Konštrukčné systémy drevených konštrukcií

Návrh nosného systému závisí predovšetkým od:

-Polohy a typu podperných konštrukcií

-Počtu a typu vzájomných prepojení samostatných nosných jednotiek

-Tvaru konštrukcie

-Tuhosti nosných prvkov

1. Strešné drevené konštrukcie

Základné časti drevenej strechy:

-Krytina

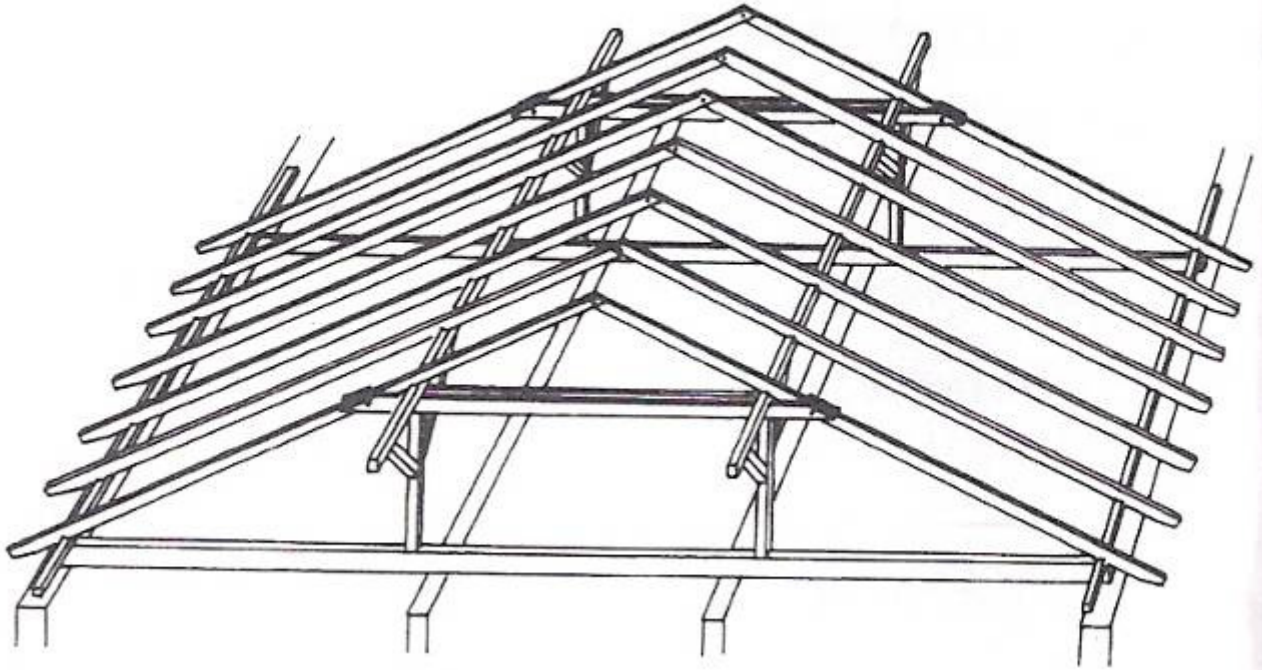
-Debnenie alebo latovanie (podľa typu krytiny)

-Krokvy

-Väznice

-Väzby (väzníky)

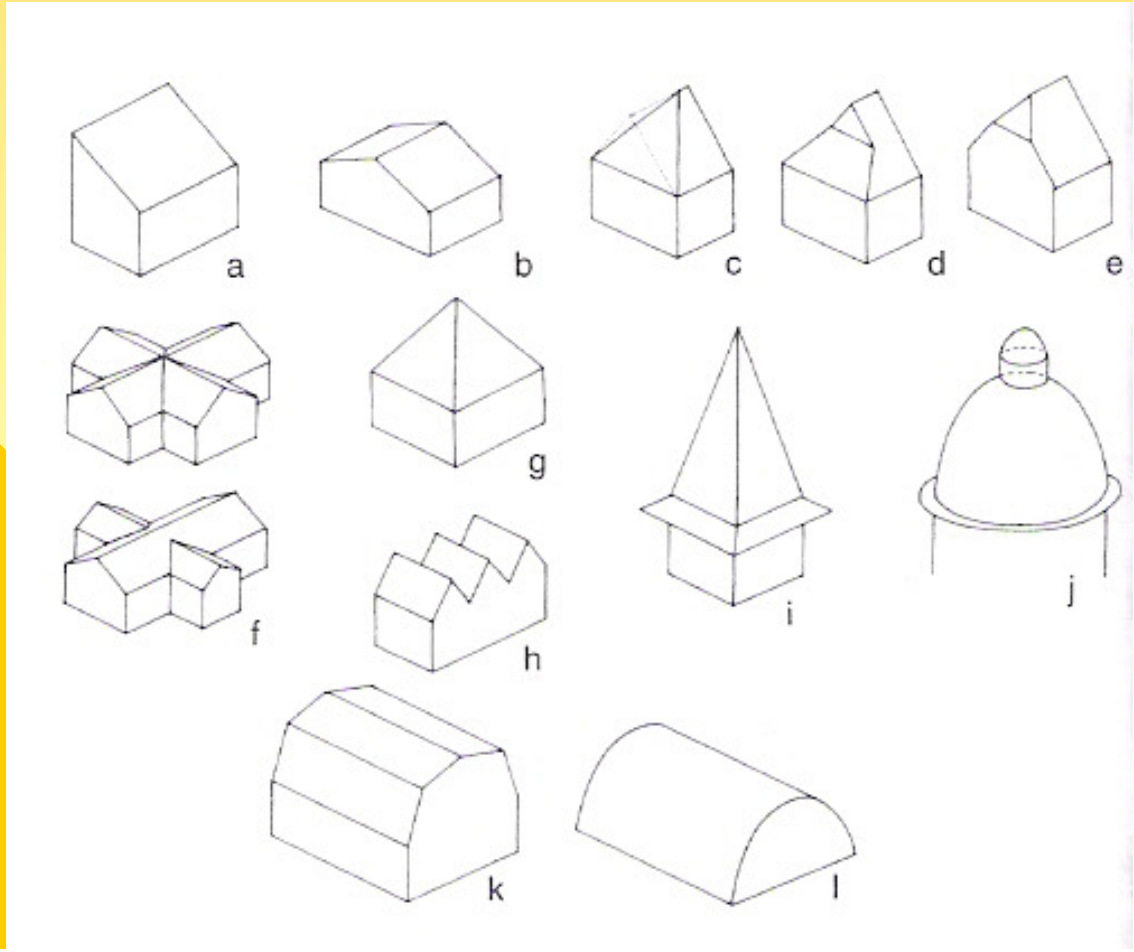
-Vystužovadlá



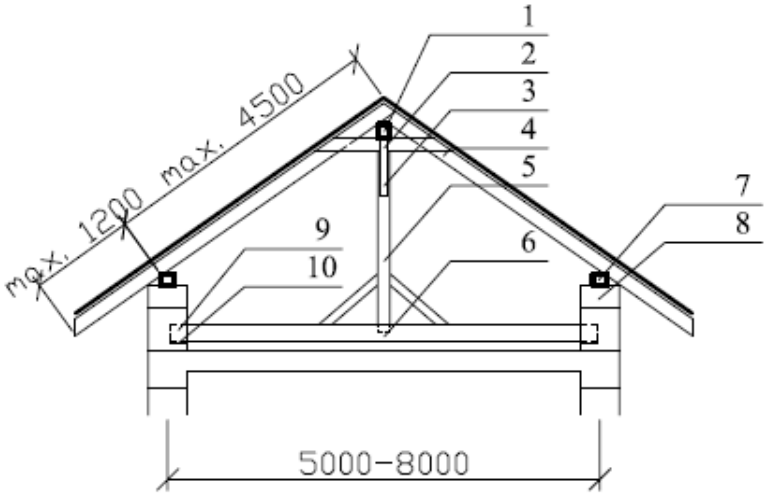
Tvary striech:

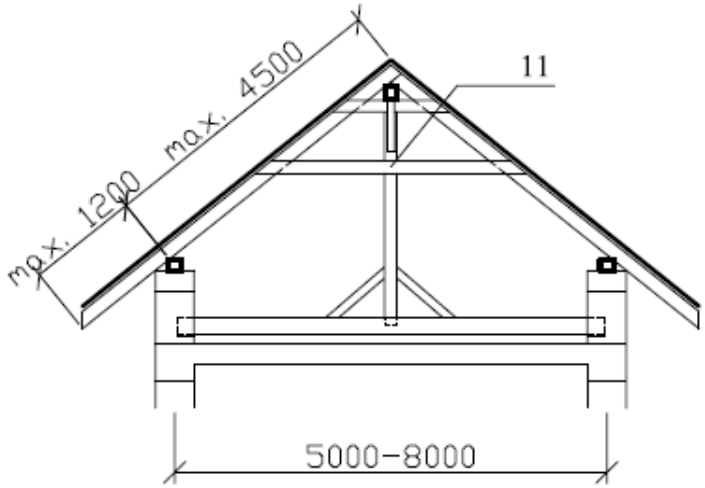
- pultová
- sedlová
- valbová (s valbou alebo čiastočnou valbou)
- stanová
- vežová
- rotačné plochy (kupoly)
- pílová
- manzardová (podľa: staviteľ Francois Mansard *1598)
- valcová

Terminológia hrán strechy:



1 VRCHOLOVÁ ÄZNICA
2 KLIEŠTINA
3 PÁSIK
4 KROKVA
5 STĹPIK
6 VÄZNÝ TRÁM
7 POMÚRNICA
8 KOTVENIE POMÚRNICE
9 IMPREGNOVANÉ ZÁHLAVIE
10 PODLOŽKA
11 KLIEŠTINA NA ZMENŠENIE VZPERNEJ DĹŽKY
12 STREDOVÁ VÄZNICA
13 PODPORA VÄZNÉHO TRÁMU
14 VZPERA





STOJATÁ STOLICA S VRCHOLOVOU VÄZNICOU (JEDNODUCHÁ)

Základné časti drevenej strechy:

-Krytina (typ krytiny závisí od sklonu strechy)

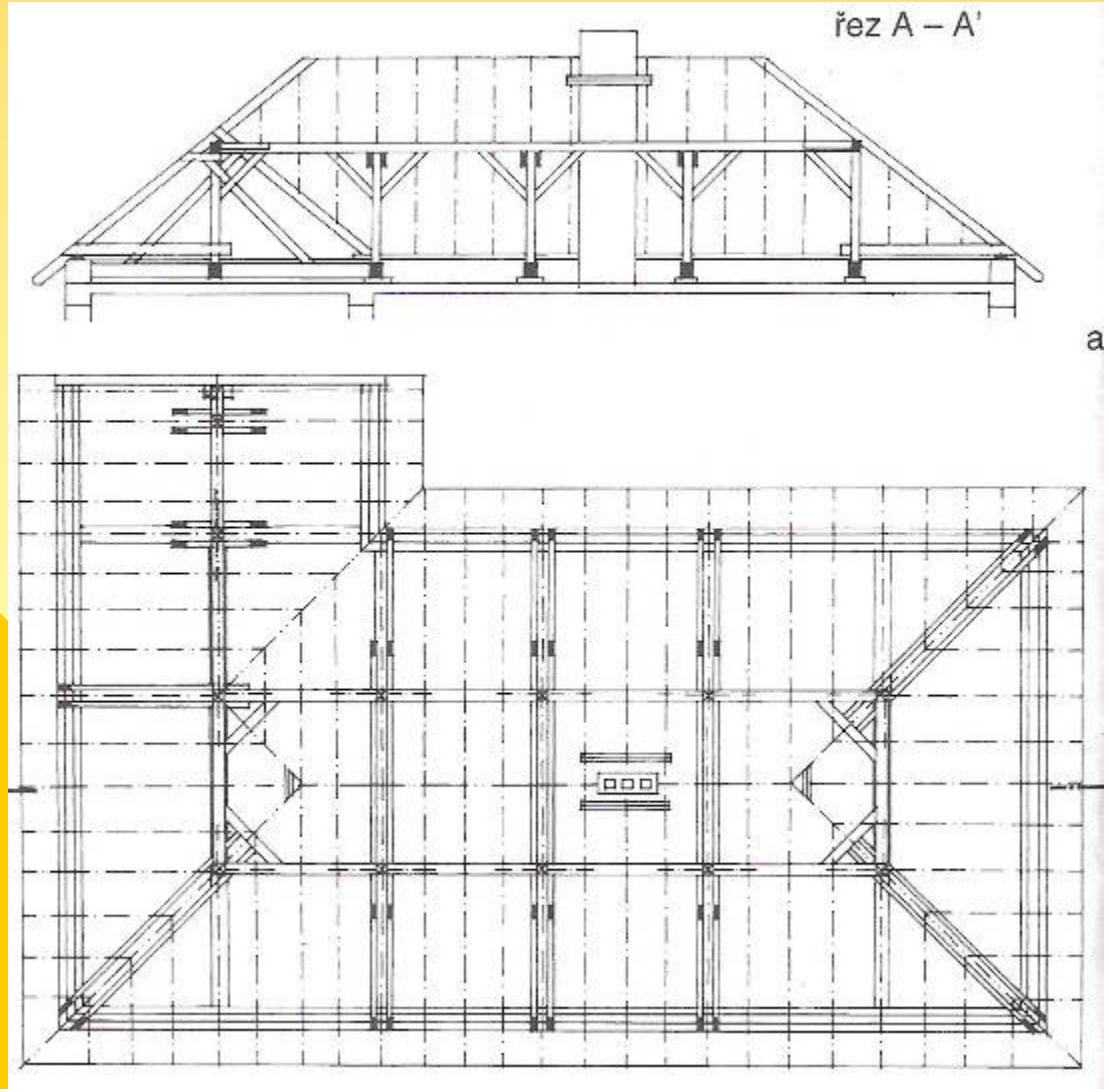
-Debnenie alebo latovanie (podľa typu krytiny)

-Krokvy

-Väznice

-Väzby (väzníky)

-Vystužovadlá

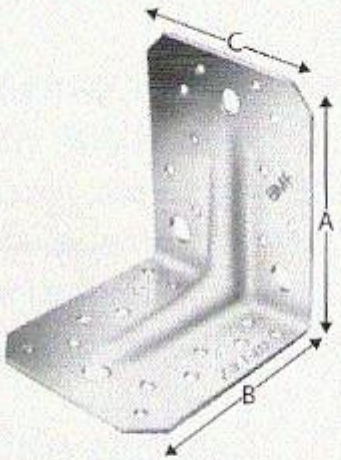


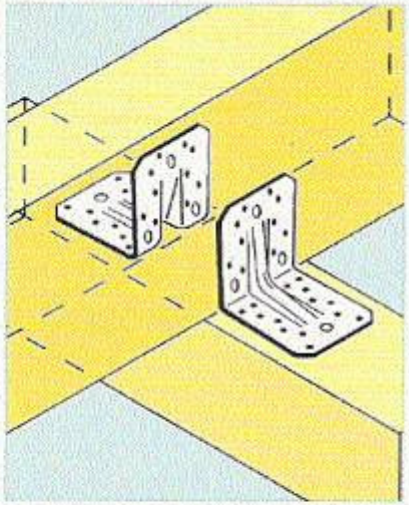
Väznice (podľa typu objektu, podľa typu nosnej konštrukcie)

- statické systémy
- zaťaženie
- vnútorné sily
- dimenzovanie
- prípoje

Väznice-prípoje

BMF® Uholníková spojka 105 s rebrom

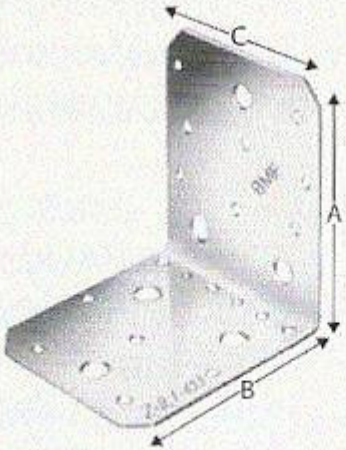


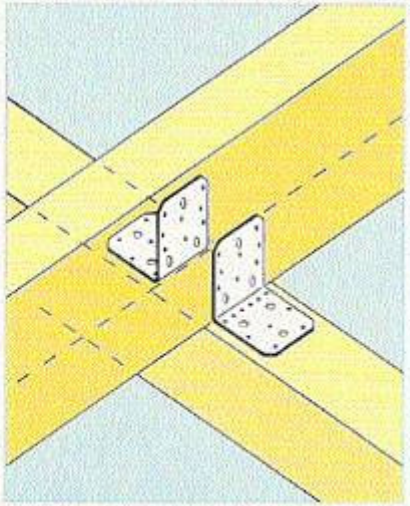


Art. No.	Popis	A	B	C	T
07105 00	105 s/R	105	105	90	3,0

Upevnenie:
BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0 / Svorníky

BMF® Uholníková spojka 105 bez rebra



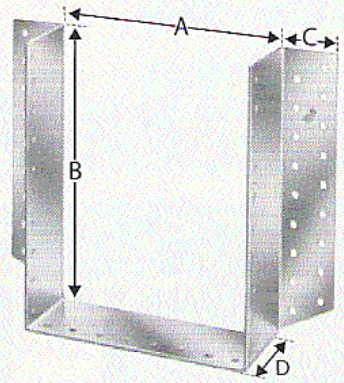


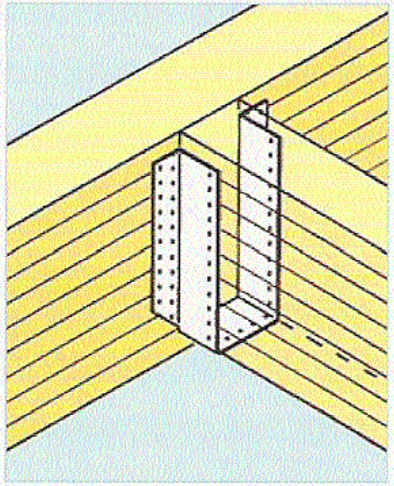
Art. No.	Popis	A	B	C	T
07106 00	105 b/R	103	103	90	3,0

Upevnenie:
BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0 / Svorníky

Väznice-prípoje

BMF® Papuča trámu A (vonkajšia)

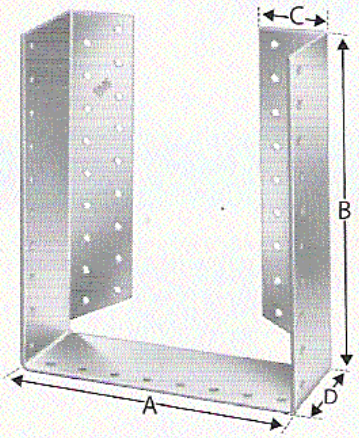


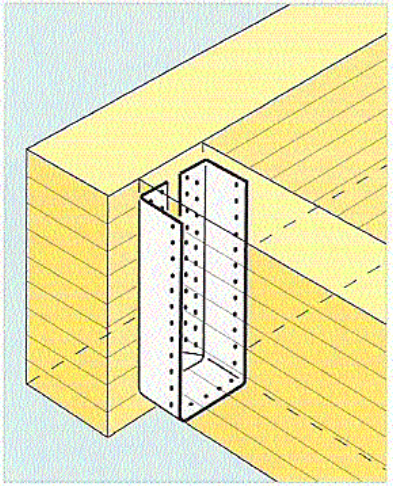


Art. No.	Popis	A	B	C	D	T	Ø
06010 00	A 120x240	120	240	42,5	60	2,5	5
06012 00	A 140x240	140	240	42,5	60	2,5	5
06000 00	A 160x160	160	160	42,5	60	2,5	5
06001 00	A 160x200	160	200	42,5	60	2,5	5
06002 00	A 180x220	180	220	42,5	60	2,5	5
06006 00	A 200x200	200	200	42,5	60	2,5	5
06008 00	A 200x240	200	240	42,5	60	2,5	5

Upevnenie:
BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0

BMF® Papuča trámu A (vnútorná)



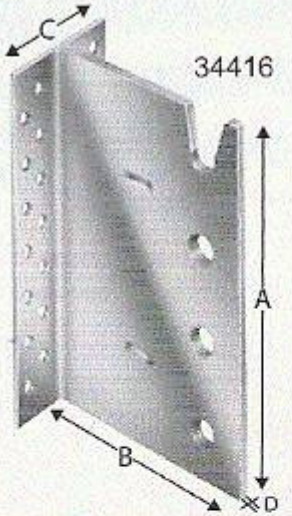


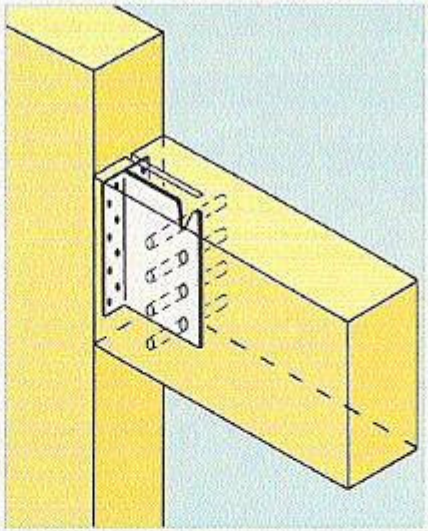
Art. No.	Popis	A	B	C	D	T	Ø
06110 00	A 120x240 I	120	240	42,5	60	2,5	5
06112 00	A 140x240 I	140	240	42,5	60	2,5	5
06100 00	A 160x160 I	160	160	42,5	60	2,5	5
06101 00	A 160x200 I	160	200	42,5	60	2,5	5
06102 00	A 180x220 I	180	220	42,5	60	2,5	5
06106 00	A 200x200 I	200	200	42,5	60	2,5	5
06108 00	A 200x240 I	200	240	42,5	60	2,5	5

