

**THATCHAM**

TRAINING CENTRE



**EVALUATION REPORT  
ON THE  
ANEST IWATA W 100  
GRAVITY SPOT REPAIR  
AND PRESSURE FED  
SPRAY GUNS**

**CONDUCTED BY  
THATCHAM  
TRAINING CENTRE**

**SEPTEMBER 1998**



REPORT OF THE EVALUATION OF THE  
PAINT TRANSFER EFFICIENCY OF THE  
ANEST IWATA W100 GRAVITY SPOT  
REPAIR GUN AND THE W100 PRESSURE  
FED GUN CARRIED OUT BY  
THE MOTOR INSURANCE REPAIR  
RESEARCH CENTRE,  
THATCHAM TRAINING  
AT THE REQUEST OF THE  
ANEST IWATA CORPORATION

**SEPTEMBER 1998**

## **OBJECTIVE**

To confirm that the Anest Iwata W100 Spot Repair Gravity Spray Gun and the W100 Pressure Fed Gun can achieve a paint transfer efficiency (weight) of greater than 65% based on the ASTM D5286-95 test methods for testing transfer efficiency.

## **METHOD**

Paint materials used for evaluation of the spray guns were 2K HS Primer, 2K HS direct gloss, water based base coat and 2K HS lacquer onto aluminium foil and painted steel and aluminium substrates simulating a refinish process.

Aluminium panels (210mm x 300mm) were used for the spot repair gun to give a more accurate reading for T.E. due to the small amount of material applied in a spot repair.

It was decided to spray panels in an upright position in a conventional down draft spray booth keeping the spray within the area of the foil/panel (see Appendix A3).

Appendix B1 details the variables assessed together with the number of samples prepared at each variable.

All aluminium foils were given one coat of paint, the number of gun passes per panel detailed in the result sheets Appendix B6.

The steel/aluminium panels were prepared with the normal substrate for the particular paint being sprayed, the paint being sprayed as in a refinish operation. For details of number of gun passes and number of coats applied see result sheets Appendix B6.

Before evaluation began, paint fluid flow, viscosity and solids of the paint were measured (see Appendix B2).

Foils were pre-weighed and then reweighed after coating and stoving to give 'dry-up' material. The spray gun was weighed before and after the paint application to determine 'wet spray material'. A wire was attached to the gun to maintain the correct spraying distance. Each aluminium foil was secured to a steel/aluminium backing panel and placed on the spraying jig for spraying. After spraying, the foils were placed into a further spray booth on a steel backing panel for stoving.

Steel or aluminium panels after preparation (see Appendix B3) were pre-weighed and then reweighed after coating and stoving to give 'dry-up' material. The spray gun was weighed before and after the paint application to determine 'wet spray material'. A wire was attached to the gun to maintain the correct spraying distance. Each panel was placed on the spraying jig for spraying. After spraying the panels were placed in a further spray booth for stoving. Paint thickness measurements were carried out before spraying and after spraying and stoving. See Appendix B5 for number and position on panels where film thickness measured. Average film build is recorded in Result Sheets for each particular element.

## **RESULTS**

See Appendix B6 for recorded results and calculations

Appendix A1 summaries the results.

## **NOTES:**

Using the recommended pot pressures, the pressure fed gun as used in this report, with 2K HS primer, did not give sufficient paint output to give a satisfactory application speed. A larger set up in the gun or higher pot pressure would possibly overcome this problem. This also occurred with 2K HS Direct gloss where pot pressure was raised to 12 psi.

## **CONCLUSION**

The Anest Iwata W100 Gravity and Pressure Fed Spray Gun complies with the requirements of the Environmental Protection Act 1990 Part 1 - 1997 Revision as detailed in PG6/34 (97), PG6/23 (97), PG6/40 (94) and PG6/41 (94) when used as detailed in this report achieving a Transfer efficiency (weight) of greater than 65%.

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- B2 Method for Material Solids  
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- B3 Preparation of Steel/Aluminium Panels for T.E.
- B4 Spraying and Stoving of Test Samples
- B5 Number and Position on Panels for Paint Thickness Measurement
- B6
- |  |                 |                              |                                     |
|--|-----------------|------------------------------|-------------------------------------|
|  | Result Sheet 1A | 2K Primer Pressure Gun Foil  |                                     |
|  | 1B              | 2K Primer Pressure Gun Steel |                                     |
|  | 1C              | 2K Primer Spot Gun Foil      |                                     |
|  | 1D              | 2K Primer Spot Gun Aluminium |                                     |
|  | Extra Test      | 2A                           | Direct Gloss Pressure Gun Foil      |
|  |                 | 2AA                          | Direct Gloss Pressure Gun Foil      |
|  |                 | 2B                           | Direct Gloss Pressure Gun Steel     |
|  |                 | 2C                           | Direct Gloss Spot Gun Foil          |
|  |                 | 2D                           | Direct Gloss Spot Gun Aluminium     |
|  |                 | 3A                           | Water Based B/ct Pressure Gun Foil  |
|  |                 | 3B                           | Water Based B/ct Pressure Gun Steel |
|  |                 | 3C                           | Water Based B/ct Spot Gun Foil      |
|  |                 | 3D                           | Water Based B/ct Spot Gun Aluminium |
|  |                 | 4A                           | Clear Lacquer Pressure Gun Foil     |
|  |                 | 4B                           | Clear Lacquer Pressure Gun Steel    |
|  |                 | 4C                           | Clear Lacquer Spot Gun Foil         |
|  |                 | 4D                           | Clear Lacquer Spot Gun Aluminium    |

