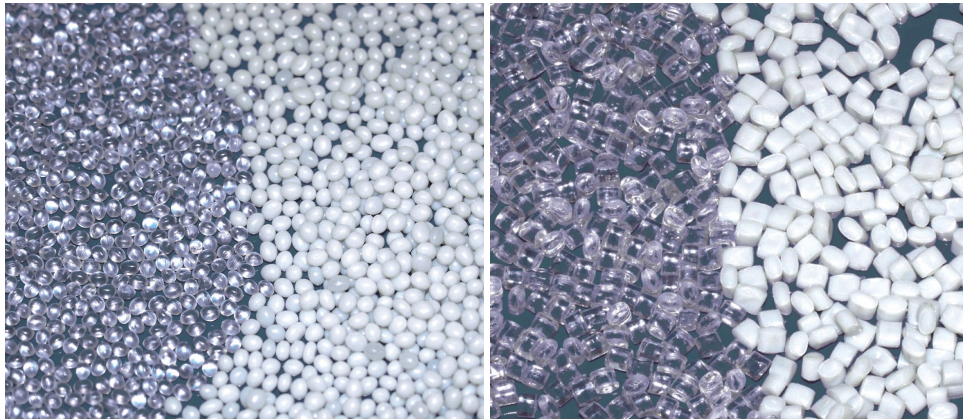


PET direct crystallization – Energy savings in a reliable process

Combi-Crystal-PET® (CC-PET®)

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CC-PET® combines pelletizing, drying and crystallization in a common process. Downstream treatment of the pellets, usually in a Solid State Polymerisation (SSP), is simplified very much. The semi-crystalline end product cannot stick any more upon post-processing. CC-PET® can be applied in the virgin polymer production and in recycling applications, both with stranding or underwater die face pelletizing lines, with production capacities ranging from 750 kg/h up to 15,000 kg/h. Optionally, the output of one reactor can be diverted to several pelletizing lines and then again concentrated to one single crystallizer.

FUNCTION OF THE CC-PET® SYSTEM

The PET melt is discharged from the reactor or the extruder by a melt pump **1**.

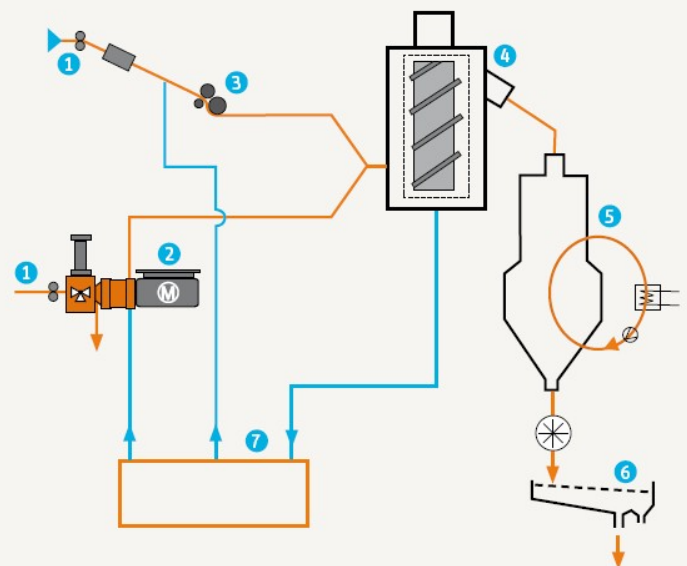
The material is processed by an underwater pelletizer SPHERO® **2** or by an underwater strand pelletizer USG **3**.

The hot process water rapidly transports the pellets to the dryer **4**, where the water is separated from the plastic pellets.

The crystallizer **5** processes the PET pellets utilizing the residual heat, as well as additional heating as required.

After crystallizing, the pellets are suitable for any kind of post-processing **6**.

The process water is tempered, filtered and returned to the points of use in a closed duct **7**.



From Melt to Crystalline PET Pellets

Immediately after conventional processing PET pellets are amorphous. Such amorphous pellets become sticky upon heating at temperatures above 70 °C and thus are not suitable for sub-sequent processing like:

- Post-condensation in the SSP – the pellets must be processed for several hours at approx. 210 °C.
- Drying prior to downstream processing – due to its hygroscopic properties PET must be subjected up to 6 hours intensively to hot air at 160 – 180 °C.

