REFERENCES

1. Banov, A. Paints & Coatings Handbook. 2nd edition. Structures Publishing Company, Michigan, 1978, pp 1-107.
2. Lam bourne, R. Paint and Surface Coatings. John Wiley & Sons, New York, 1987, pp 22-677.
3. Baghdachi, J.A. Adhesion Aspects of Polymeric Coatings. Federation of Societies for Coatings Technology, U.S.A., 1996, pp 7-33.
4. Oldring, P. and Hayward, G. Resins for Surface Coatings. Volume II. Sita Technology Ltd., London, 1987, pp 3-91.
5. Prane, J.W. Introduction to Polymers And Resins. Federation of Societies for Coatings Technology, Blue Bell, 1996, pp 7-24.
6. Odian, G. Principles of Polymerization. 3rd edition. John Wiley & Sons, New York, 1992, pp 134-140.
7. Zeno, W., JR. Wicks, JR., Frank, F.N. and Peter Pappas, S. Organic Coatings: Science and Technology. Volume I. John Wiley & Sons, New York,1992, pp 162-265.
8. Plueddlemann, E.P. Silane Coupling Agents. 2nd edition. Plenum Press, New York, 1991, pp 4-289.
9. Pocius, A.V. Adhesion and Adhesives Technology. Hanser/Gardner Publications Inc., New York, 1997, pp 137-139.
10. Mark, J.E., Allcock, H.R., and West, R. Inorganic Polymers. Prentice Hall, Inc., New Jersey, 1992, pp 141-169.
11. Solomon, D.H. and Hawthorne, D.G. Chemistry of Pigments and Fillers. John Wiley & Sons, New York, 1983, pp 143-154.

12. Witucki, G.L. A Silane Primer: Chemistry and Applications of Alkoxy Silanes, Journal of Coatings Technology. 65(1993) : pp 57-60.

13. Eldred, N.R. and Scarlett, T. What the Printer Should Know about Ink. 2nd edition Pittsburgh, Pensylvania, 1990, pp 17-26.

14. Carter, V.E. Corrosion Testing for Metal finishing. Redwood Burn Ltd., England, 1982, pp 45-55.

15. Smith, A. Inorganic Primer Pigments. Federation of Societies for Coatings Technology, Philadelphia, 1988, pp 22-24.

16. Hill, L.W. Mechanical Properties Of Coatings. Federation of Societies for Coatings Technology, Philadelphia, 1987, pp 19-23.

17. Davis, H.E., Troxell, G.E. and Hauck, G.F. The Testing of Engineering Materials. 4th edition. Magraw-Hill, New York, 1964, pp 195-203.

18. Plueddemann, E.P. and Pape, P.G. The Use of Mixed Silane Coupling Agents. Dow Corning Corporation Midland, Michgan, 1985, pp 1-7.

19. Foscante, R.E., Gysegem, A.P., Martinich, P.J. and Law, G.H. Interpenetrating Polymer Network Comprising Epoxy Polymer and Polysiloxane. United States Patent 4,250,074, 1981.

20. Kim, H. and Jang, J. Copper Corrosion Protection of Various Silane-Modified Poly(vinyl imidazole)(1)s, Journal of Applied Polymer Science, 64(1997) : pp 2585-2595.

21. Hull, G.H. The Chemistry and Application of Advanced Polysiloxane Polymers, Surface Coatings Australia, 35(1998) : pp 24-27.

22. Turner, M.R., Duguet, E. and Labrugere, C. Characterization of Silane-modified ZrO_2 Powder Surfaces, Surface and Interface Analysis, 25(1997) : 917-923.

23. Quinton, J.S. and Dastoor, P.C. Influence of Surface Electrokinetics on Organosilane Adsorption, Surface and Interface Analysis, 28(1999) : pp 12-15.

24. Quinton, J.S. and Dastoor, P.C. Conformational Dynamics of γ-APS on the Iron Oxide Surface: an Adsorption Kinetic Study using XPS and ToF-SIMS, Surface and Interface Analysis, 30(2000) : pp 21-24.

25. Jang, J. and Kim. E.K. Corrosion Protection of Epoxy-Coated Steel Using Different silane Coupling Agents, Journal of Applied Polymer Science, 71 (1999) : pp 585-593.

26. Fordham, S. SILICONES. William Clowes & Sons limited, London, 1960, pp 65-78.

27. Finzel, W.A. and Vincent, H.L. Silicone in Coatings. Federation of Societies for Coatings Technology, Blue Bell, 1996, pp 7-32.

28. Zeno, W., Wicks, JR., Frank, F.N. and Peter Pappas, S. Organic Coatings : Science and Technology. VolumeII. John Wiley & Sons, New York, 1994, pp 163-188.

29. Zeno, W. and Wicks, JR. Corrosion Protection By Coatings. Federation of Societies for Coatings Technology, Philadelphia, 1987, pp 7-21.

30. Jonen, D.A. Principles and Prevention of Corrosion. Macmillan Inc., New York, 1992, pp 22-24.

APPENDICES

APPENDIX A

Test Methods for Corrosion Evaluation

Table A-1 Classification of adhesion test results (ASTM D3359)

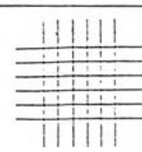
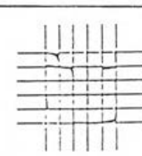
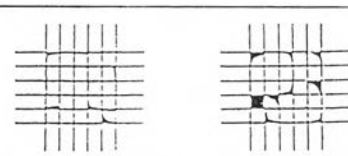
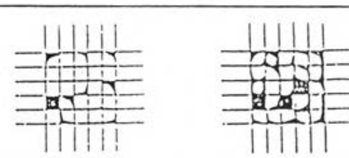
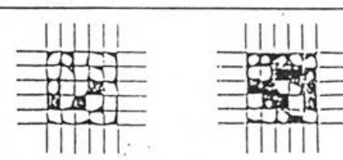
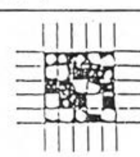
CLASSIFICATION OF ADHESION TEST RESULTS		
CLASSIFICATION	PRECENT AREA REMOVED	SURFACE OF CROSS-CUT AREA FROM WHICH FLAKING HAS OCCURRED FOR SIX PARALLEL CUTS AND ADHESION RANGE BY PERCENT
5B	0% None	
4B	Less than 5%	
3B	5 – 15 %	
2B	15 – 35 %	
1B	35 – 65 %	
0B	Greater than 65%	

Table A-2 Rating of failure at scribe (ASTM D1654)

