

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2019  
DateRun: 10/04/2019  
Experimenters: Nicole Kebler, Rimsha Paneru  
ClientType: Electroplating Company  
ProjectNumber: Project #2  
Substrates: Graphite  
PartType: Part  
Contaminants: Fluxes, Solder  
Cleaning Methods: Immersion/Soak  
Analytical Methods: Visual

Purpose: To evaluate cleaners effectiveness at removing flux on graphite fixtures.

Experimental Procedure: Pre-contaminated graphite fixtures were provided by the company. Each of the four cells on one fixture was rated based on how contaminated they were initially and rated again after drying. The following visual rating keys were used.

## Initial Visual Rating Key

| # | Description             |
|---|-------------------------|
| 1 | No contamination        |
| 2 | Minimal contamination   |
| 3 | Partially contaminated  |
| 4 | Mostly contaminated     |
| 5 | Completely contaminated |

## Final Visual Rating Key

| # | Description        |
|---|--------------------|
| 1 | Completely removed |
| 2 | Mostly removed     |
| 3 | Partially removed  |
| 4 | Minimal removal    |
| 5 | No removal         |

One fixture was immersed in an unheated cleaner for 15 minutes. Visual observations of the fixture and flux removal were taken every five minutes, and the fixtures were air dried with room temperature forced air for five minutes before final observations.

Results: Visual Observations:

| Cleaner | 5 Mins                                   | 10 mins     | 15 mins     | Dry                                  |
|---------|--|-------------|-------------|--------------------------------------|
| 1       | - no visible bubbles<br>- clear dilution | - no change | - no change | -Flux still present, minimal removal |
| 2       | - no visible bubbles<br>- clear dilution | - no change | - no change | -Little to no removal                |

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|   |  |                    |                    |                          |
|---|--|--------------------|--------------------|--------------------------|
| 3 | - no visible bubbles<br>- clear dilution | - no change        | - no change        | -No removal              |
| 4 | - Bubbles on rim                         | - no change        | -no change         | -Minimal removal         |
| 5 | - Bubbles on rim                         | - no change        | - no change        | -Little to no removal    |
| 6 | -No change, No bubbles                   | - no change        | - no change        | - Residue left in middle |
| 7 | - Bubbles on surface                     | -Bubbles appearing | -Bubbles disappear | -No removal              |

Average Ratings:

| Cleaner | Average Before Cleaning | Average After Cleaning |
|---------|-------------------------|------------------------|
| 1       | 4.5                     | 4                      |
| 2       | 5                       | 4.5                    |
| 3       | 4.5                     | 4.5                    |
| 4       | 5                       | 4                      |
| 5       | 5                       | 4.5                    |
| 6       | 5                       | 4.5                    |
| 7       | 5                       | 5                      |

Summary:

| <b>Substrates:</b>                 | Graphite                   |        |             |                          |               |
|------------------------------------|----------------------------|--------|-------------|--------------------------|---------------|
| <b>Contaminants:</b>               | Fluxes, Solder             |        |             |                          |               |
| Company Name:                      | Product Name:              | Conc.: | Efficiency: | Effective:               | Observations: |
| Fisher Scientific                  | Isopropanol (CAS: 67-63-0) | 99%    |             | <input type="checkbox"/> |               |
| JR Hess & Co., Inc.                | Sta-Sol ESS 160            | 100%   |             | <input type="checkbox"/> |               |
| Alconox Inc                        | Liquinox                   | 1%     |             | <input type="checkbox"/> |               |
| Brulin Corporation                 | Aquavantage 1400           | 5%     |             | <input type="checkbox"/> |               |
| International Products Corporation | Micro 90 Conc.             | 2%     |             | <input type="checkbox"/> |               |
| Fisher Scientific                  | Isopropanol (CAS: 67-63-0) | 70%    |             | <input type="checkbox"/> |               |
| Fisher Scientific                  | Isopropanol (CAS: 67-63-0) | 10%    |             | <input type="checkbox"/> |               |

Conclusion:

None of the cleaners were effective with unheated immersion. Next step will be to add heat to cleaners that can be heated safely without engineering controls.