

Profile extrusion of TempRite® CPVC compounds is similar to extruding rigid vinyl compounds. TempRite® compounds process readily if the proper equipment, streamlined tooling and recommended running conditions are used. TempRite® pellet compounds can be extruded on both single screw and twin screw extruders. This guide was developed to assist processors achieve successful extrusion of TempRite® compounds.

#### EQUIPMENT REQUIREMENTS

Screw Design: A variety of screw designs can be used.

- A typical PVC metering screw is usually satisfactory.
- **Plate** the screw with a polished, hard chrome finish without pinholes.
- Suggested screw dimensions are as follows:

Screw	L/D	Feed	Transition	Metering
2 ½" (60mm)	24:1	5@ 0.500-0.525"	10-12	6-8@0.200-0.210"
3 ½" (90mm)	24:1	5@ 0.625-0.650"	10-12	6-8 @0.250-0.260"

Screw Tip:

- Blunt screw tips can be used, but for maximum run life, use a tip that extends into the adapter to minimize melt inventory and avoid stagnation.
- Shape the tip to allow the melt to flow smoothly into the die for a long run life.
- The screw tip should be removable for processing flexibility.

Screw Cooling: Screw cooling is not recommended.

Screen Packs / Breaker Plates:

- Do not use screen packs with CPVC
- **Do not use** breaker plates as they provide areas for material to hang up and stagnate.
- A "dummy" breaker plate or spacer ring made from 420 or 450 stainless steel is required.

Temperature Control:

- Use solid state, dual mode controllers with 3 to 5 zones on the barrel and single mode controllers for the adapter and die.
- Rheostat controllers are not recommended for die temperature control since they do not provide precise control.

Ventilation: An air extraction vent above the die where the hot melt exits is recommended to remove any potential fumes.

#### DIE DESIGN

The same good practices used in building a die for rigid vinyl should be followed. **Flat plate dies are suited only for prototype development.**

Materials of Construction:

- **Use 420 or 450 stainless steel** for a durable, corrosion resistant surface to which the melt will not stick.
- Teflon® filled anodized aluminum and chrome plated steel dies can also be used, with note that these surfaces are susceptible to scarring from mishandling.
- Avoid unplated carbon steel or high copper content stainless such as 17-4 pH. Both of these materials promote sticking and degradation.

Internal Volume: Minimize internal die, adapter volume, and shape to promote flow and reduce residence time.

Streamlining:

- **Streamlined approaches to the die lands are necessary.**
- Avoid sharp angles, corners, blunt obstructions, and abrupt changes in melt flow direction.

Land Length:

- **The land length of the die should be at least ten times the opening thickness of the die.**

- A long land length to die opening ratio leads to easier die balancing and a better, high gloss profile.
- Allow extra land length when cutting a new die to provide some room for adjustment.
- When adjusting the die, remove metal from the back of the die to maintain streamlining.

Die Swell: The die swell of TempRite® CPVC is the same as or slightly less than rigid vinyl.

Die Balancing: Balance the die at the intended production output rate – a die balance at cold, slow rates may not run parts to the same dimensions as when running in production at higher rates and stock temperatures.

Use of Dies Designed for Other Materials: Use dies designed for rigid vinyl for prototypes, noting that slight modifications may be required to meet exact product dimensions.

Coextrusion: TempRite® CPVC profiles can be coextruded and tri-extruded at production rates with various polymer systems such as 0.003" to 0.005" rigid vinyl capstocks, flexible vinyls, EPDM/SAN and ASA/PVC blends. See design guide for material and product design recommendations.

## OPERATING PROCEDURES

MSDS are available for all TempRite® products. All employees should have access to them.

**Start Up:** These initial operating condition suggestions should be optimized for the particular job and machine.

- **Material must be dried** for 2 to 4 hours at 180-190°F before melt processing. Use dual tower, regenerative microsieve dryers with a dew point monitor.
- Begin extruding with an open face (die and adapter removed).
- Start-up conditions for Single Screw Extruders:

	Start-up	2 ½" screw	3 ½" screw
Barrel: All Zones (°F)	340	320-340	320-340
Die: Zone 1 (°F)	340	320-340	320-340
Screw RPM		15-30	7-15
Head Press, PSI		1000-5000	1500-6500

- Turn screw RPM up to that planned for production.
- **Use screw RPM to work up compound** and deliver surface appearance – melt should be well fused and of uniform consistency at the equilibrium melt temperature.
- For very large parts, the melt can be hotter; for thin wall, high rate products, the melt should be cooler.
- Once the melt is smooth and satiny, and at the correct temperature, turn of screw drive.
- Attach the preheated die and adapter as quickly as possible, preferably within 5 to 10 minutes.
- Restart the screw drive at a slow 3 to 5 RPM.
- As melt appears at the die lips, slowly increase RPM.
- String up the extrudate through the sizing plates and downstream equipment. The process should take approximately 10-20 minutes to come to equilibrium.
- Do not use more than 15% clean dried CPVC regrind.
- Refrain from use of regrind which may be contaminated with other polymers.

## TROUBLESHOOTING GUIDE

### ***Pitting or Foaming***

- Further drying is required

### ***Rough Appearance***

- Check that proper screw is installed

### ***Too Glossy***

- Reduce screw speed
- Reduce barrel temperature
- Check that proper screw is installed

### ***Surging***

- Reduce screw speed
- Eliminate screw cooling

### ***Dimensional Variation***

- Reduce screw speed

### ***Black specks, Burning***

- Check temperatures
- Check quality and material of construction for surfaces in contact with melt
- Check for streamlined, low inventory die/adapter
- Clean out all burned or foreign material from die, adapter, and extruder
- Check that proper screw is installed

### ***Poor Impact and Physical Properties***

- Check stock temperatures
- Check that melt is well fused

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