



**DANISH
TECHNOLOGICAL
INSTITUTE**

DLH A/S
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Report no. 349953
Page 1 of 1
Appendices 6
Initials pfy/jlj/hbs

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Test Report

**ITT testing according to EN 1195:1997 Timber structures.
The testing of structural floor decking**

CE 1235
EU Notified Body

Material: **Floor construction – Timberman Joker Parket top floor on 22 mm DLH THERMOGULV – particleboard Sub floor with floor heating system, see app. 1.**

Sampling: The test material was sampled and sent by the client and received at the Danish Technological Institute 10-02-2010

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 12871:2001 “Wood based panels. Performance specifications and requirements for load bearing boards for use in floors, walls and roofs”
Installed according to guidance given on DLH homepage.
Tested with a centre to centre span of 600 mm. Tested at flying joints in sub floor. Glued in T&G and fixed with screws 4.6 × 64 mm countersunk 4 pcs in each joist. Top floor floating on sub floor. Minimum panel length of 900 mm in sub floor
CEN/TS 12872:2007 “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, EQP-619

Period: February 2010

Result: Tested as structural floor decking with heating system (load category A Residential) on joists with a 600 mm centre to centre span and flying 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: Thickness, density, sub floor
Appendix 7: Test set-ups
Evaluation of test results:
Soft body impact load
The floor structure **meets** the requirements for floors given in EN 12871.
Static point load
 $R_m = 535 \text{ N/mm}$
 $F_{ser,k} = 3550 \text{ N}$
 $F_{ult,k} = 7174 \text{ N}$
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 22-02-2010, Danish Technological Institute, Wood and Textile, Taastrup

Signature

Authorized Signatory

Verifier

Materials

Laboratory No 349953

Sub floor

Material	:	Particleboard
Thickness	:	Nominal 22 mm
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	:	22 mm DLH THERMOGULV STD. E1 EN 13986 P6 1070-CPD-202 B:44 24/11/09 P:44 05/11/09 C CE
Number of panels	:	48
Tested number of elements	:	46

**Heat distribution plates**

Heat distribution plate	:	DLH THERMOGULV Ø 16 x 2,0 – 180 x 1150 mm, 0,207 M ² UNDGÅ KNIRKELYDE, BRUG KUN RØR MED ILTSPÆRRE I MIDTEN AF RØRET
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Heating hose

Heating hose	:	PEX 5 layer komposit 16 x 2,0 mm Gulv- varme/Centralvarme DIN 4726 DIN 16892 95°C 6 bar L2 26/11/08 L47
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Layer between floor

Material	:	Cardboard 500 g/m ²
Dimension	:	1 m width
Production date	.	No information
Marking	:	-

Top Flooring

Material	:	Timberman Joker Parket, ASK CLASSIC CLIC – MATLAK HVID
Thickness	:	Nominal 13,5 mm (Actual 13,2-13,3)
Production date	.	No information
Board width and length	:	200 mm x 2230 mm
Marking	:	Board marking: 2100452151/093TWSC (13,5) Package marking: CE, Singha Paratech PLC., 132 Moo 4 Banmoh, Promburi Singburi 16120, Thailand 08. EN 14342 Multi Layer parquet with UV coated, tongue and groove for floating installation. Density and thickness 500,13 Reaction to fire D _{fl} - s1 Emission of formaldehyde E1 Breaking strength (max load) NPD Slipperiness URSV 16

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 flying end joints.
- Heat distribution plates fitted into grooves in sub floor.
- Heating hose pressed into heat distribution plates
- Cardboard between sub floor and top floor.
- Top flooring. 13,5 mm Timberman Joker Parket ASK CLASSIC CLIC – MATLAK HVID. Installed perpendicular to the sub floor.

