
GENERAL INFORMATION

A. UNBEATEN FIBER:

Paper is made from the cellulose found in plant fibers. Pulp for papermaking is made by placing dry fibers in water and quite literally beating them to a pulp. Paper can be made from nearly any plant, but those with a high content of long, stringy cellulose work best, such as those used for cloth, rope, or cordage. Each fiber is described in detail in the following pages.

COOKING FIBER:

Raw plant fiber must be "cooked" (boiled in a caustic solution) to remove the non-cellulose impurities. If the fiber isn't cooked, these impurities can rot, discolor, or otherwise adversely affect the strength and archival qualities

of paper. Papermaking fibers that come from cloth need not be cooked as the cooking took place during the manufacture of the thread. Fibers that must be cooked are called "raw" in this catalog.

RECOMMENDATIONS FOR USE:

As a guideline, we usually recommend Cotton Linter #27 for paper castings, Cotton Linter #29 for art paper, and Cotton Rag #89 for calligraphy or book paper. These and other fibers are discussed in the following section. We also recommend our fiber Sampler for a labeled sample of all the many fibers we carry to help choose fiber and pulp and as a teaching aid for instructors.

B. WET, READY-TO-USE PULP:

We make pulp for artists, craftsmen, and teachers all over the U.S. and Canada. They take advantage of our equipment and experience, and avoid one of the more perplexing aspects of papermaking...beating (see below).

PULP MADE ESPECIALLY FOR YOU:

We prepare each pulp to order to ensure that it is just right for your needs. Your pulp is made from any of the many Twinrocker fibers, beaten to your specifications, with sizing and/or methylcellulose added depending on your requirements.

BEATING:

Beating softens the fibers and works water into their intermolecular structure, which makes possible the bonds that differentiate paper from fiber. Well beaten fiber forms many bonds and makes paper that is strong, hard, "rattly", translucent, and that shrinks a great deal during drying. Currency (money)

paper is made from well beaten fiber. Paper made from fiber with little beating (such as blotter paper) has few bonds, is weak, soft, opaque, and shrinks little during drying. These are, of course, the extremes. The pulp for most papers fall in between.

SPECIFYING BEATING:

We use the term "Very Fine" to describe well-beaten fiber, and "Very Coarse" to describe lightly beaten fiber, with "Coarse", "Medium Coarse", "Medium", "Medium Fine", and "Fine" to describe the range between.

BEATING RECOMMENDATIONS:

As a rule of thumb, we usually recommend Medium Coarse beating for paper castings and other three dimensional, sculptural uses, Medium for forming sheets of art paper and some 3D techniques, and Fine for calligraphy and book papers

C. ADDITIVES:

1. SIZING:

Paper is naturally absorbent, like paper towels. Sizing makes paper less absorbent and easier to write or draw on. Twinrocker Internal Sizing is an archival material that is easy to use.

RECOMMENDATIONS FOR SIZING:

Always use sizing as it protects your work. Use unsized ("waterleaf") paper only if "bleeding" or wicking is an important aesthetic effect in your work. Directions for use are on the label.

2. METHYLCELLULOSE (CMC):

An archival material made from cellulose that promotes fiber-to-fiber bonding and, therefore, strength. As a consequence, it also provides some additional sizing effect. We recommend the use of CMC for sculptural casting of paper pulp. We also recommend its use with other techniques whenever the

vital pressing step is not used, or with fiber that has received little beating.

RECOMMENDATIONS FOR CMC:

Use CMC for paper castings, and other sculptural techniques.

3. CALCIUM CARBONATE:

A buffer to protect the paper from an acidic environment after it is made. It can also be used as a white pigment.

RECOMMENDATIONS FOR CALCIUM CARBONATE:

Use when archival qualities are a major concern.

4. KAOLIN (CLAY):

When added to pulp it reduces shrinkage in drying.

RECOMMENDATIONS FOR KAOLIN:

Use for casting and other sculptural techniques.

