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To: Perry Roberts
From: Chris Carlstein
Date: July 20, 2016
Subject: GM Flint Oven Solvent Loading, MTR 09PT7616

General Motors requested that BASF perform oven solvent loading testing for the Flint 3Wet Plant system per MTR 09PT7616. Testing was completed at the BASF Southfield laboratory facility located at 26701 Telegraph Rd. in Southfield, MI. Testing was completed between June 20– 30, 2016.

BASF evaluated the following products: BCP Grey Primer U338AW225F, WA8624 Summit White WBBC E54WW310F, WA636R Switchblade Silver WBBC E211AW314F and 2K4 (E10CG081G/N52CG081). All materials were sprayed at target film builds.

Testing for the waterborne primer (table #1) was completed per the process noted below and consistent with the material test requirements.

Primer Surfacer (Generic Gray WA#225A)

W_0 = weight of bare panel/foil

Apply primer surfacer
W_1 = Weight of panel + primer surfacer (immediately after spraying as practical)

Flash for **4.54** minutes @ ambient temp.

W_2 = Weight of primed panel/foil after ambient flash

Flash for **5.43** minutes @ **140**°F .

W_3= Weight of primed panel/foil after heated flash

Flash for **13.2** minutes @ ambient temp.

W_4 = Weight of primed panel/foil after ambient flash

Flash for **4.4** minutes at **140°F**. Remove panel from oven and cool down for **1** minute.

W_5 = Weight of primed panel/foil after heated flash and cool down.

Flash for **17.1** minutes @ ambient temp

W_6 = Weight of pane/foil after ambient flash

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Determine the amount of water in the film by spraying extra panels and analyze using Karl Fisher or GC

Bake for 25 minutes at 265°F

Let panel cool

W_7 = Weight of cooled, cured primed panel/foil

BASF Analytical Support Laboratory

The amount of water in the primer films was determined through quantitative analysis of various foil samples generated during topcoat application. The analysis of the waterborne primer identified up to eight different solvents.

Sample analysis was performed on the samples using a Hewlett Packard 6890 GC-FID and solvent identity was confirmed using a Hewlett Packard 5973 GC-MSD, ASTM D 6266-00a (reapproved 2005) – Standard Test Method for Determining the Amount of Volatile Organic Compound (VOC) Released From Waterborne Automotive Coatings and Available for Removal in a VOC Control Device (Abatement)

The Grey BCP waterborne primer CL average (lbs VOC / gal solids applied) after the ambient zone (W1 – W2) is 0.0208. The CL average after the heated flash (W2 – W3) is 1.1146. The CL average during basecoat application and flash (W3 – W4) is 0.0286. The CL average after the basecoat heated flash (W4 – W5) is 0.0605. The CL average during the clearcoat application and flash (W5 – W6) is 0.0397. The CL average after the bake oven (W6 – W7) is 0.1717. These results are detailed in Table 1 below:

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Table #1

FORM 4 - OVEN SOLVENT LOADING AND FLASH STUDY
Oven Solvent Loading Report Format

ZONE : Ambient Flash (W1 - W2)

Product Code:	U338AW225F	
Color Name:	Grey ProBloc	
Film Build:	0.5 - 0.7 mils	
Fi: Bare Panel/Foil (g)	0.7967	0.7701
Gi: Painted Before Zone (g)	1.0546	0.9503
Gf: Painted-After Zone (g)	0.9960	0.9470
W_{ci} : Painted After Fully Baked (g)	0.9049	0.8664
P_{Bi} = Gi - Fi :Weight of paint sample before zone	0.2579	0.1802
P_{Ci} = Gf - Fi :Weight of paint sample after zone	0.1993	0.1769
$\%VOC_{Bi}$: %Organic Before Zone	5.78	5.86
%NV: Before Zone	41.95	53.44
%Water: Before Zone	52.27	40.70
$\%VOC_{Ci}$: %Organic After Zone	7.37	6.22
%NV: After Zone	54.29	54.44
%Water: After Zone	38.34	39.34
WFS Liquid Paint (% w t solids)	32.93	32.93
WGC Liquid Paint (lb/gal)	9.34	9.34
VFS Liquid Paint (% vol solids)	27.30	27.30
D_{COS} = (WGC*WFS)/VFS (Solids Density)	11.27	11.27
W_{VOC} =[P_{Bi} X $\%VOC_{Bi}$] - [P_{Ci} X $\%VOC_{Ci}$] (g VOC)	0.0002	-0.0004
W_{COS} = W_{Ci} - F_i (g slds applied)	0.1082	0.0963
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	0.0208	-0.0468
CL average (Lbs VOC / Gal Solids Applied)	0.0208	

