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European Technical Assessment

ETA-12/0288 of 26/06/2015

English translation prepared by CSTB - Original version in French language

General Part

Technical Assessment Body issuing the ETA:	**Centre Scientifique et Technique du Bâtiment (CSTB)**
Nom commercial ***Trade name***	**MODULISO**
Famille de produit **Product family**	*Unité de construction préfabriquée métallique pour bâtiments multi étagés.* **Prefabricated metal building unit for multi storey buildings.**
Titulaire **Manufacturer**	**YVES COUGNAUD** **Parc d'activités de Beaupuy 2** **Mouilleron-le-captif** **85035 LA ROCHE-SUR-YON CEDEX - FRANCE**
Usine de fabrication **Manufacturing plant**	**YVES COUGNAUD** **Parc d'activités de Beaupuy 2** **Mouilleron-le-captif** **85035 LA ROCHE-SUR-YON CEDEX - FRANCE**
Cette evaluation contient: **This Assessment contains:**	*17 pages incluant 8 annexes qui font partie intégrante de cette évaluation* **17 pages including 8 annexes which form an integral part of this assessment**
Base de l'ETE **Basis of ETA**	*ETAG 023, Version Août 2006, utilisé en tant que Document d'Évaluation Européen (DÉE)* **ETAG 023, Edition August 2006 used as EAD**
Cette evaluation remplace: **This Assessment replaces:**	ETA-12/0288 du 27/06/2012

1 Technical description of the product

MODULISO building units are prefabricated three-dimensional metal structures, transportable and relocatable, comprising floor, roof and walls. The units may form a building generally in conjunction with other units. The units comprise a metal frame with all the components required for structural stability.

The full specification and drawings for the materials and components covered by this ETA have been examined and are retained by the CSTB. This section and the annexes give only general details of the system.

The configuration of the main assembled components is shown in Annexes 1 to 3. Material and component specifications are shown in Annexes 5 and 6.

The metal frame of each unit comprises four steel hollow-section columns welded to cold-formed galvanized steel frameworks at floor and roof level. The floor structure consists of floor joists welded to two main beams in the long direction. The roof structure consists of roof joists welded to two main beams in the long direction. Floor and roof structures are completed by two main beams in the short direction in order to create the diaphragm effect. Lifting points are integrated at each corner of the units and welded to the main beams of the roof and to the columns. Steel grade varies from S235 to S275 and steel protection could be Z275 according to EN 10346, painting according to EN ISO 12944-1, zinc-coating according to EN ISO 4998 (see annex 6). The metal frame is completed by non structural steel elements which are used as interface between the structure and the non structural components.

Property MODULISO 615+, 615+ P120, 618+, 618+ P120	
Maximum unit length (m)	**6,036**
Maximum unit width 615+ (m)	**2,44**
Maximum unit width 618+ (m)	**2,93**
Maximum unit height (m)	**2,92**

Table 1: maximum size of the units

Foundations, external cladding, internal lining and floor covering are not assessed in this ETA. Windows, doors, stairs, ground floor, internal fittings, technical installations and other components which are necessary to form a complete building are not part of this ETA.

The completed buildings (the works) based on the kits are not under the responsibility of ETA holder Yves COUGNAUD. The way in which it is ensured that the final building meets the local regulatory requirements shall be provided for on national level. The person(s) responsible for fulfilment of the essential requirements of the completed building may ask Yves COUGNAUD for all data and details that are necessary.

2 Specification of the intended use

The intended use of the MODULISO units is the construction of temporary and definitive buildings used for example in office buildings, schools and medical buildings.

The provisions made in this European Technical Approval are based on an assumed working life of the building composed with MODULISO units of 50 years for the load-bearing structure, provided that the conditions laid down in sections 4 for the transport, storage, installation, maintenance and repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product

3.1 Characteristics of product

The building system was assessed only for the Essential Requirements (ER) 1, 2 and 3. The results for ER1 are tabulated in tables 2 to 5.

3.2 Mechanical resistance and stability (BWR 1)

The characteristic performance of the buildings was determined by calculation according to EN 1993. Examples of building units combination with load hypothesis are shown in Annex 7 and 8.

The structural design should confirm that, according to the structural requirements for the works, the relevant loads combination at ultimate limit state does not exceed the design loadbearing capacities given in “Horizontal elements” and “Vertical elements” of tables 2 to 5. Clause 4.1.2 gives general provisions about the design of a whole building. Each line of the part “Acceptable loads from above” of tables 2 to 5 gives designed values elements by elements and for one direction of load.

Seismic design shall be carried on according to EN 1998-1.

