



European Technical Assessment

ETA-09/0123
of 19/05/2015

GENERAL PART

Technical Assessment Body issuing the European Technical Assessment:

Centre Scientifique et Technique du Bâtiment (CSTB)

Trade name:

DOMIBOIS, KOALA, CONSTRUIBOIS, MODULBOIS

Product family:

Timber frame kits

Manufacturer:

GIE GIPEN
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Internet : www.gipen.fr

Manufacturing plant(s):

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IDEE PAVISOL GIPEN – CD 927 – 45300 PITHIVIER LE VIEIL
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Idée GIPEN chemin de Saint Hilaire 30210 REMOULINS
KALLISTE Bois, route d'Antisanti. 20270 ALERIA

This European Technical Assessment contains:

46 pages including 4 annexes which form an integral part of the document.

This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of:

EAD project (EOTA File Number 14-13-0032-02-04) "TIMBER FRAME KITS"

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SPECIFIC PART

1. Technical description of the product

GIPEN timber frame kits are prefabricated timber frame kits for individual houses including all structural elements for walls, suspended floor and roof structure.

Every structural element is preassembled in the factory, and then delivered as a package to be assembled on site.

Every component is described afterwards as well as the assembly principle. Material data are given in Annex 1. Cross sections are presented in annex 3.

The non-loadbearing internal walls, thermal and acoustic insulations, internal lining, vapour control layers, Windows, doors and roof covering may not be part of the kit. These can be part of the kit only if they meet requirements according to harmonized European standards or local regulations.

Internal surfaces in wet areas, floor finishes and complementary parts like substructure, internal fittings for water, heating, ventilation and other components which are necessary to form a complete house are not part of the assessment.

The buildings are designed with individual adjustments for each customer or designed exclusively for the customer. The kits are prepared in the factory for each individual building, delivered to the building site as elements and packages of materials. The extent of the kit is described in the delivery description and the material specifications and also from the construction drawings.

2. Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)

The timber frame kits is intended to be used for the structure of house of maximum one storey with or without basement not included in the kit. The roof space can be occupied for living purposes.

The timber frame kits are to be used in European countries. Adjustments depending on national regulations may be necessary for certain cases and are then described in the design documentation for each individual works.

The intended use shall be evaluated in each individual case depending on the climatic boundary conditions.

The provisions made in this European Technical Assessment are based on an assumed working life of "GIPEN Timber Frame Kits", of 50 years for the building, of least 25 years for the exterior wall cladding. The indications given on the working life of the construction product cannot be interpreted as a guarantee given by the producer, but are regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

No performance has been determined regarding seismic action.

3. Performances of the product and references to the methods used for their assessment

Performances of GIPEN Timber Frame Kits, related to the basic requirements for construction works (hereinafter BWR), were determined according to chapter 2 of the EAD "TIMBER FRAME KITS".

3.1 Mechanical resistance and stability (BWR 1)

Basic Works Requirement 1 : Mechanical resistance and stability			
	Essential characteristic	Method of verification and assessment	Expression of product performance
Assembled system	On external walls : - Vertical load capacity - Horizontal load capacity - Combined vertical/horizontal load capacity - Racking load capacity	Verification of structural capacities in general	See annex 1. Design is made case by case for other type of timber frame
	On suspend floors : - Imposed load capacity		See annex 2 for solid wood and reconstructed solid wood. Design is made case by case for other type of joists
	- Horizontal diaphragm shear load capacity		No performance determined
	On roof frames : - Snow and/or wind load capacity - Concentrated imposed load capacity - Horizontal diaphragm shear load capacity		Design is made case by case
	Strenght of mechanical joints	-Strenght of mechanically fixed joints; properties of fasteners and connectors as to their ETA or	See Annex 2

		<p>relevant EN standards, calculation codes and design specifications</p> <p>-Spacings and edge distances of mechanical fasteners in mm measured and evaluated</p>	
Timber structural element such as beams, lumbers and timber based panels	<i>Strenght of timber structural elements and wood based panels</i>	<p>- Geometrical characteristics and tolerances on elements</p> <p>- For timber structural elements : Strenght class declaration according to relevant standard for Timber (EN 338), Glulam (EN 14080), LVL (EN 14374) or loadbearing capacity; Structural prefabricated wood based beams and columns (ETA)</p> <p>For timber based panels : Strenght class declaration according to EN13986 or 14374 for LVL</p>	See table A4-1
Mechanical fasteners and connectors	<i>Load bearing capacity of mechanical fasteners and connectors</i>	<p>- For three-dimensional nailing plates: Load bearing capacity according to European technical assessments on the basis of ETAG 015</p> <p>- For dowel-type Fasteners according to EN 14592: Load bearing capacity according to European technical assessments or to the relevant EN standard.</p> <p>- For connectors according to EN 14545: Load bearing capacity according to European technical assessments or to the relevant EN standard.</p>	See table A4-2

3.2 Safety in case of fire (BWR 2)

Basic Works Requirement 2 : Safety in case of fire			
	Essential characteristic	Method of verification and assessment	Expression of product performance
Timber structural element such as beams, lumbers and timber based panels		<p>Classification according to Euroclasses in EN 13501-1</p>	<p>D-s2, d0 (CWFT)</p>

three dimensional nailing plates		Classification according to Euroclasses in EN 13501-1	According to relevant ETA
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3.3 Hygiene, health and the environment (BWR 3)

The wood based components satisfy class E1 according to EN 13986.

Based on the declaration of the manufacturer, the GIPEN Timber Frame Kits do not contain other harmful or dangerous substances as defined in the EU database.

- Wood preservatives

The use of biocide(s) has/have to be declared by the applicant according EN 15228.

The biocide is approved according Commission Directive 98/8/EC (the BPR - (EU) No. 528/2012- will apply EU-wide from 1st September 2013) or reference to a national assessment has to be given.

Based on the information declared by the manufacturer the following information has to be given:

- The amount and stage of the treatment
- The chemical name(s) of the active agent(s) and
- The concentration of the active agent.

Additionally the following has to be considered: Declaration of the content of PCP.

In Germany the content of PCP does not exceed 5 ppm. In Norway the content of 0.1 % is proposed prohibited

According to EC Directive 2003/53/EC the use of PCP and its salts and esters in concentrations of 0.1 mass% or more in substances or preparations are forbidden. Nonylphenol and nonylphenoethoxylate cannot be market as a compound or a component of a preparation in concerations of 0.1 mass% or more, inter alia, as co-formulants inanto growth protection products and biocides.

Additional A national assessment is necessary in some member states, e.g. Germany.

Poland: The content of chlorophenols including pentachlorophenol in construction products used indoors is prohibited.

- Formaldehyde:

The wood based components satisfy class E1 according to EN 13986. No other substances declared by the applicant.

Note: In some MS for some products the use of EN 717-1 is mandatory"

Note: If regulatory requirement exists in the country of production and destination the product shall fulfill the requirements of class E1 according to table "Classification criteria for the class E1 and E2 for the emission of formaldehyde".

- Halogenated aromatic compounds [e.g. Polybrominated diphenylether (PBDE)] respectively Organophosphorous compounds:

Due to the chemical composition or the declaration of dangerous substances, the product does not contain halogenated aromatic compounds respectively organophosphorous compounds European Assessment Document 13-03.04, Edition October 2014 25 of 33

- "T+" or "T", Carcinogenic (T, R 45; T, R 49) and mutagenic (T, R 46) substances of categories 1 and 2 respectively 1A and 1B (CLP):

No toxic substances, very toxic substances and carcinogenic and mutagenic substances of categories 1 and 2 / 1A and 1B are used.

- Cadmium:

The product does not contain cadmium.

Note:

The content of cadmium and cadmium compounds contained in plastics, paints, lacquers, varnishes, zinc or zinc coatings and used as a coating shall meet the respective regulations, e.g. in Norway products containing more than 0,01 cadmium or cadmium compounds are proposed prohibited.

Poland: The content of cadmium as a pigment in construction products is in Poland prohibited

- Arsenic and arsenic compounds:

The product does not contain arsenic or arsenic compounds.

Note: The content of arsenic and arsenic compounds shall meet the respective regulations. In Norway products (see list II) with more than 0.01% arsenic by weight are proposed prohibited.

- Lead and lead compounds:

Due to the chemical composition or the declaration of dangerous substances, the product does not contain lead or lead compounds.

Note: In some member states the content of lead or of lead compounds shall be is restricted, e.g. in Norway (products with more than 0.01%) are proposed prohibited.

Poland: The content of lead as a pigment in construction products is prohibited. Use of lead as an anti-corrosive agent is admissible in industrial buildings, except in the agricultural & food industry.

- Organic chemicals: VVOC, SVOC, VOC

There is no risk that these substances will be set free by consideration of all possible release scenarios. European Assessment Document 13-03.04, Edition October 2014 26 of 33

Note: In Germany the assessment of VOC/SVOC for floorings is obligatory according a national assessment.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Product Directive, these requirements need also to be complied with, when and where they apply.

3.4 Safety and accessibility in use (BWR 4)

Basic Works Requirement 4 : Safety and accessibility in use			
	Essential characteristic	Method of verification and assessment	Expression of product performance
Assembled system	Serviceability	<ul style="list-style-type: none"> - Stiffness against floor vibration - Maximum deflection at serviceability limit state related to the load bearing capacities declared under BWR1 	See Annex 3

	Moisture content of framing members of mechanically fixed elements	- Measurement as to EN 13183-2 for wood elements	Values between two assembled elements
Timber structural element such as beams, lumbers and timber based panels	Biological durability	Assessed to be acceptable in relation to intended use and the effect on performance related to BWR1. - Declared values as EN 350-2 class for timber components, for wood based panels EN 13986 performance class and EN 1995-1-1 Service Class taking into account national annex (NA) Preservative treated timber components declared acc. To EN 15228 and wood based panels according EN 13986	Beams and lumber Use classe 2 or 3, see sections annex 4 Timber panels See table A4-1 Annex 1
	Moisture content of framing members of mechanically fixed elements	Measurement as to EN 13183-2.	Values
Mechanical fasteners and connectors	Durability	Assessed to be acceptable in relation to intended use and the effect on performance related to BWR1. Type of corrosion protection (type of coating, thickness) or the steel grade in the case of stainless steel products	Service class 1
	Possible conditions regarding maintenance		

3.5 Protection against noise (BWR 5)

Not relevant for the GIPEN Timber Frame Kits.

3.6 Energy economy and heat retention (BWR 6)

Not relevant for the GIPEN Timber Frame Kits.

3.7 Sustainable use of natural resources (BWR 7)

No performance was determined for the GIPEN Timber Frame Kits.

3.8 General aspects relating to the performances of the construction product

Not relevant for the GIPEN Timber Frame Kits.

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

4.1 Attestation of conformity system

According to Decision 1999/455/EC, as amended, the systems of AVCP given in the following table apply:

Table 1 - System(s) of attestation of conformity applicable to timber frame kits

Product	Intended use	Attestation of conformity system(s)
GIPEN Timber Frame Kits	Structure of house of maximum one storey	1

The system(s) of attestation of conformity referred to above is (are) defined as follows:

System 1: Certification of the conformity of the product by a notified certification body on the basis of:

(a) Tasks for the manufacturer:

- (1) Factory production control;
- (2) Further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;

(b) Tasks for the notified body:

- (3) Initial type-testing of the product;
- (4) Initial inspection of factory and of factory production control;
- (5) Continuous surveillance, assessment and assessment of factory production control;

4.2 Responsibilities

4.2.1 Tasks of the manufacturer

The actions to be undertaken by the manufacturer of the Timber Frame Kits in the procedure of attestation of conformity are laid down in Table 2.

Table 2 – Control plan for the manufacturer

No	Subject/type of control (product, raw/constituent material, component - indicating characteristic concerned)	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
(1)	(2)	(3)	(4)	(5)	(6)
Factory production control (FPC)					
1	Type and material characteristic of each component: - Framing members - Panels and boards - Mechanical fasteners and connectors	check	See EAD §1.5.1.1		daily: production ≤ 10 elements per element type: once per element type per production day production > 10 elements: every tenth element per element type
2	Dimensional characteristic of components and openings - dimensions of components - cross-sectional structure - spacing of framing members - dimensional tolerances of elements	Measure and drawings			daily: production ≤ 10 elements per element type: three framing members with at least three measurements on each member (once per element type and production day) production > 10 elements: three framing members with at least three measurements on each member (every tenth element per element type) weekly: one batch per production line
3	Mechanical resistance of assembled system - checking compliance of structural design specifications and elements - Type and size of fastener and connectors - Edge distance and spacing of fasteners	see EAD § 1.5.1 1.3.5 et 1.5.1.1.3	see EAD § 1.5.1 1.3.5 et 1.5.1.1.3		once per element type per production day

No	Subject/type of control (product, raw/constituent material, component - indicating characteristic concerned)	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
(1)	(2)	(3)	(4)	(5)	(6)
5	Durability of individual components and of bonding strength:				
	- Corrosion protection and resistance of metal parts	check	See EAD §1.5.2.3		daily: production ≤ 10 elements per element type: once per element type per production day production > 10 elements: every tenth element per element type
	- Moisture content of framing members of mechanically fixed elements	measure	See EAD § Erreur ! Source du renvoi introuvable. et § Erreur ! Source du renvoi introuvable.		daily: production ≤ 10 elements per element type: three framing members with at least three measurements on each member (once per element type and production day) production > 10 elements: three framing members with at least three measurements on each member (every tenth element per element type)
	- Durability of structural timber, glued laminated timber LVL and wood based panels against biological organisms with or without treatment	check compliance for each delivery	See EAD § Erreur ! Source du renvoi introuvable.		Each delivery of framing member and/or panel material where relevant
6	Documentation drawings and other documents of the elements being produced	check compliance of elements and documents			Weekly one batch per production line

4.2.2 Tasks of notified bodies

4.2.2.1 Initial type-testing of the product

For initial type testing the results of the tests performed as part of the assessment for the European Technical assessment shall be used unless there are changes in the production line

or plant. In such cases the necessary initial type testing has to be agreed between the Centre Scientifique et Technique du Bâtiment and the notified body involved.

