

## Cotton

*Cotton or chemical wood pulp for long-term archiving? Research tests have come to a clear conclusion.*



### Description:

KLUG-CONSERVATION has been involved and dealing for many years with the development and production of age-resistant, permanent matting and conservation board qualities based on the ISO 9706 technological standard. The constant monitoring of technical changes taking place within the paper industry, has made it possible to ensure and guarantee extremely high qualities of permanent board and paper materials suitable for long-term archiving purposes.

Here are a few examples regarding the changes and developments that have taken place within the paper production industry:

- Increase usage of synthetic calcium carbonates (PCC) instead of natural carbonates (chalk) (GCC)
- The use of various genuine recycled fibres (DIP = Delinked Pulp)
- Changes within water purification methods
- Use of aluminium sulphate ( $Al_2(SO_4)_3$ ) even for neutral sizing.

Unfortunately not all factors influencing the ageing of paper have been researched adequately thus to counter act, we „KLUG-CONSERVATION“ have taken the necessary measures.

Since many years, one has been always been able to read articles in promotional brochures and other publications, claiming that paper made from cotton pulp was more durable and than that made from cellulose pulp. Below, you may please read an opinion written about the use of cotton pulp for long-term archiving.

The Fine Art Trade Guild – Trade Association for the Art and Framing Industry – and various other competitors believe and claim that passepartout/matting board materials used within museums, and naturally ideal for long-term archiving, should be manufactured from cotton pulp (cellulose paper). So quotes „The Fine Art Trade Guild Association“ on their website about the usage of cotton: „Cotton Museum Board is the only standard of mount board suitable for Museum level framing“.

Products made with materials based on cotton fibres meet the highest standards for long-term archiving and offer the best environmental protection for the artefact being preserved.

The view that cotton fibres used for the manufacture of paper and board, are cellulose fibres derived from the textile part of the cotton plant, is absolutely wrong and incorrect – excluding of course some speciality papers e.g. that are used for banknotes. The aspect that cotton fibres are fundamentally a different type of fibre in comparison to cellulose fibre, which is made from the basic raw material wood or other plant parts such as grasses or leaves, is also incorrect.

Below, please find a few technical explanations:

**Rags**, are basically made from textiles, in other words from already processed plant or animal fibres. Previously, the fibres were mainly flax and hemp fibres; later on cotton fibres were used. Cotton based board material is not manufactured from rag but from linter cellulose. The fibres used are exclusively the visible, long fibres of the cotton plant (12 to 50 mm). Cotton pulp for special papers – are obtained from cotton rag, processed cotton fibre material, passepartout/mats are NOT counted for in this category.

**Cotton linter**, the raw material used for paper and board manufacturing are the short fibres that remain stuck to the cotton seed after the cotton fluff (seed fibre) has been removed. These more contaminated fibres are cut more often thus resulting in a first and second cut. Due to their high content of impurities they have to be boiled and bleached. These fibres are very economical because they are basically a by-product within the textile industry. Other factors also leading to their economical price are their various lengths (1 to 6 mm), great variation in contamination content, un-spinable etc. In the paper industry cotton linter is particularly used for soft and absorbent products.

„**Paper with rag content**“ possesses due to commercial reasons basically a higher content of cotton linter, up to 5 – 10 % more. The functional significance why this is so has not been defined as yet. The cellulose content is approx. 90 % (alpha cellulose) wood pulp fibre (ECT) (residual hemi-cellulose) and the cotton linter content is 5 – 10 %.

KLUG-CONSERVATION has had the scientific difference between cotton cellulose fibres and wood based cellulose fibres analysed by an independent research institute, Paper Technical Foundation PTS Heidenau, and you may read the study report written by Dr. Klaus Eberhard [here](#).

Please note that in the analysis report of Dr. Eberhard only the „virgin“ type cellulose fibres were taken into consideration. During the production of paper and board material, these fibres are cut, crushed and ground, fraught with fillers, adhesives, colour and with a number of other chemical substances. They are then dried on the paper machine, again re-moistened in the size press, thereafter dried and then finally again crushed and ground, the last step is actually referred to as either calender smoothed (machine finished) or calender glazed. During this process the marginal differences existing between these two cellulose fibre types basically gets equalized. The kappa value test prevalently available on the market clearly points this out (kappa value indicates the actual percentage of oxidizable constituents):

- Board made of cotton fibres „Type 1“ – Kappa value 0.54
- Board made of cotton fibres „Type 2“ – Kappa value 0.55
- Board made from chemical wood pulp (alpha cellulose) KLUG Museum board „Quality 01705“ – Kappa value 0.56.

Both the fibre type (cotton cellulose pulp and chemical wood pulp) initially have sufficient potential strength to cope with and meet the demands for further processing. Most essential during paper and board manufacturing is to make sure that no harmful endogenous and exogenous impurities (pollutants) get active, as they are responsible for degradation reactions, resulting in the ageing and decay of paper. Therefore, it is vital that the technological developments within the paper production industry are recognized early, so that if required, precautions (preventive measures) can be taken. Unfortunately the paper industry adheres in no way to pre-requisites regarding age-resistance of paper and board while developing their products.

The best guideline is by taking the ISO 9706 standard consistently into consideration while manufacturing age-resistant, permanent and conservation quality board and paper materials suitable for long-term archiving.

Further information, such as our Guarantee of Quality, certificates of independent Testing Institutions and information regarding application methods and instructions are stated on our website [klug-conservation.com](http://klug-conservation.com).

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