



Using Laponite® in silicate based paints

Fields of use

There is an increasing use of silicate based paints as long term protective coatings for mineral surfaces, such as masonry, brickwork, stonework and concrete. These paints contain high levels of sodium or potassium silicate, which react with and generate strong chemical bonds to the mineral surface.

Laponite® products show excellent compatibility with the high levels of alkalinity contained in silicate based paints and can be used to increase suspension stability and develop highly shear thinning and thixotropic structure

Grades

The recommended grade for use in silicate based paints is Laponite® RDS.

Laponite® RDS contains an inorganic dispersant which allows it to be prepared as a low viscosity pre-mix (< 10 cP) at up to 10% solids content in water. When this liquid pre-mix is added to silicate paint formulations with stirring, the effect of the dispersant on the Laponite® is overcome and the paint will develop an increase in viscosity, giving a shear thinning and thixotropic structure, usually within seconds.

An outline procedure for addition of Laponite® RDS into a silicate based paint is given over leaf.

Benefits and advantages

Laponite® is commonly used in very high pH systems and has excellent chemical compatibility with the very high levels of sodium and potassium silicates used as binder in silicate paints.

Silicate paints contain high levels of heavy fillers which can give rise to problems with settling or produce a creamy, paste-like texture that is difficult to apply in thin, smooth films. Laponite® can build high levels of low shear rate viscosity to give good suspension stability, but will shear thin under application conditions to allow the paint to flow and level.

Paints formulated with Laponite® will recover viscosity rapidly after application to give improved sag control.

Laponite® products are entirely inorganic and their use satisfies the target in this market area to reduce levels of organic additives in these mineral paint formulations.

For more information- contact the Laponite team on help@laponite.com

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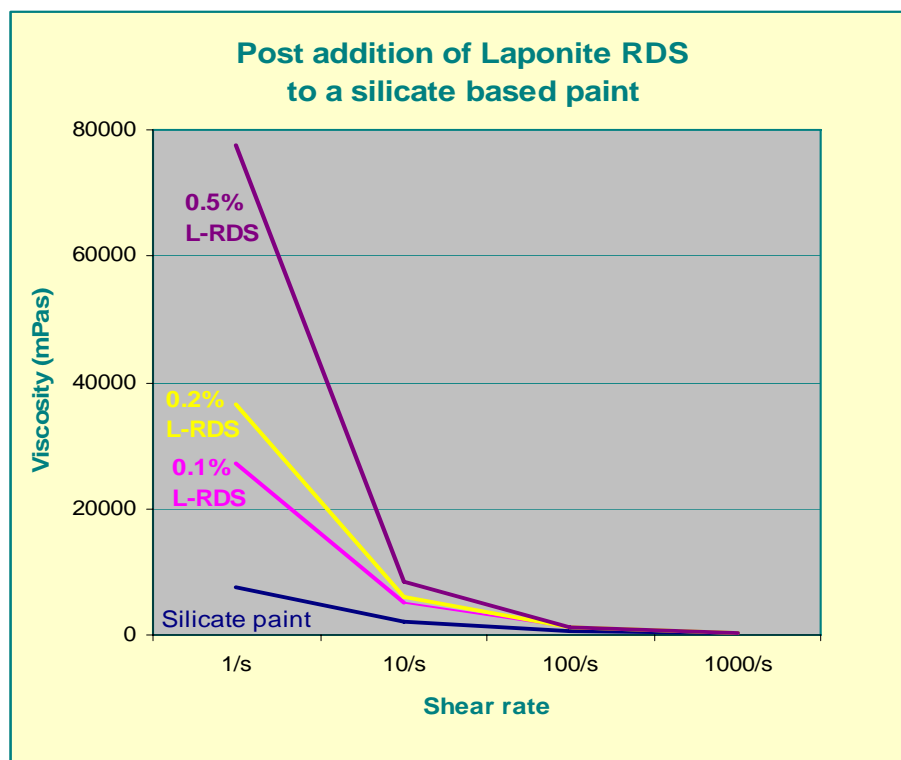
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The graph opposite shows the effect of post addition of Laponite RDS at a ladder of three different levels into a commercially available silicate based paint product. The Laponite was prepared and added to the paint as described in the procedure outlined below. The viscosity measurements shown in the graph were made on the samples after ageing for 24 hours using a Haake RS600 - Measuring system Z40 DIN TI at 23°C.

It is clearly seen that addition of Laponite® develops a very high level of viscosity in the low shear rate range. This viscosity falls rapidly, even under moderate levels of shear stress.

Guideline procedure

A procedure is described below that is suitable for making a small scale lab trial using Laponite® RDS with a silicate based paint. A video titled, "Prepare & activate a Laponite sol grade", showing a similar procedure with an emulsion paint can be seen in The Movie Collection section of the Laponite Technical CD-ROM. A copy of this can be ordered by sending an e-mail to help@laponite.com.

1	Weigh 20g Laponite® RDS powder. Add 180g water into a clean beaker. Set the water stirring using a propeller blade or similar (see Page 6 & 7 of the Laponite® Brochure for more information on this). Ensure that the whole body of the water is moving rapidly to produce a vortex around the shaft of the stirrer.
2	Add the Laponite® RDS powder to the water gradually over ~10 seconds. Continue mixing for at least 15 minutes. At this time, the dispersion should be a relatively clear, colourless, low viscosity liquid.
3	This pre-mix should be aged for a further 30 minutes. After this time it is suitable for addition into the paint and can be stored for up to one week. After this time the viscosity will begin to increase, making it more difficult to add into the paint formulation. Laponite® is completely inorganic and addition of a biocide into the pre-mix is not normally required.
4	Weigh 200g of the paint formulation in a clean beaker and set stirring with an impeller that causes the paint to move smoothly. Weigh 10g of the Laponite® RDS dispersion produced above. Add the Laponite dispersion into the paint and continue mixing until homogenous.
5	This procedure gives an active Laponite content of 0.5% in the paint. An immediate increase in viscosity will occur in a typical silicate based paint.

This example is an effective means to demonstrate the effect and compatibility of using Laponite in the laboratory. Under normal circumstances, the water used to make up the Laponite® dispersion would be taken from the water used in the mill base and/or the let down stage.

Use level

- Typical use level is 0.1% - 0.5% dry mass of Laponite® RDS based on total mass of liquid paint. Best results are obtained when the Laponite® RDS pre-mix is added to the paint as the final step in manufacture.