SPACE INVADER
PROFIT FROM SPACE

SpaceInvader guidelines and test documentation

SpaceInvader
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Guidelines and test documentation

- for international transport with SpaceInvader pallet racks

Approved and directed by:

ISTA - International Safe Transit Association
https://ista.org/

The Danish Technological Institute (Teknologisk Institut)
https://www.dti.dk

Kapacitet A/S - Danish R&D Engineering Consultancy
https://kapacitet.dk/

Guidelines for cargo securing during road transport

When transported on a truck or a lorry, the loaded rack must be secured against moving forward, backward and sideways.

Securing the loaded rack against moving can be achieved by placing it directly against the headbord, sideboard, sidesupports, crossbars, beams, other goods etc., so it is kept firmly in place. The supporting height must be at least 80 cm (equal the width of a pallet), in order to prevent the loaded rack from tipping over.

The shape of the rack secures the top pallet against sliding in accordance with the regulation standards set forth by EN 12195-1:2010. If the top pallet has an uncentered centre of gravity, it must be lashed to the rack to ensure against tipping.

In situations where it is not possible to support the rack and where the top pallet cannot be lifted down, the loaded rack must be lashed according to standards prescribed by EN 12195-1:2010.

See appendix link:

- SpaceInvader user manual (EN)
- SpaceInvader Benutzerhandbuch (DE)
- SpaceInvader brugermanual (DK)
- SpaceInvader brukermanual (NO)

TEST Reg. No 92

DANISH TECHNOLOGICAL INSTITUTE

TEST REPORT

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Client

Freebird & Sunshine
Edvard Thomsens Vej 9 st. dør 01
2300 København S
Denmark

Report no 2003252

Date: 8 February 2016
SNH/MOB/bbi

Specification

One Pallet Stacking System

Test requirements

The test was performed according to ISTA 3E (2009), Unitized Loads of same Product

	Packaging and Logistics Equipment no:
Atmospheric Preconditioning	
Shock test - Incline Impact	23
Shock test - Rotational Edge Drop	27
Compression test	29
Random vibration test	24.1
Shock test - Rotational Edge Drop	27

Metric units were used.

The test was performed by

Senior Consultant Søren Henriksen and Consultant Mogens Buch.

Results

The Pallet Stacking System passed all tests

Accredited testing was carried out in compliance with the current guidelines laid down by DANAK (Danish Laboratory Accreditation Scheme), please see www.danak.dk, and in compliance with Danish Technological Institute's General Terms and Conditions regarding Commissioned Work Accepted by Danish Technological Institute, February 2013. The test results apply to the tested products only.
This test report may be reproduced in extract only if the Laboratory has approved the extract in writing.

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Mogens Buch, Consultant
Phone: +45 72 20 15 83
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Co-reader

Test Material

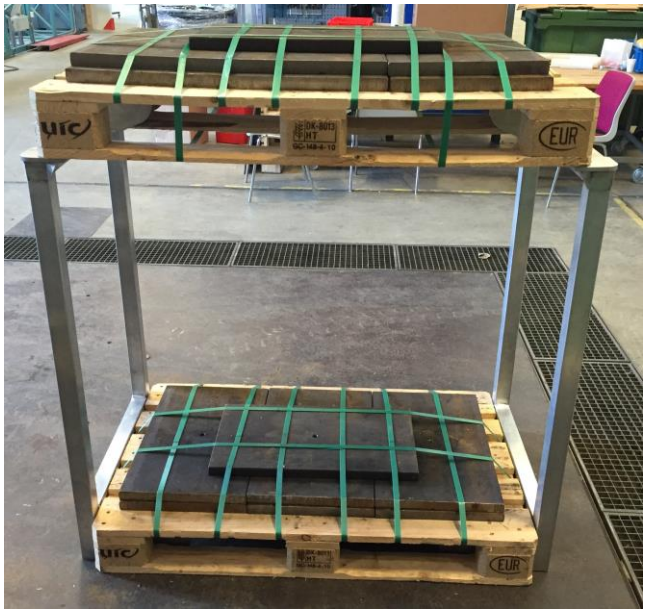
One Pallet Stacking System

Dimensions: L x W x H = 1300 x 800 x 1380 mm (external measures)

Weight (Stacking System): 2 x 9.2 kg

Weight (Pallets): 2 x 350.0 kg

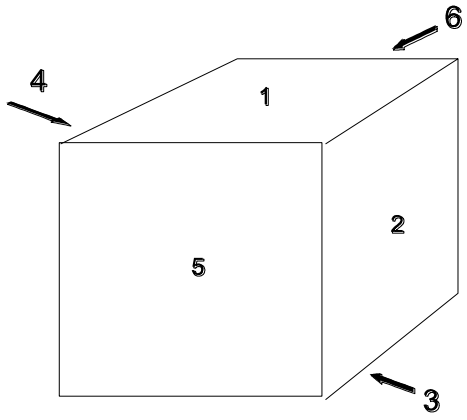
Weight (Total): 718.4 kg



The test material was received in week 4, 2016.

