LABORATORY REPORT:

EN 1177 (2008)

Assessment of Critical Fall Height on Mulch 30mm & 40mm and Mulch Hybrid 60mm, 70mm, 90mm & 130mm

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SUMMARY

Samples of Mulch 30mm & 40mm and Mulch Hybrid 60mm, 70mm, 90mm & 130mm have been tested in accordance with EN 1177:2008 “Impact Absorbing Playground Surfacing – Safety requirements and test methods”. This report describes the samples tested, the method of the test employed and the results obtained are given.

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1. INTRODUCTION

A programme of testing has been carried out on samples of Mulch 30mm & 40mm and Mulch Hybrid 60mm, 70mm, 90mm and 130mm.

The products were tested to the method given in EN 1177:2008 “Impact Absorbing Playground Surfacing – Safety requirements and test methods”. The method of test employed is described and the results obtained are given.

2. PRODUCT DETAILS & DESCRIPTION

- Bound Mulch 30mm
- Bound Mulch 40mm
- Bound Mulch Hybrid 60mm
- Bound Mulch Hybrid 70mm
- Bound Mulch Hybrid 90mm
- Bound Mulch Hybrid 130mm

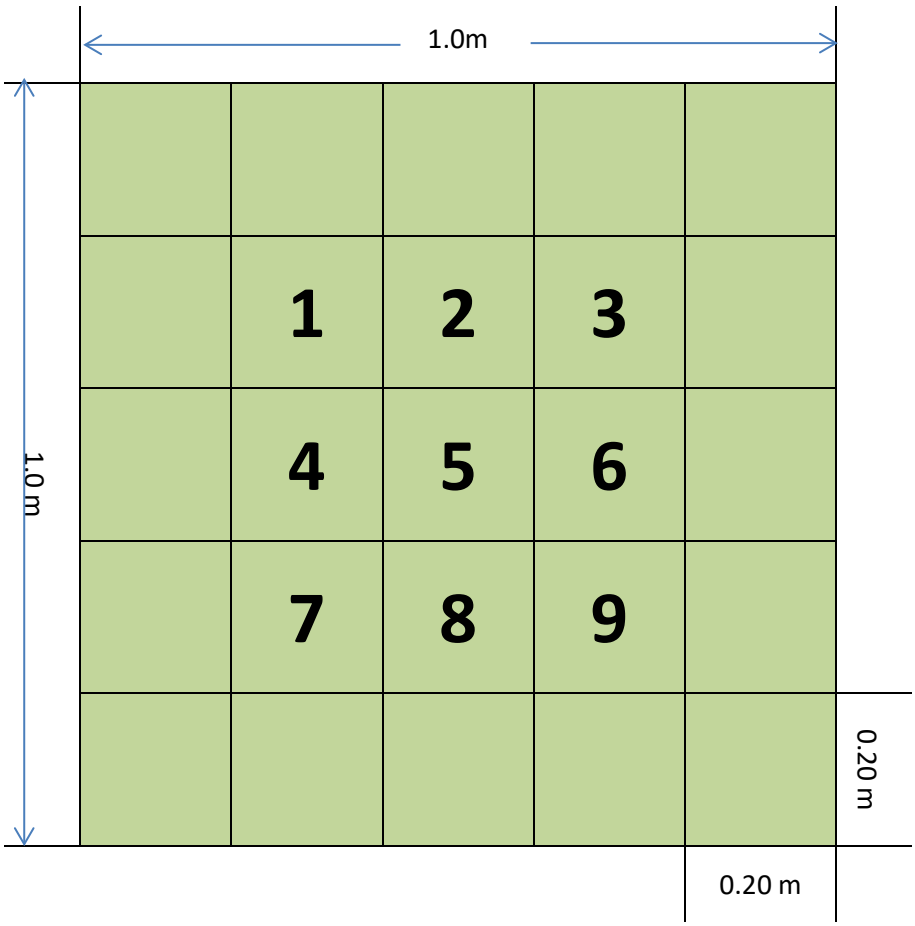
TEST PROCEDURE

The test procedure employed was that described in section 4 of EN 1177:2008 "Impact Absorbing Playground Surfacing – Safety requirements and test methods". All samples were conditioned in a temperature controlled laboratory at 23 ± 2˚C for 24 hours prior to testing and the air temperature maintained over the same range during testing. The samples were tested laid loose on the concrete laboratory floor.

