

Clothing Longevity Protocol



The Clothing Longevity Protocol offers guidelines for good practice in order to aid moves towards garments that will last longer and thus to help protect brand value, screen out garments which fail prematurely and reduce the environmental impact of the clothing sector.

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Front cover photography: Examples of failed garments (Source: Michelle Hughes, NTU)

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Clothing Longevity Protocol

The Clothing Longevity Protocol has been developed as part of the Sustainable Clothing Action Plan (SCAP), which brings together industry, government and the third sector in order to improve the sustainability of clothing across its life-cycle. An important means of achieving a reduction in the environmental footprint of clothing is to increase garment lifetimes. A recent survey identified the main reasons for garments failure as colour fading (particularly for jersey and woven fabrics) or fabric quality (most notably pilling in the case of knitwear and jersey). Other key issues were fabric breakdown in the form of fraying and thinning (especially hems), general wear around the crotch of trousers, discolouration in white shirts (particularly collars) and holes in seams (including jacket linings).

This Protocol is intended to support companies wishing to develop and supply garments designed and manufactured for a longer life than current practice. The potential benefit to companies is that a minimum standard of good practice can be embedded across the product range, complementing specific design innovations such as anti-fading and anti-pilling technologies (as may be used in premium-priced products) and reinforcing brand value by:

- Providing a means of **quality assurance**, so that all garments meet an acceptable standard, hence protecting brand reputation for quality and value for money.
- Providing a structured approach for development teams to ensure that **good practice** is achieved for all garments, minimising the threat of suffering the cost of discovering poor quality at a later stage.
- Enabling the development team to screen out those short-term failures which lead to higher rates of customer return (such as trims) and to **ensure appropriate levels of performance** on attributes associated with longer-term failure modes and customer perceptions of poor quality (such as fading and pilling).
- Providing **practical or workable regimes for garment testing** that build the knowledge and experience to predict, identify and avoid sub-standard performance and avoid premature failure.

Companies adopting this Protocol will follow a specified product development process, as far as practical, and utilise guidelines for tests and performance criteria. In combination, these will enable development teams to set their required level of performance on garment attributes which relate to the most common modes of failure or customer dissatisfaction. The Protocol thus comprises two key tools:

1. A check list which outlines a process of making decisions relating to longevity and provides a structured approach for different members of the development team to assign responsibilities and make decisions (Appendix 1).
2. Testing and performance standard guidelines to use with some core product categories (Appendix 2). Guidelines for other product categories would follow similar principles with the aim of precluding the production of short-lived garments.

Companies may choose to implement the Protocol for a limited number or range of garments. The Protocol has implications for areas of responsibility throughout the product life-cycle and will therefore be relevant for various functional areas: designers, garment technologists and buyers in retailers, product development teams, quality/testing personnel in manufacturers, and marketers. In practice there may be overlap within the supply chain as new product development and quality control tend to cut across business boundaries. Implementation of the Protocol is liable to involve change in (i) design, specifying and sourcing, (ii) testing (including wearer trials) and (iii) communication to consumers. It is assumed that companies will interpret the Protocol using common sense and integrity.

Appendix 1: Product Development Process

Users of the Protocol will review how the product development process for design, production and testing for garment longevity is implemented in their company and define specific actions to be taken by named individuals. These actions will be documented using the checklist below.

The process is designed to be applied in four stages, with a pass required from one stage before proceeding to the next. Approval or sign-off of each stage should be a collective team responsibility.¹

It is recognised that exact functional responsibilities will vary in each organisation. Organisations may have both in-house and externally sub-contracted staff who influence final products in terms of their performance attributes in relation to longevity. Typically designers, buyers and technologists work together to develop new product ranges and this will need to be taken into account. However, the main retailer or supplier needs to take the lead in terms of using the Protocol to set the standard for longevity; with this in mind, the following 'good practice' approach for product development teams has been outlined.

Buying: Consider quality and garment life-span as well as style. The balance of cost versus customer quality/value assessment for repeat purchase should be taken into account. The range structure could be reviewed (e.g. the balance of fast fashion versus more durable fashion items).

Design: Seek access to materials (yarns, fabrics and components) from reputable suppliers who understand the brand's performance requirements and can supply test reports for all elements before a sample is made. Designers should have sufficient technical knowledge of the product (or access to guidance from a technologist) in order to select components that in expected use will not be a 'first fail' area and to specify sewing operations and make-up methods that will achieve the required longevity performance.

Technology: Ensure that strict guidance is given to designers and buyers. Technologists should have the authority to reject products that do not perform adequately. They should be involved at the initial stages of garment development, when fabrics and trims are being selected.

Manufacturing Quality Assurance: Activities will often involve a retailer's own garment/fabric technologist, the supplier's technologist, and typically a 3rd party testing house or quality control agency. Material procurement (fabric and trimmings) should include appropriate test standards and compliance, and assembly processes should comply with required specifications and quality standards.

