

**PRIMAL™ HG-415 Pure Acrylic Binder**

For Gloss Paints With Improved Application Properties

Product Description

PRIMAL™ HG-415 Acrylic Binder is a pure acrylic gloss enamel binder providing improved application properties (flow and levelling) versus conventional acrylic polymers.

PRIMAL™ HG-415 Acrylic Binder uses ambient temperature cross-linking to offer improved film performance versus conventional polymers. It has a high gloss potential, excellent hardness development and durability for interior and exterior applications.

Regional Product Availability

EMEA

Application

- APEO free *
- Very good applicability, flow and levelling and improved open time
- Very good gloss potential
- Good hardness development and block resistance
- Very good exterior durability
- Excellent alkyd adhesion
- Good stain and grease resistance

*APEO are not intentionally added and are not knowingly introduced from another raw material

Typical Properties

(The following properties are typical but do not constitute specifications)

Property	Typical Values
Appearance	Milky white liquid
Solids Content	44.5–45.5 %
pH	8.0–9.0
Brookfield LV Viscosity (Spindle 3, 60 rpm)	<500 mPa.s
Minimum Film Formation Temperature	~23°C
Specific gravity (wet polymer)	1.06 g/cm ³
Specific gravity (dry polymer)	1.14 g/cm ³

Formulation Guidelines

Dispersants

Hydrophobic copolymers like OROTAN™ 731-A ER Dispersant or hydrophilic copolymers like OROTAN™ 1124 Dispersant can be used with this self-cross-linking binder. Both give good gloss development and pigment stability upon aging of the paint.

Defoamers

A combination of DOWSIL™ 8603 Additive in the grind and DOWSIL™ 8590 Additive in the let-down was found to give good performance in gloss formulations based on PRIMAL™ HG-415 Acrylic Binder. The optimal combination of defoamers in a semi-gloss paint based on PRIMAL™ HG-415 was found to be DOWSIL™ 74 Additive in the grind and DOWSIL™ 62 Additive in the let-down.

Rheology Modifiers and Thickeners

PRIMAL™ HG-415 Acrylic Binder used in combination with appropriate rheology modifiers facilitates reaching an alkyd like flow behaviour. The “low shear” / “high shear” viscosity balance profile, which can be obtained from PRIMAL™ HG-415 Acrylic Binder, is much more Newtonian than most commercial waterborne technologies. HEUR type thickeners are suggested to maximize flow and gloss properties of paints based on PRIMAL™ HG-415 Acrylic Binder. ACRY SOL™ RM-3030 and ACRY SOL™ RM-2020E Rheology Modifiers have been found to offer a distinctive Newtonian rheological profile to gloss and semi-gloss paints based on PRIMAL HG-415 Acrylic Binder. This distinctive profile helps the paint formulator to get high “high shear” viscosity (Cone and Plate viscosity) while maintaining a relatively low “low shear” viscosity. This permits to optimize film build, brush drag (closer to that of conventional solvent based alkyd paints) and maintain the flow characteristics. If higher low shear viscosity is required, addition of ACRY SOL™ RM-8WE or ACRY SOL™ SCT-275 Rheology Modifiers can be done without affecting flow and application performance.

Coalescents and co-solvents

We suggest starting with a coalescent level in the range of 8–10% calculated on binder solids. In our studies, we found that an 8% level of DOWANOL™ DPnB Glycol Ether, Texanol or UCAR™ Filmer IBT ester alcohol is suitable to get a good film formation. The excellent flow and reflow properties of PRIMAL™ HG-415 Acrylic Binder can be achieved without the use of a co-solvent such as propylene glycol or other open time improver. Therefore, PRIMAL™ HG-415 Acrylic Binder can be used to formulate very low VOC gloss and semi-gloss paints.

