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 WS-400-AX-1 Spray Gun (Digital and Non-Digital) with Air Cap WS-400-01-AX-1

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 WS-400-AX-1 Spray Gun (digital or non-digital) with Air Cap WS-400-01-AX-1 is capable of achieving a transfer efficiency equivalent to or greater than HVLP spray equipment.

The District grants conditional approval of the Anest Iwata WS-400-AX-1 Spray Gun (digital or non-digital) with Air Cap WS-400-01-AX-1 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 two submitted SCAQMD approval letters (one for the digital version and one for the non-digital version) 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 WS-400-AX-1 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 WS-400-AX-1 Spray Gun is equal to or less than 36 psig. Anest Iwata shall supply written notification with each Anest Iwata WS-400-AX-1 Spray Gun sold or distributed for use within the District that the maximum air pressure supplied to the spray gun shall not exceed 36 psig.

3. Anest Iwata shall supply a digital pressure gauge (Part Number DPG-1) with each digital Anest Iwata WS-400-AX-1 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 WS-400-AX-1 Spray Gun sold or distributed for use within the jurisdiction of the District. Anest Iwata shall supply written notification with each Anest Iwata WS-400-AX-1 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 36 psig whenever the spray gun is in operation.

4. This approval is only valid if during actual operation the Anest Iwata WS-400-AX-1 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-AX-1" for all Anest Iwata WS-400-AX-1 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-400-01-AX-1" and indicates that the inlet air pressure shall not exceed 36 psig for all Anest Iwata WS-400-AX-1 Spray Guns sold or distributed for use within the District.

7. This approval is only valid if during actual operation the Anest Iwata WS-400-AX-1 Spray Gun (digital or non-digital) with Air Cap WS-400-01-AX-1 is labeled as described in Conditions 5 and 6.

8. This approval is only valid for the Anest Iwata WS-400-AX-1 Spray Gun (Digital and Non-Digital) with Air Cap WS-400-01-AX-1 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. Tony Robson
Global Technical Manager
Anest Iwata Strategic Center
Via degli Aceri 1
21010 Cardano al Campo, Italy

Dear Mr. Robson:

Subject: Rule 1151 Transfer Efficiency Approval of the WS-400-AX-1 Digital Spray Gun with Air Cap WS-400-01-AX-1 (Clearcoat), Application No. 632690.

The South Coast Air Quality Management District (South Coast AQMD) has completed review of your report entitled "Evaluation of the Anest Iwata WS-400-AX-1 non-digital and digital paint spray guns for use in the South Coast Air Quality Management District (SCAQMD)" dated August 30, 2022. The results of the transfer efficiency testing performed indicate that the WS-400-AX-1 Digital Spray Gun with Air Cap WS-400-01-AX-1 is capable of achieving equivalent or better transfer efficiency than high-volume, low-pressure (HVLP) spray equipment. The WS-400-AX-1 Digital Spray Gun with Air Cap WS-400-01-AX-1 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 Strategic Center ("Anest Iwata") shall supply written notification with each WS-400-AX-1 Digital Spray Gun sold or distributed for use within the jurisdiction of the South Coast AQMD that the spray gun with the Air Cap WS-400-01-AX-1 is only approved for the application of clearcoats subject to South Coast AQMD Rule 1151.

2. This approval is only valid if the air pressure supplied to the WS-400-AX-1 Digital Spray Gun is less than or equal to 36 psig. Anest Iwata shall supply written notification with each WS-400-AX-1 Digital 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 36 psig.

3. Anest Iwata shall supply a digital pressure gauge (Part No. DPG-1) with each WS-400-AX-1 Digital 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-AX-1 Digital 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 36 psig whenever the spray gun is in operation.

4. This approval is only valid if during actual operation, the WS-400-AX-1 Digital 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-AX-1" and indicates that the inlet air pressure shall not exceed 36 psig for all WS-400-AX-1 Digital 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-400-01-AX-1" for all WS-400-AX-1 Digital 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-AX-1 Digital Spray Gun with Air Cap WS-400-01-AX-1 (Clearcoat) is labeled as described in Condition Nos. 5 and 6.

8. This approval is only valid for WS-400-AX-1 Digital Spray Gun with Air Cap WS-400-01-AX-1 (Clearcoat) 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

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

April 13, 2023

Mr. Tony Robson
Global Technical Manager
Anest Iwata Strategic Center
Via degli Aceri 1
21010 Cardano al Campo, Italy

Dear Mr. Robson:

Subject: Rule 1151 Transfer Efficiency Approval of the WS-400-AX-1 Non-digital Spray Gun with Air Cap WS-400-01-AX-1 (Clearcoat), Application No. 636151.

The South Coast Air Quality Management District (South Coast AQMD) has completed review of your report entitled "Evaluation of the Anest Iwata WS-400-AX-1 non-digital and digital paint spray guns for use in the South Coast Air Quality Management District (SCAQMD)" dated August 30, 2022. The results of the transfer efficiency testing performed indicate that the WS-400-AX-1 Non-digital Spray Gun with Air Cap WS-400-01-AX-1 is capable of achieving equivalent or better transfer efficiency than high-volume, low-pressure (HVLP) spray equipment. The WS-400-AX-1 Non-digital Spray Gun with Air Cap WS-400-01-AX-1 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 Strategic Center ("Anest Iwata") shall supply written notification with each WS-400-AX-1 Non-digital Spray Gun sold or distributed for use within the jurisdiction of the South Coast AQMD that the spray gun with the Air Cap WS-400-01-AX-1 is only approved for the application of clearcoats subject to South Coast AQMD Rule 1151.

2. This approval is only valid if the air pressure supplied to the WS-400-AX-1 Non-digital Spray Gun is less than or equal to 36 psig. Anest Iwata shall supply written notification with each WS-400-AX-1 Non-digital 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 36 psig.

3. Anest Iwata shall supply a mechanical pressure gauge (Item #8131B) that clearly identifies the maximum allowable spray gun inlet air pressure with each WS-400-AX-1 Non-digital 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-AX-1 Non-digital 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 36 psig whenever the spray gun is in operation.

