TESMEC Limited: Test house, Unit 19 Newey Business Park
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TESMEC

Independent Testing & Engineering Services

Report and Load Survey of: Fabricated post pallets

Document number: *TES000149TR-1*
Client: *VR Access Solutions Ltd*

Address: *1 Swan Court Yard*
Charles Edwards Road
Birmingham
B26 1BU

Date of applied testing/survey: *Start date 15th July 2016 to 21st July 2016*

Item description: *Free issue fabricated open sided post pallets, material assumed carbon steel.*
Vertical uprights constructed from 60mmx60mmx 2.8mm square hollow section, outer main structural frame constructed from 60mmx60mmx 2.8mm square hollow section, 2 number lateral base inserts constructed from 25mmx50mm hollow section.
Vertical uprights complete with pressed steel base cup for stacking and pressed steel domed capping top.
Triangular gussets welded beneath each outer perimeter SHS from vertical leg
Overall height at 750mm, overall width 1120mm²
Distance from floor to underside of base fabrication 140mm.
Digital image figure 1 shows fabrication.
Material finish: grey primer.

Identification mark affixed to item: *No apparent identification marks affixed*

Client submitted drawing numbers: *Non submitted*

Client design review Ref: *To be conducted by client*

Quantity submitted for test: *5 fabrications submitted, 1 for concentrated study and failure load survey, 4 number for stacking load study..*

Client submitted British standard or procedure number*: verbal client instruction only*

Address of where testing /surveys were conducted: *TESMEC Limited;*
Independent Testing and Engineering services.
Test House
Unit 19, Newey Business Park
Sedgley Road West
Tipton, West Midlands
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Number of pages contained in this report: 14

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1.1 TESMEC mission statement

It is the intention of TESMEC Limited; Independent Testing and Engineering services to continuously provide independent advice in addition to a professional and confidential Engineering service to all of its trusted clients and where applicable, engage in incessant professional development through review, investment and training to further our existing service and to support the increasing requirements of our customers.

1.2 Test/survey requirements

The client requested a load survey to be conducted to the submitted fabricated post pallets and individual components in accordance verbal instructions.
Requested Working load limit of 1500kgs per pallet
Live load applied safety factor on a single sample 2250kgs
Live load applied overload of 3000kgs on a single pallet
Hydraulic concentrated base point load across centre
Compressive concentrated load survey to 3 number pressed steel feet through to failure
Compressive concentrated load survey to domed capping top
Stacking load application at 4 high
Equipment: Calibrated test mass, Denison 500kN servo hydraulic tensile/compression machine class 1 calibration, serial number DMG921-2

1.3 Figure 1

Typical image of submitted component

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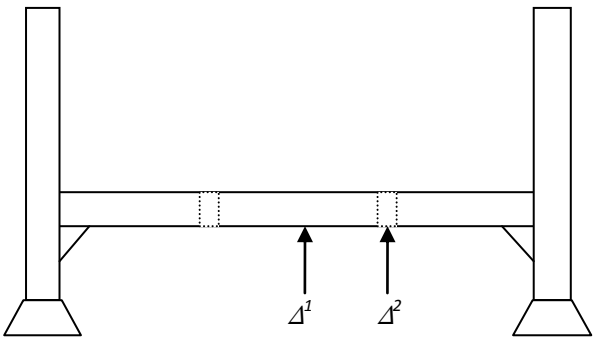
Section 2: Live load uniformly distributed load survey

A uniformly distributed load was applied using 25kg test mass at increments of 200kg
Displacements were monitored at the outer perimeter structure Δ^1 and internal lateral brace support Δ^2
Uniform loads applied to 1600kg requested working limit and a factor of 1.5
1600x1.5= 2400kg

