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LION Floor™

Guidance Notes

The purpose of a fabricated underlay is to smooth out any irregularities of a sub-floor before laying a floor covering which will telegraph these imperfections through to the floor surface (for example fully bonded thin vinyl on a particleboard sub-floor may telegraph the joint lines). It is recommended that the underlay should be ideally 4.8 mm or 6 mm thick, depending on the level of rigidity required, and that panels as large as possible/practical are used to minimise the number of joints.

LION Floor™ underlay is for use over strip timber, particleboard, OSB and plywood floors to provide a flat, uniform, indent resistant base for laminate flooring, resilient sheet and tile floor coverings including flexible and semi-rigid PVC, cork, rubber, linoleum and cushioned vinyl. LION Floor™ is also frequently used beneath textile floor coverings.

LION Floor™ conforms to BS8203:2017 and to BS EN 13986, and is an oil tempered fibreboard (hardboard type HB.H), conforming to BS EN 622-2. LION Floor™ complies with the recommendations for a fabricated underlay for resilient flooring as detailed in BS 8203:2017.

The application of LION Floor™ underlay offers particular benefits in that it:

1. Is used in residential, commercial and institutional buildings;
2. Bridges small irregularities and joins between subfloor timbers or wood-based sheet materials.
3. Is tough, flexible and resistant to cracking or fracturing;
4. Minimises the adverse effect of subfloor dimensional movement on the floor covering;
5. Adds strength and stiffness to the subfloor;
6. Provides a smooth, fine surface for the uniform and economical application of adhesive;
7. Lessens the residual indentation of resilient floor coverings which can occur when the coverings are applied over soft underlays and substrates e.g. softwood, plywood, paper felt;
8. Is easy to work and fix with normal wood working tools and flooring installation equipment. Special tools are not necessary;
9. Will not split or fracture during normal working and fixing;
10. Is a light weight, easy-to-handle wood panel product; and
11. Improves the life of resilient floor coverings

Subfloor

Suitable subfloors for the application of LION Floor™ underlay include:

1. New or old structural timber floors.
2. Structural Plywood Flooring.
3. Structural Particleboard Flooring.
4. Structural OSB Flooring.

General

LION Floor™ can be laid either mesh side up or smooth side up, however, where it is critical that there is no transfer of the mesh pattern to the surface (such as when using very thin floor coverings), the underlay should be laid smooth side up, and this would be our recommended laying method for most applications.

Hardboards should not be used as fabricated underlays for floor coverings of semi-flexible polyvinyl chloride tiles.

NOTE Historically, semi-flexible tiles have cracked and rucked when laid over very thin hardboards with bitumen Adhesives

When laying LION Floor™, in common with all fabricated underlays, it is important to ensure that it is at the equilibrium moisture content that it will have in service at the time it is covered, in accordance with BS 8203:2017.

When used as a Fabricated underlay for resilient flooring (as defined by BS 8203:2017), it is important that a minimum thickness of 4.8mm nominal is chosen. The thicker the board, the greater its rigidity. Hardboard should be checked for suitability when used in high traffic commercial and light industrial areas.

NOTE It is envisaged that the floor underlay application does not exceed BS EN 335, Use Class 2 in long-term service life. On this basis LION Floor would be sufficient once in service.

Site Conditions

Following extensive consultation with industry experts we have detailed some suggested procedures to help achieve a professional and reliable installation of LION Floor™ in the subfloor preparation process. Finnish Fibreboard welcome the help, support and involvement of all suppliers of subfloor preparation products in ensuring LION Floor™ can be used appropriately and successfully with all types of materials.

Timber bases should be sound, rigid, level and dry. The timber or wood based panels should be at equilibrium moisture content, i.e. the state of dryness attained in normal service conditions, at the time it is covered.

It is recommended by BS 8203:2017 that all timber bases (including floating floors) should be covered with a suitable fabricated underlay, such as LION Floor™.

Suspended timber floors at ground level should be adequately ventilated (see BS 8102). Where plain edged boards or tongued and grooved boards have been nailed to joists or battens, LION Floor™ should also be used.

NOTE This acts as a buffer and thereby helps to minimize movement in the boards which might affect the appearance of the floor covering.

Uneven timber floors should be levelled by sanding, planing or by patch-filling with a suitable proprietary flexible cementitious smoothing underlayment before any fabricated underlay is laid. Boarded floors nailed into joists secured by clips set in concrete, or dovetailed battens set in concrete, or boards nailed direct into concrete at ground level should be adequately ventilated and protected by a damp-proof membrane.

The single most important factor affecting the performance of any fabricated underlay laid over a subfloor is moisture, and with this in mind, we pay particular attention to this aspect in our guidance notes.

LION Floor™ should only be installed over floors which are adequately ventilated and where there are no indications of dampness.

The cause of excessive moisture must be corrected and the floor allowed to dry.

Subfloor ventilators should provide a clear, cross flow of air beneath the floor so that any excessive moisture vapour is removed from the subfloor area. Excess moisture and dampness can lead to the distortion and possible decay of flooring members and excessive movement of LION Floor™.

Adequate ventilation is particularly important where impervious floor coverings are used, as they restrict the escape of moisture through the floor.

In common with other wood-based panel products, LION Floor™ is hygroscopic and its dimensions will change in response to changes in humidity. However, wood tends to shrink/expand much more across the grain than along the grain and the non-directional structure of LION Floor™ means that it tends to be more stable than some other wood based products. Accordingly, the dimensional movement of LION Floor™ is quite small: Typically, a 1% change in moisture content increases or decreases the length and width of LION Floor™ by approximately 0,03%. The corresponding change in thickness is likely to be in the region of 0,9% per 1% change in moisture content. These figures should be taken as a guide only.

When overlaying a subfloor with LION Floor™, a moisture test of the subfloor should be carried out using a good quality and reliable wood moisture meter. A reading of the relative humidity in the air and the room temperature also needs to be carried out. Once all three readings have been taken, the installer should be able to make a decision on whether the timber subfloor is at the correct moisture content in relation to the humidity and temperature of the room.

Prior to installing, a moisture test should be carried out on LION Floor™ and a reading taken. If it is within + or - 2% of the timber subfloor the LION Floor™ can be installed.

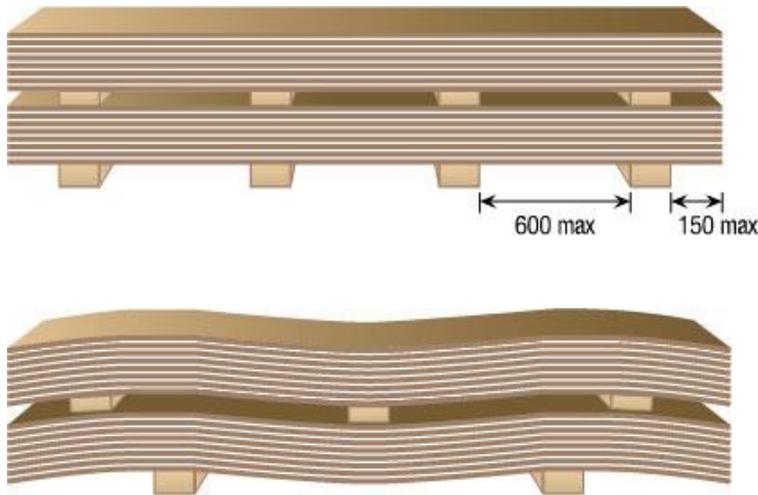
i.e. if the subfloor has a reading of 10% moisture content, LION Floor™ would need to have a moisture content between 8% mc – 12% before it can be installed. If the reading is not within 2% of the subfloor, LION Floor™ should be left in the room to acclimatise until it is within equilibrium of the subfloor.

Storage

Panels should preferably be stored in an enclosed dry building. Where temporary storage outside cannot be avoided, then stacks should be covered with waterproof but vapour permeable sheeting, keeping all panels on raised bearers to prevent contact with the ground, water or vegetation. Any protective wrapping should be kept in place as long as possible prior to conditioning for use.

Panels should be stacked flat on a level surface with all four edges flush. The ideal base is a close boarded or slatted pallet. If this is not possible the panels should be carefully stacked on battens of equal thickness at centres not exceeding 600 mm as shown in Figure 1.

Fig 1.



