StroiLaboratoria SL
LIMITED LIABILITY COMPANY
ul. Narodnogo Opolcheniya 14, building 2, 123423 Moscow, Russian Federation
Tel.: +7 (499) 191-29-08, (499) 191-34-05.
e-mail: stroilab1@yandex.ru

StroiLaboratoria SL Test Laboratory
Test Lab Accreditation Certificate of the Mosstroisertifikatsia System No. RU.MSS.AL.661 valid through 14.09.2020

Test Report No. 2-19I dated 20.02.2019

Determining Safe Operating Characteristics of Laminated Wooden Beam Grade BDK N20

Applicant:	DELOVIYE INVESTITSII, OOO ul. Nekrasova, 2, building 77, Room 4, Shodnya District, Khimki, 141420 Moscow Region, Russian Federation
Reason for the works/tests:	Letter No. 10/02 of 18.02.2019
Types of the works/tests performed:	To determine permissible bending moment and permissible transverse force for of a Laminated Wooden Beam grade BDK N20
Regulatory documents:	EN 13377:2002 - Prefabricated timber formwork beams Requirements, classification and assessment.
Control methods:	Destructive
Type of the tested samples:	Samples No. 1.1 - 1.6 of laminated wooden beam grade BDK N20, 1500 * 200 * 77 * 24 mm; Samples No. 2.1 - 2.6 of laminated wooden beam grade BDK N20, 3300 * 200 * 77 * 24 mm;
Test equipment:	Metal measuring ruler (500 mm measurement limit) scale division = 1 mm (GOST 427-75); Vernier caliper with depth gauge Class 2, 0 - 125 mm measuring range, scale division = 0.1 mm; Matrix hydraulic jack (load of up to 12 t); portable compression dynamometer, type DOS-3-100I with force sensor No. E214139
Date of tests:	20.02.2019 г.

Head of StroiLaboratoria SL Test Lab (SIGNATURE) L. N. Voronina

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Moscow 2019

Test Results for the Samples Submitted for the Tests

The samples were stored in the Laboratory for 48 hours at a temperature of (23 ± 5) °C and humidity of (65 ± 5)%.

Before the tests, the samples have been visually inspected. Based on the inspection it was found that the geometric dimensions of the samples correspond to the declared ones.

Test Method: EN 13377: 2002 - Prefabricated Timber Formwork Beams. Requirements, Classification and Assessment.

1. Determining safe transverse force for the laminated wooden beam grade BDK N20.

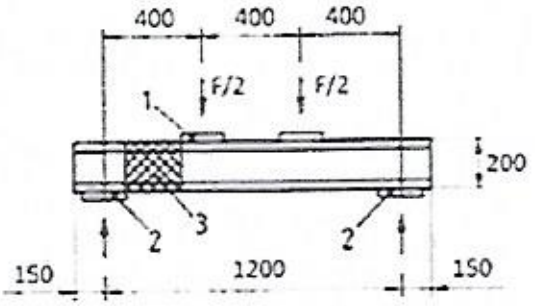

Figure 1: Beam Test Configuration according to Annex A to the EN 13377

Results of the tests for shearing strength of the laminated wooden beam grade BDK N20 are given in Table 1 below:

Table 1

Sample No. 1.1	Failure load F = 53.66 kN
Sample No. 1.2	Failure load F = 62.32 kN
Sample No. 1.3	Failure load F = 55.18 kN
Sample No. 1.4	Failure load F = 58.30 kN
Sample No. 1.5	Failure load F = 58.18 kN
Sample No. 1.6	Failure load F = 55.94 kN

Test result for the sample 1.1 is rejected, since it is not in compliance with the permissible values from Table 1 of the EN 13377.

The value of the characteristic being studied was calculated based on data obtained during the tests (Table 1) according to the statistical analysis (Appendix B of the Standard EN 13377), and amounted to:

$$F_{max} = 56.85 \text{ kN}$$

The value of the maximum transverse force is calculated as: V = F/2.

Given the safety factors in accordance with Annex E of the Standard EN 13377, the safe transverse force is:

$$Q_{operating} = ((56.85/2) * 0.9) / (1.5 * 1.3) = 13.12 \text{ kN}$$

where: k_{mod} is the change factor equal to 0.9;

Υ_M is reliability factor of the characteristics of the material, which is 1.3 for timber;

Υ_F is partial reliability factor, equal to 1.5.

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2. Determining safe bending moment for the laminated wooden beam grade BDK N20.

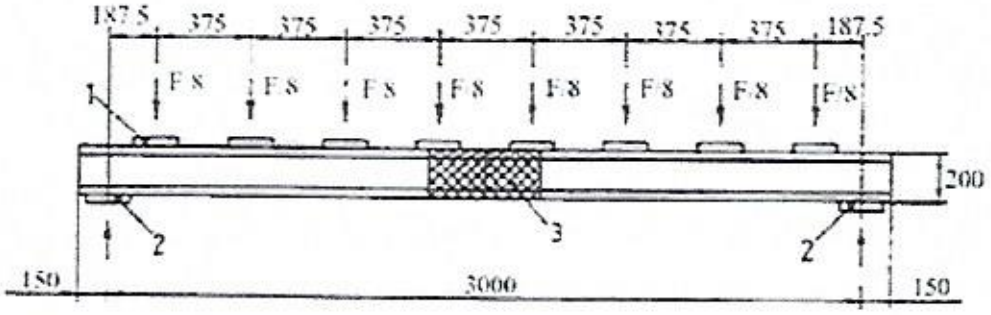

Figure 2: Beam Test Configuration according to Annex A to the EN 13377

Results of the tests for determining bending strength of the laminated wooden beam grade BDK N20 are given in Table 2 below:

Table 2

Sample No. 2.1	Failure load F = 34.08 kN
Sample No. 2.2	Failure load F = 34.52 kN
Sample No. 2.3	Failure load F = 33.40 kN
Sample No. 2.4	Failure load F = 35.02 kN
Sample No. 2.5	Failure load F = 33.80 kN
Sample No. 2.6	Failure load F = 35. 48 kN

The value of the characteristic being studied was calculated based on data obtained during the tests (Table 2) according to the statistical analysis (Appendix B of the Standard EN 13377), and amounted to:

$$F_{max} = 34.34 \text{ kN}$$

The value of the maximum bending moment is calculated as: M = (F/2) * L.

Taking into account the safety factors in accordance with Annex E of the Standard EN 13377, the safe operating moment is:

$$M_{operating} = (((34.34 * 3)/8) * 0.9) / (1.5 * 1.3) = 5.94 \text{ kN}$$

where: k_{mod} is the change factor equal to 0.9;

Υ_M is reliability factor of the characteristics of the material, which is 1.3 for timber;

Υ_F is partial reliability factor, equal to 1.5.

Note: 1. This Test Report refers exclusively to the samples which have passed the tests.
2. Reproduction of this Test Report without prior permission of the Test Lab is prohibited.
3. This Test Report is made in 2 copies having the same legal force.

Findings:

Based on the results of the test conducted to determine the safe bending moment and transverse force for the laminated wooden beam grade BDK N20 it was found, that this beam conforms with requirements provided for by the Standard EN 13377 (Annex E, Table E.1 – Safe operating loads for wooden beams).

The tests have been carried out by (SIGNATURE) D. A. Kireenkov

Blue Rectangular Stamp:
STROILABORATORIA SL, OOO
TEST LAB
OGRN: 1027739818479
TIN: 7734011175
ul. Narodnogo Opolcheniya 14,

Blue Rectangular Stamp: