

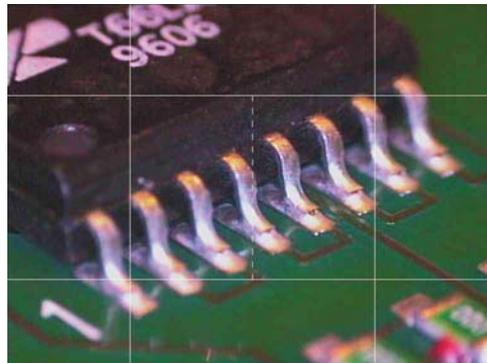
ALPHA® Vaculoy® SACX™ Lead-Free Wave Solder Alloy

Ride the SACX™ Wave
to Higher Value.

- Global acceptance: over 60% of ALPHA's lead-free bar sales in Europe
- Yield: outperforms Sn/Cu/Ni
- Hole fill: delivers exceptional wetting speed and force
- Lower dross generation versus Sn/Cu/Ni and SAC 305
- Reliability: no failures in multiple thermal cycling tests
- SAC 305 performance at 30% lower alloy cost

ALPHA® Vaculoy® SACX™ delivers high yields and excellent value.

- Fast wetting speed delivers improved solderability, outperforming all Sn/Cu/Ni-based alloys.
- Excellent drainage, minimizes bridging.
- Strong, mechanically sound joints that deliver long in-service reliability.
- Low dross generation that enables low process maintenance and reduced solder usage.



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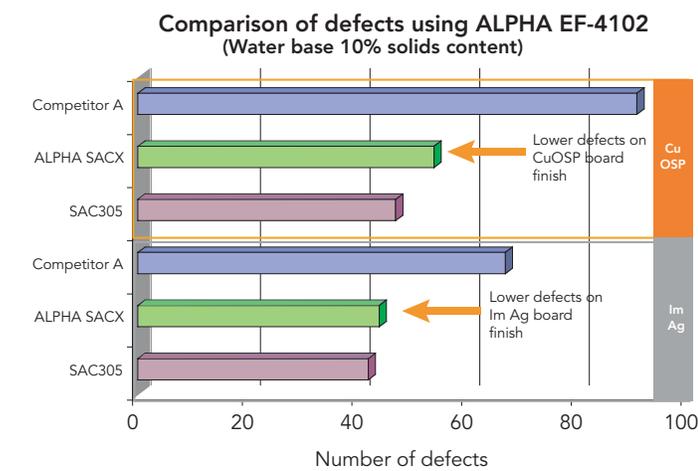
ALPHA® Vaculoy® SACX™ Lead-Free Wave Solder Alloy

Better yield than all Sn/Cu/Ni-based alloys

- Superior drainage versus Sn/Cu/Ni-based alloys.
- Same performance as industry standard SAC 305 alloy
- Process window supports the use of a wide range of flux technologies.
- Copper dissolution rates lower than Competitor A.

Ride the SACX™ Wave to Higher Value.

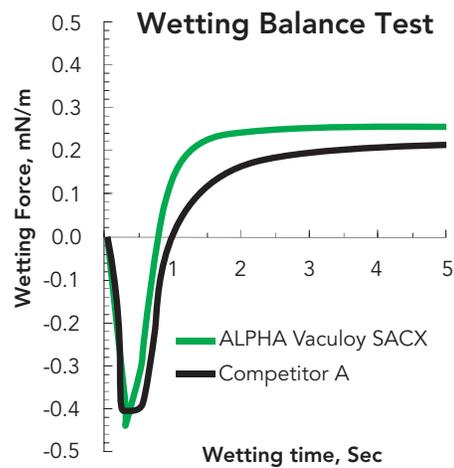
Competitor A: Leading competitor's Sn/Cu/Ni-based alloy



Test conducted using Cookson test board designed to produce defects.

Faster wetting than all Sn/Cu/Ni-based alloys

- Faster wetting speed delivers better soldering yields.
- Reduced contact time.



Performance Summary

PROCESS BENEFIT	ALPHA VACULOY SACX	Performance Capability	Customer Benefit
Wave Solder Process	Yield	Comparable yield to Industry Standard Vaculoy SAC305 and much superior to leading competitor's Sn/Cu/Ni-based alloy	Lower rework and warranty costs
	Wetting speed	Wetting speed of 0.75 sec compared to 0.65 sec for Industry Standard Vaculoy SAC305 and 1.00 sec for leading competitor's Sn/Cu based product	High yield and throughput rates achievable
	Contact time, pot temperature and conveyor speed	Contact time 2.3 - 3.5 sec, pot temperature 255° - 265° Celcius (491° - 509° F) Conveyor speeds 1.0 - 1.5 m/min (3.3 - 5 ft/min)	Wide wave solder process window
Process Maintenance	Dross generation	Low levels of dross generation, approximately 8% less than Sn/Cu/Ni alloys	Lower solder consumption
	Copper dissolution rate	Equivalent to Industry Standard Vaculoy SAC305, process monitoring and equilibrium point for copper will be equivalent	Process monitoring costs are equivalent
Joint Reliability	Surface mount shear strength	Surface mount components shear strength comparable to higher cost, Industry Standard SAC 305	Equivalent reliability at lower cost
	Through hole pull strength	Equivalent to Industry Standard Vaculoy SAC305 for pull strength on through hole components	Equivalent reliability at lower cost
	Thermal cycling	Equivalent to Industry Standard Vaculoy SAC305 and 63/37 over 400 Cycles (-40° to +125°C) tests ongoing	Indication of acceptable product life

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