## APPENDIX A1

### SUMMARY OF RESULTS OF T.E.

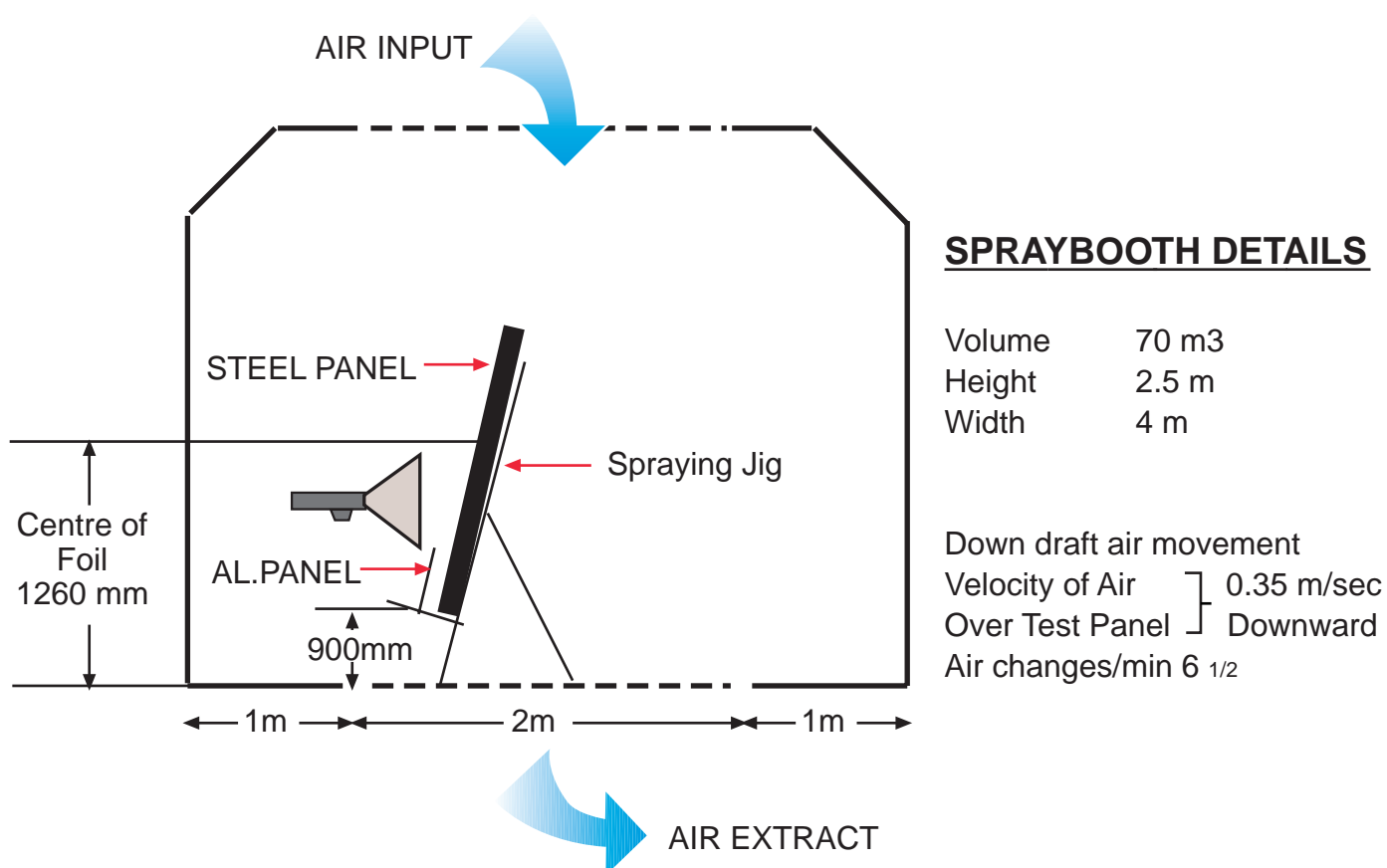
PAINT SUBSTRATE	W 100 PRESSURE GUN	W 100 SPOT REPAIR GUN
Primer Foil	89,3	97,3
Primer Steel/Aluminium	93,6	97,4
Direct Gloss – Foil	76,0	81,0
Direct Gloss – Steel/Aluminium	76,3	79,8
Base Coat – Foil	78,2	89,5
Base Coat – Steel/Aluminium	79,3	89,2
Clear Lacquer – Foil	70,5	79,3
Clear Lacquer – Steel/Aluminium	74,1	72,8
Direct Gloss – Foil *	80,9	

**APPENDIX A2****TRANSFER EFFICIENCY (T.E)  
CALCULATIONS (WEIGHT)**

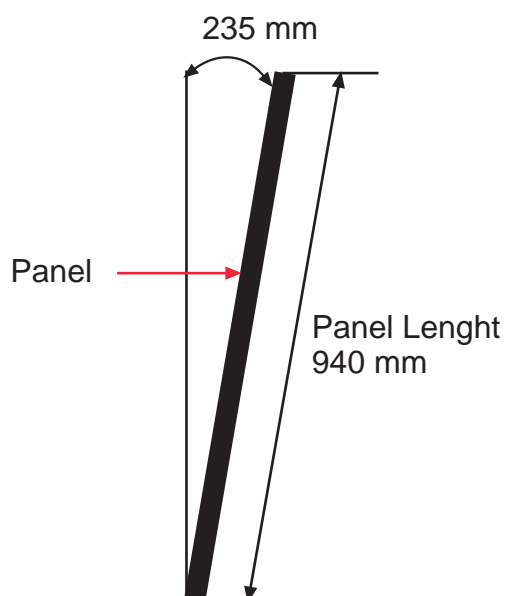
1. Weight of Foil/Steel/Aluminium panel
2. Weight of Foil/Steel/Aluminium panel + 'Dry-up'
3.  $(2-1) =$  Weight of 'Dry-up'
4. Wet Spray Material  
i.e. Gun weighed before and after application - weight difference.
5. Spray Solid =  $(4 \times \text{Av. Mat. Solids})$
6.  $\text{T.E. (weight)} = (3 \div 5) \times 100\%$