SUMMARY OF READY-TO-USE PULP RECOMMENDATIONS:			
Papermaking Process	Fiber	Beating	Additives
Casting and other 3D Techniques	Cotton Linter #27	Medium Coarse	1. Sizing 2. CMC
Forming Sheets of Art Paper	Cotton Linter #29	Medium	Sizing
Forming Thin Sheets of Book or Calligraphy Paper-	Cotton Rag #89	Medium Fine	Sizing

STORING PULP:

If you cannot use your pulp at one time, it is possible to store it for a while. An unopened pail of cotton linter pulp will last up to several months, if kept cool. Opened pails won't last as long, due to moles, spores, etc. from the atmosphere. While you are using it, make sure your hands and your tools are clean, and reseal the lid as soon as possible. If you must store your opened pulp for a long time, add a capful of chlorine bleach to a gallon or two of water, add to the pulp, and stir thoroughly. Let it sit for awhile, and then rinse it thoroughly in clean water. Cotton pulps are the only ones that will last for more than a week or two; fibers such as flax, abaca, hemp, etc. just won't last...use them when you get them. You can, however, freeze pulp, but after defrosting, you must use a mechanical stirring device (such as a paint stirrer chucked into an electric drill) to get the lumps out.

PAPERMAKING FIBERS

ABACA

Abaca (botanical name *Musa textillis*) comes from the leaves of a type of banana tree grown in the Philippines and is often called Manila hemp. It is a very long fiber that is high in tear strength. It is soft if prepared in a blender and hard and rattly if prepared in a beater. Abaca has qualities of both Oriental and Western fibers and can be used with or without a formation aid. Currently available in two forms:

A. *Unbleached Abaca*. This Abaca is a creamy tan color. Comes as half-stuff in sheet form, ready for beating.

B. *Unbleached Abaca with Specks* Darker than A. with darker specks. Comes as half-stuff in sheet form, ready for beating.

C. *Bleached Abaca*. Paler than above, actually an off-white. Comes as half-stuff in sheet form, ready for beating.

COIR

Coir is fiber from coconut husks that is an unusual brown color. It isn't quite as exotic as it sounds and looks; Coir has long been used for welcome mats. It must be cooked in a caustic to be used for papermaking and

provides an interesting fleck when combined with other fibers. Long, loose strands of raw fiber ready for cooking and beating. Fiber artists use Coir as is in their work as well.

COTTON

Cotton (botanical name *Gossypium*) is a strong, versatile fiber that comes in many forms. It is called a "seed hair" as it surrounds the seed in the cotton ball. When the cotton is ginned, the long "staple" fibers are separated from the seeds and are used to make cloth. Cloth scraps from the garment industry are the source from which papermakers receive their "rag" fibers, and there are many varieties depending on the length of the original fiber and the subsequent treatment, such as bleaching. The remaining cotton seeds are a further source of fiber as they are covered with short thick fibers known as "linters". Cotton fiber is available in three forms, Cotton Linter, Cotton Rag, and Raw Cotton.

A. *Cotton Linter*.

Linter is the young cotton fiber closest to the seed. It can be made into any type of paper from thick, absorbent sheets to thin, rattly ones; it is the primary fiber used for machine

made "cotton content" paper. Cotton linter is a relatively short fiber with thick walls, when compared to cotton rag or linen, and is therefore particularly suited to thick, opaque papers. We stock two types of linter fiber, both are bright white in color:

1. TR# 27 is a first cut linter that we suggest for casting sculpture as it shrinks less in drying but is also suitable for sheet forming when a soft or absorbent paper is desired.
2. TR# 29 is a first cut linter used mainly for sheet forming but also used in 3D media when strength or detail is important. Both types of cotton linter fiber come in sheets measuring about 36"x40" and weighing about 10-12 ounces, and are priced the same. Please note, however, that they are priced by the pound rather than by the sheet as the weight per sheet can vary considerably. Proper beating in a Hollander is best.

(COTTON continues on the next page.)

B. Cotton Rag

This is 100% Staple Cotton that is called "rag" because it is made from new garment cuttings. Staple cotton is a much longer fiber than linter and makes a stronger, harder sheet of paper that shrinks more in drying. It is well suited for watercolor and book papers.

TR# 89 a bleached muslin that is warm white in color. Rag fiber is called "half-stuff" because it has been broken out of the cloth into

near thread form and is therefore half-prepared.

C. Raw Cotton

The longest, strongest cotton fiber we have yet seen. It is unbleached and uncooked, and should be cooked in a mild caustic to remove non-archival impurities. It makes a very strong, hard paper that shrinks a good deal during drying. It is the natural color of cotton, as in unbleached muslin. Loose strands of fiber ready for cooking and beating.

