versalis revive®

versalis

VERSALIS REVIVE®, NEW LIFE TO PLASTIC AND RUBBER WASTE THROUGH MECHANICAL RECYCLING

Developed at Versalis research laboratories, Versalis Revive® and Refence® are product lines with different base polymers (styrenics, elastomers and polyethylene) containing recycled materials.

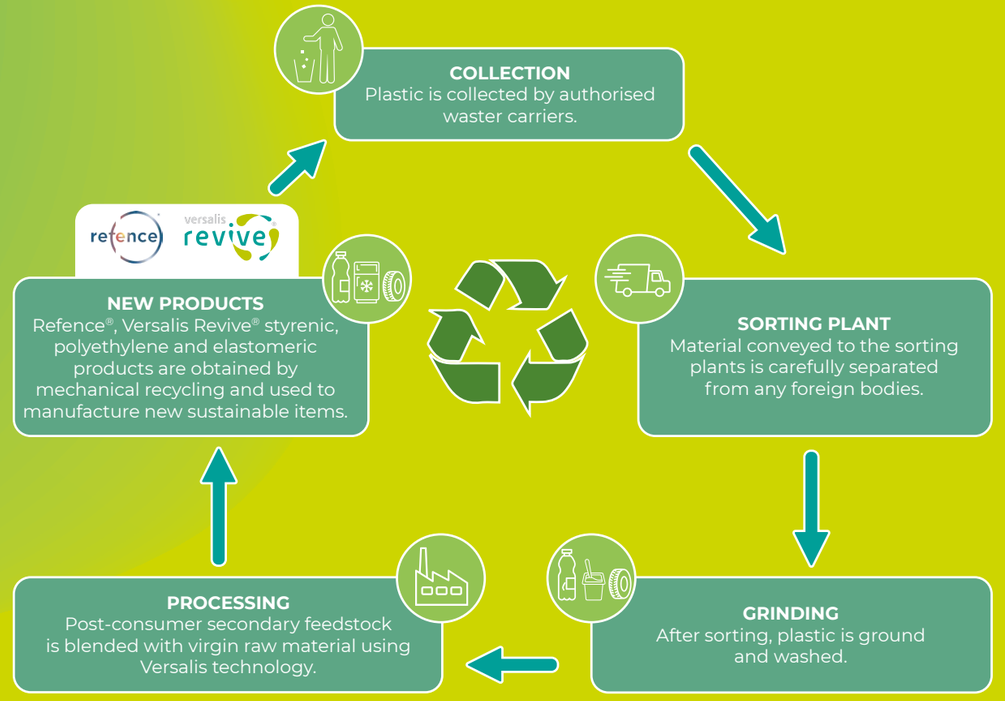
With this product range, we are tackling one of the circular economy's most demanding, yet worthwhile, technological challenges: giving new life to waste plastic and rubber by recycling, creating new products for a wide range of high-quality applications.

From innovation to sustainability: mechanical recycling of plastics and elastomers

To breathe new life into polymer waste, Versalis Revive® and Refence® rely on an advanced mechanical-recycling process, a core element of the plastic life cycle.

This method enables recovery of post-consumer and post-industrial materials, transforming them into new feedstocks without affecting performance.

This technology allows Versalis Revive® and Refence® to not only extend the material life cycle but also reduce both virgin feedstock consumption and environmental impact, offering sustainable high-performance solutions for various industrial applications.



The Versalis Revive® and Refence® product families expand and complement the corporate portfolio, offering customers innovative grades with varying levels of recycled content to ensure high-quality applications.

VERSALIS REVIVE®
STYRENICS

NEWER®
Decontamination technology for mechanical recycling

NEWER® is new technology developed at Versalis research laboratories in Mantua and enables purification of recycled polymers in compliance with Recycling Regulation (EU) 2022/1616. Implemented on an industrial scale at the Forever Plast plants in Lograto (Brescia), as a result of a co-development agreement between Versalis and Forever Plast, **NEWER**® technology has received a No Objection Letter (NOL) from the US Food and Drug Administration (FDA).
This technology has extended the Versalis Revive® family, giving rise to the new **REFENCE**® range of mechanically recycled products for **direct food-contact applications**.

