VTT EXPERT SERVICES OY

CERTIFICATE

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NAME OF PRODUCT

UGRA
Structural laminated veneer lumber

MANUFACTURER

OAO LVL-UGRA
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CERTIFICATE HOLDER

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PRODUCT DESCRIPTION

This certificate gives design information according to the Eurocodes. It describes the product in accordance with Declaration of performance given by the manufacturer according to EN 14374 and other relevant European standards. Since the regulations are not harmonised, the user is recommended to consider separately the relevant national regulations regarding the intended use.

The UGRA (UGRA S, UGRA T and UGRA Q) products are laminated veneer lumber products for use as structural or non-structural elements in buildings and bridges. The thickness of UGRA varies from 21 to 75 mm. The products are available in different sizes. The products are manufactured from coniferous wood, that are pine *(Pinus sylvestris),* spruce *(Picea abies*) and larch *(Larix sibirica)* veneers, with a nominal thickness of 3.0 mm, using an adhesive suitable for exterior and interior conditions. In UGRA S and UGRA T, all veneers are parallel grained. In UGRA Q, some of the veneers are crossgrained.

The products are certified according to EN 14374. The system of assessment and verification of constancy of performance, AVCP, of LVL is 1.

CERTIFICATION PROCEDURE

This certificate has been issued by VTT Expert Services Ltd, which is a certification body (S017, EN ISO/IEC 17065) accredited by the Centre for Metrology and Accreditation (FINAS accredited).

This certificate is based on an initial type assessment of the product, and an initial inspection of the factory and the factory production control. The general certification procedures are based on the certification system of VTT Expert Services Ltd.

This certificate is valid for a maximum of five years from the date of revision. The conditions of validity are described in section 13-15.

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REGULATIONS, STANDARDS AND INSTRUCTIONS

1. European product requirement standards

1.1 Products are CE marked in accordance with the standard EN 14374, Timber structures - Structural laminated veneer lumber - Requirements.

2. Other standards and instructions

2.1 The following European standards also have relevance for the use of UGRA products (any national determined parameters shall separately be considered):

EN 335	Durability of wood and wood-based products - Definition of use classes - Part 1: General
EN 1995-1-1+A1 + A2	Eurocode 5, Design of timber structures. Part 1-1: General - Common rules and rules for buildings
EN 1995-1-2	Eurocode 5, Design of timber structures. Part 1-2: General - Structural fire design
EN 1995-2	Eurocode 5, Design of timber structures. Part 2: Bridges
EN ISO 10456	Building materials and products. Hygrothermal properties. Tabulated design values and procedures for determining declared and design thermal values.

PRODUCT INFORMATION

3. Product description, marking and quality control

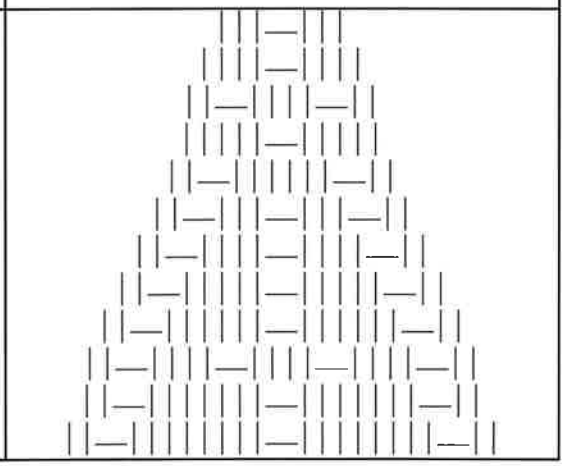
3.1 UGRA products are manufactured by LVL-Ugra at the mill located in Nyagan city, Khanty-Mansiysk Region, Russia.

3.2 UGRA products are manufactured from veneers, peeled from coniferous wood that are pine (*Pinus sylvestris*), spruce *(Picea abies)* and larch *(Larix sibirica),* which have the nominal thickness of 3.0 mm after pressing. All veneers are graded with regard to strength and appearance in order to have the desired quality of the product. The minimum number of veneers is 7.

3.3 The lay-up of the cross-section of UGRA S and UGRA T consists of parallel grained veneers.

3.4 The lay-up of the cross-section of UGRA Q has some cross grained veneers. The lay-ups are given in Table 1.

Table 1. Lay-up of UGRA Q-products.

