



RECYCLING LINE recoSTAR PET

for production and post-consumer scrap, preforms, bottle and sheet flakes, **integrated pre-drying**, dust-free processing, optional inline solid stating, **energy efficient**, high ROI, **full automatisisation**





State-of-the-art recycling technology for the in-house recycling of PET flakes from bottles, preforms, strapping bands and sheets as well as for the **recycling of post-consumer bottle flakes** after the washing process. The **end product is melt-filtrated, uniform granulate** that can be used for a wide range of applications.

Solid state polycondensation – optionally for the **IV increase of PET and outstanding decontamination**. The regranulate after the Starlinger iV+ process is suitable for **food contact applications** such as bottle-to-bottle or bottle-to-sheet. The process has achieved several national and brand-owner approvals.



The PET flakes are fed into the pre-drying unit on top of the extruder. The material is dried, heated and crystallised, either by application of hot (dessicant) air, or vacuum. This treatment already contributes to outstanding decontamination results.



The high-vacuum degassing extruder reduces viscosity loss during extrusion and purifies the melt from volatile contamination. The water-free vacuum pump reduces production and maintenance costs.



Continuous filters for dirt particle removal are available with or without backflushing. The direct material flow reduces stress on material. Finest filtration available on request. **The inline viscosimeter** optionally measures the IV for immediate quality control.



The underwater pelletiser is energy-saving, features a simple start-up procedure and can replace the strand pelletiser or automatic strand pelletiser. Pellet size and bulk density are adjustable for all pelletising systems.



The optional inline crystallisation after underwater pelletising ensures optimised foot-print, energy saving and high crystallinity. **Inline colour measurement** guarantees first-class colour values.



SSP technology enables constant and adjustable IV increase with the FIFO principle. Outstanding decontamination values qualify for food contact applications. AA level and other VOCs are reduced to the levels of virgin resin.



Alternative energies such as natural gas or steam can be used as a cost-friendly alternative for heating. The energy recovery kit uses the residual heat of the PET regranulate for drying and heating the input material, achieving considerable energy savings.



Resin-like characteristics of the rPET in terms of form, flow behaviour, crystallinity, humidity, VOC, AA and EG levels, IV, dust content, etc. Consequently, the material is suitable for all PET applications.

Advantages

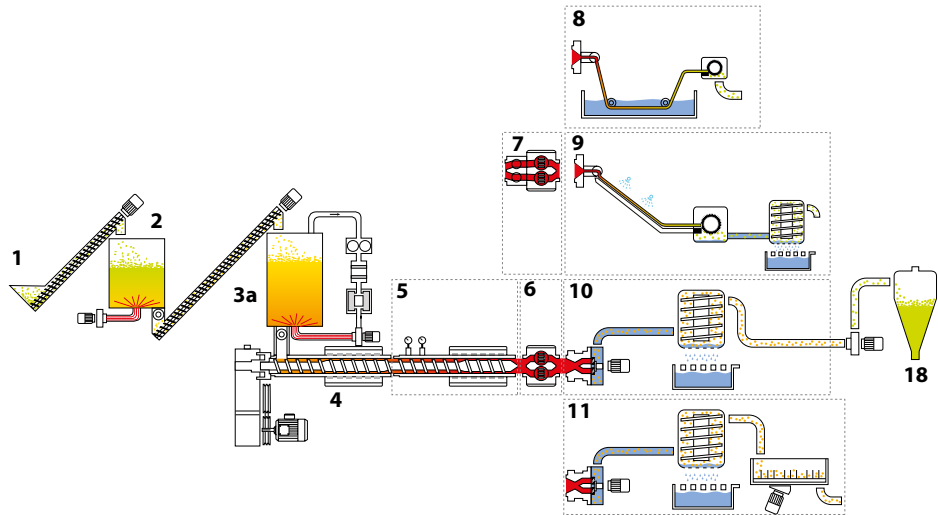
- FIFO ensures uniform treatment
- Outstanding decontamination
- Adjustable IV increase
- Energy saving through inline processing
- Improved production efficiency
- User-friendly touchscreen and high automatisaton
- Modular design provides flexibility, single mode extruder operation for recoSTAR PET 330



Starlinger recycling technology allows utmost flexibility for the customer and adjustment to the ever changing requirements in the market or applications through modular design.

