

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2020  
 DateRun: 01/31/2020  
 Experimenters: Othon Pagounes, Tatyanna Moreland Junior  
 ClientType: Capacitor Manufacturer  
 ProjectNumber: Project #3  
 Substrates: Aluminum, Ceramics  
 PartType: Coupon  
 Contaminants: Oil  
 Cleaning Methods: Immersion/Soak  
 Analytical Methods: Gravimetric, Visual  
 Purpose: To evaluate the effectiveness of solvent and aqueous based cleaners on the removal of oil by heated immersion on aluminum and ceramic coupons.

Experimental Procedure: A set of 18 pre-weighed coupons, nine per substrate, were contaminated with either Canola Oil, Expoxidized Soybean Oil, or SAS-60E. Coupons were immersed into the cleaning solution heated to 140° F for one minute and then transferred into a deionized water bath also heated to 140° F for an additional minute. Afterwards, the coupons were dried with a heat gun, before final weights were recorded.

Results:

| Cleaner        | Substate | Soils                   | Initial wt of cont. | Final wt of cont. | %Cont Removed | % Average |
|----------------|----------|-------------------------|---------------------|-------------------|---------------|-----------|
| Aquaese PL 732 | Aluminum | Canola Oil              | 0.5061              | 0.4038            | 20.21         | 33.59     |
|                |          |                         | 0.4555              | 0.2607            | 42.77         |           |
|                |          |                         | 0.4926              | 0.3065            | 37.78         |           |
|                |          | Expoxidized Soybean Oil | 0.5270              | 0.4751            | 9.85          | 5.62      |
|                |          |                         | 0.5124              | 0.5048            | 1.48          |           |
|                |          |                         | 0.5071              | 0.4790            | 5.54          |           |
|                |          | SAS-60E                 | 0.4485              | 0.0074            | 98.35         | 96.51     |
|                |          |                         | 0.5310              | 0.0075            | 98.59         |           |
|                |          |                         | 0.4756              | 0.0353            | 92.58         |           |
|                | Ceramic  | Canola Oil              | 0.4335              | 0.0195            | 95.50         | 95.97     |
|                |          |                         | 0.4304              | 0.0202            | 95.31         |           |
|                |          |                         | 0.4505              | 0.0130            | 97.11         |           |
|                |          | Expoxidized Soybean Oil | 0.5057              | 0.1011            | 80.01         | 76.95     |
|                |          |                         | 0.5182              | 0.0737            | 85.78         |           |
|                |          |                         | 0.4957              | 0.1732            | 65.06         |           |
| SAS-60E        |          | 0.4611                  | 0.0301              | 93.47             | 88.22         |           |
|                |          | 0.4337                  | 0.0706              | 83.72             |               |           |
|                |          | 0.4965                  | 0.0622              | 87.47             |               |           |

Summary Table

| Contaminant             | Substrate | Efficiency % | Effective |
|-------------------------|-----------|--------------|-----------|
| Canola Oil              | Aluminum  | 33.59        | No        |
|                         | Ceramic   | 95.97        | Yes       |
| Expoxidized Soybean Oil | Aluminum  | 5.62         | No        |
|                         | Ceramic   | 76.95        | No        |
| SAS-60E                 | Aluminum  | 96.51        | Yes       |
|                         | Ceramic   | 88.21        | Yes       |

Summary:

|                      |                      |               |                    |                                     |                      |
|----------------------|----------------------|---------------|--------------------|-------------------------------------|----------------------|
| <b>Substrates:</b>   | Aluminum, Ceramics   |               |                    |                                     |                      |
| <b>Contaminants:</b> | Oil                  |               |                    |                                     |                      |
| <b>Company Name:</b> | <b>Product Name:</b> | <b>Conc.:</b> | <b>Efficiency:</b> | <b>Effective:</b>                   | <b>Observations:</b> |
| Hubbard Hall Inc     | Aquaese PL 732       | 10%           |                    | <input checked="" type="checkbox"/> |                      |

Conclusion: Aquaese PL 732 was effective on ceramic for canola oil and SAS-60E, and it was effective on aluminum with SAS-60E.