

Polyethylene Blown Film Troubleshooting

This troubleshooting guide suggests ways of overcoming common film production problems. It is not meant to be all-inclusive and your ExxonMobil Chemical technical representative should be contacted for additional assistance.

Identified Problem

Possible solution

Melt Fracture

- Widen die gap
- Increase melt temperature
- Increase temperature of last two extrusion zones
- Increase temperature of die lips
(do not go above 500 °F (260 °C) in systems with process aid)
- Insulate air ring from die & surroundings
- Add / increase process aid (be aware of regulatory limits)
- Use a higher melt index (MI) resin
- Use a higher melt flow ratio (MFR) resin
- Reduce output rate
- Add 5-10% LDPE

Bubble Instability

- Reduce melt temperature
- Use chilled air
- Use a lower MI resin (A higher MI resin may at times reduce melt temperature sufficiently to improve bubble stability)
- Add 5-10% LDPE to linear PEs (preferably frac melt or autoclave)
- Lower output rate
- Narrow die gap
- Install / use stabilizing frame
- Check for even air flow to / through air ring
- Upgrade air ring (dual lip, collars)
- Check for outside air drafts (AC, doors, etc)
- Adjust blow-up ratio (BUR)
- Reduce die diameter
- Use properly designed extrusion screw

Excessive Amps or Melt Pressure

- Increase extruder temperature settings; check zone heater operation
- Widen die gap
- Use coarser screen pack
- Use larger diameter die
- Use a higher MI resin
- Lower output rate
- Regear motor for higher power at lower screw RPM



TROUBLE shooting

Identified Problem	Possible solution
Excessively High Melt Temperature	<ul style="list-style-type: none"> • Use a higher MI resin • Check extruder cooling systems • Lower RPM • Widen die gap • Check extruder output vs. screw RPM • Use properly designed extrusion screw
Surging or Variable Output	<ul style="list-style-type: none"> • Check for uneven feeding due to hopper bridging or blockage • Check for uneven feeding of reclaim • Check for pellet cut uniformity • Check for mix uniformity of resin(s) and masterbatch(es) • Check extrusion temperature profile • Adjust temperature of 1st zone; add cooling water to 1st zone or extruder throat
Thickness Variation	<ul style="list-style-type: none"> • Clean air ring • Check air ring alignment • Clean die / die gap • Check die gap alignment • Check for even air flow to / through air ring • Check alignment of tower, nip rolls (vis-à-vis die) • Lower frost line and keep it level • Use IR gauge to check melt temperature uniformity around bubble • Use oscillation to minimize appearance of problem (although this doesn't solve the problem)
Inadequate Drawdown	<ul style="list-style-type: none"> • Increase melt temperature • Increase frost line height • Narrow die gap • Check for gels, contamination in film • Use a higher MI resin • Add 10-20% LLDPE to LDPE films
Poor Optical Properties	<ul style="list-style-type: none"> • Use refrigerated (or cooler) air • Increase melt temperature • Reduce antiblock usage or change type to silica • Add 5-10% LDPE to linear PEs
Gels - Unmelts	<ul style="list-style-type: none"> • Adjust extrusion temperatures • Check for resin contamination by different polymer • Check for extruder cold spots • Replace screen pack • Change to a finer screen pack
Gels - Resin Degradation	<ul style="list-style-type: none"> • Check for hot melt temperature or extruder hot spots • Remove / reduce reclaim • Increase AO in resin • Clean die and/or screw of buildup • Change production rate (may need to go faster or slower based on exact conditions)

Identified Problem	Possible solution
Clear Bubbles in Film	<ul style="list-style-type: none"> • Dry resin before use • Inspect resin for variable pellet size • Inspect resin for pellet surface melt fracture • Change LL / LD blend ratio • Reverse temperature profile of extruder • Increase mixing (lower temperature, higher pressure, finer screen pack) • Add processing aid
Low Impact Strength / Splittiness	<ul style="list-style-type: none"> • Check film for die lines, gels, contamination • Increase BUR • Narrow die gap • Increase frost line height • Use LLDPE or mPE based masterbatch(es) • Remove / reduce LDPE in linear rich systems • Avoid LL / LD blends in 30/70 to 70/30 range
Film Discoloration	<ul style="list-style-type: none"> • Remove all NO_x sources from production, storage areas (e.g. gas powered forklifts, heaters) • Reduce extrusion melt temperature • Add phosphite type antioxidant <p><i>See also Tip from Technology - Discoloration</i></p>
Blocking	<ul style="list-style-type: none"> • Increase bubble cooling • Decrease melt temperature • Decrease nip-roll pressure • Increase antiblock loading • Decrease extrusion rate • Store finished rolls / bags in cool place • Change base resin (move to lower MI, higher density)
Sealing Problems	<ul style="list-style-type: none"> • Check for overtreatment of area to be sealed • Use a lower density resin • Use a mPE resin in place of a LLDPE • Use a polar comonomer resin (e.g. EVA) • Reduce melt temperature • Reduce slip agent level • Avoid excessive antiblock, filler levels
Skins / Streamers / Angel Hair	<ul style="list-style-type: none"> • Check resin for fines and streamers that arrive with material • Reduce transfer velocity • Reduce transfer line temperature • Use specialty elbows in transfer system • Use shot-peened pipe, especially on horizontal sections • Inspect and wash silos



TROUBLE shooting

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