

PHOTOMER® products for UV/EB curing

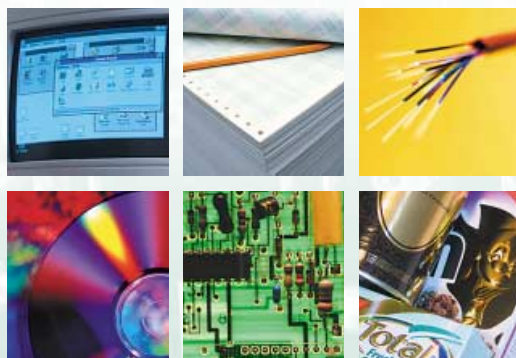


Spot UV curing process on the cover was done using Cognis PHOTOMER® acrylates.

cognis
we know how

PHOTOMER® Products

PHOTOMER® products and additives provide unique benefits to every UV/EB application. Whether you need excellent color development and fast curing inks, high abrasion, solvent and yellowing resistant coatings or high bond strength adhesives, there is a PHOTOMER® solution to improve your products.



Products

Full portfolio of PHOTOMER® monomers, oligomers & adhesion promoters

- Acrylated epoxy oligomers
- Acrylated monomers
- Acrylated polyester oligomers
- Acrylated urethane oligomers
- Specialty polyols
- Low surface tension methoxyether acrylates
- Solvent free UV/EB monomers

A range of UV additives

- Defoamers
- Slip agents
- Flow agents
- Leveling agents
- Dispersing agents

Formulation Range

- Near zero VOC, 100% solids coatings
- Low odor, low extractable laminating adhesives
- Optimum rheology high pigment loading inks
- Matte effect and water resistant coatings
- Water reducible inks and coatings

Who is Cognis

We are a world leader in specialty chemical solutions. We use sustainably sourced materials to deliver many biodegradable and/or environmentally sound products. We conduct business in over 100 countries and have production or service centers in nearly fifty countries on five continents.

We combine our broad line of naturally sourced high value-added products, keen market orientation and decades of formulation experience to create, improve and deliver innovative products for existing and emerging market needs.

PHOTOMER® 4000 Series - Monofunctional Monomers

| Product | Chemical Description | Typical Viscosity (mPa.s) (@ 25°C) | Color APHA or Gardner | Acid Value mg KOH/g, max | Specific gravity @ 25 °C | Surface tension @ 25 °C (m n/m) | Regulatory Status | Product Attributes | Applications |
|-------------|--------------------------------------|------------------------------------|-----------------------|--------------------------|--------------------------|---------------------------------|--|--|--|
| 4003 | Nonyl Phenol (4) ethoxylate acrylate | 113 | 3 | 0.5 | 1.12 | 34.5 | TSCA, IECSC, AICS EINECS, ECL ENCS, PICCS | Adhesion Flow & Leveling High MW Resin Compatibilizer | Adhesives* Optical Coatings Composites |
| 4035 | 2-Phenoxyethyl acrylate | 13 | 150 | 1.0 | 1.10 | 39.5 | TSCA, AICS EINECS, DSL ENCS | Adhesion Coating Hardness High MW Resin Compatibilizer | Adhesives* Graphic Arts* Composites |
| 4039 | Phenol (2.5) ethoxylate acrylate | 20 | 150 | 0.5 | 1.12 | 40.7 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS | Adhesion Coating Hardness High MW Resin Compatibilizer | Adhesives* Graphic Arts* Composites |
| 4810 | Isodecyl acrylate | 8 | 200 | 1.0 | 0.88 | 28.7 | TSCA, IECSC, AICS EINECS, ECL ENCS, PICCS | Flexibility Pigment Wetting Substrate wetting | Coatings* Graphic Arts* Inkjet Inks |
| 4812 | Lauryl acrylate | 8 | 250 | 0.5 | 0.88 | 29.8 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Low Viscosity Flexibility High MW Resin Compatibilizer | Coatings* Graphic Arts* Composites |
| 4814 | Myristyl acrylate | 8.5 | 1 | 0.5 | 0.86 | 30.3 | TSCA EINECS ENCS | Flexibility Low Skin Irritation High MW Resin Compatibilizer | Coatings* Graphic Arts* Composites |
| 4816 | Hexadecyl acrylate | 10 | 3 | 0.5 | 0.86 | 31.0 | TSCA, IECSC EINECS, ECL ENCS, PICCS | Flexibility Low Skin Irritation High MW Resin Compatibilizer | Coatings* Graphic Arts* Composites |

