WETTABILITY

In order for the solution to form an efficient barrier, it must spread over the plate surface in a coherent film.

When a drop of liquid is applied to a smooth, flat surface, it will cover a certain area, i.e. it "wets" the surface.

The surface area that a fixed volume of a particular liquid will cover is controlled by:

1 Composition of the surface

2 Surface tension of the liquid

1 Surface Composition

The structure and chemical nature of the surface will control its ability to be "wet" by a particular liquid.

The background areas of a grained and anodised plate will be easily wetted by water but the image areas will be less readily wetted. This is the basic principle of lithography.

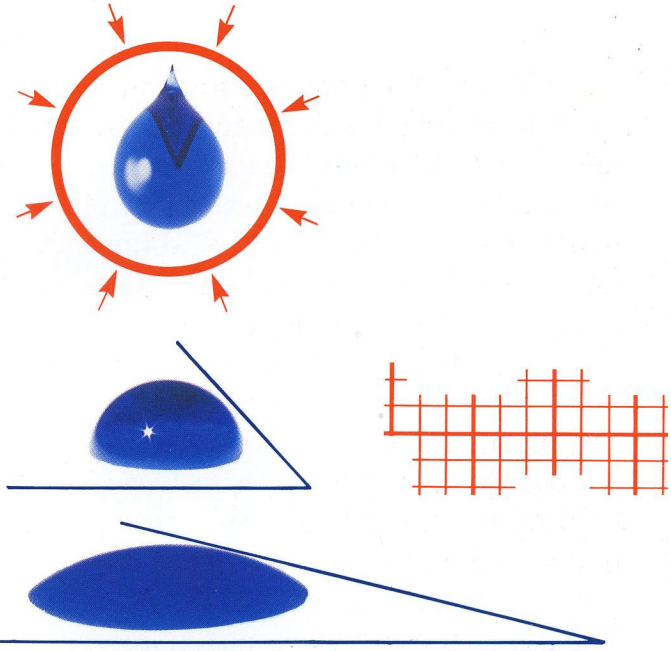
2 Surface Tension

This is a term used to encompass all the various forces which decided whether a liquid will or will not spread/wet a given surface.

All liquids are bound together by physical forces (work of cohesion). In the interior of these liquids, these forces work in all directions. The liquid is stable when these forces are equal.

At the surface of a liquid, all these forces are directed inward, therefore the liquid will contract to give the smallest possible area. This is why drops of liquid become spherical.

Water has a surface tension of 72.8 mN/m (dynes/cm). The illustration shows the behaviour of a drop of water applied to a flat surface. If a liquid with a lower surface tension is applied to the same surface, the same volume will cover a larger area.



The angle is called the contact angle and is a measure of the liquid's "wetting" ability.

When a liquid is applied to a solid (condensed phase) its behaviour is governed by the relative strength of these forces, measured by its surface tension (more correctly this should be called interfacial surface tension). With respect to the printing process these forces can be modified by various means so that the damping solution can wet the ink and the printing plate more effectively. However, they can be modified in such a way that over emulsification does not become a problem.

Alcohol has become the most widely used additive to lower the surface tension of the damping solution. Levels of 5% to 25% are commonly used but the reduction in surface tension is not the only reason why alcohol improves damping efficiency.
It also has the ability to reduce the level of emulsification and is volatile enough to evaporate and not accumulate in the ink film. Much work has been carried out to establish why alcohol behaves in the way it does, but no firm conclusions have been drawn.