FLOOR AND ROOF BEAMS

Kerto® beams are suitable for use as load-bearing structures in buildings with for example a timber, steel or a concrete frame. These beams are used, for instance, as supporting beams, and in ground floors, intermediate floors, and roof structures.

The dimensionally accurate Kerto beam structure supports and gives form to roofs of various shapes. Kerto brings the unparalleled features of wood, including strength, lightness, and easy workability. Kerto also offers architectural elegance in open and visible roof structures.

With Kerto-S beams, it is easy to build high and spacious rooms, large windows, oriels, galleries, and balconies for residential buildings. The versatility of the material allows for responding to individual wishes. Its high rigidity prevents harmful vibration in ground and intermediate floors even with long spans. The width to depth relation of a Kerto-S beams can generally be maximum 1/8.

The Kerto-Qp beam is slim and tall but still provides a rigid structure. It can be manufactured with a larger height-to-width ratio than Kerto-S, the width/depth ratio can be up to 1/12. Kerto-Qp makes it easy to create energy efficient structures.

THE ADVATANGES OF KERTO BEAMS

- A large variety of standard stock, as well as user-defined, cross-sections.
- Tall and slim beams that are useful in, for instance, energy efficient walls and for reducing heat loss through floor and roof structures.
- An optimized cross-section, decreasing the amount of material needed.
- A high modulus of elasticity and bending stiffness (EI), providing better resistance of, for example, deflection.
- Long beams, well suited to headers and multi-span purlins.
- Kerto beams are straight and light with accurate dimensions
- Material and design methods that are also tested for holes and notches, allowing large holes in relation to beam depth.
- Fast and accurate design with the Finnwood® software, developed by Metsä Wood.
- An extensive range of steel joint parts available.