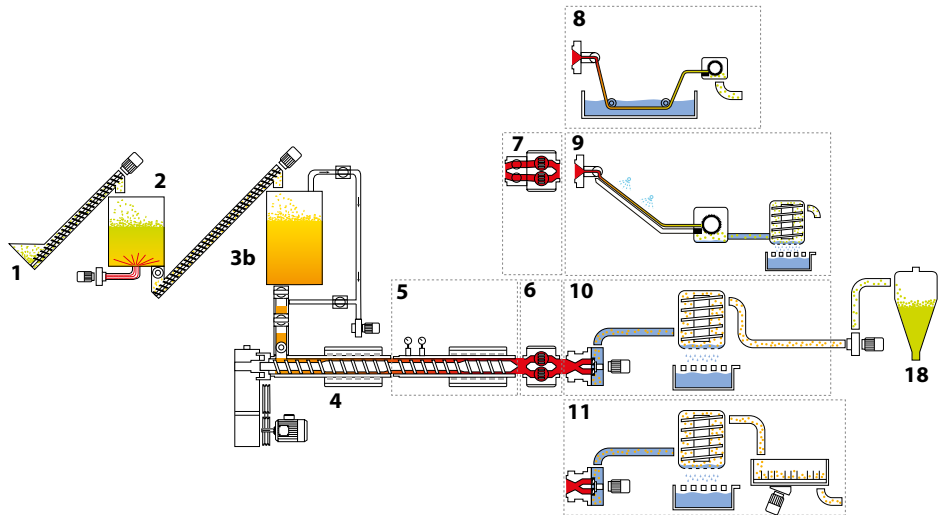
recoSTAR PET FG	Food contact	FDA/EFSA	Decontamination/ VOC	Brand owner approved	Low AA level	IV increase
	✓	✓	✓		optionally	✓ with reduced output

PET flakes are heated and dried in a two-stage process, first with hot air, then with dry air. The special design of the dryer outlets results in center flow prevention, consistent residence time and FIFO processing. This ensures decontamination for food contact applications and ideal preparation for the extrusion process with maintained IV level. A choice of filtration and pelletising systems is available. Once installed, the unit can be equipped with an SSP reactor (iV+) to increase viscosity and decontamination levels.



recoSTAR PET FG+	Food contact	FDA/EFSA	Decontamination/ VOC	Brand owner approved	Low AA level	IV increase
	✓	✓	✓✓		✓	✓✓ with full output

PET flakes are heated and dried in a two stage process, first with hot air, then by means of vacuum. The special design of the dryer outlets results in center flow prevention, consistent residence time and FIFO processing. This ensures decontamination for food contact applications and ideal preparation for the extrusion process with IV increase. A choice of filtration and pelletising systems is available. Once installed, the unit can be equipped with an SSP reactor (iV+) to increase viscosity and decontamination levels.



- 1. Conveyor screw
- 2. Hot air drying unit
- 3a/b. Pre-drying unit/pre-drying unit under vacuum

- 4. Extruder
- 5. High-vacuum degassing extruder
- 6. Melt filter without backflushing