Upevnenie:
BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0

Väznice-prípoje

BMF® Nosič trámu 4-radový

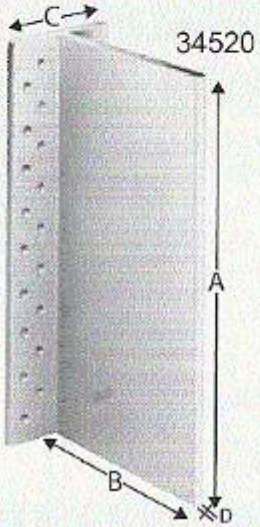


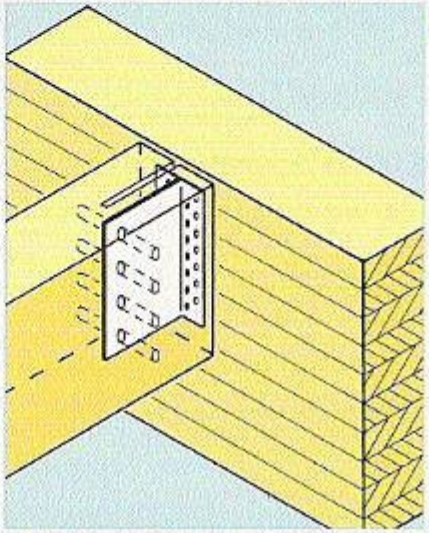


Art. No.	Popis	A	B	C	D	T	Ø
34409 00	90 - 4	90	103	62	6,0	3,0	5; 8,5
34412 00	120 - 4	120	103	62	6,0	3,0	5; 13
34416 00	160 - 4	160	103	62	6,0	3,0	5; 13
34420 00	200 - 4	200	103	62	6,0	3,0	5; 13
34424 00	240 - 4	240	103	62	6,0	3,0	5; 13

Upevnenie:
BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0 / BMF® Kolíky 8,0; 1

BMF® Nosič trámu ALU

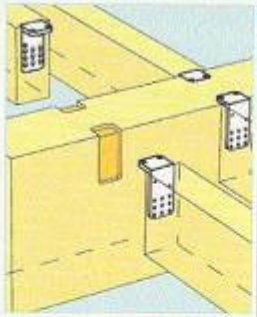




Art. No.	Popis	A	B	C	D	T	Ø
34509 00	90 ALU	86	103	62	6,0	6,0	5
34512 00	120 ALU	116	103	62	6,0	6,0	5
34516 00	160 ALU	156	103	62	6,0	6,0	5
34520 00	200 ALU	196	103	62	6,0	6,0	5
34524 00	240 ALU	236	103	62	6,0	6,0	5
34503 00	3000 mm ALU	3000	103	62	6,0	6,0	5

Upevnenie:
BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0 / BMF® Kolíky 8,0; 1

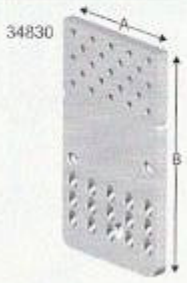
BMF® Nosič trámu EL

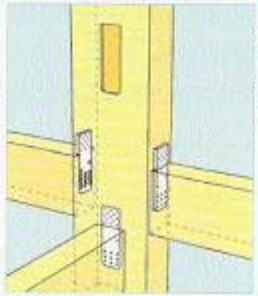


Art. No.	Popis	A	B	C	T	Ø
34803 00	EL 30	30	55	120	10,0	5,4*; 9
34804 00	EL 40	40	55	120	10,0	5,4*; 9
34806 00	EL 60	60	55	120	10,0	5,4*; 9
34808 00	EL 80	80	55	120	10,0	5,4*; 9
34810 00	EL 100	100	55	120	10,0	5,4*; 9

Upevnenie:
ABC SPAX-S Vruty so zápustnou hlavou 5,0 / BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0
** Zápustné vŕtanie*

BMF® Nosič trámu EL-S



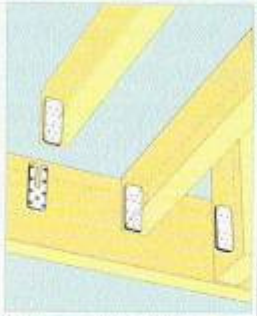


Art. No.	Popis	A	B	T	Ø
34823 00	EL-S 30	30	178	10,0	5,4*; 5
34824 00	EL-S 40	40	178	10,0	5,4*; 5; 9
34826 00	EL-S 60	60	178	10,0	5,4*; 5; 9
34828 00	EL-S 80	80	178	10,0	5,4*; 5; 9
34830 00	EL-S 100	100	178	10,0	5,4*; 5; 9

Upevnenie:
ABC SPAX-S Vruty so zápustnou hlavou 5,0 / BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0
** Zápustné vŕtanie*

SIMPSON Nosič trámu ATF

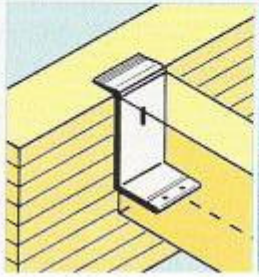
NOVINKA



Art. No.	Popis	A	B	T	Ø
34751 00	55x110	55	110	5,0	5*
34755 00	55x150	55	150	5,0	5*
34759 00	55x190	55	190	5,0	5*
34775 00	75x150	75	150	5,0	5*
34779 00	75x190	75	190	5,0	5*

Upevnenie:
BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0
** Zápustné vŕtanie*

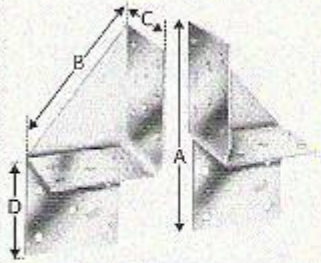
BOZETT® Alu-SK

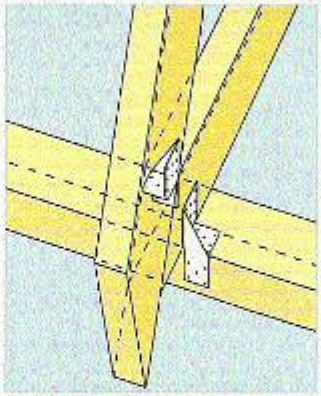


Art. No.	Popis	A	B	C	D	T	Ø
80700 00	SK 96 x 60	96	60	60	35	6,0	4.5; 7; 9x30
80701 00	SK 96 x 80	96	60	80	35	6,0	4.5; 7; 9x30
80730 00	SK 96 x 1150	96	60	1150	35	6,0	4.5; 7; 9x30
80702 00	SK 116 x 60	116	60	60	35	6,0	4.5; 7; 9x30
80703 00	SK 116 x 80	116	60	80	35	6,0	4.5; 7; 9x30
80704 00	SK 116 x 100	116	60	100	35	6,0	4.5; 7; 9x30
80731 00	SK 116 x 1150	116	60	1150	35	6,0	4.5; 7; 9x30
80705 00	SK 136 x 60	136	60	60	45	8,0	4.5; 7; 9x30
80706 00	SK 136 x 80	136	60	80	45	8,0	4.5; 7; 9x30
80707 00	SK 136 x 100	136	60	100	45	8,0	4.5; 7; 9x30
80732 00	SK 136 x 1150	136	60	1150	45	8,0	4.5; 7; 9x30
80708 00	SK 156 x 60	156	60	60	45	8,0	4.5; 7; 9x30

DIN 1052-2

BMF® Univerzálna spojka MIDI 130



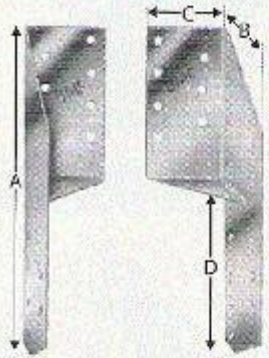


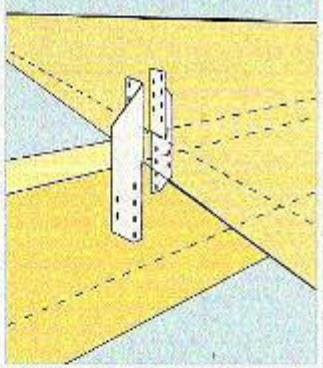
Art. No.	Popis	A	B	C	D	T	Ø
01100 00	MIDI 130 ľavá	130	61,5	62,5	58	2,5	5
01101 00	MIDI 130 pravá	130	61,5	62,5	58	2,5	5

Upevnenie:
BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0

SIMPSON Strong-Tie DIN 1052

BMF® Univerzálna spojka MAXI 190



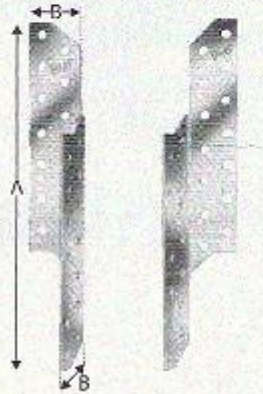


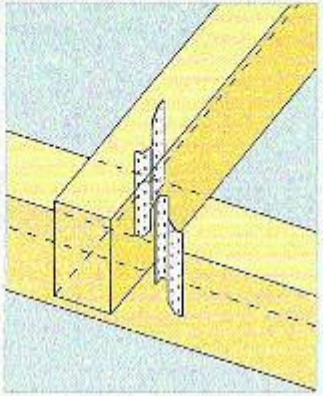
Art. No.	Popis	A	B	C	D	T	Ø
01000 00	MAXI 190 ľavá	192	49,5	49,5	96	2,0	5
01002 00	MAXI 190 pravá	192	49,5	49,5	96	2,0	5

Upevnenie:
BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0

SIMPSON Strong-Tie DIN 1052-2

BMF® Kotva krokva-väznica





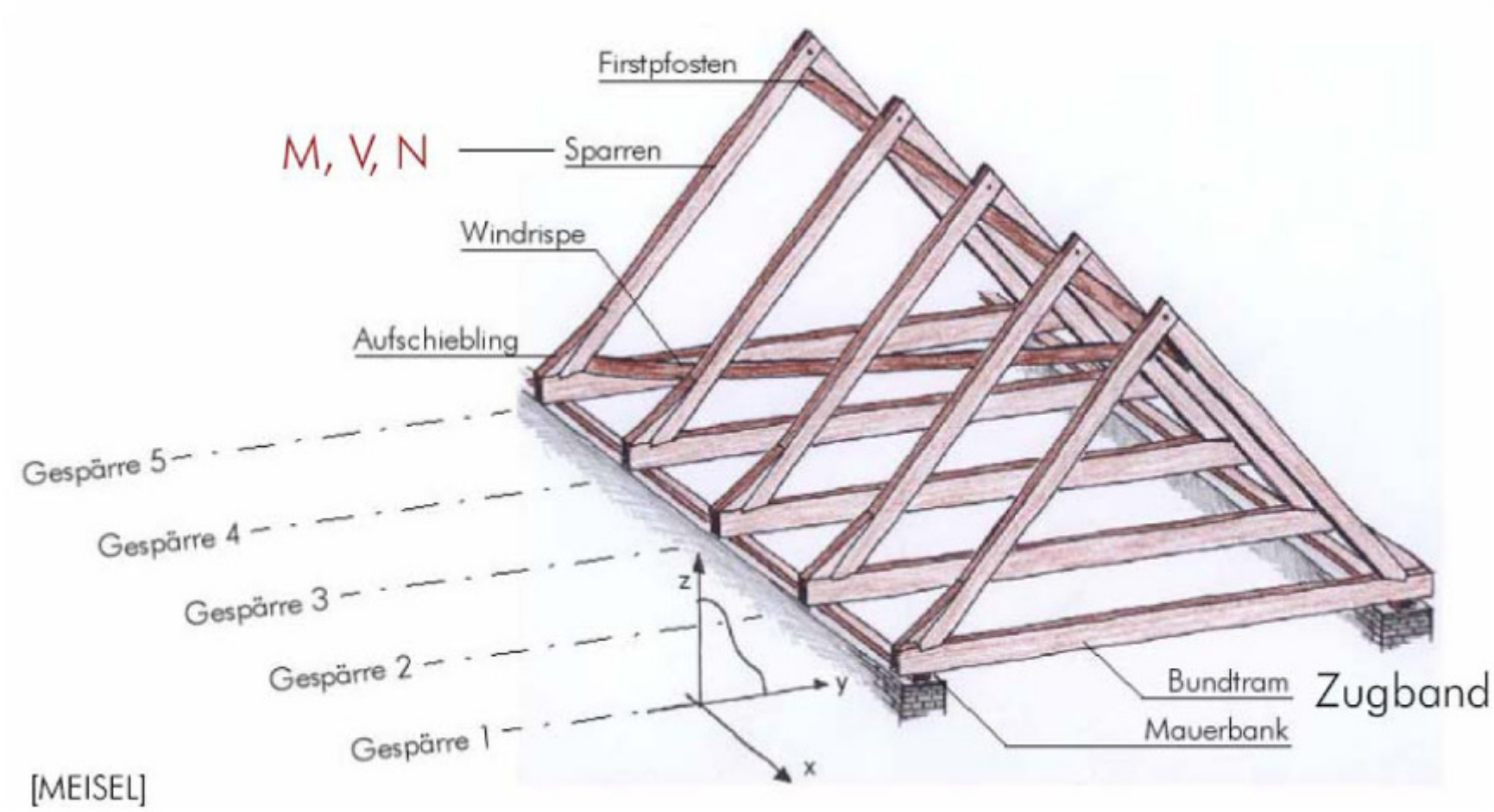
Art. No.	Popis	A	B	T	Ø
02170 00	170 ľavá	170	34,5	2,0	5
02171 00	170 pravá	170	34,5	2,0	5
02172 00	170 p/f	170	34,5	2,0	5
02210 00	210 ľavá	210	34,5	2,0	5
02211 00	210 pravá	210	34,5	2,0	5
02212 00	210 p/f	210	34,5	2,0	5
02250 00	250 ľavá	250	34,5	2,0	5
02251 00	250 pravá	250	34,5	2,0	5
02290 00	290 ľavá	290	34,5	2,0	5
02291 00	290 pravá	290	34,5	2,0	5
02330 00	330 ľavá	330	34,5	2,0	5
02331 00	330 pravá	330	34,5	2,0	5
02370 00	370 ľavá	370	34,5	2,0	5
02371 00	370 pravá	370	34,5	2,0	5

Upevnenie: BMF® Hrebienkové klince 4,0 / BMF® Skrutky 5,0

SIMPSON Strong-Tie DIN 1052

Krovy

Krokvičková sústava (bez tiahla alebo s tiahlom)



Krokvičková sústava s tiahlom

Krokvičková sústava

-Statický systém

-Zaťaženie - symetrické – stále, sneh-1

-nesymetrické – sneh-2, vietor, tvar strechy

-Vnútorné sily

-Navrhovanie (dimenzovanie prierezov a prípojov) a posudzovanie

-Priestorová stabilita!

Hambálková sústava (vodorovné sily v stropnom nosníku)

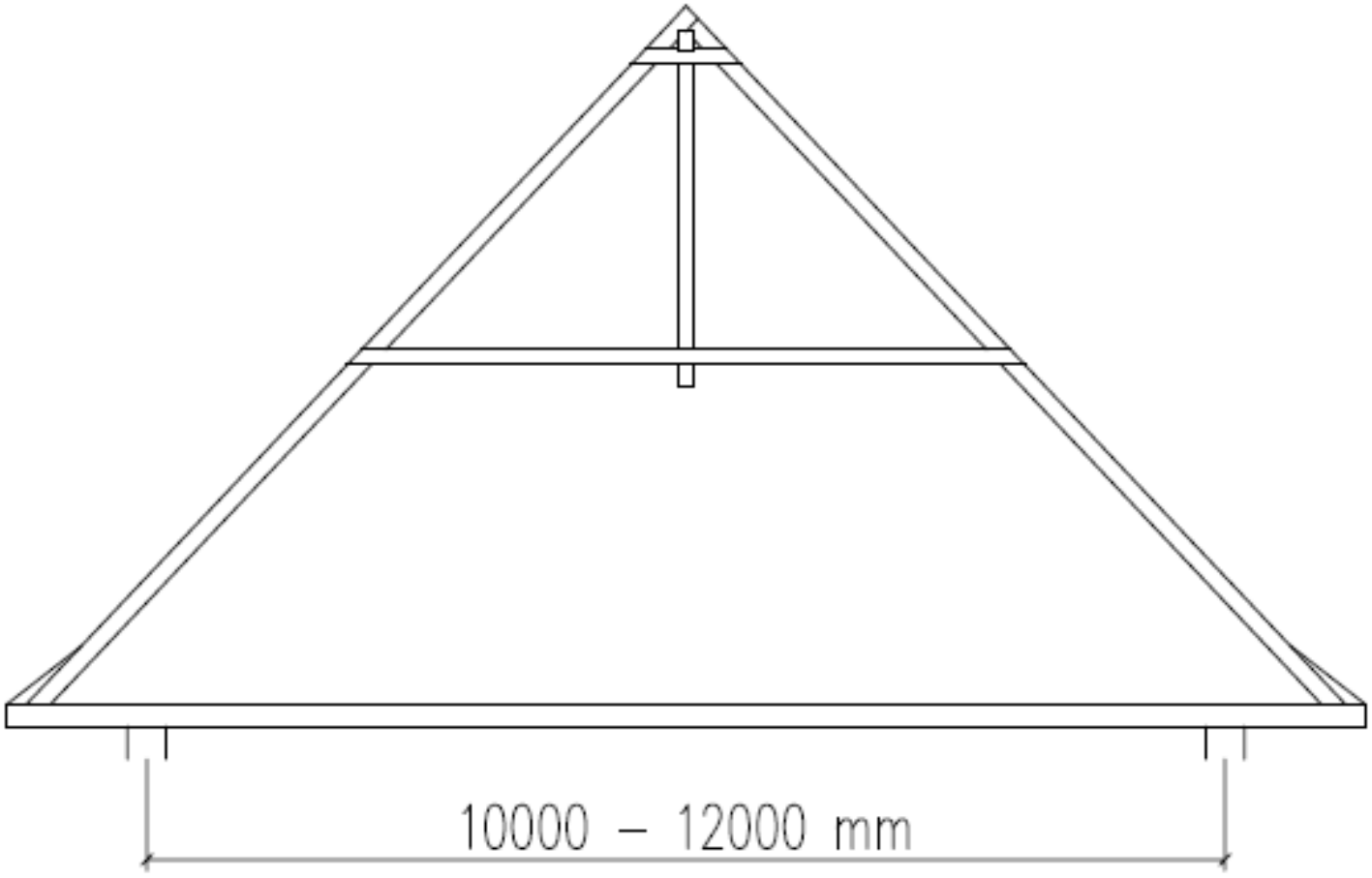


SCHÉMA HAMBÁLKOVEJ SÚSTAVY

Hambálková sústava (vodorovné sily cez tiahla do stropu)

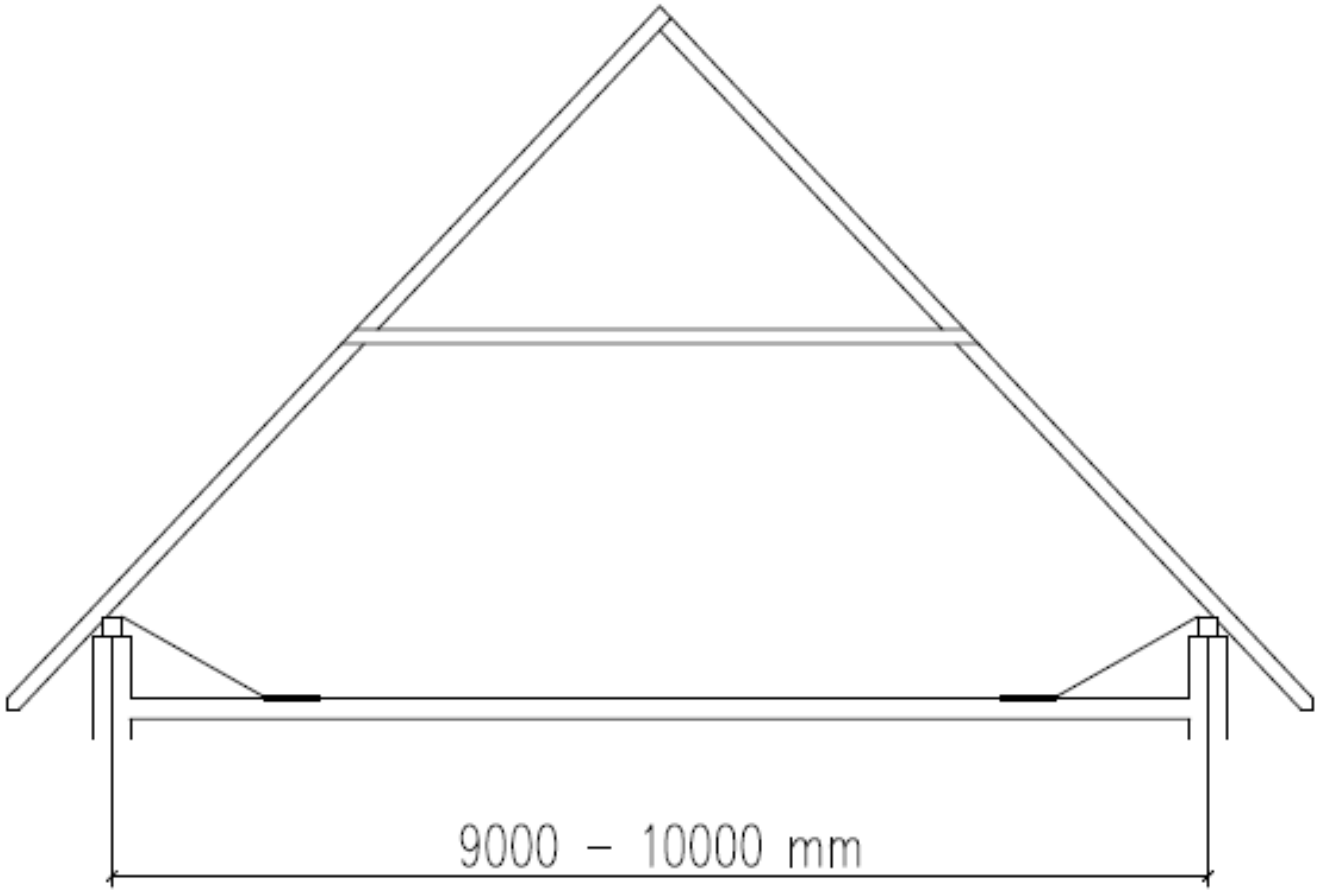
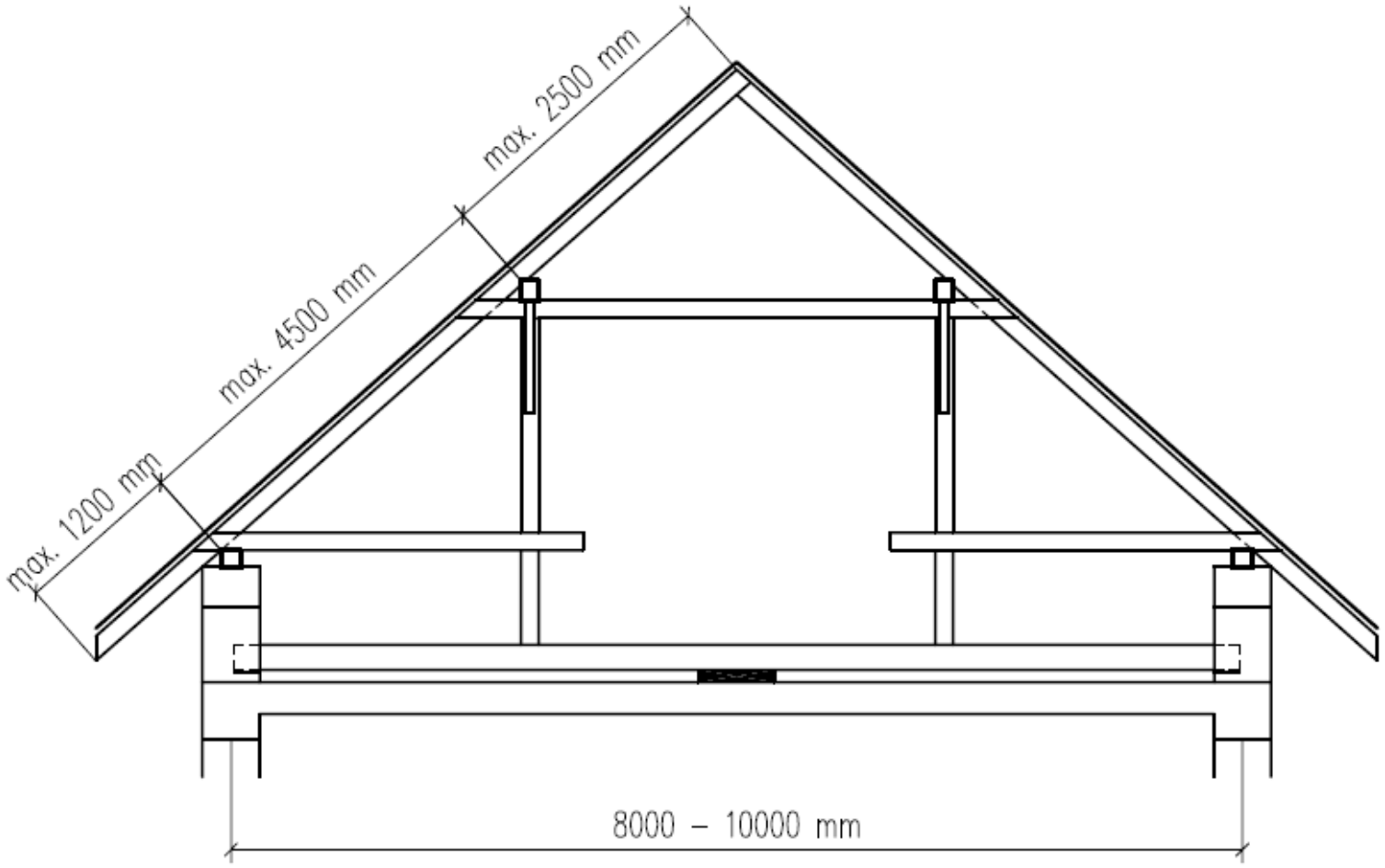