The test was carried out in week 4, 2016.

Before the test, the Pallet Stacking System was marked as follows:



Test programme

The Pallet Stacking System was tested according to ISTA 3E (2009), Unitized Loads of same Product

1. Atmospheric Preconditioning

The Pallet Stacking System was Pre-conditioned at 21°C and 52% RH for 24 hours

2. Shock test - Incline Impact

The Pallet Stacking System was tested according to standard with an impact speed of 1.1 m/s.

Sequence	Orientation	
1	Face	2
2	Face	4
3	Face	5
4	Face	6

3. Drop test, Rotational Edge Drop:

The Pallet Stacking System was tested according to standard on edge 2-3 and 3-5 from a height of 200 mm.

4. Compression test (Machine apply and release)

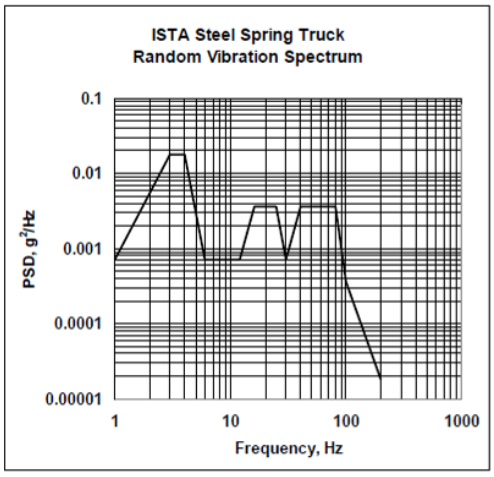
The Pallet Stacking System was tested to the following Test force:

Test force = 735 x 3 x 9.8 x 1.4 = 30,252 N

5. Vibration test, random:

The pallet Stacking system was tested according to standard with an overall grms level of 0.54

Frequency (Hz)	PSD Level, g²/Hz
1.0	0.00072
3.0	0.018
4.0	0.018
6.0	0.00072
12.0	0.00072
16.0	0.0036
25.0	0.0036
30.0	0.00072
40.0	0.0036
80.0	0.0036
100.0	0.00036
200.0	0.000018



240 min. on face 3 = ≥ 1920 km transport

6. Drop test, Rotational Edge Drop:

The Pallet Stacking System was tested according to standard on edge 4-3 and 3-6 from a height of 200 mm.