Stacking on edge should be avoided whenever possible. Where space will only permit edge stacking then the edges should not be permitted to come into direct contact with the floor to avoid possible moisture pick-up or damage to the edges. Panels should not be leant against walls but supported by a braced, purpose made rack using thick (> 18 mm) base and back panels (see Figure 2).

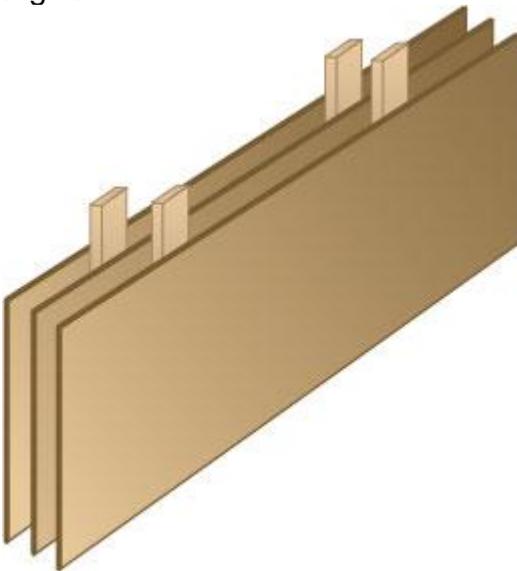
Fig 2.



Once on site, it is preferable for individual panels to be 'layered' and for battens to be inserted to separate individual sheets before installation in order to allow air to circulate and to allow the panels to attain a moisture content as close as possible to the final in-service moisture content.

Battens shall be placed directly above those below. The battens should be placed parallel to the short edges across the full width. The battens should all be of equal thickness and should be vertically aligned with any others in the same stack, in order to avoid distortion of the hardboard. Overhang of the panels at the ends of the stack should not exceed 150 mm – see Fig 3. Where stacks are placed on top of one another, the bearers should line up vertically to prevent distortion. The top of the stack should be covered.

Fig 3.



Installation

Preparation

Before installing LION Floor™, the building needs to be watertight with appropriate heating, lighting and ventilation. It is important to check that ventilation to the subfloor area is adequate and provides a clear cross flow of air beneath the floor.

The subfloor area should be free of excess moisture vapour and dampness. (Refer "Site Conditions.") The subfloor timbers and flooring must be in reasonable condition, dry and free from decay.

Replace any loose or broken boards. Floor nails should be punched below the floorboard surface.

LION Floor™ in thicknesses of 4.8mm or thicker are sufficiently rigid to bridge minor irregularities in the floor surface. The best results are obtained when the floor is machine sanded to a flat finish.

Care should be taken to ensure good workmanship and efficient supervision. Operatives with the necessary skill and knowledge should be employed to fix any fabricated underlay, including LION Floor™.

In common with the installation of any type of flooring, before laying LION Floor™, the subfloor should not only be in good condition, but it should also thoroughly cleaned and checked to ensure and that any debris has been removed that it is free of any contaminants, thus allowing LION Floor™ to lay as flat as possible. Any hollows in the base should be levelled by sanding, planing or patch-filling with a suitable smoothing underlayment.

The correct thickness of LION Floor™ panel should be selected dependent upon the level of rigidity required, the quality of the surface to be overlaid and the ultimate height/level of the finished floor.

It is recommended, that where ever possible, sheets are laid perpendicular to floor boards with the joints in the LION Floor™ being staggered.

Typical fixings recommended are ring shank nails, screw nails, countersunk screws and some types of divergent staples; see section on fixing LION Floor™ below.

Advice on suitability of fixing process should be taken with regard to the type of covering to be applied and any further surface preparation required. Certain fixings should be countersunk if necessary.

In common with other wood based fabricated underlays (see BS8203:2017), fixings should be placed at a maximum of 100mm centres around the edge of each sheet, with a fixing line 12mm from the edge and thereafter at 150mm centres throughout the entire area of the sheet. Perimeter fixings must not be more than 18mm from the board edges.

When using levelling or seam filling compounds which contain water, the LION Floor™ and associated subfloor components will again need to be allowed a period to dry out and reach a moisture equilibrium before further finishing of the floor covering installation.

Moisture Meter Information

Basic moisture meters have only one scale, which can be crude and is usually based on readings for Pine; whereas more sophisticated meters have a range of 8 or 9 different scales for different wood species and this is therefore the sort of equipment recommended. Readings can then be taken with the corresponding scale for the correct type of wood - in both the subfloor and the hardboard. If these types of readings are not done, then the inaccuracy of a "basic" meter can actually be more than the "plus or minus 2%" as recommended; and so the REAL m/c's of the floor and the LION Floor™ may be considerably more than 2% adrift from one another.

Moisture content, conditioning and the effects of moisture

Moisture content

Moisture content of wood-based panel products varies in accordance with the moisture condition of the surrounding environment, and is affected primarily by the relative humidity (rh) of the surrounding air. It moves towards and maintains an equilibrium moisture content (emc) i.e. one that is in equilibrium with the surrounding air. This means that moisture contents in wood-based panel products will vary depending on the situation of use and with time as temperature and humidity conditions change.

Although it is not possible to give precise levels, the figures in Table A give a general indication of the range of moisture contents in wood-based panels in various conditions.

Table A - Equilibrium moisture content and conditions of use

Service Class	Normal range of relative humidity (rh) at 20°C	Approximate equilibrium moisture content (emc)	Conditions of use
1	30% to 65%	$4\% \leq \text{emc} \leq 11\%$	Dry installations, no risk of wetting
2	65% to 85%	$11\% \leq \text{emc} \leq 17\%$	Risk of wetting during installation
3	> 85%	$\text{emc} > 17\%$	Risk of regular wetting in service

The moisture content of most hardboard panels when they leave the factory can be as low as 4 %, but LION Floor™ is supplied as a pre-conditioned board, which will mean that the panels supplied will have a moisture content of 9%-11% when they leave the factory.

This indicates that unconditioned newly manufactured panels can increase in moisture content when installed in a building under construction and subsequently change in moisture content as the building is occupied, heated and dries out, with the consequence of dimensional changes.

Dimensional movement

In common with other wood-based panel products, LION Floor™ is hygroscopic, and its dimensions will change in response to changes in humidity. All timber and wood-based panels expand on taking up moisture from the surrounding air, and shrink on losing moisture. Excessive changes in moisture content may therefore lead to unacceptable dimensional changes which may result in bowing, buckling or open joints between panels. LION Floor™ should be protected from rain, dampness and accidental wetting and prior to fixing be conditioned to the moisture content corresponding to the moisture conditions of its end use.

Problems which may occur if insufficient care is taken with protection or conditioning include edge swelling due to moisture ingress at unprotected edges, localised swelling due to moisture pick-up from adjacent materials which have a higher moisture content,

e.g. timber joists, and general expansion causing bowing between supports or restraints. Any increase in moisture content will cause slight expansion in the panel.

Table B - Expected moisture content of LION Floor™

Relative humidity at 20° C	Approximate equilibrium moisture content (emc)
30 %	6 %
65 %	10 %
85 %	13 %

Conditioning

To reduce dimensional changes the panels should be conditioned in the service class for the intended end use by loose laying (for example on floors) or stacking with spacers as appropriate (see Figure 3).

LION Floor™ should then be stacked for at least 48 h and preferably longer before fixing to allow for acclimatisation. BS 8203 recommends that all fabricated underlays be stored to as close to in-use conditions as possible before laying for at least 48 hours and preferably one week. Hardboards conditioned on site should be installed and fixed whilst slightly expanded, but allowed to fully dry after fixing to avoid the risk of buckling after the floor covering is applied.

The length of time allowed for conditioning will vary depending on the panel and the likely condition of use.

Temperature

Temperature also has an influence on the dimensional stability of wood based fabricated underlays, and should be taken into consideration when deciding upon where to use LION Floor™. The optimum temperature for the sub-floor should be 20 deg C with a relative humidity not exceeding 60%.

Due to the high temperature variations within structures that contain a lot of glass (especially in areas with glass roofs e.g. conservatories) we would not recommend the use of LION Floor™ or any wood based fabricated underlay in these areas where products are to be adhered to the surface.

LION Floor™, like other wood based fabricated underlays will perform best if the temperature variation on the floor is kept to a minimum. Due to the possible dimensional movement of resilient floor coverings when exposed to high temperatures e.g. from solar gain combined with the fact that some adhesives are not suitable for use in areas that may exceed 27 deg C, we do not recommend that LION Floor™ be used in areas that are likely to exceed 27 deg Celsius.

