

# INDUSTRIAL LAUNDRY STARCHING



## WHAT IS STARCH?

Starch is found in many plants and is the form in which food is stored for future use, just as animals store fat for use in leaner times.

With rice, wheat & maize, the major sources of laundry starch, the starch is stored in a dry form in the seeds or ears of the plant and is converted to sugars for energy when the seed germinates in wet soil. With potatoes and other plants, starch is stored in the root.

When manufacturing starch the source plants are treated to remove all other materials such as husks, proteins and other impurities which would hamper performance in the laundry environment.

## THE PURPOSE OF STARCH IN LAUNDERING

The stiffness imparted to fabrics to enhance appearance, texture and performance in use.

All fabrics, natural or man made have a tendency to crease, pucker or flop even after high pressure ironing. Starch makes a table cloth lie perfectly smooth on a table with razor edges at the sides, napkins can be crafted into fans and chef hats can sit proudly and professionally on the wearer's head. Starch also gives thin linen more body and a high quality feel.

Collars through the ages have provided the biggest challenge and testimony to the powers of starch with elaborate Elizabethan ruff collars springing to mind, delicately sculpted by devoted maids with goffering irons.

The modern stiff collar is a complex creation that requires great skill to turn a floppy strip of cotton into a smart, perfectly formed accoutrement. We once knew a lady called Alice Allen who worked in a laundry in Surrey for over 40 years, she would have people sending collars from Mexico and India to receive her expert treatment.

## WHAT GIVES STARCH STIFFENING QUALITIES?

When the starch powder is added to water in the final rinse of a wash process the grains of starch penetrate the fibres and swell up. When the articles bearing the starch are later subjected to high temperatures and pressure on a press or calender, the retained water in the fabric turns to steam and the grains of starch burst, releasing a sticky substance called gluten which stiffens and binds the fibres as the item dries and cools.

Correct temperature and pressure are very important to achieving a good starch result as any unburst grains of starch will not give any stiffening effect. The roller pressure is also important to successful ironing of all work, not just starch work.

### Steam pressure & temperature

Recommended levels vary from machine to machine but generally fall between 100 and 170psi giving 170 - 190°C.

Of course, one can see calenders that run at 80psi and 160°C and good starching can be achieved at these levels but only if the calender is run slowly enough to compensate.

We are much happier to see starch work going through a fast high temperature machine where starch grains are burst quickly and aggressively by the instant conversion of retained water in the fabric to steam. On a cooler slower machine more of the starch will be baked rather than burst.

There are also high temperature calenders on the market that operate up to 215psi and 200°C.

### Roller pressure

This can be said to be adequate when a piece of calender tape is fed in 10 - 15 cm, the pull should be firm but not sufficient to break the tape.

### Bed pressure

When a set of calender clothing is well run, the bed pressure should be set at approximately 65psi.

## BEST PRACTICE



As a rule of thumb, good starching will be achieved when steam can be seen rising between the first and second rollers of the calender only. The first roller should burst most of the starch grains and the remaining rollers should merely polish and dry the articles.

A good starch result will ensue assuming that the preceding application of starch in the washing machine has been carried out correctly.

## MAIN TYPES OF LAUNDRY STARCH

### Wheat

This has a medium grain size and gives a tough, pliable film without great stiffness. It gives filling and body to the fabric and is particularly useful on table linen.



### Maize

Maize starch has the largest grain size and gives a much stiffer less pliable cardboard type finish more suited to white cotton coats and aprons but gives less filling effect and minimal gloss. When maize is used on coloured table linen, for example, one can often get a streaking effect on the surface of the cloth. It is the cheapest starch, however, and is therefore used widely.



### Rice

Rice starch has a very small grain size which allows it to penetrate quickly into compact closely woven fabrics such as stiff collars, shirts and hats. Rice starch is more expensive than other natural starches.

Most starches on the market are blends known as combination starches which seek to balance the advantages of various starches in one bag, together with other additives for lubrication, quick penetration and the inhibition of mildew.

