



RHOPLEX™ ST-954 **Soft and Durable Acrylic Binder**

For Nonwovens

Regional Product Availability

North America

Description

RHOPLEX ST-954 is an APE free acrylic emulsion used in the manufacture of soft and durable nonwoven webs such as those used in apparel interlinings or interfacings. Webs using this binder possess excellent resistance to degradation from drycleaning and laundering together with the softness required of typical apparel applications.

Nonwovens bonded with RHOPLEX ST-954 not only have the strength characteristics of stiffer binders, and binders of comparable softness crosslinked with a melamine-formaldehyde resin, but do so without compromising hand. The improved balance of strength and softness in this acrylic binder results from an advanced emulsion manufacturing technology.

Benefits

The main benefits of using RHOPLEX ST-954 as the binder for interlinings are:

- Desirable drape attained in apparel applications
- Shape and strength retained after repeated laundering
- Good resistance to drycleaning solvents
- Reduction or elimination of melamine-formaldehyde resins
- Easy formulation and application with conventional techniques and equipment.

While RHOPLEX ST-954 is designed specifically for durable applications, it also has potential in disposable uses such as carrier fabrics or medical drapes and gowns. The balance of softness and strength combined with its slightly hydrophobic nature recommends RHOPLEX ST-954 to these market segments.

Performance Features

The balance of strength and softness offered by RHOPLEX ST-954 can be demonstrated by using the glass transition temperature (T_g , °C) as an indicator of softness, and tensile measurements for evaluation of strength. Table 1 shows that the wet tensile strength of nonwovens bonded with RHOPLEX ST-954 significantly exceeds that of an acrylic emulsion of essentially equal T_g , and is equivalent to that of RHOPLEX NW-1402, a significantly stiffer binder.

RHOPLEX ST-954 was also compared to the acrylic emulsion of equal softness modified with a melamine-formaldehyde resin (MFR). As illustrated in Table 2, the tensile strengths of this binder approach those of the MFR-modified emulsion, while the hand of RHOPLEX ST-954 is significantly softer. These relative strength relationships are maintained on webs wet with water or solvents, indicating the suitability of RHOPLEX ST-954 for durable and disposable wipe-type applications. These results were obtained by testing commercially produced nonwoven Dacron polyester webs normalized at 0.7 ounces per square yard and a 70/30 fiber/binder ratio.

Table 1 – Softness Versus Wet Tensile Strength			
	Softness	Water-Wet Tensile Strength	
	(T _g , °C)	g/in	g/cm
Nonwoven acrylic binder standard	-23	150	60
RHOPLEX™ ST-954	-23	250	100
RHOPLEX NW-1402	-11	250	100

Table 2 – Comparison of Tensile Strengths and Softness of Acrylic Binders			
	RHOPLEX ST-954	Acrylic binder standard	Acrylic binder standard + 4% MFR
Web Stiffness Handle-O-Meter, g (4 x 4 inch sample) (lower numbers are softer)	40	37	48
Tensile strength, g/inch width (CMD)			
Dry	330	225	375
Water wet	250	150	330
After 5 commercial drycleaning cycles	160	50	250
2-Propanol	140	100	175

Formulation

Catalyst

Acid catalysts such as ammonium chloride and oxalic acid can be used to accelerate the cure of RHOPLEX ST-954 where curing capacity is limited. The following levels of catalyst are recommended:

Catalyst	Concentration (solids on emulsion solids)	Comment
Oxalic acid	0.5%	Add as a 10% solution
Ammonium chloride	1.5%	Add as a 25% solution

pH

To maximize emulsion shear stability, the pH of the bath should be adjusted to 8.0–8.5 with a volatile base such as ammonium hydroxide.

Surfactant

A nonionic surfactant, such as TRITON™ X-114, is recommended in the formulation to achieve better wetting. This surfactant should be used at a starting level of 0.5 percent solids on polymer solids and diluted with at least 3 times its weight of warm water before being added to the formulation. An anionic surfactant, such as TRITON GR-5M, should be used where rewetting properties in the end product are desirable. The same solids level and predilution as with TRITON X-114 should be used.

Defoamer

A general purpose defoamer such as Foamaster DF-160L is recommended at a starting level of 0.05–0.1% (product as supplied) on the total weight of the formulation. Prior to use, any defoamer should be pre-emulsified with at least an equal weight of warm water and added to the emulsion, under agitation, before other compounding agents.

Starting Point Formulation

The following formulation is offered as a starting point for general purpose rayon or polyester nonwovens. For a specific balance of properties, recommendations will be provided upon request.

General Purpose Durable Nonwoven Formulation		
Ingredients in Order of Addition	Parts Product by Weight (as supplied)	Parts Product on a Solids Basis
Water	66.02	–
Foamaster DF-160L	0.05	0.05
Warm water premix	0.05	–
TRITON™ X-114	0.07	0.07
Warm water premix	0.21	–
RHOPLEX™ ST-954	33.00	15.00
Ammonium chloride (25%)	0.60	0.15
Ammonium hydroxide	to pH 8.0 to 8.5	
Total	100.00	15.27

Typical Properties

These properties are typical but should not be considered specifications.

Appearance	Milky-white liquid
Type	Self-crosslinking acrylic
Ionic Charge	Anionic
Solids Content, %	45.5
pH (as packed)	3.5
Brookfield Viscosity at 25° C, cP (#1 spindle, 60 rpm)	30
Glass Transition Temperature (DSC method)	–23
Density, 25°C	8.7 lb/US gal (1.04 kg/l)
Mechanical stability	Excellent

Handling Precautions

Before using this product, consult the Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS) for details on product hazards, recommended handling precautions and product storage.

CAUTION! Keep combustible and/or flammable products and their vapors away from heat, sparks, flames and other sources of ignition including static discharge. Processing or operating at temperatures near or above product flashpoint may pose a fire hazard. Use appropriate grounding and bonding techniques to manage static discharge hazards.

CAUTION! Failure to maintain proper volume level when using immersion heaters can expose tank and solution to excessive heat resulting in a possible combustion hazard, particularly when plastic tanks are used.

Storage

Store products in tightly closed original containers at temperatures recommended on the product label.

Disposal

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow Coating Materials Technical Representative for more information.

Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

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RHOPLEX™ ST-954 Soft and Durable Acrylic Binder / Adhesives and Functional Polymers

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