CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2015
DateRun:	03/18/2015
Experimenters:	Luis Raudales, Abigail Giarrosso, Alicia McCarthy
ClientType:	Manufactures parts for Semi-Conductor Industry
ProjectNumber:	Project #1
Substrates:	Aluminum
PartType:	Coupon
Contaminants:	Paints
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric, Visual
Purpose:	To evaluate seven supplied products for removal of red lacquer from aluminum with immersion at room temperature.
Experimental Procedure:	One of seven supplied cleaning products were diluted with DI water at room temperature to vendor recommended concentration for cleaning (20% DI water in 100ml). All other Products were 100ml of 100% concentration in a beaker. Aluminum coupons were pre-weighted for initial weights before coating with red lacquer using a swab method. Dirty weights were collected 24 hours later before testing to determine the amount of soil added after drying. Three coupons were placed into each beaker with one of the products for 5 minutes. All 25 coupons were then removed, dipped in DI water, and air blown off. Visual observations of removal were ranked from total removal to no removal. They were then placed back into the solution and the process repeated until the end of 30 minutes. All coupons were then placed back into the beakers for a continuous 30 minutes, removed, dipped in DI water, air blown off and then visually observed for the last time. Clean weights were measured 24 hours later in hope that the leftover epoxy on coupons would be less swelled due to products. Coupons were completely cleaned and weighed to collect initial weights.
Results:	Gravimetric Testing:

Cleaner	Initial wt of cont.	Final wt of cont.	% Cont Removed
ZemaSol	0.20	0.18	10.00
	0.17	0.15	11.76
	0.18	0.16	11.11
Chimista GreenStrip	0.19	0.03	84.21
	0.16	0.11	31.25
	0.18	0.12	33.33
Stepsol MET 10U	0.20	0.18	10.00
	0.18	0.16	11.11
	0.17	0.14	17.64
D-Zolv 917	0.18	0.19	-5.55
	0.18	0.18	0.00
	0.17	0.19	-11.76
Sky Kleen	0.23	0.22	4.34
	0.19	0.17	10.52
	0.21	0.20	4.76
Graffiti Remover	0.20	0.03	85.00
	0.2	1.09	-445.00
	0.18	0.18	0.00
Bio-circle BC 100	0.27	0.25	7.40
	0.27	0.27	0.00
	0.21	0.20	4.76

Visual Testing:
1. Total Removal
2. Mostly Removed

CLEANING LABORATORY EVALUATION SUMMARY

3. Some Removed
4. Little Removal
5. No removal

Cleaner	5 min	10 min	15 min	20 min	25 min	30 min	30 min straight
ZemaSol	2	1.5	1.5	1	1	1	1
	4	1.5	1.5	1.5	1.5	1.5	1.5
	1	1	1	1	1	1	1
Chimista Greenstrip	1	1	1	1	1	1	1
	2	1	1	1	1	1	1
	1	1	1	1	1	1	1
Stepsol MET 10	4	2.5	1.5	1.5	1.5	1.5	1.5
	4.75	4.5	3	2	1.5	2.5	1.5
	4.5	4	3	2	1.5	1.5	1.5
D-Zolv 917	5	5	5	5	5	5	5
	5	5	5	5	5	5	5
	5	5	5	5	5	5	5
Sky Kleen	4	3.5	2.5	1.5	1.5	1.5	1
	4	3	1.5	1	1	1	1
	4	3	2.5	1.5	1.5	1.5	1
Graffiti Remover	5	2	1	1	1	1	1
	4.5	4.5	4	3	2	2	2
	5	4.5	4.5	2.5	2.5	2.5	2.5
Bio-circle BC 100	5	5	5	5	5	5	1
	5	5	5	5	5	5	5
	5	5	5	5	5	5	5

Summary:

Substrates:	Aluminum
Contaminants:	Paints

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
TBF Environmental Technologies	ZemaSol	100	10.96	☐	
Chimista Specialty Chemicals	GreenStrip 10 Biobased paint stripper	100	49.60	☐	
Transene Company, Inc.	D Zolve 917	100	-5.77	☐	
Solutia	Sky Kleen 1000 (Aviation Solvent)	100	6.54	☐	
Twin Rivers Technologies	Graffiti Remover	68	-120.00	☐	
J Walter Inc.	Bio Circle CB 100	20	4.05	☐	
Stepan	Steposol SB-D	100	12.92	☐	

Conclusion:

Even though gravimetric results were in the negative in most areas due to the red lacquer soaking up the products used, visually, ZemaSol, Chimista, Stepsol MET 10U, Sky Kleen, and Graffiti Remover were found to be effective for removing the red lacquer soil from steel at room temperature immersion. D-Zolv 917 and Bio-circle BC 100 showed limited or next to no removal of the epoxy from the steel. The 30 straight minutes of immersion also showed better removal than the continuous removal every five minutes for a half hour.