

Reliability Test Matrices for Lead-Free Solder Evaluation Project #1*Objectives:*

1. Determine the moisture and temperature sensitivity of package types to 260 ° C preconditioning temperature.
2. Determine sensitivity of key device types to 260 ° C preconditioning temperature.

Scope:

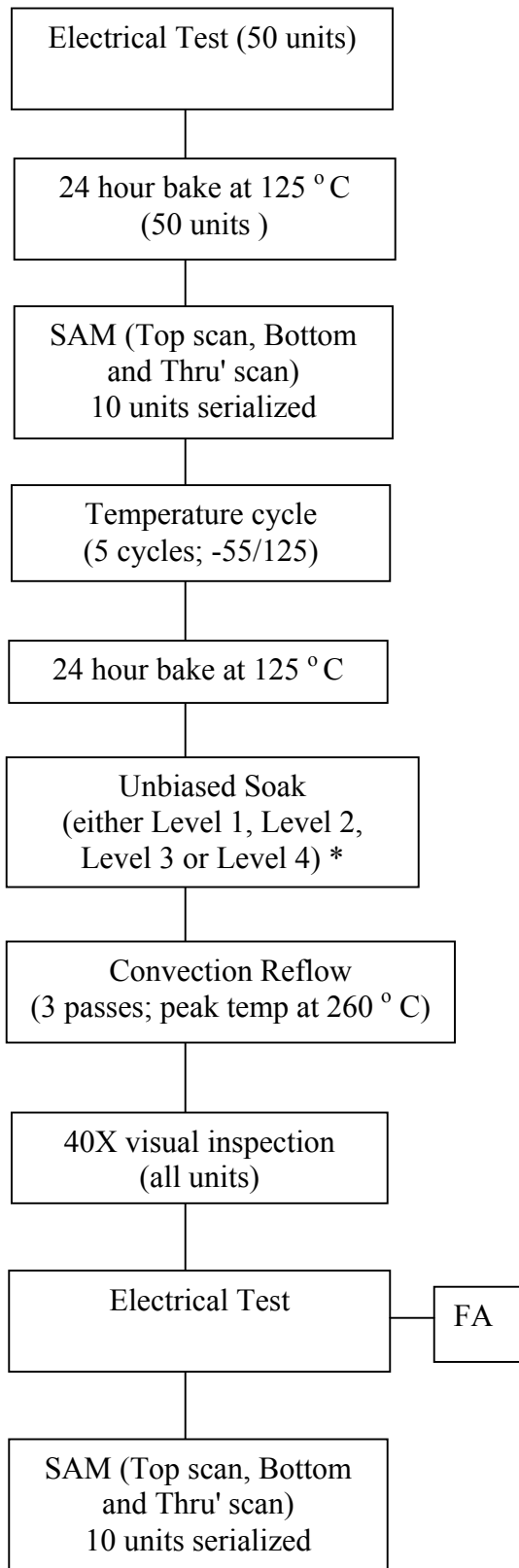
1. Reliability tests include:
 - a. Preconditioning with peak profile temperature at 260 ° C.
 - b. Preconditioning at 260 ° C followed by temperature cycling at -55/125 ° C to 1000 cycles.
 - c. Preconditioning at 260 ° C followed by 85 ° C/ 85 % RH to 1000 hours.
 - d. Preconditioning at 260 ° C followed by high temperature storage at 150 ° C to 1000 hours.
 - e. Preconditioning at 260 ° C followed by steam pressure pot at 121 ° C/15 PSIG to 168 hours.
2. Scanning Acoustic Microscopy (SAM) will be used to determine delamination with in the package. SAM is required as indicated in the reliability matrix flow attached within this request.
3. Visual inspection at 40X will be used to determine "pop corning". Visual inspection is required as indicated in the reliability matrix flow attached within this request.
4. Warpage measurement shall be done in the only reliability test (a) only. (Discussion on method of measurement needed with team members).
5. Sample size per package or device is 50 per reliability test.
6. The list of packages and devices need to be identified.
7. The preconditioning reflow profile will take reference from the profile recommended by NEMI. The only distinction is the melting point is defined at 217 o C. In NEMI, no melting temperature was defined. The profile is as shown below:

Condition	Requirement
Average ramp up rate to melting point	2.5 to 3 ° C /sec (max)
Pre-heat temperature and dwell time	60 to 120 sec (max) at 125 ° C (+/- 25 ° C)
Time above melting point	80 secs (min)
Time within 5 ° C of actual peak temperature	10 to 20 secs
Peak temperature range	255 ° C (+5, -0 ° C)
Ramp down rate	6 ° C/ sec (max)
Time from 25 ° C to peak temperature	6 mins (max)

Report Needed:

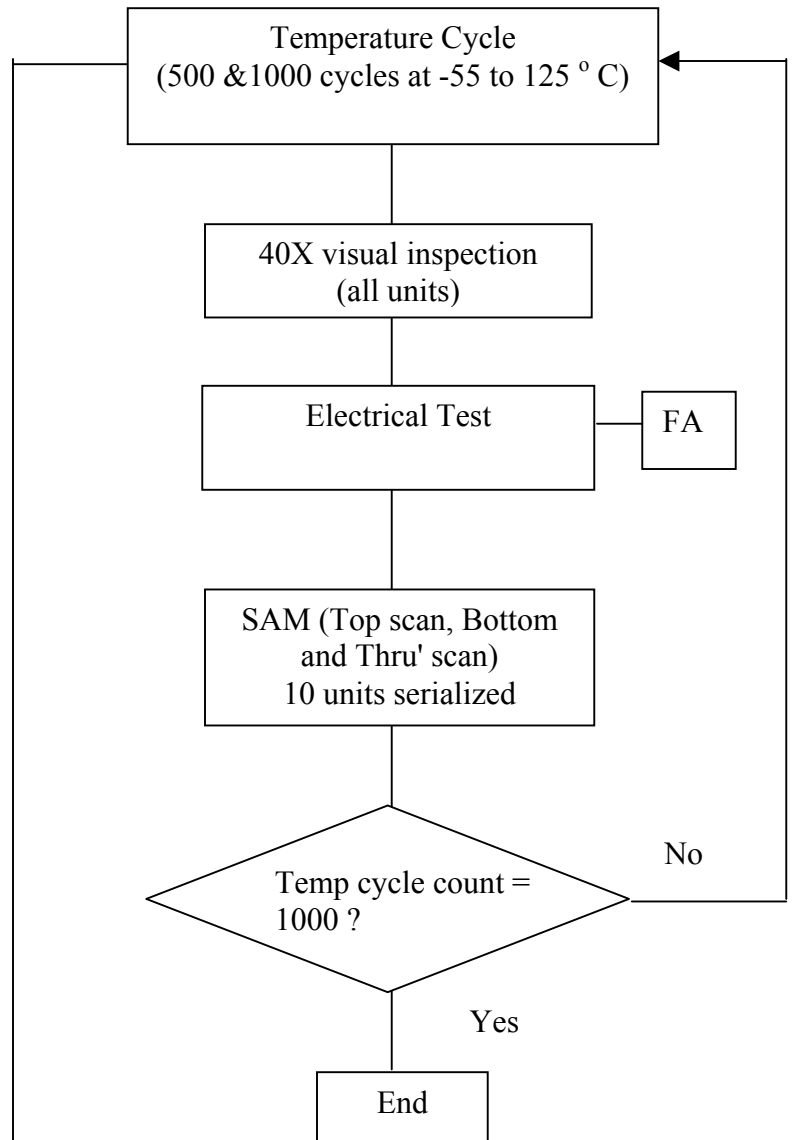
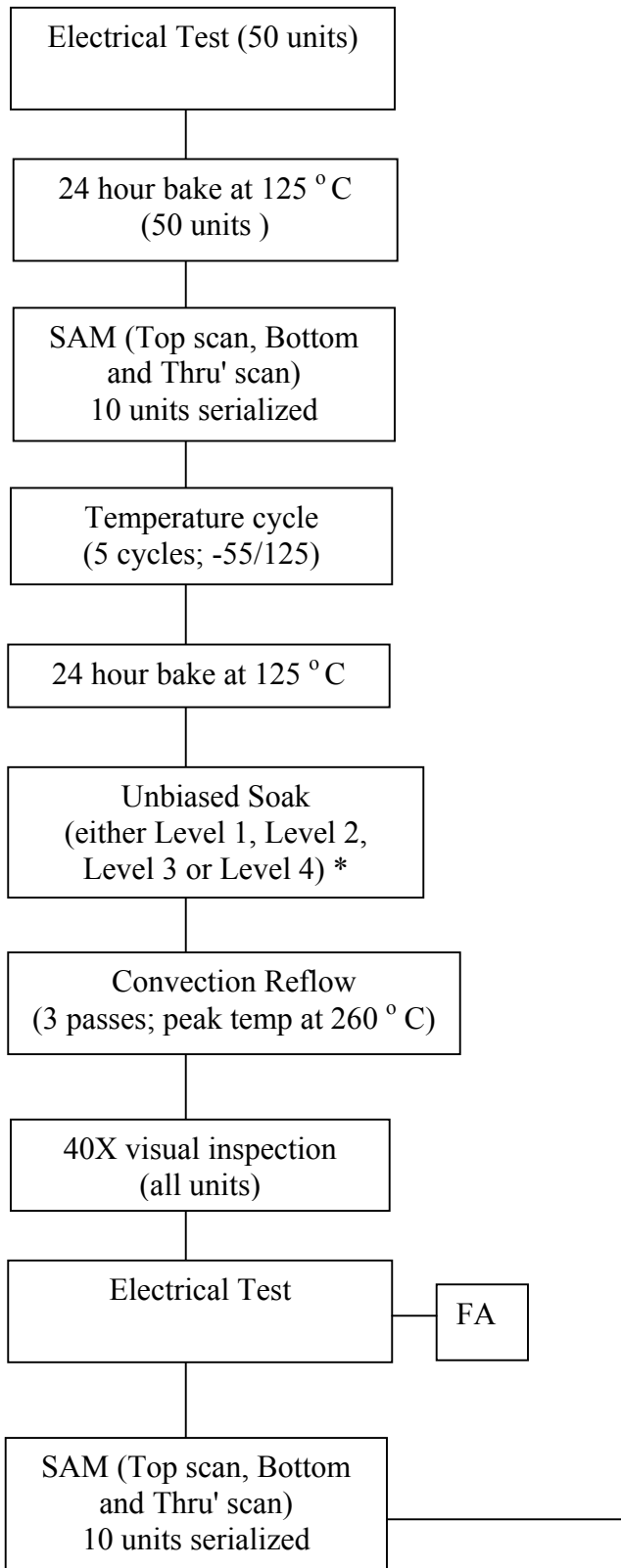
1. Summary of the visual inspections at 40 X. (to be conducted by Rel Lab)
2. SAM pictures of all 10 units at required in the reliability flows.
3. For any delamination observed, select one sample from the non-serialized units for SAM. If confirmed with similar delamination, then submit to FA for cross-sectioning to determine the location where delamination occurs.
NOTE: Do not send serialized units for FA. They should carry thru' till end of the test.
4. Summary of the % of delamination at each read point per test.
5. Electrical test yields are to be compiled. Electrical fallouts are to be shipped to Singapore for failure analysis. If serialized units fails electrical test, removal for FA is allowed.
6. The warpage data must be compiled.