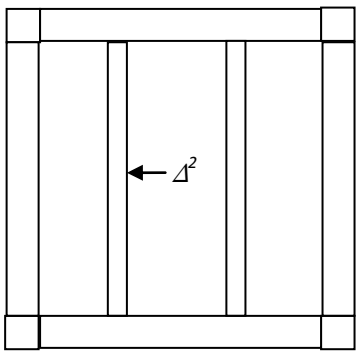
2.1. *UDL load displacement table*

Incremental UDL kg	*Displacement Δ^1*	*Displacement Δ^2*
200	*0*	*0.17*
400	*0.08*	*0.29*
600	*0.08*	*0.4*
800	*0.08*	*0.53*
1000	*0.16*	*0.68*
1200	*0.28*	*0.78*
1400	*0.32*	*0.84*
1600	*0.46*	*1.04*
1800	*0.57*	*1.14*
2000	*0.76*	*1.26*
2250	*0.91*	*1.47*
@30min dwell	*0.92*	*1.47*
No load	*0.27*	*0.08*

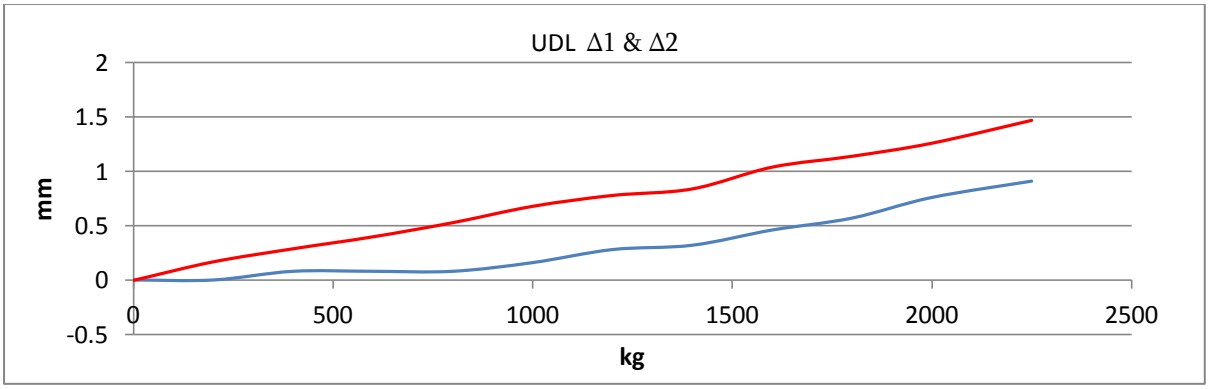
2.1.1. *Displacement diagram 1*



Plan view



2.1.2 *Load displacement graph UDL*



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2.2. *UDL load factor x2*

The sample was subject to a UDL application with a test coefficient of 2
1500x2=3000kg
The test load was sustained for 30 minutes and compressive readings pre and post load observed
No significant post load permanent displacement recorded.

2.2.1. *Digital image of concentrated UDL test coefficient of x2*

Actual applied load
Block number 3: 1190 kg
Block number 4: 1188 kg
Block number 5: 1170 kg

Mass verification report number: TESSR1
Calibration conducted on 3ed March 2016
Load cell calibration number: TTN914

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2.3. *Concentrated partial area load*

The sample was subject to a concentrated partial area load application.
250mm foot print across the length of the base fabrication positioned through the centre line.
Incremental load was applied with permanent displacements monitored.

2.3.1. *Digital image of concentrated application*

Δ1 Displacement reading taken at end of main outer SHS structure at mid span.

Δ2 Displacement reading taken at lateral cross member mid span.

2.3.2. *Results table load displacement Δ1 & Δ2*

Load applied kN	*Δ1 outer SHS*	*Δ2 inner SHS*	*Load applied kN*	*Δ1 outer SHS*	*Δ2 inner SHS*
0	0	0	*16*	2.76	1.09
1	0.11	0	*0*	0.03	0.01
2	0.3	0	*18*	3.05	1.29
3	0.48	0	*0*	0.05	0.3
4	0.67	0	*20*	3.32	1.46
5	0.87	0.13	*0*	0.07	0.13
6	1.07	0.25	*22*	3.53	1.56
7	1.24	0.36	*0*	0.07	0.14
8	1.4	0.46	*24*	4.14	2
9	1.58	0.55	*0*	0.11	0.17
10	1.8	0.68	*26*	4.38	2.2
0	0.04	0.16	*0*	0.18	0.18
12	2.08	0.7	*28*	4.76	2.36
0	0.01	0.08	*0*	0.23	0.18
14	2.37	0.9	*30*	5.11	2.54
0	0.02	0.04	*0*	0.53	0.22