4. This approval is only valid if during actual operation, the WS-400-AX-1 Non-digital 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-AX-1" and indicates that the inlet air pressure shall not exceed 36 psig for all WS-400-AX-1 Non-digital 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-400-01-AX-1" for all WS-400-AX-1 Non-digital 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-AX-1 Non-digital Spray Gun with Air Cap WS-400-01-AX-1 (Clearcoat) is labeled as described in Condition Nos. 5 and 6.

8. This approval is only valid for WS-400-AX-1 Non-digital Spray Gun with Air Cap WS-400-01-AX-1 (Clearcoat) 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

Fraunhofer IPA

Final report

Evaluation of the ANEST IWATA WS-400-AX-1 non-digital and digital paint spray guns for use in the South Coast Air Quality Management District (SCAQMD)

Release: August 30, 2022

Project-No.: 11-06255

prepared for: ANEST IWATA Strategic Center
Via Degli Aceri 1
21010 Cardano al Campo (VA)
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Dipl.-Ing. (FH) Philipp Knee
Dipl.-Ing. (FH) Stephan Paustian

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1 General Information

1.1 Test location & independent test lab

Institution:

Fraunhofer-Institute Manufacturing Engineering and Automation (IPA)

Nobelstr. 12

70569 Stuttgart

Germany

Responsible Scientist:

Dr. rer. nat. Michael Hilt

Deputy head of Fraunhofer Institute for Manufacturing Engineering and Automation IPA

Divisional director "Surface Engineering and Materials Technology"

Head of Department "Coating Systems and Painting Technology" Phone: (0049) 711 / 970 – 3821

e-mail: michael.hilt@ipa.fraunhofer.de

Date: August 30, 2022

Signature: 

1.2 Testing Laboratory

The measurements and evaluations were performed at Fraunhofer IPA (Fraunhofer-Institute for Manufacturing Engineering and Automation) in Stuttgart.

This institute possesses detailed experience with respect to surface coating technology as well as the know-how and instrumentation required to perform the measurements described below. Established companies such as AUDI AG, Mercedes-Benz Group AG, Dürr AG, BASF AG and PPG corp. are permanent customers of IPA. As a neutral partner of the industry, the institute has already established a great number of analyses and comparative measurements for diversified tasks.

The equipment available at IPA with regard to the tests conducted and the measuring technology fulfil the requirements of the guidelines given.

These measurements have been carried out in accordance with SCAQMD "Spray Equipment Transfer Efficiency Test Procedure for Equipment User" (May 24, 1989), the "Guidelines for Demonstrating Equivalency with District approved Transfer Efficient Spray Guns" (September 26, 2002) and the certified source test protocol (SCAQMD-Letter, dated May 20, 2022, S/T ID P 22 027, facility ID No. 168 078, A/N 632 690 and 636151).

IPA takes an entirely neutral position towards ANEST IWATA. There are no economic dependences whatsoever. Signed "Statement of Non-Conflict as an independent laboratory" was already supplied with certified source test protocol (September 24, 2021). For further information, see: http://www.ipa.fraunhofer.de/en/paintingtechnology.html

2 Objective

The objective is to demonstrate that the paint spray guns ANEST IWATA WS-400-AX-1 non-digital and ANEST IWATA WS-400-AX-1 digital (non-HVLP spray guns) are capable of achieving equivalent or better transfer efficiencies than the HVLP technology currently in use in the SCAQMD area under District Rule 1151. The gun settings used in these tests must comply with the application conditions used in practice as well as with the manufacturer`s written instructions and be in accordance to the approved source test protocol and the paint data sheets. This is confirmed by additional quality measurements including film build, gloss, DoI and orange peel.

The final purpose is to permit the sale and use of ANEST IWATA WS-400-AX-1 non-digital and ANEST IWATA WS-400-AX-1 digital paint spray guns in motor vehicle and mobile equipment non-assembly line coating operations. This test was completed to satisfy the requirements of Rule 1151 (d)(6)(A)(v), which states:

(6)Transfer Efficiency

(A) A person shall not apply automotive coatings to any motor vehicle, mobile equipment or any associated parts or components to a motor vehicle or mobile equipment except by the use of one of the following methods:

(i) electrostatic application, or

(ii) high-volume, low-pressure (HVLP) spray, or

(iii) brush, dip, or roller, or

(iv) Spray gun application, provided the owner or operator demonstrates that the spray gun meets the HVLP definition in paragraph (c) (17) in design and use. A satisfactory demonstration must be based on the manufacturer's published technical material on the design of the spray gun and by a demonstration of the operation of the spray gun using an air pressure tip gauge from the manufacturer of the spray gun.

(v) Any such other automotive coating application methods as demonstrated, in accordance with the provisions of subparagraph

(h)(1)(F), to be capable of achieving equivalent or better transfer efficiency than the automotive coating application method listed in clause (d)(6)(A)(ii), provided written approval is obtained from the Executive Officer prior to use.

3 Summary

Following the SPRAY EQUIPMENT TRANSFER EFFICIENCY TEST PROCEDURE FOR EQUIPMENT USER given by the SCAQMD the transfer efficiency (TE) of the ANEST IWATA WS-400-AX-1 non-digital and ANEST IWATA WS-400-AX-1 digital paint spray guns (non-HVLP spray guns) has been compared to the HVLP guns SATAjet 5000 B HVLP and DeVilbiss DV1 C1-Plus HVLP.

In summary, the average transfer efficiency results for the candidate paint spray guns were greater than, or equal to the average transfer efficiency of at least one of the baseline HVLP paint spray guns (application method clause (d)(6)(A)(ii)), for each coating manufacturer. The results were obtained at OEM equivalent paint film qualities and practically relevant film builds.

Therefore, the ANEST IWATA WS-400-AX-1 non-digital and ANEST IWATA WS-400-AX-1 digital paint spray guns should be approved for sale and use in the SCAQMD area.

