Myriant

Chemistry Refined...Naturally

Myrifilm® Zero-VOC Coalescing Solvent

Myrifilm® Coalescing Solvent in Compliant Coatings

- Zero-VOC
- Low Odor
- High-Efficiency, Lower Usage Lower Formulation Costs
- Smaller environmental footprint
- Bio-based solvent produced from renewable sources
- Performs in Wide Range of Resins

Myrifilm® Coalescing Solvent

- **Application Testing Areas & Protocol**
- Performance Comparable to Industry Standard Texanol™ *
- Performance Comparable to Other Coalescing Solvents
- Performs In a Broad Range of Resin Types
- High Efficiency May Result in Lower Formulation Costs
- Performs Well in Commercial Coatings Formulations

* Texanol™, TXIB™ and Optifilm™ are registered tradeamark owned by Eastman Chemical Company.
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ACRONAL® and STYROFAN® are registered trademarks owned by BASF AKTIENGESELLSCHAFT CORPORATION

Application Areas for Myrifilm® Testing

Application Area	Architectural Coatings 5.35 MM MT resin	Construction and Adhesives 2.39 MM MT resin	General Industrial 1.5 MM MT resin	Graphics 466 kMT resin
Typical Formulation	Acrylic, Styrene/Acrylic, EVA Resin Pigment Coalescing Solvent Performance Additives	Styrene/Butadiene, Styrene/Acrylic, Acrylic Resin Pigment Coalescing Solvent Performance Additives	Acrylic, Styrene/Acrylic Resin Pigment Coalescing Solvent Performance Additives	Acrylic Resin Pigment Coalescing Solvent Performance Additives
Myriant Tested	Semi-gloss acrylic paint [Rhoplex™ SG-30, Orgal® P855RR] Myrifilm® vs.: Texanol™, TXIB™, Optifilm™ 400, DPnB Tested general paint and finished coating properties	Acrylic (Rhoplex™ SG-30, Acronal® S504) Styrene/Acrylic (Acronal® 296D) Styrene/Butadiene (Styrofan® ND 593) Tested film forming effectiveness vs. Texanol™		No testing performed

Myriant- Cal Poly Development Partnership

CAL POLY
SAN LUIS OBISPO

Leader in development and testing of waterborne coatings systems

- Polymer development and characterization
- Formulation development
- Performance characterization
- VOC method development

Western Coatings Technology Center

Sponsors: BASF, Boeing, Dunn Edwards, DuPont, ET Horn, Guidant, Kelly-Moore Paints, Rohm and Haas, Sherwin Williams, Valspar, Vista Paint

Myrifilm® Key Performance Parameters

- Myrifilm® evaluated for the following characteristics
  - Viscosity
  - Sag
  - Leveling
  - Contrast Ratio
  - Tint Strength
  - Gloss
  - Block resistance
  - Scrub Resistance

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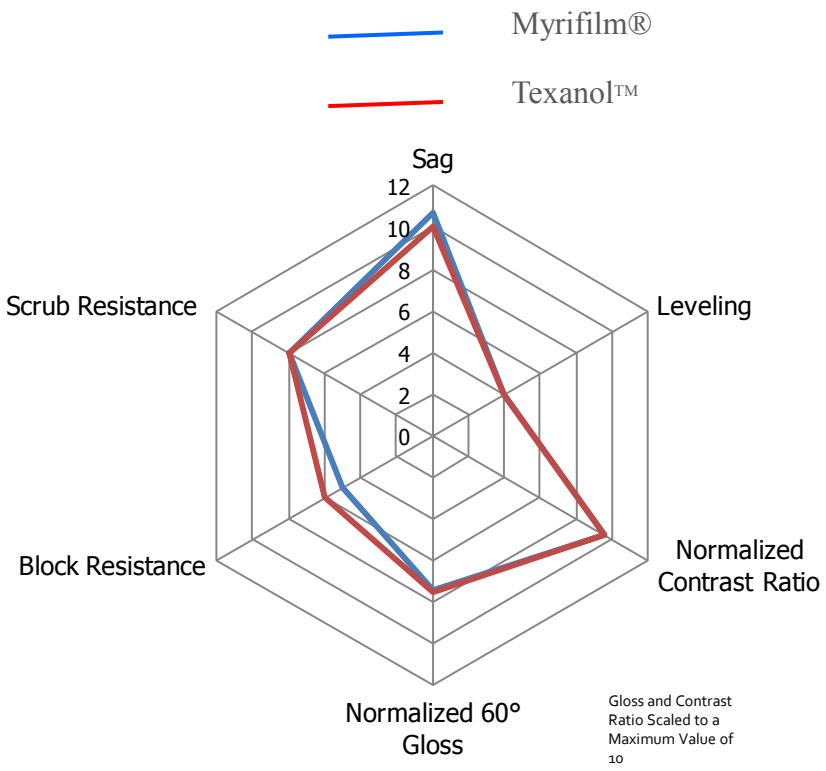
Myrifilm® vs. Texanol™

