

SMARTPLY® FLOOR

SMARTPLY FLOOR is a very strong and moisture resistant OSB3 panel that is engineered to perform in the most demanding flooring applications.

Panels are available in various sizes with both square edge (SE) and tongue & groove (T&G) profiled edges which enable quick, easy and reliable installation in almost any timber floor design.

SMARTPLY® FLOOR

QUALITY & ENVIRONMENTAL CERTIFICATION

SMARTPLY OSB is manufactured in accordance with the requirements of EN 300: *Oriented Strand Boards (OSB) - definitions, classification and specifications*.

SMARTPLY OSB is CE marked in accordance with the harmonised standard EN 13986: *Wood-based panels for use in construction – characteristics, evaluation of conformity and marking*. This standard is a technical specification for woodbased panels which implements the provisions of the Construction Products Regulation (CPR). In addition to the CE mark, SMARTPLY OSB panels are marked 2+ Structural for ease of reference.

SMARTPLY OSB3 is certified by the Irish Agrément Board (IAB) and the British Board of Agrément (BBA). Due to this certification it is permitted for structural use by Homebond (Ireland) and NHBC (UK) when used in accordance with the requirements of the Building Regulations in the country of use. Other quality certification includes SINTEF (Norway) and KOMO (Netherlands).

SMARTPLY has achieved I.S. EN ISO 9001:2008, the internationally recognised quality management system which is certified by the National Standards Authority of Ireland (NSAI).

SMARTPLY has Forest Stewardship Council (FSC®) Chain of Custody certification for its manufacturing, processing, sales and distribution processes.

SMARTPLY operates under an Integrated Pollution Prevention Control (IPPC) licence, which is monitored by the Environmental Protection Agency (EPA) in Ireland.

All SMARTPLY OSB3 products are manufactured using formaldehyde-free resin.



SUITABILITY

The selection of SMARTPLY OSB3 Floor panels depends on a number of factors of which the most important are:

- **The type of floor:** Due design consideration must be given to the type of floor and the level of performance required, i.e. intermediate, party, suspended, floating, overlays, raised access, industrial platform, etc. It is the designer's responsibility to ensure that the floor design meets current structural, thermal, acoustic and fire regulations.
- **The load that the floor has to carry:** When designing a floor using permissible stress design, it is convenient to design the floor to one of three load classes:

Domestic: with a maximum UDL of 1.5 kN/m² and a maximum concentrated load of 2.7 kN/m².

Non-domestic light duty: with a maximum UDL of 2.5 kN/m² and a maximum concentrated load of 2.7 kN/m².

Non-domestic heavy duty: with UDL and concentrated loads above 2.5 kN/m² and 2.7 kN/m² respectively.

The designer can design the floor to carry any specified load. Comparable load classes for use with limit state analysis are given in Eurocode 1. Various standards are being reviewed as a result of the changeover to Eurocodes and it is therefore the designer's responsibility to ensure the application of correct design principles and loads.

- **The ambient moisture conditions:** Moisture conditions can affect the performance of OSB floor panels. Floor structures should be assigned to one of the three service classes defined in EN 1995-1-1 (Eurocode 5). OSB3 is only suitable for service class 1 and 2.

Always check current regulations specific to the country of use. As well as conditions in service, consideration must also be given to the construction phase where high levels of moisture or humidity often exist. In such conditions SMARTPLY strongly recommends the use of OSB3 or OSB4. Detailed guidance is provided in the 'Moisture Content' section of this technical datasheet.

SPECIFICATION & DESIGN

As design values can vary between manufacturers, it is important to ensure that the SMARTPLY FLOOR panels specified by the designer are those used on site. All SMARTPLY panels are clearly marked with the following information:

- a** Major axis (length of panel, direction of laying arrows)
- b** Production identification number
- c** Product Certification mark (e.g. BBA, IAB)
- d** CE marking
 - i. Manufacturer's name / Logo (SMARTPLY)
 - ii. Notified body identification number
 - iii. Quality certification (EN 300, EN 13986)
 - iv. Panel type (e.g. OSB3)
 - v. Thickness (e.g. 18mm)
 - vi. Formaldehyde class (e.g. E1)
- e** Additional marking for ease of reference (e.g. 2+ structural)
- f** FSC certification

Note: Markings may vary depending on product type.

The most popular panel sizes for floor decking are 2440 x 1220mm SE, 2397 x 1197mm SE, 2397 x 1200mm T&G2, 2400 x 600mm T&G4 and 2440 x 590mm T&G4 depending on market area, although other panel sizes are available. The narrower panels are often preferred for ease of handling in internal spaces and a length of 2400mm suits nominal framing centres of 400 or 600mm. Common panel thicknesses for flooring include 15, 18 and 22mm. Other thicknesses available on request. For the full product range, please refer to the SMARTPLY Product Selector table or SMARTPLY Technical Datasheet - 'SMARTPLY OSB'.

Panels are available in square edge (SE) or tongue & groove (T&G) profiled - on two long edges (T&G2) for wide panels or on all four edges (T&G4) for narrow panels. Conti-roll technology ensures a precise thickness tolerance. However, some floor coverings may require a sanded surface, which is available on request. Guidance on expansion gaps, laying and fixing is provided in this datasheet.

For domestic loading the minimum thickness of SMARTPLY FLOOR panels should conform to the "deemed to satisfy" tables for domestic floor applications given in BS 8103-3. These minimum thicknesses are given in Table 1, plus a SMARTPLY recommendation for enhanced floor performance.

TABLE 1:

Thickness of OSB FLOOR panels for domestic loading (extracted from BS: 8103-3)

Maximum centres of support members (mm)	Minimum thickness (mm)
450	15
600	18
600	22 (where enhanced floor performance is required)

Other span/thickness combinations may be acceptable if determined by calculated design. For example, 'engineered floors' such as I-joists or metal-web joists are often designed at 480mm joist centres, which suits 2400mm long SMARTPLY FLOOR panels. The floor system manufacturer's instructions must be followed in relation to all aspects of design, i.e. structural, thermal, acoustic and fire and requirements.

For non-domestic loading and if the "deemed to satisfy" approach to design is not applicable for the country of use, recourse must be made to either designing by prototype testing or design by calculation according to EN 1995-1-1 (Eurocode 5) or other relevant standards.

TRANSPORTATION, STORAGE & HANDLING

Careful transportation, storage and handling are important to maintain panels in their correct condition for use. Precautions must be taken during storage, prior to delivery and on site to minimise changes in moisture content of the OSB panels due to weather.

Panels must be stored on dry bases, and packs must be evenly supported on bearers with spacer sticks at regular intervals (depending on panel thickness but max 600c/c).

Packs should be sheeted with tarpaulins or other impervious material so arranged to give full cover, but at the same time to permit free passage of air around and through the pack. Care must be taken not to deform stacked panels. Bands should be cut as soon as practical and safe to avoid permanently deforming the panels. During transport and handling it is particularly important to protect edges and corners with suitable coverings to prevent damage from chafing or slings.

Where the flooring panels are required to have low moisture contents, it might not be possible to maintain suitable conditions on site other than for short periods, and deliveries must be arranged accordingly.

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ASSEMBLY & ERECTION

The erection sequence and site storage must be planned so as to minimise the length of time that panels are left uncovered. Re-use polythene wrapping to provide weather protection to open packs during erection or site delays. In the case of prefabricated floor cassettes, lifting points must be clearly indicated and care needs to be taken during lifting to avoid distortion of the panels, straining of the fixings and joints and damage to edges.