4 Test Procedure

The determination is performed by respecting the AQMD stipulations described in:

- SCAQMD "Spray Equipment Transfer Efficiency Test Procedure For Equipment Users" (May 24,1989)
- SCAQMD "Guidelines for Demonstrating Equivalency with District approved Transfer Efficiency Spray Guns" (September 26, 2002)
- Anest IWATA evaluation test plan for the use of ANEST IWATA WS-400-AX-1 non-digital and ANEST IWATA WS-400-AX-1 digital paint spray guns in the South coast Air Quality Management District (Demonstration of Equivalence between ANEST IWATA WS-400-AX-1 non-digital and ANEST IWATA WS-400-AX-1 digital paint spray guns against District approved HVLP spray guns; dated September 24, 2021)
- SCAQMD certified source test protocol, letter of Michael Solis, Review Date May 20, 2022, S/T ID P 22 027, facility ID No. 168 078, A/N 632 690 and 636151)
- Rule 1151 (h)(1)(F): Test Methods

5 Test Information

5.1 Spray Equipment tested

The following spray equipment was tested:

- ANEST IWATA WS-400-AX-1 non-digital at 36 psi inlet pressure (recommended pressure; see certified source test protocol, p. 7), nozzle size 1.3 mm, air cap WS-400-01-AX-1
- ANEST IWATA WS-400-AX-1 digital at 36 psi inlet pressure (recommended pressure; see certified source test protocol, p. 7), nozzle size 1.3 mm, air cap WS-400-01-AX-1
- SATAjet 5000 B HVLP at 29 psi inlet pressure (see certified source test protocol, p. 9). Air cap pressure max. 10 psi. Air cap pressure was measured (if necessary adjusted). Nozzle size 1.3
- DeVilbiss DV1 C1-Plus HVLP at 29 psi inlet pressure (see certified source test protocol, p. 11,). Air cap pressure max. 10 psi. Air cap pressure was measured (if necessary adjusted). Nozzle size 1.3 mm.

The two HVLP guns are popular commercially available HVLP spray guns in the U.S. market purposely selected to serve as comparative equipment for the transfer efficiency evaluation.

5.2 Materials tested

The following types of coating materials, representing typical applications, were applied throughout the tests:

	major manufacturer SpiesHecker (solvent-borne)		major manufacturer PPG (solvent-borne)		major manufacturer Axalta (waterborne)	
Type of coating	**coating name**	**mix ratio**	**coating name**	**mix ratio**	**coating name**	**mix ratio**
clear coat	Permasolid Low VOC Clear Coat 8096	2 parts Permasolid+ 1 part Hardener 3194 Medium + 10-15% Reducer 3394	EC 520 En-V High Production CC	3 parts EC520 + 1 part Hardener ECH 5075 + 1 part compliant reducer slow DT 1855	WBCC RK-40525	3 parts RK-40525 + 1 part activator FG-40560 + 1 part reducer T-98736

Table 2 : Paint Materials tested

The materials were applied according to the manufacturers' recommendations. Mix ratios and viscosities are documented in the data sheets of the individual tests.

5.3 Test Panels and Aluminium Foils

5.3.1 Test Panels

The size of the test panels to be coated was selected as follows:

- Large Target Size / Large Panel: 18" x 12" (457 x 305 mm)
- Small Target Size / Small Panel: 12" x 6" (305 x 152 mm)

5.3.2 Aluminium Foils

For the TE tests, both large and small panels were wrapped in aluminium foils. The foils were prepared by some 2'' larger than particular panel size, thus enabling the operator to wrap them properly, avoiding e.g. inclusions of air between panel and foil. The thickness of only some 50 µm (2 mils) does not have a significant effect on the panel width. Hence, the sizes of the aluminium foils to be coated for the TE measurements are identical to the panel sizes, i.e.:

- Large Target Size / Large Panel: 18" x 12" (457 x 304 mm²)
- Small Target Size / Small Panel: 12" x 6" (304 x 152 mm²)

The empty foils were weighed on the eve of wrapping the test panels, the coated and dryed foils were weighed directly after removing test panels from oven resp. neighboured spray booth and unwrapping.

5.3.3 Geometry

The panels are placed vertically. The principal geometry, start and stop position of painting (gun trigger) is shown in the figure below.

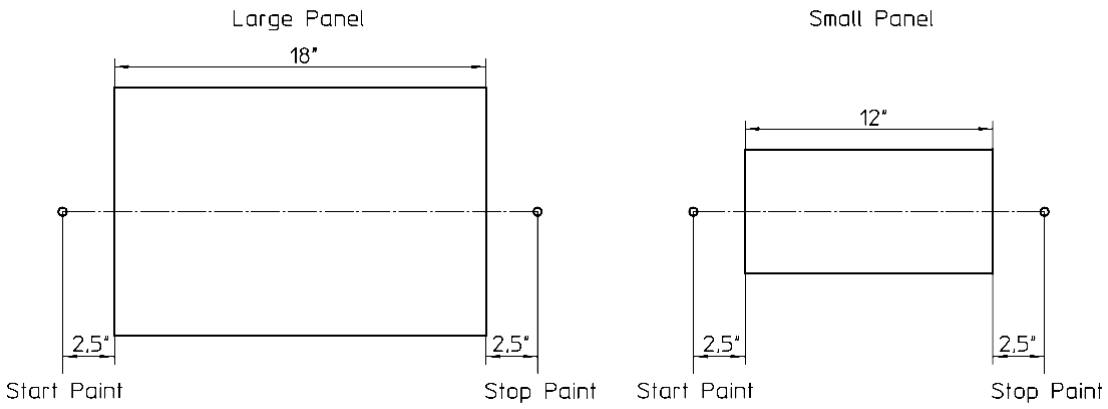


Fig. 1 : Geometry of the panels

5.4 Test Order

Listed below is the randomised test order for each gun, panel size and material tested.