## APPENDIX A3

### a) POSITION OF TEST PANELS IN SPRAY BOOTH



### PANEL IN UPRIGHT POSITION

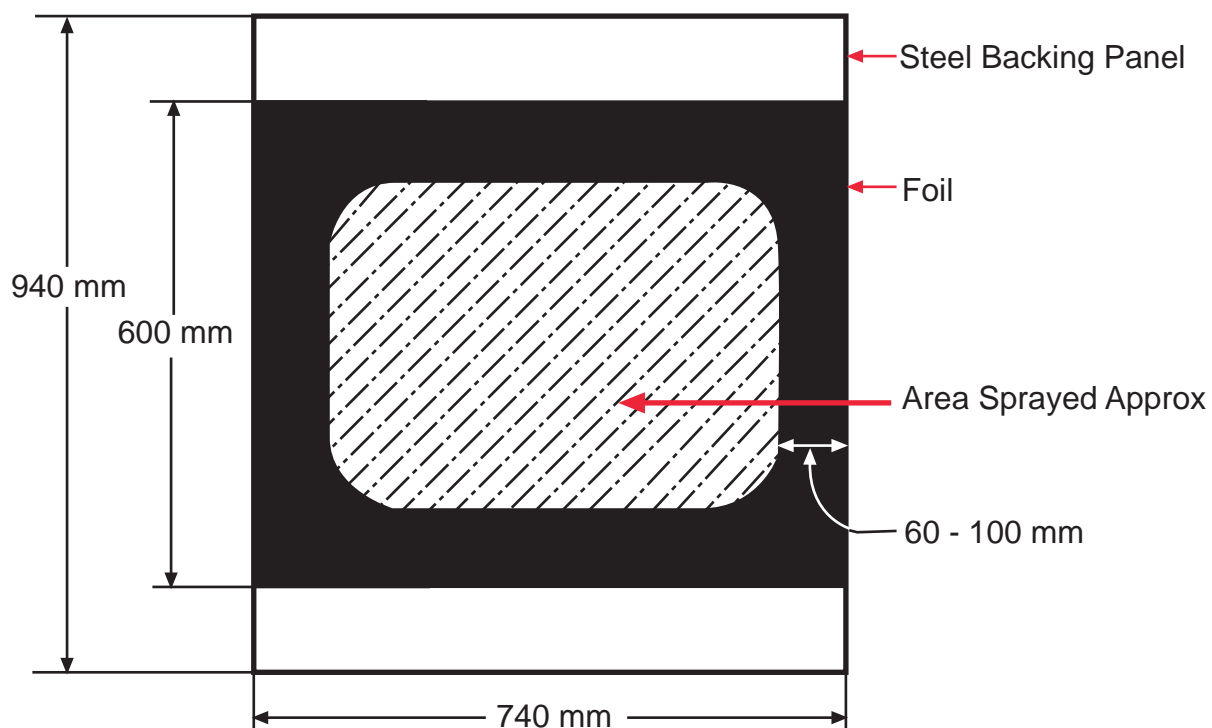




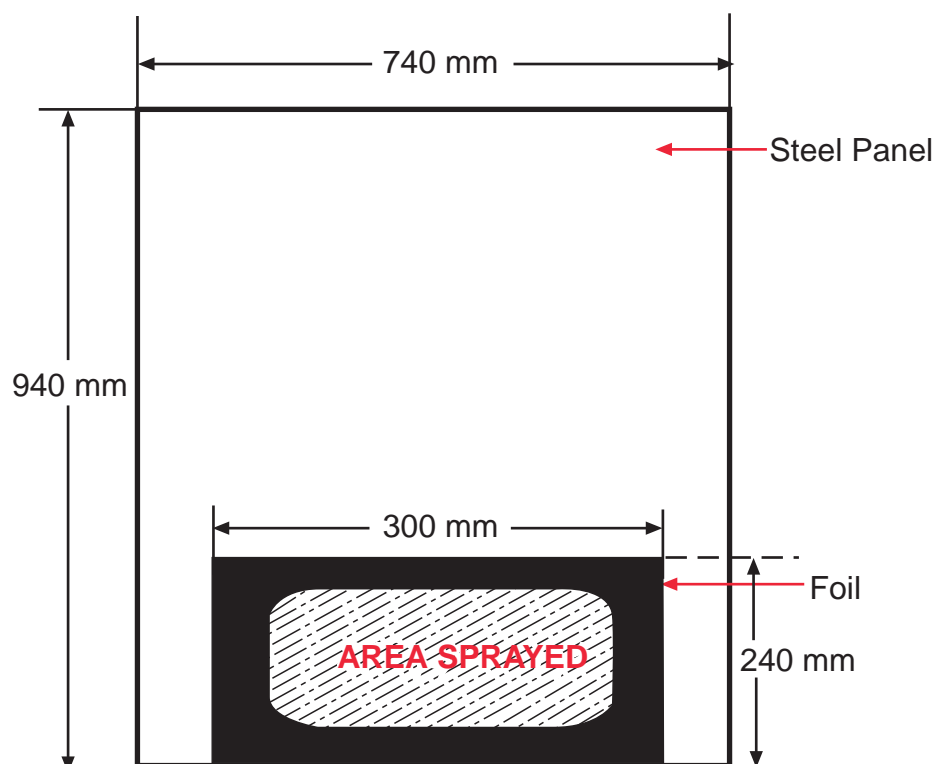
## APPENDIX A3 contd.

b) FOIL TEST SAMPLE - SIZE AND AREA SPRAYED

PRESSURE GUN

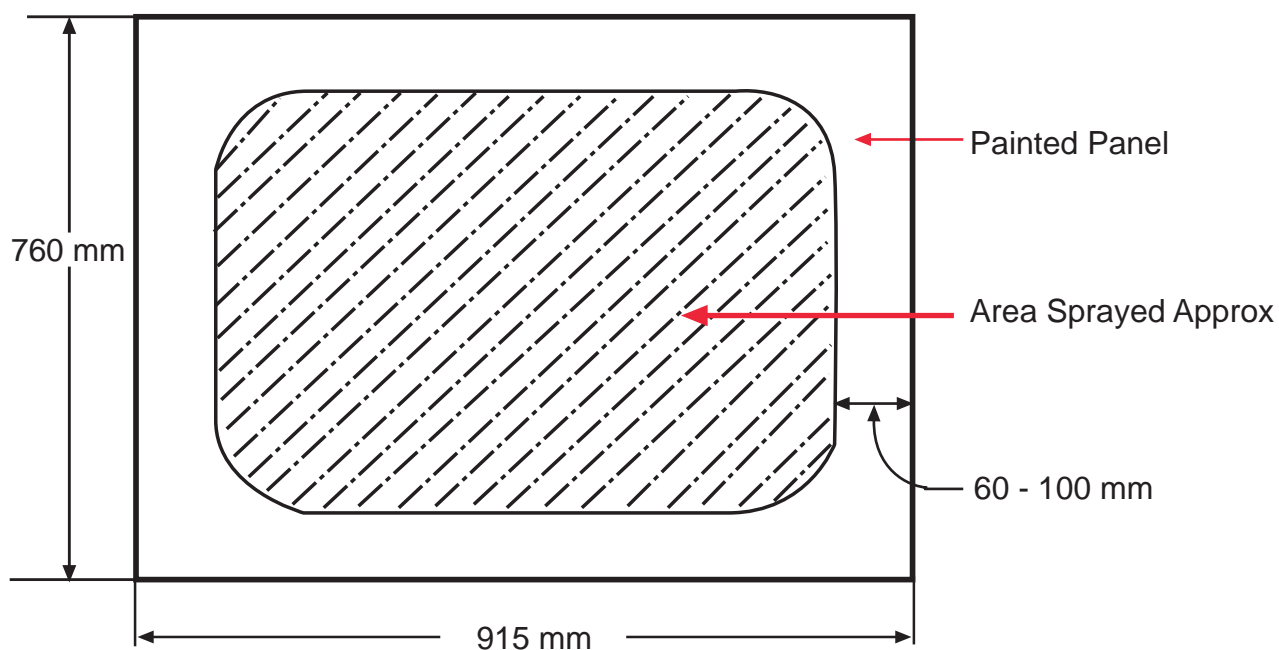
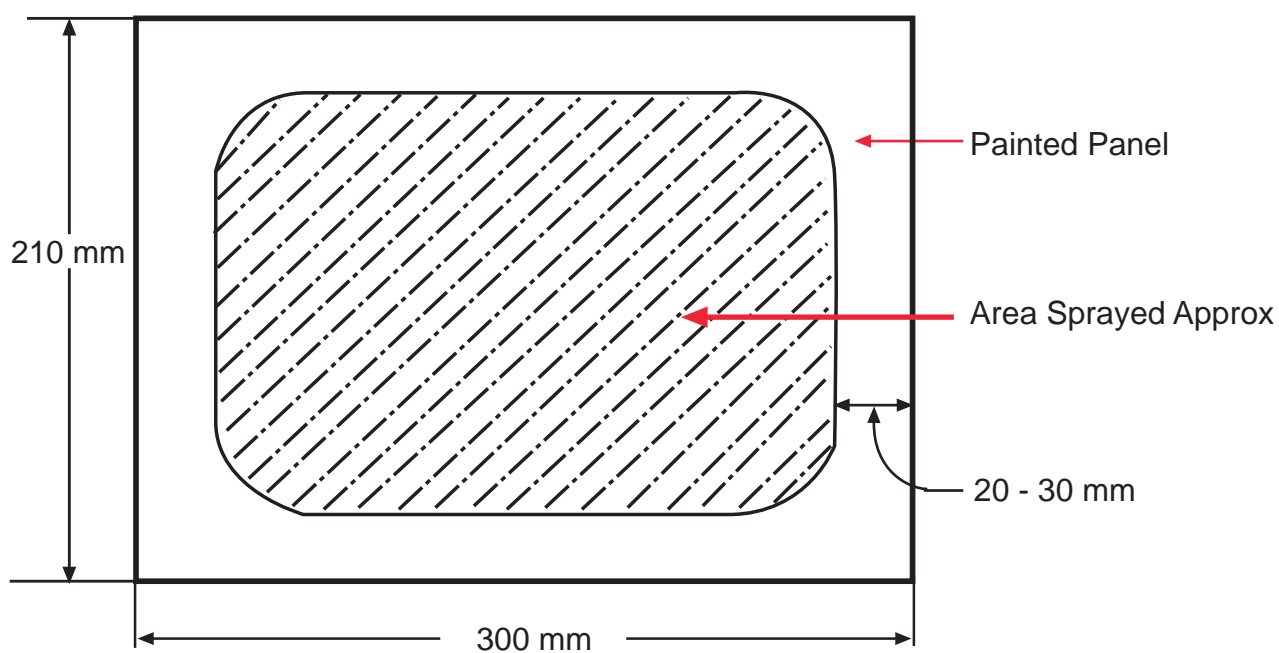


