YOLO-SOLANO AIR QUALITY MANAGEMENT DISTRICT
1947 Galileo Ct., Suite 103 · Davis, CA 95618 · (530) 757-3650 · www.ysaqmd.org

April 11, 2024

Sara Robbe
Marketing Manager
Anest Iwata Americas, Inc.
10148 Commerce Park Drive
Cincinnati, OH 45246

RE: Rule 2.26 Transfer Efficiency Conditional Approval of the Anest Iwata Series 2 WS-400 Spray Gun (Digital and Non-Digital) with Air Caps WS-400-02, WS-400-02-OBS, and WS-400-03-BF

Dear Ms. Robbe:

The Yolo-Solano Air Quality Management District (District) has performed a compliance review of your product with the requirements of District Rule 2.26 - Motor Vehicle and Mobile Equipment Coating Operations and has examined the conditional written approval from the South Coast Air Quality Management District (SCAQMD) included with your correspondence.

Rule 2.26, Section 304.5 requires any alternate coating application method achieve a transfer efficiency equivalent to or higher than High-Volume, Low-Pressure (HVLP) spray equipment.

Based on our review of the submitted correspondence and documentation the District agrees that the Anest Iwata Series 2 WS-400 Spray Gun (digital or non-digital) with Air Caps WS-400-02, WS-400-02-OBS, or WS-400-03-BF is capable of achieving a transfer efficiency equivalent to or greater than HVLP spray equipment.

The District grants conditional approval of the Anest Iwata Series 2 WS-400 Spray Gun (digital or non-digital) with Air Caps WS-400-02, WS-400-02-OBS, and WS-400-03-BF for use on any motor vehicle or mobile equipment or their parts or components. This approval is subject to the same conditions outlined in the submitted SCAQMD approval letter dated April 13, 2023 which are repeated below for information:

1. Anest Iwata Americas, Inc. (“Anest Iwata”) shall supply written notification with each Anest Iwata Series 2 WS-400 Spray Gun sold or distributed for use within the jurisdiction of the District that the spray gun is only approved for the application of coatings subject to District Rule 2.26.

2. This approval is only valid if the air pressure supplied to the Anest Iwata Series 2 WS-400 Spray Gun is equal to or less than 29 psig. Anest Iwata shall supply written notification with each Anest Iwata Series 2 WS-400 Spray Gun sold or distributed for use within the District that the maximum air pressure supplied to the spray gun shall not exceed 29 psig.

3. Anest Iwata shall supply a digital pressure gauge (Part Number DPG-1) with each digital Anest Iwata Series 2 WS-400 Spray Gun sold or distributed for use within the jurisdiction of the District. Anest Iwata shall supply a mechanical pressure gauge (Item Number 8131B) that clearly identifies the maximum allowable spray gun inlet air pressure with each non-digital Anest Iwata Series 2 WS-400 Spray Gun sold or distributed for use within the jurisdiction of the District. Anest Iwata shall supply written notification with each Anest Iwata Series 2 WS-400 Spray Gun sold or distributed within the District specifying that the pressure gage shall be attached to the spray gun and be in good working condition and reading no greater than 29 psig whenever the spray gun is in operation.

4. This approval is only valid if during actual operation the Anest Iwata Series 2 WS-400 Spray Gun is equipped with a properly operating pressure gauge that meets the criteria specified in Condition 3.

5. Anest Iwata shall add a clearly visible permanent label on the spray gun body that identifies it as "WS-400 Series 2" for all Anest Iwata WS-400 Series 2 Spray Guns sold or distributed for use within the District.

6. Anest Iwata shall add a clearly visible permanent label on the spray gun air cap that identifies it as "WS-400-02," "WS-400-02-0BS," "WS-400-03," or "WS-400-03- BF" and indicates that the inlet air pressure shall not exceed 29 psig for all Anest Iwata WS-400 Series 2 Spray Guns sold or distributed for use within the District.

7. This approval is only valid if during actual operation the Anest Iwata Series 2 WS-400 Spray Gun with Air Caps WS-400-02, WS-400-02-OBS, or WS-400-03-BF is labeled as described in Conditions 5 and 6.

8. This approval is only valid for the Anest Iwata Series 2 WS-400 Spray Gun (Digital and Non-Digital) with Air Caps WS-400-02, WS-400-02-OBS, and WS-400-03-BF tested. Any modification of the spray gun or pressure gauge design shall invalidate this approval letter unless the modification is approved by the District in writing prior to the modification.

If you have any questions, please contact me at (530) 757-3667.

Sincerely,

Benjamin Beattie
Engineering Manager

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

April 13, 2023

Mr. Eric Paugh
Project Engineering Supervisor
Anest Iwata USA, Inc.
10148 Commerce Park Drive
Cincinnati, OH 45246

Dear Mr. Paugh:

Subject: Rule 1151 Transfer Efficiency Approval of the WS-400 Series 2 Spray Gun (Digital and Non-Digital) with Air Caps WS-400-02, WS-400-02-OBS, WS-400-03, and WS-400-03-BF (Basecoat and Clearcoat), Application No. 627297.

The South Coast Air Quality Management District (South Coast AQMD) has completed review of your report entitled "Anest Iwata Transfer Efficiency – Final Report" dated August 10, 2022. The results of the transfer efficiency testing performed indicate that the WS-400 Series 2 Spray Gun (digital and non-digital) with Air Caps WS-400-02, WS-400-02-OBS, WS-400-03, and WS-400-03-BF is capable of achieving equivalent or better transfer efficiency than high-volume, low-pressure (HVLP) spray equipment. The WS-400 Series 2 Spray Gun (digital and non-digital) with Air Caps WS-400-02, WS-400-02-OBS, WS-400-03, and WS-400-03-BF is approved for operations subject to Rule 1151, Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations, under South Coast AQMD Rule 1151(d)(6)(A)(v). This approval is subject to the following conditions:

1. Anest Iwata USA, Inc. ("Anest Iwata") shall supply written notification with each WS-400 Series 2 Spray Gun sold or distributed for use within the jurisdiction of the South Coast AQMD that the spray gun with air caps WS-400-02, WS-400-02-OBS, WS-400-03, and WS-400-03-BF is only approved for the application of basecoats ("Color Coating") and clearcoats subject to South Coast AQMD Rule 1151.

2. This approval is only valid if the air pressure supplied to the WS-400 Series 2 Spray Gun is less than or equal to 29 psig. Anest Iwata shall supply written notification with each WS-400 Series 2 Spray Gun sold or distributed for use within the jurisdiction of the South Coast AQMD that the maximum air pressure supplied to the spray gun shall not exceed 29 psig.

3. Anest Iwata shall supply a digital pressure gauge (Part No. DPG-1) with each digital WS-400 Series 2 Spray Gun sold or distributed for use within the jurisdiction of the South Coast AQMD. Anest Iwata shall supply a mechanical pressure gauge

(Item #8131B) that clearly identifies the maximum allowable spray gun inlet air pressure with each non-digital WS-400 Series 2 Spray Gun sold or distributed for use within the jurisdiction of the South Coast AQMD. Anest Iwata shall supply written notification with each WS-400 Series 2 Spray Gun sold or distributed for use within the jurisdiction of the South Coast AQMD specifying that the pressure gauge shall be attached to the spray gun, be in good working condition, and reading no greater than 29 psig whenever the spray gun is in operation.

4. This approval is only valid if during actual operation, the WS-400 Series 2 Spray Gun is equipped with a properly operating pressure gauge that meets the criteria specified in Condition No. 3.

5. Anest Iwata shall add a clearly visible permanent label on the spray gun body that identifies it as "WS-400 Series 2" for all WS-400 Series 2 Spray Guns sold or distributed for use within the South Coast AQMD.

6. Anest Iwata shall add a clearly visible permanent label on the spray gun air cap that identifies it as "WS-400-02," "WS-400-02-OBS," "WS-400-03," or "WS-400-03-BF" and indicates that the inlet air pressure shall not exceed 29 psig for all WS-400 Series 2 Spray Guns sold or distributed for use within the South Coast AQMD.

7. This approval is only valid if during actual operation, the WS-400 Series 2 Spray Gun with Air Caps WS-400-02, WS-400-02-OBS, WS-400-03, and WS-400-03-BF is labeled as described in Condition Nos. 5 and 6.

8. This approval is only valid for the WS-400 Series 2 Spray Gun (Digital and Non-Digital) with Air Caps WS-400-02, WS-400-02-OBS, WS-400-03, and WS-400-03-BF tested. Any modification of the spray gun, air caps, or pressure gauge design shall invalidate this approval letter unless the modification is approved by the South Coast AQMD in writing prior to the modification.

If you have any questions regarding this approval, please call me at (909) 396-3129 or send me an email at mhaimov@aqmd.gov.

Sincerely,

Mitch Haimov, M.S.
Senior Engineering Manager
Coating, Printing, Plating,
Military & Entertainment Operations

MH:SNK:GM

University of Dayton Research Institute

ANEST IWATA TRANSFER EFFICIENCY – Final Report

PO Number: 6221-00
CRADA: 18-061-RX-01
UDRI Report Number: UDR-TR-2022-97
CCEG Tracking Number: LTW012

Prepared by: Christopher A. Joseph
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ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

Prepared for:
Anest Iwata USA, Inc.
Eric Paugh
Engineering Manager
10148 Commerce Park Drive
Cincinnati, OH 45246

10 August 2022

Approved:

Matthew Rothgeb
Coatings, Corrosion & Erosion Group Leader, UDRI

Distribution: Anest Iwata & UDRI only.

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ACKNOWLEDGMENTS

The University of Dayton Research Institute (UDRI) would like to acknowledge those who helped in the planning, support, and implementation of this project:

- The South Coast Air Quality Management District (SCAQMD) for their assistance in the testing protocol.
- Eric Paugh from Anest Iwata.

STATEMENT OF NON-CONFLICT AS AN INDEPENDENT LABORATORY

A Statement of No Conflict of Interest as an Independent Laboratory is in **Appendix A**.

OPENING STATEMENT

UDRI operates the Coating, Corrosion and Erosion Laboratory (CCEL), previously known as the Coatings Technology Integration Office (CTIO) for the United States Air Force. The facility is located at Wright-Patterson Air Force Base, Dayton, Ohio. UDRI is ISO 17025 accredited; accreditation issued by ANAB, an ANSI-ASQ National Accreditation Board (certificate number L1189-1). The following tests are part of the accreditation:

- Gloss
- Density
- Viscosity
- Dry Film Thickness

The purpose of this testing was to determine the transfer efficiency (TE) of two spray guns supplied by Anest Iwata USA, Inc. (AI). AI supplied a Clearcoat spray gun and a Basecoat spray gun and they were tested with both basecoat and clearcoat. The spray guns were tested in accordance with Rule 1151 from the SCAQMD. The transfer efficiency of the AI Spray Guns, on average, are to be the same or better than one of the average TE of a current high-volume, low-pressure (HVLP) technology spray gun. The AI spray guns are a compliant, non-high volume, low pressure gun,

and it was compared to two of the more commonly used HVLP spray guns used in the automotive aftermarket.

The test dates were the weeks of 10 January and 17 January 2022. We were not able to complete all of the spray-outs during the first week of testing so a second week was scheduled. Conducting the spray events from UDRI were Chris Joseph, Senior Research Engineer; LaNay Barley, Senior Coatings Technician; Matt Sigler, Coatings Technician; and Jarred Steel, Coatings Technician.

The test methods performed were performed in accordance with the South Coast Air Quality Management District *Spray Equipment Transfer Efficiency Test Procedure for Equipment User,* dated 24 May 1989 and "*Guidelines for Demonstrating Equivalency with District Approved Transfer Efficient Spray Guns"* dated September 26, 2002 along with a test plan protocol approved by SCAQMD.

SUMMARY

The South Coast Air Quality Management District (SCAQMD) requires HVLP spray guns or guns that meet or exceed transfer efficiency of HVLP guns to be used in the automotive aftermarket.

AI has developed a compliant clearcoat spray gun and a compliant basecoat spray gun. The objective of this project was to determine the overall TE of the AI spray guns and to compare the TE results of them to two of the more popular HVLP spray guns found in the SCAQMD area. The two HVLP spray guns used for comparison were the Devilbiss GTI and Sata 5000.

Each of the spray guns was set up to be operated as closely as possible to the other spray guns, staying within the recommended settings found in each operator's manual. The intent was to produce test panels that were similar in appearance, regardless of material or spray gun used.

Testing for the AI spray guns was performed to satisfy the requirements of SCAQMD *Rule 1151 - Motor Vehicle and Mobile Equipment Non-assembly Line Coating Operations.* The purpose of this rule is to reduce emissions of volatile organic compounds (VOC) and stratospheric ozone-depleting and global-warming compounds from coatings applied on Group I Vehicles and Equipment and Group II Vehicles, as defined in this rule, and their parts and components.

The complete data summary can be found in **Appendix D**.

DISTINCTNESS OF IMAGE (DOI) AND GLOSS

DOI is not part of UDRI's ISO accreditation. No major differences are found between the different spray guns and the different coating applications for both DOI and gloss. The locations for the Gloss and Dry Film Thickness readings can be found in **Table 1**. DOI and gloss are not typically

done on clearcoat only panels. The data is being supplied because it was in the test protocol. The DOI readings are from a desktop reflection type meter. The readings are fairly subjective and are generally taken in the center of the panels.

Table 1: Distinctness of Image and 60° Gloss (average of 12 readings)

	Average DOI		Average Gloss 60°	
	Small	**Large**	**Small**	**Large**
Anest Iwata (BC)				
PPG	90	90	91	90
Cromax	90	90	91	92
Anest Iwata (CC)				
PPG	90	90	93	93
Cromax	90	90	93	94
Devilbiss GTI (HVLP)				
PPG	90	90	89	92
Cromax	90	90	90	94
Sata 5000 HVLP				
PPG	90	90	91	89
Cromax	90	90	89	90

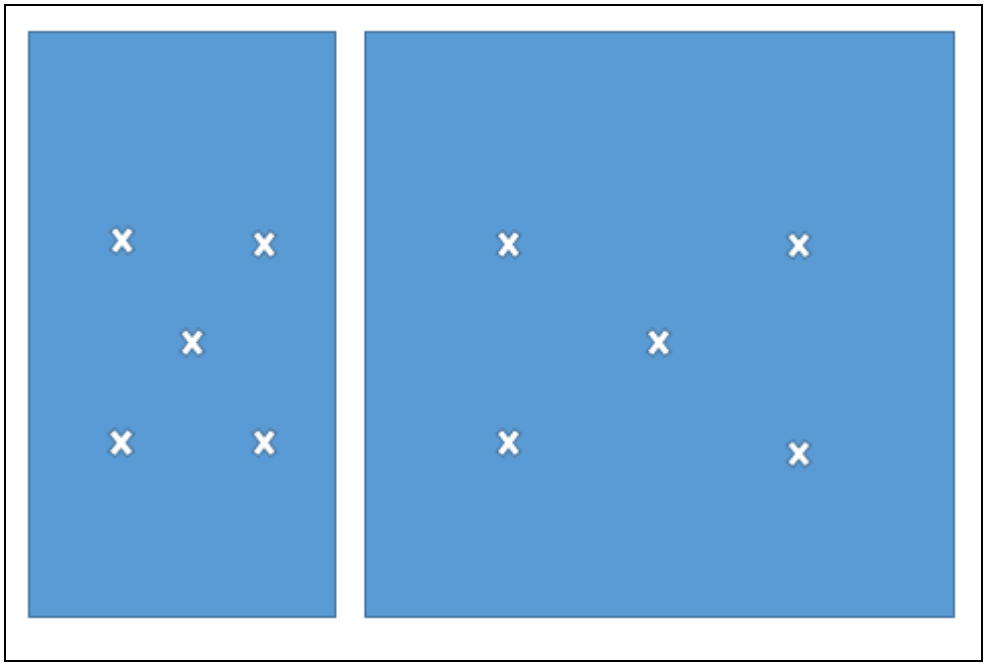

Figure 1: X = Dry Film Thickness locations. Gloss readings taken in the four quadrants and center

DRY FILM THICKNESS (DFT)

The average DFT's of the different applications can be found in Table 2.

Table 2: Dry Film Thickness Averages

Basecoat Averages							
AI BC PPG Small	AI CC PPG Small	Devilbiss PPG Small	SATA PPG Small	AI BC PPG Large	AI CC PPG Large	Devilbiss PPG Large	SATA PPG Large
0.39	0.51	0.48	0.34	0.57	0.42	0.61	0.41
AI Cromax Small	AI CC Cromax Small	Devilbiss Cromax Small	SATA Cromax Small	AI Cromax Large	AI CC Cromax Large	Devilbiss Cromax Large	SATA Cromax Large
0.69	0.55	0.55	0.49	0.44	0.47	0.61	0.44
Clearcoat Averages							
AI BC PPG Small	AI CC PPG Small	Devilbiss PPG Small	SATA PPG Small	AI BC PPG Large	AI CC PPG Large	Devilbiss PPG Large	SATA PPG Large
1.76	1.80	1.96	1.35	1.75	1.79	2.08	1.23
AI BC Cromax Small	AI CC Cromax Small	Devilbiss Cromax Small	SATA Cromax Small	AI BC Cromax Large	AI CC Cromax Large	Devilbiss Cromax Large	SATA Cromax Large
1.48	1.67	1.41	1.39	1.30	1.61	2.05	1.60

TRANSFER EFFICIENCY RESULTS

The average data used to calculate the TE is in **Table 3** and **Table 4**. The formula used for the calculation was:

$$\mathbf{TE = A/(B*C)}$$

Based on the testing performed and the data provided in this report, the AI spray gun provided higher average TE than one of the two HVLP spray guns tested.

Table 3: Basecoat Transfer Efficiency Calculations and Average

Spray Gun		MFR	Panel Size	% Weight of Solids on Panels (A) (grams)	% Weight of Paint Sprayed (B) (grams)	% Solids (C)	Transfer Efficiency (A/(B*C))	Average TE (%)
AI BC		PPG	Small	1.58	7.59	11.89	20.82	24.60
			Large	3.67	14.62	12.65	25.10	
		Cromax	Small	2.72	11.89	13.75	22.92	
			Large	5.12	17.33	15.40	29.55	
AI CC		PPG	Small	1.99	10.87	11.89	18.31	21.59
			Large	3.42	15.34	12.65	22.28	
		Cromax	Small	2.36	12.12	15.40	20.24	
			Large	4.05	15.84	13,75	25.54	
Devilbiss		PPG	Small	1.74	11.55	12,65	15.02	23.30
			Large	3.56	12.12	11.89	29.41	
		Cromax	Small	2.44	12.49	12.65	19.57	
			Large	5.15	17.63	15.31	29.20	
SATA		PPG	Small	1.24	9.35	12.65	13.24	20.86
			Large	2.82	14.74	12.65	19.13	
		Cromax	Small	1.88	13.10	15.40	29.55	
			Large	3.44	15.99	15.31	21.52	

Table 4: Clearcoat Transfer Efficiency Calculations and Average

Spray Gun		MFR	Panel Size	Weight of Solids on Panels (A) (grams)	Weight of Paint Sprayed (B) (grams)	% Solids (C)	Transfer Efficiency (A/(B*C))	Average TE
AI BC		PPG	Small	7.22	30.61	41.9	23.60	26.57
			Large	13.85	43.48	43.1	31.84	
		Cromax	Small	5.06	21.729	36.2	23.27	
			Large	11.07	40.14	36.7	27.57	
AI CC		PPG	Small	7.37	28.90	41.9	25.51	28.31
			Large	14.17	42.99	43.1	32.95	
		Cromax	Small	6.97	31.15	41.9	22.37	
			Large	12.71	39.19	36.2	32.43	
Devilbiss		PPG	Small	8.23	33.03	43.1	24.93	29.38
			Large	17.79	49.24	41.9	36.12	
		Cromax	Small	5.74	26.24	36.2	21.86	
			Large	17.18	49.66	37.9	34.60	
SATA		PPG	Small	5.56	34.59	43.1	16.07	24.56
			Large	9.19	28.92	43.1	31.77	
		Cromax	Small	7.86	33.40	36.7	23.55	
			Large	12.88	47.94	37.9	26.87	

When comparing the AI spray gun to the other spray guns with the same materials and same panel sizes the AI spray gun had better transfer efficiency than at least one of the HVLP spray guns.

SELF-CRITIQUE

Overall, the testing went very smoothly. Representative paint events were recorded and are provided on the accompanying DVDs, along with still images that show the weight solids, air pressures, air cap pressures, target distances…

With a recommendation from SCAQMD the trigger points were set up to completely trigger on before the test panel and to trigger off after the entire spray pattern was off of the panel. This was not done with previous Transfer Efficiency tests but this will be the new method for all future TE testing. Because of this test set-up and procedure, none of the spray guns tested were expected to achieve the recommended 65% TE as required in the SCAQMD *Spray Equipment Transfer Efficiency Test Procedure for Equipment User* dated 24 May 1989.

INDUSTRY SURVEY

Along with the testing of the AI spray guns, two HVLP spray guns were selected for comparison purposes and were recommended for use by AI. The two HVLP spray guns were the Devilbiss GTI and the Sata Jet 5000. Both are commonly used in the automotive coatings aftermarket. The spray guns used can be found in **Table 5**.

Table 5: Spray Guns

Manufacturer	Model	Inlet psi	Air Cap
AI (CC)	400	29	WS-400-03
AI (BC)	400	29	WS-400-02
Devilbiss	GTI	24	HV30
SATA	Jet 5000 HVLP	29	Jet 5000 1.3 HVLP

The coatings selected were manufactured by PPG (Envirobase) and Cromax (Cromax). PPG and Cromax are two of the largest manufacturers of automotive aftermarket coatings and OEM coatings for the auto industry. The coatings used are some of the most common coatings used in the SCAQMD area and they are Rule 1151 compliant.

All components of the PPG coatings were manufactured by PPG. All components of the Cromax coatings were manufactured by Cromax. The mix ratios and other information for the coatings and the testing can be found in **Table 6**. This information was taken from the Technical Data Sheets which can be found in **Appendix C**. General Test Information can be found in **Table 7**. The Technical Data Sheets for each material can be found on the DVD.

