

## **SHRINK RESISTANCE**

### **SHRINK RESISTANT FINISHES**

#### **3.28.1 Current criterion**

The current criterion is formulated as follows:

“Halogenated shrink-resist substances or preparations shall only be applied to wool slivers.”

#### **3.28.2 Changes to the criterion**

Shrink resistant finishes or anti-felt finishing is applied with the purpose of conferring anti-felt characteristics to the wool goods. It is required when the material needs to be repetitively washed in a laundry machine without shrinking.

According to the draft IPPC reference document from February 2001 (IPPC (2001)) two treatments, which are also complementary, are applied:

- oxidizing treatment (subtractive treatment)
- treatment with resins (additive treatment).
- These treatments can be applied at any stage of the process and on all different make-ups. They are most commonly applied on combed tops for specific end products (e.g. underwear).

#### ***Oxidizing treatments***

This treatment has traditionally been carried out using one of the following chlorine releasing agents:

- sodium hypochlorite
- sodium salt dichloroisocyanurate
- active chlorine (no longer used)

The oldest process is the one using sodium hypochlorite. However, since the development of active chlorine is difficult to control, wool fiber characteristics can be deeply changed, also giving irregular results. Dichloroisocyanurate is more advantageous here, because it has the ability to release chlorine gradually, thereby reducing the risk of fiber damage.

The chlorine-based agents have recently encountered restrictions because they react with components and impurities (soluble or converted into soluble substances) in the wool, to form absorbable organic chlorine compounds (AOX). Alternative oxidizing treatments have therefore been developed. In particular, peroxydisulphate, permanganate, enzymes and corona discharge come into consideration here. However, the only alternative to chlorine-based agents readily available today is peroxydisulphate. The

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process with peroxysulphate compounds is quite similar to the chlorine treatment. If necessary, the material is treated with a polymer (see treatments with resins below).

### ***Treatments with resins (additive processes)***

In additive processes polymers are applied to the surface of the fiber with the aim of covering the scales with a coating. The polymer may be, in some case, sufficiently effective on its own to make pre-treatment unnecessary. Otherwise an oxidative and reductive pre-treatment is necessary.

### ***Combined treatments***

However, the combination of subtractive and additive processes has the largest technical effect. A combined treatment has been widely used for years as anti-felt finishing of wool in different states (loose fiber, combed top, yarn, knitted and woven fabric) due to its low cost and high quality effects.

However, the effluent shows high concentrations of COD and AOX. The formation of AOX is attributable not only to the oxidant, but also to the resin, which is based on a cationic polyamide and involves the use of epichlorohydrine.

Alternative resins have been developed, based on polyethers, cationic aminopolysiloxanes, synergic mixtures of polyurethanes and polydimethylsiloxanes, but they all have some limitations concerning their applicability.

New processes have also been developed, but so far the results achieved with the combined treatment process cannot be fully matched by any alternative, which is why it is still the preferred process particularly for treatments such as the anti-felt finishing of combed tops.

According to the PARCOM recommendations from 1992 chlorinated shrink resistant finishes were still accepted for wool sliver, knitted wool garments and socks before piece dyeing. These recommendations were revised in December 1999 after which chlorinated shrink resistant finishes were only recommended for wool tops.

According to Interlaine (communication, April 2001) research has been carried out to produce shrink resistant wool tops using other compounds than chlorine. Unfortunately, these alternatives are less effective, less reliable and less reproducible than chlorine. In addition, all these new processes are more expensive than the chlorine treatment.

Furthermore, according to Interlaine certain non-halogenated compounds for shrink resist treatment can be used, but at other stages of the processing chain. They can however not be applied on semi manufactured products. The products are very specific in their application, are very costly and less efficient than the chlorine ones.

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### ***Proposal for a new criterion***

Based on the considerations regarding the technological and economical constraints on the use of chlorinated substances in shrink resistant finishes, it was proposed to leave the criterion unchanged, apart from adding the assessment and verification procedure: "Halogenated shrink-resist substances or preparations shall only be applied to wool slivers.

***Assessment and verification: The applicant shall provide a declaration of non-use (unless used for wool slivers).***