BauBuche Beech laminated veneer lumber

Comparison of BauBuche and other building materials

06

Pollmeier

BauBuche

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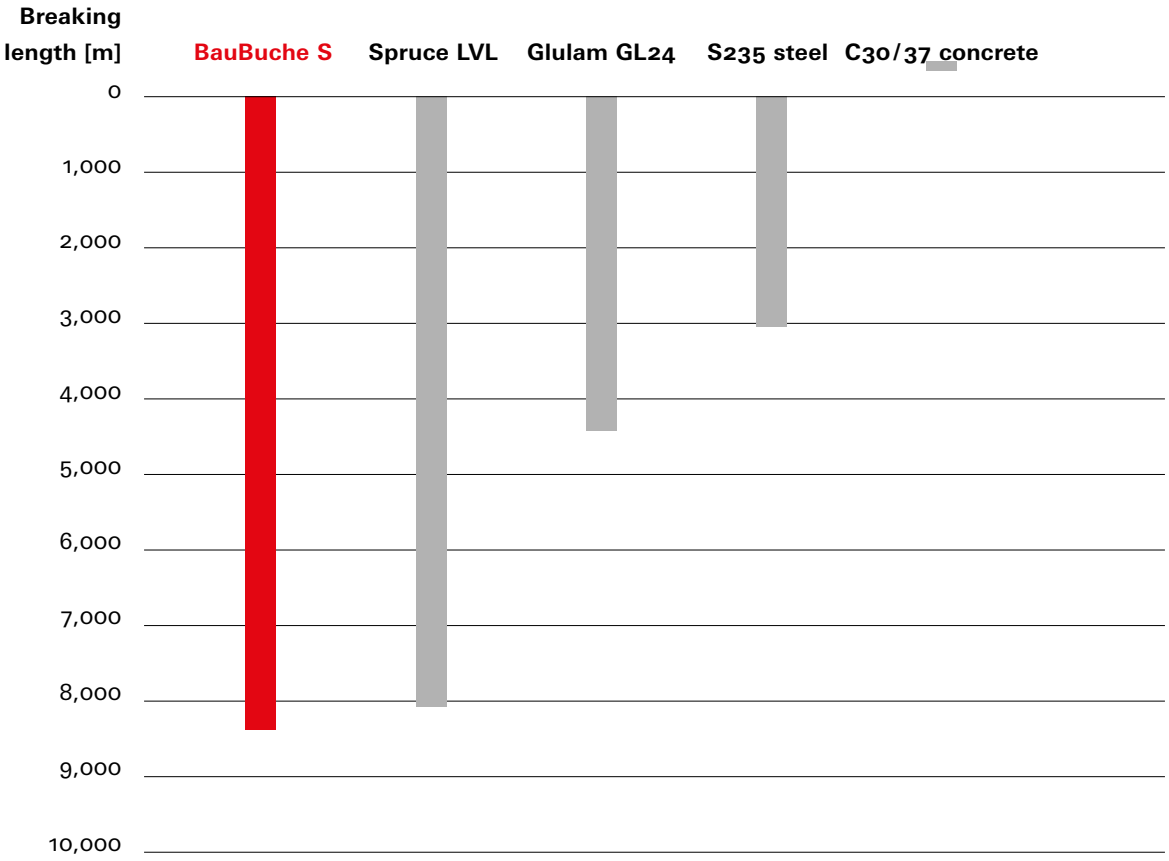
Cover photo: Christian Grass

6.1 Breaking length

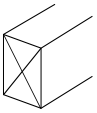
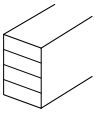
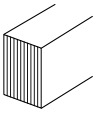
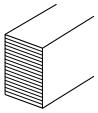
BauBuche is a high-performance material. Relative to its own weight, BauBuche can carry higher loads than most other building materials. This is demonstrated by the breaking length: The breaking length is a measurement of the strength of a material. Image a long suspended column. The breaking length of BauBuche is 8.3 kilometres, which means that if you were to construct a column of BauBuche and hang it from its top, it would need to be 8.3 kilometres long until it would break under its own weight. In contrast, the breaking length of conventional structural steel is 3.2 kilometres.



