Confidential Technical Report
55645

Date: 29th April 2013

PROPOSAL NO: 111717EC (Issue 4)
PROJECT NO: GU0528

TESTING OF RUBBER SAFETY TILES AND INTER-LOCKING RUBBER PAVERS

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Smithers Rapra and Smithers Pira Ltd | Registered in England & Wales No. 5761324 | Registered Office as above

TESTING OF RUBBER SAFETY TILES AND INTER-LOCKING RUBBER PAVERS

1. INTRODUCTION

Details of the samples supplied and the tests requested are as follows:

Sample Designations:	Black square rubber tiles Red square rubber tiles Black 'ɪ' shaped interlocking rubber pavers Red 'ɪ' shaped interlocking rubber pavers
Description of Materials Received:	500 x 500mm square rubber tiles Colour: Black 25mm thickness Colour: Red 37mm thickness 220 x 180mm 'ɪ' shaped interlocking rubber pavers Colour: Black 45mm thickness Colour: Red 25mm thickness
Date Received:	10th October 2012
Supplied under Order Number:	Paid in advance by pro-forma
Tests Requested:	BS EN 1177:2008 - Critical fall height BS 7188:1998+A2:2009 - Slip resistance (clause 6) Ease of ignition (clause 7)

2. LIMITATIONS

This report has been prepared solely based on information supplied up to the point of its completion and has been accepted in good faith.

The obtained CFH figures relate only to the samples as received and tested against a concrete sub-base and should only be used as an indication of the likely figure that may be obtained from similar surfaces of the same thickness and as installed on the same sub-base materials and cannot prove that the product is generally fit for any intended purpose.

The samples were tested as received and to the supplier's instructions and no responsibility can be taken for them being unrepresentative.

Smithers Rapra will destroy all the supplied materials relating to this contract six months after the work is completed unless a written request is received within that time that the client wishes to have the material returned.

Smithers Rapra is an ISO/IEC 17025 laboratory. However, unless a test is specifically stated to be included within the scope of our accreditation to, it should be assumed not to be so. Note that any opinions or interpretations given are outside the scope of our UKAS accreditation.

3. EXPERIMENTAL DETAILS

The samples were tested in accordance with the following standards, except as otherwise noted. Ambient temperature in the physical testing laboratory was maintained at 23±2°C and all equipment used was calibrated to the accuracy required in the appropriate standard.

3.1 Critical Fall Height – Concrete sub-base

Critical Fall Height (CFH) is determined by a series of impacts being conducted in general accordance with the requirements of the Head Injury Criterion (HIC) method that is given in BS EN 1177:2008.

A free falling hemispherical head-form with a mass of 4.60 kg and a diameter of 160 mm is used to carry out the test. A tri-axial accelerometer, which measures the total resultant deceleration and time duration of the complete impact, is mounted in the centre of gravity of the head-form.

The supplied test material was nominally 1000mm square and from a range of increasing drop heights, HIC values were obtained. A graph of HIC against drop height was plotted, and from this graph the height equivalent to a HIC value of 1000 was calculated using a curve fitting technique. Nine areas were tested at each of at least four drop heights, each impact point being at least 250 mm from the edge of the sample and 250 mm from its neighbouring impact point.

For each sample thickness supplied, the tiles were laid in a group of 4 to make up the 1 metre square test area and the pavers were interlocked together to form a 1 metre test area.

Date of tests: 13th November 2012.

3.2 Ease of ignition

The ease of ignition properties of a red 37mm thick tile were assessed in general accordance with BS 7188:1998+A2:2009 clause 7 which references BS 4790:1987 clauses 8 and 9. Three 300 x 300 mm test samples were cut from a red 37mm thick tile and conditioned for a minimum of 24 hours at 23±2°C prior to test. They were then mounted in a test chamber using method 1 and secured by a clamping ring with an internal diameter of 250 mm. A hexagonal stainless steel nut with a mass of $30^{+3}/_{-2}$ g was heated up to a temperature of 900°C in a muffle furnace and then placed on the surface of the test sample and removed after 30 seconds. At the end of this period the times of flaming and afterglow, and the greatest radius of the effects of ignition from the point of application of the nut, are then recorded.

Date of test: 13th November 2012

3.3 Slip resistance

Testing was carried out in accordance with BS 7188:1998+A2:2009 Clause 5. Eight determinations were made on a red 37mm thick tile and each site was tested in three directions for both dry and wet (distilled water) conditions. Test direction A was with the direction of manufacture and B was at approximately 90° to A, test direction C was at approximately 45° to A. In each case the first three readings were disregarded and the mean of the next five readings reported.

Date of test: 9th – 13th November 2012

4. RESULTS

4.1 Critical Fall Height

4.1.1 HIC Results

Rubber tiles – Black 25mm thick								
Drop	**Height**	**HIC**	**Height**	**HIC**	**Height**	**HIC**	**Height**	**HIC**
1	0.60	648	0.70	842	0.80	1064	0.90	1211
2	0.60	657	0.70	881	0.80	987	0.90	1300
3	0.60	768	0.70	835	0.80	1203	0.90	1535
4	0.60	446	0.70	780	0.80	984	0.90	1254
5	0.60	800	0.70	987	0.80	1051	0.90	1378
6	0.60	659	0.70	828	0.80	970	0.90	1214
7	0.60	718	0.70	858	0.80	1158	0.90	1218
8	0.60	677	0.70	797	0.80	979	0.90	1151
9	0.60	624	0.70	857	0.80	1022	0.90	1190

Rubber tiles – Red 37mm thick								
Drop	**Height**	**HIC**	**Height**	**HIC**	**Height**	**HIC**	**Height**	**HIC**
1	1.00	834	1.06	1009	1.12	1051	1.18	1094
2	1.00	888	1.06	901	1.12	1046	1.18	1162
3	1.00	828	1.06	908	1.12	1062	1.18	1177
4	1.00	717	1.06	851	1.12	950	1.18	1069
5	1.00	866	1.06	1011	1.12	1197	1.18	1083
6	1.00	814	1.06	986	1.12	1040	1.18	1094
7	1.00	830	1.06	923	1.12	1074	1.18	1130
8	1.00	770	1.06	922	1.12	968	1.18	1098
9	1.00	912	1.06	967	1.12	1072	1.18	1241

