Recon	rLDPE + rHDPE + rAlu (pressed pellets)	6.500	3	Transport pallets, Bird feeders, Chairs, 3D printing
Spain	Trans Sabater	rLDPE + rAlu (granules)	8.000	3,5	Transport Pallets, Baskets, Other injection moulding applications
Spain	Alier	rLDPE + rHDPE + rAlu (granules)	10.000	On request	Injection moulding applications
OTHER COUNTRIES					
China	Fulun	rLDPE + rHDPE (granules)	30.000	3,7	Injection moulding applications, e.g. Furniture, Pallets, Waste bins
South Africa	Gayatri	rLDPE + rAlu (granules)	2.000	3	Outdoor furniture, Retail displays, Transport pallets

2.2 PolyAl recycling processes

Recycling processes for different polyAl output qualities: a simplified overview

Recycling process	General recycling process steps	Pelletising process/ manufacturing process	Potential end-product
Chemical separation & dry-cleaning	Reducing fibre & aluminium. Removal of contaminants (glass, stone etc.). Sorting out caps & closures. Separation of polymer & aluminium.	Extrusion pelletising with melt-filtration	LDPE granules (aluminium free, <1%) (Figure 1)
Cold wash (& friction wash)	Reducing fibre & aluminium content. Removal of contaminants (glass, stone etc.). Sorting out caps & closures.	Extrusion pelletising with melt-filtration	Melt-filtrated polyAl granules (Figure 2)
Dry cleaning	Reducing fibre (& aluminium content). Removal of contaminants (glass, stone etc.). Sorting out caps & closures.	Agglomeration or hotmelt pressing	Agglomerated polyAl or panels/ roof sheets (Figure 3)
Full carton	Shredding. Drying. Pressing beverages cartons.	Hotmelt pressing	Panels/ roof sheets (Figure 4)



Figure 1 LDPE granules



Figure 2 PolyAl granules



Figure 3 Agglomerated polyAl



Figure 4 Roof sheets of polyal

3. PolyAI recyclers and materials

3.1 Plastigram Industries a.s. (rLDPE, rLDPE + Alu, rHDPE + rPP, rAlu)

CZECH REPUBLIC, POLAND

Company profile

Plastigram has polyAl recycling facilities in the Czech Republic and Poland. In Sokolov (CZ), it operates an innovative recycling line that allows for recovery of plastics (rLDPE granulate and mixed polyolefins regrind or regranulate) and aluminum (powder). In Szczuczyn (PL), it runs a dry cleaning line to produce aluLDPE granulate.

Process in Czech Republic: Dry cleaning, sorting caps and foils, chemical separation of LDPE and aluminum and extrusion with vacuum degassing and melt filtration of rLDPE.

Process in Poland: Dry cleaning, sorting caps and foils and extrusion with vacuum degassing and melt filtration of LDPE with aluminum particles (aluLDPE).

Locations: Sokolov, Czech Republic & Szczuczyn, Poland

Production capacities: 5.000 – 6.000 MT/yr (CZ) & 5.000 – 6.000 MT/yr (PL)

Quality description: Aluminium powder, share of organic contaminants (paper fibres, plastics) ca 40%

Examples of end-uses/ processing method: Compounding, Geogrids, Other injection moulding applications.

Website: <https://plastigram.eu/>



TECHNICAL DATA SHEET

Regranulate from caps



Company profile: Plastigram Industries a.s. has developed a technology for recycling the remains of used beverage cartons after paper recycling. The process allows for recovery of plastics (LDPE regranulate and regranulate from caps) and aluminum (powder).

Process description: Dry cleaning, sorting of caps from foils, wet cleaning of caps, regranulation with melt filtration.

Location: Sokolov, Czech Republic

Volume: approx. 1500-2000 MT/yr

Contact: Luděk Lamich, lamich@plastigram.eu
Iren Matuška, matuska@plastigram.eu



Primary information	Indicative Value	Method of measurement
Granule diameter	4 mm	
Filter size in extrusion	230 µm	
Material composition	45% HDPE, 35% LDPE, 15-20% PP	
Inorganic content	1.1 %	ISO 11358-1
Density	0.95 g/cm ³	ISO 1183
Smell/odour	0	Score (0 – no odour to 3 – strong odour)
MFI	7,5 g/10mins	ISO 1133 (190 °C; 2,16kg)
Tensile modulus	720 MPa	ISO 527-2
Tensile strength	17.8 MPa	ISO 527-2
Elongation at yield	7.9 %	ISO 527-2
Elongation at break	8.2 %	ISO 527-2
Flexiular modulus	680 MPa	ISO 178
Impact strength	3.4 kJ/m ²	ISO 798-1 Charpy notched
Shore D hardness	57.5	ISO 868 after 15 s

Plastigram Industries a.s. | Evnářova 1035/1a, 349 00 Prácheň | IČ: 03219608

TECHNICAL DATA SHEET



aluLDPE regranulate

Origin: LDPE and aluminium layers of used beverage cartons (e.g. Tetra Pak, Elopak, SIG Combibloc).

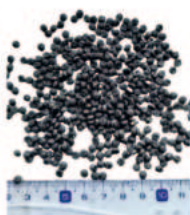
The input material is a reject from recycling paper from used beverage cartons.

The recycling process includes dry cleaning, sorting of foils from caps/closures and regranulation with melt filtration.

Location: Sokolov, Czech Republic

Volume: approx. 4000-6000 tons / year

Contact: Luděk Lamich, lamich@plastigram.eu
Iren Matuška, matuska@plastigram.eu



Primary information	Indicative Value	Method of measurement
Granule diameter	4 mm	
Filter size in extrusion	800 µm	
Material composition	LDPE, aluminium and traces of LLDPE, HDPE, PP	
MFI	2-3 g/10mins	ISO 1133 (190 °C; 2,16kg)
Non-combustible residue	15-18 %	600 °C, 30 min
Density	1.07 g/cm ³	Helium gas pycnometry
Smell/odour	1	Score (0 – no odour to 3 – strong odour) measured at 190 °C
Young's modulus	528 ± 18 MPa	ISO 527-1
Tensile strength	13.0 ± 0.2 MPa	ISO 527-1
Elongation at break	28 ± 2 %	ISO 527-1
Impact strength	83 ± 8 kJ/m ²	ISO 179, un-notched, 23 °C
Impact strength	57 ± 11 kJ/m ²	ISO 179, un-notched, -30 °C



Plastigram industries a.s.