PHOTOMER® 4000 Series - Monofunctional Monomers Continued

| Product | Chemical Description | Typical Viscosity (mpa.s) (@ 25 °C) | Color APHA or Gardner | Acid Value, mg KOH/g, max | Specific gravity @ 25 °C | Surface tension (m n/m) @ 25 °C | Regulatory Status | Product Attributes | Applications |
|-------------|---|-------------------------------------|-----------------------|---------------------------|--------------------------|---------------------------------|---|--|--|
| 4818 | Stearyl acrylate | Solid | 250 | 0.5 | 0.85 @ 60 °C | --- | TSCA, IECSC, AICS EINECS, ECL ENCS, PICCS | Flexibility Low Skin Irritation High MW Resin Compatibilizer | Coatings* Graphic Arts* Composites |
| 4822 | Behenyl acrylate | Solid | 250 | 0.5 | 0.85 @ 60 °C | --- | TSCA, IECSC, AICS EINECS, ECL ENCS, PICCS | Flexibility Low Skin Irritation High MW Resin Compatibilizer | Coatings* Graphic Arts* Composites |
| 4960 | Nonyl phenol (2.5) propoxylate acrylate | 125 | 250 | 1.0 | 1.12 | 32.7 | TSCA EINECS ENCS | Adhesion Flow & Leveling High MW Resin Compatibilizer | Adhesives* Optical Coatings Composites |

PHOTOMER® 4000 Series - Difunctional Monomers

| | | | | | | | | | |
|-------------|--|-----|-----|-----|------|------|--|---|---|
| 4011 | 1,6-Hexanediol (3) ethoxylate diacrylate | 20 | 200 | 0.5 | 1.06 | 38.4 | TSCA EINECS ENCS | Low Viscosity Pigment Wetting Flow & Leveling | Inkjet Inks Flexographic Inks Lithographic Inks |
| 4017 | 1,6-Hexanediol diacrylate | 9 | 100 | 1.0 | 1.02 | 35.2 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Low viscosity Adhesion Chemical Resistance | Coatings* Graphic Arts* Adhesives* |
| 4025 | Bisphenol-A (8) ethoxylated diacrylate | 750 | 3 | 1.0 | 1.15 | 45.8 | TSCA, AICS EINECS, DSL ENCS | Low Viscosity Gloss Low Shrinkage | Wood Coatings OPV Photoresist |

PHOTOMER® 4000 Series - Difunctional Monomers Continued

| Product | Chemical Description | Typical Viscosity (mpa.s) (@ 25 °C) | Color APHA or Gardner | Acid Value, mg KOH/g, max | Specific gravity @ 25 °C | Surface tension (m n/m) @ 25 °C | Regulatory Status | Product Attributes | Applications |
|-------------|---|-------------------------------------|-----------------------|---------------------------|--------------------------|---------------------------------|--|---|---|
| 4028 | Bisphenol-A (4) ethoxylated diacrylate | 1200 | 150 | 0.5 | 1.14 | 45.5 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Low Viscosity Gloss Low Shrinkage | Wood Coatings OPV Photoresist |
| 4050 | Polyethylene glycol 200 diacrylate | 23 | 250 | 0.5 | 1.11 | 39.5 | TSCA, AICS EINECS, DSL ENCS | Flexibility Flow & Leveling Water soluble | OPV Graphic Arts* Wood Coatings |
| 4061 | Tripropylene glycol diacrylate | 15 | 250 | 0.5 | 1.03 | 33.0 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | High Reactivity Low Skin Irritation Film Former | Coatings* Graphic Arts* Adhesives* |
| 4102 | Decanediol diacrylate | 12 | 200 | 1.0 | 1 | 36.4 | TSCA EINECS ENCS | Flexibility Low Viscosity | Graphic Arts* Coatings* |
| 4127 | Neopentyl glycol (2) propoxylate diacrylate | 15 | 200 | 0.5 | 1.01 | 31.5 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS | Dispersive Properties Pigment Wetting Flow & Leveling | Coatings* Graphic Arts* Adhesives* |
| 4160 | Neopentyl glycol (2) ethoxylate diacrylate | 15 | 250 | 1.0 | 1.04 | 33.5 | TSCA EINECS ENCS | Dispersive Properties Pigment Wetting Flow & Leveling | Coatings* Graphic Arts* Adhesives* |
| 4226 | Dipropylene glycol diacrylate | 10 | 250 | 0.5 | 1.07 | 32.8 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS | Low Viscosity Pigment Wetting High Reactivity | Flexographic Inks Inkjet Inks Lithographic Inks |

PHOTOMER® 4000 Series - Difunctional Monomers Continued

| Product | Chemical Description | Typical Viscosity (mpa.s) (@ 25°C) | Color APHA or Gardner | Acid Value, mg KOH/g, max | Specific gravity @ 25 °C | Surface tension (m n/m) @ 25 °C | Regulatory Status | Product Attributes | Applications |
|-------------|---|------------------------------------|-----------------------|---------------------------|--------------------------|---------------------------------|-------------------|---|---|
| 4361 | 1,6-Hexanediol (2) ethoxylate diacrylate | 15 | 250 | 0.1 | 1.02 | 37.5 | TSCA ENCS | Low Viscosity Pigment Wetting Flow & Leveling | Inkjet Inks Flexographic Inks Lithographic Inks |
| 4362 | 1,6-Hexanediol (2) propoxylate diacrylate | 20 | 160 | 0.1 | 1.02 | 34.4 | TSCA ENCS | Low Viscosity Pigment Wetting Flow & Leveling | Inkjet Inks Flexographic Inks Lithographic Inks |