Please note: testing on a rigid concrete substrate will provide a worst case scenario for HIC and hence the CFH values obtained in the laboratory will often be lower than one would expect or experienced in-situ when the systems are often placed on a macadam, unbound or naturally occurring base/formation.

Test floor	Concrete
Test location	Labosport laboratory
Method of attachment	Loose Laid
Surface condition	Dry
Surface temperature	22.5°C
Laboratory temperature	23.2°C

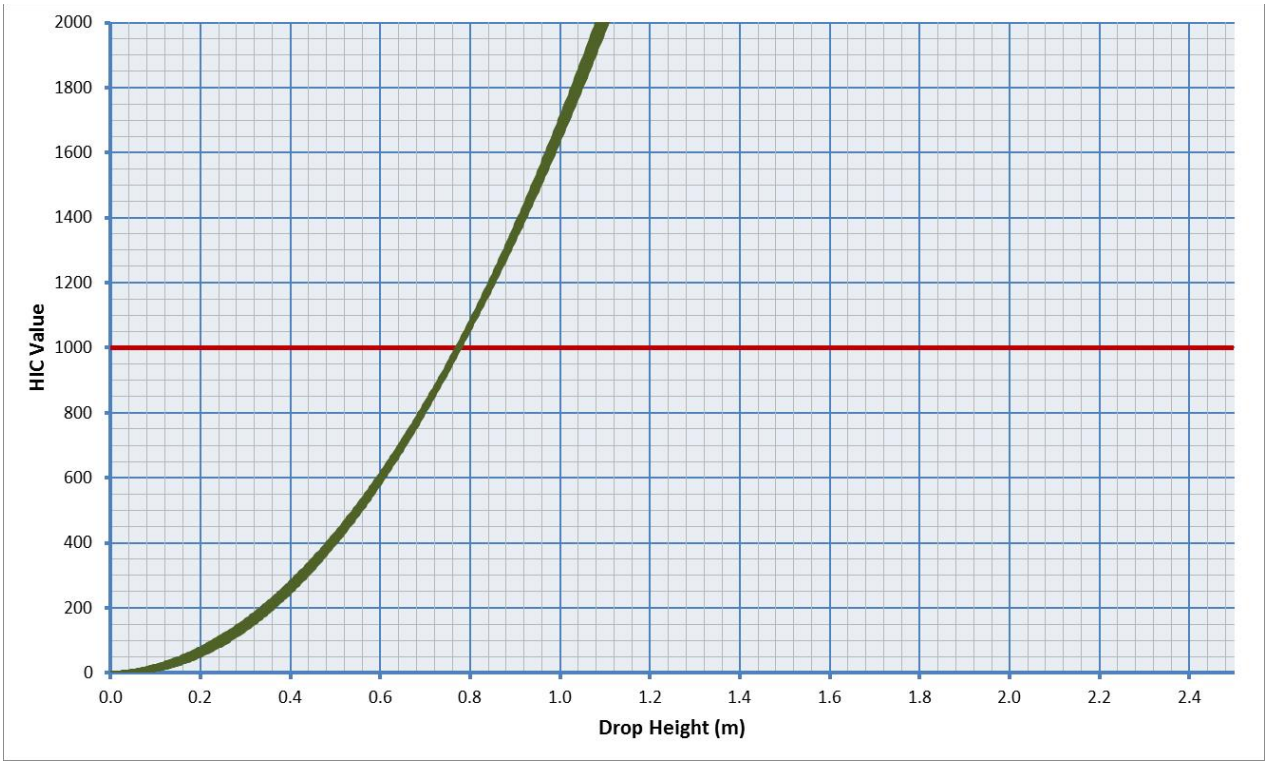
The samples were tested at the following locations (diagram not to scale):