Table 6: General Information from the Paint Companies - Technical Data Sheet

	PPG	Cromax	PPG	Cromax
	Basecoat		Clearcoat	
Component A (Ratio)	10	10	EC520 (3)	LE5400S (4)
Component B (Ratio)	1	2	ECR85 (1)	LE1170S (1)
Component C (Ratio)	N/A	N/A	ECH5075 (1)	N/A
VOC (admixed) LE (g/l / lb/gal	257-395 g/l 2.11-3.30 lbs/gal	236 g/l 2.0 lbs/gal	114-248 g/l 0.95 – 2.07 lbs/gal	248 g/l 2.1 lbs/gal
VOC (admixed) AP	53-125 g/l 0.44-1.03 lbs/gal	69 g/l 0.6 lbs/gal	58–153 g/l 0.48–1.28 lbs/gal	121 g/l / 1.0 lbs/gal
Ready to Spray % Solids wgt.	13.8-41.5	24	41.7 – 44.0	Not reported
Density (g/l / lb/gal)	993-1231 g/l 8.29-10.27	1086 g/l 9.0 lbs/gal	1117 – 1176 g/l 9.32 – 9.81 lbs/gal	1085 g/l / 9.05 lbs/gal
Viscosity (mfg)	23-28s (DIN4)	Not reported	14 – 15s (DIN4)	14.5 – 16s (Zahn 2)
Force Dry (Dry to handle)	N/A	N/A	15m @ 140°F	10m@ 120°F
Pot Life	1 hour	4 hours	45 minutes	60 minutes
Number of coats	2 – 3 coats	2 coats	2 medium wet	2 medium wet
Flash between coats	2 – 4 minutes With air dryer	Wet on wet	3 – 5 minutes	3 – 5 minutes
Typical Dry Film Thickness (DFT in mils)	Until opacity reached	1-1.5 mils or opacity reached	2.0 – 3.5	2.0 – 2.4

Table 7: General Test Information

Substrate Type	2024 0.032” thick Aluminum panel (10 x 12 and 5 x 12) three of each for each TE test
Cup used for viscosity	Ford #4
Estimated Weight of Substrates	Large panels 170 grams, small panels 89 grams
Estimated Weight gain (coating dependent)	Large panels approximately 1 – 8 grams Small panels approximately ½ to 3 grams
Location of DFT tests	See Figure 1 Page 6
Dimensions of booth opening (approximate)	8’ x 10’
Air velocity at part	89 lfpm – 118 lfpm (approximately 10,000 CFM)
Pressure drop across filters	0.05 inches
Air temperature	77°F ± 3°F at 50% ± 5% relative humidity

HP rating of exhaust fan	5 HP
Cure temperature and time	1 hour at 140°F
Measuring Equipment Information	See Table 12
Standard Test Methods used	Viscosity – LP012 IAW ASTM D1200 and ASTM D4212 Density – LP047 IAW ASTM D1475 Solids – ASTM D2369 VOC – N/A we do not perform VOC calculations

Two different sizes of panels were sprayed. The small size of the panels used for TE calculations was 5 x 12 x .032 inch aluminum alloy (AA) 2024-T3. The large size of the panels used for TE calculations was 10 x 12 x .032 inch AA 2024-T3. Since the testing was basecoat and clearcoat only, separate appearance panels were not required.

MANUFACTURER'S TEST PROTOCOL

The spray robot has pneumatic triggers that are controlled by transducers. The triggers are actuated by a computer program set up to spray the two different sizes of panels. The same basic program was used for each of the spray guns. The spray robot was manufactured at UDRI specifically for TE testing.

Practice test panels were sprayed before actual TE testing so that the spray patterns could be verified and optimized. Traverse rate was determined by fluid flows through the spray guns when sprayed at the recommended air inlet pressure. The panels were set up so that the entire panel was covered with two passes, with each pass offset by approximately 5 inches. The panels were set up at a 7 – 8 inch target distance with the "trigger on" point approximately 3 inches off the panel and the "trigger off" point approximately 3 inches off the panel. Two coats for each material was sprayed on each panel.

An example of a program with settings can be found in **Figure 2**. The paint robot is set up so that the spray gun is fixed and the panel traverses back and forth and up and down. The program is an example of one used to control the spray guns trigger on, trigger off, travel distance, traverse speed, index distance, start point, etc.

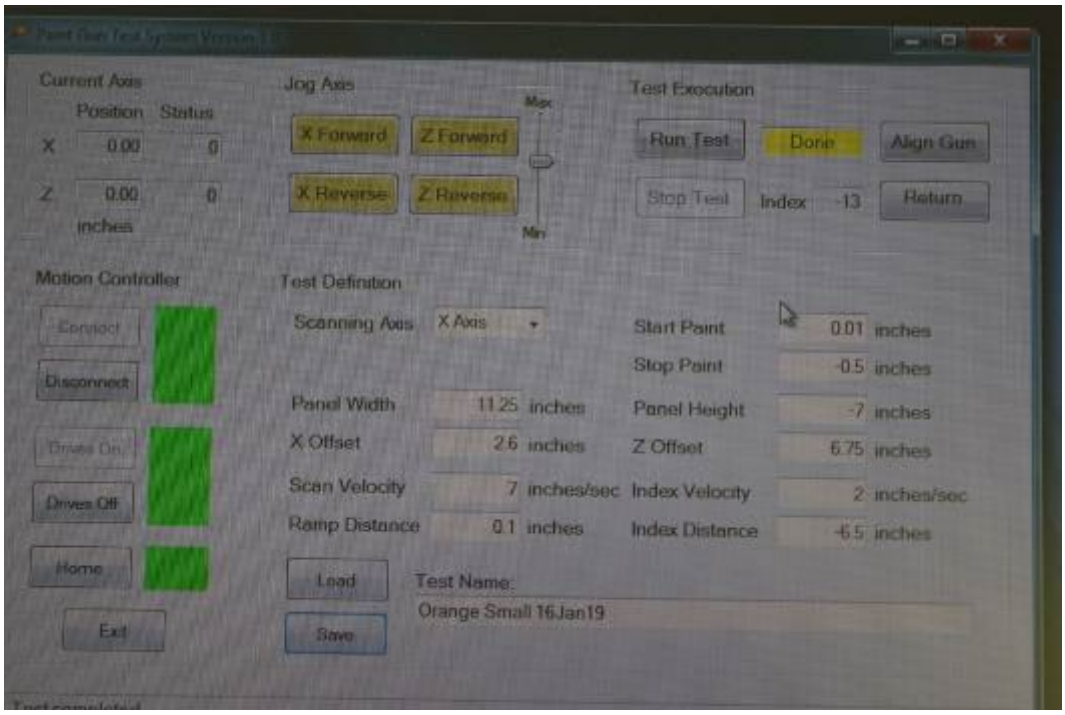

Figure 2: Small Panel Program (AI CC)

Figure 2 shows the computer screen when the robot is turned on and connected to the computer (Hewlett-Packard (HP) Probook 4520s).

Once power is supplied to the computer and controllers, the controllers are energized by pressing "Connect" and "Drives On". The red boxes next to the buttons will turn green when the controllers are energized. The "Home" button is then pressed and the robot will set itself to the 0,0 point for the X and Z axis and the "Home" indicator will turn green. The 0,0 point is fixed and is determined by limit switches. The program parameters of the "X offset" and "Z offset" are then determined which will move the panel to its start position which is where the X-axis movement begins.

For this example, the start point for the spray gun is 2.6 inches on the X axis and 6.75 inches on the Z axis from the 0,0 HOME position. When the spray gun reaches the start position the "Run Test" button is pressed and the target panel will begin moving at the programmed scan velocity, 7 inches per second, and start spraying immediately (Start Paint = 0.01 inches). If the "Start Paint" were set at 1 inch then the spray gun would be triggered after moving 1" in both directions sprayed.

To cover the panel, the spray gun moves along the X-axis, and at the end of the first path the panel will index -6.5 inches at 2 inches per second and the return pass will be sprayed. In this example the spray gun will trigger almost immediately as the "Start Paint" parameter is 0.01 inches. The "Stop Paint" value of -0.5 will stop the trigger at the "Panel Width" dimension minus the "Stop

Paint" value. The spray gun will trigger off after the spray gun has traversed 10.75 inches (11.25 inches minus 0.50 inches). Pneumatic lag was minimized by setting the spray guns up so that the trigger was pressed to just before the paint is triggered meaning the atomizing air was on. When the panel has been painted the spray gun will return to the 0,0 position.

Each spray gun used the same program for each of the three panels per test. One program for the large panels and one program for the small panels. Because each spray gun was held differently in their respective holders, the "X offset" and "Z offset" changed for each gun. A schematic of the spray patterns can be found in **Figures 3 and 4**.

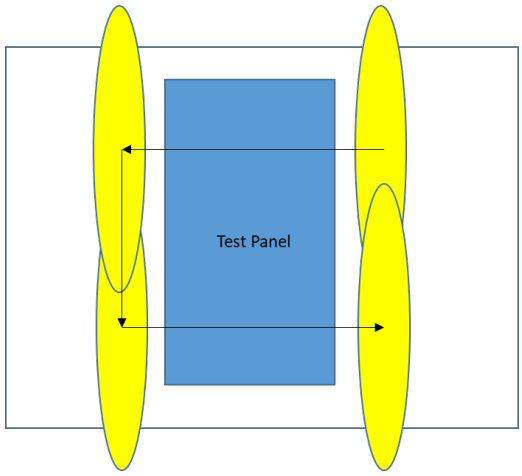

Figure 3: Small Panel Spray Schematic

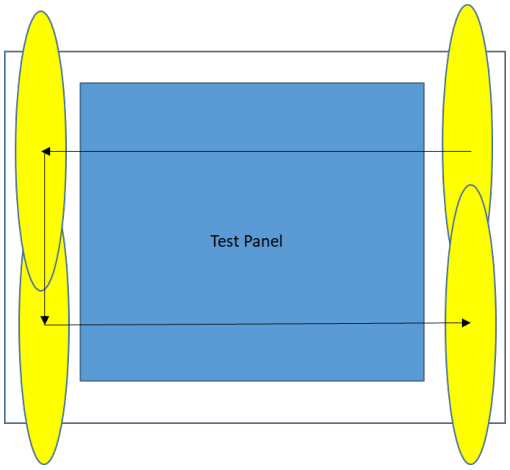

Figure 4: Large Panel Spray Schematic

The proposed target distance for each of the spray guns was 7" – 8" measured with a metal ruler An example of a target distance measurement can be found in **Figure 5**.

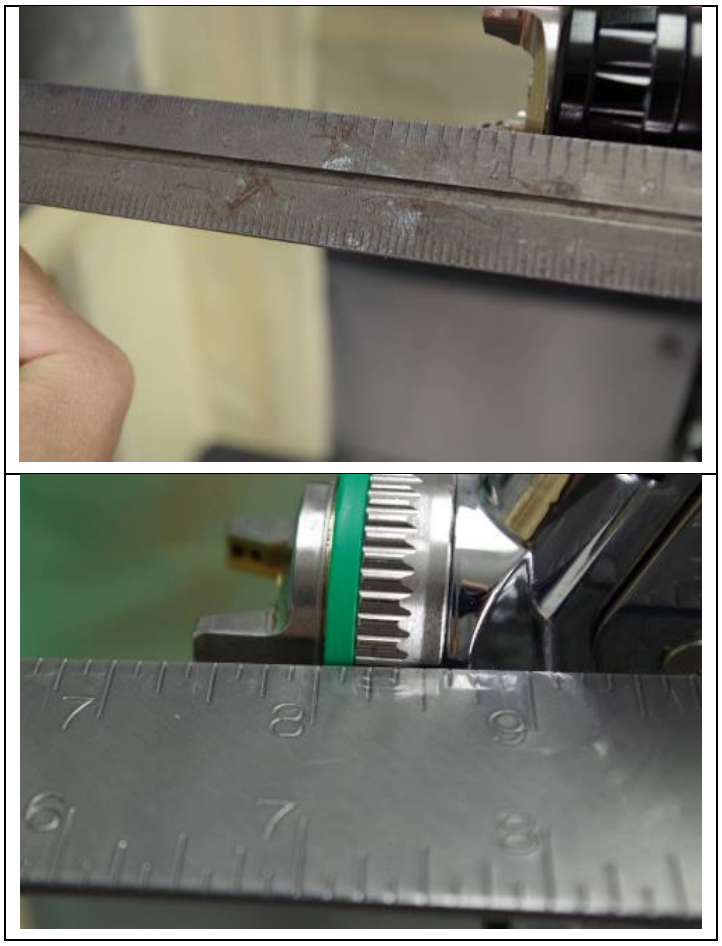

Figure 5: Target Distance Measurement Example

The traverse speeds for the coating applications were determined by the fluid flows performed in the preliminary testing. The traverse speeds and fluid flows can be found in **Table 8**.

Table 8: Preliminary Fluid Flows (g/min) and Traverse Speeds (inches/sec)

	PPG				Cromax		
AI BC Fluid Flow and Traverse Speed	AI CC Fluid Flow and Traverse Speed	Devilbiss Fluid Flow and Traverse Speed	SATA Fluid Flow and Traverse Speed	AI BC Fluid Flow and Traverse Speed	AI CC Fluid Flow and Traverse Speed	Devilbiss Fluid Flow and Traverse Speed	SATA Fluid Flow and Traverse Speed
CLEARCOAT							
212	212	187	171	212	212	166	184
6.0" per second	6.0" per second	5.3" per second	4.8" per second	6.0" per second	6.0" per second	4.7" per second	5.2" per second
BASECOAT							
220	220	179	153	220	220	176	163
6.0" per second	6.0" per second	4.4" per second	4.2" per second	6.0" per second	6.0" per second	4.7" per second	4.4" per second

Fluid Flows were not required after each spray event but were measured anyway and the results can be found in **Table 9**. The areas showing N/A were not taken by mistake.

Table 9: Fluid Flows after Spray Event (g/min)

AI BC	**AI CC**	**Devilbiss Tekna Prolite**	**SATA**	**AI BC**	**AI CC**	**Devilbiss Tekna Prolite**	**SATA**
CLEARCOAT							
PPG Small	**PPG Small**	**PPG Small**	**PPG Small**	**Cromax Small**	**Cromax Small**	**Cromax Small**	**Cromax Small**
230.4	203.1	136.0	77.1	N/A	176.8	131.5	166.8
PPG Large	PPG Large	PPG Large	PPG Large	Cromax Large	Cromax Large	Cromax Large	Cromax Large
124.2	154.1	155.9	125.1	194.0	185.0	169.6	175.0
BASECOAT							
PPG Small	**PPG Small**	**PPG Small**	**PPG Small**	**Cromax Small**	**Cromax Small**	**Cromax Small**	**Cromax Small**
217.6	243.9	198.5	161.4	225.7	260.2	191.3	176.8
PPG Large	PPG Large	PPG Large	PPG Large	Cromax Large	Cromax Large	Cromax Large	Cromax Large
238.4	N/A	N/A	160.5	242.1	226.7	171.4	161.4

The gun parameters for the application were determined prior to spraying the practice panels. Fluid and atomizing air controls were fully open on all of the spray guns during all tests. The spray guns

were fed with a gravity feed cup. The gun was set up so that the fluid needle was perpendicular to the target panel. The air pressure for each HVLP spray gun was set up with a special test air cap that was fitted with a pressure gage. The air cap pressures were checked with the gages supplied with the AI, Devilbiss, and SATA guns (**Table 10**). The AI spray guns were set so that the inlet pressure at the heel of the gun was at 29 psi. **Figures 6 and 7** shows the inlet pressures at 29 psi. The wall regulator was adjusted to get to the required inlet pressures. The inlet pressure for the Devilbiss was set at 29 psi (**Figure 7**) and the inlet pressure for the SATA was set at 29 psi.

Table 10: Inlet Air Pressure Settings / Air Cap Pressures (psi)

Spray Gun	AI	Devilbiss	SATA
Air Inlet psi	29.0 / NA	29.0 / 10.5	29.0 / 10.5

This was done according to manufacturer's recommendations.

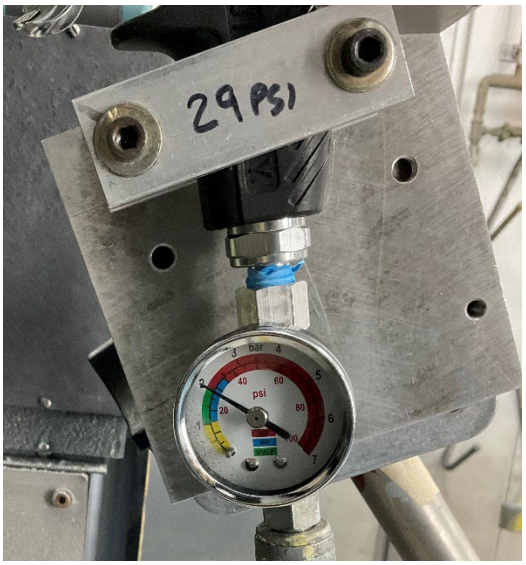

Figure 6: AI Clearcoat Inlet Air Pressure Check

Figure 7: AI Basecoat Inlet Air Pressure Check

Each fan pattern size was determined by the use of the practice panels and spraying at the 7 to 8 inch target distance. Fan patterns were measured so that they were all within 1 inch of each other on the long dimension and ½ inch on the width of the pattern. **Table 11** shows the fan pattern measurements and **Figure 8** shows a typical spray pattern and its measurements.

Table 11: Fan Pattern Measurements

	AI	AI	SATA
PPG	12 ½ x 2 3/4	12 ¾ x 2 7/8	12 ¾ x 2 ¾
Cromax	13 ½ x 3 3/8	13 ½ x 3 ½	13 x 3 ½

Figure 8: Fan Pattern Measurement Example

Each spray gun had a dedicated holding fixture (**Figure 9)**. The triggering mechanism can be seen along with the pneumatic cylinders that engage the trigger.

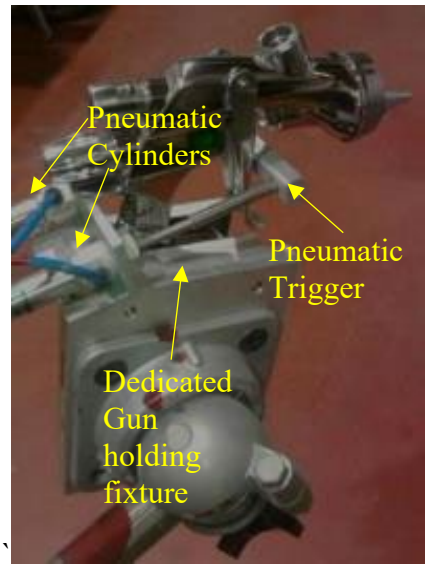

Figure 9: Holding Fixture Example

Coatings were mixed according to the manufacturer's recommendations. Pot life of the coatings was found in the TDS; coatings were not allowed to go past their pot life times. The testing sequence is shown in **Table 12**. Three replicates of each set were painted for TE calculations.

Table 12: Testing Sequence Clearcoat and Basecoat

Test #	Spray Gun	Manufacturer	Panel Size
1	AI BC Cap	PPG	Small
2	Devilbiss	Cromax	Large
3	SATA	Cromax	Large
4	AI CC Cap	PPG	Small
5	Devilbiss	PPG	Large
6	AI CC Cap	Cromax	Small
7	SATA	Cromax	Small
8	AI BC Cap	Cromax	Large
9	Devilbiss	PPG	Small
10	AI CC Cap	PPG	Large
11	SATA	PPG	Small
12	SATA	PPG	Large
13	AI BC Cap	PPG	Large
14	Devilbiss	Cromax	Small
15	AI CC Cap	Cromax	Large
16	AI BC Cap	Cromax	Small

LABORATORY INFORMATION AND PROCEDURES

Most of the Coatings, Corrosion & Erosion Group (CCEG) staff at UDRI has been together for over 15 years and includes research scientists with various backgrounds. This project was conducted by:

- Mr. Christopher Joseph - Project Manager. Mr. Joseph has over 30 years of experience working with paints and coatings. He was a process engineer in various assembly plant paint departments (GM Norwood and GM Van Nuys) and was a paint engineer at the General Motors Technical Center in Warren, MI, and a technical paint service representative at BASF Corporation (Ford Chicago and Honda Marysville). Mr. Joseph has experience performing TE tests on a larger scale at automotive assembly plants testing TE on automotive car and truck bodies. Chris has a degree from the University of Dayton in Mechanical Engineering Technology and an MBA from Northern Illinois University.
- Ms. LaNay Barley – Senior Coatings Technician – Ms. Barley has extensive experience in the maintenance and corrosion control of United States Air Force weapons systems. She represents the Air Force Coatings Technology Integration Office (CTIO), Wright-Patterson AFB, OH, in support of Field Support Project Manager at Air Force Corrosion Prevention and Advisory Boards, Integrated Pollution Prevention Meetings and other Air Force/Department of Defense Conferences.
- Mr. Matt Sigler – UDRI technician for four years
- Mr. Jarred Steel – UDRI technician for two years.
- The remainder of the professional staff has worked at UDRI for over anywhere from one years to 18 years. The technical staff has paint experience ranging from powder coating, ceramics, and automotive aftermarket painting. The experience of the technicians in paint ranges from 2 years to over 30 years.

The paint booth was monitored throughout the testing. The paint booth is environmentally controlled for temperature and humidity; controllers are calibrated annually. The set points for the testing were 77°F and 50% RH. The paint booth has a maintenance cycle that occurs every six weeks. Temperatures were recorded for each paint event and the booth never fluctuated more than 2°F and 5% humidity throughout the testing. A manometer is attached to the paint booth and verified the positive pressure conditions and pressure differential before and after the booth filters. The temperature and humidity controls are at the supply end of the paint booth and the manometer

is at the exhaust end of the paint booth. A diagram of the paint booth can be found in **Figure 10.** **Figures 11** and **12** show the exhaust and supply sides of the booth. **Figure 13** shows the location of the paint spray robot in the spray booth towards the exhaust side of the spray booth.

