



## Dow Industrial Solutions

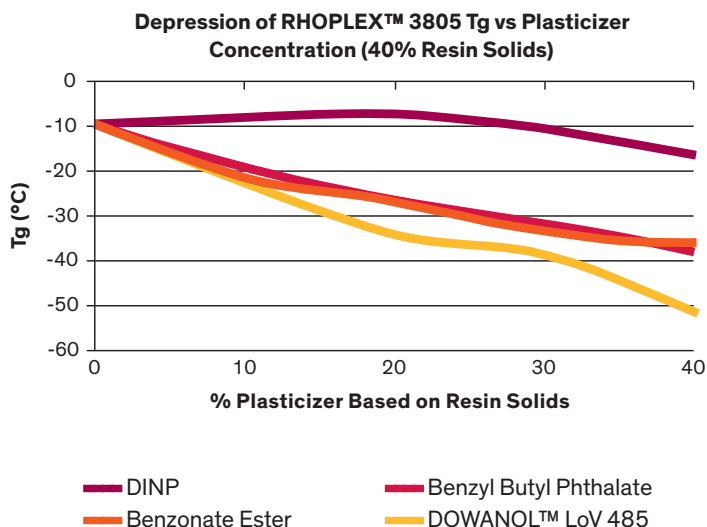
# Phthalate-Free High Efficiency Plasticizer

## Improved Performance with an Enhanced Environmental Profile

### DOWANOL™ LoV 485 Glycol Ether

Dow has introduced a phthalate-free, P-Series glycol ether ester to enable optimal plasticizer performance and meet evolving demands of end-use customers. DOWANOL™ LoV 485 Glycol Ether displays superior plasticizing properties with high-performance acrylic sealant binders compared to industry standard phthalates and competitive non-phthalate products. DOWANOL™ LoV 485 can help to reduce plasticizer use, meet regulatory requirements and improve the environmental profile of a product while maintaining performance.

Through Glass Transition Temperature (T<sub>g</sub>) depression testing, DOWANOL™ LoV 485 has shown to be at least 25% more efficient than benzyl butyl phthalate. The graph below represents results of depression testing with DOWANOL™ LoV 485, benzyl butyl phthalate, diisononyl phthalate (DINP) and a benzoate ester in a waterborne acrylic emulsion (RHOPLEX™ 3805 Acrylic Emulsion).



#### Key Features:

- Phthalate-free
- Aromatic free
- Superior plasticizing in caulking formulations
- Very low odor
- Low foam
- No Proposition 65 listing
- Ultra Low VOC
- Non-HAPs

Typical Product Properties*	Value
Molecular Weight (g/mol)	490.69
Boiling Point (at 760 mmHg)	485°C
Flash Point (Setaflash Closed Cup)	156°C (312°F)
Freezing Point	< -80°C
Vapor Pressure (mmHg at 20°C)	<0.000001
Specific Gravity (at 25°C/25°C)	0.97557
Liquid Density (lb/gal at 25°C)	8.12
Viscosity (cP at 20°C)	19.4
Specific Heat (J/g/°C at 25°C)	1.42
Heat of Vaporization (J/g/°C at 25°C)	342.9
Net Heat of Combustion (kJ/g predicted at 25°C)	28.8
Surface Tension (dynes/cm at 20°C)	25.77
Evaporation Rate (n-butyl acetate=1)	<0.000001
Solubility (wt% at 25°C)	
Solvent in Water	<1.0
Water in Solvent	<1.0
Hansen Solubility Parameters (joules/cm <sup>3</sup> ) <sup>1/2</sup>	
Δd (Dispersion)	16.1
Δp (Polar)	4.0
Δh (Hydrogen Bonding)	6.0

\*These are typical properties, not to be construed as specifications.

The graphic representations are presented here for illustrative purposes only and should not be construed as product specifications.

## Results of ASTM C920 Testing on RHOPLEX™ 3805 Construction Sealant Formulation

DOWANOL™ LoV 485 Glycol Ether was also compared to benzyl butyl phthalate (BBP) and found to be 30% more efficient. Standard Specification for Elastomeric Joint testing (ASTM C920) was performed on a cold-applied elastomeric joint sealant containing RHOPLEX™ 3805 Acrylic Emulsion. This formulation could be used for sealing, caulking, or glazing operations on buildings, plazas, and decks for vehicular or pedestrian use.

Property	Benzyl Butyl Phthalate	DOWANOL™ LoV 485
pH (% Plasticizer based on resin solids)	7.8	7.9
Brookfield viscosity (x103, cPs)		
Initial	331-344	301-310
24 hrs.	349-370	330-340
Consistency (sec) (at 40psi)	9.4	7.4
Extrusion Rate (g/sec)	25.7	32.2
Flex		
-26°C (no through cracks required)	Pass	Pass
Channel Slump		
Slump (mm)	0	0
Wet Peel Adhesion (pli) (>5lbf, <25% adhesive failure required)		
Glass	16-18 C/LC	10-22 C/LC,A(25)
Aluminum	15-19 C	13-19 LC/C/SD,A(10)
Tensile Properties		
Stress at 25% Elongation (psi)	20 ± 2	21 ± 1
Stress at 50% Elongation (psi)	34 ± 2	35 ± 2
Stress at 100% Elongation (psi)	63 ± 4	61 ± 3
Maximum Stress (psi)	178 ± 8	170 ± 5
Elongation to Break (%)	470 ± 70	580 ± 15

Property	Value
Pigment/Binder Ratio	1.5
Total Pigment Volume Concentration (PVC)	30.5%
Volume Solids	65.7%
Weight Solids	76.6%
Density	11.7 lb/gal

**NOTE:** The BBP was replaced with enough DOWANOL™ LoV 485 Glycol Ether to achieve a concentration of 28% on resin solids and the difference made up with water.

### Sample BBP Formulation with 40% Plasticizer on Resin Solids

Material Name	Pounds	Gallons
RHOPLEX™ 3805 Acrylic Binder	539.8	61.0
Ethylene Glycol	10.8	1.2
TRITON™ X-405 Surfactant	12	1.3
TAMOL™ 851 Dispersant	1.5	0.2
KATHON™ LX 1.5% Microbicide	1.6	0.2
SKANE™ M-8 Mildewcide	1.1	0.1
CELLOSIZ™ QP-3000H Cellulosic Polymer	2.9	0.3
Benzyl Butyl Phthalate	125.2	13.4
Odorless Mineral Spirits	12.4	1.9
Silane	1.1	0.1
Untreated Calcium Carbonate	445.1	19.7
Titanium Dioxide	8.8	0.3
Ammonia (28%)	2.6	0.4
<b>Totals</b>	<b>1165.2</b>	<b>100.0</b>

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