
Unconfined Yield Strength

Material Flow Solutions, Inc.



Unconfined Yield Strength is the major principle stress level that will cause bulk material in an unconfined (unsupported) state to fail in shear. It is the primary flow property that governs the development of hang-ups in process equipment. It is generally a significant function of the compaction pressure which has been applied to the material in order to induce failure. It is used to compute critical arching and rat-hole dimensions for a given material in a hopper or bin.

All hang-ups in process equipment result in formation of a free surface. By definition, the stress acting normal to any free surface is zero. However, stresses acting along the free surface may not be zero. In a hang-up condition, the material on a free surface is supported by stresses that act along the free surface and are equal to the unconfined yield strength of the

material. Therefore, measured values of material strength under stress (**unconfined yield strength**) are critical to proper design and utilization of both process system equipment and product characterization.

At Material Flow Solutions, Inc. we measure material strength under a wide variety of temperature and pressure conditions that will simulate your particular process, allowing us to give you process-specific recommendations to improve your product and/or process performance so as to INCREASE YOUR COMPANY BOTTOM LINE.

PRACTICAL APPLICATIONS of **unconfined yield strength** data include, but are not limited to:

- ✿ Preventing process hang-ups
- ✿ Predicting blending
- ✿ Mitigating segregation
- ✿ Predicting agglomerate strength
- ✿ Optimizing tablet production
- ✿ Predicting fluidization problems and solutions
- ✿ Preventing arching and rathole problems
- ✿ Creating consistent feed rates