Load application stopped at 30kN, permanent displacement recorded at a positive 0.53mm

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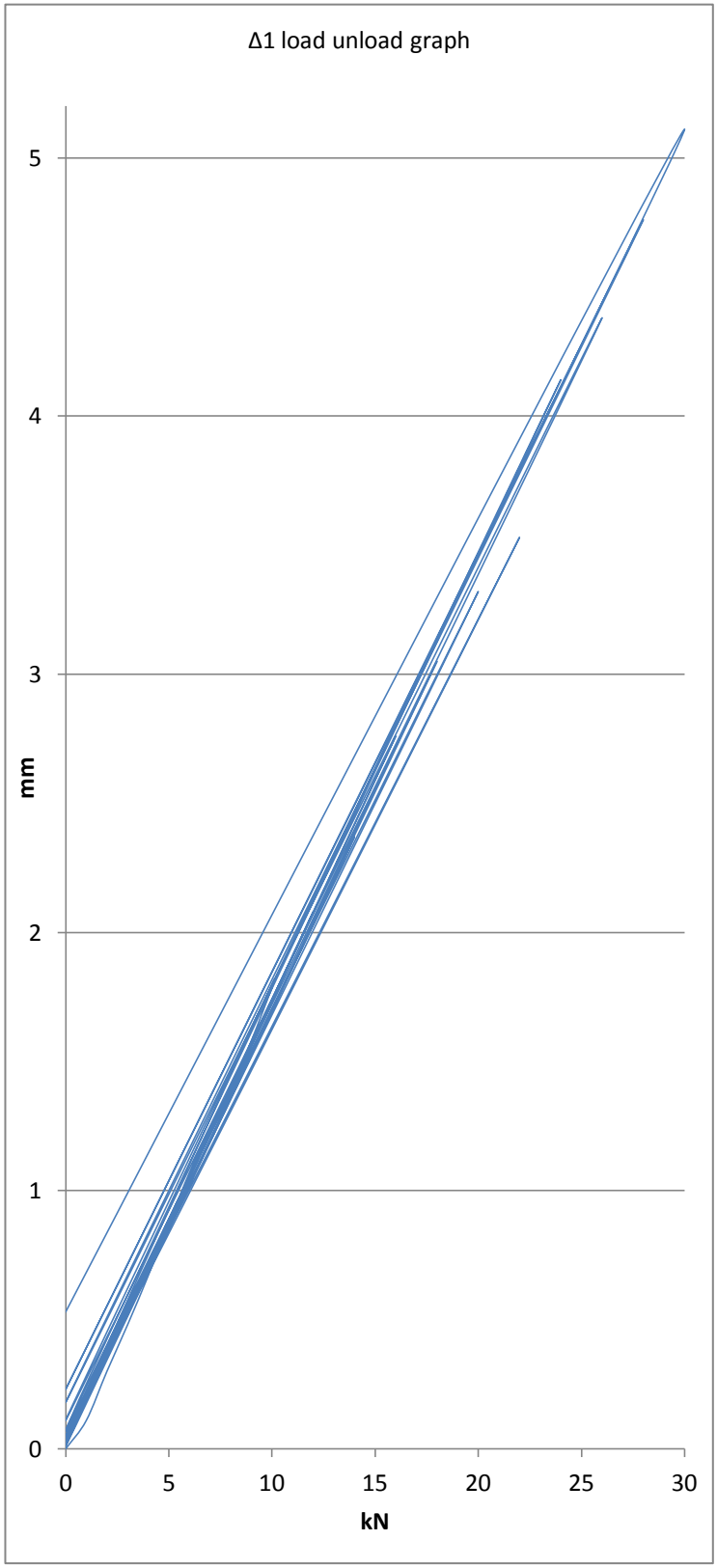
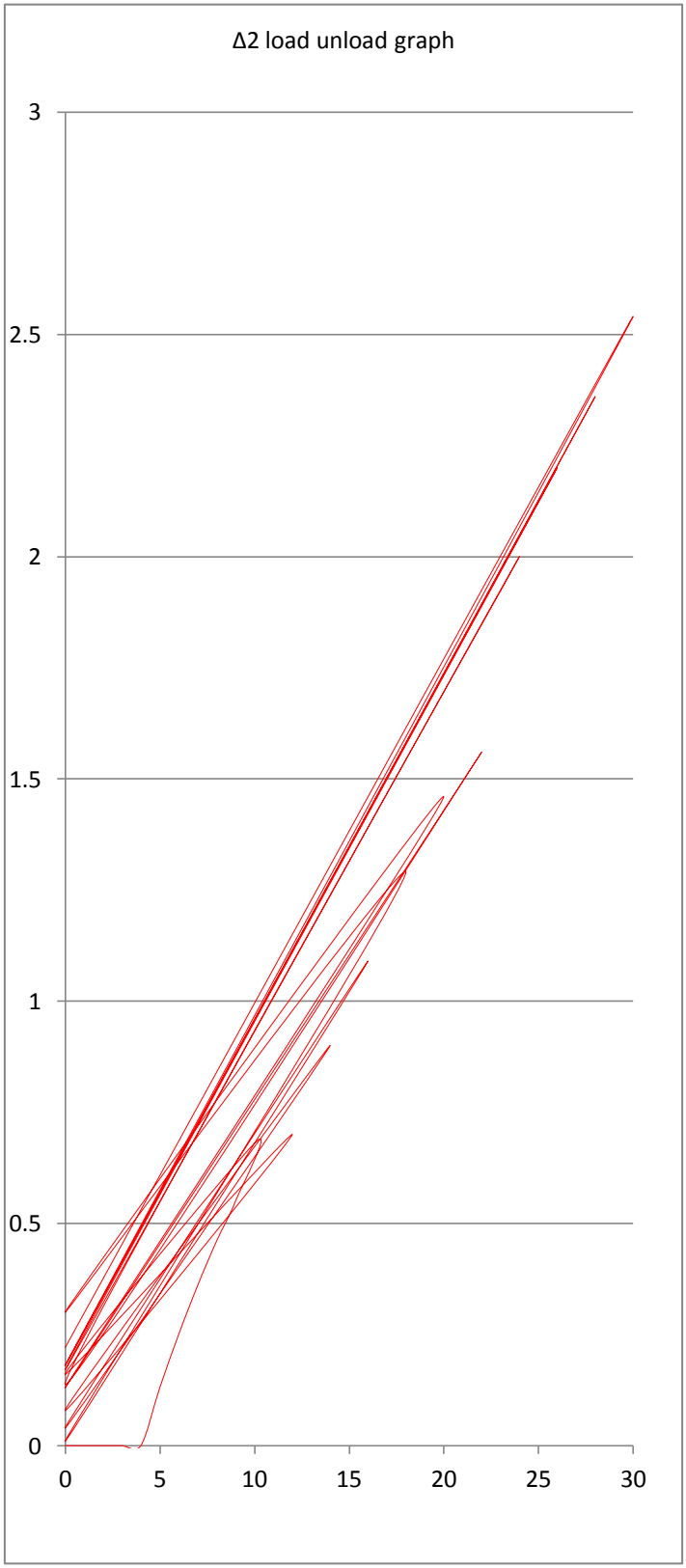
2.3.3. *Load displacement graph Δ1 & Δ2 showing unloading*





