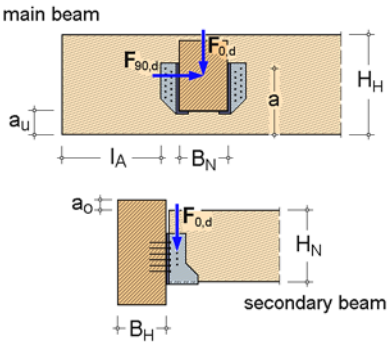
POSITION 12: SIMPSON BSN2P

4H-HOLZ joist hanger connection

(4H-HLZ72 Version: 1/2012-1a) (principle sketch)



calculation bases:
DIN EN 1995-1-1:2010-12 (EC5) /NA:2010-12,
ETA-06/0270 und ETA-04/0013

sizes of main and secondary beam (single-sided)
H_H = 320 mm B_H = 240 mm a_O = 50 mm
H_N = 220 mm B_N = 120 mm a_U = 50 mm
w = 162 mm a = 232 mm $l_A < H_H$

service class 2

species/timber grade
main beam: coniferous timber, timber grade C24
secondary beam: coniferous timber, timber grade C24

internal forces and factors

$F_{0,d}$	force perpendicular to the base plate
$F_{90,d}$	force parallel to the base plate
$N_{,d}$	normal force in secondary beam

combinations of internal forces (design values)

LK-Nr.	KLED	$F_{0,d}$	$F_{90,d}$	$N_{,d}$	k_{mod}
1	permanent	1.50 kN	0.50 kN	---	0.60

connection method joist hanger (2-teilig)
make Simpson BSN2P 30X182
joist hanger size width b = 30.0 mm height h = 182.0 mm steel plate thickness t = 2.0 mm
nails CNA ribbed nails 4,0x40
d_n = 4.0 mm l_n = 38.5 mm d_k = 8.0 mm l_g = 30.0 mm M_{yk} = 6.6 Nm

verifications

combination of internal forces 1 (design values)

LK-Nr.	KLED	$F_{0,d}$	$F_{90,d}$	$N_{,d}$	k_{mod}
1	permanent	1.50 kN	0.50 kN	---	0.60

nail anchorage capacities (withdrawal)
main beam $f_{1,k}$ = 6.125 N/mm² $R_{ax,k}$ = 0.735 kN $R_{ax,d}$ = 0.339 kN
secondary beam $f_{1,k}$ = 6.125 N/mm² $R_{ax,k}$ = 0.735 kN $R_{ax,d}$ = 0.339 kN
nail anchorage capacities (shear)
main beam $f_{h,k}$ = 18.935 N/mm² $R_{1a,k}$ = 1.279 kN $R_{1a,d}$ = 0.698 kN
secondary beam $f_{h,k}$ = 18.935 N/mm² $R_{1a,k}$ = 1.279 kN $R_{1a,d}$ = 0.698 kN
joist hanger load-carrying capacities (full nailing)
number of nails n_H = 26 n_N = 14
form factors k_{H1} = 73.40 k_{H2} = 37.60
material safety factors $\gamma_{M,timber}$ = 1.30 $\gamma_{M,steel}$ = 1.10 $\gamma_{M,calc}$ = 1.00
transversely load-carrying capacity ($R_{2,d}$) (1)
e_N = 36.40 mm R = 0.00 mm
$F_{2,d}$ = 0.45 kN $R_{2,d}$ = 3.07 kN $F_{2,d}/R_{2,d}$ = 0.15 ≤ 1.00 verification successful
load-carrying capacity for load towards base plate ($R_{1,d}$) (2)
$F_{1,d}$ = 9.00 kN $R_{1,d}$ = 11.16 kN $F_{1,d}/R_{1,d}$ = 0.81 ≤ 1.00 verification successful
load-carrying capacity for load away from base plate ($R_{1a,d}$) (3)
$F_{1a,d}$ = 0.00 kN $R_{1a,d}$ = 9.77 kN $F_{1a,d}/R_{1a,d}$ = 0.00 ≤ 1.00 verification successful
verification of interaction (4 + 5)
$(F_{1,d}/R_{1,d})^2 + (F_{2,d}/R_{2,d})^2$ = 0.67 ≤ 1.00 verification successful
$(F_{1a,d}/R_{1a,d})^2 + (F_{2,d}/R_{2,d})^2$ verification not required
verification of splitting capacity (6)
a = 232.0 mm H_H = 320.0 mm a/H_H = 0.725
at a/H_H = 0.725 > 0.7 no verification of splitting capacity required.

LK1: all verifications successful.

summary

maximum utilization max U = 0.84
decisive load combination 1, verification 6