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Designated
according to
Article 29 of
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European Technical Assessment

ETA 24/0806
of 30/09/2024

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011:	**Eurofins Expert Services OY**
Trade name of the construction product	**VMG Lignum Joist**
Product family to which the construction product belongs	Composite wood-based beams and columns
Manufacturer	**VMG Lignum Construction UAB** Ryto g. 6, Menčių village 85271 – Akmenės district Lithuania www.vmg.eu
Manufacturing plant	Ryto g. 6, Menčių village 85271 – Akmenės district Lithuania
This European Technical Assessment	12 pages including 2 Annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	EAD 130367-00-0304

II Specific Part

1 Technical description of the product

VMG Lignum Joist are wood-based composite joists and columns the cross section of which is I shaped. The flanges are made of LVL and the web of particleboard and they are glued together. The materials, dimensions and tolerances are given in Annex 1. The standard cross sections are given in Annex 2.

2 Specification of the intended uses in accordance with the applicable European Assessment Document, EAD

2.1 Intended uses

VMG Lignum Joist I-joists and studs are intended to be used as structural elements for load-bearing applications in buildings and civil engineering structures, for example: construction members or frame elements for walls, roofs, floors.

The products are intended to be used in service class 1 and 2 according to EN 1995-1-1. The product may be exposed to the weather for a short time during installation.

The product is only intended to be used subject to static or quasi-static actions. In seismic areas the behaviour factor of composite wood-based beams and columns used for the design is limited to non-dissipative or low-dissipative structures (q ≤1,5), defined according to Eurocode 8 (EN 1998-1:2004 clauses 1.5.2 and 8.1.3 b).

2.2 Working life and durability

The provisions made in this European Technical Assessment are based on an assumed intended working life of VMG Lignum Joists of 50 years, when installed in the works, provided that the composite wood-based beams and columns are subject to appropriate installation, use and maintenance, see 2.1. These provisions are based upon the current state of the art and the available knowledge and experience. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works[1].

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

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[1]   The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product can also be shorter than the assumed working life.

3 Performance of the product and references to the methods used for its assessment

Table 1. Basic requirements for construction works and essential characteristics

Basic requirement and essential characteristics	Performance
BWR 1. Mechanical resistance and stability	
Bending strength and/or bending moment capacity (edgewise and flatwise) and size effect parameter (edgewise and flatwise)	Clause 3.1, Annex 2
Tension strength and/or tension capacity parallel to the product and size effect parameter	Clause 3.1, Annex 2
Tension strength and/or capacity perpendicular to the product	No performance assessed
Compression strength and/or capacity parallel to the product	Clause 3.1, Annex 2
Compression strength perpendicular to the product (edgewise and flatwise) and/or bearing capacity	Clause 3.1, Annex 2
Shear strength and/or capacity (edgewise and flatwise) and size effect parameter (flatwise)	Clause 3.1, Annex 2
Modulus of elasticity parallel to the grain	Clause 3.1, Annex 2
Shear modulus (edgewise and flatwise)	Clause 3.1, Annex 2
Torsional shear capacity and rigidity	Clause 3.1, Annex 2
Density	Clause 3.1, Annex 2
Creep	Clause 3.1, Annex 2
Dimensional stability	Annex 1
Corrosion resistance of metal fasteners and other connectors	No performance assessed
Bonding quality and durability of bonding strength	Clause 3.1
BWR 2. Safety in case of fire	
Reaction to fire of materials and components	Clause 3.2
Resistance to fire	No performance assessed
BWR 3. Hygiene, health and the environment	
Content, emission and/or release of dangerous substances	Clause 3.3
BWR 6. Energy economy and heat retention	
Thermal conductivity	Clause 3.4
Thermal inertia	No performance assessed
Aspects of durability	
Natural Durability	Clause 3.5

3.1 Mechanical resistance and stability, BWR 1

Characteristic value or mean values of the mechanical properties inclusive stiffness values of the standard joist sections are given in Annex 2.

Actions at joist supports shall not exceed the bearing resistance given in Annex 2.

The adhesive is of type I (full exposure to the weather) as defined in EN 301. The bonding quality and durability of bonding strength have been assessed according to the shear test method described in EN 13377, D.4. to be suitable for use class 1 and 2 conditions.

3.2 Safety in case of fire, BWR 2

3.2.1 Reaction to fire

The joists consist of materials classified to have reaction to fire class D-s2,d0 or better.

3.3 Hygiene, health and environment, BWR

3.3.1 Content, emission and/or release of dangerous substances

The release of dangerous substances is determined according to EAD 130067-00-0304, "Composite Wood-base beams and columns". The manufacturer has not declared that the joists would have other harmful or dangerous substances as defined in the EU database than formaldehyde and pentachlorophenol. The class of the product is E1 for formaldehyde. The web material has the class ≤ 5ppm for pentachorophenol.

