



**The abrasion debate.
A resource examining the
methods used in abrasion
testing, factors affecting
results, and outlining
the Camira position.**

Abrasion resistance is an important technical specification in textiles, but one that is over-simplified and largely misunderstood.

The basic premise is quite straightforward: it’s the ability of a fabric to resist surface wear caused by flat rubbing contact with another material in an attempt to mimic people’s clothes as they sit on furniture. People incorrectly assume that abrasion tests predict a product’s overall durability and lifespan which leads them to over-specify abrasion levels. This is simply not the case and this white paper will tell you why.

Test methods and standards

There are two main methods which are typically used to test abrasion - Martindale (in Europe and North America) and Wyzenbeek (in North America) – which use different apparatus and approaches to try and establish the breakdown of fabric through surface rubbing. There is absolutely no correlation between the tests, so it is not possible to estimate the abrasion results that would be achieved on one test if the results of the other test are already known.

Martindale (test methods ISO 12947-2 and ASTM D4966)

In the Martindale test the fabric specimen is mounted flat in an abrasion head and rubbed against a piece of worsted wool cloth, which acts as the abradant, in a progressive non-repeating pattern. The apparatus records the number of cycles – or rubs – which the fabric has been subjected to until a physically significant end point has been reached. Depending on the specific standard, the end point is when either two or three threads are broken; the number of abrasion cycles can be taken as either the mean value reported or the lowest individual value of several specimens which are tested from the full width of a single sample of fabric. The fabric is abraded at a force of 12 kPa and the worsted cloth changed every 50,000 cycles.

Determination of end point: ISO 12947-2

End point: 2 threads broken
Number of cycles: from 2016 this is the lowest value reported from 3 test specimens; previously it was the mean value from 4 specimens

ASTM D4966

End point: 2 threads broken
Number of cycles: mean value reported from 3 test specimens

BS 2543 – Upholstery fabrics for end use applications – classification

End point: 3 threads broken

Number of cycles: the lowest value reported from 4 test specimens
Grading: severe contract is 40,000 cycles

EN 14465 – Upholstery fabrics specification

End point: 3 threads broken
Number of cycles: the lowest value reported from 4 test specimens
Grading: Grade A is 35,000 cycles

Wyzenbeek (test method ASTM D4157)

The Wyzenbeek testing process requires samples of the test fabric to be pulled taut in a frame, held stationary, and then abraded back and forth using a cotton fabric, specifically a #10 cotton duck fabric. Each back and forth motion is called a “double rub” and the end point is when two breaks occur or when appreciable wear is evident. Individual test specimens are cut from both the warp and weft directions, four specimens are tested and the number of double rubs taken is the mean value reported.

North America’s Association for Contract Textiles (ACT) sets out the following performance guidelines for grading:

- 15,000 double rubs Wyzenbeek method: suitable for low traffic / private spaces
- 30,000 double rubs Wyzenbeek method: suitable for high traffic / public spaces

Please note a further specific point from ACT:

In an effort to bring further clarity to the appropriate consideration of double rub numbers, as of April 1, 2015, textile companies and furniture manufacturers that use the ACT certification mark for abrasion on their samples **A** now include the following statement whenever publishing test results in excess of 100,000 double rubs: “Multiple factors affect fabric durability and appearance retention, including end-user application and proper maintenance. Wyzenbeek results above 100,000 double rubs have not been shown to be an indicator of increased lifespan.”

The big problem - variability of results

We know from experience that the results of abrasion testing are highly variable even on the same piece of fabric. Research undertaken by the Association for Contract Textiles has found that “the results of multiple abrasion tests on the same fabric sample can vary by as much as 25,000 +/- Wyzenbeek double rubs or Martindale cycles”. In the actual British Standard 12947-2, Annex B considers the precision of the test and concludes that variations from the mean can be as high as 60%. This would mean that an average abrasion result of 50,000 Martindale cycles could give results as high as 80,000 or as low as 20,000.

As an illustration of variability, here are results of just one Camira fabric, Aspect, which was tested for abrasion a total of 19 times, both in our in-house technical laboratory and externally by independent test houses.



Above: Fabric being abraded in a Wyzenbeek machine

External testing – lowest recorded value	External testing – highest recorded value	Internal testing – lowest recorded value	Internal testing – highest recorded value
32,000	70,000	37,000	78,000

So why are there such variations?

The ACT organisation indicates that “testing conditions such as changes or differences in humidity, temperature, testing abradant, testing machines and test evaluators can cause significant variations in the test results.” British Standard 12947-2, Annex B highlights a number of practical influences:

- The variability of the fabric under test
- The higher the end point, the wider the variation of that end-point
- The importance of correct conditioning in the laboratory
- Assessment of end point varies between operators and some fabrics are difficult to assess due to the difficulty of seeing individual threads in the fabric construction

What other points are worth keeping in mind?

- A fabric with double the number of abrasion cycles does not indicate double the service life.
- Abrasion results exceeding 100,000 cycles are not meaningful in predicting additional longevity
- Polypropylene fabrics are prone to low abrasion results due to the heat generation and subsequent melting of synthetic fibres which is caused by the friction of the test
- Fabrics wear differently when they are upholstered over different densities of upholstery foam
- The mechanical action of both Martindale and Wyzenbeek simply cannot replicate how people actually sit on furniture

What else can affect fabric wear and breakdown?

We’ve tried to stress that abrasion resistance is only one element in affecting the overall lifespan of a fabric. There are a number of interplaying parameters which can influence not just a fabric’s appearance retention but potentially its premature wear through. These can include such aspects as a lack of proper care and maintenance, improper upholstering, exposure to sunlight and microbial contamination. When you’re choosing and using contract fabrics, think about some day to day practicalities to help evaluate a fabric’s fitness for purpose and durability over the lifetime of the furniture:

- **End-use area** – how much use and abuse will the fabric be subjected to?
- **Correct application** – making sure fabrics are intended for seating not panels.
- **Stain-repellent treatments** – could the end-use benefit from applying an anti-stain treatment?
- **Care and maintenance** – will the fabric receive proper care and maintenance? Dirt in the fabric accelerates fabric wear.

The Camira Position

Product integrity and robust technical governance are intrinsic to the Camira value proposition. Much as we would like to remove the abrasion figures all together from our technical specifications, we understand that the market is not yet ready for such a bold approach. It would arguably take a coordinated effort from the whole contract fabric supply market rather than a lone stance from a single company. So we quote an externally certified abrasion figure we believe is realistic in terms of its repeatability – by no means the highest a fabric has achieved, but not the lowest either. And all independent certification is backed by a guarantee of durability regardless of the number of rub cycles that have been achieved:

- 5 year guarantee on PU and PVC
- 5 year guarantee on printed fabrics
- 10 year guarantee on standard fabrics
- 10 year guarantee on high endurance fabrics
(24 hour use, 7 days a week)



Year guarantee



Year guarantee



Year guarantee
24 hour use