Representative Creepage From Scribe		
Millimetres	Inches (Approximate)	Rating Number
Zero	0	10
Over 0 to 0.5	0 to 1/64	9
Over 0.5 to 1.0	1/64 to 1/32	8
Over 1.0 to 2.0	1/32 to 1/16	7
Over 2.0 to 3.0	1/16 to 1/8	6
Over 3.0 to 5.0	1/8 to 3/16	5
Over 5.0 to 7.0	3/16 to 1/4	4
Over 7.0 to 10.0	1/4 to 3/8	3
Over 10.0 to 13.0	3/8 to 1/2	2
Over 13.0 to 16.0	1/2 to 5/8	1
Over 16.0 to more	5/8 to more	0

Table A-3 Description of rust grade (ASTM D 610)

Rust Grades	Description	Photographic Standard
10	no rusting or less than 0.01% of surface rested	Unnecessary
9	minute rusting, less than 0.03% of surface rusted	no. 9
8	few isolated rust spots, less than 0.1% of surface rusted	no.8
7	less than 0.3% of surface rusted	none
6	extensive spots but less than 1% of surface rusted	no.6
5	rusting to the extent of 3% of surface rusted	none
4	rusting to the extent of 10% of surface rusted	no.4
3	approximately one-sixth of the surface rusted	none
2	approximately one-third of the surface rusted	none
1	approximately one-half of the surface rusted	none
0	approximately 100% of the surface rusted	Unnecessary

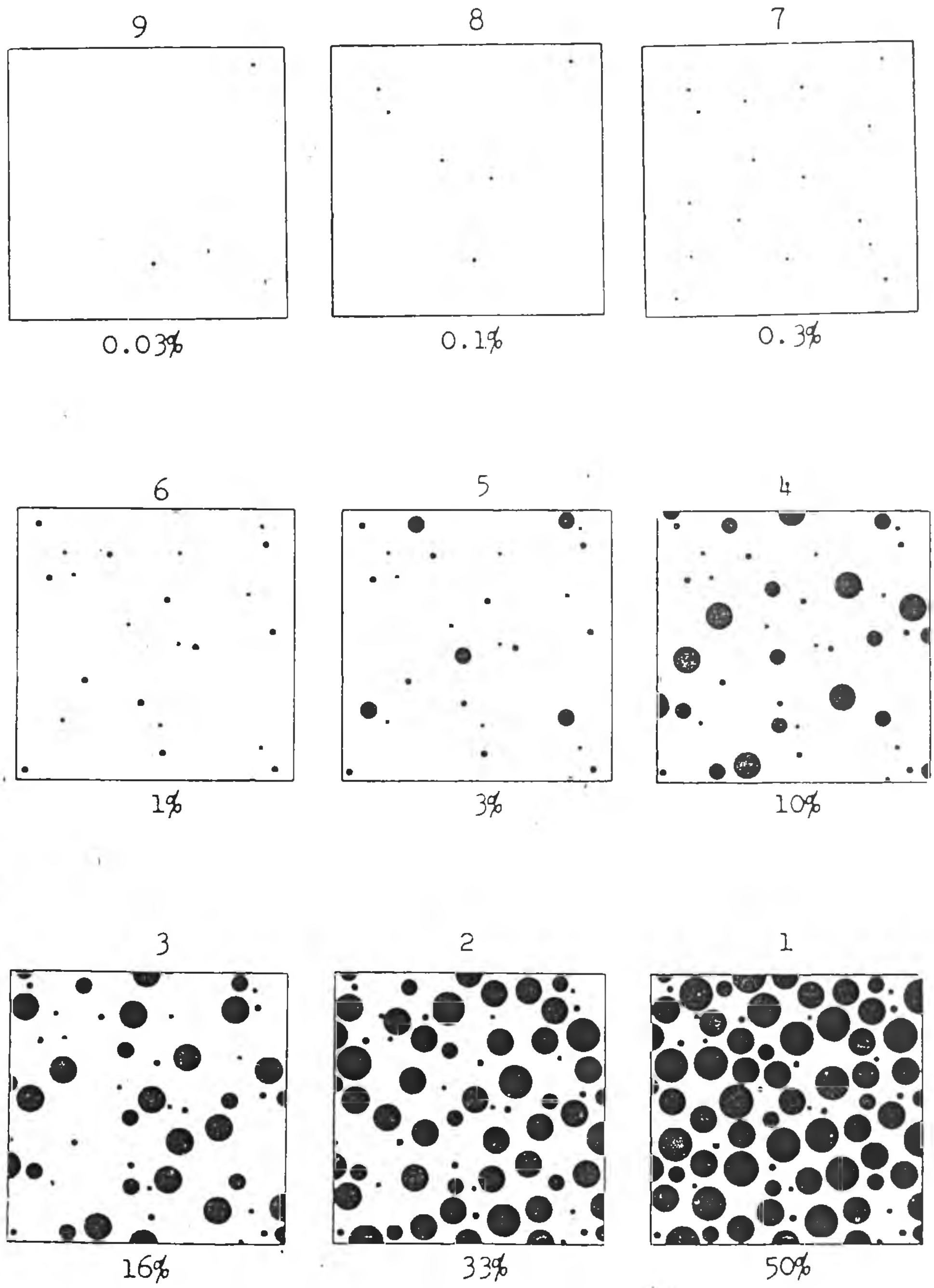
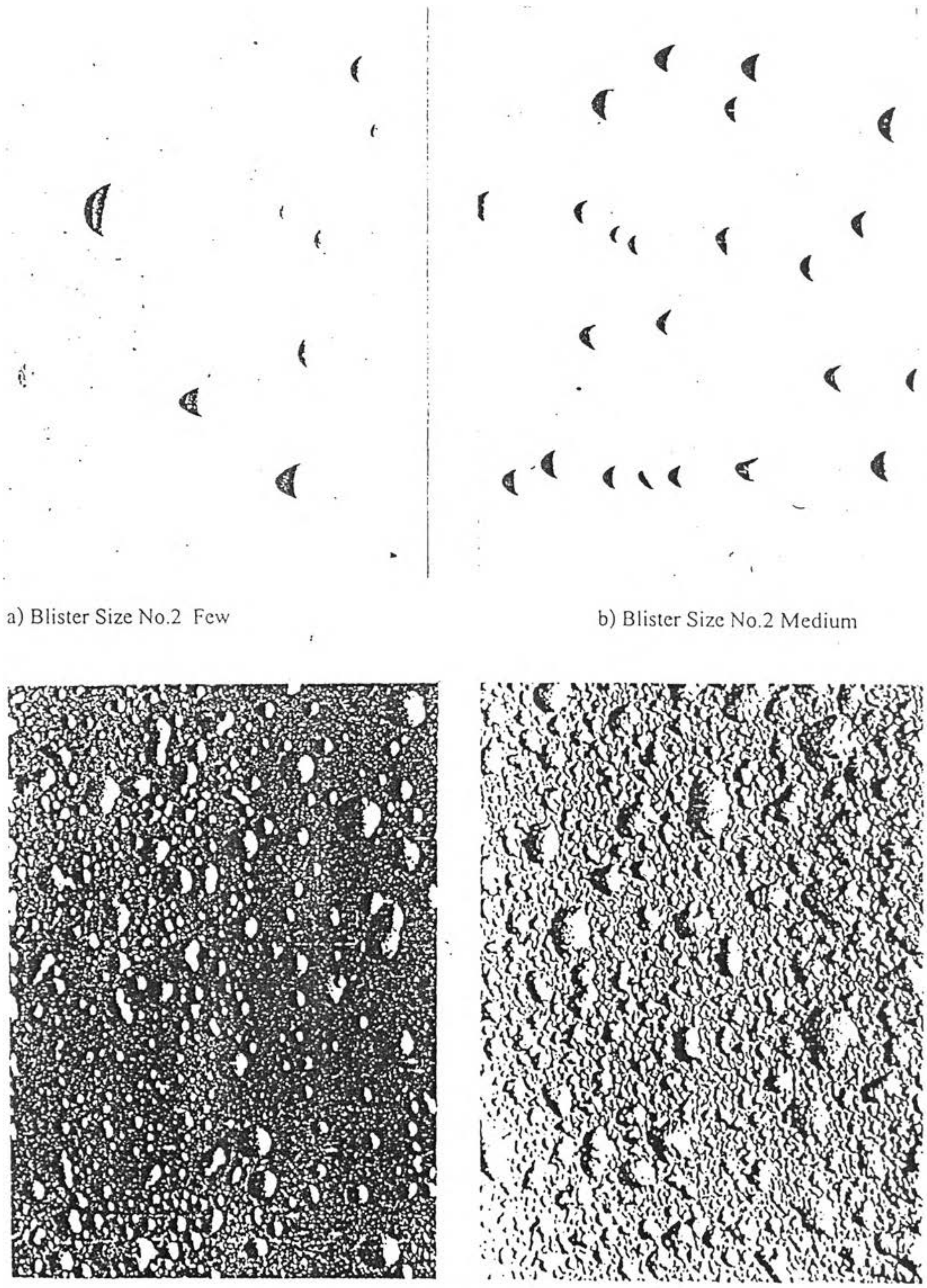


