

Stanyl[®] 46SF

The best insulator material for extreme connector designs

MAKE THE SMALLEST, THINNEST CONNECTORS WITH HIGHEST RELIABILITY

Are you confronted by the following design challenges?

- Smaller, thinner connectors, pitches well below 0.3 mm and form factors of below 0.8 mm
- Connectors with very thin walls – locally down to as little as 0.06 mm
- Even longer connectors with higher pin counts, up to 100 pins or more

Are you looking for an insulator material that

- Processes both extremely easily and consistently
- Copes with longer and thinner flow paths without undue increase in injection pressure
- Has close dimensional accuracy/tolerances, before and after (lead-free) SMT soldering
- Has the lowest insertion force, both in manual and in high-speed automated terminal insertion processes
- Gives high connector reliability and durability, through excellent pin retention and connector strength in repeated mating and unmating cycles



[Stanyl[®] SF is the answer]

Stanyl® 46SF5030.

The solution to your innovation issues

Typical applications are

Most new generation electronic products where space is at a premium. Typically FPC, FFC, SIM card, wire-to-board and board-to-board connectors for:

■ Notebooks



■ Mobile phones



■ DVD players



■ MP3 players



■ PDA devices



■ Flat-panel TV's or LCD screens

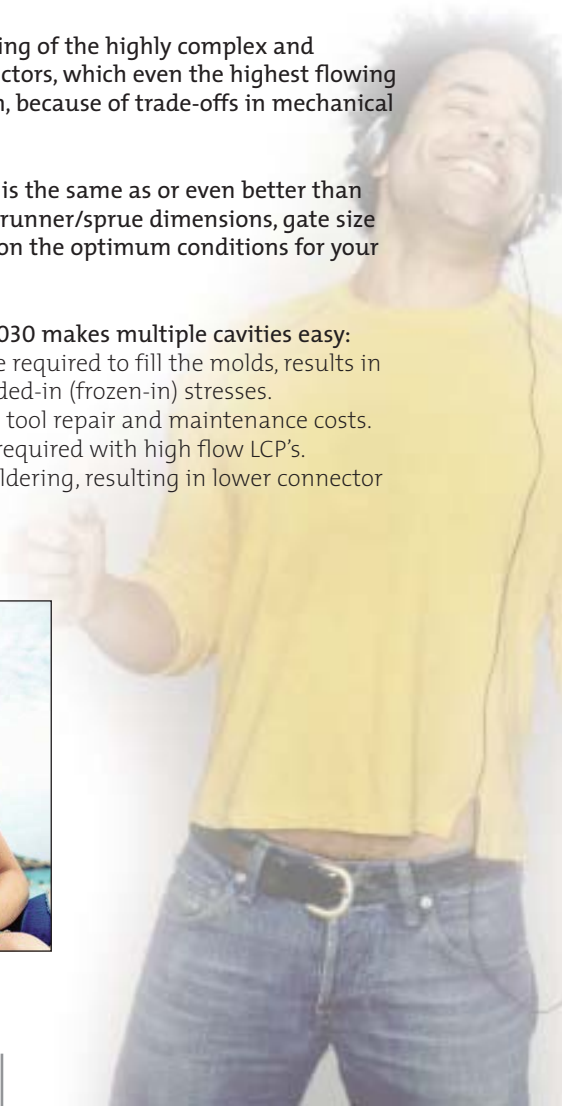


Stanyl 46SF5030, a 30% glass-fiber reinforced super-flow Stanyl grade with UL94 V-0 @ 0.4 mm wall thickness, is characterized by superb processability, exceptional strength and ductility and outstanding weld line strength. Stanyl 46SF5030 is also ideally suited to lead-free soldering processes. It has the required high thermal resistance with the retention of mechanical properties that you expect from Stanyl and it does not blister during soldering at the low wall thicknesses used in these extreme designs. The material is Underwriters' Laboratories (UL) listed and DSM quality procedures make sure of a solid flame retardant performance in all circumstances.

Stanyl 46SF5030 makes extremely thin connectors possible and ensures their mechanical reliability!

Stanyl 46SF5030 has the same flow as the newest generations of high-flow LCP but with much improved mechanicals in the real-life situation of thin walls and multiple weld lines. Other high-temperature polyamides do not even come close:

- Stanyl 46SF5030 enables the molding of the highly complex and thin-walled new generation connectors, which even the highest flowing LCP's can not sufficiently cope with, because of trade-offs in mechanical properties.
- Productivity with Stanyl 46SF5030 is the same as or even better than LCP's, when using the appropriate runner/sprue dimensions, gate size and position. DSM can advise you on the optimum conditions for your application.
- The very high flow of Stanyl 46SF5030 makes multiple cavities easy:
 - Very low injection pressures are required to fill the molds, results in lower tool wear and lower molded-in (frozen-in) stresses.
 - Lower pressures result in lower tool repair and maintenance costs.
 - Lower tool temperatures than required with high flow LCP's.
 - Low stress relaxation during soldering, resulting in lower connector deformation.



