

Waterbased Coating – Phasing/Stratification

Scope

- Waterbased coating products are manufactured with multiple ingredients that are homogeneously blended during the manufacturing process. As these ingredients can have different inherent weights, the homogenous state of the coating can slowly begin to change when left static as the heavier ingredients begin to drop/sink from suspension towards the bottom of the coating container and lighter ingredients begin to float to the top of the container. This process of ingredients separating and layering within the coating container by weight is referred to as ‘phasing’ or ‘stratification’.
- An everyday example of phasing/stratification is Italian salad dressing – when left static the heavier herbs will sink to the bottom of the bottle whereas the lighter oil will float to the surface. To re-incorporate the ingredients into a homogenous condition prior to applying to a salad, the dressing must be mixed or shaken in the bottle.
- This occurrence is no different for waterbased coatings which need to be mixed prior to use to ensure homogenous condition so that all intended performance characteristics such as Gloss, COF/AOS, Rub and Block Resistance are fully realized.
- When phasing/stratification occurs in waterbased coatings, there will generally be no visible indicators – upon inspection, the coating liquid can appear normal whether viewing in the container or during circulation/use on press.

Phasing/Stratification of Waterbased Coating

- The two primary components in waterbased coatings that are subject to phasing/stratification are the resin ‘solids’ and the waxes.
- The resin solids which will ultimately be applied to the substrate and coalesce into the final coating-film are much heavier and denser than all other components contained in the coating and will inherently drop/sink from suspension towards the bottom of the container if the coating is left static for an extended period.
- The waxes which will ultimately populate the applied coating-film surface to provide slip/lubricity and rub/wear resistance are lighter and more buoyant than all other components contained in the coating and will inherently float to the surface of the container if the coating is left static for an extended period.

Viscosity/Temperature Influence

- The viscosity/thickness of the coating in the container can directly impact the rate and severity in which phasing/stratification occurs:
 - The lower in viscosity/thinner the coating, the more rapidly ingredients can separate and stratify/layer within the coating container.
 - The higher the viscosity/thicker the coating, the more slowly this effect can occur.
- As temperature directly impacts coating viscosity, high temperature exposure will inherently lower coating viscosity which can accelerate and exacerbate the phasing/stratification process, even if the high temperature exposure is only a short-term/temporary condition:
 - This circumstance is most prevalent during summer months in areas of the country where temperatures are consistently >85F, or during periods of peak temperature conditions.
- Circumstances that can contribute to high temperature exposure yielding a reduced relative coating viscosity:
 - In-transit trailer conditions – trailer conditions can reach >130F during summer months
 - Storage in non-climatized conditions – warehouse, dock, exterior storage/trailer
 - Storage near exterior walls or upper areas of a facility where heat/temperature may be most extreme
 - Storage near heat-generating equipment

Mixing

- Pre-mixing the coating is the best means of ensuring the coating product is homogenous for use.
- Use of an adequate mixer for the container size is important to ensure proper mixing capabilities.
- Pre-mix all coating products whether new/unused or used/partial before use – circulation is not mixing.
- Reference the INXCAC technical document on ‘Coating Mixing/Agitation’ for further details on best practices for mixing coating.