Test Results EN 1195 IMPACT LOAD. Floor Decking**Material: Particleboard floor heating system covered by 13 mm multilayer flooring**

Panel thickness: 22 mm

Cc: 600 mm

Drop height mm	Point No. 1 Panel 38+43			Point No. 2 Panel 40+45			Point No. 3 Panel 41+46			Point No. 4 Panel 39+44			Point No. 5 Panel 37+42		
	Ser ult.	set	diff. set	Ser ult.	set	diff. set	Ser ult.	set	diff. set	Ser ult.	set	diff. set	Ser ult.	set	diff. set
0	-	0	Nm	-	0	Nm	-	0	Nm	-	0	Nm	-	0	Nm
150	-	-0,75	Nm	-	-0,92	Nm	-	-0,40	Nm	-	-0,15	Nm	-	-0,10	Nm
300	-	-0,87	Nm	-	-0,92	Nm	-	-0,50	Nm	-	-0,30	Nm	-	-0,13	Nm
450	-	-0,94	Nm	-	-1,10	Nm	-	-0,60	Nm	-	-0,30	Nm	-	-0,30	Nm
600	-	-0,96	Nm	-	-1,30	Nm	-	-0,60	Nm	-	-0,40	Nm	-	-0,33	Nm
750	-	-0,95	Nm	-	-1,50	Nm	-	-0,40	Nm	-	-0,40	Nm	-	-0,40	Nm
900	-	-0,83	Nm	-	-1,8	Nm	-	-0,80	Nm	-	-0,10	Nm	-	-0,59	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)

Aud: Audible cracks
 Ser: Serviceability limit (Visible cracks and/or deflection exceeds 1 mm)
 Ult: Serviceability limit (Severe cracks)
 Thr: Sand bag through test set-up
 - : No cracks or failures have been recorded

Test results EN 1195. Static point load. Floor decking

Sample: Panel type: EN 312 P6
Sample mark: DLH THERMOGULV STD E1
Nominal thick- 22 mm
ness:
Description:

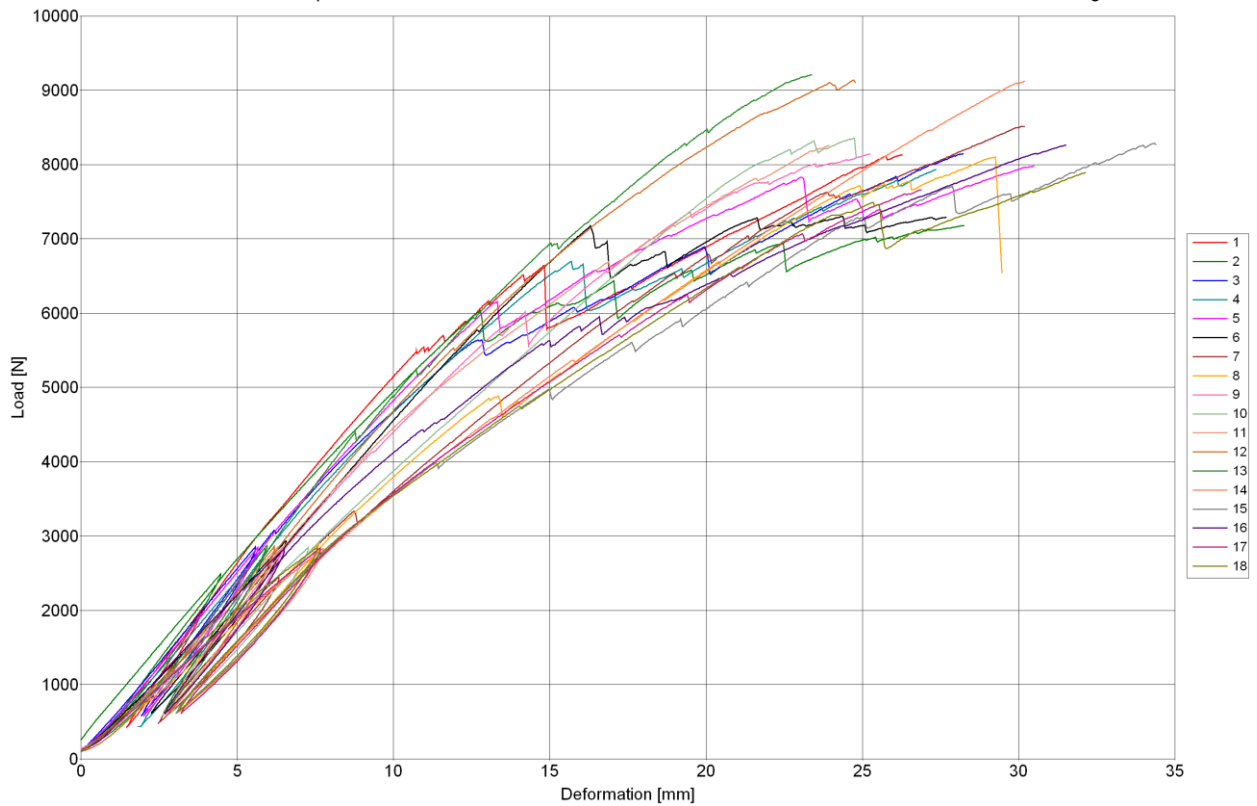
Test setup: Load cell: HBM U2 5t EQP_652
Transducer: HBM Transducer W50K EQP_619
Load diameter: 25 mm
Span, cc: 600 mm
Period: 2010-02-16 - 2010-02-18