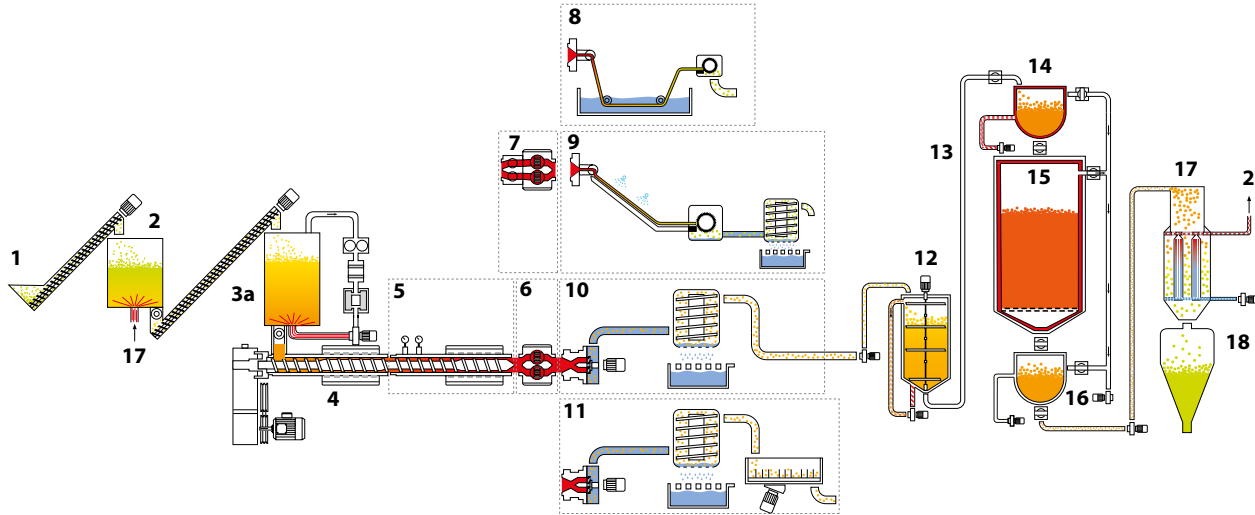
- 7. Melt filter with backflushing
- 8. Strand pelletiser
- 9. Automatic strand pelletiser

The final product fulfils a variety of characteristics comparable to virgin resin. PET recycling – equipment designed to fit your requirements.

recycling technology

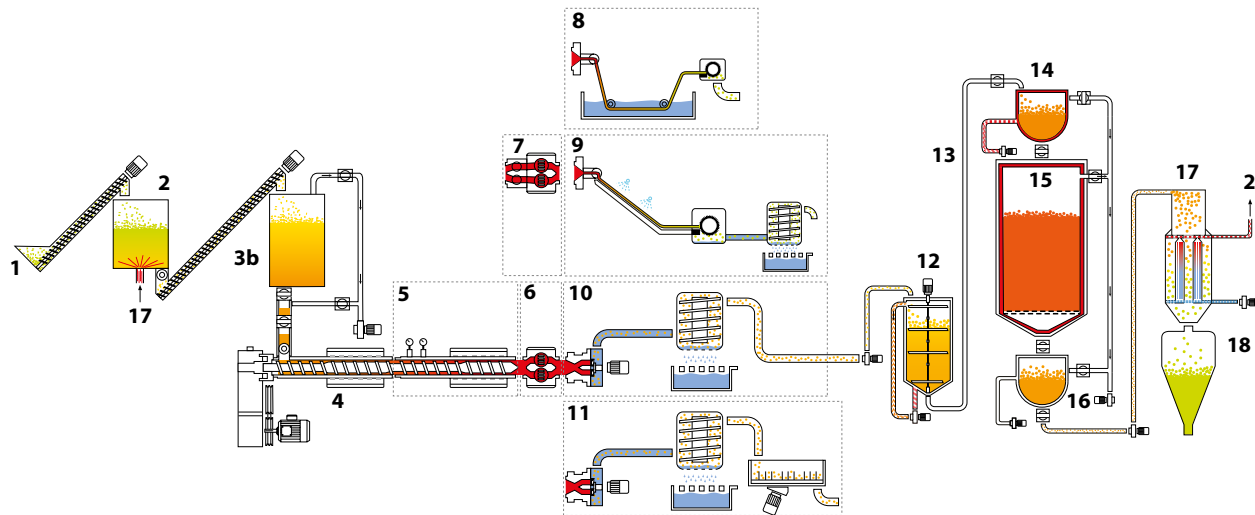
recoSTAR PET iV+	Food contact	FDA/EFSA	Decontamination/ VOC	Brand owner approved	Low AA level	IV increase
	✓	✓	✓✓✓	✓	✓✓	✓✓✓ with full output