Rubber pavers – Black 45mm thick								
Drop	**Height**	**HIC**	**Height**	**HIC**	**Height**	**HIC**	**Height**	**HIC**
1	1.00	819	1.10	1011	1.20	1021	1.30	1242
2	1.00	858	1.10	857	1.20	974	1.30	1161
3	1.00	872	1.10	979	1.20	1098	1.30	1313
4	1.00	828	1.10	985	1.20	1118	1.30	1281
5	1.00	757	1.10	1050	1.20	1204	1.30	1312
6	1.00	888	1.10	1034	1.20	1108	1.30	1309
7	1.00	894	1.10	969	1.20	1084	1.30	1305
8	1.00	775	1.10	887	1.20	1072	1.30	1187
9	1.00	988	1.10	1125	1.20	1229	1.30	1444

Rubber pavers – Red 25mm thick								
Drop	**Height**	**HIC**	**Height**	**HIC**	**Height**	**HIC**	**Height**	**HIC**
1	0.60	701	0.70	1030	0.80	1189	0.90	1464
2	0.60	750	0.70	871	0.80	1111	0.90	1327
3	0.60	743	0.70	962	0.80	1130	0.90	1397
4	0.60	684	0.70	921	0.80	1161	0.90	1255
5	0.60	548	0.70	706	0.80	863	0.90	1024
6	0.60	618	0.70	733	0.80	871	0.90	1070
7	0.60	667	0.70	855	0.80	1070	0.90	1041
8	0.60	754	0.70	999	0.80	1192	0.90	1471
9	0.60	684	0.70	977	0.80	1197	0.90	1412