test seq. #	tag. #	gun	panel size	paint material
1	15	SATAjet 5000 B HVLP	Large	clear coat Spies Hecker
2	12	DeVilbiss DV1 C1-Plus HVLP	Small	clear coat Spies Hecker
3	13	Anest IWATA WS-400-AX-1 non-dig.	Large	clear coat Spies Hecker
4	11	SATAjet 5000 B HVLP	Small	clear coat Spies Hecker
5	9	Anest IWATA WS-400-AX-1 non-dig.	Small	clear coat Spies Hecker
6	10	Anest IWATA WS-400-AX-1 digital	Small	clear coat Spies Hecker
7	16	DeVilbiss DV1 C1-Plus HVLP	Large	clear coat Spies Hecker
8	14	Anest IWATA WS-400-AX-1 digital	Large	clear coat Spies Hecker
9	17	Anest IWATA WS-400-AX-1 non-dig.	Small	clear coat PPG
10	24	DeVilbiss DV1 C1-Plus HVLP	Large	clear coat PPG
11	18	Anest IWATA WS-400-AX-1 digital	Small	clear coat PPG
12	22	Anest IWATA WS-400-AX-1 digital	Large	clear coat PPG
13	19	SATAjet 5000 B HVLP	Small	clear coat PPG
14	23	SATAjet 5000 B HVLP	Large	clear coat PPG
15	21	Anest IWATA WS-400-AX-1 non-dig.	Large	clear coat PPG
16	20	DeVilbiss DV1 C1-Plus HVLP	Small	clear coat PPG
17	7	SATAjet 5000 B HVLP	Large	WB clear coat Axalta
18	3	SATAjet 5000 B HVLP	Small	WB clear coat Axalta
19	6	Anest IWATA WS-400-AX-1 digital	Large	WB clear coat Axalta
20	8	DeVilbiss DV1 C1-Plus HVLP	Large	WB clear coat Axalta
21	4	DeVilbiss DV1 C1-Plus HVLP	Small	WB clear coat Axalta
22	2	Anest IWATA WS-400-AX-1 digital	Small	WB clear coat Axalta
23	1	Anest IWATA WS-400-AX-1 non-dig.	Small	WB clear coat Axalta
24	5	Anest IWATA WS-400-AX-1 non-dig.	Large	WB clear coat Axalta

Table 3 : Test order

6 Initial Spray Set-up and Performance

The spray distance for all tests has been fixed to 6,5“ (165.1 mm) +/- 0.5‘‘ (12.7 mm). Detailed information can be taken from the individual datasheets submitted with this report. As already mentioned, the panels are placed vertically with the spray being orientated horizontally.

The spraying robotic system which is used for the transfer efficiency tests is a free programmable 7-axis-robot, type ABB IRB-5403. The tests were performed at a constant downdraft air velocity of 0.3 +/- 0.05 m/s, an air humidity of 60 % ± 7 % and an air temperature of 23° C ± 1° C. This was confirmed by measurements during each test according to the flow chart. The zero point of as well the large as the small object were checked daily. Deviations have always been less than one millimeter.

Fig. 2 : Set-up of spray gun in front of the target

Fig. 3 : Arrangement of panel holder inside the spray booth (air humidity, temperature and downdraft velocity see individual data sheets)

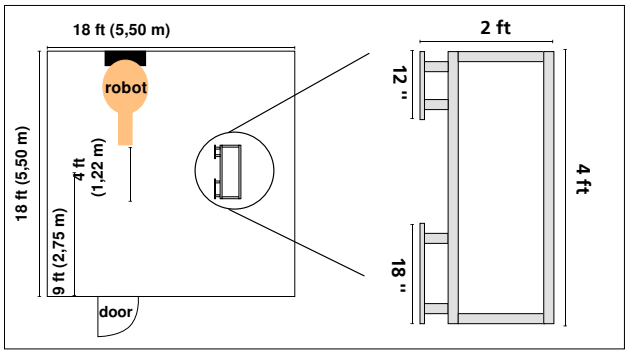


Fig. 4 : Schematic setup of spray booth

6.1 Measured fluid flows

In the following table the fluid flows for the individual spray guns and materials are listed. This information was used to adjust the speed of the robot so that all spray guns produced similar film builds.

paint material	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP
	[g/min], ca. mean	[g/min], ca. mean	[g/min], ca. mean	[g/min], ca. mean
CC SpiesHecker	255	240	160	210
CC PPG	275	260	175	230
WBCC Axalta	290	285	170	215

Table 4 : Measured approx. fluid flows

6.2 Pattern Size

The pattern sizes have been determined at the particular working distances. The pattern size differences for all paint spray guns do not exceed more than one inch within one paint class. The fan width (W) varies between 12 1/2" and 13 1/2" and the fan thickness (Th) between 3 1/4" and 4".

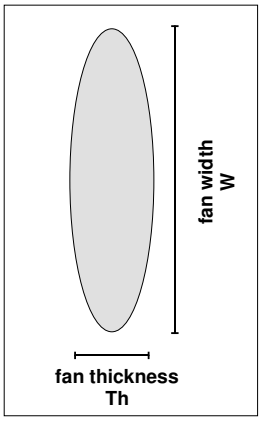


Fig. 5 : pattern sizes W and TH

The determination of the static spray pattern is shown in the video. The spray pattern characteristics were achieved with the fluid and fan adjustment regulator being fully opened.

paint material	ANEST IWATA WS-400-AX-1 non-digital		ANEST IWATA WS-400-AX-1 digital		SATAjet 5000 B HVLP		DeVilbiss DV1 C1-Plus HVLP	
	W [inch]	Th [inch]	W [inch]	Th [inch]	W [inch]	Th [inch]	W [inch]	Th [inch]
CC SpiesHecker	**12 ¾** [32.5 cm]	**3 ¾** [9.5 cm]	**12 ½** [32.0 cm]	**3 ½** [9.0 cm]	**12 ½** [32.0 cm]	**3 ¾** [9.5 cm]	**13 ½** [34.0 cm]	**3 ¼** [8.5 cm]
CC PPG	**13** [33.0 cm]	**3 ½** [9.0 cm]	**12 ¾** [32.5 cm]	**3 ½** [9.0 cm]	**12 ½** [32.0 cm]	**4** [10.0 cm]	**13 ½** [34.0 cm]	**3 ¼** [8.5 cm]
WBCC Axalta	**13 ¼** [33.5 cm]	**3 ½** [9.0 cm]	**12 ½** [32.0 cm]	**3 ¼** [8.5 cm]	**13 ½** [34.0 cm]	**3 ¾** [9.5 cm]	**13 ½** [34.0 cm]	**3 ¼** [8.5 cm]