Nominal thickness mm	Number of plies	Lay-up
21	7	
27	9	
30	10	
33	11	
36	12	
39	13	
45	15	
51	17	
57	19	
60	20	
63	21	
69	23	

3.5 The veneers are glued together using an adhesive suitable for exterior and interior use. On one side of a veneer, phenol-formaldehyde glue is spread evenly. The veneers are scarf jointed using a phenol-formaldehyde adhesive. From scarf joints the glue run over is less than 5 % of the visible surface.

3.6 The products are cut and sawn according to the specification of the customer. The standard sizes of the products are presented in Table 2.

UGRA beams and panels are delivered in customer lengths or market area specific standard lengths. The maximum length of a product is 18 m.

3.7 The tolerances of dimensions at the reference moisture content of 10 ± 2 % are presented in Table 3.

The angle of the cross section shall not deviate more than 1:50 (about 1.1°) from the right angle.

Table 2. The standard sizes of the UGRA products.

Product	Thickness, mm	Width / height (mm)											
		40	66	90	100	200	260	300	360	450	600	900	1800
UGRA S	21				X	X							
UGRA S	27				X	X							
UGRA S	33				X	X	X						
UGRA S	36				X	X	X	X					
UGRA S	39	X			X	X	X	X					
UGRA S	45				X	X	X	X	X				
UGRA	48				X	X	X	X	X				
UGRA S	51				X	X	X	X	X				
UGRA S	57				X	X	X	X	X	X			
UGRA S	60	X											
UGRA S	63				X	X	X	X	X	X	X	X	
UGRA S	69				X	X	X	X	X	X	X	X	
UGRA S	75				X	X	X	X	X	X	X	X	
UGRA T	27	X	X	X	X								
UGRA T	30	X	X	X	X								
UGRA T	33	X	X	X	X								
UGRA T	39	X	X	X	X								
UGRA T	45	X	X	X	X								
UGRA T	60	X	X	X	X								
UGRA Q	21										X	X	X
UGRA Q	27										X	X	X
UGRA Q	30										X	X	X
UGRA Q	33										X	X	X
UGRA Q	36										X	X	X
UGRA Q	39										X	X	X
UGRA Q	45										X	X	X
UGRA Q	51										X	X	X
UGRA Q	57										X	X	X
UGRA Q	60										X	X	X
UGRA Q	63										X	X	X
UGRA Q	69										X	X	X

Table 3. Tolerances of UGRA products.

Dimension	Size, mm	Tolerance, mm or %
Thickness	All	+ (0,8+0,03 t) mm and – (0,4+0,03 t) mm
Width	< 400 ≥ 400	± 2 mm ± 0,5 %
Length	All	± 5,0 mm

t is thickness

3.8 Products are CE marked in accordance with the standard EN 14374. The UGRA products covered by this Certificate may be marked with the oval VTT certificate marking.

3.9 The factory production control is regular and comprises the control of equipment, raw and incoming materials, production processes and finished products.

3.10 The manufacturer has an agreement of quality control with VTT Expert Services Ltd. The continuous surveillance, assessment and approval of the factory production control are carried out at least twice a year.

4. Delivery and storage on site

4.1 The UGRA products are delivered in polyethylene packages. Each delivery package is labelled with the number and dimensions of the UGRA and the delivery address or order number.

4.2 UGRA products should be stored only temporarily on the building site. Any measures to keep the moisture content low and to avoid condensation should be done carefully. Therefore tarpaulins should be used to protect the UGRA products from rain, dirt and excessive solar radiation. The plastic package is only intended to protect the UGRA member during delivery, and does not provide sufficient protection against weather.

UGRA products should be stored on a plane underlay using a sufficient number of supports according to manufacturer's instructions.

4.3 Exposure to rain, water flowing as well as water convection from other structures should be avoided. The product may be exposed to the weather for a short time during installation. Products which have become wet shall be dried before use.

DESIGN INFORMATION

5. General

5.1 UGRA products are used for structural or non-structural applications in buildings and bridges.

5.2 UGRA products can be painted or stained. The suitability of the treatment shall be checked with manufacturer.

6. Structural performance

6.1 The structural performance of UGRA products is considered in accordance with the limit state design principles specified in Eurocode 5. Alternatively, national design codes may be used if they are consistent with the Eurocodes system.

