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Rakennusalan tuotteita koskevan jäsenvaltioiden  
lainsäädännön lähentämisestä 21 päivänä joulukuuta  
1988 annetun neuvoston direktiivin 89/106/EEC  
mukaisesti ilmoitettu tuotehyväksyntälaitos

EOTAN JÄSEN

## Eurooppalainen tekninen hyväksyntä European Technical Approval

# ETA-08/0225

**Kauppanimi:**

Trade name

PRT- Lami I-joist  
PRT- Lami I-joist X

**Hyväksynnän haltija:**

Holder of approval:

PRT-Lami Oy  
Leiviskäntie 2  
FI-92930 PYHÄNTÄ

**Tuotetyyppi ja sen käyttötarkoitus:**

Generic type and use of construction  
product:

**Puuaineinen yhdistelmäpalkki rakenteelliseen käyttöön**

Light composite wood-based beam for structural purposes

**Voimassaoloaika:** Validity from/to

**From 2008-09-08 to 2013-09-08**

**Valmistuspaikka:**

Manufacturing plants:

PRT-Lami Oy  
Leiviskäntie 2  
92930 PYHÄNTÄ

**Tämä hyväksyntä sisältää**

This European Technical Approval  
contains

Sivuja/liitteitä

Pages/Annexes

14 sivua sisältäen 3 liitettä

14 pages including 3 Annexes



Eurooppalainen tekninen hyväksyntäorganisaatio  
European Organisation for Technical Approvals

## I LEGAL BASIS AND GENERAL CONDITIONS

1. This European Technical Approval is issued by the Technical Research Centre of Finland (VTT) in accordance with:
  - Council Directive (89/106/EEC)<sup>1</sup> of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products, modified by the Council Directive 93/68/EEC of 22 July 1993<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - Laki rakennustuotteiden hyväksynnästä (230/2003) luvut 3 ja 10, Ympäristöministeriön asetus rakennustuotteiden hyväksynnästä 3 § sekä Ympäristöministeriön 14.10.1997 antama valtuutus päätös (12/352/94);
  - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC<sup>4</sup>;
  - Guideline Nr 011 for European Technical Approval of Light Composite Wood-based Beams and Columns.
2. The Technical Research Centre of Finland (VTT) is authorised to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.
3. This European Technical Approval is not to be transferred to manufacturers or agents of manufacturer other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.
4. This European Technical Approval may be withdrawn by the Technical Research Centre of Finland (VTT) pursuant to Article 5 (1) of the Council Directive 89/106/EEC.
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6. The European Technical Approval is issued by the approval body in its official language. This version should correspond fully to the version used by EOTA for circulation. Translations in other languages have to be designated as such.

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<sup>1</sup> Official Journal of the European Communities N° L 40, 11.2.1989, p. 12

<sup>2</sup> Official Journal of the European Communities N° L 220, 30.8.1993, p. 1

<sup>3</sup> Official Journal of the European Union N° L284, 31.10.2003, p. 1

<sup>4</sup> Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

## **II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL**

### **1 Definition of product and intended use**

PRT-Lami I-joists are wood-based composite joists and columns the cross section of which is I-shaped. The flanges are made of sawn timber and the web of hardboard and they are glued together. The materials, dimensions and tolerances are given in Annex 1. The standard cross sections are given in Annex 2.

PRT-Lami I-joists are intended to be used as load-bearing parts of building constructions. With regard to moisture behaviour of the product, the use is limited in service classes 1 and 2 as defined in EN 1995-1-1.

The provisions made in this European Technical Approval are based on an assumed intended working life of the joists of 50 years<sup>5</sup>. The product has been manufactured essentially similar since 1982 under supervision of an independent inspection body.

### **2 Characteristics of product and methods of verification**

#### **ER 1 Mechanical resistance and stability**

The mechanical properties of the standard joist sections are given in Annex 2. The joists are not intended to be used in areas where they might support seismic action.

#### **ER 2 Safety in case of fire**

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

For resistance to fire, no performance is determined<sup>6</sup>.

#### **ER 3 Hygiene, health and environment**

Based on the declaration of the manufacturer, the joists do not contain harmful or dangerous substances as defined in the EU database. The product does not contain pentachlorophenol. The formaldehyde class of the hardboard is E1, according to EN 13986.

In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, 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 Directive, these requirements need also to be complied with, when and where they apply.

