

## ROVACE™ HP-2931

### High Performance Vinyl Acetate/Acrylic Copolymer Emulsion

#### Description

ROVACE HP-2931, vinyl acetate acrylic copolymer emulsion, is designed for use in formulation high performance adhesives for the packaging industry. It provides a high level of adhesion to a variety of difficult-to-bond surfaces including polyolefin films. ROVACE HP-2931 delivers this superior adhesion without the need for chlorinated solvents.

This polyvinyl alcohol stabilized copolymer provides a high level of performance with minimal compounding while also accepting traditional compounding additives if more extensive modification is desirable. ROVACE HP-2931 is representative of a new technology that combines the economics and desirable performance properties of vinyl acetate based polymers with the diversity and superior performance of acrylic polymers.

#### Typical Properties

These properties are typical but do not constitute specifications.

Solids, %	54 min
pH	5.0
Brookfield LVT Viscosity, cP (#3 spindle, 12 rpm)	2,000-4,000
Stabilizing System	polyvinyl alcohol
Mechanical Stability	Excellent
Storage Stability at 25°C	6 months
Freeze/Thaw Stability	Good
Density, lb/U.S. gal	8.9
kg/l	1.07
Film Properties:	
Clarity	Clear
Water Resistance	Good
Glass Transition Temperature, °C (DSC Method)	-25

#### Features and Benefits

Adhesion to Plastics

Adhesion to Michelman Type Coatings

Low Temperature Flexibility

Good Plasticizer Response

Crosslinkable

Performance Without 1,1,1-TCE

Benzene Free

FDA, CONEG, and BGA Recommendation XIV Compliance

## Performance Properties

### Specific Adhesion

ROVACE HP-2931 provides excellent adhesion to the wide variety of surfaces encountered in the packaging industry, as detailed below.

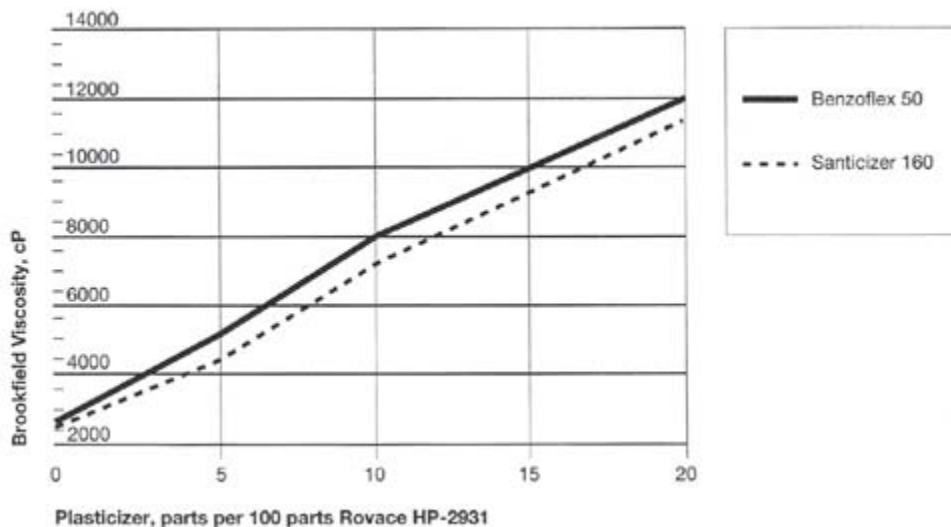
Substrate	Peel, grams per linear inch
Aluminum Foil	SF
Metallized PET	5000 C
Metallized OPP	850 A
Paper	550 SF
Paperboard	775 SF
Polyester	925 A
Polyethylene (TR)	1560 A
Polyethylene (UNTR)	175 A
Polypropylene (TR)	950 A
Polypropylene (UNTR)	400 A

Failure Modes: A = Adhesive  
C = Cohesive  
SF = Substrate Failure

### Plasticizer Response

ROVACE HP-2931 exhibits excellent thickening response to the addition of typical plasticizers used in the industry such as dipropylene glycol dibenzoate and butyl benzyl phthalate. A straight line plasticizer concentration versus thickening efficiency relationship is maintained even at high plasticizer additional levels.

#### Viscosity Response of ROVACE HP-2931 to Plasticizer Addition



## Starting Point Formulations

The following formulations are provided as starting point recommendations. All formulations should be adjusted for solids and viscosity to obtain the desired physical properties. All materials are used as supplied. Defoamers and biocides should be added as necessary.