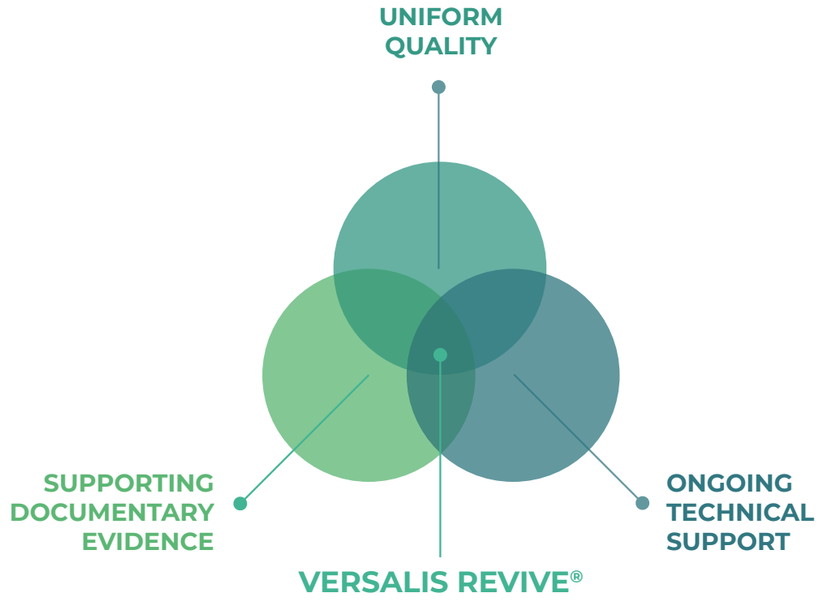
PORTO MARGHERA
Mechanical recycling hub

At Porto Marghera, Versalis has established the first advanced mechanical recycling plant for post-consumer plastics. The facilities are equipped with 4 production lines capable of providing styrenic polymers (r-GPPS and r-EPS) obtained from secondary feedstock for sectors **such as packaging and building**. These new products extend the **Versalis Revive**® portfolio, consolidating its European leadership in the recycled styrenic polymer sector.

VERSALIS REVIVE® AND REFENCE®
The right choice for a sustainable future

Versalis Revive® and **Refence**® products represent an innovative solution for those seeking sustainable, circular materials.

- An advanced production process allows us to guarantee **uniform end-product quality** by managing a secondary raw material (SRM) with naturally variable properties.
- Every material includes complete **certifications and technical documentation** for full transparency, regulatory compliance, and traceability.
- We provide **specialist technical support**, assisting customers in material choice and optimisation for their specific applications.
- As a **European mechanical recycling hub**, we guarantee a continuous and reliable supply of materials, meeting the needs of an increasingly sustainability-driven industry.



PSV Certification: sustainability and quality assurance

The recycled content in Versalis Revive® and Refence® products, as well as the origin of the recycled plastic materials used, are verified and certified through robust management and traceability systems.
Refence®, Versalis Revive® PE, PS and EPS grades have Plastica Seconda Vita (PSV or second life plastic) certification under the terms of a scheme developed by the IPPR (Institute for the Promotion of Recycled Plastic).
There are various types of mark, each one revealing the 'first life' of the certified item's constituent plastics.

Carbon footprint measurement using LCA method

Versalis is committed to developing and promoting more sustainable solutions by expanding its portfolio with products made from alternative feedstocks, such as secondary raw materials (SRM) obtained from mechanical recycling, and by performing LCA (Life Cycle Assessment) evaluations according to internationally standardized methodologies. For Versalis Revive® and Refence® grades, we have internal carbon footprint assessments available upon request.