Table 5 : Measured pattern sizes

7 Transfer Efficiency Results

Below, the final results for the transfer efficiencies are listed.

paint material	large panel				small panel			
	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP
CC SpiesHecker	**44.8%**	**45.9%**	41.3%	44.1%	**24.5%**	**26.0%**	24.3%	23.8%
CC PPG	**46.3%**	**46.9%**	39.7%	39.6%	**24.2%**	**26.4%**	22.8%	16.9%
WBCC Axalta	**54.3%**	**55.7%**	49.3%	48.5%	28.9%	**32.3%**	**29.8%**	23.6%

Table 6 : mean transfer efficiencies

In any case, the mean TE of each of the candidate guns is higher than the mean TEs of at least one of the HVLP guns compared.

For information purposes only, table 7 shows the transfer efficiencies as erroneously calculated in the past without regarding lead and lag distances (calculation see individual data sheets, page 7).

paint material	large panel				small panel			
	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP
CC SpiesHecker	**57.2%**	**58.6%**	52.7%	56.4%	**34.7%**	**36.8%**	34.4%	33.7%
CC PPG	**59.2%**	**59.9%**	50.7%	50.6%	**34.2%**	**37.4%**	32.3%	23.9%
WBCC Axalta	**69.4%**	**71.1%**	63.0%	62.0%	40.9%	**45.8%**	**42.2%**	33.4%

Table 7 : mean transfer efficiencies without regarding lead and lag distances

Here as well, in any case, the mean TE of each of the candidate guns is higher than the mean TEs of at least one of the HVLP guns compared.

8 Finish Quality Results

The finish quality was evaluated based on film build, gloss, orange peel and DOI. The results are listed below.

8.1 Film Build

All film thickness measurements were made using the Fischer Dualscope 30 magnetic-inductive film thickness measurement instrument, mounted on an automatic traversing table.

The average film thickness was measured at 35 locations on the large beauty panel and 10 locations on the small beauty panel as shown below. In order to achieve a higher statistical reliability, 7 points have been measured along one route on the large panel. The additional locations were placed symmetrically between the approved measurement locations. With respect to the small panel the distance between the routes was identical to the large panel, i.e. 1.25''. For the calculation of average film build, only the three middle lanes were considered. The average film builds are summarised in the table below. In addition, the individual measurement results are listed in the appendix. The final film builds for the individual paint materials were chosen in accordance with the practical use and the paint data sheets:

CC SpiesHecker	2,0 - 2,5 mils (50,8 - 63,5 µm)	2 coats
CC PPG	2,0 - 3,0 mils (50,8 - 76,2 µm)	2 coats
WBCC Axalta	1,8 - 2,2 mils (45,7 - 55,9 µm)	2 coats

Table 8 : film build in accordance with practical use and paint data sheets

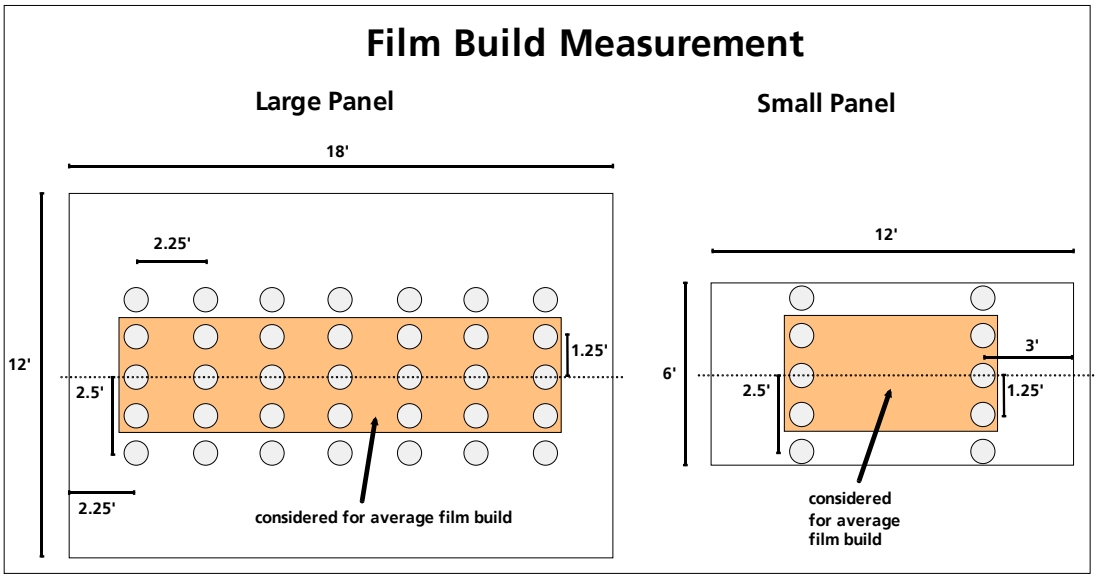


Fig. 6 : Locations of the film build measurements

paint material	large panel				small panel			
	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP
CC SpiesHecker	**2.12** [53.8 µm]	**2.29** [58.2 µm]	**2.27** [57.7 µm]	**2.31** [58.6 µm]	**2.06** [52.3 µm]	**2.19** [55.5 µm]	**2.27** [57.6 µm]	**2.14** [54.4 µm]
CC PPG	**2.17** [55.2 µm]	**2.36** [60.0 µm]	**2.61** [66.2 µm]	**2.42** [61.4 µm]	**2.16** [54.8 µm]	**2.34** [59.5 µm]	**2.52** [64.1 µm]	**2.25** [57.1 µm]
WBCC Axalta	**2.08** [52 µm]	**2.05** [52.1 µm]	**2.04** [51.9 µm]	**2.00** [50.9 µm]	**2.01** [51.0 µm]	**1.98** [50.2 µm]	**2.08** [52.8 µm]	**2.02** [51.3 µm]

Table 9 : Measured average film builds

8.2 Gloss

The Gloss was checked on 4 points on each panel using a BYK Gardner TriGloss reflectometer. The measurement locations are shown below.

