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Injection Molding Getting Started

This bulletin provides key injection molding conditions that can get you started molding TOTAL Petrochemicals USA, Inc. polypropylene. Its purpose is not to provide the complete and optimum molding conditions for an infinite variety of part shapes and types. Unfortunately, that is really not possible. If you are molding polypropylene for the first time, or if it has been a while since you molded polypropylene, this information should get you up and molding so that you can make the machine adjustments your own observation will indicate are needed.

The following conditions are suggested as a starting point for TOTAL Petrochemicals polypropylene resins:

MATERIAL TEMPERATURE	**440°F**
MOLD TEMPERATURE	**75°F**

A Rear Zone barrel setting of 350°F, a Mid Zone of 400°F, and a Front Zone of 440°F are suggested as the initial profile. If you find that higher material temperatures are required to optimize the processing of the part, **the maximum molding temperature should not exceed 500°F.**

Obviously, molding times and pressures have not been included. These vary so widely from molding job to molding job that TOTAL Petrochemicals cannot make suggestions concerning these parameters. But the following comments apply:

INJECTION TIME	In all cases, you need to inject at least as long as it takes for gate freeze. It may take as little as 2 to 5 seconds for small parts with small gates or as long as 10 seconds or more for larger parts with larger gates.
COOLING TIME	This has to be a beside-the-machine judgment. Thin parts (0.020 to 0.035 inches) may need only 5 seconds or less cooling, but it all cases, the cooling must continue until the part is hard enough to be removed from the mold.
INJECTION PRESSURE	To get started set the injection pressure at about 50% of the available injection pressure of the machine you are using.

The conditions presented above can get you started, but once you are molding, you will no doubt find that adjustments are needed. For example, if you start out with the injection pressure set at 50% of available and parts are short, you will need to add injection pressure. Conversely, if parts display flash, lower pressures are called for. Similarly, most of the starting conditions will need to be modified. To cite another example of what might occur, you might find that you simply cannot fill the cavity for your particular part with a mold temperature of 75°. In that case, the mold temperature will need to be increased. These are just simple examples, but the point is that the final molding conditions, which you find best for the production of your part, may be quite different than these suggested starting conditions.

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Many inquiries are made about mold shrinkage. Since mold shrinkage will depend not only on part thickness, but also on gate size, injection pressure and mold temperature, TOTAL Petrochemicals can only provide a guide to the approximate shrinkage you might expect. For parts under 0.125 inches thick, the shrinkage should be from 0.010 to 0.020 inches per inch. Parts thicker than 0.125 inches will exhibit shrinkage of from 0.015 to 0.025 inches per inch.

Colder molds, larger gates and higher effective cavity pressure all result in lower shrinkage, and conversely, hotter molds, smaller gates and lower effective cavity pressures result in higher shrinkage.

If mold shrinkage needs to be known with high accuracy, TOTAL Petrochemicals strongly suggests that a prototype mold be constructed and used with the desired resins to determine mold shrinkage.

Resin density is a highly important issue for polyethylene, for various grades exhibit markedly different densities, which leads to property differences. The density of TOTAL Petrochemicals polypropylene, at 0.905, does not vary and is not an important issue in the selection of TOTAL PETROCHEMICALS polypropylene grades. In terms of parts produced per pound of resin, the yield, with this comparatively low density, will be among the highest for any plastic.

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