CRYSTALADD® NUCLEATING MASTERBATCHES

Nucleation technology has been used with polymers such as polypropylene and nylon for many years, and it is an effective aid in helping the polymers to crystallize faster and more consistently and to improve physical or mechanical properties. While polyethylene resins do not require a nucleator to start crystallization, the addition of CRYSTALADD® advanced nucleation technology can bring about many positive changes such as reduced cycle time, improved clarity, improved barrier performance, color leveling and improved dimensions/reduced warpage. Entec provides CRYSTALADD® advanced nucleation technology products in a masterbatch form for easy handling and use.

CRYSTALADD HM-237 is based on an unfilled LDPE carrier resin and is designed for use in processes requiring high melt strength such as extrusion blow molding, blown film extrusion and sheet extrusion.

CRYSTALADD HM-237B is based on an unfilled LLDPE carrier resin and is designed for use in injection molding, extrusion blow molding, blown film extrusion or sheet extrusion. In blown film CRYSTALADD HM-237B can reduce haze, improve clarity, improve barrier properties and improve machine direction modulus. CRYSTALADD HM-237B is a universal product that works well in polyethylene or polypropylene.

CRYSTALADD HM-237E is based on a highly calcium carbonated filled HDPE resin and is designed for use in opaque injection molding, blow molding and sheet extrusion. CRYSTALADD HM-237E offer the highest nucleation efficiency in polyethylene.

CRYSTALADD HM-664 is based on an unfilled HDPE carrier resin and is specifically designed for use in heavy-gauge industrial injection molding applications. It can reduce warpage and improve stiffness and HDT allowing high density polyethylene to potentially replace polypropylene impact copolymers in applications such as pallets, totes, returnable transport packaging and other dunnage containers. Based on its specific chemistry, CRYSTALADD HM-664 cannot be used in processes other than injection molding.

CRYSTALADD PRODUCT GRADE SLATE

GRADE	CARRIER RESIN	FILLER TYPE	MAJOR USES
HM-237	LDPE	None	Extrusion blow molding, blown film or other processes requiring high melt strength.
HM-237B	LLDPE	None	Standard grade for use in PE or PP injection molding, extrusion blow molding or blown film applications.
HM-237E	HDPE	75% CaCO3	For opaque injection molding or extrusion blow molding applications; highest efficiency of nucleation.
HM-664	HDPE	None	For industrial, heavy-gauge injection molding applications. Best improvement in stiffness and HDT to allow HDPE to compete against PP impact copolymers.

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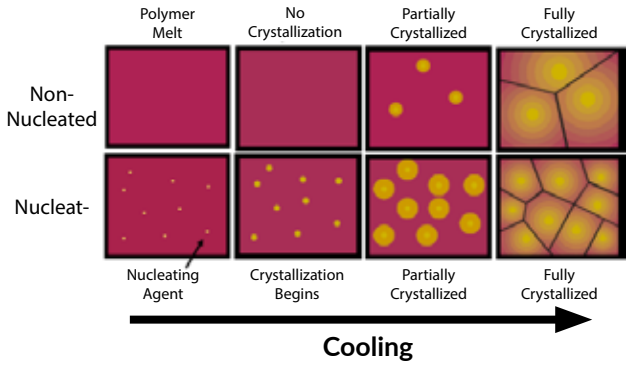
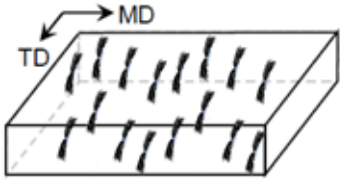
HOW IT WORKS

Polymers being crystallizing around a nucleating agent. CRYSTALADD provides for more points of nucleation which allows a PE resin to crystallize faster and with smaller crystals. In film, the smaller crystal size reduces surface haze, provides for better barrier properties (reduced oxygen, water and solvent permeation) and more consistency. In injection molding, blow molding and extrusion, CRYSTALADD can provide faster cycle times, more uniform shrinkage, improved environmental stress crack resistance and color leveling.

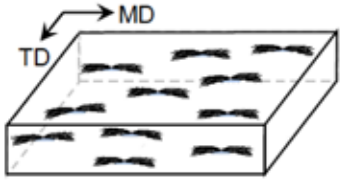


CRYSTALADD HM-237, HM-237B and HM-237E stimulates crystalline growth of PE in the transverse direction which reduces warpage by causing the transverse and machine direction shrinkage to be more similar. In CRYSTALADD HM-664 the CRYSTALADD stimulates the crystalline growth of PE to occur in the machine direction which increases stiffness and HDT properties allowing HDPE to replace some PP impact copolymers.

Crystal Growth in:
CRYSTALLADD HM-237 Series



Crystal Growth in:
CRYSTALLADD HM-664



POTENTIAL APPLICATIONS

CAPS & CLOSURES

FILM EXTRUSION

BLOW MOLDED

HEAVY GAUGE