Installed OSB3 panels can withstand short periods of temporary wetting during construction, although such exposure must be minimised as much as possible. Temporary protection is recommended where panels are installed before the structure is adequately weatherproofed. Water must never be allowed to pool on the surface of panels, particularly at panel edges and T&G joints. A floor squeegee is recommended to remove rainwater from panels. Alternatively, a small number of 10mm diameter holes can be drilled through the OSB to allow water to drain away, but advice should be sought from the designer to ensure that acoustic and fire performance of the finished floor assembly is not compromised.

MOISTURE CONTENT

Moisture content of wood-based panel products varies in accordance with the moisture content 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 the moisture contents of the 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 2 (below) give a general indication of the range of moisture contents in wood-based panels in various conditions:

TABLE 2:
Equilibrium moisture content & conditions of use
(extracted from PD CEN/TR 12872)

Service class	Normal range of RH at 20°C	Approx emc	Conditions of use
1	30% to 60%	4% < emc < 11%	Dry installations, no risk of wetting in service
2	65% to 85%	11% < emc < 17%	Risk of wetting during installation and risk of occasional wetting in service

As required by EN 300, the ex-works moisture content of SMARTPLY OSB panels is in the range of 2 - 12%. As recommended in BS 8103-3, the moisture content of panels at the time of erection or fixing must be no greater than 12%. See Table 3 (below). As a guide, normally these following moisture content ranges are encountered for various heating conditions:

TABLE 3:
Typical moisture contents for various heating conditions (extracted from BS 8103-3)

Unheated	15% to 19%
Intermittent heating	10% to 14%
Continuous heating	9% to 11%
Underfloor heating	6% to 8%

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. For guidance purposes it may be assumed that a 1% change in panel moisture content will cause a dimensional change in panel width, length and thickness as given in Table 4 (below).

TABLE 4:
Dimensional change for a 1% change in panel moisture content (Extracted from PD CEN/TR 12872)

Panel type	Length %	Width %	Thickness %
OSB3	0.02	0.03	0.5





CONDITIONING

To minimise dimensional changes, the floor panels must be conditioned in the service class for the intended use by loose laying or stacking with spacers as appropriate. The length of time allowed for conditioning will vary depending on the panel and the likely condition of use. A minimum period of 48 hours is required but a longer period of up to 1 week is necessary in more extreme conditions. Failure to adequately condition panels can result in buckling of the installed OSB panels.

EXPANSION GAPS

The 'Moisture Content' section of this technical datasheet explains how wood-based panels experience dimensional change when subjected to changes in moisture content. It is necessary to allow for such movement by incorporating expansion gaps as follows:

- **Perimeter, upstands and abutting construction:** A gap must be left wherever panels abut any rigid upstand or abutting construction such as a perimeter wall, column, fireplace surround, etc. This gap must be 2mm per metre length of floor but not less than 10mm wide and can be covered by skirting or loose cover strip. This gap applies where both square edge and T&G panels are used.
- **Long floors:** On long floors (above approximately 10-12m), it may be necessary to divide the area into smaller independent sections by incorporating intermediate expansion gaps. These gaps must allow for a possible overall expansion of 2mm per metre length of floor and applies where both square edge and T&G panels are used.

The spacing of these gaps and how they are concealed depends largely on the floor plan layout and the type of floor covering. Gaps should either be left open and masked by a loose cover strip, or filled with an easily compressible material such as cork or softboard. If large intermediate expansion gaps are required, a purpose-designed slip joint can be used, the design of which should be suitable for the floor covering used. In areas such as long corridors, door thresholds can provide a convenient cover strip.

A sensible spacing for intermediate expansion gaps is 7200mm, i.e. every 3 panels where they are laid perpendicular to the joists or every 6 panels where they are laid parallel to the joists. This dimension also suits nominal framing centres of 400 and 600mm. It is important that the panels are installed in the direction of the design.

This guidance applies to thermal and moisture movements of the OSB only. Structural movement of the floor diaphragm should also be accommodated if specified by the floor designer.