Results:	Test Point	Wm Deformation mm	R Stiffness N/mm	Fser Service N	Fmax Ultimate N
	1 and 7	3,43	636	5500	8135
	3 and 9	4,57	564	6000	7183
	5 and 11	5,17	587	5500	8149
	6 and 12	5,34	571	6700	7944
	4 and 10	5,14	591	6100	7982
	2 and 8	5,83	519	5700	7309
	14 and 20	5,66	479	3300	8519
	16 and 22	6,44	493	4900	8101
	18 and 24	5,43	575	5800	8142
	17 and 23	6,42	481	8100	8357
	15 and 21	5,38	576	6700	8263
	13 and 19	5,00	625	5200	9138
	25 and 31	4,78	652	4400	9213
	27 and 33	7,11	445	5200	9142
	29 and 35	7,01	449	4000	8291
	30 and 36	5,76	544	4500	8266
	28 and 34	6,88	459	6200	7661
	26 and 32	6,90	459	4600	7890
	Number	18	18	18	18
	Mean	5,68	535	5467	8205
	Std.dev.	0,98		1125	558
	COV	17,21		21	7
	Char.Val.	5,68		3550	7174

Software version: WoodLabBasic version 1.02 of 2010-02-01.

Test results EN 1195. Load-deflection curves

Order no.: 349953 - Sample mark: DLH THERMOGULV STD E1 - Test series: EN 1195. Static load. Floor decking. T&G.



APPENDIX 5

349953

pfy/jlj/hbs

Page 1/2

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

Panel:	0554	Test date:	2010.02.22.	Tester:	PFY
Grade:	EN 312-6	Customer:	DLH A/S		
Thickness [mm]:	22	Case no.:	349953		
Lab. no.:	349953	Produced:	2010.02.19.	Week:	7
Factory:		Prod.line:			
Material:	22 mm particleboard sub floor				