Figure A-1 Examples of rusting area percentages (ASTM D610)



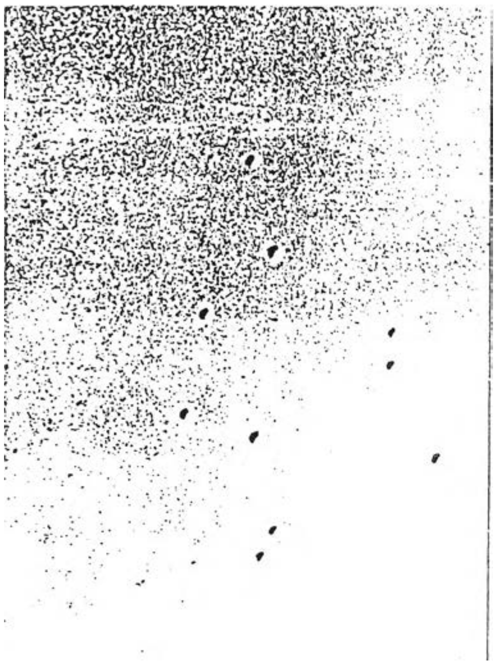
a) Blister Size No.2 Few

b) Blister Size No.2 Medium

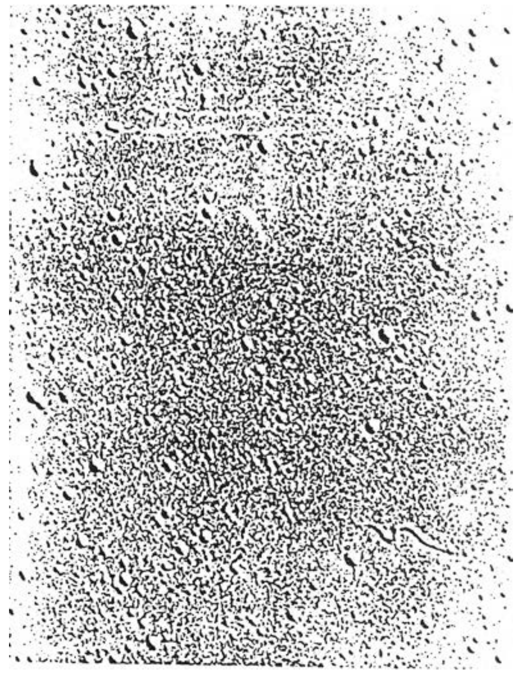
c) Continued Medium Dense

d) Continued Dense

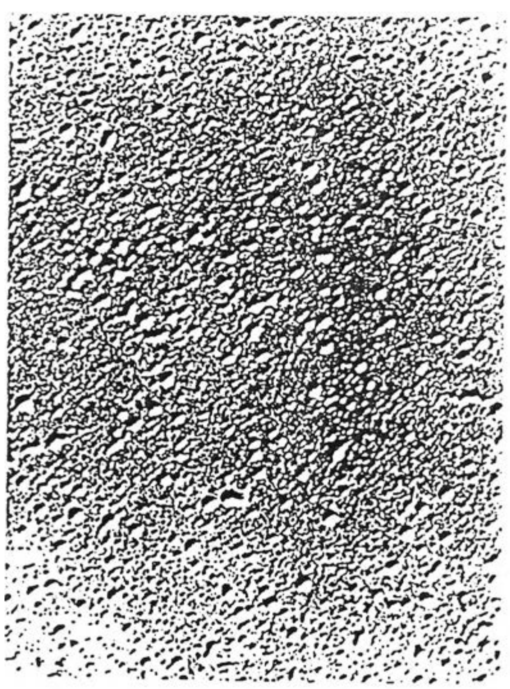
Figure A –2 Standard Test Method "Evaluation Degree of Blistering of Paints" (ASTM D714)



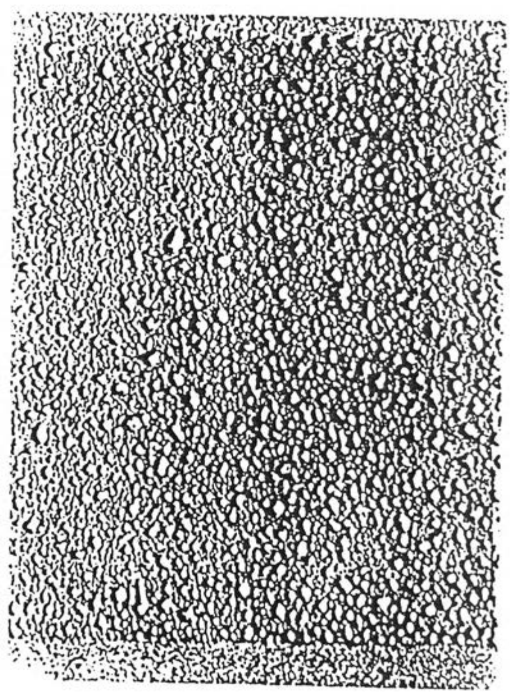
e) Blister Size No.4 Few



f) Blister Size No.4 Medium

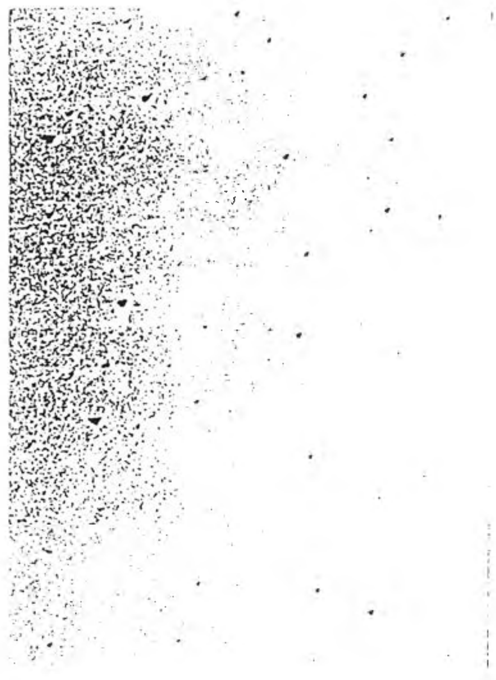


g) Continued Medium Dense

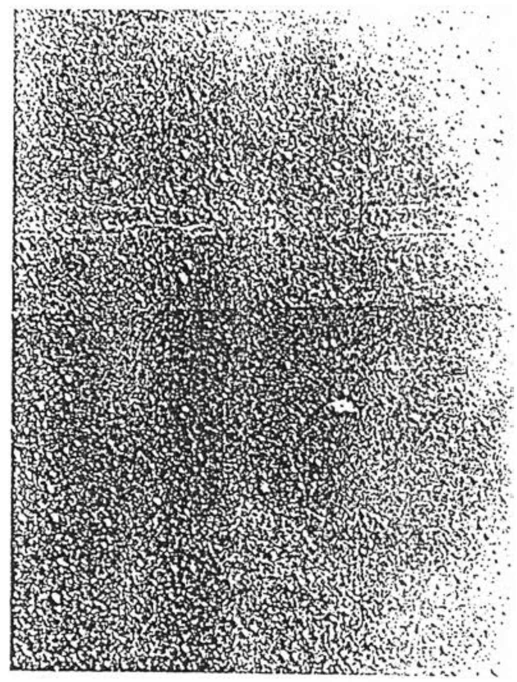


h) Continued Dense

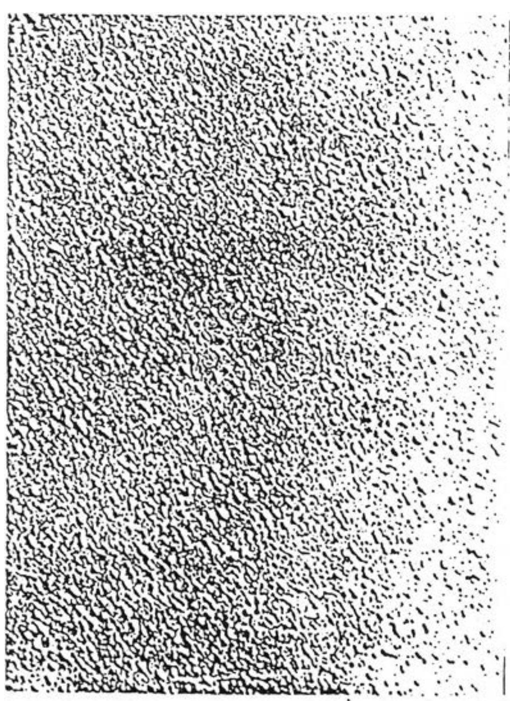
Figure A –2 Standard Test Method "Evaluation Degree of Blistering of Paints" (ASTM D714).



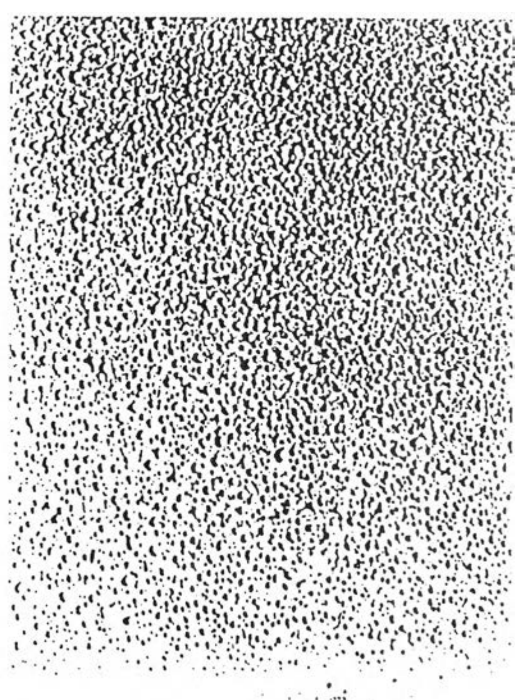
i) Blister Size No.6 Few



j) Blister Size No.6 Medium

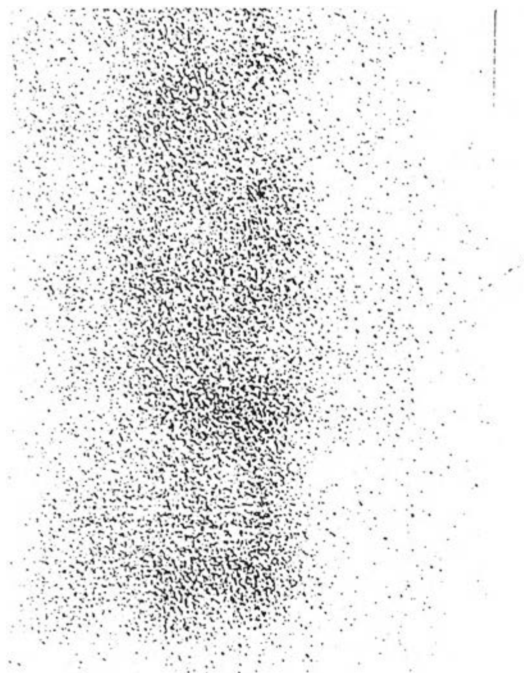


k) Continued Medium Dense

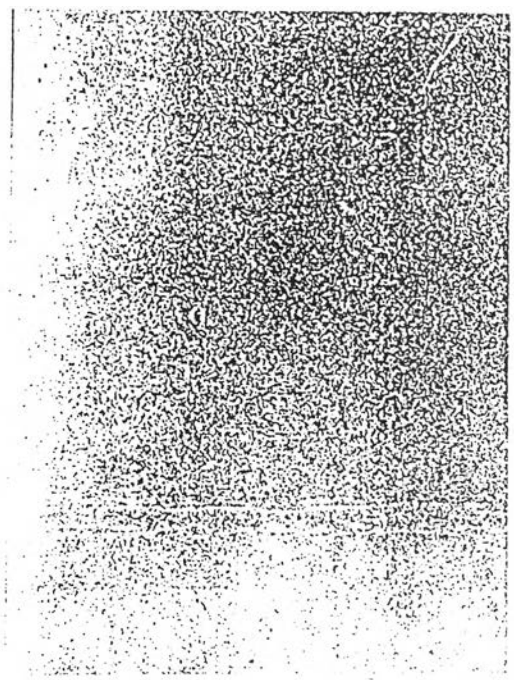


l) Continued Dense

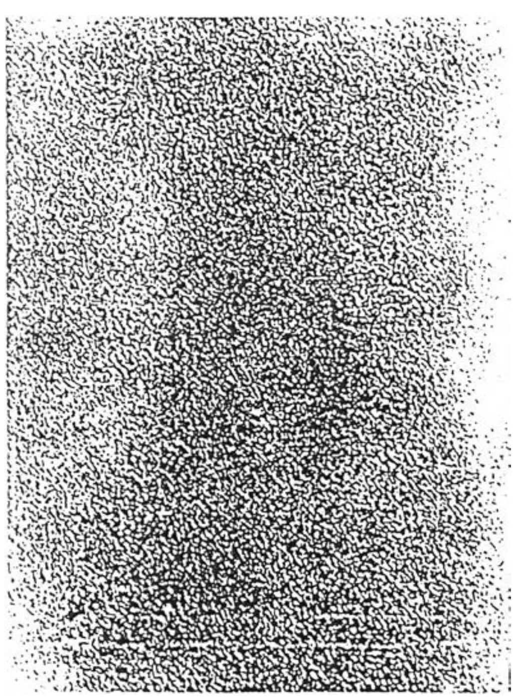
Figure A –2 Standard Test Method "Evaluation Degree of Blistering of Paints" (ASTM D714)



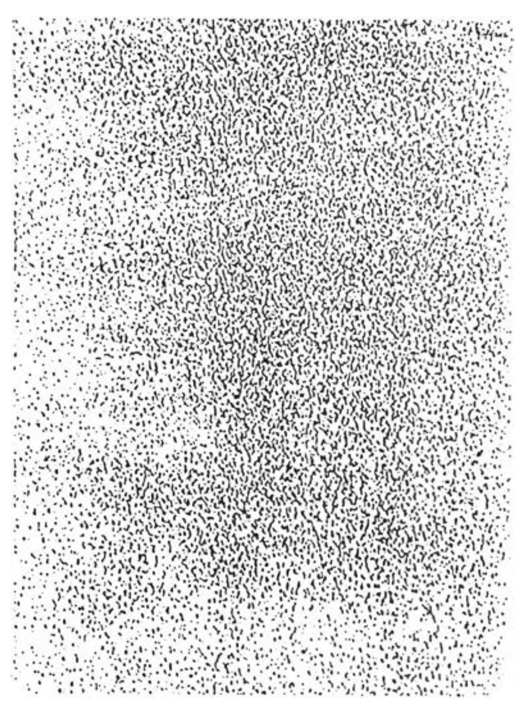
m) Blister Size No.8 Few



n) Blister Size No.8 Medium



o) Continued Medium Dense



p) Continued Dense

Figure A –2 Standard Test Method "Evaluation Degree of Blistering of Paints" (ASTM D714)

APPENDIX B

Epoxy Resin/Amine hardener Calculation

For optimum curing of epoxy resins, one epoxide equivalent from resin must be reacted with one amine equivalent from the amine hardener. The epoxide equivalent (EEW) of most epoxy resins is known and provided in commercial data. It is calculated from :

$$EEW = \frac{MW_E}{N_{EG}} \qquad \text{(B-1)}$$

Where MW_E = molecular weight of the resin, and N_{EG} = number of epoxide groups/molecule

The amine equivalent is, similarly, the molecular weight divided by the number of amine hydrogens per molecule:

$$AE = \frac{MW_E}{N_{AH}} \qquad \text{(B-2)}$$

The amount of amine hardener required to neutralise 100 parts by mass of resin is:

$$W_A = \frac{AE \times 100}{EEW} \qquad \text{(B-3)}$$

When a mixture of different epoxy resin and curing agents is used, it is appropriate to calculate a common equivalent mass of the mix

$$\text{Equivalent mass}_{mix} = \frac{\text{mass}_{mix}}{\dfrac{\text{mass curing agent}_1}{\text{equivalent mass}_1} + \dfrac{\text{mass curing agent}_2}{\text{equivalent mass}_2}} \tag{B-4}$$

APPENDIX C

Physical and Mechanical Properties of Epoxy/Silane-based Coating and Flooring

Table C-1 Color difference of epoxy coating (control sample, colorimeter (CR 300))

a) Heat resistance at 200 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	66.24	+0.73	+0.18	60.01	+0.26	+11.35	12.80	12.52	0.40
	66.27	+0.78	+0.16	60.40	+0.16	+10.88	12.24		
50	65.32	+0.73	+0.18	59.19	+0.41	+11.63	12.99	12.22	1.10
	65.57	+0.64	+0.23	60.29	+0.37	+10.38	11.44		
75	65.33	+0.59	+0.26	61.02	+0.22	+10.53	11.14	11.36	0.31
	64.48	+0.71	+0.18	60.27	+0.27	+10.96	11.58		
100	66.16	+0.66	+0.33	61.45	+0.11	+9.11	9.98	10.07	0.13
	65.96	+0.68	+0.39	61.45	+0.08	+9.47	10.16		

