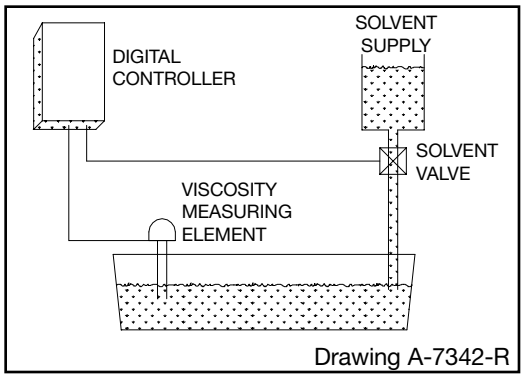
Viscosity Control % of Solids

Application Note 105

A number of industrial process fluids require maintainence of optimum solids content to produce uniform coatings. The manufacture of integrated circuits and printed circuit boards in the electronic industry present a number of examples:

Photo resist coatings
Resins for fiberglass impregnation
Solder Flux for wave soldering
Application of conformal coatings

Similarly in industrial finishing the coating thickness of paint or other material is heavily dependent on maintaining optimum solids content.



Since changes in % solids are related to changes in specific gravity, which can be measured with hydrometers, it has been customary, in some applications, to control % solids by measuring and adjusting the specific gravity. The chart at the right illustrates the degree of control of a solder flux, via a hydrometer, and how much more precisely % solids can be controlled by using automatic viscosity control.

Viscosity is a property of fluids that is extremely sensitive to changes in solids content. NORCROSS viscosity control systems can continuously and automatically control % solids to +- 0.5%. Typically the required solids content is maintained by replacing solvent lost through evaporation.

The basic system is shown in the diagram below and consists of a measuring element, controller and solvent control valve. Viscosity measurements are made automatically twice a minute and displayed by the controller. The controller energizes the solvent solenoid valve to initiate solvent additions, when the viscosity exceeds the set point.

The system illustrated operates at atmospheric pressure. Measuring elements are available for operation on closed vessels at positive or negative pressure and for in-line applications. Control panels for up to 10 stations can be supplied. Visual and audible alarms for viscosities above and below the control point are available.

Bulletins on controllers and specific measuring elements can be requested.

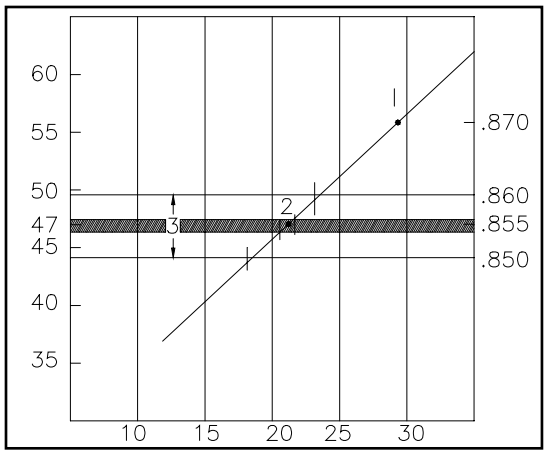
The data for the above graph was obtained with a Norcross viscometer, a laboratory hydrometer and % solids/specific gravity data furnished by a flux manufacturer.

At Point 1, the % solids was 28%, the specific gravity .870 and the viscosity 55 centipoise.

After thinning, at Point 2 the % solids was 21%, the specific gravity .855 and the viscosity 47 centipoise.

The full width of Band 3 represents a specific gravity of +-.005 which is the normal variation variation detectable with a hydrometer. The shaded portion of Band 3 represents a specific grabity of +-.001 and control within this variation can be obtained via automatic viscosity control.

Automatic viscostiy control can maintain % solids between 20.5 and 21.5 whereas specific gravity control via a hydrometer can only maintain % solids between 18.5 and 23.5



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