Claims

1. An aqueous coating composition having a PVC of from 70 to 80% comprising, based on the total volume solids of the dry coating unless otherwise stated,

a) opacifying pigment particles comprising

i) from 4 to 10% titanium dioxide

ii) from 0 to 20% of hollow polymeric particles

b) non-opacifying extender particles comprising

i) calcium magnesium carbonate and/or

ii) calcium carbonate and/or

iii) nepheline syenite and/or

iv) kaolin

wherein i)+ii)+iii)+iv) = 40 to 75% (to be announced by Katy) and iv) is 0 to 45%

c)styrene-acrylic polymer binder particles having a calculated Fox Tg of from -30 to 5°C having an acid value of from 15 to 65mg KOH/g of polymer and wherein the polymer particles are derived from acrylic monomers and optionally further comprising derivatives of styrene

d) dispersant which is insoluble in water at pH 3

wherein the composition is free of volatile organic solvent.

2. A coating composition according to claim 1 wherein the composition is free of non-fugitive coalescing solvent.

3. A coating composition according to claim 1 or claim 2 wherein any difference between the actual PVC and the sum of a) and b) is made up with other non-opacifying extender particles.

4. A coating composition according to any one of the preceding claims wherein the opacifying pigments are white.

5. A coating composition according to claim 4 wherein the white opacifying pigments are selected from titanium dioxide and hollow polymeric particles.

6. A coating composition according to any one of the previous claims wherein the polymeric hollow spheres comprise less than 10% by vol.

7. A coating composition according to any one of the previous claims wherein the extender particles are selected from the group consisting of calcium magnesium carbonate, calcium carbonate, nephelene syenite and kaolin.

8. A coating composition according to claim 7 wherein from 20 to 50% of the total volume solids of the dry coating comprises extender particles of d50 $\leq$2 microns.

9. A coating composition according to any one of the previous claims wherein the polymer binder has a calculated Fox Tg of from -25 to 0°C.

10. A coating composition according to any one of the previous claims wherein the polymer binder is derived from styrene, butyl acrylate and acrylic acid.

11. A coating composition according to any one of the previous claims wherein the binder comprises from 5 to 20% of the dried coating.

12. A coating composition according to any one of the preceding claims wherein the acid value of the polymer binder is from 15 to 60mg KOH/g of polymer.

13. A coating composition according to any one of the preceding claims wherein the acid component comprises acrylic acid and/or methacrylic acid and/or maleic acid and/or its anhydride.

14. A coating composition according to any one of the preceding claims wherein the dispersant demand is estimated by the following method or its equivalent; i) gradually adding dispersant to an aqueous dispersion of the non-polymeric opacifying pigment and extender particles and monitoring the viscosity of the resulting mixture to

determine the minimum viscosity ii) identifying the amount of dispersant added to reach the minimum viscosity as the dispersant demand.

15. A coating composition according to any one of the preceding claims wherein the dispersant is selected from the group comprising or consisting of Orotan 731 and Orotan 2002, Coadis 123k, Sokolan CP9 and Hydropalat 34.

16.A coating composition according to any one of the preceding claims and further containing colour pigments.

17. A coating composition according to any one of the previous claims and having a colour when dry satisfying the criteria of

$C^* < C_{critical}$ and

$Y > mC^* + 35$

when calculated using m and $C_{critical}$ according to the table below

Hue angle h*	m	$C_{critical}$
0	0.098	39.063
10	0.063	42.739
20	0.231	40.130
30	0.399	37.522
40	0.498	37.444
50	0.579	38.000
60	0.655	39.500
70	0.732	41.000
80	0.793	45.286
90	0.854	49.571
100	0.803	47.136
110	0.740	43.955
120	0.663	41.727

130	0.580	39.909
140	0.498	38.565
150	0.416	37.696
160	0.346	37.381
170	0.318	39.586
180	0.283	40.850
190	0.190	39.350
200	0.101	38.000
210	0.060	38.000
220	0.021	38.333
230	-0.007	40.000
240	-0.041	40.314
250	-0.083	38.600
260	-0.125	36.886
270	-0.167	35.171
280	-0.152	34.640
290	-0.131	34.240
300	-0.079	34.000
310	0.016	34.000
320	0.112	34.000
330	0.207	34.000
340	0.235	34.471
350	0.161	35.647
360	0.098	39.063

18. A coating composition according to claim 16 having a C* value of less than 5 and a Y value greater that 85.

19. A coating composition according to any one of the preceding claims and having a sheen of less than 15% when measured at 85°.

