

## Rheology Modifiers

*Philip Green, Paint Technology Consultant, comments on the definition and practical usage of physical attributes that are commonly used for the characterisation of coatings. Contact: Philip@iccorp.co.za*

### HMHEC

Hydrophobically modified hydroxy cellulose ether - a modified cellulose associative thickener with improved brush drag and flow. HMHEC is very popular in some markets, it was developed in the mid-late 1980's.

### ASE

Alkali swellable emulsion - an acidic emulsion which solubilises on neutralisation and swells up, thus thickening the water phase. It was launched in the late 1960s as a possible liquid replacement for HEC. ASE's have never really replaced HEC on a large scale but they have found some use in certain product types where low shear viscosity is very important (e.g. textured finishes)

### HASE

Hydrophobically modified alkali swellable emulsions follow the same basic principal as ASE, but their polymer backbones have been modified in such a way that they do not just thicken water but also associate with the other components present in the system (mostly the latex binder, but also with other components). Thus, they not only give a change in viscosity but also a change in rheology (e.g. improvement in flow or restrictiveness) and application properties. They were commercialised in the early 80's but their use has now grown and there are many types available from many manufacturers.

### HEUR

Hydrophobically modified urethanes are water soluble/miscible low molecular weight polymers which do not thicken water but associate with polymers and other paint components to not only increase viscosity but also have a profound impact on rheology and application properties.

The first HEUR was commercially launched in the late 70's and now there are many types available in some markets, for some premium products this type of thickener is dominant.

### Practical Usage

As stated above these four rheology modifiers come in many types from many suppliers, they are also quite system dependent - so much so that very slight formulation modifications can have far bigger impacts than could be expected. The following is a very generalised overview:

- a) MHEC normally are available in only one or two viscosity grades and the rheology imparted is mostly low shear (with some high shear modifications). They are better for brush rather than roller applied finishes but can be used in both.
- b) ASE affect mostly the low shear viscosity, they can for instance be used for high pigment volume concentration or textured finishes.
- c) HASE come in many forms/sources and can impart a myriad of different rheology profiles. It is now almost possible to tailor make HASEs to impart any required rheology for a given system.
- d) both HEURs and HASEs now come in a myriad of forms

and can be used also in combination (e.g. one for high/medium and one for low shear viscosity) to impart the desired rheological profile for a given system.

Please note that the viscosity and rheology imparted by HEC, HASE or HEUR can be very adversely effected by glycol containing tinters. Such changes need to be thoroughly investigated when developing tint bases based on these types.