



ACRYSOL™ RM-2020 E Rheology Modifier

Hydrophobically modified ethylene oxide urethane (HEUR) high-shear rheology modifier for latex paints.

Regional Product Availability

EMEA

Description

ACRYSOL™ RM-2020 E Rheology Modifier is a solvent-free*, non-ionic, urethane associative thickener offering very versatile means of formulating paints with an optimal film build and high shear viscosity. It is specifically designed for applications where a low odour or low VOC is required and specific environmental requirements are needed.

However, ACRYSOL™ RM-2020 E Rheology Modifier is also suggested in a wide range of other paints (flat through high gloss). It can be used either alone or in combination with thickeners effective in the low shear range to reach the desired balance of flow and sag resistance. ACRYSOL™ RM-2020 E Rheology Modifier can be used as a sole thickener in high gloss paints in order to achieve enhanced flow properties.

ACRYSOL™ RM-2020 E Rheology Modifier allows formulating paints with a Newtonian rheology profile and high film build, combined with excellent water and alkali resistance. The use of cosolvents for optimising some formulations does not adversely affect the efficiency of ACRYSOL™ RM-2020 E Rheology Modifier.

Key Features

- Excellent film build and applied hiding development
- Excellent flow and levelling
- High and sharp gloss
- Solvent-free* - low odour
- Excellent water and alkali resistance
- Use over a wide pH range
- Resistant to microbial attack
- Ease of handling

* Solvent is not intentionally added and is not knowingly introduced from another raw material.

Typical Properties

These are typical properties, not to be construed as specifications	
Appearance	Hazy liquid
Solids content %	~20
Brookfield Viscosity	2500–3800 cP
Specific gravity (wet polymer)	1.045
Solvent	Water
Chemistry	HEUR*

* Hydrophobically modified polyethylene oxide urethane

Formulations

ACRYSOL™ RM-2020 E Rheology Modifier can be applied in a wide range of paint formulations including environmentally friendly ones with low volatile organic content, formaldehyde and ammonia-free. It is particularly adapted for the following types of formulations:

- Solvent-free paints based on self film forming latex binders
- High opacity, high build coatings for exterior mineral substrates where improved hiding and excellent exterior durability (alkaline and water resistance) are essential.
- For interior wall paints, ACRYSOL™ RM-2020 E Rheology Modifier is compatible with all types of emulsions, allowing formulations with excellent technical performance as well as outstanding application properties,
- In gloss paints it is suggested to be used in combination with small particle size hydrophobic, acrylic gloss binders. The outstanding flow and levelling properties imparted by ACRYSOL™ RM-2020 E Rheology Modifier, combined with its strong gloss development, make it ideally suited for these applications.

Formulating Guidelines

Incorporation

ACRYSOL™ RM-2020 E Rheology Modifier is supplied as a pourable and pumpable liquid, free of solvent* and with very low odour. It can be added to the mill-base or during letdown.

Rheology Profile

ACRYSOL™ RM-2020 E Rheology Modifier imparts a Newtonian rheology profile to a paint. In gloss and semi-gloss paints this is ideal for giving the excellent flow and levelling properties required for brush application. For roller application, however, it is suggested to use it in combination with other thickeners. A more pronounced structure is obtained by adding some ACRYSOL™ SCT-275 Rheology Modifier, whereas a combination with ACRYSOL™ RM- 845 Rheology Modifier results in a smoother, less structured paint surface.

Dispersing Agents

In most formulations OROTAN™ 731A ER Pigment Dispersant (in matt to sheen paints) and OROTAN™ 1124 Pigment Dispersant (in semi-gloss paints) have been found to give good results in systems thickened with ACRYSOL™ RM-2020 E Rheology Modifier.

For high-gloss paints, however, when enamel binders are used, OROTAN™ 681 Pigment Dispersant is suggested. It shows a superior overall performance and acting like flow modifiers, gives a greater degree of gloss reproducibility.

