DANISH TECHNOLOGICAL INSTITUTE

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CE 1235
EU Notified Body

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Project/ Order no.	1214195-02 321662-1
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Test Report – ITT testing according to EN 1195:1997 *Timber structures.*

The testing of structural floor decking

Material: **Floor construction – 10 mm particleboard top floor on 22 mm particleboard Sub floor with floor heating system.** See Appendix 1

Sampling: The test material was sampled and sent by the client and received at the Danish Technological Institute 16-07-2009

Method:

EN 322:1993	*"Wood Based Panels. Determination of moisture content"*
EN 323:1993	"*Wood Based Panels. Determination of density"*
EN 324-1:1993	"*Wood Based Panels. Determination of dimensions of boards – Part 1: Determination of thickness, width and length"*
EN 1195:1997	*"Timber structures. The testing of structural floor decking"*
EN 12871:2000	"*Wood based panels. Performance specifications and requirements for load bearing boards for use in floors, walls and roofs"*

Installed according to guidance given by Vibopan in e-mail, dated 13-07-2009
Tested with a centre to centre span of 600 mm. Tested at unsupported end joints. Glued in T&G and fixed with screws 4.6 × 64 mm countersunk and maximum spacing at Perimeter/-Intermediate: 150 mm/300 mm. Top floor screwed to sub floor.

ENV 12872:2000 "*Wood based panels. Guidance on the use of load bearing board in floors, walls and roofs"*

The test material was not conditioned prior to testing.

Test Equipment: Load cell: 50 kN HBM, Type U2, EQP-652
Length transducer: ± 50 mm HBM, W50K Nr 39712

Period: July 2009

Result: Tested as structural floor decking with heating system (load category A Residential) on joists with a 600 mm centre to centre span and unsupported end joints the test results are given in :
Appendix 2: Impact load,
Appendix 3: Static Load,
Appendix 4: Load/deflection curves,
Appendix 5: Moisture Content, sub floor
Appendix 6: Density, sub floor
Appendix 7: Thickness, sub floor
Evaluation of test results:
<u>Soft body impact load</u>
The floor structure meets the requirements for floors given in EN 12871.
<u>Static point load</u>
R_m = 539 N/mm
$F_{ser,k}$ = 4056 N
$F_{ult,k}$ = 4929 N
The floor structure meets the requirements for wood based panel floorings (point load + soft body impact test) given in the Danish NA to EN 13986.

Terms: The test has been performed according to attached conditions, which are according to the guidelines laid down by DANAK (The Danish Accreditation). The testing is only valid for the tested specimen. The test report may only be extracted, if this is either public accessible, or if the laboratory has approved the extract.

Date/place: 29-07-2009, Danish Technological Institute, Wood and Textile, Taastrup

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Materials
Laboratory No 321662

Sub floor

Material	:	Particleboard
Thickness	:	Nominal 22 mm
Production date	.	17-04-2009 kl. 5:19 (T&G) (Panels from more production dates are tested)
Panel width and length	:	600 mm by 1800 mm
Edges	:	T&G in all edges - See cross section below
Grooves for heat system		See cross section below
Marking	:	CE 1073-CPD-803 Novopan 09 EN 13986 EN 312-6 Flooring E1 D_{fl}-S1 22 mm > 600 kg/m^3 130409 Denne side op 17=04=09 05:19
Number of panels	:	51
Tested number of elements	:	24

Heat distribution plates

Heat distribution plate	:	Wavin, Trigris heat distribution plate Alu Ø 16 x 180 mm, date 04-08-2008

Heating hose

Heating hose	:	Wavin 21 PE-RT Gulvvarme-Floor heating DIN 16833/4721 ISO/DIS 22391 D433420 Iltspærre-oxygen barrier DIN 4726 2009/06/22 22:50 16 x 2,0 60 °C PN 6 18561 M

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Floor cardboard

Material	:	Paper
Dimension	:	500 grams/m^2
Production date	.	No information
Marking	:	None

Top Flooring

Material	:	Novopan Particleboard P1
Thickness	:	Nominal 10 mm
Production date	.	No information
Board width and length	:	1220 mm by 2505 mm
Edges	:	Straight
Marking	:	None

Floor construction:

- 45x 165 mm joists, cc 600 mm, on steel frame
- Sub floor. 22 mm particleboard – glued together in T&G with PVAC and fixed to joist with screws 4,6 x 64 mm. Installed with unsupported end joints. Minimum panel length 300 mm.
- Heat distribution plates fitted into grooves in sub floor and nailed to the particleboard with 2 roofing felt nails per plate.
- Heating hose pressed into heat distribution plates
- Cardboard – no overlay.
- Top flooring. 10 mm particleboard – glued together with PVAC and fixed to sub floor with screws 4,6 x 51 mm per 190 x 190 mm, minimum 20 mm from panel edges

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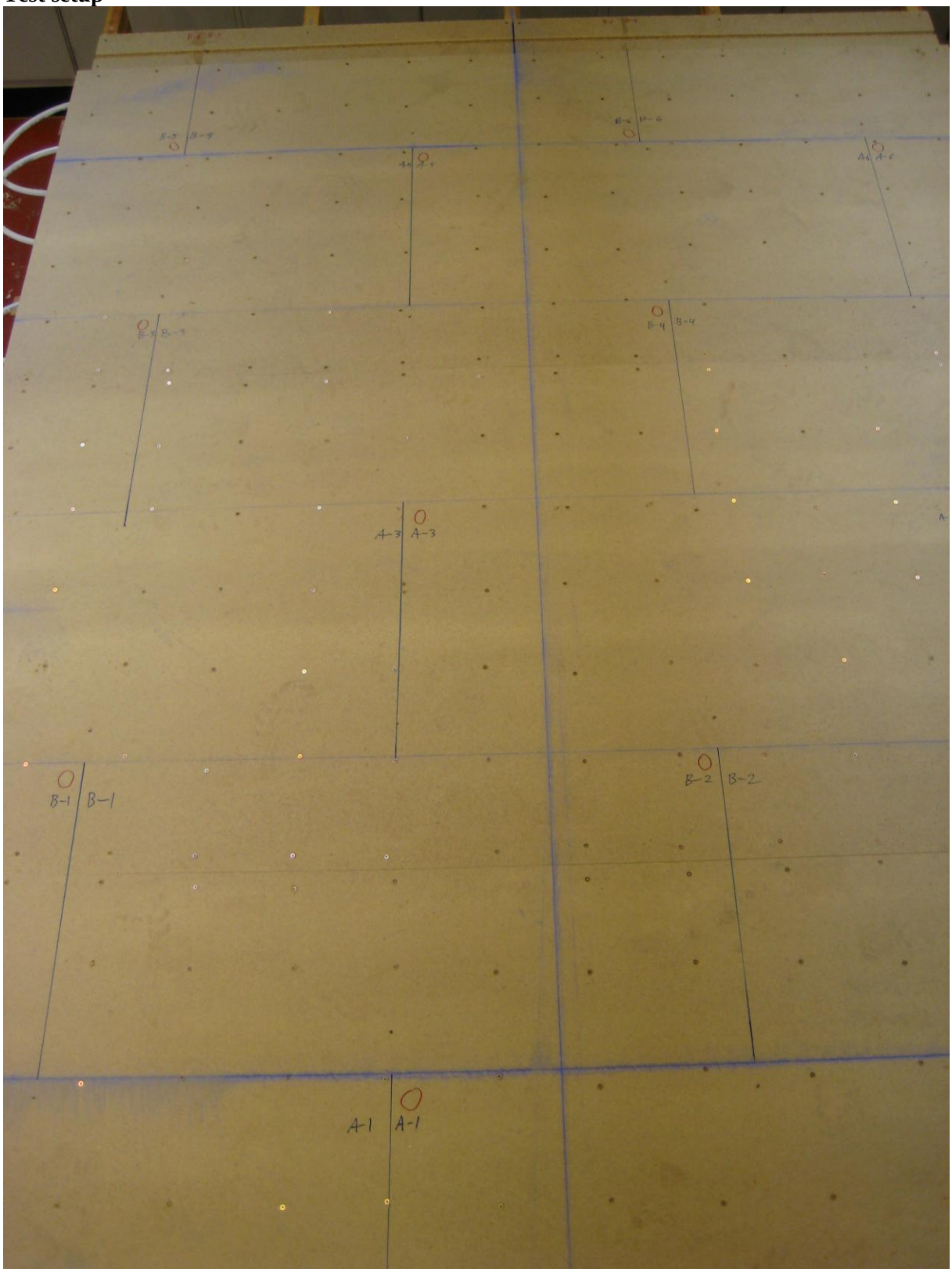
Test setup