Marketers: Seek promotion opportunities for explaining long-lasting qualities of garments to customers. Communication techniques should be implemented to raise consumer awareness of garment quality, durability and care issues and to create emotional attachments to clothing. The opportunity to create apps and use other direct marketing to allow better wardrobe management could be investigated.

Consumer assurance: Communicating aspects of garment longevity might be addressed as part of corporate market positioning and general reputation of the brand or retailer. Some

¹ The description of the four stages outlined is indicative. Industry trials have shown that each stage of the process may need to differ slightly, depending on the product involved and company structure.

aspects could be incorporated into garment labelling or information leaflets/web pages/social media. Product guarantees (or less formal 'promises') could indicate a minimum expected number of 'wear and wash' cycles and be communicated through use of a durability index/kitemark, a statement on the returns procedure, or specific product advice on swing tickets.

The Product Development Process Checklist

	Person Responsible	Action Required	Target Date
<i>Stage 1 – Initial design development</i>			
■ Ensure that the choice of materials is appropriate for each component so that in expected use none is expected to be a 'first fail' area, addressing qualities supportive of garment longevity i.e. physical performance and colour fastness requirements.			
■ Use reliable suppliers who will ensure that fabrics, trims, components and yarns pass the testing standards.			
■ Apply specified make-up methods that reduce early failure.			
<i>Stage 2 – Pre-contract garment developed for buying / selection</i>			
■ Request physical performance test reports from the yarn/trim/fabric supplier prior to sample garment development (for standard fabrics).			
■ Carry out risk assessment to identify any possible failings and weak areas within the manufacture of the garment prior to the specification being sent to the factory.			
■ Fully test fabric using the relevant physical performance tests for that product (e.g. pilling, dimensional stability and spirality for knitwear).			
■ Carry out a care label wash with visual assessment and, if appropriate for the product, extended wash cycle tests.			

Stage 3 – Pre-production testing and sealing (approval for production)

<ul style="list-style-type: none"> Confirm that testing at the development Stages 1 and 2 has assured quality and all garments and fabrics/yarns meet the required pass criteria. 			
<ul style="list-style-type: none"> Undertake additional 'longevity testing' if production fabric and trims are available (e.g. extended care label washes, durability wash tests and extended wearer trials). Final product testing should simulate washing/wear for the anticipated life-expectancy of the garment.² 			
<ul style="list-style-type: none"> Address potential bulk colour fastness issues (review dye stuff selection, dye recipe evaluation tests). 			
<ul style="list-style-type: none"> Identify instructions for care labelling recommendations to encourage good consumer practice. 			
<ul style="list-style-type: none"> Identify end-of-use guidelines for returns and possible reuse of products. 			

Stage 4 – Bulk Production

<ul style="list-style-type: none"> Submit garments to bulk physical performance and colour fastness tests. 			
<ul style="list-style-type: none"> Undertake due diligence testing from production, either by retailer or trusted supplier (e.g. random sampling care label wash, extended wash cycle test). 			
<ul style="list-style-type: none"> Carry out extended wearer trials for base fabrics or continuity styles. 			
<ul style="list-style-type: none"> Use an on-line quality management system (examiners on the production line, faults/rejects analysis, random inspection, etc.) within the critical path process. 			

² It is often difficult with critical path dependencies and commercial pressures to ensure that all testing is complete before bulk production begins. This is part of risk-assessment; testing may occur in parallel with production and pre-retail logistics processes, but ideally should be done before sales to consumers.

Appendix 2: Test and Performance Guidelines

Core test performance standards that can be reasonably expected of some basic product types to deliver 'good practice' performance are identified in Figure 1. The tests and standards refer to the normal clothing and textile testing procedures used internationally by companies such as Intertek, SGS, HSTTS and Bureau Veritas. Some are specific measurements; others are based on judgement against standards for colour fastness e.g. on a 1-5 [worst-best] scale.

While these tests and standards are already used, the pass/fail criteria may be set lower than indicated. To comply with the Protocol, the criteria defined in Figure 1 should be met after applying an extended number of wash tests (see Figure 2 for more details). The tests and standards need to take account of the fibre and fabric used for the garment.

Figure 1: Core test performance standards

Core Test	Knitwear	Shirt	Jeans	Socks	T-shirt
Number of washes to conduct before testing	30	40	30	62	56
Dimensional Stability to washing/dry clean	+or- 5%	+or- 3%	+or- 3%	to fit sock boards or volumetric legs	+or- 5%
Pilling	4	n.a.	n.a.	4	4
Care Label Wash with visual assessment	expert judgement	expert judgement	expert judgement	expert judgement	expert judgement
Colour Fastness to:					
• Washing* / dry clean	4	4	4	4	4
• Water or perspiration*	4	4	4	4	4
• Light	4	4	n.a.	n.a.	4
• Rubbing	4	4	4	4	4
<i>(*includes shade change and staining)</i>					
Spirality	3%	n.a.	n.a.	n.a.	3%
Seam slippage	n.a.	80N for 6mm opening	n.a.	n.a.	n.a.
Seam strength	n.a.	100N at breakdown	n.a.	n.a.	n.a.
Fusible lamination	n.a.	appearance after wash	n.a.	n.a.	n.a.