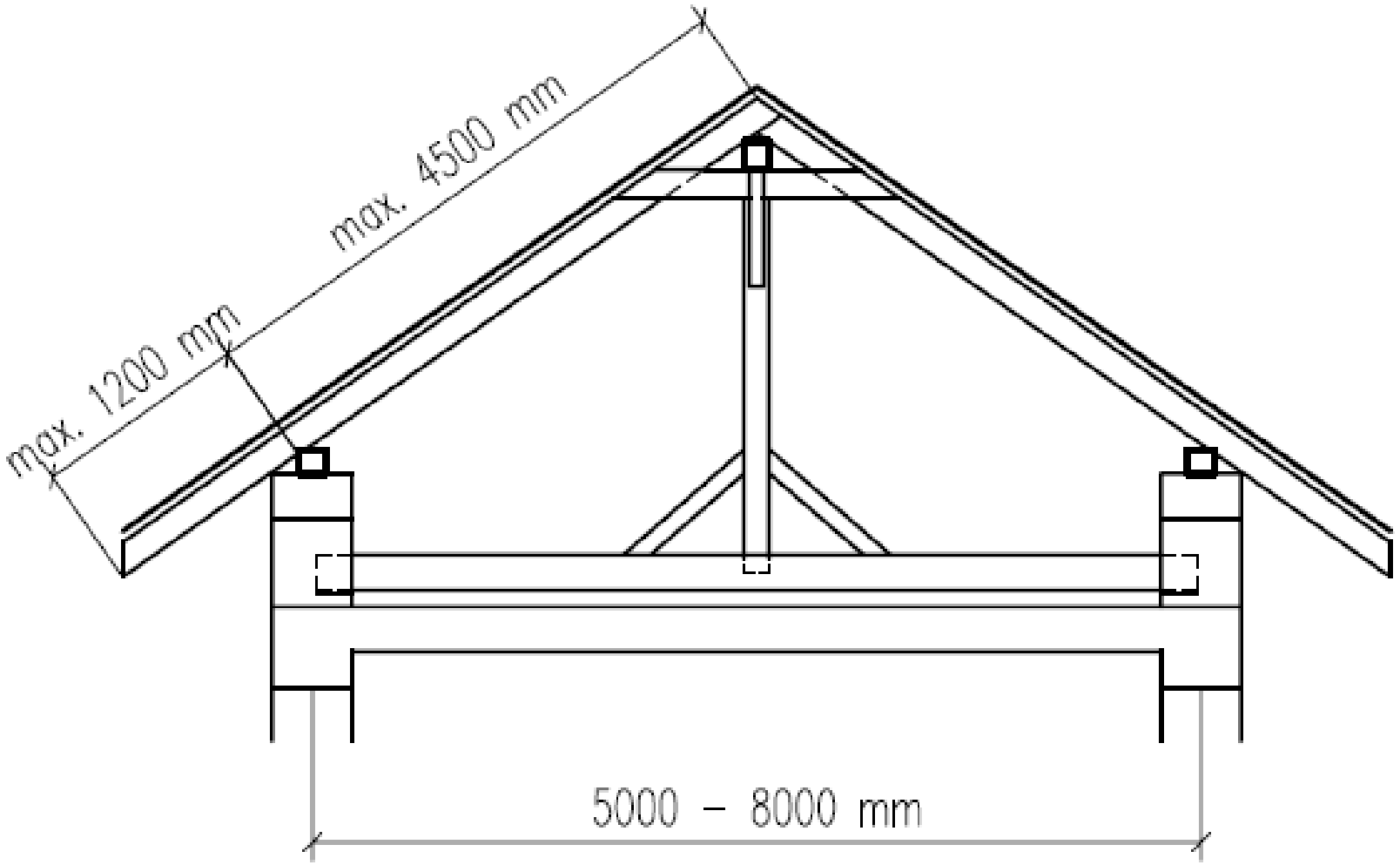
SCHÉMA HAMBÁLKOVEJ SÚSTAVY BEZ STROPNICE

- kotvenie krokva – pomúrnica
- kotvenie pomúrnica – veniec (ŽB, drevený)
- kotvenie veniec - strop

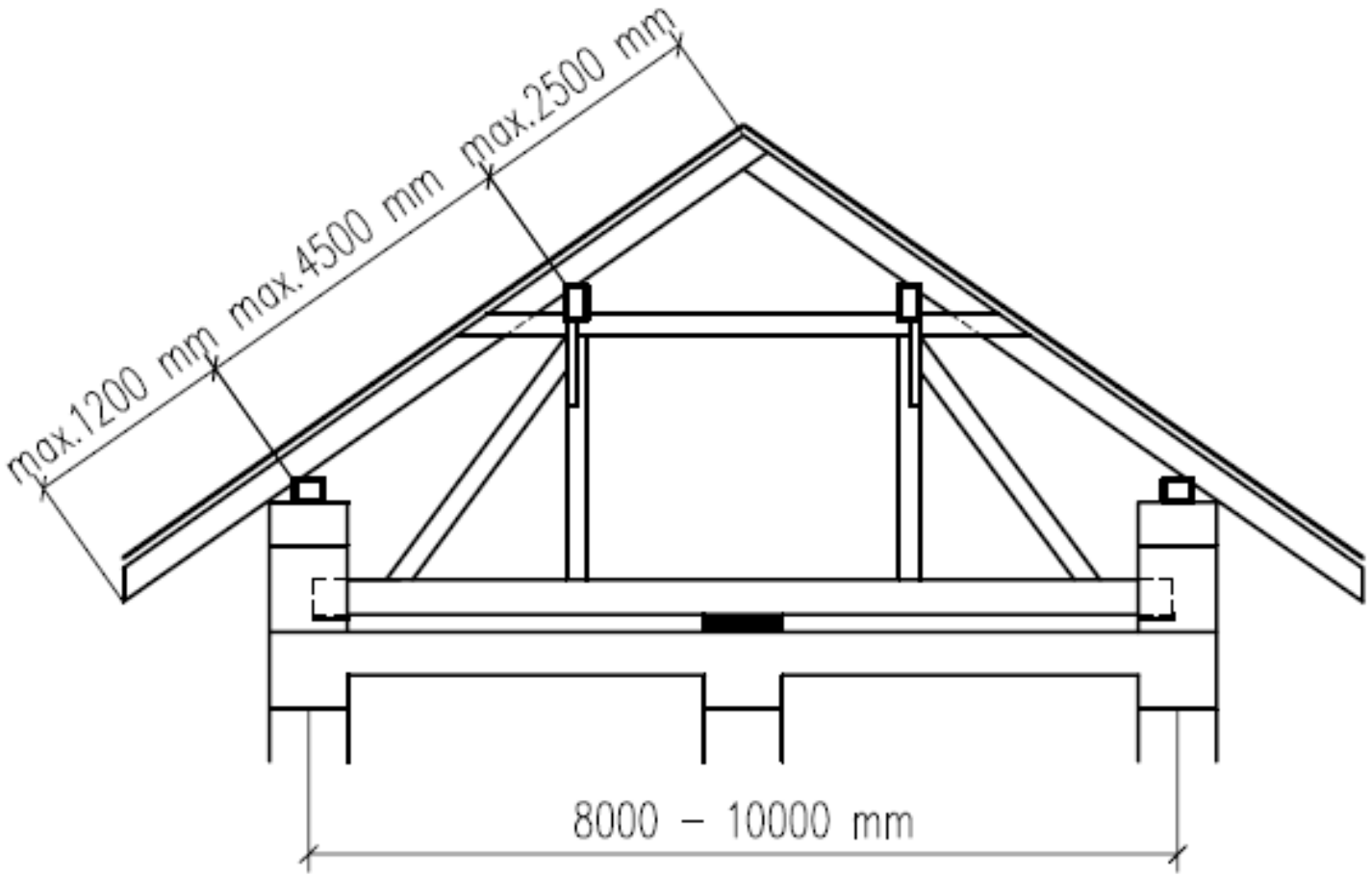
Väznicové sústavy



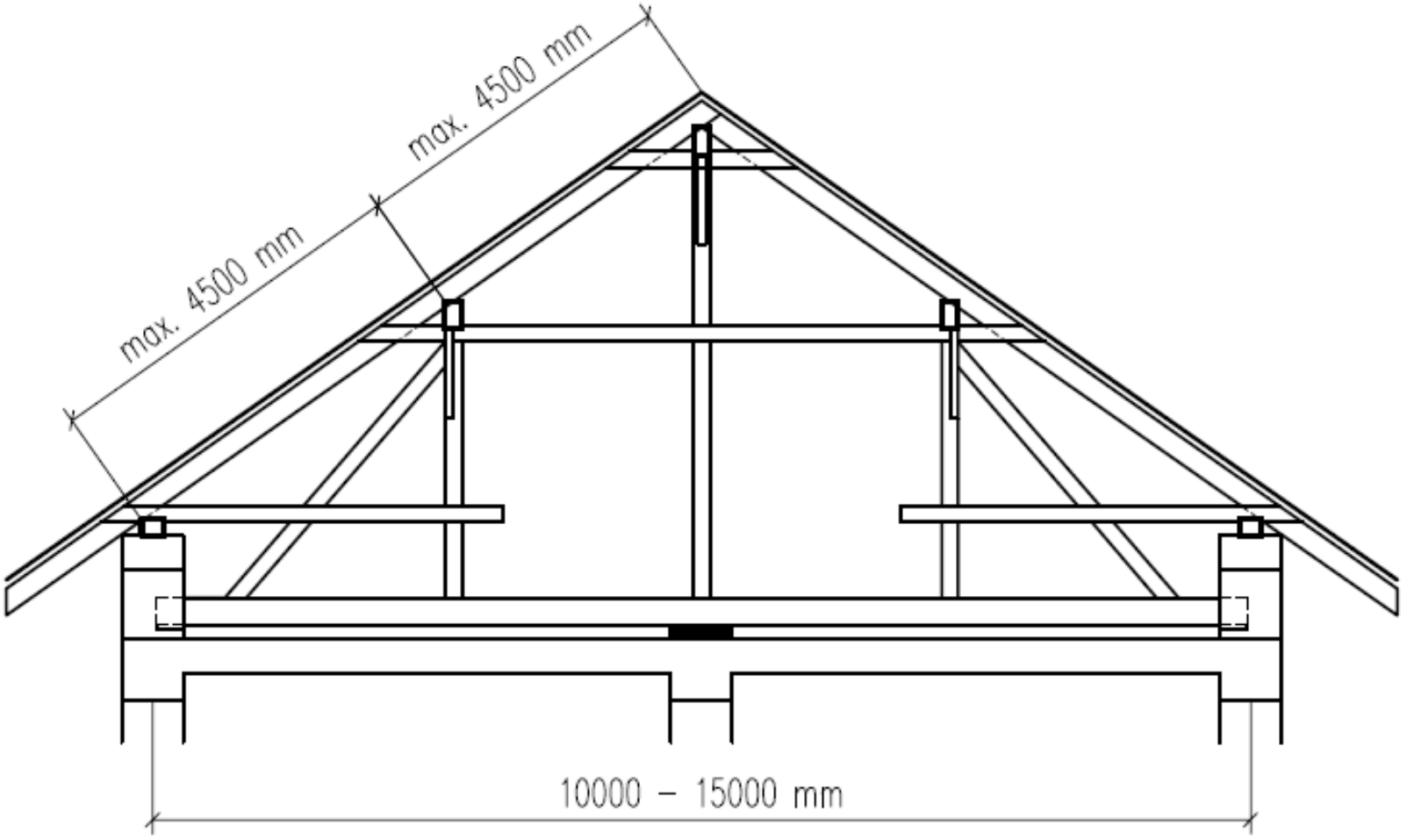
Stojatá stolica (s podopretím väzného trámu)



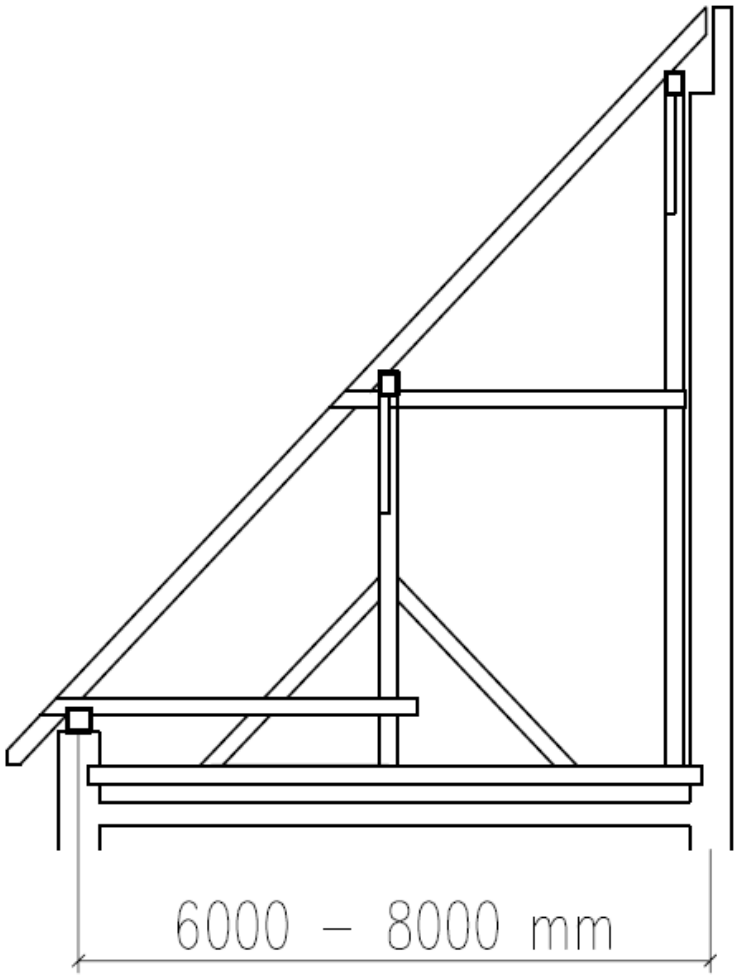
Stojatá stolica s vrcholovou väznicou



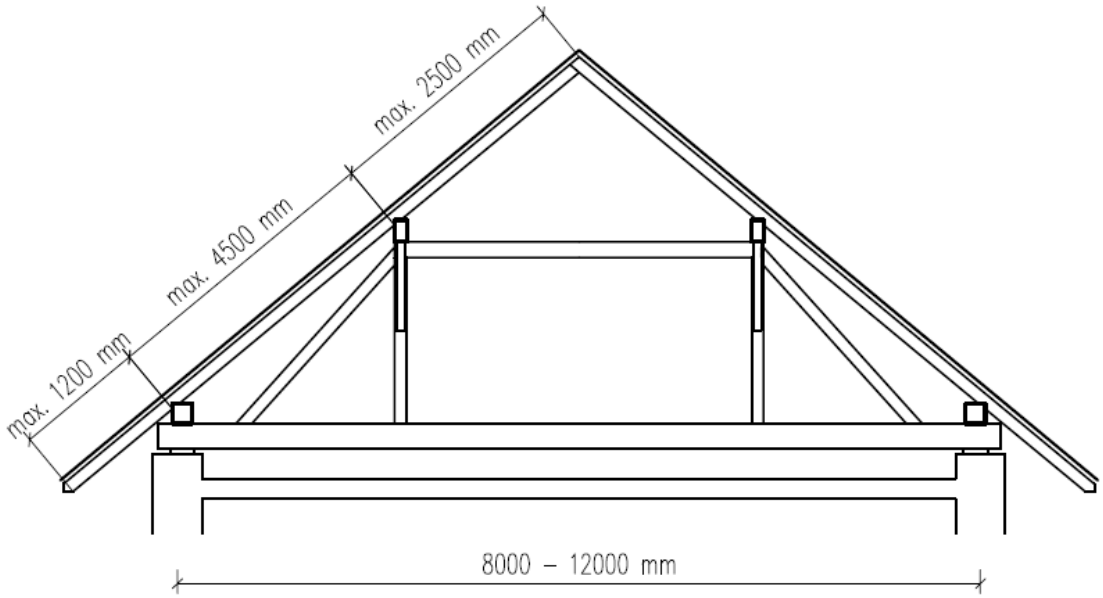
Stojatá stolica (s podopretím väzného trámu (do rozpätia 12 m))

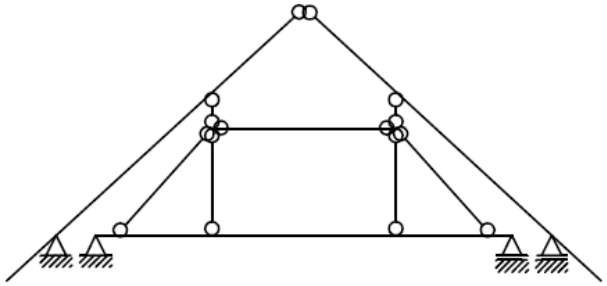


Stojatá stolica s tromi (2 dve stredové, jedna vrcholová) väznicami



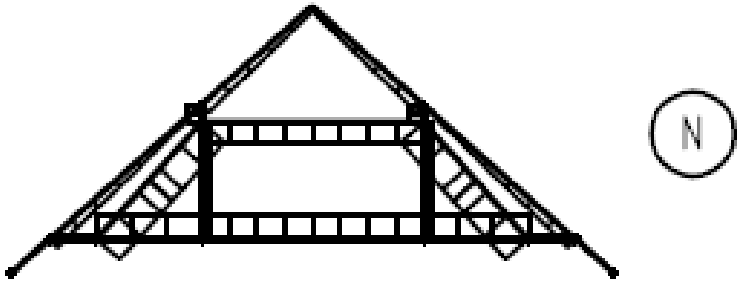
PLNÁ VÄZBA STOJATEJ STOLICE
PRE PULTOVÚ STRECHU



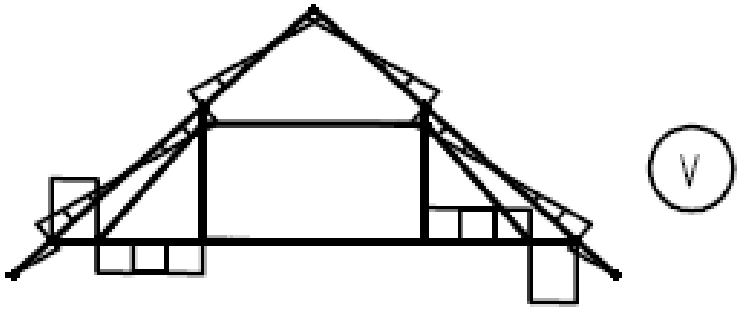


Vešadlo (tvar ako stojatá stolica bez podopretia väzného trámu)

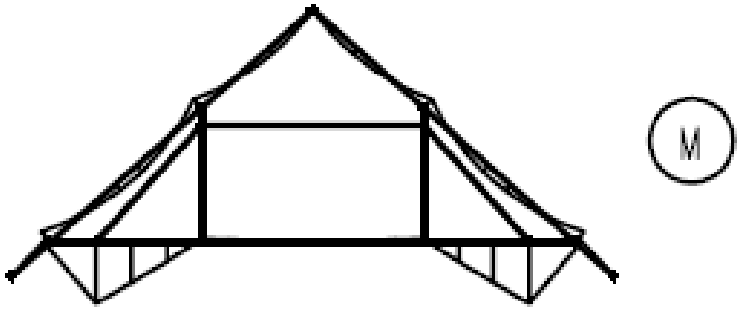
Priebeh vnútorných síl na konštrukcii od zaťaženia vlastnou tiažou, strešným plášťom a snehom.
Zaťaženie je symetrické.