Property	Semi-Gloss Acrylic with Myrifilm®	Semi-Gloss Acrylic with Texanol™
KU Viscosity (immed./24 h)	87.9/14.2	90.7/107.8
Sag	10.7	10
Leveling	4	4
Contrast ratio (Air-dry, 24h)	96.24	96.25
Gloss 20°/60°/85°	44.4/74.4/97.9	39.8/75.3/97.8
Block Resistance (120 °F, 24 h)	5	6
Scrub Resistance (2400 cycles)	8	8
Low Temperature Coalescing (40 °F, 10 mil)	5	5
Tint Strength (Red) $\%T_{SUC}$	103.3	99.8
Tint Strength (Yellow) $\%T_{SUC}$	83.5	99.4
Tint Strength (Blue) $\%T_{SUC}$	101.4	100
VOC (ASTM)	**0.5**	**18**
Odor	**Low**	**High**



Myrifilm ® performs as well as Texanol™ in typical acrylic formulation with Zero VOC & Low Odor

10.49 lb/gal density, 33.97% solids in formulation. Dow Rhoplex ® SG-30 Binder resin (47.7 % w/w); 2.5 wt% coalescent relative to binder resin; TiO_2 Pigment with final PVC 21.95. Based on Dow recommended formulation for this resin.

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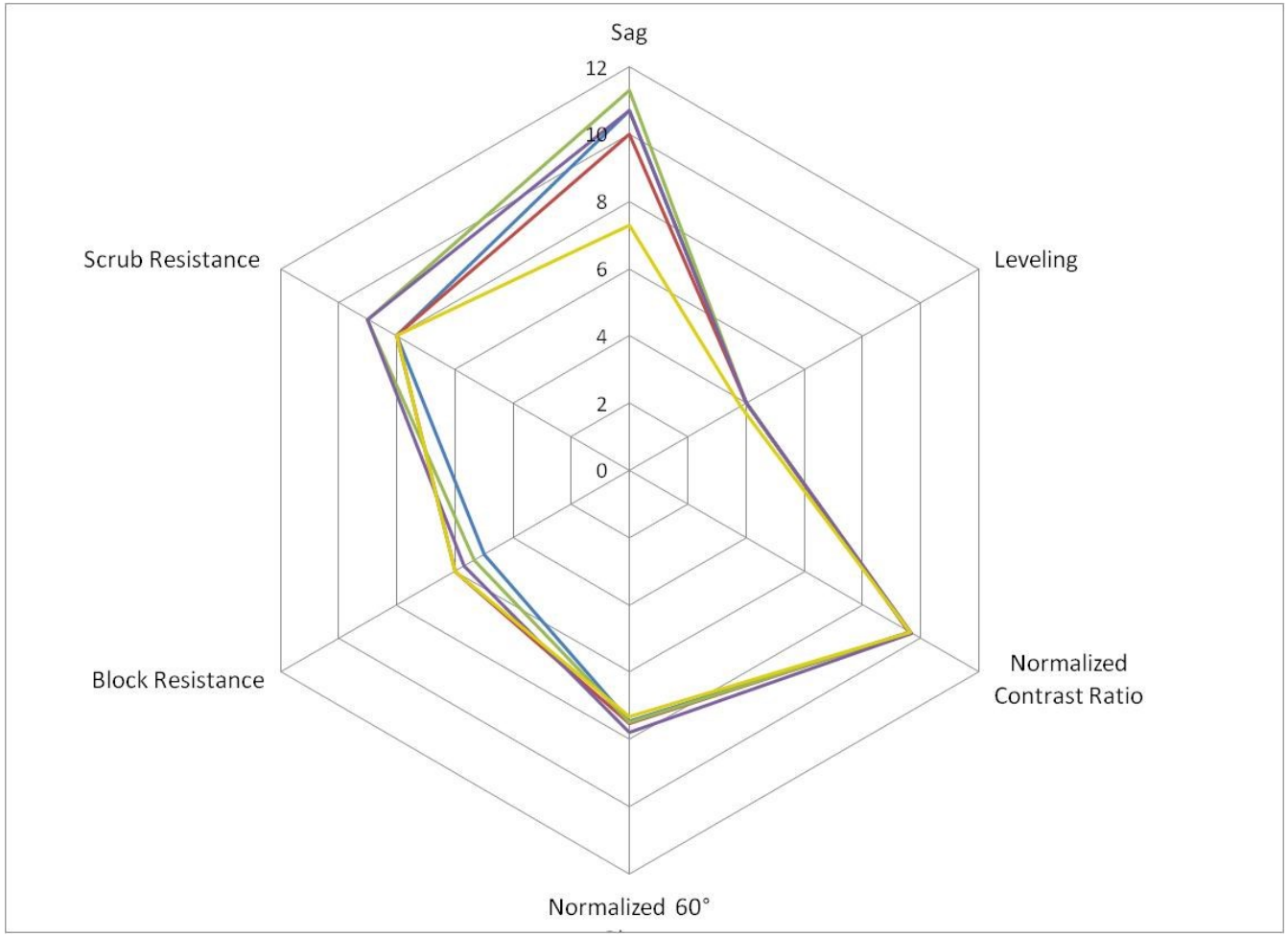
Myrifilm® vs. Other Coalescents