PHOTOMER® 4000 Series - Trifunctional & Higher Monomers

| | | | | | | | | | |
|-------------|--|-----|-----|-----|------|------|--|--|--|
| 4006 | Trimethylolpropane triacrylate | 100 | 250 | 0.7 | 1.11 | 36.8 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | High Reactivity Coating Hardness Chemical Resistance | Coatings* Graphic Arts* Adhesives* |
| 4072 | Trimethylolpropane (3) propoxylate triacrylate | 100 | 250 | 1.0 | 1.06 | 33.0 | TSCA, IECSC, AICS EINECS, DSL ENCS | High Reactivity Flexibility Chemical Resistance | Coatings* Graphic Arts* Adhesives* |
| 4094 | Glyceryl (4) propoxylate triacrylate | 90 | 250 | 0.5 | 1.06 | 35.2 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Pigment Wetting Flexibility Impact Resistance | Coatings* Graphic Arts* Adhesives* |
| 4095 | Glyceryl (4) propoxylate triacrylate (high purity) | 80 | 250 | --- | 1.06 | 35.1 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Pigment Wetting Flexibility Impact Resistance | Coatings* Graphic Arts* Adhesives* |

PHOTOMER® 4000 Series - Trifunctional & Higher Monomers Continued

| Product | Chemical Description | Typical Viscosity (mpa.s) (@ 25°C) | Color APHA or Gardner | Acid Value, mg KOH/g, max | Specific gravity @ 25 °C | Surface tension (m n/m) @ 25 °C | Regulatory Status | Product Attributes | Applications |
|-------------|--|------------------------------------|-----------------------|---------------------------|--------------------------|---------------------------------|--|---|---|
| 4149 | Trimethylolpropane (3) ethoxylate triacrylate | 73 | 200 | 0.5 | 1.1 | 38.1 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | High Reactivity Coating Hardness Tensile Strength | Coatings* Graphic Arts* Adhesives* |
| 4155 | Trimethylolpropane (7) ethoxylate triacrylate | 70 | 250 | 1.0 | 1.1 | 40.1 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Flexibility Impact Resistance Abrasion Resistance | Coatings* Graphic Arts* Adhesives* |
| 4158 | Trimethylolpropane (14) ethoxylate triacrylate | 150 | 3 | 1.0 | 1.11 | 39.3 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Flexibility Impact Resistance Abrasion Resistance | Coatings* Graphic Arts* Adhesives* |
| 4171 | Pentaerythritol (4) propoxylate triacrylate | 200 | 250 | 1.0 | 1.01 | 35 | TSCA EINECS ENCS | High Reactivity Dispersive Properties Flexibility | Offset Inks Lithographic Inks Wood Coatings |
| 4172 | Pentaerythritol (5) ethoxylate tetraacrylate | 130 | 100 | 0.7 | 1.01 | 39.9 | IECSC, AICS EINECS, ECL ENCS | High Reactivity Dispersive Properties Flexibility | Offset Inks Lithographic Inks Wood Coatings |
| 4399 | Dipentaerythritol pentaacrylate | 7000 | 3 | 2.0 | 1.13 | 44.1 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Coating Hardness Cure Speed Chemical Resistance | Coatings* Graphic Arts* Adhesives* |

PHOTOMER® 3000 Series - Epoxy Acrylates

6

| Product | Chemical Description | Typical Viscosity, (mpa.s) (@ 25 °C) | Color Gardner | Acid Value, mg KOH/g, max | Specific gravity @ 25 °C | Tensile Strength (psi) | Elongation (%) | Glass Transition Temp- Tg (°C) | Regulatory Status | Product Attributes | Applications |
|-----------------|---|--------------------------------------|---------------|---------------------------|--------------------------|------------------------|----------------|--------------------------------|--|---|--|
| 3005 | Acrylated epoxy soya oil | 16,500 | 6 | 5 | 1.04 | 1150 | 16 | 8 | TSCA, IECSC, AICS EINECS, DSL ENCS, PICCS | Low Viscosity Flexibility Pigment Wetting | Laminating Adhesives OPV Lithographic Inks |
| 3015 | Bisphenol A epoxy diacrylate | 85,000 | 2 | 3 | 1.17 | 7500 | 6 | 39 | TSCA EINECS ENCS | Low Viscosity Gloss Flexibility | OPV Optical Coatings Lithographic Inks |
| 3016 | Bisphenol A epoxy diacrylate | 4000 (60) | 2 | 5 | 1.17 | 4150 | 3 | 43 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Gloss Chemical Resistance Coating Hardness | Wood Coatings Composites Automotive Coatings |
| 3016-20R | Epoxy acrylate/monomer blend/ (20% TPGDA) | 15,000 | 2 | 5 | 1.14 | --- | --- | --- | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Gloss Chemical Resistance Flexibility | Coatings* Graphic Arts* Adhesives* |
| 3016-20T | Epoxy acrylate/monomer blend/ (20% TMPA) | 55,000 | 2 | 2 | 1.14 | --- | --- | 38 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Cure Speed Chemical Resistance Coating Hardness | Coatings* Graphic Arts* Adhesives* |
| 3016-25R | Epoxy acrylate/monomer blend/ (25% TPGDA) | 13,000 | 2 | 5 | 1.14 | 7800 | 5 | 45 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Low Viscosity Gloss Tensile Strength | Coatings* Graphic Arts* Adhesives* |