SPOT GUN



FOIL PLACED ON AL. BACKING PANEL OF EQUAL SIZE

## APPENDIX A3 contd.

c) STEEL PANEL TEST SAMPLE - SIZE AND AREA SPRAYEDAL PANEL TEST SAMPLE - SIZE AND AREA SPRAYED

## APPENDIX B1

## VARIABLES ASSESSED AND PANEL NUMBERS

## ALUMINIUM FOIL

Spray Product	Gun		Number of Foils
	Pressure Fed	Spot Repair	
1) 2K HS Primer	W100 1.3mm Gun Pressure 15 psi Pot Pressure 6 psi	W100 1.3mm Gun pressure 10 psi	Three
2) 2K HS Direct Gloss	W100 1.3mm Gun Pressure 15 psi Pot Pressure 8 psi	W100 1.3mm Gun Pressure 10 psi	Three
	W100 1.3mm Gun Pressure 15 psi Pot Pressure 12 psi		Two
3) Water Based Base Coat	W100 1.3mm Gun Pressure 15 psi Pot Pressure 6 psi	W100 1.3mm Gun Pressure 10 psi	Three
4) 2K HS Clear Lacquer	W100 1.3mm Gun Pressure 15 psi Pot Pressure 6 psi	W100 1.3mm Gun Pressure 10 psi	Three

NOTE: Spray distance for pressure gun 150 mm  
Spray distance for spot repair gun 100 mm

## APPENDIX B1 (CONTINUED)

### VARIABLES ASSESSED AND PANEL NUMBERS

#### ALUMINIUM FOIL

Spray Product	Gun		Spot Repair	Number of Panels
	Substrate	Pressure Fed		
1) 2K HS Primer	Etch Primer	W100 1.3 mm Gun Pressure 15 psi Pot Pressure 9 psi	W100 1.3mm Gun pressure 10 psi	Two
2) 2K HS Direct Gloss	Etch Primer + 2K HS Primer P500 Dry Flat	W100 1.3 mm Gun Pressure 15 psi Pot Pressure 8 psi	W100 1.3mm Gun Pressure 10 psi	Two
3) Water Based Base Coat	Etch Primer + 2K HS Primer P500 Dry Flat	W100 1.3 mm Gun Pressure 15 psi Pot Pressure 6 psi	W100 1.3mm Gun Pressure 10 psi	Two
4) 2K HS Clear Lacquer	Etch primer + 2K HS Primer + Water Based Base Coat	W100 1.3 mm Gun Pressure 15 psi Pot Pressure 6 psi	W100 1.3mm Gun Pressure 10 psi	Two

## APPENDIX B2

### MATERIAL SOLIDS

Paint was weighed into a pre-weighed aluminium foil dish (approx. size 215mm x 215m). By tipping the dish the paint was allowed to run and cover the bottom. After stoving at 130°C for 120 minutes, the dishes were allowed to cool and re-weighed. For water based base coat the stoving was 40°C for 45 minutes followed by 130° for 70 minutes.

Calculation:

1. Aluminium dish weight
2. Wet material weight
3. 'Dry-up' material & dish weight
4. 'Dry up' weight = (3 - 1)
5. Material solids = (4 ÷ 2)

#### Note

All paint was mixed by weight using the s.g of each material. This was considered a more accurate way of mixing than by volume.

### VISCOSITY

The viscosity was tested using a DIN 4 Cup

### PAINT FLUID FLOW THROUGH THE GUN

After setting up the gun, it was weighed, the paint sprayed for 20 seconds in the booth and the gun re-weighed. Weight difference gave paint fluid flow for 20 seconds (S)

## APPENDIX B3

### PREPARATION OF STEEL/ALUMINIUM PANELS FOR T.E. - EVALUATION AS PER REFINISH PROCESS

Mild steel flat sheet 1mm thick 740mm x 940mm or Aluminium Panels 1mm thick 210mm x 300mm.

1. Both sides cleaned using scotchbrite grey and solvent wipe  
Then Cleaned twice again
2. One side spray coated with Standox 1K full primer thinned 50% with 1K thinner - 2 coats applied with 10 minute flash off between coats.

Flash off at 20°C for 20 minutes

Stoved at 70°C for 40 minutes

These panels used for 2K HS Primer T.E. evaluation after grey scotchbrite and tack cloth.

3. For base coat and direct gloss, one coat of Standox 1K full primer applied, flashed off at 20°C for 20 minutes.  
2 coats of Standox 2K HS Fuller thinned 4:1 with Fuller hardener applied using W400 Gun 1.8mm fluid tip, flash off between coats at 20°C for 10 minutes, and stoved at 65°C for 40 minutes.  
P500 dry flat and spirit wiped, tack wiped prior to applying base coat or direct gloss for T.E.
4. For Lacquer evaluation, panels prepared as in 3 above, two coats of base coat applied followed by half coat, flashed off for 20 minutes at 25°C, then stoved for 20 minutes at 70°C

## APPENDIX B4

### SPRAYING AND STOVING OF TEST SAMPLES

All foils, steel and aluminium panels were placed onto the panel spray jig inside the spray booth in an upright position. All panels/foils were sprayed keeping the sprayed material within the area of the panels/foils (See Appendix A3 for details).

Foils were sprayed with one coat of paint, the number of gun passes being recorded on the test result sheet using a slow spraying speed.

The steel and aluminium painted panels were sprayed as per data sheet instructions on the use of the particular paint product to give an acceptable finish.

2K HS Primer - two coats applied with 5 minutes flash off between coats

2K HS Direct Gloss - half a coat followed directly by one full coat

Waterbased Base Coat - two coats with drying in between coats followed by a half coat (see Result sheets for variation to this)

2K HS Clear Lacquer - half a coat followed directly by one full coat

In order to maintain the correct spraying distance from the panels, a wire was attached to the spray gun handle extending to the side of the gun, then forward for the correct distance, towards the panel. When spraying the tip of the wire was kept just above the panel surface. The wire did not interfere with the spray pattern.

Air pressure at the inlet to the gun and/or pressure pot was continually monitored with the gun pulling air.