Test results

The Pallet Stacking System passed all tests

Test Report

The Danish Technological Institute

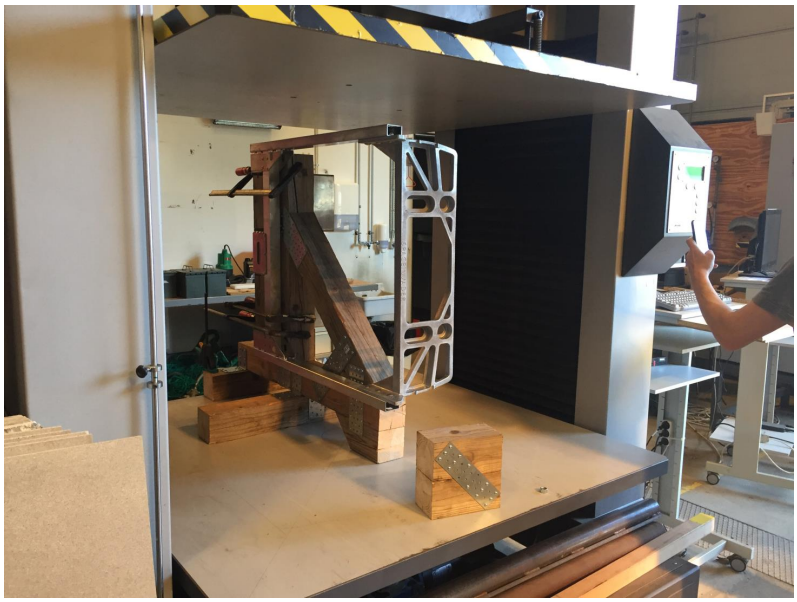
Structural stress and strength tests

Kapacitet

Test hos Teknologist Institut (TI) – 2019-05-24

Test at krydsstabilitet for 1250mm og 870mm

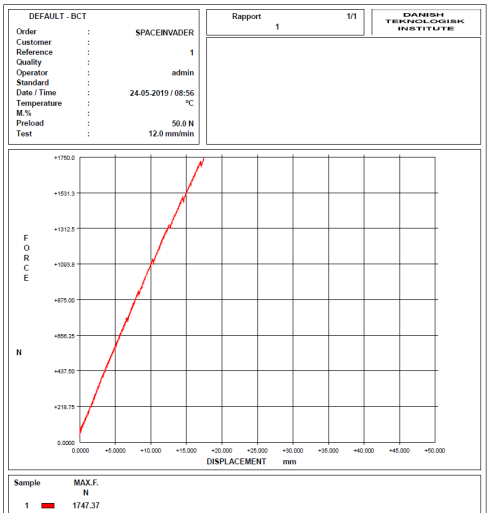
Gældene for begge stativer er at Test 1, 2 og 3 er udført på samme stativ.



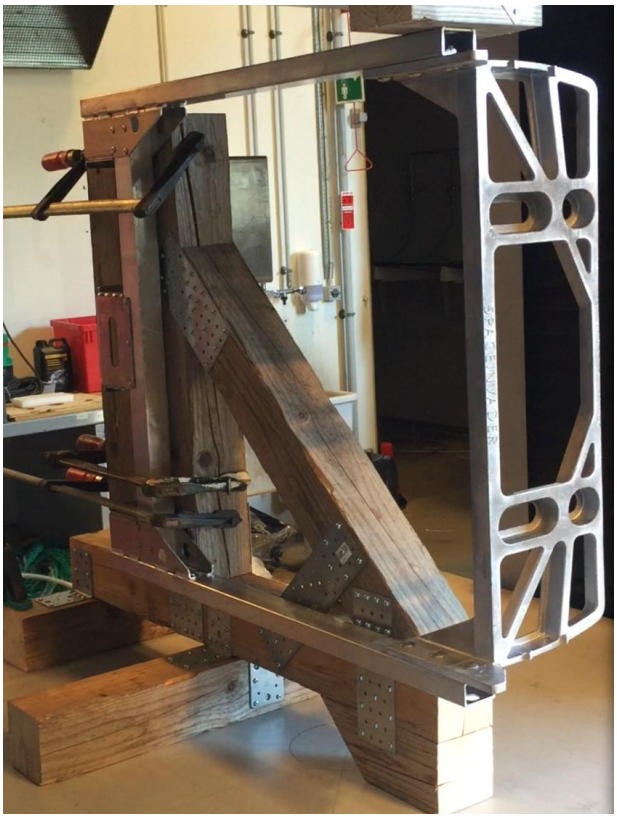
1289 - 2019-05-24 - Spaceinvader - Test hos TI

Resultater fra test hos TI – 870mm stativ

Test 1:
Belastning 1747N (178kg)
Udbøjning: 17,5mm
Ingen deformation efter test.

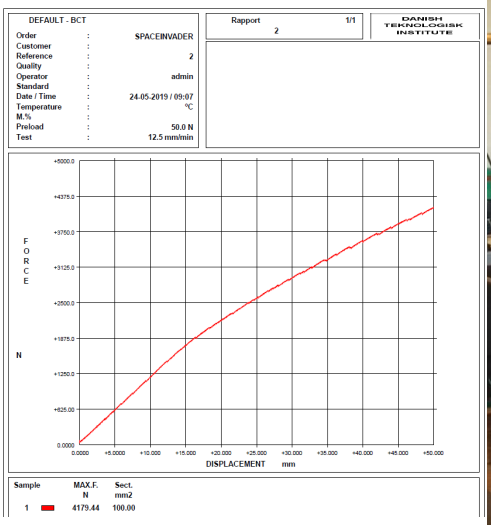


1289 - 2019-05-24 - Spaceinvader - Test hos TI



Resultater fra test hos TI – 870mm stativ

Test 2:
Belastning 4179N (425kg)
Udbøjning: 50mm
Lidt deformation efter test. Se mellemrum efter aflastning