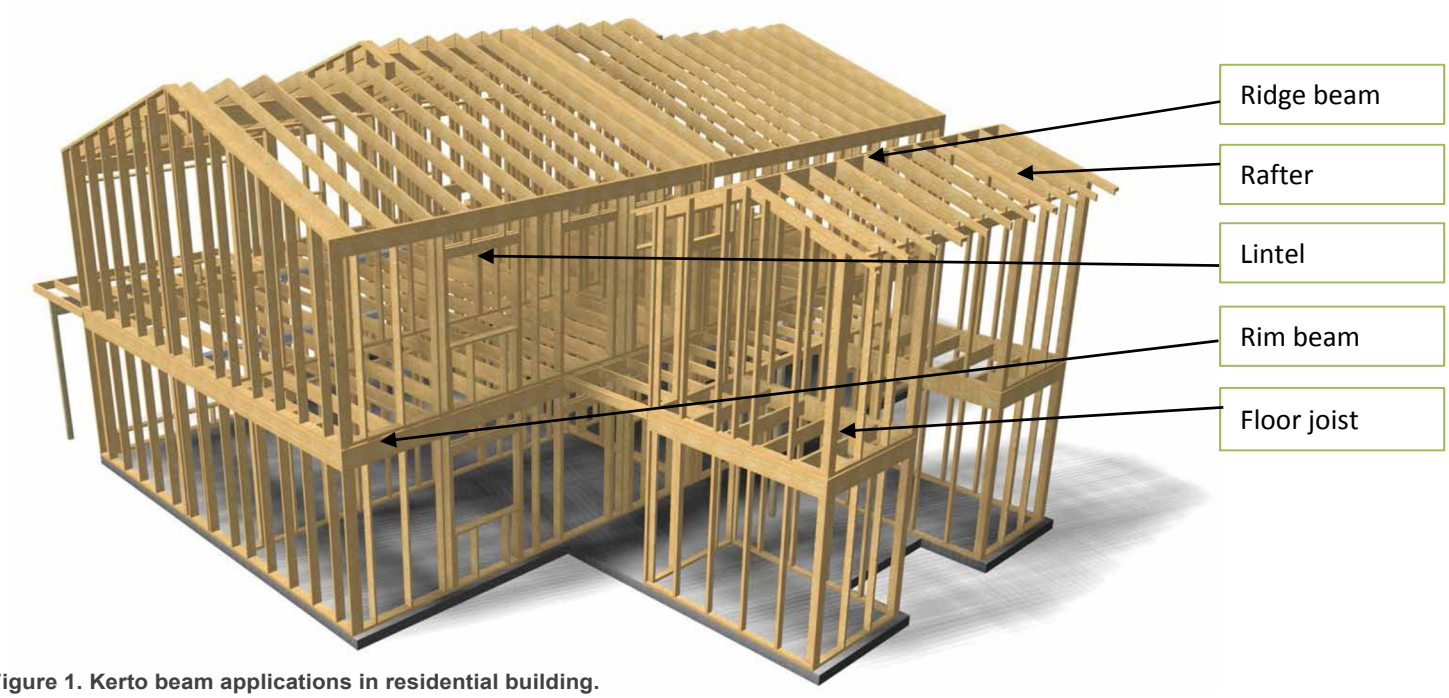


Figure 1. Kerto beam applications in residential building.

STRUCTURAL DESIGN

All Kerto products can be designed according to EN 1995 (Eurocode 5) and its national annexes.

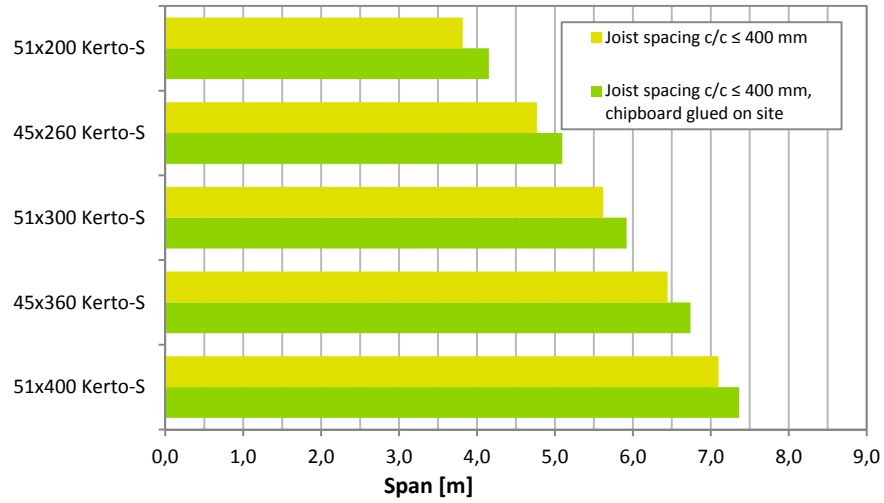
To facilitate design calculations, Metsä Wood has developed a special software program, Finnwood®, for structural engineers. It lets you dimension individual structural elements, such as columns, floor joists, and roof rafters. In addition to Kerto products, other Metsä Wood products are also included

The benefits offered by Finnwood include an intuitive user interface and easy and fast dimensioning of structural elements according to EC 5. As a result, the user obtains clear structural calculations to be presented, for instance, to the local building inspection authorities.

The wide range of Kerto cross-sections also offers ideal solutions for long span lengths.

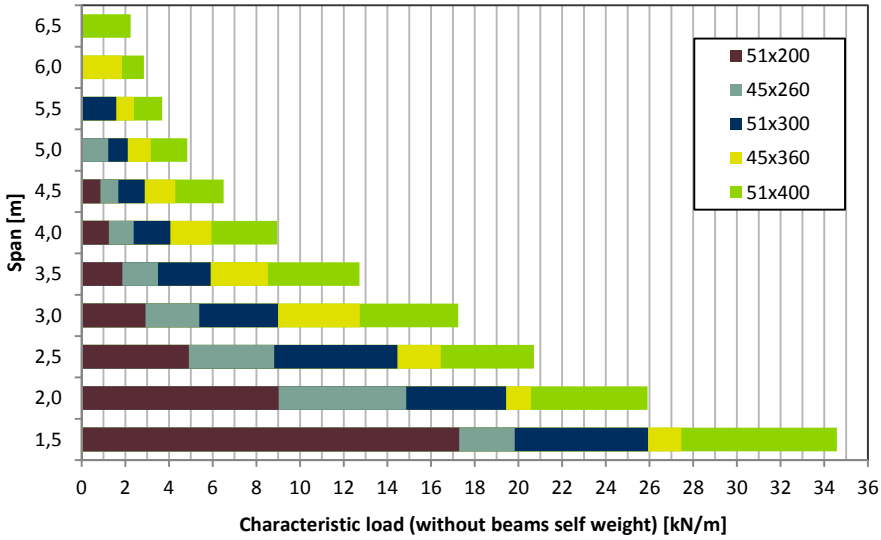
Finnwood is available for download free of charge from www.metsawood.com. Registration is required before downloading. Several country specified versions are available including eg. Finland, Sweden, France, Germany and UK.