Sample no.	Initial Weight [g]	Final Weight [g]	Moisture Content [%]
1	37,79	35,81	5,5
2	38,09	36,12	5,5
3	38,62	36,58	5,6
4	35,72	33,86	5,5
5	38,12	36,13	5,5
6	37,88	35,86	5,6
7	37,71	35,71	5,6
8	37,14	35,25	5,4
9	38,38	36,30	5,7
10	36,92	34,89	5,8
11	37,83	35,77	5,8
12	37,57	35,55	5,7
13	35,99	33,89	6,2
14	37,35	35,32	5,7
15	35,86	33,72	6,3
16	38,86	36,70	5,9
17	36,92	34,73	6,3
18	38,41	36,37	5,6
19	38,76	36,59	5,9
20	38,56	36,30	6,2
21	34,87	32,96	5,8
22	38,30	36,05	6,2
23	42,01	39,70	5,8
24	36,36	34,27	6,1
25	36,72	34,53	6,3
26	37,68	35,38	6,5
27	39,07	36,76	6,3
28	39,49	37,09	6,5
29	36,60	34,47	6,2
30	38,30	36,01	6,4
31	37,79	35,52	6,4
32	37,36	35,17	6,2
33	38,27	35,98	6,4
34	38,83	36,56	6,2
35	37,09	34,91	6,2
36	36,86	34,73	6,1
37	37,61	35,28	6,6
38	36,29	34,10	6,4
39	36,99	34,74	6,5
40	35,40	33,26	6,4
41	37,61	35,28	6,6
42	38,69	36,33	6,5
43	37,76	35,46	6,5
44	38,56	36,28	6,3
45	38,77	36,42	6,5
46	36,25	34,13	6,2

APPENDIX 5

349953

pfy/jlj/hbs

Page 2/2

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EN 322 - Moisture Content

Panel:	0554	Test date:	2010.02.22.	Tester:	PFY
Grade:	EN 312-6	Customer:	DLH A/S		
Thickness [mm]:	22	Case no.:	349953		
Lab. no.:	349953	Produced:	2010.02.19.	Week:	7
Factory:		Prod.line:			
Material:	22 mm particleboard sub floor				
Number:	46	46	46		
Mean:	37,65	35,50	6,1		
Standard Deviation:	1,24	1,18	0,4		
Coefficient of Variation:	3,3	3,3	6,0		

Comments:

Test results EN 323. Sub floor. Thickness and density after test



EN 323 - Density

Panel:	0554	Test date:	2010.02.19.	Tester:	PFY
Quality:	EN 312-6	Customer:	DLH A/S		
Thickness [mm]:	22	Case no.:	349953		
Lab. no.:	349953	Produced:	2010.02.19.	Week:	7
Factory:		Production line:			
Material:	22 mm particleboard sub floor				

Sample no.	Weight [g]	Thickness [mm]	Width [mm]	Length [mm]	Area weight [kg/m²]	Density [kg/m³]
1	37,80	21,79	50,39	49,60	15,1	694,1
2	38,08	21,94	50,35	52,90	14,3	651,6
3	38,63	21,81	50,40	50,90	15,1	690,4
4	35,73	21,99	50,39	50,50	14,0	638,5
5	38,11	21,99	50,35	50,40	15,0	682,9
6	37,88	21,80	50,36	49,80	15,1	692,8
7	37,71	21,89	50,21	49,80	15,1	689,0
8	37,14	21,82	50,41	50,00	14,7	675,3
9	38,34	22,00	50,26	49,20	15,5	704,8
10	36,91	21,98	50,29	50,00	14,7	667,8
11	37,82	21,87	50,32	49,40	15,2	695,7
12	37,57	21,98	50,36	49,70	15,0	682,9
13	35,98	22,00	50,47	48,80	14,6	664,0
14	37,34	22,00	50,34	49,30	15,0	683,9
15	35,85	21,83	50,28	49,70	14,3	657,2
16	38,85	21,80	50,37	49,70	15,5	711,9
17	36,91	21,89	50,42	49,20	14,9	679,7
18	38,41	21,96	50,30	49,50	15,4	702,5
19	38,75	21,86	50,36	49,70	15,5	708,2
20	38,56	21,84	50,35	49,80	15,4	704,1
21	34,84	21,90	50,35	49,60	14,0	637,0
22	38,29	21,89	50,41	49,70	15,3	698,2
23	42,00	22,00	50,49	54,10	15,4	698,9
24	36,35	21,90	50,32	49,90	14,5	661,0
25	36,71	22,49	50,39	49,60	14,7	653,1
26	37,66	21,91	50,28	49,40	15,2	692,0
27	39,04	21,86	50,42	50,10	15,5	707,0
28	39,47	21,88	50,33	49,50	15,8	724,1
29	36,59	21,96	50,28	49,80	14,6	665,4
30	38,29	21,83	50,29	49,70	15,3	701,8
31	37,77	21,98	50,29	49,70	15,1	687,5
32	37,35	21,87	50,17	49,70	15,0	684,9
33	38,27	21,90	50,32	50,20	15,2	691,8
34	38,82	21,85	50,36	49,60	15,5	711,3
35	37,08	21,93	50,38	49,20	15,0	682,1
36	36,86	21,85	50,32	49,60	14,8	675,9