ZONE : BCP Heated Flash (W2 - W3)

Fi: Bare Panel/Foil (g)	0.7967	0.7701
Gi: Painted Before Zone (g)	0.9960	0.9470
Gf: Painted-After Zone (g)	0.9144	0.8751
W_{ci} : Painted After Fully Baked (g)	0.9049	0.8664
P_{Bi} = Gi - Fi :Weight of paint sample before zone	0.1993	0.1769
P_{Ci} = Gf - Fi :Weight of paint sample after zone	0.1177	0.1050
$\%VOC_{Bi}$: %Organic Before Zone	7.37	6.22
%NV: Before Zone	54.29	54.44
%Water: Before Zone	38.34	39.34
$\%VOC_{Ci}$: %Organic After Zone	2.07	2.77
%NV: After Zone	91.93	91.71
%Water: After Zone	6.00	5.52
WFS Liquid Paint (% w t solids)	32.93	32.93
WGC Liquid Paint (lb/gal)	9.34	9.34
VFS Liquid Paint (% vol solids)	27.30	27.30
D_{COS} = (WGC*WFS)/VFS (Solids Density)	11.27	11.27
W_{VOC} =[P_{Bi} X $\%VOC_{Bi}$] - [P_{Ci} X $\%VOC_{Ci}$] (g VOC)	0.0123	0.0081
W_{COS} = W_{Ci} - F_i (g slds applied)	0.1082	0.0963
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	1.2812	0.9479
CL average (Lbs VOC / Gal Solids Applied)	1.1146	

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Table 1 (cont.)

ZONE : BC Application and Flash (W3 - W4)

Fi: Bare Panel/Foil (g)	0.7967	0.7701
Gi: Painted Before Zone (g)	0.9144	0.8751
Gf: Painted-After Zone (g)	0.9151	0.8755
W_{ci} : Painted After Fully Baked (g)	0.9049	0.8664
P_{Bi} = Gi - Fi :Weight of paint sample before zone	0.1177	0.1050
P_{ci} = Gf - Fi :Weight of paint sample after zone	0.1184	0.1054
$\%VOC_{Bi}$: %Organic Before Zone	2.07	2.77
%NV: Before Zone	91.93	91.71
%Water: Before Zone	6.00	5.52
$\%VOC_{ci}$: %Organic After Zone	1.98	2.40
%NV: After Zone	91.39	91.37
%Water: After Zone	6.63	6.23
WFS Liquid Paint (% w t solids)	32.93	32.93
WGC Liquid Paint (lb/gal)	9.34	9.34
VFS Liquid Paint (% vol solids)	27.30	27.30
D_{cos} = (WGC*WFS)/VFS (Solids Density)	11.27	11.27
W_{voc} =[P_{Bi} X $\%VOC_{Bi}$] - [P_{ci} X $\%VOC_{ci}$] (g VOC)	0.0001	0.0004
W_{cos} = W_{ci} - F_i (g slds applied)	0.1082	0.0963
CL(total) = D_{cos} X (W_{voc} / W_{cos})	0.0104	0.0468
CL average (Lbs VOC / Gal Solids Applied)	0.0286	

ZONE : Topcoat Heated Flash (W4 - W5)

