HOME CARE

Coltide™ HSi

Stay Vibrant and Protected

Benefits

- Reduces fabric wrinkles and creases
- Reduces garment ironing time
- Longer lasting colours
- Protects fibre through washing and drying process
- Improves moisture retention and conditioning of fabrics
- Reduces formation and release of microplastics
- Easy to formulate – water soluble
- Vegetable protein derived

Applications

- Laundry detergents - suitable for liquids, powders & tablets
- Speciality wool care products
- Fine / delicate wash detergents
- Fabric conditioners / softeners
- Easy-iron sprays
- Suitable for EU Ecolabel approved formulations

Coltide HSi is an advanced copolymer of hydrolysed wheat protein and silicone that is recommended for use in fabric care. Coltide HSi combines the unique functionalities of both molecules in one ingredient and is proven to be effective in reducing wrinkles and creases on fabrics. It delivers longer lasting colour, protection of prints on garments and less fabric and fibre damage through washing and drying process.

The process of washing and drying causes damage, leaving garments looking worn and old over time. Coltide HSi leverages its complex polymeric structure and cross-linking features to form a protective network. This network aids in smoothing of fibres and promoting the longevity of garments. Ultimately, it ensures garments remain vibrant and look newer for a longer period.

It has biodegradability and aquatic toxicity data support and suitable for customers to use in EU Ecolabel approved formulations.

Usage in detergents

Reduction of wrinkles and creases

Incorporating anti-wrinkle properties into fabric care products can reduce ironing time, enhance efficiency, and improve consumer experiences. Coltide HSi reduces the need for ironing by effectively reducing wrinkles and creases in garments after every wash. Its proven efficacy has been demonstrated in decreasing the effort required and simplifying the task.

The anti-wrinkle effect was assessed visually by taking photographs of washed garments after one (1) wash and dry cycle with a washing machine. As can be seen in Image 1, different garments (100% cotton and mix of 60% cotton and 40% polyester) were evaluated for anti-wrinkle effect. It was observed that all the garments washed with a 10g concentrated laundry capsule containing 2% Coltide HSi showed fewer wrinkles and creases compared to the garments washed without Coltide HSi.

Image 1: Anti-wrinkle effects on different materials (100% cotton and mix of 60% cotton and 40% polyester) after 1 wash and dry cycle with a 10g concentrated laundry capsule, with and without Coltide HSi

Longer lasting colour

All denim jeans were washed with a washing machine and air-dried for 8 cycles before the assessment. The control denim jean was treated with a 30g standard commercial detergent (without Coltide HSi) and the test denim jean was treated with the same volume of detergent with containing of 2% Coltide HSi. The change in colour was assessed visually and quantified using a X-rite spectrophotometer.

Coltide HSi gives visible enhancement in colour retention of the denim jeans when compared to denim jean washed with standard commercial detergent only. Image 2 shows the denim jeans subjected to 8 wash cycles with and without Coltide HSi compared with unwashed sample. Upon visual inspection, the denim jeans washed with 2% Coltide HSi are closer in colour to the unwashed sample. Denim jeans washed without Coltide HSi shows more significant colour fading.

Image 2: Visual difference in different parts of denim jeans after 8 wash cycles with a 30g liquid detergent, with and without Coltide HSi

Figure 1 demonstrates that denim jeans washed with 2% Coltide HSi has a 24% reduction in colour change compared to control garment.