Therefore, the PET pellets must first be crystallized, since only this status is not sticky. For crystallizing, the pellets must be heated for a limited period of time to a temperature of approx. 130 - 180 °C. In order to avoid agglutination during the crystallizing operation, the pellets must be kept moving, e.g. by vibration, stirring or fluidizing.

The crystallization process is exothermic – the reaction heat in combination with residual heat can often satisfy the energy needs of the process. At this point, CC-PET® helps to preserve as much as possible internal heat from upstream processing steps in the pellets.

ΔQ crystallizer for virgin polymers



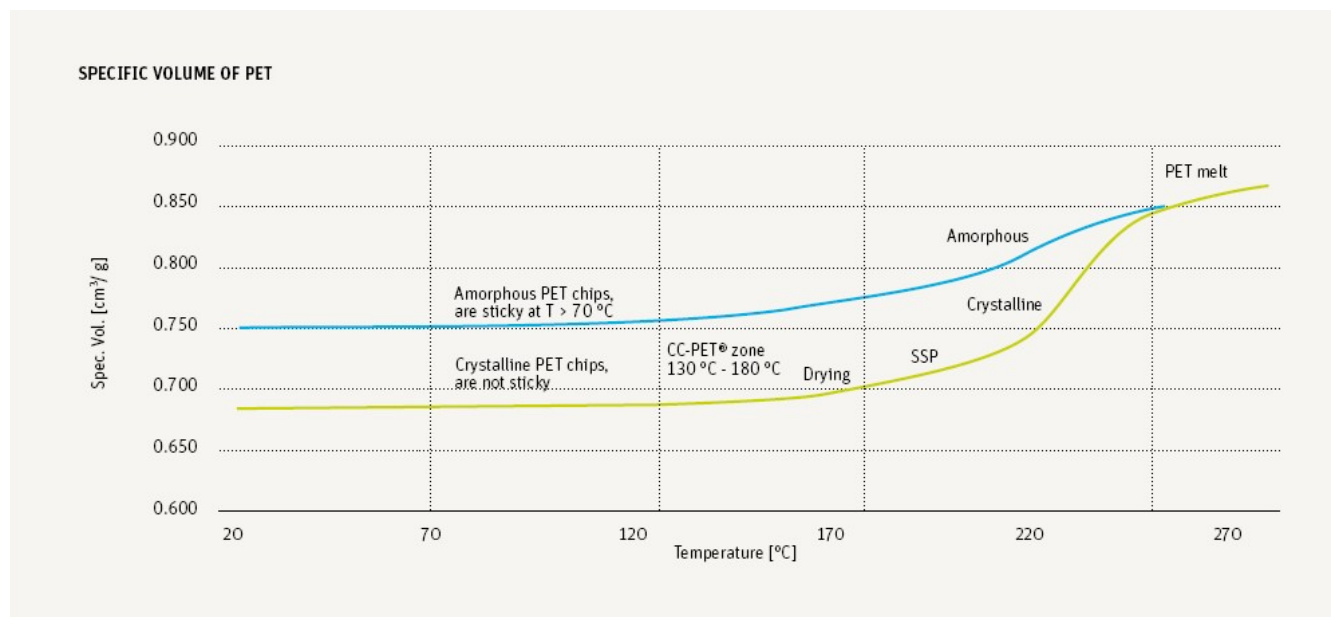
Crystallization conveyor for recycling applications



CC-PET® integrates the crystallization of PET directly into the pelletizing operation, using either SPHERO® for underwater pelletizing or USG for underwater strand pelletizing. The end product does not stick in subsequent downstream processing operations. This results in:

- reduced energy consumption,
- lower investment costs and
- increased operating profitability.

Furthermore, CC-PET[®] provides for controlled nucleation, as well as the supply of additional heating as required, for a wide range of raw material types. This ensures constant crystallization conditions which are not sensitive to fluctuations in material properties, guaranteeing highly uniform product quality.



PET status zones

Benefits with CC-PET[®]

- Reduced investment costs compared to conventional PET processing
- Lower production costs due to high energy savings; additional heating often required only upon production start-up
- Spherical or cylindrical, nearly dust-free and non-sticky pellets
- High bulk density for downstream processing of the material
- Flexibly adaptable to variable process conditions
- Stable process, independent of material properties; targeted heat supply makes it also independent of residual heat from upstream processes
- Crystallization temperature and dwell time continuously adjustable
- Reliable setting of material properties: acetaldehyde content (AA), pellet temperature, residual moisture

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