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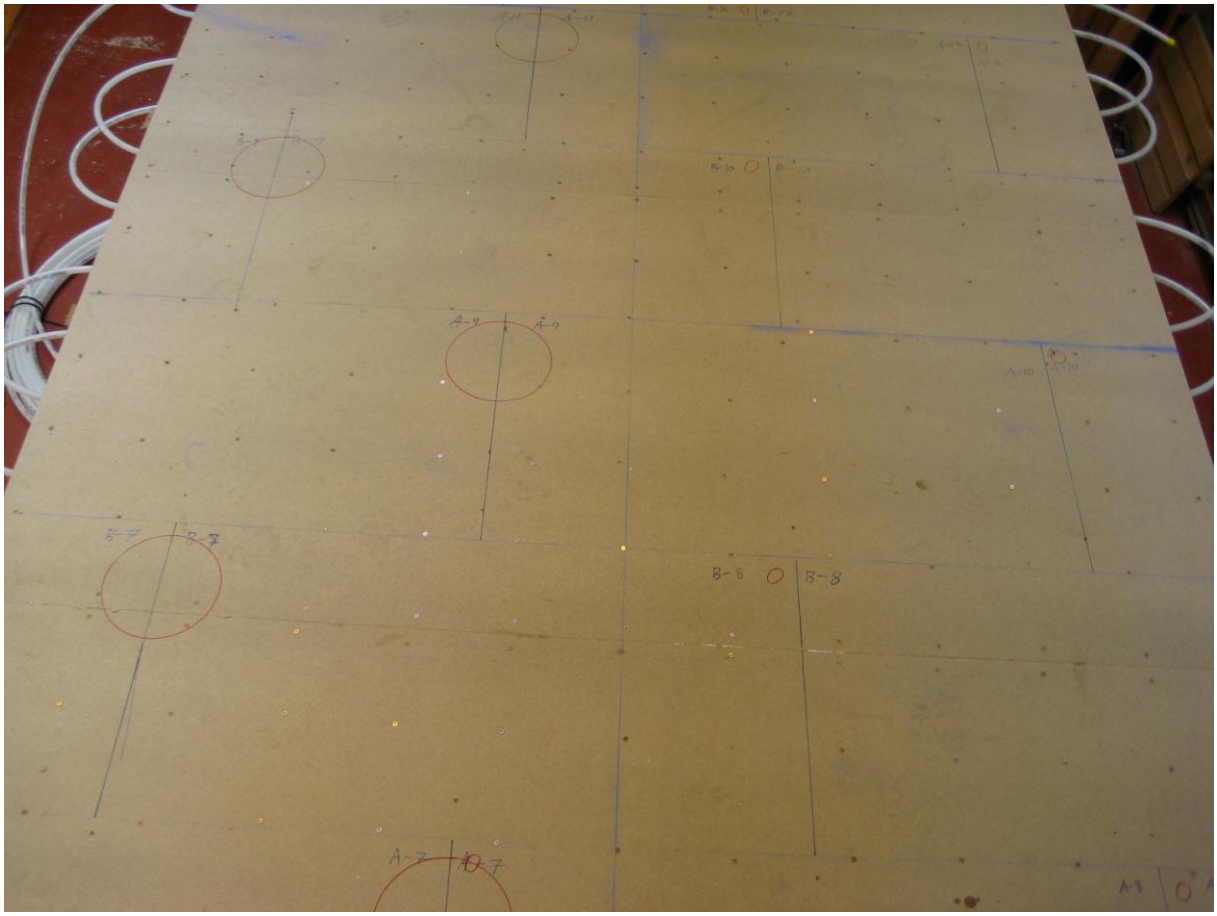

