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## LION Floor™

**LION Floor™ is the first hardboard panel to be designed and manufactured specifically for the flooring industry.**

**LION Floor™ has been specifically designed to take into consideration the exacting requirements of the flooring industry, and is fully compliant with CFA Guidance and BS8203:2017 code of practice for installation of resilient floor coverings.**

The objective of this document is to explain why Finnish Fibreboard sought 3<sup>rd</sup> party accreditation, how they chose the testing institution, and their interpretation the attached reports.

1. Third part accreditation was sought to primarily determine two issues that have been raised by the flooring industry:
  - a. What is the dimensional stability of LION Floor™
  - b. BS8203:2017 now stipulates an Oil Tempered hardboard to be used as a fabricated underlay for resilient flooring, but being oil tempered, will flooring adhesives stick to the surface, and meet the requirements of EN 14259.
2. Finnish Fibreboard considered many of Europe's testing institutions, but decided on LAMK – Lahti University of Applied Sciences.
3. Attached are 2 reports from LAMK, the first dated 23.03 2018 and the other 11.05.2018
4. Interpretation of LAMK reports

## The Issues

### **Dimensional Changes**

All timber based panels are hygroscopic, that is, they will absorb moisture from the air, and being wood based, will swell. The degree to which these wood panels swell is clearly important, especially when these panels are being used as a fabricated underlay for resilient flooring.

BS 8203:2017 states in section 5.1.1 that 'hardboard type HB.H (oil tempered) conforming to BS EN622-2' is one of only 2 materials recommended for use as a fabricated underlay for resilient flooring.

The Flooring Industry has used hardboard for decades, but in recent years, as the availability on the UK market of thicker hardboards has reduced, and some flooring fitters used thin, non-oil tempered boards (which were inappropriate for use under modern resilient flooring) hardboard received some poor reviews, and many fitters moved to using plywoods.

It is important to understand, that the reason that some of these boards did not perform well, was for a combination of factors (i) As with plywoods, there are different grades, qualities and manufacturers of hardboard, and not all hardboards are the same (ii) As highlighted in section 6.7.1 of BS8203:2017 'oil tempered hardboard with a minimum nominal thickness of 4.8mm' should be used as a fabricated underlay for resilient flooring; thinner boards are simply not recommended for this application (iii) As previously mentioned, all wood based panels are hygroscopic, but HB.H oil tempered boards will absorb much less moisture from the air than a hardboard that isn't oil tempered. Standard hardboards will swell far more than oil tempered boards.

Although plywoods have dominated the fabricated underlay market for some years, the vast majority of plywoods that are available in the UK are simply unsuitable for use as a fabricated underlay (as they do not meet Annex A of BS8203:2017), and although, like 'unsuitable hardboards' there will be instances where these 'unsuitable plywoods' may provide months (or possibly even years) of service, due to either their glue line, the species/density of their veneers, the thickness of their veneers etc, there is strong and historically proven record that they are very likely to fail under certain circumstances, which is why both British Standards and the CFA have developed standards and recommendations that detail what products can safely be used as a fabricated underlay, and LION Floor™ meets these standards.

Due to the large volume of dimensionally unstable plywoods on the UK market, it was requested that we obtain third party verification of the dimensional stability of our LION Floor™ product, so that customers could use our product with confidence

### **Adhesion**

As LION Floor™ is a type HB.H Oil tempered hardboard, complying to EN622-2, some flooring specialists expressed concern that the oil tempering process may leave a residue on the surface of the board that would mean that the adhesive bond would be weak. Although our boards had undergone tests by some of the UK's largest glue and screed manufacturers e.g. Ardex, and passed their own internal tests, we felt it was important to have our board tested by an independent testing institution, and to ensure that our boards did actually meet the requirements of SFS-EN 1372

## Testing Institution

The forest industry in Finland, together with its value chain generates a tax revenue of over €4b for the Finnish economy, and the forestry industry spends approximately €100m per year on research, development and testing.

Because Finland has one of the largest timber industries in Europe, it is no surprise that Finland's testing institutions are also some of the best in Europe; especially when you consider how much of our economy depends upon their work.

Although we considered other testing institutions, we decided to approach Lahti University of Applied Sciences (LAMK), as their FuMaTec laboratory were already were involved in the testing of plywoods, and who due to their geographical situation, are well located to service the requirements of the timber sector in Finland.

LAMK are a well renown independent testing institution and have an enviable reputation.

Being a public institution, they are totally independent and have no vested interest in the research and testing work they do for private companies like Finnish Fibreboards Ltd.

## Attached Reports

You will find annexed to this document two reports from LAMK

The first report, dated the 23<sup>rd</sup> March 2018, reports on the tests LAMK did on LION Floor™ to determine the dimensional changes associated when relative humidity levels increased.

