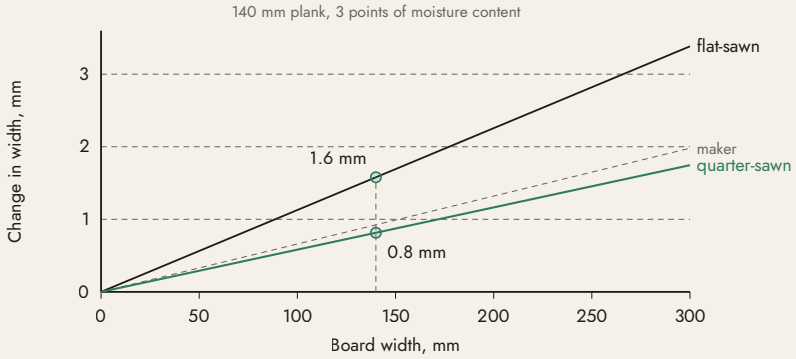
Seasonal *movement* in timber floors: gaps, cupping and plank width

A timber floor changes width with room humidity. Estimate the change in one board as width times a coefficient times the swing in moisture content; a laid floor moves less than a free board, so ask the partner for the gap and joints.

AT A GLANCE

Board width	Flat-sawn white oak, mm	Quarter-sawn white oak, mm	One maker's 0.22 % per point, mm
90 mm	1.0	0.5	0.6
120 mm	1.4	0.7	0.8
140 mm	1.6	0.8	0.9
190 mm	2.1	1.1	1.3
300 mm	3.4	1.7	2.0

Change in width of one board free to move, for a 3 point change in moisture content. Flat-sawn and quarter-sawn use the Wood Handbook (2021) Table 13-5 coefficients for white oak (0.00376 and 0.00194 per point). A laid floor moves less than a free board. Estimates, not predictions.



Change in width of one free board for a 3 point change in moisture content: white oak flat-sawn (0.00376) and quarter-sawn (0.00194), Wood Handbook (2021) Table 13-5, and one maker's 0.22 % per point. Original drawing by Make Bespoke Studio.

THE ESTIMATOR IN BRIEF

Movement of one board = width × C × swing (Wood Handbook 2021, equation 13-3, valid for 6 to 14 % moisture content).

Step	What to use
1. Swing in moisture content	30 to 50 % RH = 3.0 points; 45 to 65 % = 3.5; 40 to 65 % = 4.3; 30 to 65 % = 5.8 (Table 4-2, 21 °C)
2. Coefficient C	White oak: 0.00376 flat-sawn, 0.00194 quarter-sawn. Walnut 0.00274 and 0.00190. Maple 0.00353 and 0.00165. Table 13-5; European oak not listed
3. Multiply	140 mm flat-sawn white oak, 3 points: 1.6 mm. Quarter-sawn: 0.8 mm
Room, every board free	4 m flat-sawn: 45 mm. Real floors move less: boards restrain each other and fixings hold them

SPECIFICATION WORDING

HUMIDITY RANGE AND MOVEMENT STATEMENT

The floor is designed for room conditions of [45 to 65] % relative humidity and [15 to 25] degrees C, held for the life of the floor, as stated by [workshop] for [product]. At the moisture content swing of [3.5] points between the driest and dampest design conditions, movement across the width of one [140] mm [flat-sawn / quarter-sawn] [species] board is calculated at [1.6] mm (width x coefficient [0.00376] x swing). The workshop is to state the coefficient used and where it comes from. Seasonal gaps at the joints up to [ ] mm in the dry season are expected movement and are not a defect [contract adviser to confirm this clause].

MOVEMENT JOINTS AND HUMIDITY RECORD

Perimeter gap [ ] mm, and internal movement joints at [ ] m centres where the floor is wider than [ ] m, as stated by [workshop] for the fixing method [fully bonded / nailed / floating], shown on layout drawing [ref] and covered by [skirting / threshold profile]. Gaps are not to be filled. A temperature and humidity logger is to be placed at floor level in [each room] from [7] days before delivery until handover; the record is to be issued to [designer] at handover.

CLIENT HANDOVER NOTE (ADAPT)

Your floor is solid timber. It takes up moisture in damp weather and gives it up in dry weather, so in the heating season expect fine gaps between some boards, up to about [ ] mm. They close when the air is damper. This is movement, not a fault: please do not fill them. Keep the room humidity between [ ] % and [ ] %; a logger is fitted in [location], and if it stays below [ ] % add humidification. Contact [name] with questions.

TERMS USED

Dimensional change coefficient

The change in a board's size, as a fraction of its size, for one point of change in moisture content. It is given separately for the radial and tangential directions and changes with the species. The Wood Handbook (2021) lists it for 6 to 14 % moisture content.

Equilibrium moisture content (EMC)

The moisture content at which wood is neither gaining nor losing moisture in air of a given humidity and temperature. A floor settles towards it, so the swing in room humidity sets the swing in moisture content.

Expansion gap

A deliberate space left at the edges of a timber floor, and at fixed obstructions, so that it can swell. The size is set by the maker and the fixing method; sources give 1.5 mm per metre with a minimum of 10 mm (a UK distributor), 12 to 15 mm (a UK maker) and 12.7 to 19 mm (a US trade body).

STANDARDS AND SOURCES

- USDA Forest Products Laboratory, Wood Handbook (FPL-GTR-282, 2021): chapter 13 (equation 13-3, Table 13-5), chapter 4 (Table 4-2) and chapter 3 (Table 3-1), read. US species.
- NWFA Installation Guidelines (revised 02.2016), Wood Floor Facts: Relative Humidity (2018) and Hardwood Floors magazine, 'Tis the Season (2017, updated 2026): read. US trade body; US units converted.
- A UK distributor's installation guidelines (Jan 2024) and a UK maker's wide plank guide (2023): read; suppliers, not independent bodies.
- BS 8201:2011: BSI lists it as Current (31 October 2011). Not read: confirm its advice on gaps.

Full guide: https://makebespoke.com/trade/technical/seasonal-movement-in-timber-floors. Make Bespoke Studio coordinates manufacture through its partner workshops. Figures are guidance only and your specification governs; some may be superseded, so contact the studio to verify.