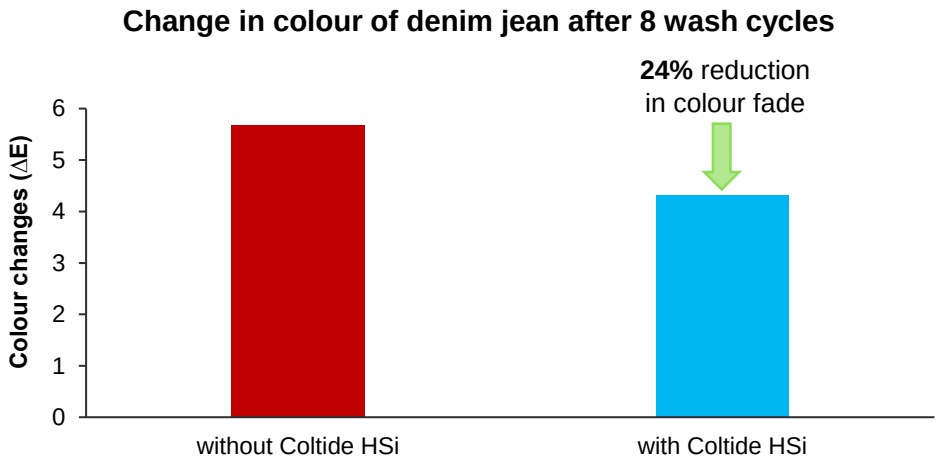


Figure 1: Change in colour of denim jeans after 8 wash cycles, with and without Coltide HSi

Protection of prints on garments

Repeated washing and drying of garments put strain on the fabric, resulting in fibrillation and fibre damage, thereby reducing the lifespan of garments. Damage to garments can also be identified as “cracking” of printed patterns, resulting in garments looking worn and old.

At a macroscopic level, damage to garments can easily be identified from the prints looking “cracked” and uneven. Coltide HSi demonstrates print protection, helps protect garments and fibres, reduces the visual signs of stress and results in garments looking newer. In Image 3 and 4, it can easily be observed that the printed t-shirts washed with 30g of detergent powder containing Coltide HSi maintain their printed patterns better than the printed t-shirts washed without Coltide HSi. Printed t-shirts washed with 30g of powder detergent only (without Coltide HSi) resulted in more “cracking” on the printed patterns.

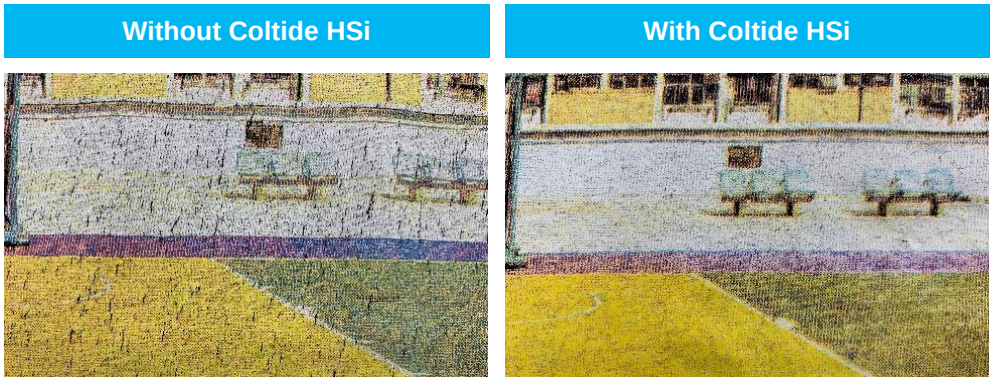


Image 3: Visual difference of printed t-shirts after 10 wash cycles in a 30g powder detergent, with and without Coltide HSi

Image 4: Visual difference of printed t-shirts after 20 wash cycles in a 30g powder detergent, with and without Coltide HSi

Protection of fabric and fibre during wash process

Coltide HSi provides protection to the fabric and fibre structure by maintaining moisturisation of the fibres, leading to a reduction in breaking and fibrillation. Fibre damage can be analysed using a digital microscope and a scanning electron microscopy (SEM). Fuzziness or whiteness on garments observed through digital microscopy are signs of fibre damage. When using SEM, fibre damage was often observed as uneven, rough with twisted fibre formations and frayed and loose fibre strands.

Coltide HSi was evaluated on natural delicate fabrics such as cashmere and wool, after 5 and 20 wash cycles with a 52g liquid laundry detergent, respectively. Digital microscope and SEM images were captured for fibre damage assessment. In Image 5 and 6, the garments washed with Coltide HSi demonstrated less fibre damage. The fibres observed through the digital microscope and SEM look better ordered, fuller, and overall less damaged compared to garments washed without Coltide HSi.