PHOTOMER® 3000 Series - Epoxy Acrylates Continued

| Product | Chemical Description | Typical Viscosity, (mpa.s) (@ 25 °C) | Color Gardner | Acid Value, mg KOH/g, max | Specific gravity @ 25 °C | Tensile Strength (psi) | Elongation (%) | Glass Transition Temp- Tg (°C) | Regulatory Status | Product Attributes | Applications |
|-----------------|---|--------------------------------------|---------------|---------------------------|--------------------------|------------------------|----------------|--------------------------------|--|--|---|
| 3016-40G | Epoxy acrylate/monomer blend/ (40% GPTA) | 10000 | 2 | 2 | 1.14 | --- | --- | --- | TSCA, AICS EINECS, DSL ENCS | Low Viscosity Flexibility Tensile Strength | Coatings* Graphic Arts* Adhesives* |
| 3016-40R | Epoxy acrylate/monomer blend/ (40% TPGDA) | 2000 | 2 | 4 | 1.14 | --- | --- | 45 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS, PICCS | Low Viscosity Flexibility Tensile Strength | Coatings* Graphic Arts* Adhesives* |
| 3016-40T | Epoxy acrylate/monomer blend/(40% TMPA) | 7500 | 2 | 4 | 1.14 | --- | --- | 53 | TSCA, AICS EINECS, DSL ENCS | Low Viscosity Chemical Resistance Cure Speed | Coatings* Graphic Arts* Adhesives* |
| 3072 | Epoxy acrylate oligomer | 5000 (60) | 3 | 5 | 1.14 | 4270 | 5 | 40 | TSCA, AICS EINECS, ECL, DSL ENCS | Low Viscosity Dispersive Properties Gloss | OPV Lithographic Inks Adhesive binders |
| 3082 | Acrylated epoxy linseed oil | 100,000 | 6 | 5 | 1.14 | 1350 | 11 | 17 | TSCA, IECSC EINECS, ECL, DSL | Pigment Wetting Adhesion Flexibility | Lithographic Inks Offset Inks Screen Inks |
| 3215 | Epoxy acrylate oligomer | 15,000 | 1 | 5 | 1.17 | 3830 | 4 | 43 | TSCA ENCS, DSL | Low Viscosity High Reactivity Gloss | OPV Graphic Arts* Adhesives* |

7

PHOTOMER® 5000 Polyester Acrylates

8

| Product | Chemical Description | Typical Viscosity (mPa.s) (@ 25 °C) | Color Gardner | Acid Value, mg KOH/g, max | Specific gravity @ 25 °C | Tensile Strength (psi) | Elongation (%) | Glass Transition Temp. Tg (°C) | Regulatory Status | Product Attributes | Applications |
|---------|-----------------------------------|-------------------------------------|---------------|---------------------------|--------------------------|------------------------|----------------|--------------------------------|---|---|--|
| 5010 | Polyester acrylate | 3000 | 1 | 1 | 1.08 | --- | --- | --- | EINECS | Self-matting Low Gloss Flexibility | Wood Coatings Industrial Coating Screen Inks |
| 5429 | Tetrafunctional oligomer | 300 | 1 | 20 | 1.09 | 1870 | 10 | 45 | TSCA, IECSC, AICS EINECS, ECL, DSL ENCS | Low Viscosity Tensile Strength Cure Speed | Graphic Arts* Pipe Coatings Wood Coatings |
| 5430 | Tetrafunctional oligomer | 2500 | 1 | 25 | 1.02 | 854 | 14 | -20 | TSCA EINECS ENCS | Pigment Wetting Flexibility High Reactivity | Lithographic Inks Offset Inks Screen Inks |
| 5432 | Tetrafunctional oligomer | 4500 (60) | 3 | 20 | 1.11 | 3260 | 10 | 47 | TSCA EINECS | Tensile Strength Chemical Resistance Non-yellowing | Wood Coatings Graphic Arts* Metal Coatings |
| 5662 | Modified polyether/ester-acrylate | 3000 | 1 | 1 | 1.14 | --- | --- | --- | EINECS | Adhesion Flexibility Coating Hardness | Wood Coatings Parquet Coatings |
| 5806 | Tetrafunctional oligomer | Gel Consistency | --- | 5 | 1.14 | --- | --- | 45 | TSCA | Pigment Wetting Misting Reduction High Reactivity | Lithographic Inks Offset Inks Screen Inks |
| 5930 | Modified polyether/ester-acrylate | 500 | 1 | 1 | 1.15 | --- | --- | --- | EINECS | Pigment Wetting High Reactivity Chemical Resistance | Graphic Arts* Wood Coatings Screen Inks |