Ver. 6. A. 2024

TECHNICAL DATA SHEET



LDPE regranulate

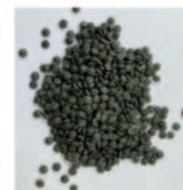
Company profile: Plastigram Industries a.s. has developed a technology for recycling the remains of used beverage cartons after paper recycling. The process allows for recovery of plastics (LDPE regranulate and regrind from caps) and aluminium (powder).

Process description: Dry cleaning and sorting, washing and separation of LDPE and Aluminium, regranulation with melt filtration.

Location: Sokolov, Czech Republic

Volume: approx. 4000-6000 tons / year

Contact: Luděk Lamich, lamich@plastigram.eu
Iren Matuška, matuska@plastigram.eu



Primary information	Indicative Value	Method of measurement
Granule diameter	4 mm	
Filter size in extrusion	110 µm	
Material composition	rLDPE with traces of PP, PET PA6	
Inorganic content	0.6 %	
Density	0.93 g/cm ³	ISO 1183
Smell/odour	1	Score (0 – no odour to 3 – strong odour) measured at 190 °C
MFI	5,5 g/10mins	ISO 1133 (190 °C; 2,16kg)
Tensile strength	8 MPa	ISO 527-3
Elongation at break	80 %	ISO 527-3
Flexural modulus	170 MPa	ISO 178
Impact strength	48 kJ/m ²	ISO 180 A, Izod notched at 23 °C
Recommended processing temperature	< 190 °C	



Plastigram industries a.s. | Šestná 1055/5a, 149 00 Praha | IČ 03219038

3.2 Palurec GmbH (rLDPE + rAlu, rHDPE + rPP, rAlu)

GERMANY

Company profile

Palurec GmbH was founded in December 2017. Fachverband Kartonverpackungen für flüssige Nahrungsmittel e.V. (FKN – Association for Beverage Cartons) is the sole shareholder. There are three companies in the association, Tetra Pak GmbH, SIG Combibloc GmbH and Elopak GmbH, which have invested around 8 million euros in the construction of the Palurec recycling plant. The first stage of production will provide capacity of around 18,000 tonnes input. The plant began to operate in spring 2021. With Palurec, it is now possible for the first time in Germany to recycle plastic and aluminium components from cartons into marketable secondary raw materials for a wide range of industrial applications, covering more than 50 percent of the plastic and aluminium components from cartons in Germany.

Palurec is certified with the RecyClass Recycling Process Certificate.

Process: Wet washing pre-treatment process, including reduction of aluminium content by friction and finally processed with agglomeration, extrusion and melt filtration.

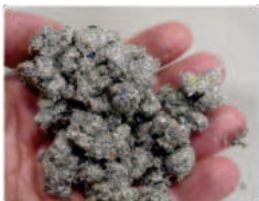
Location: Hurth, Germany

Production capacity: 6.000 MT/yr

Quality description: Aluminium powder containing 75% moist. Remaining 25% has 75% organic contaminants (paper fibres, plastics).

Examples of end-uses: Injection moulding applications, e.g. Transportation pallets.

Website: <https://www.palurec.com/en/palurec-en/>



rHDPE & rPP can be used after further processing in non-food products such as canisters, pipes, boxes etc.



Status: 01.02.2023

PRODUKT INFORMATION

Designation Paluren 500 LDPE

General technical data

Form granules
 Color greenish
 Filter screen 500 µm
 Material origin post consumer (beverage carton preparation)
 Aluminum content approx. 3-6%
 moisture <1 %

Physical properties	Value	Unit	Norm
Ash residue	10 to 13	%	DIN EN ISO 3451
MFI (190 °C, 2,16 kg)	3,4 to 3,8	g/10 min	DIN EN ISO 1133
Density	1,037	g/cm ³	DIN EN ISO 1183
Bulk density	0,42	g/cm ³	DIN EN ISO 60*

Mechanical properties

Tensile strength	11,4	MPa	DIN EN ISO 527- 1,2
Tensile modulus of elasticity	369	MPa	DIN EN ISO 527- 1,2
Bending test	12,2	MPa	DIN EN ISO 178
Notched impact strength	19,2	kJ/m ²	DIN EN ISO 179-1

The values given in this product information sheet do not represent a guarantee, they are rather to be understood as orientation values. The values are based on technical knowledge and analysis and do not release the user from his own incoming inspections.

Palurec GmbH, Industriestraße 149, 50354 Hürth, phone +49 2233 460 608-0



Produktblatt PALUREN Regranulat Stand 20230201

3.3 saperatec (rLDPE, rHDPE + rPP)

GERMANY

Company profile

saperatec GmbH is an advanced recycling technology company offering solutions for multi-layer composite waste materials. Its patented delamination recycling technology separates plastics from metals, glass and paper. In 2024, saperatec is ramping up its recycling plant for polyAl recycling. saperatec offers saperalenFILM G for film applications including for non-food packaging. The recycled LDPE is highly purified with high filtration quality and resulting low ash content (<0,5%). The product is deodorised for non-food consumer packaging applications. For instance, it has been qualified for blow-film pouch packaging in composite mono-polyethylene structures with at least 35% recycled content. The company also offers recycled HDPE regrind with low ash content for thin wall injection molding applications.

Process: Advanced mechanical recycling saperatec has developed an innovative recycling process that incorporates delamination of multi-layer composites. This enables the mechanical separation of polymer from aluminum foil as found in rejects from beverage carton defibering in specialised paper mills.

Location: Dessau-Rosslau, Germany

Production capacity: rLDPE (granules) - 8.000 MT/yr & rHDPE - 2.000 MT/yr

Examples of end-uses: Film applications including Packaging, Thin wall injection moulding applications.

Website: <https://www.saperatec.de>

SaperalenFILM-G



Advanced mechanical recycling

Saperatec has developed an innovative recycling process that incorporates delamination of multi-layer composites. This enables the mechanical separation of polymer from aluminum foil as found in rejects from beverage carton defibering in specialized paper mills.

SaperalenFILM-G is a post-consumer, low density polyethylene (LDPE) for film blowing and casting application.

It is obtained from our innovative mechanical recycling process for PolyAl, a waste fraction left after used beverage carton defibering in paper mills. This makes SaperalenFILM-G the first LDPE grade, which is suitable for film extrusion and blow moulding obtained from this fraction of household waste.

The careful polymer treatment with advanced decontamination technologies delivers a superior polymer quality suitable for the extrusion of translucent film.

