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Foam Concentrates

RTP Company's foam concentrates reduce part weight by up to 20% for density-critical applications such as fuel floats and energy-saving transportation equipment. Foam concentrates also eliminate sink marks on injection molded parts. Sink marks are shallow depressions on a part surface and are the result excessive shrinkage in thicker areas of the part. They can be eliminated by adding a small amount of foam concentrate which, instead of foaming and reducing weight, create just enough internal pressure within the molded part to offset excessive shrinkage and minimize the sink.

Foam concentrates are available for most thermoplastics. Choosing the type of concentrate is important; it should activate and foam at a temperature slightly below the normal process temperature of the host polymer. The concentrate should also be compatible with the host polymer to avert blistering and delamination during molding. RTP Company has developed specific concentrates that have excellent activation and compatibility with the intended polymer system.

RTP Company's foam concentrates include:

<u>Concentrate</u>	<u>Activation Temperature</u>	<u>Recommended Polymer Use</u>
FCX 27301	300-350 F	Polypropylene, Polyethylene, Acetal, Nylon 11 & 12
FCX 27310	460-485 F	Nylon 6, 6/6, 6/10, 6/12, PBT, PET, PTT
FCX 27312	460-485 F	Polycarbonate and Polycarbonate Alloys
FCX 27314	300-350 F	Polystyrene, HIPS, SAN, ABS

Recommendations for use:

<u>Use</u>	<u>Let Down Ratio</u>	<u>Percent</u>
Sink Control	200:1	0.5%
Foaming Starting Point	50:1	2.0%
Foaming Maximum	20:1	5.0%

Foam Molding with FCX Foam Concentrates

- Maximum foaming of a material should never exceed a 20% density reduction; 10-15% reductions are preferred. The recommended level of blowing agent is 2-5% FCX.
- For a foamed part, a clamp requirement of approximately one ton/in² (14 N/mm²) is adequate.
- Wall thickness for a foamed part should normally be 0.250" (6 mm) thick with an absolute minimum of 0.187" (5 mm).
- The surface of a foamed part typically contains many swirls and flow lines compared to standard injection molding.
- Injection speeds should be set as fast as possible so material entering the cavity is hot; running a hotter mold assists in the process. This way, the blowing agent expands and fills the cavity before solidification occurs. Such temperatures, plus internal pressure from the blowing agent, mean the part must cool long enough to form a rigid skin that is thick enough to resist deformation upon demolding. We recommend closed mold times of 2 to 3 times longer than standard molding.
- Use low holding pressure and zero cushion.
- A foamed part is generally more stress free and, therefore, less likely to distort or warp.
- Shut-off nozzle is required.

Sink Control Molding with FCX Foam Concentrates

- Molding conditions and requirements are identical to normal injection molding parameters.
- Shut-off nozzle is required.
- To eliminate sinks, we recommend using 0.5% FCX.
- Press requirement is approximately 4 tons/in.² (55 N/mm²).
- Use low holding pressure and minimum cushion.

Mold Recommendations

- Gate placement should be in a thin area.
- Runner size should be 0.375" x 0.250" (10 mm x 6 mm) trapezoidal to allow as much flow as possible.

Troubleshooting

Troubleshooting procedures for foamable resins are much the same as for other thermoplastics. The following table is presented as a quick reference guide. Only one solution to a given problem should be tried at any one time; never attempt to combine possible remedies.

	STOCK TEMPERATURE	MOLD TEMPERATURE	INJECTION CLAMP PRESSURE	MOISTURE	GATE SIZE	BACK PRESSURE	SCREW PRESSURE	CONTAMINATION	FILL RATE / SPEED	COOLING TIME	SHOT SIZE	BLOWING AGENT	VENTING	REGRIND
Key														
▲ Increase to Improve														
▼ Decrease to Improve														
HEAVY PART	▲	▲	▲									▼		▲
POST BLOW	▼	▼									▲			▼
ELEPHANT SKIN	▲	▲					▲					▲	▲	
SHORT SHOT	▲	▲	▲				▲					▲		▲
FLASH	▼	▼				▲	▼					▼	▼	
WARPAGE	▼	▼					▼				▲	▲		
SINKS	▲	▼	▲				▲				▲	▼	▲	▲
VOIDS	▼	▲	▲				▲	▲			▼	▼		▲
SLOWING SPEED	▲											▲		▲
POOR SURFACE	▲	▲	▲									▲	▲	▲
BRITTLENESS	▼					▼	▼	▼	▼					▲
BROWN STREAKS	▼		▲			▼		▼	▼	▼		▼		
CHARRED AREAS							▼			▼		▼		
PART STICKING	▼	▼					▼				▼	▼		▲
POOR WELD LINES	▲	▲	▲			▼	▲			▼		▲		▲
DELAMINATION	▼	▲	▲									▼		

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