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<sup>5</sup> This means that it is expected that when this working life has elapsed, the real working life may be, in normal use conditions, considerably longer without major degradation affecting the essential requirements of the works. The indications given as to the working life of a beam cannot be interpreted as a guarantee given by the producer or the approval body. They should only be regarded as a means for the specifiers to choose the appropriate criteria for beams in relation to the expected, economically reasonable working life of the works.

<sup>6</sup> Resistance to fire for structures where PRT-Lami I-joists are incorporated shall be determined for the complete construction.

#### **ER 4 Safety in use**

Not relevant

#### **ER 5 Protection against noise**

Not relevant

#### **ER 6 Energy economy and heat retention**

The thermal conductivity  $\lambda$  for flange material is 0,13 W/(m·K) and for web material 0,18 W/(m·K) according to EN 12524. The natural density variation of the materials is taken into account in this value.

#### **Aspects of durability, serviceability and identification**

PRT-Lami I-joists can be used in service classes 1 and 2 according to Eurocode 5, and hazard classes 1 and 2 as specified in EN 335. The product may be exposed to the weather for a short time during installation.

When manufactured, the moisture content of the flanges is 12-16 % and the web 4-9 %. Due to varying temperature and relative humidity of the surrounding air the moisture content of the joists will continuously change.

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.

Serviceability of the joists and columns is understood as their ability to resist loads without unacceptable deformation. This characteristic is treated under ER 1.

The joists are identified by the flanges being of sawn timber and the web being of hardboard. The web bears the mark of the manufacturer of the joist and the CE-marking of the joist as described in clause 3.3.

### **3 Evaluation of Conformity and CE marking**

#### **3.1 Attestation of conformity**

According to the decision 99/92/EC of the European Commission<sup>7</sup> the system 1 of attestation of conformity applies. This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved 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;

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<sup>7</sup> Official Journal L 29, 03.02.1999

- (b) Tasks for the approved body
  - (3) initial type-testing of the product;
  - (4) initial inspection of factory and of factory production control;
  - (5) continuous surveillance, assessment and approval of factory production control.

## **3.2 Responsibilities**

### 3.2.1 Tasks of the manufacturer

#### 3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production according to a written manual that is endorsed by the approval body. The factory production control (FPC) includes checking of incoming materials and components and process controls as additional grading of flange material, glue spread and curing temperature.

#### 3.2.1.2 Involving a notified body

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of light composite wood-based beams and columns in order to undertake the actions laid down in section 3.3. For this purpose, the FPC manual referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body or bodies involved.

#### 3.2.1.3 Testing of samples taken at the factory

Testing of samples taken at the factory according to a prescribed control plan is part of the FPC. The control plan is deposited at the VTT, and is available to approved bodies involved in the attestation of conformity to this ETA.

#### 3.2.1.4 Declaration of Conformity

When all the criteria of the Conformity Attestation are satisfied the manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the European technical approval ETA-08/0225 issued on 8 September 2008.

### 3.2.2 Tasks of approved bodies

#### 3.2.2.1 Initial type testing of the product

Approval tests have been conducted by the approval body or under its responsibility in accordance with section 5 of the ETA Guideline. The approval body has assessed the results of these tests in accordance with section 6 of the ETA Guideline, as part of the ETA issuing procedure. The product characteristics determined by the initial test programme and by the experience of the external inspections is found sufficient to serve as initial type testing. This shall be validated by the approved body for the purpose of certification of conformity.

#### 3.2.2.2 Initial inspection of the factory and FPC

The approved body shall conduct initial inspection of the factory in order to ensure that the manufacturer has acceptable premises, technical equipment, qualified personnel and a factory production control system which is in accordance with the provisions in the ETA Guideline 011 and this ETA.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

#### 3.2.2.3 Continuous surveillance, assessment and approval of the FPC

The approved body shall visit the factory at least twice a year for regular inspection. It shall be verified that the factory production control is performed according to the manufacturer's quality manual, including tests of samples according to the prescribed test plan.

#### 3.2.2.4 Certification

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its "Control Plan" are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform VTT without delay.

### 3.3 CE-Marking

The CE marking shall be affixed on each joist or column. The CE marking shall be accompanied by the following information:

- the name and address of the producer and manufacturing plant,
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product containing the number of the notified certification body,
- the number of the European technical approval,
- product name and type of cross section according to Annex 1 for the specification of the mechanical properties according to Annex 2 of this ETA.

## 4 Assumptions under which the fitness of the product for the intended use was favourably assessed

### 4.1 Manufacturing

PRT-Lami I-joists are manufactured in the factory in accordance with the provisions of this European Technical Approval as identified during the inspection of the plant by the Technical Research Centre of Finland (VTT). Gluing of flanges to web and of web joints is performed according to specific provisions based on relevant standards for structural gluing of wood material and endorsed by the approval body.

### 4.2 Installation

PRT-Lami I-joists shall be installed on the basis of a specific structural design for each installation. In design, the resistance values given in Annex 2 of this ETA shall be used.

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

The joists shall be installed by appropriately qualified personnel, following an installation plan and relevant construction details worked out for each individual building project. The installation

plan shall be based on the manufacturer's general guide and provisions for installing PRT-Lami I-joists given in Annex 3.

Holes in the joists to provide openings for ducts, pipes etc. may only be made in the web, after the resistance has been checked. The rules for web holes given in Annex 3 shall be followed.

## **5 Indications to the manufacturer**

### **5.1 Packaging, transport and storage**

The joists shall be protected against harmful wetting during transport and storage.

The joists must not be lifted or stored in such a way that bending around the weak axis may cause damage to the joists.

### **5.2 Recommendations on use, maintenance and repair**

Before the installation it shall be controlled that the joists are not damaged during transport or storage. Damaged joists shall be replaced by sound ones.

If there is a need to modify or repair the construction this may be done if the installation guide mentioned in Annex 3 still can be followed.

The manufacturer shall ensure that the information of these provisions is given to those concerned.

On behalf of VTT

Espoo, 8 September 2008



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Table 1-2. Characteristic strength values of the sawn timber used for flanges of PRT-Lami I-joists needed in design of PRT-Lami.

Property		N/mm <sup>2</sup>
Bending strength	$f_{m,k}$	27
Tension strength parallel to grain	$f_{t,0,k}$	16
Compression strength parallel to grain	$f_{c,0,k}$	22
Shear strength	$f_{v,k}$	2,8
5th percentile modulus of elasticity parallel to grain	$E_{0,k}$	7700
Mean modulus of elasticity parallel to grain	$E_{mean}$	11500

The web of PRT-Lami I-joists is made of hard board the strength values of which correspond to grade HB.HLA1 in accordance with EN 13986 and EN 622-2. The characteristic strength values of the hard board shall be at least as given in Table 1-3.

Table 1-3. Characteristic strength values of the hard board used for web of PRT-Lami I-joists.

Property		Value N/mm <sup>2</sup>
Shear strength, panel shear	$f_{v,k}$	7,5
Shear strength, planar shear	$f_{r,k}$	2,2
Bending strength		28
Mean modulus of elasticity	$E_w$	3100

The web of PRT-Lami X-grade I-joists is made of hard board the strength values of which correspond to grade HB.HLA2 in accordance with EN 13986 and EN 622-2. The characteristic density of the board shall be at least 800 kg/m<sup>3</sup> and the characteristic strength values of the hard board shall be at least as given in Table 1-4.

Table 1-4. Characteristic strength values of the hard board used for web of PRT-Lami I-joists grade X.

Property		Value N/mm <sup>2</sup>
Shear strength, panel shear	$f_{v,k}$	10
Shear strength, planar shear	$f_{r,k}$	3
Bending strength		32
Mean modulus of elasticity	$E_w$	4600

Bending strength and mean modulus of elasticity are defined by tests according to EN 310. Panel shear and planar shear are defined according to EN 789.

The web is joined by scarf joints. The joint between flange and web, web joints and the flange finger joints are glued with a structural adhesive is of type I (full exposure to the weather) as defined in EN 301.

## ANNEX 2 MECHANICAL PROPERTIES OF THE 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 and 2-2, which also may be used to calculate the properties for non-standard cross sections. The evaluation methods have been calculation or design assisted by testing. The structural properties of PRT-Lami I-Joists within the ranges for joist depth and flange specification given in Annex 1 may be calculated using PRT-Lami's design procedures approved by VTT. For the standard range of PRT-Lami I-Joists mechanical properties have been calculated in Table 2-4 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 of PRT-Lami I-joists to be used in calculations.*

<b>Property</b>	<b>Symbol</b>	<b>Value N/mm<sup>2</sup></b>
Bending strength of flanges	$f_{mk}$	27
Tensile strength of flanges	$f_{t0k}$	20
Compression strength of flanges	$f_{c0k}$	22
Shear strength of flanges	$f_{vk}$	2,8
Bending strength of web edgewise	$f_{mk,w}$	17
Shear strength of web	$f_{vsk}$	8,6
Shear strength of web/flange joint	$f_{vpk}$	1,1
Characteristic modulus of elasticity of flanges	$E_k$	7 700
Mean modulus of elasticity of flanges	$E_f$	11 500
Mean modulus of elasticity of web	$E_w$	3 500
Modulus of rigidity of web	$G_w$	1 400

Table 2-2. Characteristic strength and modulus of elasticity and rigidity values of PRT-Lami I-joists grade X. to be used in calculations.