The regranulated polymer is available with tailored properties for sustainable packaging applications.



Technical Information

Property	Value	Unit	Test Method	Melt filtration is done with a maximum of 100 µm sieve fineness. Melt filtration with higher sieve fineness can be done upon request.
Bulk Density	500 ± 20	kg/m³	DIN EN ISO 6186	Colorization of the granules can be adjusted upon request.
Density	0.93 ± 0.01	g/cm³	DIN EN ISO 1183-1	
Tensile strength	9.5 ± 0.25	MPa	DIN EN ISO 527-3	
Elongation at break	> 250	%	DIN EN ISO 527-3	
Melt flow rate	4.0 ± 1.0	g/10 min (190°C, 2.16 kg)	DIN EN ISO 1133	
Ash content	< 0.6	%	DIN EN ISO 3451	
Moisture content	< 0.1	%	Adapted DIN EN ISO 585	

Logistic Information

SaperalenFILM-G is available in FIBC's. Alternative packaging units or containers are available upon request.

Contacts

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Disclaimer

Additional information can be provided upon request. The information contained in this product information is, to the best of our current knowledge and practical experience, true and accurate. The values provided with this information are averages and do not release those using the materials from any obligation to perform own tests and analyses in order to ensure the required properties of their end product. Since the origin of raw materials are beyond our control, variations in the material may occur. Legally binding assurances with regard to the properties of the end product or its suitability for specific purposes cannot be inferred from the information that we have provided here. The parties receiving/processing our materials should always ensure that they have observed and fulfilled their own responsibilities and obligations concerning applicable property rights and existing laws and regulations.

True Circularity by Saperatec

We strive for the best quality of our products from post-consumer waste, because no compromise in performance can be made if recycled materials shall find their way back into their initial applications. Only then, true circularity of raw materials is possible.



3.4 Ecorevive srl (rLDPE + rHDPE + Alu)

ITALY

Company profile

Ecorevive started in 2012 building on decades of experiences in plastic recycling machineries.

An innovative plant has been set, optimised to recycle hetero-geneous plastic materials having high humidity contamination. The process is defined as a 'dry process', no water is used to wash and clean the materials.

Process: Shredding and sorting, then agglomeration by means of a twin screw and final grinding at 08-20mm screen size (as per customer requirement).

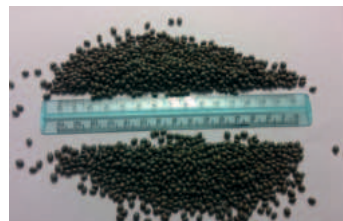
The agglomerate (TPN) can be granulated on request (TPR).

Location: Brescia, Italy

Production capacity: 6.000 MT/yr rLDPE

Examples of end-uses/ processing method: Urban furniture, Poles and panels, Pallets and additive for asphalts.

Website: <https://www.ecorevive.it/>





TECHNICAL DATAS TPN



MADE IN ITALY

Technical code: PlastiQü TP series recycled Agglomerated polyolefinic plastic granules (R-POMIX)

Commercial name code: TPN

COMPOSITION

- 70% LLDPE
- 17% LDPE
- 3% HDPE/PP
- 10% Aluminium (<50µm, filler)
- <3% cellulose pulp/wood
- <1% PET
- 10ppm Aluminium cans <8mm

TARIFF CODE
39019080

Polymers of ethylene, in primary forms (excl. polyethylene, ethylene-vinyl acetate copolymers, ethylene alpha-olefins copolymers having a specific gravity of < 0.94, ionomer resin consisting of a salt of a terpolymer of ethylene with itaconyl acrylate and methacrylate, acryl and A-B-A block copolymer of ethylene of polystyrene, ethylene-butylene copolymer and polystyrene, containing by weight <= 35% of styrene, in blocks of irregular shape, lumps, powders, granules, flakes and similar bulk forms)

TECHNICAL CHARACTERISTICS

Density	0,95 – 1,00 g/ml
Bulk density	330-350 kg/mc
Melt index (190° - 5 Kg)	Melt flow rate: 5,50 g/10 min
Softening temperature Vicat	96°C

PROCESSABILITY
Technology
The material can be mould injected, extruded and thermoformed. It's a good substitute of the virgin material in all that application whose don't need elevated performances.

MAIN APPLICATIONS
Urban furnitures (fences, chairs benches), Buildings, Gadgets, Profiles, Pots and planters, Pallets

ENVIRONMENTAL INFORMATIONS
100% Recycled and Recyclable.
PlastiQü TPN is made with plastic fraction coming from papermills that contain very high quantity of humidity. Our technology is able to remove all this humidity by means of an agglomeration. It represent an innovative solution for environment. Main part of plastic from papermill is made of tetrapack bricks, that with our technology can now be recycled. Moreover the aluminium foil of tetrapack became a powder filler in the plastic giving to the final product a metallized color effect. PlastiQü TP series is Remade in Italy* certified and it's sold like R-POMIX agreeing to UNI-UNIPLAST 10667-16.

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www.ecorevive.it



TECHNICAL DATAS TPR



MADE IN ITALY

CODIFICATION
Technical code: PlastiQü TP series recycled polyolefinic plastic granules (R-POMIX)

Commercial name code: TPR

COMPOSITION

- 70% LLDPE
- 17% LDPE
- 3% HDPE/PP
- 10% Aluminium (<50µm, filler)
- 1% cellulose pulp

TARIFF CODE
39019080

Polymers of ethylene, in primary forms (excl. polyethylene, ethylene-vinyl acetate copolymers, ethylene alpha-olefins copolymers having a specific gravity of < 0.94, ionomer resin consisting of a salt of a terpolymer of ethylene with itaconyl acrylate and methacrylate, acryl and A-B-A block copolymer of ethylene of polystyrene, ethylene-butylene copolymer and polystyrene, containing by weight <= 35% of styrene, in blocks of irregular shape, lumps, powders, granules, flakes and similar bulk forms)

TECHNICAL CHARACTERISTICS

Density	0,98 – 1,02 g/ml
Bulk density	330-350 kg/mc
Melt index (190° - 5 Kg)	Melt flow rate: 5,50 g/10 min
Softening temperature Vicat	95°C

PROCESSABILITY
Technology
The material can be mould injected, extruded and thermoformed. It's a good substitute of the virgin material in all that application whose don't need elevated performances.