Working with LION Floor™

LION Floor™ can be sawn, routed, spindled or drilled. Satisfactory results can be achieved using hand tools, but quicker and more consistent results can be achieved using either portable or fixed power tools.

When cutting any wood-based panels it is important to pay attention to normal good practice, sharp cutters, adequate support close to saws and cutters, elimination of machine vibration and correct allowance for saw kerf.

The quality of cut is dependent on the cutter type, tool and material speed and also on the material type and density. Tools must be kept sharp, as dull cutters will cause edges to 'bell'. LION boards can be drilled using all types of woodworking drill bits.

Where a very close tolerance fit is needed, boards should be cut to size after moisture content "conditioning".

Fixing LION Board™

LION Board can be fixed with nail screws, annular ring shank nails, staples, and screws; the type used will depend upon the end use. Screws through thinner hardboards should have cups if 'pull through' is a possibility. LION board can be bonded with most types of woodworking adhesives. Most common floor laying adhesives are suitable for use with wood-based panels; however, in common with other fabricated underlays, water-based adhesives should not be used unless they have a very low water content or the panel surface is sealed with a suitable sealer. This will prevent excessive amounts of water (which may not be able to evaporate through the floor covering being absorbed by the panel) causing swelling and/or distortion if present in sufficient quantities.

Nail Screws

The most secure way of fixing the product for commercial applications is by using a nail screw. An example of a suitable nail screw would be the ITW NailScrew® 2.5/2.8mm 30mm140610 and their LCP45 GN Paslode plastic coil nailer makes light work of inserting fixings when large areas have to be completed

Staples

The advantages of using staples is a reduction in the tendency of splitting or deformation particularly near the edge of the board, but they can leave the surface of the material rather bumpy.

Use 25mm minimum length galvanised or copper etched narrow crown type, preferably resin coated.

Adjust the staple gun to set the staple crown 0.4mm maximum below the LION Floor™ surface.

Staples must not be driven deeply into the board.

Please Note: BS8203:2017 does not recommend the use of staples for ANY fabricated underlay materials

Nails

Where nailing is the preferred fastening method, correct nail selection is important. In general rust-resistant nails should be specified with a length of at least two and a half times the board thickness.

Head ring grooved buttress type underlay nails are an example of a suitable nail type, along with annular ring shank and helically threaded nails. An example of a suitable nail fixing would be the ITW 142200 25 x 2.8 HDGV ring shank nail and their IM45 GN Paslode plastic coil nailer makes light work when fixing large areas.

The recommended nails will give better hold than staples and are preferred for softwood floor boards.

Fixing Procedure

All wood-based panels used as underlays should be loosely stacked in the room where they are to be laid (see figures 1 & 2), as close to the in-use conditions as possible, to acclimatise or condition the sheets before laying; see above sections. Where possible, hollows in the sub-floor should be brought level by sanding, planing or patch-filling with a suitable underlayment. The underlay panels should be laid across the line of the panels in the sub-floor.

In order to obtain the best results LION Floor™ should be laid so that there are no gaps between the joints of the panels, nor any step between each panel. A gap should be provided around the perimeter of a floor to upstands or abutting construction and at door thresholds to allow for possible expansion of the underlay. This should be a minimum of 10mm at each stage or 2mm per metre run of panel. The gap should be left open and covered by a skirting panel, or filled with a compressible strip such as cork. Joint lines should be staggered and joints in the panel and the timber base should not coincide

Hardboard underlay can be laid either mesh side up or smooth side up. However, when using resilient floor coverings are being laid on top of the hardboard, and where it is critical that there is no transfer of the pattern to the surface, especially when using very thin floor coverings, the underlay should be laid smooth side up.

There are two important factors concerned with fixing boards accurately and successfully:

1. Correct sequence in fixing - start from one edge of the sheet and work across. With the second sheet, start from the edge adjacent to the sheet already secured. Do not fix corners first then centres as this will “build-in” a tendency towards bulging from the outset. Even when adhesives are used for fixing, the board should be pressed home at one edge first and then “smoothed” on to the remaining supports.
2. Correct fixing centres - a large number of relatively low strength fixings are preferable to just a few strong fixings.
3. Always stagger the joints – so that the joints of the LION Floor™ do not mirror those of the floor that you are over-boarding.