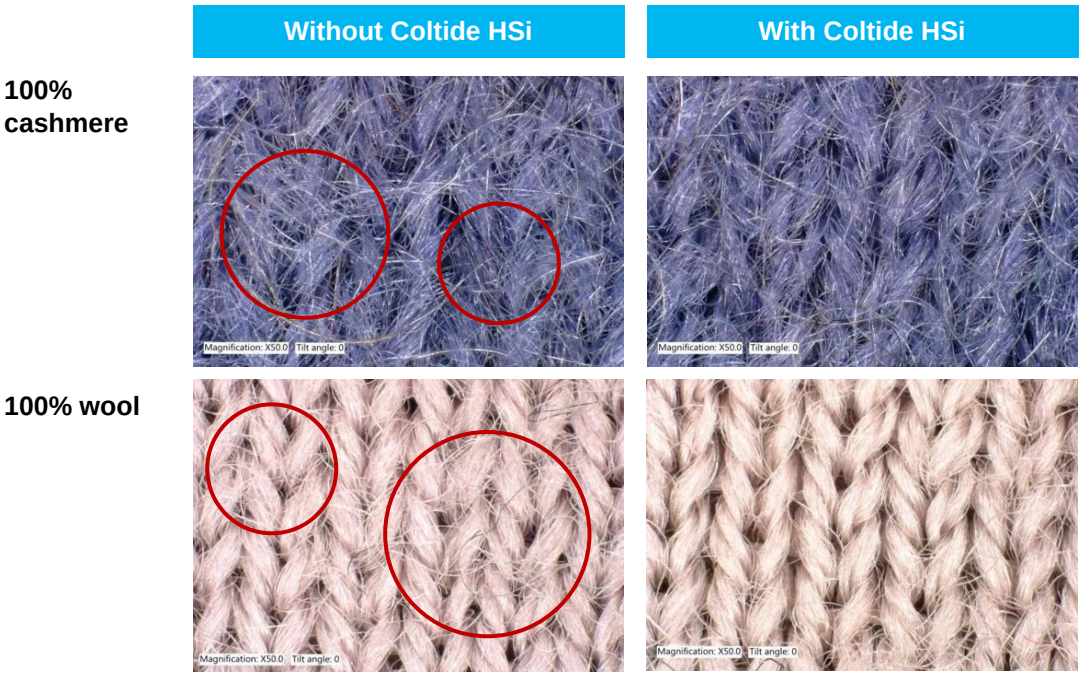


Image 5: Digital microscope images of 100% cashmere after 5 wash cycles and 100% wool garments after 20 wash cycles with a 52g liquid detergent, with and without Coltide HSi, at magnification of 50x