MAIN APPLICATIONS
Urban furnitures (fences, chairs benches), Buildings, Gadgets, Profiles, Pots and planters, Pallets

ENVIRONMENTAL INFORMATIONS
100% Recycled and Recyclable.
PlastiQü TPR is made with plastic fraction coming from papermills that contain very high quantity of humidity. Our technology is able to remove all this humidity by means of an agglomeration. It represent an innovative solution for environment. Main part of plastic from papermill is made of tetrapack bricks, that with our technology can now be recycled. Moreover the aluminium foil of tetrapack became a powder filler in the plastic giving to the final product a metallized color effect. PlastiQü TP series is Remade in Italy* certified and it's sold like R-POMIX agreeing to UNI-UNIPLAST 10667-16.

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www.ecorevive.it

3.5 Lucart (rLDPE + rHDPE + Alu)

ITALY

Company profile

Lucart is Europe's largest producer of machine glazed paper for flexible packaging and is one of the top European manufacturers of paper and tissue products. The production capacity of Lucart Group is 395.000 MT/yr with 12 paper machines and 65 converting lines. The consolidated turnover is over €500m and the number of employees is more than 1600. The Lucart Group confirms its strategic plan through a multinational structure to compete on the global market. The polyAl line in Italy has a capacity of 8.000 MT/yr input material.

Process: In Italy, Lucart has a polyAl recycling line including washing equipment for rejects, new drying equipment and an extruder with melt filtration.

Location: Lucca, Italy


Production capacity: 6.000 MT/yr rLDPE

Examples of end-uses/ processing method: Transportation pallets.

Website: <https://www.lucartgroup.com/en/>



Revisione del 15/09/2023



Granpiast

Caratteristiche:
Nella tabella qui sotto riportata sono elencate le principali caratteristiche medie chimico/fisiche derivanti da recupero di cartoni per bevande usati.

Nome commerciale:
Granpiast Std (1,8 mm)


Parametro	Metodo	u. d. m.	Valore
Indice di fluidità / Melt Flow Index (MFI)	ASTM D1238 (190 °C, 5 kg)	g/10 min	11 ± 2
Densità a 23 °C / Density at 23 °C	ISO 1183-1A	g/cm ³	1,0 ± 0,05
Densità apparente / Bulk Density at 23 °C	-	g/l	550 ± 50
Ritiro parallelo / Parallel Mould Shrinkage	ISO 294	%	1,7 ± 0,5
Ritiro perpendicolare / Normal Mould Shrinkage	ISO 294	%	1,8 ± 0,5
Rammollimento VICAT / Vicat	ISO 306 (1 kg, 50°C/h)	°C	96,3 ± 2
Modulo elastico a trazione / Tensile Modulus	ISO 527-2	MPa	650 ± 200
Carico a rottura a trazione / Tensile Strength at Break	ISO 527-2	MPa	9,5 ± 1,5
Allungamento a rottura / Elongation at Break	ISO 527-2	%	30 ± 3,0
Modulo a flessione / Flexural Modulus	ISO 178	MPa	550 ± 100
Contenuto di umidità / Moisture content	-	%	< 0,5
Additivi e componenti a basso Peso Molecolare / Additives and Low Molecular Weight components	Estrazione con acetone	%	0,65 ± 0,2
Cellulosa / Cellulose	TGA	%	< 5
PP/PET	DSC	%	< 5
HDPE	DSC	%	35 +/- 3
LDPE	DSC	%	55 +/- 5
Sostanza di carica (Alluminio) intrinsecamente legata al PE / Aluminium Filler (intrinsically bonded to PE)	TGA	%	< 15

L'alta presenza di LDPE permette di realizzare elementi con profili complessi.


I parametri sopra riportati hanno variazioni variabili fra il 3 e il 5 %.

Istruzioni per l'immagazzinamento:
Il materiale viene prodotto con un tasso di umidità estremamente basso. Il materiale deve essere stoccato in area asciutta e protetta dalle intemperie.

Lucart SpA
Sede legale:
Via Ciarpi, 77
55016 - Porcari (LU)
P. IVA: 00145780466



Revisione del 15/09/2023



Granpiast

Caratteristiche:
Nella tabella qui sotto riportata sono elencate le principali caratteristiche medie chimico/fisiche derivanti da recupero di cartoni per bevande usati.

Nome commerciale:
Granpiast Extra (1,0 mm)


Parametro	Metodo	u. d. m.	Valore
Indice di fluidità / Melt Flow Index (MFI)	ASTM D1238 (190 °C, 5 kg)	g/10 min	11 ± 2
Densità a 23 °C / Density at 23 °C	ISO 1183-1A	g/cm ³	1,0 ± 0,05
Densità apparente / Bulk Density at 23 °C	-	g/l	550 ± 50
Ritiro parallelo / Parallel Mould Shrinkage	ISO 294	%	1,5 ± 0,5
Ritiro perpendicolare / Normal Mould Shrinkage	ISO 294	%	1,8 ± 0,5
Rammollimento VICAT / Vicat	ISO 306 (1 kg, 50°C/h)	°C	96,3 ± 2
Modulo elastico a trazione / Tensile Modulus	ISO 527-2	MPa	600 ± 200
Carico a rottura a trazione / Tensile Strength at Break	ISO 527-2	MPa	9,0 ± 1,5
Allungamento a rottura / Elongation at Break	ISO 527-2	%	31,5 ± 2,0
Modulo a flessione / Flexural Modulus	ISO 178	MPa	580 ± 100
Contenuto di umidità / Moisture content	-	%	< 0,5
Additivi e componenti a basso Peso Molecolare / Additives and Low Molecular Weight components	Estrazione con acetone	%	0,75 ± 0,2
Cellulosa / Cellulose	TGA	%	< 5
PP/PET	DSC	%	< 5
HDPE	DSC	%	35 +/- 3
LDPE	DSC	%	55 +/- 5
Sostanza di carica (Alluminio) intrinsecamente legata al PE / Aluminium Filler (intrinsically bonded to PE)	TGA	%	< 15

L'alta presenza di LDPE permette di realizzare elementi con profili complessi.

I parametri sopra riportati hanno variazioni variabili fra il 3 e il 5 %.

Istruzioni per l'immagazzinamento:
Il materiale viene prodotto con un tasso di umidità estremamente basso. Il materiale deve essere stoccato in area asciutta e protetta dalle intemperie.