MODULISO 618+	*Member Ref. (see annex 5-6)*	**Design approach of unit**	
		A	D1
Horizontal elements			
Maximum imposed floor load $\gamma_q Q_q = 1{,}5 * 2{,}5$ (kN/m²)		3,75	3,75
Maximum imposed roof upward load $\gamma_{q1} Q_{q1} + \sum_{i>1} \psi_{0,i} \gamma_{q1} Q_{q1}$ (kN/m²)		0,97	R+1 =0,72 R+2 =1,03
Maximum imposed roof down load $\gamma_{q1} Q_{q1} + \sum_{i>1} \psi_{0,i} \gamma_{q1} Q_{q1}$ (kN/m²)		1,2	1,2
Vertical elements			
Maximum wind load pressure $\gamma_{q1} Q_{q1} (c_{pe} - c_{pi-})$ (kN/m²)		0,88	R+1 =0,88 R+2 =1,21
Maximum wind load suction $\gamma_{q1} Q_{q1} (c_{pe} - c_{pi+})$ (kN/m²)		0,56	R+1 =0,55 R+2 =0,72
Acceptable loads from above			
Column supporting roof loads – $N_{b,Rd}$ (kN)	8	161,2	157,2
Column supporting roof loads – $M_{b,Rd}$ (kN.m)		9,04	9,04
Main beam in the long direction of the floor – $N_{b,Rd}$ (kN)	1	542,3	542,3
Main beam in the long direction of the floor – $M_{by,Rd}$ (kN.m)		24,44	24,44
Main beam in the long direction of the floor – $M_{bz,Rd}$ (kN.m)		15,56	15,56
Main beam in the short direction of the floor – $N_{b,Rd}$ (kN)	2	459	459
Main beam in the short direction of the floor – $M_{by,Rd}$ (kN.m)		14,72	14,72
Main beam in the short direction of the floor – $M_{bz,Rd}$ (kN.m)		11,72	11,72
Main beam in the long direction of the roof – $N_{b,Rd}$ (kN)	3	361,9	374,4
Main beam in the long direction of the roof – $M_{by,Rd}$ (kN.m)		14,54	15,04
Main beam in the long direction of the roof – $M_{bz,Rd}$ (kN.m)		6,55	6,55
Main beam in the short direction of the roof – $N_{b,Rd}$ (kN)	4	397,5	397,5
Main beam in the short direction of the roof – $M_{by,Rd}$ (kN.m)		15,77	15,77
Main beam in the short direction of the roof – $M_{bz,Rd}$ (kN.m)		9,44	9,44
Roof joist – $M_{by,Rd}$ (kN.m)	7	1,7	1,7
Floor joist – $M_{by,Rd}$ (kN.m)	5	3,75	3,75
Maximum horizontal deflection		**H/200**	**H/200**
Maximum vertical deflection		**L/200**	**L/200**
Général			
Capacity of fixings to structure M12 (6.8) - Min ($F_{v,Rd}$; $F_{b,Rd}$) (kN)		20,2	20,2
Capacity of fixings between units M12 (6.8) - Min ($F_{v,Rd}$; $F_{b,Rd}$) (kN)		20,2	20,2
Minimum number of units per level		**R0 = 1**	**R+1 = 2** **R+2 = 8**
Seismic performance (low seismicity recommended)	Energy dissipation factor q	1,5	
	Ductility class	DCL	