Paint pH Control

In some formulations, a high pH can cause polymer swelling. In turn, this can lead to high viscosity paints and instability. For this reason, paints thickened with ACRYSOL™ RM-2020 E Rheology Modifier are best formulated at around pH 8.0.

In ammonia free, low VOC formulations, it has been proven that potassium tetrphosphate (KTPP) maintains the pH and therefore improves the stability.

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Interactive Effects of the Paint System

The rheology modifying mechanism of ACRY SOL™ RM-2020 E Rheology Modifier is primarily associative. Hydrophobic elements of the molecular structure tend to associate with other hydrophobic elements in the paint. These other hydrophobic elements are mostly latex binder and opaque polymers. Association with inorganic pigments is less frequent, but can exist.

In the end, we get a network of associations, modifying the rheological profile of the paint and giving it the desired flow.

However, associative also means that the rheology of the paint is influenced by a whole range of elements other than the thickener itself. The following factors have a direct impact on the efficiency of ACRY SOL™ RM-2020 E Rheology Modifier in latex paints:

- Latex polymer particle size and distribution
- Latex polymer composition
- Surfactants and cosolvents

Latex Polymer Particle Size and Distribution

The primary site for the associative characteristics of a rheology modifier is the surface of the binder particles. As a consequence, a greater surface area will lead to stronger association. Greater association leads to an increased efficiency. For a given volume of unimodal latex binder, a small particle size binder will have a greater total surface area than a larger particle size binder. Thus, the rheology modifier will work more efficiently with the smaller particle size binder.

When a binder contains a distribution of particle sizes, the answer is not as clear. Here the distribution of particle sizes from large to small will determine the associative conditions more realistically than average particle size.

Latex Polymer Composition

ACRY SOL™ RM-2020 E Rheology Modifier is most efficient with hydrophobic latexes. This hydrophobicity may vary with the latex composition or the stabilising system.

Surfactants

The hydrophobic nature of surfactants allows them to compete with the associative capacity of the rheology modifier for the latex polymer surfaces. If the surfactant is able to displace the rheology modifier, the viscosity that is inherent to the rheology modifier polymer interaction can be reduced considerably. This means that special attention is needed for the type and amount of surfactant that is used, and for the combination with the binder. In addition, consideration must be given to the surfactants introduced with the colorant system. Predispersed colorants generally contain surfactants for stability and to facilitate colour acceptance. Each colorant may have a different type and level of surfactant.

Cosolvents

Water insoluble cosolvents, such as UCAR™ Filmer IBT, have little or no effect on the medium shear viscosity of a paint thickened with an associative thickener. Water soluble cosolvents, however, may reduce the low shear viscosity.

Products such as ethylene glycol and propylene glycol will have the least effect, while butyl CARBITOL™ Solvent will have the greatest effect among the cosolvents tested to date. As in the case of surfactants, the level of cosolvent that is introduced with a predispersed colorant must be accounted for.

One outcome of this cosolvent interaction is the potential to use these products for low shear viscosity adjustments. This can be done very effectively, but with a cost penalty and a potential reduction in water resistance due to the water solubility of these products.

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.
Storage	Store products in tightly closed original containers at temperatures recommended on the product label.
Disposal Considerations	Dispose in accordance with all, local or national 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 or national regulations. Contact your Dow Coating Materials Technical Representative for more information.
Chemical Registration	Many countries within EMEAI require the registration of chemicals, either imported or produced locally, prior to their commercial use. Violation of these regulations may lead to substantial penalties imposed upon the user, the importer or manufacturer, and/or cessation of supply. It is in your interests to ensure that all chemicals used by you are registered. Dow does not supply unregistered products unless permitted under limited sampling procedures as a precursor to registration.
Note on EMEAI Product Line	Product availability and grades vary throughout the countries in the EMEAI area. Please contact your local Dow Coating Materials representative for further information and samples.
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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