Lucart SpA
Sede legale:
Via Ciarpi, 77
55016 - Porcari (LU)
P. IVA: 00145780466



3.6 FiloAlfa (3D-printed filament)

ITALY

Company profile

Filoalfa is an Italian brand specialising in the production and distribution of 3D printing filaments throughout the world and belonging to Maip Compounding Srl from 2021. It offers a vast choice of advanced filaments, made with quality polymer compounds, capable of satisfying different needs of the market in the industrial and design field.

Process: Compounding and filament production

Location: Torino, Italy

Production capacity: On request

Examples of end-uses: 3D-printed products - Furniture, Lamps

Website: <https://www.filoalfa3d.com/it/>



data di emiss./date of issue 04/04/2023

TECHNICAL DATA SHEET		provisional	ALFAPAK			
Descrizione: PE riciclato sviluppato con Tetrapak®, ottima adesione dei layers, rinforzo fibra carbonica.						
Description: Recycled PE developed in partnership with Tetrapak®, good layers adhesion, carbon fiber reinforced.						
PROPERTIES						
PROPRIETA'		METODO	UNITA'	COND. PROVA	VALORE	
PROPERTIES		STANDARD	UNIT	TEST COND.	VALUE	
PHYSICAL & MECHANICAL	Densità	Density	ISO 1183	g/cm ³	23°C, Met A	-
	Indice di fluidità	Melt Flow Index	ISO 1133	g/10 min	-	-
	Allungamento a rottura	Elongation at break	ISO 527	%	v=5mm/min	7
	Carico a rottura a trazione	Tensile strength at break	ISO 527	MPa	v=5mm/min	20
	Carico a flessione	Flexural Strength	ISO 178	MPa	v=2mm/min	30
	Modulo a flessione	Flexural Modulus	ISO 178	MPa	v=2mm/min	2400
THERMAL	Urto Izod con intaglio	Izod notched impact	ISO 180-1A	kJ/m ²	23°C	15
	Temp. distorsione sotto carico	Heat Deflection Temperature	ISO 75	°C	0,45 / 1,80 MPa	-/-
	Vicat, Temp. di rammolimento	Vicat, Softening Temp.	ISO 306	°C	1/5 kg, 120°C/h	-/-
	Grado di infiammabilità	Flammability grade	UL-94	Class	/mm	HB
SUGGESTED PRINTER SETTINGS						
PARAMETRI		UNITA'	VALORI			
PARAMETERS		UNIT	VALUES			
Temperatura dell'estrusore	Extruder Temperature	°C	235 - 255			
Velocità di stampa	Print Speed	mm/s	30 - 50			
Temperatura del piatto	Bed Temperature	°C	30			
Modifiche del piatto	Bed mods		PE/PF (scotch da pacchi/Havana duct tape)			
Parametri di Essiccazione	Drying Parameters	°C / h	-			
Suggerito ugello in acciaio ≥ 0,70mm	Steel nozzle recommended ≥ 0,70mm		Suggerito 1 mm / Suggested 1 mm			
PRODUCT DETAILS & CERTIFICATIONS						
Diametro	Diameter	1,75 mm	Tollerance ± 0,10mm			
		2,85 mm	Tollerance ± 0,10mm			
REACH		compliant				
RoHS		compliant				
Food contact approval		not compliant				
<small> FiloAlfa®: Il presente foglio descrittivo è un documento di proprietà intellettuale di Maip Compounding S.p.A. e non può essere copiato, distribuito o utilizzato in alcun modo senza permesso scritto dalla Maip Compounding S.p.A. </small>						
<small> FiloAlfa®: Il presente foglio descrittivo è un documento di proprietà intellettuale di Maip Compounding S.p.A. e non può essere copiato, distribuito o utilizzato in alcun modo senza permesso scritto dalla Maip Compounding S.p.A. </small>						

FILOALFA® by Maip Compounding s.r.l.
 Str. Caffadio 24 - 10036
 Settimo Torinese (TO) - ITALY

3.7 Ravago (Ravapura)

ITALY

Company profile

RAVAGO GROUP

The Ravago Group is a global service provider in the Polymers, Chemicals & Life Ingredients, and Building Materials markets. Today, the group has an annual sales volume of over 7,800,000 metric tons, serving more than 56,000 active customers through 325+ locations across more than 60 countries worldwide. Ravago's production competence consists of 50+ manufacturing facilities, of which 25 are recycling and compounding plants in North America, Europe, Asia and Africa, with a combined annual capacity of over 955,000 metric tons; 16 production plants in Europe that offer finished product solutions for the building sector, and 9 plants and 9 application laboratories for its Chemicals & Life Ingredients business. This all would not have been possible without the help of its 10,000 employees.

RAVAGO ITALY


Ravago Italia Spa is a compounding company based in Mornico Al Serio, Northern Italy, producing mainly polypropylene compounds. Its portfolio consists of virgin, post-industrial, and post-consumer recycled products, that can additionally be mineral, or glass fiber filled. It has an annual processing capacity of 65,000 metric tons, with 7 extruders and 120 employees. Ravago Italia's compounds can be found in many markets including automotive, building & construction, furniture, packaging, and more.

Process: Compounding


Location: Mornico Al Serio, Italy

Production capacity: 65.000 Mt/yr

Website: <https://www.ravago.com/>



Ravapura® PP 30 20 S
Polypropylene
Recycled Quality Compound



Description:
Polypropylene with 30% of materials coming from recycled Post-Consumer Waste (PCW) from Tetra Pak®.
Available in grey and black colors.

General

MFI (230°/2,16kg)	ISO 1133	20	g/10min
Density	ISO 1183	0,93	g/cm ³

Thermal

Vicat softening point (B50 (50N))	ISO 306	60	°C
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Mechanical

Izod notched impact strength (23 °C)	ISO 180	6,5	kJ/m ²
Tensile strength at yield (23 °C)	ISO 527	20	MPa
Elongation at break (23 °C)	ISO 527	15	%
Flexural modulus (23 °C)	ISO 178	900	MPa

Various

Ash content (600 °C)	ISO 3451	5	%
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Remark:
Preliminary Data Sheet

The data and information contained herein are typical average values, based on our current level of knowledge and experience, and do not constitute sales specifications. No liability, warranty or guarantee of product performance is created by this document. Ravago Recycled Quality are ISO 14021:2016 compliant. Even though the selection of the raw materials, the production and the quality control is being done following to the common best practices, it is the buyer's responsibility to inspect and test our products in order to determine the suitability for the buyer's application.