Table 1 : performances of the units MODULISO 618+

MODULISO 615+	*Member Ref. (see annex 5-6)*	**Design approach of unit**	
		A	D1
Horizontal elements			
Maximum imposed floor load $\gamma_q Q_q = 1{,}5 * 2{,}5$ (kN/m²)		3,75	3,75
Maximum imposed roof upward load $\gamma_{q1} Q_{q1} + \sum_{i>1} \psi_{0,i} \gamma_{q1} Q_{q1}$ (kN/m²)		0,97	R+1 =0,85 R+2 =1,03
Maximum imposed roof down load $\gamma_{q1} Q_{q1} + \sum_{i>1} \psi_{0,i} \gamma_{q1} Q_{q1}$ (kN/m²)		1,2	1,2
Vertical elements			
Maximum wind load pressure $\gamma_{q1} Q_{q1} (c_{pe} - c_{pi-})$ (kN/m²)		0,88	R+1 =1,02 R+2 =1,21
Maximum wind load suction $\gamma_{q1} Q_{q1} (c_{pe} - c_{pi+})$ (kN/m²)		0,56	R+1 =0,61 R+2 =0,71
Acceptable loads from above			
Column supporting roof loads – $N_{b,Rd}$ (kN)	8	161,2	157,2
Column supporting roof loads – $M_{b,Rd}$ (kN.m)		9,04	9,04
Main beam in the long direction of the floor – $N_{b,Rd}$ (kN)	1	412,8	412,8
Main beam in the long direction of the floor – $M_{by,Rd}$ (kN.m)		18,97	18,97
Main beam in the long direction of the floor – $M_{bz,Rd}$ (kN.m)		12,16	12,16
Main beam in the short direction of the floor – $N_{b,Rd}$ (kN)	2	459	459
Main beam in the short direction of the floor – $M_{by,Rd}$ (kN.m)		14,72	14,72
Main beam in the short direction of the floor – $M_{bz,Rd}$ (kN.m)		11,72	11,72
Main beam in the long direction of the roof – $N_{b,Rd}$ (kN)	3	361,9	374,4
Main beam in the long direction of the roof – $M_{by,Rd}$ (kN.m)		14,54	15,04
Main beam in the long direction of the roof – $M_{bz,Rd}$ (kN.m)		6,55	6,55
Main beam in the short direction of the roof – $N_{b,Rd}$ (kN)	4	397,5	397,5
Main beam in the short direction of the roof – $M_{by,Rd}$ (kN.m)		15,77	15,77
Main beam in the short direction of the roof – $M_{bz,Rd}$ (kN.m)		9,44	9,44
Roof joist – $M_{by,Rd}$ (kN.m)	7	1,7	1,7
Floor joist – $M_{by,Rd}$ (kN.m)	5	2,71	2,71
Maximum horizontal deflection		**H/200**	**H/200**
Maximum vertical deflection		**L/200**	**L/200**
Général			
Capacity of fixings to structure M12 (6.8) - Min ($F_{v,Rd}$; $F_{b,Rd}$) (kN)		20,2	20,2
Capacity of fixings between units M12 (6.8) - Min ($F_{v,Rd}$; $F_{b,Rd}$) (kN)		20,2	20,2
Minimum number of units per level		**R0 = 1**	**R+1 = 3** **R+2 = 10**
Characteristic racking strength in the short direction ($kN.m^{-1}$)		230	230
Characteristic racking strength in the long direction ($kN.m^{-1}$)		207	207
Seismic performance (low seismicity recommended)	Energy dissipation factor q	1,5	
	Ductility class	DCL	

Table 2: performances of the units MODULISO 615+

MODULISO 618+ P120	*Member Ref. (see annex 5-6)*	**Design approach of unit**
		D1
Horizontal elements		
Maximum imposed floor load $\gamma_q Q_q = 1{,}5 * 2{,}5$ (kN/m²)		3,75
Maximum imposed roof upward load $\gamma_{q1} Q_{q1} + \sum_{i>1} \psi_{0,i} \gamma_{q1} Q_{q1}$ (kN/m²)		1,17
Maximum imposed roof down load $\gamma_{q1} Q_{q1} + \sum_{i>1} \psi_{0,i} \gamma_{q1} Q_{q1}$ (kN/m²)		1,2
Vertical elements		
Maximum wind load pressure $\gamma_{q1} Q_{q1} (c_{pe} - c_{pi-})$ (kN/m²)		1,15
Maximum wind load suction $\gamma_{q1} Q_{q1} (c_{pe} - c_{pi+})$ (kN/m²)		0,73
Acceptable loads from above		
Column supporting roof loads (ground floor only) – $N_{b,Rd}$ (kN)	9	265,5
Column supporting roof loads(ground floor only) – $M_{b,Rd}$ (kN.m)		22,2
Main beam in the long direction of the floor – $N_{b,Rd}$ (kN)	1	542,3
Main beam in the long direction of the floor – $M_{by,Rd}$ (kN.m)		24,44
Main beam in the long direction of the floor – $M_{bz,Rd}$ (kN.m)		15,56
Main beam in the short direction of the floor – $N_{b,Rd}$ (kN)	2	459
Main beam in the short direction of the floor – $M_{by,Rd}$ (kN.m)		14,72
Main beam in the short direction of the floor – $M_{bz,Rd}$ (kN.m)		11,72
Main beam in the long direction of the roof – $N_{b,Rd}$ (kN)	3	486,2
Main beam in the long direction of the roof – $M_{by,Rd}$ (kN.m)		17,6
Main beam in the long direction of the roof – $M_{bz,Rd}$ (kN.m)		8,42
Main beam in the short direction of the roof – $N_{b,Rd}$ (kN)	4	397,5
Main beam in the short direction of the roof – $M_{by,Rd}$ (kN.m)		15,77
Main beam in the short direction of the roof – $M_{bz,Rd}$ (kN.m)		9,44
Roof joist – $M_{by,Rd}$ (kN.m)	7	1,7
Floor joist – $M_{by,Rd}$ (kN.m)	5	3,75
Maximum horizontal deflection		**H/200**
Maximum vertical deflection		**L/200**
Général		
Capacity of fixings to structure M12 (6.8) - Min ($F_{v,Rd}$; $F_{b,Rd}$) (kN)		20,2
Capacity of fixings between units M12 (6.8) - Min ($F_{v,Rd}$; $F_{b,Rd}$) (kN)		20,2
Minimum number of units per level		**10**
Characteristic racking strength in the short direction ($kN.m^{-1}$)		230
Characteristic racking strength in the long direction ($kN.m^{-1}$)		207
Seismic performance (low seismicity recommended)	Energy dissipation factor q	1,5
	Ductility class	DCL

