

ANALYTICAL REPORT (English translation)

Effect of cleaning products on Link Solution CMX-DET detectable cable tags.

Date:	9/6 2020
Sponsor:	Link Solutions Aps
Contact:	Lars Honoré
Test subjects:	1) Cable tags with black text CMX-DET 75x15 mm 2) Cable tags with white text CMX-DET 75x15 mm
Material:	Extruded polyether based TPU compound
Color bands:	Black: FTI-HX White: FTI-X-CO-110x300 WE
Test period:	17/4 2020 – 15/5 2020
Test responsible:	Frank Sode



Purpose:	The purpose of the tests is to evaluate the effect of a number of cleaning products on two types of tags, delivered by Link Solutions Aps. The types tested: 1) Colored cable tags made of extruded polyether, with black printed text. 2) Colored cable tags made of extruded polyether, with white printed text. The printed text states the name of test-solution, major component and a serial number.
Test conditions:	The test consisted of two parts: Part 1) Total-immersion test, basically as described in Novadans internal instruction <i>KI-LA-109</i> and the standard: <i>ASTDM D534 Standard Practices for</i> <i>Evaluating the resistance of Plastics to Chemical Reagents.</i> The oxidizing solutions (Cip Alka Cl & Des Foam PAA) were replaced every week. Part 2) Manual SCRUB-test with brush, basically as described in the standard: <i>MIL STD-202G.</i> The same test-solutions were used in both parts of the test.
Procedure:	The test-subjects were tested as received, without previous cleaning or drying. Part 1) Two test-subjects were placed in 250 ml screw-capped pyrex bottles and covered with the respective solutions of the cleaning products. Products and concentrations are described in Table 1. The cleaning products was chosen to cover commonly used chemicals for surface cleaning. Comprising both alkaline, acid and oxidizing substances, also including solvents (alcohols and vegetable oil). After the test period, the tags were removed from the solutions, rinsed in DW and dried for 24 hours at ambient temperature. Part 2) The test included: immersion for three minutes, followed by 10 scrub-movements with the brush. These steps were repeated 3 times (in all 30 scrub-movements). The test-subjects were photographed before af after the tests, and regarding part 1 also weighed before and after. All dilutions were made in demineralized water (DW).



Table 1:

Products						
Major pH Name/type Components (1% DW) Test cc						
		Cip Alka 60	KOH/NaOH	12,7	1%	
Alkaline C		Foam 30	NaOH/TEA/non-ioincs	10,9	5%	
	Ovid	Cip Alka Cl	Hypochlorite	12,3	3%	
	Oxiu.	Des Foam PAA	Peracetic acid	3,2	13%	
		Foam 13	Org. acids/surfactans	2,5	5%	
		Cip Acid KA	Nitric acid/Phosphoric acid	(2%) 1,3	10%	
		IPA	Isopropanole	-		
Solvents		Ethanol/IPA	Ethanol, isopropanole	-		
		Rapsolie	Rapeseed-fatty acids	-		

Temperature and test-periods described in Tabel 2. Test conditions is selected with a start point of Novadan internal procedure called KI-LA-109.

Tabel 2:

Products			Novadan test conditions			
Navn/type			Temp.	Duration	Test conc.	
		Cip Alka 60	70°C	168 h (7 days)	1%	
Alkaline		Foam 30	70°C	168 h (7 days)	5%	
	Ovid	Cip Alka Cl	RT	672 h (28 days)	3%	
	Oxiu.	Des Foam PAA	RT	672 h (28 days)	13%	
		Foam 13	70°C	168 h (7 days)	5%	
		Cip Acid KA	70°C	168 h (7 days)	10%	
		IPA	RT	672 h (28 days)	100%	
Solvents		Ethanol/IPA	RT	672 h (28 days)	100%	
		Rapeseed oil	RT	672 h (28 days)	100%	

RT: Ambient (room) temperature

Part 2)

Same type of solutions as in Part 1 were used, and at same temperatures.

One test-subject of each type (black or white test) was immersed in the cleaning solution for 3 minutes. After this, they were taken op and placed on the table with the writing facing up. With a brush (new one for each solution) the tags were scrubbed with 10 movements, applying a light pressure.

The entire procedure, with immersion and scrubbing, was repeated three times.



Results:

Part 1:

The results (weights and observations) is listed in Table 3. Photos before and after is enclosed in Appendix 1.

Part 2:

Results (observations) is listed in Table 4. Photos are enclosed in Appendix 2.



