



RELIABLE ANALYSIS INC.

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REPORT NUMBER 1300203R-19757R
1300830-19883R
PURCHASE ORDER 355997
TEST DATE 03/06-04/26/13
REPORT DATE 04/30/13
TOTAL PAGE(S) NUMBER 1/10

REPORT FOR

Printex
12113 Kirkham Rd.
Poway, CA 92064

Work Requested

Perform the following tests with the three (3) ink samples, hardener and thinner submitted in accordance with Mil specification A-A-208B and the specified laboratory procedures:

- 5.3.1 Drying Opacity (Hiding Power), ASTM D 2508
- 5.3.2 Color
- 5.3.3 Gloss
- 5.3.5 Stenciling, stencil brush
 - . Obtain and prepare fiberboard and enameled steel panels
 - . Letter approx. 0.75" high, 5 letter – used 1" letters and 6 letters per panel
 - on 3" x 6" in enameled steel panels for Type I
 - on fiberboard for type II
- 5.4 Resistance to Rubbing
 - . Evaluate 15 minutes after application and after 15 minute bake at 55°C (130°F)
- 5.5 Resistance to Water
 - . Sample preparations (type I & II)
 - . 4 h in distilled water at 70°F
 - . 1 hour dry at 70°C
 - . Evaluation with vigorous rubbing

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Sample Description

Three (3) sets of ink samples and one (1) bottle of hardener, received on March 5, 2013, were identified as:

1. Federal Standard MPB 37038-C Black Ink (MP-310)
2. Federal Standard MPB 33538-C Orange/Yellow Ink
3. Federal Standard MPB 37925-C Insignia White (MP-320)
4. MP 200 Hardener

One (1) bottle of thinner received on April 9, 2013, was identified as:

5. MP103 Fast Thinner (used for tests in sections 5.3.5, 5.4, and 5.5 only)

Three (3) sets of draw downs of ink samples, received on April 4, 2013, were identified as:

6. MP-310 Black (Fed Std 37038), master sample and batch
7. MP-33538-C (Fed Std 33538) (yellow), master sample and batch
8. MP-320 White (Fed Std 37925), master sample and batch

Work Performed

The samples were conditioned for a minimum of 24 hours at the standard laboratory conditions of $23 \pm 2^{\circ}\text{C}$ and $50 \pm 5\%$ R.H. prior to testing. The tests were performed in accordance with the above specified laboratory procedures.

Test Results

5.3.1 Drying Opacity (Hiding Power), ASTM D2508

Dried films of the stencil type I and type II inks were received from the customer on Leneta charts. The contrast ratios were determined per ASTM D2508.

Requirement: Minimum contrast ratios for: Black (No. 37038) 1.00, Yellow (No. 33538) 0.90, White (No. 37875) 0.90, per Table 1 of A-A-208-B.

<u>Sample ID</u>	<u>Results</u>	<u>Evaluation</u>
MP-310 Black (Fed Std 37038)	1.0469	Met the requirement
MP-33538-C (Fed Std 33538)	0.9713	Met the requirement
MP-320 White (Fed Std 37925)	0.9312	Met the requirement



Test Results (continued)

5.3.2 Color

The color of the stencil inks shall be a general match to the specified color in Table I as determined by visual inspection under illumination in accordance with ASTM D 1729. If the visual inspection described above proves inconclusive, the color variance of ΔE 1.75 maximum, will be considered acceptable.

Requirement: ΔE 1.75 Maximum

<u>Sample ID</u>	<u>Standard</u>	<u>Batch</u>	<u>Difference</u>	<u>Delta</u>
MP-310 Black (Fed Std 37038)				
L*	23.23	23.50	0.27	DE* 0.28
a*	0.70	0.65	-0.05	DC* -0.02
b*	0.68	0.71	0.03	DH* 0.06

Evaluation: AATCC Rating: 5. Visually and numerically met the requirement

MP-33538-C (Fed Std 33538) Yellow				
L*	72.77	72.81	0.04	DE* 0.12
a*	25.15	25.11	-0.04	DC* -0.12
b*	67.00	66.89	-0.11	DH* 0.00

Evaluation: AATCC Rating: 5. Visually and numerically met the requirement

MP-320 White (Fed Std 37925)				
L*	95.84	95.79	-0.05	DE* 0.26
a*	-0.87	-0.92	-0.05	DC* 0.20
b*	0.66	0.90	0.24	DH* -0.16

Evaluation: AATCC Rating: 5. Visually and numerically met the requirement

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Test Results (continued)

5.3.3 Gloss

For Type I stencil ink shall be tested on an absorbent surface and for Type II gloss shall be tested on fiberboard with a maximum gloss reading of 10 being acceptable as tested in accordance with ASTM D 523.

Requirement: 10 max. 60 degree

<u>Sample ID</u>	<u>Results</u>	<u>Evaluation</u>
MP-310 Black (Fed Std 37038)	7.1	Met the requirement
MP-33538-C (Fed Std 33538)	10.0	Met the requirement
MP-320 White (Fed Std 37925)	7.5	Met the requirement

5.3.5 Stenciling

Enameled panels were prepared by using ACT’s CRS unpolished 4” x 12” x .032” cut to size. Panels were primed using Rust-Oleum Automobile Primer #2081 Lt Gray. Primed panels were allowed to dry for 1 hour and were top-coated with Rust-Oleum Gloss Protective Enamel #7786 Smoke Gray. The panels were air-dried over night, baked for 1 hour at 70°C, then conditioned for 72 hours before the ink was mixed and applied. The fiberboard used was MDF from Home Depot.

The inks were prepared according to the ratio of 100:20:30 (ink to hardener to fast thinner) by weight. Stencil brush was dipped in ink and then dabbed on a paper towel until almost dry before dabbing on the stencil-covered substrates.

Six letters were stenciled with a stencil brush on each steel and fiberboard panel.

5.4 Resistance to Rubbing

After 15 minutes, the letters were rubbed lightly with fingers to check for smear. The panels were then baked for 15 minutes at 55°C (130°F) and rechecked for smearing, etc.

Requirement: Stenciling shall present legible characters of uniform boldness and general appearance. The ink shall not smear 15 minutes after application at 23°C when rubbed lightly with fingers.

<u>Sample ID – Fiber Board</u>	<u>Results</u>	<u>Evaluation</u>
15 minutes after application		
MP-310 Black (Fed Std 37038)	No smear	Met the requirement
MP-33538-C (Fed Std 33538)	No smear	Met the requirement
MP-320 White (Fed Std 37925)	No smear	Met the requirement



Test Results (continued)

5.4 Resistance to Rubbing (continued)

Sample ID – Fiber Board

After 15 minutes @ 55°C

MP-310 Black (Fed Std 37038)

MP-33538-C (Fed Std 33538)

MP-320 White (Fed Std 37925)

Results

No smear

No smear

No smear

Evaluation

Met the requirement

Met the requirement

Met the requirement

Sample ID – Enameled panel

15 minutes after application

MP-310 Black (Fed Std 37038)

MP-33538-C (Fed Std 33538)

MP-320 White (Fed Std 37925)

Results

No smear

No smear

No smear

Evaluation

Met the requirement

Met the requirement

Met the requirement

Sample ID – Enameled Panel

After 15 minutes @ 55°C

MP-310 Black (Fed Std 37038)

MP-33538-C (Fed Std 33538)

MP-320 White (Fed Std 37925)

Results

No smear

No smear

No smear

Evaluation

Met the requirement

Met the requirement

Met the requirement

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Test Results (continued)

5.5 Resistance to Water

The letters were stenciled. After 48 hours, the letters were immersed in distilled water at 70°F for 4 hours and dried for 1 hour at 70°C per customers e-mail.

Requirement: The stenciled lettering shall be legible, retain its characteristics color, not smear with vigorous rubbing, nor crack or peel when tested one hour after stenciling by placing steel panels or fiberboard panels in distilled water at 70°F for 4 hours and air dried for 1 hour.

<u>Sample ID –Fiberboard panel</u>	<u>Results</u>	<u>Evaluation</u>
48 hrs application and bake		
MP-310 Black (Fed Std 37038)	No smear	Met the requirement
MP-33538-C (Fed Std 33538)	No smear	Met the requirement
MP-320 White (Fed Std 37925)	No smear	Met the requirement

<u>Sample ID – Enameled Panel</u>	<u>Results</u>	<u>Evaluation</u>
48 hrs application and bake		
MP-310 Black (Fed Std 37038)	No smear	Met the requirement
MP-33538-C (Fed Std 33538)	No smear	Met the requirement
MP-320 White (Fed Std 37925)	No smear	Met the requirement

Test Equipment

1. E-463, Despatch Oven, calibration due: 03/14
2. E-178, Ohaus Scout Balance, calibration due: 05/13
3. E-313, Ertco Eutechnics Digital Thermometer, calibration due: 06/13
4. E-354, Precision Mechanical Convection Oven, calibration due: 01/14
5. E-007, Byk Micro-TriGloss Gloss Meter, calibration due: 11/13
6. E-169, HunterLab UltraScan XE Spectrophotometer, verified: 04/13

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Sample Disposition

The tested specimens are being returned with this report for your further evaluation.

Reliable Analysis, Inc.

A handwritten signature in black ink that reads "Scott Etzel". The signature is written in a cursive style.