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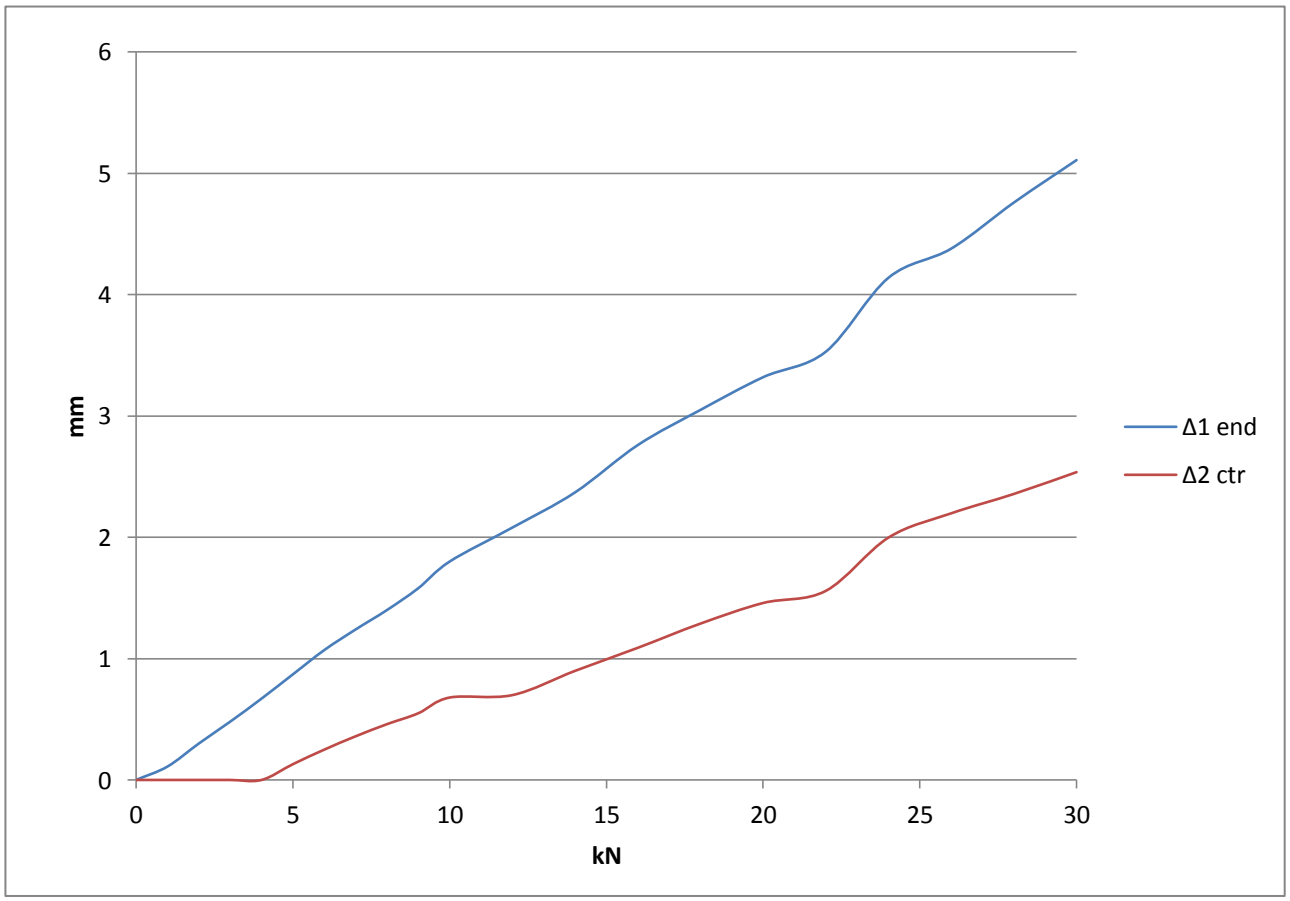
2.3.4. *Load displacement graph Δ1 & Δ2 excluding unloading*