VERSALIS REVIVE® EPS

Produced in **Mantua** and **Porto Marghera** plants, the **Versalis Revive® EPS** (expanded polystyrene) gamma contains Secondary Raw Materials (SRM) sourced from the collection of food packaging, appliance packaging, and seed-trays, compliant to UNI 10667/10.
This approach increases product circularity and significantly enhances the recyclability of styrenic polymer-based items. It also gives a second life to everyday products, transforming them after use into durable goods.
The **Versalis Revive® EPS** portfolio:

Commercial name	Versalis Revive® EPS 3000	Versalis Revive® EPS 3000 AE	Versalis Revive® EUROPE 3/5 AE	Versalis Revive® ES 3/5 AE
Dimensional range (mm)	0.7-1.1	0.7-1.1	0.7-1.1 1-1.6	0.6-1.2 1-1.6
Certification for recycled or bio-based centent	PSV	PSV	PSV	PSV
% recycled	35	15	15	80
Application	Industrial packaging	Insulation	Insulation	Insulation
Compliance with regulations	European Recycled Packaging Regulations	CAM (minimum environmental criteria)	CAM (minimum environmental criteria)	CAM (minimum environmental criteria)
Insulation performance	x	x	xx	xx
Colour	○	○	●	●
Fire test	-	Euroclass E	Euroclass E	Euroclass E*

(*) Certification on going.

Versalis Revive® EPS products are used in the **industrial packaging** and **building insulation** sectors.

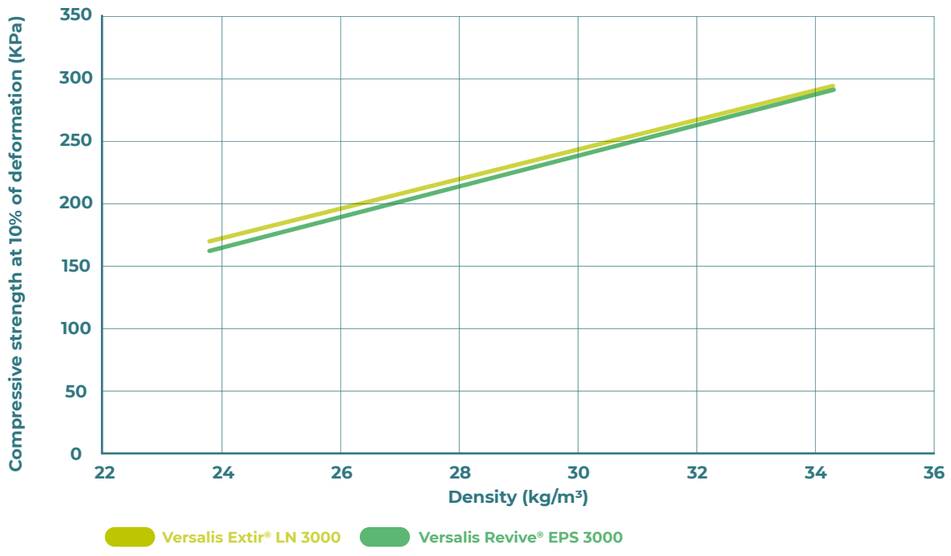
Versalis Revive® EPS 3000 contains **35% secondary feedstock** and is used for appliance, furniture and pharmaceutical packaging, meeting key European sustainable-packaging standards and regulations.
Indeed, **Versalis Revive® EPS 3000** is the answer to the most critical packaging problems such as containment, protection, thermal insulation and environmental sustainability.