N



V

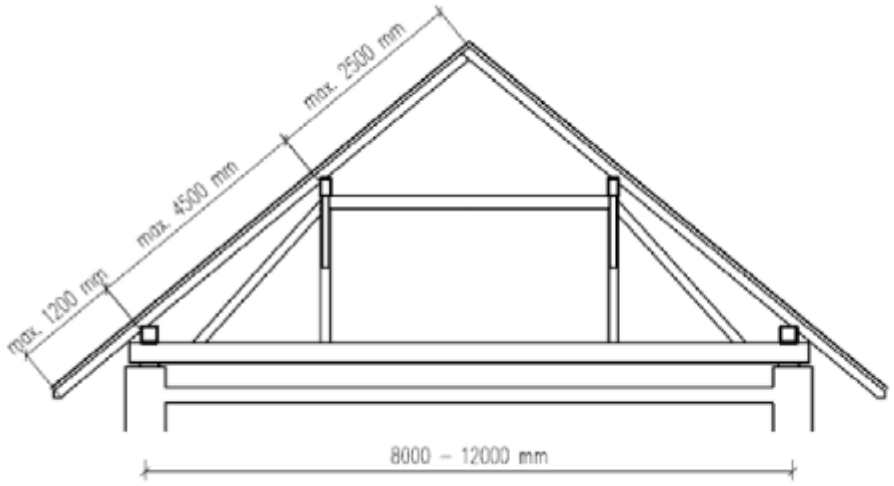


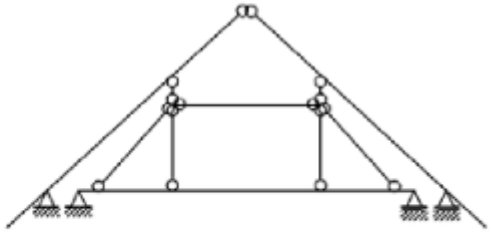
M

Väznicová sústava - vešadlo

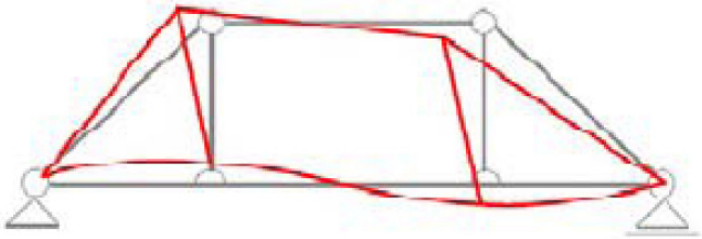
- Výhody

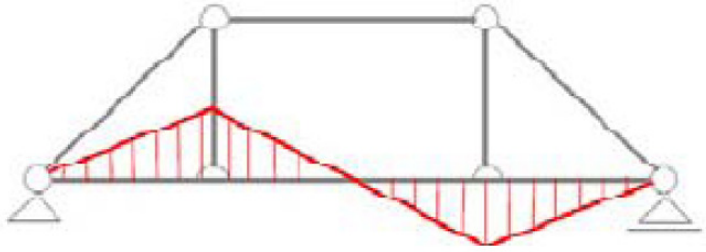
- Nevýhody

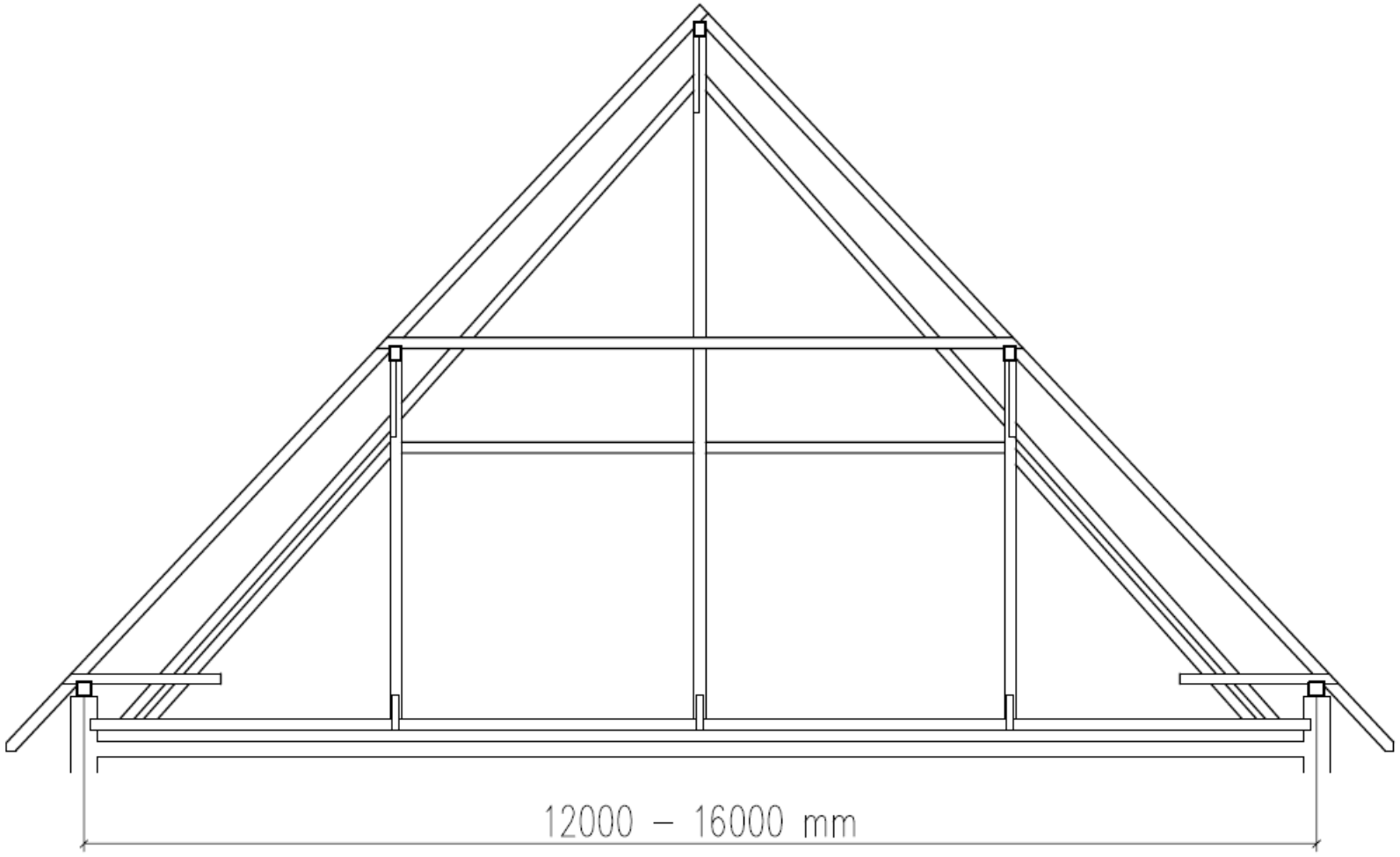




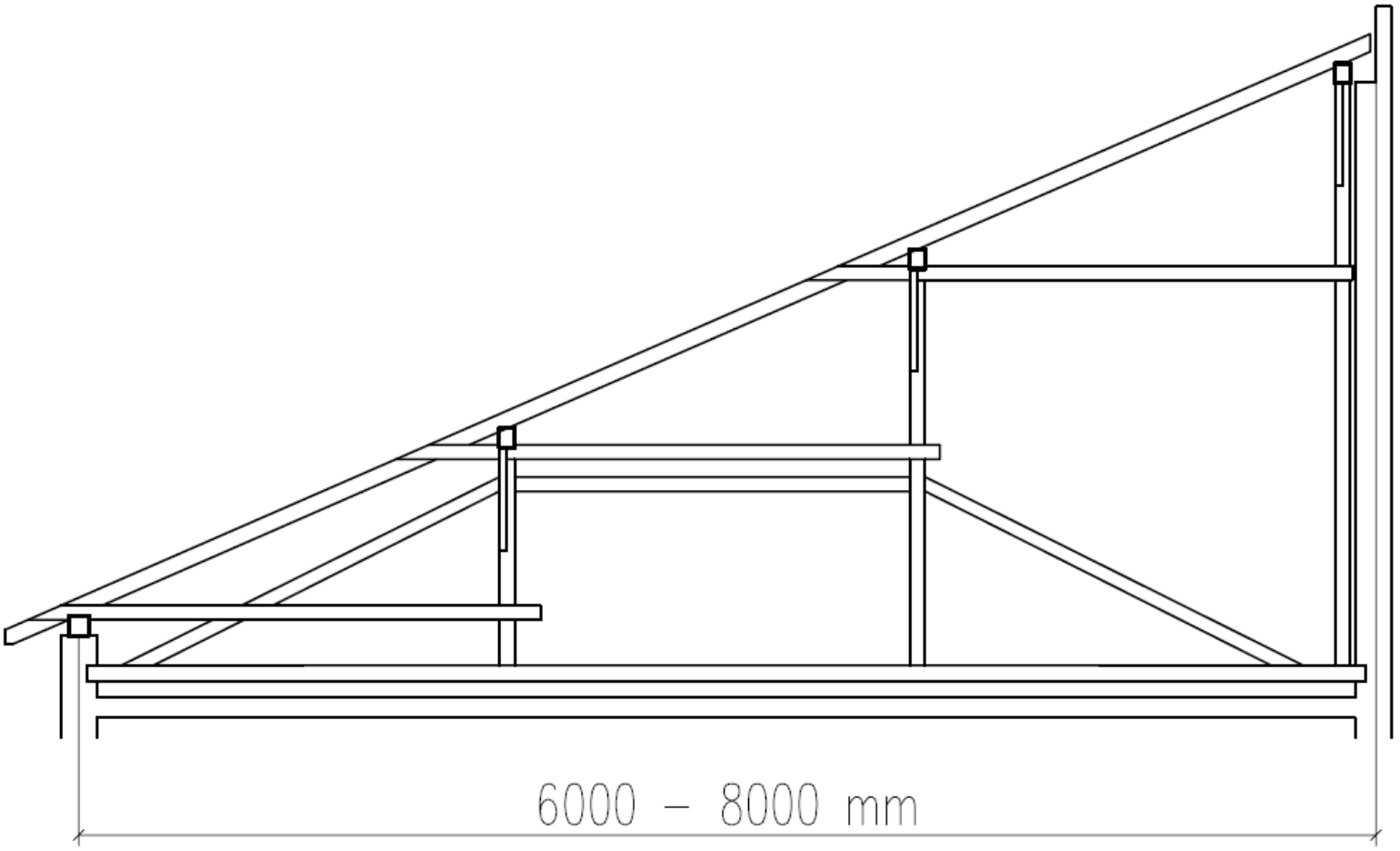
Nesymetrické zaťaženie – nesymetrický tvar, vikiere, terasy,...