3. TEST RESULTS

Mulch 30mm

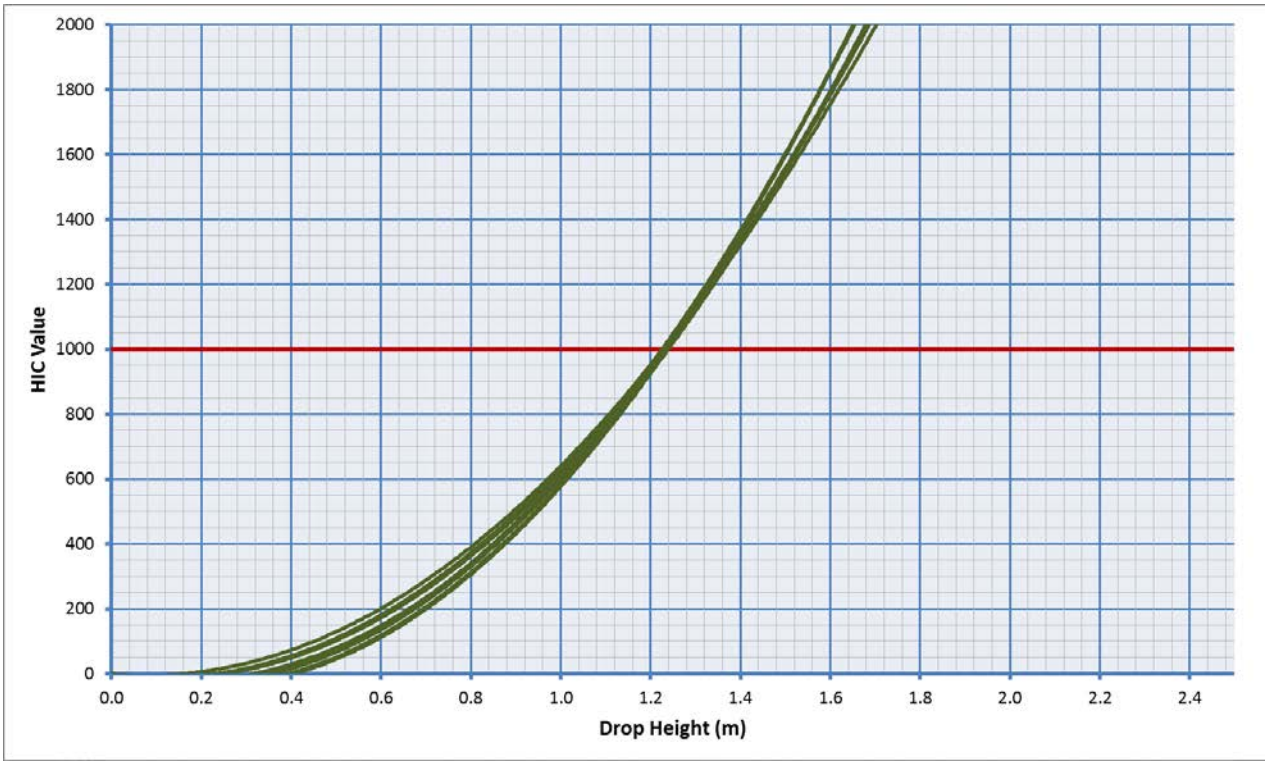
Drop Height (m)	Test Location									Average HIC (m)
	1	2	3	4	5	6	7	8	9	
0.00	0	0	0	0	0	0	0	0	0	
0.60	591	596	607	586	592	575	582	603	596	
0.70	859	851	863	855	854	849	848	853	850	**0.7**
0.80	1025	1018	1034	1029	1015	1008	1018	1023	1029	
0.90	1397	1352	1380	1359	1369	1375	1371	1356	1360	**Delta T <3 ms**
Critical Fall Height (m)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	