Industrial packaging

PACKAGING SHOULD ENSURE	VERSALIS REVIVE® EPS IS	SOME FACTS
Containment	Easily molded in all shapes	Thickness 2 to 200 mm
Protection	Impact resistant	Can be used to pack 100-1000 times its weight
Insulation	Thermal insulating for cold and warm applications	Thermal conductivity up to values even lower than 32 mW/mK at 15 g/l
Trasportability	Light weight	About 98% of an EPS item consists of air
Enrivonmental compatibility	100% recyclable 35% recycled	40% of EPS packaging in Europe is recycled

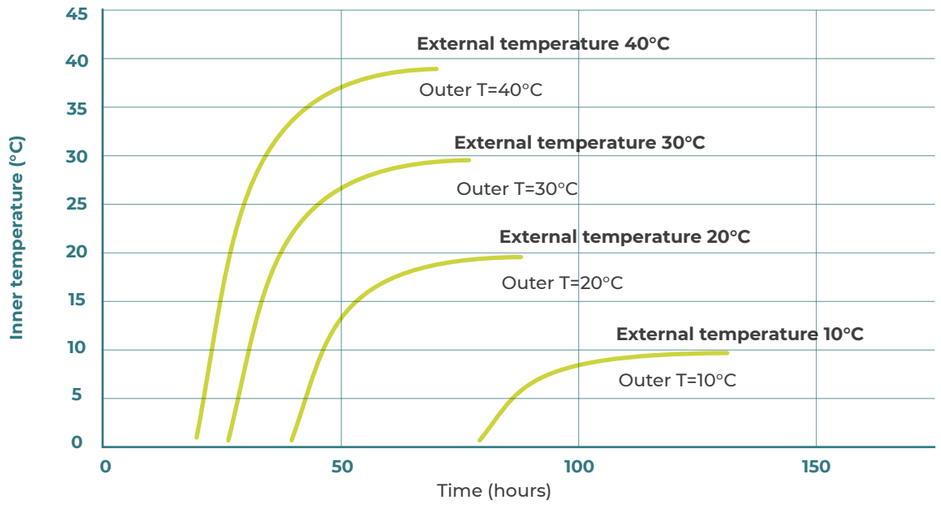
Its compressive strength allows packaging of heavy items and multiple-tier stacking.

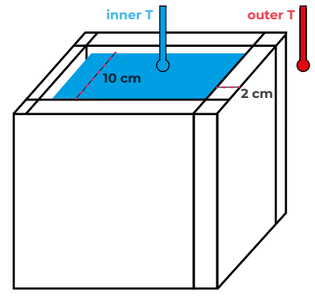
The Versalis Research and Development Department has optimised **Versalis Revive® EPS 3000** to fully match the mechanical performance of its conventional counterpart.



Versalis Revive® EPS 3000 compressive strength versus density

The unique cellular structure of **Versalis Revive® EPS 3000** allows to manufacture courier boxes for the pharmaceutical and medical sectors able to keep the required low internal temperature for several hours.





Thermal insulation packaging with **Versalis Revive® 3000** Ice (917 g) in a EPS box (size 10x10x10 cm, thickness 2 cm) at different outer temperatures

Building insulation

Each **Versalis Revive® EPS product** for building is designed to deliver an optimum combination of properties for its intended use in compliance with Italian CAM (Criteri Minimi Ambientali) regulations.

Commercial name	Versalis Revive® EPS 3000/5000 AE	Versalis Revive® EPS EU 3 AE	Versalis Revive® EPS EU 5 AE	Versalis Revive® EPS ES 3 AE	Versalis Revive® EPS ES 5 AE
Dimensional range (mm)	**0.7-1.1/ 1-1.6**	**0.7-1.1**	**1.0-1.6**	**0.6-1.2**	**1.0-1.6**
Colour	White	Dark grey	Dark grey	Dark grey	Dark grey
Reaction to fire	Euroclass E	Euroclass E	Euroclass E	Euroclass E*	Euroclass E*
Typical density range (g/l)	15-30	17-25	13-25	17-30	17-25
Blocks	●	●	●	●	●
Moulding	●	●		●	
Thin-wall moulding	●	●		●	

(*) Certification on going.

