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**Stat-Tech™**  
STATIC DISSIPATIVE &  
ELECTRICALLY CONDUCTIVE  
FORMULATIONS



# Stat-Tech™

Stat-Tech™ Static Dissipative and Electrically Conductive Formulations are specifically engineered to provide antistatic, ESD and EMI/RFI shielding performance for critical electronic equipment applications. These materials combine the performance of select engineering resins with reinforcing additives, such as carbon powder, carbon fiber, nickel-coated carbon fiber and stainless steel fiber, for low-to-high levels of conductivity depending upon application requirements.

Base Resin	PC	PC/PSU	PES	PEI	PP	ABS	PEEK	PA
<b>Barrel Temperatures* °F (°C)</b>								
Rear Zone	530–560 (277–293)	550–575 (288–302)	660–700 (349–371)	675–725 (357–385)	390–420 (199–216)	425–460 (219–238)	680–730 (360–388)	430–500 (221–260)
Center Zone	515–560 (269–288)	540–565 (282–296)	650–690 (343–366)	655–710 (352–377)	380–405 (193–207)	415–450 (213–232)	670–710 (354–377)	420–490 (216–254)
Front Zone	510–525 (266–274)	530–555 (277–291)	640–680 (338–360)	655–700 (346–371)	370–395 (188–202)	405–440 (207–227)	650–690 (343–366)	410–480 (210–249)
Nozzle	520–535 (271–280)	540–565 (282–296)	650–690 (343–366)	665–710 (352–377)	380–400 (193–204)	415–450 (213–232)	660–700 (349–371)	420–490 (216–254)
Melt Temperature	525–560 (274–293)	530–580 (277–304)	650–700 (343–371)	660–730 (349–388)	375–395 (191–202)	410–460 (210–238)	650–730 (343–388)	420–500 (216–260)
<b>Mold Temperature</b>	175–250 (80–121)	160–220 (71–104)	280–350 (138–177)	275–350 (135–177)	100–135 (38–57)	150–180 (66–82)	300–425 (149–219)	160–230 (71–110)
<b>Pack &amp; Hold Pressure</b>	50%–75% of Injection Pressure							
<b>Injection Velocity</b> in/s	0.5–2.0							
<b>Back Pressure</b> psi	50							
<b>Screw Speed</b> rpm	40–70	40–70	40–70	40–70	40–70	40–70	40–70	40–70**
<b>Drying Parameters</b> °F (°C)	6 hrs @ 250 (121)	4 hrs @ 250 (121)	4 hrs @ 275 (135)	4 hrs @ 250 (121)	3 hrs @ 300 (150)	2 hrs @ 200 (93)	3 hrs @ 275 (135)	4 hrs @ 180 (82)
<b>Cushion</b> in	0.125–0.250							
<b>Screw Compression Ratio</b>	2.0:1–2.5:1	2.0:1–2.5:1	2.5:1–3.5:1	2.5:1–3.5:1	2.5:1–3.5:1	2.5:1–3.5:1	2.5:1–3.5:1	2.5:1–3.5:1
<b>Nozzle Type</b>	General Purpose	General Purpose	General Purpose	General Purpose	General Purpose	General Purpose	General Purpose	Reverse Taper
<b>Clamp Pressure</b>	5–6 Tons/in <sup>2</sup>							

\* A reverse temperature profile is important to obtain optimum conductive properties. Other key processing parameters are slow injection speeds and low back pressures.

\*\* Avoid processing for a resin-rich surface. Conductive properties are achieved with a silver or fibrous surface appearance.

STARTUP & SHUTDOWN	RECOMMENDATIONS
Purge Compound	HDPE or HIPS
Recycling	Recycling Stat-Tech up to 20% is permissible. Testing the application is highly recommended to determine the effect recycling has on the desired physical properties.

