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**ENGINEERING REPORT**

**FOR**

**LOAD TESTING**

**PORTABLE ALUMINUM WHEEL PLATFORMS**

**1.0 PURPOSE**

The purpose of the load test is to determine the loading capacity ( $\pm$  ultimate) of the fabricated aluminum platform. The load test was conducted at the fabricators shop on Wednesday, February 18, 2004.

**2.0 EQUIPMENT**

- a) One aluminum wheel platform unit. The platform is measured 40" long x 20.5" wide x 6.25" high. A cross-section of the tested platform is shown on Figure 1.
- b) Steel flat table
- c) Hydraulic compressor having the following properties:  
Effective area of cylinder = 12.73 in<sup>2</sup>  
Maximum pressure capacity = 5000 psi
- d) Pressure gauge
- e) Steel flat plates
- f) Straight edge

**3.0 PROCEDURE**

The unit was examined and found to be fabricated in accordance with the approved drawings. Two load tests were conducted - one on each half of the same unit.

The fabricated platform, steel plates and the compressor rod were placed as shown on Figure 2. The compressor rod was located approximately 10" from the end and at the center of the platform. Photo 1 shows the general arrangement of the test setup.

The load was applied in increments of 500 $\pm$  psi up to 3500 psi as indicated on the compressor pressure gauge. The pressure was released and the platform was inspected for any distortion or damage. Photo 2 shows the maximum pressure applied to the platform.

A second test was conducted on the other half of the same platform. The same procedure was followed and the same results were obtained.

#### 4.0 STRUCTURAL ANALYSIS

Design Loading Capacity = 24,250 lbs (11,000 kg)  
over a contact area of 250 in<sup>2</sup> (20.5" x 10")

$$\begin{aligned} \text{Design pressure} &= \frac{24,250}{250} \\ &= 118 \text{ psi} \end{aligned}$$

Desirable safety factor = 2

$$\begin{aligned} \text{Maximum load applied at test} &= \text{area of cylinder} \times \text{pressure} \\ &= 12.73 \text{ in}^2 \times 3500 \text{ psi} \\ &= 44,555 \text{ lbs} \end{aligned}$$

$$\begin{aligned} \text{Area of compressor rod} &= 2" \times 3" \\ &= 6 \text{ in}^2 \text{ direct contact area at top plate} \end{aligned}$$

##### Assumption A

The distribution of the applied load through the steel plates is 2 H to 1 V.

$$\begin{aligned} \text{Net contact area over the platform} &= 10 (3 + (5 \times 2)) \\ &= 130 \text{ in}^2 \end{aligned}$$

Net pressure applied to the top of the platform =

$$\begin{aligned} &\frac{44,555}{130} \\ &= 343 \text{ psi} \end{aligned}$$

$$\begin{aligned} \text{Safety factor for test} &= \frac{343}{118} \\ &= 2.9 > 2.0 \quad \text{OK} \end{aligned}$$

##### Assumption B

The distribution of the applied load through the steel plate is 3:1

$$\begin{aligned} \text{Area} &= 10 (3 + (7.5 \times 2)) \\ &= 180 \text{ in}^2 \end{aligned}$$

$$\begin{aligned} \text{Net Applied Pressure} &= \frac{44,555}{180} \\ &= 247 \end{aligned}$$

$$\begin{aligned} \text{Safety factor} &= \frac{247}{118} \\ &= 2.1 > 2.0 \quad \text{OK} \end{aligned}$$

Assumption C

The applied load of 44,555 lbs is distributed over the full area of the bottom steel plate (20.5" x 10" = 205 in<sup>2</sup>)

Net pressure applied to the top of the unit =

$$\frac{44,555}{205} \\ = 217 \text{ psi}$$

$$\text{Safety factor} = \frac{217}{118} \\ = 1.84$$

Assumption C represents an extreme case but is not a viable assumption and should not be considered.

**5.0 CONCLUSIONS**

The design loading capacity of the fabricated wheel platform is 24,250 lbs to be distributed over a contact area of 20.5" x 10". The purpose of the test is to rate the capacity of the platform using a factor of safety of 2.

The simulated test has shown that the platform would have a factor of safety greater than 2.

The safety factor would be 2.9 when 2:1 distribution is assumed.

The safety factor would be 2.1 when 3:1 distribution is assumed.

The safety factor would be 1.8 when full distribution over the entire plate is assumed.

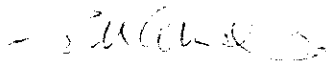
However, the way the load is applied, a full distribution over the entire bottom plate is not a viable assumption and it should not be considered. A reasonable distribution would be 2:1.

The loading test has indicated that the platform is capable to support the required load with an acceptable factor of safety.

There was no visual signs of excessive deflection, deformation or damage to the tested platform. The test has indicated that the platform would meet the specification for weight capacity. Photos 3 and 4 show the platform after the completion of the test.

If you have any questions regarding this report, please contact the undersigned.

All of which is respectfully submitted.



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