



# C16 timber: supporting a transition to more sustainable timber specification in the UK

In 2024, the UK produced 3.2 million m<sup>3</sup> of wood products, including 825,000m<sup>3</sup> of graded construction timber used in structural applications<sup>1</sup>. While the UK imports about two-thirds of its sawn softwood needs, there is still a significant opportunity to transition to a more sustainable, homegrown approach to timber construction.

The UK currently imports approximately 80% of its wood products, making it the second-largest global importer after China<sup>2</sup>. This reliance on overseas supply highlights both a significant risk but also a significant opportunity to transition toward a more sustainable, homegrown approach to timber specification within the built environment.

## What is homegrown timber?

In a UK context, homegrown timber refers to material sourced from trees grown and managed within the UK. The primary commercial species group is British spruce, comprising mainly Sitka spruce with some Norway spruce. Grown on rotations of approximately 35 to 45 years, these species produce timber well suited to a broad range of structural applications. The sawn timber of the two species is practically identical and it is sawn and processed together. These species are also grown in Ireland, which is considered as a common growth area with the UK, with logs and sawn timber passing the border and mixing together.

UK-grown logs are processed through domestic sawmills (**Figures 1 and 2**), where specialist expertise ensures the resource is converted into high-quality structural timber. Specifying homegrown material strengthens the local economy by directing investment

<sup>1</sup>Average distance from UK mill to merchant = 185 road miles vs min. 1,000 miles from a region of southern Scandinavia to merchant for imported timber. Transport emission factors can be found at [www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2025](http://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2025)

into domestic forestry and timber industries, supporting jobs across the supply chain. It can also deliver carbon savings by reducing transport distances from mill to site\*, and lowers risk by decreasing reliance on imported materials and vulnerable global supply chains. Sustainability is also ensured by the UK Forestry Standard<sup>3</sup>.

Homegrown timber has been an established and dependable material in UK construction for decades. Mostly strength-graded to

C16, UK spruce softwood is suitable for wall framing, floor joists, roof structures, and other loadbearing elements in housing and low-rise buildings. When designed correctly, C16 provides predictable structural performance and is well aligned with modern construction methods, including timber-frame systems and offsite manufacture.

## Imported vs homegrown?

C16 and C24 are the two most commonly

FIGURE 1: Harvesting of timber





➤ **FIGURE 2:** Processing of timber

utilised strength classes of structural softwood timber in the UK. They are just two of the strength classes defined across Europe under Standard EN 338. The UK also uses the non-EN 338 strength class TR26 for trussed rafters.

All structural softwood timber originates from coniferous species such as spruce or larch, which is why strength classes are designated with the letter 'C' for coniferous. However, it is also possible for some lower-density hardwoods such as poplar to be

graded to C-classes. The number denotes the characteristic (fifth percentile) bending strength of the timber, expressed in newtons per square millimetre: 16N/mm<sup>2</sup> for C16 and 24N/mm<sup>2</sup> for C24. There are also strength classes for softwood based on tension strength (T-classes) but these are intended for use in glulam production<sup>4</sup>.

Each strength class has its own suitable applications. C16 timber can be used for studwork, joists, general carcassing (**Figure 3**), and loadbearing elements where verified through structural design. C24 timber can be used in the same applications but offers greater spanning capability, increased load-carrying capacity.

**It is important to specify timber appropriately. UK-grown spruce timber is predominantly graded to C16, although around 25% could potentially be classified as C24<sup>5</sup>. As a result, routine default specification of C24 when C16 can do the job can unintentionally limit the use of homegrown timber, reducing opportunities to benefit from locally sourced material.**

#### Homegrown timber availability

In the recently published *50-Year Forecast of Softwood Timber Availability (2026)*<sup>6</sup>, Forest Research have indicated that the UK forest estate will have the potential to supply a surplus of softwood over the next 10 years. Due to underharvesting, the near-term surplus amounts to 4–5 million cubic metres per year.

Timber processors will be in a position to utilise this additional material and increase supply of sawn softwood, provided the market for their products allows. The major processors currently have surplus capacity (>25% more) for kiln drying and grading construction timber. They will be in a position to maintain this capacity, and should demand for homegrown

C16 timber increase, they have the ability to increase capacity through further investment.