PHOTOMER® 6000 Series - Aliphatic Urethane Acrylates

| Product | Chemical Description | Typical Viscosity (mPa.s) (@ 60 °C) | Color Gardner | Specific gravity @ 25 °C | Refractive Index @ 20 °C | Tensile Strength (psi) | Elongation (%) | Glass Transition Temp. Tg (°C) | Regulatory Status | Product Attributes | Applications |
|---------|--------------------------------|-------------------------------------|---------------|--------------------------|--------------------------|------------------------|----------------|--------------------------------|--|---|---|
| 6008 | Aliphatic urethane triacrylate | 16,000 | 1 | 1.20 | 1.4900 | 6820 | 8 | 47 | TSCA EINECS ENCS, AICS | Coating Hardness Tensile Strength Non-yellowing | Optical Coatings Wood Coatings Automotive Coatings |
| 6010 | Aliphatic urethane diacrylate | 5900 | 1 | 1.08 | 1.4900 | 2060 | 45 | -7 | TSCA, IECSC, AICS EINECS, ECL ENCS | Scratch Resistant Abrasion Resistance Flexibility | Automotive Coatings Plastic Coatings Optical Coatings |
| 6019 | Aliphatic urethane triacrylate | 3300 | 1 | 1.08 | 1.4900 | 8180 | 8 | 51 | TSCA EINECS ENCS, AICS | Low Viscosity Coating Hardness Tensile Strength | Optical Coatings Wood Coatings Automotive Coatings |
| 6184 | Aliphatic urethane triacrylate | 60,000 (25) | 1 | 1.10 | 1.4900 | 5380 | 7 | 53 | TSCA EINECS ENCS, AICS | Ease of Handling Coating Hardness Tensile Strength | Coatings* Graphic Arts* Composites |
| 6210 | Aliphatic urethane diacrylate | 12,000 (25) | 1 | 1.13 | 1.4900 | 1400 | 40 | 32 | TSCA, AICS EINECS, ECL ENCS | Scratch Resistant Flexibility Impact Resistance | Automotive Coatings Glass Coatings Metal Coatings |
| 6217 | Aliphatic urethane diacrylate | 3500 | 1 | 1.05 | 1.4900 | 3260 | 27 | 35 | TSCA EINECS ENCS | Tensile Strength Flexibility | Plastic Coatings Metal Coatings |
| 6230 | Aliphatic urethane diacrylate | 3500 | 1 | 1.08 | 1.4754 | 1050 | 69 | 2 | TSCA EINECS, AICS | Abrasion Resistance Non-yellowing Impact Resistance | Wood Coatings Metal Coatings Adhesives* |

9

Polyester Acrylates
Urethane Acrylates

PHOTOMER® 6000 Series - Aliphatic Urethane Acrylates Continued

| Product | Chemical Description | Typical Viscosity (mPa.s) (@ 60 °C) | Color Gardner | Specific gravity @ 25 °C | Refractive index @ 20 °C | Tensile Strength (psi) | Elongation (%) | Glass Transition Temp. Tg (°C) | Regulatory Status | Product Attributes | Applications |
|-----------------|--------------------------------|-------------------------------------|---------------|--------------------------|--------------------------|------------------------|----------------|--------------------------------|------------------------|---|--|
| 6891 | Aliphatic urethane diacrylate | 8000 (25) | 1 | 1.08 | 1.4863 | 1990 | 60 | 28 | TSCA EINECS ENCS | Flexibility Impact Resistance Non-yellowing | Metal Coatings Plastic Coatings Glass Coatings |
| 6892 | Aliphatic urethane triacrylate | 33,000 (25) | 1 | 1.08 | 1.4933 | 1300 | 47 | 14 | TSCA EINECS ENCS | Adhesion Chemical Resistance Flexibility | Adhesives* Plastic Coatings OPV |
| 6893-20R | Aliphatic urethane diacrylate | 2300 | 1 | 1.15 | 1.4861 | 2740 | 42 | 41 | TSCA, AICS EINECS | Ease of Handling Tensile Strength | Metal Coatings Plastic Coatings |

PHOTOMER® 6000 Series - Aromatic Urethane Acrylates

| | | | | | | | | | | | |
|-------------|------------------------------|--------|---|------|--------|------|----|-----|-----------------------------|--|---|
| 6363 | Aromatic urethane diacrylate | 5200 | 1 | 1.09 | 1.5013 | 1980 | 32 | 27 | TSCA EINECS, DSL ENCS | Abrasion Resistance Coating Hardness Flexibility | Wood Coatings Glass Coatings Plastic Coatings |
| 6572 | Aromatic urethane diacrylate | 45,000 | 5 | 1.14 | 1.4934 | 970 | 86 | -29 | TSCA EINECS ENCS | Adhesion Chemical Resistance Flexibility | Adhesives* Wood Coatings Metal Coatings |