Stanyl® 46SF5030 enables trouble-free SMT lead-free reflow soldering

Stanyl is a proven solution for lead-free soldering processes. Stanyl 46SF5030, like earlier Stanyl grades, has a high HDT of 290°C and excellent stiffness retention at typical lead-free soldering (peak) temperatures, making it eminently suitable for SMT lead-free soldering. Mechanical property levels after soldering are excellent, ensuring a high pin retention and consequent connector reliability in mating/unmating operations. Low molded-in stresses and the high stiffness, even at peak soldering temperatures, reduce the risk of deformation during soldering which can lead to reject parts. And for advanced, thin wall connectors, blistering will not be encountered.

In lead-free SMT (hot-air) reflow processes, advanced, thin wall connectors made from Stanyl 46SF5030 will have an extended shelf-life as specified in IPC/JEDEC J-STD-020C up to moisture sensitivity levels (MSL) 1 (85°C/85% R.H./168 hrs exposure time) without encountering blistering or undue deformation. This represents unlimited product shelf life.

Recent market reports indicate that blistering can occur when super-flow LCP's are used!

Blistering:

Stanyl 46SF5030 does not blister in low wall-thickness, advanced connectors, while with super-flow LCP blistering does occur!

In very thin-walled applications, the average walls are thinner than those in which blistering may occur with Stanyl. Excess moisture, the only potential source of blistering in Stanyl, is safely and timely “breathed out” during the lead-free soldering step and Stanyl parts will **not blister**.

Super-flow LCP's, when used in such applications, are reported as having a **tendency to blister**. This does not appear to be caused by moisture and does not seem to be a controllable risk. The superior performance of Stanyl 46SF5030 can help you reduce product reject rates.

In applications where wall thicknesses > 0.5mm are encountered, blistering may occur due to seasonal environmental factors of high temperature combined with high relative humidity. In these situations, DSM recommends adopting simple and cheap product packaging to minimize potential moisture absorption, the root cause of blistering in Stanyl and hence maximize your product's shelf life.

Example

Stanyl 46SF5030 in low-wall thicknesses and up to approx. 2% moisture absorption in 80 pin FPC connector, did not blister

Test Conditions

*Reflow IR solder method. Temperature profile as shown
Glass epoxy board, 45x100x1.6mm.*

*Solder paste: 96.5% Sn/3% Ag/0.5%Cu (Flux content 11%)
Metal mask: 0.15mm thick*

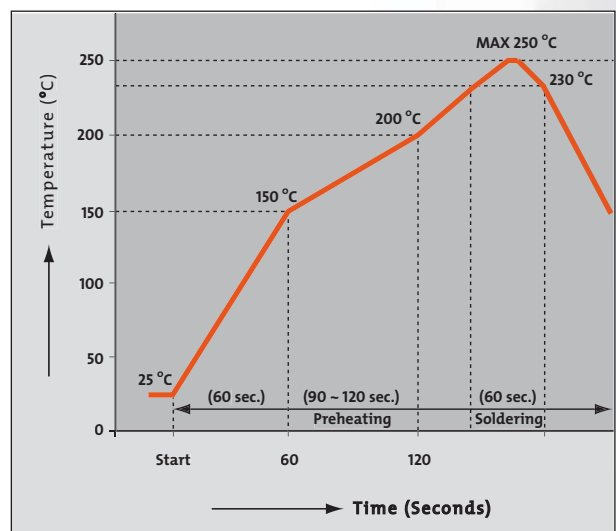


Figure 1.
Typical lead-free reflow profile.

Processing Stanyl® 46SF5030

Extremely high flow and still the most user-friendly material for advanced connectors!

Injection molding complex and multiple cavities with Stanyl 46SF5030 is easy: Stanyl is the most user-friendly, high-temperature resistant material to process. Typical processing conditions are outlined in table 1. For further processing support, please contact your local DSM representative.

For best results, DSM can advise you on the optimum sprue/runner and gate design, helping to optimize tool design and minimize the eventual occurrence of shear degradation and possible discoloration. DSM's industrial and materials expertise is supported by state-of-the-art flow CAE software and capabilities.

Some "guidelines" to make processing Stanyl 46SF5030 even easier and to ensure smoother start-up:

- Low back pressures.
- High dosing speeds (high screw speed).
- High injection speeds.
- Low holding pressure in case of buffer variations.
- If nozzle drooling occurs due to the extremely high flow of the material, lower the nozzle temperature.

