

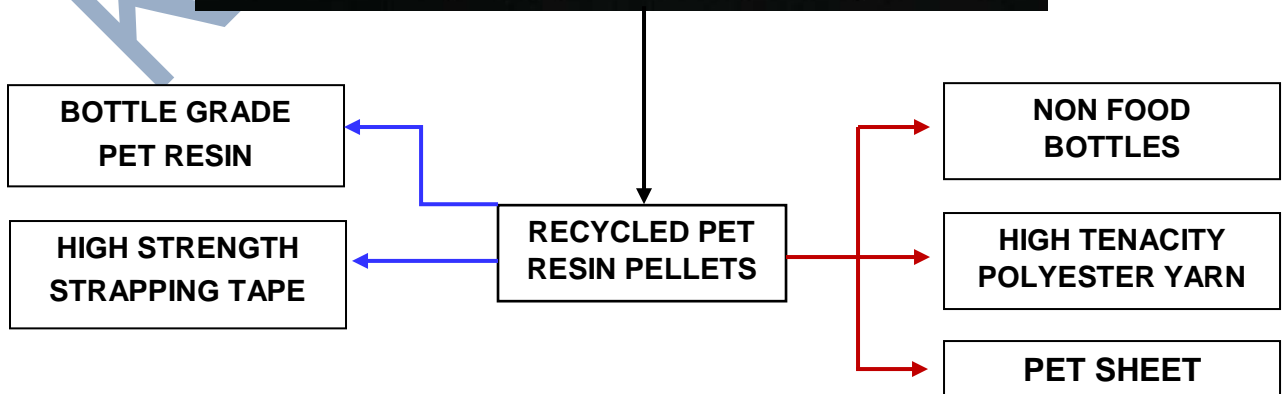
HIGH GRADE RECYCLED PET RESIN CHIPS



WASTE PET BOTTLES



CLEAN PET FLAKES



Production of High Grade PET Chips

- Input Material: Post consumer PET bottles
- Production of high purity hot washed PET flakes
- Drying to remove moisture and feeding
- Extrusion of pellets / chips
- Thermal crystallization
- Solid State Polycondensation (SSP) under vacuum or N₂
- Or (Liquid State Polycondensation in the melt phase)
- Packing in jumbo bags for despatch

When post consumer PET bottles flakes are recycled (extruded) the polymer resin undergoes degradation leading to undesirable drop in mechanical & chemical properties. Without further processing the PET flakes have low IV (e.g. 0.60 to 0.64) and cannot be used for high grade application except fiber and filament yarn.

SSP process increases the intrinsic viscosity of the polymer and along with other measures such a vacuum degassing & melt filtration (during extrusion) removes aldehydes, VOCs & solid impurities improving the mechanical & chemical properties of the polymer for higher value added applications.

INDUSTRY / APPLICATION

Desired I.V.

dL/g

Virgin PET from resin producers	0.76 – 0.88
Filled bottles by marketers	0.76 – 0.88
Sheets	0.76 – 0.84
Straps	0.84 – 0.92
Monofilaments	0.66 – 0.76
Master batch	0.76 – 0.84
Injection moulded articles	0.80 – 0.84
Industrial Yarns (Tire Cord / Conveyor Belt / Sewing Thread)	0.92 – 1.00
Polyester Staple Fiber	0.60 – 0.64
Polyester Oriented Yarn	0.60 – 0.64
Non Woven fabric	0.60 – 0.64
Fully Drawn Yarn	0.60 – 0.64

Re-cycling of Post Consumer PET Bottles

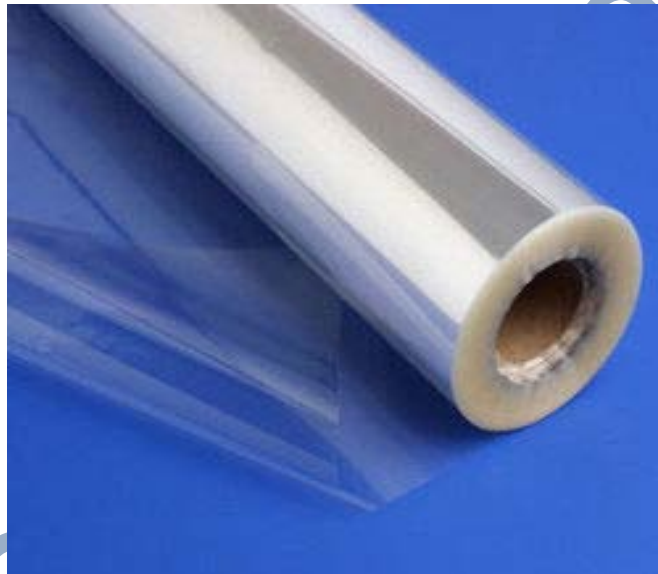
PET is one of the few thermoplastics that can be Up-Cycled and not only Re-cycled. However, there are certain impediments when PET polymer is recycled. The PET resin is highly hydrophilic i.e. readily absorbs moisture from the surrounding air. When post consumer PET bottle flakes are recycled (extruded) the polymer resin undergoes Thermal, Oxidative & Hydrolytic Degradation leading to undesirable drop in mechanical & chemical properties such as

- The Intrinsic Viscosity (IV) of the PET polymer decreases leading to a drop in physical - mechanical properties
- Generates impurities like Aldehydes and other VOCs due to which it cannot be used further for food contact applications
- Leads to Dis-colouration or yellowing of the resin
- Formation of agglomerates & lumps
- The post consumer PET bottle flakes contain foreign matter & impurities that needs to be filtered out.

What is the way out? There are various methods & technologies available. Some of them are used together in conjunction to do the job as per end requirement.

- 1) Pre-drying of PET bottle flakes to reduce moisture content
- 2) Vacuum De-gassing to remove moisture and VOCs during extrusion
- 3) Melt Filtration through Screens to remove agglomerates and solid contaminants
- 4) Adding chemicals called Chain Extenders to increase polymer IV
- 5) Liquid State Polycondensation (LSP) process utilizes the inherent capability of the PET polymer to condensate in the molten phase under vacuum that leads to an increase of IV. The high performance vacuum effectively decontaminates the material from harmful chemicals enabling it to be used for food contact applications.
- 6) Solid State Polycondensation (SSP) at elevated temperature and under vacuum of the recycled PET pellets to increase IV followed by thermal crystallization.









We are a leading Project & Technical Consultancy organization in the field of plastics and rubber recycling and have more than 20 years expertise in the field. We can prepare Techno Economic Project Report enabling you understand all aspects of the project and take an informed business decision, for Bank Finance and Govt. statutory approvals. We can provide project consultancy services like Selection and Sourcing of plant & machinery, Plant layout design, Processing & Compounding know-how, Installation & Commissioning, Trial running of the plant, Quality Control & Testing system, Market intelligence etc.

Regards,

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