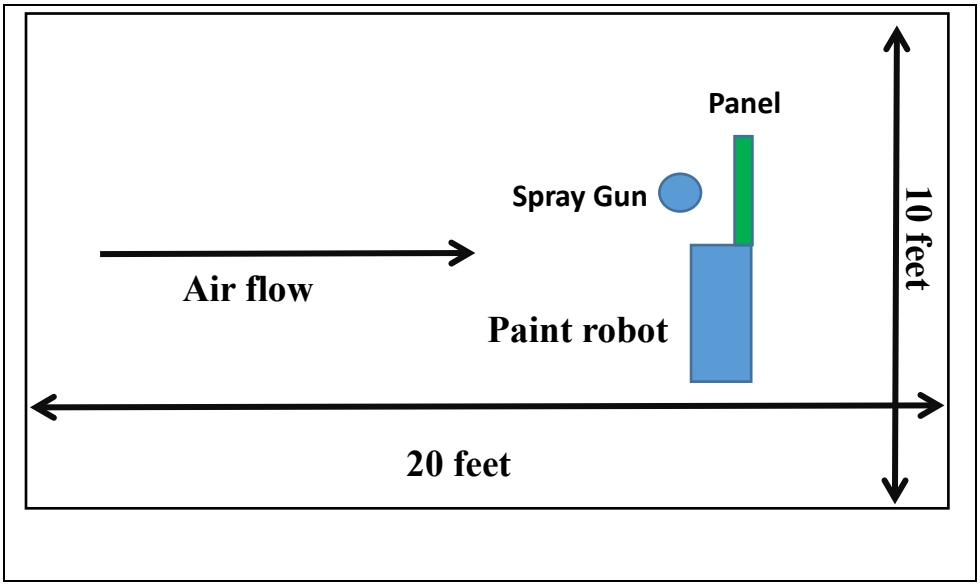

Figure 10: Booth Diagram (not to scale)

Figure 11: Spray Booth Exhaust

Figure 12: Spray Booth Supply

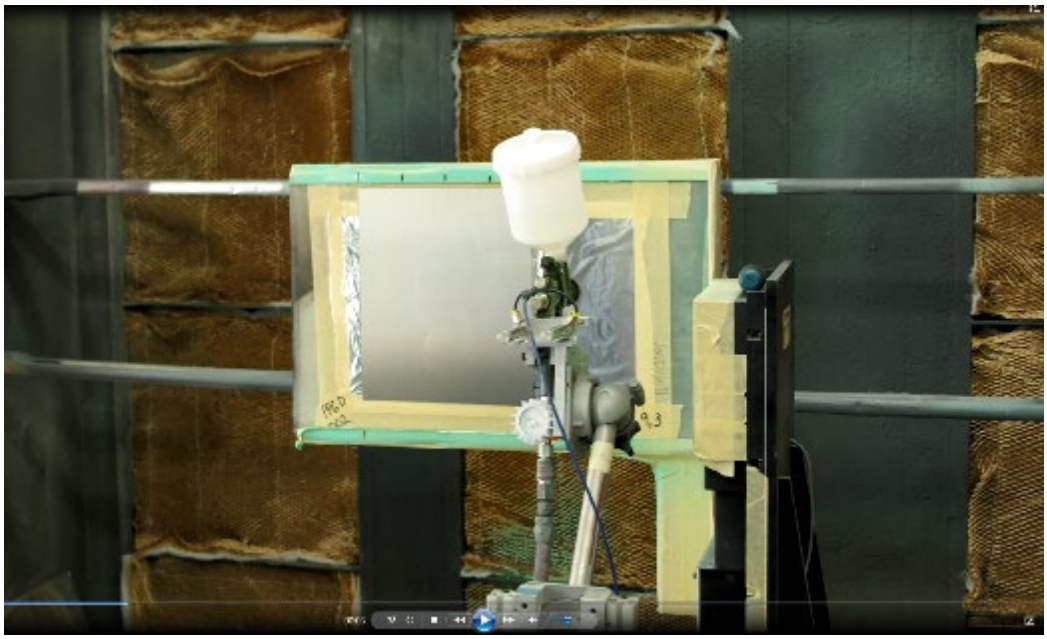

Figure 13: Paint Robot in Spray Booth

Figure 14 shows the controllers for the paint mix room and the paint booth. The set points for temperature were 74°F and the set points for humidity were 50%.

Figure 14: Controllers for Paint Mix Room and Spray Booth

EQUIPMENT

The equipment used can be found in **Table 13**. All equipment that is not identified as "No Calibration Required" is on a regular calibration schedule. Each piece that is calibrated is calibrated at least annually. Calibrations are performed either by the Air Force Calibration office

or by UDRI; the calibration group at UDRI is ISO 17025 accredited. Equipment calibration certificates are in **Appendix B**. Accreditation and calibration information is provided if available. The DFT meter, Positector 6000 DFT is "verify before use." The accreditation information is for the shims used to verify the Positector 6000 DFT.

Table 13: Equipment Used

Equipment Name	ID Number	Use	Accredited By	Accreditation #
Positector 6000 DFT *	72246	Dry Film Thickness	NIST	AFTO 00-20-14
Gardco Ford #4	J306W	Viscosity	AClass	ACT-1267
Fisher Scientific Stopwatch*	14-649-5	Viscosity	AClass	ACT-1267
Gardco Density Cup*	N/A	Density		
Digital Thermometer	F165186	Viscosity	WPAFB/PMEL	AFTO 00-20-14
Pennsylvania Scale M7300	C830047	Weigh Paint Gun	WPAFB/PMEL	AFTO 00-20-14
Paint Booth Temperature	C829301	Booth Temperature	WPAFB/PMEL	AFTO 00-20-14
Paint Booth Humidity	C829302	Booth Humidity	WPAFB/PMEL	AFTO 00-20-14
Wet Process Temperature	C829303	Wet Process Temperature	WPAFB/PMEL	AFTO 00-20-14
Wet Process Humidity	C829304	Wet Process Humidity	WPAFB/PMEL	AFTO 00-20-14
Delta Range PR2003 Scale	C830046	Panel Weights and Foil weights	WPAFB/PMEL	AFTO 00-20-14
Go – NoGo Gages* Meyer Black Tip Set	M049530	Orifice Size		
Anemometer Dwyer MVA-02		Paint Booth Air Flow	WPAFB/PMEL	AFTO 00-20-14
* no calibration required				

TEST PANEL AND FOIL HANDLING

All test panels were identified on the backs with an engraved identification (ID) number.

The weighing foils (**Figure 15**) used for calculating the solids of the paints were prepared by being placed in an oven at 110°C (230°F) for a minimum of 60 minutes and then placed in a desiccator. The foils for calculating percent solids were removed from the desiccator when they were needed. After the coatings were measured out into the foil, 3 ml of MEK was added to the coating to help disperse the coating. The foils were then baked for 1 – 1 ½ hours at 140°F to ensure all of the non-solids were baked out to ensure the most accurate measurements possible for each coating. After the coatings were baked, the foils were placed in a desiccator for a minimum of 24 hours. Each of the foils was then weighed after 24 hours minimum in the desiccator. Powder free gloves were worn when handling the foils, syringes, and test panels.

Figure 15: Weighing Foil

The oven used to bake the samples for percent solids was an ESPEC environmental chamber.

The calibrated oven used for the foil bake was turned on 24 hours prior to testing and ran the entire week at the set temperature of 60°C (140°F) (**Figure 16**).

Figure 16: Oven Used

Figure 17 shows the balance used for all of the weight measurements including the panels, foils, Density measurements, and Percent Solids measurements.

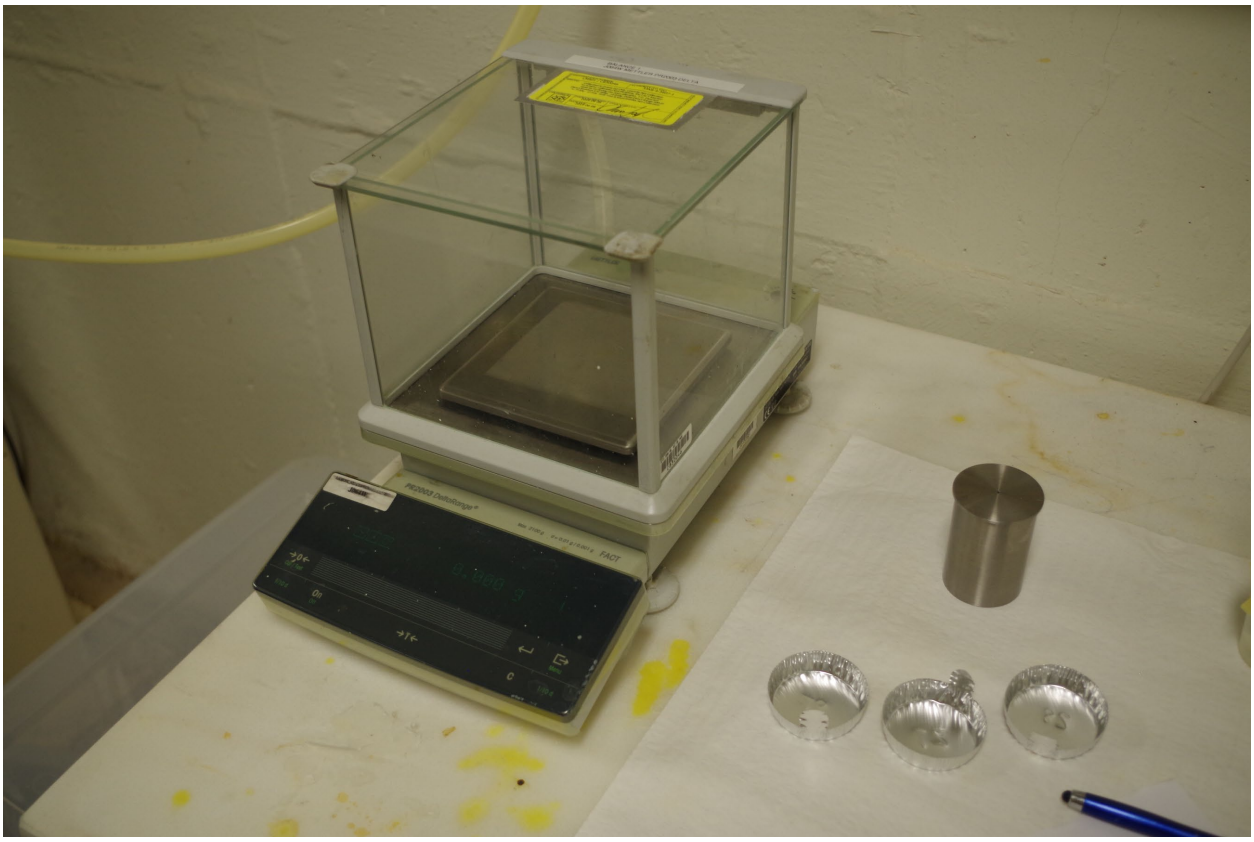

Figure 17: Balance

All components used in the mixing of the paints were performed in a climate-controlled booth called the mix room. The mix room (**Figure 18**) is temperature and humidity controlled.

Figure 18: Climate Controlled Paint Mix Room

VISCOSITY AND DENSITY

The calculated viscosity and density data can be found in **Table 14**. **Figures 19 and 20 s**how an example of the coating temperature being measured and a Ford #4 cup. A Ford #4 density cup was used for all viscosity checks.

Table 14: Average Viscosity and Density measurements

Material	Ford #4 Viscosity	Density g/L	Density lb/gal
PPG Clearcoat	14.95	1150.9	9.6
Cromax Clearcoat	12.61	1089.6	9.1
PPG Basecoat	31.7	1009.8	8.4
Cromax Basecoat	26.4	1009.9	8.4

Figure 19: Clearcoat Temperature Check

Figure 20: Ford #4 Viscosity Cup

PERCENT SOLIDS

The % solids calculated from the foils are found in **Tables 15 and 16**. Each coating material % solids was calculated using three foils.

The procedure used to determine percent solids was as follows:

1. Obtain weighing foils, identify weighing foils and bake at 110°C (230°F) for a minimum of 60 minutes. For this project the foils were baked overnight and gloves were used to handle all foils. The foils were placed in a desiccator after they were removed from the oven for a minimum of 24 hours.
2. Methyl ethyl ketone (MEK) was used as the reagent for the clearcoats.
3. Samples were mixed in accordance with the manufacturers recommendations.
4. A representative sample of the paint was taken after thorough mixing.
5. The aluminum weighing foils were weighed and the weight was recorded.

6. Solvent was added to the weighing dish using a plastic pipette after the coating was dispersed into the foil weighing dish. (3 ± 1 ml of MEK).
7. The coating was then drawn into a syringe and the outside of the syringe was wiped clean.
8. The syringe was weighed.
9. Material in the syringe was then transferred into the appropriate weighing foil. Care was taken to ensure the materials were properly dispersed.
10. The syringe was then reweighed.
11. This process was duplicated so that three samples of each material were tested.
12. The weighing foils were then baked at 60°C (140°F) for a minimum of 60 minutes.
13. After the foils were removed from the ESPEC they were placed in a desiccator for a minimum of 24 hours.
14. The weighing foils with the baked materials were reweighed.

Table 15: Percent Solids Clearcoat

	Average % Solids
PPG Clearcoat	43.0
Cromax Clearcoat	35.2

Table 16: Percent Solids Basecoat

	Average % Solids
PPG Basecoat	13.3
Cromax Basecoat	12.8

To ensure that the volume of paint fed through the gun was consistent across the different spray guns and materials, the same amount of paint was mixed and poured into each gravity feed cup. The amount of material mixed was approximately 500 ml of all components for each test.

The orifice sizes of the fluid tips were checked with a Meyer Black Tip Set (**Table 17**). The largest gage pin that fit in the orifice was recorded.

Table 17: Orifice Go/No-Go Values

Spray Gun	Anest Iwata	Devilbiss	SATA
Gage Pin Diameter	0.052”	0.054”	0.053”

FILM THICKNESS MEASUREMENT

After curing the DFT of the coatings was measured.

The DFT data was obtained using an Eddy Current Film thickness gage, the Positector 6000-FN3. Certified shims were used to calibrate the DFT gage. The shim used to verify the gage was 2.06 mils and the shim is NIST traceable.

The SCAQMD requires two film thickness readings per panel; however, for this test, five film thickness readings were taken per test panel. **Table 18** summarizes the dry film thicknesses.
In all instances, the clearcoats were applied in two coats and the appearance was good. A two to three minute flash off was allowed between coats and the panels were placed horizontally for the flash off period.

Table 18: Dry Film Thickness Averages (15 readings)

Basecoat Averages	
AI BC Cap	0.52
AI CC Cap	0.49
Devilbiss HVLP	0.56
SATA HVLP	0.42
Clearcoat Averages	
AI BC Cap	1.57
AI CC Cap	1.72
Devilbiss HVLP	1.87
SATA HVLP	1.39

SEQUENCE OF EVENTS

Tables 19 and 20 show the timing of the spray events, the bake for the foils and for the clearcoats. All sprayouts for each of the materials was performed with one mixed batch of paint per test.

Table 19: Sequence of Events Clearcoat

Date	Material	Mix	Density	Foil Begin	Foil End	Spray Begin	Spray End
01/19/22	PPG	10:00	10:10	10:20	11:40	10:06	10:15
01/19/22	Cromax	10:20	10:30	10:40	12:00	10:25	10:33
01/19/22	Cromax	10:20	10:30	10:40	12:00	10:42	10:47
01/19/22	PPG	11:00	11:10	11:20	1:05	11:07	11:14
01/19/22	PPG	11:00	11:10	11:20	1:05	11:25	11:33
01/19/22	Cromax	12:05	12:15	12:25	1:50	12:15	12:21
01/19/22	Cromax	12:05	12:15	12:25	1:50	12:26	12:34
01/19/22	Cromax	12:05	12:15	12:25	1:50	12:38	12:47
01/19/22	PPG	1:00	1:10	1:20	2:45	1:05	1:11
01/19/22	PPG	1:00	1:10	1:20	2:45	1:12	1:24
01/19/22	PPG	1:00	1:10	1:20	2:45	1:26	1:35
1/19/22	PPG	1:00	1:10	1:20	2:45	1:42	1:50
01/19/22	PPG	1:00	1:10	1:20	2:45	1:53	2:02
01/19/22	Cromax	2:15	2:25	2:35	4:00	2:17	2:26
01/19/22	Cromax	2:15	2:25	2:35	4:00	2:31	2:40
01/19/22	Cromax	2:15	2:25	2:35	4:00	3:01	3:09

Table 20: Sequence of Events Basecoat

Date	Material	Mix	Density	Foil Begin	Foil End	Spray Begin	Spray End
01/20/22	PPG	10:00	10:10	10:20	11:45	10:04	10:16
01/20/22	Cromax	10:22	10:32	10:42	12:05	10:25	10:34
01/20/22	Cromax	10:22	10:32	10:42	12:05	10:40	10:48
01/20/22	PPG	10:53	11:03	11:13	12:45	10:55	11:04
01/20/22	PPG	10:53	11:03	11:13	12:45	11:08	11:14
01/20/22	Cromax	11:20	11:30	11:40	1:15	11:28	11:37
01/20/22	Cromax	11:20	11:30	11:40	1:15	11:50	12:00
01/20/22	Cromax	11:20	11:30	11:40	1:15	12:09	12:20
01/20/22	PPG	12:35	12:45	12:55	2:20	12:38	12:46
01/20/22	PPG	12:35	12:45	12:55	2:20	12:51	1:00
01/20/22	PPG	12:35	12:45	12:55	2:20	1:05	1:12
01/20/22	PPG	12:35	12:45	12:55	2:20	1:14	1:21
01/20/22	PPG	12:35	12:45	12:55	2:20	1:25	1:35
01/20/22	Cromax	1:38	1:48	1:58	3:15	1:42	1:49
01/20/22	Cromax	1:38	1:48	1:58	3:15	1:57	2:06
01/20/22	Cromax	1:38	1:48	1:58	3:15	2:10	2:19

RESULTS AND DISCUSSION

Anest Iwata USA, Inc requested that their compliant spray gun be tested with two air caps, one air cap designed for basecoat and one air cap designed for clear coat, to the current Transfer Efficiency protocol developed by SCAQMD. Each air cap was tested with both materials tested. According to the SCAQMD protocol, if the non-HVLP spray gun has an **average** TE better than just one of the HVLP spray guns then it passes the rigorous testing required by SCAQMD.

The data generated from this project indicate that the Anest Iwata spray gun with the different air cap and material combinations performed equal to or better than at least one of the HVLP spray guns commonly used in automotive aftermarket repair shops.

The spray applications, booth conditions, and paint volumes were all performed so that each spray gun set up would be as similar as possible. All spray guns were set up with the fluid and air controls full open. The spray guns were set up so that there was no distinct difference in the fan patterns. The target distances were set so that the fan patterns were as similar as possible. The test data generated is only valid if the Anest Iwata spray gun is used at the parameters used for this test. Any variation in the spray parameters and spray gun set up will cause different results.

An example of spray applications was videotaped and a DVD copy of the recordings is included with this report along with still images.

APPENDIX A – STATEMENT OF NO CONFLICT OF INTEREST

South Coast Air Quality Management District

STATEMENT OF NO CONFLICT OF INTEREST
AS AN INDEPENDENT TESTING LABORATORY

(To be completed by authorized source testing firm representative and included in source test report)

The following facility and equipment were tested by my source testing firm, and are the subjects of this Statement:

Facility ID: CCEL/UDRI Date(s) Tested: 12 Jan 2019 - 26 Feb 2019
Facility Name: Coatings Corrosion And Erosion Lab
Equipment Address: 2700 D Street Bldg 1661
WPAFB, OH 45433
Equipment Tested: Columbia Tekna Clean Coat
Device ID, A/N, P/N: Tekna Clean Coat

I state, as its legally authorized representative, that the source testing firm of:

Source Test Firm: University of Dayton Research Institute
Business Address: 300 College Park
Dayton, OH 45469

is an "Independent Testing Laboratory" as defined in ***District Rule 304(k)***:

For the purposes of this Rule, when an independent testing laboratory is used for the purposes of establishing compliance with District rules or to obtain a District permit to operate, it must meet all of the following criteria:

(1) The testing laboratory shall have no financial interest in the company or facility being tested, or in the parent company or any subsidiary thereof;

(2) The company or facility being tested, or parent company or any subsidiary thereof, shall have no financial interest in the testing laboratory;

(3) Any company or facility responsible for the emission of significant quantities of pollutants to the atmosphere, or parent company or any subsidiary thereof, shall have no financial interest in the testing laboratory; and

(4) The testing laboratory shall not be in partnership with, nor be owned by, in part or in full, the contractor who has provided or installed equipment (basic or control), or monitoring systems, or is providing maintenance for installed equipment or monitoring systems, for the company being tested.

Furthermore, I state that any contracts or agreements entered into by my source testing firm and the facility referenced above, or its designated contractor(s), either verbal or written, are not contingent upon the outcome of the source testing, or the source testing information provided to the SCAQMD.

Signature: [signature] Date: 01 April 2019
Christopher A. Joseph (PRINT) Sr. Research Engineer (Title) 937-640-7585 (Phone) 01 April 2019

Form ST-110 : 110 All_No Conflict of Interest.doc (Revised 10/06/04)

APPENDIX B – EQUIPMENT CALIBRATION CERTIFICATES

University of Dayton Research Institute

ACCREDITED
CERTIFICATE #3790.01

Certificate of Calibration

Certificate number: 2021120365

Page 1 of 2

University of Dayton Research Institute
Structure and Component Characterization Group
1031 Irving Ave
Dayton OH 45419-8008

Customer Information

Coatings Corrosion Erosion Lab
AFRL-RXSS
2700 D. Street Building 1661
Wright Patterson AFB, OH 45433

Contact: Chris Joseph

Instrument Information

Instrument ID:	J361W	Serial # :	7003
Equipment Type:	Ford cup #4	Model:	VI-3304 C
Mfr:	Gardco		
Location:	SPC 1120		
Range:	127.6 cSt @ 25° C		
Tolerance:	± 10% from Standard		

Certificate Information

Reason for Service:	Calibration	Cal Date:	12/20/2021
Technician:	E. Jansen	Cal Due:	12/31/2022
As Found Condition:	In tolerance	Temperature:	25.07 °C
As Left Condition:	As found	Humidity:	N/A
Coefficients checked:	Yes		
Procedure:	SCC-CI-141		
Type:	Test for compliance with customer defined tolerance.		
Remarks:			

This calibration is in conformance with the requirements of ISO/IEC 17025.

Unless otherwise detailed in a Statement of Measurement Uncertainty, reported measurement uncertainty ±U (k=2 coverage factor and approximately 95% confidence interval) is the sum of the combined standard uncertainty and the readability of the calibrated device in the procedure and conditions at the time of calibration or; is the laboratory's ISO/IEC 17025 scope calibration measurement capability when greater. In general, determination of additional factors is needed to estimate measurement uncertainty for a device in use.

Evaluation of the calibrated device to a tolerance, when reported, is determined without factoring in the effect of measurement uncertainty. A ratio of device tolerance to combined reference standard uncertainty of at least 4:1 is routinely observed unless otherwise stated.
Calibration due dates appearing on this certificate of calibration and label are determined by the client for administrative purposes and do not imply continued conformance to specification. All results contained herein relate only to item(s) calibrated.
The instruments listed on this report have been calibrated against standards traceable to the International System of Units (SI) through National Institute of Standards and Technology (NIST) or use intrinsic physical properties unless otherwise stated.
Opinions and interpretations identified with a diamond.
This report shall not be reproduced except in full without the written consent of the University of Dayton Research Institute.