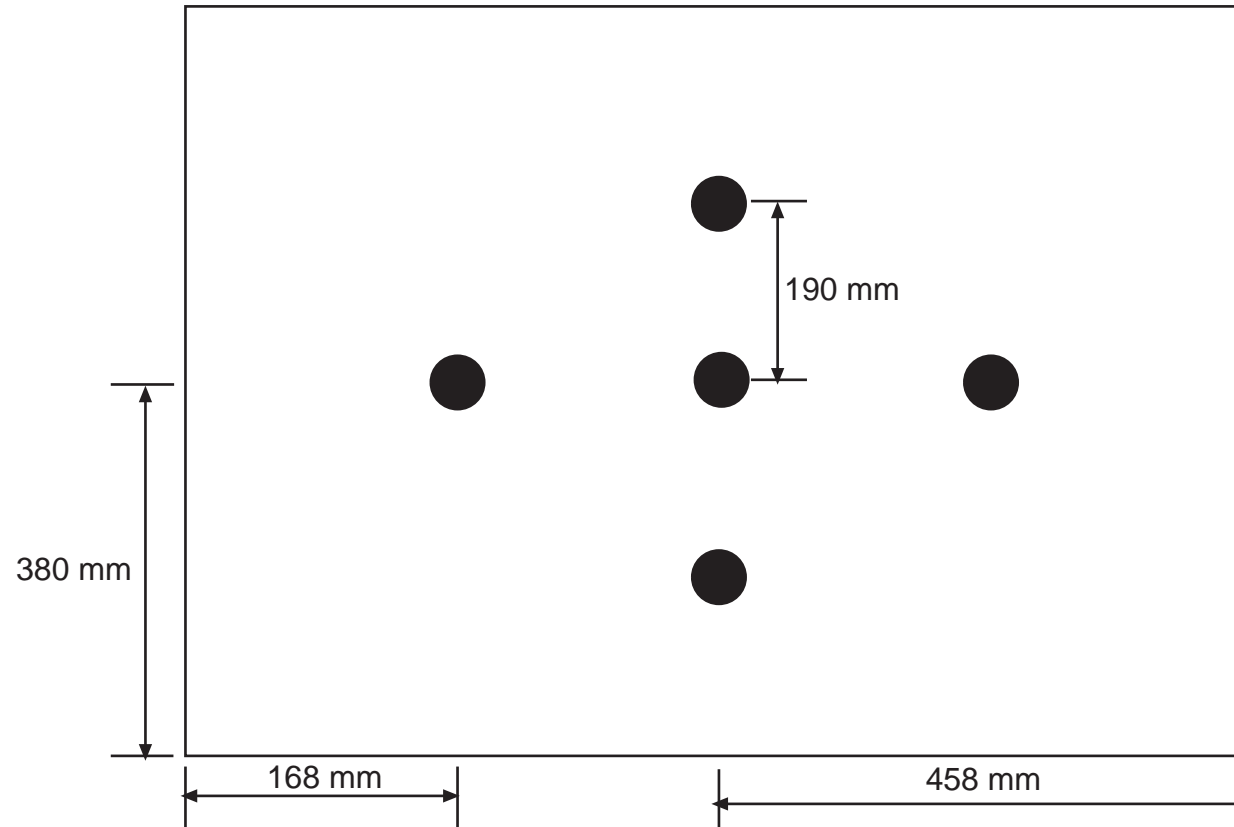
After spraying, the panels/foils were placed in a further booth for stoving at the relevant schedules (See Appendix B6 Result Sheets).

For the steel and aluminium panels, a control panel having the same substrate as the panels being painted was stoved at the same time to determine any weight loss due to the substrate.

## APPENDIX B5

● Hole positions in paper sheet placed over painted panel through which paint thickness was measured

### STEEL PANELS



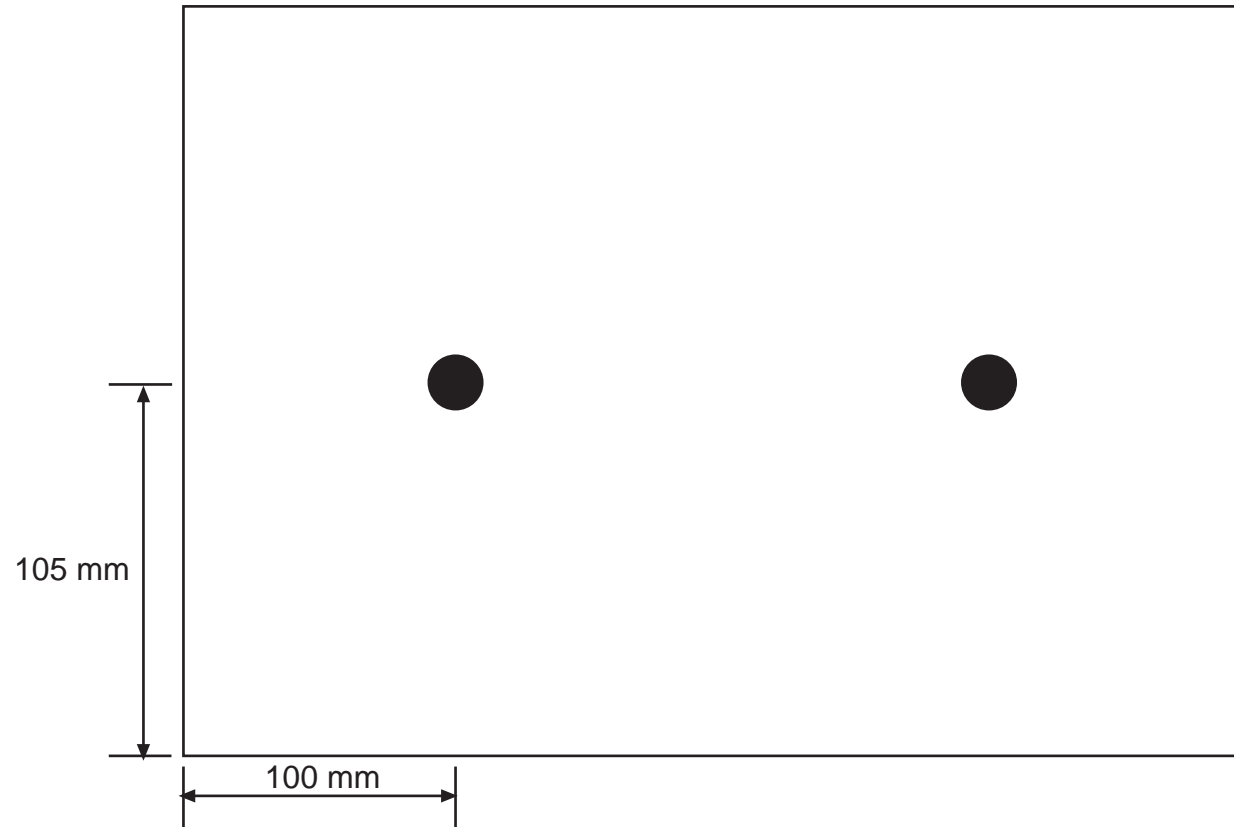
AVERAGE OF FIVE MEASUREMENTS TAKEN



**APPENDIX B5 contd.**

● Hole positions in paper sheet placed over painted panel through which paint thickness was measured

ALUMINIUM PANELS



AVERAGE OF TWO MEASUREMENTS TAKEN

**PRESSURE GUN - NOZZLE 1.3 AIR CAP W100 - H2**

**APPENDIX B6**

**RESULT SHEET 1A**

**Date: 27.8.1998**

- 1. Materials: Standox HS Primer
- Viscosity: 25S DIN 4 at 22°C
- Spray Temp. 23°C
- Spray Humidity 50% RH
- Mix Ratio 499.2g HS Primer : 76.8g Hardener