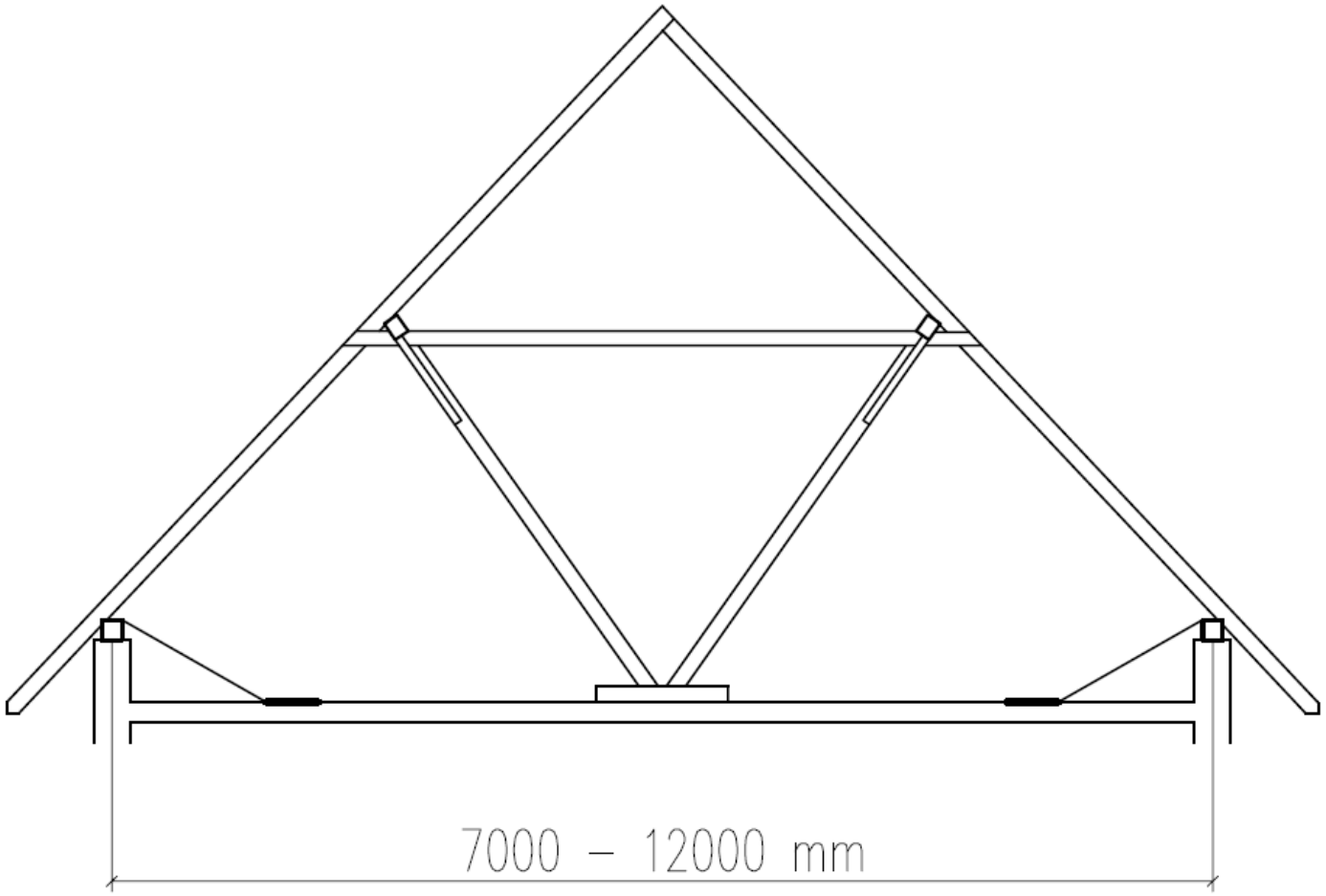




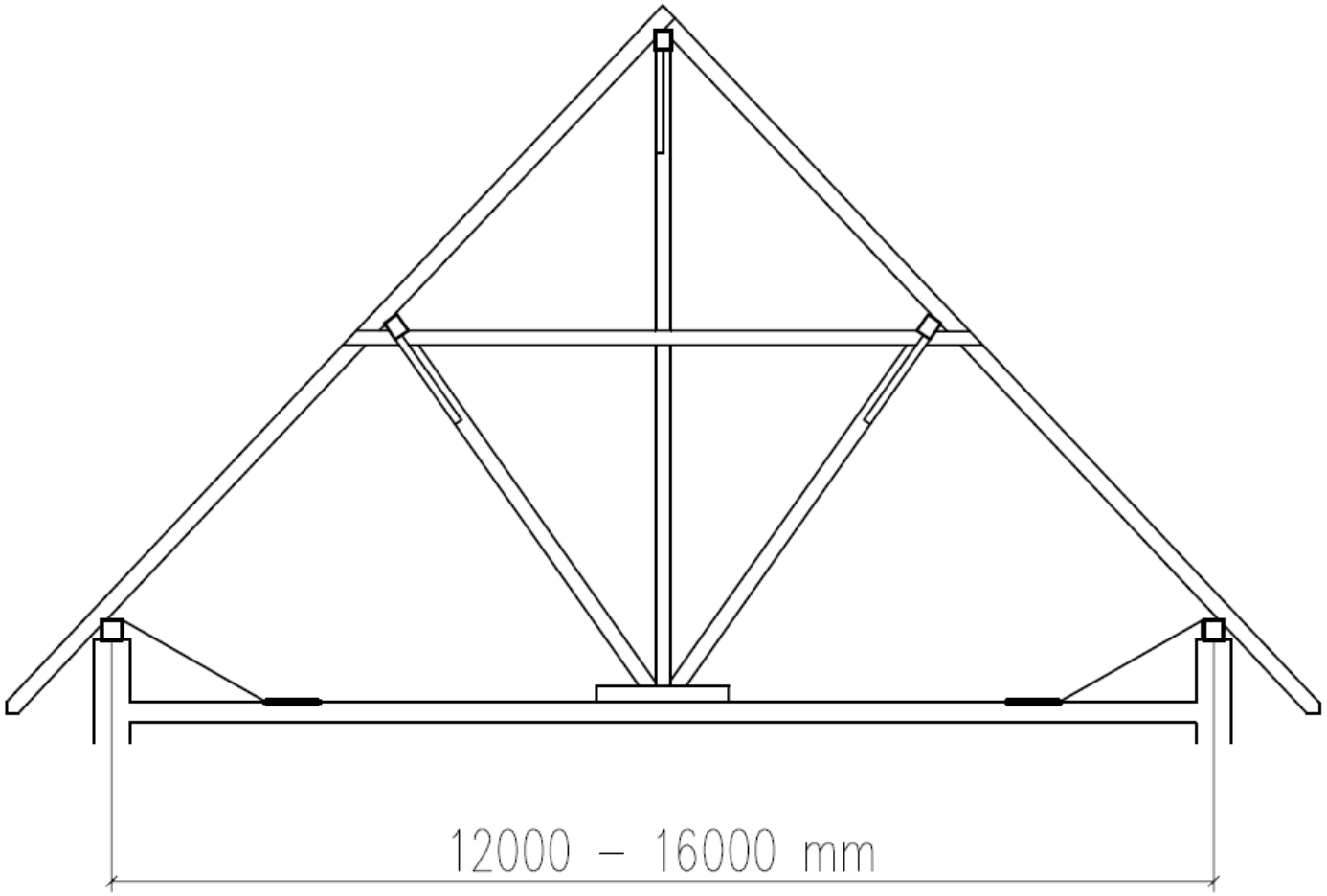


PLNÁ VÄZBA TROJITÉHO VEŠADLA PRE SEDLOVÚ STRECHU


6000 – 8000 mm

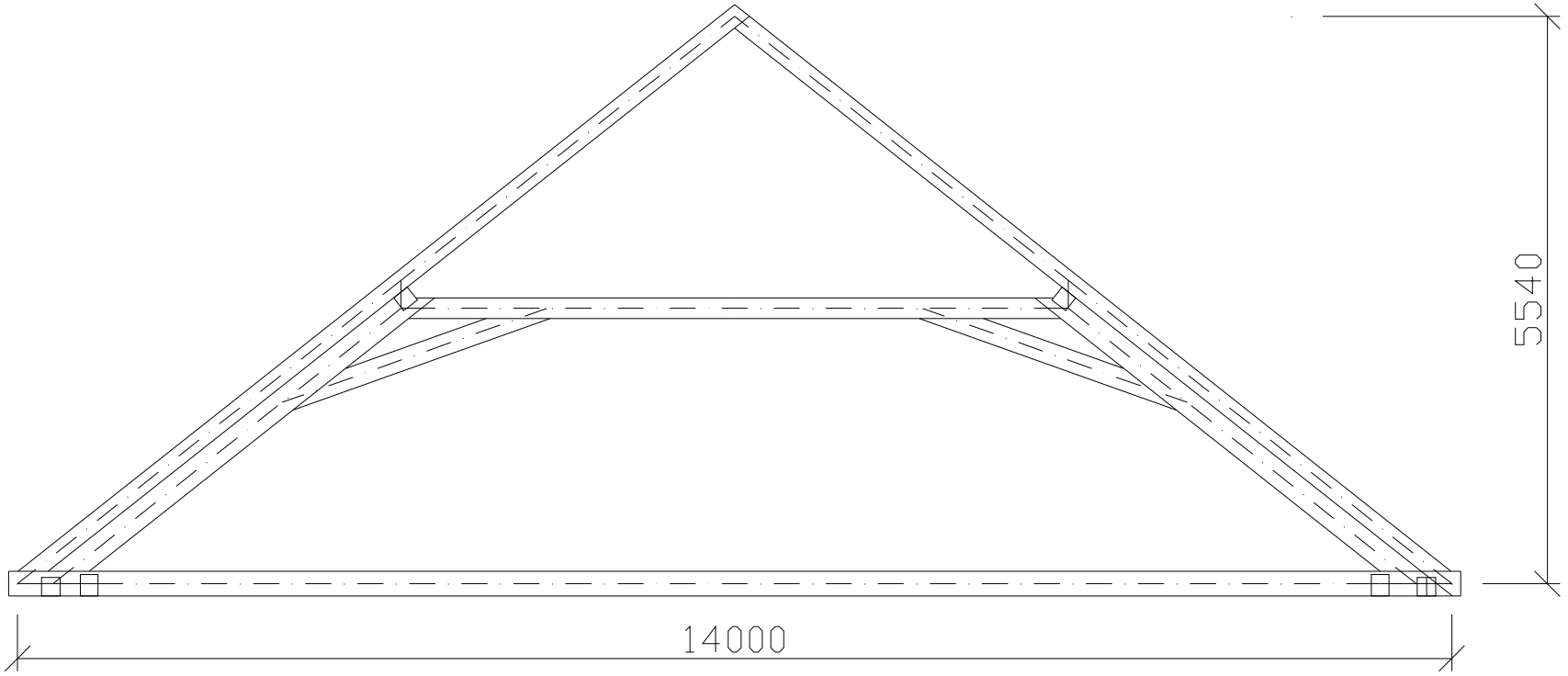


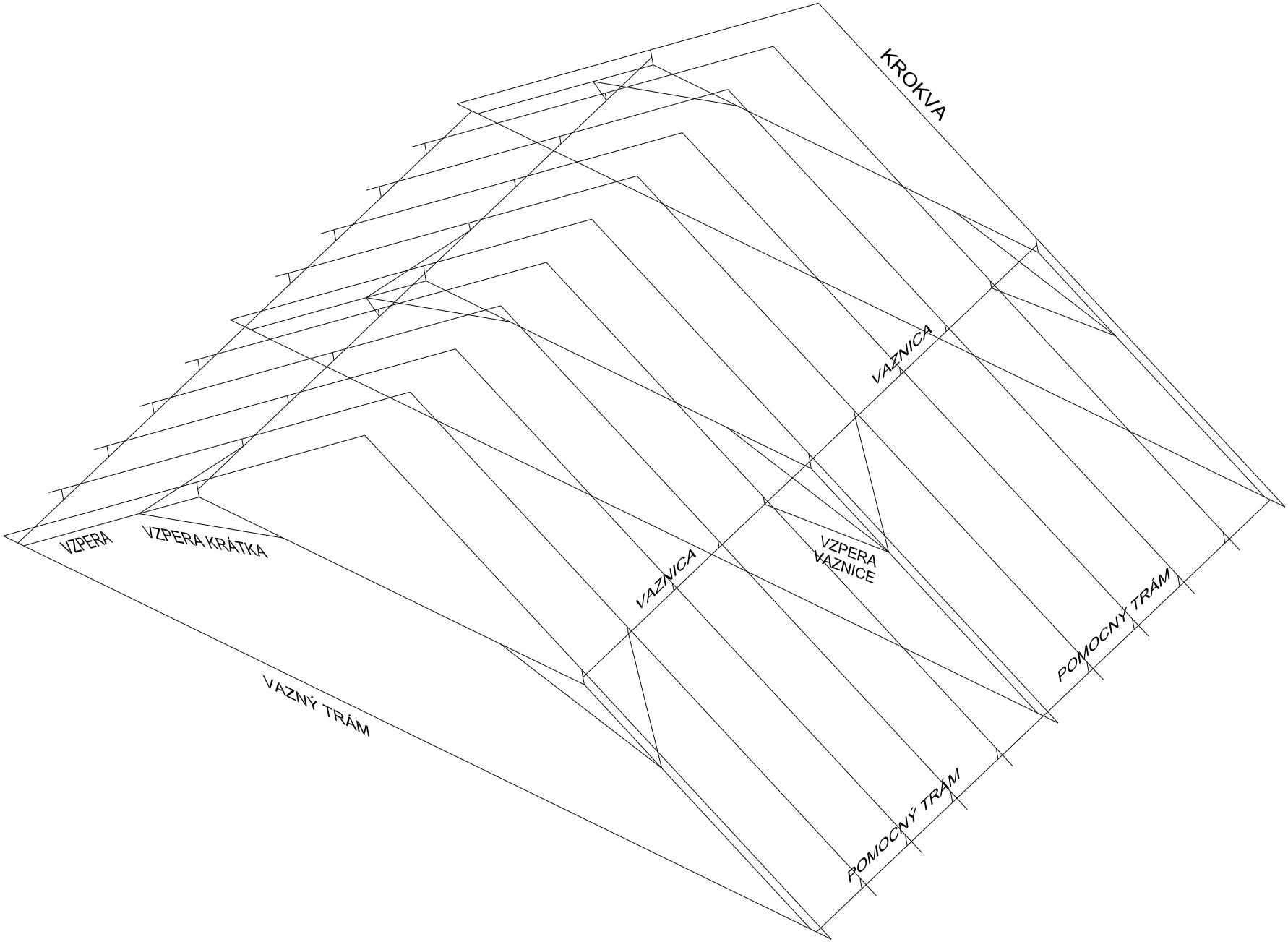
PLNÁ VÄZBA LEŽATEJ STOLICE PRE SEDLOVÚ STRECHU,
BEZ VÄZNÉHO TRÁMU S KOTVENÍM STĽPIKOV DO PAPUČE

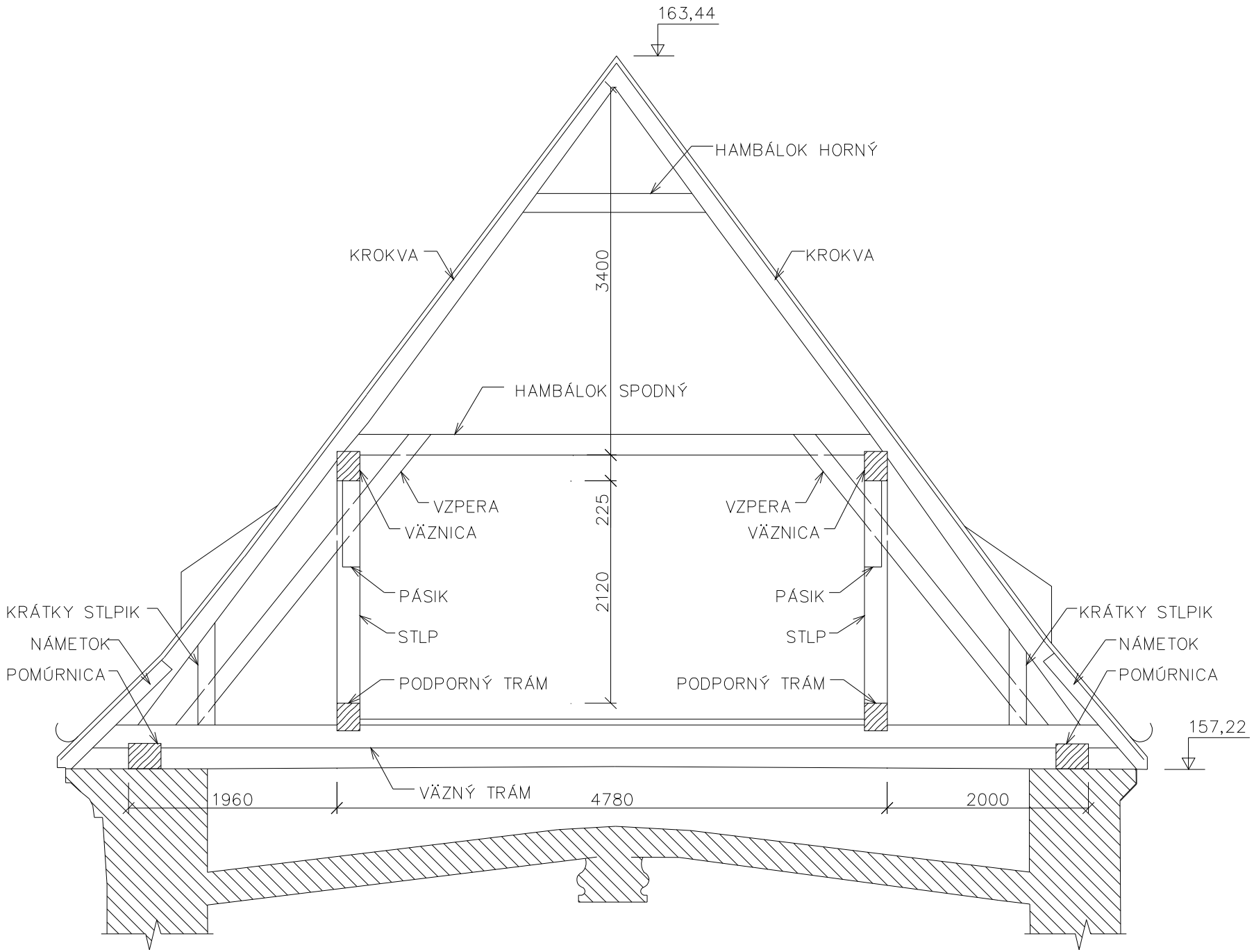


PLNÁ VÄZBA LEŽATEJ STOLICE PRE SEDLOVÚ STRECHU

•Ležatá stolica

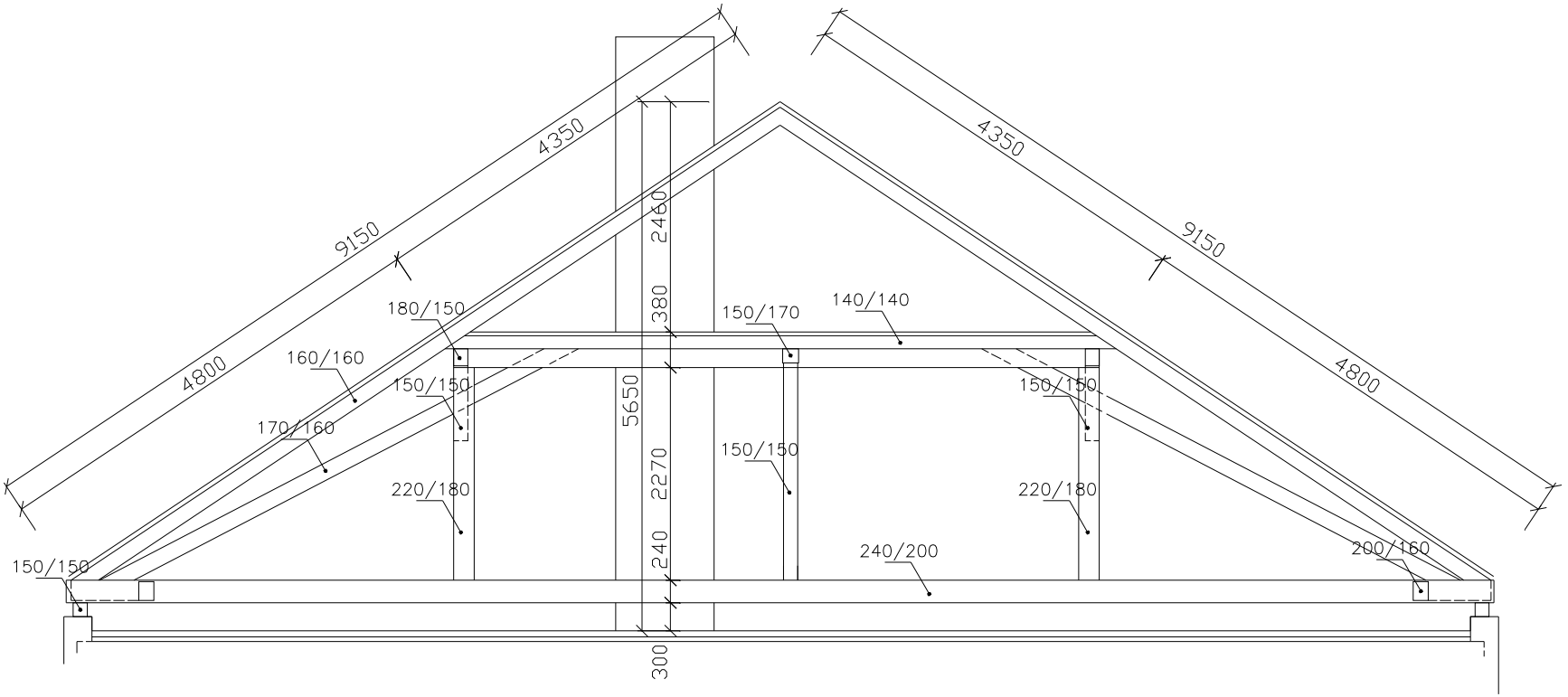



KROKVA
VAZNICA
VZPERA
VZPERA KRATKA
VAZNICA
VZPERA VAZNICE
POMOCNÝ TRÁM
VAZNÝ TRÁM
POMOCNÝ TRÁM

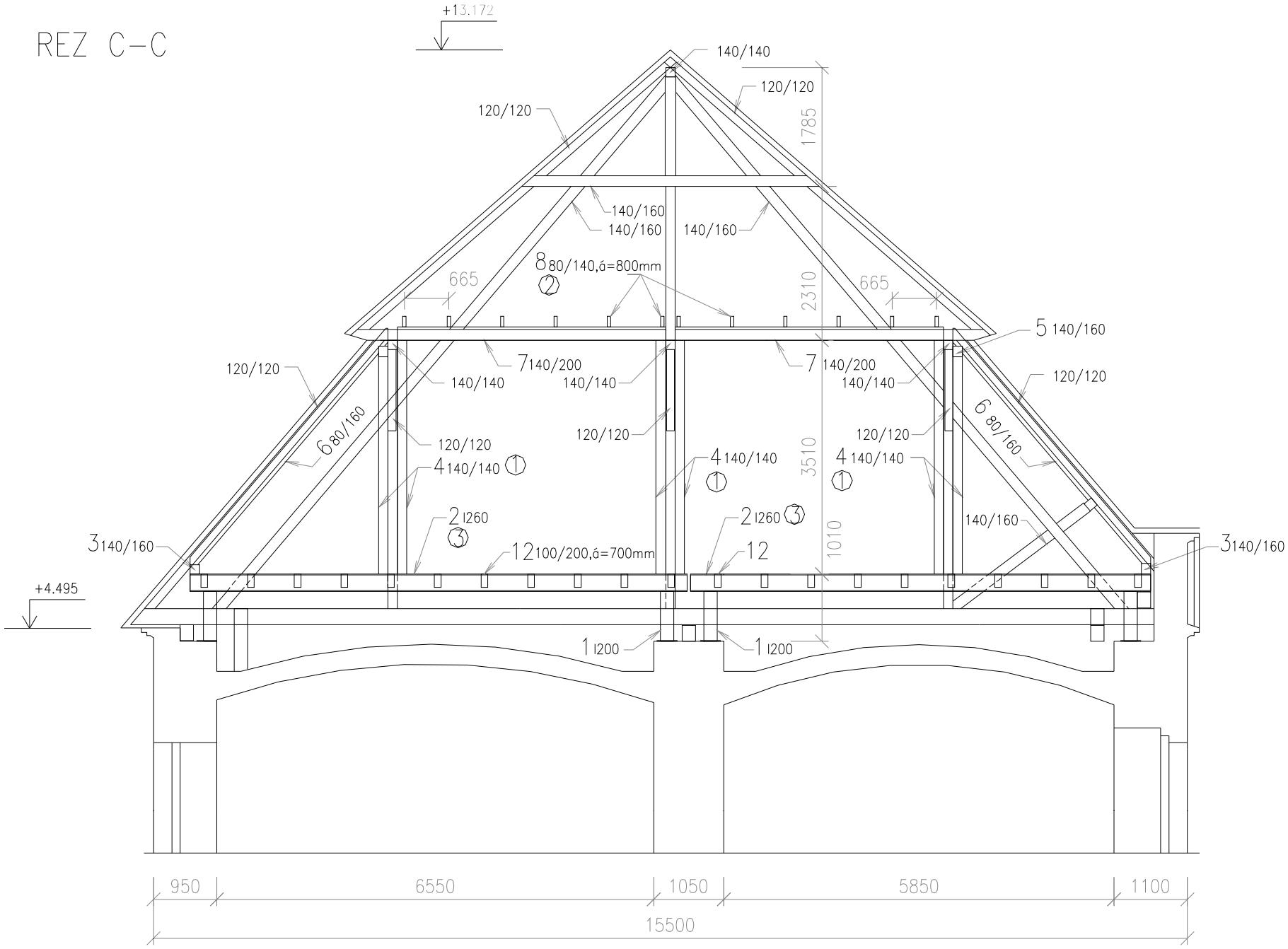

163,44
HAMBÁLOK HORNÝ
KROKVA
KROKVA
3400
HAMBÁLOK SPODNÝ
VZPERA
VÄZNICA
VZPERA
VÄZNICA
225
2120
PÁSIK
STLP
PÁSIK
STLP
KRÁTKY STLPIK
NÁMETOK
POMÚRNICA
PODPORNÝ TRÁM
PODPORNÝ TRÁM
KRÁTKY STLPIK
NÁMETOK
POMÚRNICA
157,22
VÄZNÝ TRÁM
1960
4780
2000

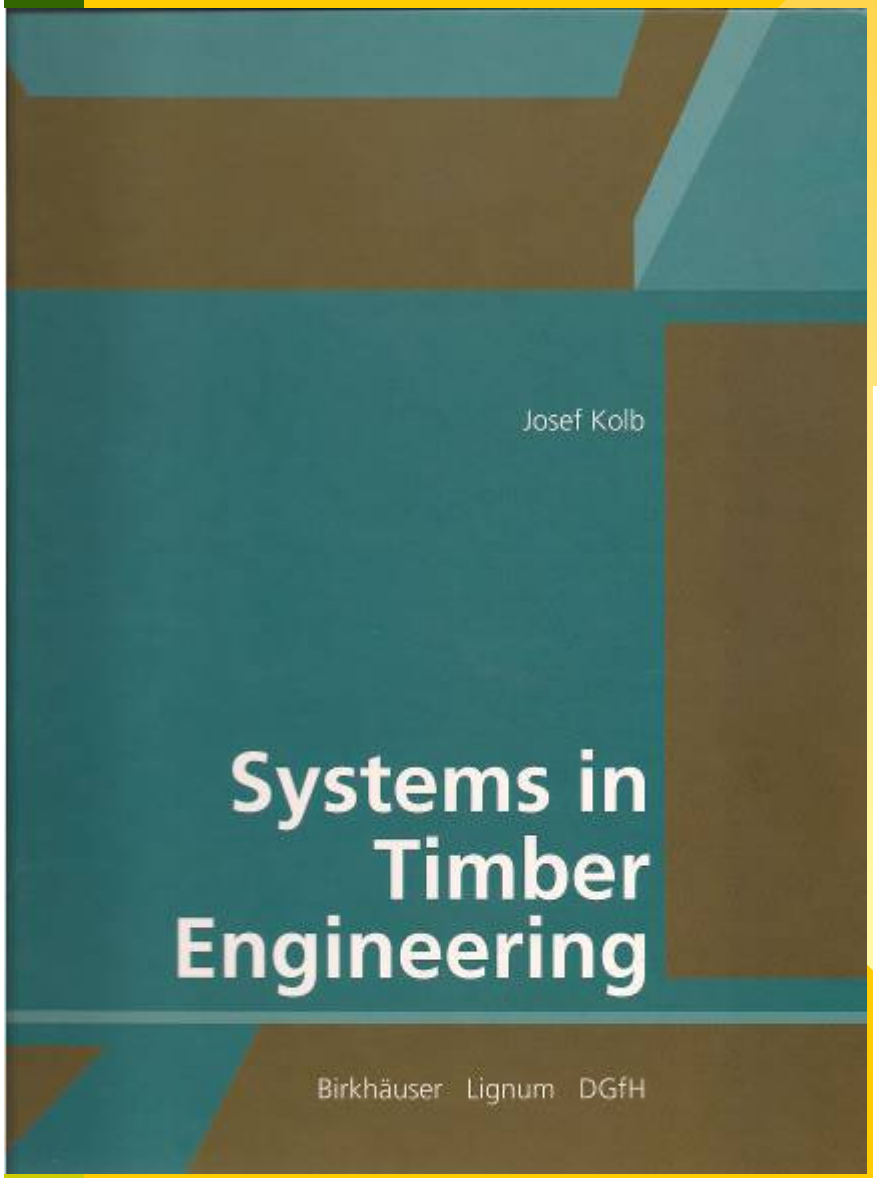
Meštiansky dom v Trnave

REZ A A



REZ C–C


+13.172
+4.495
140/140
120/120
120/120
1785
140/160
140/160
140/160
8 80/140,á=800mm
2
665
665
2310
5 140/160
7 140/200
140/140
7 140/200
140/140
120/120
120/120
6 80/160
6 80/160
120/120
120/120
120/120
4 140/140
1
4 140/140
1
4 140/140
1
3510
2 I260
3
2 I260
3
140/160
3 140/160
12 100/200,á=700mm
12
1010
1 I200
1 I200
950
6550
1050
5850
1100
15500

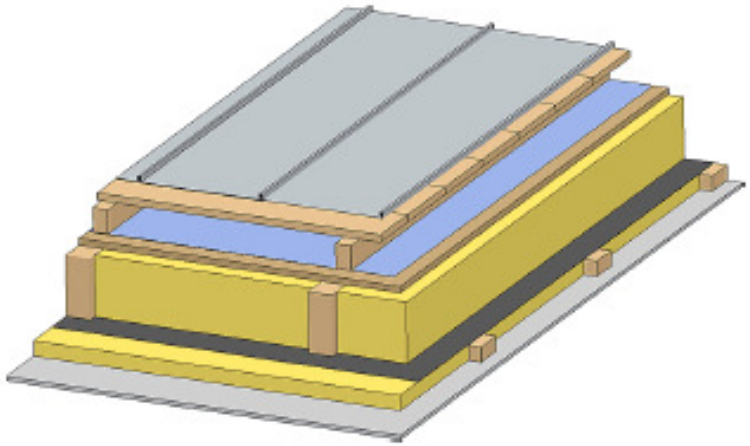


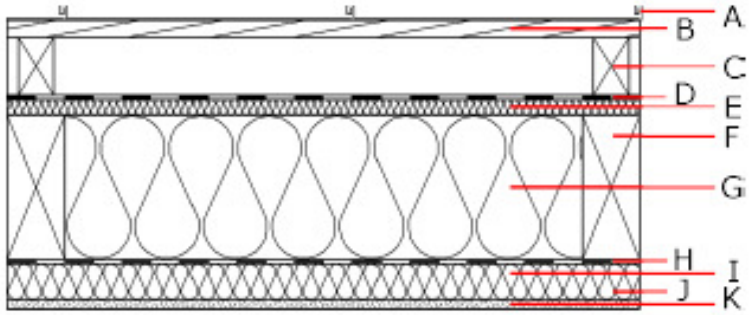
www.dataholz.com

databáza:

- skladby stropov, stien, striech,

- technické parametre



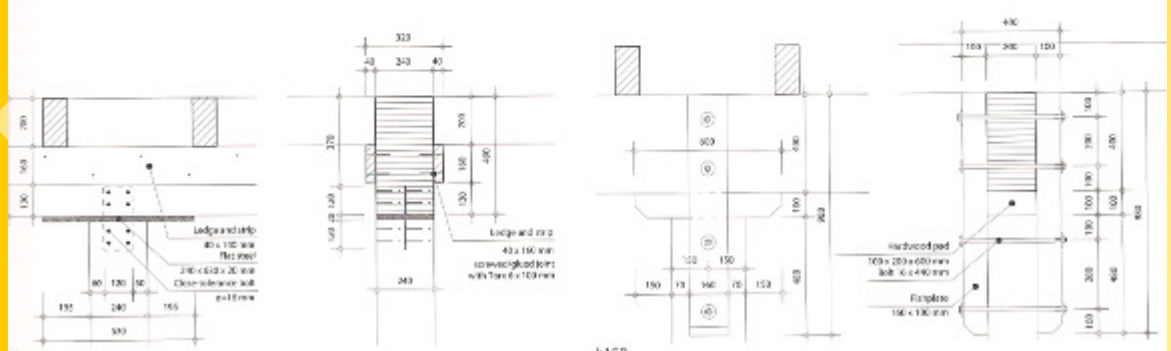


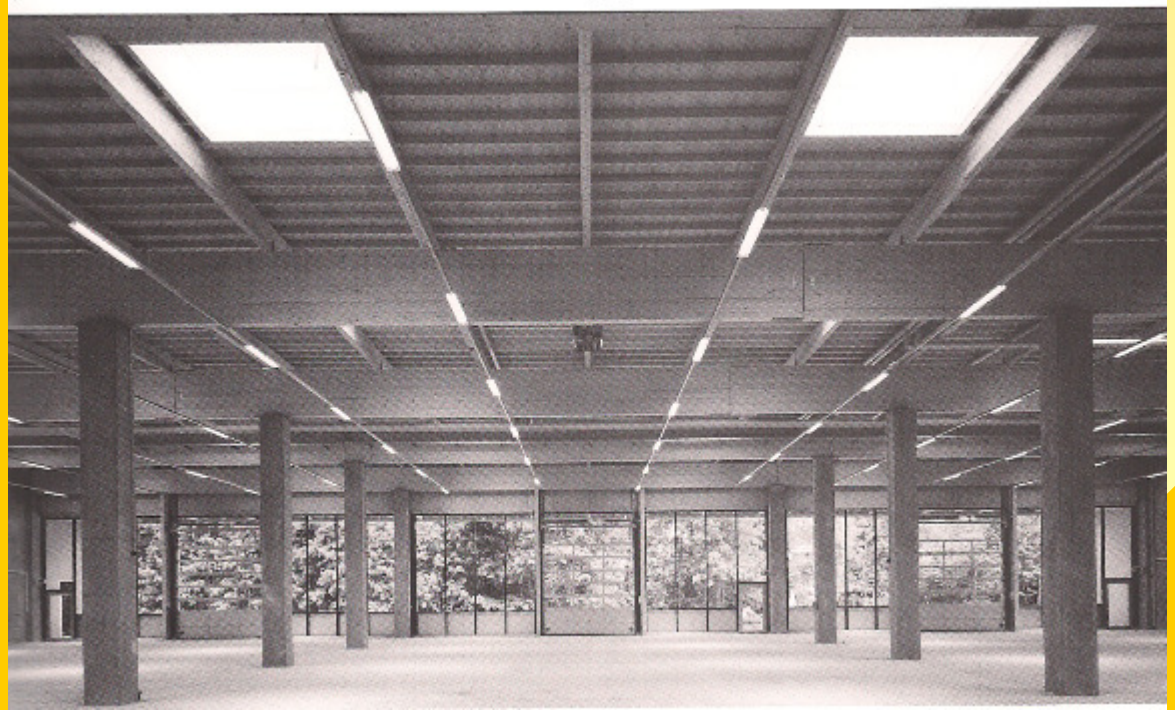
Drevené konštrukcie v občianskych stavbách, v bytovej výstavbe, vo výstavbe rodinných domov, ...

