CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2023
DateRun:	05/04/2023
Experimenters:	Alicia McCarthy, Amelia Wagner, Siddhant Trivedi
ClientType:	Manufacturing
ProjectNumber:	Project #1
Substrates:	Laminate
PartType:	Coupon
Contaminants:	Adhesive
Cleaning Methods:	Manual Wipe
Analytical Methods:	Visual
Purpose:	To evaluate the effectiveness of several cleaners in removing adhesive from adhesive from laminate
Experimental Procedure:	Two 2"x1" pieces of laminate were each divided into three equal sections for each product tested and initial visual rankings of cleanliness recorded. Application of three, thin one-inch lines of Wilsonart 3000 adhesive in each section using a swab acted as three individual tests per product. A putty knife scraped the adhesive to create a very thin coating and air-dried at room temperature (68F) for 30 minutes.

Diluted and or ready-to-use cleaners tested based on vendor recommendation:

(A) Startex Laquer Thinner (100%) (Current Product)

(B) MD Stetson HD-32 Heavy Degreaser (31%)

(C) Bioneat All Purpose Cleaner (6:1 Dilution)

(D) MD Stetson EPS (1:10 Dilution)

(E) Seventh Generation All Purpose Cleaner (100%)

(F) Cloth + Bristle All The Things (100%)

Prepared cleaners in spray bottles sprayed five times on a t-shirt rag and three sprays directly on the laminate section before manually wiping the surface for 20 seconds. Recordings of visual rankings for each strip of adhesive in a section used the following ranking key:

Rating	Description
1	Adhesive completely removed
2	Most of the adhesive removed
3	Partial removal of the adhesive
4	A little removal of the adhesive
5	No removal of the adhesive

An additional timed test was then performed to see how long it took to remove the adhesive using the client's current product with the same product application protocol and manual wipe with a t-shirt rag.

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Results:

Product	Cleanliness Ratings	
	20 Seconds	Overall Average Visual Removal
Startex Lacquer Thinner	4.25	4.08
	4	
	4	
MD Stetson HD-32 Heavy Degreaser	1.75	1.25
	1	
	1	
Bioneat All Purpose Cleaner	1.5	1.83
	2	
	2	
MD Stetson EPS	2	1.42
	1	
	1.25	
Seventh Generation All Purpose Cleaner	2.25	2.00
	2	
	1.75	
Cloth + Bristle All the Things	4	4.08
	4	
	4.25	

Additional Timed Test:

Startex Lacquer Thinner (100%) (Current Product): After 20 seconds of manual wiping, the adhesive had begun to peel but was not removed. It took an additional one minute and 49 seconds of manual wiping for the adhesive to be completely removed.

MD Stetson HD-32 Heavy Degreaser (31%): Coupons were manually wiped for an additional one minute and 49 seconds after the initial 20 seconds of cleaning. In this time frame, most of the adhesive was removed, however, some spots of gloss remained.

Bioneat All Purpose Cleaner (6:1 Dilution): Coupons were manually wiped for an additional one minute and 49 seconds after the initial 20 seconds of cleaning. In this time frame, all of the adhesive was removed.

MD Stetson EPS (1:10 Dilution): Right after the initial 20 seconds of manual wiping, the coupons did not appear to visually be cleaned to an acceptable level. However, when looked at again 30 seconds later, the coupons appeared to be completely cleaned. Coupons were not manually wiped for an additional one minute and 49 seconds because the adhesive had already been completely removed in the initial 20 seconds of manual wiping.

Seventh Generation All Purpose Cleaner (100%): Coupons were manually wiped for an additional 1 minute and 49 seconds after the initial 20 seconds of cleaning. In this time frame, most of the adhesive was removed however some peeling still remained.

Cloth + Bristle All The Things (100%): Coupons were manually wiped for an additional one minute and 49 seconds after the initial 20 seconds of cleaning. Although the cleaner did not make much difference during the initial 20 seconds, all of the adhesive residue on the surface was completely removed from the coupons within the time frame of the additional one minute and 49 seconds.

Observations:

MD Stetson HD-32 Heavy Degreaser (31%): This cleaner is not an effective alternative to the current product as it did not match the cleaning capabilities of the current product within the same time frame. It also includes ingredients Ethanolamine and Benzylic alcohol, which while may be less hazardous than the active ingredients of the current product, still have implications for human health and environmental hazards.

Bioneat All Purpose Cleaner (6:1 Dilution): This cleaner is an effective alternative to the current product because it matched the cleaning capabilities of the current product within the same time frame.

MD Stetson EPS (1:10 Dilution): This cleaner is the most effective alternative to the current product because it was able to match the cleaning capabilities of the current product within a much shorter time frame. However, it is important to note that the cleaner includes the ingredients Ethanolamine and Benzylic alcohol, which while may be less hazardous than the active ingredients of the current product, still have implications for human health and environmental hazards.

Seventh Generation All Purpose Cleaner (100%): This cleaner is not an effective alternative to the current product because it did not match the cleaning capabilities of the current product within the same time frame.

Cloth + Bristle All The Things (100%): This cleaner is an effective alternative to the current product because it was able to match the cleaning capabilities of the current product within the same time frame.

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Summary:

Conclusion: Bioneat All Purpose Cleaner (6:1 Dilution), MD Stetson EPS (1:10 Dilution), and Cloth + Bristle All the Things (100%) were all effective at removing 30-minute aged Wilsonart 3000 adhesive from laminate. The next step will be to test laminate coupons that have 24-hour aged Wilsonart 3000 adhesive using the effective alternative cleaners to compare the original project; Seventh Generation All Purpose Cleaner will not be tested since it was ineffective.

Additional testing can be performed using pure Ethanolamine and Benzlic alcohol, the main ingredients for the MD Stetson products, to confirm what is actively removing the adhesive from the laminate. Hansen Solubility Parameters in Practice (HSPiP) software could be used to identify safer ingredients and work with MD Stetson to change their formulation.