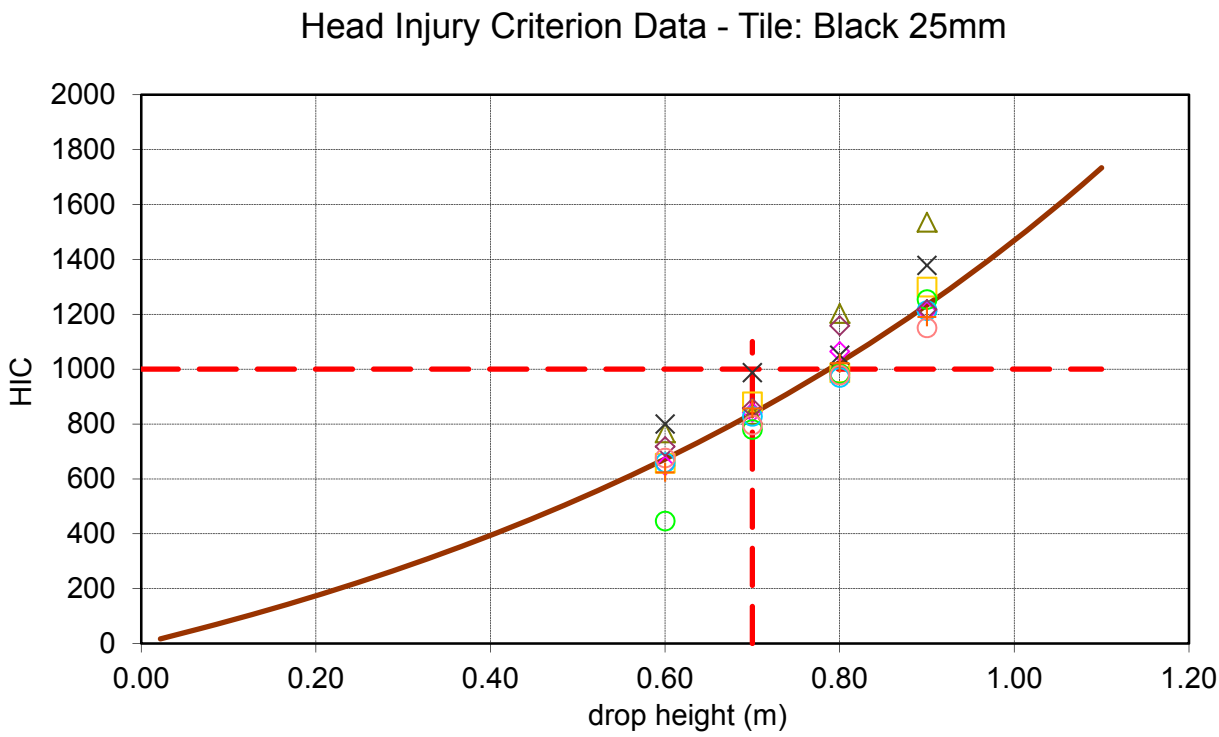
4.1.2 Derived CFH

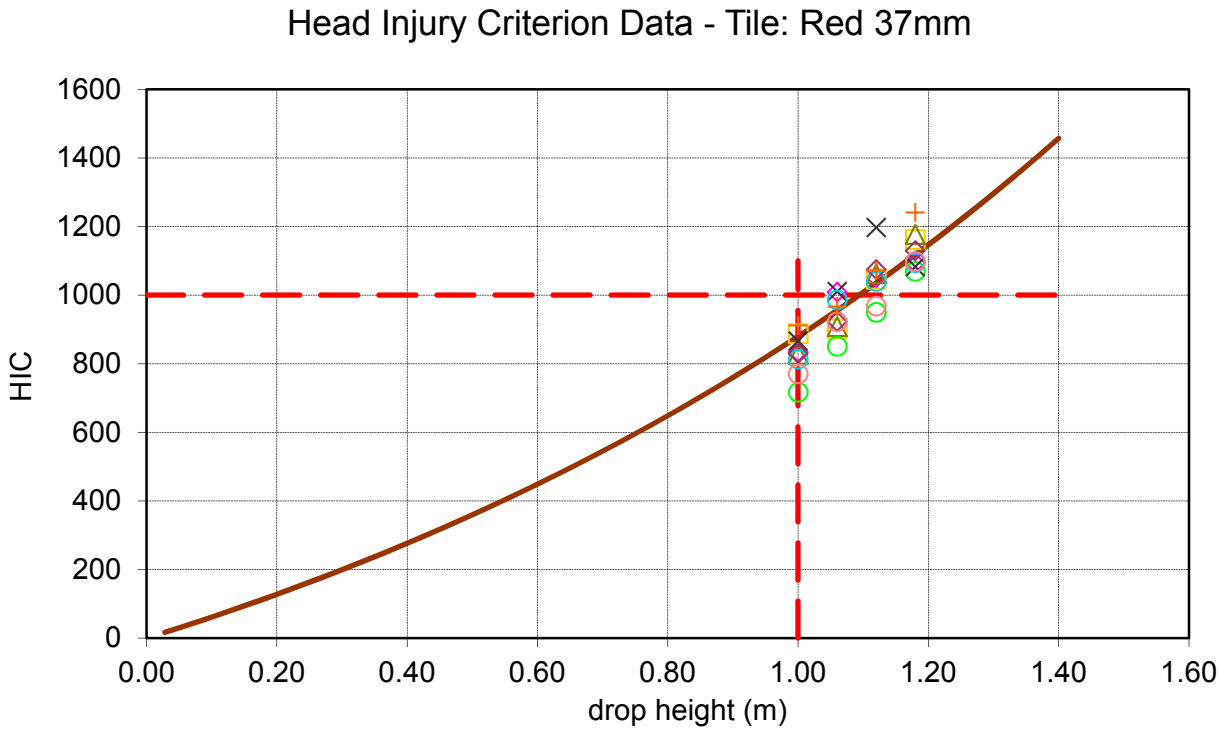
Test Drop N°	Tiles		Pavers	
	Individual values (m)	Individual values (m)	Individual values (m)	Individual values (m)
Position	Black 25mm	Red 37mm	Black 45mm	Red 25mm
1	0.7	1.0	1.1	0.7
2	0.7	1.0	1.1	0.7
3	0.7	1.0	1.1	0.7
4	0.8	1.1	1.1	0.7
5	0.7	1.0	1.1	0.8
6	0.8	1.1	1.0	0.8
7	0.7	1.0	1.1	0.8
8	0.8	1.1	1.1	0.7
9	0.7	1.0	1.0	0.7
CFH (m)	**0.7**	**1.0**	**1.0**	**0.7**

The maximum HIC value for an acceptable level of injury prevention is taken to be 1000. The resultant Critical Fall Height for the sample is determined as the lowest figure obtained within the series of the tests as undertaken rounded down to the nearest 100 mm.

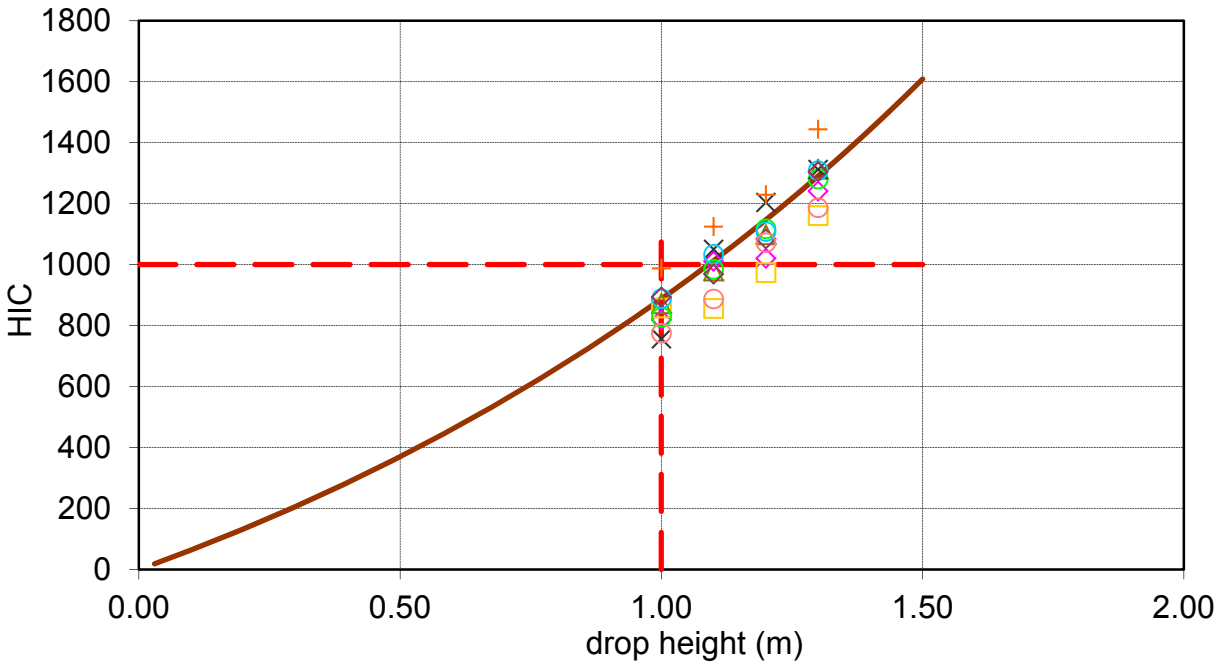
4.1.3 Head Injury Criterion

The following head injury criterion graph shows the results for the predicted HIC and the calculated HIC values. The predicted HIC values are depicted by the curve on the graph and are used for predicting HIC values above 2.7m where there is no recorded test data. The X Y indices show the true calculated HIC value based on the recorded test data for HIC values below 2.7m.

