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Suggested Start-Up and Shut-Down Procedures for Blow Molding Polyethylene Resins

Optimum start-up and shut-down procedures are often found through experimentation. For that reason and because the number of types of blow molding machinery available is large, the recommendations presented here are general in nature. Finding and implementing precise, optimum, blow molding procedures is very important, especially to minimize material degradation during processing. If, during extrusion, polyolefin resins are subjected to very high heat or long residence times, oxidized material can build up on the internal surfaces of the extruder and head tooling. This oxidized material can lead to gels and black specks in the end product – an unacceptable condition. Even the best antioxidant-additive package cannot protect a polyolefin from degradation when it is subjected to abnormal temperature and residence time. Sometimes purging is enough to clear out the degraded material but often all equipment must be dismantled and cleaned – a lengthy and costly process.

▪ SUGGESTED START-UP PROCEDURE

I. Heating the extruder

A. Method #1

1. Turn on power to the die-head heater bands. If applicable, turn on die-head preheaters. Set the die-head heater to 275°F.
2. After the die head temperatures have reached the set points, turn on power to the extruder heaters. Set heater to 275°F.
3. After the extruder temperatures have reached the set points, raise all set points to 325°F.
4. After the die head and extruder temperatures have reached the set point, proceed to Step II.

B. Method #2

1. Turn on power to all extruder- and die-heater bands. If applicable, turn on die-head preheaters. Set all temperatures to 325°F.

tech.topic

2. After the die head and extruder temperatures have reached the set points, allow 30 minutes for machine heat to stabilize.
3. Proceed to step II.

II. After the temperatures have reached the set points:

- A. Turn off the die-head preheaters.
- B. Start the hydraulic system.
- C. Start extruding polymer at minimum screw speed. **CAUTION:** *Head pressure and extruder motor amperage should be watched closely to be sure levels do not exceed manufacturer-recommended maximums.*
- D. Set temperatures at desired operating levels.

(Continued on Page 2)

tech.topic

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III. After temperatures have once again reached the set points:

- A. Turn on the chiller for mold cooling.
- B. Gradually increase extruder speed to the proper operating level. **CAUTION:** *Head pressure and extruder motor amperage should be watched closely to be sure levels do not exceed manufacturer-recommended maximums.*
- C. Open the valve that supplies pressurized air to the blow molding machine. The air pressure range should be 80 psi -120 psi. Pre-blow air should range from 5 psi - 15 psi.

IV. Set timers and die programmers to the established settings.

V. Start the blow molding machine on its automatic cycle for continuous operation.

▪ SUGGESTED SHUT-DOWN PROCEDURES

I. If the equipment will be down for less than 60 minutes:

- A. Leave the heaters at their operating set points.
- B. Periodically, run the extruder at low speed for a few minutes to reduce the chance of resin degradation.

II. If the equipment will be shut down for more than 60 minutes:

- A. Reduce heater set points to 325°F.
- B. Lower the extruder speed to the minimum. **CAUTION:** *Head pressure and extruder motor amperage should be watched closely to be sure levels do not exceed manufacturer-recommended maximums.*

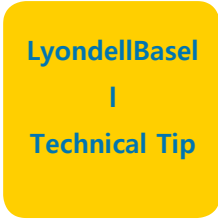
III. When temperatures reach the set points:

- A. Stop the extruder
- B. Lower heater set points to 275°F.

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- C. Cover the face of the die tooling with plastic-coated aluminum foil with the plastic side facing the tooling. Covering the tooling with this material minimizes the amount of oxygen entering the system and thus minimizes polymer degradation. ***CAUTION:*** *The equipment should not be left unattended during this process. An electrical malfunction can cause damage. Electrically energized equipment should be checked periodically. If the equipment must be left unattended, it should be completely shut down.*

(Continued on Page 3)



tech.topic

Suggested Start-Up and Shut-Down Procedures for Blow Molding Polyethylene Resins *(continued)*

Start-up and Shutdown for Blow Molding

SUGGESTED OPERATING CONDITIONS					
SETTING	UNITS	LDPE	LLDPE	HDPE	PP
Temperature Zones					
Rear	°F	310	315	330	370
Transitions	°F	320	325	350	390
Metering	°F	330	330	360	400
Head	°F	330	330	375	410
Molds	°F	60	60	60	60
Air Pressure					
Blow Air	psi	90	90	90	90
Pre-Blow	psi	10	10	10	10



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