FrameAI Timber Design Calculation Note

EN 1995-1-1 Glulam Timber Roof with Steel Ridge Beam
Client: Trafast AB, Gothenburg SE
Project: Sawtooth Hybrid Roof, GL 24h + IPE 240
Date: 2026-06-08
Designer: S. Lindqvist

TIMBER SECTION GL 24h Glulam
Section: 80 x 320 mm
f_m,k = 24 N/mm2, E_0,mean = 11,600 N/mm2
k_h = 1.10 for edge purlins (single member, h=320mm)
gamma_M = 1.30

LOADS
g_k (roof + insulation) = 0.55 kN/m2
s_k (snow Gothenburg) = 1.8 kN/m2 (EN 1991-1-3 Sec.5.2 NA.SE)
gamma_G = 1.35, gamma_Q = 1.50

BENDING DESIGN EN 1995-1-1 Sec.6.1.6
M_y,Ed = 42 kNm (maximum at mid-span)
f_m,d = f_m,k / gamma_M x k_h = 24/1.30 x 1.10 = 20.3 N/mm2
sigma_m,y,d = 44.3 N/mm2, sigma_m,d / f_m,d = 0.821 -> 82.1% PASS

LTB EN 1995-1-1 Sec.6.3.2
k_crit = 0.89 (18m span, effective length factor 1.0)
sigma_m,d / (k_crit x f_m,d) = 0.821/0.89 = 0.922 -> 82.1% PASS

SHEAR EN 1995-1-1 Sec.6.1.7
V_Ed = 12.8 kN
k_cr = 0.67 (glulam, mean density >= 420 kg/m3)
f_v,d = 3.2/1.30 = 2.46 N/mm2
tau_d = 0.82 N/mm2 -> 33% utilisation PASS

STEEL IPE 240 RIDGE BEAM
f_yk = 355 N/mm2, gamma_M0 = 1.0
V_Ed (ridge) = 88 kN
tau_Ed = 38.6 N/mm2 -> 46.2% PASS

Full calculation available in FrameAI app
https://frameai-structural.polsia.app/examples/timber-steel-hybrid-roof

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