The second report, dated 11<sup>th</sup> May 2018, details the results of peel tests they carried out on both LION Floor™ and SP101 flooring plywood - a plywood meeting the requirements of BS8203: 2017, Annex A.

## Interpretation of Attached Reports

1. LAMK report dated 23.03.18, regarding dimensional changes associated with changes in relative humidity.

The report itself, carried out by the FuMaTec laboratory in February/March of 2018, is self-explanatory. The report details the results of tests carried out to determine the dimensional changes in LION Floor™ at both 65% relative humidity (RH) and 85%RH.

Typically, hardboard type HB.H has a moisture content of approximately 4-5%. BS8203:2017 in section 7.3.1 therefore states that hardboard should be **either** conditioned by wetting on site **or** a pre-conditioned hardboard should be used, which doesn't require conditioning with water on site. Lion Floor is produced pre-conditioned, which means that we increase the moisture content of the boards to 9%-11%. For comparison purposes, a good quality flooring grade plywood meeting Annex A of BS8203:2017 is usually 8-10%.

In the UK, it is generally advisable to keep RH levels below 60%, with an advisory limit of 40% in winter (<http://www.idealhome.co.uk/news/humidity-house-190521>), but 65% would not be an uncommon RH in new build houses/buildings, and even higher levels can be experienced.

With 40% - 50%RH being considered normal, and above 60% being high and requiring attention, we believe that a test at 65%RH is a realistic level to have LION Floor™ tested at, to record its dimensional stability. The report shows in table 2 that at 65%RH Lion

Floor™, the moisture content of the boards is virtually unchanged from the moisture content upon delivery, and the dimensional changes were exceedingly small.

It must be noted at this point that none of these samples were fixed. In a 'real life' situation, these boards would be securely fixed to the subfloor, and due to fixing, no perceptible changes would occur.

We have already established that 40% - 50%RH is considered normal, but the flooring industry is interested to know what will happen in extreme circumstances, so we asked LAMK to also perform the same tests with a RH of 85%.

The tests show in table 4, that even at 85%RH, and with a 27% increase in the RH of LION Floor™ itself, the board only swelled in length by 0.1%, and in thickness by only 0.143mm. However, it is important to note at this point, that in accordance with BS8203: 2017, if you were to install any fabricated underlay in a building with 85%RH, under section 6.4.1 and sections 7.3.1, that the fabricated underlay should be loosely stacked in the area where it is to be laid, so that the boards may attain an 'equilibrium moisture content' with the room in which they are to be laid, so when fitted, they are 'as close to in-use conditions as possible'. In a real-life situation, if LION Floor™ had been correctly acclimatised, and reached equilibrium moisture content in an area of 85%RH (so boards will have a moisture content of circa 13.5%) before installation, then upon correct installation, the boards will be extremely stable, and when fixed in accordance with BS8203:2017 section 7.3.1, will remain dimensionally stable even when the RH drops to 40% - 50%.

## 2. LAMK report dated 11.05.18, regarding peel test

EN 14259 Adhesives for floor coverings specifies the performance requirements of an adhesive when tested to a standard method with a characteristic type of floor covering.

The attached report carried out by the FuMaTec laboratory in April/May of 2018, was carried out in accordance with SFS-EN 1372, which specifies the test method for determining the bond strength (peel test) of resilient flooring .

All flooring adhesives used in the UK use this normative standard, and although some of the UK's major adhesive and screed manufacturers had carried out their own internal tests, none of the UK manufacturers we spoke to actually used tensile testing machines to accurately determine how strong the glue bonds actually were.

For the purpose of the tests, we attempted to emulate 'real-life' applications, so for some tests we used primer, smoothing underlayment and adhesive, for others simply smoothing underlayment and adhesive, and in our final tests, we simply stuck the resilient flooring

direct to the fabricated underlay, without even applying a primer. All combinations of screed and adhesive etc are detailed in table 1.

In these tests, we used products from Ardex and F Ball, who recommended to us their most popular smoothing underlayment/adhesive for use on plywoods.

In order to meet the requirements of EN 14259, the standard specifies a minimum glue bond resistance in EN14259 table 1, which varies according to the type of floor covering being used e.g. a mean peel resistance of 0.5N/mm is required for Linoleum and Textiles, but 1N/mm needs to be attained for Polyolefin floor coverings.

As you will see from the test results in table 2, all combinations easily surpassed the requirements of EN 1372, and in all tests, it was the adhesive that failed as opposed to the fabricated underlay.

## Certificates



CE marked in accordance with requirements of EN 13986:2004+A1:2015 standard



The classification presents emission requirements for the building materials, fixture and furniture without padding or textile coverings used in ordinary work spaces and residences with respect to good indoor air quality. M1 stands for low emissions. [m1.rts.fi/en](http://m1.rts.fi/en)



PEFC certificate: Promoting sustainable forest management



Member of Contract Flooring Association