3.0. *Pressed steel feet concentrated load survey.*

3.1. *Recorded failure loads*

Three vertical uprights were removed to allow concentrated compressive load survey to be conducted.
Each sample was subject to a compressive load through to ultimate failure at an applied load rate of 5mm per minute.

Sample 1 ultimate recorded load 204.72kN (20875.63kg) initial compressive yield recorded approximately at 180kN (load displacement graph 3.1.1.)
Sample 2 ultimate recorded load 198.86kN (20278.08kg) initial compressive yield recorded approximately at 190kN (load displacement graph 3.1.2.)
Sample 3 ultimate recorded load 176.61kN (18009.21kg) initial compressive yield recorded approximately at 170kN (load displacement graph 3.1.3.)
Sample 3 vertical square hollow section compressive yield recorded (see digital image 3.2.3.)

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3.1.1. *Load displacement sample 1*

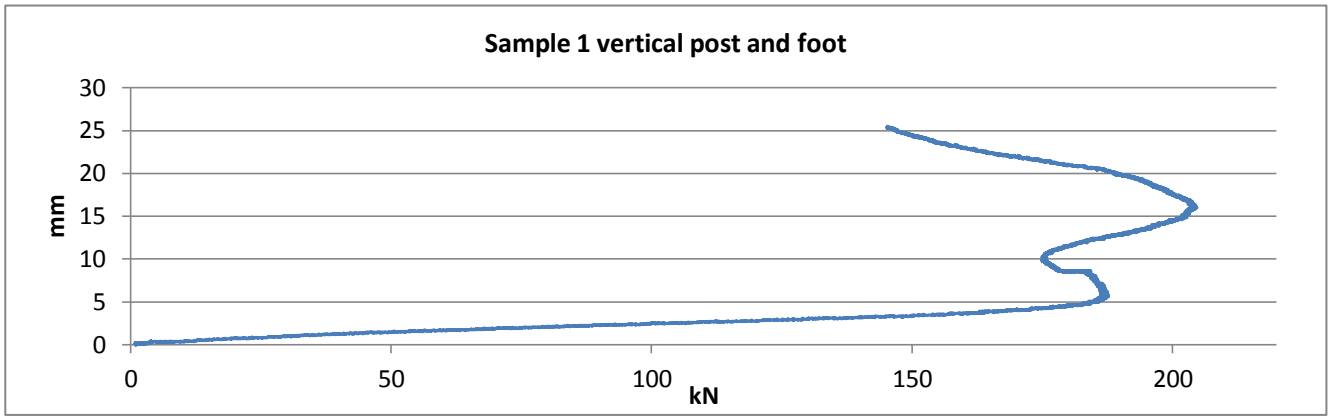

Image of post load failure: digital image 3.2.1.

3.1.1.2. *Load displacement sample 2*

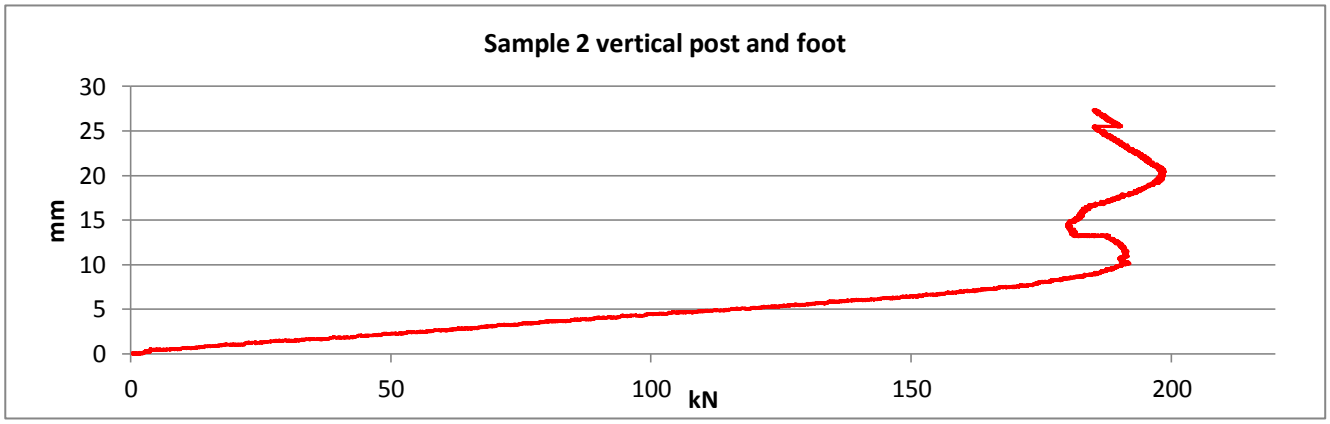

Image of post load failure: digital image 3.2.2.