Stoving Schedule: -Foil 70°C for 90 minutes  
 - Steel ---" -----  
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
1.	3.86	5.17	7.15	3.29	.6364	.6378
2.	3.58	5.64	7.18	3.60	.6383	
3.	4.04	6.89	8.44	4.40	.6386	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
A1	W100	Fully	Gun 15psi	150mm	Upright	4	96 gm	16.88	23.27	6.39	11.40	7.27	87.9	89.3
A2	"	Open	Pot	"	"	"	per min	16.66	25.17	8.51	14.8	9.44	90.1	
A3	"	"	6 psi	"	"	"	"	15.30	22.29	6.99	12.2	7.78	89.8	

**RESULT SHEET 1B**

**Date: 30.9.1998**

- 1. Materials: Standox HS Primer  
 Viscosity: 21S DIN 4 at 22°C  
 Spray Temp. 21°C  
 Spray Humidity 60% RH  
 Mix Ratio 499.2g HS Primer : 76.8g Fuller Hardener

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
4.	2.33	4.47	5.17	2.84	0.6353	0.6368
5.	2.35	5.85	6.06	3.71	0.6341	
6.	2.48	8.83	8.14	5.66	0.6410	

3. Transfer Efficiency (TE) On Steel Panel

Substrate Etch Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of coats	Paint Output	(1) Panel Weight	(2) Dry-up & panel	(3)(2)-(1) Dry up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E Average	Paint Thickness Applied
J	Control	panel	for	weight					5503.8	5502.9	0.9					
B	W100	Fully open	Gun 15 psi	150mm	Upright	8	2	60 gm per	5380.8	5422.5	41.7+0.09*	71.8	45.72	93.2	93.6	35µ
C	"	"	Pot 9psi	"	"	8	2	minute	5361.2	5394.5	=42.6 34.2*	57.2	36.42	93.9		

\* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

NOTE: Gun speed very slow. Either a larger gun set up is required or pot pressure increased to give good application speed.

**GRAVITY GUN (SPOT REPAIR) NOZZLE 1.3 AIR CAP W100-H2**

**APPENDIX B6 (Cont'd)**

**RESULT SHEET 1C**

**Date: 17.8.1998**

1. Materials: Stadox HS Primer  
 Viscosity: 20S DIN 4 at 26°C  
 Spray Temp. 22½°C  
 -  
 Spray Humidity 60% RH  
 Mix Ratio 499.2g HS Primer : 76.8g Hardener

Stoving Schedule: -Foil 70°C for 90 minutes  
 - Aluminium ----- " -----  
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
4.	2.86	6.55	7.03	4.17	.6366	.6352
5.	3.04	5.71	6.66	3.62	.6340	
6.	2.90	6.74	7.18	4.28	.6350	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
1.	W100	0	10psi	100mm	Upright	3	60 gm	2.75	4.75	2.00	3.25	2.06	97.1	97.3
2.	"	"	"	"	"	"	per min	3.03	5.24	2.21	3.55	2.26	97.8	
3.	"	"	"	"	"	"		2.71	5.05	2.34	3.80	2.41	97.1	

0 Paint Adj.: Fan Nozzle - 2 Turns out  
 Fluid Flow - 3 Turns out

**GRAVITY GUN (SPOT REPAIR) - NOZZLE 1.3 AIRCAP W100-H2**

**APPENDIX B6 (Cont'd)**

**RESULT SHEET 1D**

**DATE: 27.8.1998**

Materials: Standox HS Primer  
 For Aluminium Panels -  
 Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
1	3.86	5.17	7.15	3.29	.6364	.6378
2	3.58	5.64	7.18	3.60	.6383	
3	4.04	6.89	8.44	4.40	.6386	

4. Transfer Efficiency (TE) On Aluminium Panel

Substrate Etch Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average	Paint Thickness Applied
A1		Control	Panel	for	weight	loss			166.27	166.27	0.00					
A2	W100	0	10 psi	100 mm	Upright	3	2	54.6 g	167.69	172.19	4.50*	7.2	4.59	98.0	97.4	86µm
A3	"	"	"	"	"	3	3	per minute	167.55	174.16	6.61*	10.7	6.82	96.9		109µm

\* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

0 Paint Adj. Fan Nozzle -2 turns out  
 Fluid Flow -3 turns out

**PRESSURE GUN - NOZZLE 1.3 AIR CAP W100-H2**

**APPENDIX B6 (Cont'd)**

**RESULT SHEET 2A**

**Date: 24.9.1998**

- 1. Materials: Standox HS Direct Gloss - Ford Provence Green
- Viscosity: 27S DIN 4 at 23°C
- Spray Temp. 21°C
- Spray Humidity 60% RH
- Mix Ratio 1014.6 g D.G : 500g Hardener H.S. Kurtz

Stoving Schedule: -Foil 70°C for 90 minutes  
 - Steel -----“-----  
 Solids Temp/Time: 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
B1.	3.89	4.90	6.64	2.75	0.5612	0.5540
B2.	4.06	8.15	8.59	4.54	0.5571	
B3.	3.45	3.66	5.44	1.99	0.5437	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
A18	W100	Fully	Gun 15psi	150mm	Upright	4	62.1gm	21.13	26.99	5.86	13.9	7.70	76.1	76.0
A19	“	Open	Pot	“	“	“	per minute	21.09	27.05	5.96	14.3	7.92	75.3	
A20	“	“	8 psi	“	“	“	minute	20.97	26.65	5.68	13.4	7.42	76.5	

RESULT SHEET 2AA

Date: 24.9.1998

1. Materials: Standox HS Direct Gloss - Ford Provence Green  
 Viscosity: 27S DIN 4 at 23°C  
 Spray Temp. 21°C  
 Spray Humidity 60% RH  
 Mix Ratio 1014.6 g D.G : 500g Hardener H.S. Kurtz

Stoving Schedule: -Foil 70°C for 90 minutes  
 - Steel-----“-----  
 Solids Temp/Time: 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
B1.	3.89	4.90	6.64	2.75	0.5612	0.5540
B2.	4.06	8.15	8.59	4.54	0.5571	
B3.	3.45	3.66	5.44	1.99	0.5437	

3. Transfer Efficiency (TE) On Foil - Primer Foils Used on Reverse Side

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
A1	W100	Fully	Gun 15psi	150mm	Upright	4	-	22.96	28.70	5.74	12.6	6.98	82.2	80.9
A2	“	Open “	Pot 12 psi	“	“	“	-	25.19	32.72	7.53	17.1	9.47	79.5	
A3	Control	Panel	for	Weight	Loss			22.27	22.27	0.00				

Pressure at Pot raised to 12 psi in order to increase paint flow. 8 psi at pot gave too slow application and ‘orange peel’ when spraying the steel panels

**PRESSURE GUN - NOZZLE 1.3 AIRCAP W100-H2**

**APPENDIX B6 (Cont'd)**

**RESULT SHEET 2B**

**DATE: 24.9.1998**

Materials: Stadox HS Direct Gloss - Ford Provence Green  
 For Aluminium Panels -  
 Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
B1	3.89	4.90	6.64	2.75	0.5612	0.5540
B2	4.06	8.15	8.59	4.54	0.5571	
B3	3.45	3.66	5.44	1.99	0.5437	

4. Transfer Efficiency (TE) On Steel Panel

Substrate Etch Primer + 2K HS Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average	Paint Thickness Applied
D		Control	Panel	for	weight	loss			5534.0	5533.2	0.8					
E	W100	Fully	Gun	100 mm	Upright	6	2	62.1 g	5576.4	5599.8	23.40*	56.5	31.30	77.3	76.3	45µ
F	"	Open	15 psi Pot	"	"	6	1½	per minute	5543.8	5557.5	+0.8 = 24.2* 14.5*	34.8	19.28	75.2		29µ

\* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

Gun Finish was too 'orange peel' due to insufficient paint fluid flow.