Property	Symbol	Value N/mm <sup>2</sup>
Bending strength of flanges	$f_{mk}$	27
Tensile strength of flanges	$f_{t0k}$	20
Compression strength of flanges	$f_{c0k}$	22
Shear strength of flanges	$f_{vk}$	2,8
Bending strength of web edgewise	$f_{mk,w}$	23
Shear strength of web	$f_{vsk}$	11,4
Shear strength of web/flange joint	$f_{vpk}$	1,5
Characteristic modulus of elasticity of flanges	$E_k$	7 700
Mean modulus of elasticity of flanges	$E_f$	11 500
Mean modulus of elasticity of web	$E_w$	4 600
Modulus of rigidity of web	$G_w$	1 900

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 2-4 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.

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<sup>8</sup>.

Table 2-3. Values of  $k_{mod}$  for the PRT-Lami I-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

<sup>8</sup> According to EUROCODE 5, final draft 2002-10-09.

*Table 2-4. Values of  $k_{def}$  for the PRT-Lami I-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 2-4 are based on spacing of lateral constraints 400 mm. If the lateral bracing is spaced more sparsely the values shall be reduced according to the instructions given by the manufacturer.

The values to be used in design are given on the following page in Table 2-5.

Table 2-5. Standard cross sections, basic properties and characteristic resistances and rigidity values to be used in calculations.

PRT-Lami I-joists grade X.

Beam size	Cross sections		Characteristic resistances				Stiffness values			Point load or support reaction at the end Length of support		Point load or support reaction in the middle Length of support	
	Af mm <sup>2</sup>	Au mm <sup>2</sup>	Mk (kNm)	Vk (kN)	Nck (kN)	Ntk (kN)	(EI)*10-12 (Nmm <sup>2</sup> )	(GA)ix10-5 N	(EA)ix10-6 (kN)	45 mm Stiffenings (kN)	90 mm No stiffenings (kN)	45 mm Stiffenings (kN)	90 mm No stiffenings (kN)
45x45x200	1935	840	6,43	10,0	92,5	84,1	0,289	1,596	48,4	10,8	10,7	21,5	22,7
45x45x250	1935	1140	8,48	13,1	95,2	86,5	0,503	2,166	49,7	10,8	8,2	21,5	22,7
45x55x220	2385	840	8,42	10,6	112	102	0,403	1,596	58,7	10,8	11,5	21,5	22,7
45x55x270	2385	1140	10,89	13,7	115	105	0,678	2,166	60,1	10,8	9,0	21,5	22,7
45x55x320	2385	1440	13,43	16,9	118	107	1,029	2,736	61,5	10,8	6,5	21,5	22,7
45x70x250	3060	840	11,60	11,6	142	129	0,618	1,596	74,2	10,8	13,2	21,5	22,7
45x70x300	3060	1140	14,92	14,6	145	132	0,993	2,166	75,6	10,8	10,8	21,5	22,7
45x70x350	3060	1440	18,09	17,7	147	134	1,464	2,736	77,0	10,8	8,3	21,5	22,7
45x70x400	3060	1740	21,33	18,2	150	136	2,033	3,306	78,4	10,8	5,8	21,5	22,7
45x70x450	3060	2040	24,61	17,6	153	139	2,700	3,876	79,8	10,8	3,3	21,5	22,7
42x70x300	2850	1140	13,93	14,7	135	123	0,927	2,166	70,8	10,1	9,8	20,1	21,2
42x70x350	2850	1440	16,89	17,8	138	126	1,368	2,736	72,2	10,1	7,5	20,1	21,2
42x70x400	2850	1740	19,92	18,2	141	128	1,899	3,306	73,6	10,1	5,2	20,1	21,2
42x70x450	2850	2040	23,00	17,6	143	130	2,523	3,876	74,9	10,1	2,8	20,1	21,2