6.2 The characteristic strength and stiffness values for UGRA LVL are given in Table 4.

The characteristic strength values are given at an equilibrium moisture content resulting from a temperature of 20 °C and a relative humidity of 65 % exposed to duration of load of 5 minutes.

Furthermore, the reference width (depth of the beam) in edgewise bending is 300 mm while the reference length in tensile parallel to grain is 3000 mm.

6.3 In design, the effect of moisture content and duration of load on strength and deformation shall be taken into account by the modification factor k_{mod} and the deformation factor k_{def} as given in Eurocode 5.

For UGRA Q, flatwise, the k_{mod} and k_{def} values of plywood shall be used. For UGRA Q, edgewise, the k_{mod} and k_{def} values of LVL shall be used.

6.4 The effect of member size on edgewise bending and tensile strength values shall be taken into account. This is made by the factors k_h and k_l given in Eurocode 5 for which the s-values are given in Table 4.

6.5 The characteristic values given in Table 4 can be used without any modifications for temperatures between -50 °C and +50 °C for a prolonged period of time.

Table 4

The UGRA products fulfil the requirements specified in the Declaration of Performance No 001-CPR-2013-07-01, 1.7.2013.

Property	Symbol	Characteristic value, N/mm^2 or kg/m^3		
		UGRA S Thickness 21-75 mm	UGRA T Thickness 21-75 mm	UGRA Q Thickness 21-69 mm
Fifth percentile values				
Bending strength:				
Edgewise (depth 300 mm)	$f_{m.0.edge.k}$	44	27	32
Size effect parameter	s	0.15	0.15	0.15
Flatwise	$f_{m.0.flat.k}$	50	32	36
Tensile strength:				
Parallel to grain (length 3000 mm)	$f_{t,0,k}$	35	26	26
Perpendicular to grain, edgewise	$f_{t,90,edge,k}$	-	-	-
Perpendicular to grain, flatwise	$f_{t.90.flat.k}$	-	-	-
Compressive strength:				
Parallel to grain	$f_{c.0.k}$	38	26	26
Perpendicular to grain, edgewise	$f_{c,90,edge,k}$	6.0	2.0	9.0 or 8.0*)
Perpendicular to grain, flatwise	$f_{c.90.flat.k}$	2.0	0.8	1.8
Shear strength				
Edgewise	$f_{v.0.edge.k}$	3.8	1.6	3.8
Flatwise	$f_{v.0.flat.k}$	2.8	0.8	1.3
Modulus of elasticity:				
Parallel to grain	$E_{0.k}$	11600	8800	8200
Perpendicular to grain, edgewise	$E_{90,edge,k}$	350	-	1600
Perpendicular to grain, flatwise	$E_{90.flat.k}$	100	-	100
Shear modulus:				
Edgewise	$G_{0.k}$	400	300	400
Flatwise	$G_{0.k}$	400	300	70
Density	ρ_k	550	420	510
Mean values				
Modulus of elasticity:				
Parallel to grain	$E_{0.mean}$	13800	10000	9700
Perpendicular to grain, edgewise	$E_{90,edge,mean}$	430	-	2000
Perpendicular to grain, flatwise	$E_{90.flat.mean}$	130	-	130
Shear modulus:				
Edgewise	$G_{0.mean}$	600	450	600
Flatwise	$G_{0.mean}$	600	450	100
Density	ρ_{mean}	580	450	540
Reaction to fire	D-s2, d0 (Euroclass)			
Formaldehyde class	E1			

*) For the thicknesses of 27 mm and 33 mm the value of 8.0 shall be used. For all other thicknesses the value of 9.0 can be used.

6.6 Since the dimensions of UGRA products remain quite stable during temperature changes, it is not usually necessary to consider any effects of temperature variations on the structural design.

6.7 UGRA members shall be designed in such a way that width and thickness changes due to moisture content variation do not cause harmful stresses in the structures. Special attention shall be paid to the design of joints.

6.8 In structural applications, any holes and notches to be worked out during the installation shall be considered separately and accepted by the designer.

6.9 During installation, the temporary bracing of the UGRA members shall be considered by the designer.

7. Performance in relation to moisture

7.1 On delivery, the moisture content ω of UGRA products is about 12 %. Due to changes in temperature and relative humidity of the surrounding air, the moisture content will continuously change. In service class 1 the moisture content usually varies between 6 and 10 %, while in service class 2 it usually varies between 10 and 16 %.