4.2.2.2 Initial inspection of factory and of factory production control

The notified body shall ascertain that, in accordance with the prescribed control plan, the factory, in particular the staff and equipment, and the factory production control are suitable to ensure continuous and orderly manufacturing of the GIPEN Timber Frame Kits according to the provisions mentioned in the EAD as well as in the present ETA.

4.2.2.3 Continuous surveillance

The notified body shall visit the factory at least twice a year for regular inspection. It has to be verified that the factory production control and the specified manufacturing process are performed and maintained according to the manufacturer's quality manual, including test of samples according to the prescribed test plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to the Centre Scientifique et Technique du Bâtiment. In cases where the provisions of the European Technical Assessment and the prescribed test plan are no longer fulfilled the conformity certificate shall be withdrawn.

4.3 CE-Marking

The CE marking shall be affixed on each packaging. The CE-marking shall be accompanied by the following information:

- identification number of the certification body;
- name or identifying mark of the producer and manufacturing plant;
- the last two digits of the year in which the CE-marking was affixed;
- number of the EC certificate of conformity;
- number of the European Technical Assessment;
- name and size of the product;
- number of the EAD (EOTA File Number *14-13-0032-02-04*).

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at the CSTB.

The control plan is given in Annex A. As the control plan contains confidential information, Annex A is not included in the published parts of this ETA.

Issued in Marne-la-Vallée on 19/05/2015

by

C. Baloche, Technical Director
of the CSTB

Table A4-1 – Identification of the components

Product	Identification	Dimensions	Standard	Other Characteristics	Structure element
Solid wood	Timbers C18 or C24	36 x 95 – 45 x 120 mm minimum	EN 338	–	Wall
Solid wood or reconstructed solid wood		Thickness 36 to 90 mm Height 170 to 290 mm	EN 338 GT24 according to NF B52-010	–	Floor/Roof
I-joist	–	Determined case by case	ETAG 011	–	Floor/Roof
Laminated Veneer Lumber LVL	KERTO	Determined case by case	EN 14 374	–	Floor/Roof
Glued laminated timber	–	Determined case by case	EN 386	–	Floor/Roof
OSB	OSB 3	9 mm minimum	EN 300 EN 12369-1	E1	Wall
		≥18 mm			Floor
Plywood	EN 636 / 3	8 mm minimum	EN 636 EN 12369-2	E1	Wall
Particle board	P5	10 mm minimum ≥22 mm	EN 312 EN 12369-1	E1	Wall
					Floor
Cement bonded particleboard	–	12 mm minimum	EN 634-2	E1	Wall
Fixing devices	Nails	Ø = 2,5 mm l = 50 or 60 mm	–	–	–
	Staples Orientation 30°	2,3 x 12 x 45 mm	–	–	–

Material data
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Load capacities per wall element: standard size $H \times L = 2600 \times 1250$ mm.

For smaller wall element presenting the same structure, the same load capacities can be used. For larger elements, design has to be performed case by case.

Following performance are given in the table below:

- Vertical load capacity $F_{\text{Vert}, Rk}$ on the edge of the wall and in the middle of the wall.
- Horizontal Load capacity $q_{r,k}$.
- Racking load capacity $F_{\text{hor}, Rk}$ for 1 m panel width, and for one panel width.

Wood based panels (minimum thickness)	Solid wood (minimal dimensions)	Fastening	External stile $F_{\text{vert}, rk} (kN)$	Internal stile $F_{r, k} (kN)$	$q_{r, k} (kN/m^2)$	Racking resistance $F_{\text{hor}, rk}$	
						For 1 meter racking panel (kN/m)	For 0,625 meter racking panel (kN/panel)
OSB 9 mm/ Particle board 10 mm	36*95	Staple 2,3*45	20,5	24,2	2	15,1	9,4
		Point 2,5*50	20,5	24,2	2	9,6	6
		Point 2,5*60	20,5	24,2	2	10,2	6,4
	45*120	Staple 2,3*45	31,9	37,8	4	15,1	9,4
		Point 2,5*50	31,9	37,8	4	9,6	6
		Point 2,5*60	31,9	37,8	4	10,2	6,4
Plywood 8 mm	36*95	Staple 2,3*45	20,5	24,2	2	16,6	10,4
		Point 2,5*50	20,5	24,2	2	8,0	5,0
		Point 2,5*60	20,5	24,2	2	8,5	5,3
	45*120	Staple 2,3*45	31,9	37,8	4	16,6	10,4
		Point 2,5*50	31,9	37,8	4	8,0	5,0
		Point 2,5*60	31,9	37,8	4	8,5	5,3
Cement-bonded particle-board 12 mm	36*95	Staple 2,3*45	20,5	24,2	2	22,6	14,1
		Point 2,5*50	20,5	24,2	2	13,4	8,4
		Point 2,5*60	20,5	24,2	2	14,0	8,7
	45*120	Staple 2,3*45	31,9	37,8	4	22,6	14,1
		Point 2,5*50	31,9	37,8	4	13,4	8,4
		Point 2,5*60	31,9	37,8	4	14,0	8,7

Mechanical resistance - Walls

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Combined vertical and horizontal load.

Wind Load $q_{r,k} \text{ (kN/m}^2\text{)}$	Vertical Load capacity $F_{vert,rk}$	
	For a timber minimal section 36 x 95 mm	For a timber minimal section 45 x 120 mm
0	24,2*	31,7 *
0,1	24,2*	31,7 *
0,2	24,2*	31,7 *
0,3	24,2*	31,7 *
0,4	24,2*	31,7 *
0,5	24,2*	31,7 *
0,6	24,2*	31,7 *
0,7	24,2*	31,7 *
0,8	24,2*	31,7 *
0,9	24,2*	31,7 *
1	24,2*	31,7 *
1,1	24,2*	31,7 *
1,2	24,2*	31,7 *
1,3	24,2*	31,7 *
1,4	24,2*	31,7 *
1,5	24,2*	31,7 *
1,6	24,2*	31,7 *
1,7	23,8	31,7 *
1,8	19,5	30,7
1,9	13,8	21,7
2	0,0	0,0
(*) the value is limited by compression of the bottom horizontal timber		

Mechanical resistance - Walls

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For the calculation, the span of the joists is limited to 5 m for solid wood.

- Four different loads systems have been considered:

Case 1: light floor without partition wall, $gk_1 = 0,5 \text{ kN/m}^2$

Case 2: light floor with partition wall, $gk_2 = 1,00 \text{ kN/m}^2$

Case 3: heavy floor, with partition wall, $gk_3 = 1,5 \text{ kN/m}^2$

Case 4: really heavy floor with partition wall, $gk_4 = 2,00 \text{ kN/m}^2$

Table A3 – 1 gives the calculated configurations.

Tables A3 – 2 and A3 – 3 give the spans of the joists, the spans of the lath and the distance between joists and laths if any.

The calculation is performed for every case presented here above. Only the minimum value at SLS and at ULS is given. Hypotheses are given below.

Eléments de planchers – Hypothèses de calculs

Données de calculs

Catégorie de l'ouvrage	A (résidentielles)
Classe de service	2
Coefficient Ψ_2	$\Psi_2 = 0.30$
Coefficient bois massif :	modification classe de service $K_{def} = 0.80$
	charge permanente $K_{modG} = 0.60$
	moyen terme $K_{modQ} = 0.80$
Coefficient panneau EN 300/OSB3 et 4:	modification classe de service $K_{def} = 2.25$
	charge permanente $K_{modG} = 0.30$
	moyen terme $K_{modQ} = 0.55$
Coefficient panneau particules EN 312/P5	modification classe de service $K_{def} = 3.00$
	charge permanente $K_{modG} = 0.20$
	moyen terme $K_{modQ} = 0.45$
Coefficient contreplaqué EN 636/2:	modification classe de service $K_{def} = 1.00$
	charge permanente $K_{modG} = 0.60$
	moyen terme $K_{modQ} = 0.80$
Moments résultants ELU	$MELU = 1.35 \times Mg + 1.5 \times Mq$
Moments résultants ELS	$MELS = Mg + Mq$
Coefficient partiel matériaux bois	$\gamma_m = 1.3$
Déformation instantanée	$u_{1inst} = 300$
Déformation finale	$u_{1fin} = 250$

Charges permanentes

Cas 1 : Charges de planchers légers sans cloison	$gk_1 = 0.50 \text{ kN/m}^2$
Cas 2 : Charges de planchers légers avec cloison	$gk_2 = 1.00 \text{ kN/m}^2$
Cas 3 : Charges de planchers lourds avec cloison (chape sèche)	$gk_3 = 1.50 \text{ kN/m}^2$
Cas 4 : Charges de planchers très lourds avec cloison (chape maçonnée)	$gk_4 = 2.00 \text{ kN/m}^2$

Charges d'exploitation

Charges répartie	$q_k = 1.50 \text{ kN/m}^2$
Charge ponctuelle	$Q_k = 2.00 \text{ kN}$

Load capacity – Suspended floor

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Table A3 – 1 : Studies configurations

Function	Constitution	Minimal Thickness (mm)	Minimal Height (mm)	Mechanical class
Lath	Solid wood	36	70	C24
		36	95	C24
Joist		36	145	C24
		36	195	C24
		36	220	C24
		36	240	C24
		45	170	C24
		45	195	C24
		45	220	C24
		45	240	C24
		70	170	C18
		70	195	C18
		70	220	C18
		70	240	C18
		90	170	C18
		90	195	C18
		90	220	C18
		90	240	C18
		90	290	C18
		Reconstructed solid wood	70	170
70	195		C24	
70	220		C24	
70	240		C24	
90	170		C24	

			90	195	C24
			90	220	C24
			90	240	C24
			90	290	C24
	Screed	Particleboard	22		EN 312/P5
			25		EN 312/P5
		OSB panels	18		EN 300/OSB 3
			22		EN 300/OSB 3
			25		EN 300/OSB 3
	Load capacity – Suspended floor				

Table A3 – 2 – Joists' spans

Load system:	CASE 1			CASE 2			CASE 2			CASE 3		
Long term loads:	gk = 0.5 kN/m ²			gk = 1.0 kN/m ²			gk = 1.5 kN/m ²			gk = 2.0 kN/m ²		
Uniform short term loads:	qk = 1.5 kN/m ²			qk = 1.5 kN/m ²			qk = 1.5 kN/m ²			qk = 1.5 kN/m ²		
Localised short term loads:	Qk = 2.00 kN			Qk = 2.00 kN			Qk = 2.00 kN			Qk = 2.00 kN		
Total deflexion:	u2 = 400			u2 = 400			u2 = 400			u2 = 500		
Distance between joists (mm):	400	500	600	400	500	600	400	500	600	400	500	600
Minimal Sections (mm)	Joists' spans (m)											
<i>Solid wood joists C24</i>												
36 x 145	2.95	2.78	2.64	2.76	2.57	2.41	2.57	2.38	2.24	2.38	2.13	1.95
36 x 195	3.97	3.74	3.55	3.72*	3.45	3.24	3.45*	3.21*	2.93	3.11	2.78	2.54
36 x 220	4.48	4.22	4.01	4.19*	3.89*	3.62	3.90*	3.58*	3.27	3.47*	3.10*	2.83*
36 x 240	4.89*	4.60*	4.37	4.57*	4.25*	3.91*	4.25*	3.88*	3.54	3.75*	3.36*	3.06*
45 x 170	3.73	3.51	3.33	3.49	3.24	3.05	3.24*	3.01	2.83	3.05*	2.75*	2.51*
45 x 195	4.28	4.03	3.82	4.00*	3.72*	3.50	3.72*	3.45*	3.25*	3.48*	3.11*	2.84*
45 x 220	4.83*	4.54*	4.31	4.52*	4.19*	3.95*	4.20*	3.90*	3.66*	3.88*	3.47*	3.17*
45 x 240	5.27*	4.95*	4.71*	4.93*	4.57*	4.30*	4.58*	4.25*	3.96*	4.20*	3.75*	3.43*
<i>Massive wood joists C18</i>												
70 x 170	4.04	3.80	3.61	3.78*	3.51	3.30	3.52*	3.26*	3.07	3.31*	2.97*	2.71*
70 x 195	4.64	4.36	4.14	4.34*	4.03*	3.79*	4.03*	3.74*	3.52*	3.76*	3.36*	3.07*
70 x 220	5.23*	4.92*	4.68*	4.90*	4.54*	4.28*	4.55*	4.22*	3.95*	4.19*	3.75*	3.42*
70 x 240	5.71*	5.37*	5.10*	5.34*	4.96*	4.67*	4.96*	4.61*	4.27*	4.53*	4.05*	3.70*
90 x 170	4.40	4.14	3.93	4.11*	3.82*	3.59*	3.82*	3.55*	3.34*	3.60*	3.34*	3.08*
90 x 195	5.04*	4.74*	4.51*	4.72*	4.38*	4.12*	4.38*	4.07*	3.83*	4.13*	3.81*	3.48*
90 x 220	5.69*	5.35*	5.08*	5.32*	4.94*	4.65*	4.95*	4.59*	4.32*	4.66*	4.25*	3.88*
90 x 240	6.20*	5.84*	5.55*	5.81*	5.39*	5.07*	5.40*	5.01*	4.71*	5.08*	4.60*	4.20*
90 x 290	7.50*	7.06*	6.70*	7.02*	6.51*	6.13*	6.52*	6.05*	5.70*	6.09*	5.45*	4.97*
<i>Massive wood joists or reconstructed massive wood C24</i>												
70 x 170	4.32	4.07	3.86	4.04*	3.75*	3.53	3.76*	3.49*	3.28*	3.54*	3.29*	3.09*

70 x 195	4.96*	4.66*	4.43*	4.64*	4.31*	4.05*	4.31*	4.00*	3.77*	4.06*	3.77*	3.54*
70 x 220	5.59*	5.26*	5.00*	5.23*	4.86*	4.57*	4.86*	4.52*	4.25*	4.58*	4.25*	3.95*
70 x 240	6.10*	5.74*	5.45*	5.71*	5.30*	4.99*	5.31*	4.93*	4.64*	5.00*	4.64*	4.27*
90 x 170	4.70	4.42	4.20	4.40*	4.08*	3.84*	4.09*	3.79*	3.57*	3.85*	3.57*	3.36*
90 x 195	5.39*	5.07*	4.82*	5.04*	4.68*	4.41*	4.69*	4.35*	4.10*	4.41*	4.10*	3.86*
90 x 220	6.08*	5.72*	5.44*	5.69*	5.28*	4.97*	5.29*	4.91*	4.62*	4.98*	4.62*	4.35*
90 x 240	6.63*	6.24*	5.93*	6.21*	5.76*	5.42*	5.77*	5.36*	5.04*	5.43*	5.04*	4.75*
90 x 290	8.02*	7.54*	7.17*	7.50*	6.96*	6.55*	6.97*	6.47*	6.09*	6.57*	6.09*	5.74*

(*) Specific investigation is necessary to determine the frequency regarding the EC5 criteria $f < 8\text{Hz}$.