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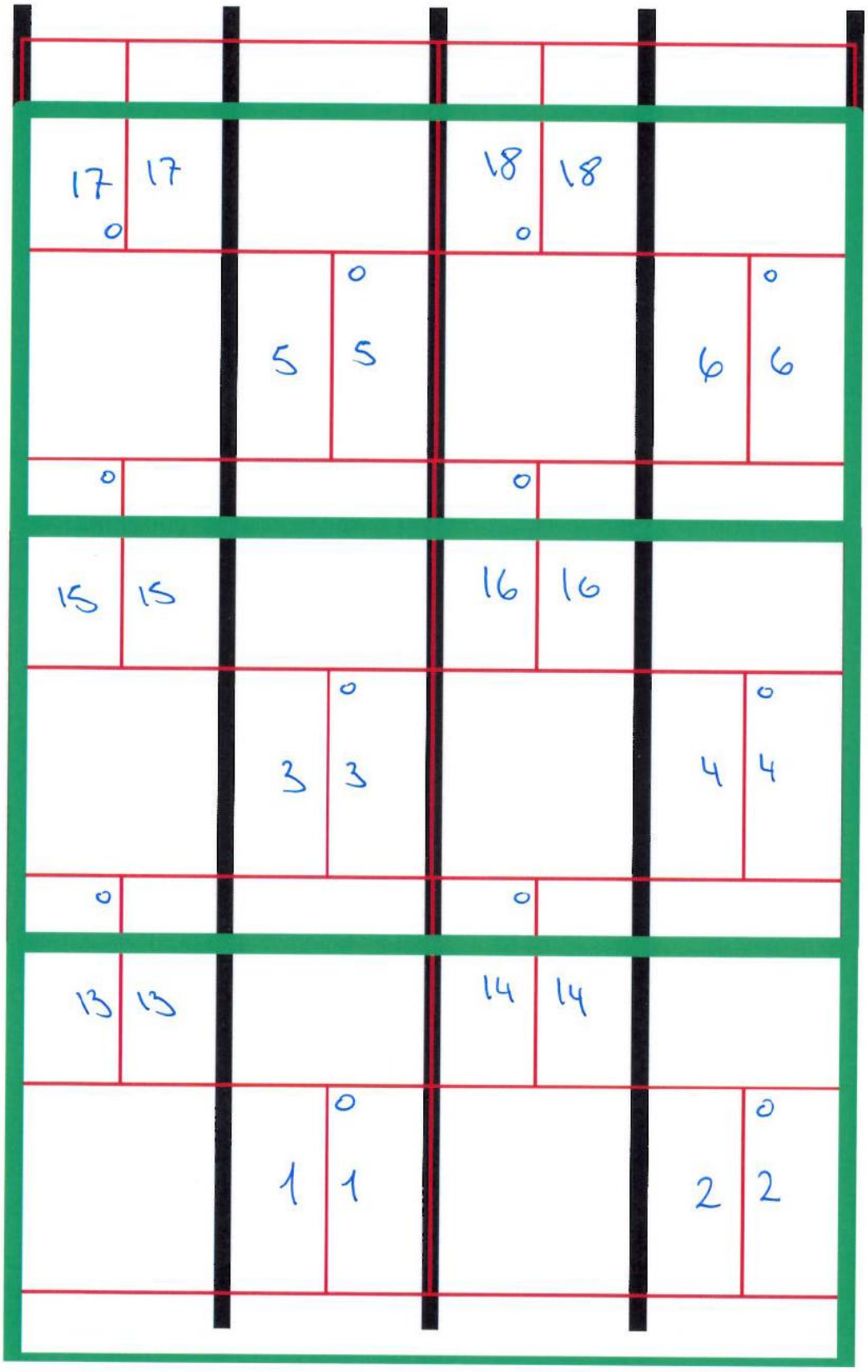

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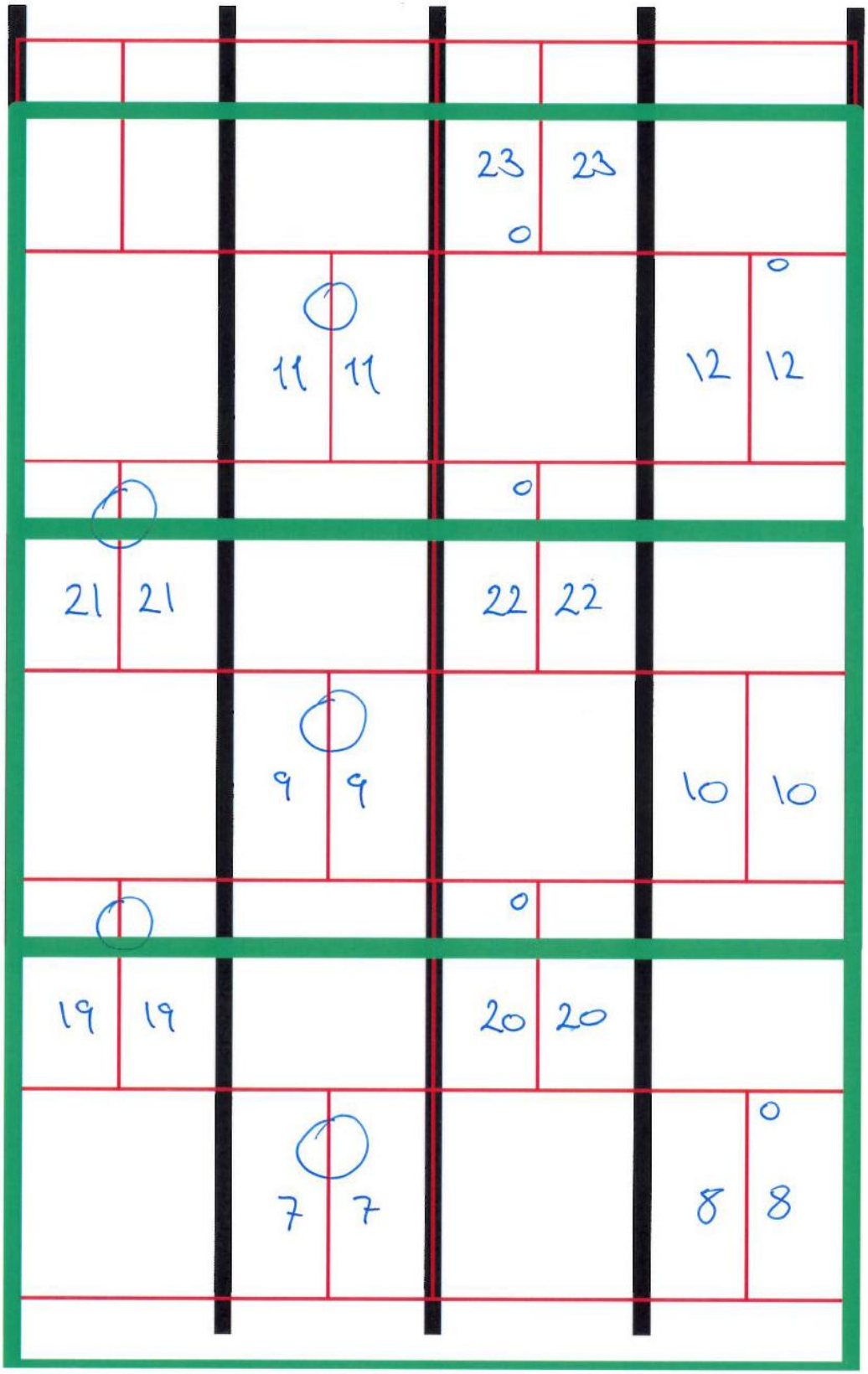

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Test Results EN 1195 IMPACT LOAD. Floor Decking

Material: Particleboard floor heating system covered by 10 mm particleboards
Panel thickness: 22 mm Cc: 600 mm

Drop height	Point No. 7 Joint in sub floor			Point No. 9 Joint in sub floor			Point No. 11 Joint in sub floor			Point No. 21 Joint in sub floor			Point No. 19 Joint in sub floor		
mm	Serult.	set	diff. set	Serult.	set	diff. set	Serult.	set	diff. set	Serult.	set	diff. set	Serult.	set	diff. set
0	-	0	Nm	-	0	Nm	-	0	Nm	-	0	Nm	-	0	Nm
150	-	-0,11	Nm	-	0	Nm	-	0	Nm	-	-0,55	Nm	-	-0,29	Nm
300	-	-0,29	Nm	-	-0,16	Nm	-	0	Nm	-	-0,75	Nm	-	-0,48	Nm
450	-	-0,49	Nm	-	-0,49	Nm	-	-0,22	Nm	-	-0,75	Nm	-	-0,68	Nm
600	-	-0,80	Nm	-	-0,77	Nm	-	-0,48	Nm	-	-0,75	Nm	-	-0,70	Nm
750	-	-1,71	Nm	ser	-1,79	Nm	ser	-1,17	Nm	-	-1,11	Nm	ser	-1,24	Nm
900	-	-2,70	Nm	ult	7,73	Nm	ser	-2,9	Nm	-	-2,41	Nm	ser	-2,42	Nm

Set: Set at point of impact in mm. Measured on top side of panel.
Diff. set: Differential set in nearest joint in mm. Measured on top side of panel.
Nm: Not possible to measure due to the construction of the floor
Os Out of scale (more than 10 mm)

Ser: Serviceability limit (When cracks occur)
Ult: Ultimate limit (When failures occur)
- : No cracks or failures have been recorded

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Test results EN 1195. Static point load. Floor decking

Sample:

Panel type:	Particleboard
Sample mark:	Top floor: 10 mm particleboard
Nominal thick-ness:	22 mm
Description:	22 mm sub floor, heating system and 10 particleboard

Test setup:

Load cell:	HBM U2 5t
Transducer:	HBM 50
Load diameter:	25 mm
Span, cc:	600 mm
Period:	2009-07-23 - 2009-07-24

Results:

Test Point	**Wm Deformation mm**	**R Stiffness N/mm**	**Fser Service N**	**Fmax Ultimate N**
2	4,76	561	4415	6202
4	5,21	509	4290	5567
6	4,82	558	4839	5658
18	4,86	545	4687	5641
16	4,39	567	4386	5645
14	4,58	534	4790	5394
1	4,45	550	4187	5745
3	4,46	545	4635	4838
5	4,42	551	4837	5620
17	4,78	518	4420	5544
15	4,69	513	4686	5650
13	4,29	567	4767	5620
8	5,00	506	5320	5683
10	4,96	511	4897	5270
12	4,64	537	4374	4829
24	4,47	553	5460	5603
22	4,54	545	5420	5426
20	4,53	539	4705	5591
Number	18	18	18	18
Mean	4,66	539	4729	5529
Std.dev.	0,24		372	314
COV	5,26		8	6
Char.Val.	4,66		4056	4929

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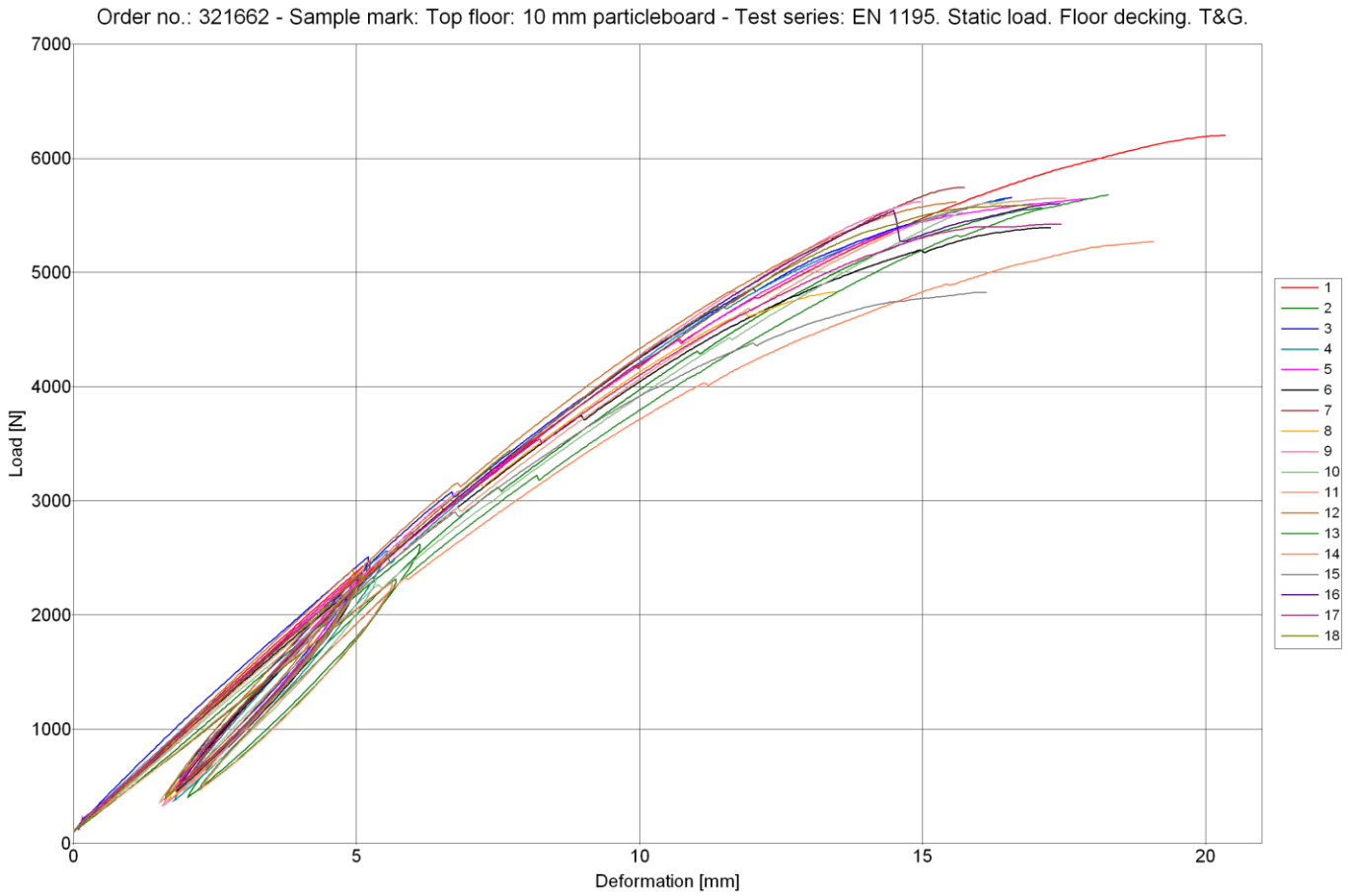
Test results EN 1195. Load-deflection curves



