ExxonMobil

Quick processing reference

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This document provides an overview of suggested processing and tooling references for injection molding of Exxtral™ performance polyolefins[a]. Per the MSDS[b], elevated temperatures over 288°C are to be avoided.

Values shown are for reference only and are not be construed as exhaustive or as material specifications.

Processing parameters

Parameter	Typical range	Suggested values[c] / notes
Drying	2 to 6h at 70 to 110°C (desiccant) 3 to 6h at 80 to 110°C (hot air)	lowest values help limit energy consumption & avoid pellet aggregates. pellets exposed to moisture may need higher values to mitigate splay defects on parts
Melt temperature	200°C to 250°C	230°C
Barrel zones		depend on screw design & barrel capacity
Rear	190°C to 230°C	210°C
Middle	200°C to 240°C	220°C
Front & nozzle	210°C to 250°C	230°C
Manifold & drops	± 10°C of melt temperature	230°C
Mold temperature	15°C to 90°C	30°C to 50°C
Screw speed	40 to 100 rpm	depends on screw diameter
Cushion	5 to 15 mm	depends on barrel capacity
Injection speed	medium, 100 to 700 cm^3/s	450 cm^3/s or as fast as part quality allows
Fill time	1 to 10 seconds	fill part 95% to 98% full if conditions allow
Pack/hold time	1 to 20 seconds	profile to complete mold filling, avoid screw bounce back, pack out part & allow gate freeze off
Cooling time	15 to 40 seconds	depends on part & mold design
Cycle time	30 to 90 seconds	application, wall thickness dependent
Pressures (melt)		hydraulic pressures depend on intensification ratio
Injection	350 to 1200 bar	750 bar
Pack / hold	50 to 75% of transfer	pack: 400 to 550 bar / hold: 300 to 450 bar
Back	35 to 150 bar	50 bar, higher for more shear/mixing
Residence time in barrel	1 to 5 mins, continuous molding up to 30 mins, during stoppage	avoid residence time >5 mins when processing with high temperature/shear, regrind or color sensitive applications. optimization to assure melt/part quality depends on machine, mold, part, material and other process conditions

Exxtral performance polyolefins are semi-crystalline materials and moldings may show some tendency for sink marks/shrinkage voids. This can be minimized by using effective part packing, slower injection speeds and/or higher packing pressures. Holding/packing time should be long enough for gate freeze off, yet short enough to prevent parts binding to cores. Similarly, cooling time is minimized for cycle time but long enough for part ejection and complete screw recovery. High flow grades may be processed at lower melt/barrel temperatures, i.e. about 10 to 20°C lower than those shown above.

a Exxtral performance polyolefins are a family of high performance engineered polypropylene compounds mainly used in injection molded automotive applications.
b Material Safety Data Sheet
c Based on ExxonMobil Chemical internal laboratory conditions and experience from customers molding conditions.

Mold and part design considerations

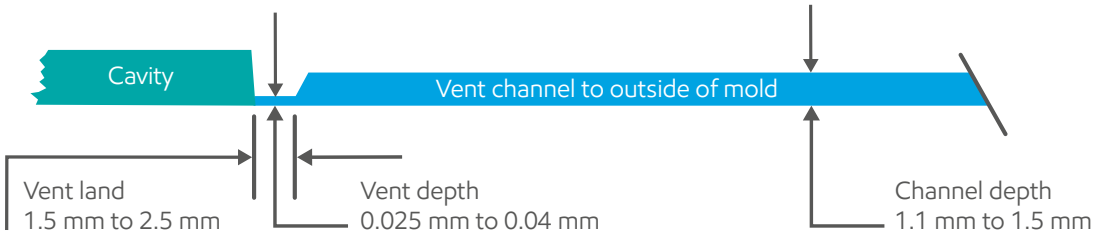
Good temperature control of the cavity and core surfaces is very important as this influences crystallization and cooling of the injected material. Cooling lines/system should be designed and operated accordingly.

Runners and gates should be fully sized to promote easy flow, avoid excessive shear heating of the material and allow a range of filling speeds in process optimization for surface appearance and dimensional control. Gate diameter/thickness should be around 50% to 70% of part wall thickness at the gate. Preferred gate location is at thickest point on a part to promote resin flow from thick to thin sections for optimum mold filling and packing.

Avoid large differences (>=25%) in wall thickness in adjacent regions of a part.

Avoid direct contact with Copper in the mold especially for applications requiring heat ageing performance.

Generous venting is important in molds designed for these grades. Mold filling can cause "dieseling", involving high pressurization of air in the mold, burning of the leading edge of the melt front and higher fill pressures. Dieseling can be reduced/avoided with proper venting of mold cavity periphery, lifters, slides and molded part corners. Vent widths of 10 to 20 mm spaced at 25 to 75 mm are suggested depending on part size (see dimensions below).



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