

## 7 PIPE AND TUBING EXTRUSION

### PIPE EXTRUSION TROUBLESHOOTING GUIDE

Problem/ Issue	Cause(s)	Potential Solution(s)/ Action(s)
Die (extrudate) lines.	Damage to the exit edges of the tip or die.	Refinish tip or die exit edges to sharp and uniform about the diameters.
	Die drool or build-up on the tip or die faces.	Adjust temperature of the die exit accordingly
Extruder surging	Too fast extruder throughput relative to OEM Extruder specifications	Check OEM guaranteed extruder throughput and run extruder within specifications
	Improper extruder temperature settings	Adjust temperature setting according to OEM recommendations
	Poor resin- extruder design match versus extruder OEM specifications for throughput	Discuss with resin supplier and implement actions to ensure extruder runs within OEM specifications
	Extruder not set as per OEM design specifications	Check with OEM and ensure compliance with design specifications
Gels and other contaminations in pipe	Resin contains foreign particles/ contaminated with gels etc	Check with resin supplier for presence of gels etc. Check regrind for contaminants
	Degraded resin coming off the die during extrusion	Follow proper shut-down procedures for extruder to avoid long exposure of resin to excessive temperatures
Localised thick spots in pipe wall	Improper die setting	Adjust the die setting
	Hot and cold spots in die profile temp	Check for uniformity in die heating
	Uneven pipe drag downstream of the extruder	Check for spots in cooling baths which could cause pipe drag
	Haul-off slippage	Check and adjust haul-off
	Uneven melt delivery from die -extruder surging	Check remedies for extruder surging
Pipe out of round	Sizing device (calibrator) in adequate or out of shape	Check the calibrator for concentricity.
		Ensure it is 3–5% larger than the final pipe diameter
	Pipe is too warm when it reaches the haul off unit	Ensure sufficient downstream cooling length before pipe gets to the haul off unit Decrease throughput
	Wrong vacuum setting in vacuum tanks	Ensure proper vacuum setting in vacuum tanks
Pipe tear	Haul-off too fast	Check and adjust the speed of haul off
	Pipe too hot at the entrance to calibrator	Check for water flows on calibrator and adjust to avoid hot spots
		Ensure adequate calibrator size
Pipe dragging in cooling tanks	Check and eliminate drag spots	
Pipe sag	Melt temperature too high	Adjust extruder temperature setting and throughput to lower melt temperature
	Die gap not adjusted to accommodate sag	Adjust die gap – wider at the top and narrower at the bottom of the die
	Resin's inherent resistance to sag is not adequate for the pipe wall thickness	Use low-sag resin
	No enough cooling capability in line	Ensure adequate water temperature in cooling baths and enough cooling length

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Rough surface inside or outside	Moisture in resin	Ensure minimum of 1.5 hrs drying of resin at 70–90°C
	Not adequate water flows setting to the calibrator	Adjust water flows to calibrator
	Melt temperature too low	Increase die/ and or extruder temperatures
Thermal degradation of pipe-failed OIT	Too high melt temperature	Adjust extruder/ and or die temperatures accordingly
	Excessive extruder screw speed	Lower extruder throughput
	Die too small for required throughput	Ensure adequate die size
	Die pin too hot	Check operation of pin cooling otherwise decrease throughput
	Extruder surging	Check remedies for extruder surging
Uneven pipe cut	The saw blade is flexing	Get thicker/ larger blades
	The saw blade is lose	Check and fix
	Saw arm is entering pipe too quickly and with insufficient revolutions	Adjust as required
	The saw arm is lose or bushes worn and is 'floating'	Check and fix
	There is wear/slack in slip rings of the saw planetary components	Check and fix
	Uneven speed of haul-off or cutting carriage	Check uniformity of the speed of haul-off and cutting carriage
	Saw is not capable of cutting the pipe	Check with OEM for saw specifications
Uneven wall thickness	Uneven melt delivery from the die -extruder surging	Check remedies for extruder surging
	Uneven take-off speed	Check haul-off unit
	Improper alignment of die and haul-off units	Check for alignment
	Die and pin not centred evenly	Even die gap
	Excessive sag of a polymer	Check remedies for pipe sag
Voids in pipe	Moisture in resin	Ensure minimum of 1.5 hrs drying of resin at 70–90°C
	Trapped air	Adjust extruder temperature setting and back pressure accordingly

### Disclaimer

The proposed solutions in this guide are based on conditions that are typically encountered in the manufacture of products from polyethylene. Other variables or constraints may impact the ability of the user to apply these solutions. Qenos also refers the user to the disclaimer at the beginning of this document.