Table 3: performances of the units MODULISO 618+ P120

MODULISO 615+ P120	*Member Ref. (see annex 5-6)*	**Design approach of unit**
		D1
Horizontal elements		
Maximum imposed floor load $\gamma_q Q_q = 1{,}5 * 2{,}5$ (kN/m²)		3,75
Maximum imposed roof upward load $\gamma_{q1} Q_{q1} + \sum_{i>1} \psi_{0,i} \gamma_{q1} Q_{q1}$ (kN/m²)		1,17
Maximum imposed roof down load $\gamma_{q1} Q_{q1} + \sum_{i>1} \psi_{0,i} \gamma_{q1} Q_{q1}$ (kN/m²)		1,2
Vertical elements		
Maximum wind load pressure $\gamma_{q1} Q_{q1} (c_{pe} - c_{pi-})$ (kN/m²)		1,40
Maximum wind load suction $\gamma_{q1} Q_{q1} (c_{pe} - c_{pi+})$ (kN/m²)		0,88
Acceptable loads from above		
Column supporting roof loads (ground floor only) – $N_{b,Rd}$ (kN)	9	265,5
Column supporting roof loads(ground floor only) – $M_{b,Rd}$ (kN.m)		22,2
Main beam in the long direction of the floor – $N_{b,Rd}$ (kN)	1	412,8
Main beam in the long direction of the floor – $M_{by,Rd}$ (kN.m)		18,97
Main beam in the long direction of the floor – $M_{bz,Rd}$ (kN.m)		12,16
Main beam in the short direction of the floor – $N_{b,Rd}$ (kN)	2	268
Main beam in the short direction of the floor – $M_{by,Rd}$ (kN.m)		9,02
Main beam in the short direction of the floor – $M_{bz,Rd}$ (kN.m)		7,26
Main beam in the long direction of the roof – $N_{b,Rd}$ (kN)	3	379 ,7
Main beam in the long direction of the roof – $M_{by,Rd}$ (kN.m)		13,7
Main beam in the long direction of the roof – $M_{bz,Rd}$ (kN.m)		6,58
Main beam in the short direction of the roof – $N_{b,Rd}$ (kN)	4	397,5
Main beam in the short direction of the roof – $M_{by,Rd}$ (kN.m)		15,77
Main beam in the short direction of the roof – $M_{bz,Rd}$ (kN.m)		9,44
Roof joist – $M_{by,Rd}$ (kN.m)	7	1,7
Floor joist – $M_{by,Rd}$ (kN.m)	5	2,71
Maximum horizontal deflection		**H/200**
Maximum vertical deflection		**L/200**
Général		
Capacity of fixings to structure M12 (6.8) - Min ($F_{v,Rd}$; $F_{b,Rd}$) (kN)		20,2
Capacity of fixings between units M12 (6.8) - Min ($F_{v,Rd}$; $F_{b,Rd}$) (kN)		20,2
Minimum number of units per level		**10**
Characteristic racking strength in the short direction ($kN.m^{-1}$)		230
Characteristic racking strength in the long direction ($kN.m^{-1}$)		207
Seismic performance (low seismicity recommended)	Energy dissipation factor q	1,5
	Ductility class	DCL

Table 4: performances of the units MODULISO 618+ P120

3.3 Safety in case of fire (BWR 2)

3.3.1 Reaction to fire

The MODULISO building units are made of steel classified to have reaction to fire Class A1.

3.3.2 Resistance to fire

No performance determined for resistance to fire.

3.4 Hygiene, health and the environment (BWR 3)

Based on the declaration of the manufacturer in accordance with Technical Report EOTA n° 034, MODULISO building units do not contain harmful or dangerous substances.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Assessment, there may be 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 Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.5 Safety in use (BWR 4)

For Basic requirement Safety in use the same criteria are valid as for Basic Requirement Mechanical Resistance and Stability (BWR1).