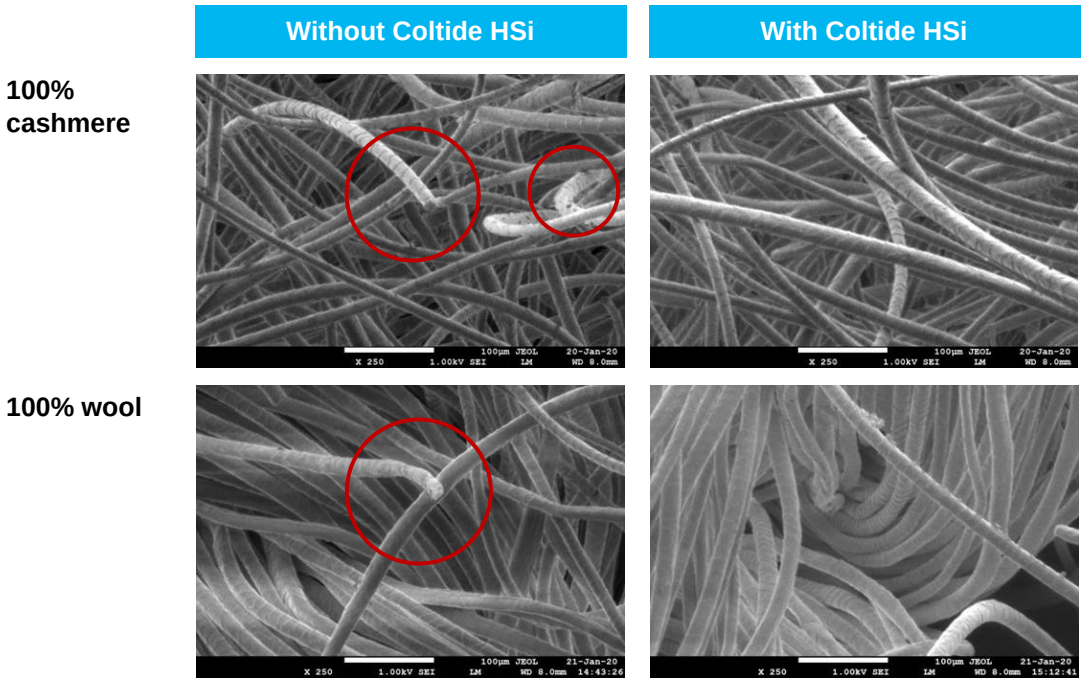


Image 6: SEM images of 100% cashmere and 100% wool garments after 20 wash cycles with a 52g liquid detergent, with and without Coltide HSi, at magnification of 250x

Reduction in Microplastics Emissions

Definition of a Microplastic

Microplastic are solid particles, including fibers, composed of polymers or a mixture of polymers and functional additives. They are composed of more than 1% in weight of particles having a dimension comprised between 1nm and 5 mm or a length comprised between 3 nm and 15 mm. They are synthetic, non-degradable or with a water solubility below 2g/L.

(Reference: COMMISSION REGULATION (EU) 2023/2055)

Definition of a Microfibre

A subset of microplastic used to describe fibres that are shed from clothing during production, consumer use, or end of life, and end up as pollution in the environment, also measuring <5 mm in size.

(Reference: The Microfibre Consortium)

Research has shown that when garments are worn and washed, fibres are released from each wash. Due to their small dimensions, they can partially pass though wastewater plants, and reach the oceans. As current washing machine filters allow fibres to pass through, there is a growing demand for garment fibres to be protected, leading to a reduction of microfibres released during the washing process.

Coltide HSi offers fibre protection during the washing process, resulting in fewer lost fibres and reduced microplastics released into the water system. The garments, 100% polyester blankets, were washed using 40°C wash program in a liquid detergent formulation with and

without Coltide HSi. The estimated microfibres released during washing process were calculated by multiplying the residue weight in mg, by 475,998 (Reference: Release of synthetic microplastic plastic fibres from domestic washing machines: Effects of fabric type Imogen E. Napper, Richard C. Thompson).

In Figure 2, liquid detergent containing 4% Coltide HSi consistently gave a reduction in microplastics released compared to liquid detergent without Coltide HSi. The 100% polyester blankets washed with liquid detergent containing 4% Coltide HSi released 20% fewer microplastics after the first wash cycle. The second wash cycle showed the most significant reduction, with a 51% reduction of microplastics released. An accumulation of microplastics reduction after four (4) wash cycles was 37%, which equates to over 5 million microfibres prevented from entering the water system.