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 Products Regulation, these requirements need also to be complied with, when and where they apply.

3.4 Energy economy and heat retention, BWR 6

3.4.1 Thermal resistance

The thermal conductivity λ for both web and flange material is 0,13 W/(m K) according to EN 12524. The natural density variation of the materials is taken into account in this value.

3.5 Aspects of durability

3.5.1 Natural durability

The adhesive of type I also can be used in service class 3, but the untreated flange and web materials do not withstand attacks from fungi. The biological durability is DC5 (not durable) based on spruce sapwood classification according to EN 350. Therefore, VMG Lignum Joist I joists can be used in service classes 1 and 2 as defined in Eurocode 5, which correspond to the use classes 1 and 2 as defined in EN 335. The product may be exposed to the weather for a short time during installation.

Durability may be reduced by attack from insects such as long horn beetle, dry wood termites and anobium in regions where these may be found.

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

According to the Decision 99/92/EC of the European Commission[2], the system of assessment and verification of constancy of performance (see Annex V to the regulation (EU) No 305/2011) is System 1.

4.1 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 Eurofins Expert Services Oy.

Issued in Espoo on September 30, 2024
by Eurofins Expert Services Oy

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Manager, Structures

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[2] Official Journal of the European Communities L 29 of 03.02.1999

ANNEX 1

DESCRIPTION OF THE JOISTS

1   Cross sections and sizes

The shape of the joists is shown in Figure 1-1. The depths of VMG Lignum Joists are from 200 mm to 400 mm. The thickness of the web is 10 mm. The width of the flange is from 45 to 90 mm and the flange depth is 39 mm. Tolerances measured in equivalent conditions when RH is 65 % and temperature 20 °C are given in Table 1-1. Standard cross sections are given in Annex 2, Table 2-4.
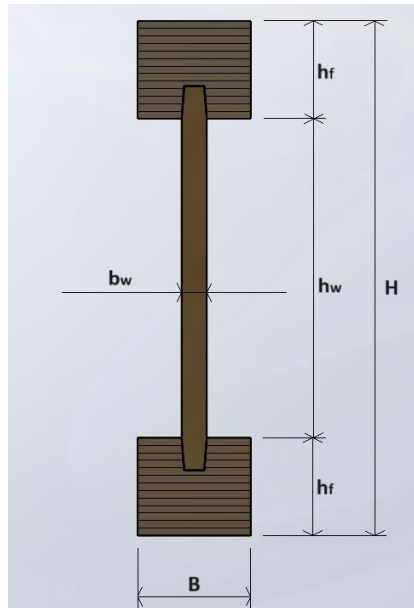

Figure 1-1. Cross-section of VMG Lignum Joist.

The type of cross section is given by a code, e.g. 60-300, where the first figure indicates the width of the flange and the second one the depth of the joist.

Nominal depth of the web-flange joint is 13mm. The angle of the web flange joint is 5° (nominal). In the tip of the web flange joint a small space is left for the overflow glue. The joints of the web boards are made as a V shaped joint by gluing and they are allowed to be spaced deliberately. The nominal root depth of the joint is 7 mm.

Table 1-1. Tolerances of the VMG Lignum Joist.

Overall joist depth	$H < 400\ mm$	± 2,0 mm
	$H \geq 400\ mm$	-1 / +3 mm
Overall joist length	L	- 0 / + 10 mm
Flange width	B	± 2,0 mm
Flange depth	h_f	± 2 mm
Web thickness	b_w	± 0,8 mm

2 Specifications of components

The flanges are made of VMG Lignum LVL 48P (laminated veneer lumber) produced by VMG Lignum Construction UAB or corresponding LVL. The LVL flanges are orientated such that their veneers are perpendicular to the plane of the of the web. The material properties of the flanges comply with EN 14374. The characteristic strength values of the LVL shall be at least as given in Table 1-2 and they shall be certified by an approved body.

Table 1-2. Characteristic strength values of the LVL used for flanges of VMG Lignum Joist.

Property (N/mm²)	Symbol	Value
Bending strength, flatwise	$f_{m,o,flat,k}$	50
Tension strength parallel to grain	$f_{t,0,k}$	35
Compression strength parallel to grain	$f_{c,0,k}$	39
Compression strength perpendicular to grain, flatwise	$f_{c,90,flat,k}$	2,6
5th percentile modulus of elasticity parallel to grain	$E_{0,k}$	11 600
Mean modulus of elasticity parallel to grain	$E_{0,mean}$	14 000

The web is made of particleboard which corresponds with at least grade P5 in accordance with EN 312 and EN 12369-1. The characteristic strength values of the P5 particle board shall be at least as given in Table 1-3.

Table 1-3. Characteristic strength values of the 10mm P5 particleboard used for web of VMG Lignum Joist.

Property N/mm²	Symbol	Value
Tension strength, bending calculations	$f_{t,,k}$	9,4
Compression strength, bending calculations	$f_{c,,k}$	12,7
Shear strength, panel shear	$f_{v,k}$	7,0
Shear strength, planar shear	$f_{r,k}$	1,9
Mean modulus of elasticity, bending stiffness calculations	$E_{0,mean}$	2 550
Mean shear modulus	$G_{v,mean}$	960

The adhesive is of type I (full exposure to the weather) as defined in EN 301.

3 Moisture content

When manufactured, the moisture content of the flanges and the web are below the equilibrium value in use conditions. Due to changing temperature and relative humidity of the surrounding air the moisture content of the joists will continuously change.

ANNEX 2
MECHANICAL PROPERTIES OF VMG LIGNUM JOISTS

The product is intended to be used in service classes 1 and 2 as defined in Eurocode 5. Characteristic resistances for the standard joist cross sections are based on characteristic strength values given in Table 2-1, which also may be used to calculate the properties for non-standard cross sections. The evaluation methods have been calculation or calculation assisted by testing. The structural properties of VMG Lignum Joists within the ranges for joist depth and flange specification given in Annex 1 may be calculated using VMG Lignum Construction's design procedures assessed by Eurofins Expert Services Oy. For the standard range of VMG Lignum Joists mechanical properties have been calculated in Tables 2-5 and 2-6 using these procedures. For sizes other than given in the tables, mechanical properties may be calculated by interpolation.

Table 2-1. Characteristic strength and modulus of elasticity and rigidity values to be used in calculations of VMG Lignum Joists.

Property	Symbol	Value (N/mm²)
Bending strength of flanges[3]	$f_{F,m,k}$	42
Tensile strength of flanges[3]	$f_{F,t,0,k}$	30
Compression strength parallel to gain of flanges[3]	$f_{F,c,0,k}$	33
Compression strength perpendicular to grain of flanges[3]	$f_{F,c,90,k}$	2,6
Bending strength of web edgewise	$f_{W,m,k}$	9,4
Shear strength of web	$f_{v,s,k}$	7,0
Shear strength of web/flange joint	$f_{v,p,k}$	3,0
Characteristic modulus of elasticity of flanges	$E_{F,0,k}$	11 600
Mean modulus of elasticity of flanges	$E_{F,0,mean}$	14 000
Mean modulus of elasticity of web	$E_{W,mean}$	2 550
Modulus of rigidity of web	$G_{W,mean}$	960

Serviceability of the joists is understood as their ability to resist loads without unacceptable deformation. Both bending deformation and shear deformation will cause deflection of the joist. Table 2-5 gives the mean stiffness values for the joists. These values are based on mean values of modulus of elasticity *E* and modulus of rigidity *G* given in Table 2-1, which also may be used to calculate the properties for non-standard cross sections.

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[3] To be used in the calculations only.

The modification factors for the joists, k_{mod} and k_{def} as defined in Eurocode 5, are given in Tables 2-2 and 2-3.

Table 2-2. Values of k_{mod} for the VMG Lignum Joists.

Duration of load	Bending and axial resistance		Shear resistance		Bearing resistance	
	Service class 1	Service class 2*	Service class 1	Service class 2	Service class 1	Service class 2
Permanent	0,6	0,6	0,30	0,20	0,6	0,6
Long term	0,7	0,7	0,45	0,30	0,7	0,7
Medium term	0,8	0,8	0,65	0,45	0,8	0,8
Short term	0,9	0,9	0,85	0,60	0,9	0,9
Instantaneous	1,10	1,10	1,10	0,80	1,10	1,10

* In service class 2, in addition to k_{mod}, the axial resistance and bending resistance based on the compression parallel to grain strength of the LVL flange material should be reduce by a factor 0,8. The reason for this that EN1995-1-1:2004 doesn't take into consideration the difference of the compression parallel to grain strength of LVL in SC1 and SC2 conditions.

Table 2-3. Values of k_{def} for the VMG Lignum Joists.

Bending and axial deformation		Shear deformation	
Service class 1	Service class 2	Service class 1	Service class 2
0,60	0,80	2,25	3,00

The structural performance of the product relies on adequate restraint to the compression flange. The effect of the restraint on the load-bearing capacity of the joist has to be taken into account as specified in Eurocode 5. The bending resistance values given in Table 2-5 are based on spacing of lateral constraints 500 mm. If the lateral bracing is spaced more sparsely the values shall be reduced according to the instructions given by the manufacturer.

Bearing resistance values are given without restriction for shear resistance. When relevant, the limiting effect of shear resistance shall be taken into account. Linear interpolation shall be used for bearing lengths in between the specified lengths.

