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European Technical Assessment

ETA 17/0424
of 25/04/2018

General Part

Technical Assessment Body issuing the European Technical Assessment
Technický a zkušební ústav stavební Praha, s.p.

Trade name of the construction product	**Sk-beam**
Product family to which the construction product belongs	Product area code: 13 Structural timber products/elements and ancillaries
Manufacturer	OOO "KARKAS KOMPLEKT" Volokalamskoe sh. d.1, off. 515 125080 Moscow Russian Federation www.karkaskomplekt.ru
Manufacturing plant	OOO "KARKAS KOMPLEKT" Moskovskaja oblast Istrinskij rajon Ul. Pervomajskaja, Vladenije 1 Russian Federation
This European Technical Assessment contains	20 pages including 3 Annexes, which form an integral part of this European Technical Assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	ETAG 011 used as EAD, edition January 2002, Light composite wood-based beams and columns

Specific Parts

1 Technical description of the product

The subjects of this European Technical Assessment (ETA) are the beams as the light wood-based composite products with I-shaped cross section manufactured by OOO "KARKAS KOMPLEKT", Russian Federation, with or without circular or rectangular hole named as Sk-beam. The beams are designed and installed in accordance with the ETA holder's design and installation instructions, deposited at Technický a zkušební ústav stavební Praha, s.p.

The beams consist of flanges and webs. The web is adhesively bonded to the flanges. The web could have circular or rectangular hole. The ETA holder is ultimately responsible for the complete product.

The flanges are made of finger jointed laminated veneer lumber (LVL) and the web is made of oriented strand board OSB/3 with thickness 10 mm.

The characteristics (standard cross sections, materials, dimensions and tolerances) of the beams are specified by the ETA holder as described in point 1.1 and Annex 1 of the following pages.

A general example of configuration is shown below.

1.1 Characteristics and requirements

1.1.1 Types of Sk-beams

Table 1 Types of the beams

Type	Height of the beam H [mm]	Flange dimensions (laminated veneer lumber) width x depth b_f x h_f [mm]	
		64 x 38	89 x 38
1	241	x	x
2	302	x	x
3	356	x	x
4	406	x	x
5	457	--	x

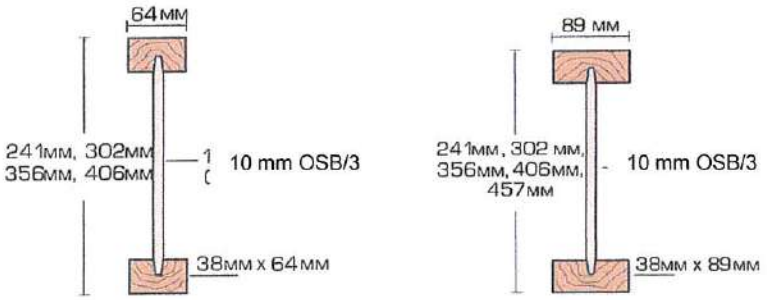

Figure 1 Types of the beams

1.1.2 Shape and dimensions

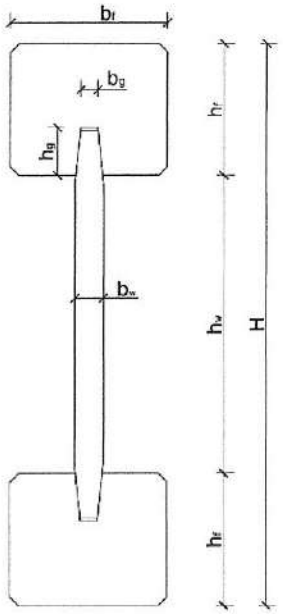

Figure 2 Sk-beam cross section

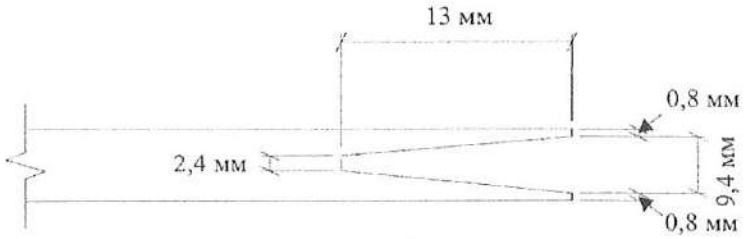

Figure 3 Detail of Sk-beam connection (64x38; 89x38); dimensions in mm

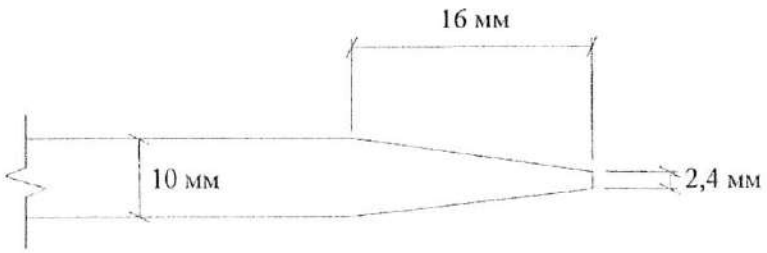

Figure 4 Detail of Sk-beam connection (64x38; 89x38); dimensions in mm

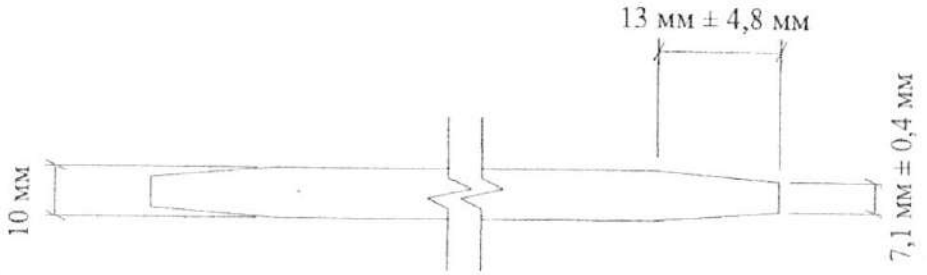

Figure 5 Detail of Sk-beam connection (64x38; 89x38); dimensions in mm

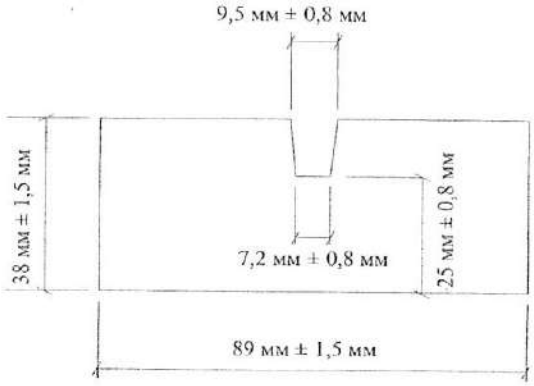

Figure 6 Detail of Sk-beam connection (89x38); dimensions in mm

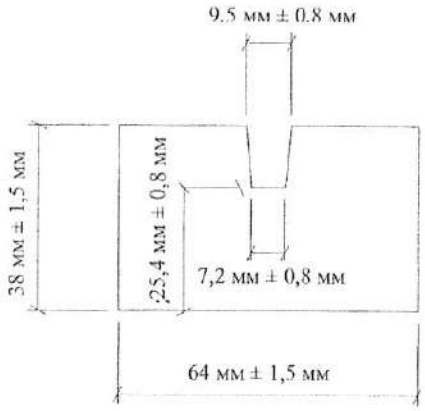

Figure 7 Detail of Sk-beam connection (64x38); dimensions in mm

Table 2 Cross-sectional sizes of the beams

Type	Dimensions [mm]				
	H	b_f	h_f	h_w	b_w
1	241	64	38	203	10
2	241	89	38	203	10
3	302	64	38	264	10
4	302	89	38	264	10
5	356	64	38	318	10
6	356	89	38	318	10
7	406	64	38	368	10
8	406	89	38	368	10
9	457	89	38	419	10

The acceptable dimensional tolerances for beams are stated in table below.

Table 3 The acceptable dimensional tolerances

Overall depth	H	[mm]	± 1.5 mm
Length	l		± 10 mm
Flange width	b_f		± 1.5 mm
Flange depth	h_f		± 1.5 mm
Web thickness	b_w		± 0.8 mm

1.1.3 Beams

The flanges consist of laminated veneer lumber (LVL) in accordance with EN 14374.

The flanges are produced from timber or LVL which is finger jointed in accordance with EN 14080.

The web consists of 10 mm oriented strand board of class OSB/3 according to EN 13986+A1, with characteristic values for structural design according to EN 300.

The adhesive must comply with EN 301 or EN 15425.

1.1.4 Moisture content

When the beams are manufactured, the maximum moisture content of the flanges shall be (12 ± 3) %, which is above the equilibrium value in normal use condition. The moisture content of the web is approximately 8 %, which corresponds to the value in normal use conditions. Due to changing temperature and relative humidity of the surrounding air the moisture content will continuously change.

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

Beams produced by OOO KARKAS KOMPLEKT are intended for use as load-bearing parts of building constructions. With regard to the moisture effect has on the product, the use is limited in service classes 1 and 2 as defined in Eurocode 5 (EN 1995-1-1 Eurocode 5: Design of timber structures - Part 1-1: General - Common rules and rules for buildings).

The provisions made in this European Technical Assessment are based on an assumed minimum working life of 50 years, provided that the beams are subject to appropriate use and maintenance.

The indications given as to the working life cannot be interpreted as a guarantee given by the producer or Technical Assessment Body but are regarded only as a mean for choosing the right products in relation to the expected economically reasonable working life of the works.

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

The assessment of the fitness for use of the Sk-beams according to the basic requirements for construction works were performed in accordance with ETAG 011.

The European Technical Assessment is issued for the beams on the basis of agreed data and information, deposited at Technický a zkušební ústav stavební Praha, s.p., which identifies beams that has been assessed and judged. Changes to the beams or production process, which could result in this deposited data and information being incorrect, should be notified to Technický a zkušební ústav stavební Praha, s.p. before the changes are introduced. Technický a zkušební ústav stavební Praha, s.p. will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alternations to the ETA shall be necessary.