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Test Results EN 322. Sub floor. Moisture Content after Test

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EN 322 - Moisture Content

Panel:	**0444**	Test date:	**2009.07.30.**	Tester:	**TNP**
Quality:	**EN 312-6**	Customer:	**Novopan Træindustri, Vibopab afd.**		
Thickness [mm]:	**22**	Case no.:	**321662-1**		
Lab. no.:		Produced:		Week:	
Factory:		Production line:			
Material:	**Spånplade med spor til varmeslanger**				

Sample no.	Initial Weight [g]	Final Weight [g]	Moisture Content [%]
1	41,79	39,46	5,9
2	41,32	38,70	6,8
3	40,62	38,21	6,3
4	39,72	37,33	6,4
5	41,59	38,95	6,8
6	38,04	35,69	6,6
7	39,67	37,25	6,5
8	39,88	37,46	6,5
9	39,77	37,40	6,3
10	38,05	36,00	5,7
11	39,49	37,28	5,9
12	39,80	37,40	6,4
13	41,66	39,25	6,1
14	40,72	38,23	6,5
15	40,95	38,54	6,3
16	39,79	37,42	6,3
17	41,03	38,51	6,5
18	42,34	39,70	6,6
19	41,94	39,33	6,6
20	43,87	41,16	6,6
21	41,86	39,54	5,9
22	42,44	39,88	6,4
23	41,98	39,51	6,3
Number:	23	23	23
Mean:	**40,80**	**38,36**	**6,4**
Standard Deviation:	1,42	1,31	0,3
Coefficient of Variation:	3,5	3,4	4,6

Comments:

2009-07-30 09:41:29 IR/TNP 1

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Test results EN 323. Sub floor. Density after test

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EN 323 - Density

Panel:	**0444**	Test date:	**2009.07.29.**	Tester:	**TNP**
Quality:	**EN 312-6**	Customer:	**Novopan Træindustri, Vibopab afd.**		
Thickness [mm]:	**22**	Case no.:	**321662-1**		
Lab. no.:		Produced:		Week:	
Factory:		Production line:			
Material:	**Spånplade med spor til varmeslanger**				

Sample no.	Weight [g]	Thickness [mm]	Width [mm]	Length [mm]	Area weight [kg/m²]	Density [kg/m³]
1	41,78	22,06	50,84	51,60	15,9	722,0
2	41,32	21,99	50,34	50,60	16,2	737,7
3	40,65	22,10	52,22	51,50	15,1	683,9
4	39.74	22.07	51.34	50.60	15.3	693.1
5	41,47	22,06	51,81	51,70	15,5	701,8
6	38,00	22,05	49,63	50,10	15,3	693,1
7	39,65	22,05	50,82	50,80	15,4	696,5
8	39,89	22,04	50,58	51,20	15,4	698,9
9	39,77	22,16	50,93	51,30	15,2	686,9
10	38,09	22,08	50,00	50,60	15,1	681,9
11	39,46	21,98	50,84	50,90	15,2	693,8
12	39.82	21.98	50.86	51.10	15.3	697.1
13	41,65	22,02	51,95	51,90	15,4	701,5
14	40,71	21,90	50,43	51,30	15,7	718,5
15	40,98	21,98	51,58	51,90	15,3	696,5
16	39,78	22,01	52,20	50,60	15,1	684,3
17	41.04	22.17	52.20	51.20	15.4	692.6
18	42.35	22.17	52.62	51.60	15.6	703.5
19	41.93	22.20	51.18	52.40	15.6	704.3
20	43.88	22.18	52.30	52.30	16.0	723.3
21	41,86	22,08	52,78	51,80	15,3	693,4
22	42,47	22,16	52,80	52,60	15,3	690,1
23	42,03	22,08	52,92	51,10	15,5	703,9
Number:	23	23	23	23	23	23
Mean:	**40,80**	**22,07**	**51,44**	**51,3**	**15,4**	**699,9**
Standard Deviation:	1,42	0,08	0,96	0,6	0,3	13,8
Coefficient of Variatic	3,5	0,4	1,9	1,3	1,9	2,0

Comments:

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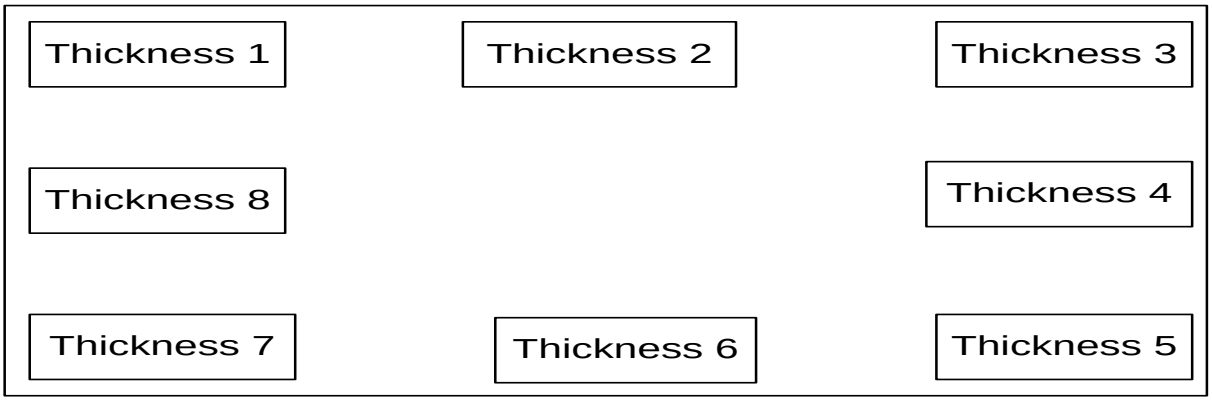
Test Results EN 324-1, Sub floor. Panel thickness



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Test Results EN 1195 IMPACT LOAD. Floor Decking

Panel No	Thickness [mm]								Max	Min
	1	2	3	4	5	6	7	8		
1	22,01	22,04	21,98	22,02	22,01	22,00	21,98	22,04	22,04	21,98
2	21,96	22,00	21,95	21,93	21,91	21,99	21,94	21,96	22,00	21,91
3	22,02	22,01	22,01	22,02	22,00	22,00	21,98	22,06	22,06	21,98
4	21,99	21,93	21,95	21,96	21,92	21,92	21,92	21,98	21,99	21,98
5	22,01	22,01	21,99	21,99	21,98	21,98	22,04	22,00	22,04	21,96
6	22,01	22,00	22,01	21,98	21,98	21,95	21,97	21,98	22,01	21,95
7	22,00	22,00	22,01	21,98	21,96	21,95	21,987	22,01	22,01	21,95
8	22,00	22,05	22,02	22,01	21,99	21,94	21,98	21,97	22,05	21,94
9	22,02	22,01	22,18	22,05	22,03	21,98	22,00	22,05	22,18	21,98
10	22,02	22,01	22,04	22,02	22,01	21,98	220,3	22,00	22,04	21,98
11	21,90	21,91	21,95	21,92	21,95	21,88	21,98	21,94	21,95	21,88
12	21,90	21,90	22,16	21,94	21,93	21,87	21,86	21,87	22,16	21,86
13	21,90	21,99	22,05	21,93	21,92	21,85	21,86	21,90	22,05	21,85
14	21,89	21,90	21,94	21,92	21,86	21,82	21,83	21,82	21,94	21,82
15	21,90	21,90	21,93	22,21	21,93	22,00	21,88	21,90	22,21	21,88
16	21,90	21,90	21,98	21,95	21,93	21,88	21,89	21,96	21,96	21,88
17	22,09	22,08	22,12	22,15	22,16	22,09	22,06	22,09	22,16	22,06
18	22,11	22,12	22,06	22,15	21,14	22,09	22,10	22,12	22,18	22,06
19	22,11	22,10	22,14	22,16	22,12	22,08	22,08	22,17	22,17	22,08
20	22,09	22,09	22,13	22,08	22,10	22,07	22,07	22,06	22,13	22,06
21	21,90	21,91	21,92	21,91	21,93	21,88	21,88	21,88	21,93	21,88
22	21,89	21,89	21,93	21,93	21,92	21,85	21,87	21,86	21,93	21,86
23	21,89	21,89	21,93	21,91	21,92	21,88	21,87	21,92	21,93	21,87
24	21,90	21,90	21,94	21,99	21,94	21,87	22,02	21,90	22,02	21,87

EN 12871 Dimensional thickness tolerances for sanded panels ± 0,4 mm