DEFAULT - BCT

Order	:	SPACEINVADER
Customer	:	
Reference	:	2
Quality	:	
Operator	:	admin
Standard	:	
Date / Time	:	24-05-2019 / 09:07
Temperature	:	°C
M.%	:	
Preload	:	50.0 N
Test	:	12.5 mm/min

Rapport 1/1
2

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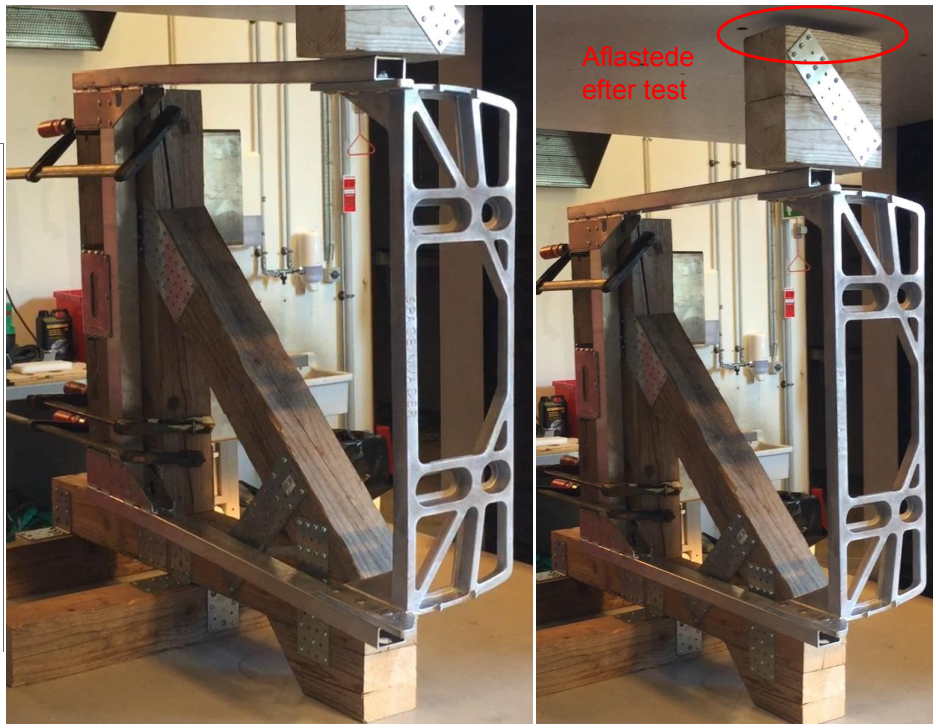
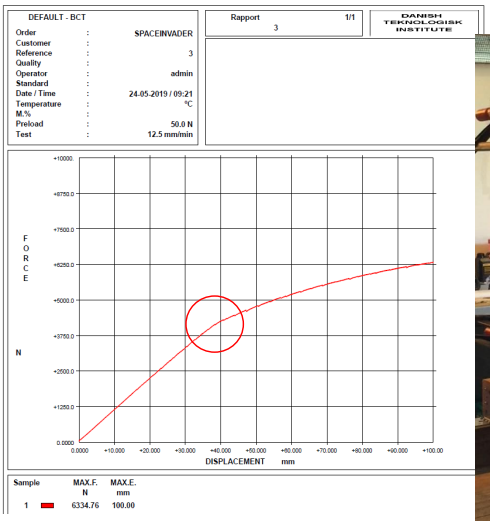
Sample	MAX.F. N	Sect. mm2
1	4179.44	100.00

1289 - 2019-05-24 - Spaceinvader - Test hos TI



Resultater fra test hos TI – 870mm stativ

Test 3:
Belastning 6334N (645kg)
Udbøjning: 100mm
Kurven knækker omkring 4200N (428kg) hvor udbøjningen er ca. 40mm (deformeret efter test)


DEFAULT - BCT

Order	:	SPACEINVADER
Customer	:	
Reference	:	3
Quality	:	
Operator	:	admin
Standard	:	
Date / Time	:	24-05-2019 / 09:21
Temperature	:	°C
M.%	:	
Preload	:	50.0 N
Test	:	12.5 mm/min