PHOTONOL® 7000 SERIES - SPECIALTY PRODUCTS

| Product | Chemical Description | Typical Viscosity (mPa.s) (@ 25 °C) | Color Gardner | Specific gravity @ 25 °C | Hydroxyl Value, mgKOH/g | Surface tension @ 25 °C (m n/m) | Regulatory Status | Product Attributes | Applications |
|-----------------------------------|----------------------------------|-------------------------------------|---------------|--------------------------|-------------------------|---------------------------------|-------------------------------------|---|--|
| Hydroxy Functional Polyols | | | | | | | | | |
| PHOTONOL® PHO-7028 | Bisphenol A (4) ethoxylate | 9500 | 2 | 1.17 | 260 | --- | TSCA EINECS ENCS DSL, AICS | Coating Hardness Tensile Strength High Reactivity | Plastic Coatings OPV Adhesive binders Cationic UV Coatings |
| PHOTONOL® PHO-7127 | Neopentyl glycol (2) propoxylate | 200 | 2 | 0.98 | 510 | 32.2 | TSCA EINECS ENCS | Flow & Leveling Film Former Dispersive Properties | Lithographic Inks Flexographic Inks Adhesive Binders Cationic UV Coatings |
| PHOTONOL® PHO-7149 | Trimethylpropane (3) ethoxylate | 850 | 2 | 1.00 | 695 | 44.1 | TSCA EINECS ENCS, AICS | High Reactivity Low Skin Irritation Chemical Resistance | Glass Coatings OPV Adhesive binders Cationic UV Coatings |

PHOTOMER® 8000 Series - Methyl Ether Acrylates

| Product | Chemical Description | Typical Viscosity, (mPa.s) (@ 25 °C) | Color APHA or Gardner | Specific gravity @ 25 °C | Acid Value, mg(OH)/g max | Surface tension @ 25 °C (m n/m) | Regulatory Status | Product Attributes | Applications |
|-------------|--|--------------------------------------|-----------------------|--------------------------|--------------------------|---------------------------------|-------------------------------|---|---|
| 8061 | Tripropylene glycol monomethyl ether acrylate | 8 | 250 | 0.99 | 0.5 | 30.1 | TSCA, IECSC EINECS ENCS | Water soluble Dispersive Properties Low Viscosity | Flexographic Inks Lithographic Inks Coatings* |
| 8127 | Propoxylated neopentyl glycol monomethyl ether acrylate | 8 | 3 | 0.96 | 1.0 | 25.7 | TSCA, IECSC EINECS ENCS | Flow & Leveling Water Soluble Dispersive Properties | Graphic Arts* Adhesives* Coatings* |
| 8149 | Ethoxylated trimethylolpropane monomethyl ether diacrylate | 28 | 250 | 1.08 | 1.0 | 35.2 | TSCA EINECS, ECL ENCS | High Reactivity Water Soluble Low Viscosity | Flexographic Inks Lithographic Inks Coatings* |

PHOTOMER® - Amine Modified Acrylates — Amine Modified Oligomers

| Product | Chemical Description | Typical Viscosity, (mPa.s) (@ 25 °C) | Color Gardner | Specific gravity @ 25 °C | Acid Value, mg(OH)/g max | Amine Value, mg(OH)/g max | Surface tension @ 25 °C (m n/m) | Regulatory Status | Product Attributes | Applications |
|-------------|-------------------------------|--------------------------------------|---------------|--------------------------|--------------------------|---------------------------|---------------------------------|-------------------|--|---|
| 3660 | Amine modified epoxy acrylate | 70,000 | 1 | 1.15 | 4 | 14 | --- | TSCA | Low Viscosity Coating Hardness Chemical Resistance | OPV Wood Coatings Flexographic Inks |

PHOTOMER® - Amine Modified Acrylates — Amine Synergists

| | | | | | | | | | | |
|-------------|----------------------------------|-----|---|------|-----|-----|------|---------------------------|--|--|
| 4771 | Aliphatic amine acrylate | 700 | 3 | 1.11 | --- | 14 | 41.9 | TSCA | Cure Speed Non-yellowing Low Viscosity | OPV Flexographic Inks Lithographic Inks |
| 4967 | Aliphatic amine acrylate | 20 | 6 | 0.98 | --- | 220 | 31.4 | TSCA, AICS EINECS, DSL | Cure Speed High Reactivity Chemical Resistance | OPV Lithographic Inks Offset Inks |
| 5006 | Amine modified polyesteracrylate | 70 | 2 | 1.02 | --- | 210 | 43.3 | EINECS | Cure Speed High Reactivity Chemical Resistance | OPV Flexographic Inks Lithographic Inks Wood Coatings |

PHOTOMER® Photoinitiators

| Product | Chemical Description | Typical Viscosity (mPa.s) @ 25°C | Color Gardner | Surface tension @ 25°C (m n/m) | Regulatory Status | Product Attributes | Applications |
|-----------|----------------------|----------------------------------|---------------|--------------------------------|--|--|--|
| 81 | Liquid benzophenone | 23 | NA | 1.07 | TSCA, AICS EINECS, DSL ENCS, ECL | Ease of Handling High Reactivity Non-yellowing | Coatings* Graphic Arts* Adhesives* |