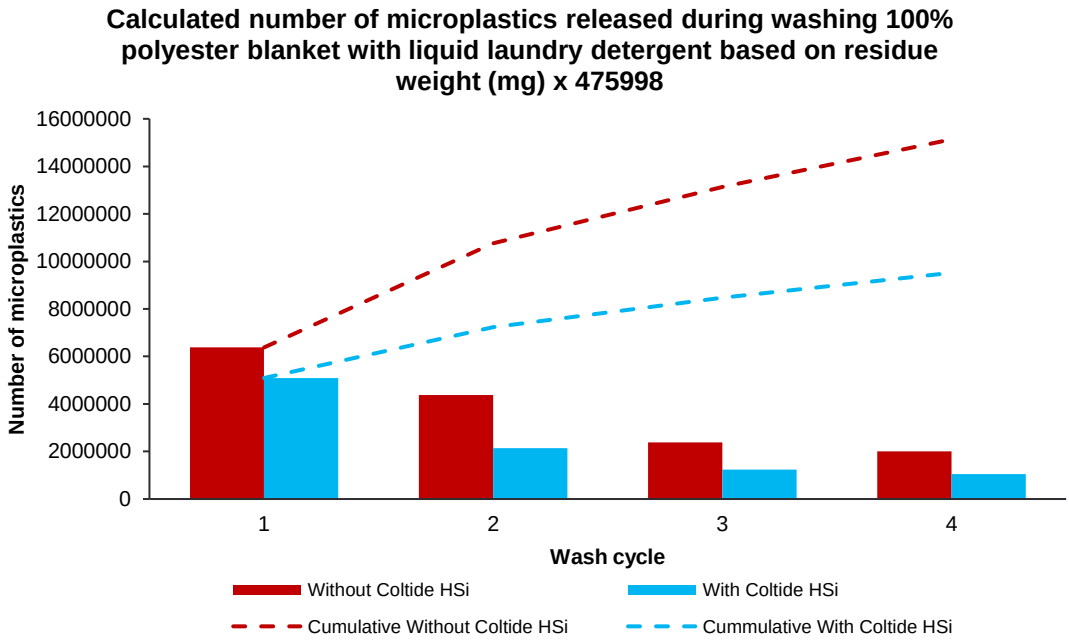


Figure 2: The estimated number of microplastics released during each wash cycle and the cumulative number of microplastics released over the experiment with and without Coltide HSi

Usage in fabric conditioner

Coltide HSi has a unique protein/silicone copolymer technology that has also proven to be effective in improving the 'easy iron' properties, wrinkle reduction, fibre protection and conditioning benefits in fabric conditioners.

Crease reduction

Coltide HSi provides wrinkle reduction after the washing and drying process, enhancing the ease of ironing. Image 7 shows the ability of Coltide HSi to reduce the need for ironing after the fabric conditioning cycle. Cotton t-shirts were washed in washing machines along with a ballast load before being treated with a commercial fabric conditioner and tumble dried. The cotton t-shirt washed with a 20g fabric conditioner containing 1% Coltide HSi has less

wrinkles observed compared to the cotton t-shirt washed with commercial fabric conditioner only.

Image 7: Wrinkle reduction effect on cotton t-shirts after conditioning cycle with a 20g fabric conditioner, with and without Coltide HSi

Easy ironing

The 'easy ironing' benefits of Coltide HSi were tested on cotton using a standard fabric conditioner base. The force required to pull a domestic iron across the cotton swatches was obtained using a Lloyd tensile tester.

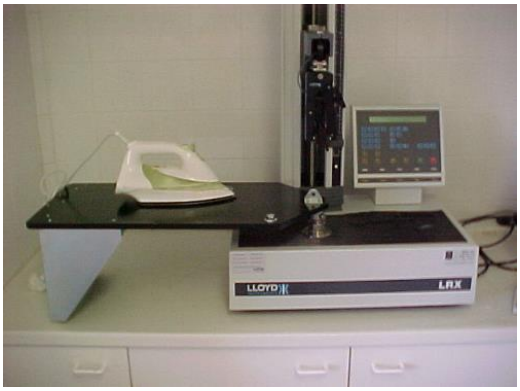


Image 8: Lloyd tensile tester and standard domestic iron, used to evaluate the ease of iron on cotton swatches

Figure 3 shows that Coltide HSi significantly reduces the coefficient of friction of the cotton swatches, thereby improving the ease of ironing. Coltide HSi was also compared to silicones, which are commonly used as 'easy iron' additives to conditioners. In order to achieve comparable performance Coltide HSi was required at only 0.25% (as supplied), resulting in a cost-effective alternative to silicones.

