holmessolutions

Humpty's Fallbreaker

PO Box 9067

Hamilton 3240

30/07/2014

Attention: Peter Brown

Energy absorption capability - revised

Dear Peter,

This letter serves to provide clarification on the testing performed by Holmes Solutions with respect to your Humpty's Fallbreaker product. The letter also serves to address queries raised by Worksafe and received by email (22/07/2014). Additionally, this letter provides calculations detailing the energy absorption ability of the system and how this relates to different sized masses falling from different heights.

Testing performed

Holmes Solutions has performed a variety of testing on your system in a range of configurations. All testing was performed in accordance with AS/NZS 4389:1996 – Safety mesh and delivered under our quality system which is certified to ISO 17025. The testing is summarised in our attached test reports (ref 109444RP1212.100 (v1.1) and 109444RP1302.200 (v1.0)).

Additional testing was also performed at your request, however no official test report was produced. This additional testing was carried out in accordance with AS/NZS 4389:1996 and used the same test set-up as that described in 109444RP1302.200 (v1.0). This testing followed the same procedure as described in the previous reports, however a further test was carried out where the drop height of the test mass was increased to 2.5 metres. The additional testing was successful and met the requirements of AS/NZS 4389:1996.

We note that Worksafe have asked for information regarding the deflection of the system which occurred during testing. AS/NZS 4389:1996 does not specifically state that deflection of the system be recorded and therefore these results were not included in our test report. However, review of the test video recordings indicates that the observed deflection was less than your recommended under mesh clearance of 1 metre. Photographic stills of the maximum observed deflection are also included in the reports for independent review.

Energy absorption capacity

At your request, we have completed a series of calculations comparing the impact energy imparted on the system under a variety of weights and fall heights. The system successfully arrested a 165kg mass falling from 2.5m which imparted a total energy of 4.0kJ on the system. Using this impact energy as a baseline value we have calculated the equivalent fall height for a range of masses that will induce an

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equivalent level of energy. The calculations are provided as an attachment and the results are summarised in the following table.

	Tested	**Equivalent alternatives**		
Mass (kg)	165	100	120	140
Fall height (m)	1.5	3.1	2.4	1.9

I trust this information satisfies your requirements however please contact me should you require any further information or clarification.

Yours faithfully,

Tim Porter BE (Hons), MEFE, DMS
Project Director

[109444L.0714.TP v2.0]

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Attachment 1 – Calculations

1 – Energy absorbed

The energy absorbed by the Humpty's fallbreaker system for a 165kg mass falling from a test drop height of 2.5m can be calculated as follows:

$$E = m.g.d$$
$$E = 165kg * 9.81ms^{-2} * 2.5m$$
$$E = 4.0kJ$$

2 – Equivalent fall heights

The equivalent fall height can be calculated for various masses through the following equation

$$h_{fall} = \frac{E}{m.g} - h_{c.o.m}$$

Where, h = fall height (m)

E = energy to be absorbed (J)

m = mass (kg)

g = acceleration due to gravity (ms^{-2})

$h_{c.o.m}$ = height of the worker centre of mass – assumed to be 1m as per "Safe use of safety nets, May 2014, Worksafe NZ".

Therefore for a test mass of 100 kg the work height relating to a 4.0kJ energy absorption requirement can be calculated as follows:

$$d = \frac{4000J}{100kg.9.81ms^{-2}} - 1m$$
$$d = 3.1m$$

By the same calculation the following can also be shown for the following masses:

	Tested	**Equivalent alternatives**		
Mass (kg)	165	100	120	140
Fall height (m)	1.5	3.1	2.4	1.9

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