Figures 2 to 7 show maximum spans for Kerto-S floor joists and roof rafters, as well as dimensioning tables for the main floor and roof beams calculated according to EC 5 and its Finnish National Annex. The dimensioning figures for main floor and roof beams (Figures 4 and 6) are based on the most common Kerto-S standard cross sections. Dimensioning Figures 5 and 7 provide examples of dimensioning based on larger main beam cross-sections.



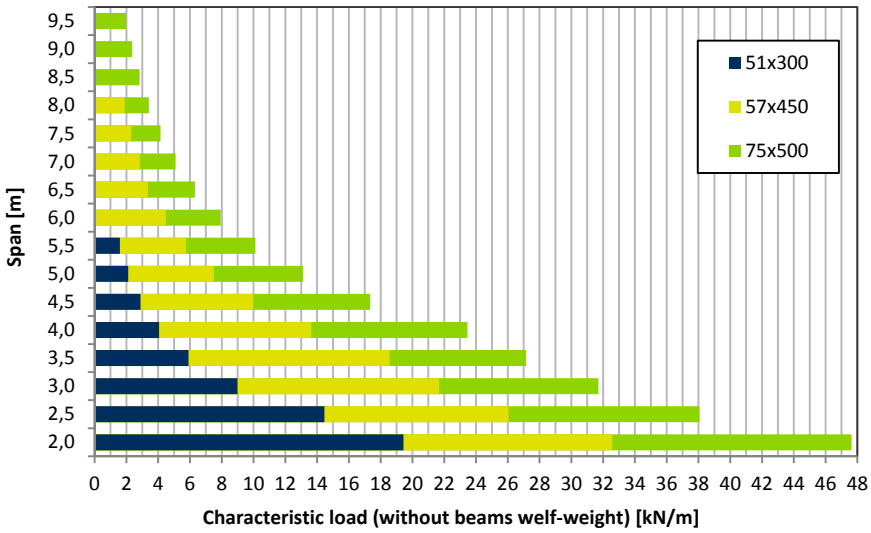
Calculations according to EN 1995-1-1:2004+A1:2008 and its Finnish National Annex. The permanent load is 0.6 kN/m² and the imposed load is 2.0 kN/m² (category A). The service class is 1 or 2 and the consequences class is CC2. The joists have a continuous lateral torsional buckling supports at the top surface. Transverse bracing at the centre of span. When $L < 4$ m, one bracing line at the centre, when $L \geq 4$ m, two bracing lines at the centre c/c 1000. Room is square shaped and supported at four edges. A 22 mm thick chipboard (EN 312-6) at top surface. Site gluing gives 50 % composite action for vibration calculation. The support length is ≥ 45 mm. The instantaneous deflection $w_{inst} \leq L/400$ and the net final deflection $w_{net,fin} \leq L/300$.
$\gamma_M = 1.2$.
Does not replace project-specific structural design.

Figure 2. Dimensioning table for Kerto-S floor joist.