Calibrated by: Elaine Jansen
Metrology Technician

Elaine Jansen
I have reviewed this document
2021.12.20 16:09:12 -05'00'

Phone: (937) 229-2473
E-mail: elaine.jansen@udri.udayton.edu

Approved by: Daniel Drodge
MSE , Quality Manager

Daniel Drodge
2022.01.06
15:26:47 -05'00'

Phone: (937) 229-3175
E-mail: Daniel.Drodge@udri.udayton.edu

University of Dayton Research Institute

Certificate of Calibration

Certificate number: 2021120365

University of Dayton Research Institute
Structure and Component Characterization Group
1031 Irving Ave
Dayton OH 45419-8008

Calibration Data

Trial Number	Cannon Standard	Efflux (sec)	Efflux Temp °C	[1]Viscosity (cSt)
Trial 1	C60	37.59	25.08	127.44
Trial 2	C60	37.53	25.07	127.20
Trial 3	C60	37.60	25.06	127.47

Avg. Temp:	25.07	°C		
Avg. Efflux:	37.57	sec		
V_d =	127.37	cSt		
V_c =	127.60	cSt	0.1	(stdev)

			± U %
[2]AS FOUND calculated variation:	**0.18**	**%**	1.0

[1]The following formula was used to convert the efflux time (t), measured in seconds, to Kinematic viscosity(V_d) measured in centistokes (cSt) $V_d = 3.85\ (t - 4.49)$

[2]The percent variation between the viscosity determined above (V_d) and the certified viscosity (V_c) supplied with the C60 calibration standard was determined according to the following equation:
% Variation = [(Vc-Vd) x 100] / Vc

Calibration Standards

Lot # of Cannon certified viscosity standard used:	Kinematic Viscosity	Certified Flow Time	Certification Date	Expiration Date	Instrument ID#
20301	127.6 mm^2/s(cSt) @	37.63	4/9/2020	4/30/2022	J344W

NIST Traceable #	Instrument ID#	Description	Manufacturer	Model	Calibration Date	Calibration Due
Bionetics report 192610059	H043TR-1	Instrulab PRT#1	Instrulab	139AP	26-Mar-21	31-Mar-22
MM 200067209	H068ER	Multimeter	Hewlett Packard	HP3478A	29-Mar-21	29-Mar-22
Control Company Ref 1000441899	H073ER	Timer SN 200147887	Fisher Scientific	14-649	27-Mar-20	27-Mar-22

Original Data on file. Transfer checked by E. Jansen

End of Report

University of Dayton Research Institute

ACCREDITED
CERTIFICATE #3790.01

Certificate of Calibration

Certificate number: 2022010002

Page 1 of 2

University of Dayton Research Institute
Structure and Component Characterization Group
1031 Irving Ave
Dayton OH 45419-8008

Customer Information

Coatings Corrosion Erosion Lab
AFRL-RXSS
2700 D. Street Building 1661
Wright Patterson AFB, OH 45433

Contact: Chris Joseph

Instrument Information

Instrument ID:	J351W	Serial # :	49852
Equipment Type:	Viscosity Cup	Model:	EZ Zahn No. 2
Mfr:	Gardco		
Location:	SPC 1120		
Tolerance:	± 10% variation		
Range:	127.6 cSt @ 25 °C		

Certificate Information

Reason for Service:	Calibration	Cal Date:	1/4/2022
Technician:	E. Jansen	Cal Due:	1/31/2023
As Found Condition:	In tolerance	Temperature:	25.02 °C
As Left Condition:	As found		
Coefficients checked:	Yes		
Procedure:	SCC-CI-141		
Type:	Test for compliance with customer defined tolerance.		
Remarks:			

This calibration is in conformance with the requirements of ISO/IEC 17025.

Unless otherwise detailed in a Statement of Measurement Uncertainty, reported measurement uncertainty ±U (k=2 coverage factor and approximately 95% confidence interval) is the sum of the combined standard uncertainty and the readability of the calibrated device in the procedure and conditions at the time of calibration or; is the laboratory's ISO/IEC 17025 scope calibration measurement capability when greater. In general, determination of additional factors is needed to estimate measurement uncertainty for a device in use.

Evaluation of the calibrated device to a tolerance, when reported, is determined without factoring in the effect of measurement uncertainty. A ratio of device tolerance to combined reference standard uncertainty of at least 4:1 is routinely observed unless otherwise stated.
Calibration due dates appearing on this certificate of calibration and label are determined by the client for administrative purposes and do not imply continued conformance to specification. All results contained herein relate only to item(s) calibrated.
The instruments listed on this report have been calibrated against standards traceable to the International System of Units (SI) through National Institute of Standards and Technology (NIST) or use intrinsic physical properties unless otherwise stated.
Opinions and interpretations identified with a diamond.
This report shall not be reproduced except in full without the written consent of the University of Dayton Research Institute.

Calibrated by: Elaine Jansen
Metrology Technician

Elaine Jansen
I have reviewed this document
2022.01.04 15:42:31 -05'00'

Phone: (937) 229-2473
E-mail: elaine.jansen@udri.udayton.edu

Approved by: Daniel Drodge
MSE , Quality Manager

Daniel Drodge
2022.01.06
15:33:22 -05'00'

Phone: (937) 229-3175
E-mail: Daniel.Drodge@udri.udayton.edu

University of Dayton Research Institute

Certificate of Calibration

Certificate number: 2022010002

University of Dayton Research Institute
Structure and Component Characterization Group
1031 Irving Ave
Dayton OH 45419-8008

Calibration Data

Trial Number	Cannon Standard	Efflux (sec)	Efflux Temp °C	[1]Viscosity (cSt)
Trial 1	C60	50.83	25.04	127.63
Trial 2	C60	51.14	25.03	128.59
Trial 3	C60	51.19	25.00	128.74

Avg. Temp:	25.02	°C		
Avg. Efflux:	51.05	sec		
V_d =	128.32	cSt		
V_c =	127.6	cSt	0.6	(stdev)

[2]AS FOUND calculated variation:	-0.56	%	± U % 2.0

[1]The following formula was used to convert the efflux time (t), measured in seconds, to Kinematic viscosity(V_d) measured in centistokes (cSt) $V_d = 2.80\,(t) - (747/t)$

[2]The percent variation between the viscosity determined above(V_d) and the certified viscosity (V_c) supplied with the C60 calibration standard was determined according to the following equation:
% Variation = $\{ (V_c - V_d) \times 100 \} / V_c$

Calibration Standards

Lot # of Cannon certified viscosity standard used:	Kinematic Viscosity	Certified Flow Time	Certification Date	Expiration Date	Instrument ID#
20301	127.6 mm^2/s(cSt) @ 25 °C	37.63	4/9/2020	4/30/2022	J344W

NIST Traceable #	Instrument ID#	Description	Manufacturer	Model	Calibration Date	Calibration Due
Bionetics report 192610059	H043TR-1	Instrulab PRT#1	Instrulab	139AP	26-Mar-21	31-Mar-22
MM 200067209	H068ER	Multimeter	Hewlett Packard	HP3478A	29-Mar-21	29-Mar-22
Control Company Ref 1000441899	H073ER	Timer SN 200147887	Fisher Scientific	14-649	27-Mar-20	27-Mar-22

Original Data on file. Transfer checked by EJ

End of Report

Y-TECH SERVICES, INC
A YULISTA HOLDING SUBSIDIARY

YULISTA SUPPORT SERVICES, LLC
A YULISTA HOLDING SUBSIDIARY

Digital Thermometer

WRIGHT-PATTERSON AFB PMEL
CERTIFICATE OF CALIBRATION
Report Number 20210728WP2042

EXP: 06 AUG. 2022

Calibration Item:

Part Number:	15-078G
Serial Number:	150131889
Label Number:	M107944
JCN:	20210728WP2042
Date Calibrated:	2021 08 06
Date Due Calibration:	2022 08 06

Equipment Submitted by:
OWC Code: LM901
Address:
2700 D Street
BLDG 1661
WPAFB, OH 45433

Item Condition / Special Customer Requirements:

As Received:	Limited / Special Calibration (See Remarks)
As Returned:	Limited/ Special Calibration (See Remarks)

Environmental Conditions at Time of Calibration:

Temperature	75.0 °F	Barometric Pressure:	N/A
Relative Humidity:	52.00% RH		

Remarks:
Calibrated from 0 to 230°C Only.
Accuracy ±4.2°C.

Traceability:

Measurement standards and test equipment used are traceable to the National Institute of Standards and Technology through the Air Force Primary Standards Laboratory to the extent allowed by Air Force directives; or to other national metrology institutes; or to mutual consent standards; or have been derived from accepted values or natural physical constants; or have been derived by ratio or reciprocity type measurement techniques.

General Conditions:

1. The standards and calibration program of the Wright-Patterson AFB Precision Measurement Equipment Laboratory, as operated by Y-Tech Services, complies with the requirements of Air Force Technical Order 00-20-14.
2. This report may not be reproduced, except in full, without written approval of Y-Tech Services, Wright-Patterson Metrology Operations.

Calibrated By:

X CHRISTENSEN.THOMAS.A.1173108865 Digitally signed by CHRISTENSEN.THOMAS.A.1173108865 Date: 2021.08.06 15:10:12 -04'00'

Thomas Christensen
Metrology Technician

Approved By:

X Jermaine Boyd Digitally signed by BOYD.JERMAINE.1043804673 Date: 2021.08.06 15:32:25 -04'00'

Jermaine Boyd
Lab Manager

631 DISCOVERY DRIVE | HUNTSVILLE, AL 35806 | 256-319-1671

Y-TECH SERVICES, INC
A YULISTA HOLDING SUBSIDIARY

YULISTA SUPPORT SERVICES, LLC
A YULISTA HOLDING SUBSIDIARY

Standards Used: **Report Number 20210728WP2042** Page 2 of 2

Nomenclature:	Model/PartNo:	ID Number	Cal Due Date
Dry Well	9142-B-P-156/AF	J266613	2022 11 12
Dry Well	9143-A-P	J268449	2021 11 08
Probe	2626-S	C815315	2023 06 18
Display	1620	C815324	NCR

Reported Value(s):

Function Certified:	Unit of Measure	Standard	Tolerance	As Received	As Returned
Temperature	°C	0.00	±4.2	2.1	
	°C	46.00	±4.2	48.6	
	°C	92.00	±4.2	94.9	
	°C	138.00	±4.2	141.5	
	°C	184.00	±4.2	187.5	
	°C	229.99	±4.2	234	

Uncertainties:

The AFMETCAL program differs from commercial industry in the application of uncertainties. Commercial laboratories publish uncertainties to inform their customer of the results of a specific measurement or set of measurements derived from an independent traceability chain. Conversely, the USAF rigidly controls the traceability chain. AFMETCAL determines the uncertainty required to maintain the performance reliability of the various weapons systems. The 33K series technical orders identify standards that will meet those uncertainties and ensure the transfer of the required accuracy, given the measurements are performed within the specified laboratory environment. AFMETCAL provides a single interface with the National Institute of Standards and Technology through the Air Force Primary Standards Laboratory. Specification of measurement uncertainty is not necessary for Air Force applications when a laboratory complies with and applies the principles of the AFMETCAL program.

END OF REPORT

631 DISCOVERY DRIVE HUNTSVILLE, AL 35806 256-319-1671

Y-TECH SERVICES, INC — A YULISTA HOLDING SUBSIDIARY | YULISTA SUPPORT SERVICES, LLC — A YULISTA HOLDING SUBSIDIARY

Paint Booth

WRIGHT-PATTERSON AFB PMEL
CERTIFICATE OF CALIBRATION
Report Number 20210816WP2021

Page

EAD 19 AUG 2021

Calibration Item:

Part Number:	Paint Booth
Serial Number:	857
Label Number:	M480857
JCN:	20210816WP2021
Date Calibrated:	2021 08 19
Date Due Calibration:	2022 08 19

Equipment Submitted by:
OWC Code: LM901
Address:
2977 Hobson Way
BLDG 1661 Area B
WPAFB, OH 45433

Item Condition / Special Customer Requirements:

As Received:	Limited / Special Calibration (See Remarks)
As Returned:	Limited/ Special Calibration (See Remarks)

Environmental Conditions at Time of Calibration:

Temperature	78.2 °F	Barometric Pressure:	NA
Relative Humidity:	39.0% RH		

Remarks:
Special Calibration: Single point cal @78.2°F, 39.5%RH. Accuracy: ±4°F, ±8%RH.

Traceability:
Measurement standards and test equipment used are traceable to the National Institute of Standards and Technology through the Air Force Primary Standards Laboratory to the extent allowed by Air Force directives; or to other national metrology institutes; or to mutual consent standards; or have been derived from accepted values or natural physical constants; or have been derived by ratio or reciprocity type measurement techniques.

General Conditions:
1. The standards and calibration program of the Wright-Patterson AFB Precision Measurement Equipment Laboratory, as operated by Y-Tech Services, complies with the requirements of Air Force Technical Order 00-20-14 and ANSI Std Z-540.
2. *This report may not be reproduced, except in full, without written approval of Y-Tech Services, Wright-Patterson Metrology Operations.*

Calibrated By:

X BAXLEY.KEVIN.PAUL.1298622650 Digitally signed by BAXLEY.KEVIN.PAUL.1298622650 Date: 2021.08.19 15:21:30 -04'00'

Kevin Baxley
Metrology Technician

Approved By:

X *Jermaine Boyd* Digitally signed by BOYD.JERMAINE.1043804673 Date: 2021.08.19 15:32:29 -04'00'

Jermaine Boyd
PMEL Site Manager

631 DISCOVERY DRIVE | HUNTSVILLE, AL 35806 256-319-1671

Y-TECH SERVICES, INC. — A YULISTA HOLDING SUBSIDIARY

YULISTA SUPPORT SERVICES, LLC — A YULISTA HOLDING SUBSIDIARY

Standards Used: **Report Number 20210816WP2021** Page

Nomenclature:	*Model/PartNo:*	*ID Number*	*Cal Due Date*
Temp/Humidity Ind.	11-661-7B	C837988	2022 01 26

Reported Value(s):

Function Certified:	*Unit of Measure*	*Standard*	*Tolerance*	*As Received*	*As Returned*
Temperature	°F	78.2	±4	77.4	
Humidity	%RH	39.5	±8	36.0	

Uncertainties:

The AFMETCAL program differs from commercial industry in the application of uncertainties. Commercial laboratories publish uncertainties to inform their customer of the results of a specific measurement or set of measurements derived from an independent traceability chain. Conversely, the USAF rigidly controls the traceability chain. AFMETCAL determines the uncertainty required to maintain the performance reliability of the various weapons systems. The 33K series technical orders identify standards that will meet those uncertainties and ensure the transfer of the required accuracy, given the measurements are performed within the specified laboratory environment. AFMETCAL provides a single interface with the National Institute of Standards and Technology through the Air Force Primary Standards Laboratory. Specification of measurement uncertainty is not necessary for Air Force applications when a laboratory complies with and applies the principles of the AFMETCAL program.

END OF REPORT

631 DISCOVERY DRIVE | HUNTSVILLE, AL 35806 256-319-1671

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A YULISTA HOLDING SUBSIDIARY

YULISTA SUPPORT SERVICES, LLC
A YULISTA HOLDING SUBSIDIARY

Wet Process Room C33A

Page

Exp 19 AUG 2022

WRIGHT-PATTERSON AFB PMEL
CERTIFICATE OF CALIBRATION
Report Number 20210816WP2020

Calibration Item:

Part Number:	Wet Process
Serial Number:	856
Label Number:	M480856
JCN:	20210816WP2020
Date Calibrated:	2021 08 19
Date Due Calibration:	2022 08 19

Equipment Submitted by:
OWC Code: LM901
Address:
2977 Hobson Way
BLDG 1661 Area B
WPAFB, OH 45433

Item Condition / Special Customer Requirements:

As Received:	Limited / Special Calibration (See Remarks)
As Returned:	Limited/ Special Calibration (See Remarks)

Environmental Conditions at Time of Calibration:

Temperature	74.8 °F	Barometric Pressure:	NA
Relative Humidity:	69.0% RH		

Remarks:
Special Calibration: Single point cal @74.8°F, 68.3%RH. Accuracy: ±4°F, ±8%RH.

Traceability:
Measurement standards and test equipment used are traceable to the National Institute of Standards and Technology through the Air Force Primary Standards Laboratory to the extent allowed by Air Force directives; or to other national metrology institutes; or to mutual consent standards; or have been derived from accepted values or natural physical constants; or have been derived by ratio or reciprocity type measurement techniques.

General Conditions:
1. The standards and calibration program of the Wright-Patterson AFB Precision Measurement Equipment Laboratory, as operated by Y-Tech Services, complies with the requirements of Air Force Technical Order 00-20-14 and ANSI Std Z-540.
2. This report may not be reproduced, except in full, without written approval of Y-Tech Services, Wright-Patterson Metrology Operations.

Calibrated By:

X BAXLEY.KEVIN.PAUL.1298622650 Digitally signed by BAXLEY.KEVIN.PAUL.1298622650 Date: 2021.08.19 15:16:47 -04'00'

Kevin Baxley
Metrology Technician

Approved By:

X Jermaine Boyd Digitally signed by BOYD.JERMAINE.1043804673 Date: 2021.08.19 15:31:58 -04'00'

Jermaine Boyd
PMEL Site Manager

631 DISCOVERY DRIVE | HUNTSVILLE, AL 35806 256-319-1671

Y-TECH SERVICES, INC
A YULISTA HOLDING SUBSIDIARY

YULISTA SUPPORT SERVICES, LLC
A YULISTA HOLDING SUBSIDIARY

Standards Used:

Report Number 20210816WP2020 Page

Nomenclature:	*Model/PartNo:*	*ID Number*	*Cal Due Date*
Temp/Humidity Ind.	11-661-7B	C837988	2022 01 26

Reported Value(s):

Function Certified:	*Unit of Measure*	*Standard*	*Tolerance*	*As Received*	*As Returned*
Temperature	°F	74.8	±4	76.0	
Humidity	%RH	68.3	±8	69.6	

Uncertainties:

The AFMETCAL program differs from commercial industry in the application of uncertainties. Commercial laboratories publish uncertainties to inform their customer of the results of a specific measurement or set of measurements derived from an independent traceability chain. Conversely, the USAF rigidly controls the traceability chain. AFMETCAL determines the uncertainty required to maintain the performance reliability of the various weapons systems. The 33K series technical orders identify standards that will meet those uncertainties and ensure the transfer of the required accuracy, given the measurements are performed within the specified laboratory environment. AFMETCAL provides a single interface with the National Institute of Standards and Technology through the Air Force Primary Standards Laboratory. Specification of measurement uncertainty is not necessary for Air Force applications when a laboratory complies with and applies the principles of the AFMETCAL program.

END OF REPORT

631 DISCOVERY DRIVE | HUNTSVILLE, AL 35806 256-319-1671

Y-TECH SERVICES, INC
A YULISTA HOLDING SUBSIDIARY

YULISTA SUPPORT SERVICES, LLC
A YULISTA HOLDING SUBSIDIARY

Balance

Page

WRIGHT-PATTERSON AFB PMEL
CERTIFICATE OF CALIBRATION
Report Number 20210708WP2030

EXP: 08 July 2022

Calibration Item:

Part Number:	PR2003 DR
Serial Number:	1116102861
Label Number:	C830046
JCN:	20210708WP2030
Date Calibrated:	2021 07 08
Date Due Calibration:	2022 07 08

Equipment Submitted by:
OWC Code: LM901
Address:
2977 Hobson Way
BLDG 1661 Area B
WPAFB, OH 45433

Item Condition / Special Customer Requirements:

As Received:	Limited / Special Calibration (See Remarks)
As Returned:	Limited/ Special Calibration (See Remarks)

Environmental Conditions at Time of Calibration:

Temperature	72.5 °F	Barometric Pressure:	NA
Relative Humidity:	48.0% RH		

Remarks:
Linearity not calibrated. To achieve calibration specifications, the FACT function must be turned on during use and cal (T.O. Directed). Direct Readout Accuracy 0g-400g: ± 16mg; 0g-2100g ±84mg. Shift Test and Repeatability not calibrated.

Traceability:
Measurement standards and test equipment used are traceable to the National Institute of Standards and Technology through the Air Force Primary Standards Laboratory to the extent allowed by Air Force directives; or to other national metrology institutes; or to mutual consent standards; or have been derived from accepted values or natural physical constants; or have been derived by ratio or reciprocity type measurement techniques.

General Conditions:
1. The standards and calibration program of the Wright-Patterson AFB Precision Measurement Equipment Laboratory, as operated by Y-Tech Services, complies with the requirements of Air Force Technical Order 00-20-14 and ANSI Std Z-540.
2. This report may not be reproduced, except in full, without written approval of Y-Tech Services, Wright-Patterson Metrology Operations.

Calibrated By:

X BAXLEY.KEVIN.PAUL.1298622650 Digitally signed by BAXLEY.KEVIN.PAUL.1298622650 Date: 2021.07.13 15:43:52 -04'00'

Kevin Baxley
Metrology Technician

Approved By:

X BOYD.JERMAINE.1043804673 Digitally signed by BOYD.JERMAINE.1043804673 Date: 2021.07.13 16:23:58 -04'00'

Jermaine Boyd
PMEL Site Manager

631 DISCOVERY DRIVE | HUNTSVILLE, AL 35806 256-319-1671

Y-TECH SERVICES, INC. — A YULISTA HOLDING SUBSIDIARY

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Standards Used: **Report Number 20210708WP2030** Page

Nomenclature:	*Model/PartNo:*	*ID Number*	*Cal Due Date*
Weight Metric	CLASS 3, ASTM	A081171	2021 12 06
Thermo Hygrometer	11-661-7B	C837988	2022 01 26

Reported Value(s):

Function Certified:	*Unit of Measure*	*Standard*	*Tolerance*	*As Received*	*As Returned*
Direct Readout	gram	40	±0.016	40.000	
400g Range		100	±0.016	99.998	
		200	±0.016	199.998	
		300	±0.016	299.996	
		360	±0.016	359.996	
2100g Range	gram	600	±0.084	599.99	
		800	±0.084	799.99	
		1250	±0.084	1249.99	
		1700	±0.084	1700.00	
		2000	±0.084	2000.01	

Uncertainties:

The AFMETCAL program differs from commercial industry in the application of uncertainties. Commercial laboratories publish uncertainties to inform their customer of the results of a specific measurement or set of measurements derived from an independent traceability chain. Conversely, the USAF rigidly controls the traceability chain. AFMETCAL determines the uncertainty required to maintain the performance reliability of the various weapons systems. The 33K series technical orders identify standards that will meet those uncertainties and ensure the transfer of the required accuracy, given the measurements are performed within the specified laboratory environment. AFMETCAL provides a single interface with the National Institute of Standards and Technology through the Air Force Primary Standards Laboratory. Specification of measurement uncertainty is not necessary for Air Force applications when a laboratory complies with and applies the principles of the AFMETCAL program.