T.E. tests repeated on foil using Pot pressure of 12 psi to increase paint fluid flow (See Test Result Sheet)



**GRAVITY GUN (SPOT REPAIR) - NOZZLE 1.3 AIR CAP W100 - H2**

**APPENDIX B6 (Continued)**

**RESULT SHEET 2C**

**Date: 11.8.1998**

1. Materials: Standox HS Direct Gloss - Ford Provence Green  
 Viscosity: 27S DIN 4 at 27°C  
 Spray Temp. 26°C  
 Spray Humidity 55% RH  
 Mix Ratio 1014.6g D.G. : 500g Hardener HS

Stoving Schedule: -Foil 70°C for 90 minutes  
 - Aluminium ---" -----  
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
22.	2.99	4.64	5.48	2.49	.5366	.5397
23.	3.08	5.60	6.11	3.03	.5410	
24.	2.99	5.65	6.05	3.06	.5416	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
19	W100	0	10psi	100mm	Upright	3	22.8 gm	2.89	4.02	1.13	2.6	1.40	80.7	)81.0
20	"	"	"	"	"	"	per min	2.99	4.29	1.30	2.95	1.60	81.3	
21	"	"	"	"	"	"	"	2.87	4.39	1.52	3.3	1.78	85.4?	

- 0 Paint Adj. Fan Nozzle - 2 turns out  
 Fluid Flow - 2 turns out

**GRAVITY GUN (SPOT REPAIR) - NOZZLE 1.3 AIRCAP W100-H2**

**APPENDIX B6 (Cont'd)**

**RESULT SHEET 2D**

**DATE: 24.9.1998**

Materials: Stadox HS Direct Gloss - Ford Provence Green  
 For Aluminium Panels -  
 Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
B1	3.89	4.90	6.64	2.75	0.5612	0.5540
B2	4.06	8.15	8.59	4.54	0.5571	
B3	3.45	3.66	5.44	1.99	0.5437	

4. Transfer Efficiency (TE) On Aluminium Panel

Substrate Etch Primer + 2K HS Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average	Paint Thickness Applied
A7		Control	Panel	for	weight	loss		39g per minute	178.92	178.86	0.06					
A8	W100	0	10 psi	100 mm	Upright	3	1½	"	183.78	185.33	1.55*	3.5	1.94	83.0	79.8	53µ
A9	"	"	"	"	"	3	1½	per minute	180.63	182.44	+0.06 = 1.61* 1.87*	4.4	2.44	76.6		56µ

\* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

0 Paint Adj Fan Nozzle - 2 Turns Out  
 Fluid Nozzle - 3 Turns Out

RESULT SHEET 3A

Date: 11.8.1998

1. Materials: Standox Water Based Base Coat, Vauxhall Oriental Blue 24L 97196-900  
 Viscosity: 20S DIN 4 at 28°C Stoving Schedule: -Foil 35°C for 20 minutes, 70° for 45 minutes  
 Spray Temp. 28°C - Steel ---" -----  
 Spray Humidity 35% RH Solids Temp/Time 40°C for 45 minutes, 130°C for 70 minutes  
 Mix Ratio 4.1 (Mixed by wt. 1528.1g Base Coat : 375g V.E. Wasser)

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
A1.	3.80	4.45	4.38	0.58	0.1303	0.1316
A2.	3.78	5.08	4.43	0.65	0.1280	
A3	4.24	5.42	4.97	0.74	0.1365	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
A7	W100	0	Gun 15psi	150mm	Upright	4	120 gm	20.58	22.73	2.15	20.7	2.72	79.0	78.2
A8	"		Pot	"	"	"	per min	20.34	22.33	1.99	19.6	2.58	77.1	
A9	"		6 psi	"	"	"	"	20.39	24.42	2.03	19.7	2.59	78.4	

- 0 Paint Adj. Fan Nozzle - 2 Turns out  
 Fluid Flow - 1 Turn out

**PRESSURE GUN - NOZZLE 1.3 AIRCAP W100-H2**

**RESULT SHEET3B**

**DATE: 12.8.1998**

1. Materials: Standox Water Based Base Coat - Vauxhall Oriental Blue 24L 97196-900  
 Viscosity: 19S DIN 4 at 26°C  
 Spray Temp. 25°C  
 Spray Humidity 40% RH  
 Mix Ratio 1528.1g Base Coat. : 375g V.E. Wasser

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
AA	3.86	4.14	4.42	0.56	0.1353	0.1333
AB	4.10	3.62	4.58	0.48	0.1326	
AC	3.64	4.77	4.27	0.63	0.1321	

3. Transfer Efficiency (TE) On Aluminium Panel

Substrate Etch Primer + 2K HS Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average	Paint Thickness Applied
J		Control	Panel	for	weight	loss			5503.8	5503.1	-0.7					
K	W100	0	Gun	150 mm	Upright	6	2½	135 g	5538.2	5543.0	4.8	51.2	6.82	80.6	76.3	
L	"	"	15 psi Pot 6 psi	"	"	"	"	per minute "	5561.7	5566.9	+0.7* = 5.5 5.9*	56.8	7.57	77.9		

- Weight adjusted for loss of weight on control panel in accordance with ASTM procedures
- 0 Paint Adj. Fan Nozzle -2 turns out Fluid Flow -1¼ turns out

**GRAVITY GUN (SPOT REPAIR)- NOZZLE 1.3 AIR CAP W100 - H2**

**APPENDIX B6 (Continued)**

**RESULT SHEET 3C**

**Date: 11.8.1998**

1. Materials: Standox Water Based Base Coat, Vauxhall Oriental Blue 24L  
 Viscosity: 19S DIN 4 at 26°C Stoving Schedule: -Foil 35°C for 20 minutes, 70° for 45 minutes  
 Spray Temp. 26°C - Aluminium ---" -----  
 Spray Humidity 55% RH Solids Temp/Time 40°C for 45 minutes, 130°C for 70 minutes  
 Mix Ratio 4.1g (Mixed by wt. 1528.1g Base Coat : 375g V.E. Wasser)

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
10.	2.92	4.98	3.55	0.63	0.1265	0.1258
11.	2.94	5.16	3.58	0.64	0.1240	
12.	2.98	4.81	3.59	0.61	0.1268	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
7	W100	0	Gun 10psi	100mm	Upright	3	35 gm	3.01	3.36	0.35	3.1	0.39	89.7	89.5
8	"	"	"	"	"	"	per min	3.86	4.18	0.32	2.8	0.35	91.4	
9	"	"	"	"	"	"	"	3.01	3.36	0.35	3.0	0.38	92.1	
10	"	"	"	"	"	"	"	3.53	3.81	0.28	2.6	0.33	84.8	

