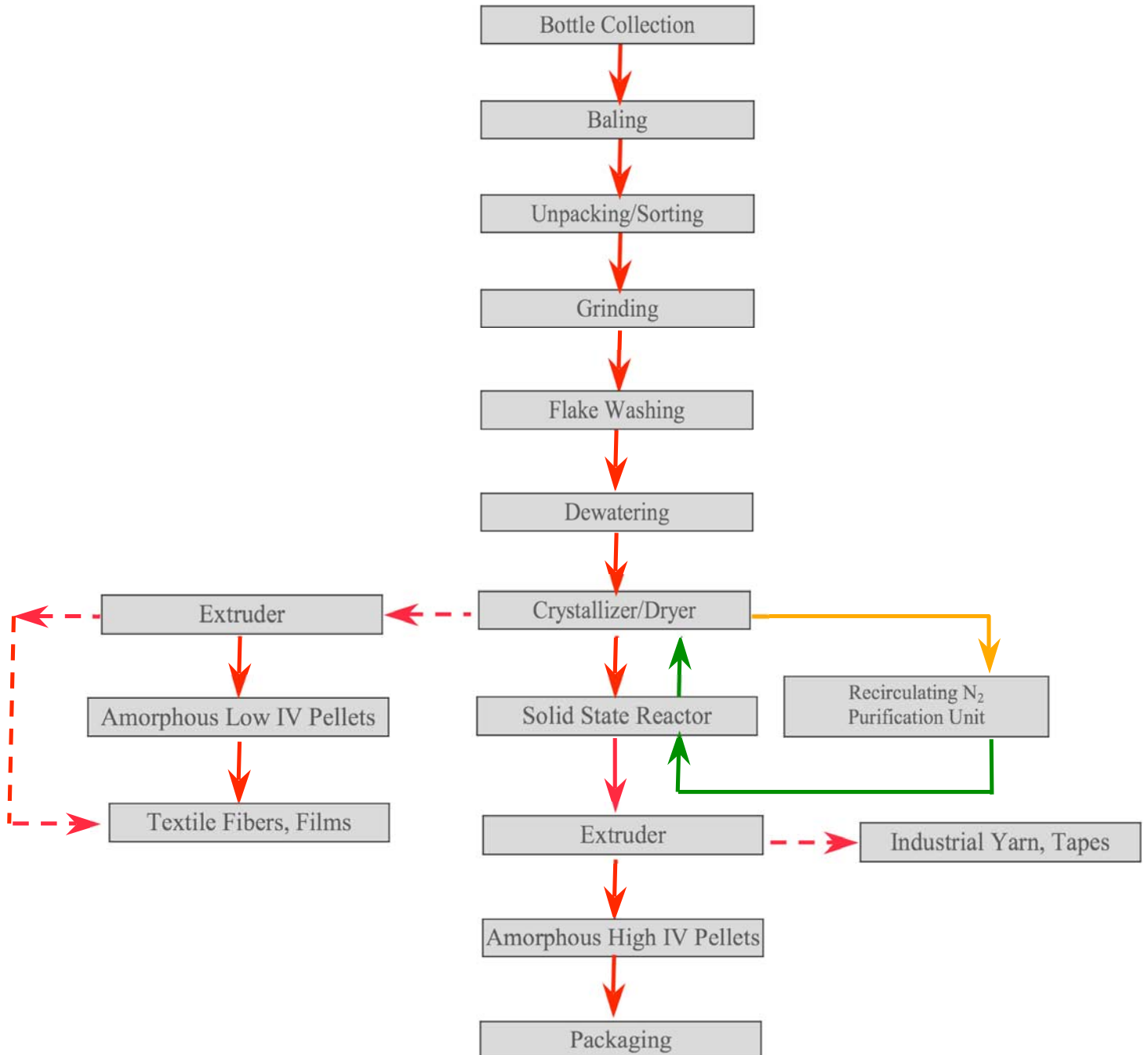


BEPEX RECYCLED PET TECHNOLOGY



BEPEX RPET TECHNOLOGY

The process steps for the manufacture of contaminant free Recycled PET (RPET) pellets and finished articles are as follows:

Bottle Collection

Empty post-consumer bottles are collected at curb-side or at bottle redemption centers operated by local governments or private companies.