ESPARTO

Esparto is a fiber from the esparto grass plant. Its botanical name is *Lygeum Spartam*. The fiber has historically been used in the manufacture of cordage, shoes (espadrilles, which got their name from the fiber), and baskets. Esparto fibers are relatively short, and

not terribly strong...more like wood pulp than cotton or linen. It shrinks very little in drying, however, and is therefore a good casting fiber. It comes as half-stuff in sheet form, and is sold by the pound.

FLAX AND LINEN

The flax plant (botanical name *Linum Usitatissimum*) is used to make linen cloth. It is a "bast" fiber in that it comes from the inner bark of the plant. Three types are available: Raw (uncooked) Flax, Flax Half-Stuff (in sheets), and Linen Rag.

A. Raw Flax:

When flax fiber is processed, it is divided into two grades: Line Flax, combed clean of any straw, which is used for linen cloth, and Flax Tow, which has been combed only once, so it includes some straw and other impurities. Raw flax fiber is very long, strong, and interesting, but must be cooked in a caustic solution to remove the non-archival impurities. This fiber makes a strong paper that is hard, brittle, and rattly but will shrink considerably in the drying process. Used alone or mixed with other fibers, flax adds strength and aesthetic interest. Two types of raw flax are available:

1. Raw Line Flax: This pure line flax has been chopped into 2 in. lengths for easier cooking and beating. It is a natural tan color.

2. Raw Flax Tow: This is an unrefined fiber with straw and other impurities. It must be cooked for papermaking. Long, loose strands of fiber ready for cooking and beating (also suitable as is for weaving or sculpture).

B. Spanish Flax Half-Stuff:

European flax fiber that has been cooked and partially prepared in a Hollander beater. The fiber is off-white in color, having been lightly bleached. It is in sheet form, ready for beating. It is called half-stuff because the cooking and breaking is about half the preparation needed and the flax is therefore half-prepared

(FLAX AND LINEN is continued on the next page)

C. Linen Rag:

Quality Linen is woven from combed, white line flax. It makes a paper that is slightly translucent, rattly, hard, strong (excellent folding strength) that tends to shrink a great deal in drying. Two colors are available:

1. *Khaki*: khaki-colored fabric scraps.

2. *Black Linen*: beautiful black linen fabric scraps.

KAPOK

This is a naturally hollow, seed-hair fiber that grows in a pod on a tree found in the South Pacific. It is a beautifully silky, creamy colored fiber that can make a lovely translucent paper when formed into a thin sheet and is a beautiful fiber when used raw by fiber artists. Available in two forms:

A. *Raw Kapok, Pale* with specks, and

B. *Raw Kapok, Dark* with more specks. Both are long, loose, strands of fiber ready for cooking and beating. They are hollow, however, and float in water. The air pockets must be crushed and broken before cooking, so the fiber will sink in water.

KOZO

Kozo is the most common of the Japanese papermaking fibers. It comes from the inner bark of shoots of the Kozo (Paper Mulberry) plant, which are harvested annually. Kozo fiber has three layers of bark: the outer black bark, green bark, and the inner white layer. The fiber we carry has had the black bark (chiri) removed, which saves you a lot of chiri picking. The secondary green bark layer, however, has not been removed. fiber from the green bark makes perfectly good

paper but not as white as when it is removed. These fibers are strong and very long but must be cooked in a caustic solution before using. They are much easier to beat than cotton or linen and can, in fact, be beaten by hand. A Hollander beater is much too severe for these fibers. Traditional sheet forming requires the use of a formation aid, see the Additives section. We do not offer these fibers in pulp form as they work better when beaten by hand or with a stamper.

MAGUEY

Maguey (botanical name *Furcraea*) is from a fleshy leaved type of agave plant. It is surprisingly similar to Abaca in texture and strength.

Maguey is grey brown in color with darker fibers visible. It comes as half-stuff in sheet form.

RUSSIAN HEMP

Hemp has a long history as a papermaking fiber; it was as common as linen in Europe from the 14th to the 18th century. This is an unrefined fiber that has been combed to remove most of the straw. It is a long interesting looking fiber that is a natural brown with

a greenish cast. Hemp makes a very strong, rattly paper with high shrinkage. Long, loose strands of fiber that are ready for cooking and beating (also suitable as is for weaving or sculpture).