END OF REPORT

631 DISCOVERY DRIVE | HUNTSVILLE, AL 35806 256-319-1671

University of Dayton Research Institute

ACCREDITED
CERTIFICATE #3790.01

Certificate of Calibration

Certificate number: 2022020076

Page 1 of 2

University of Dayton Research Institute
Structure and Component Characterization Group
1031 Irving Ave
Dayton OH 45419-8008

Customer Information

Coatings Corrosion and Erosion Lab
AFRL-RXSS
2700 D. Street Building 1661
Wright Patterson AFB, OH 45433

Contact: Chris Joseph

Instrument Information

Instrument ID:	J375T Oven 13	Serial # :	196140
Equipment Type:	Oven	Model:	LAC2-18-8
Mfr:	Despatch	Equipment Tag No:	K032267
Location:	Rm 128		
Range:	50 to 200 °C		
Tolerance:	± 4 °C		

Certificate Information

Reason for Service:	Calibration w/Data	Cal Date:	22-Feb-22
Technician:	E. Jansen	Cal Due:	28-Feb-23
As Found Condition:	In Tolerance	Temperature:	22.3 °C
As Left Condition:	Left As Found	Humidity:	46% RH
Coefficients checked:	yes		
Procedure:	SCC-CI-109		
Type:	Test for compliance with customer defined tolerance.		
Remarks:	Limited calibration.		

This calibration is in conformance with the requirements of ISO/IEC 17025.

Unless otherwise detailed in a Statement of Measurement Uncertainty, reported measurement uncertainty ±U (k=2 coverage factor and approximately 95% confidence interval) is the sum of the combined standard uncertainty and the readability of the calibrated device in the procedure and conditions at the time of calibration or; is the laboratory's ISO/IEC 17025 scope calibration measurement capability when greater. In general, determination of additional factors is needed to estimate measurement uncertainty for a device in use.

Evaluation of the calibrated device to a tolerance, when reported, is determined without factoring in the effect of measurement uncertainty. A ratio of device tolerance to combined reference standard uncertainty of at least 4:1 is routinely observed unless otherwise stated.
Calibration due dates appearing on this certificate of calibration and label are determined by the client for administrative purposes and do not imply continued conformance to specification. All results contained herein relate only to item(s) calibrated.
The instruments listed on this report have been calibrated against standards traceable to the International System of Units (SI) through National Institute of Standards and Technology (NIST) or use intrinsic physical properties unless otherwise stated.

Opinions and interpretations identified with a diamond.

Calibrated by: Elaine Jansen
Metrology Technician

Elaine Jansen
I have reviewed this document
2022.02.25 13:38:42 -05'00'

Phone: (937) 229-2473
E-mail: elaine.jansen@udri.udayton.edu

Approved by: Daniel Drodge
MSE , Quality Manager

Daniel Drodge
2022.02.25
15:47:00 -05'00'

Phone: (937) 229-3175
E-mail: Daniel.Drodge@udri.udayton.edu

University of Dayton Research Institute

Certificate of Calibration

Certificate number: 2022020076

University of Dayton Research Institute
Structure and Component Characterization Group
1031 Irving Ave
Dayton OH 45419-8008

Calibration Data

× Out of Tolerance ✓ In Tolerance Tolerance= ± 4 Readability 0.5 °C

Nominal °C	STD* °C	STD** °C	DUT as found °C		DUT as Left °C		Min °C	Max °C	±U °C
50	51.8	51.7	50	✓	As Found	✓	47.7	55.7	1.0
75	76.7	77.0	75	✓	As Found	✓	73.0	81.0	1.0
100	101.3	101.3	100	✓	As Found	✓	97.3	105.3	1.0
125	125.3	125.4	125	✓	As Found	✓	121.4	129.4	1.0
150	149.3	149.4	150	✓	As Found	✓	145.4	153.4	1.0
175	173.5	173.7	175	✓	As Found	✓	169.7	177.7	1.0
200	198.0	198.3	200	✓	As Found	✓	194.3	202.3	1.0

Calibration Standards

NIST Traceable #	Instrument ID#	Description	Model	Calibration Date / Due	
Bionetics report 192610059	H009TR	Oven Calibrator	TS1	26-Mar-21	31-Mar-22
4040-11258466	H065XR-11	Temp Readout	06-662-4	1-May-20	1-May-22

Readings were taken at approximately 1/2 hour intervals.
* Used thermocouple #4
** Based on curve fit from H009TR calibration record.

End of Report

APPENDIX C – TECHNICAL DATA SHEETS

CROMAX BASECOAT

Technical Data Sheet

CROMAX® PRO BASECOAT

GENERAL

DESCRIPTION

A 3.5 lb./gal (420 g/l) VOC compliant, one-component, ultra-productive waterborne basecoat that delivers single-visit application with 1.5-coat coverage for the majority of colors and no flash time between coats to reduce steps in the repair process. It is ideal for spot, panel and overall repairs. Solid, metallic and pearl colors are clean and bright to easily and accurately match OEM finishes.

PROPERTIES

- Cromax® Pro Basecoat provides ease of application and accurate color matching.
- The excellent hiding, coverage balance gives significant savings in application time and consumption.
- Meets all VOC Regulations mandating less than or equal to 3.5 VOC RTS.
- Cromax® Pro Basecoat requires reduction with Cromax® Pro Controller to achieve RTS viscosity and proper flake control.

IMPORTANT REMARKS

- Cromax® Pro Basecoat drying will depend on external conditions such as relative humidity, air flow, temperature, etc.
- Cromax® Pro Basecoat mixing colors must be thoroughly stirred on a mixing machine before weigh-out, and the Cromax® Pro color has to be stirred immediately after weigh-out. Do not use a mechanical shaker to mix RTS color.
- Spray gun must be stainless steel and dedicated for waterborne application.
- Use plastic cans or suitable steel lined cans.

The products referenced herein may not be sold in your market. Please consult your distributor for product availability.

MIXING

COMPONENTS

Products	Packages	Shelf Life at 20°C
Cromax® Pro WB01™-WB99™ Mixing Colors	0.5-1 Liter	4 years*
Cromax® Pro WB91™ Transoxide Red	0.5 Liter	2 years
Cromax® Pro WB9908™ Super Jet Black	1.0 Liter	2 years
Cromax® Pro WB1000™-WB1025™ Pearl	0.5 Liter	3 years
Cromax® Pro WB1030™-WB1099™ Aluminum	0.5-1 Liter	2 years
Cromax® Pro WB2010™ Binder I	3.5 Liter	2 years
Cromax® Pro WB2020™ Binder II	3.5 Liter	2 years
Cromax® Pro WB2030™ Viscosity Balancer	3.5 Liter	2 years
Cromax® Pro WB2040™ Controller-Standard	3.5 Liter	2 years
Cromax® Pro WB2045™ Controller-Low Humidity	3.5 Liter	2 years
Cromax® Pro WB2047™ Controller-High Humidity	3.5 Liter	2 years
Cromax® Pro WB2091™ Blender	3.5 Liter	2 years
Cromax® Pro WB2093™ Low Humidity Blender	3.5 Liter	2 years
Cromax® Pro WB2095™ Blender Additive	1.0 Liter	4 years
Cromax® Pro WB2075™ Activator	0.5 Liter	2 years
Cromax® Pro WB1700™-WX1799™ Special Effect	0.5 Liter	3 years

LIMITED USE TONERS

- Shelf life is a guide and products may be used beyond suggested shelf life
- Mixed colors (no controller added) may be stored for 6 months in the proper container

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MIX RATIO

Cromax® Pro Blender	5% Controller optional
Cromax® Pro Solid Colors	10 to 20% Controller required
Cromax® Pro Effect Colors	20 to 30% Controller required

Option to add controller up to 10% in Blender to improve application.
Filter with 125 micron or finer strainer. Avoid cotton mesh filter due to swelling.

Relative Humidity	Controller Selection Guidelines				
100%					
90%					
80%					
70%		WB2047			
60%					
50%					
40%					
30%					
20%	WB2040		WB2045		
10%					
0%					
Temperature	60F	70F	80F	90F	100F

UNDER HOOD, TRI COAT AND TWO TONE APPLICATIONS.

- Under hood application without clearcoat: Add 10% Cromax® Pro WB2075™ activator to Cromax® Pro color followed by controller.
- Tri coats and two tone applications: Add 5% Cromax® Pro WB2075™ activator to Cromax® Pro color followed by controller to improve wetting and properties for high film build applications.

POT LIFE AT 68°F (20°C)

For optimum application properties use Cromax® Pro Basecoat immediately after reduction with Cromax® Pro Controller. Flake control and viscosity of the RTS color will be impacted at four hours. If color is to be stored while in a RTS state, reduce again with Cromax® Pro Controller prior to application.

VISCOSITY AT 68° F (20°C)

Colors are balanced to achieve sprayable viscosity.

TINT AGITATION

- It is critical to shake all solid tints and WB1050™ for 2-3 minutes on a mechanical shaker before placing them on the mix machine.
- WB01™ High Strength White is very high in pigment content and should be mechanically shaken for 10 minutes prior to placing on the mixing machine.
- Do NOT shake pearls, metallics or binders before placing them on the mix machine.
- The mix machine should spin for 3 minutes twice a day (i.e. morning, afternoon).

APPLICATION

SUBSTRATES

All OEM finishes and Cromax® 2K primers and sealers. Do not use Cromax® Pro over ChromaBase® "4:1" Undercoats.

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SPRAY SETUP

Gravity feed	1.2-1.4 mm
HVLP	1.2-1.3 mm
Compliant	1.2-1.3 mm

SPRAY PRESSURE

HVLP	10 psi at the cap
Compliant	20-33 PSI

COLOR TEST PANEL

- Spray a test panel for each color in order to confirm color match and opacity.
- Reproduce the application done on the test panel with the actual application that will be done on the vehicle and respect spray parameters (see Application section).
- Let flash for 30 seconds between the wet coat (coverage) and the half coat (effect coat for color match). This will better simulate the true application.

SURFACE PREPARATION

- Clean surface with warm water and car wash soap, rinse thoroughly.
- Pre-clean surface with VOC compliant surface cleaner. Wipe dry with clean cloth.
- Repair according to type and extent of damage.

Tips for Success:

- Wipe to loosen and lift contaminants.
- Do not allow cleaner to dry on the surface. If this occurs, re-wet and wipe dry. This prevents rag tracking.
- Keep cap on container after using. Cleaner may evaporate and change strength.
- Sanding pastes are not recommended. Improper rinsing may leave residual paste that can cause blistering.
- Use of pump spray bottles are required in some regulated markets and should be considered a best practice.

SANDING

When applying Cromax® Pro direct to primer, finish sand primer with:

- Dry mechanical: P500 with interface pad
- Dry hand: P800
- Wet: P800 or finer

When applying Cromax® Pro to Sealer, finish-sand sealer's substrate with:

- Dry mechanical: P400 with interface pad
- Dry hand: P500
- Wet: P600 or finer

Tips for Success

- Use gray scuff pads or equivalent before DA, and only for edging.
- For best results, always use interface pad when dry sanding. Interface pad allows for consistent scratch around rolls and contours and helps prevent edge break-through.
- Scuff pad scratches are more noticeable than DA scratches.

APPLICATION

Apply 1 medium coat at a gun distance of 8-10 inches from the surface to achieve 75% opacity, followed immediately with one light coat at a gun distance of 12-15 inches from the surface. Apply an even paint film through dense overlapping (70% or more). Apply all coats wet-on-wet. Do not flash between coats. Flash until flat before application of clearcoat.

SPOT REPAIR

1. Clean surface with water and soap.
2. Degrease with VOC compliant surface cleaners and wipe dry with clean cloth.
3. Repair with recommended undercoats.
4. Machine compound the edge of the blend panel and the adjacent OEM panel for true OEM color.
5. Sand primed spots as recommended, finish with P500 orbital or P800 wet manual.

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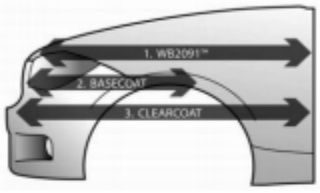
6. Prepare complete blending area with 1000 grit hand or machine.
7. Rinse with water and wipe dry.
8. Final wash with VOC compliant surface cleaners.
9. Wipe dry and tack rag.
10. The following spot repair method can be used with use of Blend Coat:

STANDARD BLEND PROCESS

A. Apply WB2091™ to the blend panel.
B. Apply the first coats of basecoat, extending 2nd coat beyond the previous one, into the wet mid-coat. Apply a 3rd light coat to effect a smooth transition as required.
C. Apply the clearcoat on the entire panel after the last coat of the basecoat is completely flat.



BLENDING PROCESS FOR HIGH METALLIC COLORS

This applies to:
- Colors containing Cromax® Pro WB1032™ and WB1035™ Bright Aluminum Toners.
- Colors containing higher than 50% total aluminum in formula.

The following recommendations are for normal conditions (65-85°F / 18-29°C with 30%-50% Relative Humidity.)

Mixing
- Dilute color with 20% Cromax® Pro WB2091™ Blender.
- To diluted color, add 20% to 30% Cromax® Pro WB2040™ Controller.
- In dry conditions (less than 30%), use Cromax® Pro WB2045™ Low Humidity Controller.
- This mix is your RTS color.

Equipment
- In most conditions use a 1.2-1.3 fluid tip.
- In hot, dry conditions use a 1.3 fluid tip.

Order of Application: Apply Wet bed 1st , perform Color blend 2nd , move on to Panel paint 3rd

Step 1
- Apply Cromax® Pro WB2091™ Blender to the entire blend-panel.
  Note: In high humidity conditions, add 5% to 10% Cromax® Pro WB2040™ into Cromax® Pro WB2091™ Blender.
- Use closed-coat method. This means in close (4"gun distance) using fast gun speed. Maintain a soft, thin edge at repaired or replaced panel.
- Do not allow wet bed to dry or flash. Move immediately to Step 2.

Step 2
- Blend color into blender using an outside/in application.
- Apply the 1st coat using an effect coat technique, 10-12 inch gun distance, 75% overlap, and carry the furthest distance into the blend.
- Apply the 2nd coat using an effect coat technique, 10-12 inch gun distance, 75% overlap, staying inside the 1st coat.
- Apply the 3rd coat using an effect coat technique, 10-12 inch gun distance, 75% overlap, staying inside the 2nd coat.

Step 3
- Panel paint the remainder of the repair using standard 1.5 coat application method.
- Using an 8" gun distance, apply a medium wet cover coat over entire panel.
- Edge part, if necessary.
- Using a 12" gun distance, apply the effect coat to panel.

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- Flash 1–2 minutes prior to using blowers.

Relative Humidity	Blender / Controller Selection Guidelines				
100%					
90%					
80%					
70%		WB2091			
60%					
50%					
40%					
30%	WB2091				
20%			WB2093		
10%					
0%					
Temperature	60F	70F	80F	90F	100F

Use WB2040 under these conditions
Use WB2047 under these conditions
Use WB2045 under these conditions

EQUIPMENT CLEANING

Refer to local regulations that govern equipment cleaning

Clean all equipment immediately after use, in a dedicated waterborne equipment cleaning machine where required.

There are two primary options for cleaning waterborne spray equipment:

Option 1: Machine Cleaning
- Dispose of excess waterborne material properly.
- Pre rinse the spray gun with warm tap water into a disposable cup.
- Remove air cap to ensure fluid tip gets properly cleaned.
- Clean in an automatic gun washer (warm water / surfactant options).
- Rinse with DI water and blow dry the gun with compressed air.

Option 2: Manual Cleaning
- Dispose of excess waterborne material properly.
- Pre rinse the spray gun with warm tap water into a disposable cup.
- DI Water rinse into water waste stream.
- Purge with acetone into solvent waste stream to remove water droplets.
- Blow dry spray gun with compressed air.

WATER TREATMENT

Always keep separate waste stream for solventborne and waterborne waste. The polluted water can either be handled as chemical waste or it can be treated with a coagulant that will separate solid from liquid components and reduce your chemical waste.

DRY TIMES

Cromax® Pro dry times will depend on the relation of relative humidity, airflow, and temperature in the spray booth. The optimum conditions for accelerated drying of Cromax® Pro Basecoat are:

- 25% relative humidity
- A regular and constant airflow of 300 ft./minute
- 104°F (40°C) booth temperature

When the relative humidity in your spray booth exceeds 60%, the airflow can be increased to 500 ft. /minute. Do not go over that limit to avoid possible paint defects.

Raising the booth temperature will help decrease humidity, but it is important not to increase the temperature higher than 104°F (40°C) for drying Cromax® Pro.

Refer to VOC wall charts for your area to insure compliance with local regulations.

STORAGE AND HANDLING

CONTAINER

Cromax® Pro Basecoat should be mixed and stored in plastic containers or suitable "lined" metal containers. Failure to store appropriate containers will result in an interaction of the paint with the metal container and will destroy the paint quality.

Caution: Some plastic containers may impact product quality due to contamination.

TEMPERATURE

Ideally Cromax® Pro Basecoat should be stored at a temperature of 68°F (20°C) with minimal temperature fluctuation. The absolute range is 32°F to 122°F (0°-50°C).

If the material is exposed to temperatures below 32°F (0°C) for more than a few hours, there is a risk of damage to the product in the form of color shift, seed, or gelling. Material that is allowed to freeze will be completely destroyed.

Storage of material between 96°F (36°C) and 102°F (39°C) for greater than 14 days will be at risk of increased viscosity. Materials stored between 103°F (36°C) and 122°F (50°C) for longer than five days will result in damage such as color shift, seed, thickening and gelling. Material exposed to temperature of 140°F (60°C) will be completely destroyed.

Technical Data Sheet

PHYSICAL PROPERTIES

	Dry Film Thickness	Coverage at Recommended DFT
Solids	1.0-1.5 mil	300-500 square feet per gallon
Pearls	0.5 – 0.8 mil	400-600 square feet per gallon
Metallics	0.4-0.6 mil	450-650 square feet per gallon

This data relates only to the material designated herein and does not apply to use in combination with any other material or any process. The data is not to be considered as a warranty or quality specification and we assume no liability in connection with its use.

All Values Ready To Spray

	Solid with 20% Controller	Effect with 30% Controller
Max. VOC (LE)	236 g/L (2.0 lbs./gal)	416 g/L (3.5 lbs./gal)
Max. VOC (AP)	69 g/L (0.6 lbs./gal)	132 g/L (1.1 lbs./gal)
Avg. Gal. Wt.:	1086 g/L (9.0 lbs./gal)	1031 g/L (8.60 lbs./gal)
Avg. Wt.% Volatiles:	75.3%	80.1%
Avg. Wt.% Exempt Solvent	.9%	1.2%
Avg. Wt.% Water:	68.7%	70.1%
Avg. Vol.% Exempt Solvent	1.2%	1.5%
Avg. Vol.% Water:	74.0%	72.1%

	Under-hood / Tri-Coat : 10% WB2075 & 20% Controller	Under-hood / Tri-Coat : 10% WB2075 & 30% Controller
Max. VOC (LE)	259 g/L (2.2 lbs./gal)	397 g/L (3.3 lbs./gal)
Max. VOC (AP)	89 g/L (0.7 lbs./gal)	146 g/L (1.2 lbs./gal)
Avg. Gal. Wt.:	1086 g/L (9.1 lbs./gal)	1036 g/L (8.6 lbs./gal)
Avg. Wt.% Volatiles:	71.6%	76.3%
Avg. Wt.% Exempt Solvent	1.1%	1.1%
Avg. Wt.% Water:	63.7%	64.9%
Avg. Vol.% Exempt Solvent	1.1%	1.4%
Avg. Vol.% Water:	68.3%	67.0%

	Blender with no Additive	Blender with 10% Controller
Max. VOC (LE)	227 g/L (1.9 lbs./gal)	238 g/L (2.0 lbs./gal)
Max. VOC (AP)	48 g/L (.4 lbs./gal)	54 g/L (0.4lbs./gal)
Avg. Gal. Wt.:	1008 g/L (8.4 lbs./gal)	1009 g/L (8.4 lbs./gal)
Avg. Wt.% Volatiles:	83.0%	82.4%
Avg. Wt.% Exempt Solvent	.7%	.7%
Avg. Wt.% Water:	77.0%	76.3%
Avg. Vol.% Exempt Solvent	.9%	1.0%
Avg. Vol.% Water:	76.6%	76.6%

	Blender with 5% Controller and 5% WB2095
Max. VOC (LE):	356 g/L (3.0 lbs./gal)
Max. VOC (AP):	92 g/L (.8 lbs./gal)
Avg. Gal. Wt.:	1007 g/L (8.4 lbs./gal)
Avg. Wt.% Volatiles:	83.1%
Avg. Wt.% Exempt Solvent:	.7%
Avg. Wt.% Water:	73.3%
Avg. Vol.% Exempt Solvent:	.9%
Avg. Vol.% Water:	73.2%

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Technical Data Sheet

VOC REGULATED AREAS

These directions refer to the use of products which may be restricted or require special mixing instructions in VOC regulated areas. Follow mixing usage and recommendations in the VOC Compliant Products Chart for your area.

SAFETY AND HANDLING

For industrial use only by professional, trained painters. Not for sale to or use by the general public. Before using, read and follow all label and MSDS precautions. If mixed with other components, mixture will have hazards of all components.

Ready to use paint materials containing isocyanates can cause irritation of the respiratory organs and hypersensitive reactions. Asthma sufferers, those with allergies and anyone with a history of respiratory complaints must not be asked to work with products containing isocyanates.

Do not sand, flame cut, braze or weld dry coating without a NIOSH approved air purifying respirator with particulate filters or appropriate ventilation, and gloves.