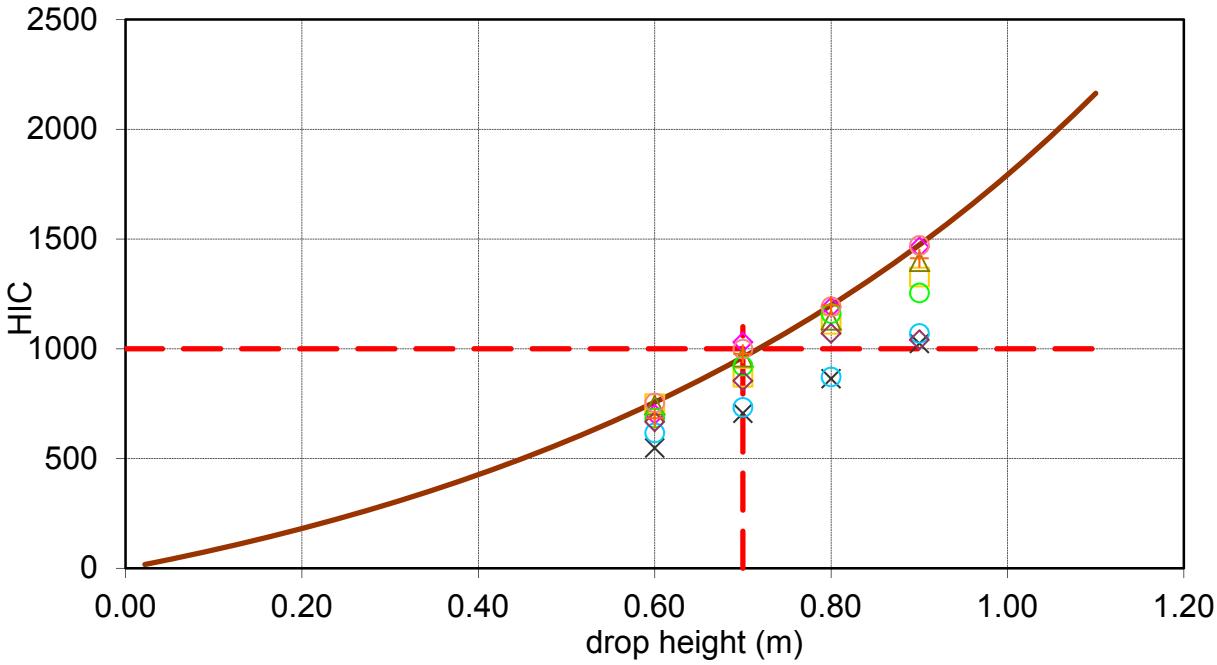

Head Injury Criterion Data - Tile: Black 25mm
HIC
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0.00
0.20
0.40
0.60
0.80
1.00
1.20
drop height (m)


Head Injury Criterion Data - Tile: Red 37mm
HIC
1600
1400
1200
1000
800
600
400
200
0
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
drop height (m)

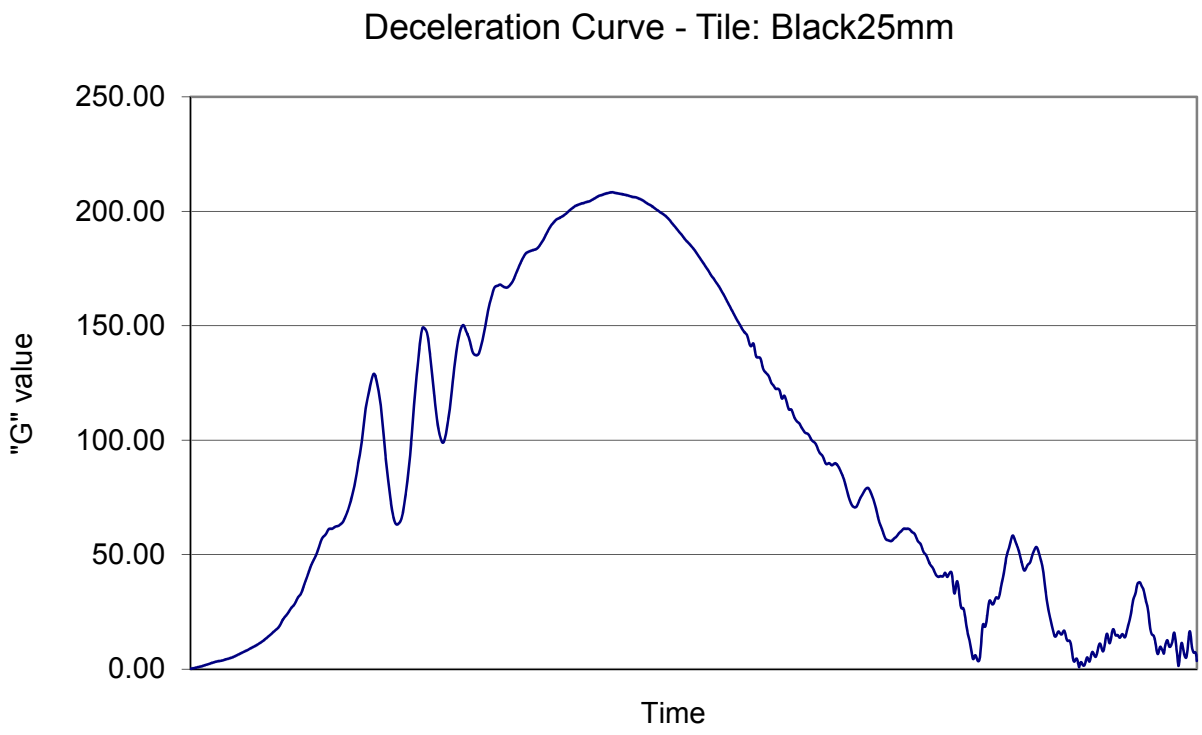
Head Injury Criterion Data - Paver: Black 45mm