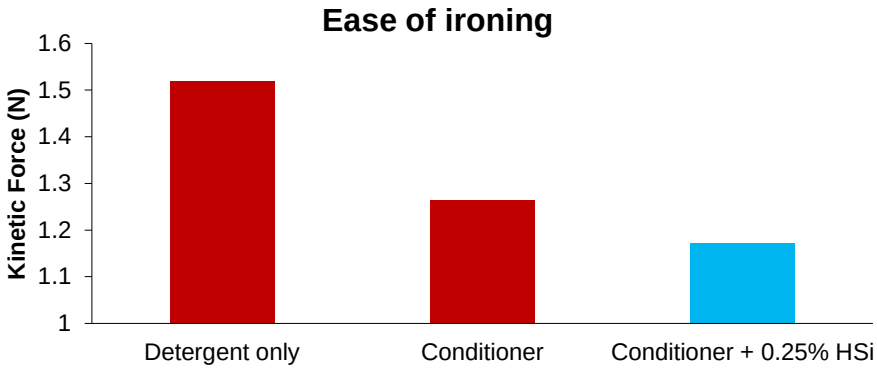


Figure 3: Reduction of force required to pull domestic iron across cotton swatches using Coltide HSi

To further evaluate the ease of ironing claim a panel study was conducted, in which panellists ironed four shirts – some washed with detergent and fabric conditioner treated with Coltide HSi (0.5g in a 35mL dose of fabric conditioner) and some washed with detergent and using 35mL dose of commercial fabric conditioner. All were then tumble dried. The panellists were recorded ironing the shirts and the contact times between the iron and the fabric were calculated for each shirt ironed. It was found that Coltide HSi reduced the required contact time between the iron and the shirt from 114 seconds to 95 seconds – a 19 second reduction in ironing time for a typical white work shirt. This gives an overall 19% reduction in ironing time and so provides a very strong easier ironing claim.

Stay vibrant and protected

Colour protection

Coltide HSi helps to prevent colour fade on garments when used in fabric conditioner. Blue denim jeans were washed along with ballast with a commercially available laundry detergent and then treated with a commercial fabric conditioner before being tumble dried. The control garments were treated with the standard commercial products whereas the test garments included Coltide HSi. The change in colour was assessed through visual inspection to see a difference in the colour of the garments and using a reflectometer to give a quantitative result.

In Image 9, all assessors could see a difference in the colour of the blue denim jeans with the Coltide HSi treated clothes retaining a darker shade.

Image 9: Visual difference in blue denim jeans after 20 wash cycles, with and without Coltide HSi