3.6 Protection against noise (BWR 5)

No performance determined for protection against noise.

3.7 Energy economy and heat retention (BWR 6)

No performance determined for energy economy and heat retention.

3.8 General aspects relating to fitness for use

3.8.1 Aspects of durability, serviceability and identification

3.8.1.1 Durability

Durability of the kit is acceptable in relation to the intended use and performance related to Essential Requirements 1, 2 and 3.

3.8.1.2 Corrosion of the metal

Cold formed thin gauge members are made of steel (S235 to S275) + Z275 according to EN 10346, painting according to EN ISO 12944-1, zinc-coating according to EN ISO 4998 (see annex 6).

The estimated working life of the various parts of the kit, based on general knowledge of metal frame performance and by examining the building details which are part of the unit, related to the intended use specified in 1.2, is 50 years, if maintenance activities as regards in 4.5 are done.

3.8.1.3 Serviceability

Horizontal and vertical deflections are to be determined according to each building project. Values for maximal deflections at service limit state are:

- ✓ H/200 for horizontal deflection with H equal to the unit height;
- ✓ L/200 for vertical deflection with L equal to the maximum floor span.

3.8.1.4 Identification

The Identification parameters for materials and components of the kit are shown in Annexes 5 and 6 of European Technical Approval. The way in which they are assembled is shown in Annexes 1 to 3.

3.8.2 Methods of verification

The assessment of fitness of the building unit for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1, 2 and 3 has been made in accordance with the « Guideline for European Technical Approval of prefabricated building units ».

4 Assessment and Verification of Constancy of Performance (AVCP)

According to Decision 2003/728/EC of the European Commission the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Prefabricated Building Units	In building works	–	1

5 Technical details necessary for the implementation of the AVCP system

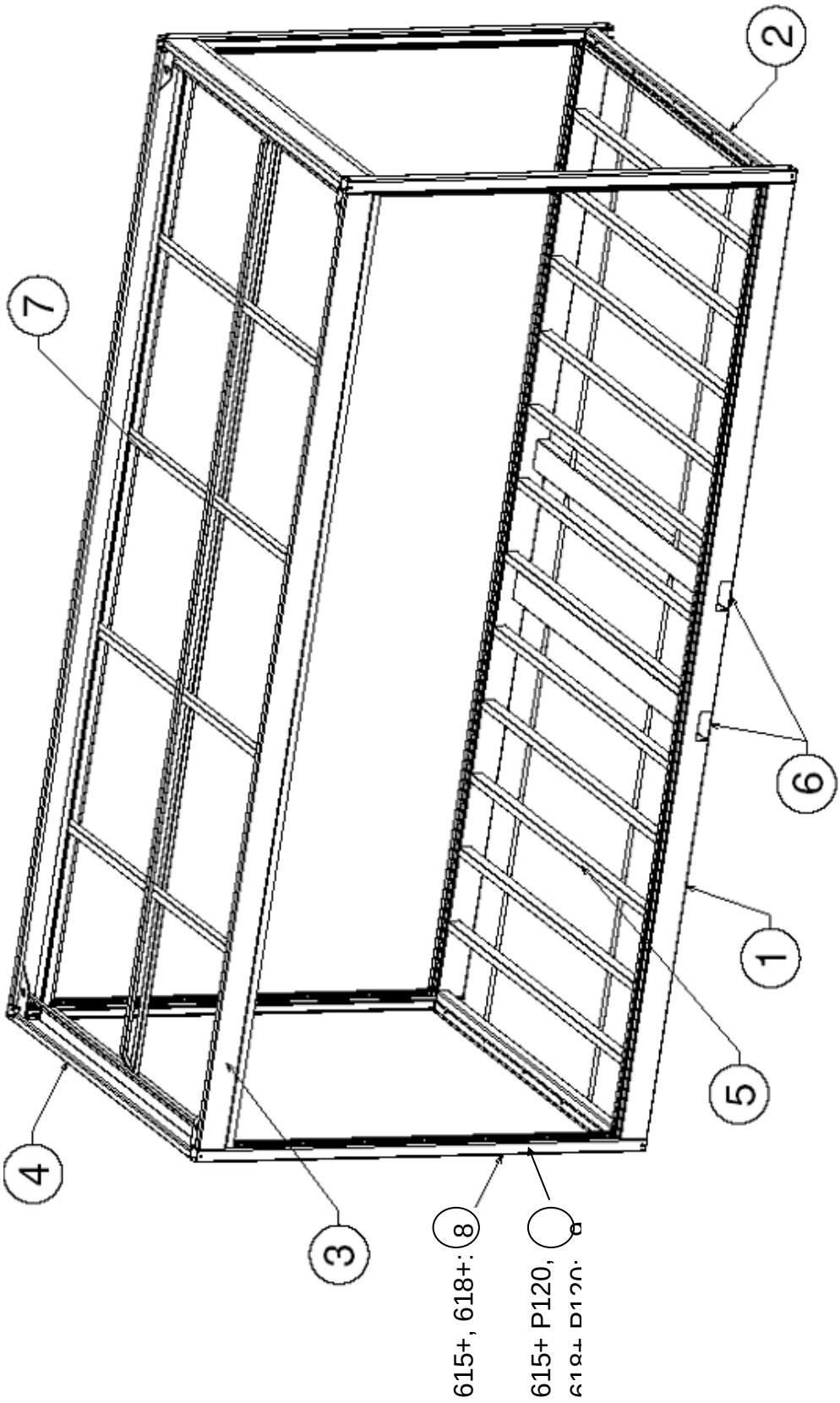
Technical details necessary for the implementation of the Assessment and verification of constancy of performance (AVCP) system are laid down in the control plan deposited at Centre Scientifique et Technique du Bâtiment.