Fi: Bare Panel/Foil (g)	0.7967	0.7701
Gi: Painted Before Zone (g)	0.9151	0.8755
Gf: Painted-After Zone (g)	0.9129	0.8739
W_{ci} : Painted After Fully Baked (g)	0.9049	0.8664
P_{Bi} = Gi - Fi :Weight of paint sample before zone	0.1184	0.1054
P_{ci} = Gf - Fi :Weight of paint sample after zone	0.1162	0.1038
$\%VOC_{Bi}$: %Organic Before Zone	1.98	2.40
%NV: Before Zone	91.39	91.37
%Water: Before Zone	6.63	6.23
$\%VOC_{ci}$: %Organic After Zone	1.51	1.98
%NV: After Zone	93.12	92.77
%Water: After Zone	5.37	5.25
WFS Liquid Paint (% w t solids)	32.93	32.93
WGC Liquid Paint (lb/gal)	9.34	9.34
VFS Liquid Paint (% vol solids)	27.30	27.30
D_{cos} = (WGC*WFS)/VFS (Solids Density)	11.27	11.27
W_{voc} =[P_{Bi} X $\%VOC_{Bi}$] - [P_{ci} X $\%VOC_{ci}$] (g VOC)	0.0006	0.0005
W_{cos} = W_{ci} - F_i (g slds applied)	0.1082	0.0963
CL(total) = D_{cos} X (W_{voc} / W_{cos})	0.0625	0.0585
CL average (Lbs VOC / Gal Solids Applied)	0.0605	

Table 1 (cont)

ZONE : CC Application Zone and Flash (W5 - W6)

Fi: Bare Panel/Foil (g)	0.7967	0.7701
Gi: Painted Before Zone (g)	0.9129	0.8739
Gf: Painted-After Zone (g)	0.9142	0.8743
W_{cl} : Painted After Fully Baked (g)	0.9049	0.8664
P_{BI} = Gi - Fi :Weight of paint sample before zone	0.1162	0.1038
P_{Ci} = Gf - Fi :Weight of paint sample after zone	0.1175	0.1042
$\%VOC_{BI}$: %Organic Before Zone	1.51	1.98
%NV: Before Zone	93.12	92.77
%Water: Before Zone	5.37	5.25
$\%VOC_{CI}$: %Organic After Zone	1.31	1.51
%NV: After Zone	92.09	92.42
%Water: After Zone	6.60	6.07
WFS Liquid Paint (% w t solids)	32.93	32.93
WGC Liquid Paint (lb/gal)	9.34	9.34
VFS Liquid Paint (% vol solids)	27.30	27.30
D_{COS} = (WGC*WFS)/VFS (Solids Density)	11.27	11.27
W_{VOC} =[P_{BI} X $\%VOC_{BI}$] - [P_{CI} X $\%VOC_{CI}$] (g VOC)	0.0002	0.0005
W_{COS} = W_{CI} - F_I (g slds applied)	0.1082	0.0963
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	0.0208	0.0585
CL average (Lbs VOC / Gal Solids Applied)	0.0397	

ZONE : Bake Oven (W6 - W7)

Fi: Bare Panel/Foil (g)	0.7967	0.7701
Gi: Painted Before Zone (g)	0.9142	0.8743
Gf: Painted-After Zone (g)	0.9049	0.8664
W_{cl} : Painted After Fully Baked (g)	0.9049	0.8664
P_{BI} = Gi - Fi :Weight of paint sample before zone	0.1175	0.1042
P_{CI} = Gf - Fi :Weight of paint sample after zone	0.1082	0.0963
$\%VOC_{BI}$: %Organic Before Zone	1.31	1.51
%NV: Before Zone	92.09	92.42
%Water: Before Zone	6.60	6.07
$\%VOC_{CI}$: %Organic After Zone	0.00	0.00
%NV: After Zone	100.00	100.00
%Water: After Zone	0.00	0.00
WFS Liquid Paint (% w t solids)	32.93	32.93
WGC Liquid Paint (lb/gal)	9.34	9.34
VFS Liquid Paint (% vol solids)	27.30	27.30
D_{COS} = (WGC*WFS)/VFS (Solids Density)	11.27	11.27
W_{VOC} =[P_{BI} X $\%VOC_{BI}$] - [P_{CI} X $\%VOC_{CI}$] (g VOC)	0.0015	0.0016
W_{COS} = W_{CI} - F_I (g slds applied)	0.1082	0.0963
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	0.1562	0.1872
CL average (Lbs VOC / Gal Solids Applied)	0.1717	

Testing for the waterborne basecoat (table #2 and 3) was completed per the process noted below and consistent with the material test requirements.

Waterborne Basecoat (Summit White - WA#8624 & Switchblade Silver - WA#636R)

W_0 = weight of bare panel/foil

Apply basecoat

W_1 = Weight of panel/foil + basecoat (immediately after spraying as practical)

Flash for **10.9** minutes @ ambient temp.