- **Between square edge panels:** A 3mm gap must be left between all adjoining square edges of panels. It is essential that the gaps are kept free from plaster and mortar droppings and other debris during construction.

Notes: T&G panels have an expansion gap included in the T&G joint, so T&G edges must be butted together with the joints glued. However the requirement for perimeter and intermediate expansion gaps still applies.

Depending on joist width, extra joists or noggins may be required to support panel edges and facilitate edge fixing of panels. Panels should have a minimum bearing of 17.5mm on joists or noggins. Most commercially available joist widths provide adequate edge support while also facilitating the 3mm expansion gaps between square edge panels. Where narrow joists (<38mm) are used, a double joist or extra noggins will be required or T&G4 panels should be used.

The above guidance is based on the requirements for expansion gaps given in BS 8103-3 and PD CEN/TR 12872 and SMARTPLY's long-term experience. However, it is recommended to calculate the specific expansion requirements for every flooring application taking both the moisture content during construction and the expected in-service equilibrium moisture content into account. Failure to leave adequate expansion gaps can result in buckling of the OSB panels.

SMARTPLY[®]

FLOOR

INSTALLATION

The area of decking installed in any working day must be no greater than can be quickly protected from wetting. Supporting joists should be plumb, in line and to level. Joists and noggins must provide adequate support for the panel edges in line with the design of the floor, as described above.

SMARTPLY OSB FLOOR panels have maximum strength and stiffness along the length (major axis) and are therefore laid to best structural advantage with the long edge spanning across the joists. However, panels must be installed in the direction assumed by the design. Maximum strength and stiffness will be obtained if each panel is continuous over at least two spans between joists. To facilitate ease of laying, panels are marked with laying direction arrows, indicating the major axis. Panels must be laid with the identification marks facing down.

For square edge panels, it is essential that panels are supported continuously along all edges by either joists or noggins. For T&G panels, both short edges must be supported by the centre line of a joist or noggin but no support is necessary under the long edges set between correctly spaced joists. When using either square edge or T&G panels, joints along the short edges must be staggered and the panel length must not be less than two joist spacings. It is essential that edges around the perimeter of the floor are continuously supported, either on joists or noggins. Furthermore, it is recommended to provide additional edge support in areas of constant or high load concentration such as at doorways or stair landings.

For all panel types, it is recommended to glue the panels to the supporting timber joists, ensuring that all joists are level and free from mortar droppings and debris before laying. The moisture content of the joists must not exceed 20%. T&G panel joints should be glued using a moisture resistant polyvinyl acetate (PVA) adhesive conforming to EN 204 ensuring a snug fit with all T&G joints. This ensures a reliable distribution of strength, stiffness and spanning capacity along and across the panel plus it improves floor performance and reduces the risk of 'creaking' noises due to trafficking. Once correctly installed, care must be taken not to overload the floor beyond its design load, particularly in relation to stockpiling building materials on the deck.

FIXING

All panels must be fastened firmly to the supporting timber with flat head annular ringed shank nails or countersunk head traditional wood screws (in predrilled holes), 3.0 - 3.35mm in diameter (3.0mm diameter is preferable for ≤ 38 mm thick joists to reduce the possibility of splitting). Countersunk head self-drilling wood screws, No. 8 screw gauge or 4.0mm in diameter can also be used.

All fixings should be a minimum of 50mm in length or 2.5 times the thickness of the panel, whichever is greater. In service class 2, fixings must be corrosion resistant. Fixings should be spaced at 150mm centres along panel perimeters and at 300mm centres along intermediate supports. Fixings must be at least 10mm from the edge of the panel. In order to avoid buckling, fixings should commence at the top centre of the panel and continue outwards and downwards.

The above recommendations are a combination of those extracted from the 'Manual for the design of timber building structures to Eurocode 5' and based on SMARTPLY's longterm experience. A structural engineer may specify different fixings requirements based on calculated design but such mechanical fixing must not excessively restrict the natural movement of the OSB panels.