APPENDIX 6

349953

pfy/jlj/hbs

Page 2/2

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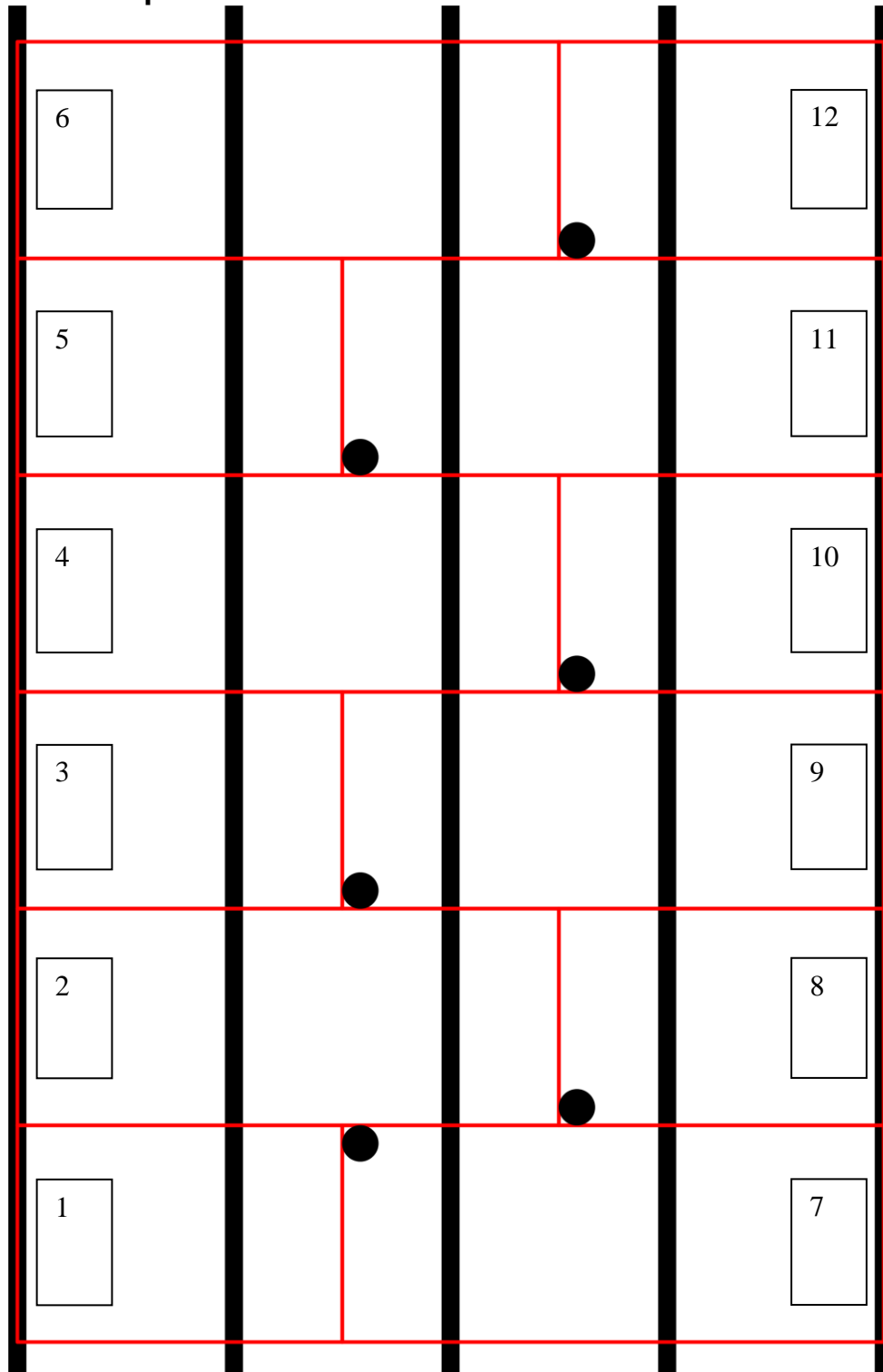