Rapport 1/1
3

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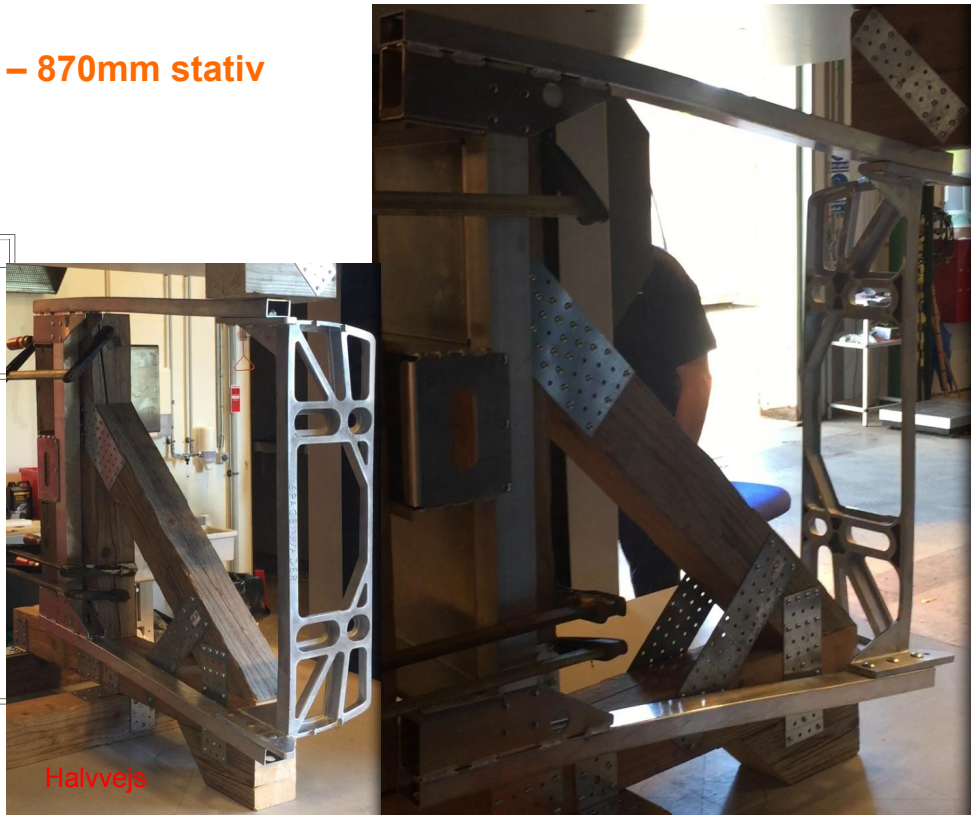
Sample	MAX.F. N	MAX.E. mm
1	6334.76	100.00