b) Heat resistance at 250 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	66.31	+0.69	+0.14	29.47	+13.43	+10.84	40.42	40.44	0.03
	66.27	+0.78	+0.22	29.63	+13.65	+11.58	40.46		
50	65.19	+0.69	+0.17	26.37	+12.52	+6.17	41.02	41.25	0.33
	65.69	+0.56	+0.86	26.17	+12.01	+6.08	41.48		
75	64.46	+0.67	+0.17	29.59	+16.26	+12.12	40.02	40.29	0.38
	64.48	+0.71	+0.18	29.27	+16.27	+12.96	40.56		
100	65.70	+0.67	+0.26	29.70	+15.78	+12.26	40.84	40.93	0.12
	65.91	+0.61	+0.38	29.98	+16.40	+12.27	41.01		

c) Heat resistance at 300 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	66.56	+0.64	+0.16	23.34	+1.16	-0.78	43.23	43.10	0.19
	66.57	+0.68	+0.20	23.63	+1.65	-0.80	42.96		
50	65.54	+0.68	+0.16	23.00	+1.22	-0.77	42.55	42.69	0.08
	66.59	+0.59	+0.18	23.17	+1.20	-0.88	42.44		
75	64.87	+0.63	+0.20	22.88	+1.31	-0.72	42.01	42.07	0.09
	64.48	+0.69	+0.19	22.37	+1.62	-0.96	42.14		
100	65.38	+0.73	+0.74	23.25	+1.37	-0.77	42.16	42.14	0.02
	65.83	+0.62	+0.35	23.72	+1.14	-0.67	42.13		

Table C-2 Color difference of epoxy/silane coating (Sample 1, colorimeter (CR 300)

a) Heat resistance at 200 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	65.44	+0.66	+0.53	60.03	+0.25	+11.08	11.86	12.25	0.55
	65.51	+0.70	+0.45	60.15	+0.29	+11.89	12.64		
50	65.34	+0.58	+0.88	59.73	+0.25	+11.72	12.21	12.06	0.22
	65.40	+0.54	+0.95	59.90	+0.22	+11.50	11.90		
75	65.31	+0.56	+0.47	59.78	+0.29	+10.94	11.76	11.98	0.32
	65.09	+0.66	+0.41	59.88	+0.22	+11.44	12.21		
100	64.80	+0.58	+0.61	61.51	-0.21	+9.92	9.91	10.03	0.17
	65.24	+0.56	+0.67	61.63	-0.23	+10.12	10.15		

b) Heat resistance at 250 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	65.44	+0.71	+0.42	31.56	+15.60	+14.86	39.73	39.86	0.18
	65.61	+0.63	+0.54	31.49	+15.63	+15.04	39.99		
50	65.25	+0.50	+0.93	26.05	+11.43	+5.53	40.95	41.12	0.24
	65.49	+0.46	+0.88	26.17	+11.99	+5.99	41.29		
75	65.39	+0.57	+0.45	35.94	+17.85	+21.34	40.03	40.08	0.08
	65.09	+0.66	+0.41	35.88	+17.22	+22.40	40.14		
100	64.50	+0.59	+0.65	34.02	+18.23	+19.47	39.93	39.89	0.06
	65.01	+0.58	+0.78	34.76	+17.47	+20.46	39.85		

c) Heat resistance at 300 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	65.44	+0.69	+0.55	22.96	+1.09	-0.68	42.50	42.82	0.45
	65.61	+0.63	+0.56	22.49	+1.03	-0.71	43.14		
50	65.90	+0.57	+0.88	23.21	+1.13	-0.78	42.73	42.69	0.06
	65.78	+0.56	+0.87	23.17	+1.20	-0.98	42.65		
75	65.16	+0.56	+0.44	23.23	+1.51	-0.45	41.95	41.64	0.44
	65.19	+0.59	+0.42	23.88	+1.72	-0.42	41.33		
100	65.22	+0.47	+0.76	23.64	+3.25	+0.06	41.68	41.57	0.16
	65.12	+0.58	+0.78	23.76	+3.47	+0.20	41.46		

Table C-3 Color difference of epoxy/silane coating (Sample 2, colorimeter (CR 300))

a) Heat resistance at 200 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	65.28	+0.73	+0.08	60.43	+0.22	+10.98	11.94	12.39	0.63
	65.60	+0.65	+0.15	60.41	+0.05	+11.87	12.83		
50	65.73	+0.72	+0.24	59.86	+0.05	+12.33	13.46	12.94	0.73
	65.43	+0.71	+0.25	59.98	+0.04	+11.40	12.43		
75	65.93	+0.67	+0.23	60.45	-0.11	+11.76	12.79	12.60	0.27
	65.19	+0.73	+0.11	60.45	+0.02	+11.56	12.41		
100	66.40	+0.64	+0.33	61.17	-0.42	+9.42	10.54	10.53	0.01
	65.71	+0.60	+0.40	61.12	-0.37	+9.82	10.52		

b)Heat resistance at 250 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	65.31	+0.73	+0.04	32.11	+16.25	+15.62	39.82	39.93	0.16
	65.25	+0.72	+0.13	32.51	+16.38	+17.06	40.05		
50	65.63	+0.65	+0.28	31.86	+17.25	+15.24	40.49	40.75	0.36
	65.47	+0.66	+0.24	31.12	+17.19	+15.33	41.00		
75	65.83	+0.70	+0.23	35.94	+17.85	+20.75	40.11	40.05	0.08
	65.29	+0.73	+0.21	35.45	+17.56	+20.86	40.00		
100	65.94	+0.61	+0.31	36.30	+18.39	+22.01	40.81	40.26	0.78
	65.85	+0.66	+0.44	35.96	+17.85	+20.14	39.71		

c) Heat resistance at 300 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	65.27	+0.68	+0.09	23.05	+1.26	-0.68	42.23	42.27	0.06
	65.45	+0.70	+0.07	22.15	+1.35	-0.75	42.31		
50	65.58	+0.69	+0.25	23.27	+1.82	-0.40	42.33	42.40	0.09
	65.57	+0.67	+0.24	23.13	+1.72	-0.53	42.46		
75	65.77	+0.66	+0.21	23.86	+2.69	-0.34	41.96	41.74	0.30
	65.93	+0.70	+0.19	24.45	+2.56	-0.45	41.53		
100	65.45	+0.63	+0.33	23.88	+3.55	+0.02	41.67	41.70	0.04
	65.24	+0.67	+0.13	23.68	+4.48	-0.10	41.73		