The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of anchors for issuing the certificate of conformity CE based on the control plan.

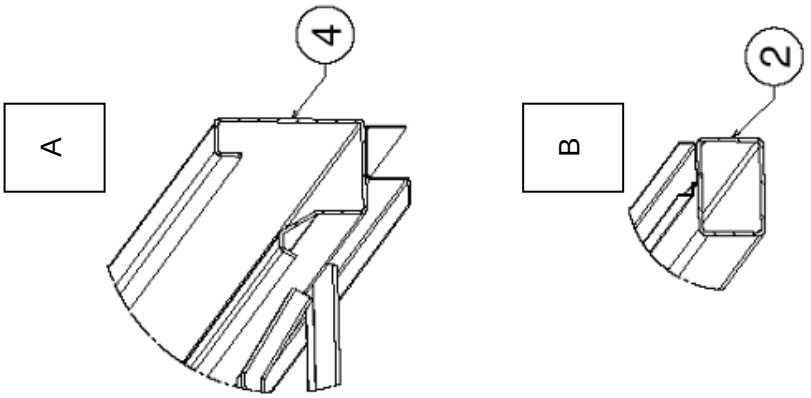
Issued in Marne La Vallée on 26-06-2015 by

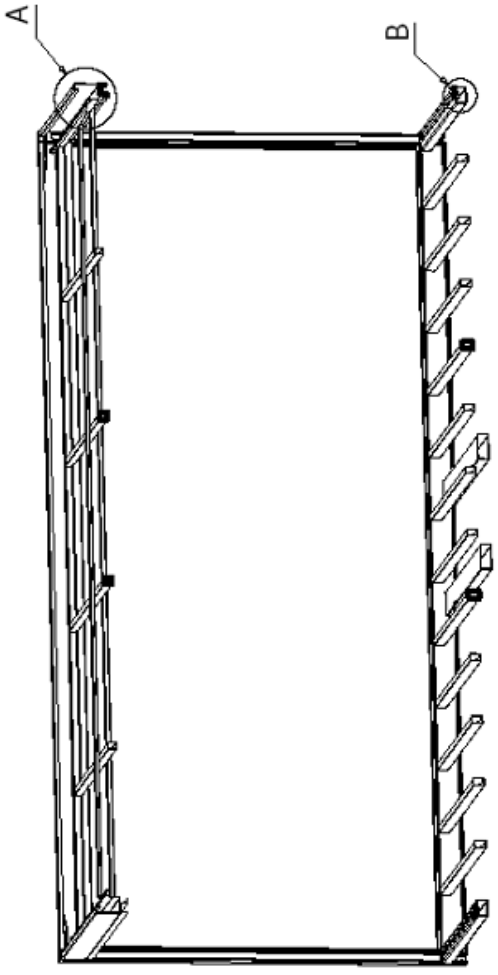
Charles Baloche *The original French version is signed*

Directeur technique



MODULISO building unit	**Annex 1** **of the European Technical Assesment**
Product description	**ETA – 12/0288**