PET flakes are heated and dried in a two stage process, first with hot air, then with dry air. The special design of the dryer outlets results in center flow prevention, consistent residence time and FIFO processing, ensuring ideal preparation for the extrusion process. A choice of filtration and pelletising systems is available. The downstream inline vacuum SSP reactor uses the energy of the previous step. Special FIFO design ensures consistent reaction parameters, adjustable IV increase as well as highly effective decontamination (ultra low VOC, AA < 1 ppm) for food contact applications.



recoSTAR PET iV+ Superior	Food contact	FDA/EFSA	Decontamination/ VOC	Brand owner approved	Low AA level	IV increase
	✓	✓	✓✓✓✓	✓	✓✓	✓✓✓ with full output

The combined decontamination steps – first the flakes in the vacuum dryer upstream of the extruder (FG+), then the pellets in the SSP reactor downstream of the extruder (iV+) – result in the highest possible pellet quality. This superior decontamination reduces AA and VOC to a minimum. Optionally, the two steps can be separated to double the capacity: Food-contact flakes and/or food-contact pellets can be produced.



- 10. Underwater pelletiser
- 11. Underwater pelletiser with inline crystallisation
- 12. Crystalliser/post-crystallisation unit

- 13. Vacuum transport
- 14. Preheating unit
- 15. SSP reactor

- 16. Cooling unit/vacuum sluice
- 17. Energy recovery kit
- 18. Storage silo

Special features and services



Recipe control
All settings required for a certain type of production are stored in the control system of the line together with the chosen recipe name and the date.



Trend reporting
One feature of the colour touch panel is the integrated storage of main production parameters (extruder load, melt pressures, etc.), which can be displayed within seconds.



Maintenance list
As a support for maintenance personnel and the operator, each line is programmed with a customized maintenance system.

recoSTAR technology is designed for **high automation** and **userfriendliness**. The touch screen enables a simple start-stop procedure, password controlled user levels, and screenshots (USB port). This ensures **highest efficiency** and consequently **fast ROI**. Features are either standard or can be added according to customer’s requirements.



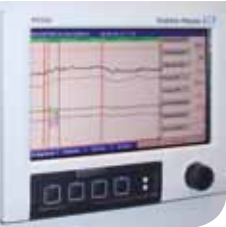
Optional online support
Based on a DSL connection, the online support establishes a connection from Starlinger to the customer line – wherever in the world it is installed.



Optional inline viscosimeter
The continuously measured IV of the PET melt during extrusion helps to control quality and indicates any required change of the residence time in SSP.