VERSALIS REVIVE® PS

The **Versalis Revive® PS** portfolio consists of solid polystyrene grades with a variable recycled content. The material is sourced from different streams, including household waste, recovered appliances (WEEE), and compacted EPS briquettes, making it ideal for a variety of applications like **thermal insulation, electrical enclosures, packaging, and household goods**.
Most products in the Versalis Revive® PS line are mainly developed in partnership with Forever Plast, Italian company and leading European player in the recovery and recycling of **post-consumer plastic** sourced from the **CoRePla circuit** of sorted municipal solid waste. A specialised processing line enables separation of the polystyrene fraction contained in plates, cups, trays and yoghurt pots.
These products have been awarded Plastica Seconda Vita (PSV) certification.

Thermal insulation - XPS

Versalis Revive® PS HE - HE(B) contains 60% recycled content from compacted EPS, which is sourced from packaging, agricolture and building and is designed to produce XPS board of varying thickness for thermal insulation sector. The product can be used to manufacture CAM-compliant (minimum environmental criteria) board.

Electrical&Electronics

Versalis Revive® PS RT has been specially developed for the E&E (electrical and electronics) sector and designed for the manufacture of electrical and electronic components such as enclosures and junction boxes. It contains at least 30% secondary raw material from separate household waste collection or recovery of electrical and electronic equipment (WEEE).
It is available in either light grey or white according to the requirements of the E&E (electrical and electronics) sector.

PRODUCT	COLOUR	RAL
Versalis Revive® PS RT 33010	Light grey	7035
Versalis Revive® PS RT 31600	White	9003

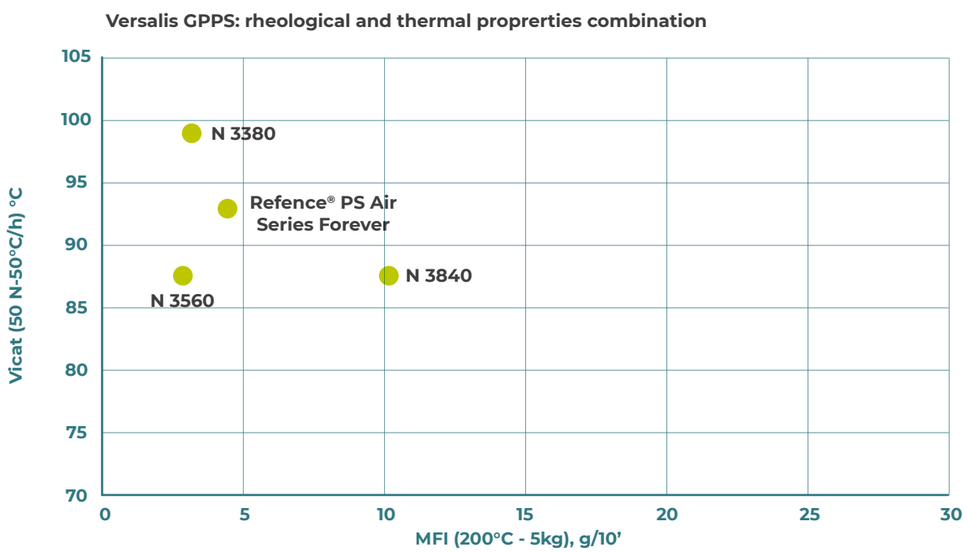
FOOD PACKAGING - REFENCE®

REFENCE® is the innovative range of mechanically recycled polymers designed for **direct food-contact applications**. This new family enhances the Versalis Revive® portfolio, increasing the opportunities for mechanical recycling, and is suitable for both rigid and expanded polystyrene food packaging.

Developed in partnership with the Italian company **Forever Plast**, Lograto (Brescia), a leading post-consumer plastic recycler, REFENCE® grades are produced using **Newer® technology** that ensures purification of recycled polymers in accordance with Regulation (EU) 2022/1616.

In addition to the standard Edistir® food packaging range, we have: **Refence® PS Air-Series Forever** and **Refence® PS Land-Series Forever** with minimum 75% content of recycled polystyrene obtained from separate household waste collection.

Refence® PS Air-Series Forever has been specifically developed for the production of **semi-foamed food trays** (e.g. for meat and fish).