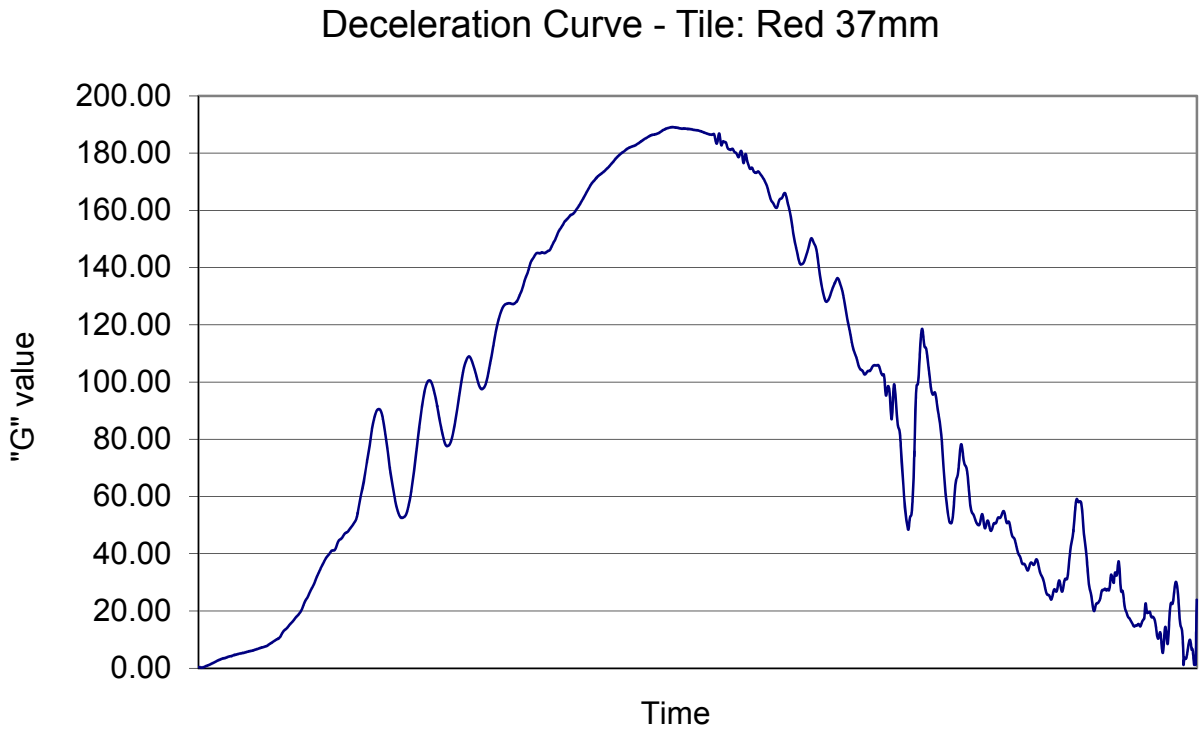


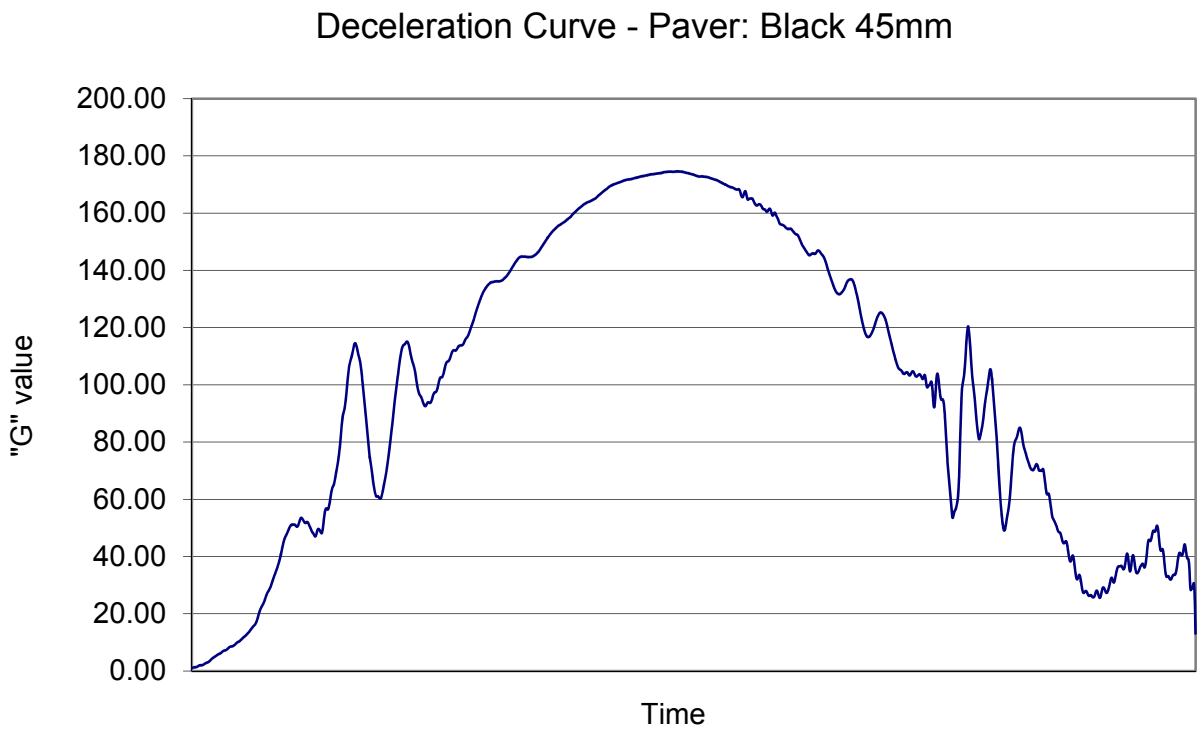
Head Injury Criterion Data - Paver: Red 25mm

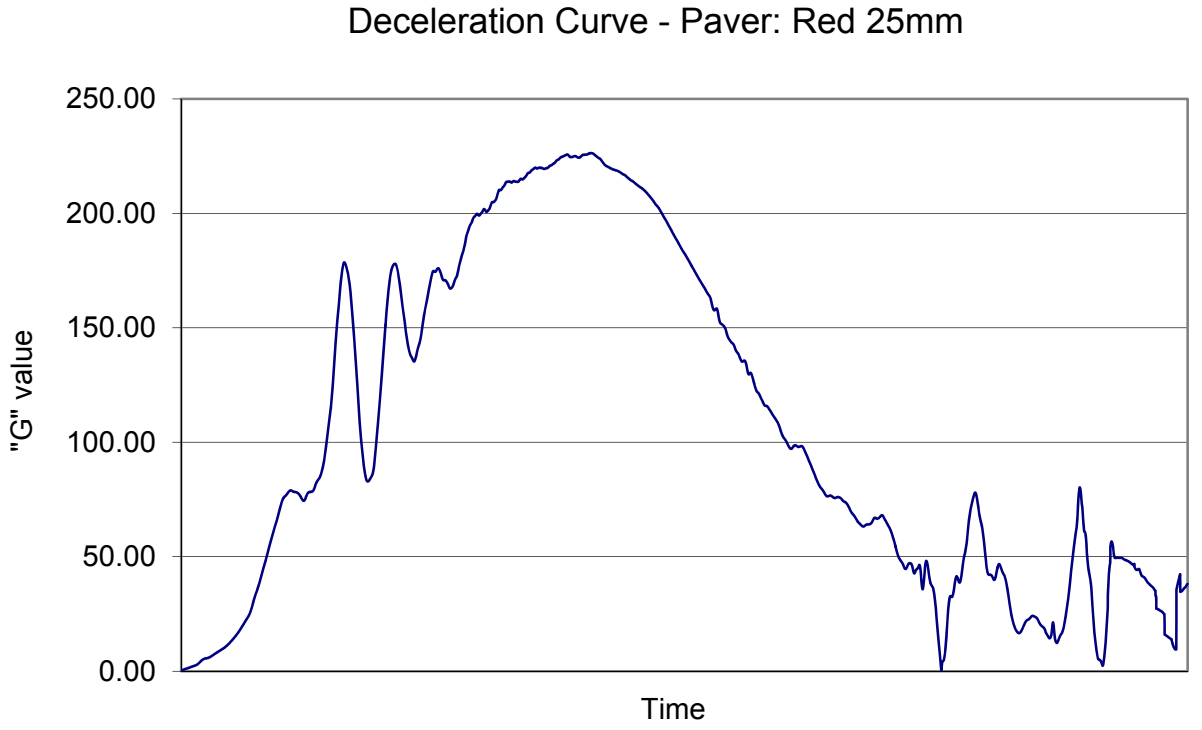


4.1.4 Deceleration curves






Deceleration Curve - Paver: Black 45mm
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
"G" value
Time


Deceleration Curve - Paver: Red 25mm
250.00
200.00
150.00
100.00
50.00
0.00
"G" value
Time

4.2 Ease of ignition

Tested on a 37mm thick red tile

Test N°	Sample Thickness	Ignition of sample	Extinction of flame (sec)	Afterglow/ smouldering (sec)	Radius of effect (mm)	Underside effect
1	37.9	Yes	58	38	20	No
2	37.4	Yes	56	34	21	No
3	36.5	Yes	55	35	20	No

4.3 Slip resistance

TRRL Pendulum Test utilising Slider 55

		DATA/READINGS								
Direction	Preparation / condition	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Mean**
A	Pink L.F/ DRY	72	74	74	74	75	75	75	75	**75**
A	Pink L.F / WET	58	59	58	58	56	56	55	55	**56**
B	Pink L.F/ DRY	71	72	72	72	73	73	74	74	**73**
B	Pink L.F / WET	60	60	59	58	57	56	54	53	**56**
C	Pink L.F/ DRY	73	75	75	76	76	76	77	77	**76**
C	Pink L.F / WET	60	59	58	56	55	55	54	53	**55**

Mean Slider 55 (Pink L.F)	**DRY**	**75**
Mean Slider 55 (Pink L.F)	**WET**	**55**

TRRL Pendulum Test utilising Slider 96

		DATA/READINGS								
Direction	Preparation / condition	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Mean**
A	Pink L.F/ DRY	36	37	37	37	37	38	38	39	**38**
A	Pink L.F / WET	31	29	27	25	25	25	25	24	**25**
B	Pink L.F/ DRY	35	35	35	36	36	36	36	36	**36**
B	Pink L.F / WET	29	27	26	25	25	25	24	24	**25**
C	Pink L.F/ DRY	35	35	35	35	36	35	36	37	**36**
C	Pink L.F / WET	29	26	25	25	25	25	25	25	**25**

Mean Slider 96 (Pink L.F)	**DRY**	**37**
Mean Slider 96 (Pink L.F)	**WET**	**25**

5. CONCLUSION

5.1 Critical fall height

When tested against a concrete sub-base the Critical Fall Height for the samples submitted in this programme of work was as follows;

Black rubber tiles 25mm thick on a concrete sub-base – CFH = 0.7m
Red rubber tiles 30mm thick on a concrete sub-base – CFH = 1.0m
Black rubber pavers 45mm thick on a concrete sub-base – CFH = 1.0m
Red rubber pavers 25mm thick on a concrete sub-base – CFH = 0.7m

5.2 Ease of ignition

The greatest radius of the effects of ignition shall not exceed 35mm, when tested using a 37mm red tile, all test pieces passed the requirement.

5.3 Slip resistance

All slip resistance testing was carried out using 37mm red tiles.

BS 7188:1998+A2:2009 requires that the minimum slip resistance in any direction, under either wet or dry conditions shall be not less than 40. Therefore the slider 55 passes the requirements of the standard.

In accordance with ‘The Assessment of Floor Slip Resistance’: The UK Slip Resistance Group Guidelines - Issue 4: 2011. The supplied surface in the “Ex-factory” condition when tested using Slider 96 would be classified as having a low slip potential under dry conditions and a moderate slip potential under water wet conditions.

End of Report

Smithers Rapra

CONDITIONS OF BUSINESS (the "Conditions")

DEFINITIONS

"Smithers Rapra" means Smithers Rapra and Smithers Pira Limited (registration number: 5761324 and whose registered office is at Shrewsbury Road, Shawbury, Shropshire, SY4 4NR), trading as Smithers Rapra;
"Client" means the person(s), firm or company who purchases the Goods and/or Services from Smithers Rapra;
"Conditions" means the terms and conditions set out in this document as amended from time to time;
"Contract" means any contract between Smithers Rapra and the Client for the sale and purchase of Goods and/or provision of Services, incorporating these Conditions;
"Goods" means any goods agreed in the Contract to be supplied to the Client by Smithers Rapra (including any parts of them);
"Intellectual Property Rights" means any patent, registered design, copyright (including rights in software), design right, database right, moral right, trade mark, service mark, domain name, rights in confidential information and all similar property rights anywhere in the world in each case whether registered or not and including any application for registration of the foregoing;
"Order" means in the Client's purchase order form, the Client's written acceptance of Smithers Rapra's quotation or overleaf, as the case may be;
"Services" means any services agreed in the Contract to be supplied to the Client by Smithers Rapra;
"Work" means Goods and Services;
"Working Day" means a day (other than a Saturday or Sunday) on which the banks are ordinarily open for business in the City of London.