This represents a significant growth opportunity for the industry, but it depends on restoring sales of C16 to previous levels. While we don't yet have a full picture of the reasons behind the recent decline, the Trust UK C16 Campaign was established to understand these drivers and support a coordinated industry response.

#### Timber grading

In the UK, structural timber is graded under the system set out by the harmonised European standard EN 1408-1. It sorts rectangular cross-section timber into grades based on requirements for three primary grade determining properties: bending strength, bending stiffness and density. The reference moisture content for these properties is 12%, irrespective of the moisture content at which grading is carried out. The term 'dry-graded' means that the strength grading has been completed at 20% moisture content or below, and has been checked for distortion, fissures and other drying defects. The actual moisture at delivery needs to be specified separately as this is different from the dry-graded criterion<sup>7</sup>.

Strength and density are specified as fifth percentiles and stiffness by the mean – these are known as the characteristic properties and are probabilistic descriptions rather than properties of any single piece of timber. This way of expressing properties fits into Eurocode 5. For C16, the minimum requirements to be achieved are:

- Bending strength (5th percentile): 16N/mm<sup>2</sup>
- Bending stiffness (mean): 8kN/mm<sup>2</sup>
- Density (5th percentile): 310kg/m<sup>3</sup>

#### Visual grading vs machine grading

There are two recognised methods for strength grading structural timber, both of which must comply with EN 14081-1.

Visual grading is a manual process carried out by a trained grader, who assesses each piece of timber against a defined set of grading rules based on visible characteristics. In the UK, this type of grading is typically carried out by smaller sawmills and can be useful for grading less common, UK-grown species such as pine, larch and Douglas fir. However, it is still quite common for large-dimension spruce in the UK and for much of the imported structural softwood (even from the big producers). Visual grading can only achieve certain strength classes, so if specifying homegrown visually graded timber, it is first necessary to check what strength classes are possible (see table below).

Machine grading is an automated process that uses mechanical systems. In the UK, this is typically done with X-ray scanning to measure properties such as density and the size and





FIGURE 3: Carcassing with machined timber

position of knots, or by acoustic vibration assessment of stiffness. Machine grading is well suited to assessing large volumes of timber quickly and consistently and is therefore widely adopted by larger UK sawmills.

### Grading other homegrown species

Although spruce is the predominant commercial species grown in the UK, other species groups, such as pine, larch and Douglas fir, are also available. The intended application, particularly where timber will be exposed externally, may influence the most appropriate species selection.

While they can be machine graded, the strength grading of these species is typically carried out visually, as they do not have the same level of commercial production as spruce. When specifying a particular species, it is important to understand which visual strength classes are achievable and to design accordingly. Visual assignments for each species group are provided in Table 1.

### Specifying C16 vs C24

Timber Development UK (TDUK) have published span tables for both C16 and C24 strength classes, allowing direct comparison of the differences in joist section size, spacing, or span capacity<sup>8,9</sup>.

Using the example of a ceiling joist in a domestic setting, with a dead load not exceeding  $g_k = 0.25\text{kN/m}^2$  and an imposed load of  $q_k = 0.25\text{kN/m}^2$ , and assuming joists at 400mm centres, the maximum clear spans for a 38 x 184 mm section are:

**C16: 3.86m    C24: 4.39m**

This represents an increase of 0.53m, equivalent to **14%**, when specifying C24

instead of C16.

Where enhanced performance is required, it is worth considering whether other parameters, such as joist spacing or section size, can be adjusted. Doing so may allow wider use of C16 timber, increasing opportunities to utilise homegrown material.

### Physical and mechanical properties of UK-grown timber (C16+)

Timber grown in the UK typically shows slightly higher density and strength than the characteristic values assigned to C16 in BS EN 338 (Figure 4). Because of this improved performance, homegrown timber is sometimes referred to as **C16+**<sup>10</sup>. These modest increases in strength and density can allow

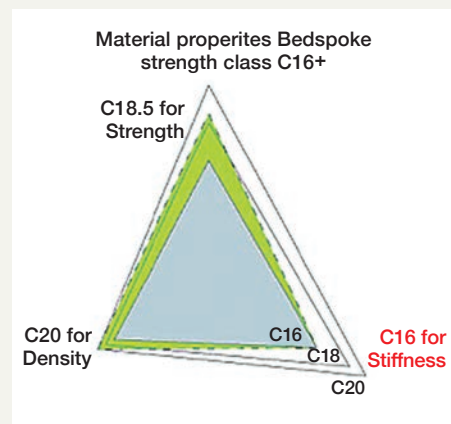


FIGURE 4: Material properties of C16+ timber

Table 1: Visual grading assignments for timber grown in UK when grading with BS 4978 or BS 5756 to EN 338