20. A method of coating an article or structure having a surface with a composition as defined in any one of the preceding claims including the steps of applying at least one

liquid layer of the coating by brush, roller, pad or spray; allowing or causing the layer to dry and/or harden.

21. An article or structure having a surface coated with a composition as defined in any one of claims 1 to 19.

Claims

1. An aqueous coating composition having a PVC of from 70 to 78% comprising, based on the total volume solids of the dry coating unless otherwise stated,
a) opacifying pigment particles comprising
i) from 4 to 10% titanium dioxide
ii) from 0 to 20% of hollow polymeric particles

b) non-opacifying extender particles comprising
i) calcium magnesium carbonate and/or
ii) calcium carbonate and/or
iii) nepheline syenite and/or
iv) kaolin

wherein i)+ii)+iii)+iv) = 40 to 75% and iv) is 0 to 45%

c)styrene-acrylic polymer binder particles having a calculated Fox Tg of from -30 to 5°C having an acid value of from 15 to 65mg KOH/g of polymer and wherein the polymer particles are derived from acrylic monomers and optionally further comprising derivatives of styrene

d) dispersant which is insoluble in water at pH 3
wherein the composition is free of volatile organic solvent.

2. A coating composition according to claim 1 wherein the composition is free of non-fugitive coalescing solvent.

3. A coating composition according to claim 1 or claim 2 wherein any difference between the actual PVC and the sum of a) and b) is made up with other non-opacifying extender particles.

4. A coating composition according to any one of the preceding claims wherein the opacifying pigments are white.

5. A coating composition according to any one of the previous claims wherein the polymeric hollow spheres comprise less than 10% by vol.

6. A coating composition according to any one of the previous claims wherein the extender particles are selected from the group consisting of calcium magnesium carbonate, calcium carbonate, nephelene syenite and kaolin.

7. A coating composition according to any one of the previous claims wherein the polymer binder has a calculated Fox Tg of from -25 to 0°C.

8. A coating composition according to any one of the previous claims wherein the polymer binder is derived from styrene, butyl acrylate and acrylic acid.

9. A coating composition according to any one of the previous claims wherein the binder comprises from 5 to 20% of the dried coating.

10. A coating composition according to any one of the preceding claims wherein the acid value of the polymer binder is from 15 to 60mg KOH/g of polymer.

11. A coating composition according to any one of the preceding claims wherein the dispersant demand is estimated by the following method or its equivalent; i) gradually adding dispersant to an aqueous dispersion of the non-polymeric opacifying pigment and extender particles and monitoring the viscosity of the resulting mixture to determine the minimum viscosity ii) identifying the amount of dispersant added to reach the minimum viscosity as the dispersant demand.

12. A coating composition according to any one of the preceding claims wherein the dispersant is selected from the group consisting of Orotan 731 and Orotan 2002, Coadis 123k, Sokolan CP9 and Hydropalat 34.

13. A coating composition according to any one of the preceding claims and further containing colour pigments.

14. A coating composition according to any one of the previous claims and having a colour when dry satisfying the criteria of

$C^* < C_{critical}$ and

$Y > mC^* + 35$

when calculated using m and $C_{critical}$ according to the table below

Hue angle h*	m	$C_{critical}$
0	0.098	39.063
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60	0.655	39.500
70	0.732	41.000
80	0.793	45.286
90	0.854	49.571
100	0.803	47.136
110	0.740	43.955
120	0.663	41.727
130	0.580	39.909
140	0.498	38.565
150	0.416	37.696
160	0.346	37.381
170	0.318	39.586
180	0.283	40.850
190	0.190	39.350
200	0.101	38.000
210	0.060	38.000
220	0.021	38.333

230	-0.007	40.000
240	-0.041	40.314
250	-0.083	38.600
260	-0.125	36.886
270	-0.167	35.171
280	-0.152	34.640
290	-0.131	34.240
300	-0.079	34.000
310	0.016	34.000
320	0.112	34.000
330	0.207	34.000
340	0.235	34.471
350	0.161	35.647
360	0.098	39.063

15. A coating composition according to any one of the preceding claims and having a sheen of less than 15% when measured at 85°.

16. A method of coating an article or structure having a surface with a composition as defined in any one of the preceding claims including the steps of applying at least one liquid layer of the coating by brush, roller, pad or spray; allowing or causing the layer to dry and/or harden.

17. An article or structure having a surface coated with a composition as defined in any one of claims 1 to 15.