Coming to Terms: M.F.F.T. = Minimum Film Forming Temperature

M.F.F.T. is the lowest temperature at which a polymer or solid portion of an aqueous polymer dispersion (also called latex or emulsion) self coalesces in the semi dry state to form a continuous polymer film, which in turn acts as a binder for the rest of the solids in the paint film. At temperatures at and above the M.F.F.T. of the polymer the film is formed. At temperatures below its M.F.F.T. the polymer cannot coalesce to form a continuous film and thus cannot bind together itself (or any pigments and extenders that may be present) and a "cracked, crazed" powdery layer results.

**Practical Usage**
M.F.F.T. is normally used as a guide by coatings formulators as to how the polymer will affect the following parameters of any coating in which it is used:
- Ease of low temperature film formation/Storage Stability: the higher the M.F.F.T. the lower the chance of unaided low temperature film formation
- Flexibility: As a rough rule of thumb, the lower the M.F.F.T. of a polymer the more flexible and elastomeric it will be. However, with modern polymer systems this rule may not apply. Flexibility is very monomer dependent: For instance, pure acrylic and a styrene acrylic copolymer emulsions may have exactly the same M.F.F.T. but not have the same flexibility/elasticity.
- Dirt retention/film thermoplasticity: The higher the M.F.F.T. the harder the final polymer film and the less thermoplastic the polymer will be, which in turn means that the chance of dirt adhering to it will be lower.

As usual in coatings technology, we actually require a balance between these properties, and so we tend to manipulate these properties of the polymer either by adding a temporary volatile plasticiser (coalescent) or by altering the polymer backbone morphology (e.g. core/shell-systems) to achieve the desired properties.

**Practical Measurement/Determination**
If you know the exact monomeric build-up of a polymer, it is possible to roughly calculate the M.F.F.T. of a dispersion polymer. However, it is also fairly easy to very accurately determine the M.F.F.T. of a polymer with and without coalescent, using fairly unsophisticated equipment - a copper bar heater/ice and thermocouples/thermometers.

Properties like M.F.F.T. are very polymer composition dependent. They will thus vary from batch to batch, even for mixtures of the same ingredients. Therefore, most dispersion polymer manufacturers indicate an M.F.F.T.-range rather than a specific figure.

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