Table 3 – Results from Part 1:

	Text	Tag nr	Weight before [g]	Weight after [g]	Loss [g]/[%]	Appearance of tag after	Appearance of solution
Cip Alka 60	White	1-1	0,935	0,932	0,003g/0,3%	Has a white patina after flushing and drying, which can be	Clear/few elongated crystals
		1-2	0,935	0,933	0,002g/0,2%	rubbed of.	(colorless 3-4 mm)
	Plack	1-1	0,931	0,925	0,006g/0,6%	Has a white patina after flushing and drying, which can be	
	DIACK	1-2	0,929	0,926	0,003g/0,3%	rubbed off.	
White Foam 30 Black		2-1	0,933	0,931	0,002g/0,2%	Has a bit of white patina after flushing and drying, which can	
	White	1 1	0.026	0,932	0.004 a /0.4%	be rubbed off. The text disappeared when flushing with	
		2-2	0,950	0 0 2 0	0,004g/0,4%	Has a bit of white pating after flushing and drying which can	
	Black	2-1	0,932	0,525	0,003g/0,3%	be rubbed off.	
	White	2-2	0,933	0,525	0,004g/0,4%	No vicible changes	
		3-1	0,929	0,930	-0,001g/-0,1%	NO VISIBLE CHANGES.	
Cip Alka Cl	Black	3-2	0,931	0,929	0,002g/0,2%	No vicible changes	
		3-1	0,934	0,952	0,002g/0,2%	NO VISIBLE CHANGES.	
		3-2	0,931	0,928	0,003g/0,3%	Also 1944 a de como	
	White	4-1	0,927	0,927	0,000g/0,0%	No visible changes.	
Des Foam PAA		4-2	0,928	0,925	0,003g/0,3%		
	Black	4-1	0,930	0,929	0,001g/0,1%	No visible changes.	
	Brack	4-2	0,930	0,929	0,001g/0,1%		
		5-1	0,929	0,937	-0,008g/-0,9%	Removes some of the text and the remaining is not firmly	
Foam 13	White	5-2	0.923	0,933	-0.010g/-1.1%	attached after flushing and drying. Otherwise no changes in the material.	Unclear(foggy)/a few yellow floating particles
	Black	5-1	0,929	0,939	-0,010g/-1,1%	No visible changes.	
		5-2	0,925	0,935	-0,010g/-1,1%		



Cip Acid KA	W/hito	6-1	0,924	0,969	-0,045g/-4,9%	The tag is porous, blistering and breaks easily.	
	6-2	0,929	0,975	-0,046g/-5,0%		Clear yellow liquid	
	Black	6-1	0,929	0,970	-0,041g/-4,4%	The tag is porous, blistering and breaks easily.	
	DIACK	6-2	0,925	0,975	-0,050g/-5,4%		
\A/bita	W/bito	7-1	0,929	0,941	-0,012g/-1,3%	No visible changes.	
	vviiite	7-2	0,933	0,948	-0,015g/-1,6%		
IPA	Plack	7-1	0,926	0,942	-0,016g/-1,7%	No visible changes.	
Die	DIACK	7-2	0,930	0,944	-0,014g/-1,5%		
\A/bite	W/bito	8-1	0,933	0,935	-0,002g/-0,2%	No visible changes.	
Ethanol/IDA	Ethanol/IPA	8-2	0,937	0,938	-0,001g/-0,1%		
EthanolyipA		8-1	0,930	0,930	0,000g/0,0%	No visible changes.	
DIdCK	DIdCK	8-2	0,930	0,931	-0,001g/-0,1%		
	W/bito	9-1	0,936	0,954	-0,018g/-1,9%	No visible changes, but the surface cannot be rinsed	
Rapsolie	white	9-2	0,934	0,943	-0,009g/-1,0%	completely with water.	Clear/yellow
	Black	9-1	0,931	0,938	-0,007g/-0,8%	No visible changes, but the surface cannot be rinsed	
		9-2	0,930	0,937	-0,007g/-0,8%	completely with water.	



Tabel 4 – Resultater fra Del 2:					
		Mærke	Udseende efter		
	Skrift	nr			
Cip Alka 60	Hvid	1-1	A few abrasion marks in the white text.		
Сір Аїка бо	Sort	1-1	No abrasion marks in the black text.		
Feem 20	Hvid	2-1	Den hvide tekst er slidt meget af.		
FUAITI 30	Sort	2-1	No abrasion marks in the black text.		
	Hvid	3-1	No abrasion marks in the white text.		
Cip Alka Ci	Sort	3-1	No abrasion marks in the black text.		
Des Foam PAA	Hvid	4-1	No abrasion marks in the white text.		
	Sort	4-1	No abrasion marks in the black text.		
Foom 12	Hvid	5-1	Very few abrasion marks in the white text.		
Foam 13	Sort	5-1	No abrasion marks in the black text.		
	Hvid	6-1	No abrasion marks in the white text.		
Сір Асій ка	Sort	6-1	No abrasion marks in the black text.		
	Hvid	7-1	A few abrasion marks in the white text.		
IPA	Sort	7-1	No abrasion marks in the black text.		
Ethanol/IPA	Hvid	8-1	Some abrasion marks in the white text.		
	Sort	8-1	No abrasion marks in the black text.		
Rapsolie	Hvid		No abrasion marks in the white text. Rapsolie skylles ikke		
		9-1	ordentlig af med dem.vand.		
	Sort	9-1	No abrasion marks in the black text. Rasolie skylles ikke ordentlig af med dem.vand.		

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Appendix 2 – photos from Part 2:

