



The Chemical Company

Acronal[®] PLUS 4670

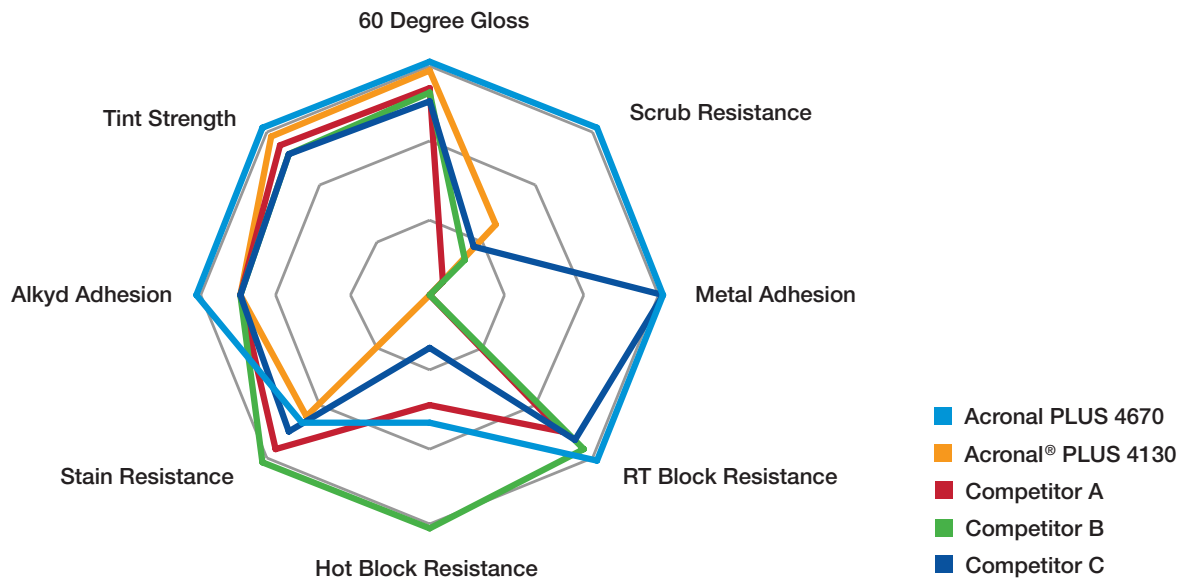
Delivering superior Titanium Dioxide efficiency for interior paints

Acronal® PLUS 4670

Delivering superior TiO₂ efficiency for interior paints at less than 50 g/L VOC.

Acronal PLUS 4670 is an APEO free, zero-VOC capable, 100% acrylic latex. It is intended for use in flat through gloss formulations. This highly versatile latex demonstrates strong performance characteristics: superior hiding, tint strength, outstanding blister resistance and scrub resistance. These attributes enhance formulations for flat through gloss interior applications.

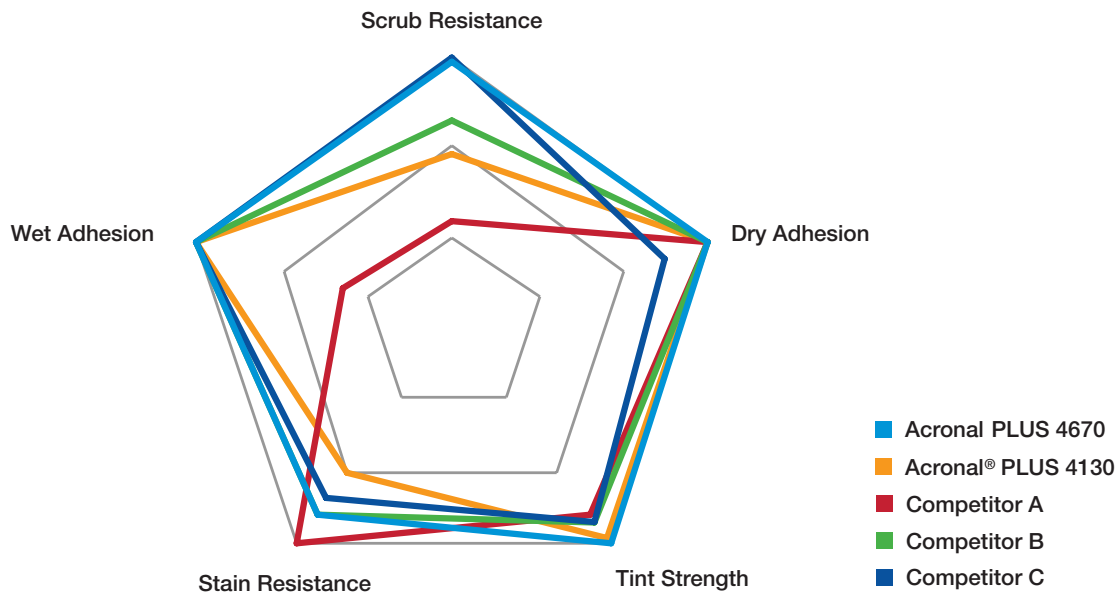
Performance of Acronal PLUS 4670 in a DIY semi-gloss formulation