SILK

Silk textile scraps in mixed colors, available while quantities last. Call for color description

SISAL

Sisal (botanical name Agave Sisalana) is a leaf fiber that has been used for cordage for centuries. It has a lovely, golden cream color. Available in two forms:

A. Raw Sisal, long golden strands of fiber ready for cooking and beating (also suitable as is for weaving or sculpture).

B. Sisal Half-Stuff, golden cream in sheet form ready for beating, that makes a pleasant, soft paper.

WHEAT STRAW

Golden wheat straw (raw) from the Brookston area of Indiana. It makes nonarchival paper unless cooked in a caustic solu-

tion, which removes the impurities but leaves most of the color. Long, loose strands of fiber ready for cooking and beating.

JUMBO FIBER SAMPLER

Labeled 1/8 lb. samples of each of the twenty-one fibers we carry. These larger samples contain enough fiber to use or test and still

leave enough to keep as a permanent reference



Raw flax fiber and linen fabric scraps

PIGMENTS AND OTHER ADDITIVES:

TWINROCKER PIGMENTS

Pigments are the only truly lightfast colorants. Pigments are chemically inactive and therefore very stable. Dyes, on the other hand, impart color through a chemical reaction and are therefore susceptible to further chemical reaction (fading) due to sunlight or heat. Pigments color simply by being there, and have no particular affinity for the fiber. Twinrock Internal Sizing, however, has an affinity for both fiber and pigment, and is therefore said to 'retain' the pigment on the fiber. Retention Agents have the same effect. Our pigments are 'aqueous dispersed', which means that they are finely ground and dispersed (in a concentrated form) in water. The pigments can be combined to create any color either before or after being retained to the pulp.

Use of Pigments:

Pigments should be added to ready-to-use pulp before the pulp is added to the vat. The pulp should be relatively thick, "sloppy", but not "clumpy", and not too "runny". The white pulp itself acts as white color, for pastel shades simply add a tiny amount of pigment to the pulp. Intense colors require more pigment. Pigments may be mixed to create greens, oranges, etc. before adding to the pulp, or previously colored pulps can be mixed together, just like paint. The pigment is "retained" on the fiber either with Twinrock Sizing or Retention Aid 201. If you use Retention Aid 201, add a small amount to the pulp before adding pigment, and then add a little more after. In either case, the color is properly retained when the fiber is colored and the water is clear.

Making ink:

When mixed with an appropriate binder, such as spirit gum or gum arabic, these pigments work well as calligraphy inks.

Individual Pigments:

We offer pigments in two and four fluid ounce, eight fluid ounce (half-pint), sixteen fluid ounce (pint), and thirty-two fluid ounce (quart) plastic jars.

Thirteen Different Colors and White (and their Color Index numbers):

Black (Black 7), Magenta (Red 122), Cool Red (Red 170), Warm Red (Red 3), Red Oxide (Red 101), Yellow Ochre (Yellow 42), Warm Yellow (Yellow 42), Cool Yellow (Yellow 83), Turquoise (Green 7), Blue (Blue 15:3), Violet (Violet 23), Raw Umber (Yellow 42), Burnt Umber (Red 10), and White. White (titanium dioxide) is normally used to increase opacity, the white pulp itself is most often used to create pastel shades, simply by using a small amount of pigment to tint the white pulp.

Pigment Sampler Set:

One of each pigment we carry, excluding white, thirteen in all (white is a special case, see above). Our Pigment Sampler available in each of four different sized jars (2, 4, 8, & 16 fluid ounces).

Primary Pigment Set:

Warm Red, Warm Yellow, Blue, and Black. Available in each of four different sized jars (2, 4, 8, & 16 fluid ounces).

Secondary Pigment Set:

Cool Red, Cool Yellow, Turquoise, and Magenta (formerly Violet). Available in each of four different sized jars (2, 4, 8, & 16 fluid ounces).

Earthtone Pigment Set:

Yellow Ochre, Raw Umber, Burnt Umber, and Black. Available in each of four different sized jars (2, 4, 8, & 16 fluid oz).