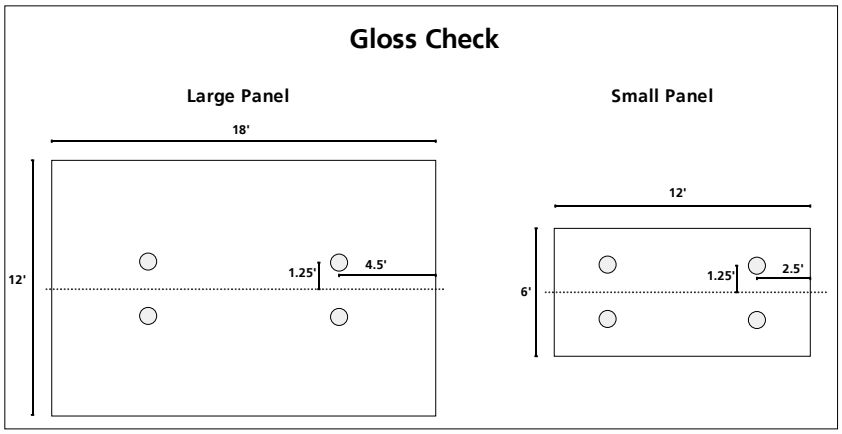


Fig. 7 : Locations of the gloss measurements

As mirror finish panels were used to ensure stable film build measurements, the gloss of the clear coat panels could not be determined by the Micro Gloss instrument.

paint material	large panel				small panel			
	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP
CC SpiesHecker	-	-	-	-	-	-	-	-
CC PPG	-	-	-	-	-	-	-	-
WBCC Axalta	-	-	-	-	-	-	-	-

Table 10: Measured gloss values

A visual inspection shows acceptable results for all guns. No deficiency could be observed

8.3 Orange Peel

The Orange Peel was checked using a Byk Gardner WaveScan Dual on two lines along the center of the panel. The results are given in terms of mean values of long wave and short wave and MB-tension, which is derived from long wave and short wave.

8.3.1 Long wave and short wave results

paint material	large panel								small panel							
	ANEST IWATA WS-400-AX-1 non-digital		ANEST IWATA WS-400-AX-1 digital		SATAjet 5000 B HVLP		DeVilbiss DV1 C1-Plus HVLP		ANEST IWATA WS-400-AX-1 non-digital		ANEST IWATA WS-400-AX-1 digital		SATAjet 5000 B HVLP		DeVilbiss DV1 C1-Plus HVLP	
	L	S	L	S	L	S	L	S	L	S	L	S	L	S	L	S
CC SpiesHecker	15,6	40,7	16,3	38,4	15,6	38,2	16,6	40,5	16,1	39,6	16,4	40,7	15,9	43,0	16,0	37,9
CC PPG	20,4	40,0	16,2	38,0	18,4	39,7	19,3	38,8	18,3	39,9	16,5	44,5	16,3	41,5	17,0	37,1
WBCC Axalta	15,1	27,2	12,7	30,1	14,5	31,1	12,4	25,7	12,3	27,6	15,8	24,8	12,2	27,2	14,9	22,2

L: long wave **S:** short wave

Table 11 : Measured long wave and short wave values

There were no significant or relevant differences in the WaveScan-values obtained. However, the waterborne clear coat in general shows lower values for both long wave and short wave.

8.3.2 MB-Tension

The tension was calculated according to the formula used by Mercedes-Benz Group (MB-tension):

$$MB\text{-}T = 20 - 7 * \log((a - 0.08\ b)/3 + 1)$$

with *a* being the variance of the amplitude of the long wave signals and *b* the variance of the amplitude of the short wave signals.

paint material	large panel				small panel			
	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP	ANEST IWATA WS-400-AX-1 non-digital	ANEST IWATA WS-400-AX-1 digital	SATAjet 5000 B HVLP	DeVilbiss DV1 C1-Plus HVLP
CC SpiesHecker	15,0	14,9	15,0	14,8	14,9	14,9	15,0	14,9
CC PPG	14,2	14,9	14,5	14,4	14,5	14,9	14,9	14,7
WBCC Axalta	14,9	15,5	15,1	15,5	15,5	14,8	15,5	14,9

Table 12 : Measured MB-tension values

All guns show acceptable results.

8.4 DOI

DOI measurements would only be sensible with base coat applied underneath the clear coat. However, this situation is not relevant here.

