



Safoam[™]
CHEMICAL FOAMING AGENTS

Customer Manual for Using Safoam in Extrusion Applications

Foam Extrusion Using Reedy Safoam

Reedy manufactures several grades of chemical foaming agents (CFAs). The right CFA grade should accommodate the process conditions especially as it relates to activation temperature and cell size.

Void content is the amount of gas bubbles in the foamed polymer. It is a measure of the amount of polymer replaced by the foaming process. Depending on the process, void content can be as high as 60%, although less than 40% void content is common. In lbs./cu. ft the minimum achievable density is about 221lbs/cu. ft. (.365g/cc) for a low-density polyethylene with a density of 571lbs.cu.ft (.918g/cc).

Depending on the desired amount of foam, the dosage level for Safoam is approximately 0.5% - 3%.

Extrusion Equipment Recommendations

1. An L:D ratio of 30:1 or longer: It is ideal to have a long screw so that changes. Especially temperature, are gradual. A shorter extruder can be used but will be more sensitive to changes in the extrusion profile.

2. One Stage Screw: A one stage screw is best at minimizing pressure drops. Two stage screws have a decompression section at the end of the first stage which causes the foam to start expanding at the decompression section. The expanded foam will then collapse, with broken cells, as it makes its way into the second stage. The outcome is a rough surface large cells and voids.

Note: A two-stage screw may be used if melt temperatures in the first stage stay below the activation temperature of the CFA. Use the second stage to increase heat and induce activation of the CFA.

3. Mixing Section or Static Mixer: Thermal homogenization is one of the keys for making consistent foam. If temperatures across a processed part varies, the foam density will vary. Hot spots will cause collapse or large cells, and cooler areas will have smaller cells.

Adding mixing elements (for dispersive or distributive mixing) ensures consistent heating throughout the polymer matrix. The only exception is a barrier screw which is not recommended due to the pressure drop it creates.

4. Die With a Short Land Length: A land length ratio of 8:1 is preferred but not critical. A pressure drop occurs at the land and a long land length may cause pre-foaming and unacceptable foam. One can use an existing die and observe the results. Lowering the die temp is a way to increase the pressure at the landing.

5. Reliable Feeder: The amount of CFA being used is critical and one should ensure that it is fed consistently (*VERY IMPORTANT*). Gravimetric feeders are the best option, but volumetric feeders can be used if calibrated. Ribbon blenders and drum tumblers can be used as a last option.

6. Use a screen: at the breaker plate, no finer than a 60 mesh to minimize the pressure drop between the breaker plate and adaptor or die.

Extrusion Process Recommendations

Feed Hopper: Resin pellets and Reedy Safoam CFA can be mixed by means of a blender, then add to the hopper or the Safoam can be fed via a gravimetric or volumetric feeder. Calibrating the gravimetric or volumetric feeder and determining the feed rate is important as the Safoam generally has a higher bulk density than resin.

Screw RPM: RPM should be set at 30 or more. Too slow RPM can cause pre-activation in the feed or transition zones.

Temperature Settings

Feed Zone: Set below the activation temperature but high enough to form a melt plug.

Transition Zone: Set it at 10°C to 15°C above the activation temperature. If the CFA is not activating, raise temperatures about 2-3°C at a time.

Metering Zone: Set it cooler than the transition zone by about 5°C or similar to or slightly lower than the feed zone.

Die: Set this below or close to the activation temperature to build pressure and to produce a smooth sheet.

Extrudate: Since foam expansion occurs after exit from the die, look to adjust to accommodate the increase in volume. This usually involves increasing line speed and adjusting the roll gap as well as die gap due to increase thickness when foam occurs. Try to keep pressures in the extrusion process above 1,400 PSI so that the foaming gas stays in solution. This will help to prevent pre-foaming in the extruder. For best foam quality, foam expansion should occur after exiting the die.

For help with your specific application, please contact us at
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