

# Film coalescence & coalescing surfactants



## Characteristics of a good coalescing surfactant:

- Significantly reduces surface tension of waterborne coatings at relatively low use levels (0.1–1.0 wt.%)
- Very low VOC content
- Significantly reduces minimum film formation temperature (MFFT)
  - Improves low-temperature film formation
  - Enables removal of at least some of the traditional coalescent
- Has solubility parameters similar to that of the polymer binder
- Has minimal effect on formulation and coating performance properties

## Typical properties of SURFYNOL® AD01 & DYNOL™ 360 compared to other coalescing agents

PROPERTIES	DMM	DPnB	TMPIB	TPnB	Low-VOC Coalescent #1	Low-VOC Coalescent #2	SURFYNOL® AD01	DYNOL™ 360
Vapor Pressure, kPa, 20°C	0.55	0.04	0.01	0.002	N/A	$1.3 \times 10^{-5}$	$1.9 \times 10^{-5}$	$6.4 \times 10^{-7}$
Boiling Point, °C	175	230	254	274	N/A	374–381	278	356
Water Solubility Limit, wt.%, 20°C	35%	4.5%	4.5%	4.2%	N/A	negligible	0.06%	0.06%
EST, mN/m, 25°C	67	59	39	53	44	46	35	28
DST at 6 Hz, mN/m, 25°C	68	60	41	56	64	70	36	35
DST at 20 Hz, mN/m, 25°C	68	61	44	58	70	71	40	44
VOC, US EPA Method 24	100%	N/A	N/A	N/A	N/A	0	0	0

## Regulatory drivers require lower VOC coatings

- National/regional VOC regulations and indoor air quality regulations must be met
- Lower VOC coatings necessitate removal of volatile solvents and coalescing agents
- Side effects of removing solvents and coalescing agents
  - Poor coating integrity and appearance if applied at or below MFFT
- Coalescing surfactants help achieve target VOC levels while maintaining performance and reducing overall additive loadings



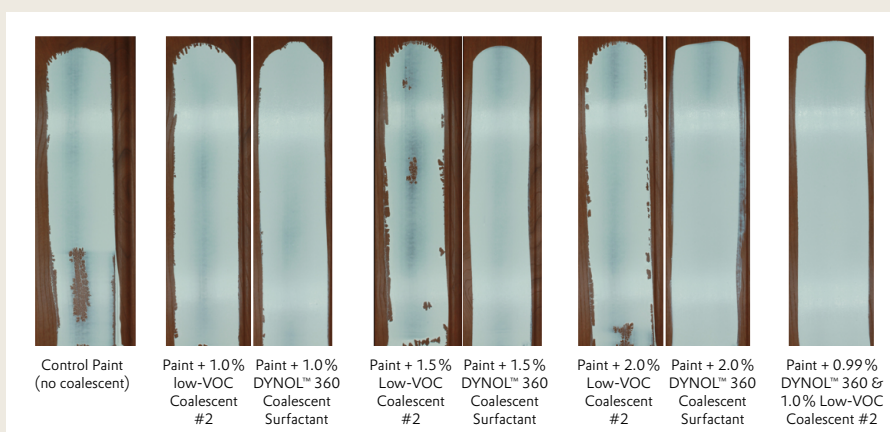
**i** Click here for more information!

## DYNOL™ 360 provides outstanding wetting in a 100% acrylic latex-based gloss paint

DYNOL™ 360 enables the acrylic gloss paint to wet hydrophobic faux wood baseboard moulding with a surface energy of 27 mN/m.

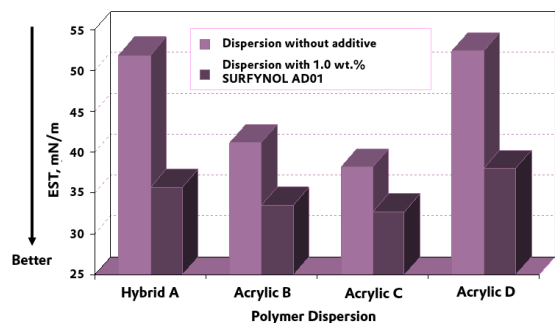
Multifunctionality offers significant advantages in low-VOC architectural coatings:

- No VOC contribution per ASTM D6886
- Highly efficient wetting
- Effective coalescing ability in low and “near zero” VOC formulations
- Non-foam stabilizing, nonemulsifying, hydrophobic chemistry

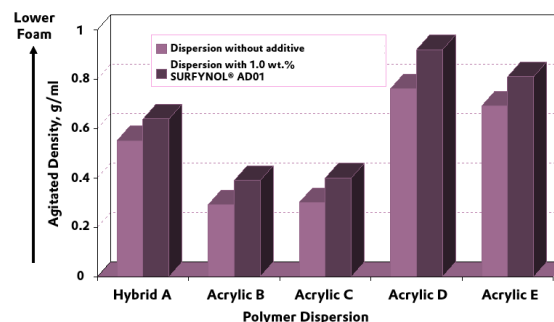


## SURFYNOL® AD01 lowers equilibrium surface tension and foam in a low-VOC waterborne clear coat formulation

### SURFYNOL® AD01 lowers the equilibrium surface tension of aqueous polymer dispersions.



### SURFYNOL® AD01 reduces the foaming of aqueous polymer dispersions.



## How to maximize the benefits of using coalescing surfactants:

- ✓ Add them to the grind to achieve rapid dry pigment wetting and deaeration
  - Should enable replacement of some surfactant used in milling
  - May enable use of less defoamer in grind
- ✓ Use in the amount needed to achieve dry pigment wetting – typically ≤ 1 wt.%
  - Wetting benefits will carry through to final substrate wetting
- ✓ Check MFFT of formulation and, if needed, add a little traditional coalescent

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