Quick Guide to POKETONE Injection Molding

Drying

POKETONE does not readily absorb moisture and can normally be fed to molding machine without drying. However, if the material has adsorbed moisture due to improper handling or storage, drying may be necessary to prevent gas issues. For oven drying, the POKETONE pellets should be placed in the oven for three to four hours at 80°C(176°F).

Barrel Temperature

POKETONE polymer process well using melt temperature at injection between 240°C(465°F) and 250°C(482°F). A typical barrel temperature profile would range from 230°C(446°F) to 245°C(491°F) given the shear heating during processing.

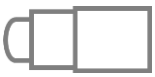
Screw Design

POKETONE polymer can be processed with common types of screw. For optimum result, however, the following screw configuration is recommended.
L/D: 18~22:1
Compression ratio: 2~3:1

Hopper

To avoid premature melting of granules in the feed throat of barrel, the temperature at the hopper should not be set too high, typically 40°C(104°F).

Nozzle



Conventional free flow nozzles are recommended for POKETONE.
Well-controlled heated nozzles as using enough capacity heater and separated thermocouple are strongly recommended to prevent freeze-off issue at nozzle due to small sized nozzle orifice or rapid solidification of POKETONE.
Recommended nozzle orifice size
>Small sized m/c (200T less): min. Ø3.5mm >Mid sized m/c (200~450T): min. Ø4.0mm
>Mid~Large sized m/c (500T over): min. Ø5.0mm >Reinforced grades: +0.5mm

Starting up

In all cases, once POKETONE is introduced into the barrel it should be kept moving to prevent overheating. If a delay of over 15 minutes is anticipated, the machine should be purged every few minutes. Do not allow the cylinder temperature to exceed 260°C(465°F) until drooling is observed.

Shrinkage

The typical mold shrinkage of POKETONE unreinforced resins is between 1.8 and 2.0%, except for the supertough and fiber-containing grades which have a lower shrinkage. In many cases you can switch from POM to PK with few or no adjustments at all to the tool. Mold temperature can help fine-tune part dimentions. Tools designed for PA, PBT or POM are often suitable for PK.

Cooling

Field trials have indicated that significant reductions in overall cycle time can be achieved with POKETONE polymers when compared with other engineering thermoplastics under similar conditions due to their rapid set-up.

Purging

After processing, clean the barrel by low melt-flow resin immediately. High density polyethylene or polypropylene is suitable for purging. The new material should be introduced to the machine only after proper cleaning and adjustment to the appropriate processing conditions.

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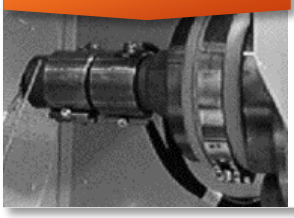
POKETONE Injection Molding Troubleshooting

POKETONE Polymers can be successfully processed on conventional injection molding units. As with all polymers, however, some processes will require modification to achieve fully optimized products. Below are some typical troubles during POKETONE processing without proper equipment and procedures.

Nozzle Freeze Off



Due to the rapid solidification of POKETONE resins, material in the nozzle can freeze off if the nozzle internal diameter is too small, or a nozzle heater band is not long enough to completely cover overall nozzle to the tip.

[Possible Corrective Action]
Thermocouple sensor near the nozzle tip may be more effective in preventing potential freeze-off problems. Nozzle diameters should not be too small in order to prevent premature freezing. Generally, the nozzle diameter should be larger than Ø3.5mm.

Mold Adhesion

Unbalanced filling or deep core pin can cause overpacking and subsequent part sticking. With it low modulus, it could be harder to release POKETONE part than the other hard polymer part. Low mold temperature results in the mold opening before complete cooling. This causes the sticking.

[Possible Corrective Action]
If it is hard to release the molded parts from the cavity, you can appropriately lower mold temperature and increase cooling time. In addition, too high temperature of the fixed mold will also cause sticking sprues or parts. For deep core parts, ensure the mold surface is well polished and the cooling line has no defect.

Black Specks

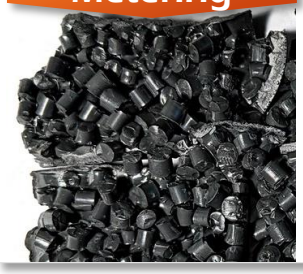
When you see black or brown specks on POKETONE molded part, most often, they are signs that the material has been degraded to a charred state, which usually means the POKETONE polymer has been at temperature for too long.

[Possible Corrective Action]
Clean the barrel by low melt-flow resin immediately. High density polyethylene or polypropylene is suitable for purging.
Set the barrel temperature between 240°C(465°F) and 255°C(491°F) given the shear heating during processing.

Shutdown: Thoroughly and Immediately

One unusual aspect of the rheological behavior of POKETONE is its tendency to exhibit a gradual increase in melt viscosity with increasing residence time in the melt as aldol condensation proceeds slowly at melt temperatures leading to molecular weight advancement, long-chain branching, and eventually to crosslinking. The machine should be purged thoroughly and immediately after POKETONE injection molding which cuts the time required for subsequent start-up and reduces risk of contamination. There is a risk of crosslinking caused by excessive barrel temperature as well as long residence time. Crosslinking is visible through black specks. In this case, purge immediately with polyolefins.

Unstable Metering



Due to the excessive temperatures, POKETONE pellets travelling down feed throat could melt and clump up. This can partially block the flow of resin into the screw and barrel and essentially run the machine out of material, while also blocking much of the flow of gas out of the machine.

[Possible Corrective Action]
Sufficient feed throat cooling must be provided to prevent bridging. Otherwise, a low temperature set point should be used at the feed throat. Colder is not always better. Too low feed throat set point can result in additional cycling of the rear barrel zones as well as the possibility of condensation introducing water into the material as it feeds into the screw.