### Case and Carton Sealing and Assembly

Formulating Problem	Formulation Solution
Remove solvent while maintaining excellent adhesion to Michelman coatings	<b>Formulation I</b> ROVACE HP-2931 Neat
Lower the cost while maintaining good adhesion without solvent	<b>Formulation II</b> ROVACE HP-2931/PVA/Plasticizer
Increase shear resistance while maintaining low cost and adhesion without solvent	<b>Formulation III</b> ROVACE HP-2931/Filler/Plasticizer
Increase setting speed while maintaining cost, shear resistance and adhesion without solvent	<b>Formulation IV</b> ROVACE HP-2931/Filler/PVA/Plasticizer
Increase wet tack/green strength	<b>Formulation V</b> ROVACE HP-2931/RHOPLEX™ N-495

Formulation Details	I	II	III	IV	V
		Parts Product (by weight) As Supplied			
ROVACE HP-2931	100.0	55.0	75.0	60.0	92.0
PVA			35.0		20.0
RHOPLEX N-495					8.0
Plasticizer (Benzoflex 50)		10.0	10.0	10.0	
Clay (ASP-400)			15.0	10.0	
Clay (ASP-400)	excellent adhesion	lower cost	improved shear resistance	improved shear resistance, lower cost	improved wet tack

All these formulations for packaging provide adhesion to difficult surfaces without need for solvent or plasticizers. They can be further formulated for specific performance requirements and raw material cost targets.

### Flexible Packaging Applications

Formulating Problem	Formulation Solution
<i>High cost</i> adhesion promoting materials for VAE's	<b>Formulation I</b> ROVACE HP-2931 Neat
<i>Difficult</i> carton stock (e.g., u.v. coatings, varnish)	<b>Formulation VI</b> ROVACE HP-2931/RHOPLEX AC-264/Plasticizer
<i>Adhesion to untreated polyolefins</i>	<b>Formulation VII</b> ROVACE HP-2931/Tackifier/Plasticizer

Formulation Details	I	VI	VII
	Parts Product (by weight) As Supplied		
ROVACE HP-2931	100.0	87.0	75.0
RHOPLEX AC-264		8.0	35.0
Plasticizer (Benzoflex 50)		5.0	5.0
Tackifier*	general admission	adhesion to u.v. coatings & varnish	adhesion to polyolefins

\*Tackifier choice must be compatible with polymer and other raw materials (e.g., acrylic rich systems require Aquatac 6085 or 6025)

### Specific Adhesion Test Method

Two 1-inch width strips of 80-square cotton cloth are immersed into the adhesive for 10 seconds. They are then removed and drawn between two glass stirring rods to remove the excess adhesive. The fully saturated strips of cotton cloth are then applied to the test substrate which has been affixed to a rigid surface. A polyethylene cover sheet is placed over the test substrate and adhesive saturated cotton strips. Two passes over the composite are then made with a 2-pound rubber roller with only the weight of the rubber roller to serve as laminating pressure. The polyethylene cover sheet is then removed, and the laminate is dried at 200°F (93°C) for 15 minutes.

After removal from the oven and equilibration to room temperature, one sample is stored at 75°F (24°C)/50% RH and the other sample immersed in water. After 24 hours exposure, the laminates are peel tested for 180° peel bond strength on the Instron tester at a cross-head speed of 10 inches/minute and full scale load of 20 pounds. Results are reported in grams per linear inch.

### Compliances

In our opinion ROVACE HP-2931 complies with the applicable requirements of the Coalition of Northeast Governors' (CONEG) standards on heavy metals, BGA Recommendation XIV guidelines, and the following Food and Drug Administration (FDA) regulations:

21CFR 175.105 Adhesives

21CFR 176.180 Components of paper and paperboard in contact with dry food

21CFR 176.170 Components of paper and paperboard in contact with aqueous and fatty food provided the food contact surface of the paper or paperboard complies with the extractives requirements in 21CFR 176.170 paragraph (c).

We believe this information to be accurate and reliable as of this date. We recommend that you make your own determination on the suitability of ROVACE HP-2931 for your particular application. Since we cannot guarantee that the status of this product will remain unchanged indefinitely, we recommend that you periodically verify the regulatory status of Rovac HP-2931.

### Source of Supply

Product	Manufacturer
Aquatac 6085 Aquatac 6025	Arizona Chemical
Benzoflex 50	Velsico Chemical Corp.
Michelman coatings	Michelman, Inc.
Santicizer 160	Monsanto Industrial Chemicals Co.
RHOPLEX AC-264 RHOPLEX N-495	Rohm and Haas Co.

### Safe Handling Information

Rohm and Haas Material Safety Data Sheets (MSDS) contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products.

Under the OSHA Hazard Communication Standard, workers must have access to and understand MSDS on all hazardous substances to which they are exposed. Thus, it is important that you provide appropriate training and information to your employees and make sure they have available to them MSDS on any hazardous products in their workplace.

Rohm and Haas Company sends MSDS on non-OSHA hazardous as well as OSHA-hazardous products to both the "bill to" and "ship to" locations of all our products (whether or not they are considered OSHA-hazardous). If you do not have access to one of these MSDS, please contact your local Rohm and Haas representative for an additional copy. Updated MSDS are sent upon revision to all customers of record. In addition, MSDS are sent on an annual basis to all customers of record.

MSDS should be obtained from your suppliers of other materials recommended in this bulletin.

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