1. Masívne stavby – zrubové (prvky uložené vodorovne),
   stĺpové (vertikálne prvky jeden vedľa druhého)

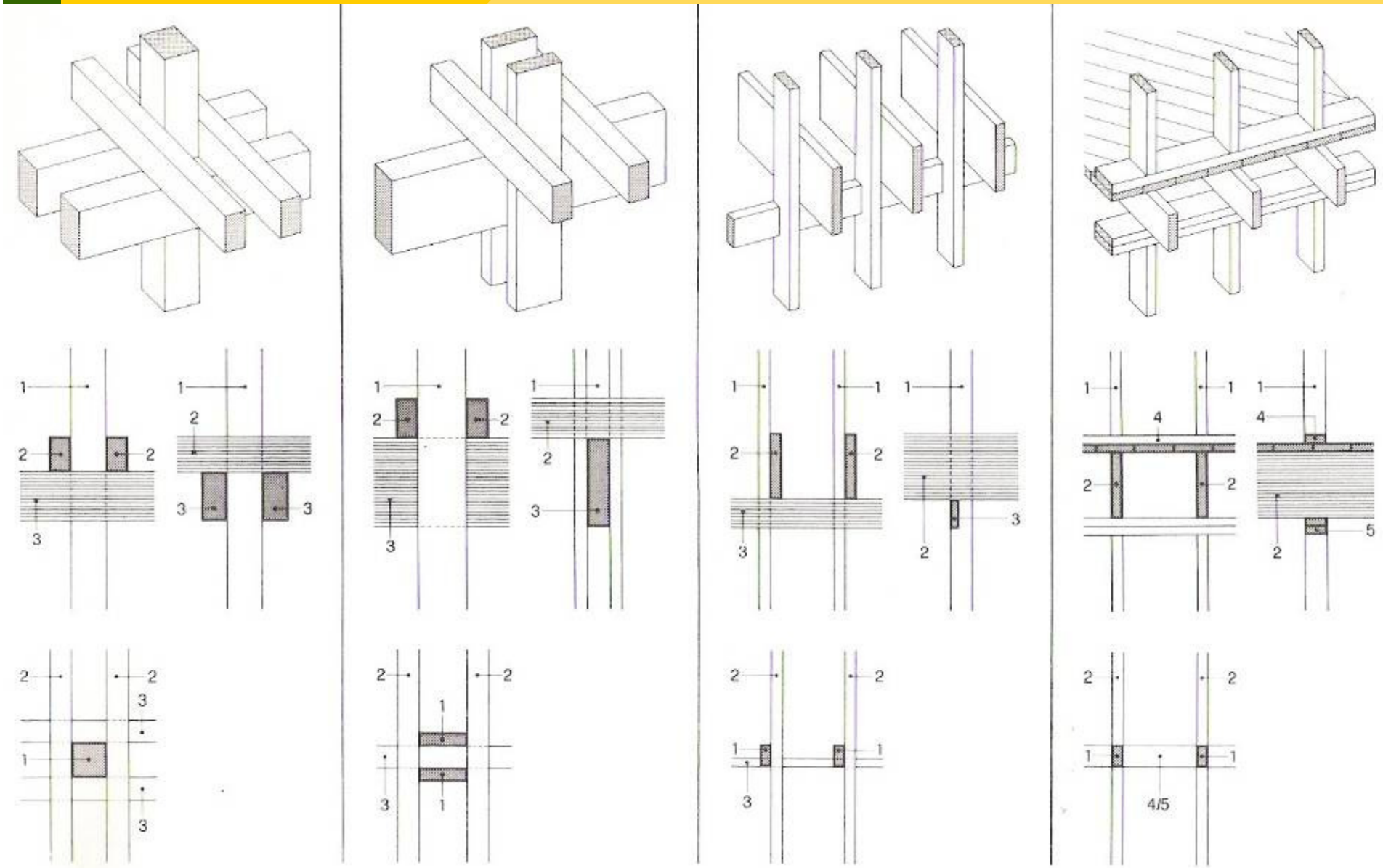
2. „Ťažký“ skelet – historické a inžinierske skelety,
   hrázdené konštrukcie

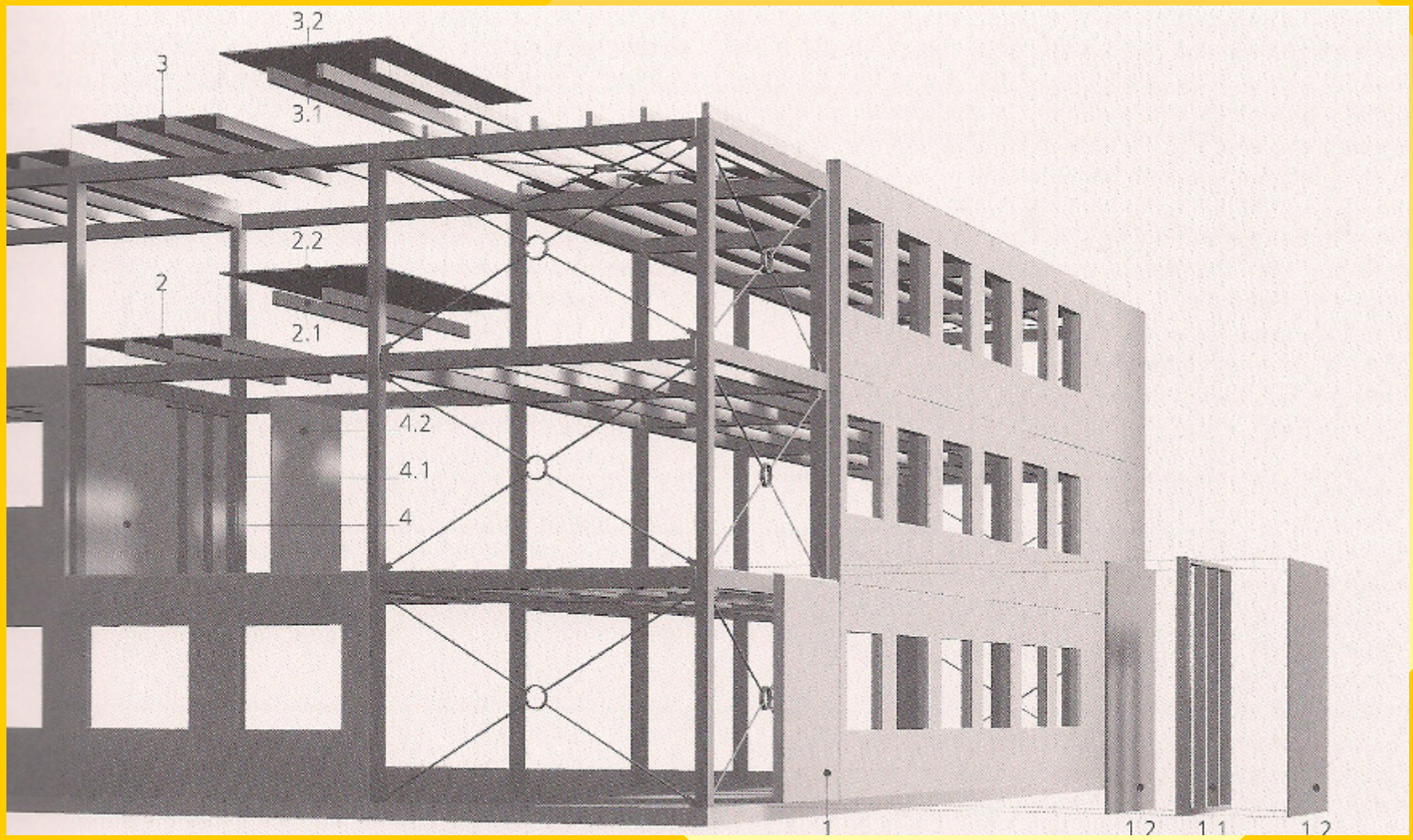
3. „Ľahký“ skelet – stĺpikové, panelové, bunkové konštrukcie

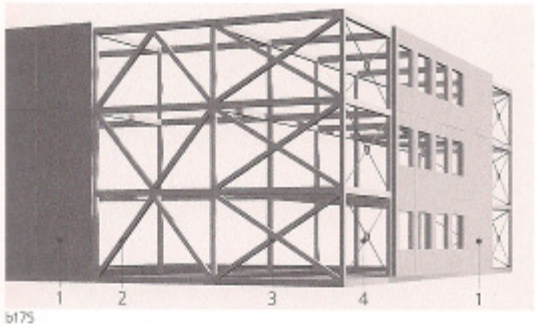




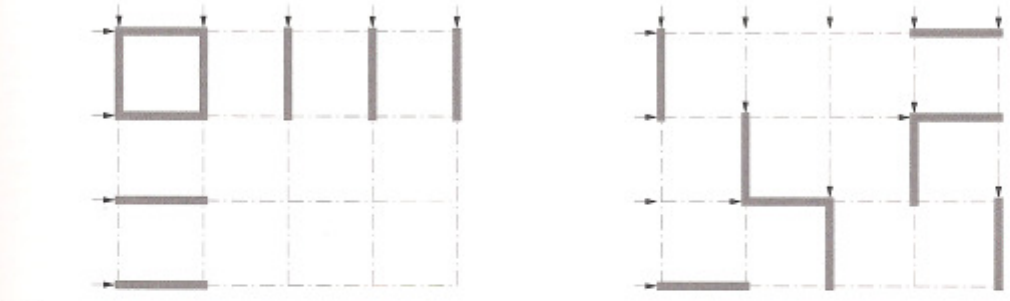
Skeletové konštrukcie – spôsoby kombinácie zvislých a vodorovných prvkov



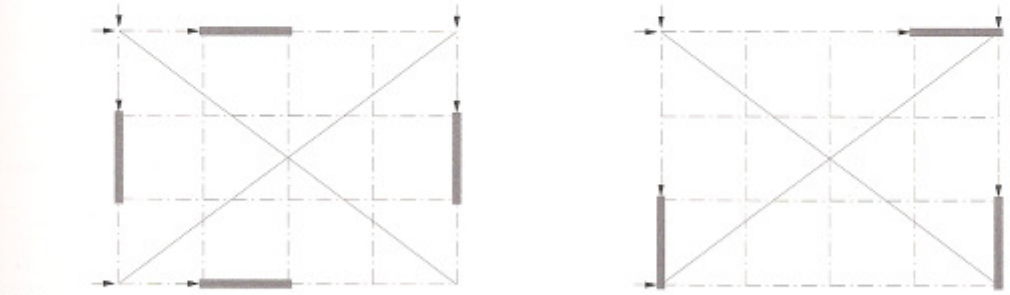

3.2
3
3.1
2.2
2
2.1
4.2
4.1
4
1
1.2
1.1
1.2



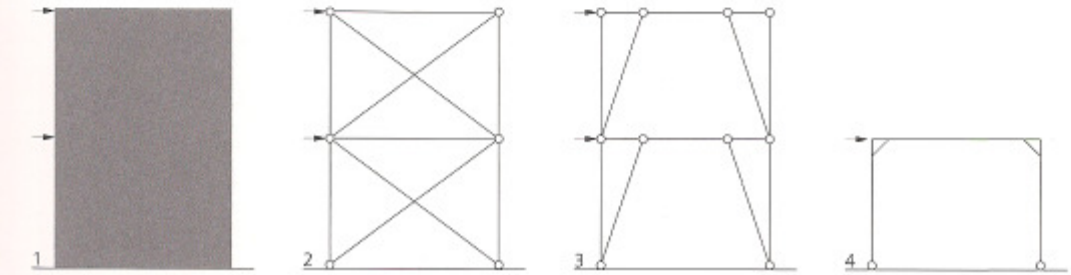
b175



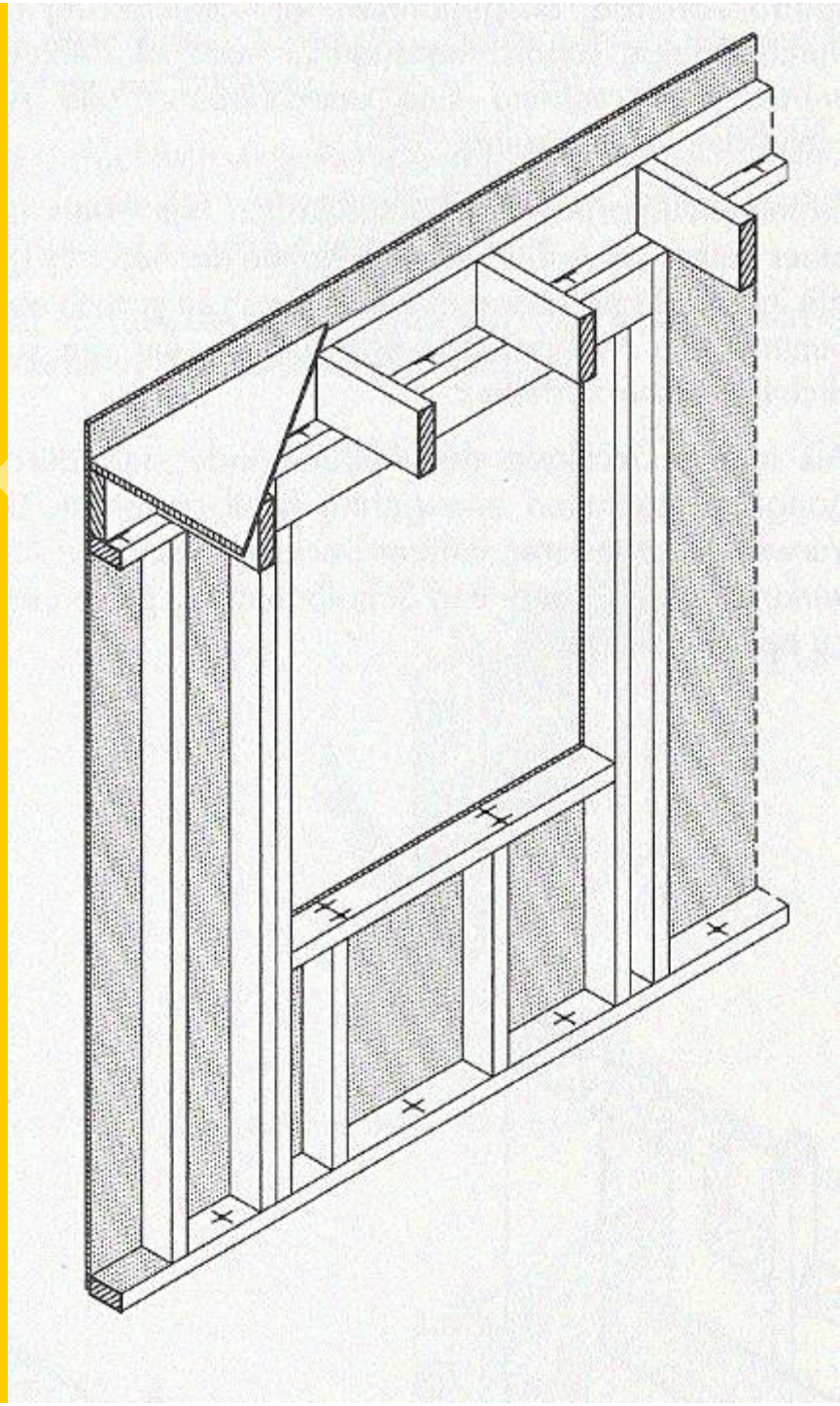
b176

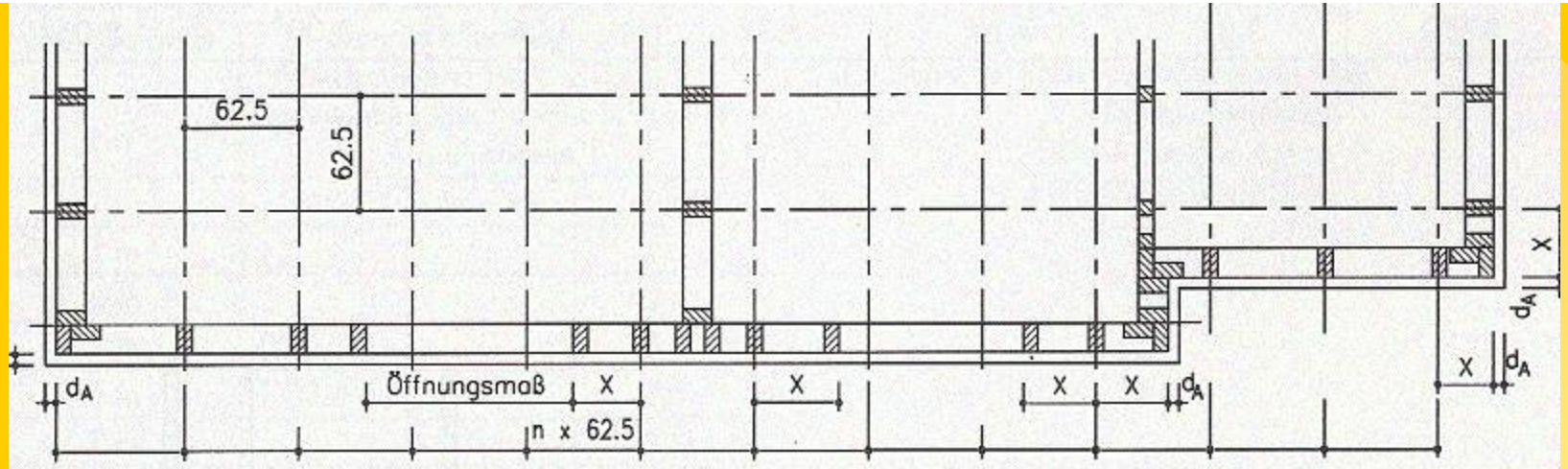


b177



b178



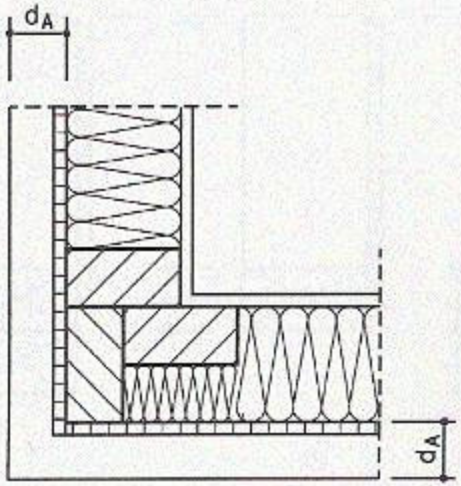


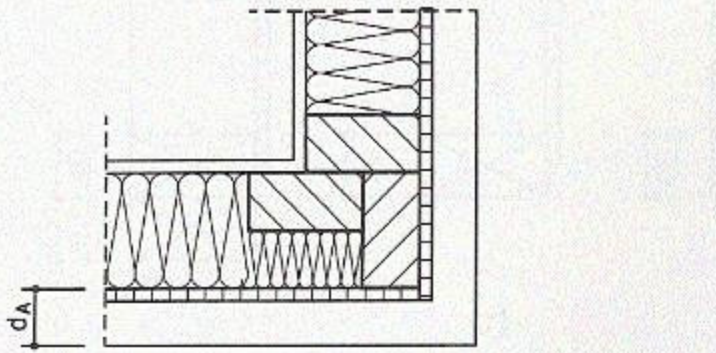
d_A = Maß von Außenkante Holzständer bis Außenkante Außenwand-bekleidung unter 6.1 jeweils angegeben

n = natürliche Zahl

X = beliebiges Maß

Eckgrundrisse M= 1:10





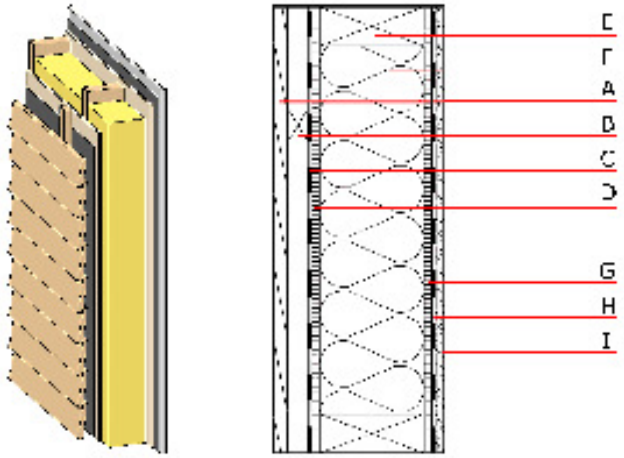
www.dataholz.com

angl., nem., špan.

dataholz.com

Bezeichnung: awrtho02a-02
Stand: 27.01.2009
Quelle: Holzforschung Austria
Bearbeiter: HFA, SP

Aussenwand - Holzrahmenbau, hinterlüftet, ohne Installationsebene, geschalt



Bemerkung: Aufgrund des verbleibenden Restholzquerschnittes ist der Steher unter Druckbelastung für das jeweilige Objekt gesondert auf Knicken nachzuweisen.

