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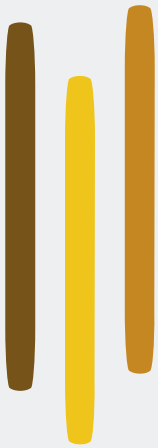
INTERIORS & EXTERIORS



DECK STATIC RESISTANCE VALUES ACCORDING TO THE CARCASS GAP RANGES

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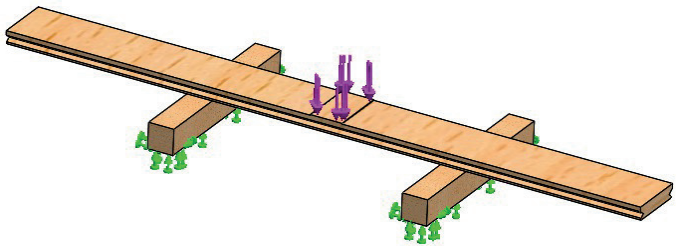
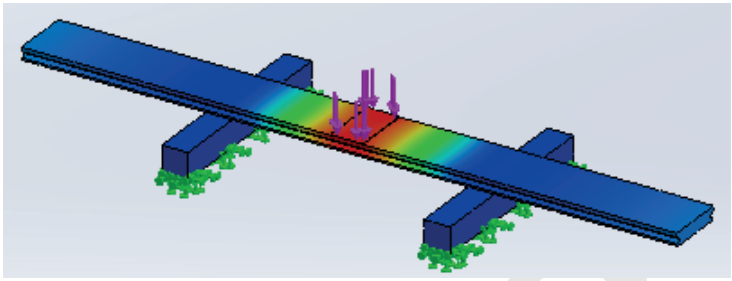
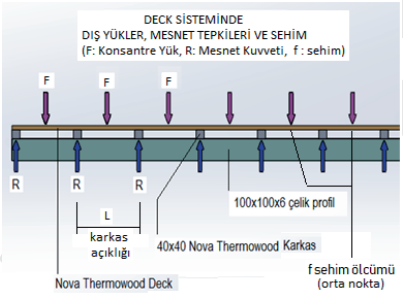
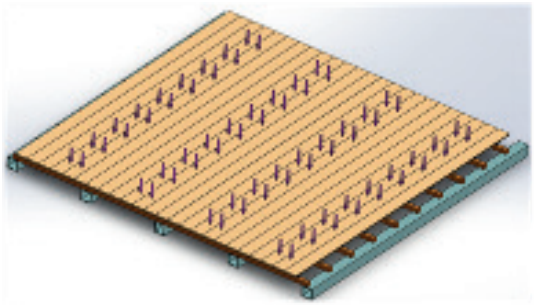




The calculations and tests of the breaking load values of the decks according to different tree types and thicknesses were carried out with the help of Novawood Test Systems in the Mechanical Laboratory of Manisa Celal Bayar University. Ergonomic and safe maximum stretching value of 1 mm (one) is accepted.

The relevant general material characterization tests have been carried out in accordance with the international standards and the calculations for approxiamete measurements have been realized by using structural analysis simulations with the help of computer-aided numerical analysis techniques. The following tables were created by considering the values obtained from the test results and the high safety coefficient. These tests, which are carried out according to the load applied to the middle axis of the deckings in each carcass range selected, take into account much heavier conditions than the real life conditions. As the most risky situation, the force was applied to the middle point of the carcass. In this case, the risky loading, in which a person is pressing only the middle part of the carcass with one foot, is taken as the basis. Even considering that the average foot length of a person is 25-30 cm and the load is right in the middle of the deckings, in reality two or three decks are forcedt simultaneously. In other words, two or three decks actively resist the load.





An average of 2-3 times safety can be mentioned. In addition, since the decks are supported to each other and so the carcass with the Nova-Clips system, it should not be forgotten that other neighboring decks will have positive contributions to increase the deformation resistance. In the calculations, this advantageous situation was also ignored and the safety coefficient was kept even higher. By adopting this expanded safety concept; it is aimed to produce solutions against the possibility of loading in dynamic conditions that may be several times more than the static conditions or the use of heavy loads gathered on a pointed chair or similar point.

Due to the anisotropic structure of the wood, and due to all these experimentally supported calculations, where the size, material types and support opening variations are accepted as the main parameters, it is inevitable that it will contain some deviations. This situation has been tried to be tolerated with a high safety coefficient. In addition, it should not be forgotten that wood is a natural material. The uncontrolled sudden impact load that may occur in situations such as local deformations and corner contact caused by chair legs are excluded from the calculations. The risk of this situation has been tried to be eliminated by the use of a high safety coefficient.