1289 - 2019-05-24 - Spaceinvader - Test hos TI

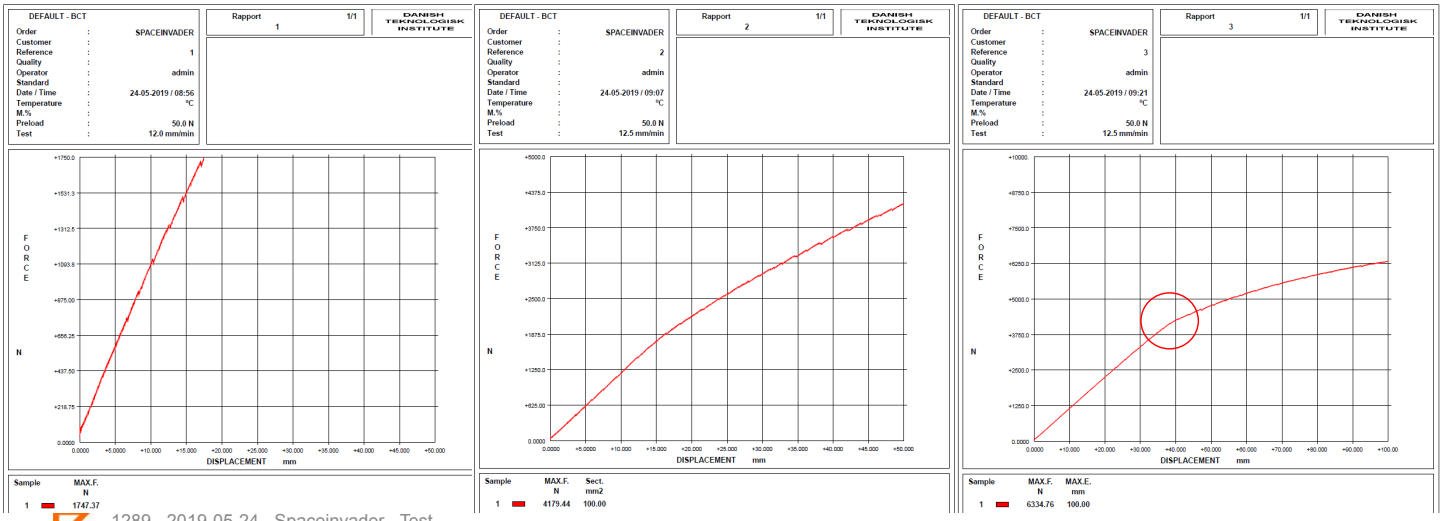


Resultater fra test hos TI – 870mm stativ

Test 1:
Belastning 1747N (178kg)
Udbøjning: 17,5mm
Ingen deformation efter test.

Test 2:
Belastning 4179N (425kg)
Udbøjning: 50mm
Lidt deformation efter test.

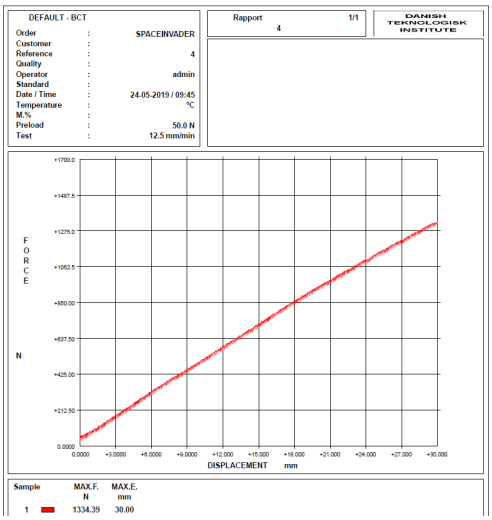
Test 3:
Belastning 6334N (645kg)
Udbøjning: 100mm
Kurven knækker omkring 4200N (428kg) hvor udbøjningen er ca. 40mm (deformeret efter test)



1289 - 2019-05-24 - Spaceinvader - Test hos TI

Resultater fra test hos TI – 1250mm stativ

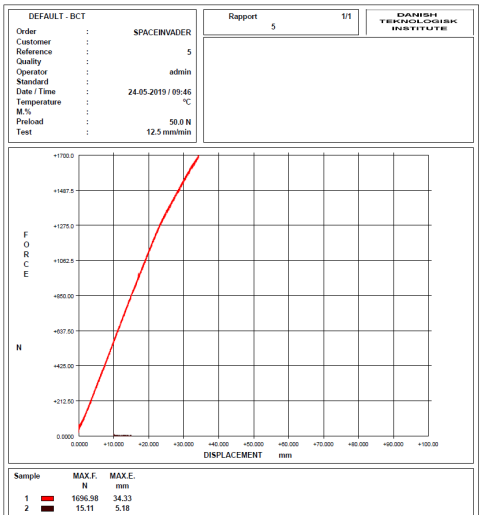
Test 1:
Belastning 1334N (135kg)
Udbøjning: 30mm.
Ingen deformation efter test.



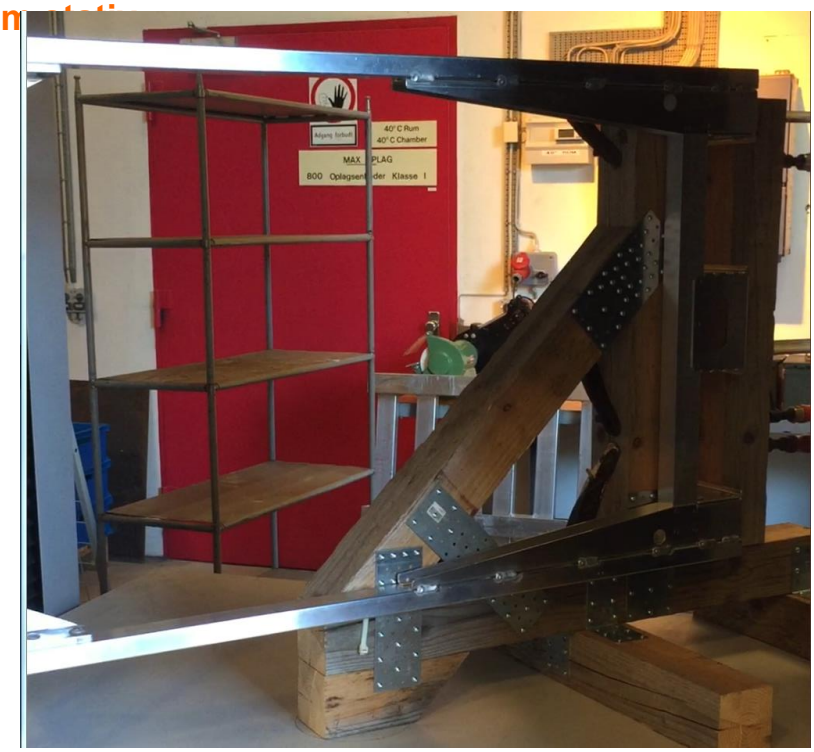
1289 - 2019-05-24 - Spaceinvader - Test hos TI

