

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2017

DateRun: 05/30/2017

Experimenters: George Liang, Vinh Tran

ClientType: Cleaner Manufacturer

ProjectNumber: Project #1

Substrates: Copper

PartType: Part

Contaminants: Greases, Waxes

Cleaning Methods: Manual Wipe

Analytical Methods: Gravimetric

Purpose: To evaluate supplied product (Quicksolv DMC) for grease soil removal from copper coupons.

Experimental Procedure: The following experimental procedure followed TURI's cleaning standard for grease soil removal with the manual SLW machine.

## Soiling Process:

A set of pre-weighed copper coupons were soiled with 0.5 grams of multi-purpose super white grease soil using a hand held swab. Another set of pre-weighed copper coupons were soiled with 0.5 grams of wax blend using a hand held swab. The wax blend is made from a blend of polybutene oil 50%, and BE Square 50%. After soiling the coupons with the respective soils, each coupon was re-weighed for the amount of contaminants added.

## Cleaning Process:

Three copper coupons soiled with the same soil were placed into a Gardner Straight Line Washability unit. A Wypall X60 reinforced wipe was attached to the cleaning sled and soaked with 1 spray of cleaning solution. Each coupon was sprayed once with the same cleaning solution. Each cleaning solution was used at full concentration. The solution was allowed to penetrate/contact for 30 seconds followed by cleaning in the SLW unit for 20 cycles (~33 seconds).

## Efficacy Rating Process:

After cleaning, the coupons were left to sit at room temperature for 1 hour before re-weighing the coupons for the amount of contaminants removed. The efficacy of a cleaner is measured by the amount of contaminated removed using gravimetric analysis. As a general rule of the lab, an effective cleaner is observed to have an efficacy rating of 85% or higher.

Chemistries Evaluated: Quicksolv DMC; Acetone

Results: The sample cleaner (Quicksolv DMC) was observed to be just as effective as the comparative cleaner (acetone) when removing multi-purpose super white grease soil from copper coupons: with respective efficacy ratings of: 90.56% and 86.77%. Similarly, the sample cleaner (Quicksolv DMC) was observed to be just as effective as the comparative cleaner (acetone) when removing wax blend soil from copper coupons: with respective efficacy ratings of 19.33% as compared to 14.55%.

Table pertaining to the amount of contaminant added and removed using a gravimetric scale, to measure the efficacy of the respective cleaners.

| Initial wt. of Cont. (g) | Final wt. of Cont. (g) | Cont. Removed (%) | Avg. Cont. Removed (%) | Avg. Efficacy (%)         |
|--------------------------|------------------------|-------------------|------------------------|---------------------------|
| 0.4965                   | 0.0288                 | 94.2              | 90.56                  | 54.95<br>Quicksolv<br>DMC |
| 0.5008                   | 0.0276                 | 94.49             |                        |                           |
| 0.4955                   | 0.0843                 | 82.99             |                        |                           |
| 0.501                    | 0.3967                 | 20.82             | 19.67                  |                           |
| 0.4992                   | 0.3958                 | 20.71             |                        |                           |
| 0.4733                   | 0.3906                 | 17.47             |                        |                           |
| 0.5166                   | 0.3756                 | 27.29             | 19                     |                           |
| 0.4973                   | 0.3934                 | 20.89             |                        |                           |
| 0.5189                   | 0.4732                 | 8.81              |                        |                           |
| 0.4982                   | 0.0562                 | 88.72             | 86.77                  | 50.66<br>Acetone          |
| 0.4982                   | 0.0643                 | 87.09             |                        |                           |
| 0.5036                   | 0.0781                 | 84.49             |                        |                           |
| 0.5041                   | 0.4684                 | 7.08              | 14.87                  |                           |

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|        |        |       |       |  |
|--------|--------|-------|-------|--|
| 0.4987 | 0.3552 | 28.77 | 14.24 |  |
| 0.4932 | 0.4501 | 8.74  |       |  |
| 0.5051 | 0.4879 | 3.41  |       |  |
| 0.5056 | 0.3278 | 35.17 |       |  |
| 0.4983 | 0.4776 | 4.15  |       |  |

\*Note that there are two trials for cleaning the wax blend soil because the first trial was observed to have a high standard deviation. Therefore, a second trial was conducted to verify the results of the first trial. There is no significant difference between the first and second trial runs.

Summary:

|                                |                      |                |                    |                                     |  |
|--------------------------------|----------------------|----------------|--------------------|-------------------------------------|--|
| <b>Substrates:</b>             |                      | Copper         |                    |                                     |  |
| <b>Contaminants:</b>           |                      | Greases, Waxes |                    |                                     |  |
| <b>Company Name:</b>           | <b>Product Name:</b> | <b>Conc.:</b>  | <b>Efficiency:</b> | <b>Effective:</b>                   | <b>Observations:</b>                                     |
| J.T. Baker                     | Acetone              | 100            | 86.77              | <input checked="" type="checkbox"/> | Multi-purpose super white grease; only 14 % on wax blend |
| Inventec Performance Chemicals | Quicksolv DMC        | 100            | 90.56              | <input checked="" type="checkbox"/> | Multi-purpose super white grease 90.56; Wax Blend 19.33  |

Conclusion:

In conclusion, the sampled cleaner (Quicksolv DMC) was just as effective as the comparative cleaner (acetone) for removal of both soils (white grease and wax blend).