Definitions:

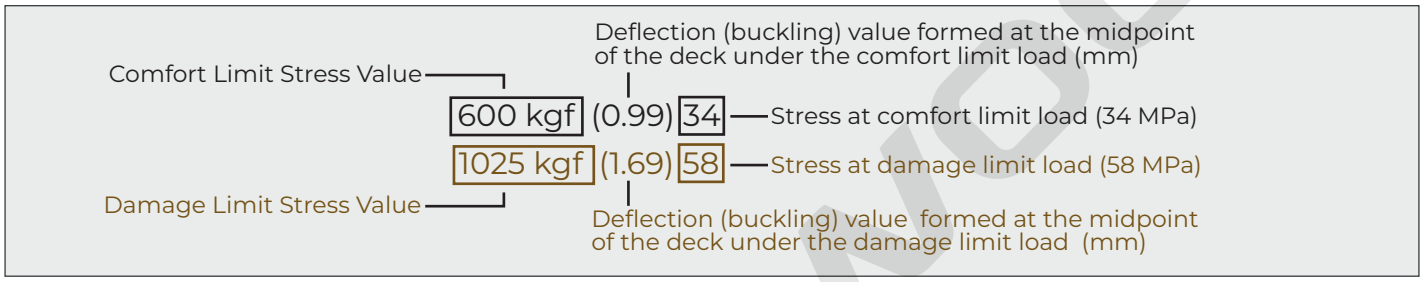
(The values given as examples below are 20x90 Nova-Ash with 30 cm carcass gap .)

Comfort Limit Load Value: Maximum load value in kg force (600 kgf) where the ergonomic and safe maximum stretching value of the decking does not exceed 1 (One) mm

Damage Limit Load Value: Approximately the maximum load value in kg force (1025 kgf) where the damage on the deckings starts

Comfort Limit Deflection Value: The deflection value formed at the midpoint of the decking at the comfort limit load (0.99 mm)

Damage Limit Deflection Value: Deflection value formed at the midpoint of the decking at the damage limit load (1.69 mm)



The midpoint deflection of less than 1 (One) mm will occur until the compression load applied on the decking reaches 600 kgf. Deflection of approximately 1 (One) mm at limit value of 600 kgf will be formed. Considering that the weight of an average person is 80 kgf under real conditions and cannot step on a single deck at the same time, it is not possible to achieve the load level of 1 (One) mm deflection, which will be accepted as the ergonomic limit value. In other words, each decking will never be forced with 600 kgf. Even in sudden jump, running and similar dynamic situations, the 600 kgf threshold, which is an ergonomic load value, will not be exceeded.

The damage load value causing the breakage is also calculated by considering the fact that this damage load value can be reached in special cases such as areas where vehicles are passing on the decking. The value of 1025 kgf given in the second row of the table depicts this situation. In other words, if a force of 1025 kgf is applied on each decking and its midpoint, a damage will occur on the decking. The decking stretches 1.69 mm at this load value. After this value, increasing the strength level will not be appropriate as the damage would begun. The values at the right of the each box in the table show the stresses occurring on the decking . At 600 kgf comfort limit value, 0.99 mm stretch and 34 MPa stress occur. This stress value should not exceed 58 MPa, which is the strength limit of the material as shown in the table. In calculating the limit damage load values given in the table, the damage limit stress value of 58 MPa for Nova-Ash is taken as basis. It was evaluated that it would be appropriate for practitioners and designers to take into account the limit load and midpoint deflection values comparatively for the selection of materials and sections.

For 20x90 mm Nova-Ash, if the carcass spacing is increased to 40 cm, the 600 kgf comfort threshold is naturally regessed to 250 kgf. The damage load value has also decreased from 1025 kgf to 700 kgf. The deflection at the beginning of the damage increased from 1.69 mm to 2.82 mm.

Prof. Dr. Nurettin ARSLAN - Manisa Celal Bayar Ünv. Tek. Fak. Mak. Müh. Böl.