PHOTOMER® - Rheology Modifying Resins

| Product | Chemical Description | Typical Viscosity (mPa.s) @ 60°C | Color Gardner | Specific gravity @ 25°C | Acid Value, mgKOH/g max | Regulatory Status | Product Attributes | Applications |
|---------------|-----------------------------------|----------------------------------|---------------|-------------------------|-------------------------|--|--|---|
| RM-370 | Rheology modifying resin acrylate | 60,000 | 7 | 1.1 | 5 | TSCA, IECS, AICS EINECS, ECL ENCS, PICCS | Pigment Wetting Misting Reduction Adhesion | Offset Inks Lithographic Inks Screen Inks Spray Coatings |

PHOTOMER® - Adhesion Promoters

| Product | Chemical Description | Typical Viscosity (mPa.s) @ 25°C | Color Gardner | Specific gravity @ 25°C | Acid Value, mg KOH/g, max | Surface tension @ 25°C (m n/m) | Tensile Strength (psi) | Elongation (%) | Regulatory Status | Product Attributes | Applications |
|-------------|----------------------------------|----------------------------------|---------------|-------------------------|---------------------------|--------------------------------|------------------------|----------------|--|---|---|
| 4703 | Acidic adhesion promoter | 173 | 2 | 1.29 | 260 | 47.4 | --- | --- | TSCA, IECS ENCS | Adhesion Low Viscosity Chemical Resistance | Laminating Adhesives Plastic & Glass Coatings Photoresists, etchresists |
| 4846 | Low acid value adhesion promoter | 750 | 1 | 1.14 | <10 | 37.9 | --- | --- | TSCA, IECS, AICS EINECS, DSL ENCS, PICCS | Adhesion High MW Resin Co Flexibility | Adhesives* Plastic Coatings Automotive Coatings |
| 4173 | Acidic adhesion promoter | 4000 | 1 | 1.26 | 190 | 49.1 | --- | --- | TSCA, IECS, AICS EINECS, DSL ENCS, PICCS | Adhesion Coating Hardness Chemical Resistance | Adhesives* Metal & Plastic Coatings Photoresists, etchresists |
| 5424 | Acid functional oligomer | 8500 | 12 | 1.17 | 90 | --- | 1380 | 21 | TSCA | Adhesion Flexibility Caustic Solubility | Metal Coatings Graphic Arts* PSA |

Additives for Energy Curing

16

| Product | Class | Description | Function | % Active | Viscosity mPa.s (25°C) | Specific gravity @ 25°C | % Solids | % VOC ¹ | % Water | Use Level, % | Regulatory Status |
|-----------------------|----------|---|--|----------|------------------------|-------------------------|----------|--------------------|---------|------------------|-----------------------------------|
| DEHYDRAN® 1208 | Defoamer | Proprietary polysiloxane-based defoamer for nonaqueous formulations | Defoamer for aqueous and non aqueous coatings in white spirit | 100 | 15 | 0.83 | 20.6 | 74.2 | 0.1 | 0.2-1.0TW | TSCA, AICS EINECS, DSL ENCS |
| DEHYDRAN® 4200 | Defoamer | Polysiloxane based defoamer | Effective in aqueous and 100% solid UV systems | 100 | 100 | 0.96 | 97.7 | 2.0 | 0.3 | 0.25 to 0.75% TW | TSCA DSL |
| FOAMASTER® R | Defoamer | Mineral oil based defoamer | For use in UV aqueous systems | 100 | 1440 | 0.90 | NA | 5.1 | <1.0 | 0.20 - 1.0 TW | TSCA |
| FOAMASTER® 111 | Defoamer | Mineral oil based, silicone-free defoamer | For use in UV aqueous systems | 100 | 700 | 0.90 | NA | 5.6 | <1.0 | 0.2 - 1.0 TW | TSCA, AICS EINECS, DSL |
| FOAMSTAR® A-34 | Defoamer | FoamStar technology combined with polysiloxanes | Defoamer for difficult to defoam formulations including high gloss | 100 | 90 | 0.97 | 97.6 | 2.3 | 0.1 | 0.3-0.6TW | TSCA, AICS DSL ENCS |
| FOAMSTAR® A-36 | Defoamer | FoamStar technology combined with polysiloxanes | Defoamer for difficult to defoam formulations including high gloss | 100 | 95 | 0.96 | 97.8 | 2.1 | 0.1 | 0.3-0.6TW | TSCA, AICS DSL ENCS |