Bauphysikalische und ökologische Bewertung

Brandschutz	F	30
	REI	30

mit statischem Nachweis am Restholzquerschnitt 40/190 mm
Beurteilung durch IBS

Wärmeschutz	U[W/m²K]	0,22
	Diffusionsverhalten	geeignet
	$m_{w,g,A}$[kg/m²]	25,8

Berechnung durch HFA

Schallschutz	R_w ($C;C_{tr}$)	48 (-2; -8)
	$L_{n,w}$ (C$_I$)	–

Wird die Lattung der Hinterlüftungsebene mit dem Konstruktionsholz verschraubt so ergibt sich Rw(C;Ctr)=44(-1;-7) dB
Beurteilung durch MA39

Ökologie*	$OI3_{KEA}$	-5,4

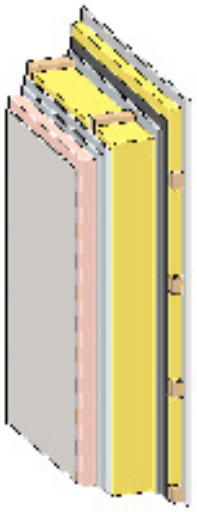
Berechnung durch IBO

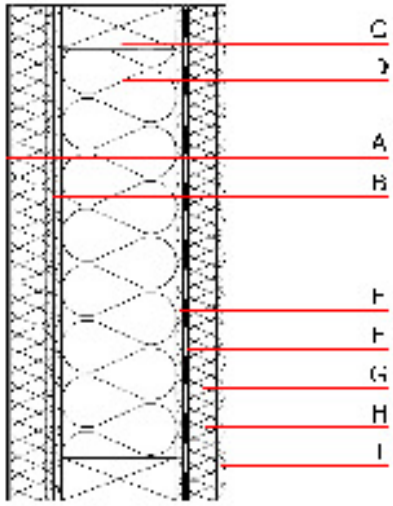
Baustoffangaben zur Konstruktion, Schichtaufbau

(von außen nach innen, Maße in mm)

	Dicke	Baustoff	Wärmeschutz				Brennbarkeitsk.	
			λ	μ min – max	ρ	c	ON	EN
A	24,0	Holz Lärche Außenwandverkleidung	0,150	50	600	1,600	B2	D
B	30,0	Holz Fichte Lattung versetzt (30/50; 30/80)-Hinterlüftung	0,130	50	500	1,600	B2	D
C		Windbremse sd ≤ 0,3m			1000			
D	12,0	Spanplatte	0,130	50 - 100	700	1,700	B1	D
E	200,0	Konstruktionsholz (60/...; a= 625)	0,110	50	400	2,500	B2	D
F	200,0	Glaswolle [0,040; R= 16]	0,040	1	16	1,030	A	A2
G	16,0	Spanplatte	0,130	50 - 100	700	1,700	B1	D
H		Dampfbremse sd ≥ 5m			1000			
I	12,5	GKF oder	0,210	8	900	1,050	B1	
I	10,0	Gipsfaserplatte	0,320	21	1000	1,100	A2	A2

Aussenwand - Holzrahmenbau, nicht hinterlüftet, mit Installationsebene, geputzt





Bemerkung: Aufgrund des verbleibenden Restholzquerschnittes ist der Steher unter Druckbelastung für das jeweilige Objekt gesondert auf Knicken nachzuweisen.

Bauphysikalische und ökologische Bewertung

Brandschutz	F	60
	REI	60

mit statischem Nachweis am Restholzquerschnitt 44/232mm
Beurteilung durch IBS

Wärmeschutz	U[W/m²K]	0,12
	Diffusionsverhalten	geeignet
	$m_{w,BA}$[kg/m²]	17,3

Berechnung durch HFA

Schallschutz	R_w ($C;C_{Tr}$)	49 (-2; -5)
	$L_{n,w}$ (C$_I$)	–

Wird die Lattung der Installationsebene senkrecht ausgeführt und direkt mit dem Riegelholz verschraubt, so ergibt sich Rw(C;CTr)=46(-1;-5) dB
Beurteilung durch MA39

Ökologie*	$OI3_{Kon}$	14,5

Berechnung durch IBO

Baustoffangaben zur Konstruktion, Schichtaufbau

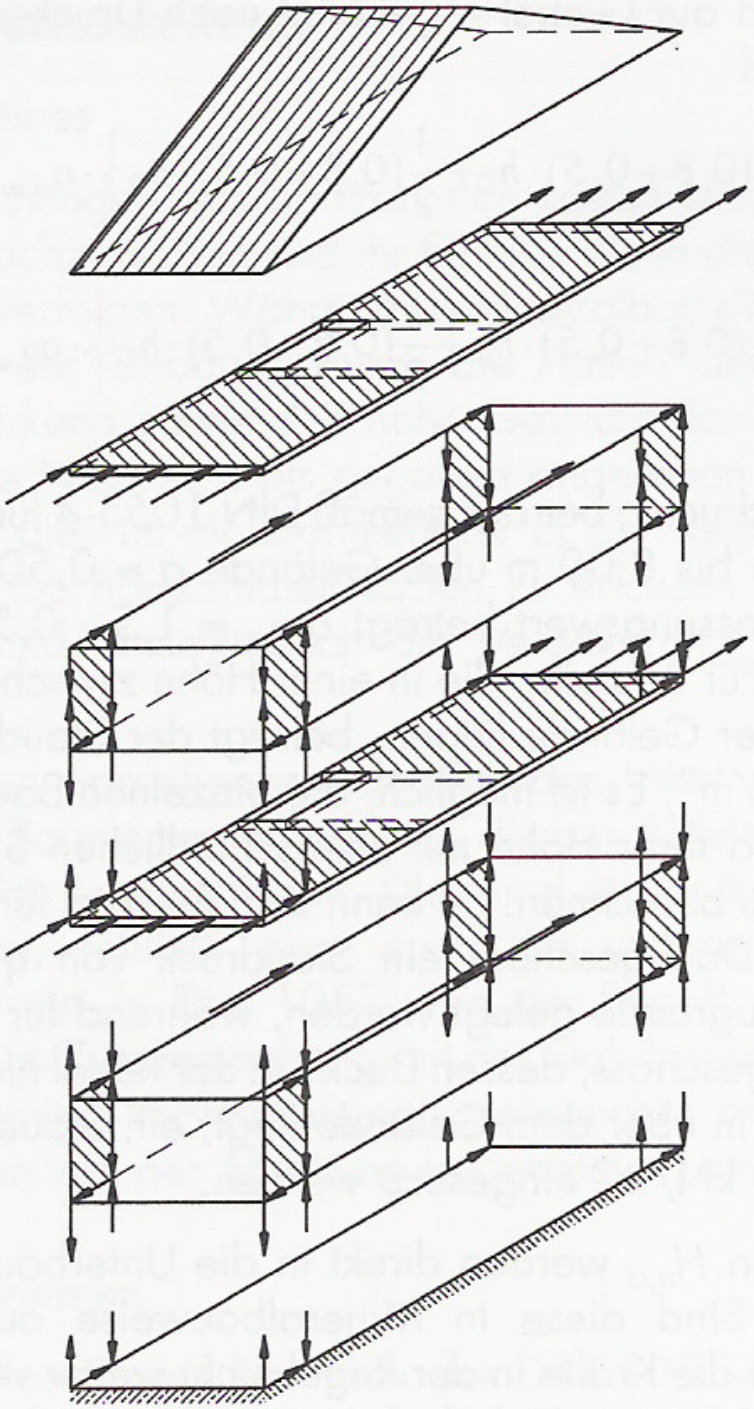
(von außen nach innen, Maße in mm)

	Dicke	Baustoff	Wärmeschutz				Brennbarkeitsk.	
			λ	μ min – max	ρ	c	ON	EN
A	4,0	Putz	1,000	10 - 35	2000	1,130	A	
B	50,0	Polystyrol EPS-F [0,040]	0,040	20 - 50	17	1,450	B1	E
C	20,0	Gipsfaserplatte (2x10mm)	0,320	21	1000	1,100	A2	A2
D	240,0	Konstruktionsholz (60/ ..; a=625)	0,110	50	400	2,500	B2	D
E	240,0	Glaswolle [0,040; R=16]	0,040	1	16	1,030	A	A2
F	12,5	Gipsfaserplatte	0,320	21	1000	1,100	A2	A2
G		Dampfbremse sd ≥ 13m			1000			
H	80,0	Holz Fichte Querlattung (a=400) bzw. Lattung versetzt	0,130	50	500	1,600	B2	D
I	80,0	Glaswolle [0,040; R=16] bzw. Luftschicht bei Variante 02	0,040	1	16	1,030	A	A2
J	12,5	GKF oder	0,210	8	900	1,050	B1	
J	10,0	Gipsfaserplatte	0,320	21	1000	1,100	A2	A2

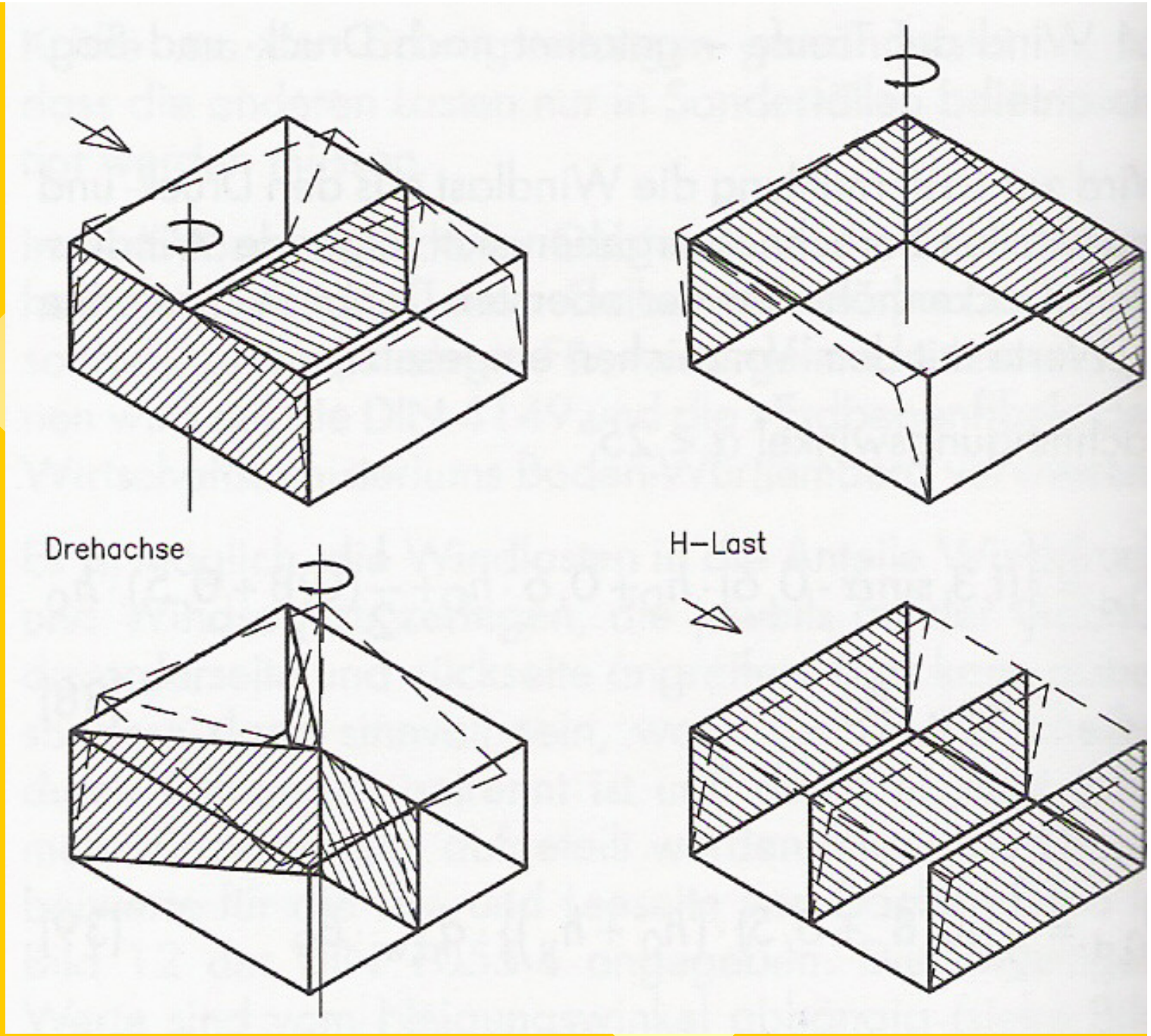
Vystuženie stĺpikových konštrukcií

Funkcia – zabezpečenie priestorovej stability objektu
(stabilita vo všetkých troch smeroch – t.j. 2 x horizontálne a
1x vertikálne)

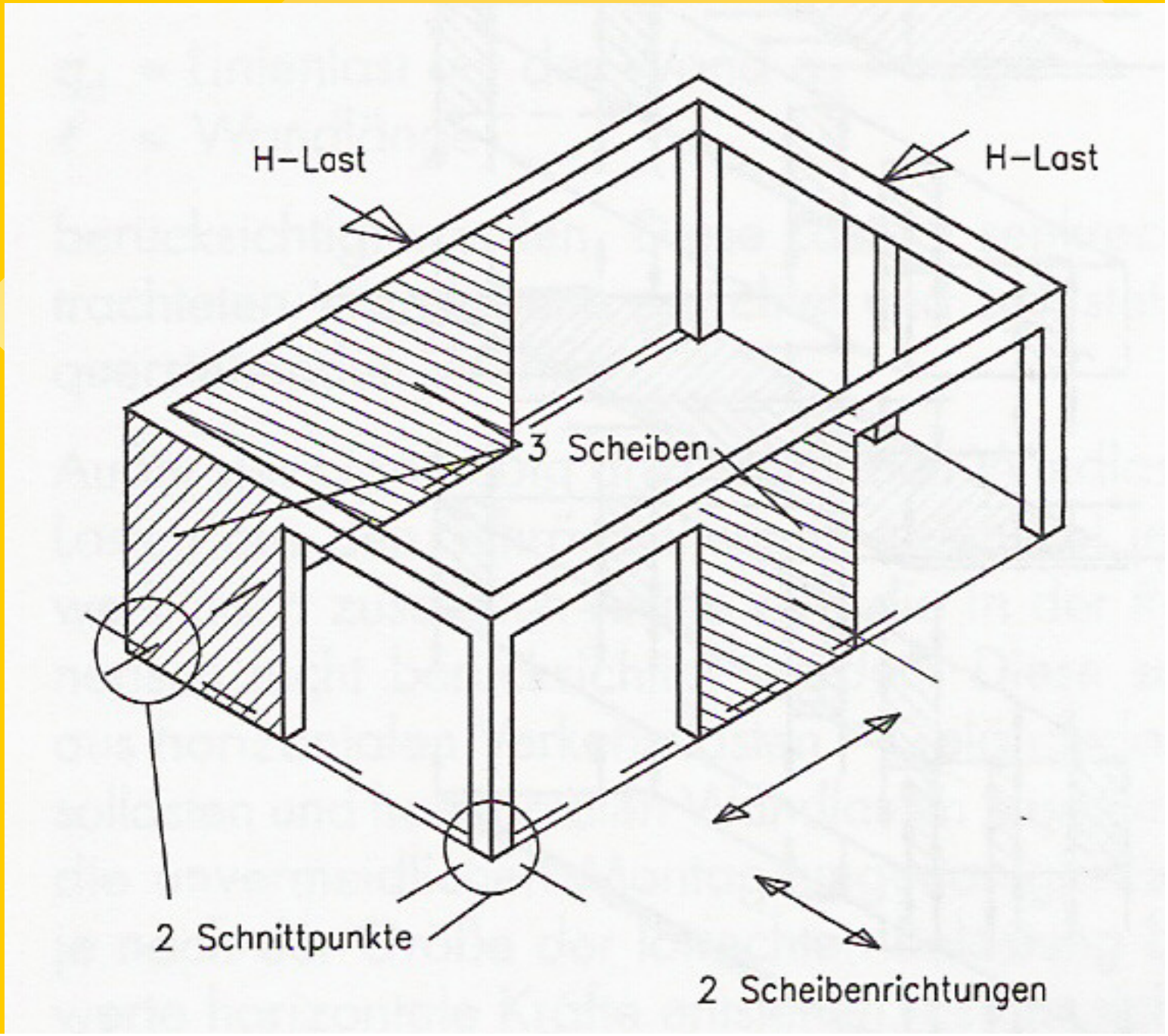
Princíp prenosu zaťaženia vetrom – pozdĺžny smer