9 Appendix

9.1 Film build (example)

Anest IWATA WS-400-AX-1

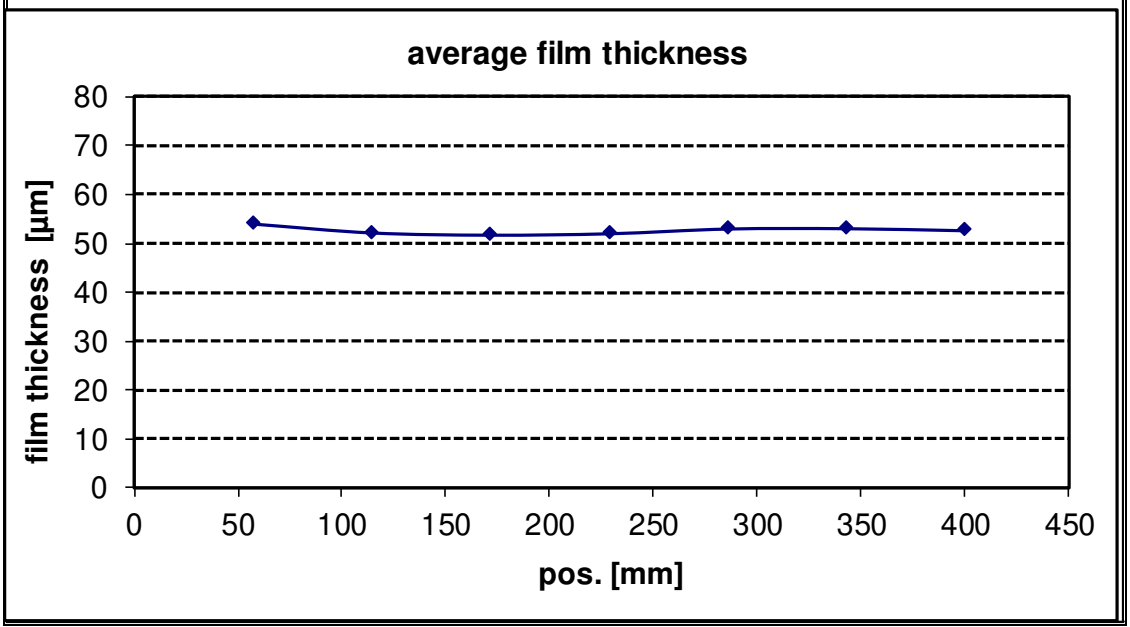
AXALTA water borne clear coat RK-40525

test sequence no.: 24

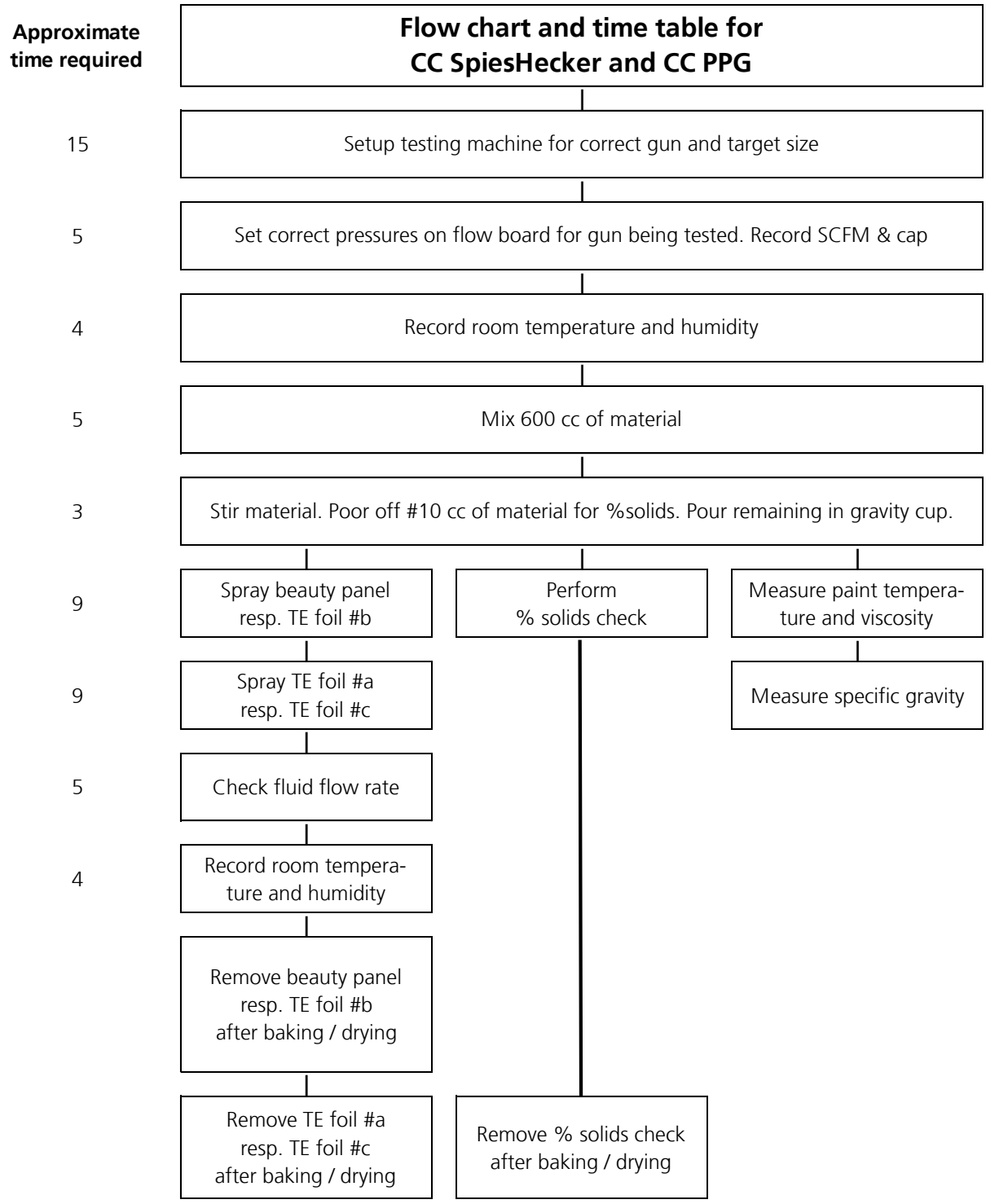
Filmbuild Large Panel

speed [mm/s]:	190
speed [inch/s]:	7,48
distance [mm]:	152,4
distance [inch]:	6,0
average [µm]:	52,7
average [mils]:	2,08

Pos. [mm]	lane 1 [µm]	lane 2 [µm]	lane 3 [µm]	lane 4 [µm]	lane 5 [µm]	average
57,3	50,1	54,5	55,3	52,5	45,4	54,1
114,3	48,5	54,8	53,6	48,3	46,4	52,2
171,5	50,9	52,1	54,5	48,7	45,6	51,8
228,6	52,5	50,3	52,2	53,7	50,8	52,1
285,8	50,8	51,6	55,2	52,4	46,7	53,1
342,9	47,1	53,7	53,0	52,7	46,8	53,1
400,0	50,6	48,9	54,8	54,4	49,3	52,7