Mulch 30mm
graph of HIC vs drop height

Mulch 40mm

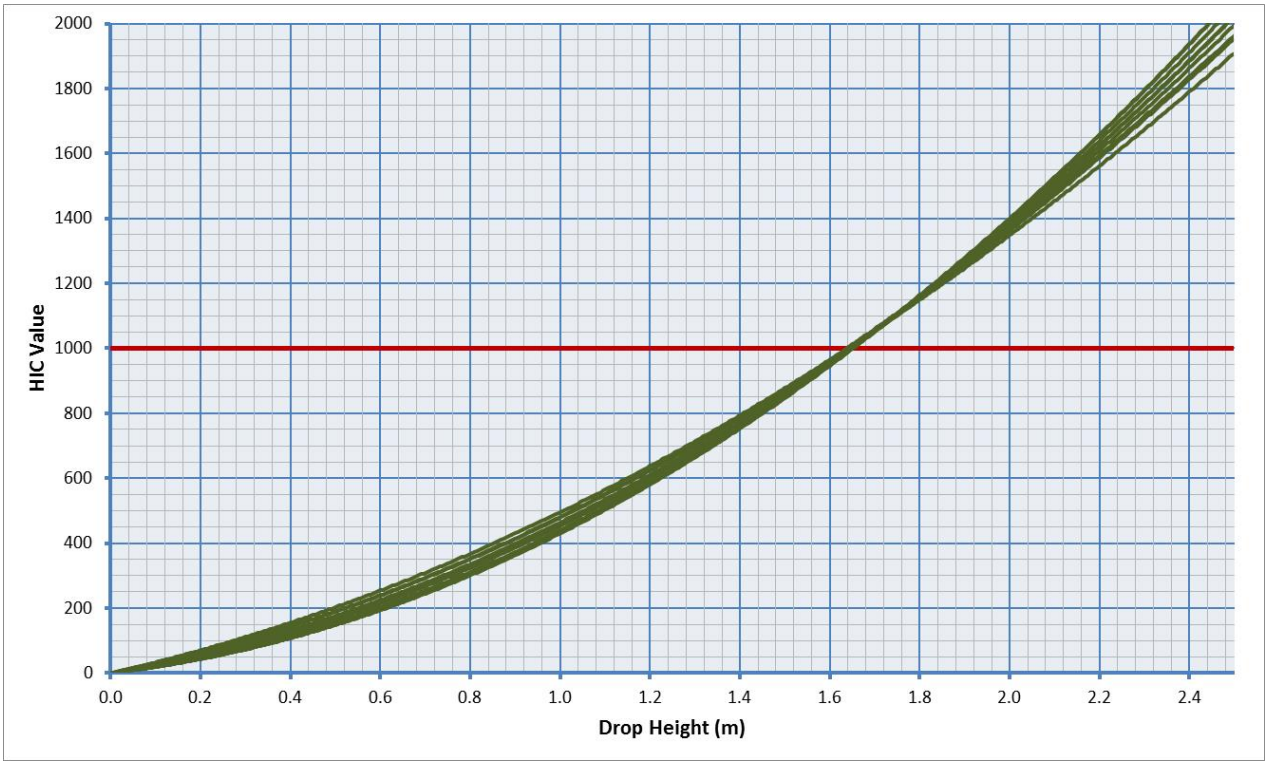
Drop Height (m)	Test Location									Average HIC (m)
	1	2	3	4	5	6	7	8	9	
0.00	0	0	0	0	0	0	0	0	0	
1.10	730	793	824	745	782	806	741	764	798	
1.20	967	913	875	945	924	897	934	956	902	
1.25	1024	1029	1053	1015	1034	1065	1017	1023	1046	**1.2**
1.30	1122	1147	1152	1113	1136	1147	1134	1156	1173	
Critical Fall Height (m)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	