Load capacity – Suspended floor

ANNEX 3

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Table A3 – 3 : Span and distance between lathes' screed

Load system :	CASE 1	CASE 2	CASE 3	CASE 4
Long term loads:	$g_k = 0.5 \text{ kN/m}^2$	$g_k = 1.0 \text{ kN/m}^2$	$g_k = 1.5 \text{ kN/m}^2$	$g_k = 2.0 \text{ kN/m}^2$
Uniform short term loads:	$q_k = 1.5 \text{ kN/m}^2$	$q_k = 1.5 \text{ kN/m}^2$	$q_k = 1.5 \text{ kN/m}^2$	$q_k = 1.5 \text{ kN/m}^2$
Localised short term loads	$Q_k = 2.00 \text{ kN}$	$Q_k = 2.00 \text{ kN}$	$Q_k = 2.00 \text{ kN}$	$Q_k = 2.00 \text{ kN}$
Total deflexion:	$u_2 = 400$	$u_2 = 400$	$u_2 = 400$	$u_2 = 500$
Lathes' span (mm):				
Solid wood lathes	Distance between lathes (mm)			
<i>36 x 70 mm² C24</i>				
400	4 608	3 584	2 932	2 481
500	4 608	3 584	2 932	2 481
600	4 608	3 584	2 932	2 481
<i>36 x 95 mm² C24</i>				
400	6 254	4 864	3 980	3 367
500	3 618	2 728	2 190	1 829
600	2 094	1 579	1 267	1 058
Thickness of panels (mm)	Spans of panels (mm)			
<i>OSB Panels EN 300/OSB 3</i>				
18	400	330	250	250
22	700	550	450	450
25	700	670	650	650
<i>OSB Panels EN 300/OSB 4</i>				
18	550	430	350	350
22	750	680	650	650
25	750	700	650	650
<i>Particleboard EN 312/P5</i>				
22	500	400	300	300
25	600	500	400	400

Load capacity – Suspended floor

ANNEX 3

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Translation tools

FRENCH	ENGLISH
Toiture	Roof structure
Chevron	Common rafter
Panne	Purlin
Bois massif	Solid timber
Murs à ossature bois	Timber frame walls
Plancher	Floor
Mur	Wall
Combles	Roof
Bois lamellé-collé	Glue-laminated wood
Chevron autoporteur	Self-weight rafter
Fixation	Fasteners
Montant	Stile
Contreventement	Racking wall
Film pare-vapeur	Vapour barrier
Film pare-pluie	Water membrane

Drawings

ANNEX 4

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Walls

Reference	Object	Title
M1	External wall	Elevation with frame
M2		Cross section
M3		Link with screed
M4		Link with external wall
M5		Link with internal wall
M6		Junction with windows

Drawings

ANNEX 4A – Walls

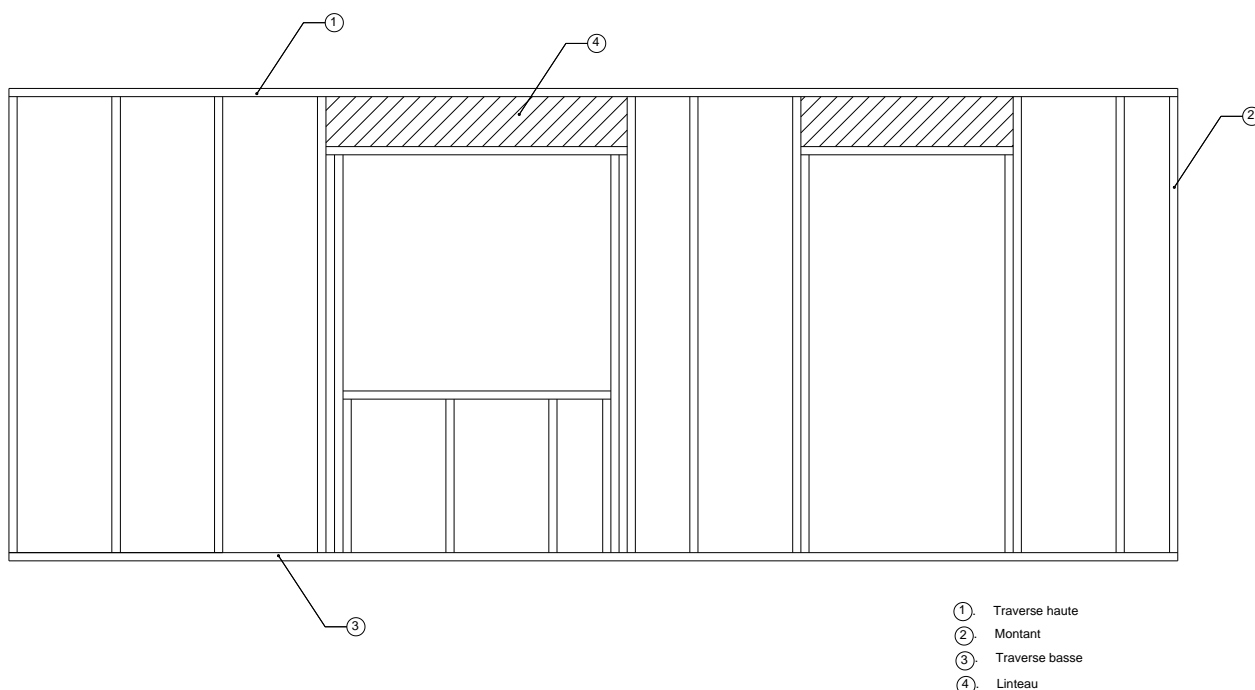
ANNEX 4A

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Technical
Assessment

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Murs extérieurs

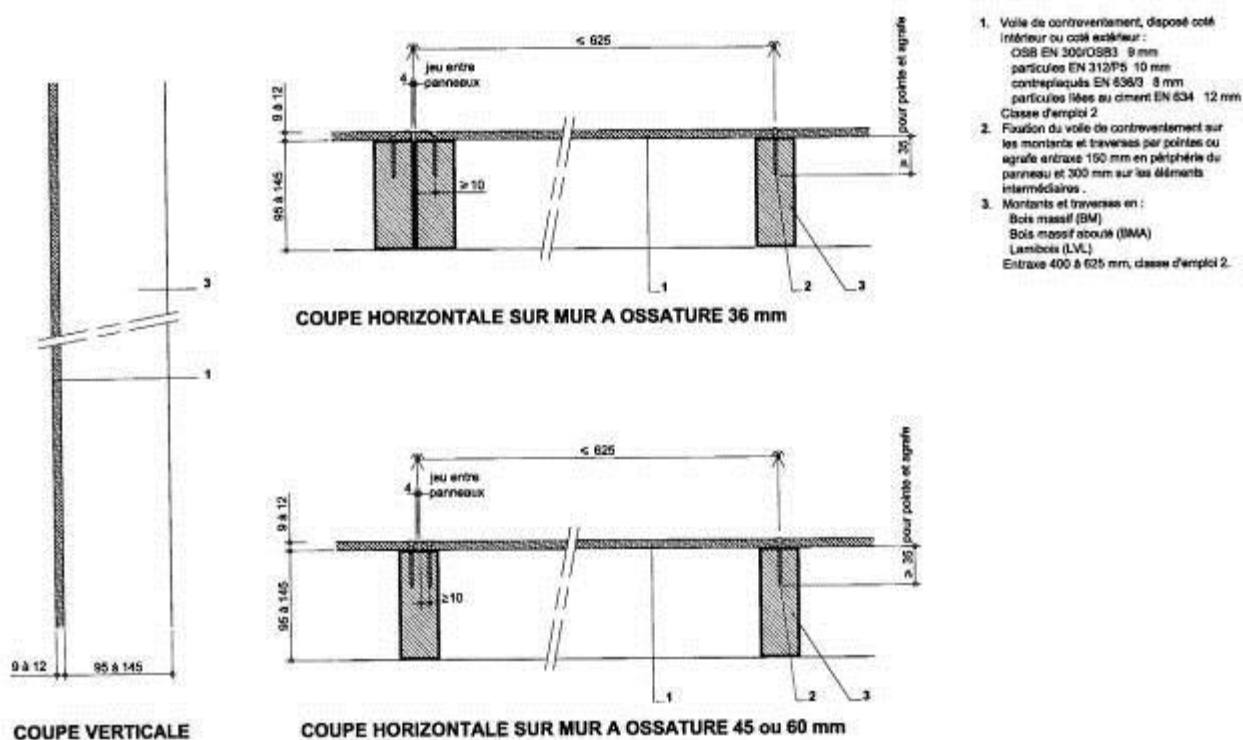
Elévation de principe de l'ossature



- ① Traverse haute
- ② Montant
- ③ Traverse basse
- ④ Linteau

Murs extérieurs

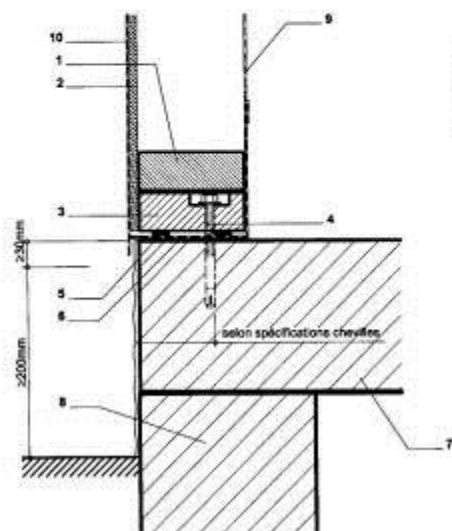
coupe de principe



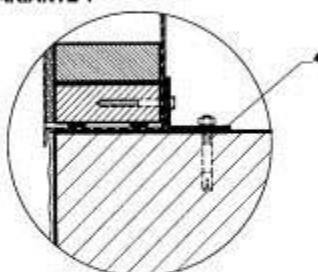
Murs extérieurs

liaison avec plancher bas maçonné

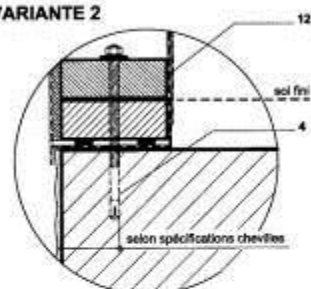
COUPE VERTICALE
SUR DALLAGE MAÇONNÉE



VARIANTE 1



VARIANTE 2

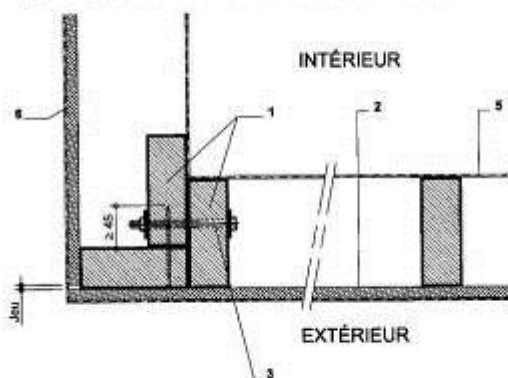


1. Montants et traverses bois
2. Voile de contreventement
3. Semelle d'appui bois, Classe d'emploi 3
4. Fixation semelle d'appui sur mur soubassement par cheville métallique à expansion, cheville chimique, étrépeau renforcé, arbrass < 1000 mm et au droit des ouvertures et des extrémités.
5. Joint d'étanchéité préformé (non fourni)
6. Barrière d'étanchéité et anti-capillarité (non fourni)
7. Dalle maçonnée
8. Mur de soubassement maçonné
9. Film pare-vapeur (non fourni) à disposer en continu sur les montants
10. Film pare-pluie (non fourni) à disposer en continu sur le voile de contreventement.