Preconditioning + Reflow with 260 ° C peak temperature



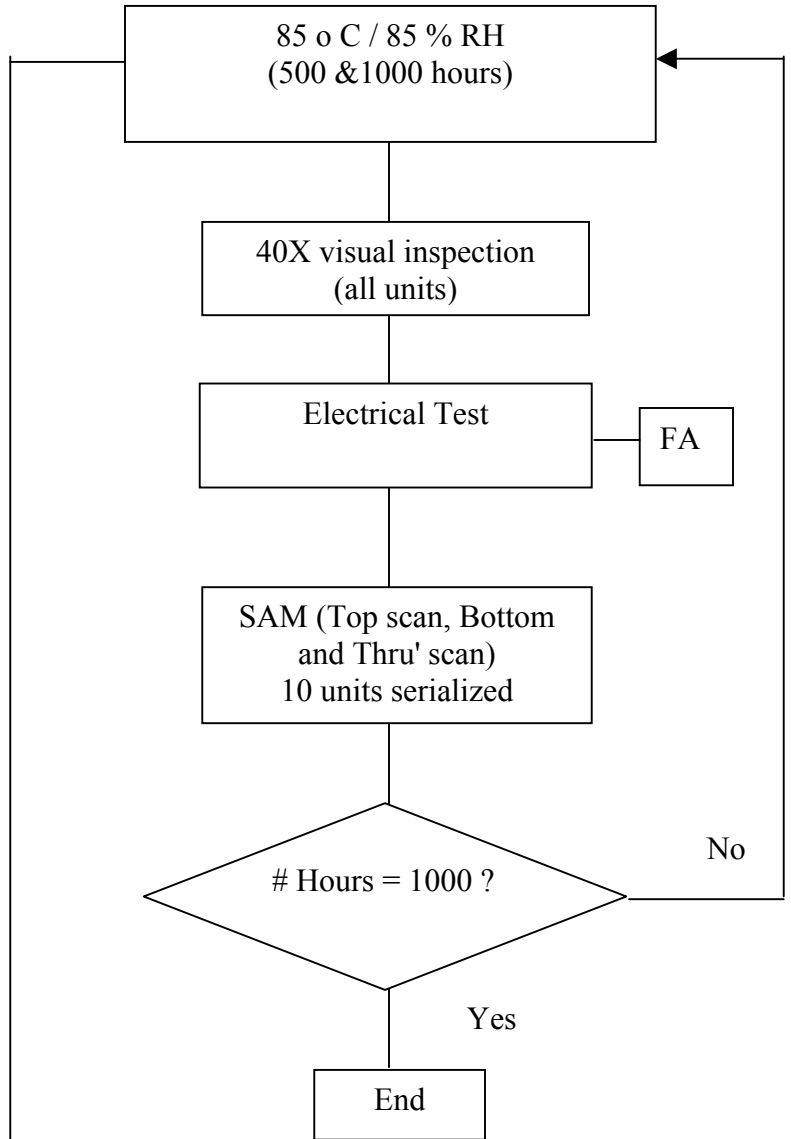
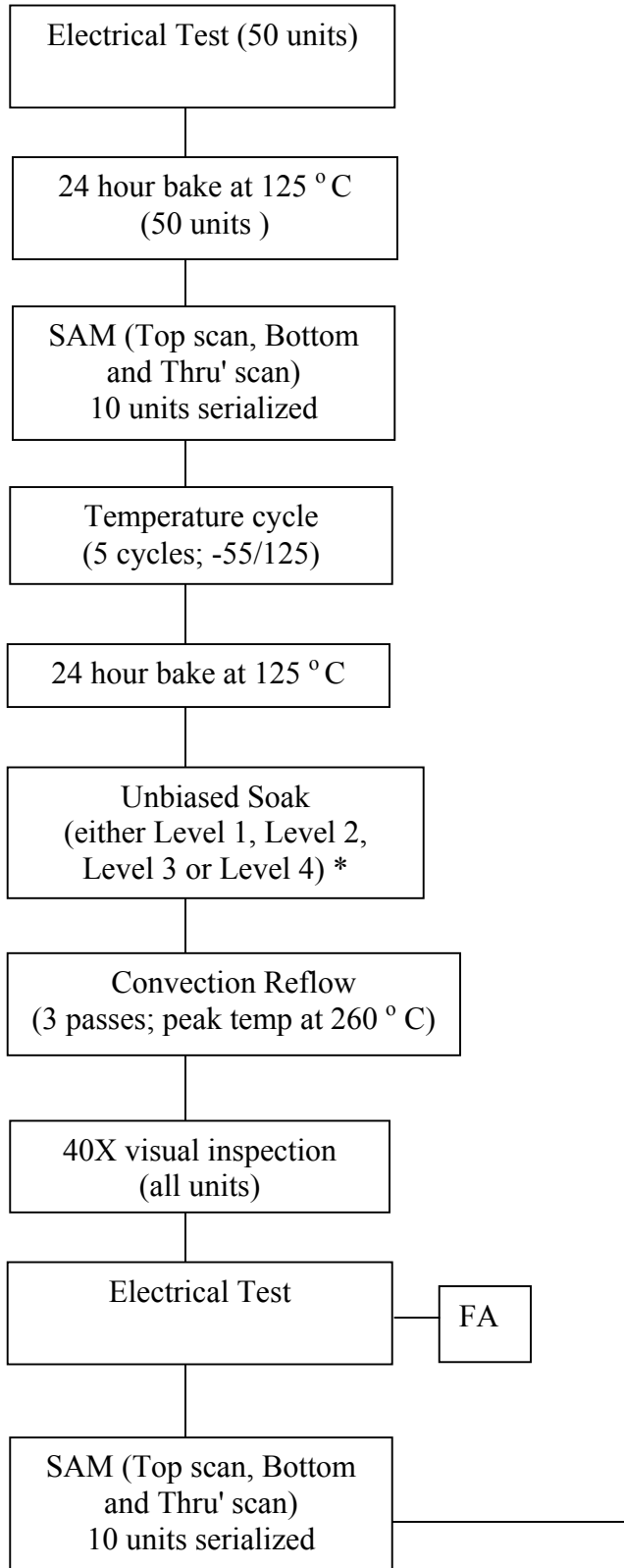
Notes:
* -- Soak should occur 1 hour after bake
** -- moisture soak condition is based on the moisture sensitivity that the package concerned was qualified at.
*** -- Convection reflow should occur 4 hours after soak.

Temperature Cycling at -55/125 ° C



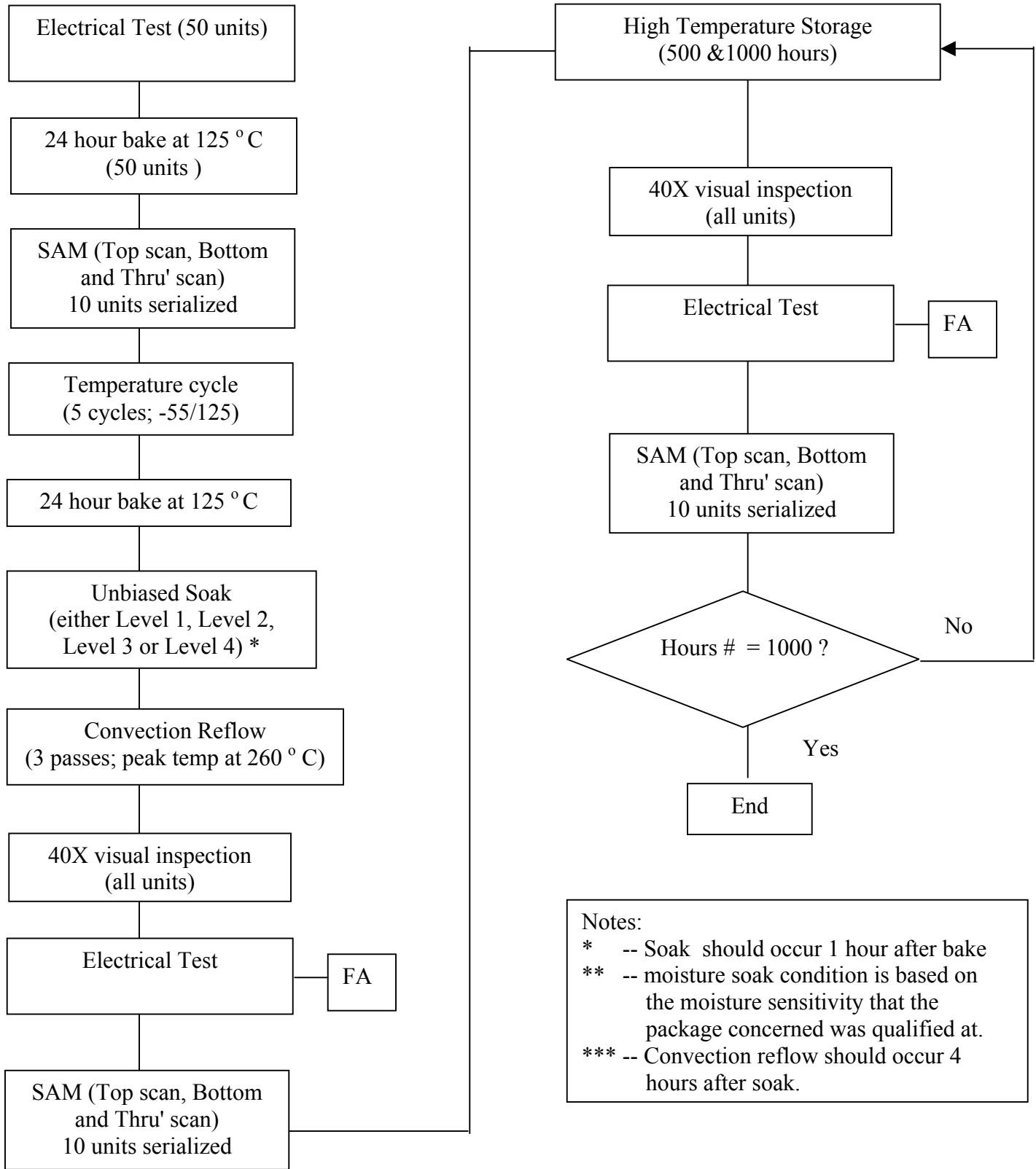
Notes:
 * -- Soak should occur 1 hour after bake
 ** -- moisture soak condition is based on the moisture sensitivity that the package concerned was qualified at.
 *** -- Convection reflow should occur 4 hours after soak.