Resultater fra test hos TI – 1250mm stativ

Test 2:
Belastning 1696N (172kg)
Udbøjning: 34mm
Ingen deformation efter test.

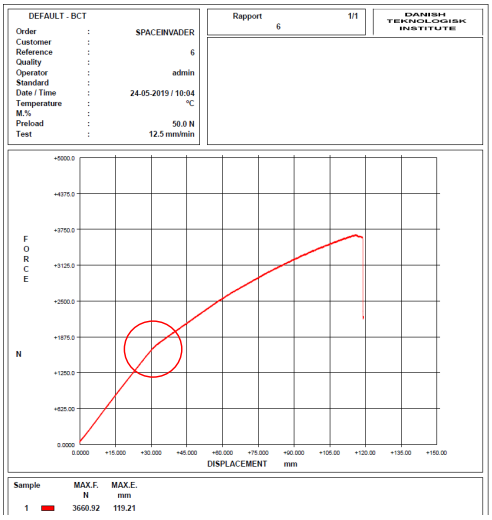


1289 - 2019-05-24 - Spaceinvader - Test hos TI



Resultater fra test hos TI – 1250mm stativ

Test 3:
Belastning 3669N (374kg)
Udbøjning: 119mm
Kurven knækker omkring 1700N (173kg), hvor udbøjningen er ca. 30mm



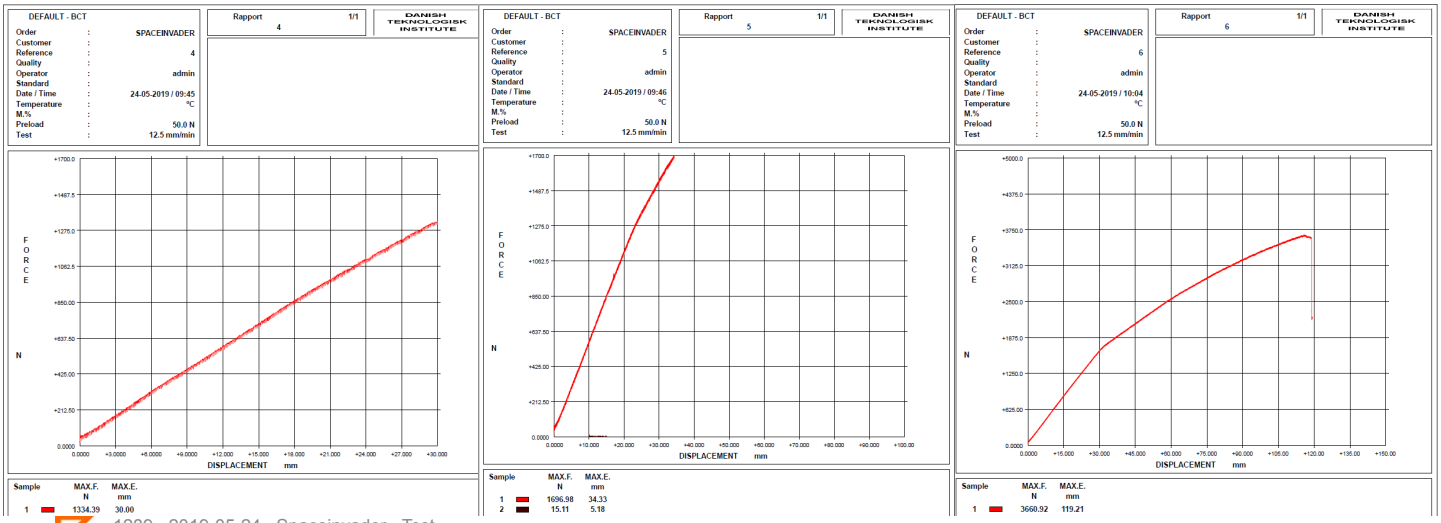
1289 - 2019-05-24 - Spaceinvader - Test hos TI

Resultater fra test hos TI – 1250mm stativ

Test 1:
Belastning 1334N (135kg)
Udbøjning: 30mm.
Ingen deformation efter test.