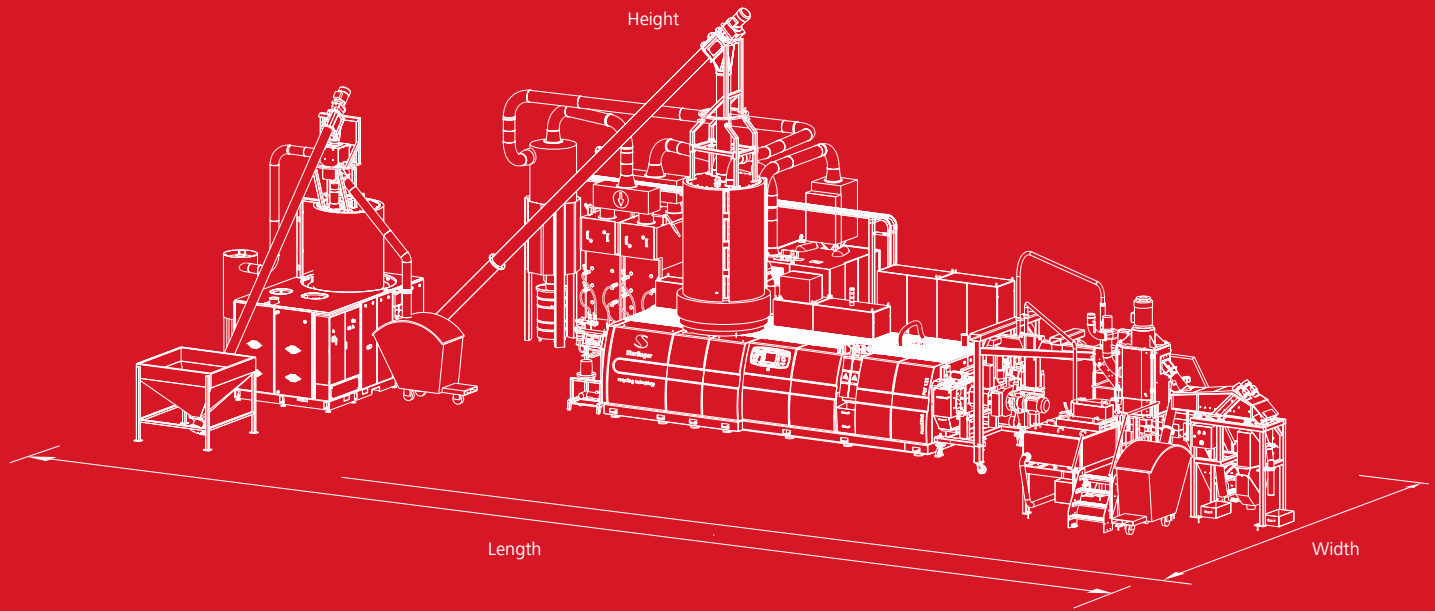


Optional inline colour measurement
Colour deviations from a set standard are detected and serve as an inline quality control of the input material: Off-spec material is rejected. Deviations can also be offset by adding additive (either liquid or masterbatch).



Optional online writer and archiving
The online writer collects all relevant production data for secure traceability. Up to 50 parameters can be stored in short sequences in an internal memory and thus are saved in the event of a power cut.