Partitions must not be supported directly by the OSB decking. Partitions must be supported directly by a joist, beam, solid blocking or noggins between the joists and fixed securely in place. This will prevent deformation of the decking and 'squeaky floors' which is the result of friction between decking material and nail shanks.

FLOATING FLOORS

EN 13810-1 permits the use of any load-bearing panel complying with EN 13986 to be used as floating floor systems. However, the use of OSB as the floating overlay panel on a 'continuously supported' floating floor requires great care in the design and site installation. This is mainly due to the absence of mechanical fixings and the associated restraint for the decking, as well as workmanship issues associated with the installation of such floors.

SMARTPLY FLOOR panels are more commonly used as part of a 'self supporting' floor where the floating floor is supported on battens, thereby providing adequate support and facilitating fixing of the decking. The panels must be type OSB3 or OSB4 T&G4 and a vapour control layer is typically required between the insulation and OSB deck. Any gaps due to the un-evenness of the subfloor must be made good. Special care must be taken to ensure that panels are laid in dry conditions after all wet trades operations such as plastering have been completed. Advice in relation to conditioning, expansion gaps, etc must be strictly followed. Partitions must be built off a structural kerb and not off the floating deck.

Good site practice and strict adherence to the specifier's instructions are essential in order to get the desired performance from floating floors. Further guidance can be found in the Code of Practice IS (WPIF)3/2008, which contains considerably more detailed guidance on the installation of floating floors than is contained in EN 13810-1, thereby complimenting the European standard.

FINISHING

SMARTPLY OSB FLOOR panels are suitable for many types of floor covering, provided that the fixing, edge support and gluing recommendations are followed. If a sanded surface is required for specific gluing application please contact SMARTPLY for assistance. Resilient floor coverings such as cork, linoleum, rubber or vinyl should be laid in accordance with BS 8203.

The interlocking joints of T&G are machined to exact tolerances to ensure optimum flatness. Sub-floors must be clean, rigid and flat. Some thin or shiny surface materials laid over the OSB floor panels can allow the panel joints to show through, particularly after heavy trafficking. Before laying materials, ensure all joints are level. Some light sanding is permissible.

Most common floor laying adhesives are suitable for use with SMARTPLY OSB FLOOR panels; however water-based adhesives must not be used unless they have 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 panels, causing swelling and/ or distortion if present in sufficient quantities.

The application of rigid ceramic tiles to OSB panels, which expand and contract in response to changes in relative humidity / moisture content, is generally not recommended by SMARTPLY due to the great care in specification, site practice and end-use conditions that are necessary to avoid cracking at joints or through tiles. However, guidance on this application is provided in BS 5385-3 and The Tile Association publication 'Tiling to timber sheets and boards, timber substrates and alternative products'. Furthermore, technical advice from the tile, adhesive and grout manufacturers must be strictly followed.



SMARTPLY[®] FLOOR

SERVICE

For further information and/or technical advice please contact your local SMARTPLY Sales Representative or SMARTPLY Technical Support Personnel through any of our European offices.

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Important notes:

The recommendations provided in this Technical Data Sheet for the correct use of SMARTPLY FLOOR panels are specifically designed to ensure longevity and performance of this quality product in service. It is therefore essential that these recommendations are strictly followed. The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product. SMARTPLY EUROPE DAC cannot be held responsible for damages arising from non-adherence to these recommendations, or product failures resulting from inadequate structural design or misuse of this product.

In order to provide comprehensive guidance for the correct use of SMARTPLY OSB products, this Technical Datasheet makes reference to relevant BS & EN standards as well as publications from other authoritative bodies.

SMARTPLY EUROPE DAC cannot be held responsible for claims arising from the use of any information that has been extracted from such sources.

Further guidance on the selection and use of OSB for floor decking can be found in EN12871, PD CEN/TR 12872, BS 8103-3 and WPIF Panel Guide.



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