Ravago Group Headquarters
Moorenstraat 85A
B - 2370 Arendonk

Tel: +32 (0)14 67 25 11
Fax: +32 (0)14 67 20 12

www.ravago.com
manufacturing@ravago.com

Issue Date:
Nov 2022

Page 1 of 1

Datasheet

3.8 Ecoplasteam (rLDPE + rHDPE + Alu)

ITALY

Company profile

Production of high quality granule with characteristics similar to virgin plastic. The patented mechanical recycling process guarantees consistency of characteristics and processability.

Process: Injection moulding, Extrusion, Rotomoulding, Extrusion blow moulding.


Location: Alessandria, Italy

Production capacity: 6.000 MT/yr

Examples of end-uses: Office & stationery, Household items, Work tools, Jewelry & fashion accessories, Trash cans & bins, Toys, Bathroom accessories, Automotive (air filter, wheel covers, glove compartment), Oil and lubricant packaging, Outdoor furniture, 3D printing items.

Website: <https://www.ecoplasteam.com/>



IL PRODOTTO THE PRODUCT		ecoplasteam.com																																																																									
EcoAllene		EcoAllene AA00																																																																									
PROCESSO BREVETTATO / PATENTED PROCESS		Property																																																																									
<p>The product consists of polymer granules obtained from the recycling of polyamine waste (polyethylene and aluminum, CER 03.03.07) deriving from tetrapak type beverage cartons.</p> <p>Product composition per KG of material: Polyethylene and aluminum waste from the treatment of post-consumer packaging waste.</p> <p>UNI 10667-1 compliant material, UNI 10667-2 and UNI 10667-16</p> <p>Percentage of certified recycled material:</p> <ul style="list-style-type: none"> • 100% post consumer material 		<p>The values in the table were obtained from an average of analyzes and tests carried out during the production of granules deriving from post-consumer and industrial waste.</p> <table border="1"> <thead> <tr> <th>ANALYSIS</th> <th>METHOD</th> <th>Unit of measure</th> <th>VALUE</th> </tr> </thead> <tbody> <tr> <td>Density</td> <td>ISO 1183</td> <td>g/cm³</td> <td>1,016</td> </tr> <tr> <td>Maximum % of aluminum</td> <td>-</td> <td>%</td> <td>10,0</td> </tr> <tr> <td>Melt Flow Index (190°C/2,16 kg)</td> <td>ASTM D1238-13</td> <td>g/10min</td> <td>2,9</td> </tr> <tr> <td>Melt Flow Index (230°C/2,16 kg)</td> <td>ISO 1133</td> <td>g/10min</td> <td>7,2</td> </tr> <tr> <td>Melt Flow Index (230°C/5 kg)</td> <td>ISO 1133</td> <td>g/10min</td> <td>27</td> </tr> <tr> <td>VICAT a 40 N (50°C/h)</td> <td>ISO 306</td> <td>°C</td> <td>67,0</td> </tr> <tr> <td>Deflection load (1,3 mm)</td> <td>ISO 927</td> <td>MPa</td> <td>22,8</td> </tr> <tr> <td>Maximum tensile load</td> <td>ISO 527</td> <td>MPa</td> <td>10,8</td> </tr> <tr> <td>Bending yield strength</td> <td>ISO 178</td> <td>MPa</td> <td>14,4</td> </tr> <tr> <td>Elongation at break in traction</td> <td>ISO 527</td> <td>%</td> <td>37</td> </tr> <tr> <td>Impact resistance IZOD c.i.</td> <td>ISO 180</td> <td>J/m</td> <td>94</td> </tr> <tr> <td>Impact resistance IZOD c.l.</td> <td>ISO 180</td> <td>KJ/m²</td> <td>23,7</td> </tr> <tr> <td>Tensile modulus of elasticity</td> <td>ISO 527</td> <td>MPa</td> <td>604</td> </tr> <tr> <td>Flexural modulus of elasticity</td> <td>ISO 178</td> <td>MPa</td> <td>556</td> </tr> <tr> <td>Longitudinal shrinkage</td> <td>ISO 294</td> <td>%</td> <td>N.D.</td> </tr> <tr> <td>Cross shrinkage</td> <td>ISO 294</td> <td>%</td> <td>N.D.</td> </tr> <tr> <td>Shore D hardness</td> <td>ISO 868</td> <td>19^{mm}</td> <td>52</td> </tr> </tbody> </table> <p>The analysis parameters can have fluctuations from 3 to 9%</p>		ANALYSIS	METHOD	Unit of measure	VALUE	Density	ISO 1183	g/cm ³	1,016	Maximum % of aluminum	-	%	10,0	Melt Flow Index (190°C/2,16 kg)	ASTM D1238-13	g/10min	2,9	Melt Flow Index (230°C/2,16 kg)	ISO 1133	g/10min	7,2	Melt Flow Index (230°C/5 kg)	ISO 1133	g/10min	27	VICAT a 40 N (50°C/h)	ISO 306	°C	67,0	Deflection load (1,3 mm)	ISO 927	MPa	22,8	Maximum tensile load	ISO 527	MPa	10,8	Bending yield strength	ISO 178	MPa	14,4	Elongation at break in traction	ISO 527	%	37	Impact resistance IZOD c.i.	ISO 180	J/m	94	Impact resistance IZOD c.l.	ISO 180	KJ/m ²	23,7	Tensile modulus of elasticity	ISO 527	MPa	604	Flexural modulus of elasticity	ISO 178	MPa	556	Longitudinal shrinkage	ISO 294	%	N.D.	Cross shrinkage	ISO 294	%	N.D.	Shore D hardness	ISO 868	19 ^{mm}	52
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<p>Storage conditions</p> <p>The storage in the customer's warehouse in conditions of unknown relative humidity can significantly vary this value and therefore, before using EcoAllene, it is suggested to subject the material to a drying phase with hot air at about 90°/2h for restore the humidity conditions to 100 ppm optimal for processing.</p>		<p>Uses not permitted</p> <p>The use of food contact and medical material is not allowed.</p>																																																																									
<p>The information contained in this technical data sheet is believed to be accurate, but all recommendations are made without any guarantee, since the conditions of use are not under the control of the company Ecoplasteam Spa Società Benefit, which declines any responsibility in relation to the use of the information and the use of this mixture in combination with other materials or in other processes.</p> <p>Rev_01 - 01/06/2021</p>		<p>Manufacturer Name: ECOPLASTEAM Spa Benefit Company</p> <p>Registered office and production site: Via Gambalera, 180 Spinetta Marengo, 15122 (AL) - Italy</p> <p>Administrative and Headquarters: Conso Galileo Ferraris, 110 Turin, 10129 - Italy</p> 																																																																									