MOLD DESIGN	RECOMMENDATIONS
Gates	<ul style="list-style-type: none"> <li>• Many different types of gates can be used such as pin, fan, tunnel, tab and edge gates. Gate type should be selected based on location and part geometry.</li> <li>• Gate diameters equivalent to 50%–75% of the average wall thickness are recommended.</li> <li>• Land lengths of 0.020"–0.035" (0.50mm–0.90mm) are typically recommended.</li> </ul>
Runners	<ul style="list-style-type: none"> <li>• Full-round runners or a modified trapezoid runner are the best designs. Half-round runners are not recommended.</li> <li>• Only naturally balanced runner systems ("H" pattern) are recommended.</li> <li>• Runner diameters larger than 0.150" (3.8mm) and not exceeding 0.375" (9.5mm) are recommended.</li> <li>• Step each 90° bend in the system down in size (from sprue to gate) approximately 1/16" (1.5mm) to reduce pressure drop.</li> <li>• Place vents at each 90° intersection and vent to atmosphere.</li> <li>• Hot runner molds are acceptable and should be sized by the manufacturer.</li> </ul>
Cold Slug Wells	<ul style="list-style-type: none"> <li>• Place these wells at the base of the sprue to capture the cold material first emerging from the nozzle.</li> <li>• Place wells at every 90° bend in the runner system.</li> <li>• Well depths approximately 1.5 times the diameter of the runner provide the best results.</li> </ul>
Venting	<ul style="list-style-type: none"> <li>• Place vents at the end of fill and anywhere potential knit/weld lines will occur.</li> <li>• All vents need to be vented to atmosphere.</li> <li>• For circular parts, full perimeter venting is recommended.</li> <li>• Cut vent depths to: <ul style="list-style-type: none"> <li>- PC Compounds: 0.001"–0.002" depth and 0.250" width</li> <li>- PC/PSU Compounds: 0.002"–0.003" depth and 0.250" width</li> <li>- PES Compounds: 0.003"–0.004" depth and 0.250" width</li> <li>- PEI Compounds: 0.001"–0.003" depth and 0.250" width</li> <li>- PP Compounds: 0.001"–0.002" depth and 0.250" width</li> <li>- ABS Compounds: 0.0015"–0.0025" depth and 0.250" width</li> <li>- PEEK Compounds: 0.002"–0.004" depth and 0.250" width</li> <li>- Nylon Compounds: 0.002" min. depth and 0.250" width</li> </ul> </li> <li>• Increase vent depth to 0.040" (1.0mm) at 0.250" (4.0mm) away from the cavity and vent to atmosphere.</li> </ul>
Draft Angle	<ul style="list-style-type: none"> <li>• Maintain a minimum draft angle of 1/2° per side.</li> </ul>

## TROUBLESHOOTING RECOMMENDATIONS

PROBLEM	CAUSE	SOLUTION
<b>Incomplete Fill</b>	Melt and/or mold temperature too cold	<ul style="list-style-type: none"> <li>• Increase nozzle and barrel temperatures</li> <li>• Increase mold temperature</li> <li>• Increase injection speed</li> <li>• Increase pack and hold pressure</li> <li>• Increase nozzle tip diameter</li> <li>• Check thermocouples and heater bands</li> </ul>
	Mold design	<ul style="list-style-type: none"> <li>• Enlarge or widen vents and increase number of vents</li> <li>• Check that vents are unplugged</li> <li>• Check that gates are unplugged</li> <li>• Enlarge gates and/or runners</li> <li>• Perform short shots to determine fill pattern and verify proper vent location</li> <li>• Increase wall thickness to move gas trap to parting line</li> </ul>
	Shot Size	<ul style="list-style-type: none"> <li>• Increase shot size</li> <li>• Increase cushion</li> </ul>
<b>Brittleness</b>	Melt temperature too low	<ul style="list-style-type: none"> <li>• Increase melt temperature</li> <li>• Increase injection speed</li> <li>• Measure melt temperature with pyrometer</li> </ul>
	Degraded/Overheated material	<ul style="list-style-type: none"> <li>• Decrease melt temperature</li> <li>• Decrease back pressure</li> <li>• Use smaller barrel/excessive residence time</li> </ul>
	Gate location and/or size	<ul style="list-style-type: none"> <li>• Relocate gate to nonstress area</li> <li>• Increase gate size to allow higher flow speed and lower molded-in stress</li> </ul>
<b>Fibers on Surface (Splay)</b>	Melt temperature too low	<ul style="list-style-type: none"> <li>• Increase melt temperature</li> <li>• Increase mold temperature</li> <li>• Increase injection speed</li> </ul>
	Insufficient packing	<ul style="list-style-type: none"> <li>• Increase pack and hold pressure, and time</li> <li>• Increase shot size</li> <li>• Increase gate size</li> </ul>
<b>Sink Marks</b>	Part geometry too thick	<ul style="list-style-type: none"> <li>• Reduce wall thickness</li> <li>• Reduce rib thickness</li> </ul>
	Melt temperature too hot	<ul style="list-style-type: none"> <li>• Decrease nozzle and barrel temperatures</li> <li>• Decrease mold temperature</li> </ul>
	Insufficient material volume	<ul style="list-style-type: none"> <li>• Increase shot size</li> <li>• Increase injection rate</li> <li>• Increase packing pressure</li> <li>• Increase gate size</li> </ul>
<b>Flash</b>	Injection pressure too high	<ul style="list-style-type: none"> <li>• Decrease injection pressure</li> <li>• Increase clamp pressure</li> <li>• Decrease injection speed</li> <li>• Increase transfer position</li> </ul>
	Excess material volume	<ul style="list-style-type: none"> <li>• Decrease pack pressure</li> <li>• Decrease shot size</li> <li>• Decrease injection speed</li> </ul>
	Melt and/or mold temperature too hot	<ul style="list-style-type: none"> <li>• Decrease nozzle and barrel temperatures</li> <li>• Decrease mold temperature</li> <li>• Decrease screw speed</li> </ul>