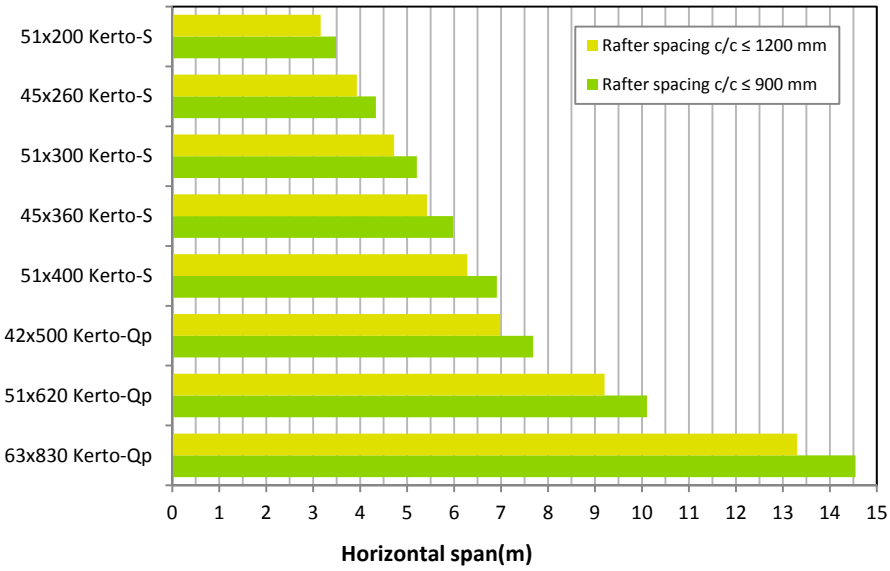
Calculations according to EN 1995-1-1:2004+A1:2008 and its Finnish National Annex. The permanent load is 20 % of the total characteristic load. The service class is 1 or 2 and the consequences class is CC2.
The beam has a lateral torsional buckling supports at the top surface with a spacing ≤ 600 mm and the loads are located at the lateral torsional buckling supports. The support length shall be calculated separately.
The instantaneous deflection $w_{inst} \leq L/400$ and the net final deflection $w_{net,fin} \leq L/300$.
$\gamma_M = 1.2$
Does not replace project-specific structural design.

Figure 3. Dimensioning table for Kerto-S main floor beam



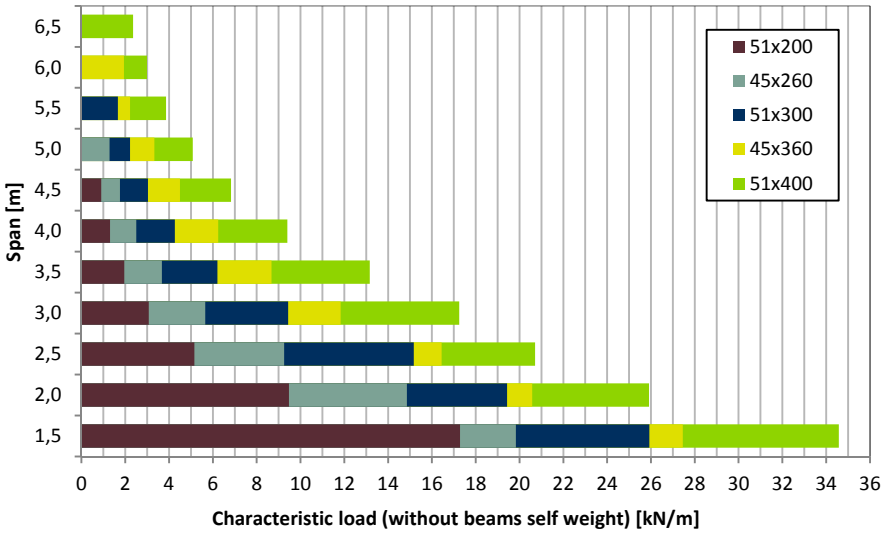
Calculations according to EN 1995-1-1:2004+A1:2008 and its Finnish National Annex. The permanent load is 20 % of the total characteristic load. The service class is 1 or 2 and the consequences class is CC2.
The beam has a lateral torsional buckling supports at the top surface with a spacing ≤ 600 mm and the loads are located at the lateral torsional buckling supports.
The support length shall be calculated separately.
The instantaneous deflection winst ≤ L/400 and the net final deflection wnet,fin ≤ L/300.
γ_M = 1.2
Does not replace project-specific structural design.

