



## Finishing cotton knitwear in the exhaust method

Cotton knitwear is normally finished with the exhaust method because of its sensitivity to tensile stress:

### Softener application in the exhaust method

Machines:	Winch beck, jet, Airflow,...
PH value of the liquor:	5 – 6
Temperature:	30 – 40 °C
Dwelling time:	15 – 20 min
Application amount	2 – 4 %

### pH Value:

The pH value of the liquor is very important for the exhaust method. The best pH range is between 5.0 and 5.5. Higher pH values can lead to:

- incomplete bath exhaustion
- danger of stains due to decreasing liquor stability, most of all with silicone products
- yellowing

### Jet stability

If the textile is finished on jets, special demands are made to the shearing stability of the softener because this is exposed to very high mechanical stress. Insufficient stability of the softener will often result in stains on the textile. The shearing stability is tested in our labs with the Ultra-Turrax-Test.

### Principle:

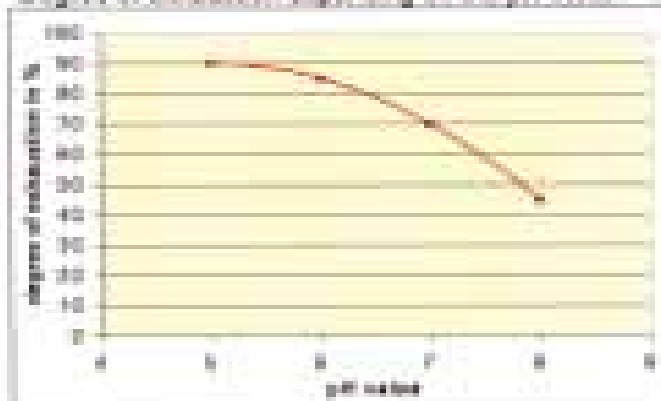
The softener emulsion is exposed to high shearing forces by the so-called rotor-stator system. After the mechanical influence the appearance of the liquor, foam height, foam consistency, foam decomposition time as well as formation of stains on the fabric are judged.

### Parameters:

Liquor preparation:	400 ml
Stirring speed:	20 000 rpm
Duration:	2 min
PH value of the liquor:	5 and 8
Liquor temperature:	40 °C
Softener concentration:	20 g/l



Degree of exhaustion depending on the pH value:



**Sewability:**

One reason for sewability problems with knitwear is the fibre becoming brittle which is caused by removal of all fibre accompanying substances such as cotton waxes and fats during pretreatment. Another reason is that industrial sewing machines are running faster and the threads are given almost no time to evade. Within a split second, the mesh which is hit by the needle must expand so that the needle can easily go through. This requires a good mobility of the mesh threads between each other as well as a low friction between needles and textile.

In order to prevent loop damages as shown on the left illustration, it is unavoidable to finish with special softeners. Special additives of paraffin, wax, polyethylene or silicone to the softeners will smoothen the fibre surface so that no sewing damages need to be feared.



not finished



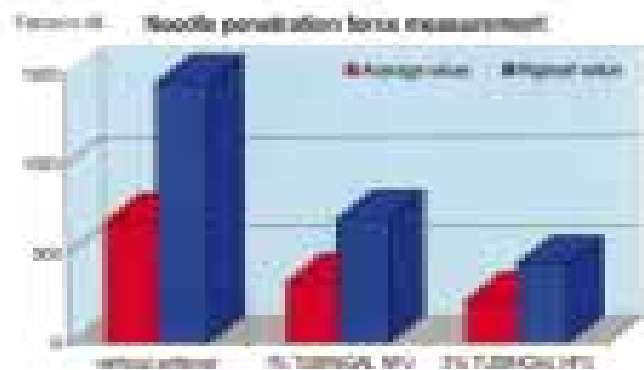
finished e.g. with TUBINGAL NPJ

**Principle:**

During the sewing process a sensor in the needle plate of the sewing machine measures the needle penetration forces. The lower and more even they are, the more uncritical will the sewing behavior of the tested sample be in practice.

**Evaluation:**

Fifty needle impingements are counted when the machine is running at full speed. The computer sets the required force in cN for every single needle impingement and assesses e.g. the average value and the highest force.



*Contributed by CHT*

The sewability properties are tested with the Measuring System ITV Denkendorf.