Princíp troch výstužných rovín

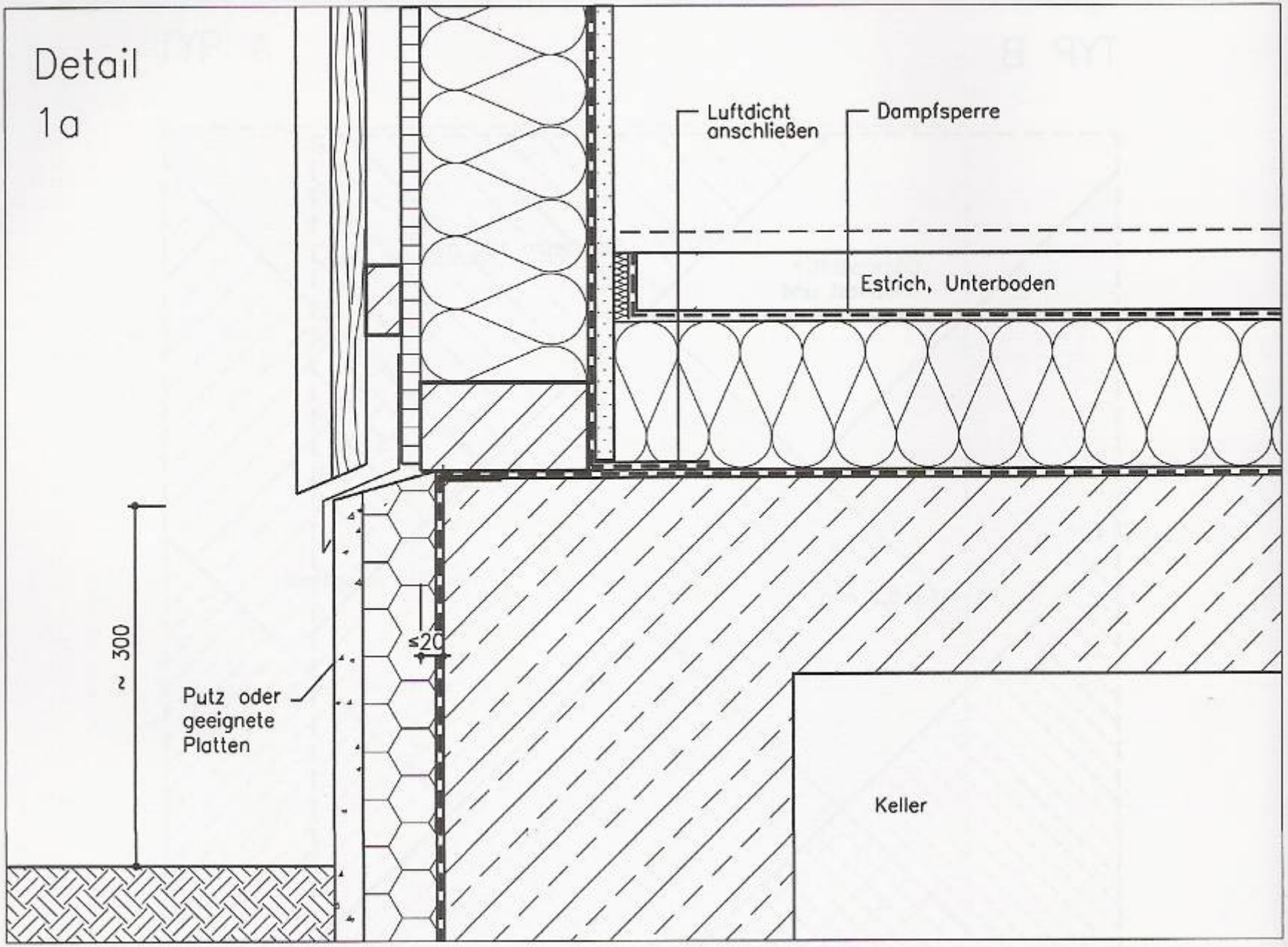


Princíp troch výstužných rovín

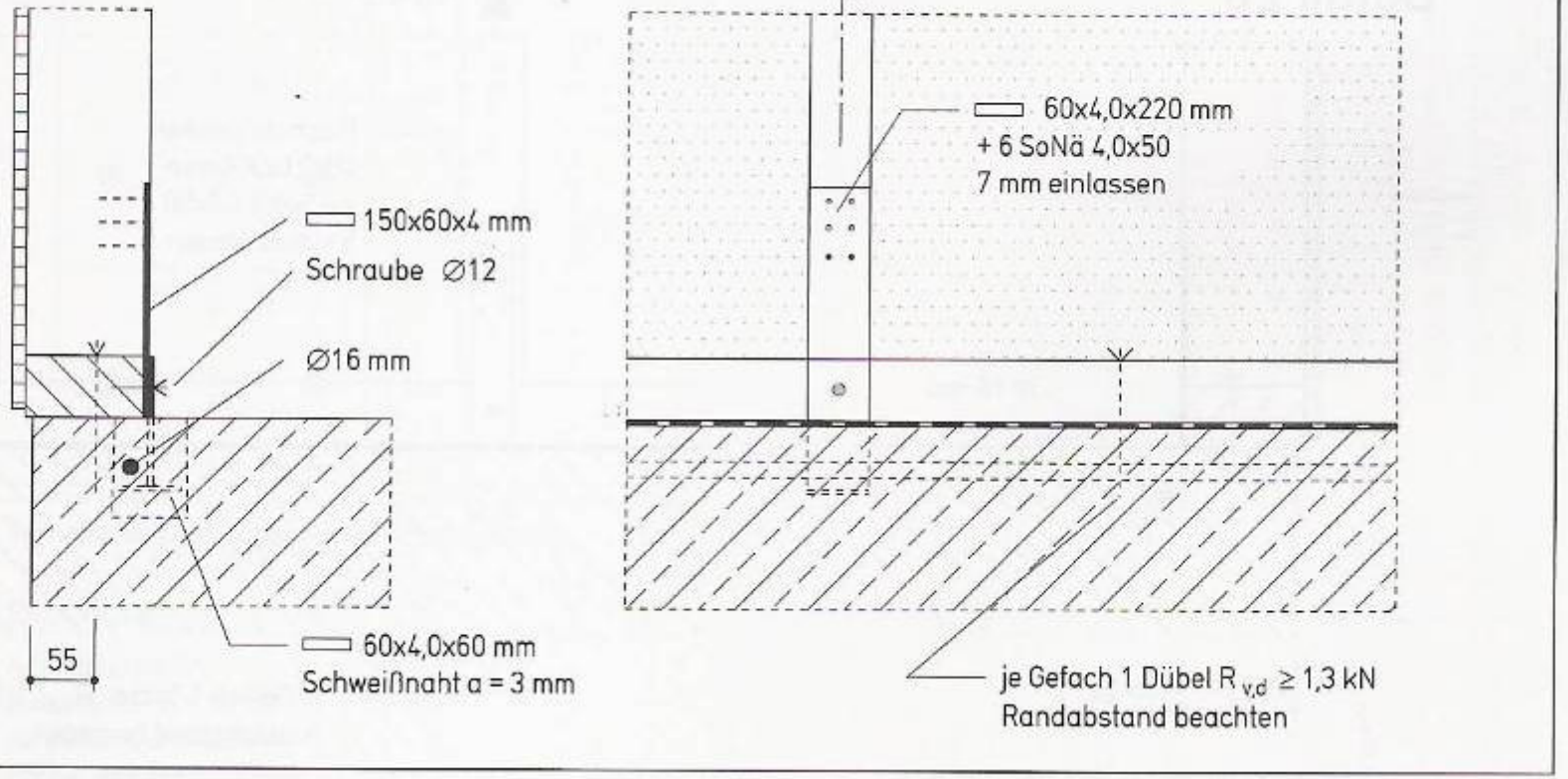


Kellerdecke, Beton

6.12.03

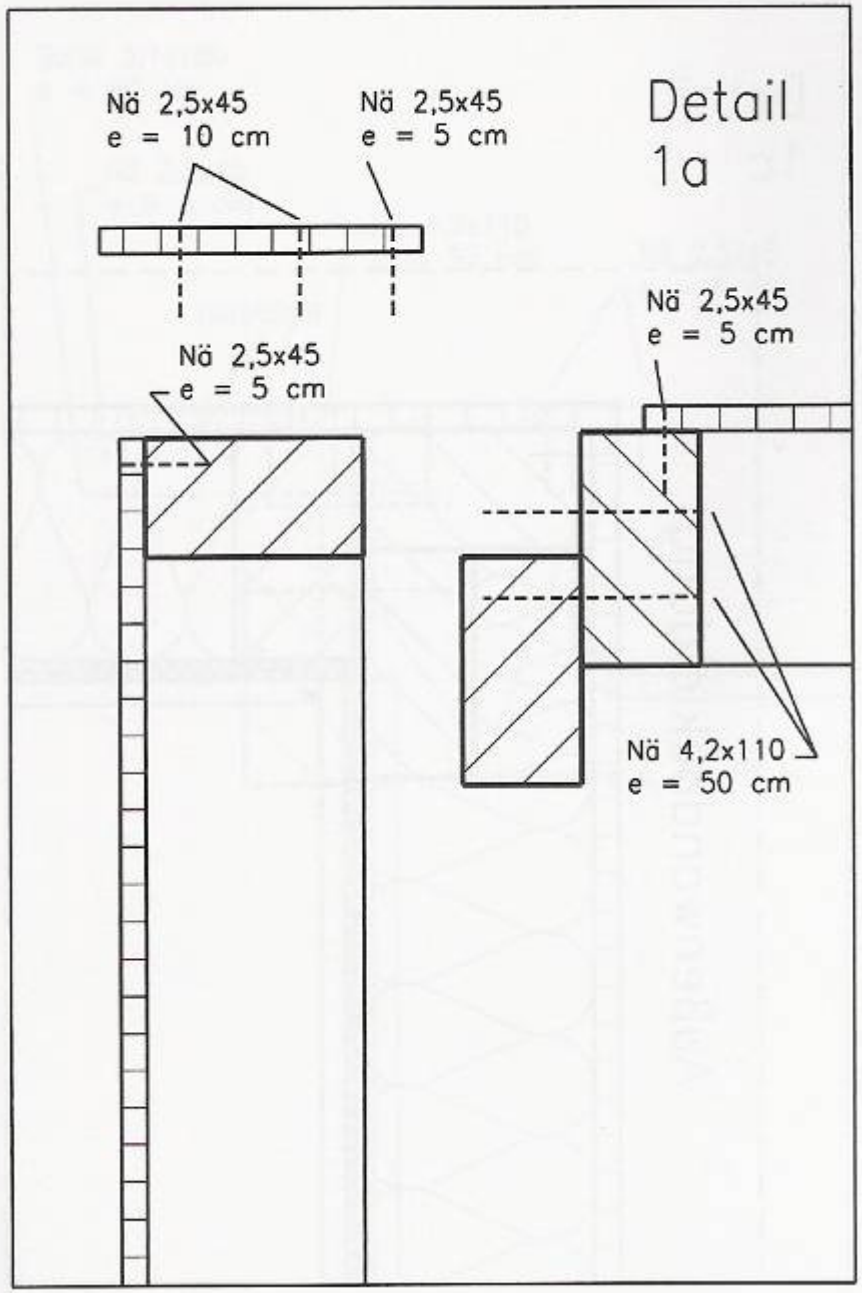


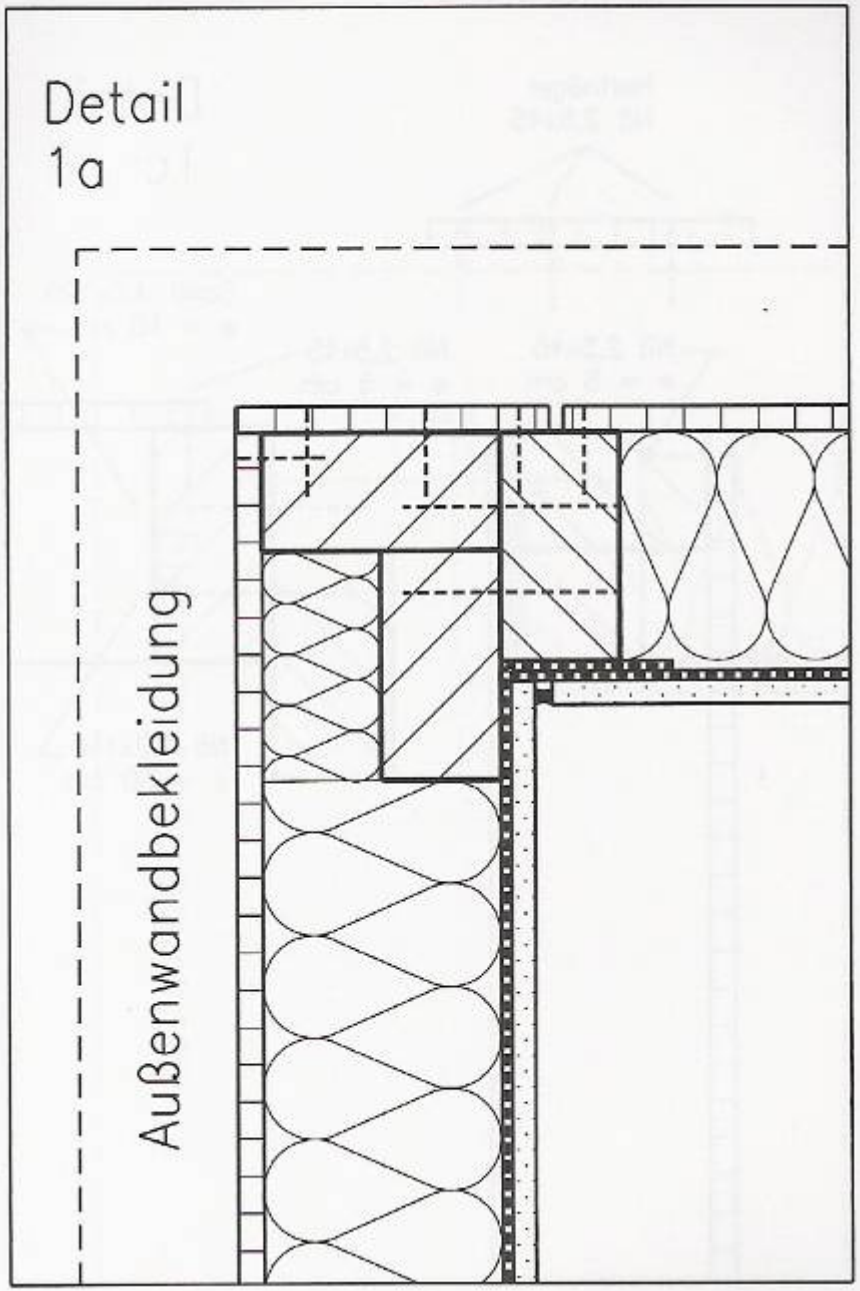
Detail 1b


$F_{t,d,dst} \leq 8{,}43$ kN
60x4,0x220 mm
+ 6 SoNä 4,0x50
7 mm einlassen
150x60x4 mm
Schraube ∅12
∅16 mm
55
60x4,0x60 mm
Schweißnaht a = 3 mm
je Gefach 1 Dübel $R_{v,d} \geq 1{,}3$ kN
Randabstand beachten

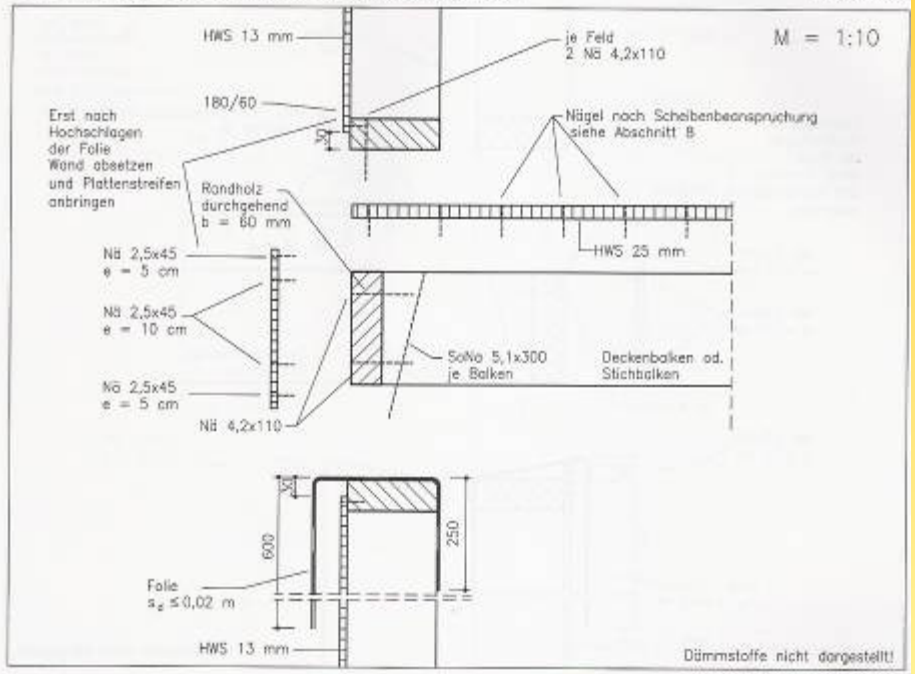
Außenwand, Außenecke

6.21.13





Außenwand, Balkendecke, Balken nicht sichtbar 6.22.13



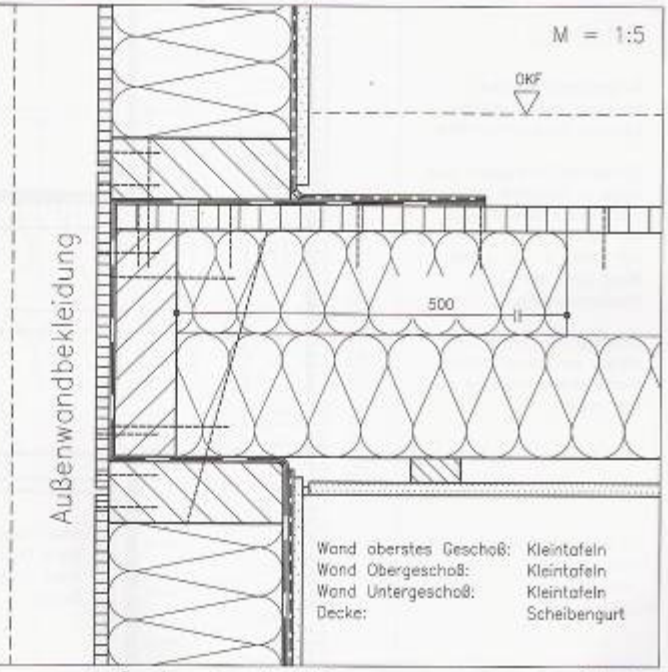
Detail 1a

M = 1:5

Aussteifende Wandbeplankung außen, durchlaufende Deckenrandhölzer.

Schubkraftübertragung über Nägel in äußerem Holzwerkstoffstreifen aus der oberen Wand und der Decke in die untere Wand.

Montage der Decke und Wände von innen möglich. Plattenstreifen nur von außen.

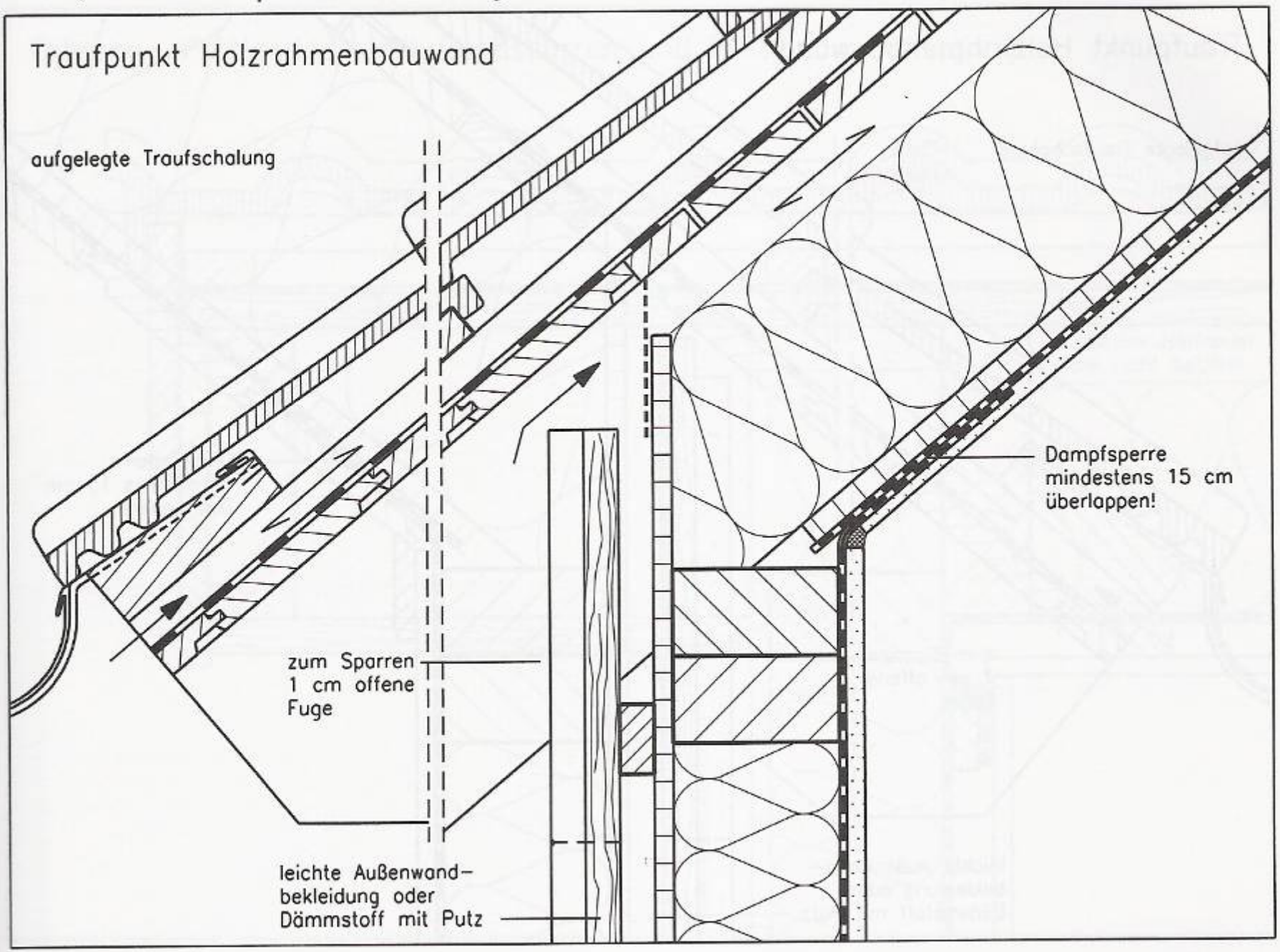


Wand oberstes Geschoß:	Kleintafeln
Wand Obergeschoß:	Kleintafeln
Wand Untergeschoß:	Kleintafeln
Decke:	Scheibengurt

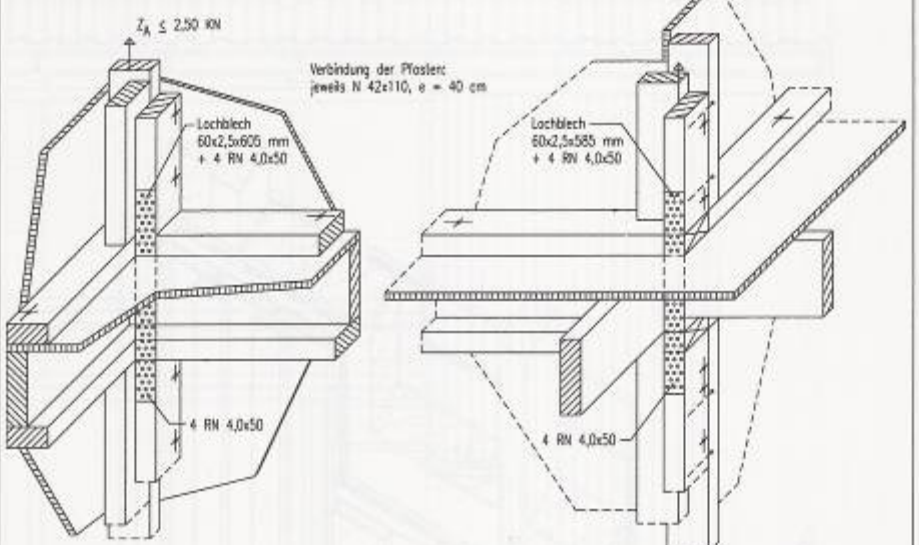
Details, Außenbeplankung aussteifend, werkseitig offen — Schnitte

Dach, Zwischensparrendämmung

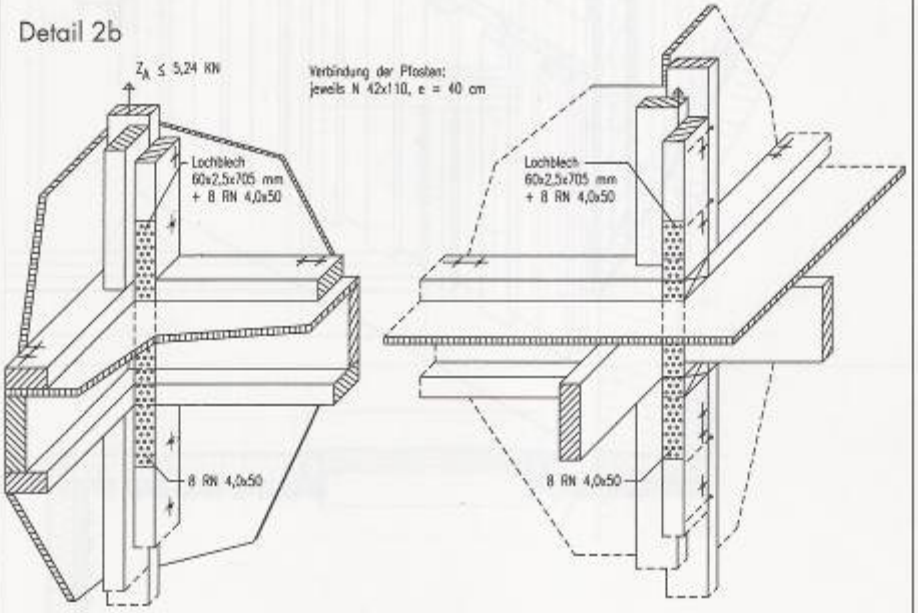
6.91.03



Detail 2a



Detail 2b



4. Panelové konštrukcie

- plošná nosná konštrukcia (stena, doska)

- vysoký stupeň predpripravenosti (otvory, vrstvy-tep. izol., ext. a int. vrstvy, ...)

- nosné, nenosné

- šírky 1-3,5 m, dĺžky 4-15 m

- spôsob výstavby – priebežné steny alebo po podlažiach (častejšie)

5-podlažný byt.dom – Langendorf (CH)

- Prefabrikácia elementov strechy
- 11 elem. 11,5x4,2m
- 3 dni


W 25
H 1
C