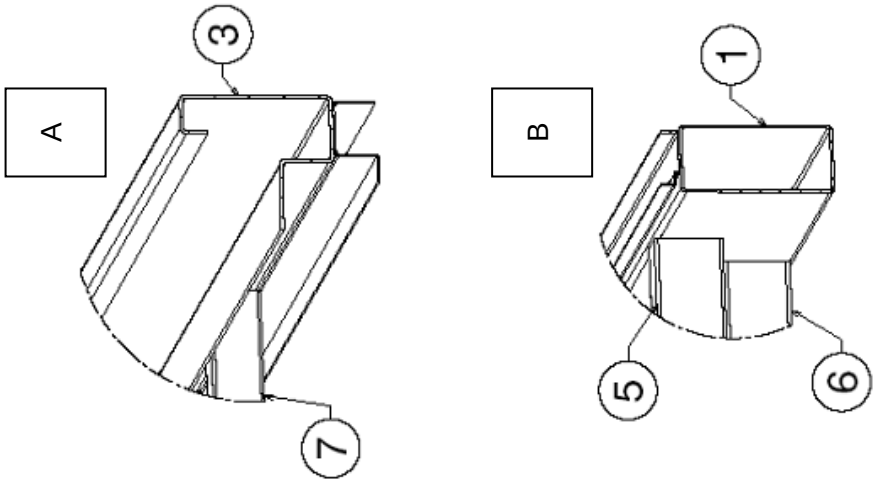


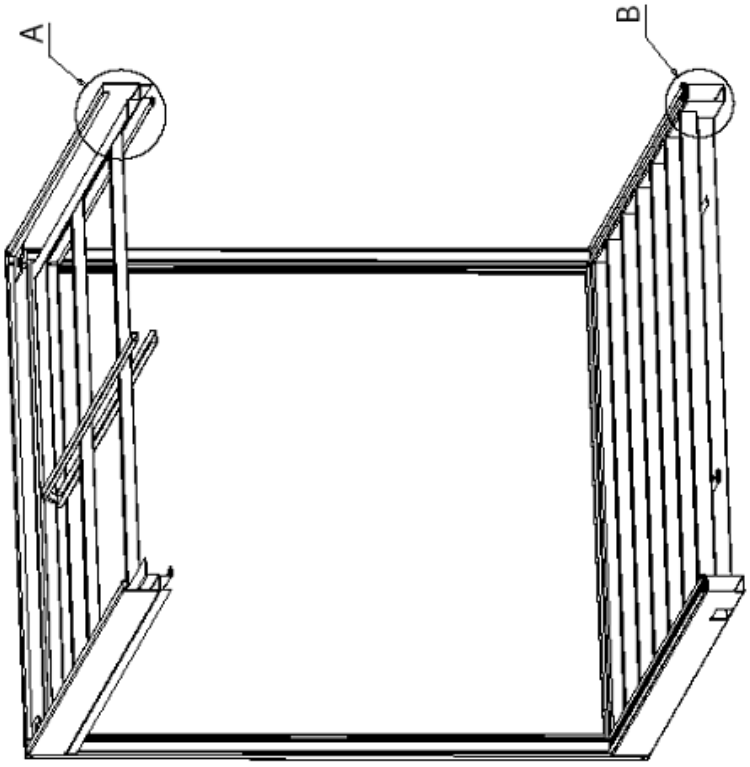
MODULISO building unit

Annex 2
of the European Technical Assesment

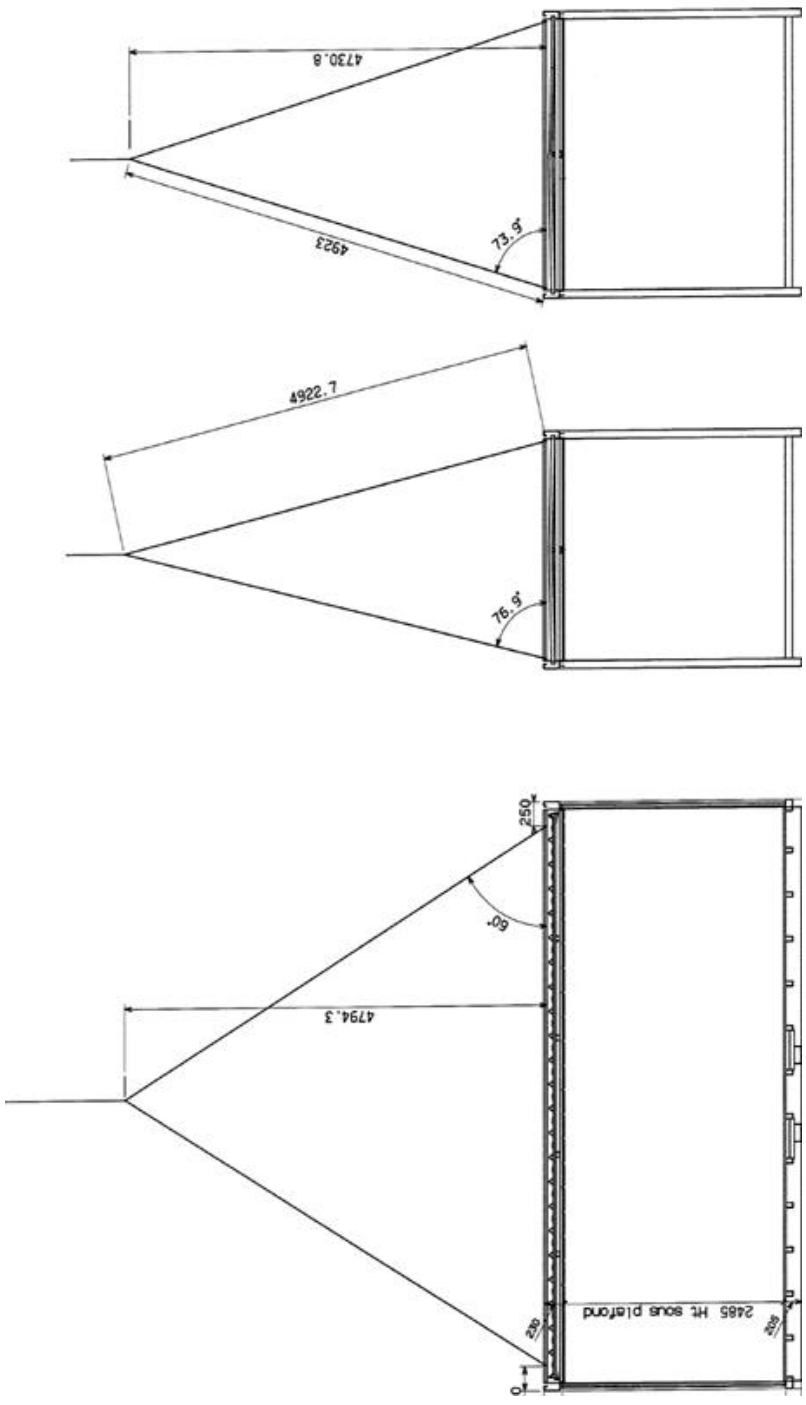
ETA – 12/0288

Top long corner detail



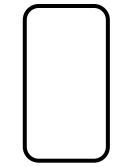


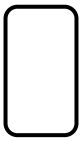
MODULISO building unit	**Annex 3** **of the European Technical Assesment**
Top long edge detail	**ETA – 12/0288**



MODULISO building unit	**Annex 4** **of the European Technical Assesment**
Unit lifting	**ETA – 12/0288**

	REFERENCE	DESIGNATION	QUANTITY
1	**1**	Main beam of the floor in the long direction	**2**
2	**2**	Main beam of the floor in the short direction	**2**
3	**3**	Main beam of the roof in the long direction	**2**
4	**4**	Main beam of the roof in the short direction	**2**
5	**5**	Floor joist	**12**
6	**6**	Transportation profile	**2**





	REFERENCE	DESIGNATION	QUANTITY
7	**7**	Roof joist	Moduliso 618+ :**8** Moduliso 615+ :**4**
8	**8**	Column	**4**
9	**9**	Column P120 (615+ P120 and 618+ P120)	**4**

Corrosion protection :