Species	Visual grade	Strength class	Reference
To BS 4978			
British spruce (Sitka & Norway)	GS	C14	EN 1912:2012 (§6)
	SS	C18	
British pine	GS	C14	
	SS	C22	
Larch	GS	C16	
	SS	C24	
Douglas fir	GS	C14	PD 6693-1:2019 (§7.2)
	SS	C18	
	SS*	C24	

GS = General Structural; SS = Special Structural

\* Cross-section area >20,000mm<sup>2</sup>, width and thickness ≥ 100mm.

Table adapted from: <https://journals.sagepub.com/doi/epub/10.1080/20426445.2022.2050549>

for more efficient structural design – either achieving better performance or reducing the volume of timber required, particularly in cases where connection design governs the overall capacity.

The three grade determining properties of C16+ are:

- | Characteristic bending strength: 18.5N/mm<sup>2</sup> (compared to 16N/mm<sup>2</sup> for C16)
- | Mean modulus of elasticity: 8kN/mm<sup>2</sup> (the same as C16)
- | Characteristic density: 330kg/m<sup>3</sup> (compared to 310kg/m<sup>3</sup> for C16)

C16+ can always be used in place of C16, but C16 cannot automatically be treated as C16+, even when it is produced from British spruce in the UK or Ireland. It only qualifies as C16+ when the grading settings explicitly state that C16+ is being produced. Even if the timber's actual strength and density might be sufficient, this cannot be assumed, as it has not been formally demonstrated to meet the C16+ specification.

In 2018, C16+ was formally incorporated into Tekla Tedds structural design software, enabling engineers to undertake structural calculations using the enhanced mechanical properties associated with this grade. Most other design platforms also allow users to add new materials to their material libraries, thereby facilitating the use of these enhanced properties.

Although C16+ is not yet widely available on the commercial market, which may limit the practical application of its mechanical properties, it can be beneficial to encourage contractors to explore non-standard supply routes, including direct engagement with local sawmills.

### Challenges in specifying homegrown timber

In general, specifying homegrown timber does not introduce additional challenges compared with specifying imported C16. The more significant issue specifiers and contractors may encounter is the limited availability of UK-grown C16 in merchant supply chains. This should not discourage engineers from specifying it. Demonstrating demand through specification is essential; when demand is

visible, supply will follow.

Where C16 is specified but unavailable, substitution with imported C24 is permissible and does not necessitate any redesign or additional work. However, the timber will be heavier, which may impact manual handling. Specifying C16 at the outset therefore preserves the opportunity to utilise locally sourced material, whereas designing directly to C24 will inadvertently eliminate this potential.

### Homegrown engineered wood products

A growing number of engineered wood products are now being developed using UK-grown timber, particularly within the mass timber sector, including homegrown glued laminated timber (glulam) and cross-laminated timber (CLT). These products demonstrate the expanding potential for homegrown material in higher-value structural applications.

One area where this is especially relevant is in the specification of glulam beams. Using UK-grown spruce, achieving GL20 is typically straightforward. While imported products often use higher strength classes as standard, it has been demonstrated that only a modest increase in section size is required to enable the use of homegrown C16 instead<sup>11</sup>. This approach can further localise supply chains and deliver the associated environmental and economic benefits.

### C16 timber: the right choice for UK industry

It should be hard to overlook the opportunity to reshore elements of our manufacturing base, strengthen rural and local economies, and build a more dependable supply chain through the greater specification of UK-grown C16.

It is recognised that greater use of the material may ask designers to approach things differently, to think more efficiently and make smarter use of what we have, but that shouldn't be seen as a drawback – it's simply good engineering.

Through this campaign, we're working with partners across the supply chain to move in that direction. But lasting progress will only happen if the industry acts together, making informed choices and being willing to drive change where it is needed.

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### Scan for more details

If you would like to contribute to the campaign, we are running a survey to gain a broader understanding of the challenges facing engineers and specifiers. Scan the QR code to find the survey.