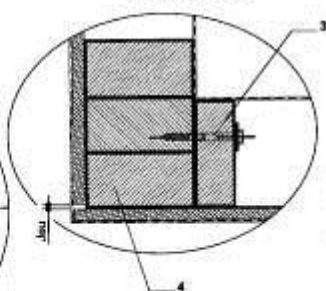
Murs extérieurs

liaison avec mur extérieur bois

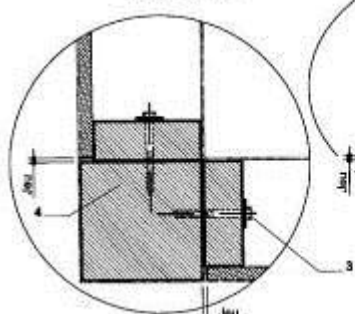
COUPE HORIZONTALE SUR ANGLE SORTANT



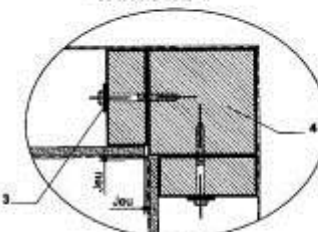
VARIANTE 2



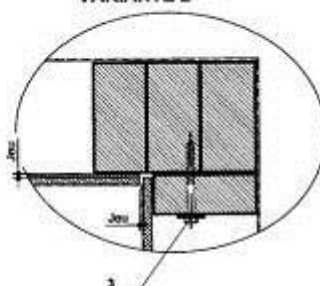
VARIANTE 1



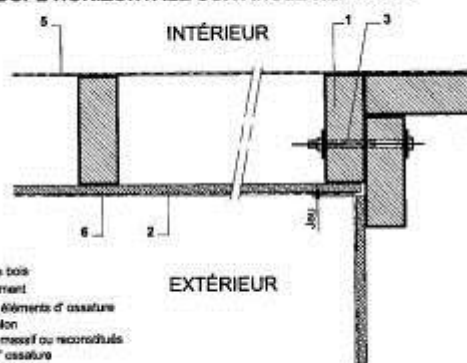
VARIANTE 1



VARIANTE 2



COUPE HORIZONTALE SUR ANGLE RENTRANT

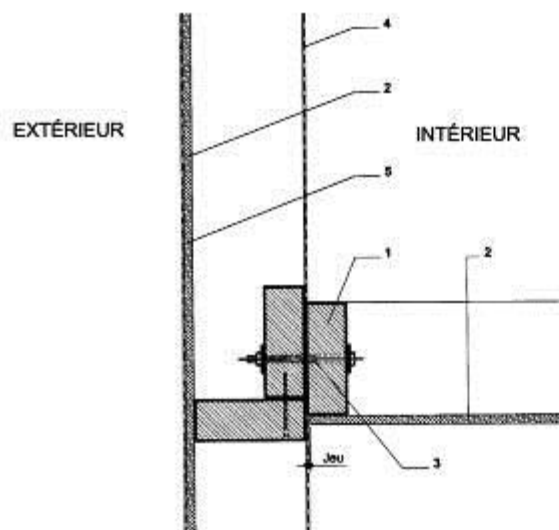


1. Montants et traverses bois
2. Voile de contreventement
3. Raccordement entre éléments d'ossature par vis, tire-fond, boulon
4. Poteau d'angle bois massif ou reconstitués avec des montants d'ossature
5. Film pare-vapeur (non fourni)
6. Film pare-pluie (non fourni)

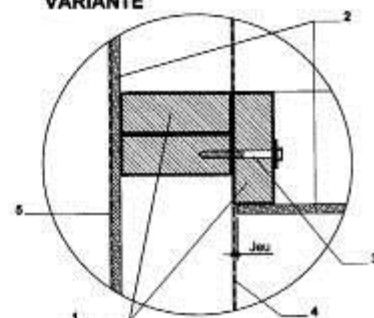
Murs extérieurs

liaison avec mur intérieur bois

COUPE HORIZONTALE SUR MUR EXTERIEUR ET MUR INTERIEUR



VARIANTE

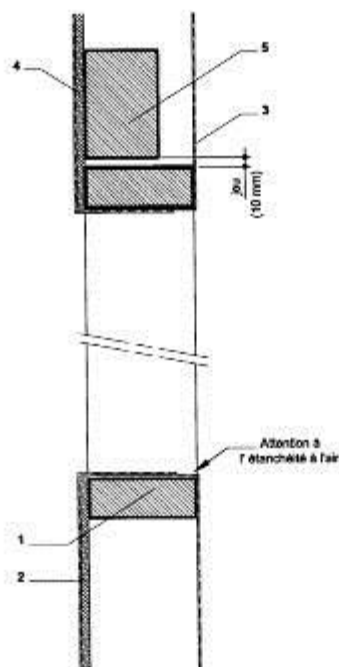


1. Montants et traverses bois
2. Voile de contreventement
3. Raccordement entre éléments de structure d'ossature par boulon, tire-fond, vis
4. Film pare-vapeur (non fourni)
5. Film pare-pluie (non fourni)

Murs extérieurs

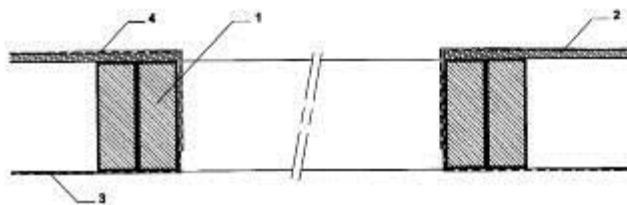
intégration des menuiseries

COUPE VERTICALE
SUR OUVERTURE POUR BAIE



1. Montants et traverses bois
2. Voile de contreventement
3. Film pare-vapeur (non fourni) : mise en œuvre en fonction de la pose de la menuiserie.
4. Film pare-pluie (non fourni)
5. Linteau de menuiserie en :
Bois massif
Bois massif reconstitué (BMR)
Lambdabois (LVL)
Bois lamellé collé (BLC)
Poutrelle acier

COUPE HORIZONTALE SUR OUVERTURE POUR BAIE



Floors

Reference	Object	Title
P7	Floor	Cross section with hidden joists
P8	Floor	Cross section with joints
P9	Floor	Link with external wall for unit frame
P10	Floor	Link with external wall for continuous frame
P11	Floor	Link with internal wall
P12	Floor	Cross section of the first floor with the substructure

Drawings

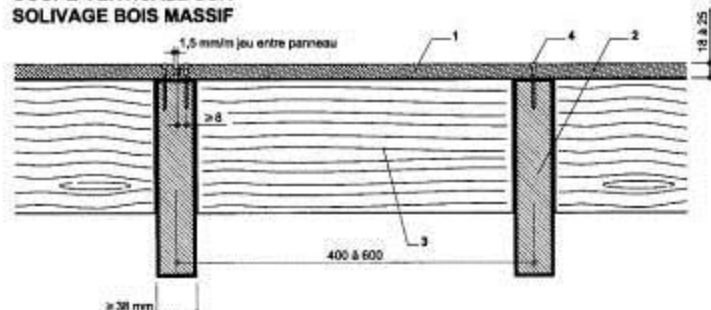
ANNEX 4B – Floors

ANNEX 4B

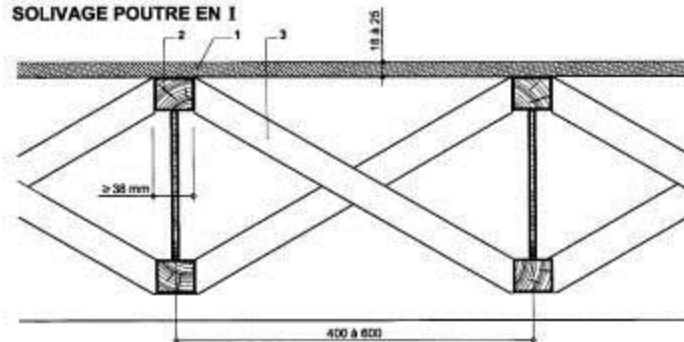
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Planchers

COUPE VERTICALE SUR SOLIVAGE BOIS MASSIF

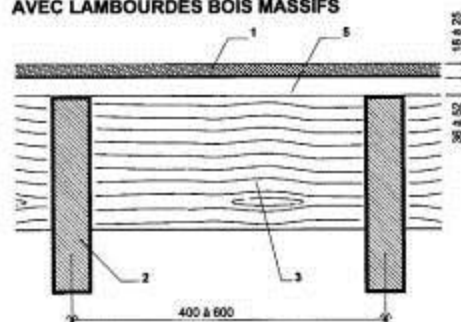


COUPE VERTICALE SUR SOLIVAGE POUTRE EN I



coupe de principe sur solivage non apparent

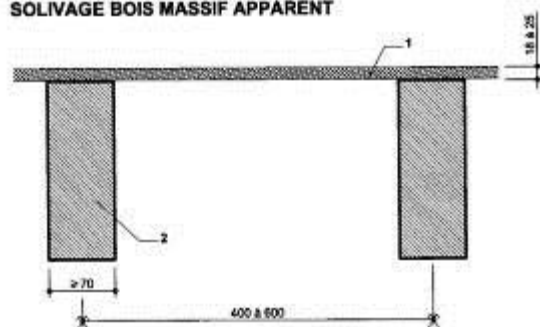
VARIANTE : COUPE DE PRINCIPE SUR SOLIVAGE AVEC LAMBOURDES BOIS MASSIFS



1. Dalle de plancher :
Panneaux OSB EN 300/OSB3 épaisseur 18 ou 22 mm
Panneaux de particules EN 312/P5 épaisseur 22 ou 25 mm
Lame de plancher bois massif, épaisseur 23 mm
Classe d'emploi 2
2. Solives support de plancher :
Bois massifs (BM)
Bois massifs reconstitués (BMR)
Bois massifs aboutés (BMA)
Bois Lamellé collé (BLC)
Lamibois (LVL)
Poutre en I
Entraxe 400 à 600 mm, classe d'emploi 2
3. Entretoise bois, hauteur > 2/3 hauteur solive, entraxe 60 x épaisseur solive, classe d'emploi 2
4. Fixation de la dalle sur la solive : entraxe 150 mm en périphérie et 300 mm intermédiaires
5. Lambourde en bois massif, classe d'emploi 2

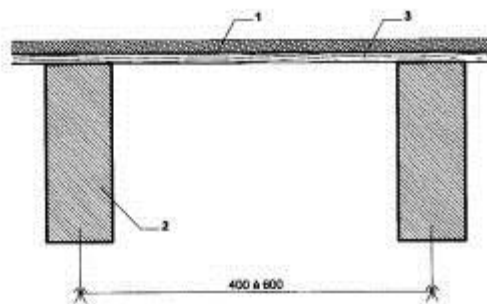
Planchers

COUPE VERTICALE SUR SOLIVAGE BOIS MASSIF APPARENT



coupe de principe sur solivage apparent

VARIANTE 1

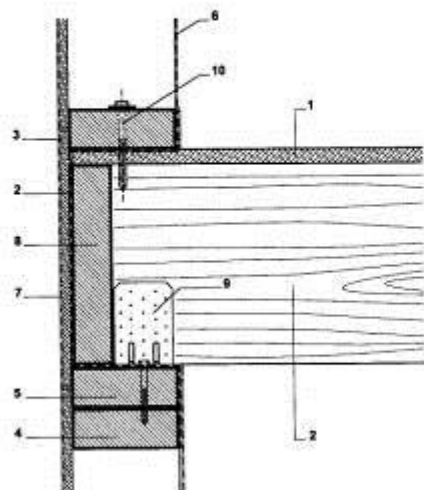


1. Dalle de plancher :
Panneaux OSB EN 300/OSB3 épaisseur 18 ou 22 mm
Panneaux de particules EN 312/P5 épaisseur 22 ou 25 mm
Lame de plancher bois massif, épaisseur 23 mm
Classe d'emploi 2
2. Solives support de plancher :
Bois massifs (BM)
Bois massifs reconstitués (BMR)
Bois massifs aboutés (BMA)
Bois Lamellé collé (BLC)
Entraxe 400 à 600 mm, classe d'emploi 2
3. Lambris bois massif, classe d'emploi 1

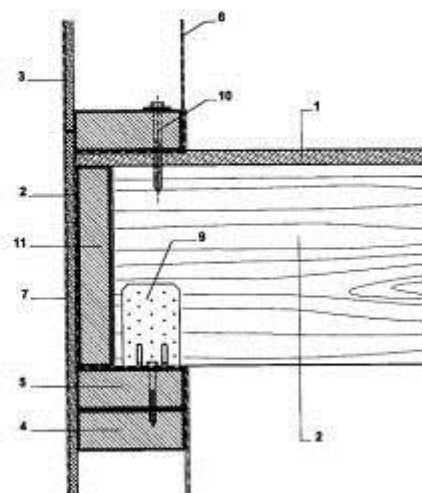
Planchers

liaison avec mur extérieur bois pour ossature plateforme

COUPE VERTICALE SUR SOLIVAGE AVEC ENTRETOISE



COUPE VERTICALE SUR SOLIVAGE AVEC CEINTURE FILANTE

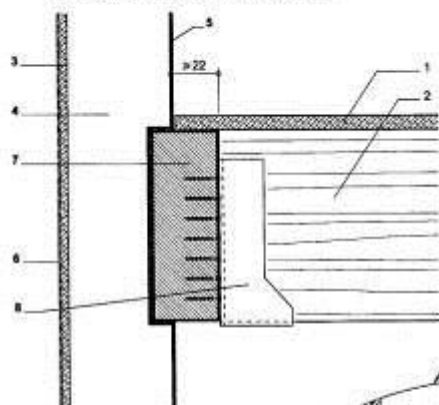


1. Dalle de plancher
2. Solive bois
3. Voile de contreventement
4. Montant et traverse bois
5. Lisse de chaînage bois
6. Film pare-vapeur (non fourni)
7. Film pare-pluie (non fourni)
8. Entretoise bois
9. Fixation solive sur chaînage ossature par équerre métallique renforcée
10. Fixation traverse tasse ossature sur solive par vis, tire-fonds, boulons, entraxe au droit des solives.
11. Ossature filante

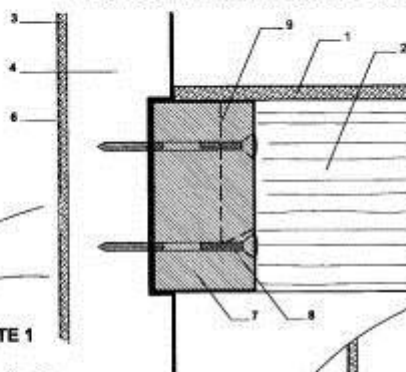
Planchers

liaison avec mur extérieur bois pour ossature filante

COUPE VERTICALE SUR SOLIVAGE AVEC BOITERS METALLIQUES

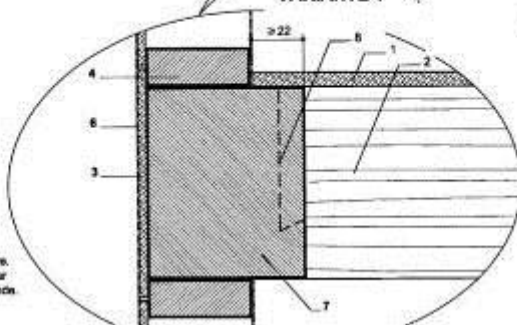


COUPE VERTICALE SUR SOLIVAGE AVEC ASSEMBLAGE EN QUEUE D'ARRONDE

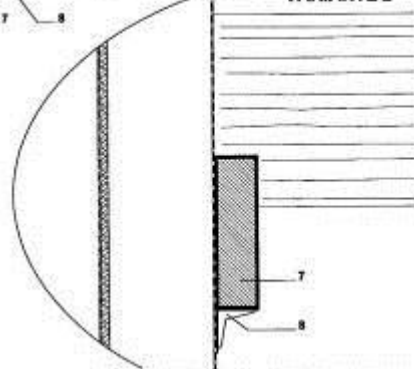


1. Dalle de plancher
2. Solive bois
3. Voile de contreventement
4. Montant et traverse bois
5. Film pare-vapeur (non fourni)
6. Film pare-pluie (non fourni)
7. Solive d'about bois
8. Fixation solive d'about sur montant > 80 mm par vis ou équerre.
9. Fixation solive sur solive d'about par boîtier métallique, ou queue d'arronde.