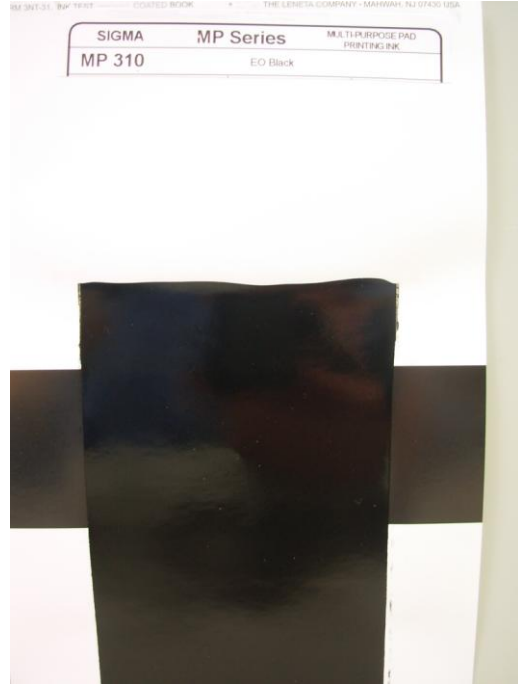
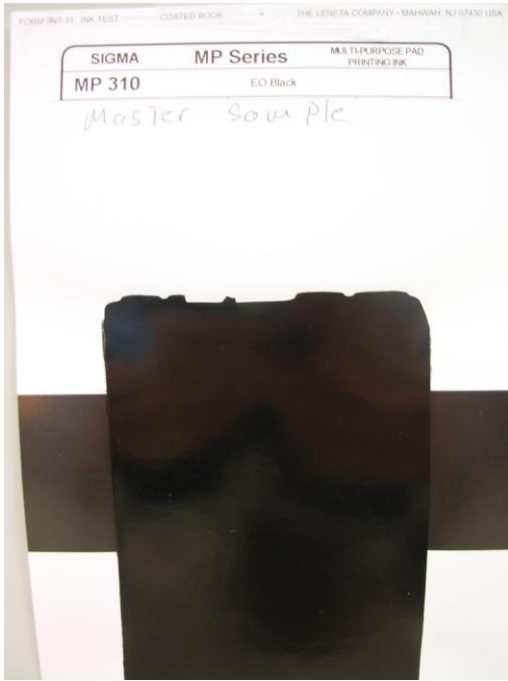
Scott Etzel
Technical Manager, Materials

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Appendix:

Black Draw Downs



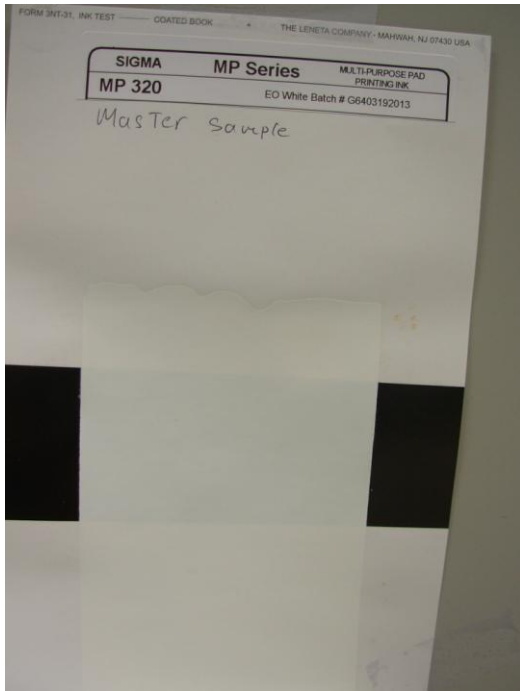
Yellow Draw Downs





Appendix: (continued)

White Draw Downs



Panels Before Stenciling

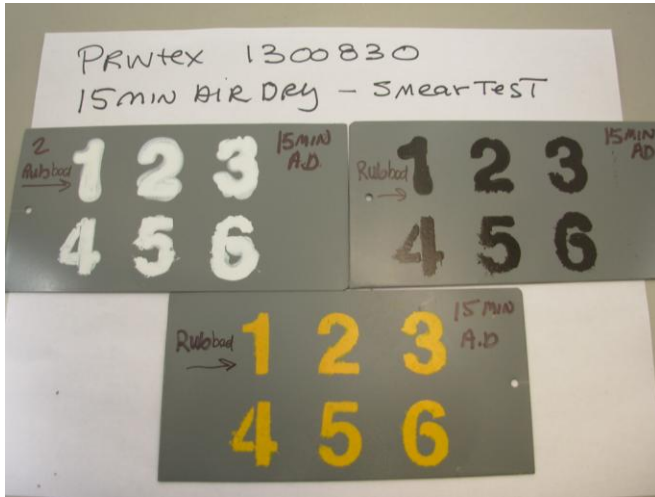




Appendix: (continued)

Enameled panels: 15 min Air Dry: first rows rubbed (123), second row untested (456)

Fiber Board panels: 15 min Air Dry: first rows rubbed (123), second row untested (456)



Enameled panels: first rows – 15 min air dry
Second rows: after 15 min @ 130°F (55°C)
4 hrs Water immersion @ 70°F then 1 hr @ 70°C

Fiber board panels: first rows – 15 min air dry
Second rows: after 15 min @ 130°F (55°C)
4 hrs Water immersion @ 70°F then 1 hr @ 70°C