W_2 = Weight of basecoated panel/foil after ambient flash

Flash for **4.4** minutes @ **140°F**. Remove from oven and cool **1** additional minute.

W_3 = Weight of basecoated panel/foil after heated flash

Flash for **17.1** minutes at ambient

W_4 = Weight of basecoated panel/foil after ambient flash

Determine the amount of water in the film by spraying extra panels and analyze using Karl Fisher or GC

Bake for 25 minutes at 265°F

Let panel cool

W_5 = Weight of cooled, cured basecoated panel/foil

BASF Analytical Support Laboratory

The amount of water in the basecoat films was determined through quantitative analysis of various foil samples generated during topcoat application. The analysis of the waterborne basecoats identified up to eleven different solvents.

Sample analysis was performed on the samples using a Hewlett Packard 6890 GC-FID and solvent identity was confirmed using a Hewlett Packard 5973 GC-MSD, ASTM D 6266-00a (reapproved 2005) – Standard Test Method for Determining the Amount of Volatile Organic Compound (VOC) Released From Waterborne Automotive Coatings and Available for Removal in a VOC Control Device (Abatement)

The Summit White waterborne basecoat CL average (lbs VOC / gal solids applied) after the ambient zone (W1 – W2) is 0.3620. The CL average after the heated flash (W2 – W3) is 1.6130. The CL average after the heated flash to bake oven (W3 – W4) is 0.0765. The CL average after the bake oven (W4 – W5) is 0.3914. The results are detailed in Table 2 below:

Table 2

FORM 4 - OVEN SOLVENT LOADING AND FLASH STUDY
Oven Solvent Loading Report Format

ZONE : Ambient Flash (W1 - W2)

Product Code:	E54WW310F	
Color Name:	Summit White	
Film Build:	0.9 - 1.1	
Fi: Bare Panel/Foil (g)	0.7921	0.7880
Gi: Painted Before Zone (g)	1.1335	1.1290
Gf: Painted-After Zone (g)	1.0636	1.0516
W_{ci} : Painted After Fully Baked (g)	0.9838	0.9755
P_{Bi} = Gi - Fi :Weight of paint sample before zone	0.3414	0.3410
P_{Ci} = Gf - Fi :Weight of paint sample after zone	0.2715	0.2636
$\%VOC_{Bi}$: %Organic Before Zone	9.27	8.67
%NV: Before Zone	56.15	54.99
%Water: Before Zone	34.58	36.34
$\%VOC_{Ci}$: %Organic After Zone	9.41	10.07
%NV: After Zone	70.61	71.13
%Water: After Zone	19.98	18.80
WFS Liquid Paint (% w t solids)	42.62	42.62
WGC Liquid Paint (lb/gal)	10.34	10.34
VFS Liquid Paint (% vol solids)	29.10	29.10
D_{cos} = (WGC*WFS)/VFS (Solids Density)	15.14	15.14
W_{VOC} =[P_{Bi} X $\%VOC_{Bi}$] - [P_{Ci} X $\%VOC_{Ci}$] (g VOC)	0.0061	0.0030
W_{COS} = W_{Ci} - F_i (g slds applied)	0.1917	0.1875
CL(total) = D_{cos} X (W_{VOC} / W_{COS})	0.4818	0.2422
CL average (Lbs VOC / Gal Solids Applied)	0.3620	

Table #2 (cont)

ZONE : Heated Flash (W2 - W3)

Fi: Bare Panel/Foil (g)	0.7921	0.7880
Gi: Painted Before Zone (g)	1.0636	1.0516
Gf: Painted-After Zone (g)	1.0101	1.0003
W_{ci} : Painted After Fully Baked (g)	0.9838	0.9755
P_{BI} = Gi - Fi :Weight of paint sample before zone	0.2715	0.2636
P_{Ci} = Gf - Fi :Weight of paint sample after zone	0.2180	0.2123
$\%VOC_{BI}$: %Organic Before Zone	9.41	10.07
%NV: Before Zone	70.61	71.13
%Water: Before Zone	19.98	18.80
$\%VOC_{CI}$: %Organic After Zone	2.36	3.09
%NV: After Zone	87.94	88.32
%Water: After Zone	9.70	8.59
WFS Liquid Paint (% w t solids)	42.62	42.62
WGC Liquid Paint (lb/gal)	10.34	10.34
VFS Liquid Paint (% vol solids)	29.10	29.10
D_{COS} = (WGC*WFS)/VFS (Solids Density)	15.14	15.14
W_{VOC} =[P_{BI} X $\%VOC_{BI}$] - [P_{CI} X $\%VOC_{CI}$] (g VOC)	0.0204	0.0200
W_{COS} = W_{Ci} - F_i (g slds applied)	0.1917	0.1875
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	1.6111	1.6149
CL average (Lbs VOC / Gal Solids Applied)	1.6130	