3.1.1.3. *Load displacement sample 3*

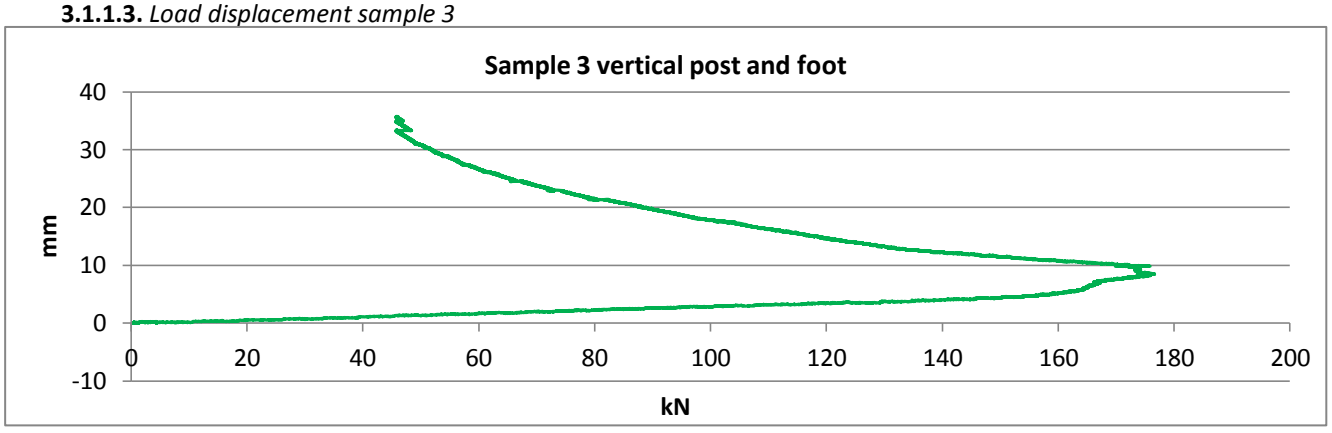

Image of post load failure: digital image 3.2.3.

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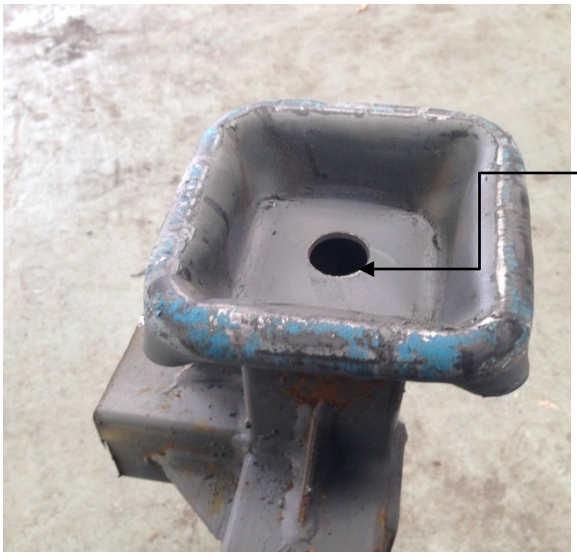
3.2. *Post load application digital images of samples*

3.2.1. *Sample 1*

Typical compressive load application

Post load failure mode

3.2.2. *Sample 2*



Both sample 1 and sample 2 showed compresive failure at the foot pressing, the lower rolled lip folding and the SHS compressing the face of the mating section.
Side wall compressive yield evident,

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3.2.3. *Sample 3*

Sample 3: Compressive failure at elevated load of approximately 17 tonne.

The images show significant material deformation, this being confined to an area of 25mm to 40mm from the point of upper load application, no fracture appeared evident in the longitudinal hollow section seam, a material tear is evident in the concave fold as shown in the image.