10.49 lb/gal density, 33.97% solids in formulation.
Dow Rhoplex® SG-30 Binder resin (47.7 % w/w); 2.5 wt% coalescent relative to binder resin; TiO_2 Pigment with final PVC 21.95.
Based on Dow recommended formulation for this resin.

Myrifilm ® performs as well as Texanol™, TXIB™, and Optifilm™ in a typical acrylic formulation

Myrifilm® vs. Other Coalescents

Property	Semi-Gloss Acrylic with Myrifilm®	Semi-Gloss Acrylic with Texanol™	Semi-Gloss Acrylic with TXIB™	Semi-Gloss Acrylic with Optifilm™ 400	Semi-Gloss Acrylic with DPnB
KU Viscosity (immed./24 h)	87.9/14.2	90.7/107.8	99.3/115.7	94.7/112.3	83.8/95.4
Sag	10.7	10	11.3	10.7	7.3
Leveling	4	4	4	4	3.8
Contrast ratio (Air-dry, 24h)	96.24	96.25	96.43	96.98	96.4
Gloss 20°/60°/85°	44.4/74.4/97.9	39.8/75.3/97.8	39.8/75.1/97.6	45.5/78.0/98.2	37.4/73.3/96.2
Block Resistance (120 °F, 24 h)	5	6	5.33	5.67	6
Scrub Resistance (2400 cycles)	8	8	9	9	8
Low Temperature Coalescing (40 °F, 10 mil)	5	5	5	5	5
Tint Strength (Red) $\%T_{SUC}$	103.3	99.8	104.3	100.8	97.1
Tint Strength (Yellow) $\%T_{SUC}$	83.5	99.4	80.1	74.3	90.1
Tint Strength (Blue) $\%T_{SUC}$	101.4	100	105.8	99.7	80.5
VOC	**0.5**	**18**	**18**	**0.5**	**18**
Odor	**Low**	**High**	**High**	**Medium**	**High**

10.49 lb/gal density, 33.97% solids in formulation.
Dow Rhoplex™ SG-30 Binder resin (47.7 % w/w); 2.5 wt% coalescent relative to binder resin; TiO_2 Pigment with final PVC 21.95.
Based on Dow recommended formulation for this resin.

Myrifilm® performs as well as Texanol™, TXIB™, and Optifilm™ in a typical acrylic formulation with Zero VOC & Low Odor

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Myrifilm® Coalescing Performs in Broad Range of Resin Types

	KU (Initial)	KU (24h)	Low Temperature Coalescing (10 mil film)	Low Temperature Coalescing (5 mil film)
Rhoplex ™SG-30 (Acrylic) with Myrifilm®	102.3	103.8	4	3
Rhoplex™SG-30 (Acrylic) with Texanol™	96.1	98.2	3	1
Styrofan® ND 593 (Styrene/Butadiene) with Myrifilm®	91.3	95.3	5	4
•Styrofan® ND 593 (Styrene/Butadiene) with Texanol™	90.3	92.8	5	5
Acronal® S504 (Acrylic adhesives) with Myrifilm®	92.3	94.3	5	5
Acronal® S504 (Acrylic adhesives) with Texanol™	93.1	95.2	5	5
Acronal® 296D (Styrene/Acrylic) with Myrifilm®	80.1	108.8	5	5
Acronal® 296D (Styrene/Acrylic) with Texanol™	84.3	105.8	5	5

Myrifilm ® performs better than Texanol™ in a broad range of typical waterborne resins

35% solids in formulation.
3 wt% coalescent relative to binder resin.