- After prolonged exposure to air, drying is recommended at 105°C for 16 hours, either under vacuum or in a nitrogen atmosphere. Stanyl 46SF5030 comes pre-dried in moisture-proof laminated bags: when using virgin material, there is no need to further pre-dry.
- For shorter exposure times, shorter drying times are best (4-6 hours).



Table 1 Typical processing conditions for High-flow and Super-flow Stanyl grades.

TEMPERATURE SETTINGS						
Stanyl	Mold	Melt	Nozzle	Front	Center	Rear
Standard grades	80-120	305-320	280-300	300-320	300-320	280-320 °C
High- and Super-Flow grades	60-120	315-330	280-300	315-330	310-325	280-310 °C

Stanyl® 46SF5030

Highest mechanicals, best reliability!

Enhances design freedom

Stanyl 46SF5030 delivers the best strength and ductility performance (both impact resistance and elongation at break) in actual thin walled connectors. Stanyl also offers a high retention of mechanical properties after lead-free soldering, unlike many competitive materials. This material feature directly influences the failure mode of most advanced connectors: namely pin pull-out in use. Pin pull-out is **significantly reduced** when Stanyl is used for the insulator material. Stanyl also has excellent creep resistance, so that connectors made with Stanyl maintain their high retention characteristics throughout the useful life of the component.

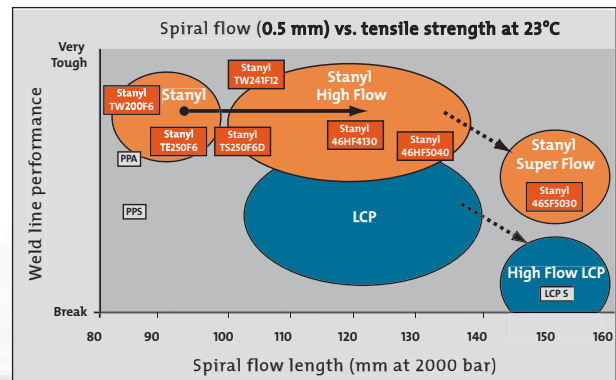


Figure 2. Highest flow to fill thinnest-wall connectors: best balance in strength/flow.

Weld line performance is the key feature, and Stanyl is best-in-class

Advanced connector designs rely on higher pin densities, so that the weld line count goes up sharply. It is more vital than ever to use a plastic insulator material with best-in-class weld line strength. Stanyl 46SF5030 was developed to give both high flow and excellent weld line strength, see table 2. The weld line elongation at break and strength of Stanyl 46SF5030 is clearly superior to high-flow LCP. This is an asset during pin insertion in densely pin-populated, low wall thickness connectors. They are more able to withstand the high forces encountered during manual or automated assembly steps, helping to lower reject rates.

Table 2 Weld line strength and elongation at break.

0.5 mm thickness, ISO 527-1A, 23°C

			Stanyl	LCP1	LCP2	LCP3
Tensile Modulus	no weld line	GPa	12	16	15	20
	with weld line	GPa	12	No result. Breaks during ejection		
Tensile strength	no weld line	MPa	161	150	160	150
	with weld line	MPa	58	No result. Breaks during ejection		
Elongation at break	no weld line	%	1.8	1.6	2.1	1.2
	with weld line	%	0.50	No result. Breaks during ejection		

Stanyl® 46SF5030 solves your innovation issues

- **Product miniaturization:** wall thicknesses down to 0.06 mm are possible.
- **Increased reliability and durability in use:** highest weld line strengths.
- **Lowest system costs:** short cycle times and high cavitation.

Property	Method	Typical value
Density	ISO 1183	1680 kg/m ³
Tensile modulus	ISO 527-1/2	12000 MPa
Stress at break	ISO 527-1/2	170 MPa
Charpy impact strength	ISO 179/1eU	40 kJ/m ²
DTUL (1.80 MPa)	ISO 75-1/2	290 °C
Flame retardancy	IEC 60695-11-10	V-0/0.4 mm
Molding shrinkage //	ISO 294-4	0.4 %
Molding shrinkage ⊥	ISO 294-4	1.1 %

Stanyl portfolio for connectors

Stanyl series	Typical grades	Description
TE series	TE250F6, TE250F8, TE250F9	Standard connector grades
TS series	TS250F6D, TS250F8	Improved flow, reduced blistering
46HF series	46HF5040, 46HF5050, 46HF5041LW	High flow, different balance between flow and strength, warpage resistance
46SF series	46SF5030	Highest flow, exceptional mechanicals/flow balance

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Astonishing **Stanyl®**