PEARLESCENT OR LUSTER PIGMENTS

Pearlescent pigments can add a magical effect to your art work. They sparkle and glitter when light is reflected from them. They can be added to colored or uncolored pulp. The greatest reflective sparkle comes from the particles of pigment that are nearest the surface of the paper. For this reason, the greatest reflective sparkle comes from laminating a very thin layer of pearlescent colored pulp onto the surface of the base sheet. The coloring process is the same as with our standard

aqueous dispersed pigments, see "Use of Pigments" in the previous section. Pearlescents can also be sprinkled onto wet paper pulp, or rubbed onto dry paper. They can also be added to inks and pastels, or to acrylic polymer medium or gum arabic to make paint.

Whites: Sparkle and Super Sparkle

Metallics: Sparkle Gold, Golden Bronze, Copper, and Super Russet

Colors: Blue, Red, Green, Violet, and Orange

INTERNAL SIZING

Paper is a naturally absorbent material. Sizing reduces this absorbency to lessen or prevent bleeding and feathering of watery media. Sizing also protects the fiber from oily media as well as dirt, pollution, &c. Twinrocker sizing is an alkylketene dimer, often called

just "dimer", in concentrated liquid form. It is used by simply diluting it in water and adding it to the pulp before papermaking. Use 37 ml per kilo of dry fiber (3.3 tsp/lb). The (refrigerated) shelf-life is 7 months.

RETENTION AGENT NUMBER 201

Retention Agent No. 201 is a liquid cationic retention agent with a nine month refrigerated shelf life. It is used to attach pigments to paper pulp. Pigments and some dyes have little or no affinity for fiber, but Retention Agent No. 201 has an affinity for both and "retains" the colorant on the fiber.

Mix in water 11 ml per kilo of dry fiber (1 tsp/lb) before use. It can be added before or after the pigments, but we recommend adding just a little before the pigment is added, and then adding just enough more to retain the pigment on the fiber.

METHYLCELLULOSE (cmc)

Methylcellulose (sodium carboxy methylcellulose gum) in powder form is a versatile adhesive which can be added to liquid pulp to promote fiber to fiber bonding and give needed strength to paper castings. It adds some sizing (water resistance) characteristics and also makes the surface of finished art

pieces more durable. CMC must be mixed with water before using: add the powder 2.2 g per kilo (.035 oz/lb) of dry fiber. Methylcellulose works best when added directly to the beater at the beginning of the beating cycle. If you are ordering ready-to-use pulp we can do this for you.

FORMATION AID (pmp)

PMP Formation Aid is used in Nagashizuki (Japanese style) papermaking. It is essential

when using the Japanese fibers and can be used with Abaca to form a thinner sheet.

CALCIUM CARBONATE

Calcium Carbonate is a pure form of limestone that has been ground into a powder. It is used mainly to provide an alkaline reserve in paper which promotes longevity. It is use-

ful as a filler to retard shrinkage in paper castings and to make a smoother surface. It can be used in sheet forming to improve opacity and whiteness .

CLAY

Clay, or Kaolin, also known as papermakers' clay, (hydrous silicate of aluminum) is a very fine white powder that can be added to pulp as a filler to reduce shrinkage of the paper pulp during drying. It also leaves a smooth

surface to your paper. It is often used as an additive for sculptural techniques. Add 175 ml per kilo (16 tsp per lb) to water spinning in a blender and then to your pulp.

NEW! TITANIUM DIOXIDE

A very fine, very white powder that is mainly used to add opacity and brightness to paper. Like calcium carbonate and clay, it also acts as a filler to reduce shrinkage of paper during drying. We package titanium dioxide

in one pint plastic jars, each jar contains one half-pound of powder. We also carry liquid titanium dioxide that is discussed under white pigment.

NEW! SODA ASH

Soda ash is a mild caustic useful for cooking the relatively delicate raw fibers such as Kozo. This used to be readily available in supermarkets, but since it has left the shelves,

we decided to stock it. We package soda ash in one pint plastic jars, each jar contains one pound of powder.

GLUES for Stationery and Collage

A. Permanent Glue

This is an envelope glue for use on the side seams of envelopes. It is also excellent for collage and all paper gluing because doesn't cause paper to shrink or buckle. It can be added to paper pulp if you want to attach wet pulp to dry paper, or to add additional pulp to paper castings after you have removed the water.

B. Remoistenable Glue.

This is an envelope glue that is remoistenable, for use on the flap. Like the permanent glue, it doesn't cause shrinkage or buckling.