

## Testing

### Test method – AS 4685:2014.

The prepared samples of material were tested in accordance with Australian test method AS 4685:2014. This method involves impacting the material with an instrumented head-form and measuring the deceleration of the head-form on impact. Two impact parameters are determined from the recorded acceleration-time relationship - the Head Injury Criterion (HIC) and the maximum deceleration produced (g-max).

HIC is a measure of the severity of the impact and takes into account the time duration of the impact as well as its magnitude. It is defined in the Standard by the following integral formula:

$$HIC = \left[ (t_2 - t_1) \left\{ \frac{1}{(t_2 - t_1)} \int_{t_1}^{t_2} a \cdot dt \right\}^{2.5} \right]_{\max}$$

where  $t_1$  and  $t_2$  are times between the starting and finishing times of the impact chosen to maximise the function,  
and  $a$  is the instantaneous value of deceleration during the impact measured in g, the acceleration due to gravity.

The critical fall height for a particular surfacing material is the lowest drop height of the head-form, which produces an HIC of 1000 or a G-max of 200 G, whichever is the lower. These threshold values, which determine the critical fall height, are set in regard to minimising head injuries resulting from an impact of a human head with a surface. Thus, the greater the critical fall height, the safer is the surfacing material. This critical fall height can be referenced to the platform heights of particular items of playground equipment installed in playgrounds from which children might fall. For the Critical Fall Heights determined in this report no assumption has been made about the height of the user above that equipment.

### Test equipment

The following test equipment conforming to AS 4685:2014 was used.

**Head-form:** Aluminium alloy head-form,  
ISO Size J, mass 5.0 kg

**Equipment:** Uniaxe-1 impact tester

**Calibration factor:** 64 mV/g (g = 9.797 m/s/s)

**Drop method:** guiding rails

**Timing:** infrared gates

### **Testing**

The testing was carried out in accordance with Impact Testing Pty Ltd Work Instruction 10567

## **Measurements**

### **Material Identification**

The safety surfacing was in the grounds of the following Company:  
Direct BioBedding.  
3B Williamson Rd,  
Ingleburn.  
NSW. 2565.

Four drops were made at each of the 3 positions from different drop heights and the maximum G-max or HIC recorded and later entered into the processing sheet attached.

The surface was classified as solid as distinct from loose fill in accordance with the testing Standard and so required 12 impact drops for testing – 3 Drop Tests of 4 impacts being distributed over the material to determine Critical Fall Height.

**Surface Temperature**      **19.1** degrees Celsius

## **Summary**

The results are contained in the attached Data Processing sheets Fig 1.  
The graph in Fig 1 of the impact waveform indicates an acceptable deceleration time history and that the determination of HIC from integration width and peak deceleration is validated.

The calculations shown indicate a Critical Fall Height of 3.5m. for the playground  
The uncertainty limits at 95 % confidence are +/- 0.08 m

The **Critical Fall Height** as per **AS 4685:2014** is **3.5 metres**

**End of report**