FORMATION OF CONTRACT

1.1 All quotations are made and all orders are accepted subject to the following conditions. All other terms, conditions or warranties whatsoever (including any terms or conditions which the Client purports to apply under any purchase order, confirmation, specification or other document whatsoever and whenever) are excluded from any contract between the parties unless expressly accepted by Smithers Rapra in writing.

1.2 Without prejudice to Smithers Rapra's right not to accept an order, quotations shall be available for acceptance for a maximum period of 20 Working Days from the dates thereof.

1.3 If any statement or representation has been made to the Client by Smithers Rapra, or its employees upon which the Client relies (other than in the documents enclosed with Smithers Rapra's quotation) then the Client must set out that statement or representation in a document to be attached to the return copy of the quotation and in any such case Smithers Rapra may accept or reject the same and/or submit a new quotation.

1.4 Each Order for Work by the Client from Smithers Rapra shall be deemed to be an offer by the Client to purchase Work in accordance with these Conditions. Smithers Rapra hereby objects to any additional, contradictory or different terms contained in any initial or subsequent order or communication from the Client pertaining to the Work. Any notice by the Client objecting to these Conditions must be in writing separate from any form purchase order. Smithers Rapra's failure to object specifically to provisions contained in any communication from the Client shall not be deemed a waiver of the provisions contained in these Conditions.

1.5 No Order placed by the Client shall be deemed accepted by Smithers Rapra until a written acknowledgement of order is issued by Smithers Rapra or the Client supplies materials, products or information pursuant to the quotation, whichever is the earlier at which point the Contract shall come into existence. The Client shall ensure that the terms of the Order and any relevant specification are complete and accurate.

PRICES

2.1 The price for the Goods is, unless otherwise stated, quoted exclusive of all costs or charges in relation to packaging, labelling, loading, unloading, carriage, freight and insurance all of which amounts the Client will pay, where appropriate, in addition when it is due to pay for the Goods.

2.2 The price for the Work is exclusive of amounts in respect of value added tax ("VAT") or other similar taxes or levies. The Client shall, on receipt of a valid VAT invoice from Smithers Rapra, pay to Smithers Rapra such additional amounts in respect of VAT as are chargeable on the supply of the Work.

2.3 All requests for variations or addition to the Work must be made by the Client in writing. In the event of any variation or addition being so requested and agreed to by Smithers Rapra, Smithers Rapra shall be entitled to make an adjustment to the contract price fairly reflecting such variation or addition.

2.4 Smithers Rapra may, by giving notice to the Client at any time up to 5 Working Days before delivery, increase the price of the Goods to reflect any increase in the cost of the Goods that is due to:
(a) any factor beyond Smithers Rapra's control (including foreign exchange fluctuations, increases in taxes and duties, and increases in labour, materials and other manufacturing costs);
(b) any request by the Client to change the delivery dates, quantities or types of Goods ordered; or
(c) any delay caused by any instructions of the Client or failure of the Client to give Smithers Rapra adequate or accurate information or instructions.

2.5 All prices quoted are valid for 20 Working Days from the date of the quote. For non Sterling quotes, Smithers Rapra reserves the right to adjust reasonably for changes in exchange rate.

2.6 The price for the Work shall be the price set out in the Order.

DELIVERY AND ACCEPTANCE OF GOODS

3.1 Unless otherwise agreed in writing by Smithers Rapra delivery of the Goods shall take place at Smithers Rapra's place of business in normal business hours and the Client shall collect the Goods within 5 Working Days of Smithers Rapra giving the Client notice that the Goods are ready for collection.

3.2 Any dates specified by Smithers Rapra for delivery of the Work are intended to be an estimate only and time for delivery shall not be of the essence. If no dates are so specified, delivery will be within a reasonable time. Delivery of the Goods shall be completed on the completion of the loading of the Goods at Smithers Rapra's place of business.

3.3 If for any reason the Client does not accept delivery of any of the Goods within 5 Working Days of Smithers Rapra giving the Client notice that the Goods are ready for collection, or Smithers Rapra is unable to deliver the Goods on time because the Client has not provided appropriate instructions, documents, licences or authorisations then:
(a) the Goods shall be deemed to have been delivered at 9.00am on the fifth Working Day following the day on which Smithers Rapra notified the Client that the Goods were ready for collection;
(b) risk in the Goods passes to the Client (including for loss or damage caused by the Client's negligence); and
(c) Smithers Rapra may: (a) store the Goods until actual delivery whereupon the Client will be liable for all related costs and expenses (including without limitations storage and insurance); or (b) sell the Goods at the best price readily obtainable and (after deduction of all reasonable storage and selling expenses) charge the Client for any shortfall below the Contract price.

3.4 Where applicable, the Client will provide at its expense at the place of delivery adequate and appropriate equipment and manual labour for loading the Goods.

3.5 If Smithers Rapra delivers to the Client a quantity of Goods of up to 5% more or less than the quantity ordered by the Client, the Client shall not be entitled to object to or reject the Goods or any of them by reason of the surplus or shortfall and shall pay for the Goods delivered at the pro rata Contract rate.

3.6 Smithers Rapra shall be entitled at its discretion to make delivery of the Goods by instalments and to invoice the Client for each instalment individually. Where the Goods are to be delivered in instalments, each delivery shall constitute a separate contract and failure by Smithers Rapra to deliver any one or more of the instalments in accordance with these Conditions or any claim by the Client in respect of any one or more of the instalments in accordance with these Conditions or any claim by the Client in respect of any one or more instalments shall not entitle the Client to treat the Contract as a whole as repudiated or to refuse to accept subsequent instalments.

3.7 The Client shall be deemed to have accepted the Goods as being in accordance with the Contract unless:
(a) within 14 days of the date of delivery of the Goods, the Client notifies Smithers Rapra in writing of any defect or other failure of the Goods to conform with the Contract (which would be apparent upon reasonable inspection and testing of the Goods within 14 days);
(b) or the Client notifies Smithers Rapra in writing of any defect or other failure of the Goods to conform with the Contract within a reasonable time where the defect or failure would not be so apparent within 14 days of the date of delivery, failing which the Client shall not be entitled to reject the Goods and Smithers Rapra shall have no liability for such defect or failure, and the Client shall be bound to pay the Contract price as if the Goods had been delivered in accordance within the Contract.

