

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2010  
 DateRun: 12/16/2010  
 Experimenters: Jason Marshall  
 ClientType: General  
 ProjectNumber: Project #1  
 Substrates: Marble  
 PartType: Coupon  
 Contaminants: Calcium/lime  
 Cleaning Methods: Immersion/Soak  
 Analytical Methods: Gravimetric, Visual  
 Purpose: To evaluate hard water stain removal

**Experimental Procedure:** A good way to predict the effectiveness of an acid is by means of the so-called "marble block" test method. This test is a good way to predict an acid's performance under practical conditions. To test the descaling performance, a marble block is submerged in a test solution for several minutes. The weight is measured before and after.

Several marble chips of similar size and shape were weighed to determine the baseline weight of each piece. The selected chips were then immersed in the products at vendor recommended dilutions and allowed to soak for 18 hours. The marble chips were removed from the products and rinsed in a tap water spray at for 1 minute to remove loose material from the chips. Then the chips were dried for 15 minutes using a Master Appliance Heat gun at 500 F. When the chips cooled to room temperature, final weights were recorded to determine weight loss, if any. Observations were made after the initial immersion of the chips into solutions (5 minutes), at 60 minutes and then following the overnight immersion.

In addition to the 4 products from the soil removal test, 2 additional products were included for hard water stain removal.

**Results:** The current toilet bowl cleaner from TMI was by far the most effective hard water stain remover based on weight loss of the marble block and visual observations. The PC 120 was the second most successful product from the previous trial. The two additional products, DFC Restroom and CLR, also were effective at low concentrations. The table lists the amount of calcium removed from the marble and the observations on the process.

Product	Initial wt	Final wt	Difference	%Wt loss of block	Ave
TMI Toilet Bowl - porcelain	16.9467	16.6224	0.3243	1.91	3.91
	7.1301	6.7089	0.4212	5.91	
Tough Job - porcelain	14.6607	14.6712	-0.0105	-0.07	-0.06
	9.8936	9.8993	-0.0057	-0.06	
7th Generation All Purpose - porcelain	20.2033	20.1934	0.0099	0.05	0.12
	7.1918	7.1781	0.0137	0.19	
PC120 - ceramic	13.4153	13.3580	0.0573	0.43	0.33
	8.4230	8.4028	0.0202	0.24	
DFC Restroom	19.8850	19.6572	0.2278	1.15	1.40
	4.8122	4.7330	0.0792	1.65	
DFC CLR	11.4138	11.3263	0.0875	0.77	1.19
	4.0115	3.9467	0.0648	1.62	
Visual Observations					
Product	Initial	5 min	60 min	18 hr	
TMI Toilet Bowl - porcelain	Aggressive	mild	particles collecting on bottom	particles collecting on bottom	
Tough Job - porcelain	little	little/none	white haze	particles collecting on bottom	
7th Generation All Purpose - porcelain	none	none	none		
PC120 - ceramic	none	none	little	particles collecting on bottom	
DFC Restroom	slight	slight	none	particles collecting on bottom	
DFC CLR	none	none	none	particles collecting on bottom	

Summary:

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<b>Substrates:</b>	Marble				
<b>Contaminants:</b>	Calcium/lime				
<b>Company Name:</b>	<b>Product Name:</b>	<b>Conc.:</b>	<b>Efficiency:</b>	<b>Effective:</b>	<b>Observations:</b>
Rochester Midland Corporation	EnviroCare Tough Job	12.5		<input type="checkbox"/>	
Seventh Generation	Free & Clear All Purpose	100		<input type="checkbox"/>	
Next-Gen Supply Group	PC 120 Peroxide Multisurface Cleaner	2		<input checked="" type="checkbox"/>	
Chemspec	DFC Restroom	2.3		<input checked="" type="checkbox"/>	
Chemspec	DFC Calcium, Lime & Rust Cleaner	2		<input checked="" type="checkbox"/>	

Conclusion: Additional marble block testing will be conducted to try and identify more effective alternatives to the current cleaning product.