3.9 Recon Polymers (rLDPE + rHDPE + rAlu)

NETHERLANDS

Company profile

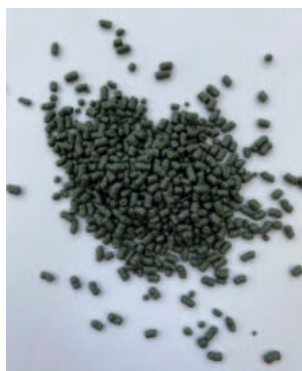
Recon Polymers has developed an efficient process to convert polyAl into widely applicable plastics. This process is characterised by a recycling yield of over 99% based on a net mass balance. This against a low energy consumption and with a high separation rate of $\pm 98\%$ of the LDPE/ aluminium foil fraction and the hard fraction, consisting of mainly HDPE caps and closures. During the process the only 'reject' is vaporised water. This is moisture added during the paper mill pulping process that is still part of polyAl-reject. The Recon Polymers plant is based on mechanical principles without adding water, chemicals or heat and has a capacity of at least 6,500 tons output per year. Based on an average moisture content of 22%, an input quantity of approximately 8,000 tons polyAl can be processed per year.

Location: Roosendaal, Netherlands

Production capacity: 6.500 MT

Examples of end-uses/ processing method: Transport pallets, Bird feeders, Chairs, 3D printing.

Website: <https://reconpolymers.com/>



Resin granulated



Resin compacted

recon polymers <small>a) new raw material technology</small>		TDS RECON POLYMERS MATERIAL	
Tensile properties			Combined Pressed pellet 14391
Strength	ISO 527-2 type 1A 23°C/ 50mm / min	Mpa	13,6
E-Modulus	ISO 527-2 type 1A 23°C/ 1mm / min	MPa	811
Strain	ISO 527-2 type 1A 23°C/ 50mm / min	%	6,7
Strain @ yield	ISO 527-2 type 1A 23°C/ 50mm / min	%	5,8
Impact properties			
Charpy notched	ISO 179-1 +23°C / 1eA	kJ/m ²	8,2
Charpy notched	ISO 179-1 -20°C / 1eA	kJ/m ²	-
Charpy unnotched	ISO 179-1 +23°C / 1eA	kJ/m ²	26,6
Thermal properties			
DSC	ISO 11357	PE% PP% PET% PA%	90% 8% 1% 1%
Rheological properties			
MFI - MFR	ISO 1133 - 190°C / 2,16kg		
	ISO 1133 - 230°C / 2,16kg		4,6
Density			1,092

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3.10 Trans Sabater (rLDPE + Alu)

SPAIN

Company profile

Trans Sabater S.L. is a Spanish family company, located in Valencia, which is dedicated to the management and recycling of waste. It manages materials such as wood, cardboard, metals, plastic and RDF in an integrated manner. With regard to plastics, it works in a circular way from collection to final recycling and the production of pellets. Its expertise in PP, HDPE, LDPE and PET deserves special mention. PolyAl is one of its latest innovation projects where it guarantees a high and constant quality in the final recycled pellets.




Process: Mechanical patented recycling process

Location: Valencia, Spain

Production capacity: 8.000 mT/yr

Examples of end-uses: Transportation pallets, Outdoor furniture, Baskets.

Website: <https://www.trans-sabater.com/>

ASTRAL ECO

PRODUCT Recycled polyethylene and aluminum
REFERENCE UNE-EN 15344
SUGGESTED APPLICATION Injection moulding
ORIGIN Postconsumer domestic
RECYCLED CONTENT 100%
SHAPE Granules
COLOR Grey
FILTRATION LEVEL 400µm




PHYSICAL AND CHEMICAL PROPERTIES

IMPACT RESISTANCE IZOD	(19 ± 5) kJ/m ² (notched)	UNE/EN ISO 180
FLEXURAL MODULUS	(370 ± 50) MPa	UNE/EN ISO 178
TENSILE MODULUS	(340 ± 50) MPa	UNE/EN ISO 527-1
MELT FLOW RATE	(3.0 ± 0.5) g/10 min (190°C 2.160 kg)	UNE/EN ISO 1133
ABSOLUTE DENSITY	(0.97 ± 0.03) g/cm ³	UNE/EN ISO 1183-1
BULK DENSITY	(0.60 ± 0.05) g/cm ³	Own Method
LDPE CONTENT	>80 %	UNE/EN ISO 11357-3
ASH CONTENT	<17.5 %	UNE/EN ISO 3451-1
MOISTURE CONTENT	<0.3 %	Own Method

PRODUCT CODE	500002
PACKING	Big bags 1200kg
TRANSPORT UNIT	Big Bags 1200kg palletized
HOMOGENEOUS BATCH	24 Tn

LEGAL WARNING
* This grade does not meet European standards for food contact materials. This grade is not intended for use in medical, pharmaceutical or sanitary applications and TRANS SABATER does not authorize its use in such applications. Before using a product, users must make their own independent determination that the product is safe, legal and technically suitable for its intended use. TRANS SABATER SL assumes no liability for the use of its materials in conjunction with other materials.

C/ dels Fogainers, s/n, Polígon Industrial Ribarroja (sector 13), 46190 Ribarroja Del Turia (Valencia) Spain
Tel.: 961 64 31 70

ASTRAL PRO

PRODUCT Recycled polyethylene and aluminum
REFERENCE UNE-EN 15344
SUGGESTED APPLICATION Injection moulding
ORIGIN Postconsumer domestic
RECYCLED CONTENT 100%
SHAPE Granules
COLOR Grey
FILTRATION LEVEL 400µm

PHYSICAL AND CHEMICAL PROPERTIES

IMPACT RESISTANCE IZOD	(22 ± 5) kJ/m ² (notched)	UNE/EN ISO 180
FLEXURAL MODULUS	(390 ± 50) MPa	UNE/EN ISO 178
TENSILE MODULUS	(360 ± 50) MPa	UNE/EN ISO 527-1
MELT FLOW RATE	(3.5 ± 0.5) g/10 min (190°C 2.160 kg)	UNE/EN ISO 1133
ABSOLUTE DENSITY	(0.98 ± 0.02) g/cm ³	UNE/EN ISO 1183-1
BULK DENSITY	(0.60 ± 0.05) g/cm ³	Own Method
LDPE CONTENT	>80 %	UNE/EN ISO 11357-3
ASH CONTENT	<17.5 %	UNE/EN ISO 3451-1
MOISTURE CONTENT	<0.3 %	Own Method

