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*The Institute for  
Interconnecting  
and Packaging  
Electronic Circuits*

# IPC-TR-465-3

## Evaluation of Steam Aging on Alternative Finishes

Round Robin Test Program Phase IIA

**IPC-TR-465-3**

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## OBJECTIVES

The purposes of this round robin test were to

1. Determine the effect of steam aging exposure on components employing a variety of solderable finishes other than hot solder dip over a copper substrate.
2. Provide data to support refinement of the standards.
3. Compare the effect of steam aging to other solder test variables, such as different testers and new vs. degraded samples.

## INTRODUCTION

The purpose of this round robin test program is to determine the effect of the steam aging environment at fixed temperatures on the various metals and platings used on electronic components and printed wiring boards.

Many studies have been performed by various industry representatives. This round robin capitalizes on this work to help establish correlations between various testers in order to verify the effect of steam aging on solderability and explore test repeatability and reproducibility.

## TEST PHASES

Because of the complexity of the test plan, the original Round Robin test program was divided into phases.

Prior to beginning the evaluation of test samples, the steam agers were tested for temperature stability and control. The results of this study were reported in IPC-TR-465-1, *The Round Robin Test on Steam Ager Temperature Control Stability*. This study showed that steam agers could hold  $\pm 3^{\circ}\text{C}$ , if carefully calibrated and maintained.

Phase I steam aging testing was intended to evaluate the repeatability of steam aging between test sites. The samples were hot solder coated copper wire and copper sheet. Phase II was similar, except the samples were solder coated copper leaded integrated circuits. The phase I and II results were documented in IPC-TR-465-2, *The Effect of Steam Aging Time and Temperature on Solderability Test Results*. In summary, this report concluded:

- A 25% reduction in all solderability responses was observed after a 2 hour, 150° C pre-conditioning bake.
- The wetting balance test results displayed a maximum steam aging temperature impact at 93°C. Visual and use test results showed no significant difference in solderability between components steam aged for 8 hours at 93°C and 97°C, but both temperatures were more severe than 87°C.

The testing discussed in this report is considered to be Phase IIA in this series. This test is intended to evaluate the effect of steam aging on a variety of solderable finishes and basis metals. Both components and printed wiring boards are included. These results will be compared to a simulated use test to validate the results.

## CONCLUSIONS

The steam age conditioning had a measurable effect on all the components. The hot solder dipped TO-99 style packages passed the test in the “unaged”, “as-received” condition, but failed when preconditioned or steam aged due to anomalies noted in the micro-sections on the “as-received” hot dipped solder surface over the plated nickel substrate.