



# REGULATORY

**UNE-EN ISO 12947 &  
UNE-EN ISO 12945  
SURFACE DURABILITY**

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**IBO**<sup>®</sup>  
TEXTILES PROTECTING LIVES

# SURFACE DURABILITY TESTING

## EN ISO 12947 & EN ISO 12945

The long term appearance and durability of a textile fabric are strongly influenced by how it reacts to repeated friction during use. Two internationally recognised test methods help evaluate this behaviour: EN ISO 12947 for abrasion resistance and EN ISO 12945 for pilling resistance. Although both tests are performed using the same Martindale testing equipment and identical rubbing movements, they assess different aspects of fabric performance. Together, these tests provide a comprehensive understanding of how well a fabric will maintain both its performance and appearance throughout its service life.

**EN ISO 12947 Abrasion resistance** refers to the gradual wearing away of the fabric surface caused by friction. Over time, abrasion can damage fibres, reduce fabric thickness, break yarns and eventually create holes.

**ISO 12945 Pilling resistance** refers to the formation of small fibre balls, commonly known as pills, on the fabric surface. These pills are created when loose fibres become entangled during repeated rubbing. While pilling does not necessarily affect the structural integrity of the fabric, it can significantly impact garment appearance and perceived quality.



### THE MARTINDALE METHOD CONTROLLED RUBBING, STANDARDISED MEASUREMENT

The Martindale method is used to evaluate fabric surface durability through controlled rubbing movements. The same Martindale machine and test motion are used for both EN ISO 12947 (Abrasion Resistance) and EN ISO 12945 (Pilling Resistance), although each test measures a different aspect of performance. For abrasion testing, the fabric is rubbed against a standardised wool abrasive material, and the result is expressed as the number of cycles the fabric can withstand before reaching a defined failure point, such as yarn breakage or hole formation. Higher cycle values indicate greater abrasion resistance. For pilling testing, the fabric is rubbed against another specimen of the same fabric, after which the surface is visually assessed and graded from 1 to 5, where Grade 5 indicates no visible pilling and Grade 1 indicates severe pilling. Together, these tests measure a fabric's resistance to both structural wear and surface appearance changes caused by friction.

### WHY ABRASION & PILLING MATTER IN DURABILITY, APPEARANCE, GARMENT PERFORMANCE

Garments are constantly exposed to friction during use. Fabric rubs against the body, equipment, tools, work surfaces, seats, backpacks, harnesses, and other textiles. Over time, this friction can cause both abrasion, which wears down the fabric structure, and pilling, which affects the surface appearance through the formation of fibre balls and fuzz. In workwear, outdoor clothing, tactical apparel, and other performance garments, these are among the most common causes of visible wear and ageing, particularly in high stress areas such as the knees, elbows, seat panels, cuffs, pockets, shoulders, and inner thighs. While Martindale testing provides valuable information about a fabric's resistance to abrasion and pilling, the results should not be interpreted as a direct prediction of garment lifetime. Real world performance also depends on factors such as garment design, user activity, washing conditions, fit, seam construction, chemical exposure, and the type of friction encountered during use. For this reason, EN ISO 12947 and EN ISO 12945 are best regarded as technical indicators of surface durability, providing valuable data for material selection, quality control, and product development.



## HOW MARTINDALE IMPACTS GARMENT LIFETIME

Abrasion resistance and pilling resistance both influence how long a garment remains functional and visually acceptable during use. Low abrasion resistance can lead to fabric thinning, broken yarns, and eventually holes, while poor pilling resistance may result in rapid surface fuzzing and the formation of pills that diminish the garment's appearance. In technical apparel, maintaining both structural integrity and surface quality is essential for long term performance, particularly in demanding environments where garments are exposed to repetitive movement, rough surfaces, and frequent laundering. For brands and garment manufacturers, EN ISO 12947 and EN ISO 12945 provide objective, standardised performance data that supports material selection, product development, quality control, and consistent production.

## BEYOND THE NUMBER BALANCING DURABILITY, APPEARANCE AND COMFORT

High abrasion resistance and strong pilling performance are important indicators of textile quality, but neither should be considered in isolation. The ideal textile solution achieves the right balance between durability, appearance retention, comfort, mobility, weight, breathability, and the specific requirements of the intended application. A fabric may offer outstanding abrasion resistance yet be too heavy, stiff, or uncomfortable for practical use, while a softer and more comfortable fabric may provide an excellent hand feel but fail to maintain its appearance if pilling develops too quickly. The goal is therefore to select materials that resist both structural wear and surface degradation while preserving the comfort and functionality required by the wearer. By considering the results of both EN ISO 12947 and EN ISO 12945 together, textile developers can make better informed material choices and achieve the optimal balance between durability, appearance, and long term wearability.



## PERFORMANCE THAT LASTS

EN ISO 12947 and EN ISO 12945 help demonstrate that a fabric is not only suitable in appearance, but technically prepared to withstand the effects of repeated wear and use. Together, these standardised test methods provide measurable data that supports material engineering, garment development and long-term quality assurance.

For IBQ Textiles, abrasion and pilling resistance are part of a broader commitment to technical performance. That is why both tests are performed on every fabric we develop, helping brands and manufacturers create garments designed to maintain their durability, appearance and performance for longer.

**Because garment lifetime starts with fabric performance.**



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WE PROTECT.**