



Luctolose™ & Hemicel® Guar Gums for Paper

In paper manufacturing, mucilages act as adhesive agents and produce strong bonds between fibrils and fibres once the sheet of paper is dried, thus increasing the strength properties of the finished paper. Although a stock, which has been refined with mechanical means, may produce a stronger sheet of paper, it possesses certain undesirable properties, which reveal themselves in the course of the manufacturing process.

It is well known that the drainage rate of the pulp decreases proportionally with the increase of refining time. This means that a highly refined pulp will drain less rapidly on the wire and will produce a sheet of paper being more difficult to dehydrate. Such a negative property does not only limit machine speed and disallow higher production but it brings about higher consumption of steam in the drying section of the machine.

In addition to this, paper made from a highly beaten stock although being stronger, becomes more dense, more translucent, less compressible less oil receptive and less opaque and shrinks more upon drying.

It should also be mentioned that highly, beaten stocks yield a sheet of paper with reduced tearing strength and porosity. Apart from all the above considerations, It should be pointed out that very high refining is extremely costly because of the enormous amounts of electrical power absorbed by refiners and beaters.

For this reason the paper making industry is constantly looking for a way to hydrate cellulose fibres by chemical means rather than by mechanical ones. In other words, the industry has been trying to find a material that would impart to the surface of cellulose fibres colloidal properties similar to those that are obtained through prolonged mechanical treatment of the pulp.

Luctolose™ & Hemicel® are a series of paper additives developed through years of scientific research. **Luctolose™ & Hemicel®** additives are based on carefully selected natural hydrophilic colloids that are submitted to chemical treatment with the purpose of rendering them similar to the cellulosic mucilages produced in the course of mechanical refining.

Luctolose™ & Hemicel® are available in non-ionic and cationic versions.

When added to the stock in the form of a low concentrated solution shortly before formation of the sheet, **Luctolose™ & Hemicel®** additives develop mucilages of pronounced colloidal character, which influence pulp properties in a very positive way. The adjunction of **Luctolose™ & Hemicel®** to the pulp substitutes mechanical hydration with a physicochemical hydrating action developed by the additives.

Seen from a practical point of view the action of **Luctolose™ & Hemicel®** products on the fibre permits a remarkable reduction of the refining time. This reduction does not cause any loss of strength in the finished sheet of paper. On the contrary, in many cases the addition of comparatively low percentages of **Luctolose™ & Hemicel®** to the pulp will permit an increase in the strength properties of the finished paper, in spite of the reduction of refining time.

As a consequence the reduction of refining time, pulp treated with **Luctolose™ & Hemicel®** will also drain more rapidly because of its rate of fibrillation being sensibly lowered.

The possibility of reducing the beating time, as well as the one of operating with a pulp possessing better drainage properties consent substantial economic advantages which may be summarised in the following points:



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- Reduction of power consumption in the beating/refining stages.
- Increase of machine speed and therefore increase of paper production.
- Decreased steam consumption in the drying section.

The cost of use of **Luctolose™ & Hemicel®** products is compensated by the above advantages as well as by the improvements of paper properties that result from the possibility of using a pulp being refined to a lower degree. In fact such a pulp that conserves its natural fibre structure will yield a sheet of paper which, in addition to regular strength properties, will possess higher porosity, higher opacity, better formation, better compressibility for printing, lower hydroexpansivity and low tendency to curl and cockle. Such a sheet of paper will also show better tearing strength leaving refining degree of pulp as well as all the manufacturing conditions unchanged. Paper treated with **Luctolose™** will show higher strength properties in comparison with untreated papers in practice, increases of 15-20 per cent may be obtained in bursting strength (Mullen) and 10-15 per cent in breaking length.

With an addition of comparatively low percentage of **Luctolose™ & Hemicel®** to the pulp, folding endurance may increase up to 80 per cent, and very remarkable improvements are also obtained in stretch properties of the finished paper.

The use of **Luctolose™ & Hemicel®** also helps the papermaker in solving the problem of substituting 100 per cent coniferous softwood pulps with softwood hardwood mixtures. The strength enhancing properties of **Luctolose™ & Hemicel®** afford the use of mixtures in which up to 10-15 per cent may be represented by hardwood cellulose, without reducing the original strength properties obtained with 100 per cent coniferous pulps

Experience demonstrates that filler retention may be increased quite substantially when **Luctolose™ & Hemicel®** is added to the pulp according to a new technique of use. Retention of mineral substances such as titanium dioxide and china clay, being generally used as sheet fillers, may be increased up to 20-25 per cent, thus affording a remarkable economy in raw material cost. The strength enhancing properties of **Luctolose™ & Hemicel®** ensure unaltered filler content of the finished sheet. **Luctolose™ & Hemicel®** additives possess high affinity for almost any kind of pulp although their effectiveness is more accentuated with pure sulphate and sulphite pulps. **Luctolose™ & Hemicel®** additives can therefore be used quite successfully in a number of paper and board grades including kraft, wrapping paper, printing and writing paper, newsprint as well as many kinds of boards.

Luctolose™ & Hemicel® products are generally used as wet-end additives in the form of a low concentrated solution, which is added in continuity to the pulp prior to sheet formation. Head Box, Mixing Pump or Mixing Box generally represents best addition points.

Percentages of use of **Luctolose™ & Hemicel®** products range between 0.25 and 0.6 per cent (calculated as dry product on finished paper) and are generally sufficient to yield optimum results.