



# Geon<sup>®</sup> Vinyl Molding Compounds Screw Design Recommendations

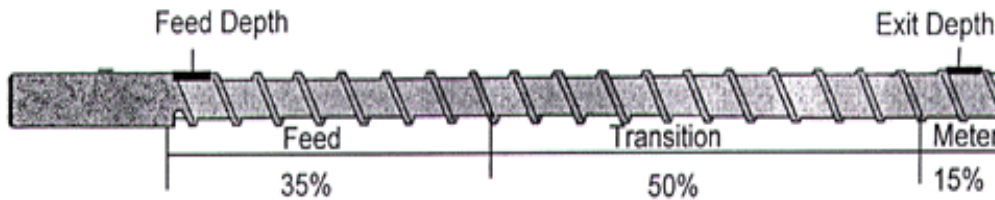
## Introduction

If long production runs of Geon<sup>®</sup> vinyl molding compounds are planned, it will be beneficial to check the screw and screw tip design in your press. The proper screw and screw tip will significantly improve processing conditions reducing heater zone overrides, long screw recovery times, shear burn, and black specks. The following recommendations are specific for Geon vinyl materials. However, other engineering thermoplastics, including modified PPO, polycarbonate, FR/ABS, PC/ABS, and PVC/ABS, also process very nicely with this type of screw and screw tip design.

## Screw Terminology

- L/D** - The length of the screw divided by the diameter of the screw.
- Compression Ratio** - The depth of the first feed flight divided by the depth of the last metering flight.
- Screw Geometry** - The number of feed, transition, and metering flights.

## Screw Geometry



$$\text{Compression Ratio} = \frac{\text{Feed Depth}}{\text{Exit Depth}}$$

## Screw Specifications

The recommended compression ratio for the screw is 2.2:1. Screws with compression ratios in the 1.8:1 to 2.8:1 range are being used successfully.

As the compression ratio of the screw increases, the processing window for the compound may decrease. This is especially true with compression ratios greater than 2.5:1.

## Exit Depth

The critical dimension for a vinyl screw is the exit depth in the metering zone. Too shallow of an exit depth will cause the screw to be sensitive to shear burning. If a shallow exit depth does exist, slow screw RPMs are needed to minimize shear burning. The following tables list the needed exit depths and feed depths for a 2.2:1 compression ratio screw.

**SCREW DIMENSIONS FOR 2.2:1 COMPRESSION RATIO SCREW**

Screw Diameter	Feed Depth	Exit Depth
2.00 inches	.297 inch	.135 inch
2.50 inches	.352 inch	.160 inch
3.00 inches	.396 inch	.180 inch
3.50 inches	.440 inch	.200 inch
4.00 inches	.485 inch	.220 inch
4.50 inches	.515 inch	.235 inch
5.00 inches	.550 inch	.250 inch
5.50 inches	.590 inch	.270 inch
6.00 inches	.630 inch	.290 inch

**SCREW DIMENSIONS FOR A 2.2:1 COMPRESSION RATIO SCREW**

Screw Diameter	Feed Depth	Exit Depth
50mm	7.5mm	3.4mm
65mm	9.0mm	4.0mm
75mm	10.0mm	4.6mm
90mm	11.2mm	5.0mm
100mm	12.3mm	5.6mm
115mm	13.0mm	5.9mm
125mm	14.0mm	6.4mm
150mm	16.0mm	7.3mm

**Too small an exit depth causes shear burning and limits injection speeds!**

**Screw Tip**

The screw tip design is very important for molding rigid vinyl compounds. Restrictive tips can cause shear burn. Ball check tips are more restrictive than sliding check rings, and their use with vinyl is discouraged. Sliding check rings with ample clearance under the check ring are recommended. The clearance under the check ring should be at least one-and-one-half times the exit depth of the screw.

Smearhead tips are used with higher viscosity vinyls used for pipe fittings and other thick-wall parts. Smearhead tips are not recommended for most custom injection molding compounds.

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