VARIANTE 1

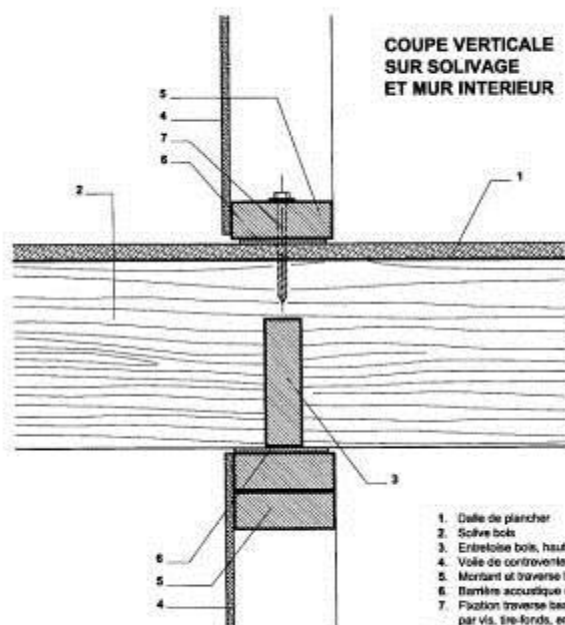


VARIANTE 2

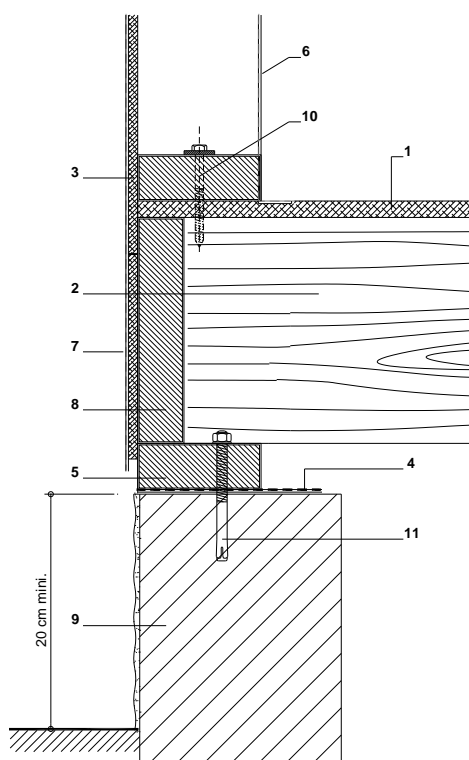
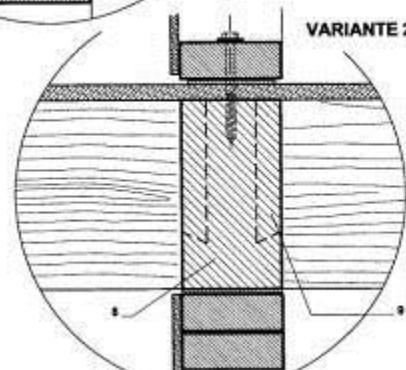
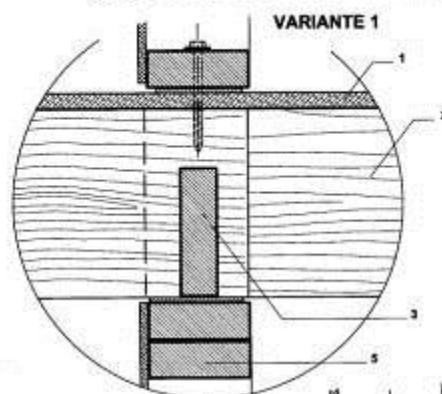


Planchers

liaison avec mur intérieur bois



1. Dalle de plancher
2. Solive bois
3. Entretoise bois, hauteur = 2/3 hauteur solive
4. Voie de contreventement
5. Mortant et traverse bois
6. Barrière acoustique éventuelle (non fournie)
7. Fixation traverse basse ossature sur solive par vis, tire-fonds, entraxe au droit des solives



1. Dalle de plancher
2. Solive bois (massif, poutre en I ...)
3. Voie de contreventement
4. Barrière contre les remontées capillaires
5. Lisse d'assise bois
6. Film pare-vapeur (non fourni)
7. Film pare-pluie (non fourni)
8. Entretoise bois ou solive de rive
9. Mur de soubassement maçonné
10. Fixation traverse basse ossature sur solive par vis, tire-fonds, boulons, entraxe au droit des solives.
11. Fixation lisse d'assise bois sur mur de soubassement par chevilles.

Roof

Reference	Object	Title
T12	Elevation	Carpentry with rafters and purlins
T13		Traditional carpentry for unheated attic
T14		Traditional carpentry for habitable attic
T15		Carpentry with self-supporting rafters
T16		Industrial carpentry for unheated attic
T17		Industrial carpentry for habitable attic and tie beam
T18		Industrial carpentry for habitable attic and wood floor
T19		Industrial carpentry for habitable attic with high tie beam
T20	Junction	Rafter/purlin
T21		Rafter with external wall
T22		Purlin with external wall
T23		Roof scale with external wall
T24		Industrial roof with external wall
T25		Industrial roof with external wall
T26		Industrial roof with suitable for conversation roof on wood floor
T27		Industrial roof with external wall
T28		Self-supporting rafter with external wall
T29		self-supporting rafter with external wall
T30		self-supporting rafter with ridge purling
T31		self-supporting rafter with ridge purling

Plans et coupes de détail

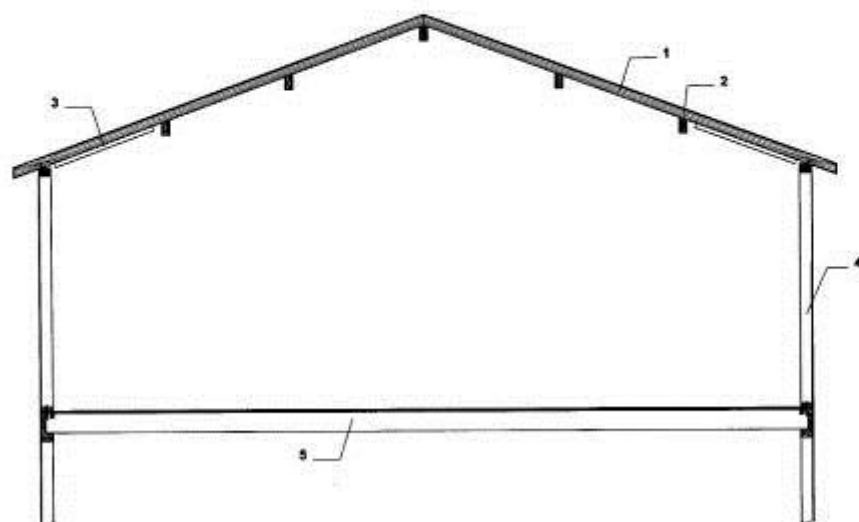
ANNEX 4C – Roof

ANNEX 4C

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Toitures

élévation sur charpente en pannes / chevrons



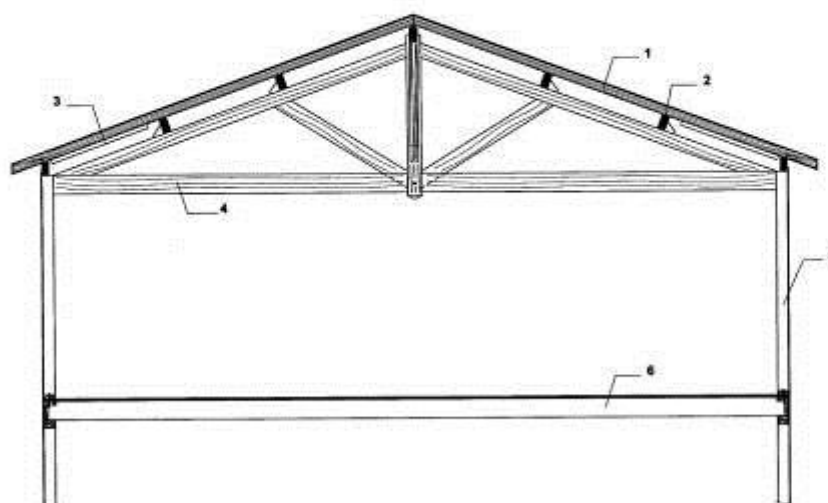
1. Chevrons :
Bois massifs
Bois massifs reconstitués (BMR)
Lamibois (LVL)
Entraxe 600 à 600 mm, classe d'emploi 2
2. Pannes :
Bois massifs
Bois massifs reconstitués (BMR)
Bois Lamellés collés (BLC)
Classe d'emploi 2
3. Dispositif de stabilité horizontale en
bois massifs ou poutres bois,
Classe d'emploi 2
4. Poutres de murs à ossature bois
5. Plancher bois

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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Toitures

élévation sur charpente traditionnelle à comble perdu



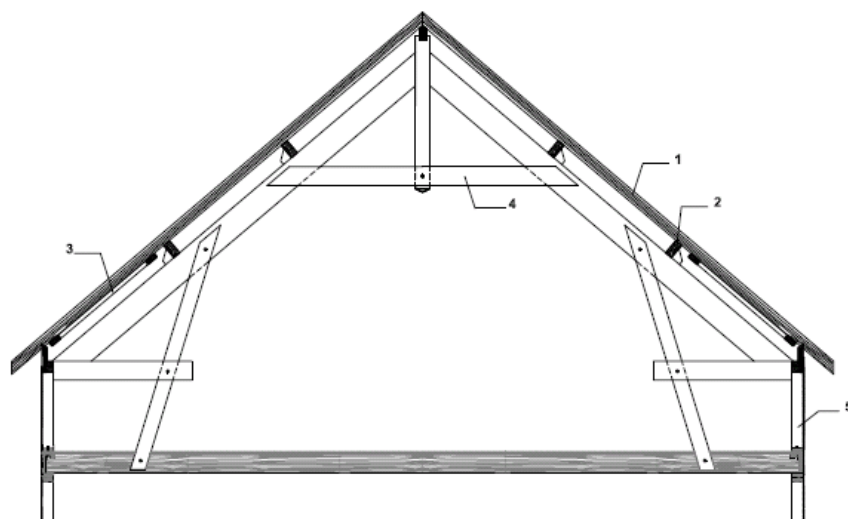
1. Chevrons :
Bois massifs
Bois massifs reconstitués (BMR)
Lambdas (LVL)
Entraxe 500 à 600 mm, classe d'emploi 2
2. Pannes :
Bois massifs
Bois massifs reconstitués (BMR)
Bois Lamellé collé (BLC)
Classe d'emploi 2
3. Dispositif de stabilité horizontale en bois
massif ou panneaux bois, classe d'emploi 2
4. Ferme traditionnelle en bois massif ou
bois massifs reconstitués, classe d'emploi 2
5. Panneaux de murs à ossature bois avec
renforts au droit des fermes
6. Plancher bois