85 ° C /85 % RH



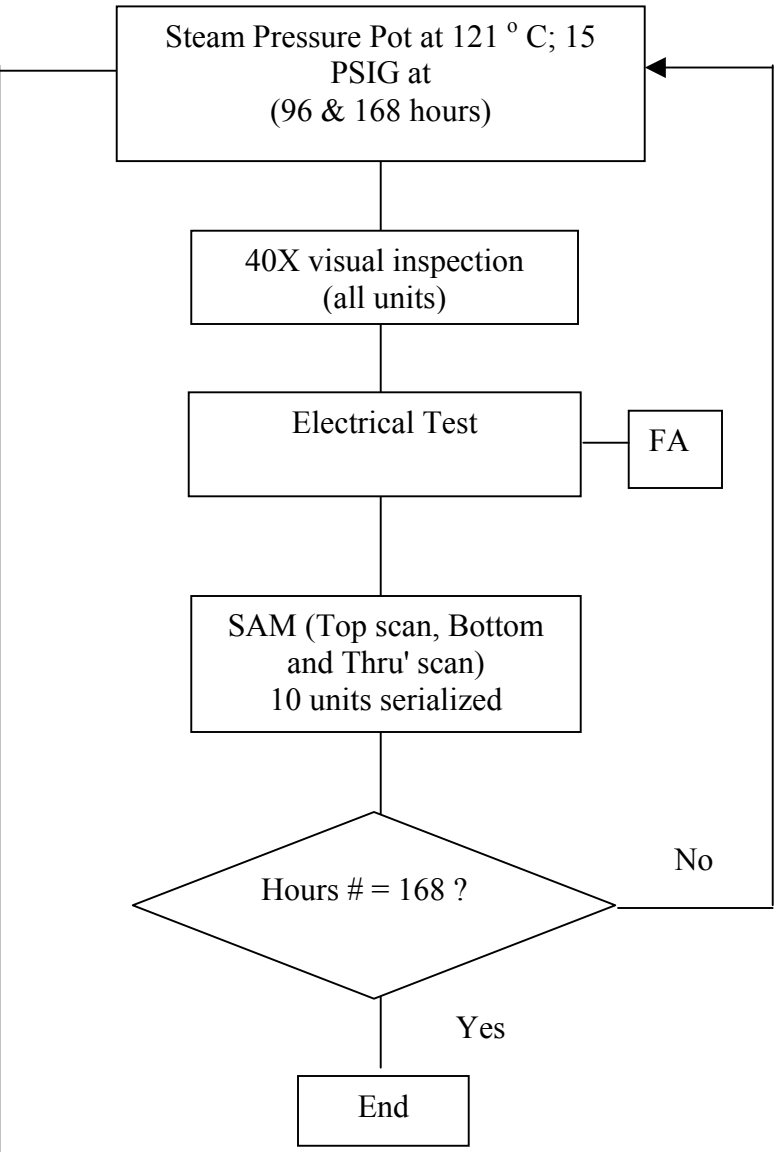
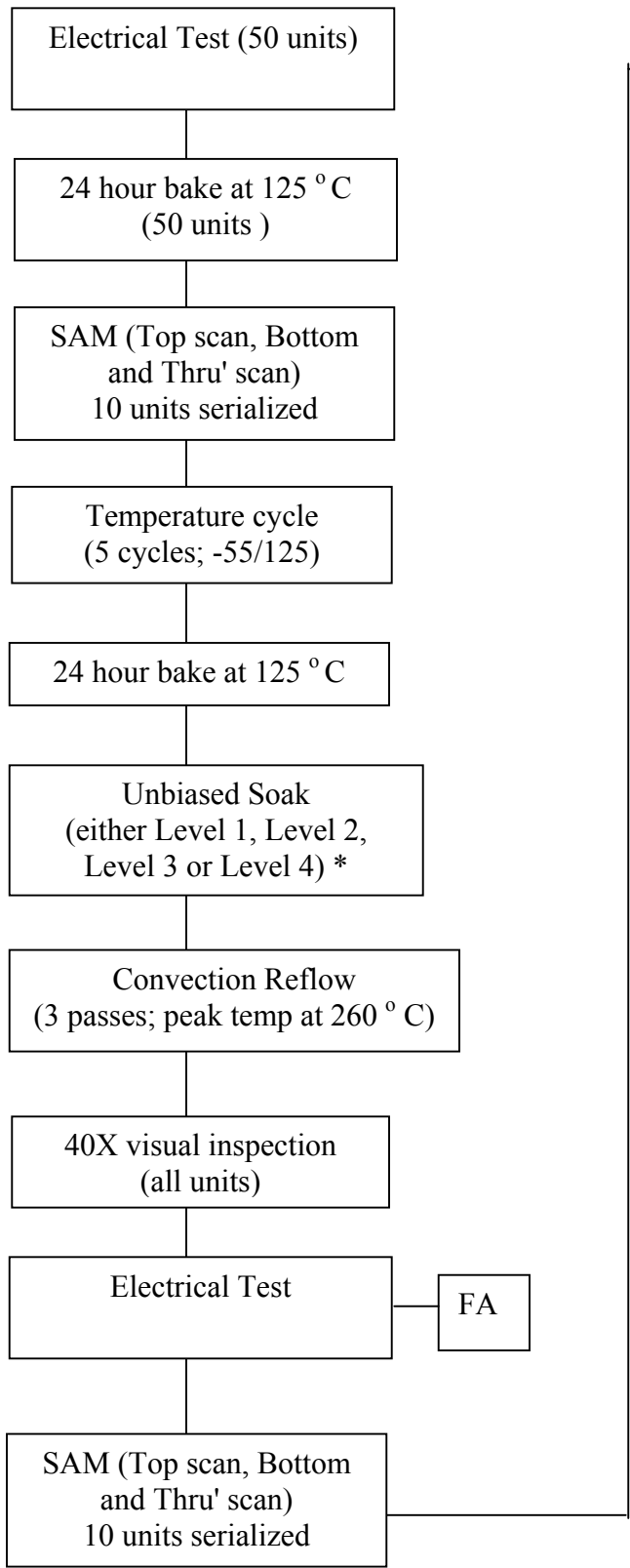
Notes:
 * -- Soak should occur 1 hour after bake
 ** -- moisture soak condition is based on the moisture sensitivity that the package concerned was qualified at.
 *** -- Convection reflow should occur 4 hours after soak.

High Temperature Storage at 150 ° C



Notes:
 * -- Soak should occur 1 hour after bake
 ** -- moisture soak condition is based on the moisture sensitivity that the package concerned was qualified at.
 *** -- Convection reflow should occur 4 hours after soak.

Steam Pressure Pot at 121 ° C; 15 PSIG



Notes:
 * -- Soak should occur 1 hour after bake
 ** -- moisture soak condition is based on the moisture sensitivity that the package concerned was qualified at.
 *** -- Convection reflow should occur 4 hours after soak.