Mulch 40mm
graph of HIC vs drop height

Mulch Hybrid 60mm

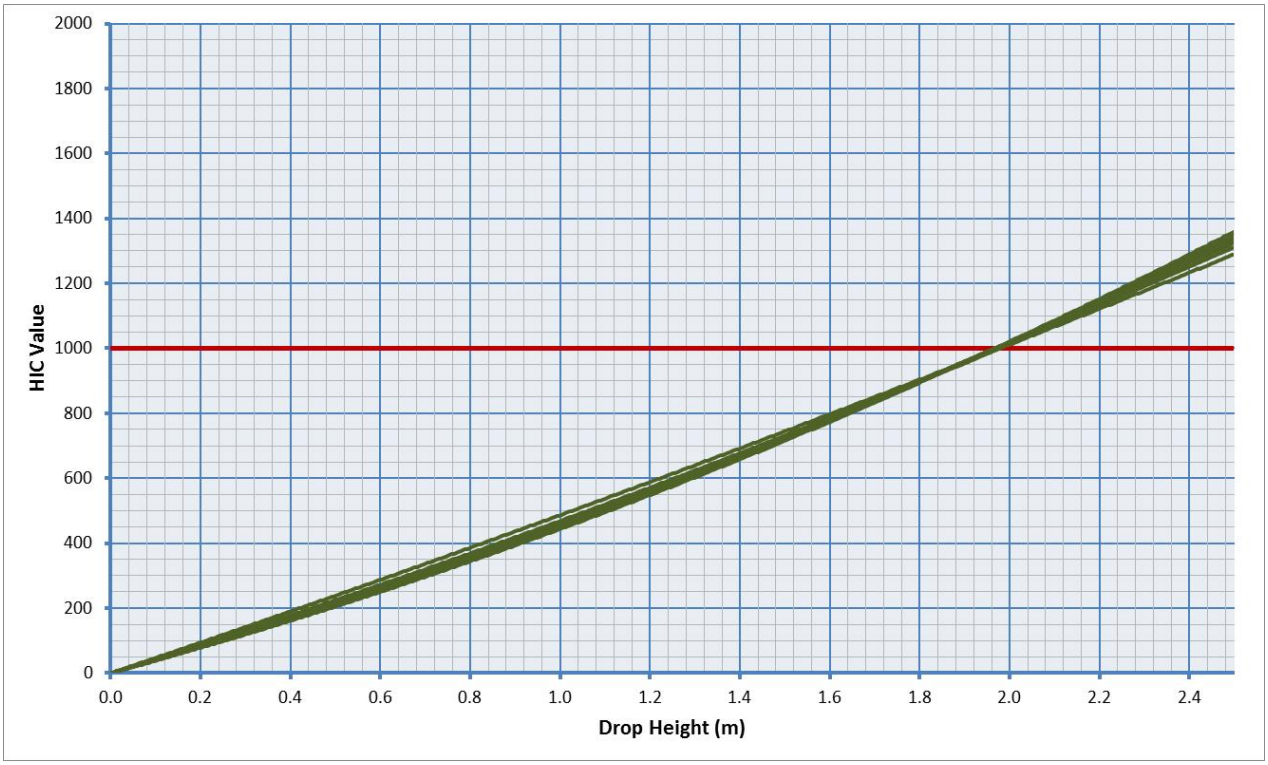
Drop Height (m)	Test Location									Average HIC (m)
	1	2	3	4	5	6	7	8	9	
0.00	0	0	0	0	0	0	0	0	0	
1.50	873	879	871	885	865	849	858	891	875	
1.60	956	962	948	951	947	960	949	955	948	
1.70	1018	1053	1029	1035	1019	1024	1029	1036	1040	**1.6**
1.80	1182	1164	1175	1169	1180	1176	1179	1164	1168	
Critical Fall Height (m)	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	



