Structural Report:

G-Deck Lite Access System

Client: Load Deck Systems Ltd

Reference: 1576-R1

Date: December 2016

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Revision	**Date**	**Description**

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1 Executive Summary

- The G-Deck Lite system can accommodate an imposed load of 1.5 kN/m^2 (150 Kg/m^2) at a platform height of 1.8m.
- The head of the perimeter posts must be securely packed against a supporting structure to provide overall stability to the assembled deck.
- Both types of post are suitable for forming a platform as described, however the 'Type 2' posts with steel CHS core are significantly stronger than the 'Type 1' posts with the steel cruciform core.
- The deck will withstand the force of a 75 Kg mass falling through 2m, impacting in the centre of a platform unit.

2 Introduction

This report and calculation package has been produced to summarise the results of the physical testing undertaken on the G Deck Lite access system.

The system has been subjected to a physical testing program at Tesmec Ltd and the findings of these tests are used where appropriate within this report. The reports used are as follows:

Tesmec reference	Date
TES00143TR-1	July 2016
TES00162TR-1	August 2016

Table 2-1 Test Report References

The report discusses the suitability of the platform unit to support imposed loads, and also to resist the impact of a falling mass. Two types of support post have been tested – Type 1 which has a steel cruciform profile within the plastic enclosure, and Type 2 which has a steel CHS profile.

3 Platform Tests

3.1 Imposed Loads

The 1000mm x 1000mm platform unit was loaded incrementally to a SLS loading of 1.5 kN/m^2 as agreed with the manufacturer. The allowable displacement was set at L/100 (10mm) in accordance with the requirements of BS EN 12811-1:2003.

At a loading of 1.5 kN/m^2, displacement of the panel was found to be acceptable at approximately 7mm in the centre of the platform.

The imposed loading was then increased to 2.5 kN/m^2 to represent a ULS loading, and the panel held the load safely. Deflection of the centre of the panel under the ULS loading was approximately 11.5mm, and minimal permanent set was observed on removal of the load.

3.2 Platform Stabilty

When assembled as a freestanding unit, with no lateral bracing, the deck was observed to be highly dynamic and oscillated freely under light agitation.

The manufacturer advised that the deck is restrained off the surrounding structure in all cases, by ‘blocking’ or packing the head of each post off a firm bearing (eg an adjacent masonry wall). In this instance there can be no sway or movement of the deck, and the effect is to provide an adequate lateral bracing method.

3.3 Drop Test

A mass of 75 Kg was dropped through a height of 2m at the clients request, onto a 2m x 2m deck assembly to assess the capability of the system to arrest the fall of the mass. The impact was on the centre of a platform unit, and the deck sustained significant damage to both the platform unit and the posts during the impact as shown below, but safely held the mass in place. The platform was perimeter braced during the test, which was necessary to ensure overall stability was maintained during the impact.

Figure 3-1 Deck Damage

Figure 3-2 Corner Post Damage

4 Type 1 Posts – Cruciform Inner Section

4.1.1 Compression Tests

4.1.1.1 Centre Post Compression

An axial load was applied to a centre post (ie having horizontal members symmetrical each side) through the deck connectors via a hydraulic jack and load cell. The maximum load achieved was approximately 7 kN. For a SLS platform load of 1.5 kN/m^2 this provides a factor of safety (f.o.s) against failure of 4.7 which is considered satisfactory.

Figure 4-1 Centre Post Compression

4.1.1.2 Corner Post Compression

An axial load was applied to a corner post (ie having horizontal members at 90 degree to each other) through the deck connectors via a hydraulic jack and load cell. The maximum load achieved was approximately 6 kN. For a ULS platform load of 1.5 kN/m^2 this provides a f.o.s against failure of 4.0 which is considered satisfactory.

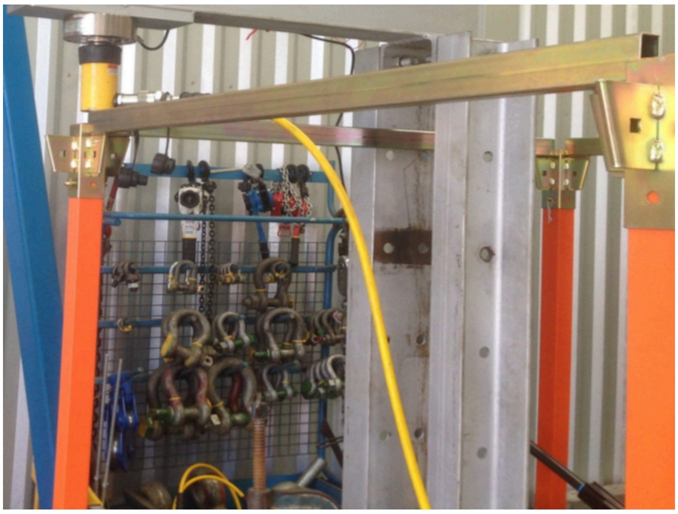

Figure 4-2 Corner Post Compression

4.1.1.3 Direct Compression

An axial load was applied directly to a post through the top of the deck connector which upstands slightly above the post core. The maximum load achieved was approximately 6 kN, again this provides a f.o.s against failure of 4.0 which is considered satisfactory.