Revised: June 2015

In the United States:
1.855.6.AXALTA
cromax.us

In Canada:
1.800.668.6945
cromax.ca

PPG BASECOAT

ENVIROBASE®
HIGH PERFORMANCE

Product Information

ENVIROBASE® High Performance Waterborne Basecoat

Product Description

Envirobase High Performance is a premium waterborne color system for use in repair and repainting of motor vehicles. Industry leading color capability is easily achieved when applied as part of a two or three-stage basecoat/ clearcoat paint process. Mixed *Envirobase* High Performance color reproduces the original OEM solid, metallic, mica, or XIRALLIC® paint finish of virtually all OEM manufacturer's worldwide.

Envirobase High Performance products are engineered to reduce volatile organic compounds (VOC) and will exceed all of today's legislative VOC restrictions throughout the United States and Canada.

Envirobase High Performance waterborne color system is also capable of producing internal colors for under the hood as well as interior color repair. For additional information, see *Envirobase* product bulletins EB145 for internal color and EB511 for interior color.

Preparation of Substrate

Starting with original OE finishes or over recommended undercoats on new parts.

In all cases, wash all surfaces to be painted with soap and water. Final clean with an appropriate waterborne cleaner. Ensure that the substrate is thoroughly cleaned and dried before starting repair.

Apply *Envirobase* High Performance after sanding with European P800-P1200 / US 500-600 grade paper.

Wash off residue and dry thoroughly before re-cleaning with appropriate waterborne substrate cleaner. The use of a tack rag is recommended.

- Before mixing, gently hand shake bottles of the *Envirobase* High Performance toners for a few seconds before use. Do not place toners or mixed color on shaker or mechanically agitate.
- Mixed *Envirobase* High Performance color should be thoroughly hand-stirred before application. If not used immediately it should be hand-stirred again before use.
- Use nylon 125 micron paint filters specially designed for use with waterborne paint materials.

PPG

EB143 10/21

APPLICATION GUIDE:

Mixing Ratio:

Envirobase High Performance Color T494/T595* Thinner	1 Part basecoat 10% by volume for solid color 20% by volume for metallic / pearl color 30% by volume for tinted mid-coat color

OR

Envirobase High Performance Color T492 Adjuster† T493 Modifier‡ (optional)	1 Part solid color 10% by volume of mixed color 5% by volume of mixed color
Envirobase High Performance Metallic / Pearl Color T492 Adjuster† T493 Modifier‡ (optional) T494/T595* Thinner	1 Part metallic / pearl color 10% by volume of mixed color 5% by volume of mixed color +10% by volume of mixed color
Envirobase High Performance Tinted Mid-Coat Color T492 Adjuster† T493 Modifier‡(optional) T494/T595* Thinner	1 Part mid-coat color 10% by volume of mixed color 5% by volume of mixed color +20% by volume of mixed color

* T595 is for use in high heat, low humidity conditions only. See thinner selection guide on page 8 for additional information.

†T492 Adjuster enhances the EHP basecoat system for leading edge parts such as bumpers and fascias. It will not affect color or potlife. DO NOT add more than 10%. Reduce with T494 as needed to obtain 23-28 seconds DIN4. Final reduction with T494 may vary from 0 - 30%.

‡T493 Modifier is designed to be used with T492 and provides EHP basecoat with the highest level of film integrity. It is recommended for vehicles that experience rough road conditions such as sustained driving off paved roads. It will not affect color however potlife is reduced to about 1 hour. Always use in conjunction with T492 and DO NOT exceed 5%. Reduce with T494 as needed to obtain 23-28 seconds DIN4. T494 may vary from 10% -40%.

Pot Life:

Un-activated, 90 days stored in sealed plastic containers.
Activated, pot life is 1 hour at 70°F (21°C).
Hand stir well before using. Do Not mechanically shake.

Always strain before use (nylon 125 micron is recommended).

Additives:

Reduce with T494 as needed to obtain 23-28 seconds DIN4 cup.

Spraygun Setup:

Fluid Tip:	1.2 - 1.4 mm or equivalent
Spray Viscosity:	23 - 28 seconds, DIN4 at 70°F (21°C)

Spray Pressure:

	Color Coat	**Control Coat**
HVLP at the air cap	§	§
Compliant at the spray gun	§	§

§Spray gun pressure will vary by manufacturer. Refer to DOX440 Waterborne Gun Setup Chart on ppgrefinish.com *Envirobase* / Technical Bulletins & Product Index tab for manufacturer's setup information.

Application:

All repairs: 2 - 3 coverage coats plus control coat¶

Horizontal surfaces may benefit from two control coats. Vertical surfaces may only require one control coat. Check vertical surfaces after first control coat and decide if a second control coat is needed.

¶A control coat is not required for solid colors.

Flash Off:
70°F (21°C)

Between Coats: 2 - 4 minutes with air dryers to achieve a matte finish

Final Flash off: After control coat, allow basecoat to dry naturally. Force drying of the control coat is not necessary.

Note: Use recommended air drying equipment, hand held blowers or wall mounted units. Do not use spray gun for dehydrating basecoats.

Note: Temperature, humidity, air movement and film build affect dry times. The best results are achieved with increased temperature and air movement with minimal film builds.

APPLICATION GUIDE (cont'd):

Drying Times:

Dust-Free 70°F (21°C)	Each coat approximately 2 - 4 minutes
Dry to Handle 70°F (21°C)	Approximately 15 - 20 minutes

Dry to De-Nib: 70°F (21°C)	Approximately 15 - 20 minutes
Tape Time 70°F (21°C)	10 - 15 minutes
Dry to Clear 70°F (21°C)	15 minutes minimum

IR enhanced curing is a process that requires 2 - 4 minutes of IR on basecoat prior to clearcoat being applied. Refer to clearcoat P-Sheet for specific IR recommendations.

Overcoat/Recoat:

Overcoat with any premium compatible clearcoat. Flash off for 15 minutes or until the entire surface has a uniform matte appearance .

Denibbing: Dry sand to remove minor dirt nibs with US 800 grit or finer

Recoat: After 24 hours, an additional coat of *Envirobase* High Performance basecoat must be applied prior to the clearcoat application. The maximum recoat time is 48 hours.

BLENDING / WET BED

Mixing Ratio:

T490 Tinted Clear Additive	4 Parts
T494 / T595* Thinner	1 Part

For use as a blending additive: Add up to 1 equal part of the T490 mixture to 1 part of ready to spray color and fade into the prepared blend panel.

For use as a wet bed: Apply 1 medium light coat of the T490 mixture to the blend panel and or the entire repair panel and allow to dry. Wet bed will appear blue when wet but dries translucent. Once dry, apply color.

* T595 is for use in high heat, low humidity conditions only. See thinner selection guide on page 6 for additional information.

3 STAGE PEARL PROCESS

Mixing Ratio:

Ground Coat		**Pearl Coat**	
Mixed color	1 part	Mixed Color	1 part
T492 (optional)†	10%	T492 (optional)†	10%
T494/T595* Thinner	10%**	T494/T595* Thinner	20%**
T493 Modifier‡(optional)	5%	T493 Modifier‡(optional)	5%

†T492 Adjuster enhances the EHP basecoat system for leading edge parts such as bumpers and fascias. It will not affect color or potlife. DO NOT add more than 10%. Reduce with T494 as needed to obtain 23-28 seconds DIN4. Final reduction with T494 may vary from 0 - 30%.

* T595 is for use in high heat, low humidity conditions only. See thinner selection guide on page 8 for additional information.

**Note: Percentage by volume. If using T492 Adjuster, see page 2 for proper use.

‡T493 Modifier provides EHP basecoat with the highest level of film integrity. It is recommended for vehicles that experience rough road conditions such as sustained driving off paved roads. It will not affect color however potlife is reduced to about 1 hour. Always use in conjunction with T492 and DO NOT exceed 5%. Reduce with T494 as needed to obtain 23-28 seconds DIN4. T494 may vary from 10% -40%.

Pot Life:

Un-activated, 90 days stored in sealed plastic containers.
Activated, pot life is 1 hour at 70°F (21°C).
Hand stir well before using. Do Not mechanically shake.
Always strain before use (nylon 125 micron is recommended).

3 STAGE PEARL PROCESS (cont'd):

Spraygun Setup:

Fluid Tip:	1.2 - 1.4 mm or equivalent
Spray Viscosity:	23 - 28 seconds DIN4 at 70°F (21°C)

Spray Pressure:

	Color Coat	Control Coat
HVLP at the air cap	§	§
Compliant at the spray gun	§	§

§Spray gun pressure will vary by manufacturer. Refer to DOX440 Waterborne Gun Setup Chart on ppgrefinish.com *Envirobase* / Technical Bulletins & Product Index tab for manufacturer's setup information.

Application:

Ground Coat

- Apply single coats until opacity is achieved.
- Flash off thoroughly between coats.
- Avoid heavy application and excessive film builds.
- Use air movement equipment to dehydrate basecoat as necessary.
- A control coat is not required for ground coat

Pearl Coat

- Reduce Pearl Coat to 30% with prior recommended options
- Determine number of coats based on color check panel
- Apply single light coats
- Flash off thoroughly between coats.
- Apply control coat and allow it to dry
- The pearl color layer is not designed to achieve opacity.

Flash Off:
70°F (21°C)

Flash off until uniformly matte in appearance.

Note: Use recommended air drying equipment, hand held blowers or wall mounted units. Do not use spray gun for dehydrating basecoats.

Drying Time:

Wait until ground coat is uniformly dry before applying pearl coat

Wait until pearl coat is uniformly dry before applying clearcoat, approximately 15 minutes.
Force drying of the control coat is not necessary

3 STAGE TINTED MID COAT PROCESS

Mixing Ratio:

Ground Coat		Tinted Mid Coat	
Color	1 part	Color	1 part
T492 (optional)†	10%	T492 (optional)†	10%
T494/T595* Thinner	20%**	T494/T595 Thinner	30%**
T493 Modifier‡(optional)	5%	T493 Modifier‡(optional)	5%

†T492 Adjuster enhances the EHP basecoat system for leading edge parts such as bumpers and fascias. It will not affect color or potlife. DO NOT add more than 10%. Reduce with T494 as needed to obtain 23-28 seconds DIN4. Final reduction with T494 may vary from 0 - 30%.
* T595 is for use in high heat, low humidity conditions only. See thinner selection guide on page 8 for additional information.

**Note: Percentage by volume. If using T492 Adjuster, see page 2 for proper use.

‡T493 Modifier provides EHP basecoat with the highest level of film integrity. It is recommended for vehicles that experience rough road conditions such as sustained driving off paved roads. It will not affect color however potlife is reduced to about 1 hour. Always use in conjunction with T492 and DO NOT exceed 5%. Reduce with T494 as needed to obtain 23-28 seconds DIN4. T494 may vary from 10% -40%.

Pot Life:

Un-activated, 90 days stored in sealed plastic containers.
Activated, pot life is 1 hour at 70°F (21°C).
Hand stir well before using. Do Not mechanically shake.

Always strain before use (nylon 125 micron is recommended).

Spraygun Setup:

Fluid Tip:	1.2 - 1.4 mm or equivalent
Spray Viscosity:	23 - 28 seconds DIN4 at 70°F (21°C)

Spray Pressure:

	Color Coat	Control Coat
HVLP at the air cap	§	§
Compliant at the spray gun	§	§

§Spray gun pressure will vary by manufacturer. Refer to DOX440 Waterborne Gun Setup Chart on ppgrefinish.com *Envirobase* / Technical Bulletins & Product Index tab for manufacturer's setup information.

3 STAGE TINTED MID COAT PROCESS (cont'd):

Application:	Ground Coat	Tinted Mid Coat
	• Apply single coats until opacity is achieved. • Flash off thoroughly between coats. • Avoid heavy application and excessive film builds. • Use air movement equipment to dehydrate basecoat as necessary. • A control coat is not required for ground coat	• Apply single light coats based on color check panels. • Flash off thoroughly between coats. • The mid coat layer is not designed to give opacity. • Flash off the mid coat until it is uniformly dry before applying clearcoat, approximately 15 minutes. • A control coat is not required for the tinted midcoat layer.

Minor Repair Guidelines
Dirt nibs or other defects in the *Envirobase* High Performance paint film may be repaired as follows:

1. Allow the surface to completely flash-off.
2. Dry sand the defect with P1500/US 800 grade paper or finer or with a fine abrasive pad or in combination with a small amount of SXA330 Wax and Grease Remover as a sanding lubricant.
3. Remove sanding dust from the surface by strong air blowing with a clean air supply
4. Tack off surface with SX1070 tack rag.
5. Re-coat the surface with *Envirobase* High Performance as normal.

Compatibility

Low VOC Markets	National Rule Markets
Envirobase High Performance	*Envirobase* High Performance
EPW115 Waterborne Speed Prime	EPW115 Waterborne Speed Prime
ECP1x A-Chromatic Surfacer[1]	ECP1x A-Chromatic Surfacer[1]
ECS2x A-Chromatic LV Sealer	ECS2x A-Chromatic LV Sealer
EC520 En-V® High Production Clearcoat	ECS6x A-Chromatic Sealer
EC530 *En-V* Performance Clearcoat	EC520 *En-V* High Production Clearcoat
EC550 *En-V* Ultra Gloss Clearcoat	EC530 *En-V* Performance Clearcoat
EC700 Series Clearcoats	EC550 *En-V* Ultra Gloss Clearcoat
EC800 Series Clearcoats	EC700 Series Clearcoats
	EC800 Series Clearcoats
ONECHOICE®	*OneChoice*
SXA103 Aerosol MULTI-PREP™	SX103 *Multi-Prep*
SXA1031 Aerosol Etch Prime - Gray[1] (cut throughs only)	SXA1031 Aerosol Etch Prime[1] (cut throughs only)
SXA1050 Aerosol Plastic Adhesion Promoter[1]	SX1050 Plastic Adhesion Promoter[1]
SX1071 ECOBASE™ 5.5 Etch Prime[1]	SWX350 *H_2O-So-Clean* Waterborne Pre Cleaner
SWX350 H_2O-SO-CLEAN® Waterborne Pre Cleaner	Plastic Prep System[2] (SU4901, SU4902, SU4903, SUA4903)
Plastic Prep System[2] (SU4901, SUA4903)	SU470LV 1K Compliant Adhesion Promoter[2]
SU470LV 1K Compliant Adhesion Promoter	SX1056 Flexible 2K Sealer
SUA470LV 1K Compliant Adhesion Promoter (Aerosol)	SX1057 Flexible 2K Surfacer
	SX1060 Rollable 2K Primer Surfacer

GLOBAL REFINISH SYSTEM®	*Global Refinish System*		
D8188 Glamour LV Clearcoat	D800x[1]	D8150	D893
D8126 CERAMICLEAR®	D8115	D8126	D894
	D8117	D8152	

DELTRON®	*Deltron*		
DPLV Low VOC Epoxy Primer	DPS305x[1]	K36	DC4125
NCP280[1] Low VOC Primer Surfacer	DPS3105	DPX801[2]	DCU2002
DC4010 Velocity Premium Clear LV	DPLV Epoxy	DC2000	DCU2021
DC4125 *CeramiClear*	DPLF[1]	DC4000	DCU2042

[1] For optimum performance a 2K primer and sealer must be used.
[2] Must be primed or sealed.

TECHNICAL DATA

Theoretical coverage (RTS), giving 12.7µm (0.5 mils) dry film thickness, 324-786 4sq. ft. per US gallon.
Percent solids by volume RTS 10.1 - 24.5%

RTS Combinations	Color	Color : T494/T595	Color : T494/T595	Color : T494/T595
Applicable Use Category	Color Coating	Color Coating	Color Coating	Color Coating
Ratio	Packaged	1 : 10%	1 : 20%	1 : 30%
VOC Actual (g/L)	53-125	49-114	47-107	46-99
VOC Actual (lbs./ US gal.)	0.44-1.03	0.41-0.95	0.39-0.89	0.38-0.83
VOC Regulatory (g/L)	257-395	253-399	261-405	266-419
VOC Regulatory (lbs./US gal.)	2.11-3.30	2.15-3.33	2.18-3.38	2.22-3.50
Density (g/L)	993-1231	993-1209	993-1191	993-1177
Density (lbs./US gal.)	8.29-10.27	8.29-10.09	8.29-9.94	8.29-9.82
Volatiles wt. %	58.5-86.2	61.5-87.5	64.3-88.5	66.6-89.40
Water wt. %	50.7-81.0	54.2-82.5	57.3-83.8	59.9-84.9
Exempt wt. %	0.0	0.0	0.0	0.0
Water vol. %	62.5-81.1	65.7-82.6	68.4-83.9	70.6-85.0
Exempt vol. %	0.0	0.0	0.0	0.0
RTS Solids vol. %	13.1-27.0	11.9-24.5	10.9-22.5	10.1-20.8
RTS Solids wt. %	13.8-41.5	12.5-38.5	11.5-35.7	10.6-33.4

RTS Combinations	T490 : T494/T595	Color : T492 : T494/T595	Color : T492 : T494/T595
Applicable Use Category	Uniform Finish Coating	Color Coating	Color Coating
Ratio	4 : 1	1 : 10% : 10%	1 : 10% : 20%
VOC Actual (g/L)	90	49-108	47-101
VOC Actual (lbs./ US gal.)	0.75	0.41-0.90	0.39-0.84
VOC Regulatory (g/L)	379	255-388	259-393
VOC Regulatory (lbs./US gal.)	3.16	2.13-3.24	2.16-3.28
Density (g/L)	993	996-1194	996-1178
Density (lbs./US gal.)	8.29	8.31-9.96	8.31-9.83
Volatiles wt. %	85.7	63.2-87.2	65.6-88.1
Water wt. %	76.7	56.0-82.3	58.8-83.5
Exempt wt. %	0.0	0.0	0.0
Water vol. %	76.3	67.0-82.5	69.4-83.7
Exempt vol. %	0.0	0.0	0.0
RTS Solids vol. %	13.8	12.2-23.7	11.2-21.9
RTS Solids wt. %	14.3	12.8-36.8	11.9-34.4

TECHNICAL DATA CONTINUED

RTS Combinations	Color : T492 : T494/T595	Color : T492 : T493 : T494/ T595	T490 : T492 : T493 : T494/ T595
Applicable Use Category	Color Coating	Color Coating	Color Coating
Ratio	1 : 10% : 30%	1 : 10% : 5% : 10%	1 : 10% : 5% : 20%
VOC Actual (g/L)	44-95	61-117	59-110
VOC Actual (lbs./ US gal.)	0.37-0.79	0.51-0.98	0.49-0.92
VOC Regulatory (g/L)	262-393	268-385	272-388
VOC Regulatory (lbs./US gal.)	2.19-3.28	2.24-3.21	2.27-3.24
Density (g/L)	996-1165	998-1188	998-1173
Density (lbs./US gal.)	8.31-9.72	8.33-9.91	8.33-9.79
Volatiles wt. %	67.7-89.0	62.1-84.9	64.5-86.0
Water wt. %	61.2-84.5	54.0-78.8	56.8-80.2
Exempt wt. %	0.0	0.0	0.0
Water vol. %	71.4-84.5	64.3-79.2	66.8-80.6
Exempt vol. %	0.0	0.0	0.0
RTS Solids vol. %	10.4-20.3	14.1-25.2	13.0-23.3
RTS Solids wt. %	11.0-32.2	15.1-37.9	14.0-35.5

RTS Combinations	T490 : T492 : T493 : T494/ T595	Color : T492	Color : T492 : T493
Applicable Use Category	Color Coating	Color Coating	Color Coating
Ratio	1 : 10% : 5% : 30%	1 : 10%	1 : 10% : 5%
VOC Actual (g/L)	56-104	52-116	65-126
VOC Actual (lbs./ US gal.)	0.47-0.87	0.43-0.97	0.54-1.05
VOC Regulatory (g/L)	276-389	252-333	265-337
VOC Regulatory (lbs./US gal.)	2.30-3.25	2.10-2.78	2.21-2.81
Density (g/L)	998-1161	996-1212	998-1212
Density (lbs./US gal.)	8.33-9.69	8.31-10.11	8.33-10.05
Volatiles wt. %	66.6-87.0	60.4-86.0	59.4-83.6
Water wt. %	59.2-81.4	52.9-80.9	50.9-77.1
Exempt wt. %	0.0	0.0	0.0
Water vol. %	68.9-81.8	64.2-81.1	61.4-77.6
Exempt vol. %	0.0	0.0	0.0
RTS Solids vol. %	12.1-21.7	13.3-25.9	15.3-27.4
RTS Solids wt. %	13.0-33.4	14.0-39.6	16.4-40.6

Envirobase High Performance Waterborne Thinner Selection Guide

Below 30% Relative Humidity

TEMPERATURE

55°F	60°F	65°F	70°F	75°F	80°F	85°F	90°F	95°F	100°F+
13°C	15°D	18°C	21°C	24°C	27°C	29°C	32°C	35°C	38°C+
T494									T595

Above 30% Relative Humidity

T494

Note: Using T595 waterborne thinner with humidity levels above 30% can cause extremely slow flash and overall drying of the basecoat. Do not blend waterborne thinners as this will affect overall basecoat performance. Use either T494 or T595 depending on humidity.

Health and Safety

See Safety Data Sheet and Labels for additional safety information and handling instructions.



- The contents of this package may have to be blended with other components before the product can be used. Before opening the packages, be sure you understand the warning messages on the labels and SDS of all the components, since the mixture will have the hazards of all its parts.
- Improper handling and use, for example, poor spray technique, inadequate engineering controls and/or lack of proper Personal Protective Equipment (PPE), may result in hazardous conditions or injury.
- Follow spray equipment manufacturer's instructions to prevent personal injury or fire.
- Provide adequate ventilation for health and fire hazard control.
- Follow company policy, product SDS and respirator manufacturer's recommendations for selection and proper use of respiratory protection. Be sure employees are adequately trained on the safe use of respirators per company and regulatory requirements.
- Wear appropriate PPE such as eye and skin protection. In the event of injury, see first aid procedures on SDS.
- Always observe all applicable precautions and follow good safety and hygiene practices.

Equipment Cleaning

- Clean all mixing equipment immediately after use, preferably using a dedicated waterborne equipment cleaning machine with a final rinse using waterborne thinner. Ensure all equipment is completely dry before storage or use.