EN 323 - Density

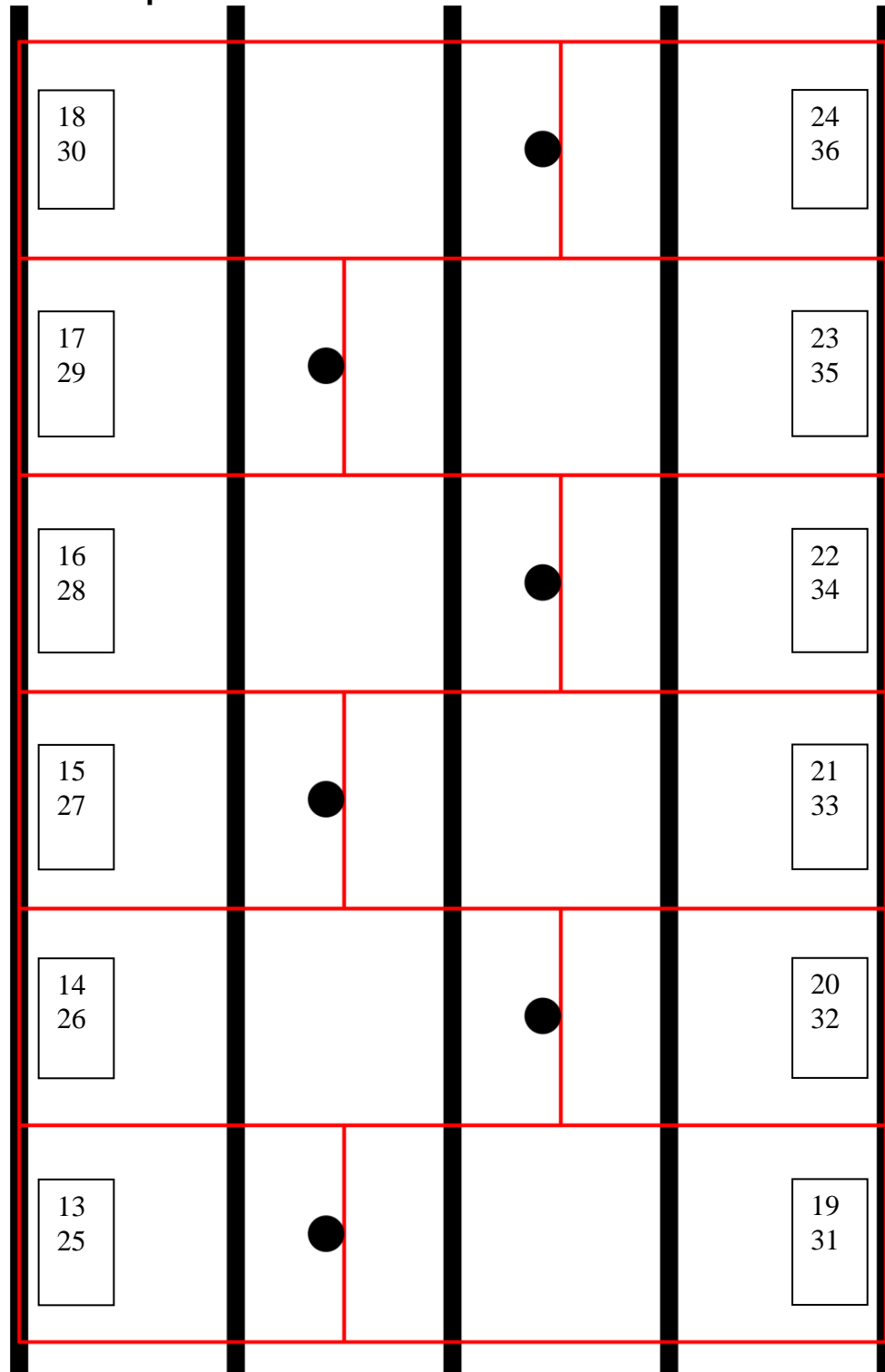
Panel:	0554				Test date:	2010.02.19.	Tester:	PFY
Quality:	EN 312-6				Customer:	DLH A/S		
Thickness [mm]:	22				Case no.:	349953		
Lab. no.:	349953				Produced:	2010.02.19.	Week:	7
Factory:					Production line:			
Material:	22 mm particleboard sub floor							
37	37,61	21,85	50,25	49,50	15,1	692,0		
38	36,28	21,88	50,35	49,60	14,5	664,0		
39	36,98	21,91	50,42	49,70	14,8	673,5		
40	35,39	21,91	50,22	49,00	14,4	656,4		
41	37,60	21,97	50,36	49,80	15,0	682,4		
42	38,68	21,88	50,35	49,70	15,5	706,5		
43	37,76	21,93	50,39	49,80	15,0	686,2		
44	38,56	21,90	50,30	49,90	15,4	701,5		
45	38,76	21,92	50,31	49,90	15,4	704,3		
46	36,25	21,91	50,31	48,30	14,9	680,9		
Number:	46	46	46	46	46	46		
Mean:	37,64	21,92	50,34	49,8	15,0	684,7		
Standard Deviation:	1,24	0,11	0,06	0,9	0,4	20,0		
Coefficient of Variatic	3,3	0,5	0,1	1,8	2,8	2,9		