Table 4 Performances of the beams

Product type: Light composite wood-based beams		**Intended use:** Load-bearing parts of building constructions
Trade name: Sk-beam		
Basic requirement for construction work (BWR)	**Essential characteristic**	**Performance**
BWR 1 Mechanical resistance and stability	Determination of flexural rigidity	Clause 3.1, Annex 1
	Determination of shear capacity	Clause 3.1, Annex 1
	Determination of bearing capacity	Clause 3.1, Annex 1
BWR 2 Safety in case of fire	Reaction to fire	Clause 3.2.1
	Fire resistance	NPA
BWR 3 Hygiene, health and the environment	Content and/or release of dangerous substances	Clause 3.3.1
BWR 4 Safety and accessibility in use	For the safety and accessibility in use, no performance was investigated for this product.	
BWR 5 Protection against noise	For the protection against noise, no performance was investigated for this product.	
BWR 6 Energy economy and heat retention	For the energy economy and heat retention, no performance was investigated for this product.	
BWR 7 Sustainable use of natural resources	For the sustainable use of natural resources, no performance was investigated for this product.	
NPA = No Performance Assessed		

3.1 Mechanical resistance and stability (BWR 1)

The mechanical properties of the Sk-beams are given in Annex 1.

No performance assessed regarding use in areas where seismic actions may occur.

In case the beams are to be used in areas where seismic actions may occur, the beams are individually designed for each individual building according to national requirements for seismic loads.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire

The webs have the classification D-s2, d0 according to EN 13501-1+A1. The flanges have the classification D-s1, d0 according to EN 13501-1+A1.

3.2.2 Fire resistance

No performance assessed.

3.3 Hygiene, health and the environment (BWR 3)

3.3.1 Content and/or release of dangerous substances

All wood-based products satisfy formaldehyde class E1 in EN 13986+A1.

3.4 Safety and accessibility in use (BWR 4)

No performance assessed.

3.5 Protection against noise (BWR 5)

No performance assessed.

3.6 Energy economy and heat retention (BWR 6)

No performance assessed.

3.7 Sustainable use of natural resources (BWR 7)

No performance assessed.

For the sustainable use of natural resources, no performance was investigated for this product.

3.8 Durability, serviceability and identification

The flanges are untreated and so do not withstand attacks from funghi, although spruce (*Picea abies*) is classified as slightly durable according to EN 350.
Durability may be reduced by attack from insects such as longhorn beetle, dry wood termites and anobium in regions where these may be found.

Serviceability of the beams is understood as their ability to resist loads without unacceptable deformation. This characteristic is treated under BWR 1.

The elements are provided with a protective foil. Each delivery package is labelled with relevant data, e.g. type mark of elements, address and other customer data. The product label also bears the CE marking.

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

According to the decision 1999/92/EC[1], of the European Commission, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies:

Product(s)	Intended use(s)	Level(s) or class(es)	System(s)
Light composite wood-based beams and columns (including T-beams, i.e. beam/ slab combinations)	in buildings	any	1

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 Technický a zkušební ústav stavební Praha, s.p.

Issued in Prague on 25/04/2018

TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, S.P. Technical and Test Institute for Construction Prague, SOE ZÚS Czech Republic Technical Assessment Body Subjekt pro technická posuzování

By
Ing. Maria Schaan
Head of the TAB

Annexes:

Annex 1 Mechanical properties of the beams

Annex 2 Manufacturing, installation and storage

Annex 3 Reference documents

[1] Official Journal of the European Communities L 29/49 and L 29/50, 03/02/1999

1 RESISTANCE AND STIFFNESS

1.1 General

The products are intended for use in service classes 1 and 2 as defined in Eurocode 5. Characteristic resistances and stiffness values for beams are given in tables below. The basis of these values is as follows:

Beams

Bending stiffness and moment resistance:	Calculation assisted by testing
Shear stiffness and shear resistance:	Calculation assisted by testing
Bearing resistance (minimum length of fastening):	Testing

1.2 Calculations

1.2.1 Design principles

Table 5 Explanatory notes

H [mm]	457	total height
b_f [mm]	89	flange width
h_f [mm]	38	flange height
b_w [mm]	10	web width
h_w [mm]	381	web height
b_g [mm]	10	groove width
h_g [mm]	15	groove height
b_t [mm]	7	web width in the groove
h_t [mm]	13	web height in the groove
A_f [mm^2]	3232	cross-sectional area of the flange
A_w [mm^2]	3992	cross-sectional area of the web
A_g [mm^2]	150	cross-sectional area of the groove
$A_{eff,inst}$ [mm^2]	7548	effective cross-sectional area for instant effects
$A_{eff,fin}$ [mm^2]	7157	effective cross-sectional area for finite effects
y_f [mm]	18.47	centroid position of the flange to the upper edge
y_w [mm]	228.5	centroid position of the web to the upper edge
$I_{y,f}$ [mm^4]	285920761	moment of inertia of the flanges
$I_{y,w}$ [mm^4]	53154419	moment of inertia of the web
$I_{y,eff,inst}$ [mm^4]	300348389	effective moment of inertia of the I-beam for instant effects
$I_{y,eff,fin}$ [mm^4]	295154443	effective moment of inertia of the I-beam for finite effects
$S_{y,f}$ [mm^3]	678829	first moment of area of the flange to the centroid
$S_{y,1/2w}$ [mm^3]	199378	first moment of area of the half of the web to the centroid
$S_{y,1/2,eff,inst}$ [mm^3]	732946	effective first moment of area of the half of the I-beam for instant effects
$S_{y,1/2,eff,fin}$ [mm^3]	713464	effective first moment of area of the half of the I-beam for finite effects

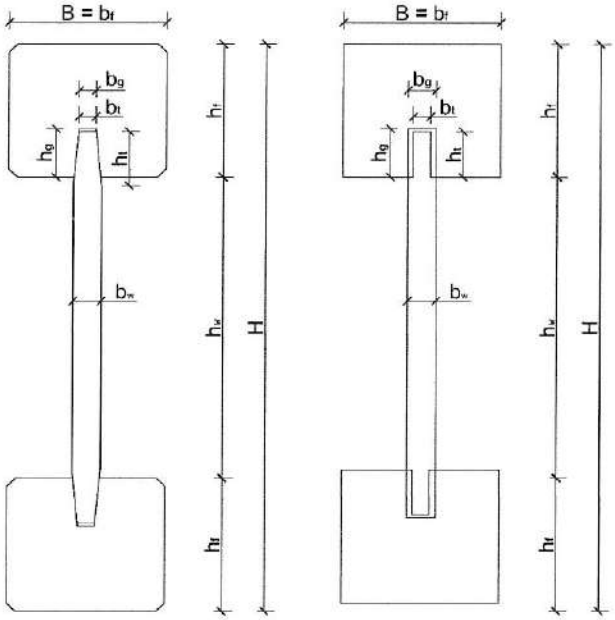

Figure 8 Simplified beam model used for calculations

Table 6 Calculation dimensions

Type	Dimensions [mm]								
	H	b_f	h_f	h_w	b_w	h_g	b_g	h_t	b_t
I457(89x38)	457	89	38	381	10	15	10	13	7
I406(89x38)	406	89	38	330	10	15	10	13	7
I356(89x38)	356	89	38	280	10	15	10	13	7
I302(89x38)	302	89	38	226	10	15	10	13	7
I241(89x38)	241	89	38	165	10	15	10	13	7
I406(64x38)	406	64	38	330	10	15	10	13	7
I356(64x38)	356	64	38	280	10	15	10	13	7
I302(64x38)	302	64	38	226	10	15	10	13	7
I241(64x38)	241	64	38	165	10	15	10	13	7

Material

Table 7 Strength, stiffness characteristic and density values of LVL

LVL		timber
$f_{m,k,flat,f}$ [MPa]	50.00	characteristic bending strength flatwise
$f_{t,0,k,f}$ [MPa]	36.00	characteristic tensile strength parallel to grain
$f_{t,90,k,f}$ [MPa]	0.90	characteristic tensile strength perpendicular to grain
$f_{c,0,k,f}$ [MPa]	40.00	characteristic compressive strength along parallel to grain
$f_{c,90,k,flat,f}$ [MPa]	3.80	characteristic compressive strength perpendicular to grain flatwise
$f_{v,k,flat,f}$ [MPa]	3.20	characteristic shear strength flatwise
$E_{0,mean,f}$ [MPa]	14000	mean value of modulus of elasticity parallel to grain
$E_{0,05,f}$ [MPa]	12000	5th percentile value of modulus of elasticity parallel to grain
$E_{90,mean,f}$ [MPa]	3000	mean value of modulus of elasticity perpendicular to grain
$G_{mean,f}$ [MPa]	500	mean value of shear modulus parallel to grain
$\rho_{k,f}$ [kg/m^3]	480	density
$\gamma_{M,f}$ [-]	1.0	partial factor for material properties
$k_{mod,f}$ [-]	1.00	modification factor value
$k_{def,f}$ [-]	0.60	deformation factor value

Table 8 Strength, stiffness characteristic and density values of OSB boards

OSB		timber
OSB/3 6-10		strenght class
$f_{m,k,II,w}$ [MPa]	18.00	characteristic bending strength in major axis
$f_{m,k,⊥,w}$ [MPa]	9.00	characteristic bending strength in minor axis
$f_{t,k,II,w}$ [MPa]	9.90	characteristic tensile strength in major axis
$f_{t,k,⊥,w}$ [MPa]	7.20	characteristic tensile strength in minor axis
$f_{c,k,II,w}$ [MPa]	15.90	characteristic compresive strength along the board in major axis
$f_{c,k,⊥,w}$ [MPa]	12.90	characteristic compresive strength along the board in minor axis
$f_{c,90,k,w}$ [MPa]	10.00	characteristic tensile strength perpendicular to grain
$f_{v,0,k,w}$ [MPa]	6.80	characteristic shear strength along the board
$f_{v,90,k,w}$ [MPa]	1.00	characteristic shear strength perpendicular to the board
$E_{0,mean,w}$ [MPa]	3800	mean value of modulus of elasticity parallel to the board
$G_{0,mean,w}$ [MPa]	1080	mean value of shear modulus parallel to the board
$\rho_{k,w}$ [kg/m³]	550	density
$\gamma_{M,w}$ [-]	1.0	partial factor for material properties
$k_{mod,w}$ [-]	1.00	modification factor value
$k_{def,w}$ [-]	1.50	deformation factor value

Table 9 Values of k_{mod} coefficient

Values of k_{mod}				
Duration of load	**Flanges (LVL)**		**Web (OSB/3)**	
	Service class 1	**Service class 2**	**Service class 1**	**Service class 2**
Permanent	0.6	0.6	0.4	0.3
Long term	0.7	0.7	0.5	0.4
Medium term	0.8	0.8	0.7	0.55
Short term	0.9	0.9	0.9	0.7
Instantaneous	1.1	1.1	1.1	0.9