Storage & Handling of *Envirobase* High Performance

- *Envirobase* High Performance tinters, *Envirobase* High Performance mixed color & waterborne thinner should be stored in a cool, dry place away from sources of heat. During storage and transportation, temperature must be maintained at a minimum of 41°F or +5°C and a maximum of 120°F or 49°C. Avoid exposure to frost or freezing conditions.
- *Envirobase* High Performance should be mixed in clean, dry plastic containers and equipment. Do not use mixing vessels or spray equipment that contains solvent residues. Mixing vessels should ideally be plastic - if metal the container should be stainless steel or have an internal anticorrosion coating.
- Store waterborne & solvent borne wastes separately. A competent agent with appropriate certification must handle all waterborne wastes. Waste must be disposed of in accordance with all Federal, State, Provincial and local laws and regulations.
- Blended to spray basecoat color with T493 Modifier has a flash point above 200°F and may be disposed in the waterborne waste stream intended for basecoat color (without activator). The waste disposal facility should be informed that the waste stream contains isocyanates. T493 Modifier handled alone should be disposed in the solvent borne waste stream.
- The *Envirobase* High performance waterborne paint residues should be segregated from all other wastes and kept in a separate closed lined container. The *Envirobase* High Performance waterborne paint residues must be disposed or in accordance with all Federal, State, Provincial and local laws and regulations.

Emergency Medical or Spill Control Information: (412) 434-4515; In Canada (514) 645-1320

PPG We protect and beautify the world™

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19699 Progress Drive
Strongsville, OH 44149
800.647.6050

PPG Canada Inc.
2301 Royal Windsor Drive, Unit #6
Mississauga, Ontario L5J 1K5
888.310.4762

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CROMAX CLEARCOAT

Technical Data Sheet

CROMAX® LE
LE5400S™ SNAP DRY CLEARCOAT

GENERAL

DESCRIPTION

A 2.1 lb. /gal VOC compliant, two-component, air dry clearcoat designed to increase productivity of spot and panel repairs. It features very low overspray, very fast dust-free attributes and outstanding cure rates (air dry 2 hours at 70°F; bake 10 minutes at 120°F).

The products referenced herein may not be sold in your market. Please consult your distributor for product availability.

MIXING

COMPONENTS

Cromax® LE LE5400S™ Clearcoat
Cromax® LE LE1160S™ Activator 60-70°F (16-21°C)
Cromax® LE LE1170S™ Activator 65-80°F (18-27°C)
Cromax® LE LE1180S™ Activator 75-90°F (24-32°C)

MIX RATIO

Combine the components by volume (4:1) or by weight (cumulative grams) and mix thoroughly.

		Weight (cumulative grams)								
Component	**Volume**	**2 oz.**	**4 oz.**	**6 oz.**	**8 oz.**	**12 oz.**	**16 oz.**	**20 oz.**	**24 oz.**	**28 oz.**
LE5400S™	4	50	100	149	199	299	399	498	598	698
LE1170S™	1	64	128	192	256	384	512	640	768	896

POT LIFE

1 hour at 70°F (21°C)

VISCOSITY

14.5-16 seconds in a Zahn #2 cup.

ADDITIVES

Application Enhancer

- Option 1: Add ½ oz. Plas-Stick® V-2350S™ Flex Additive per RTS quart to enhanced application at elevated temperatures (>85°F / 29°C)
- Option 2: Add ½ to 2 oz. 19379S™ Application Enhancer per RTS quart.

Accelerator

- Add ¼ to ½ oz. V-389S™ Accelerator per RTS quart

Fish Eye Eliminator

- Add ¼ to ½ oz. V-459S™ per RTS quart

Flex Additive

- Add 2 oz. Plas-Stick® V-2350S™ Flex Additive per RTS quart

Adding ½ part of LE1075S™ reducer is a 2.1 VOC compliant option for cutting in parts.

Page 1 of 4

Technical Data Sheet

APPLICATION

SUBSTRATES
Properly prepared OEM topcoat
Cromax® Pro Basecoat
ChromaSystem™ Midcoat

SURFACE PREPARATION
- Mask the entire vehicle to prevent overspray from sticking.
- Follow Cromax® Pro Basecoat recommendations for flash times before clearcoat. Allow ChromaPremier® and ChromaBase® Basecoats to dry 15-30 minutes prior to clearcoat application.
- Extend basecoat dry time to 30 minutes when applying several base color coats, tri-coat colors, or in cooler shop conditions.

GUN SETUPS

HVLP	1.3-1.4 mm
Compliant	1.4-1.6 mm

AIR PRESSURE

HVLP	8-10 PSI at cap
Compliant	28-32 PSI at gun

APPLICATION
Apply 2 medium-wet coats. Flash 3-5 minute flash between coats.

BLENDING
Panel Repair is the approved procedure for clearcoat warranty repairs. This allows the refinisher to attain the recommended film builds. If the refinisher chooses to blend, use 19301S™ Clearcoat Blender. Carefully taper the second coat of clear beyond the first.

After the final coat of clearcoat, reduce 2 parts RTS clear with 1 part 19301S™ Clearcoat Blender. Immediately apply clear reduced with 19301S™ Clearcoat Blender misting the spray edge. Hand polish the finish to finesse the blend edge.

EQUIPMENT CLEANING
Clean spray equipment as soon as possible with lacquer thinner.

DRY TIMES

AIR DRY

Dust Free:	10-15 minutes
Time to Handle (Assemble):	2 hours
Time to Polish:	3 hours*
Time to Stripe:	3 hours
Time to Deliver:	6 hours
Time to Decal:	After 24 hours

*Although the clearcoat may fingerprint slightly at 3 hours, it will polish very well. Optimum is 3 to 72 hours.

EXPRESS DRY

Flash before Express Dry:	0 minutes
Dry Cycle:	10 minutes at 120°F (49°C)
Dust Free:	After cool down
Time to Handle:	1 hour
Time to Polish:	1 hour
Time to Stripe:	1 hour
Time to Deliver:	1 hour
Time to Decal:	After 24 hours

Page 2 of 4

Technical Data Sheet

INFRARED DRY
Not recommended. Clearcoat may solvent pop.

Tips for Success
Do not exceed 130°F (54°C) metal temp to help maintain a commercial appearance finish. Post bake dry time can be significantly reduced with an extended bake. The clear can be polished in 10 minutes after bake with a 30 minute bake cycle.

RECOATIBILITY/RE-REPAIR
Cormax® LE LE5400S™ Snap Dry Clearcoat may be recoated 2 hours at 90°F (32°C) or 4 hours at 70°F (21°C) air dry. Wait 1 hour if the clearcoat is force dried. If recoating after 24 hours, scuff sand with 1200-1500 grit.

SANDING / COMPOUNDING / POLISHING

SANDING
Use 1500 grit or finer. Or use P1500 DA or finer.

COMPOUNDING
Use finishing compound. Apply a thin ribbon of material to the area to be polished. Use a double-sided wool polishing pad. Maintain air polisher or variable speed buffer at 1200-1500 rpm. Remove excess finishing compound with a clean soft cloth prior to applying finishing polish.

POLISHING
Use finishing polish (shake well before using). Apply a ribbon of material to work a 2-3 foot square area. Use a foam pad or a terry cloth cover. Maintain a variable speed buffer or an orbital polisher at 1200-1800 rpm. Keep the polisher/buffer moving at all times. Overlap each pass approximately 50%. As finishing polish begins to dry, stop polishing. Wipe off excess finishing polish with a clean soft cloth. Hand buff with a clean soft cloth as a finishing touch

Tips for Success
- Always use clean water to wet sand and add a few drops of soap to help clear the paper.
- Always us a foam interface pad when DA sanding.
- Do not use medium to heavy-duty compounds. Use clean cloths and pads to insure that the clear does not get scratched with dirt particles from old or re-used cloths or pads.
- Do not wax for the first 120 days after painting.

PHYSICAL PROPERTIES

All Values Ready To Spray

Max. VOC (LE):	248 g/L (2.1 lbs./gal)
Max. VOC (AP):	121 g/l (1.0 lbs./gal)
Avg. Gal. Wt.:	1085 g/L (9.05 lbs./gal)
Avg. Wt.% Volatiles:	64.1%
Avg. Wt.% Exempt Solvent:	53.2%
Avg. Wt.% Water:	0.0%
Avg. Vol.% Exempt Solvent:	51.7%
Avg. Vol.% Water:	0.0%
Theoretical Coverage:	561 ft^2 (52.1 m^2) per RTS gallon at 1 mil
Recommended Dry Film Thickness:	2.0-2.4 mils in 2 coats
Flash Point:	See MSDS/SDS

Page 3 of 4

Technical Data Sheet

VOC REGULATED AREAS

These directions refer to the use of products which may be restricted or require special mixing instructions in VOC regulated areas. Follow mixing usage and recommendations in the VOC Compliant Products Chart for your area.

SAFETY AND HANDLING

For industrial use only by professional, trained painters. Not for sale to or use by the general public. Before using, read and follow all label and MSDS/SDS precautions. If mixed with other components, mixture will have hazards of all components.

Ready to use paint materials containing isocyanates can cause irritation of the respiratory organs and hypersensitive reactions. Asthma sufferers, those with allergies and anyone with a history of respiratory complaints must not be asked to work with products containing isocyanates.

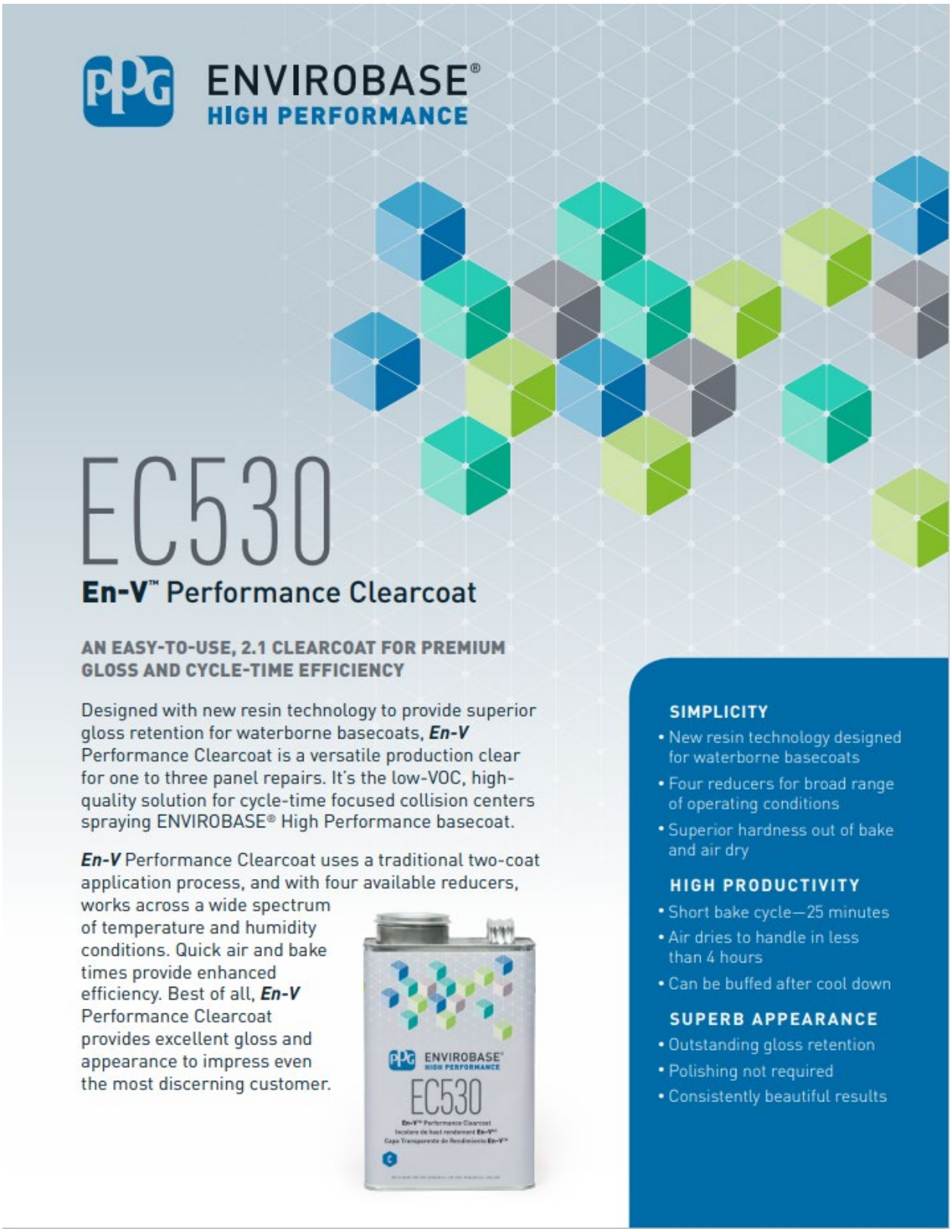
Do not sand, flame cut, braze or weld dry coating without a NIOSH approved air purifying respirator with particulate filters or appropriate ventilation, and gloves.

Revised: September 2014

In the United States:
1.855.6.AXALTA
cromax.us

In Canada:
1.800.668.6945
cromax.ca

PPG CLEARCOAT



ENVIROBASE® HIGH PERFORMANCE

EC530

En-V™ Performance Clearcoat

Application Guide:

Mixing	3	1	1
	EC530	ECH5075	ECR65/75/85/95
	Clear	Hardener	Reducer
	Pot life:	2 hours @ 70°F/21°C	
Application	Apply 2 medium wet coats (3-5 minutes between coats) 2.0-2.5 mils wet film build; 1.0-1.5 dry per coat		
	HVLP:	10 PSI at the cap	
	Compliant:	29-40 PSI at the gun	
	Fluid tip:	1.3-1.5	
Drying	Dust free:	30-40 minutes @ 70°F/21°C*	
	Dry to polish:	4-5 hours air dry or after cool down after force dry. Polishing is not normally required. To remove minor dirt nibs, sand with P1500 or finer and follow normal polishing procedure.	
	Force dry:	25 minutes @ 140°F/60°C*	
	Air dry to reassemble:	3-4 hours @ 70°F/21°C	
	Tape time:	3-4 hours @ 70°F/21°C	
	Overcoat/recoat:	6-8 hours @ 70°F/21°C air dry or after force dry for 25 minutes @ 140°F/60°C metal temperature and cool down for one hour.	

EC530 must be sanded before recoating with primer, color or clear.

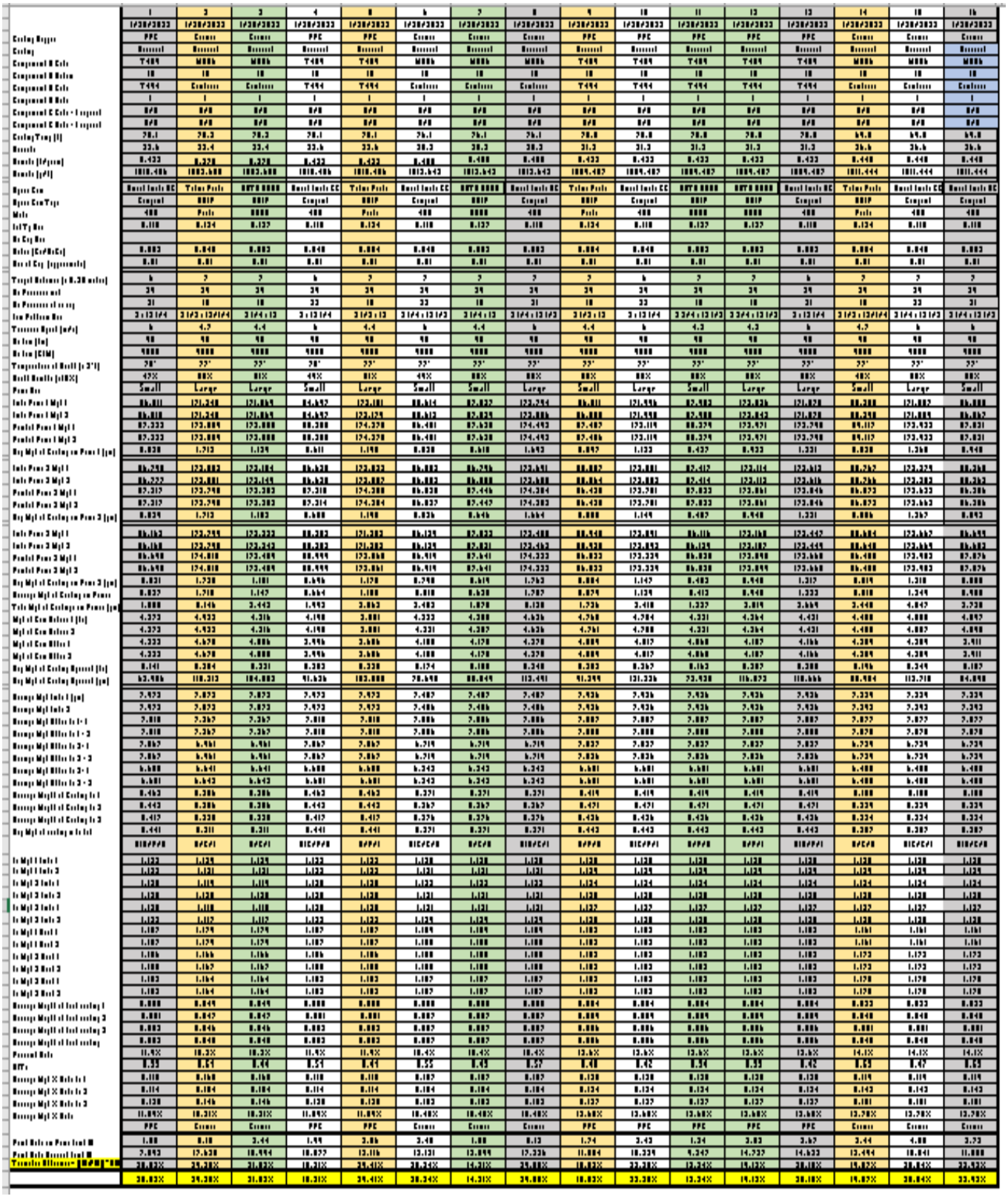
* For in-service delivery at low temperatures (below 60°F/16°C) or inclement weather conditions, allow EC530 a minimum of 4 hours air dry at shop temperature (above 60°F/16°C) or bake for 25 minutes @ 140°F/60°C metal temperature and cool for one hour prior to putting into service.