## BLENDED COMBINATION STARCH ADDITIVES

### Quarternary ammonium compounds

Act as a wetting agent for quick penetration of the starch. They also act as lubricants which help work through the calender without sticking or leaving deposits on the lip or leading edge. They also discourage mildew growth, which is important because starch is an attractive medium for mildew in a hot damp kitchen.

### Liquid starch

Man made fibres did not respond to normal starching so synthetic liquid poly vinyl compounds were introduced as an alternative form of starching specifically for synthetic fibres. However, these poly vinyl compounds are rather like glue and can stick to fibres, stiffening them on ironing. They can clog calender clothing more seriously than natural starch and cause a build up on the linen over a period of many washes.

## APPLICATION OF STARCH PRIOR TO IRONING

Powder starch is usually applied in one of three ways:

### Dry feed to machine

This is the least desirable as it can clog the hopper of a washer extractor and may not disperse well inside the machine, depositing lumps of starch on the linen which can show up as surface starch after finishing.

### Creamed in a bucket

The starch is creamed with a little cold water in the bottom of a bucket by stirring with a stick or hand. It is then topped up with water and added to the machine. Cheaper, non blended starches are more difficult to cream than blended lubricated starches and they also settle very quickly after mixing in buckets or tanks.

### Mixed in a stock tank

A full 25kg bag of starch is usually mixed in a tank at a maximum concentration of 12.5% (this would represent 25kg in 200litres). This must be agitated continuously to prevent the starch settling out and clogging pipes. This is the method used on batch tunnel washers.

## BEST PRACTICE



Some smaller operations can have problems with cold water starches. This is invariably due to inadequate equipment, often electrically heated irons and presses that are simply not hot enough. In addition, excessive tumble drying can knock most of the starch out even before ironing. In this kind of smaller scale set-up, we recommend the following procedure:

1. Cream the starch with a little cold water in the bottom of a jug.
2. Half fill jug with boiling water and stir (this starts the starch grains bursting).
3. After 30 seconds of stirring, top up jug with cold water and add to machine.

This enables a stiffer result even with inferior equipment.

## WASHERS

### Washer extractors

For successful starching in this type of machine you need a 5 minute final rinse in cold water at minimum dip level. A final high speed extraction of 7 - 10 minutes should leave you with 40% moisture retention (i.e. dry weight of article + 40%) for cotton. Polyester cotton requires only a 3 minute low speed extract to achieve this sort of moisture retention level.

At 40 to 50% moisture retention, table linen should be ready for calendaring with a fully dried starched article as the result.

If extra calender performance is required or in winter when the water supply is colder, the starch rinse may be heated to 40°C after 2 minutes of cold rinsing. This has the effect of increasing the water extraction efficiency and calendaring efficiency assuming that the load is finished immediately after washing.

Starched work should not be tumble dried after washing as this blows away much of the starch, diminishing the final result.


Table linen is rarely tumbled, except for a 30 second conditioning period in tunnel washing systems. White coats and aprons on the other hand are often tumbled before pressing. This tumbling period should be carefully standardised to avoid over-drying and consequent erratic starch results.

### Batch tunnel washers

In a tunnel washer the time and water level components of the starching equation are rarely favourable. The batch time in the last compartment may only be 2 minutes or less, and water levels are too high, even on the latest machines which drop the level in the last compartment to aid starching efficiency by increasing concentration.

Consequently, one uses more starch per kg of work in a tunnel washer.

This increase can be minimised by selecting a starch specially designed for high production use which will penetrate quickly into the fibres during the short time available.



**THE STARCHING EQUATION**

TIME +  
TEMPERATURE +  
WATER LEVEL +  
EXTRACTION

## PENETRATION OF STARCH

Cotton fibres are hollow in construction and covered in tiny hairs or filaments. Successful starching occurs when starch grains find their way into the hollow fibres or wedge themselves securely to the finer filaments surrounding the fibres. This is a purely mechanical process which requires (a) time, as we have already mentioned, (b) concentration of starch in a low dip level (c) mechanical action within the washing machine.