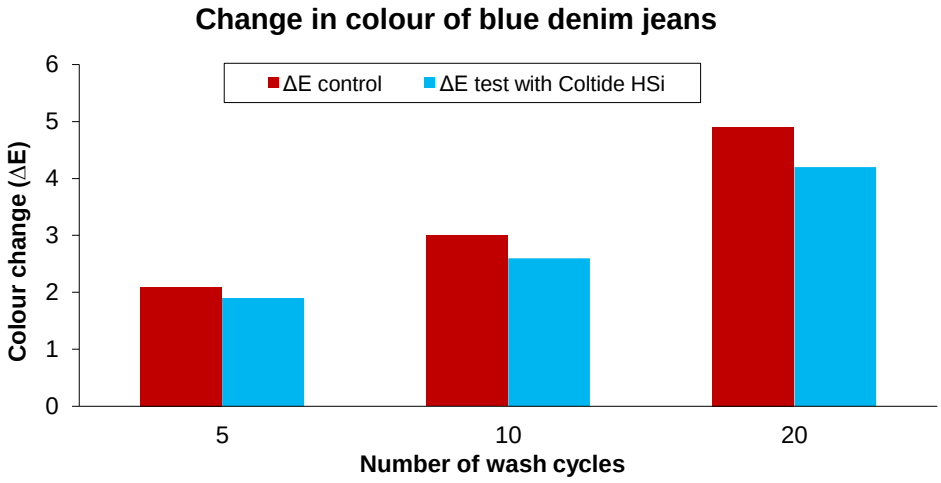
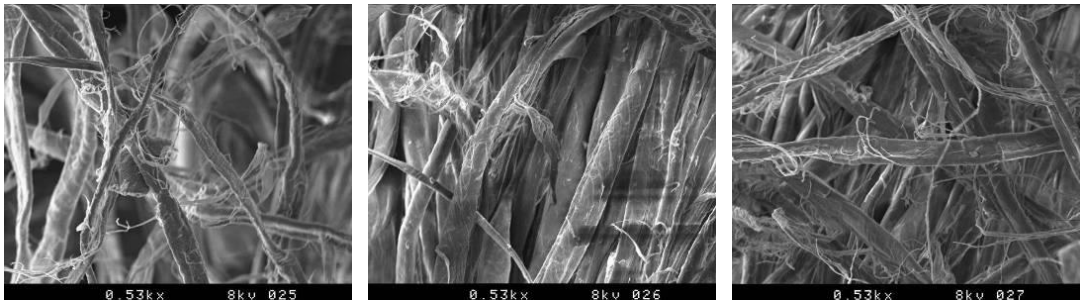


Figure 4: Change in colour of denim jeans after different wash cycles, with and without Coltide HSi

Fibre protection

Repeated washing and drying of clothes are known to cause damage to fibres and garments. Coltide HSi provides protection to the fabric and fibre structure by maintaining moisturisation of the fibres leading to a reduction in breaking and fibrillation. The blue denim jeans were studied using a scanning electron microscope (SEM) to evaluate the condition of the fibres after 20 wash cycles. In Image 10, the SEM images were taken at the waistband of the jeans, and it can be seen very clearly that there is a high level of fibrillation and fibre damage when the blue denim jean was washed with detergent and fabric conditioner only.

Washed with detergent and fabric conditioner only



Washed with detergent and fabric conditioner added Coltide HSi

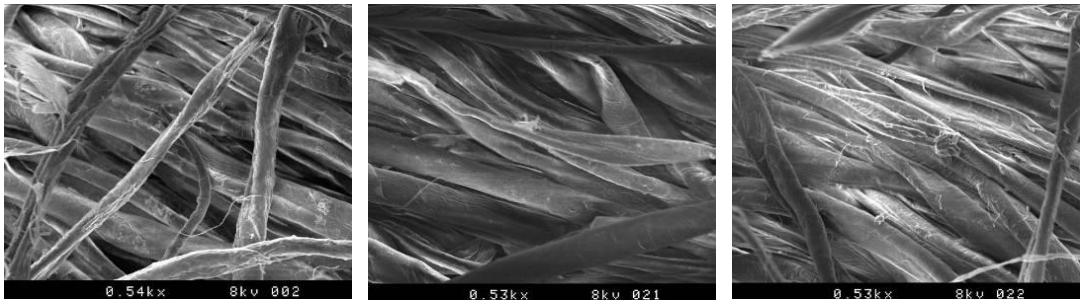


Image 10: SEM images of jeans waistband washed with detergent and fabric conditioner after 20 wash cycles, with and without Coltide HSi

Formulation examples

- Liquid laundry detergent for easy care - HC/LF/56
- Neroli easy care liquid laundry detergent - HC/LF/58
- Ultra concentrated fabric conditioner with total fabric care - HC/LF/18
- Wrinkle release with odour neutraliser - HC/LF/51

Formulating

Coltide HSi can be easily incorporated into detergent systems. Due to its polyanionic nature Coltide HSi may display some incompatibility with a limited number of cationic surfactants. Recommended usage of Coltide HSi in fabric care range from 1% - 4%, depending on the desired effect on the fabric.

Health and safety

Coltide HSi is considered to be an acceptable fabric care raw material and presents no special hazard.