## TROUBLESHOOTING RECOMMENDATIONS

PROBLEM	CAUSE	SOLUTION
<b>Excessive Shrink</b>	Too much orientation	<ul style="list-style-type: none"> <li>• Increase packing time and pressure</li> <li>• Increase hold pressure</li> <li>• Decrease melt temperature</li> <li>• Decrease mold temperature</li> <li>• Decrease injection speed</li> <li>• Decrease screw rpm</li> <li>• Increase venting</li> <li>• Increase cooling time</li> </ul>
<b>Not Enough Shrink</b>	Too little orientation	<ul style="list-style-type: none"> <li>• Decrease packing pressure and time</li> <li>• Decrease hold pressure</li> <li>• Increase melt temperature</li> <li>• Increase mold temperature</li> <li>• Increase injection speed</li> <li>• Increase screw rpm</li> <li>• Decrease cooling time</li> </ul>
<b>Burning</b>	Melt and/or mold temperature too hot	<ul style="list-style-type: none"> <li>• Decrease nozzle and barrel temperatures</li> <li>• Decrease mold temperature</li> <li>• Decrease injection speed</li> </ul>
	Mold design	<ul style="list-style-type: none"> <li>• Clean, widen and increase number of vents</li> <li>• Increase gate size or number of gates</li> </ul>
	Moisture	<ul style="list-style-type: none"> <li>• Verify material is dried at proper conditions</li> </ul>
<b>Nozzle Drool</b>	Nozzle temperature too hot	<ul style="list-style-type: none"> <li>• Decrease nozzle temperature</li> <li>• Decrease back pressure</li> <li>• Increase screw decompression</li> <li>• Verify material has been dried at proper conditions</li> </ul>
<b>Weld Lines</b>	Melt front temperatures too low	<ul style="list-style-type: none"> <li>• Increase pack and hold pressure</li> <li>• Increase melt temperature</li> <li>• Increase vent width and locations</li> <li>• Increase injection speed</li> <li>• Increase mold temperature</li> </ul>
	Mold design	<ul style="list-style-type: none"> <li>• Decrease injection speed</li> <li>• Increase gate size</li> <li>• Perform short shots to determine fill pattern and verify proper vent location</li> <li>• Add vents and/or false ejector pin</li> <li>• Move gate location</li> </ul>
<b>Warp</b>	Excessive orientation	<ul style="list-style-type: none"> <li>• Increase cooling time</li> <li>• Increase melt temperature</li> <li>• Decrease injection pressure and injection speed</li> </ul>
	Mold design	<ul style="list-style-type: none"> <li>• Increase number of gates</li> </ul>
<b>Sticking in Mold</b>	Cavities are overpacked	<ul style="list-style-type: none"> <li>• Decrease injection speed and pressure</li> <li>• Decrease pack and hold pressure</li> <li>• Decrease nozzle and barrel temperatures</li> <li>• Decrease mold temperature</li> <li>• Increase cooling time</li> </ul>
	Mold design	<ul style="list-style-type: none"> <li>• Increase draft angle</li> </ul>
	Part is too hot	<ul style="list-style-type: none"> <li>• Decrease nozzle and barrel temperatures</li> <li>• Decrease mold temperature</li> <li>• Increase cooling time</li> </ul>

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