PRT-Lami I-joists

Beam size	Cross sections		Characteristic resistances				Stiffness values			Point load or support reaction at the end Length of support		Point load or support reaction in the middle Length of support	
	Af mm <sup>2</sup>	Au mm <sup>2</sup>	Mk (kNm)	Vk (kN)	Nck (kN)	Ntk (kN)	(EI)*10-12 (Nmm <sup>2</sup> )	(GA)ix10-5 N	(EA)ix10-6 (kN)	45 mm Stiffenings (kN)	90 mm No stiffenings (kN)	45 mm Stiffenings (kN)	90 mm No stiffenings (kN)
45x45x200	1935	840	6,39	7,3	90,8	82,5	0,287	1,176	47,4	10,8	10,7	21,5	22,7
45x45x250	1935	1140	8,41	9,6	92,8	84,3	0,499	1,596	48,5	10,8	8,2	21,5	22,7
45x55x220	2385	840	8,39	7,7	111	101	0,401	1,176	57,8	10,8	11,5	21,5	22,7
45x55x270	2385	1140	10,83	10,0	113	102	0,674	1,596	58,8	10,8	9,0	21,5	22,7
45x55x320	2385	1440	13,33	12,3	115	104	1,021	2,016	59,9	10,8	6,5	21,5	22,7
45x70x250	3060	840	11,57	8,5	140	128	0,616	1,176	73,3	10,8	13,2	21,5	22,7
45x70x300	3060	1140	14,86	10,7	142	129	0,989	1,596	74,4	10,8	10,8	21,5	22,7
45x70x350	3060	1440	18,00	12,9	144	131	1,457	2,016	75,4	10,8	8,3	21,5	22,7
45x70x400	3060	1740	21,18	13,8	146	133	2,019	2,436	76,5	10,8	5,8	21,5	22,7
45x70x450	3060	2040	24,41	13,3	148	135	2,678	2,856	77,5	10,8	3,3	21,5	22,7
42x70x300	2850	1140	13,87	10,7	133	121	0,924	1,596	69,5	10,1	9,8	20,1	21,2
42x70x350	2850	1440	16,80	13,0	135	123	1,360	2,016	70,6	10,1	7,5	20,1	21,2
42x70x400	2850	1740	19,78	13,8	137	125	1,886	2,436	71,6	10,1	5,2	20,1	21,2
42x70x450	2850	2040	22,80	13,3	139	126	2,502	2,856	72,7	10,1	2,8	20,1	21,2

### ANNEX 3 INSTALLATION GUIDE FOR THE JOISTS

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

1. The instructions of the manufacturer regarding the restraint of the compression flange and temporary bracing shall be followed. Values in Annex 2 are based on the assumption that the restraint spacing is 400 mm.
2. The bearing length to be used shall be larger than 45 mm. If the bearing length is more than 90 mm, the bearing resistance values given for 90 mm shall be used.
3. Web stiffeners may be used according to the instructions of the manufacturer. The characteristic bearing resistance with web stiffeners is given in Table 2-4.
4. During installation, the finished product may be exposed for conditions corresponding to hazard class 3 during a short time before immediate protection against rain.
5. Holes may be taken in the joist web for installations according to following rules:
  - The structural effect of all additional holes must be considered separately from case to case.
  - Holes shall be positioned at the centre of the web, except of holes smaller than 20 mm in diameter.
  - The spacing of the holes shall be such, that the length of the unbroken web between the holes is at least two times the diameter of the larger hole. Else, the group of holes shall be considered as one elongated hole.
  - For rectangular holes, the corners shall be made carefully and overcutting shall be avoided.
  - For joists with holes, the shear resistance at holes can be calculated as follows:

$$V_{\text{hole,k}} = 2,8 \cdot 2I_{\text{hole}} \min\left(\frac{b}{S_{\text{flange,pp}}}; \frac{b-t_0}{S_{\text{flange,s}}}\right) + \frac{443000}{h_w}$$

where

$I_{\text{hole}}$	moment of inertia of <u>one</u> T-part with regard to its mass centre,
$S_{\text{flange,pp}}$	static moment of the timber part outside the mass centre of the flange with regard to the mass centre of the T-part,
$S_{\text{flange,s}}$	static moment of the flange part above the web with regard to the mass centre of the T-part,
$b$	width of the flange,
$t_0$	width of the web root, assumed to be 3 mm,
$h_w$	depth of the web.

Resistance is given in N and all geometrical quantities are given in mm. Shear resistance for a beam with hole must not exceed shear resistance for a beam without hole according to Table 2-5.