Additives for Energy Curing Continued

| Product | Class | Description | Function | % Active | Viscosity mPa.s (25°C) | Specific gravity @ 25°C | % Solids | % VOC ¹ | % Water | Use Level, % | Regulatory Status |
|---|------------|--|--|----------|------------------------|-------------------------|----------|--------------------|---------|---------------|------------------------------|
| PERENOL® E1 DEHYDRAN® ARA 7219 (USA) | Defoamer | Silicone-free defoamer | Defoamer/air release for non-aqueous UV formulations | 100 | 65 | 0.83 | 26.2 | 73.8 | 0.0 | 0.1 - 0.5 TW | EINECS TSCA AICS |
| PERENOL® E 14 | Defoamer | Polysiloxane based defoamer | Effective in 100% solid UV systems | 100 | NA | 0.95 | NA | NA | NA | 0.5 - 1.0 TW | TSCA, AICS EINECS ENCS |
| HYDROPALAT® 1080 | Dispersant | Monofunctional oleo alkylene oxide block copolymer | Dispersant for organic pigments in aqueous UV formulations | 80 | 200 | 1.03 | 80.0 | 1.0 | 20.0 | .20 - 1.5 TW | TSCA, AICS EINECS ENCS |
| HYDROPALAT® 3275 | Dispersant | Polymeric dispersant | Develops optimum color strength for organic and inorganic pigments | 37.5 | 3000 | 1.06 | 37.5 | 2.1 | 60.4 | 5.0 - 30 PW | TSCA EINECS ENCS |
| TEXAPHOR® P 60 | Dispersant | Polyurethane derivative | Pigment dispersant for 100% solid UV formulations | 50 | 2700 | 1.00 | 49.0 | 51.0 | 0.1 | 2.0 - 30.0 PW | TSCA EINECS ENCS |
| TEXAPHOR® P 63 | Dispersant | Modified polyurethane dispersant | Polymer dispersant/wetting agent for optimizing color development | 45 | 400 | 0.99 | 45.0 | 55.0 | 0.1 | 2.0-30.0PW | EINECS ENCS |
| TEXAPHOR® UV 20 | Dispersant | Solvent-free anionic, aliphatic Ester | Pigment dispersant for 100% solid UV formulations matt coatings | 100 | 2000 | 0.95 | 100.0 | NA | 0.1 | 0.5 - 2.0 TW | TSCA EINECS ENCS |

17

Additives for Energy Curing Continued

| Product | Class | Description | Function | % Active | Viscosity mPa.s (25 °C) | Specific gravity @ 25 °C | % Solids | % VOC ¹ | % Water | Use Level, % | Regulatory Status |
|-------------------------|-----------------|----------------------------------|---|----------|-------------------------|--------------------------|----------|--------------------|---------|---------------|-----------------------------------|
| TEXAPHOR® P 61 | Dispersant | Polyurethane derivative | Pigment dispersant for 100% solid UV formulations matt coatings | 30 | 150 | 1.01 | 30.0 | NA | 0.1 | 2.0 - 30.0 PW | TSCA EINECS ENCS |
| TEXAPHOR® SF 73 | Dispersant | Modified polyurethane dispersant | Polymer dispersant / wetting agent for optimizing color development | 100 | 6000 | 1.10 | 45.0 | NA | 0.1 | 2.0-30.0PW | TSCA EINECS ENCS |
| PERENOL® F 60 | Flow / leveling | 100% copolyacrylate | Flow modifier for 100% solid energy curable coatings | 100 | 1000 | 1.02 | 99.0 | 1.3 | 0.1 | 0.25-0.75TW | TSCA, AICS EINECS, DSL ENCS |
| PERENOL® S konz. | Slip / Leveling | Polysiloxane | Universal slip aid | 100 | NA | 1.05 | > 95 | NA | NA | 0.1 - 0.5 TW | TSCA, AICS EINECS ENCS |
| PERENOL® S 71 UV | Slip / Leveling | Acrylated polysiloxane | Tetra-functional slip and flow aid | 100 | 230 | 1.04 | NA | NA | NA | 0.5 - 1.5 TW | TSCA EINECS |
| PERENOL® S 83 UV | Slip / Leveling | Polysiloxane | Non-reactive slip and leveling aid | 100 | 280 | 1.02 | NA | NA | NA | 0.5 - 1.5 TW | TSCA, AICS EINECS |

Additives for Energy Curing Continued

| Product | Class | Description | Function | % Active | Viscosity mPa.s (25 °C) | Specific gravity @ 25 °C | % Solids | % VOC ¹ | % Water | Use Level, % | Regulatory Status |
|------------------------|--------------|--|--|----------|-------------------------|--------------------------|----------|--------------------|---------|--------------|-------------------|
| PERENOL® MS-40 | Antiblocking | Polyethylene mixed wax emulsion | For use in UV aqueous systems | 40 | 250 | 0.96 | 40.0 | 1.5 | 60.0 | 2.0 - 4.0 TW | TSCA DSL |
| PERENOL® UV-Wax | Antiblocking | Micronized ester wax with UV reactive groups | Improves scratch and blocking resistance | 100 | 1000 | 1.02 | NA | NA | NA | 1.0 - 4.0 TW | TSCA EINECS |

PW = pigment weight, TW = total weight, NA = not available, 1. EPA method 24

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|---|--|---|---|--|--|--|
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|---|--|---|---|--|--|--|

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| Regulatory Designation | Country |
|------------------------|---------------|
| TSCA | UNITED STATES |
| EINECS | EUROPE |
| ENCS | JAPAN |
| IECSC | CHINA |
| ECL | KOREA |
| AICS | AUSTRALIA |
| DSL | CANADA |
| PICCS | PHILIPPINES |

* Denotes Numerous Market Applications
PW = pigment weight
TW = total weight
NA = not available
1. EPA method 24



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