In order to achieve longer-lasting garments it is appropriate to use a testing regime that is more representative of lifetime wear. As actual usage environments and behaviour by individual consumers may vary considerably, companies may prefer to specify and communicate lifetimes in terms of 'wear and wash' cycles rather than years.

Figure 2 gives an indication of wear/wash frequencies that companies may use to help specify a representative testing regime. The data are based on expert assumptions of the typical frequency of wear and hours per wear between laundering and then related to the target product lifetime in terms of calendar years. The figures are indicative only and depend upon vagaries such as the dress sense and laundry habits of individuals and the extent of their wardrobes. For example, people generally have many more tops than bottoms, so each top is likely to be chosen less frequently. The weather, too, may play a role: with a knitwear product, for example, it may be assumed that wearing is more frequent in colder months and less frequent in warmer months. The data will also be fibre dependent, especially for knitwear.

Figure 2: Garment longevity wash and wear examples

Row	Longevity factors	Knitwear	Shirt	Jeans	Socks	T-shirt
A	Current lifetime estimate (years) ⁱ	3.7	3.6	3.1	1.8	3.3
B	Target lifetime (years) ⁱⁱ	5	5	4	2.5	4.5
C	Average wear days per year ⁱⁱⁱ	30	16	75	50	25
D	Implied wear days per month ^{iv}	2.5	1.3	6.2	4.2	2.1
E	Total days of wear for the target lifetime ^v	150	80	300	125	112.5
F	Hours of wear for the target lifetime ^{vi}	1,800	960	3,600	1,500	1,350
G	Assumed days of wear per wash ^{vii}	5	2	10	2	2
H	Hours of wear per wash ^{viii}	60	24	120	24	24
I	Average number of washes for the target lifetime ^{ix}	30	40	30	62	56

ⁱ Based on WRAP data
ⁱⁱ Based on lifetime increase of one third
ⁱⁱⁱ Working assumption (validated by industry interviews)
^{iv} Row C / 12
^v Row B x Row C
^{vi} Row E x 12 (assumed average 12 hours wear per day)
^{vii} Working assumption (validated by industry interviews)
^{viii} Row G x 12
^{ix} Row F / Row H

Once the target lifetime of a garment has been estimated, in terms of the hours of wear and number of consumer washes, additional testing may be carried out in the form of repeated wash cycles and extended wearer trials. A full lifetime test may not be feasible: in the case of knitwear, for example, this would require 30 repeated care label wash/dry cycles and 1,800 hours of wearer trials. Retailers therefore need to identify an appropriate testing

regime that would give a good indication of garment longevity measured against a set of performance criteria.

As part of the research for this protocol, longevity testing in the form of repeated wash and dry cycles and extended wearer trials was carried out on a range of 'core' products; the results are shown in Figure 3:

Figure 3: Examples of repeated wash cycle tests and extended wearer trials

Test / Trial	Knitwear	Shirt	Jeans	Socks	T-Shirt
Number of repeated wash/dry cycles	20 (cashmere)	40	40	50	50
Target wearer trial hours	200+	200+	200+	200+	200+
Average hours per wash in wearer trials	73 (cashmere) 24 mens (other fibres) 11 childrens (other fibres)	18	39	24	28

Wash tests and wearer trials are complementary, each providing insights of value in predicting longevity and potential sources of failure.

- Wearer trials reveal insights into the 'real world' effects of garments being worn and laundered.
- Repeated wash tests reveal insights into laundering processes, particularly colour retention, and can do so in a relatively short period of time.

In preparing the Protocol, repeated wash cycle tests (up to 50 washes) proved very useful for showing the point at which garments failed against specified performance criteria. In these tests certain problems were not evident until later washes. In the case of knitwear, for example, significant pilling was only evident by the 10th wash and in the case of jeans significant colour loss was only apparent after the 20th wash; in the case of shirts, 40 washes was insufficient to reveal significant deterioration. The results thus confirmed the value of repeated wash cycle tests.

In preparing the Protocol, extended wearer trials were carried out for around 200 hours on a range of core products. However, the results did not confirm the value of extending the wearer trials from 50 hours to 200 hours; the standard industry practice of carrying out trials for 50 hours already reveals points of failure that might result in customer returns after a short period of wear. Extended wearer trials are still ongoing with one of the trial companies and have achieved up to 500 hours in some cases. Garment failure is now evident on some items (for example, fabric wearing into holes at the knees on a pair of jeans). This indicates that wearer trial hours may need to be extended considerably beyond 200 hours in order to identify the point of garment failure; however, this may be difficult for retailers to factor into product development lead times.

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