Baling

The bulky collection of bottles is compressed into compact bales for shipment to recyclers.

Unpacking and Bottle Sorting

The baled PET bottles are unpacked and fed to the bottle sorting section. Metal cans, PVC bottles, colored PET bottles, and glass bottles are sorted manually or with special sorting machines.

Grinding to Flakes and Label Separation

Colorless PET bottles are sent to the size reduction section and ground to 8-10mm flakes. Labels attached to the bottles are also ground to flakes in this stage. Ground labels are removed through a pneumatic separator before washing.

Flake Washing

In this section the PET flakes are washed in hot dilute alkaline water. The surface layer is hydrolyzed and removed in the wash along with volatile and non-volatile contaminants on the surfaces.

Gravity Separation and Flake Drying

Polyolefins from caps and labels are separated by flotation followed by rinsing the PET flakes with fresh water and spin dried to remove surface moisture. The flakes may be packaged in gaylords and sold to end users such as textile fiber and film manufacturers or supplied to further processing in-house.

BEPEX RPET TECHNOLOGY

Crystallizing and Drying

Prior to extrusion or solid state polymerization, the flakes need to be heated and conditioned in order to increase its crystallinity and reduce its moisture content to acceptable levels. Bepex, a leader in thermal processing equipment and process technology, has developed specific equipment and processes for handling the flakes which tend to have a low bulk density and poor material handling characteristics.

Extrusion

The crystallized and dried hot flakes may be supplied to a vented extruder for either producing pellets or finished articles such as fiber, film or molded articles. As an alternative, the hot flakes can be further heated and conditioned to increase its molecular weight.

Solid State Polymerization

The hot flakes are transferred to a solid state polymerization (SSP) reactor. Through the SSP reactor, the molecular weight (Mw) of PET is raised to the required level to enhance moldability and mechanical properties. When the products are used for beverage bottles, it is necessary increase the MW to same level as that of the virgin bottle grade PET for good bottle clarity. Simultaneously, the remaining volatile chemicals in the flakes migrate to the surface by diffusion. A counter current stream of hot nitrogen washes away the volatile organic chemicals from the flake surface.

The large relative surface area of PET offers an added advantage since both polymerization and decontamination are diffusion dependent processes. Bepex, as a leading technology and equipment provider for SSP, has developed the “Flake SSP” technology to realize this advantage. This technology has a lower installation and operating cost relative to the “Pellet SSP” technology.

BEPEX RPET TECHNOLOGY

Extrusion

Extruders capable of handling flakes directly are now available such that the hot flakes from the SSP reactor can be melted and formed into pellets or other molded or extruded articles. These extruders have a vent zone through which remaining volatile contaminants are removed by intensive surface renewal under vacuum.

The degassed melt polymer is passed through a filtration media to remove any remaining solid particles prior quenching.

Through the above-mentioned steps the contaminant free RPET pellets are manufactured.

BEPEX RPET TECHNOLOGY

Utility Consumption for the RPET Process

No.	Utility	Remarks	Utility Consumption
1	Electricity	Bottle to Clear Flake	354 kWh/t-bottle
	Electricity	Waste water treatment	30 kWh/t-bottle
	Electricity	Pelletizing	480 kWh/t-bottle
	Electricity	SSP	248 kWh/t-bottle
2	Process Water	Bottle to Clear Flake	2.1 m3/t-bottle
	Process Water	Pelletizing	2.0 m3/t-bottle
	Process Water	SSP	0.8 m3/t-bottle
3	Fuel (Grade A Fuel oil)	Bottle Clear Flake Pelletizing	20.0 kg/t-bottle
	Fuel (Grade A Fuel oil)	SSP	17.8 kg/t-bottle
4	NaOH (solid)		4.0 kg/t-bottle
5	H2SO4(98% conc.)		5.0 kg/t-bottle
6	N2 (99.99%)		48.0 m3/t-bottle