- 0 Paint Adj. Fan Nozzle - 2 Turns out  
 Fluid Flow - 2 Turns out

## RESULT SHEET 3D

Date: 30.9.1998

1. Materials: Standox Water Based Base Coat  
 Viscosity: 19S DIN 4 at 21°C  
 Spray Temp. 21°C  
 Spray Humidity 60% RH  
 Mix Ratio 1528.1g Base Coat : 375g V.E. Wasser

## 2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
1.	2.72	7.26	3.66	0.94	0.1295	0.1283
2.	2.30	4.13	2.83	6.53	0.1283	
3.	2.92	6.69	3.77	0.85	0.1271	

## 3. Transfer Efficiency (TE) On Aluminium Panel

Substrate Etch Primer + 2K HS Primer

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of coats	Paint Output	(1) Panel Weight	(2) Dry-up & panel	(3)(2)-(1) Dry up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E Average	Paint Thickness Applied
A10	Control	panel	for	weight					183.22	183.15	0.07					
A1	W100	0	10 psi	100mm	Upright	3	3½	29 gm per	166.28	167.00	0.72+ 0.07* =0.79	6.9	0.89	88.8		18µ
A2	"	"	"	"	"	3	4½	minute	171.86	172.73	0.94*	8.3	1.06	88.7	89.2	19µ
A3	"	"	"	"	"	"	2½	"	173.64	174.11	0.54*	4.7	0.60	90.0		10µ

\* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

- 0 Paint Adj. Fan Nozzle - 2 Turns Out  
 Fluid Nozzle - 2 Turns Out

**PRESSURE GUN NOZZLE 1.3 AIR CAP W100 - H2**

**APPENDIX B6 (Continued)**

**RESULT SHEET 4A**

**Date: 23.9.1998**

1. Materials: Standox HS Lacquer  
 Viscosity: 21S DIN 4 at 23°C  
 Spray Temp. 23°C  
 Spray Humidity 52% RH  
 Mix Ratio 990 g HS Lacquer : 500 g Hardener Kurtz

Stoving Schedule: - Foil 70°C for 90 Minutes  
 - Steel -----“-----  
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
B4	5.72	4.34	8.05	2.33	0.5369	0.5399
B5	3.03	5.99	6.27	3.24	0.5409	
B6	2.60	6.57	6.16	3.56	0.5419	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
A13	W100	Fully	Gun 15psi	150mm	Upright	4	75g	20.72	25.72	5.00	13.5	7.29	68.6	70.5
A14	“	Open	Pot	“	“	“	per	21.08	26.86	5.78	15.2	8.21	70.4	
A15	“		6 psi	“	“	“	minute	20.72	27.62	6.90	17.6	9.50	72.6	

**PRESSURE GUN - NOZZLE 1.3 AIRCAP W100-H2**

**APPENDIX B6 (Cont'd)**

**RESULT SHEET 4B**

**DATE: 23.9.1998**

Materials: Stadox 2KS HS Lacquer  
 For Steel Panels -  
 Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
B4	5.72	4.34	8.05	2.33	0.5369	0.5399
B5	3.03	5.99	6.27	3.24	0.5409	
B6	2.60	6.57	6.16	3.56	0.5419	

3. Transfer Efficiency (TE) On Steel Panel

Substrate Etch Primer + HS primer + W.B. Base Ct

Paint Adj.	Gun Model		Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average	Paint Thickness Applied
G		Control	Panel	for	weight	loss			5591.8	5591.7	0.1					
H	W100	Fully open	Gun	150 mm	Upright	6	1½	75g per minute	5536.6	5554.3	17.7 +0.1 = 17.8*	45.8	24.73	72.0	74.1	33µ
I	"	"	10psi Pot 6 psi	"	"	6	1½		5510.8	5531.4	20.7*	50.4	27.21	76.1		45µ

\* Weight adjusted for loss of weight on control panel in accordance with ASTM procedures



**GRAVITY GUN (SPOT REPAIR) NOZZLE 1.3 AIR CAP W100 - H2**

**APPENDIX B6 (Continued)**

**RESULT SHEET 4C**

**Date: 11.8.1998**

- 1. Materials: Standox 2K HS Lacquer
- Viscosity: 21S DIN 4 at 26°C
- Spray Temp. 26°C
- Spray Humidity 55% RH
- Mix Ratio 990 g HS Lacquer : 500 g Hardener Kurtz

Stoving Schedule: - Foil 70°C for 90 Minutes  
 - Aluminium -----“-----  
 Solids Temp/Time 130°C for 120 minutes

2. Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
16	3.18	7.80	7.37	4.19	0.5372	0.5372
17	2.96	6.02	6.21	3.25	0.5399	
18	3.01	4.64	5.49	2.48	0.5345	

3. Transfer Efficiency (TE) On Foil

Foil No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Foil Position	Number of Gun Passes	Paint Output	(1) Foil Weight	(2) Dry-up & Foil	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average
13	W100	0	10 psi	100mm	Upright	3	25.55g	3.02	3.79	0.77	1.85	0.99	77.8	79.3
14	“	“	“	“	“	“	per minute	2.87	4.39	2.52	3.5	1.88	80.8	
15	“	“	“	“	“	“	“	3.00	4.19	1.19	2.8	1.50	79.3	

- 0 Paint Adj. Fan Nozzle - 2 turns out
- Fluid Flow - 2 turns out

**GRAVITY GUN (SPOT REPAIR) - NOZZLE 1.3 AIRCAP W100-H2**

**APPENDIX B6 (Cont'd)**

**RESULT SHEET 4D**

**DATE: 23.9.1998**

Materials: Stadox HS Lacquer  
 For Aluminium Panels -  
 Material Solids

Panel Dish No.	(1) Aluminium Foil Weight	(2) Wet Material	(3) Dry-up & Foil	(4) (3)-(1) Dry Up	(5) (4)/(2) Material Solids	Average Material Solids
B4	5.72	4.34	8.05	2.33	0.5369	0.5399
B5	3.03	5.99	6.27	3.24	0.5409	
B6	2.60	6.57	6.16	3.56	0.5419	

3. Transfer Efficiency (TE) On Steel Panel

Substrate Etch Primer + HS primer + W.B. Base Ct

Panel No.	Gun Model	Paint Adj.	Pressure at Gun	Spray Distance	Panel Position	Number of Gun Passes	Number of Coats	Paint Output	(1) Panel Weight	(2) Dry-up & Panel	(3)(2)-(1) Dry Up	(4) Wet Spray Material	(5) Spray Solid	(6) T.E. (3)/(5)	T.E. Average	Paint Thickness Applied
A4		Control	Panel	for	weight	loss			181.74	181.68	0.06					
A5	W100	Fully open	10 psi	100 mm	Upright	4	2	22.8g per minute	176.19	180.16	1.97* +0.6 = 2.03	5.0	2.70	75.2	72.8	55µ
A6	"	"	"	"	"	"	1½		179.03	180.68	1.71*	4.5	2.43	70.4		40µ

\*Weight adjusted for loss of weight on control panel in accordance with ASTM procedures

0 Paint Adj. Fan Nozzle - 2 Turns out

Fluid Flow - 2 Turns out