

Testing Book Cloth for Library Bindings

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In October, LBI received the following request from a librarian: “*Would you be able to direct me to any reports on testing of book cloth? I am specifically wondering if any testing has been done on the lighter-weight Japanese cloths?*”

This is indeed a most interesting question. Although this request sounded simple, initial research raised more questions than answers. Yes, it would be easy to go to a filing cabinet and pull copies of tests for a particular substrate or coating conducted for various clients. Unfortunately, that cannot be done. When specific tests are requested and a fee is paid, the results are owned by the client. This ownership and confidentiality prohibit distribution of the information to a third party.

Why are questions about testing cloth difficult to answer? First, take a look at my article on book cloth “*Binding Books in Cloth.*” This article, originally published in *The Library Scene*, December 1981, can also be found in a current LBI publication, *Technically Speaking*, page 46. It describes in-depth the various substrates, fillers and coatings. At least in North America, each type of cloth must meet strict manufacturing guidelines. No manufacturing standards for book cloth produced abroad exist, or at least, this writer is not aware of any.

Types of thread, weave, thread counts, fillings, coatings, etc. are a complex matter. Tests on cloth, including surface abrasion, strength, breaking strength, folding endurance, fading, and water resistance are done on pieces of cloth and not on bound books. While the tests produce various results, one cannot draw valid conclusions from them, rendering them essentially useless. Books come in different shapes and dimensions. As every librarian responsible for collection maintenance knows, a big, heavy book with loose joints will destroy any binding material in no time, whereas a light weight binding will last virtually forever. This is why, in all fairness, we can test only one apple against another, that is, identical books covered with different materials.

Technical information on testing book cloth is extensive and may, for lay people, be difficult to swallow. This is why we will keep this article very basic and simple.

A Primer in Book Cloth

In order to understand the various book cloth qualities, North American standards list the following categories. It should be noted that all the qualities listed below are finished in various ways including Starch-Filled, Natural Finish, Impregnated and Coated (Imitation Leather), and Embossed.

Category # 1 - Light Weight Threads

- Grade A Light weight cloth with a minimum amount of warp and fill.
Used for inexpensive bindings when cloth is preferred over paper.
In this category, never assume “cloth” always means quality since it is an open weave gauze with lots of starch filling.
- Grade B Medium weight cloth used for bindings where the beauty of cloth is stressed and the durability of the binding is not so important.
This is used on light to medium weight books.
- Grade C Dense, heavy duty and tightly woven substrate. Excellent performance on all types of bindings which do not exceed 2 to 3 pounds. This is used for school text books and any other products where the beauty of cloth and strength are important.

Grade C-1 More tightly woven substrate that meets the ANSI/NISO/LBI specifications for library bindings of books weighing less than 2 pounds.

Category # 2 - Heavy Duty Threads Woven in Various Patterns

Grade D Light weight buckram usually used for large coffee table and art books where the beauty of cloth is valued. Heavy duty threads enhance the appearance especially on natural finished or starch-filled cloth.

Grade E Medium weight buckram where durability and the heavy linen look are important.

Grade F The only heavy duty buckram that qualifies to be used for heavy duty library bindings. It meets the ANSI/NISO/LBI specifications and is simply the very best quality.

Cloth from Abroad

Some beautifully finished, natural book cloth is imported from abroad. An example is the Japanese bookbinding cloth. A catalog describes the 60+ varieties as “non-coated, natural finish fabrics with exceptionally brilliant colors.” Most are made with 100% Rayon.

A German book cloth manufacturer describes a very fine woven pattern as “Balloon” linen and a very heavy, rough natural finished cloth as “Sack” linen. Why such names? Since there are no specifications or performance standards, these cloths are distinguished by their names.

The best way to obtain specifications for a particular binding material is to contact the material suppliers.

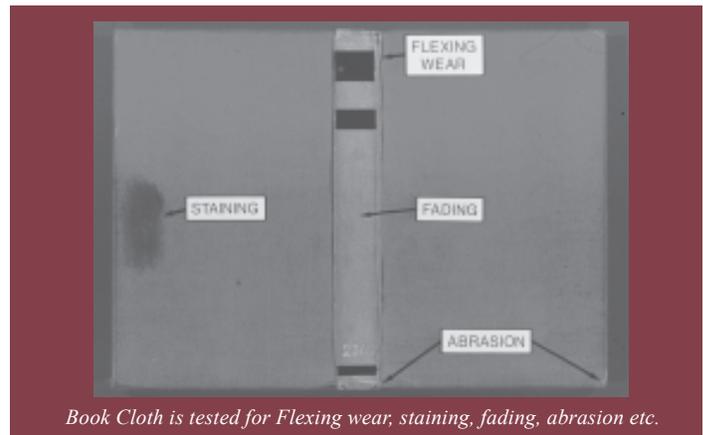
Definitions of Tests and Procedures

The tests required are complex manufacturing specifications. Below are some of the most important ones:

Abrasion Resistance – The degree to which a fabric is able to withstand surface wear by rubbing. To compare one with another, take a weight and 320 grade sand-paper. Without pressure, move the fabric over the surfaces and then compare.

Blocking – This refers to surface tackiness and requires artificial aging. Migration between vinyl coated fabrics and pyroxylin coated book cloth used to cause books to stick together.