Mulch Hybrid 60mm
graph of HIC vs drop height

Mulch Hybrid 70mm

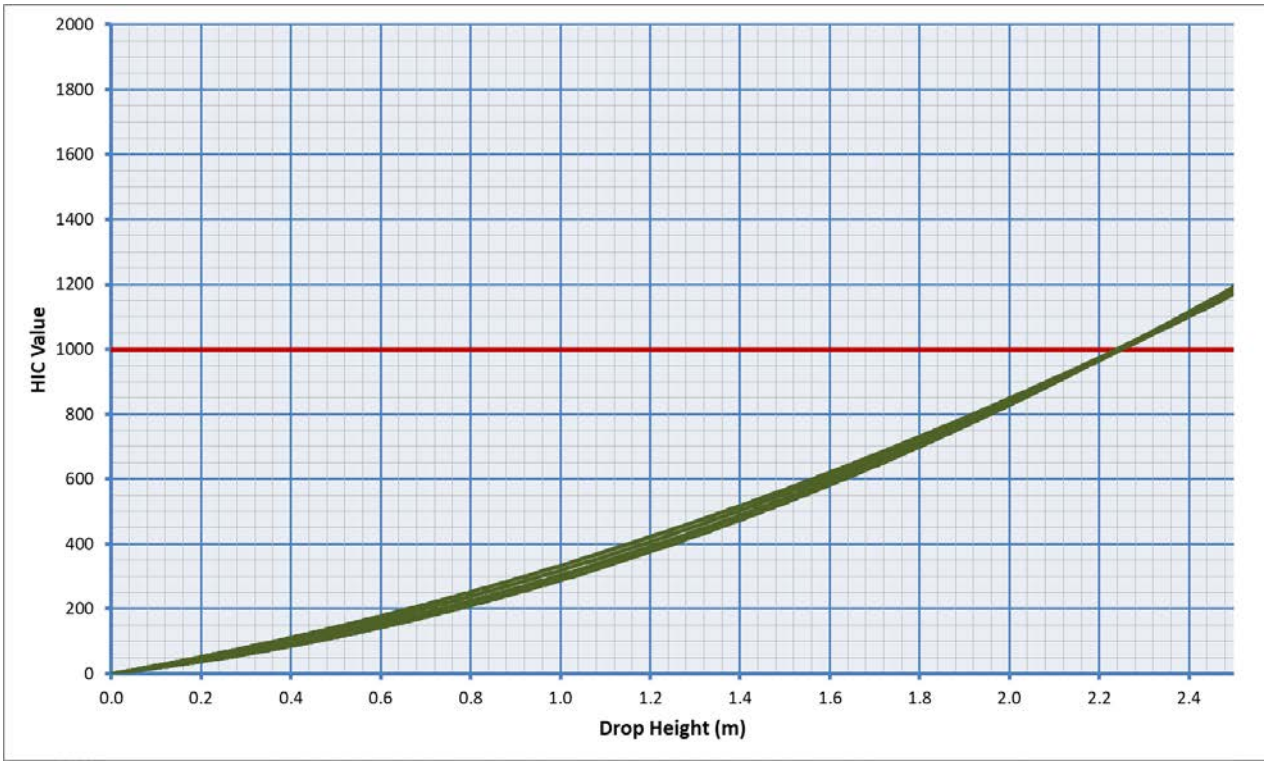
Drop Height (m)	Test Location									Average HIC (m)
	1	2	3	4	5	6	7	8	9	
0.00	0	0	0	0	0	0	0	0	0	
1.80	890	894	885	892	894	896	881	885	893	
1.90	971	959	973	964	967	952	975	970	963	
2.00	1024	1026	1029	1031	1022	1028	1026	1018	1030	**1.9**
2.10	1072	1079	1065	1069	1058	1075	1078	1063	1074	
Critical Fall Height (m)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	