PPG Automotive Refinish
Bringing innovation to the surface.™

Part No. EHPEC530FY, 8/14

APPENDIX D – COMPLETE DATA SUMMARY

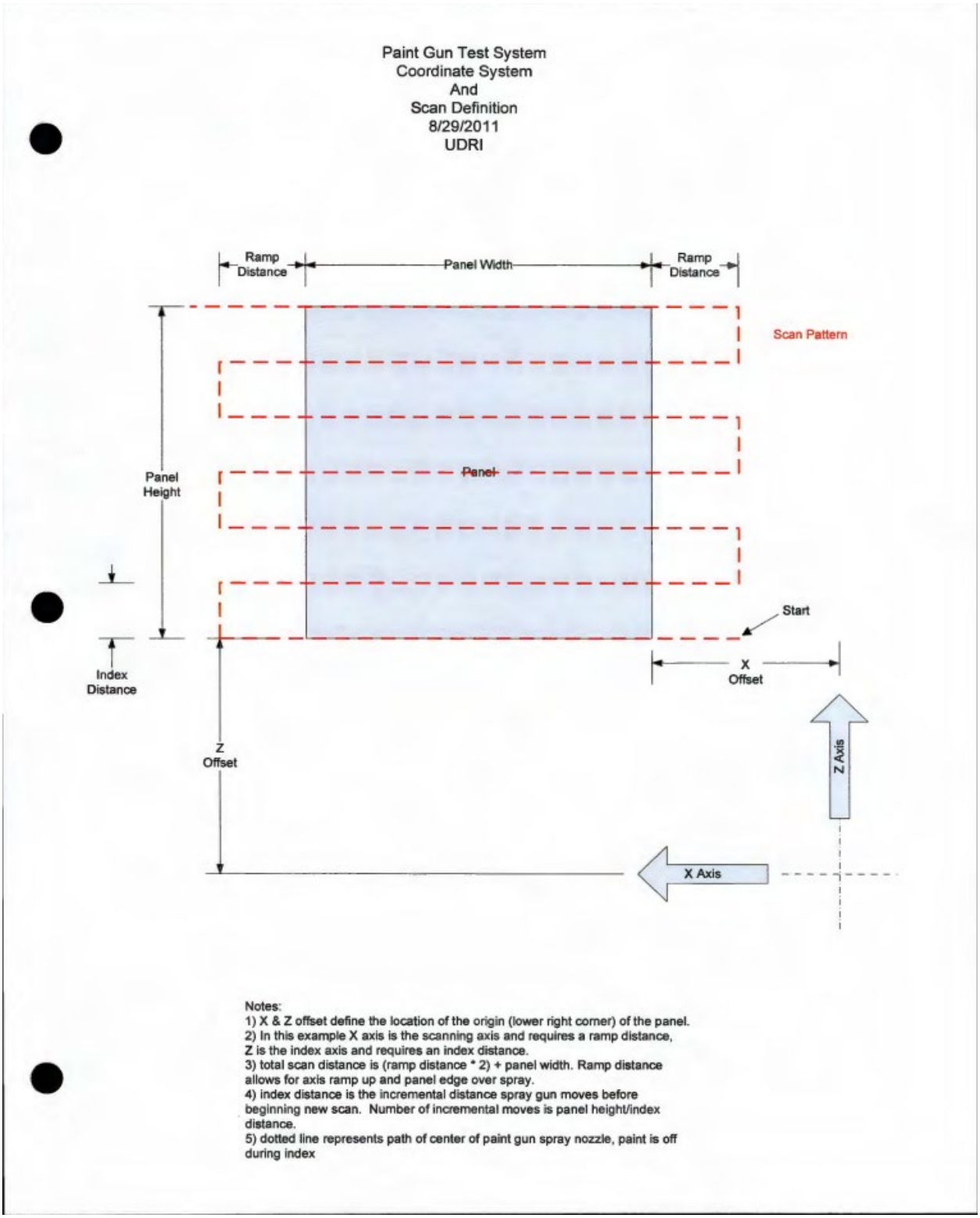
BASECOAT

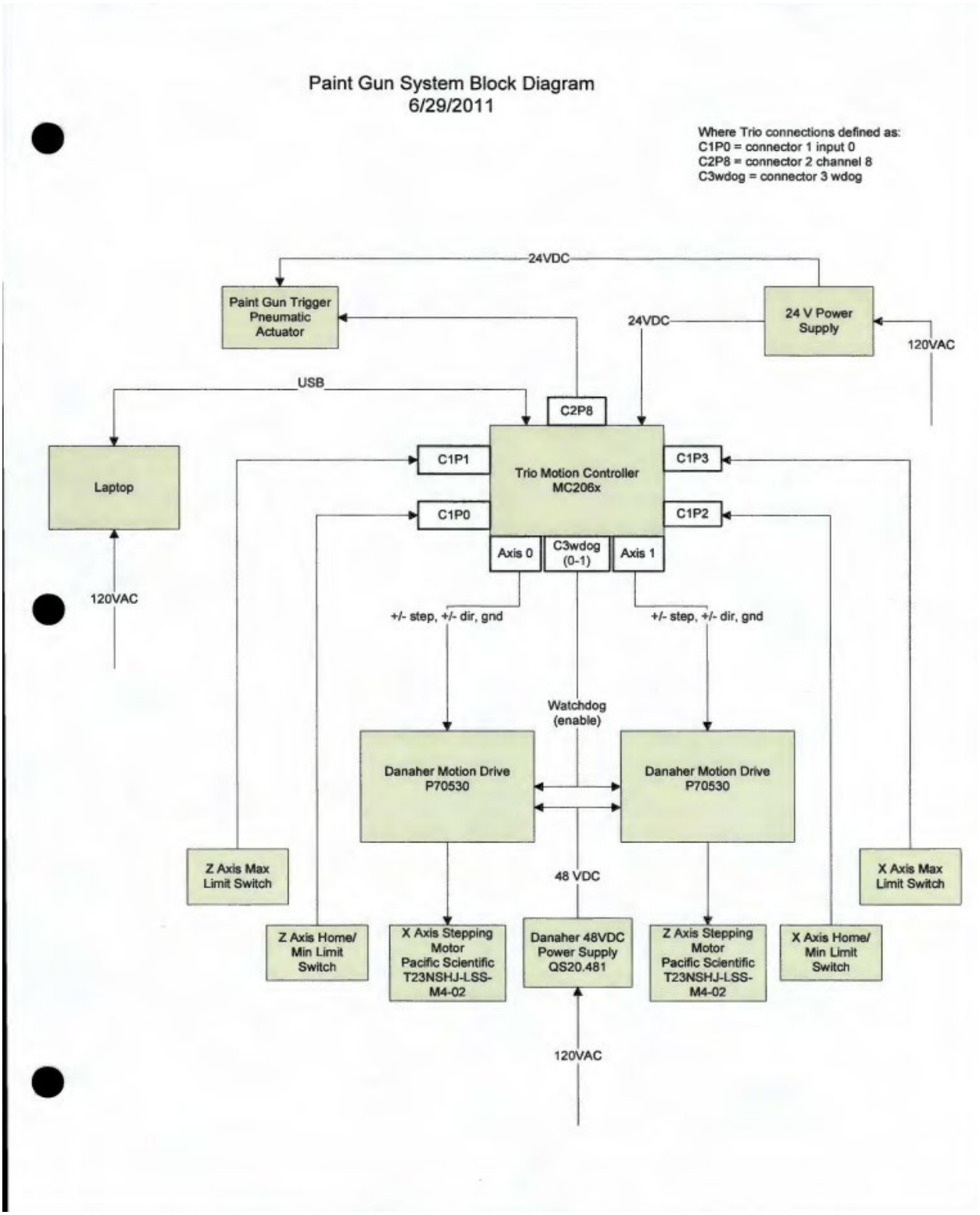


CLEARCOAT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Date Sprayed	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022	1/19/2022
Coating Supplier	PPG	Cromax	Cromax	PPG	PPG	Cromax	Cromax	Cromax	PPG	PPG	PPG	PPG	PPG	Cromax	Cromax	Cromax
Coating	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat	Clearcoat
Component A Code	EC530	LE54005	LE54005	EC530	EC530	LE54005	LE54005	LE54005	EC530	EC530	EC530	EC530	EC530	LE54005	LE54005	LE54005
Component A Ratios	3	4	4	3	3	4	4	4	3	3	3	3	3	4	4	4
Component B Code	ECH5075	LE11705	LE11705	ECH5075	ECH5075	LE11705	LE11705	LE11705	ECH5075	ECH5075	ECH5075	ECH5075	ECH5075	LE11705	LE11705	LE11705
Component B Ratio	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Component C Code - if required	ECR75	N/A	N/A	ECR75	ECR75	N/A	N/A	N/A	ECR75	ECR75	ECR75	ECR75	ECR75	N/A	N/A	N/A
Component C Ratio - if required	1	N/A	N/A	1	1	N/A	N/A	N/A	1	1	1	1	1	N/A	N/A	N/A
Coating Temp [F]	73.2	74.1	74.1	73	73	75	74.6	74.6	75.5	75.5	75.5	75.5	75.5	76.8	76.8	76.8
Viscosity	18.2	18.1	18.1	18.2	18.2	18.1	18.1	18.1	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8
Density [lb/gallon]	9.585	9.185	9.185	9.585	9.585	9.185	9.185	9.185	9.581	9.581	9.581	9.581	9.581	9.057	9.057	9.057
Density [g/L]	1151.535	1051.257	1051.257	1151.535	1151.535	1051.547	1051.547	1051.547	1150.578	1150.578	1150.578	1150.578	1150.578	1085.584	1085.584	1085.584
Spray Gun	Aerail Iwata PC	Tekna Prolite	SATA 5000	Aerail Iwata CC	Tekna Prolite	Aerail Iwata CC	SATA 5000	Aerail Iwata PC	Tekna Prolite	Aerail Iwata CC	SATA 5000	SATA 5000	Aerail Iwata PC	Tekna Prolite	Aerail Iwata CC	Aerail Iwata PC
Spray Gun Type	Compliant	HVLP	HVLP	Compliant	HVLP	Compliant	HVLP	Compliant	HVLP	Compliant	HVLP	HVLP	Compliant	HVLP	Compliant	Compliant
Model	400	Prolite	5000	400	Prolite	400	5000	400	Prolite	400	5000	5000	400	Prolite	400	400
Fluid Tip Size	0.110	0.124	0.127	0.110	0.124	0.110	0.127	0.110	0.124	0.110	0.127	0.127	0.110	0.124	0.110	0.110
Air Cap Size																
Orifice [Ga/HoGa]	0.052	0.054	0.053	0.054	0.054	0.054	0.053	0.052	0.054	0.054	0.053	0.053	0.052	0.054	0.054	0.052
Size of Cup [approximate]	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L	0.5L
Target Distance [+ 0.25 inches]	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"	7"
Air Pressure inlet	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
Air Pressure at air cap	24	10	10	22	10	22	10	24	10	22	10	10	24	10	22	24
Fan Pattern Size	2-1/2 x 10	2 3/4 x 10	5 x 12 1/2	2-1/2 x 10	2-1/2 x 10 1/4	2-1/2 x 12 1/2	5 x 12 1/2	2-1/2 x 12 1/2	2-1/2 x 10 1/4	2-1/2 x 12 1/2	2-1/2 x 10 1/4	2-1/2 x 10 1/4	2-1/2 x 10	2 3/4 x 10	2-1/2 x 12 1/2	2-1/2 x 12 1/2
Traverse Speed [in/s]	6	4.7	5.3	6	5.3	6	5.3	6	5.3	6	4.8	4.8	6	4.7	6	6
Air Flow [Cfm]	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Air Flow [CFM]	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Temperature of Booth [+ 5°F]	78°	77°	77°	77°	77°	77°	77°	77°	77°	77°	77°	77°	77°	77°	77°	77°
Booth Humidity [+10%]	47%	47%	48%	48%	48%	50%	48%	45%	45%	45%	50%	45%	45%	48%	45%	45%
Panel Size	Small	Large	Large	Small	Large	Small	Small	Large	Small	Large	Small	Large	Large	Small	Large	Small
Initial Panel 1 Wgt 1	85.885	173.455	171.358	85.771	173.535	85.481	85.854	171.854	87.258	173.514	85.885	173.554	173.854	85.554	172.735	84.448
Initial Panel 1 Wgt 2	85.881	173.445	171.355	85.788	173.535	85.451	85.851	171.833	87.253	173.515	85.883	173.551	173.847	85.553	172.737	84.448
Painted Panel 1 Wgt 1	88.848	173.154	175.535	88.254	173.445	88.584	88.888	175.373	88.367	178.388	87.742	177.118	173.537	88.424	175.345	86.117
Painted Panel 1 Wgt 2	88.848	173.154	175.535	88.255	173.445	88.584	88.888	175.373	88.367	178.388	87.742	177.118	173.537	88.424	175.345	86.117
Avg Wgt of Coating on Panel 1 [gm]	2.965	5.751	4.328	3.475	5.858	3.958	4.545	4.545	2.709	4.685	1.858	5.148	4.547	1.865	4.143	1.787
Initial Panel 2 Wgt 1	85.442	174.354	174.452	85.847	173.444	85.751	85.361	174.327	88.852	172.158	85.547	174.178	174.527	87.187	173.387	85.151
Initial Panel 2 Wgt 2	85.455	174.358	174.151	85.847	173.425	85.758	85.361	174.327	88.855	172.172	85.548	174.175	174.525	87.184	173.383	85.151
Painted Panel 2 Wgt 1	88.555	180.845	175.458	88.588	175.347	88.888	88.381	174.354	90.828	176.844	88.357	177.857	175.133	89.854	177.338	87.842
Painted Panel 2 Wgt 2	88.555	180.845	175.428	88.588	175.347	88.888	88.381	174.354	90.828	176.845	88.357	177.857	175.133	89.854	177.338	87.842
Avg Wgt of Coating on Panel 2 [gm]	3.153	5.654	4.278	3.451	5.323	3.921	4.548	5.637	2.761	4.649	1.899	5.328	4.545	1.958	4.882	1.684
Initial Panel 3 Wgt 1	85.348	172.882	174.745	85.354	173.858	85.781	85.576	172.184	87.822	174.376	85.542	173.158	173.488	86.858	171.452	85.458
Initial Panel 3 Wgt 2	85.328	172.884	174.788	85.356	173.855	85.782	85.577	172.858	87.824	174.376	85.535	173.158	173.481	86.854	171.455	85.457
Painted Panel 3 Wgt 1	88.855	178.551	178.385	88.792	173.888	89.152	89.555	173.386	90.585	176.845	88.581	176.348	177.385	88.888	175.372	87.125
Painted Panel 3 Wgt 2	88.855	178.558	178.385	88.795	173.888	89.152	89.555	173.385	90.585	176.845	88.584	176.348	177.385	88.888	175.372	87.125
Avg Wgt of Coating on Panel 3 [gm]	3.381	5.768	4.374	3.458	5.363	3.451	5.579	5.286	2.763	4.855	1.861	5.158	4.585	1.949	4.488	1.668
Average Wgt of Coating on Panels	3.488	5.738	4.393	3.458	5.329	3.923	5.622	5.538	2.744	4.722	1.853	5.865	4.545	1.942	4.297	1.585
Total Wgt of Coating on Panels [g	7.324	17.194	12.881	7.374	17.787	5.353	7.864	11.853	8.233	14.168	5.558	5.188	13.845	5.737	12.718	5.856
Wgt of Gun Before 1 [lbs]	4.544	4.725	4.422	4.457	4.855	4.585	4.852	4.515	4.733	4.623	4.465	4.485	4.528	4.675	4.455	4.118
Wgt of Gun Before 2	4.544	4.725	4.422	4.457	4.855	4.585	4.853	4.515	4.733	4.623	4.465	4.485	4.528	4.675	4.455	4.118
Wgt of Gun After 1	4.483	4.448	4.143	4.285	4.855	4.522	4.452	4.874	4.564	4.485	4.285	4.541	4.585	4.515	4.258	3.985
Wgt of Gun After 2	4.483	4.448	4.143	4.285	4.855	4.522	4.452	4.874	4.564	4.485	4.285	4.541	4.585	4.515	4.258	3.985
Avg Wgt of Coating Sprayed [lbs]	0.161	0.283	0.279	0.152	0.259	0.187	0.261	0.241	0.163	0.328	0.177	0.148	0.222	0.168	0.259	0.199
Avg Wgt of Coating Sprayed [gm]	73.028	124.888	126.552	68.945	117.488	84.832	98.945	105.945	76.557	93.738	80.285	67.152	100.524	72.575	100.488	68.184
Syringe Wgt Initial 1 [gm]	6.885	7.484	7.484	6.885	6.885	7.587	7.587	7.587	6.885	6.885	6.885	6.885	6.885	7.332	7.332	7.332
Syringe Wgt Initial 2	6.882	7.484	7.484	6.882	6.882	7.587	7.587	7.587	6.885	6.885	6.885	6.885	6.885	7.332	7.332	7.332
Syringe Wgt After Pail 1-1	6.555	7.251	7.251	6.555	6.555	7.528	7.528	7.528	6.546	6.546	6.546	6.546	6.546	6.995	6.995	6.995
Syringe Wgt After Pail 1-2	6.555	7.251	7.251	6.555	6.555	7.528	7.528	7.528	6.546	6.546	6.546	6.546	6.546	6.995	6.995	6.995
Syringe Wgt After Pail 2-1	6.582	7.885	7.885	6.582	6.582	7.872	7.872	7.872	6.245	6.245	6.245	6.245	6.245	6.658	6.658	6.658
Syringe Wgt After Pail 2-2	6.582	7.884	7.884	6.582	6.582	7.872	7.872	7.872	6.245	6.245	6.245	6.245	6.245	6.658	6.658	6.658
Syringe Wgt After Pail 3-1	6.847	8.795	8.795	6.847	6.847	7.855	7.855	7.855	5.345	5.345	5.345	5.345	5.345	6.577	6.577	6.577
Syringe Wgt After Pail 3-2	6.845	8.795	8.795	6.845	6.845	7.855	7.855	7.855	5.345	5.345	5.345	5.345	5.345	6.577	6.577	6.577
Average Weight of Coating Pail 1	0.284	0.225	0.225	0.284	0.284	0.273	0.273	0.273	0.258	0.258	0.258	0.258	0.258	0.287	0.287	0.287
Average Weight of Coating Pail 2	0.287	0.258	0.258	0.287	0.287	0.256	0.256	0.256	0.278	0.278	0.278	0.278	0.278	0.285	0.285	0.285
Average Weight of Coating Pail 3	0.286	0.274	0.274	0.286	0.286	0.277	0.277	0.277	0.300	0.300	0.300	0.300	0.300	0.274	0.274	0.274
Avg Wgt of coating in Pail dish	0.289	0.258	0.258	0.289	0.289	0.271	0.271	0.271	0.287	0.287	0.287	0.287	0.287	0.282	0.282	0.282
	1.76	2.05	1.88	1.88	2.08	1.87	1.85	1.88	1.86	1.79	1.85	1.83	1.75	1.41	1.81	1.48
Pail Wgt 1 Initial 1	1.125	1.152	1.152	1.125	1.125	1.124	1.124	1.124	1.152	1.152	1.152	1.152	1.152	1.155	1.155	1.155
Pail Wgt 1 Initial 2	1.126	1.152	1.152	1.126	1.126	1.123	1.123	1.123	1.150	1.150	1.150	1.150	1.150	1.155	1.155	1.155
Pail Wgt 2 Initial 1	1.121	1.125	1.125	1.121	1.121	1.152	1.152	1.152	1.123	1.123	1.123	1.123	1.123	1.126	1.126	1.126
Pail Wgt 2 Initial 2	1.120	1.126	1.126	1.120	1.120	1.153	1.153	1.153	1.120	1.120	1.120	1.120	1.120	1.127	1.127	1.127
Pail Wgt 3 Initial 1	1.152	1.125	1.125	1.152	1.152	1.154	1.154	1.154	1.151	1.151	1.151	1.151	1.151	1.124	1.124	1.124
Pail Wgt 3 Initial 2	1.155	1.125	1.125	1.155	1.155	1.154	1.154	1.154	1.152	1.152	1.152	1.152	1.152	1.125	1.125	1.125
Pail Wgt 1 Dried 1	1.242	1.244	1.244	1.242	1.242	1.228	1.228	1.228	1.255	1.255	1.255	1.255	1.255	1.248	1.248	1.248
Pail Wgt 1 Dried 2	1.242	1.244	1.244	1.242	1.242	1.228	1.228	1.228	1.255	1.255	1.255	1.255	1.255	1.248	1.248	1.248
Pail Wgt 2 Dried 1	1.240	1.224	1.224	1.240	1.240	1.225	1.225	1.225	1.245	1.245	1.245	1.245	1.245	1.238	1.238	1.238
Pail Wgt 2 Dried 2	1.240	1.224	1.224	1.240	1.240	1.225	1.225	1.225	1.245	1.245	1.245	1.245	1.245	1.238	1.238	1.238
Pail Wgt 3 Dried 1	1.251	1.238	1.238	1.251	1.251	1.234	1.234	1.234	1.258	1.258	1.258	1.258	1.258	1.224	1.224	1.224
Pail Wgt 3 Dried 2	1.252	1.223	1.223	1.252	1.252	1.234	1.234	1.234	1.258	1.258	1.258	1.258	1.258	1.222	1.222	1.222
Average Weight of dried coating 1	0.117	0.092	0.092	0.117	0.117	0.105	0.105	0.105	0.103	0.103	0.103	0.103	0.103	0.105	0.105	0.105
Average Weight of dried coating 2	0.120	0.093	0.093	0.120	0.120	0.094	0.094	0.094	0.117	0.117	0.117	0.117	0.117	0.104	0.104	0.104
Average Weight of dried coating 3	0.113	0.104	0.104	0.113	0.113	0.108	0.108	0.108	0.103	0.103	0.103	0.103	0.103	0.097	0.097	0.097
Average Weight of dried coating	0.124	0.095	0.095	0.124	0.124	0.099	0.099	0.099	0.124	0.124	0.124	0.124	0.124	0.102	0.102	0.102
Percent Solids	43.3%	37.3%	37.3%	43.3%	43.3%	36.7%	36.7%	36.7%	43.4%	43.4%	43.4%	43.4%	43.4%	36.2%	36.2%	36.2%
	Small	Large	Large	Small	Large	Small	Small	Large	Small	Large	Small	Large	Large	Small	Large	Small
	PPG	Cromax	Cromax	PPG	PPG	Cromax	Cromax	Cromax	PPG	PPG	PPG	PPG	PPG	Cromax	Cromax	Cromax
Paint Solids on Panel [gm] A	7.22	17.18	12.88	7.37	17.78	5.37	7.86	11.87	8.23	14.17	5.56	5.19	13.85	5.74	12.71	5.86
Paint Solids Sprayed [gm] B	26.511	45.558	47.342	26.388	43.244	31.148	35.957	48.145	33.825	42.351	34.588	28.324	43.488	26.239	33.154	24.723
Transfer Efficiency - 1-(A/B)*1	28.58%	34.58%	36.87%	28.54%	36.42%	33.37%	28.55%	37.57%	24.55%	32.35%	16.07%	34.77%	31.84%	24.86%	32.45%	23.72%
	28.58%	34.58%	36.87%	28.54%	36.42%	33.37%	28.55%	37.57%	24.55%	32.35%	16.07%	34.77%	31.84%	24.86%	32.45%	23.72%

APPENDIX E – ROBOT SCHEMATIC





END OF REPORT

ANEST IWATA Americas, Inc.
9525 Glades Drive
West Chester, OH 45011

11/30/2023

Yolo – Solano Air Quality Management District
1947 Galileo Ct
Suite 103
Davis, CA 95618

Subject: Request for Written Approval to Use Series 2 WS-400 Spray Gun (Digital and Non-Digital) with Air Caps WS-400-02, WS-400-02 OBS, WS-400-03, and WS-400-03-BF (Basecoat and Clearcoat), Application No. 627297 in CA.

Dear Benjamin Beattie,

I hope this letter finds you well. I am writing to request written approval to sell and operate the Series 2 WS-400 spray gun for Motor Vehicle and Mobile Equipment Non-Assembly Line Coating Operations in Yolo – Solano under Rule 2.26 Section 302.3.

ANEST IWATA has received South Coast Air Quality Management District approval for the Series 2 WS-400 models which you can find enclosed. This approval shows that the transfer efficiency can achieve equivalent or better transfer efficiency to a high-volume, low-pressure spray gun.

I appreciate your time and attention to this matter. If you require any further information or clarification, please do not hesitate to contact me at 513-446-8596 or sarar@anestiwata.com. I look forward to your response and appreciate your assistance.

Thank you for your consideration.

Sincerely,

Sara Robbe
ANEST IWATA Americas
Marketing Manager
sarar@anestiwata.com
513-446-8596

Grant Setzler

From: Sara Robbe <sarar@anestiwata.com>
Sent: Tuesday, January 16, 2024 8:43 AM
To: Ben Beattie
Subject: RE: County approval for Transfer Efficiency
Attachments: ANEST - 627297.pdf; Anest Iwata Final Report August 2022 - signed.pdf; ANEST - 632690.pdf; ANEST - 636151.pdf; final report Anest IWATA WS-400-AX-1 SCAQMD.pdf; Yolo_EPA_AX1_CACountyRequest_SR1_11172023-13.pdf; Yolo_EPA_SR2 _CACountyRequest_SR1_11172023 13.pdf

Hi Benjamin,
I just wanted to follow up on this request and see if you need anything else for me? I've attached the information again in case you need it.

Let me know if you have any questions. I appreciate your time.

Sara Robbe

Marketing Manager
ANEST IWATA Americas, Inc.
10148 Commerce Park Drive
Cincinnati, OH 45246
(513) 446-8596

From: Ben Beattie <BBeattie@ysaqmd.org>
Sent: Thursday, December 7, 2023 3:40 PM
To: Sara Robbe <sarar@anestiwata.com>
Subject: RE: County approval for Transfer Efficiency

Hi Sara,
You indeed reached the right person. My staff and I will take a look at the information you submitted and reach out to you if we have any additional questions.
Thank you,

Benjamin Beattie
Engineering Manager
Yolo-Solano Air Quality Management District
1947 Galileo Court
Davis CA, (530) 757-3667
www.ysaqmd.org

From: Sara Robbe <sarar@anestiwata.com>
Sent: Thursday, December 7, 2023 12:13 PM
To: Ben Beattie <BBeattie@ysaqmd.org>
Subject: County approval for Transfer Efficiency

Hello Mr. Beattie,
I am writing to gain approval for operation of our Series 2 guns in your county. I am submitting information our Series 2 WS-400 guns and our AX-1 guns. If you are not the right person or this is not the correct process, I would greatly appreciate any feedback on how to go about this correctly.

Thank you so much for your time. Please don't hesitate to contact me with any questions or concerns.

Sara Robbe

Marketing Manager
ANEST IWATA Americas, Inc.
10148 Commerce Park Drive
Cincinnati, OH 45246
(513) 446-8596

Sara Robbe

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