	Acronal PLUS 4670	Acronal PLUS 4130	Competitor A	Competitor B	Competitor C
Gloss 20°/60°/85°	25.4/62.1/84.3	16.2/55.2/82.9	15/53.4/82.8	12.3/50.6/83.1	21.9/59.8/83.6
Scrub Resistance	5979	563	1376	1263	1945
Metal Adhesion	5	0	0	5	5
Room Temperature Block Resistance	8	6.5	7.8	7	0.1
Hot Block Resistance	3.5	3	6.5	1.5	0.1
Alkyd Adhesion	5	4	4	4	4
Tint Strength	102.23	91.07	85.89	85.89	98.15

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Performance of Acronal PLUS 4670 in a DIY flat formulation



	Acronal PLUS 4670	Acronal PLUS 4130	Competitor A	Competitor B	Competitor C
Scrub Resistance	1564	1001	431	1119	1670
Metal Adhesion	0	5	0	0	1
Alkyd Adhesion	5	5	5	5	4
Tint Strength	101.27	98.46	85.2	90.91	89.85

Superior TiO₂ Efficiency

Depending on the existing latex, Acronal PLUS 4670 has been shown to reduce the titanium load by up to 30%. Acronal PLUS 4670 can be used as a sole binder, offering superior paint performance over pre-composite polymers used as sole binders.

SEM images at 10,000x

Acronal PLUS 4670



Competitor A



Competitor B



Competitor C

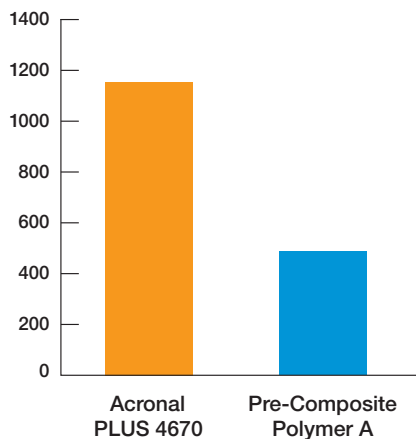


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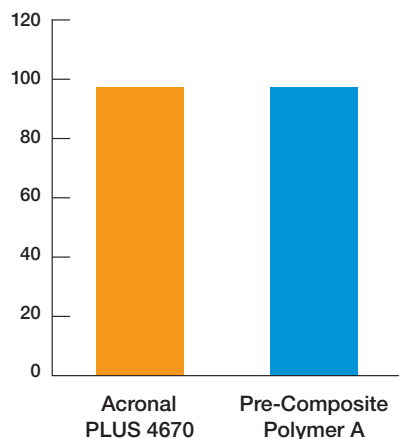
Benchmark comparison with pre-composite polymer

When compared to a competitive pre-composite polymer, Acronal PLUS 4670 demonstrates superior scrub resistance, better tint strength, and excellent block resistance.