Floor Coverings

The floor covering manufacturer's instructions should be followed in relation to the selection and use of adhesive and for the installation of the floor covering material. Where required, the LION Floor™ surface may be sealed to suite some adhesive systems. Use shellac/methylated spirits solution or proprietary sealers in accordance with the adhesive manufacturer's instructions.

If LION Floor™ is to be used under a resilient floor covering, always refer to BS 8203 Code of Practice for the Installation of Resilient Floor Coverings

Health and safety

In common with other wood products, LION boards are safe when they are handled and used correctly.

When cutting or machining fibreboards, wood dust is produced and as this can be hazardous, measures must be taken to control the dust. This is normally carried out with the use of a suitable personal dust mask or by dust extraction systems in a workshop environment. Dust from cutting operations can be controlled by complying with the Control of Substances Hazardous to Health (COSHH) Regulations 2002. Under these Regulations, wood dust has a Workplace Exposure Limit (WEL) of 5 mg/m², which is appropriate to wood dust from the machining of fibreboards. Exposure must be reduced as far as possible below this limit.

The formaldehyde potential of wet process fibreboards can be considered to be extremely low and may be considered to be within the lowest class specified in European Standards without testing.

As with all wood-based panels, there may be handling hazards and COSHH Regulation 6 requires an assessment to be made, and recorded of health risks associated with wood dust and handling. Common risks and control measures are shown in *Table C below*:

Table C - LION Boards™ - common hazards and methods of control

Activity	Hazard	Control
Manual handling (in full panel form)	Large panel sizes present a risk of strain or crush injuries if not handled correctly	<ul style="list-style-type: none"> ● Store carefully in uniform stacks on a flat level base ● Use mechanical handling equipment ● Adopt correct manual handling procedures
Joinery work Activities likely to produce high dust levels include: <ul style="list-style-type: none"> ● Sanding by machine and hand ● Sawing, routing and turning ● Hand assembling machined or sanded components 	<ul style="list-style-type: none"> ● Wood dust in general (including dust from fibreboards) has health risks - it may cause dermatitis and allergic respiratory effects ● Wood dust is inflammable 	<ul style="list-style-type: none"> ● Off site: Preparation under exhaust ventilated plant ● On site: enclosure and exhaust ventilation ● Dust extraction on portable tools ● Good ventilation ● Respiratory protection equipment (RPE) <p><i>Note: Any health hazards arising from the use of fibreboard at work can and should be controlled by compliance with the requirements of the Control of Substances Hazardous to Health (COSHH) Regulation 2002</i></p>

References

- 1 BS EN 622-1. Fibreboards. Specifications. General requirements, BSI
- 2 BS EN 622-2. Fibreboards. Specifications. Requirements for hardboards, BSI
- 3 BS EN 636. Plywood. Specifications, BSI
- 4 BS EN 312. Particleboard Specifications, BSI
- 5 BS 8203:2017. Installation of resilient floor coverings, BSI
- 6 BS EN 300. Oriented strand boards (OSB) – Definitions, classification and specifications, BSI
- 7 BS EN 13986. Wood based panels for use in construction – Characteristics, evaluation of conformity and marking, BSI
- 8 CP 102, Code of practice for protection of buildings against water from the ground
- 9 BS EN 12872, Wood-based panels. Guidance on the use of load-bearing boards in floors, walls and roofs

Further reading

BS 8201:2011, Code of practice for installation of flooring of wood and wood-based panels
BS EN 13810-1, Wood-based panels – Floating floors – Part 1: Performance specifications and requirements.

Other documents

- [1] PanelGuide Version 4. 2014. The Wood Panel Industries Federation, TRADA Technology Ltd (a BM TRADA company), and the National Panel Products Division (a division of the Timber Trades Federation).
- [2] WOOD PANEL INDUSTRIES FEDERATION. IS(WPIF)3/2008, Code of Practice for Particleboard and Oriented Strand Board (OSB) Floating Floors (WPIF Industry Standard), Lincolnshire: 2008.
- [3] GREAT BRITAIN. Building Regulations for England and Wales 2000 Approved Document B (Fire Safety) 2000. London: The Stationery Office.
- [4] GREAT BRITAIN. Health and Safety at Work etc. Act 1974. London: The Stationery Office.