Table 10 Values of γ_M coefficient

Values of γ_M	
Flanges (LVL)	1.2
Web (OSB/3)	1.2

Table 11 Values of k_{def} coefficient

Values of k_{def}		
	Service class 1	**Service class 2**
Flanges (LVL)	0.6	0.8
Web (OSB/3)	1.5	2.25

Shear resistance for beams with web holes

Circular holes

The design shear capacity, $V_{d,hole}$ in a beam cross section containing a circular hole in the web can be calculated according to:

$$V_{d,\,hole} = V_d \cdot k$$

with V_d being the design shear capacity of the beam without a hole, and with
k being a reduction factor determined by

$$k = \frac{h - h_f - 0{,}9D}{h - h_f}$$

with

h beam depth
D hole diameter, $D \leq h - 2h_f$
h_f flange depth

The restriction for hole placement are according to the figure 9. All holes should be placed centrically aligned in the web depth direction. The restrictions apply to holes with a diameter exceeding 20 mm, smaller diameter holes can be placed anywhere in the web, although with a minimum distance of 40 mm between hole edges. Point loads should not be applied closer than h mm from the hole edge, h being the beam depth.

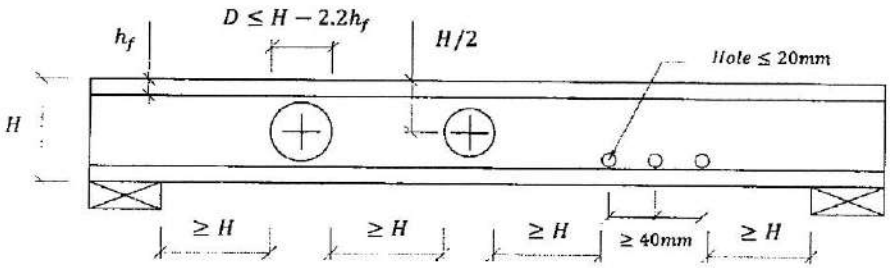

Figure 9 Restrictions on hole placement

Rectangular holes

For beams with depth $h \leq 250$ mm having rectangular holes (see figure 10), the above expressions also apply, substituting the diameter with largest side of the rectangular hole. Rectangular holes must be manufactured with corner radius larger than 20 mm. Point loads should not be applied closer than h mm from the hole edge, h being the beam depth. The following expressions for the reduction factor apply:

$$k = \frac{h - h_f - 0{,}9D}{h - h_f}$$

with

h beam depth ≤ 250 mm
D largest of a or b
a width of rectangular hole, $a \leq (h - 2h_f)$
b depth of rectangular hole, $b \leq (h - 2h_f) / 2$
h_f flange depth

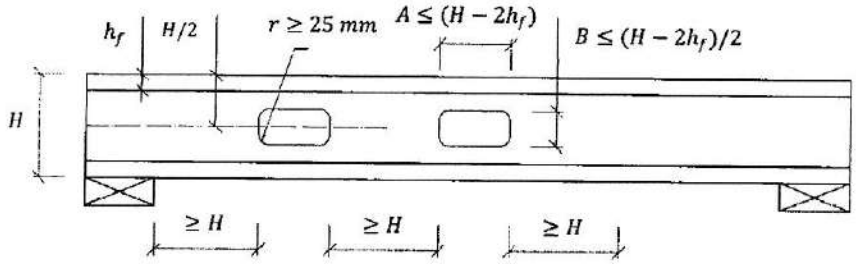

Figure 10 Beam with rectangular holes. Corner radius must be minimum 20 mm

1.2.2 Mechanical properties

Table 12 Results for beams used in service class 1
Final cross-sectional characteristics and stiffnesses (for $k_{def,f} = 0.6$ and $k_{def,w} = 1.5$)

Type	Cross-section area	Bending stiffness		Shear stiffness
	$A_{eff,fin}$	instantaneous $E_{0,mean,inst}I_{y,eff,inst}$	final $E_{0,mean,fin}I_{y,eff,fin}$	$G_{w,fin}\,A_w$
	[mm²]	[kNm²]	[kNm²]	[kN]
I457(89x38)	7157	4204.88	2582.60	1724.54
I406(89x38)	7069	3226.52	1986.39	1504.22
I356(89x38)	6982	2398.32	1479.97	1288.22
I302(89x38)	6888	1646.75	1018.77	1054.94
I241(89x38)	6782	972.59	603.43	791.42
I406(64x38)	5169	2322.75	1421.53	1504.22
I356(64x38)	5082	1722.64	1057.67	1288.22
I302(64x38)	4988	1180.07	727.10	1054.94
I241(64x38)	4882	695.35	430.16	791.42

Table 13 Results for beams used in service class 2
Final cross-sectional characteristics and stiffnesses (for $k_{def,f} = 0.8$ and $k_{def,w} = 2.25$)