When the VMG Lignum Joists are used as stud, the characteristic resistance values shall be calculated according to Eurocode 5. Axial compression resistances in Table 2-6 shall be used, as relevant.

Table 2-4. Cross section properties of VMG Lignum Joists

VMG Lignum Joist$_{PB}$	Joist depth H	Flange width B	Flange thickness h_w	Web thickness b_w	Flange area A_f	Web are A_w
	mm	mm	mm	mm	mm^2	mm^2
45-200	200	45	39	10	1755	1220
45-220	220	45	39	10	1755	1420
45-240	240	45	39	10	1755	1620
45-250	250	45	39	10	1755	1720
45-300	300	45	39	10	1755	2220
45-360	360	45	39	10	1755	2820
45-400	400	45	39	10	1755	3220
60-200	200	60	39	10	2340	1220
60-220	220	60	39	10	2340	1420
60-240	240	60	39	10	2340	1620
60-250	250	60	39	10	2340	1720
60-300	300	60	39	10	2340	2220
60-360	360	60	39	10	2340	2820
60-400	400	60	39	10	2340	3220
90-200	200	90	39	10	3510	1220
90-220	220	90	39	10	3510	1420
90-240	240	90	39	10	3510	1620
90-250	250	90	39	10	3510	1720
90-300	300	90	39	10	3510	2220
90-360	360	90	39	10	3510	2820
90-400	400	90	39	10	3510	3220

Table 2-5. Mechanical properties of VMG Lignum Joists

VMG Lignum Joist_PB	Characteristic values of capacities						Mean stiffness values	
	Bending moment M_k [1]	Shear V_k	End bearing [2]		Intermediate bearing [2]		Flexural rigidity EI_{mean}	Shear rigidity GA_{mean}
			45mm	90mm	75mm	135mm		
	kNm	kN	kN	kN	kN	kN	x 10^{12} Nmm²	x 10^6 Nmm²
45-200	8,57	10,36	8,74	13,42	15,91	22,15	0,330	1,920
45-220	9,60	11,76	8,74	13,42	15,91	22,15	0,417	2,112
45-240	10,63	13,16	8,74	13,42	15,91	22,15	0,515	2,304
45-250	11,14	13,86	8,74	13,42	15,91	22,15	0,568	2,400
45-300	13,73	17,36	8,74	13,42	15,91	22,15	0,875	2,880
45-360	16,84	18,33	8,74	13,42	15,91	22,15	1,337	3,456
45-400	18,92	20,71	8,74	13,42	15,91	22,15	1,705	3,840
60-200	11,43	10,36	10,48	16,10	19,09	26,58	0,438	1,920
60-220	12,80	11,76	10,48	16,10	19,09	26,58	0,553	2,112
60-240	14,17	13,16	10,48	16,10	19,09	26,58	0,682	2,304
60-250	14,86	13,86	10,48	16,10	19,09	26,58	0,752	2,400
60-300	18,30	17,36	10,48	16,10	19,09	26,58	1,156	2,880
60-360	22,46	18,33	10,48	16,10	19,09	26,58	1,762	3,456
60-400	25,23	20,71	10,48	16,10	19,09	26,58	2,240	3,840
90-200	17,14	10,36	10,48	16,10	19,09	26,58	0,655	1,920
90-220	19,19	11,76	10,48	16,10	19,09	26,58	0,826	2,112
90-240	21,25	13,16	10,48	16,10	19,09	26,58	1,018	2,304
90-250	22,28	13,86	10,48	16,10	19,09	26,58	1,121	2,400
90-300	27,46	17,36	10,48	16,10	19,09	26,58	1,718	2,880
90-360	33,68	18,33	10,48	16,10	19,09	26,58	2,610	3,456
90-400	37,84	20,71	10,48	16,10	19,09	26,58	3,312	3,840

[1] The flange which is under compresson stress is laterally restrained in max c/c 500mm spacing.

[2] Bearing capacies for support lengths between the support lengths in the table may be interpolated.

Table 2-6. Axial compression capacity of VMG Lignum Joists as a wall stud for centric axial loading (no eccentricity). Stud height is max 3000 mm and it has lateral restraints at every 1000 mm of the height.

VMG Lignum Joist$_{PB}$	Axial compression F_k
	kN
45-200	52,7
45-220	52,7
45-240	52,7
45-250	52,8
45-300	52,9
45-360	53,0
45-400	53,1
60-200	112,3
60-220	112,6
60-240	112,9
60-250	113,0
60-300	113,6
60-360	114,3
60-400	114,7
90-200	221,8
90-220	222,8
90-240	223,7
90-250	224,2
90-300	226,5
90-360	229,3
90-400	231,2