



# TECHNICAL C&A INFORMATION

## Coating Mixing/Agitation v1.1

Coatings and Adhesives products are formulations comprised of multiple ingredients, some of which vary in molecular weight and may distribute differently in the coating container as the manufactured product is stored. In order to ensure predictable and repeatable results for the coating product which adheres to the intended characteristics, it is important that these products are mixed prior to use and in most cases agitated continuously during use. This is particularly important when using specialized formulations that are intended to meet very specific performance criteria for the final applied film. Mixing and agitation will ensure that the product in the coating container and coating system is homogenous and contains all necessary ingredients in the formulated proportions. Failure to mix the coating product sufficiently prior to use can result in poor and/or unintended product performance during both application and on the final applied film.

### Coating Mixing/Agitation

#### Mixing Equipment

It is important that the mixing and agitation equipment being used is suitable to achieve and maintain a homogenous condition for the coating product in the container. Examples of recommended mixing equipment are:

- Drum/Tote-mixer; 0.5 - 1.5 HP electric or pneumatic mixer with ~5" impellers
- Hand-held drill with mixing blade/paddle attachment that is suitable for grout/thin-set applications; these can be sourced from most hardware stores

Drum/Tote Mixers can be sourced from the following companies:

- Indco
- Graymills
- Grainger
- McMaster
- UV Process Supply

For specific mixer product recommendations, contact your CAC Technical Service Representative.

#### Initial Mixing, Pre-Production

Prior to using any coating product, the product should be mixed thoroughly in the coating container prior to checking viscosity and circulation for use. Initial mixing should be thorough to achieve a homogenous product in the container. For mixing systems that have variable speed control, the speed of the mixer should be operated as not to create a vortex around the mixer shaft at the coating surface. Creating a vortex will introduce un-wanted air into the coating liquid. Mixer speed should be adjusted to a rate to create sufficient agitation without creating a vortex. Good judgement should be used when determining how long to mix the coating prior to use, however, a general rule of >5 minutes will ensure that the product is homogenous and suitable for use with good results.

#### Production Agitation

When using a mixing system that allows for constant agitation during production/use of the coating, care should be taken to not over-agitate the coating particularly as the drum is consumed and the mixer impellers may become located near the coating surface. Un-like initial mixing prior to use, agitation during production/use does not require the mixing speed necessary to make the product homogenous. In this case, a slow agitation is employed to maintain coating movement in the container which aids in the removal of entrained air that is returned from the coating unit. Air introduction into the coating during application/circulation by anilox/chambered systems and pan return drains must be managed for removal

## Coating Mixing/Agitation - *continued*

### **Production Agitation** (*continued*)

to avoid excessive air/foam build-up in the coating liquid. Slow agitation of the coating will help to move entrained air-bubbles to the coating surface for dissipation, and avoid coating contamination by excessive air-bubbles.

Excessive agitation of the coating liquid during production/use can introduce excessive air into the coating liquid, particularly when a vortex is created by excessive mixer speed, or the mixer impeller is located at the coating surface. As the coating container is consumed, the mixer should be stopped when the lowest mixer impeller is located at/near the coating surface to avoid problems of introducing air into the coating, or over-mixing entrained air located at the coating surface into a foam. When the lowest impeller is near the coating surface, the mixer should be stopped and the remainder of the coating container should be consumed without use of the mixer. If it is determined that the remaining coating is contaminated by excessive entrained-air/foam, the coating should be discontinued from use and replaced with a fresh coating container.

### **Effects of Over-Agitation during Production/Use**

Over-agitation of the coating during production/use can result in contamination by excessive entrained-air and foaming to occur. The results of excessive entrained air-bubbles and foaming of the coating product can be:

- Poor pumping/circulation
- Chamber starvation
- Activation of flow and level sensors of the coating unit
- Over-flow of the coating pan/recovery pan
- Insufficient coating application/coat-weight to the coating blanket/plate and substrate
- Poor coating leveling/flow-out
- Pin-holes in the applied coating film
- Insufficient or varying gloss results
- Unpredictable COF/AOS results
- Poor coating barrier characteristics
- Streaks/voids in the applied coating film
- Insufficient film cure - UV coatings
- Ink back-trap/accumulation on the coating blanket/plate
- Coating misting/slinging with anilox/chambered systems

Coating that is determined to be over-agitated and contaminated by excessive entrained air/foam should be discontinued from use and replaced with a fresh coating container. In the event that excessive mixer speed is the cause of the over-agitation, the mixer speed should be reduced or discontinued use if the minimum speed is determined to be excessive.

Coating containers that have been determined to contain excessive entrained air/foam should be set aside and the air-bubbles allowed to dissipate completely prior to re-use. Dissipation of the entrained air-bubbles could take days depending on the extent of the contamination. While there may be no evidence of large air-bubbles being present on the coating surface, the observation of small pin-sized bursts on the coating surface is an indication that air contamination still exists. Consolidation of contaminated partial coating containers into a single volume can cause the dissipation time to become extended.