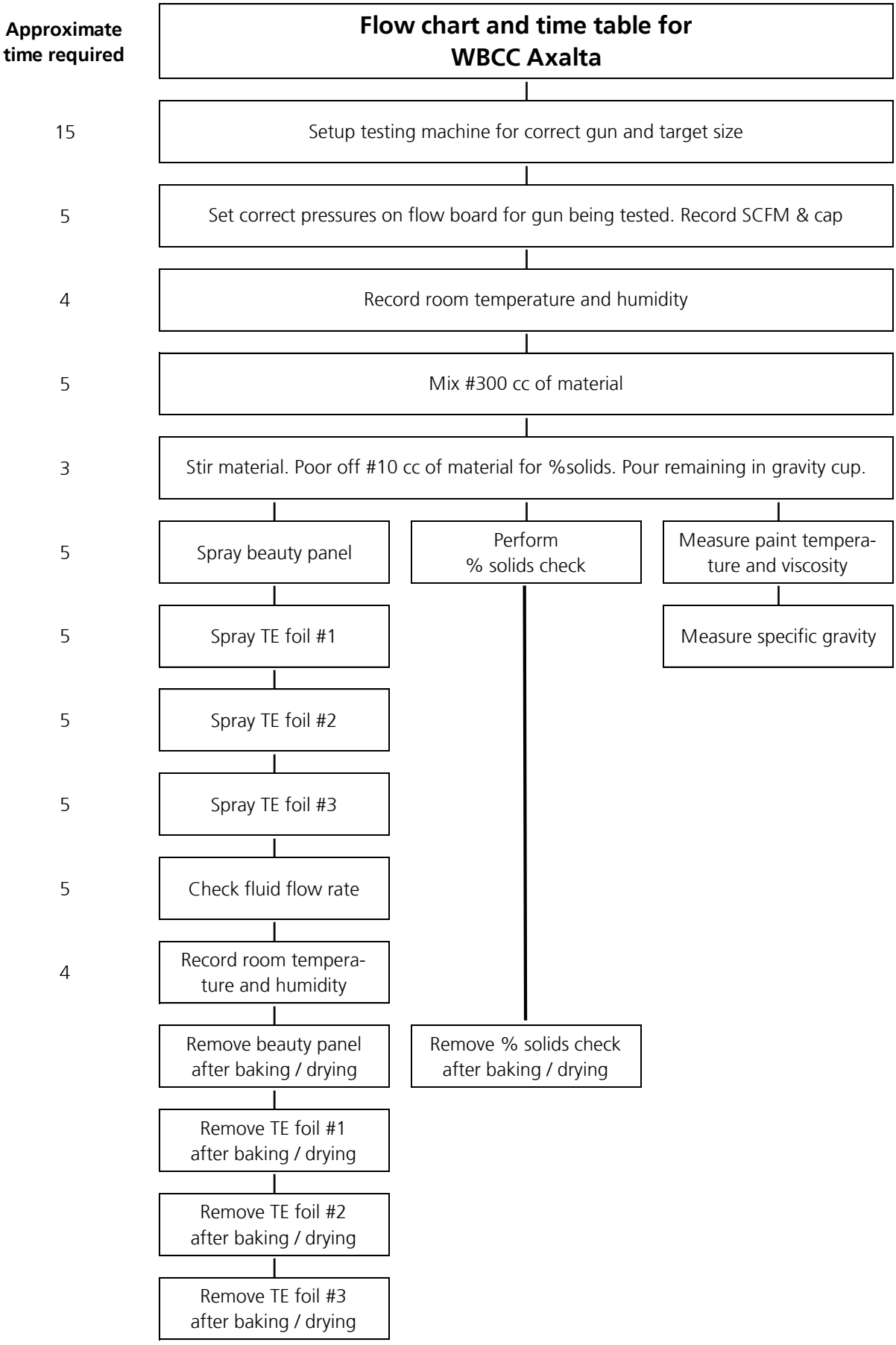


9.2 Time Tables



59 Total time (excluding baking / drying time)

Remarks: Due to short pot life time of the paint, only two tests can be performed for one particular lot of paint prepared.


Approximate time required
Flow chart and time table for WBCC Axalta
15
Setup testing machine for correct gun and target size
5
Set correct pressures on flow board for gun being tested. Record SCFM & cap
4
Record room temperature and humidity
5
Mix #300 cc of material
3
Stir material. Poor off #10 cc of material for %solids. Pour remaining in gravity cup.
5
Spray beauty panel
Perform % solids check
Measure paint temperature and viscosity
5
Spray TE foil #1
Measure specific gravity
5
Spray TE foil #2
5
Spray TE foil #3
5
Check fluid flow rate
4
Record room temperature and humidity
Remove beauty panel after baking / drying
Remove % solids check after baking / drying
Remove TE foil #1 after baking / drying
Remove TE foil #2 after baking / drying
Remove TE foil #3 after baking / drying
61
Total time (excluding baking time)

9.3 Calibration procedure

The film build probe was calibrated individually on each panel using certified foils. This procedure is recommended by the manufacturer.

9.4 CD with submitted data

FINAL REPORT

ANNEX

data sheets (144 files / 72 files XLSX, 72 files PDF), film build measurements (3 files / 3 files XLSX, 3 files PDF), timetable (1 file), overview of all tests performed (1 file), determination of solid content (1 file), calculation of transfer efficiency (1 file)

9.5 Video (attached to this report)

Scenario:	Presentation of the IPA coating centre, Fields of Institute's activities	
	Preparative work:	Mixing of paint - Check of viscosity - Adjustment of robot - Measurement of solids - Programming of robot - Adjustment of spray gun settings - Check of humidity and temperature in spray booth - Measurement of air cap pressure - Measurement of spray pattern widths
	Tests:	Spraying beauty panels and TE-foils (all guns in operation) - Panel drying procedures
	Measurements:	Film thickness – TriGloss – WaveScan - Weighing of TE foils

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-AX-1 Digital Spray Gun with Air Caps WS-400-01-AX-1 Clearcoat, Application No. 632690 in CA and the WS-400-AX-1 Non-Digital Spray Gun with Air Cap WS-400-01-AX-1 Clearcoat Application No. 636151.

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-AX-1 DIGITAL and Non-Digital SPRAY GUN 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-AX-1 DIGITAL SPRAY GUN 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
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(513) 446-8596

Sara Robbe

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