SYMOB © 2006 - CUAP OSSATURE BOIS

Détails de système constructif - T13

Toitures

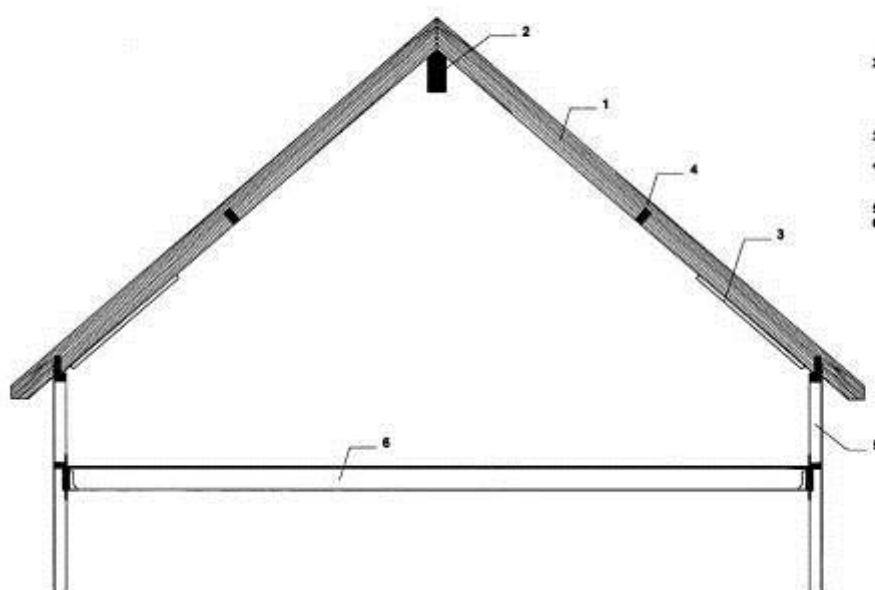
Élévation sur charpente traditionnelle à comble habitable



- 1, Chevrons en bois massifs ou bois massifs reconstitués de classe C24, ou LVL, épaisseur 36 ou 45 mm, hauteur 95 à 145 mm, entraxe 500 ou 600 mm, classe d'emploi 2
- 2, Pannes en bois massifs classe C16, ou en bois massifs reconstitués classe C24, épaisseur 70 ou 90 mm, hauteur 170 à 290 mm, classe d'emploi 2
- 3, Stabilisateur horizontal des pannes de murs de façade, bois massifs, classe d'emploi 2
- 4, Ferme traditionnelle en bois massif, classe C16, classe d'emploi 2
- 5, Panneaux de murs à ossature bois

Toitures

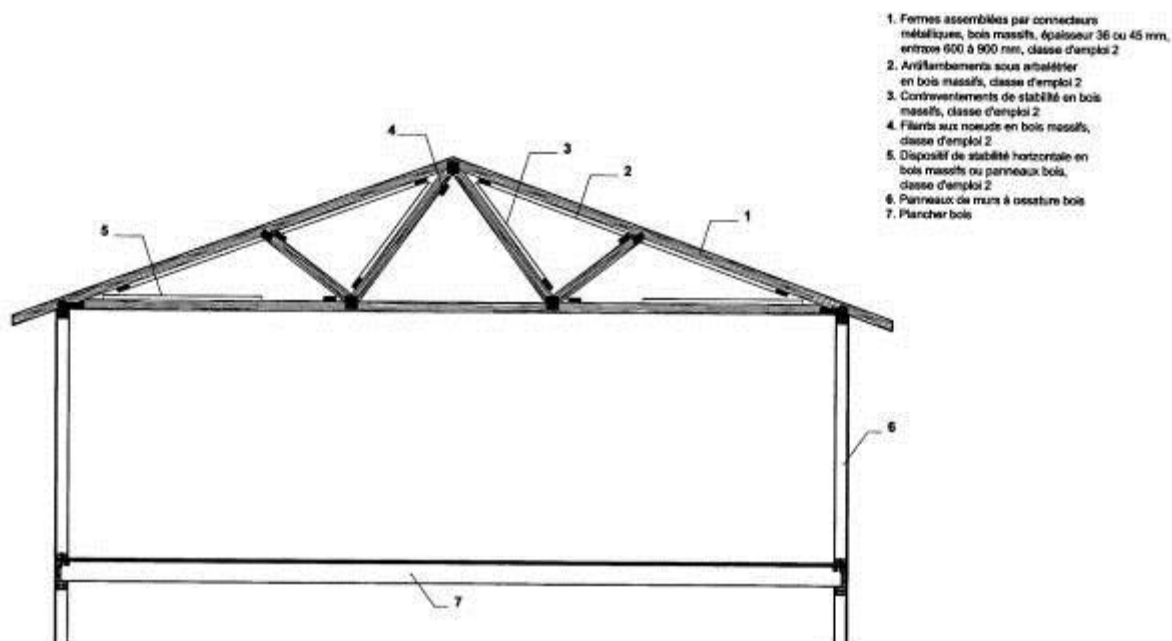
élévation sur charpente en chevrons autoporteurs



- 1, Chevrons :
Bois massifs
Bois massifs reconstitués (BMR)
Poutre en I
Lamibois (LVL)
Entraxe 500 à 600 mm, classe d'emploi 2
- 2, Pannes :
Bois massifs
Bois massifs reconstitués (BMR)
Bois Lamellé collés (BLC)
Classe d'emploi 2
- 3, Dispositif de stabilisation horizontale en bois massifs ou panneaux bois, classe d'emploi 2
- 4, Entraitée bois, hauteur = 203
hauteur chevron, entraxe 60 x épaisseur chevron, classe d'emploi 2
- 5, Panneaux de murs à ossature bois
- 6, Plancher bois

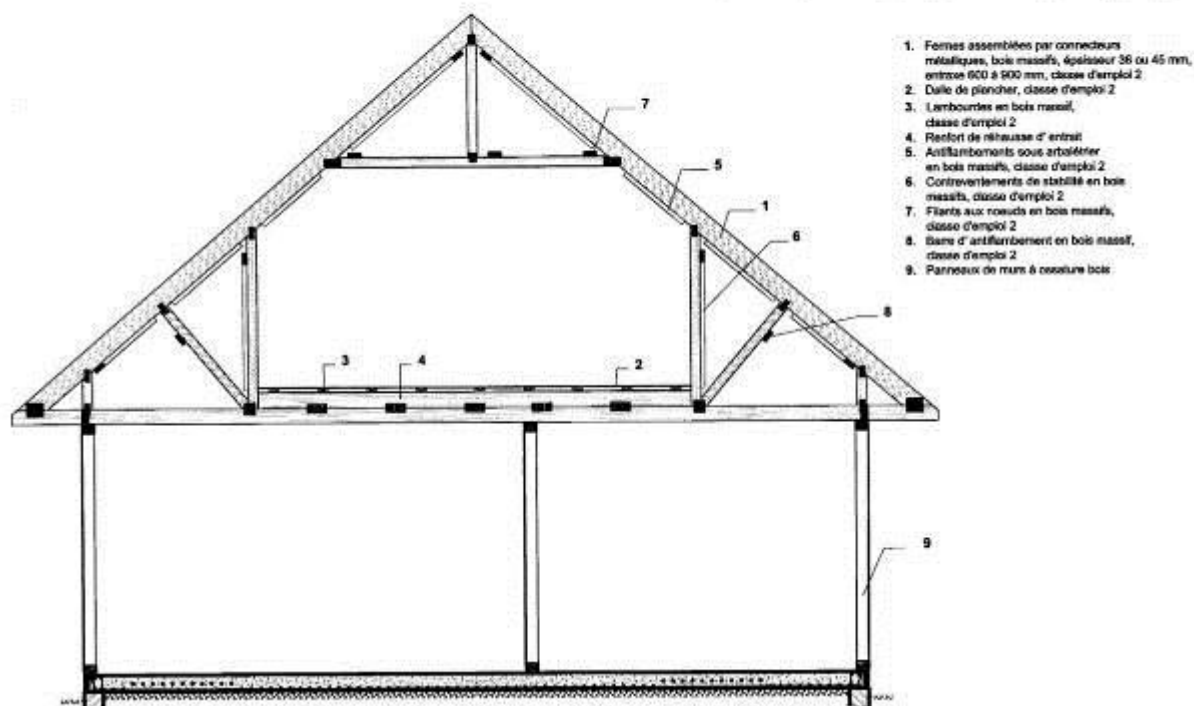
Toitures

élévation sur ferme industrielle à comble perdu



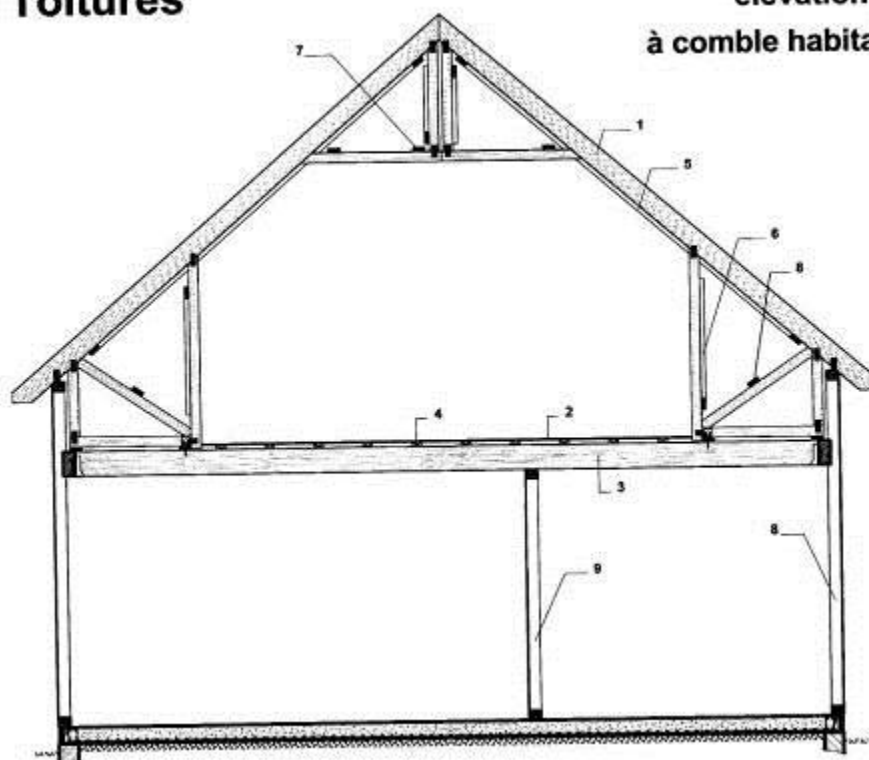
Toitures

élévation sur ferme industrielle à comble habitable et entrain porteur



Toitures

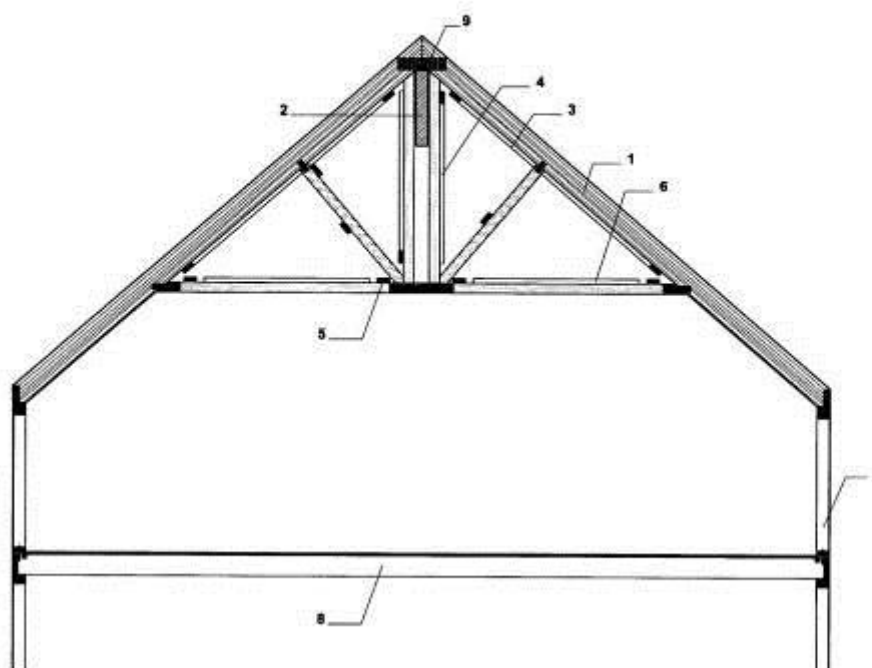
élévation sur ferme industrielle à comble habitable sur plancher bois



1. Fermes assemblées par connecteurs métalliques, bois massifs, épaisseur 36 ou 45 mm, entraxe 600 à 900 mm, classe d'emploi 2
2. Dalle de plancher, classe d'emploi 2
3. Solives bois, entraxe identique aux fermes, classe d'emploi 2
4. Lambourdes en bois massif, classe d'emploi 2
5. Arrièrements sous arbalétrier en bois massifs, classe d'emploi 2
6. Contreventements de stabilité en bois massifs, classe d'emploi 2
7. Filants aux noues en bois massifs, classe d'emploi 2
8. Barre d'arrièrement en bois massif, classe d'emploi 2 (si besoin)
9. Panneaux de murs à ossature bois

Toitures

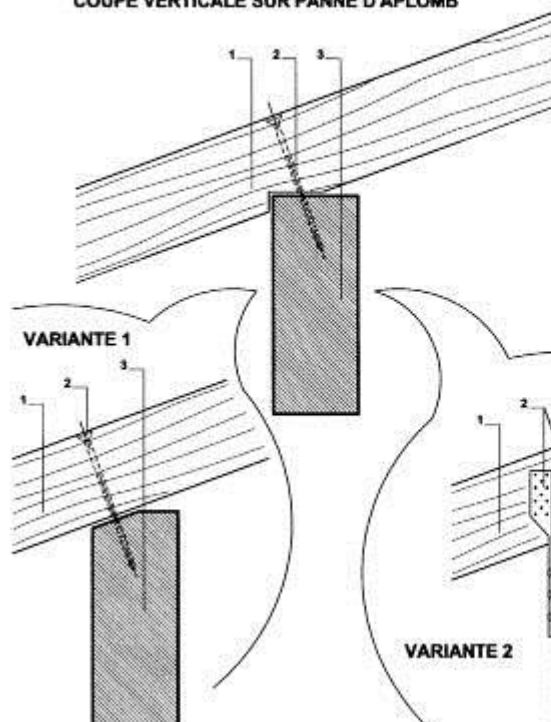
élévation sur ferme industrielle à comble habitable à réhausse d'entrait (trusstie)