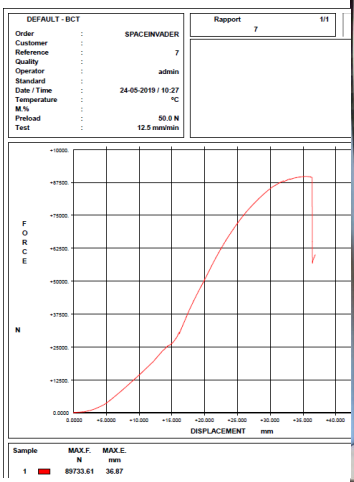
Test 2:
Belastning 1696N (172kg)
Udbøjning: 34mm
Ingen deformation efter test.

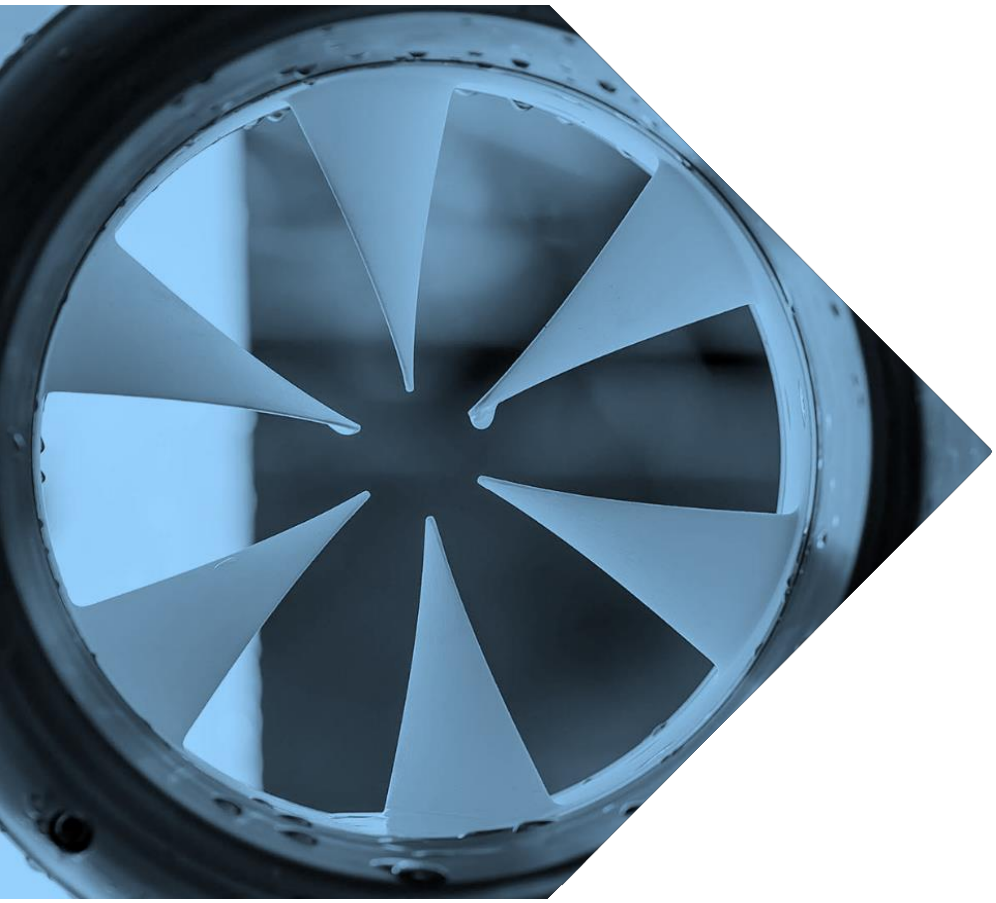
Test 3:
Belastning 3669N (374kg)
Udbøjning: 119mm
Kurven knækker omkring 1700N (173kg), hvor udbøjningen er ca. 30mm (Kan skyldes testopstilling)



Resultater fra test hos TI – 1250mm stativ – Lodret last

Test 1:
Belastning 89733N
Udbøjning: 36mm
2 bolte knækkede ved denne belastning





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