PRODUCT CODE	500003
PACKING	Big bags 1200kg
TRANSPORT UNIT	Big Bags 1200kg palletized
HOMOGENEOUS BATCH	24 Tn

LEGAL WARNING
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C/ dels Fogainers, s/n, Polígon Industrial Ribarroja (sector 13), 46190 Ribarroja Del Turia (Valencia) Spain
Tel.: 961 64 31 70

3.11 Alier (rLDPE + rHDPE + rAlu)

SPAIN

Company profile

Alier is a brand with a hundred years of history. Incorporated in 1832, it ventured into the world of paper manufacturing as early as 1886. As a result of its knowledge in the recycled paper sector, customer commitment, and the high quality of its products, it is now operating in more than 30 countries around the world. Alier has established itself as one of the leading recyclers of beverage cartons in Europe, becoming an integrated recycler capable of processing used beverage carton materials to produce recycled paper and rPolyAl.

Location: Barcelona, Spain

Production capacity: 10.000 MT/yr

Examples of end-uses: Injection moulding, Profile extrusion.

Website: <https://www.alier.com/>

TDS: To be delivered on request.



3.12 Fulun (rLDPE + rHDPE)

CHINA

Company profile

In 2018 Fulun set up its new recycling plant, which has integrated capacity for fibre (70kt/y) and polyAl (40kt/y) recycling. The plant has a drum pulper for fibre recycling and equipment for polymer and aluminium separation, upgraded from batch to continuous process, by using formic acid or NaOH to reduce the adhesion between the different layers. Fulun has also installed a plastic granulator line and a water treatment plant. With that, Fulun has become the only company with capability to treat wasted paper-based composite packaging material in Hangzhou City. Today 180 people work at Fulun, including 26 R&D colleagues. The company is certified with ISO9001 quality management system and ISO14001 environmental management system.

Process: Wet washing line with chemical separation process, using formic acid, to separate the aluminium from the LDPE, HDPE and PP.

Location: Hangzhou, China

Production capacity: 30.000 MT/yr

Examples of end-uses/ processing method: Injection moulding applications, e.g. Furniture, pallets, Waste bins.

Website: <https://www.tetrapak.com/insights/cases-articles/polyal-line-upgrade-fulun>

Primary information	Unit of Measurement	Value
Material Name		Commercial Name
Granule Diameter	Mm	2~5
Filter size in production	Micron	425
Source of feedstock	Origin description	LDPE
Impurities	%	2.13
Inorganic content	%	2.13
Smell/odour	Score (0 – no odour to 3 – strong odour)	1
MFI ISO1133 (190C; 2,16kg)	g/10mins	3.6512
Impact strength	kJ/m2, Charpy notched at 23 C	
Tensile strength	Mpa	10.36
Elongation at break	%	159.4
Flexular strength	MPa	
Flexular modulus	MPa	



3.13 Gayatri Paper Mill (rLDPE + Alu)

SOUTH AFRICA

Company profile

Tetra Pak, together with Gayatri Paper Mill, invested in a dedicated polyAl pelletising line at Gayatri Paper Mill. The line has been operational and producing pellets since 2016. Ongoing trials have been conducted with local plastic injection moulding companies to develop products made with polyAl content.

Some of the innovative and ground-breaking developments locally have been blending polyAl with other polymers such as polypropylene (PP) and high density polyethylene (HDP). This has opened new opportunities to make use of polyAl content in existing product manufacturing such as retail displays and outdoor furniture.

Further developments are underway to expand polyAl end-use through the manufacturing of transportation pallets that can be returned and reused. Another innovative product that has been developed and is being manufactured locally is a point-of-sale display stand. This is used in retail stores for shelving products for promotional purpose. A total of 1700 stands have already been distributed through a retail chain called Dischem Pharmacies.

Process: Dry cleaning process and extrusion line

Location: Johannesburg, South Africa

Production capacity: 2.000 MT/yr

Examples of end-uses/ processing method: Outdoor furniture, Retail displays, Transportation pallets.

Website: <https://www.tetrapak.com/insights/cases-articles/polyal-end-market-expansion-gayatri-paper>

TECHNICAL DATA SHEET

Technical data for Tetrapak recycled LDPE pellets			
Property	Standard	Unit	Recycled LDPE pellets
Specific density at 23 °C	ISO 1183	g/cm ³	1.05
Melt flow index	ISO 1133		
MFR 190/2,16	ISO1872/1873	g/10 min	3.35
Tensile stress at yield	ISO 527	MPa	11.5
Elongation at yield	ISO 527	%	37
Elongation at break	ISO 527	%	37
Impact strength unnotched at +23 °C	ISO 179	kJ/m ²	Not done
Impact strength unnotched at -30 °C	ISO 179	kJ/m ²	Not done
Impact strength notched at +23 °C	ISO 179	kJ/m ²	Not done
Impact strength notched at 0 °C	ISO 179	kJ/m ²	Not done
Impact strength notched at -30 °C	ISO 179	kJ/m ²	Not done
Flexural strength (3,5% flexural stress)	ISO 178	MPa	
Modulus of elasticity	ISO 527	MPa	230
Thermal stability OIT 200°C	EN 728		Not done
Metals present			Al (11%)



4. Other polyAI recyclers

Other polyAl recyclers

Recycler	Country	Grade(s)	Approximate output capacity (MT/year)
Luhai	China	rLDPE, rHDPE & PP	2.500
Khatema Fibres	India	rLDPE, rHDPE & PP	900
Marcolite	Mexico	rLDPE, rHDPE & PP	1.800
Imerssa	Mexico	rLDPE, rHDPE & PP	1.050
Lientai	Taiwan	rLDPE, rHDPE & PP	3.900
KMK Paper	Turkey	rLDPE, rHDPE & PP	1.500
STP	Saudi Arabia	rLDPE, rHDPE & PP	1.500

5. Glossary of abbreviations

MT	Metric tons
LLDPE	Linear Low Density Polyethylene
PolyAl	Polymer and aluminium
PP	Polypropylene
rHDPE	Recycled high density polyethylene
rLDPE	Recycled low density polyethylene
rPP	Recycled polypropylene
rAlu	Recycled aluminium