1. Fermes assemblées par connecteurs métalliques, bois massifs, épaisseur 36 ou 45 mm, entraxe 600 à 900 mm, classe d'emploi 2
2. Poutre de reprise :
Bois massifs reconstitués (BMR)
Bois Lamellés collés (BLC)
Poutre treillis lambois (TLV)
Classe d'emploi 2
3. Arrièrements sous arbalétrier en bois massif, classe d'emploi 2
4. Contreventements de stabilité en bois massifs, classe d'emploi 2
5. Filants aux noues en bois massifs, classe d'emploi 2
6. Dispositif de stabilité horizontale en bois massifs ou panneaux bois, classe d'emploi 2
7. Panneaux de murs à ossature bois
8. Plancher bois
9. Fourrages bois massifs, classe d'emploi 2

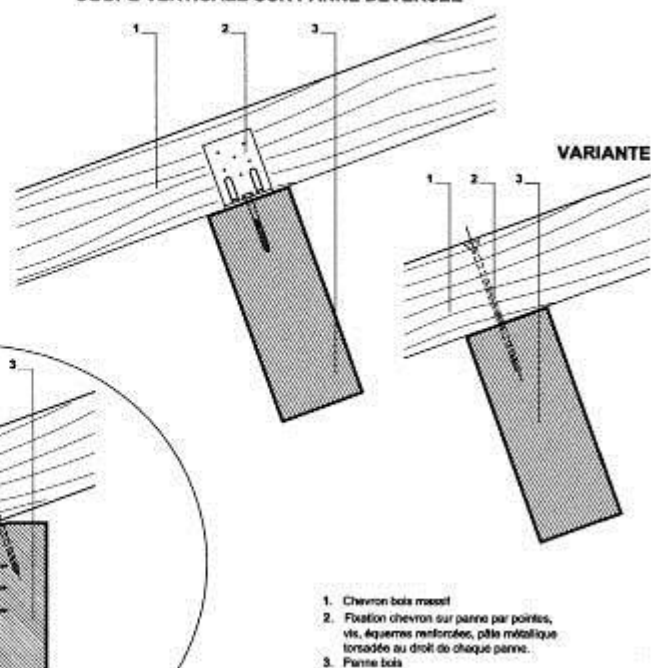
Toitures

COUPE VERTICALE SUR PANNE D'APLOMB



liaison chevron sur panne

COUPE VERTICALE SUR PANNE DÉVERSÉE

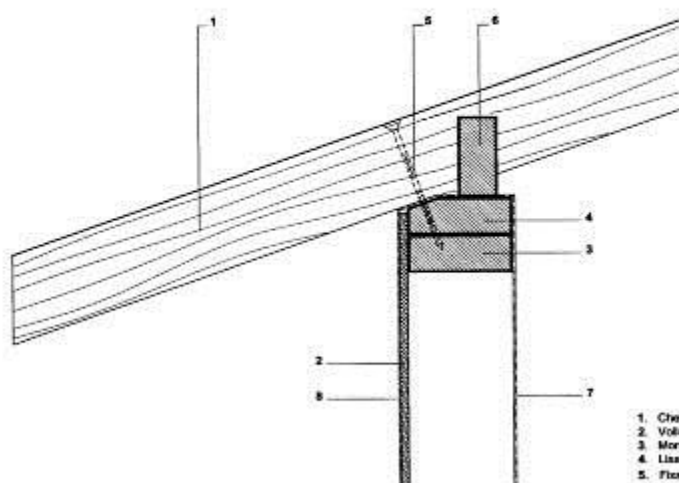


1. Chevron bois massif
2. Fixation chevron sur panne par pointes, vis, équerres renforcées, pôle métallique torsadé au droit de chaque panne.
3. Panne bois

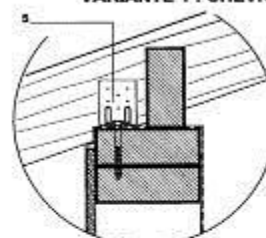
Toitures

liaison chevron avec mur extérieur bois

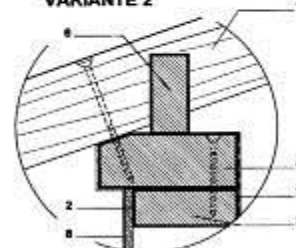
COUPE VERTICALE SUR DEBORD BAS DE PENTE RAMPANT



VARIANTE 1 : CHEVRON ENTAILÉ



VARIANTE 2

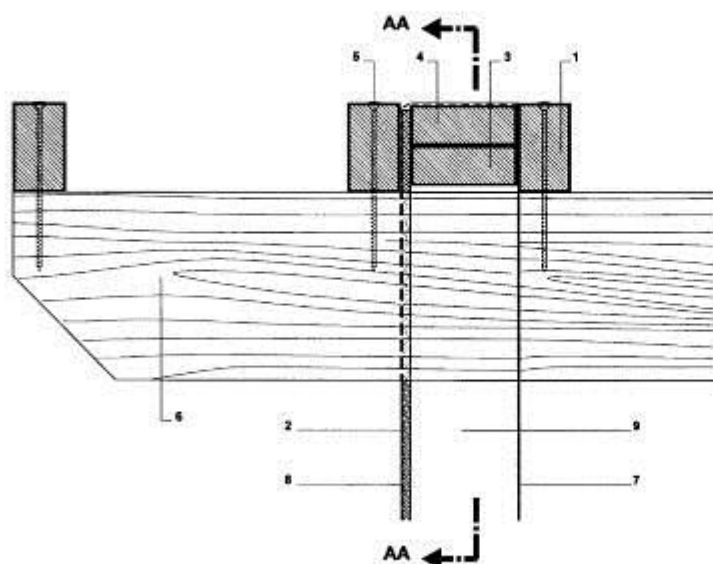


1. Chevron bois
2. Voile de contreventement
3. Montants et traverses bois
4. Liasse de chaînage bois
5. Fixation chevron sur chaînage ossature par pointes, vis, équerres métalliques renforcées au droit de chaque panne.
6. Entrées bois massif
7. Film pare-vapeur (non fourni)
8. Film pare-pluie (non fourni)

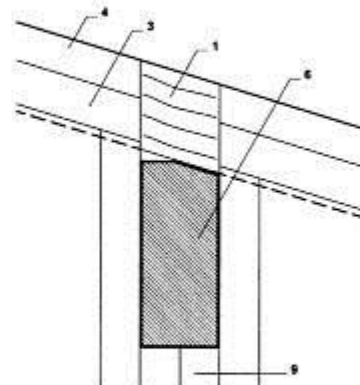
Toitures

liaison panne avec mur extérieur bois

COUPE VERTICALE SUR MUR ET DEBORD DE PIGNON AVEC SORTIE DE PANNES



COUPE AA

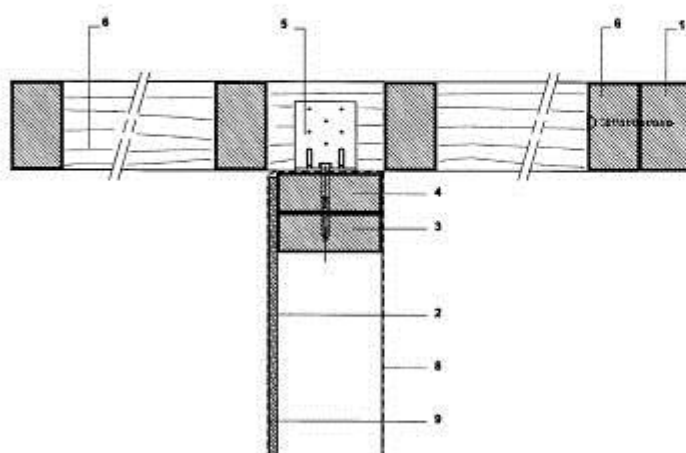


1. Chevron bois
2. Voile de contreventement
3. Montants et traverses bois
4. Lisse de chaînage bois
5. Fixation chevron sur pignon par pointe ou vis
6. Panne bois
7. Film pare-vapeur (non fourni)
8. Film pare-pluie (non fourni)
9. Renforts verticaux au droit des pannes

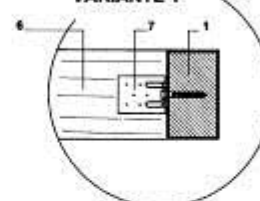
Toitures

liaison échelle de toiture avec mur extérieur bois

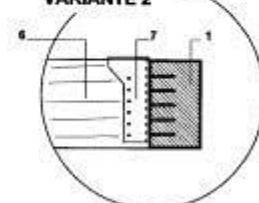
COUPE VERTICALE SUR DEBORD DE PIGNON AVEC ECHELLE DE TOIT



VARIANTE 1



VARIANTE 2

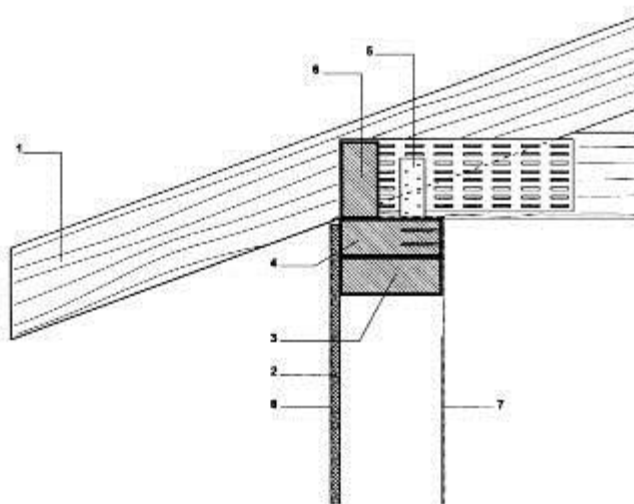


1. Chevron bois
2. Voile de contreventement
3. Montants et traverses bois
4. Lisse de chaînage, bois
5. Fixation échelle sur chaînage ossature par équerre métallique renforcée
6. Échelle de débord en bois massif
7. Fixation échelle sur chevron par vis, pointes, équerre renforcée ou bolitor métallique
8. Film pare-vapeur (non fourni)
9. Film pare-pluie (non fourni)

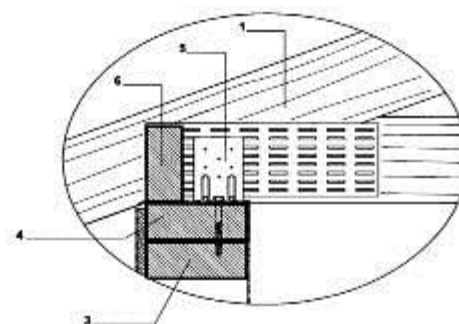
Toitures

liaison charpente industrielle avec mur extérieur bois (1)

COUPE VERTICALE SUR DEBORD BAS DE PENTE RAMPANT



VARIANTE : ÉQUERRE RENFORCÉE

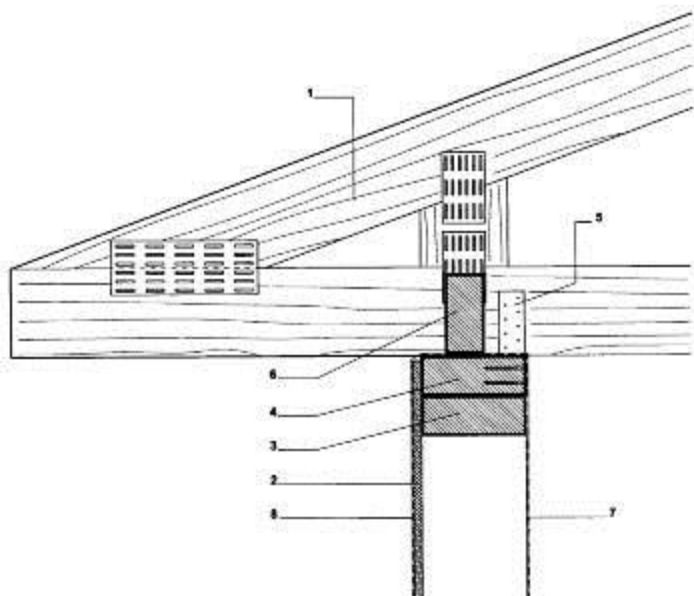


1. Fermes assemblées par connecteurs métalliques
2. Voile de contreventement
3. Montants et traverses bois
4. Lisse de chaînage bois
5. Fixation ferme sur chaînage ossature par pied de fermette ou équerre métallique renforcée
6. Entrecôte bois massif
7. Film pare-vapeur (non fourni)
8. Film pare-pluie (non fourni)

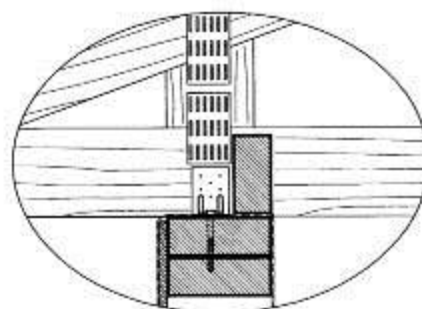
Toitures

liaison charpente industrielle avec mur extérieur bois (2)

COUPE VERTICALE SUR DEBORD BAS DE PENTE PIED DROIT (french heel)