recoSTAR PET/PET HC (High Capacity)
recoSTAR PET FG/FG+

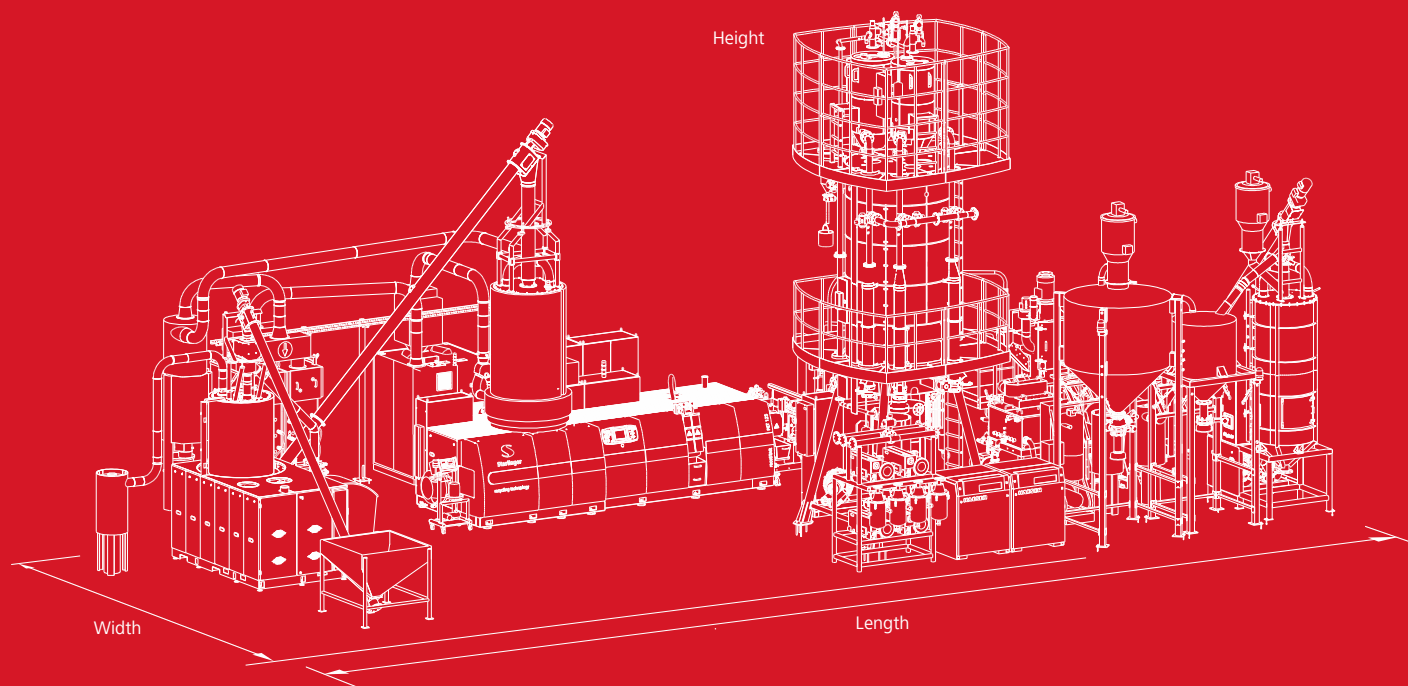


Dimensions in mm		recoSTAR PET / PET HC / PET FG / PET FG+				
Type		65	85	125	165	330
Height		5200	6200	7250	7250	11700
Width		8760	10100	11100	13400	11700
Length		14750	16350	21600	22800	27100

Technical data						
Type		65	85	125	165	330
recoSTAR PET						
Output [kg/h]		150 – 200	250 – 350	650 – 800	1250 – 1450	2500 – 2900
AC drive [kW]		45	75	160	250	500
recoSTAR PET HC						
Output [kg/h]		150 – 250	350 – 500	850 – 1050	1600 – 1800	3200 – 3600
AC drive [kW]		45	90	160	315	630
recoSTAR PET FG / FG+						
Output [kg/h]		150 – 220	250 – 400	650 – 900	1200 – 1650	2500 – 3300
AC drive [kW]		45	90	160	315	630
Extruder						
Screw diameter (L/D) [mm]		65 (40)	85 (40)	125 (40)	165 (40)	2x165 (40)
Energy consumption [kWh/kg]		0.25 – 0.35	0.25 – 0.35	0.25 – 0.35	0.25 – 0.35	0.25 – 0.35
High-vacuum [mbar]		≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Downstream equipment						
Strand pelletiser		●	●			
Underwater pelletiser		alternative	alternative	●	●	●
Automatic strand pelletiser		alternative	alternative	alternative	alternative	alternative
● standard						

All data depending on design!

recoSTAR PET iV+
recoSTAR PET HC iV+
recoSTAR PET iV+ *Superior*



Dimensions in mm

Type	65	85	125	165	330
Height	6460	6800	10300	12000	12000
Width	12000	11000	12950	15250	11900
Length	12860	18000	20500	21400	36300

Technical data

Type	65	85	125	165	330
recoSTAR PET iV+					
Output [kg/h]	150 – 200	250 – 350	650 – 800	1250 – 1450	2500 – 2900
AC drive [kW]	45	75	160	250	500
recoSTAR PET HC iV+					
Output [kg/h]	150 – 250	350 – 500	700 – 1050	1600 – 1800	3200 – 3600
AC drive [kW]	45	90	160	315	630
recoSTAR PET iV+ <i>Superior</i>					
Output [kg/h]	150 – 220	250 – 400	650 – 900	1200 – 1650	2500 – 3300
AC drive [kW]	45	90	160	315	630
Extruder					
Screw diameter (L/D) [mm]	65 (40)	85 (40)	125 (40)	165 (40)	2x165 (40)
High-vacuum [mbar]	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Downstream equipment					
Strand pelletiser	●	●			
Underwater pelletiser	alternative	alternative	●	●	●
Automatic strand pelletiser	alternative	alternative	alternative	alternative	alternative
Solid state polycondensation					
IV increase [dl/g/h]					0.01 – 0.02
Plant energy consumption [kWh/kg]	0.40 – 0.53	0.40 – 0.53	0.40 – 0.53	0.40 – 0.53	0.40 – 0.53
Energy Recovery Kit (ERK): Reduction of energy consumption [kWh/kg]					up to 0.03

● standard

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