Ref Member	Corrosion protection	Relevant
1	painting	EN ISO 12944-1
2	painting	EN ISO 12944-1
3	painting + zinc	EN ISO 12944-1 + EN 10346
4	painting + zinc	EN ISO 12944-1 + EN 10346
5	zinc	EN 10346
6	painting	EN ISO 12944-1
7	painting	EN ISO 12944-1
8 - 9	zinc or paining + zinc-coating	EN 10346 EN ISO 12944-1 + EN ISO 4998

MODULISO "618 +" unit			
Configuration		Horizontal load q_p (daN/m²)	units number per level
	R0	53,75	1
	R+1	53,3	2
	R+1	53,3	3
	R+1	91	6
	R+2	75,8	8
	R+2	79,8	10

MODULISO "615 +" unit			
Configuration		Horizontal load q_p (daN/m²)	units number per level
	R0	53,75	1
	R+1	63,28	3
	R+1	91	6
	R+2	79,8	10

ground floor : MODULISO "615+ P120" uper levels : "615+" units			
Configuration		Horizontal load q_p (daN/m²)	units number per level
	R+3	84,6	10

Notes:

"Minimum configuration" is the number of units per level in each direction needed to resist to the horizontal load q. In this configuration, the maximum vertical loads are the values declared in tables 2 to 5.

"q" is the maximum horizontal load combination at service limit state.