	BauBuche S	Spruce LVL	Glulam GL24	S235 steel	C30/37 concrete
Tensile strength	60 N/mm²	38 N/mm²	16.5 N/mm²	235 N/mm²	2.9 N/mm²
Density	730 kg/m³	480 kg/m³	380 kg/m³	7,850 kg/m³	2,300 kg/m³
Breaking length	8,378 m	8,070 m	4,426 m	3,052 m	129 m

6.2 Savings in material

The superior strength and stiffness of BauBuche allows for smaller cross-sections, which in turn means major savings in material consumption. The savings in material vary of course from construction to construction, as different properties must be taken into account for the dimensioning of a structure. In the case of single-span beams, deformation (stiffness) is generally the key factor, whereas with continuous beams, the main concerns are bending strength or shear strength.

Materials	Solid timber C24	Glulam GL28	LVL Spruce	BauBuche GL75
Key properties				
Bending strength f_m	200/100%	154/77%	92/46%	57/29%
Shear strength f_v	200/100%	240/120%	112/56%	104/52%
Compressive strength $\|\| f_{c,o}$	200/100%	152/76%	102/51%	56/28%
Tensile strength $\|\| f_{t,o}$	200/100%	129/64%	68/34%	44/22%
Modulus of elasticity E_{mean}	200/100%	175/87%	159/80%	132/66%

Required width to achieve same strength
% material consumption

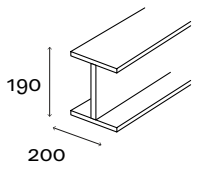
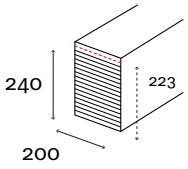
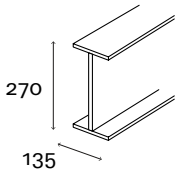
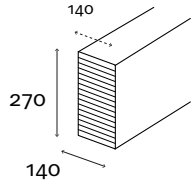
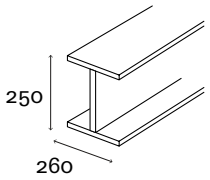
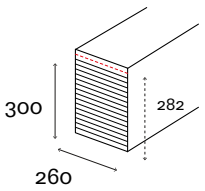
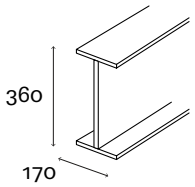
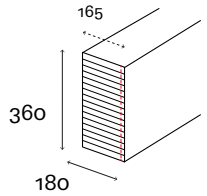
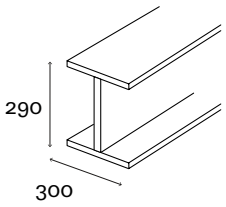
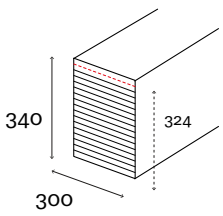
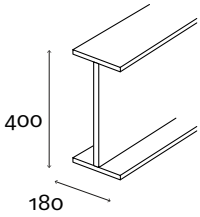
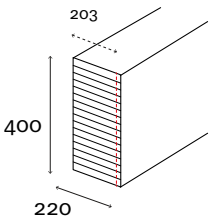
The table to the left shows the material savings that can be made by using glulam GL28, spruce LVL and BauBuche GL75, compared with C24 (standard construction timber)

Assumptions:
_ Service class 1
_ Load-duration class: medium-term
_ Constant cross-section height of 300 mm
_ Calculation according to EN 1995-1-1

6.3 Comparison of BauBuche and steel

Thanks to their excellent load-bearing capacity, BauBuche GL75 beams are a viable alternative to steel girders of similar dimensions, as BauBuche constructions have no thermal bridges and therefore do away with costly fire protection cladding. In addition, there is no need for expensive connecting elements to the steel structure.

Comparison of structural bending strength of BauBuche and various rolled steel sections

M_D	S235	BauBuche GL75 of same width	S235	BauBuche GL75 of same height
100 kNm	HEA 200  42.3 kg/m length	 0.048 m³/m length	IPE 270  36.1 kg/m length	 0.038 m³/m length
200 kNm	HEA 260  68.2 kg/m length	 0.078 m³/m length	IPE 360  57.1 kg/m length	 0.065 m³/m length
300 kNm	HEA 300  88.3 kg/m length	 0.102 m³/m length	IPE 400  66.3 kg/m length	 0.088 m³/m length

Assumptions

BauBuche	Service class 1, kmod = 0.9, γm = 1.20 (EN 1995-1-1)
	Dotted line: minimum cross-section
Steel	S 235, γm = 1.00, fy, k = 235 N/mm², Wpl,y