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3.3. *Compressive concentrated load survey to domed capping top plate.*

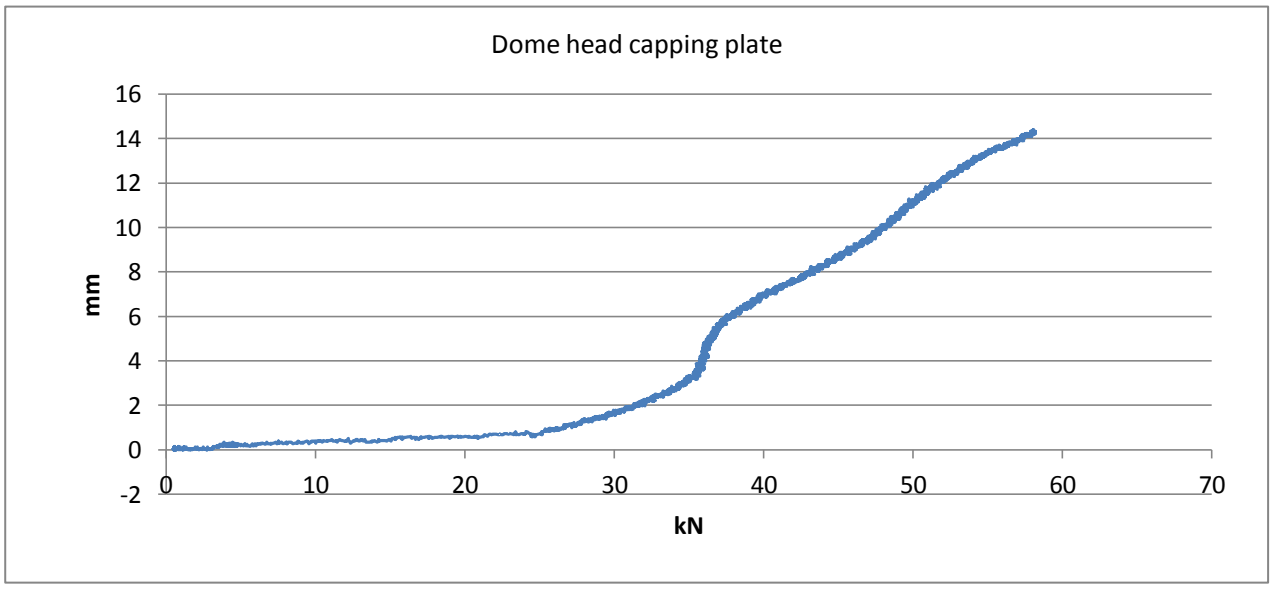
3.3.1. *Recorded failure loads*

A vertical upright was removed to allow concentrated compressive load survey to be conducted to the domed upper capping plate.

The sample was subject to a compressive load through to ultimate failure at an applied load rate of 5mm per minute.

Compressive yield recorded at approximately 24kn (2447kg)

3.3.2. *Load displacement graph capping plate*



Post load image of capping domed plate failure mode

load application

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4.0. *Post pallet stacking load survey*

The samples were subject to a stacking load application at 4 high with a UDL mass of 1500kg per pallet.
The samples were undisturbed for 24 hours with compressive displacements observed at initial stacking and post 24 hour dwell.
No visual increase in displacement found after load dwell.

An increase in mass to 1.5 x the requested load was applied and again held for a 24 hour settlement period with displacements monitored pre and post.
Total load applied UDL 2250kg per pallet.
Applied load through lower vertical nodes of base pallet assumed shared over four point's 6750kg.
Due to fabrication tolerances load would be assumed shared over 3 vertical nodes only, giving a 2250kg per vertical node at 1.5 x 1500kg requested load.

4.1. Digital image of proof load configuration

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The collated data should be subject to technical review and cross referenced to all sections of the relevant codes where applicable.

The information and data recorded in this document is for the purposes of technical review and analysis by the client.
The testing and results herein only apply to the items submitted at time of test.
Testing applied in accordance with submitted verbal procedure by the client.

END OF REPORT

Testing conducted by TESMEC Limited; Independent Testing and Engineering Services
Test House, unit 19 Newey Business Park
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Date of report issue: 21st July 2016

Signed: 

Mr S.J.Rogers Testing services Manager
Mr A Farmer Test technician.
On behalf of TESMEC Limited.

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