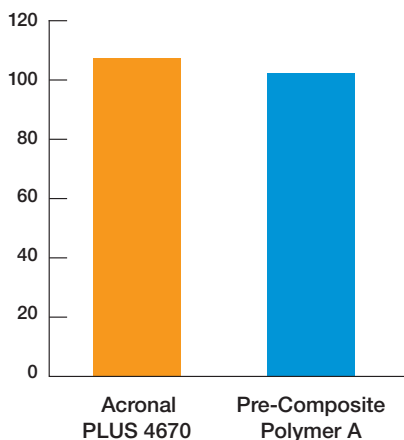
Scrub Resistance



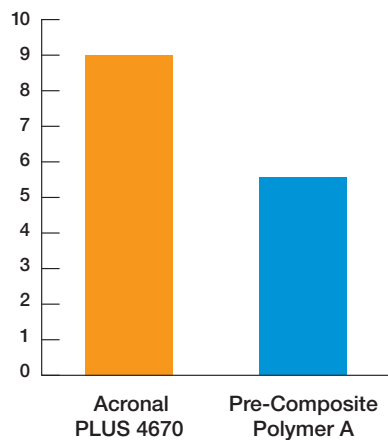
Contrast Ratio



Tint Strength



Block Resistance



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Formulation Guidelines

Acronal PLUS 4670 offers paint formulators exceptional tint strength, scrub resistance and gloss along with good block resistance and adhesion in interior architectural paint formulations. The titanium dioxide dispersing capability of this polymer allows formulators to maximize hiding while minimizing cost. Acronal PLUS 4670 is highly durable, with scrub resistance often exceeding 3,000 cycles in semi-gloss formulations.

Acronal PLUS 4670 can be formulated with outstanding performance at 50 VOC from flat through gloss finishes.

Latex Properties

Acronal PLUS 4670 Acrylic Latex Resin

Solids Content, Weight %	49 – 51
VOC Content, Weight %	<0.2
VOC Content, Volume %	<0.2
Brookfield Viscosity, cps	<1000
pH	7.5 – 9
MFFT	ca. 10°C
Particle Size, nm	ca. 140
Specific Gravity, g/cm ³	ca. 1.06
Density, lbs/gal	ca. 8.8

Rheology

Acronal PLUS 4670 has effective thickening response and compatibility with HASE, cellulosic, HMPE, and HEUR thickeners allowing the formulator a wide operating window. Use of associative thickeners with Acronal PLUS 4670 will result in a viscosity rise during equilibration. Generally, it has been found that an initial formulating KU of ~85 will result in equilibrated viscosities of 95-100 Stormer units.

Defoamers

It is suggested that the FoamStar® family of defoamers be used with Acronal PLUS 4670.

Dispersants

Both sodium and ammonium based polyacid dispersants have been used effectively with Acronal PLUS 4670. Recommended dispersants include those from the Dispex® line, specifically Dispex® CX 4320 and Dispex® 4325.

Coalescents

For complete coalescence at low temperature (4°C, 50% humidity) it is recommended that a loading of 5% by weight of coalescent to resin solids be added to the formulation. Both 0 VOC coalescing aids and evaporative coalescents can be used. Successful coalescence in 0 VOC formulations have been noted with the Loxanol® line of coalescing aids. Specifically, Loxanol® CA 5320 has been very effective.

Storage: Do not freeze.

Acronal® PLUS 4670

Suggested Formulations

Zero VOC Flat Formulation

raw materials	lbs	gallons
Water	200.0	24.01
Natrosol™ Plus 330	1.0	0.09
AEPD™ VOX 1000	1.5	0.17
Dispex® CX 4340	4.0	0.40
FoamStar® ST 2420	2.0	0.29
Proxel™ DB 20	3.0	0.33
Kronos® 2310	225.0	6.59
Minex® 4	250.0	11.49
Attagel® 50	4.0	0.20

Grind for 10 – 15 minutes, then add:

Water	100.1	12.02
FoamStar® ST 2420	2.0	0.29
Hydropalat® WE 3320	2.0	0.23
Loxanol® CA 5320	9.0	1.19
Acronal PLUS 4670	350.0	39.56
Rheovis® PE 1331	25.0	2.91
Rheovis® PU 1191	2.0	0.23

Total	1180.6	100.00
Viscosity (KU)	95 – 100	
Viscosity (ICI)	1.0 – 1.5	
Gloss 20°	40 – 45	
Gloss 60°	75 – 80	
Weight Solids %	49.5	
Volume Solids %	37.2	
PVC %	18.4	
VOC g/L	48	

Zero VOC Semi-Gloss Paint

raw materials	lbs	gallons
Water	75.0	9.00
Natrosol™ Plus 330	0.5	0.05
Ammonium Hydroxide	1.0	0.12
Dispex® CX 4325	7.0	0.70
FoamStar® ST 2420	2.0	0.29
Proxel™ DB 20	3.0	0.33
Minex® 10	25.0	1.15
Attagel® 50	3.0	0.15

Grind for 15 – 20 minutes, then add:

Water	155.6	18.68
Ti-Pure® R 746	310.0	15.96
FoamStar® ST 2420	1.5	0.21
Loxanol® CA 5320	14.0	1.84
Acronal PLUS 4670	420.0	47.48
Rheovis® PE 1331	32.7	3.80
Rheovis® PU 1191	2.0	0.23

Total	1052.3	100.00
Viscosity (KU)	95 – 100	
Viscosity (ICI)	1.0 – 1.5	
Gloss 60°	45 – 50	
Weight Solids %	47.8	
Volume Solids %	32.0	
PVC %	26.3	
VOC g/L	0	

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Suggested Formulations (continued)

Semi-Gloss Neutral Base Trim Paint Formulation

raw materials	lbs	gallons
Water	75.0	9.00
Natrosol™ Plus 330	1.0	0.09
Ammonia	1.0	0.12
Dispex® CX 4340	2.0	0.20
FoamStar® ST 2420	1.5	0.21
Proxel™ DB 20	3.0	0.33
Minex® 10	25.0	1.15
Attagel® 50	3.0	0.15
Grind for 10 – 15 minutes, then add:		
Water	170.2	20.43
Acronal PLUS 4670	550.0	62.17
FoamStar® ST 2420	1.5	0.15
Loxanol® CA 5320	14.0	1.84
Rheovis® PE 1331	30.0	3.49
Rheovis® PU 1191	5.0	0.58
Total	882.2	100.00
Viscosity (KU)	95 – 100	
Viscosity (ICI)	1.0 – 1.5	
Gloss 20°	40 – 45	
Gloss 60°	75 – 80	
Weight Solids %	49.5	
Volume Solids %	37.2	
PVC %	18.4	
VOC g/L	48	

High Gloss House and Trim Paint Formulation

raw materials	lbs	gallons
Water	100.0	12.00
Ethylene Glycol	6.0	0.65
Dispex® CX 4340	3.0	0.30
Ammonium Hydroxide	1.0	0.12
FoamStar® ST 2420	2.0	0.29
Proxel™ DB 20	3.0	0.33
Grind for 10 – 15 minutes, then add:		
Water	42.7	5.13
Ti-Pure® R 746	293.0	15.09
FoamStar® ST 2420	2.0	0.29
Loxanol® CA 5320	10.0	1.20
Strodex™ PK 95 G	4.0	0.42
Texanol™	9.0	1.14
Acronal PLUS 4670	520.0	58.78
Rheovis® PE 1331	25.0	2.91
Rheovis® PU 1191	6.5	0.76
Polyphase® 678	6.0	0.62
Total	1033.2	100.00
Viscosity (KU)	95 – 100	
Viscosity (ICI)	1.0 – 1.5	
Gloss 20°	40 – 45	
Gloss 60°	75 – 80	
Weight Solids %	49.5	
Volume Solids %	37.2	
PVC %	18.4	
VOC g/L	48	

About the Dispersions & Pigments Division

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