Extenders and opaque polymer

PRIMAL™ HG-415 Acrylic Binder has been developed for the formulation of gloss and semi-gloss paints. In semi-gloss formulations, any standard extenders, e.g. calcium carbonate, clays, can be used. The use of ROPAQUE™ Ultra E Organic Opacifier can help reduce the amount of titanium dioxide, thus formulation cost without affecting dry film appearance and resistance characteristics. Like with conventional binders, the advantages of ROPAQUE™ Ultra E in terms of durability and dirt pick up resistance are noticeable.

Biocides

Although standard in can preservatives could be used in paint formulations, it is always recommended to test them for compatibility and efficacy. As in can preservatives, we suggest the use of ROCIMA MB2X Biocide.

For exterior coatings, it is suggested to use a film preservative like BIOBAN 350 PST Biocide. Formaldehyde or aldehyde releasing additives are not suggested when formulating paints with PRIMAL™ HG-415 Acrylic Binder. They can interact with the self-cross-linking mechanism present in the binder and adversely affect the performance of paints.

**Interior / Exterior Gloss Formulation based on
PRIMAL™ HG-415 Acrylic Binder with UCAR™ Filmer
IBT Coalescent Solvent (PVC 17%)**

G-415-17-01

Materials	Kilograms	Liters	PVC
Grind			
Water	40.0	40.0	
OROTAN™ 731A ER Dispersant	8.0	7.2	
DOWSIL™ 8603 Additive	2.0	2.0	
ACRYSOL™ RM-3030 Rheology Modifier	8.0	7.7	
Ti-Pure R-706 Titanium dioxide	200.0	50.0	17.3%
Grind Sub-total	258.0	106.9	
Let Down			
Add the grind to:			
PRIMAL™ HG-415 Acrylic Binder	607.0	572.1	
DOWSIL™ 8590 Additive	1.0	1.0	
Water	50.0	50.0	
Then add slowly:			
UCAR™ Filmer IBT Coalescent Solvent	21.9	23.1	
ACRYSOL™ RM-3030 Rheology Modifier	22.2	21.3	
ACRYSOL™ RM-8WE Rheology Modifier	1.4	1.3	
Water	30.5	30.5	
ROCIMA MB2X Biocide	1.0	0.9	
BIOBAN 350 PST Biocide	7.0	6.4	
Totals	1000.0	813.5	17.3%

Paint Properties

Volume Solids:	37%
Weight Solids:	49%
Density:	1.230
pH:	~8.6
Dispersant (active based on total powders):	1.0%
Coalescent (based on polymer solids):	8.0%
Calculated VOC* content (g/L of wet paint):	0

(*) VOC: Amount in g/L of organic compounds having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa.

Viscosities:

Krebs Stormer (KU):	95–105
ICI Cone & Plate (Poise):	2.1–2.5
Brookfield (spindle 4 / 30 rpm) (mPa.s):	3800–4500
Brookfield (spindle 4 / 60 rpm) (mPa.s):	3000–3500

Gloss (100 µm, on glass), %:

Gloss 20° / 60°:	~60 / ~82
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Block resistance (100 µm, N/cm²):

1 day / 7 days dry:	5 (average) / 0 (excellent)
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König hardness (100 µm, on glass), sec:

1 day:	~36
7 days:	~43
1 month:	~58

**Interior / Exterior Gloss Formulation based on
PRIMAL™ HG-415 Acrylic Binder with
DOWANOL™ DPnB Glycol Ether (PVC 17%)**

G-415-17- 02

Materials	Kilograms	Liters	PVC
Grind			
Water	40.0	40.0	
OROTAN™ 731A ER Dispersant	8.0	7.2	
DOWSIL™ 8603 Additive	2.0	2.0	
ACRYSOL™ RM-3030 Rheology Modifier	8.0	7.7	
Ti-Pure R-706 titanium dioxide	200.0	50.0	17.3%
Grind Sub-total	258.0	106.9	
Let Down			
Add the grind to:			
PRIMAL™ HG-415 Acrylic Binder	604.0	569.3	
DOWSIL™ 8590 Additive	1.0	1.0	
Water	30.0	30.0	
Add as a premix:			
DOWANOL™ DPnB Glycol Ether	21.8	23.8	
Water	21.3	21.3	
Then add slowly:			
ACRYSOL™ RM-3030 Rheology Modifier	35.1	33.7	
ACRYSOL™ RM-8WE Rheology Modifier	3.0	2.9	
Water	17.8	17.8	
ROCIMA MB2X Biocide	1.0	0.9	
BIOBAN 350 PST Biocide	7.0	6.4	
Totals	1000.0	814.0	17.3%