Type	Cross-section area	Bending stiffness		Shear stiffness
	$A_{eff,fin}$	instantaneous $E_{0,mean,inst}I_{y,eff,inst}$	final $E_{0,mean,fin}I_{y,eff,fin}$	$G_{w,fin}\,A_w$
	[mm²]	[kNm²]	[kNm²]	[kN]
I457(89x38)	7064	4204.88	2285.98	1326.57
I406(89x38)	6987	3226.52	1759.26	1157.10
I356(89x38)	6912	2398.32	1311.49	990.94
I302(89x38)	6831	1646.75	903.35	811.50
I241(89x38)	6739	972.59	535.44	608.79
I406(64x38)	5087	2322.75	1257.16	1157.10
I356(64x38)	5012	1722.64	936.11	990.94
I302(64x38)	4931	1180.07	644.09	811.50
I241(64x38)	4839	695.35	381.42	608.79

Table 14 Results for beams used in service class 1
Final characteristic values of resistances
(for $k_{mod,f}$ = 1.0; $k_{mod,w}$ = 1.0 and $\gamma_{M,f}$ = 1.0; $\gamma_{M,w}$ = 1.0 and $k_{def,f}$ = 0.6; $k_{def,w}$ = 1.5)

Type	Shear resistance				Moment resistance		
	V_k	$V_{k,l,t}$	$V_{k,f}$	$V_{k,w}$	$M_{k,f1}$	$M_{k,f2}$	$M_{k,w}$
	[kN]	[kN]	[kN]	[kN]	[kNm]	[kNm]	[kNm]
I457(89x38)	26.17	6.76	123.83	102.66	64.59	50.59	57.51
I406(89x38)	25.02	5.92	108.41	90.56	55.92	44.29	50.95
I356(89x38)	21.62	5.10	93.42	78.63	47.51	38.17	44.63
I302(89x38)	17.95	4.23	77.41	65.68	38.55	31.63	37.97
I241(89x38)	13.80	3.25	59.56	51.01	28.62	24.33	30.71
I406(64x38)	25.02	6.00	78.92	89.81	40.02	31.66	36.67
I356(64x38)	21.62	5.16	67.90	78.08	33.95	27.24	32.06
I302(64x38)	17.95	4.27	56.18	65.33	27.52	22.53	27.21
I241(64x38)	13.80	3.28	43.15	50.83	20.40	17.31	21.96

Table 15 Results for beams used in service class 2
Final characteristic values of resistances
(for $k_{mod,f}$ = 1.0; $k_{mod,w}$ = 1.0 and $\gamma_{M,f}$ = 1.0; $\gamma_{M,w}$ = 1.0 and $k_{def,f}$ = 0.8; $k_{def,w}$ = 2.25)

Type	Shear resistance				Moment resistance		
	V_k	$V_{k,l,t}$	$V_{k,f}$	$V_{k,w}$	$M_{k,f1}$	$M_{k,f2}$	$M_{k,w}$
	[kN]	[kN]	[kN]	[kN]	[kNm]	[kNm]	[kNm]
I457(89x38)	26.17	6.74	123.31	102.66	64.31	50.38	57.51
I406(89x38)	25.02	5.90	108.01	90.56	55.71	44.13	50.95
I356(89x38)	21.62	5.09	93.14	78.63	47.37	38.05	44.63
I302(89x38)	17.95	4.22	77.22	65.68	38.46	31.55	37.97
I241(89x38)	13.80	3.25	59.45	51.01	28.57	24.29	30.71
I406(64x38)	25.02	5.96	78.52	89.81	39.81	31.49	36.67
I356(64x38)	21.62	5.14	67.61	78.08	33.81	27.12	32.06
I302(64x38)	17.95	4.25	55.98	65.33	27.42	22.46	27.21
I241(64x38)	13.80	3.27	43.04	50.83	20.35	17.26	21.96

1.3 Test results

Table 16 Determination of flexural rigidity for beams without hole (point 6.2 TR 002)

Type	No. of sample	Ultimate load F_{max} [kN]	M_u [kN·m^{-1}]	Local deflections at 0.1 and 0.4 F_{max} [mm]	Global deflections at 0.1 and 0.4 F_{max} [mm]	EI_{eff} [kN·m^2]	$(EI)_{beam}$ [kN·m^2]
I241 (64/38)	1.	24.2	17.50	0.16 1.11	2.93 15.94	808.4	1002.8
	2.			0.17 1.19	2.42 13.92	914.6	934.0
	3.			0.22 1.18	2.93 14.67	895.9	992.4
	4.			0.19 1.16	2.60 14.24	903.6	982.2
	5.			0.06 0.63	2.98 15.48	841.4	1671.4
	6.			0.24 1.25	3.05 15.42	850.3	943.3
	7.			0.22 1.16	2.83 14.65	889.8	1013.5
	8.			0.20 1.15	2.89 14.22	928.3	1002.8
I241 (89/38)	1.	30.5	22.05	0.21 1.13	3.25 14.66	1161.8	1305.1
	2.			0.23 1.12	2.8 14.68	1115.8	1349.1
	3.			0.22 1.06	3.14 14.93	1124.3	1429.4
	4.			0.27 1.29	3.34 15.09	1128.2	1177.2
	5.			0.15 0.85	3.33 15.49	1090.1	1715.3
	6.			0.06 0.96	3.19 15.44	1082.1	1334.1
	7.			0.21 1.19	3.13 15.87	1040.5	1225.2
	8.			0.16 1.16	3.32 15.38	1099.2	1200.7
I302 (64/38)	1.	22.5	20.39	0.25 1.41	2.82 17.59	1302.8	1502.6
	2.			0.15 1.27	2.57 16.79	1353.2	1556.2
	3.			0.17 1.44	2.94 17.21	1348.5	1372.4
	4.			0.25 1.47	2.9 17.80	1291.5	1428.7
	5.			0.25 1.42	2.80 16.45	1409.7	1489.7
	6.			0.23 1.38	2.69 16.95	1349.4	1515.6
	7.			0.20 1.33	2.76 16.87	1363.8	1542.5
	8.			0.22 1.40	2.81 17.14	1342.8	1477.1
I302 (89/38)	1.	21.5	19.48	0.09 0.82	1.74 12.04	1785.2	2281.5
	2.			0.12 0.95	1.83 12.18	1776.6	2006.7