Figure 4. Dimensioning table for Kerto-S main floor beam, large cross-sections



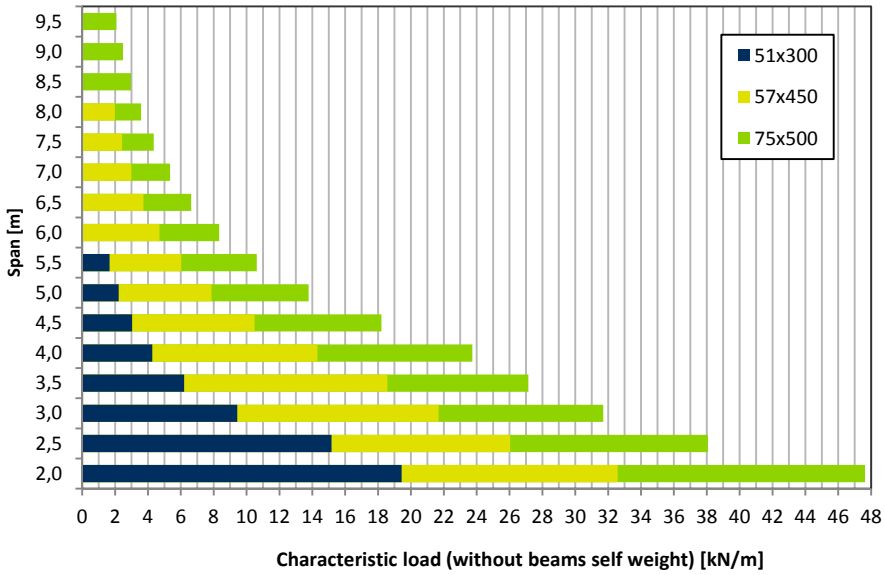
Calculations according to EN 1995-1-1:2004+A1:2008 and its Finnish National Annex. The roof slope is 1:3. The permanent load is 0.9 kN/m² and the snow load on the ground s_k is 2.5 kN/m². Wind load has not been noticed.
The service class is 1 or 2 and the consequences class is CC2. The rafter has a lateral torsional buckling supports at the top surface with a spacing ≤ 400 mm and the loads are located at the lateral torsional buckling supports.
The rafters shall be supported for the buckling at the midspan.
The support length shall be calculated separately.
The net final deflection $w_{net,fin} \leq L/200$.
γ_M = 1.2.
Does not replace project-specific structural design.

Figure 5. Dimensioning table for Kerto-S and Kerto-Qp roof rafter



Calculations according to EN 1995-1-1:2004+A1:2008 and its Finnish National Annex. The permanent load is 20 % of the total characteristic load and the snow load on the ground $s_k \leq 2.75$ kN/m2. Wind load has not been noticed.
The service class is 1 or 2 and the consequences class is CC2.
The beam has a lateral torsional buckling supports at the top surface with a spacing ≤ 1200 mm and the loads are located a the lateral torsional buckling supports.
The support length shall be calculated separately. The net final deflection $w_{net,fin} \leq L/300$.
γ_M = 1.2
Does not replace project-specific structural design.

Figure 6. Dimensioning table for Kerto-S main roof beam



Calculations according to EN 1995-1-1:2004+A1:2008 and its Finnish National Annex. The permanent load is 20 % of the total characteristic load and the snow load on the ground $s_k \leq 2.75$ kN/m2. Wind load has not been noticed.
The service class is 1 or 2 and the consequences class is CC2.
The beam has a lateral torsional buckling supports at the top surface with a spacing ≤ 1200 mm and the loads are located a the lateral torsional buckling supports.
The support length shall be calculated separately. The net final deflection $w_{net,fin} \leq L/300$.
$\gamma_M = 1.2$
Does not replace project-specific structural design.

Figure 7. Dimensioning table for Kerto-S main roof beam with a larger cross sections

NOTE. The dimensioning tables for the main roof beam can also be used for dimensioning of lintels.