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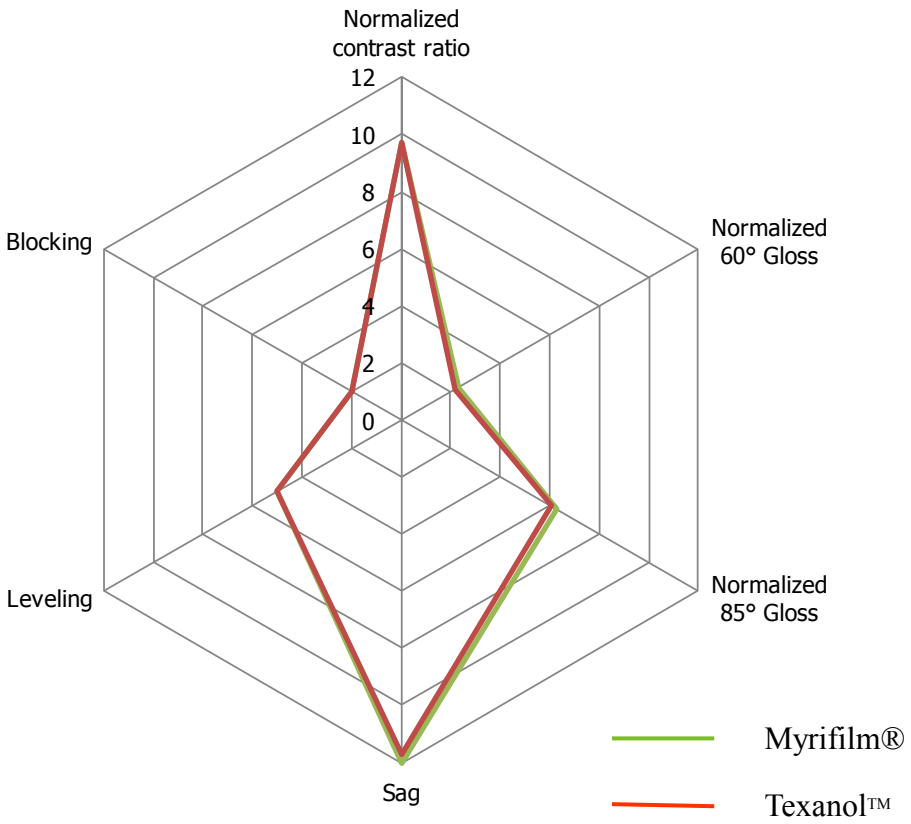
Myrifilm® Retains Performance at Lower Concentration



Myrifilm ® performs as well as Texanol™ at HALF the concentration

	Myrifilm®	Texanol™
Dosage	1.2 wt% relative to resin	2.4 wt% relative to resin
KU Viscosity	124.2	123
Contrast Ratio	97	97
60 ° Gloss	23	21.6
85 ° Gloss	62.9	60.4
Sag	12	11.7
Leveling	5	5
Blocking	2	2

10.54 lb/gal density, 36.84 vol% solids in formulation.
Orgal P885RR binder resin (38.9 % w/w); 2.5 wt% coalescent relative to binder resin; TiO_2 Pigment with final PVC 34.09.

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Myrifilm® Performance in Commercial Coatings

Property	Semi-Gloss Interior Acrylic with Myrifilm®	Semi-Gloss Deep Base Acrylic with Myrifilm®	Satin Interior Acrylic with Myrifilm®
KU Viscosity (24h/7 d)	102/105	98.2/100.4	97/105
Contrast ratio (Air-dry, 24h)	97.75	-	99.25
Gloss 20°/60°/85°	17.1/51.1/82.7	15.1/51.9/76.4	3.4/18.6/36.2
Yellowness Index (24h)	0.56	-	1.17
Freeze Thaw Stability (5x, D KU)	+18	+4.9	+5.5
140 °F Oven Stability (10d, D KU)	+12	+3.2	+5
Block Resistance (RT, 24 h/3d/7d)	8/9/9	7/8/8	8/9/9
Block Resistance (120 °F, 24 h/3d/7d)	6/7/8	3/4/6	6/8/8
Pendulum Hardness	11	11	8
Scrub Resistance	pass	pass	pass
Low Temperature Coalescing	pass	pass	pass
Stain Resistance	Pass	pass	pass

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