Type	No. of sample	Ultimate load F_{max} [kN]	M_u [kN·m^{-1}]	Local deflections at 0.1 and 0.4 F_{max} [mm]	Global deflections at 0.1 and 0.4 F_{max} [mm]	EI_{eff} [kN·m^2]	$(EI)_{beam}$ [kN·m^2]
	3.			0.15 0.92	1.98 11.71	1889.8	2163.0
	4.			0.15 1.03	1.94 12.24	1785.2	1892.6
	5.			0.17 1.02	1.85 12.33	1754.5	1959.4
	6.			0.15 0.94	2.03 12.12	1822.3	2108.3
	7.			0.12 0.94	1.83 11.96	1815.1	2031.1
	8.			0.16 0.83	1.89 12.02	1815.1	2485.9

Table 17 Determination of shear capacity for beams without hole (point 6.4 TR 002)

Type	No. of sample	Ultimate load F_{max} [kN]	Shear capacity [kN]
I241 (64/38)	1.	40.0	20.0
	2.	28.0	14.0
	3.	29.5	14.8
	4.	33.0	16.5
	5.	32.0	16.0
I241 (89/38)	1.	37.0	18.5
	2.	30.5	15.3
	3.	29.0	14.5
	4.	33.0	16.5
	5.	30.0	15.0
I302 (64/38)	1.	35.0	17.5
	2.	39.0	19.5
	3.	36.0	18.0
	4.	33.0	16.5
	5.	39.0	19.5
I302 (89/38)	1.	50.0	25.0
	2.	49.5	24.8
	3.	43.0	21.5
	4.	56.0	28.0
	5.	45.0	22.5
I356 (64/38)	1.	37.0	18.5
	2.	33.0	16.5
	3.	25.0	12.5
	4.	35.0	17.5
	5.	39.0	19.5
I356 (89/38)	1.	48.5	24.3
	2.	45.0	22.5
	3.	47.5	23.8
	4.	47.0	23.5
	5.	48.0	24.0

Table 18 Determination of shear capacity for beams with hole (point 6.4 TR 002)

Type	No. of sample	Type of hole	Ultimate load F_{max} [kN]	Shear capacity [kN]
I241 (64/38)	1.	Circular ø 115 mm	34.5	17.3
	2.		29.0	14.5
	3.		29.0	14.5
	4.		31.5	15.8
	5.		32.0	16.0
I241 (64/38)	1.	Rectangular w. 100 mm; h. 77 mm	35.0	17.5
	2.		47.0	23.5
	3.		35.5	17.8
	4.		37.5	18.8
	5.		30.0	15.0
I241 (89/38)	1.	Circular ø 112 mm	33.0	16.5
	2.		32.0	16.0
	3.		33.5	16.8
	4.		31.0	15.5
	5.		30.0	15.0
I241 (89/38)	1.	Rectangular w. 102 mm; h. 76 mm	33.5	16.8
	2.		33.5	16.8
	3.		32.0	16.0
	4.		33.0	16.5
	5.		31.0	15.5
I356 (64/38)	1.	Circular ø 150 mm	33.5	16.8
	2.		23.0	11.5
	3.		35.0	17.5
	4.		27.0	13.5
	5.		29.5	14.8
I356 (64/38)	1.	Rectangular w. 180 mm; h. 120 mm	35.0	17.5
	2.		26.0	13.0
	3.		31.0	15.5
	4.		29.0	14.5
	5.		30.0	15.0
I356 (89/38)	1.	Circular ø 150 mm	49.0	24.5
	2.		50.0	25.0
	3.		42.0	21.0
	4.		39.5	19.8
	5.		40.0	20.0
I356 (89/38)	1.	Rectangular w. 180 mm; h. 120 mm	51.0	25.5
	2.		48.0	24.0
	3.		44.0	22.0
	4.		40.0	20.0
	5.		44.0	22.0

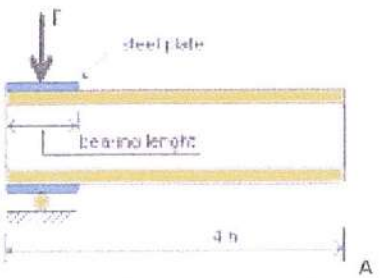

Figure 11 End bearing (45 mm)

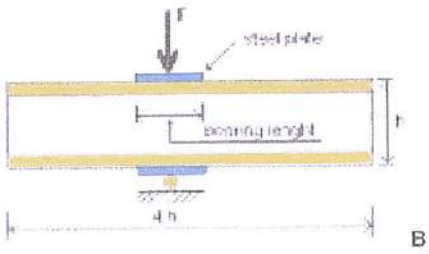

Figure 12 Inner bearing (80 mm)

Table 19 Determination of bearing capacity for beam type I241 (64/38), point 6.3 TR 002

Number of sample – Type of testing	Dimensions [mm] l	b_f/h_f	H	Bearing mm / [%]	Moisture [%]	Test time [s]	Bearing capacity [kN]	Type of failure
1 – 1	97.2	63/39	243	2.41 / 1.0	9.5	320	5.0	--
				3.62 / 1.5		453	7.4	--
1 – 2	97.2	63/39	243	2.41 / 1.0	9.5	361	6.0	--
				3.62 / 1.5		507	10.8	WC
2 – 1	96.8	64/39	242	2.41 / 1.0	9.3	314	4.0	--
				3.62 / 1.5		442	7.0	--
2 – 2	96.8	64/39	242	2.41 / 1.0	9.3	450	8.0	--
				3.62 / 1.5		535	13.2	WC
3 – 1	96.4	63/39	241	2.41 / 1.0	9.6	325	4.0	--
				3.62 / 1.5		426	7.0	--
3 – 2	96.4	63/39	241	2.41 / 1.0	9.6	437	7.4	--
				3.62 / 1.5		512	14.4	WC
4 – 1	96.4	64/39.5	241	2.41 / 1.0	9.2	320	4.0	--
				3.62 / 1.5		420	6.6	--
4 – 2	96.4	64/39.5	241	2.41 / 1.0	9.2	462	7.9	--
				3.62 / 1.5		545	12.5	WC
5 – 1	96.8	64/39	242	2.41 / 1.0	9.5	313	4.8	--
				3.62 / 1.5		412	7.2	--
5 – 2	96.8	64/39	242	2.41 / 1.0	9.5	370	6.8	--
				3.62 / 1.5		488	11.4	WC
6 – 1	96.8	64/39	242	2.41 / 1.0	9.0	302	3.6	--
				3.62 / 1.5		412	6.6	--
6 – 2	96.8	64/39	242	2.41 / 1.0	9.0	429	7.1	--
				3.62 / 1.5		522	12.4	WC
7 – 1	96.8	64/39.5	242	2.41 / 1.0	9.6	319	3.8	--
				3.62 / 1.5		431	6.7	--
7 – 2	96.8	64/39.5	242	2.41 / 1.0	9.6	476	8.7	--
				3.62 / 1.5		553	13.8	WC
8 – 1	97.2	63/39	243	2.41 / 1.0	9.2	323	4.0	--
				3.62 / 1.5		407	6.2	--
8 – 2	97.2	63/39	243	2.41 / 1.0	9.2	470	7.9	--
				3.62 / 1.5		558	12.5	WC

Note:

1 - bearing has been transmitted by steel plate with width 45 mm (see figure 11)
2 - bearing has been transmitted by steel plate with width 80 mm (see figure 12)
3 - test samples with designation "1" have been tested according to figure 11
4 - test samples with designation "2" have been tested according to figure 12
5 - WC - web failure (OSB/3 board)

2.1Manufacturing

This European Technical Assessment is issued for beams produced by the OOO KARKAS KOMPLEKT on the basis of agreed data, deposited with the Technický a zkušební ústav stavební Praha, s.p., which identifies the beams that has been assessed and evaluated. Changes to the beams or production process which could result in this deposited data being incorrect, shall be notified to the Technický a zkušební ústav stavební Praha, s.p., before the changes are introduced. Technický a zkušební ústav stavební Praha, s.p. will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA, and if so, whether further assessment or alterations to the ETA shall be necessary.

2.2Design and installation

The installation instructions including special installation techniques and provisions for the qualification of the personnel are given in the manufacturer's technical documentation.

Design, installation and execution of the beams must conform with national documents. Such documents and the level of their implementation in member states legislation are different. Therefore, the assessment and declaration of performance are done taking into account the general assumptions included in chapter 7.1 of the ETAG 011 used as EAD, which summarizes how information included in the ETA and related documents are intended to be used in the construction process and gives advice to all parties interested when normative documents are missing.

The installation instructions of the manufacturer shall be followed. Especially the following points shall be noticed:

- The bearing length to be used shall be ≥ 45 mm
- Web stiffeners are not used
- During installation, the finished product may be exposed for conditions corresponding to hazard class 3 during a short time before immediate protection against rain.

2.3Packaging, transport and storage

Information on packaging, transport and storage is given in the manufacturer's technical documentation. It is the responsibility of the manufacturer(s) to ensure that this information is made known to the people concerned.

The beams must be stored indoors and protected from the weather, damage and/or breakage.

The beams should be transported in such a way as to protect against damage or breakage.

2.4Use, maintenance and repair

Information on use, maintenance and repair is given in the manufacturer's technical documentation. It is the responsibility of the manufacturer(s) to ensure that this information is made known to the people concerned.

[1] ETAG 011 Guideline for ETA of Light composite wood-based beams and columns (edition January 2002)

[2] Technical Report TR 002 Test methods for light composite wood-based beams and columns, edition October 2000

[3] Test Report No. 070-053750 dated 30/03/2018, regarding tests of mechanical resistance and stability, issued by Technický a zkušební ústav stavební Praha, s.p., Branch in Ostrava, Czech Republic