Breaking Strength – This is used to test the cloth in two ways, warp and filling. Certain qualities require appropriate results. See page 16 in the ANSI/NISO/LBI Standard. F-Grade



Book Cloth is tested for Flexing wear, staining, fading, abrasion etc.

Buckram requires 120 pounds in the warp and 80 pounds in the filling.

Colorfastness to Light – Tested on a Fadometer, it tests resistance to light.

Crocking – This refers to the transfer of coloring matter from the surface of cloth to another cloth.

Filling – Yarns running from selvage edge to selvage edge at right angles to the warp in a woven fabric.

Grey Cloth – Fabric which has received no bleaching, dyeing or finishing treatment.

Heavy Filling, Heavy Warp – A filling yarn larger in diameter than normally used in fabric. This is used to aesthetically enhance a particular pattern.

Impregnated – A fabric in which the interstices between the yarn are completely filled with impregnating compound throughout the thickness of material, as distinguished from sized or coated materials, where the interstices are not completely filled.

Plain Finished Fabric – This is finished fabric which has received no surface design such as embossing.

Thread Count – The number of warp and filling yarns per inch in a woven fabric.

Warp – The yarns running lengthwise in a woven fabric.

Water Resistance – Resistance to water spotting with no penetration after 10 minutes.

Physical Testing of Cloth Bound Books

As stated earlier, since there are hundreds of materials to choose from, there is no single answer to questions about testing book cloth. Virtually every bound book is different.

(continued next page)

Some are small, thin, and light weight, others are heavy and thick. Some of the material within the text blocks are made of uncoated paper stock, others have slippery, coated papers. On some books, the papers are mixed. Grain direction may play a role as well. Then there are upright, oblong and square formats. Simply look at any library shelf to see my point. When it comes to bookbinding, there are many variations.

Even if they are bound within the NASTA/LBI specifications, there are always some deviations, especially in the joint areas, which affect the performance of a binding. A side sewn book is stiff in the spine. There is no shifting within a text block. An adhesive bound text block, especially if it contains coated paper stock, will create internal shifting which, again, affects the performance of the covering materials used. A smooth surfaced covering material slides better and does little harm to the text block, whereas a rough surfaced cloth offers resistance which can more easily damage the text block.

These are all observations I have made in 25 years of physical book testing. The very best test to simulate actual end use and the performances of various covering materials is the UBT Universal Book Tester which you can learn more about in my article "Performance Testing with the Universal Book Tester" in the book *Technically Speaking* (page 131) published by the Library Binding Institute (LBI). This unique testing device, sponsored and built for an extensive American Library Association (ALA) testing project, gives better results than if the individual pieces of cloth are tested. The reason is because the test incorporates all aspects of a book as previously described. In other words, UBT tests are more accurate than simple laboratory tests.

New Developments in Book Cloth

Pyroxylin coated book cloth used to be the standard. Since 1929, this coating protected library bound books from dirt and smudges. Substrate made from 100 percent cotton was the standard of the industry. With increased environmental awareness, it was discovered that the application of Pyroxylin coating created dangerous fumes. This is why acrylic coated book cloth is used today. In addition, book cloth manufacturers found that by mixing cotton and polyester, they are able to achieve a much better product. Called F-Grade poly-cotton buckram, the substrate contains 65% polyester and 35% cotton. The coatings are 100 percent aqueous acrylic. The pigment coating contains no heavy metals and the top coating, a clear coat for ultimate protection, is also aqueous acrylic. The pH level is 8.5. Best of all, today's F-



Cover materials were tested at the former LBI/RIT Book Testing Lab. From left to right: Stoll Abrasion (cloth specimen only), UBT and Tumble for bound book testing

Grade Buckram is a thinner, more consistent material than the previous traditional buckram. Due to this, turn-ins and corners are tighter and the hinges open up more freely without stress on the end sheets or the book block.

C-Grade cloth for lighter library binding has undergone similar changes. Best of all, these new developments in high quality book cloth resulted in a quality that outperforms its predecessors in abrasion resistance, tensile and tear strength tests. The good news

is they do meet and exceed all specifications of the American National Standards Institute (ANSI) Standard for Book Cover Fabrics and of course the ANSI/NISO/LBI Standard for Library Binding.

Like Japanese book cloth, many kinds of book cloth manufactured abroad are made with 100% synthetic material. Personally, I love the natural finishes since nothing beats the touch and feel of real cloth. However, when it comes to library binding, the primary goal is to create a usable, high performance binding, and that requires a strong, specified substrate and most important, a protective coating. Years ago, a well-known British preservation bookbinder raised an objection to our F-Grade library bindings. He did not like the clear coating and stated "that a beautiful, heavy duty natural cloth would truly enhance our library bindings!" Well, we had to tell him that while we sympathized with him from an aesthetical standpoint, the reality is that library bindings must endure a rough end use environment. Not only are library books sometimes tossed about, they usually get dropped down into a return box, and at times, must endure the various foods that students eat while studying. What better tests do we have than studying the performances in reality?

For 100 years, librarians and library binders, in close cooperation with book cloth manufacturers, have worked together to create high performance and strong library bindings – the very best in the entire world!

References:

- ANSI Standard L29.1-1977, Fabrics for Book Covers
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- Starch-Filled Book Cloth US Government Printing Office; Technical Bulletin No. 21 1934
- Book Cloths, Buckrams, and Impregnated Fabrics U.S. Department of Commerce 1940
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