ZONE : Heated Flash to Bake Oven (W3 - W4)

Fi: Bare Panel/Foil (g)	0.7921	0.7880
Gi: Painted Before Zone (g)	1.0101	1.0003
Gf: Painted-After Zone (g)	1.0101	0.9998
W_{ci} : Painted After Fully Baked (g)	0.9838	0.9755
P_{BI} = Gi - Fi :Weight of paint sample before zone	0.2180	0.2123
P_{Ci} = Gf - Fi :Weight of paint sample after zone	0.2180	0.2118
$\%VOC_{BI}$: %Organic Before Zone	2.36	3.09
%NV: Before Zone	87.94	88.32
%Water: Before Zone	9.70	8.59
$\%VOC_{CI}$: %Organic After Zone	2.24	2.33
%NV: After Zone	87.94	88.53
%Water: After Zone	9.82	9.14
WFS Liquid Paint (% w t solids)	42.62	42.62
WGC Liquid Paint (lb/gal)	10.34	10.34
VFS Liquid Paint (% vol solids)	29.10	29.10
D_{COS} = (WGC*WFS)/VFS (Solids Density)	15.14	15.14
W_{VOC} =[P_{BI} X $\%VOC_{BI}$] - [P_{CI} X $\%VOC_{CI}$] (g VOC)	0.0003	0.0016
W_{COS} = W_{CI} - F_i (g slds applied)	0.1917	0.1875
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	0.0237	0.1292
CL average (Lbs VOC / Gal Solids Applied)	0.0765	

Table #2 (cont)

ZONE : Bake Oven (W4 - W5)

Fi: Bare Panel/Foil (g)	0.7921	0.7880
Gi: Painted Before Zone (g)	1.0101	0.9998
Gf: Painted-After Zone (g)	0.9838	0.9755
W_{cf} : Painted After Fully Baked (g)	0.9838	0.9755
P_{Bi} = Gi - Fi :Weight of paint sample before zone	0.2180	0.2118
P_{Ci} = Gf - Fi :Weight of paint sample after zone	0.1917	0.1875
$\%VOC_{Bi}$: %Organic Before Zone	2.24	2.33
%NV: Before Zone	87.94	88.53
%Water: Before Zone	9.82	9.14
$\%VOC_{Ci}$: %Organic After Zone	0.00	0.00
%NV: After Zone	100.00	100.00
%Water: After Zone	0.00	0.00
WFS Liquid Paint (% w t solids)	42.62	42.62
WGC Liquid Paint (lb/gal)	10.34	10.34
VFS Liquid Paint (% vol solids)	29.10	29.10
D_{COS} = (WGC*WFS)/VFS (Solids Density)	15.14	15.14
W_{VOC} =[P_{Bi} X $\%VOC_{Bi}$] - [P_{Ci} X $\%VOC_{Ci}$] (g VOC)	0.0049	0.0049
W_{COS} = W_{Ci} - F_i (g slds applied)	0.1917	0.1875
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	0.3870	0.3957
CL average (Lbs VOC / Gal Solids Applied)	0.3914	

The Switchblade Silver waterborne basecoat CL average (lbs VOC / gal solids applied) after the ambient zone (W1 – W2) is 0.5445. The CL average after the heated flash (W2 – W3) is 2.3529. The CL average after the heated flash to bake oven (W3 – W4) is 0.0772. The CL average after the bake oven (W4 – W5) is 0.4228. The results are detailed in Table 3 below:

Table #3

FORM 4 - OVEN SOLVENT LOADING AND FLASH STUDY
Oven Solvent Loading Report Format

ZONE : Ambient Flash (W1 - W2)

Product Code: Color Name: Film Build:	E211AW314F Switchblade Silver 0.4 - 0.6 mils	
Fi: Bare Panel/Foil (g)	0.7866	0.7722
Gi: Painted Before Zone (g)	1.1341	1.0702
Gf: Painted-After Zone (g)	1.0944	1.0276
W_{cf} : Painted After Fully Baked (g)	0.9052	0.8766
P_{Bi} = Gi - Fi :Weight of paint sample before zone	0.3475	0.2980
P_{Cf} = Gf - Fi :Weight of paint sample after zone	0.3078	0.2554
$\%VOC_{Bi}$: %Organic Before Zone	11.33	12.77
%NV: Before Zone	34.13	35.03
%Water: Before Zone	54.54	52.20
$\%VOC_{Cf}$: %Organic After Zone	11.31	11.94
%NV: After Zone	38.53	40.88
%Water: After Zone	50.16	47.18
WFS Liquid Paint (% wt solids)	23.89	23.89
WGC Liquid Paint (lb/gal)	8.78	8.78
VFS Liquid Paint (% vol solids)	21.50	21.50
D_{COS} = (WGC*WFS)/VFS (Solids Density)	9.76	9.76
W_{VOC} =[P_{Bi} X $\%VOC_{Bi}$] - [P_{Cf} X $\%VOC_{Cf}$] (g VOC)	0.0046	0.0076
W_{COS} = W_{Cf} - F_i (g slds applied)	0.1186	0.1044
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	0.3785	0.7105
CL average (Lbs VOC / Gal Solids Applied)	0.5445	

ZONE : Heated Flash (W2 - W3)

Fi: Bare Panel/Foil (g)	0.7866	0.7722
Gi: Painted Before Zone (g)	1.0944	1.0276
Gf: Painted-After Zone (g)	0.9198	0.8891
W_{cf} : Painted After Fully Baked (g)	0.9052	0.8766
P_{Bi} = Gi - Fi :Weight of paint sample before zone	0.3078	0.2554
P_{Cf} = Gf - Fi :Weight of paint sample after zone	0.1332	0.1169
$\%VOC_{Bi}$: %Organic Before Zone	11.31	11.94
%NV: Before Zone	38.53	40.88
%Water: Before Zone	50.16	47.18
$\%VOC_{Cf}$: %Organic After Zone	5.03	4.16
%NV: After Zone	89.04	89.31
%Water: After Zone	5.93	6.53
WFS Liquid Paint (% wt solids)	23.89	23.89
WGC Liquid Paint (lb/gal)	8.78	8.78
VFS Liquid Paint (% vol solids)	21.50	21.50
D_{COS} = (WGC*WFS)/VFS (Solids Density)	9.76	9.76
W_{VOC} =[P_{Bi} X $\%VOC_{Bi}$] - [P_{Cf} X $\%VOC_{Cf}$] (g VOC)	0.0281	0.0256
W_{COS} = W_{Cf} - F_i (g slds applied)	0.1186	0.1044
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	2.3124	2.3933
CL average (Lbs VOC / Gal Solids Applied)	2.3529	

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Table 3 (cont)

ZONE : Heated Flash to Bake Oven (W3 - W4)

Fi: Bare Panel/Foil (g)	0.7866	0.7722
Gi: Painted Before Zone (g)	0.9198	0.8891
Gf: Painted-After Zone (g)	0.9198	0.8891
W_{ci} : Painted After Fully Baked (g)	0.9052	0.8766
P_{BI} = Gi - Fi :Weight of paint sample before zone	0.1332	0.1169
P_{CI} = Gf - Fi :Weight of paint sample after zone	0.1332	0.1169
$\%VOC_{BI}$: %Organic Before Zone	5.03	4.16
%NV: Before Zone	89.04	89.31
%Water: Before Zone	5.93	6.53
$\%VOC_{CI}$: %Organic After Zone	4.72	3.01
%NV: After Zone	89.04	89.31
%Water: After Zone	6.24	7.68
WFS Liquid Paint (% wt solids)	23.89	23.89
WGC Liquid Paint (lb/gal)	8.78	8.78
VFS Liquid Paint (% vol solids)	21.50	21.50
D_{COS} = (WGC*WFS)/VFS (Solids Density)	9.76	9.76
W_{VOC} =[P_{BI} X $\%VOC_{BI}$] - [P_{CI} X $\%VOC_{CI}$] (g VOC)	0.0004	0.0013
W_{COS} = W_{CI} - F_i (g slds applied)	0.1186	0.1044
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	0.0329	0.1215
CL average (Lbs VOC / Gal Solids Applied)	0.0772	

