

Stanyl®

PA46-GF Glass Reinforced

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Specialized injection molding technologies for molding small parts are recommended for achieving optimal material performance. Such micro molding applications include USB-C, BtB, 0.3 mm fine pitch FPC, etc. The goal for the molded parts is to undergo a minimal drop in Viscosity Number (VN degradation), staying within 10% versus the starting granules. Well molded Parts can withstand SMT reflow without melting, maintaining high mechanical properties and minimal color shift. The material consumption for such micro parts is very small, therefore shot weight is small (around 1.0 gm/shot or less). Besides traditional reciprocating injection molding machines, V-Line concept of injection molding machines were introduced, wherein the plunger size can be very small for a precise injection control. Accordingly, the molding process window will be narrow yet critical to final product performance. In addition to the respective material's standard IMR, we suggest using this micro injection specific IMR for a high performance result.

Envalior's Grades are commonly used for USB-C with micro injection molding

- o Stanyl® TS200F6
- o Stanyl® TS200F6 B-MB
- o Stanyl® TS200F6 A-MB
- o Stanyl® TE248F6
- o Stanyl® HFX31S
- o Stanyl® HFX31S B-MB
- o Stanyl® HFX31SW
- o Stanyl® HFX31SW B-MB

Melt Residence time recommendations

1. For processing temperature between 305°C~320°C (581°F~608°F) the recommended Melt Resident Time (MRT) is ≤ 2 minutes to control material degradation and minimize color drift post SMT.
2. When melt temperature is up to 325°C (617°F) for filling thin walls, the MRT shall be ≤1 minute. A bigger large enough runner diameter (e.g. ≥ 2 mm branch runner) and bigger gate to achieve a better balance of filling pressure drop, shear rate and filling balance. Contact the Envalior ADTS technical team to provide support, including Moldflow® simulation.
3. Melt resident time calculation of traditional screw: $MRT = (\pi D^3 \rho) / m \times t / 60$

Whereas:

MRT =Melt Residence Time	[minutes]
D = Screw Diameter	[cm]
P = Melt Density	[g/cm3]
m = Total Shot Weight (part & runner)	[g]
t = Cycle Time	[s]

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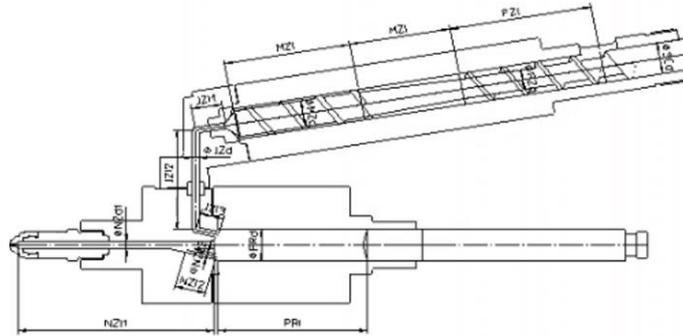
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4. V-line reference for Melt Resident Time Calculation



Item (Sodick V-line as example)		Screw Dia 14 Plunger 12	Screw Dia 18 Plunger 16
Feed Zone	cc	18.2	25.1
Compression Zone	cc	4.1	8.4
Meterring Zone	cc	2.2	4.1
Junction	cc	1.5	1.5
Nozzle	cc	1.3	1.2
Nozzle Cylinder	cc	0.6	0.7
Nozzle Path	cc	0.0	0.1
Residence Material Volume (cc)		Compression Zone + Meterring Zone + Junction + Nozzle + Nozzle Cylinder + Nozzle Path	
MRT (minutes)		Residence Material Volume*Density (g/cc)/Shot weight(g)*Cycle Time/60	
Note: Please contact your machine suppliers to get respective volume data (Sodick, Arburg, Babyplast, etc).			

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Machine Screw Geometry

Stanyl® PA46 can be processed with a general purpose screw. In order to achieve an optimal performance of the material, it is suggested to use a screw geometry based on the following recommendation:

Screw length or L/D ratio to be between 20D to 22D. The length ratios for each zone of the screw are:
 Feed zone (55~60%): compression zone (20%~25%): Metering zone (remaining balance, which is 15%~25%).



In-Line screw compression ratio:

For Stanyl® PA46, the screw compression ratio is recommended to be around 2.3

V-Line screw compression ratio:

For Stanyl® PA46 (with critical color requirement), the screw compression ratio is recommended between 1.4 and 2.2, based on a study performed by the machine vendor.

Drying and Moisture content before molding

- Material must be well dried before molding. Excessive moisture will decrease the material properties due to degradation. Preferred dryers are de-humidifier with dew point less than -30°C (-22°F).

		Drying temperature	Drying time	Moisture content
Stanyl® PA46	Light color	80 to 90°C (176 – 194°F)	4 to 6 hours	Preferred moisture content 0.02~0.05%
	Black color or Dark color	90 to 120°C (194 – 248°F)	4 to 8 hours	

Note: Moisture measurement: For measuring the moisture content after drying or before molding, the suggested setting conditions are 170°C (338°F), 10 grams of granules and 15 minutes, suggested to get measurement instrument calibrated to our Envalior KF measurement with the same samples.

- Drying equipment capacity: the material in the drying hopper should be consumed within 8 hours maximum. Especially for light colors to eliminate the risk of discoloration due to surface oxidation or any properties drop. If the production stoppage time is over 2 hours, it is suggested to reduce the drying temperature to 70°C (158°F) to minimize discoloration or surface oxidation.

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