Mulch Hybrid 70mm
graph of HIC vs drop height

Mulch Hybrid 90mm

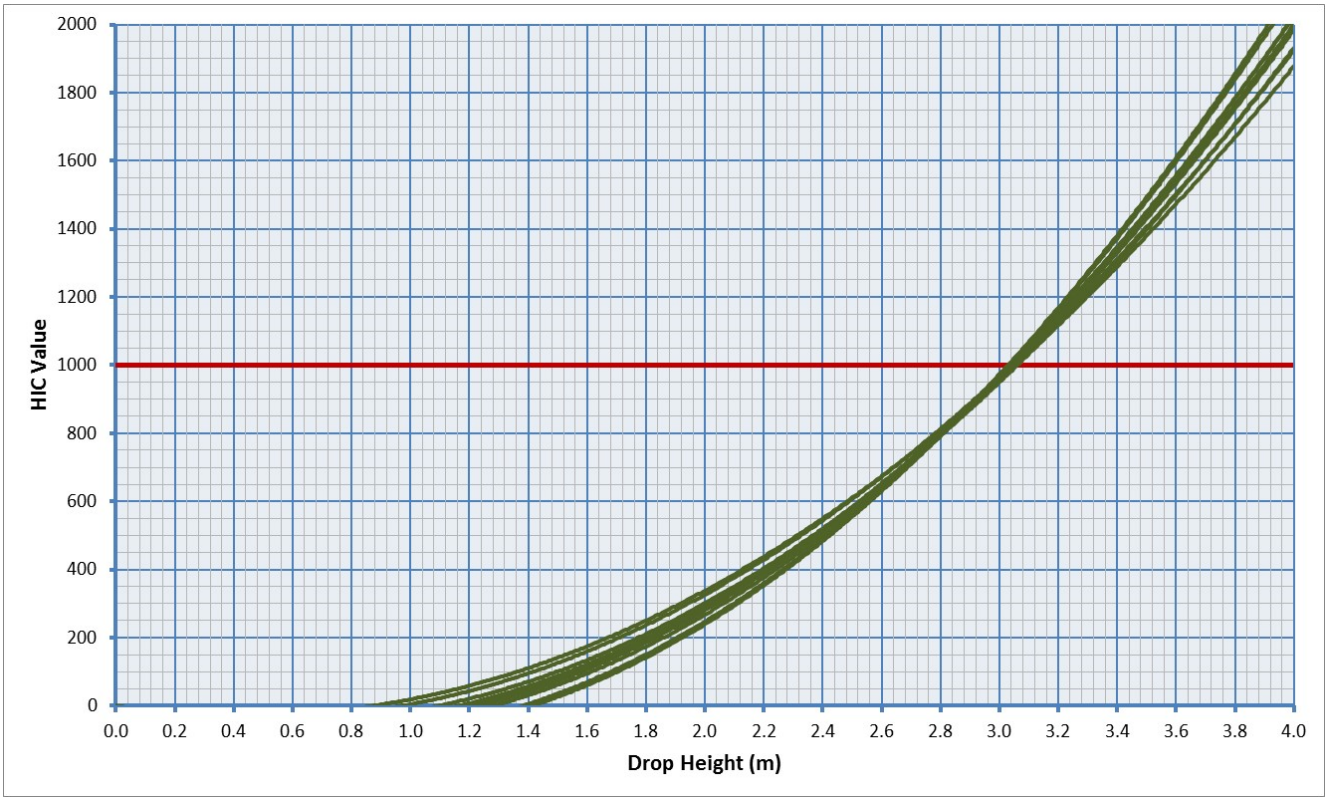
Drop Height (m)	Test Location									Average HIC (m)
	1	2	3	4	5	6	7	8	9	
0.00	0	0	0	0	0	0	0	0	0	
2.10	913	907	921	916	912	905	918	924	923	
2.20	966	969	965	956	959	963	950	959	954	
2.30	1023	1015	1029	1010	1022	1019	1035	1024	1020	**2.2**
2.40	1118	1124	1116	1119	1123	1128	1126	1127	1115	
Critical Fall Height (m)	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	



Mulch Hybrid 90mm
graph of HIC vs drop height

Mulch Hybrid 130mm

Drop Height (m)	Test Location									Average HIC (m)
	1	2	3	4	5	6	7	8	9	
0.00	0	0	0	0	0	0	0	0	0	
2.90	915	898	917	914	906	899	901	906	908	
3.00	926	933	898	928	935	939	924	946	941	
3.10	1059	1068	1002	1051	1034	1027	1049	1042	1057	**3.0**
3.20	1183	1144	1156	1143	1159	1130	1157	1169	1187	
Critical Fall Height (m)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	



Mulch Hybrid 130mm
graph of HIC vs drop height

CONCLUSIONS

The samples of Bound Mulch and Bound Mulch Hybrid were tested to the method given in EN 1177:2008 “Impact Absorbing Playground Surfacing – Safety Requirements and Test Methods.

The Bound Mulch and Bound Mulch Hybrid surfaces of the following thicknesses were found to have critical fall height values of:

Bound Mulch 40mm	1.2m
Bound Mulch Hybrid 60mm	1.6m
Bound Mulch Hybrid 70mm	1.9m
Bound Mulch Hybrid 90mm	2.2m
Bound Mulch Hybrid 130mm	3.0m

The Bound Mulch 30mm surface was found to have a critical fall height value of:

Bound Mulch 30mm	0.7m (Delta T <3 ms)

The sample of Bound Mulch 30mm did not conform to the Delta T requirement of ≥3 ms. EN 1177:2008 states that “this procedure is only valid for impact events with a HIC duration of more than 3 ms, i.e. (t2 – t1) ≥3 ms.”

Appendix A - Example of typical deceleration vs time curve