Paint Properties

Volume Solids:	37%
Weight Solids:	49%
Density:	1.230
pH:	~8.6
Dispersant (active based on total powders):	1.0%
Coalescent (based on polymer solids):	8.0%
Calculated VOC* content (g/L of wet paint):	27

(*) VOC: Amount in g/L of organic compounds having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa.

Viscosities:

Krebs Stormer (KU):	95-105
ICI Cone & Plate (Poise):	2.1–2.5
Brookfield (spindle 4/30 rpm) (mPa.s):	2800–3400
Brookfield (spindle 4/60 rpm) (mPa.s):	2300–2900

Film Properties

Gloss (100 µm, on glass), %:

Gloss 20° / 60°: ~60 / ~81

Block resistance (100 µm, N/cm²):

1 day / 7 days dry: 2.5 (good) / 0 (excellent)

König hardness (100 µm, on glass), sec:

1 day:	~42
7 days:	~65
1 month:	~66

**Interior / Exterior Semi-Gloss Formulation based on
PRIMAL™ HG-415 Acrylic Binder with UCAR™ Filmer IBT
Coalescent Solvent (PVC 35%)**

SG-415-35- 01

Materials	Kilograms	Liters	PVC
Grind			
Water	70.00	70.00	
OROTAN™ 731AER Dispersant	9.43	8.48	
DOWSIL™ 74 Additive	1.00	1.00	
ACRYSOL™ RM-3030 Rheology Modifier	4.00	3.80	
Ti-Pure R-706 titanium dioxide	180.00	45.00	16.0%
Omyacat 850 OG	53.00	19.60	7.0%
Grind Sub-total	317.43	147.88	
Let Down			
Add the grind to:			
PRIMAL™ HG-415 Acrylic Binder	460.00	433.60	
ROPAQUE™ Ultra E Organic Opacifier	68.00	66.30	12.3%
Water	49.8	49.8	
DOWSIL™ 62 Additive	1.00	1.00	
UCAR™ Filmer IBT Coalescent Solvent	16.50	17.40	
ACRYSOL™ RM-3030 Rheology Modifier	46.24	43.93	
Water	33.03	33.03	
ROCIMA MB2X Biocide	1.00	0.90	
BIOBAN 350 PST Biocide	7.00	6.40	
Totals	1000.00	800.24	35.3%

Paint Properties

Volume Solids:	36%
Weight Solids:	47%
Density:	1.250
pH:	~8.6
Dispersant (active based on total powders):	1.0%
Coalescent (based on polymer solids):	7.2%
Calculated VOC* content (g/L of wet paint):	0

(*) VOC: Amount in g/L of organic compounds having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa

Viscosities:

Krebs Stormer (KU):	94-98
ICI Cone & Plate (Poise):	2.8-3.2
Brookfield (spindle 4/30 rpm) (mPa.s):	2600–3000
Brookfield (spindle 4/60 rpm) (mPa.s):	2000–2500

Film Properties

Gloss (100 µm, on glass), %:

Gloss 20° / 60°:	33–35
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Block resistance (100 µm, N/cm²):

1 day:	0 (excellent)
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König hardness (100 µm, on glass), sec:

1 day:	~52
7 days:	~63

Handling Precautions	Before using this product, consult the Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS) for details on product hazards, recommended handling precautions and product storage.
Storage	Store products in tightly closed original containers at temperatures recommended on the product label.
Disposal Considerations	<p>Dispose in accordance with all, local or national regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.</p> <p>It is the user's responsibility to verify that treatment and disposal procedures comply with local or national regulations. Contact your Dow Coating Materials Technical Representative for more information.</p>
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