Blistering of high-temperature polyamides in lead-free soldering:

PA9T versus Stanyl® and usage of regrind

Stanyl: your preferred solution for economical manufacturing of connectors

Astonishing Stanyl®

a DSM Product

Blistering can occur for all materials: root causes

- Insufficient thermal resistance of insulator material

- Reduced material mechanicals:
  - Excessive degradation in molding
  - Voids
  - Excessive sensitivity to regrind quality fluctuations

- Excessive gaseous material in moldings:
  - Moisture
  - Entrapped degradation gases
  - Air

- Reflow profiles:
  - Hot spots
  - Too big discrepancies between top of molding/PCB temperatures
  - Too fast rising temperature profiles/too short pre-heating times

Costs of blistering prevention

Typical real-life example (I/O connector, 1 M units/month, 4 cavities, USD 50 k tool costs, shot weight 0.665 g)

	Stanyl 30% GF, FR	PA9T, 30% GF, FR
Material cost [USD/kg]	9	8.2
Max. regrind %	25	10 (*)
Cycle time [s]	11.5	13.5
Gross connector unit cost [USD/ea]	0.040	0.051
Additional packaging costs [USD/ea]	<0.01	0
Total costs [USD/ea]	0.041	0.051
Relative costs [%]	100	136

Stanyl: additional regrind % strongly offsets small packaging costs!

(*): 10% regrind is actual maximum value determined by user before cracking occurs.

Debunking the myth of blister-free lead-free soldering of PA9T connectors

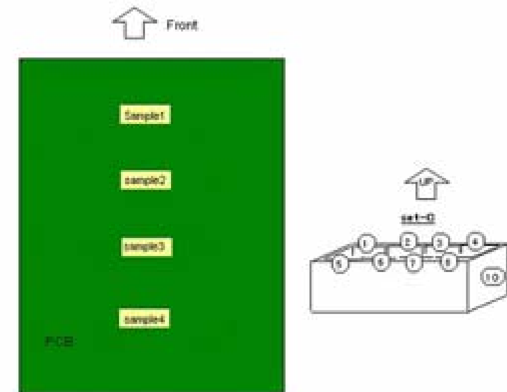
- Connectors moulded in PA9T are touted as featuring little to no blistering under lead-free soldering conditions

BUT

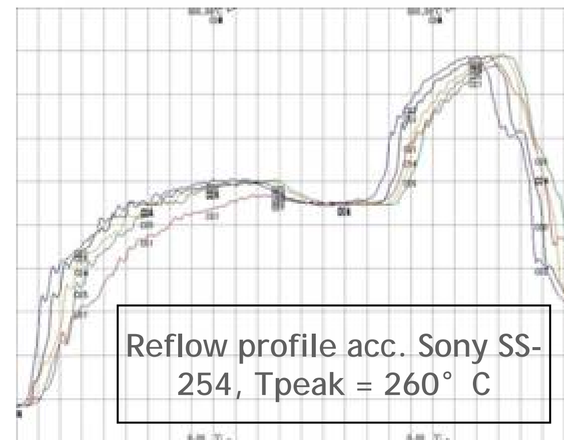
- **PA9T blisters** when **using regrind**
- This is common to all PA9T grades, at wall thicknesses ≤ 1.0 mm and at low moisture contents such as when conditioned at 85°C/85%RH/168 hours (JEDEC) and reflowed according Sony SS-254 soldering profiles?

Blistering of PA9T with 25% regrind in lead-free soldering conditions

Testing set-up:



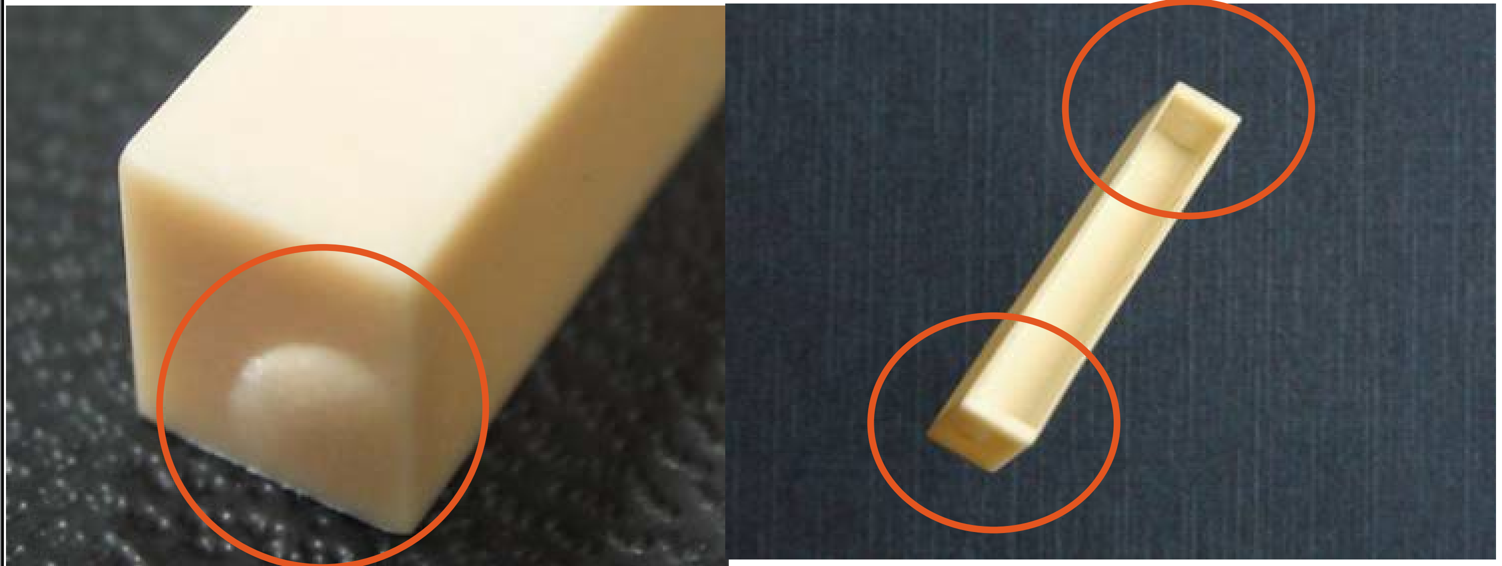
Test piece



Reflow profile acc. Sony SS-254, Tpeak = 260° C

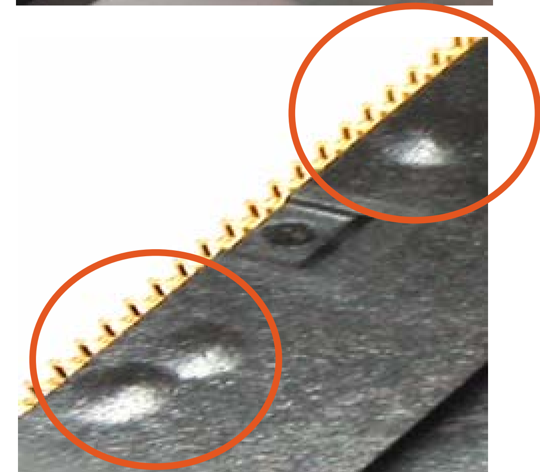
Blistering of PA9T with 25% regrind in lead-free soldering conditions - results

Blisters in PA9T test pieces (connector simulation) after conditioning at 85° C/85% relative humidity/168 hours (JEDEC MSL 1):



Blistering of PA9T - also on commercial connectors !

- Also in day-to-day reality, PA9T shows blisters on connector surfaces, especially when higher amounts (such as 25%) of regrind is added.
- Usually connector manufacturers then need to cut back on the regrind %, often down to zero% .
- This has a major impact on your connector costing and can add up to 25% to your material costs !



<u>Pictures top and bottom right:</u> details of commercial memory card connector (PA9T + 25% regrind) with blisters (T peak = 260° C)

Stanyl and regrind in connectors: your preferred solution

- Stanyl can incorporate far more than 25% regrind in most advanced connectors, resulting in substantial savings and higher productivity
- Stanyl still retains its rock-solid solid flame-retardancy – in contrast to PA9T
- Stanyl has the best retention of mechanicals – far superior to PA9T- providing you best connector reliability and durability
- Stanyl's blister performance is not affected by the use of regrind

Take the safe route: use Stanyl to save costs and increase your product reliability