Figure 4-3 Direct Post Compression

4.1.2 Connection Tests

4.1.2.1 Platform Connector Shear

The platform connector fixed at the head of each unit was placed under compression to check its connection to the main post. Failure was evident at approximately 12.6 kN via bending of the pin which connects through the main post to support the connector. Under 1.5 kN/m^2 imposed load this provides a f.o.s of 8.4 which is acceptable.

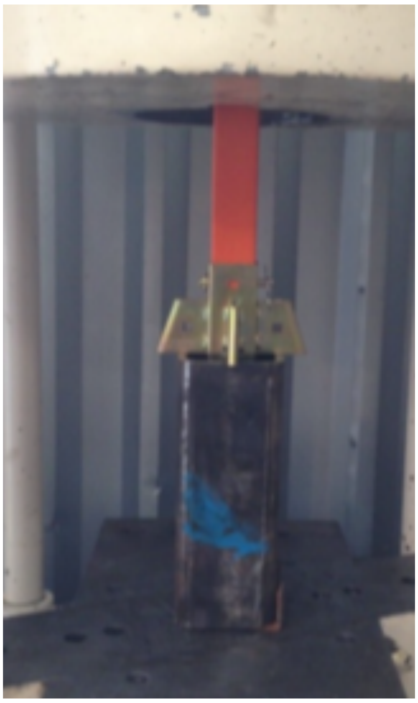

Figure 4-4 Platform Connector Shear

4.1.2.2 Base Plate Test

The base plate was subjected to a similar test and the mechanism of failure was similar, with the connecting pin showing significant bending under the test load. Failure was observed at 13 kN giving a f.o.s of 8.7 which is acceptable.

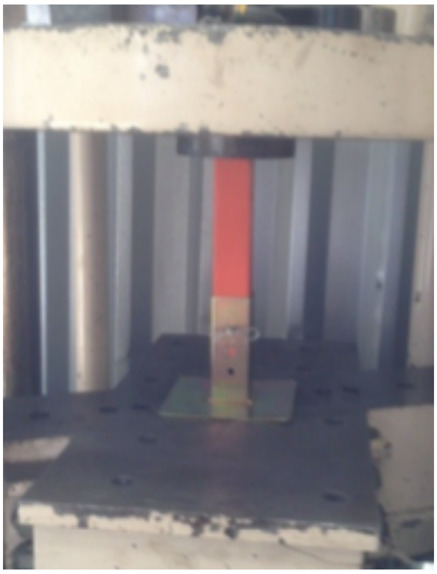

Figure 4-5 Base Plate Test

5 Type 2 Posts – CHS Inner Section

5.1.1 Compression Tests

5.1.1.1 Centre Post Compression

An axial load was applied to a centre post (ie having horizontal members symmetrical each side) through the deck connectors via a hydraulic jack and load cell as shown in Figure 4-1. The maximum load achieved was approximately 15 kN. For a SLS platform load of 1.5 kN/m^2 this provides a factor of safety (f.o.s) against failure of 10 which is considered satisfactory.

5.1.1.2 Corner Post Compression

An axial load was applied to a corner post (ie having horizontal members at 90 degree to each other) through the deck connectors via a hydraulic jack and load cell as shown in Figure 4-2. The maximum load achieved was approximately 17.7 kN. For a ULS platform load of 1.5 kN/m^2 this provides a f.o.s against failure of 11.8 which is considered satisfactory.

5.1.1.3 Direct Compression

An axial load was applied directly to a post through the top of the deck connector which upstands slightly above the post core as shown in Figure 4-3. The maximum load achieved was approximately 24 kN, this provides a f.o.s against failure of 18.0 which is satisfactory.

5.1.2 Connection Tests

5.1.2.1 Platform Connector Shear

The platform connector fixed at the head of each unit was placed under compression to check its connection to the main post as shown in Figure 4-4. Failure was evident at approximately 21.8 kN via bending of the pin which connects through the main post to support the connector. Under 1.5 kN/m^2 imposed load this provides a f.o.s of 14.5 which is acceptable.

5.1.2.2 Base Plate Test

The base plate was subjected to a similar test as shown in Figure 4-5 and the mechanism of failure was similar, with the connecting pin showing significant bending under the test load. Failure was observed at 53.9 kN giving a f.o.s of 36.

6 Type 1/ Type 2 Comparison

A comparison between the results of the two types of post is given in the table below.

	Type 1		Type 2	
	Failure (kN)	**F.O.S.**	**Failure (kN)**	**F.O.S.**
Direct Post Compression	6.0	4.0	24.0	18
Ctr. Post Compression	7.0	4.7	15.0	10
Corner Post Compression	6.0	4.0	17.7	11.8
Platform Connector	12.6	8.4	21.8	14.5
Base Plate	13.0	8.7	53.9	36

Table 6-1 Post Type Comparison

It can be seen that whilst both types of post are capable of carrying the applied load at 1.5 kN/m^2 (SLS), the Type 2 is significantly stronger and provides much greater factors of safety against collapse under vertical imposed load.