ZONE : Bake Oven (W4 - W5)

Fi: Bare Panel/Foil (g)	0.7866	0.7722
Gi: Painted Before Zone (g)	0.9198	0.8891
Gf: Painted-After Zone (g)	0.9052	0.8766
W_{ci} : Painted After Fully Baked (g)	0.9052	0.8766
P_{BI} = Gi - Fi :Weight of paint sample before zone	0.1332	0.1169
P_{CI} = Gf - Fi :Weight of paint sample after zone	0.1186	0.1044
$\%VOC_{BI}$: %Organic Before Zone	4.72	3.01
%NV: Before Zone	89.04	89.31
%Water: Before Zone	6.24	7.68
$\%VOC_{CI}$: %Organic After Zone	0.00	0.00
%NV: After Zone	100.00	100.00
%Water: After Zone	0.00	0.00
WFS Liquid Paint (% wt solids)	23.89	23.89
WGC Liquid Paint (lb/gal)	8.78	8.78
VFS Liquid Paint (% vol solids)	21.50	21.50
D_{COS} = (WGC*WFS)/VFS (Solids Density)	9.76	9.76
W_{VOC} =[P_{BI} X $\%VOC_{BI}$] - [P_{CI} X $\%VOC_{CI}$] (g VOC)	0.0063	0.0035
W_{COS} = W_{CI} - F_i (g slds applied)	0.1186	0.1044
CL(total) = D_{COS} X (W_{VOC} / W_{COS})	0.5184	0.3272
CL average (Lbs VOC / Gal Solids Applied)	0.4228	

Testing for the clearcoat layer (table #4) was completed per the process noted below and consistent with the material test requirements.

Solventborne Clearcoat - E10CG081 / N52CG081

W_0 = weight of bare panel/foil

Apply clearcoat

W_1 = Weight of panel/foil + clearcoat (immediately after spraying as practical)

Flash for **16.8** minutes at ambient conditions

W_2= Weight of clearcoated panel/foil after flash

Bake for 25 minutes at 265°F

Let panel cool

W_3 = Weight of cooled, cured clearcoated panel/foil

For the E10CG081G/N52CG081 2K4 Solventborne Clearcoat , it was requested to report per Appendix A to Subpart IIII of Part 63. The CE average of the spray zone was 79.02. and the CE of the Bake zone was 20.97. The results are detailed in Table 4 below:

Table 4

Product Code Color Name GM-XX WA-XXXX Film Build (mils)	E10CG081G / N52CG081 2K4 Clearcoat 1.8 - 2.2		
	Panel 1	Panel 2	Panel 3
W0: Bare Panel (g)	0.7758	0.7826	0.7762
W2: Painted After Spray Zone (g)	1.0693	1.1102	1.0979
W3: Painted After Bake Oven (g)	1.0396	1.0654	1.0533
Wsdep = W3 - W0 (g solids deposited)	0.2638	0.2828	0.2771
Wrem = W2 - W3 (g VOC remaining on wet panel when it leaves spray zone)	0.0297	0.0448	0.0446
Pm = Wrem / Wsdep (g VOC/g coating solids deposited)	0.1126	0.1584	0.1610
Ws CC (Fraction wt solids)	0.593	0.593	0.593
Wvoc CC (Fraction VOC by wt)	0.407	0.407	0.407
$Pvoc_{pan}$ (% VOC that remains on wet panel when it leaves the spray zone)	16.4	23.1	23.5
CE of Spray Zone = 100 - $Pvoc_{pan}$	83.6	76.9	76.5

Average CE of Bake Oven **20.97859442**

Average CE Spray Zone **79.02140558**

If you have any questions about the information presented above, please do not hesitate to contact me.

Sincerely,

Chris Carlstein
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