Moisture content ω is defined as follows:

$$\omega = \frac{m_\omega - m_0}{m_0}$$

where m_ω is the mass of the product corresponding moisture content ω and m_0 is the dry mass of the product.

7.2 UGRA products swell when the moisture content increases, and shrink when the moisture content decreases. Wetting causes permanent deformations, problems with surface veneers and falling of knots.

8. Performance in case of fire

8.1 The fire resistance of a UGRA product is considered in accordance with Eurocode 5 as follows:

The notional design charring depth $d_{char,0}$ in one-dimensional charring shall be calculated as

$$d_{char,0} = \beta_0 t$$

where t is the relevant time of fire exposure and β_0 is the basic design charring rate for one-dimensional charring at standard fire exposure. β_0 for LVL is 0.65 mm/min.

The notional design charring depth $d_{char,n}$, including the effect of corner roundings and fissures, shall be calculated as

$$d_{char,n} = \beta_n t$$

where t is the relevant time of fire exposure and β_n is the notional design charring rate, including the effect of corner roundings and fissures. β_n for LVL is 0.70 mm/min.

In addition to the fire resistance of the UGRA members, the designer shall consider the fire resistance of the joints.

8.2 Ugra members without surface treatment have Reaction to fire class given in accordance with the manufacturer's Declaration of Performance the reaction to fire class is D-s2, d0 (Euroclass).

8.3 UGRA products treated against fire are not covered by this certificate.

9. Hygiene, health and environmental performance

9.1 Outdoor use or use in high relative humidity conditions may cause mould growth on the surface of UGRA. If these kind of conditions are expected during erection, a brushable or sprayable surface treatment should be used. This kind of treatment has no adverse effects to the structural properties of UGRA.

9.2 If, due to excessive wetting, there is mould growth on the surface of UGRA, this shall be removed by sanding before the structure is enclosed.

9.3 According to the manufacturer's Declaration of Performance the formaldehyde class is E1.

10. Thermal insulation performance

The thermal conductivity of a UGRA product according to table of values in standard EN ISO 10456 is 0.13 W/(m K).

11. Durability

11.1 UGRA products 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 335-1. The product should not be used in service class 3 / use class 3 without additional protective treatment. The designer shall pay attention to the details of the construction and to ensure that no water pockets will be formed.

During the erection of the building, UGRA products and structures resist well temporary exposure to water without decay, provided that they are allowed to dry afterwards.

11.2 When necessary and required by the local authorities at the building site, UGRA products can be treated against biological attack according to the rules valid on the place. However, UGRA products treated against biological attack are excluded from this certificate. Any adverse effects of the treatment on other properties shall be taken into account according to a separate clarification.

INSTRUCTIONS FOR INSTALLATION AND USE

12. Manufacturer's instructions

12.1 To protect the UGRA members from damage and dirt, they shall be handled carefully.

12.2 UGRA products can be processed using conventional woodworking tools, e.g. sawing, planning, drilling, nailing and screwing.

12.3 General guidelines of wooden constructions shall be followed in installations and use of UGRA members.

12.4 After use, UGRA products shall be disposed of in accordance with national regulations and directives. In general, the products can be reused, composted or burned.

VALIDITY OF THE CERTIFICATE

13. Validity period of the certificate

This certificate is valid for a maximum of five years from the date of revision.

14. Conditions of validity

The certificate is valid assuming that no fundamental changes are made to the product, and that the manufacturer has a valid quality control contract. A list of valid certificates is available from VTT Expert Services Ltd.

15. Other conditions

The references made in this certificate to standards and instructions are valid in the format used at the time the certificate was awarded.

The recommendations in this certificate concerning the safe use of this product are minimum requirements that shall be satisfied when using the product. The certificate does not override current or future requirements imposed by laws and statutes. In addition to the issues presented in this certificate, design, manufacturing and use shall follow appropriate construction methods.

The manufacturer is in charge of the product's quality and factory production control. In awarding this certificate, VTT Expert Services Ltd does not bind itself to indemnification liability concerning personal injury or other damage that may directly or indirectly result from using the product described in this certificate.

The VTT Expert Services Ltd finds UGRA LVL to be suitable for use in construction as described in this certificate. This certificate No 212/05 has been awarded as described above to OAO UGRA TIMBER HOLDING.

On behalf of VTT Expert Services Ltd on December 15, 2014

Tiina Ala-Outinen
Business Manager

Pertti Jokinen
Product Manager