VARIANTE : ÉQUERRE RENFORCÉE

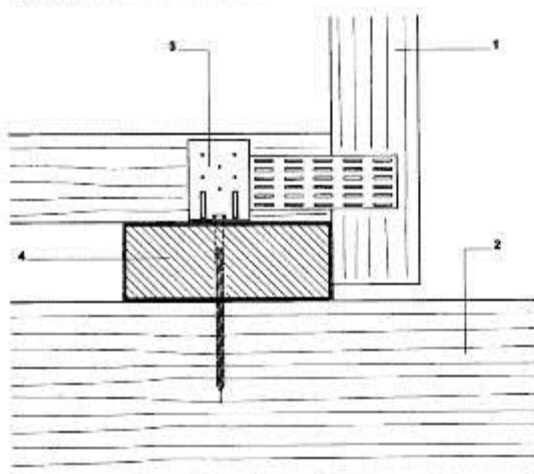


1. Fermes assemblées par connecteurs métalliques
2. Voie de contreventement
3. Montants et traverses bois
4. Lisse de chaînage bois
5. Fixation ferme sur chaînage ossature par pied de ferme ou équerre métallique renforcée
6. Entrée bois massif
7. Film pare-vapeur (non fourni)
8. Film pare-pluie (non fourni)

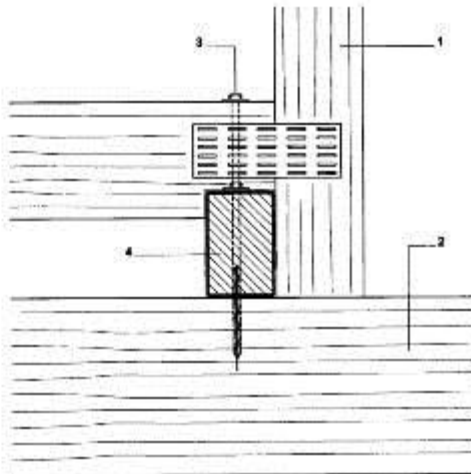
Toitures

liaison ferme industrielle comble habitable sur plancher bois

COUPE VERTICALE SUR FERME
EN APPUI SUR SUPPORT BOIS



COUPE VERTICALE SUR FERME
EN APPUI SUR SOLIVE

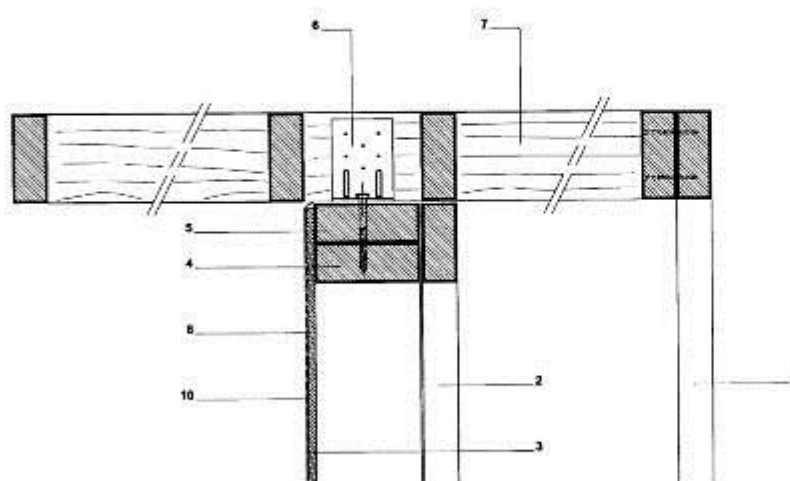


1. Formes assemblées par connecteurs métalliques, bois massifs, épaisseur 36 ou 45 mm, entraxe 800 à 900 mm, classe d'emploi 2
2. Solives bois, entraxe identique aux formes, classe d'emploi 2
3. Fixation ferme sur solive par équerres métalliques, tire-fond, vis.
4. Support formes en bois.

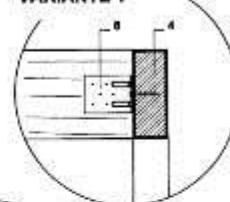
Toitures

liaison charpente industrielle avec mur extérieur bois

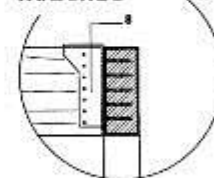
COUPE VERTICALE SUR DEBORD DE PIGNON AVEC ECHELLE DE TOIT



VARIANTE 1



VARIANTE 2

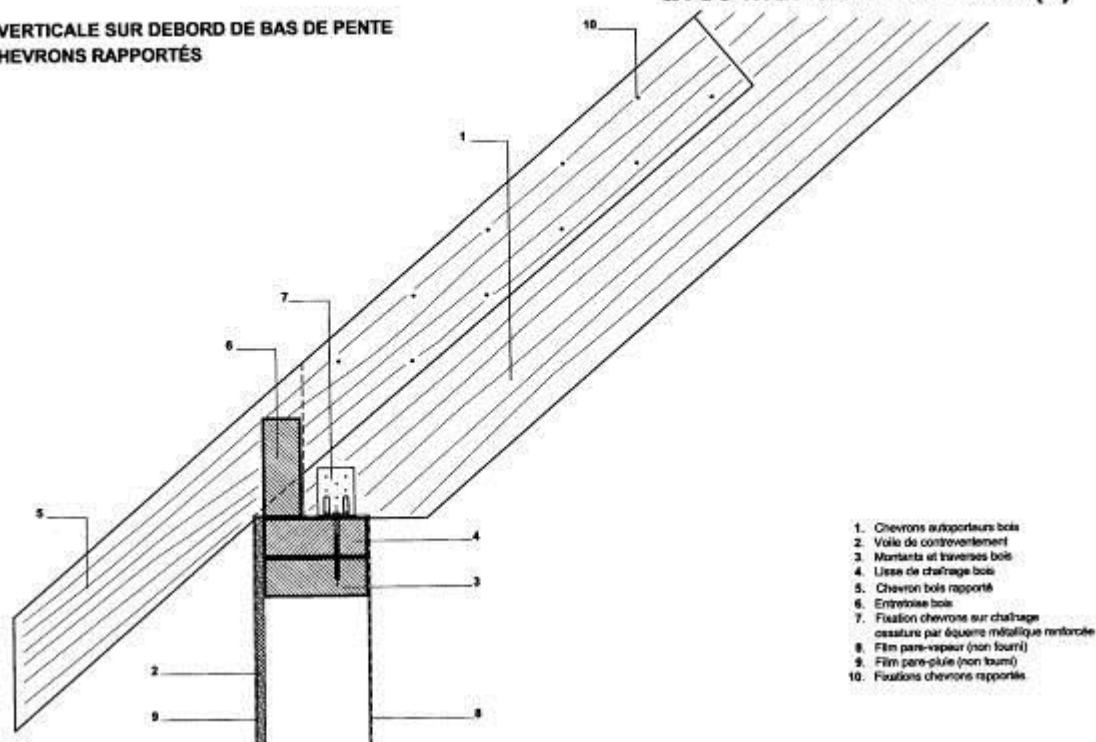


1. Fermes surbaissées assemblées par connecteurs métalliques
2. Formes surbaissées assemblées par connecteurs métalliques ou filets d'assise du contreventement
3. Vis de contreventement
4. Montants en traverses bois
5. Lisse de chaînage bois
6. Fixation échelle sur chaînage ossature par équerre renforcée
7. Échelle de débord en bois massif
8. Fixation échelle sur ferme par vis, pointes, équerre renforcée ou bolter métallique
9. Film pare-pluie (non fourni)

Toitures

COUPE VERTICALE SUR DEBORD DE BAS DE PENTE
AVEC CHEVRONS RAPPORTÉS

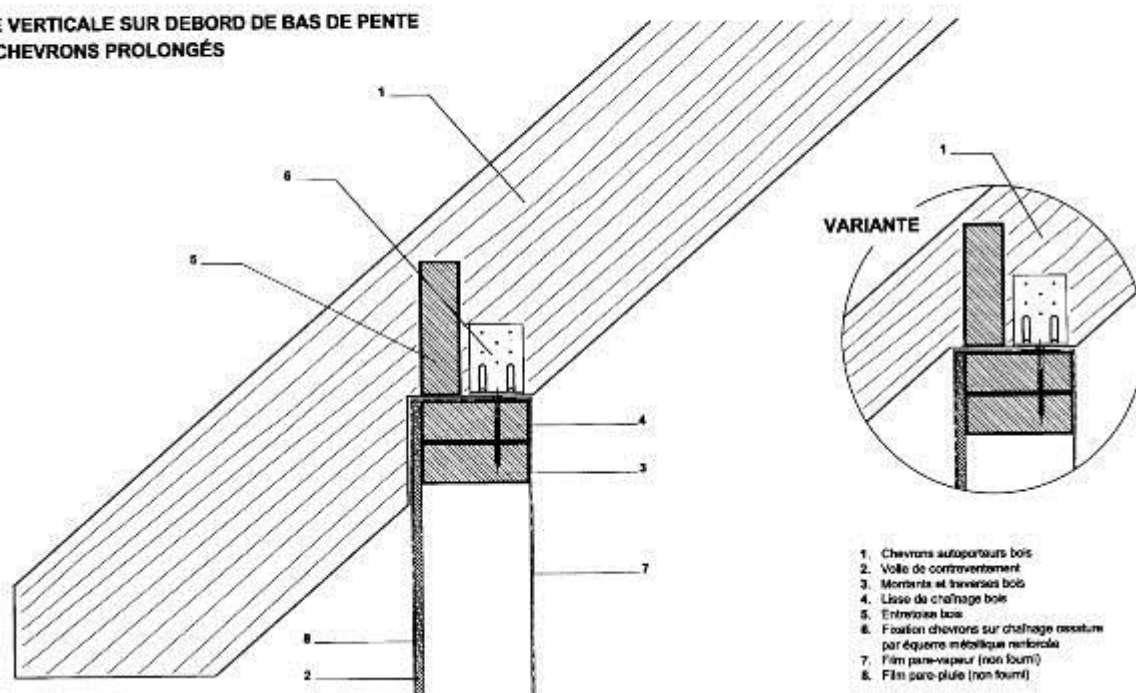
liaison chevron autoporteur
avec mur extérieur bois (1)



Toitures

COUPE VERTICALE SUR DEBORD DE BAS DE PENTE
AVEC CHEVRONS PROLONGÉS

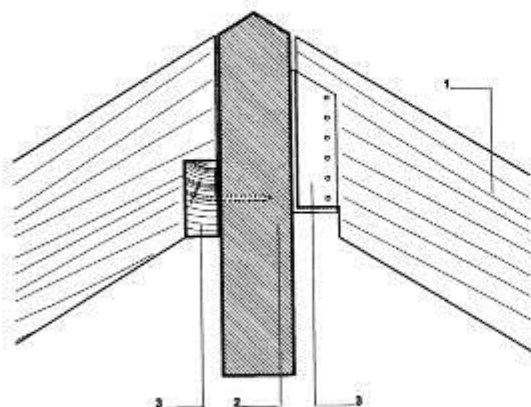
liaison chevron autoporteur
avec mur extérieur bois (2)



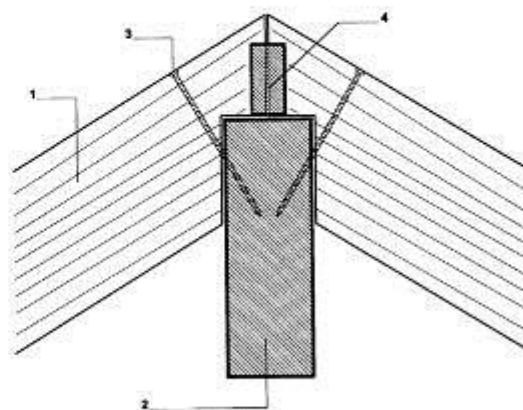
Toitures

liaison chevron autoporteur avec panne faîtière (1)

COUPE VERTICALE SUR CHEVRONS EN APPUIS



COUPE VERTICALE SUR CHEVRONS EN VIS A VIS

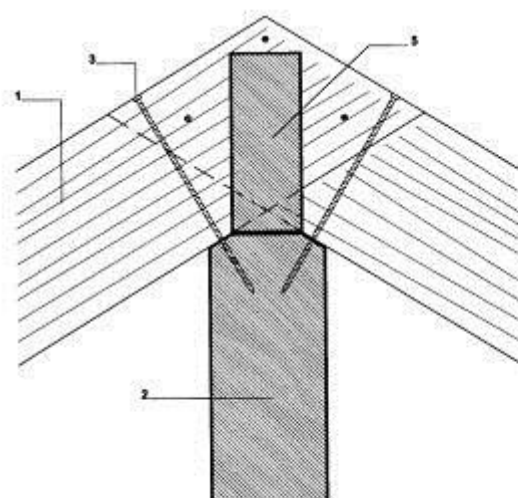


1. Chevron autoporteur
2. Panne de faîtière bois
3. Fixation chevrons sur pannes par vis, pointes, boîtiers métalliques ou tasseaux bois.
4. Entretoises bois

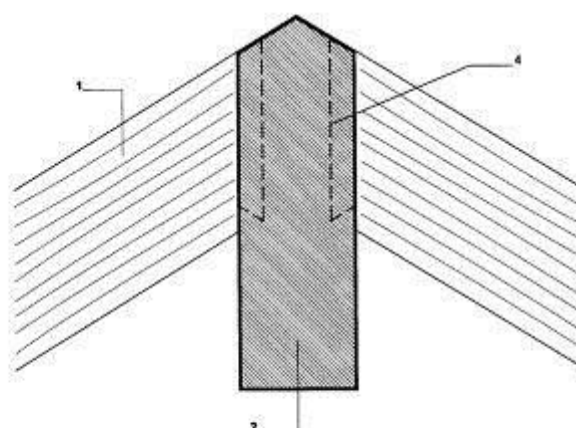
Toitures

liaison chevron autoporteur avec panne faîtière (2)

COUPE VERTICALE SUR CHEVRONS MOISÉS



COUPE VERTICALE SUR CHEVRONS EN QUEUS D'ARRONDE



1. Chevron autoporteur
2. Panne de faîtière bois massif, bois
3. Fixation chevrons entre-eux : boulons, tir-fonds, vis, pointes non lissées
4. Assemblage en queue d'arronde
5. Entretoise bois