Nova-Deck Thermowood Ash

Thickness (mm)	Width (mm)	Limit values	L: Carcass spacing from axle to axle (cm) 20	30	40	50
20	90	Comfort Limit values *	1850 kgf (0.87) 58	600 kgf (0.99) 34	250 kgf (1.00) 20	125 kgf (1.00) 13.3
		Damage Limit values *	1850 kgf (0.87) 58	1025 kgf (1.69) 58	700 kgf (2.82) 58	540 kgf (4.34) 58
20	115	Comfort Limit values *	2325 kgf (0.87) 58	775 kgf (1.0) 34	317 kgf (1.0) 20.6	159 kgf (1.0) 12.6
		Damage Limit values *	2325 kgf (0.87) 58	1320 kgf (1.71) 58	890 kgf (2.8) 58	730 kgf (4.58) 58
20	130	Comfort Limit values *	2600 kgf (0.86) 58	870 kgf (1.0) 33.6	360 kgf (1.0) 20	180 kgf (1.0) 12.5
		Damage Limit values *	2600 kgf (0.86) 58	1500 kgf (1.7) 58	1030 kgf (2.8) 58	830 kgf (4.6) 58
25	90	Comfort Limit values *	2550 kgf (0.77) 58	1050 kgf (0.99) 40	430 kgf (0,97) 24	220 kgf (0.97) 16
		Damage Limit values *	2550 kgf (0.77) 58	1510 kgf (1.42) 58	1040 kgf (2.34) 58	800 kgf (3.54) 58
25	130	Comfort Limit values *	3600 kgf (0.72) 58	1530 kgf (1.0) 40	640 kgf (1.0) 25	330 kgf (1.0) 16
		Damage Limit values *	3600 kgf (0.72) 58	2200 kgf (1.43) 58	1480 kgf (2.28) 58	1190 kgf (3.6) 58

Nova-Deck FK İroko

Thickness (mm)	Width (mm)	Limit values	L: Carcass spacing from axle to axle (cm) 20	30	40	50
18	90	Comfort Limit values *	1380 kgf (1.0) 55	386 kgf (1.0) 26	156 kgf (1.0) 15	78 kgf (1.0) 10
		Damage Limit values *	1380 kgf (1.0) 55	860 kgf (2.3) 55	560 kgf (3.6) 55	430 kgf (5.5) 55

Nova-Deck Thermowood İroko

Thickness (mm)	Width (mm)	Limit values	L: Carcass spacing from axle to axle (cm) 20	30	40	50
20	90	Comfort Limit values *	1570 kgf (1.0) 53.4	444 kgf (1.0) 27.5	206 kgf (1.0) 16.8	103 kgf (1.0) 11
		Damage Limit values *	1610 kgf (1.02) 55	890 kgf (2.01) 55	674 kgf (3.26) 55	515 kgf (4.98) 55
25	90	Comfort Limit values *	2440 kgf (0.82) 55	885 kgf (1.0) 34	370 kgf (1.0) 20	188 kgf (1.0) 13.5
		Damage Limit values *	2440 kgf (0.82) 55	1440 kgf (1.62) 55	990 kgf (2.67) 55	760 kgf (4.0) 55

Nova-Deck Thermowood Tulipwood

Thickness (mm)	Width (mm)	Limit values	L: Carcass spacing from axle to axle (cm) 20	30	40	50
21	130	Comfort Limit values *	2368 kgf (0.87) 48	790 kgf (1.0) 28	333 kgf (1.0) 17.2	165 kgf (1.0) 10.6
		Damage Limit values *	2368 kgf (0.87) 48	1350 kgf (1.7) 48	925 kgf (2.81) 48	750 kgf (4.53) 48
25	130	Comfort Limit values *	3012 kgf (1.0) 48	1228 kgf (1.0) 32	518 kgf (1.0) 20	264 kgf (1.0) 12.5
		Damage Limit values *	3012 kgf (1.0) 48	1830 kgf (1.5) 48	1240 kgf (2.4) 48	1008 kgf (3.8) 48

* YÜK: kgf (orta nokta çökme: mm)

Nova-Deck Thermowood Pine

Thickness (mm)	Width (mm)	Limit values	L: Carcass spacing from axle to axle (cm) 20	30	40	50
19	117	Comfort Limit values *	1428 kgf (1.0) 37.5	409 kgf (1.0) 19.3	167 kgf (1.0) 11.3	84 kgf (1.0) 7.2
		Damage Limit values *	1590 kgf (1.11) 42	890 kgf (2.17) 42	620 kgf (3.7) 42	490 kgf (5.86) 42
26	117	Comfort Limit values *	2480 kgf (0.86) 42	900 kgf (1.0) 24.6	381 kgf (1.0) 15.8	194 kgf (1.0) 9.7
		Damage Limit values *	2480 kgf (0.86) 42	1536 kgf (1.7) 42	1015 kgf (2.7) 42	840 kgf (4.32) 42
26	90	Comfort Limit values *	1950 kgf (0.9) 42	670 kgf (1.0) 24	289 kgf (1.0) 14.9	148 kgf (1.0) 9.9
		Damage Limit values *	1950 kgf (0.9) 42	1150 kgf (1.7) 42	810 kgf (2.87) 42	629 kgf (4.42) 42
26	138	Comfort Limit values *	2850 kgf (0.9) 42	1030 kgf (1.0) 24	438 kgf (1.0) 14.8	224 kgf (1.0) 9.7
		Damage Limit values *	2850 kgf (0.9) 42	1800 kgf (1.8) 42	1240 kgf (2.92) 42	960 kgf (4.46) 42

Nova-Deck Thermowood Ash

Thickness (mm)	Width (mm)	Limit values	L: Carcass spacing from axle to axle (cm) 20	30	40	50	60	70	80	90	100
40	130	Comfort Limit values *	6400 kgf (0.9) 58	3980 kgf (0.89) 58	2080 kgf (1.0) 40	1080 kgf (1.0) 25	640 kgf (1.0) 19.3	410 kgf (1.0) 14.3	279 kgf (1.0) 10.7	200 kgf (1.0) 8.8	120 kgf (1.0) 9.8
		Damage Limit values *	6400 kgf (0.9) 58	3980 kgf (0.89) 58	2950 kgf (1.43) 58	2450 kgf (2.25) 58	1900 kgf (2.94) 58	1650 kgf (4.0) 58	1500 kgf (5.4) 58	1300 kgf (6.6) 58	700 kgf (5.8) 58

Nova-Deck Thermowood İroko

Thickness (mm)	Width (mm)	Limit values	L: Carcass spacing from axle to axle (cm) 20	30	40	50	60	70	80	90	100
40	90	Comfort Limit values *	4190 kgf (0.6) 55	2590 kgf (1.0) 54	1190 kgf (1.0) 35	625 kgf (1.0) 22	369 kgf (1.0) 16	230 kgf (1.0) 12	155 kgf (1.0) 8.8	112 kgf (1.1) 7.3	69 kgf (1.0) 8.2
		Damage Limit values *	4190 kgf (0.6) 55	2630 kgf (1.01) 55	1890 kgf (1.6) 55	1580 kgf (2.53) 55	1260 kgf (3.4) 55	1040 kgf (4.43) 55	960 kgf (6.0) 55	840 kgf (7.5) 55	465 kgf (6.7) 55

Nova-Deck Thermowood Tulipwood

Thickness (mm)	Width (mm)	Limit values	L: Carcass spacing from axle to axle (cm) 20	30	40	50	60	70	80	90	100
40	130	Comfort Limit values *	5230 kgf (0.92) 48	3300 kgf (0.92) 48	1640 kgf (1.0) 32	870 kgf (1.0) 20	515 kgf (1.0) 15.4	330 kgf (1.0) 11.2	224 kgf (1.0) 8.5	158 kgf (1.0) 7	97 kgf (1.0) 8
		Damage Limit values *	5230 kgf (0.92) 48	3300 kgf (0.92) 48	2470 kgf (1.5) 48	2040 kgf (2.34) 48	1608 kgf (3.11) 48	1408 kgf (4.25) 48	1250 kgf (5.6) 48	1080 kgf (6.8) 48	586 kgf (6.0) 48

Nova-Deck Thermowood Pine

Thickness (mm)	Width (mm)	Limit values	L: Carcass spacing from axle to axle (cm) 20	30	40	50	60	70	80	90	100
42	138	Comfort Limit values *	5190 kgf (0.8) 42	2915 kgf (1.0) 38	1443 kgf (1.0) 25	769 kgf (1.0) 16	458 kgf (1.0) 12.2	293 kgf (1.0) 8.8	200 kgf (1.0) 6.7	141 kgf, (1.0) 5.7	86 kgf (1.0) 6.1
		Damage Limit values *	5190 kgf (0.8) 42	3220 kgf (1.1) 42	2410 kgf (1.67) 42	2010 kgf (2.61) 42	1578 kgf (3.45) 42	1390 kgf (4.74) 42	1250 kgf (6.28) 42	1040 kgf (7.36) 42	594 kgf (6.9) 42

* LOAD: kgf (midpoint downfall: mm)