Partnerships with various players in the polystyrene industry, such as **CoRePla** and **Pro Food**, have created an innovative, recyclable food-contact tray whose feedstock is recycled polystyrene.

Refence® PS Land-Series Forever is used in the manufacture of thermoformed food-packaging items with a steep draft angle such as **yoghurt pots, food containers and vending machine products**.

	R 850E	SR 550	ICE R 830D	RC(I) 600	Refence® PS Land - Series Forever
	Super Impact	High impact, high flowability	High stress-cracking resistant	High gloss	Sustainable HIPS with 75% recycled post-consumer polystyrene
MFI (200°C, 5 kg), g/10'	4	11	3	6	4.5
Izod un-notched (23°C, 4 mm), kJ/m²	10	9	10	5.5	6
Gloss (20°)	++	++	+	+++++	++
Vicat (50 N – 50 °C/h), °C	91	82	88	88	90

Refence® and **Versalis Revive® PS** products are:						
Commercial name	**Refence® PS Air-Series Forever**	**Refence® PS Land-Series Forever**	**Versalis Revive® PS 100**	**Versalis Revive® PS Air-HE/HE(B)**	**Versalis Revive® PS RT 33010**	**Versalis Revive® PS RT 31600**
Direct food-contact	Yes	Yes	No	No	No	No
% recycled	75	75	100	60	Up to 30	Up to 30
MFI (200°C, 5 kg), g/10	4.5	4.5	4.5	10-15	6.5	6.5
Izod un-notched (23°C, 4 mm), kJ/m²	3	6	3.5	-	8	7
Vicat (50 N – 50 °C/h), °C	93	90	90	97	88	88
Certification for recycled or bio-based content	PSV	PSV	PSV	PSV soon	PSV	PSV
Source of waste	Domestic post-consumer waste	Domestic post-consumer waste	Domestic post-consumer waste	SRM from compacted EPS	Domestic post-consumer waste	Recovery of electrical and electronic equipment
Main Application	Foam tray	Yoghurt pots, vending machine products, food containers	Packaging	Thermal insulation - XPS board	Electrical & Electronics	
Colour	Grey	Light grey	Grey	amber/neutral or grey/brown	RAL 7035 light grey	RAL 9003 white

VERSALIS REVIVE® ABS

Versalis Revive® ABS is the new range of solid copolymers containing secondary raw material. The high purity level of the recycled ABS and use of specific Versalis virgin styrenic polymers create a compound with performance suitable for various applications.

As part of the Versalis Revive® family, the ABS range has been developed in partnership with leading European players from the post-consumer and post-industrial plastic recovery and recycling sector. A specialised processing line enables separation and recovery of the fraction of ABS sourced from processing-industry scrap and/or WEEE recovery.

Commercial name	% recycled	Source of waste	Main Application	Processing technology
Versalis Revive® ABS L322 Black	70	Post-industrial	Automotive and other	Injection moulding
Versalis Revive® ABS F332 Black	70	Post-industrial	Automotive and other	Injection moulding
Versalis Revive® ABS SH 106 (Black)	30	Post-industrial	Automotive and other	Extrusion, Injection moulding

VERSALIS REVIVE® PE

Versalis Revive® PE is the polyethylene-based product line containing up to 100% plastic sourced from municipal post-consumer waste or the trade and industry supply chain, developed at Versalis research laboratories in partnership with leading European specialists in mechanical recovery and recycling technology.

The Versalis Revive® PE portfolio consists of five products:

• **VERSALIS REVIVE® PE LL/LD**

Four products based on low-density polyethylene (LDPE) and linear low-density polyethylene (LLDPE), suitable for use with blown film and extrusion technology. They are designed for co-extrusion and blending with virgin polyethylene to produce films for a wide range of secondary and tertiary packaging applications, such as shrink film, bags, pallet hoods, silage film, and stretch film. Other applications include artificial turf, hoses, foam materials and electrical cable sheathing.

• **VERSALIS REVIVE® PE HD**

A high-density polyethylene-based product, suitable for blown film, blow moulding and extrusion technology, used to manufacture, in co-extrusion and blended with virgin polyethylene, various films for industrial packaging and jerry cans to store industrial and household chemicals.

Commercial name	100 LF H	COM75LF1 H	100 HD	100 LC H	100 LFB H
MFI (190°C/2.16 kg)	0.7	1	0.3	2	0.5
DENSITY (g/cm³)	0.930	0.921	0.954	0.922	0.925
Certification for recycled or bio-based content	PSV	PSV	PSV	PSV	PSV
% recycled	100 industrial post-consumer	75 industrial post-consumer	100 municipal post-consumer	100 industrial post-consumer	100 industrial post-consumer
Application	Film intended for various uses in secondary or tertiary packaging: - shrink films - bags - hoods - silage films	Films intended for various uses in secondary or tertiary packaging where good optical properties are required: - shrink films - bags - hoods - silage films	Packaging of industrial products -tanks for chemical products, industrial and household use - pipes and various profiles	Films intended for the production of stretch film, where the colour is neutral and particularly requested	Film intended for various uses in secondary or tertiary packaging: - shrink films - bags - hoods
Colour	 Amber/Neutral	 Amber/Neutral	 Grey	 Amber/Neutral	 Amber/Neutral

VERSALIS REVIVE®
ELASTOMERS

Versalis has developed and marketed a line of **Versalis Revive®** elastomeric products linked to the end-of-life-tyre recycling industry.
These are ESBR grades containing a blend of end-of-life-tyre (ELT) crumb rubber, called Revive® ESBR, and a fully recycled rubber (Versalis Revive® DVC), obtained and developed as a result of partnership between Versalis and the Turin company, AGR.

VERSALIS REVIVE® ESBR

Versalis Revive® ESBR products are rubber masterbatches obtained by coagulating SBR latex and a blend of end-of-life-tyre (ELT) crumb rubber supplied and manufactured by a third-party company.
The black bales are wrapped in readily dispersible polyethylene film.
These products offer numerous sustainability benefits for rubber compounders by using recycled material and handling solid bales instead of crumb rubber, thereby preventing dust emissions in the mixing room.
Furthermore, these products can be successfully blended with other elastomers (BR, NR, etc.), thus ensuring homogeneous compounds and good curing performance.
The **Versalis Revive® ESBR 12D02** grade currently represents the portfolio and is mainly used in tyre manufacturing and technical rubber goods.

	Mooney Viscosity	Bound Styrene (% w/w)	Oil content (% w/w)	ELT Micronized powder (% w/w)
12D02*	60	23.5	-	15

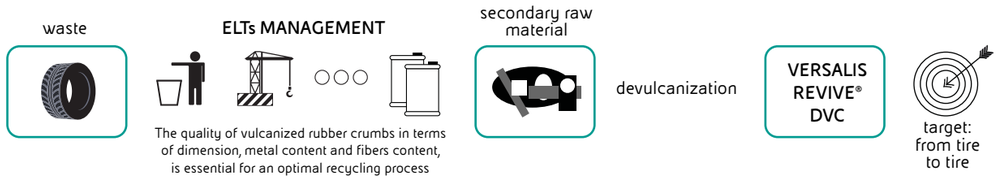
*Also available in an oil-extended version with TDAE, upon specific request.

VERSALIS REVIVE® DVC

The Versalis Revive® DVC family consists of products derived from devulcanised ELT feedstock, developed in partnership with AGR proprietary technology for the devulcanization of post-consumer elastomeric materials.
The project has been jointly developed with the EcoTyre Consortium that runs a national ELT collection and treatment network.
The **Versalis Revive® DVC 4T1** grade is generated by devulcanisation of end-of-life Truck & Bus tyres.

Key features of these materials:

- 100% products made with recycled material;
- ready to be mixed and revulcanised in new compounds as a replacement for virgin rubbers;
- different grades developed for various applications thanks to the accurate control of the feedstock and devulcanization process.



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