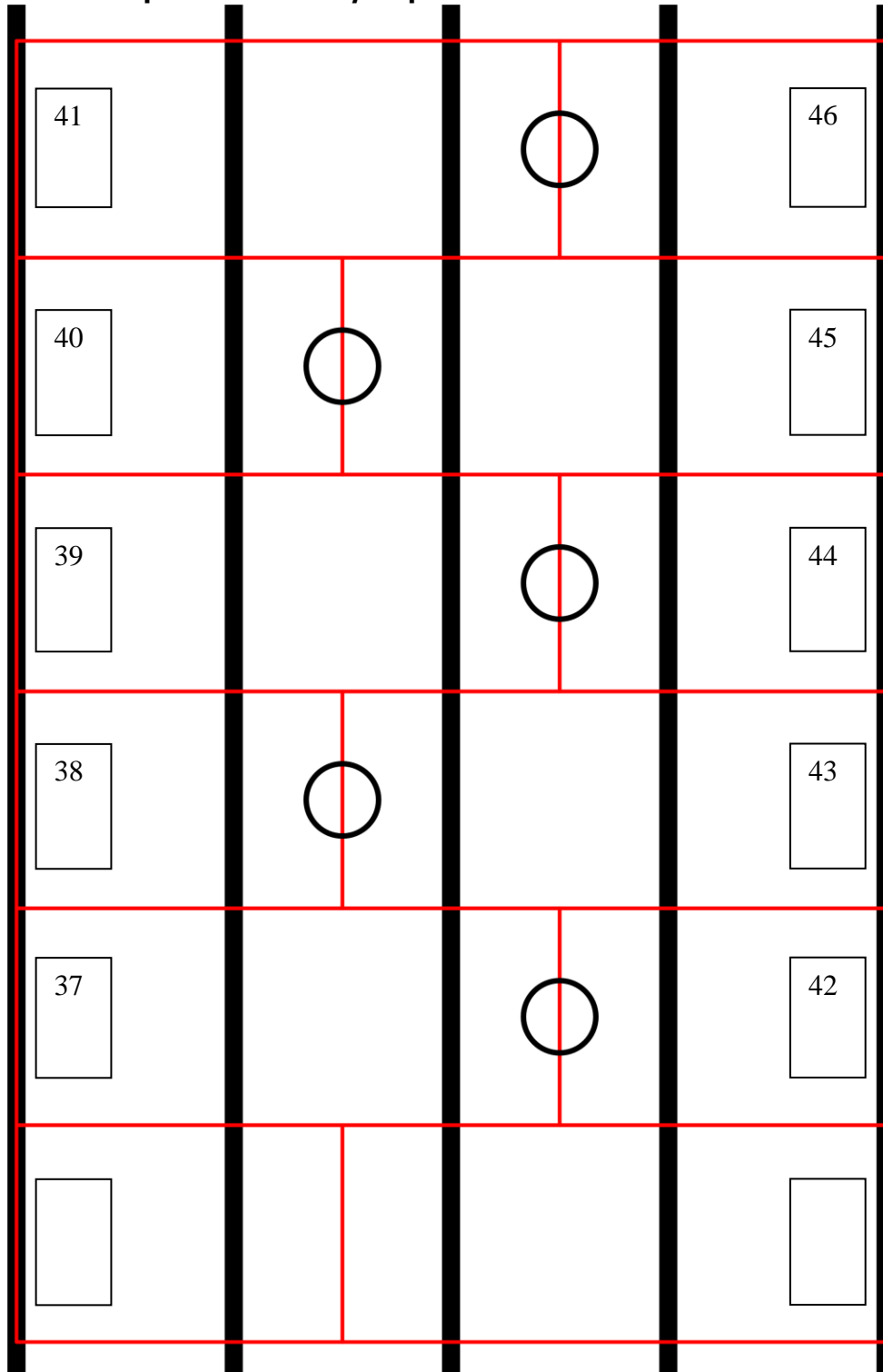
Comments:

Test set up I – Static Point load



Test set up II-III – Static Point load



Test set up IV – Soft body impact

The general conditions pertaining to assignments accepted by Danish Technological Institute shall apply in full to the technical testing and calibration at Danish Technological Institute and to the completion of test reports and calibration certificates within the relevant field.

Danish Accreditation (DANAK)

DANAK was established in 1991 in pursuance of the Danish Act No. 394 of 13 June 1990 on the promotion of Trade and Industry.

The requirements to be met by accredited laboratories are laid down in the "Danish Agency for Trade and Industry's" ("Erhvervsfremme Styrelsens") Statutory Order on accreditation of laboratories to perform testing etc. and GLP inspection. The statutory order refers to other documents, where the criteria for accreditation are specified further.

The standards DS/EN ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories" and DS/EN 45002 "General criteria for the assessment of testing laboratories" describe fundamental criteria for accreditation. DANAK uses guidance documents to clarify the requirements in the standards, where this is considered to be necessary. These will mainly be drawn up by the "European co-operation of Accreditation (EA)" or the "International Laboratory Accreditation Co-operation (ILAC)" with the purpose of obtaining uniform criteria for accreditation. In addition, DANAK draws up Technical Regulations with specific requirements for accreditation that are not contained in the standards.

In order for a laboratory to be accredited it is, among other things, required:

- that the laboratory and its personnel are not subject to any commercial, financial or other pressures, which might influence their technical judgement

- that the laboratory operates a documented quality system
- that the laboratory has at its disposal all items of equipment, facilities and premises required for correct performance of the service that it is accredited to perform
- that the laboratory management and personnel have technical competence and practical experience in performing the service that they are accredited to perform
- that the laboratory has procedures for traceability and uncertainty calculations
- that accredited testing or calibration is performed in accordance with fully validated and documented methods
- that the laboratory keeps records, which contain sufficient information to permit repetition of the accredited test or calibration
- that the laboratory is subject to surveillance by DANAK on a regular basis
- that the laboratory shall take out an insurance, which covers liability in connection with the performance of accredited services

Reports carrying DANAK's logo are used, when reporting accredited services and show that these have been performed in accordance with the rules for accreditation.