Other influencing factors on good penetration are the grain size of the starch and the additives one includes in the formulation.

For instance, a pure maize starch with large grains used in a tunnel washer would not penetrate well giving an 'on the surface' powdery result with the potential to deposit much of this on the calender lip and clothing.



Our product, **Ideal Blended Plus Starch (Bp)** on the other hand has a combination of natural starches in its formulation, which penetrate better than just maize.



**Ideal Soft Starch (So)** contains a cationic lubricant which swells the cotton fibres to receive more starch grains and also acts as a calender lubricant, minimising lip and clothing deposits on the calender.

## STARCHING CONSISTENCY

Some modern synthetic detergents can increase the abrasion experienced by linen in the washing machine, this enhances cleaning but diminishes the lubricant effect which used to be obtained from the use of pure soap. This causes more lint to be deposited on calenders.

A well designed lubricated starch will restore the missing slippage and extend periods between calender maintenance. How often are these benefits considered when selecting a starch?

## THE IDEAL STARCHES FOR MODERN LAUNDRY

The changing face of the laundry industry and the optimisation of resources has seen the historical methods of working, both with starch and other laundry chemicals, being superseded with automation and an end to the traditional washroom operator.

The modern laundry, as with most other commercial enterprises, has seen a dramatic increase in automation, with laundries keen on increased production rates and the use of far less manpower pro rata.

Along with the continued automation of machinery for laundering, liquid concentrates have been

developed for automatic injection systems, including a need for effective concentrated and stable liquid starches. As previously described, making up powder starches by dissolution, or by powder feed can have drawbacks.

One of the disadvantages of making up a stock solution of powder starch is that unless it gets used up within twenty four hours, it will settle out of solution and more importantly, may become rancid, developing a characteristic unpleasant odour. Starch is the perfect nutrient for bacteria and the temperature and humidity of a working laundry are the perfect conditions for dramatic bacterial growth.



## WE FORMULATE

Ideal has been the leader in all aspects of modern laundry product development in the United Kingdom, and we have worked extremely hard to develop the most effective natural liquid concentrate starches that comply with all injection requirements in terms of stability and consistency.

Ideal starches have been trialled and tested in professional commercial laundries to last for long periods, without any form of bacterial build-up.

Using appropriate natural starches, Ideal has been able to design the following excellent liquid concentrate products, with stabilising agents that ensure a stable emulsion starch liquid. The products are protected from any bacterial attack through the effective inclusion of specific bactericidal agents.

## PREMIUM LIQUID STARCH (Pls)

Innovative liquid starch for cotton and combination fabrics

- Combination natural liquid starch with fresh floral fragrance and added PVA to enable greater adhesion to fabrics, ready for finishing.
- An exciting innovation in the effective starching of cotton and combination fibre fabrics, provides superior results on polycotton table linen.
- A long life natural liquid concentrate starch that will not break down or go rancid.
- Convenient and stable liquid formulation eliminates need for messy pre-mixing of powder starch.
- Can be automatically dispensed through dosing equipment for consistent addition in final rinse.



## NATURAL LIQUID STARCH (Nls)

Convenient & clean starching of cotton & combination fabrics

- Natural liquid starch with delicate fresh floral fragrance, imparts a crisp professional finish to table linen and shirts.
- An exciting innovation in the effective starching of cotton and combination fibre fabrics.
- A long life natural liquid concentrate starch that will not break down or go rancid.
- Convenient and stable liquid formulation eliminates need for messy pre-mixing of powder starch.
- Can be automatically dispensed through dosing equipment for consistent addition in final rinse.



We are confident that Ideal Liquid Starches will enable accurate, consistent product additions made directly into the machine through automatic injection systems. We can also guarantee that Ideal liquid concentrates will remain stable and will not go rancid.

Starch is a very old traditional product and will, no doubt, be with us for several more centuries in the laundry industry. Here at Ideal we will continue to strive to meet the ever greater demands for performance from starches as production techniques change in the coming years.





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