Table C-4 Color difference of epoxy/silane coating (Sample 3, colorimeter (CR 300))

a) Heat resistance at 200 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	65.57	+0.68	+0.14	60.66	+0.15	+11.69	12.56	12.27	0.40
	66.26	+0.75	+0.05	60.84	+0.25	+11.73	11.99		
50	65.52	+0.71	+0.22	58.07	+0.07	+12.30	14.21	13.64	0.81
	65.45	+0.70	+0.20	59.90	+0.08	+12.01	13.06		
75	65.03	+0.67	+0.15	61.54	-0.42	+12.33	12.72	12.52	0.28
	66.02	+0.74	+0.19	62.15	-0.52	+11.82	12.32		
100	65.54	+0.65	+0.09	62.52	-0.69	+10.29	10.72	10.54	0.25
	65.74	+0.63	+0.23	62.79	-0.61	+10.09	10.37		

b) Heat resistance at 250 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	66.18	+0.68	+0.09	34.14	+15.35	+18.97	39.98	40.02	0.04
	65.85	+0.67	+0.07	34.28	+15.34	+19.88	40.04		
50	65.54	+0.60	+0.21	31.74	+16.87	+15.52	40.52	40.59	0.10
	65.31	+0.65	+0.19	29.97	+16.21	+12.92	40.66		
75	65.09	+0.72	+0.15	34.28	+18.07	+18.45	39.81	39.90	0.12
	65.25	+0.73	+0.18	34.15	+18.52	+17.92	39.98		
100	65.19	+0.70	+0.11	35.50	+18.12	+21.57	37.61	37.67	0.09
	65.81	+0.62	+0.16	33.76	+17.48	+16.20	37.74		

c) Heat resistance at 300 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	65.65	+0.70	+0.13	23.05	+1.88	-0.59	42.62	42.10	0.73
	65.85	+0.67	-0.11	24.28	+1.53	-0.65	41.59		
50	65.41	+0.67	+0.13	22.94	+2.08	-0.23	42.49	42.40	0.08
	65.33	+0.66	+0.17	22.97	+1.98	-0.29	42.38		
75	65.47	+0.69	+0.15	24.13	+1.86	-1.05	41.37	41.20	0.24
	65.85	+0.74	+0.18	24.85	+1.85	-1.09	41.03		
100	64.02	+0.74	+0.67	23.79	+7.12	+1.19	40.74	40.94	0.29
	64.35	+0.71	+0.65	23.76	+7.48	1.02	41.15		

Table C-5 Color difference of epoxy/silane coating (Sample 4, colorimeter (CR 300))

a) Heat resistance at 200 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	62.72	+0.71	+1.51	60.27	-0.67	+14.80	13.58	13.09	0.69
	63.73	+0.64	+1.53	61.10	-0.70	+13.78	12.60		
50	63.70	+0.67	+0.88	57.89	+0.11	+13.28	13.71	13.20	0.71
	63.63	+0.68	+1.03	59.14	+0.07	+12.89	12.70		
75	63.22	+0.63	+1.18	61.50	+0.50	+13.30	12.24	12.68	0.62
	64.05	+0.69	+0.98	61.30	+0.40	+13.80	13.11		
100	64.73	+0.60	+0.67	60.03	+0.10	+9.61	10.11	10.22	0.16
	64.11	+0.75	+0.55	59.74	+0.29	+9.90	10.33		

b) Heat resistance at 250 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	64.60	+0.68	+0.59	36.33	+13.72	+21.75	37.64	37.85	0.30
	65.13	+0.67	+0.57	36.23	+13.54	+31.73	38.06		
50	64.00	+0.64	+0.94	39.16	+15.50	+26.55	38.65	38.58	0.09
	64.41	+0.67	+0.88	38.37	+15.08	+25.33	38.52		
75	64.20	+0.65	+1.10	41.26	+13.99	+28.11	37.86	37.68	0.25
	64.15	+0.68	+0.99	41.20	+14.00	+27.50	37.51		
100	62.95	+1.48	+1.48	44.77	+12.57	+32.48	37.61	37.67	0.09
	63.45	+0.62	+1.04	40.98	+14.43	+28.03	37.74		

c) Heat resistance at 300 °C

D.F.T. (μm)	Before			After			Δ E*	average	S.D
	L*	a*	b*	L*	a*	b*			
25	64.06	+0.68	+0.51	26.54	+13.72	+6.46	40.16	40.68	0.74
	64.99	+0.67	+0.54	26.23	+13.54	+5.99	41.20		
50	64.28	+0.68	+0.93	26.15	+13.23	+5.37	40.39	40.50	0.16
	64.45	+0.67	+0.98	26.37	+14.08	+5.33	40.61		
75	63.69	+0.70	+1.18	28.48	+15.99	+9.13	39.20	39.11	0.13
	63.99	+0.68	+1.09	28.41	+14.85	+8.51	39.01		
100	63.05	+0.58	+1.62	27.78	+14.85	+7.69	38.53	38.74	0.30
	62.98	+0.65	+1.51	27.07	+14.35	+7.89	38.96		

Table C-6 Mass loss (W) in grams for corrosion rate

Control	Item	500 hours			average	S.D	1000 hours			average	S.D
D.F.T. (μm)		W1	W2	Δ W			W1	W2	Δ W		
25	1	44.7127	44.2800	0.4327	0.5130	0.11	47.1248	46.3964	0.7284	0.5978	0.18
	2	45.5006	44.9072	0.5934			45.9688	45.5016	0.4672		
50	1	47.8409	47.6822	0.1587	0.1836	0.04	45.8707	45.4880	0.3827	0.3431	0.06
	2	45.8380	45.6295	0.2085			45.8393	45.5358	0.3035		
75	1	47.5903	47.4128	0.1775	0.1736	0.01	45.2735	44.9003	0.3732	0.3128	0.09
	2	47.7718	47.6021	0.1697			45.5424	45.2900	0.2524		
100	1	45.8589	45.7047	0.1542	0.1562	0.00	44.9802	44.8017	0.1785	0.1886	0.01
	2	45.2633	45.1051	0.1582			45.6423	45.4436	0.1987		

Sample 1	Item	500 hours			average	S.D	1000 hours			average	S.D
D.F.T. (μm)		W1	W2	Δ W			W1	W2	Δ W		
25	1	47.1155	46.5640	0.5515	0.4921	0.08	45.6961	45.1023	0.5938	0.4379	0.22
	2	44.7127	44.2800	0.4327			45.7671	45.4852	0.2819		
50	1	47.0582	46.8667	0.1915	0.1693	0.03	45.8970	45.6166	0.2804	0.3260	0.06
	2	47.0696	46.9224	0.1472			45.8766	45.5051	0.3715		
75	1	46.7854	46.6501	0.1353	0.1761	0.06	46.0357	45.8464	0.1893	0.2233	0.05
	2	45.5704	45.3536	0.2168			45.6529	45.3956	0.2573		
100	1	46.9564	46.8104	0.1460	0.1572	0.02	47.5501	47.3585	0.1916	0.1736	0.03
	2	47.6941	47.5258	0.1683			45.5986	45.4430	0.1556		

Sample 2	Item	500 hours			average	S.D	1000 hours			average	S.D
D.F.T. (μm)		W1	W2	Δ W			W1	W2	Δ W		
25	1	45.2910	45.0685	0.2225	0.2041	0.03	45.6016	45.1997	0.4019	0.3552	0.07
	2	45.0151	44.8294	0.1857			45.8869	45.5784	0.3085		
50	1	47.0918	46.9182	0.1736	0.1864	0.02	46.8982	46.5312	0.3670	0.3126	0.08
	2	45.7055	45.5064	0.1991			45.9000	45.6418	0.2582		
75	1	45.9393	45.7752	0.1641	0.1482	0.02	45.7956	45.5831	0.2125	0.1912	0.03
	2	46.0949	45.9627	0.1322			44.3702	44.2002	0.1700		
100	1	45.5514	45.4507	0.1007	0.1013	0.00	46.1714	46.0552	0.1162	0.1349	0.03
	2	46.1845	46.0826	0.1019			46.2000	46.0464	0.1536		

Sample 3	item	500 hours			average	S.D	1000 hours			average	S.D
D.F.T. (μm)		W1	W2	Δ W			W1	W2	Δ W		
25	1	47.2971	47.1539	0.1432	0.1624	0.03	45.9618	45.5533	0.4085	0.3949	0.02
	2	45.9800	45.7984	0.1816			45.1491	44.7678	0.3813		
50	1	47.4429	47.3028	0.1401	0.1464	0.01	47.2981	47.1330	0.1651	0.1926	0.04
	2	46.1906	46.038	0.1526			45.2667	45.0466	0.2201		
75	1	45.6693	45.5699	0.0994	0.1096	0.01	45.9628	45.7984	0.1644	0.1521	0.02
	2	47.0129	46.8931	0.1198			45.8523	45.7124	0.1399		
100	1	45.9393	45.8462	0.0931	0.1007	0.01	45.5281	45.3956	0.1325	0.1284	0.01
	2	46.1384	46.0301	0.1083			45.8349	45.7106	0.1243		

Sample 4	item	500 hours			average	S.D	1000 hours			average	S.D
D.F.T. (μm)		W1	W2	Δ W			W1	W2	Δ W		
25	1	45.8948	45.7280	0.1668	0.1522	0.02	47.6183	47.1442	0.4741	0.3670	0.15
	2	45.5410	45.4033	0.1377			45.9594	45.6996	0.2598		
50	1	45.6032	45.4918	0.1114	0.1312	0.03	47.0182	46.8020	0.2162	0.1910	0.04
	2	45.6800	45.5290	0.1510			46.1548	45.9891	0.1657		
75	1	45.8283	45.7763	0.0520	0.0765	0.03	45.0302	44.8952	0.1350	0.1487	0.02
	2	45.4917	45.3907	0.1010			46.1368	45.9744	0.1624		
100	1	45.9407	45.8776	0.0631	0.0591	0.01	46.1725	46.0914	0.0811	0.0933	0.02
	2	45.1583	45.1031	0.0552			46.1384	46.0329	0.1055		

Table C-7 Corrosion rate

a) Corrosion rate at 500 hours

Film thickness (μm)	Corrosion rate at 500 hours (mpy)				
	Control	Sample 1	Sample 2	Sample 3	Sample 4
25	4.2890	4.1142	1.7064	1.3578	1.2725
50	1.5350	1.4154	1.5584	1.2240	1.0969
75	1.4514	1.4723	1.2390	0.9163	0.6396
100	1.3059	1.3143	0.8469	0.8419	0.4941

b) Corrosion rate at 1000 hours

Film thickness (μm)	Corrosion rate at 1000 hours (mpy)				
	Control	Sample 1	Sample 2	Sample 3	Sample 4
25	2.4990	1.8306	1.4848	1.6508	1.5342
50	1.4343	1.3628	1.3068	0.8051	0.7984
75	1.3076	0.9335	0.7993	0.6358	0.6216
100	0.7884	0.7257	0.5639	0.5368	0.3900

Table C-8 Hardness Shore D of the epoxy flooring

Day	Control			Sample 1			Sample 2			Sample 3		
	Shore D	average	S.D	Shore D	average	S.D	Shore D	average	S.D	Shore D	average	S.D
1	69			73			78			77		
	69			74			77			79		
	69	69.2	0.45	74	74	0.71	78	78	0.71	80	78.4	1.14
	69			74			79			78		
	70			75			78			78		
3	69			78			83			89		
	70			80			84			87		
	71	71	1.58	78	79.8	1.79	82	82.4	1.14	87	88.4	1.34
	73			82			81			90		
	72			81			82			89		
5	76			82			85			95		
	75			83			85			95		
	75	75	0.71	84	83.2	0.84	86	85.8	0.84	95	94.8	0.45
	75			83			86			94		
	74			84			87			95		
7	76			84			85			96		
	75			83			86			96		
	75	76	1.00	84	84.4	1.14	84	86	1.58	95	95.4	0.55
	77			86			88			95		
	77			85			87			95		

Table C-9 Compressive strength of the epoxy flooring

Day	piece	Control		Sample 1		Sample 2		Sample 3	
		Compressive strength (MPa)	average ± S.D	Compressive strength (MPa)	average ± S.D	Compressive strength (MPa)	average ± S.D	Compressive strength (MPa)	average ± S.D
1	1	269	287	382	382	363	361	366	364
	2	286	±18.87	380	±1.79	360	±1.90	369	±6.24
	3	306		384		359		357	
3	1	365	362	407	408	386	387	394	389
	2	354	±7.08	408	±0.65	388	±0.78	384	±5.03
	3	367		408		388		390	
5	1	397	400	417	417	404	404	415	408
	2	413	±12.32	418	±0.50	404	±0.30	405	±5.77
	3	389		417		404		405	
7	1	405	410	421	428	417	415	423	425
	2	407	±7.81	426	±8.50	413	±1.83	428	±2.52
	3	419		437		414		425	

Table C-10 Chemical resistance of epoxy flooring measured in terms of shore D hardness

Solvent	Control			Sample 1			Sample 2			Sample 3		
	Hardness Shore D			Hardness Shore D			Hardness Shore D			Hardness Shore D		
	Initial	7 days	Retention %	Initial	7 days	Retention %	Initial	7 days	Retention %	Initial	7 days	Retention %
Water	76	75	98.68	84	79	94.05	86	80	93.02	95	94	98.95
Ethanol	76	55	72.36	84	69	82.14	86	70	81.39	95	94	98.95
MEK	76	56	73.68	84	68	80.95	86	68	79.07	95	95	100.00
Toluene	76	69	90.79	84	80	95.24	86	82	95.55	95	95	100.00
Ethyl cellosolve	76	69	90.79	84	84	100.00	86	77	89.53	95	94	98.95

VITA

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