3.8 Goods, once delivered, may not be returned unless their return is agreed in advance in writing by the Client, and subject to the following conditions:
(a) Goods are returned in a new and unused condition;
(b) any packaging remains unbroken and in reasonable condition;
(c) returns are made within 3 weeks of delivery of the Goods, all transport and other redelivery costs of whatever nature are paid by the Client;
(d) returned Goods shall be accompanied by a written record of invoice number, date and a note of reasons for their return.

3.9 Smithers Rapra shall not be liable for any loss (including loss of profit), costs, damages, charges or expenses caused directly or indirectly by any delay in the delivery of the Goods (even if caused by Smithers Rapra's negligence), nor will any delay entitle the Client to terminate or rescind the Contract.

3.10 Smithers Rapra shall only be liable for the non-delivery of Goods (even if caused by Smithers Rapra's negligence) if the Client gives written notice to Smithers Rapra within 10 Working Days of the date when the Goods would, in the ordinary course of events, have been delivered.

3.11 If the Client gives notice to Smithers Rapra in accordance with Condition 3.10, the liability of Smithers Rapra for non-delivery of the Goods shall be limited to replacing the Goods within a reasonable time or issuing a credit note at the pro rata Contract rate against any invoice raised for such Goods.

PASSING OF RISK AND LEGAL TITLE

4.1 The Goods shall be at the risk of the Client on completion of delivery.

4.2 Full legal, beneficial and equitable title to and property in the Goods shall remain vested in Smithers Rapra (even though it has been delivered and risk has passed to the Client) until:
(a) payment in full, in cash or cleared funds, for all of the Goods has been received by Smithers Rapra; and
(b) all other money payable by the Client to Smithers Rapra on any other account or under the Contract or any other contract has been received by Smithers Rapra.

4.3 Until full legal, beneficial and equitable title to and property in the Goods passes to the Client:
(a) the Client shall hold the Goods on a fiduciary basis as Smithers Rapra's bailee;
(b) the Client shall keep the Goods at its premises in a proper manner in conditions which adequately protect and preserve the Goods and shall insure them against all risks for their full price from the date of delivery, without any charge to Smithers Rapra, and not tamper with any identification upon the Goods or their packaging and shall ensure that they are stored separately from any other Goods (whether or not supplied by Smithers Rapra) and are clearly identifiable as belonging to Smithers Rapra and Smithers Rapra shall be entitled to examine any such Goods in storage at any time during normal business hours upon giving the Client reasonable notice of its intention to do so;
(c) provided that the Client has not resold or irrevocably incorporated the Goods into another product as authorised to do so by Smithers Rapra, Smithers Rapra may at any time, on demand and without prior notice, require the Client to deliver the Goods up to Smithers Rapra and Smithers Rapra may repossess and resell the Goods if the Client fails to comply with the conditions specified in Condition 4.2 or becomes subject to any of the events listed in Condition 12;
(d) for the purposes of this Condition 4 Smithers Rapra, its employees, agents and subcontractors shall be entitled to free and unrestricted access to any premises owned, occupied or controlled by the Client and/or any other location where any of the Goods are situated at any time without prior notice;
(e) Smithers Rapra shall be entitled to maintain an action against the Client for the price of the Goods notwithstanding that legal, equitable and beneficial title to and property in the Goods has not passed to the Client; and
(f) Smithers Rapra hereby authorises the Client to use and/or sell the Goods in the normal course of the Client's business and to pass good title in the Goods to its clients, if they are purchasers in good faith without notice of Smithers Rapra's rights. This right shall automatically cease on the occurrence of any event set out in Condition 12 and/or if any sum owed to Smithers Rapra by the Client is not paid when due. If the Client sells the Goods prior to paying the full price thereof the Client shall hold the proceeds of sale on trust for Smithers Rapra and shall immediately pay the proceeds of the sale into a separate bank account. At Smithers Rapra's request, the Client shall assign to Smithers Rapra all claims that the Client may have against purchasers of the Goods from the Client.

4.4 Smithers Rapra's rights and remedies set out in this Condition 4 are in addition to and shall not in any way prejudice, limit or restrict any of Smithers Rapra's other rights or remedies under the Contract or in law or equity.

PROVISION OF SERVICES

5.1 Smithers Rapra shall provide the Services to the Client and shall use all reasonable endeavours to meet any performance dates for the Services specified in the Order, but any such dates shall be estimates only and time shall not be of the essence for the performance of the Services.

5.2 Where Smithers Rapra is to perform Services at the Client's premises, the Client shall procure safe access to the premises and the provision of adequate power, lighting, heating and other such facilities or supplies for Smithers Rapra's employees or agents in accordance with the demands of any applicable legislation and as Smithers Rapra shall reasonably require.

PAYMENT

6.1 Smithers Rapra may invoice the Client for the Goods on or at any time after the completion of delivery. Unless otherwise agreed by Smithers Rapra in writing the payment by the Client shall be due 20 Working Days from receipt of invoice by the Client, which shall be deemed to be two Working Days after posting. In respect of Services Smithers Rapra may submit interim invoices in respect of each stage of Work completed for the Client.

6.2 Time for payment shall be of the essence. No payment shall be deemed to have been received until Smithers Rapra has received cleared funds.

6.3 Notwithstanding any other provision, all payments payable to Smithers Rapra under the Contract shall become due immediately upon termination of this Contract for whatever reason.

6.4 The Client shall make all payments due under the Contract without any deduction whether by way of set-off, withholding, counterclaim, discount, abatement or otherwise unless the Client has a valid court order requiring an amount equal to such deduction to be paid by Smithers Rapra to the Client.

6.5 If payments received from the Client are not stated to refer to a particular invoice, Smithers Rapra may appropriate such payment to any outstanding invoice addressed to the Client from Smithers Rapra.

6.6 No indulgence granted by Smithers Rapra to the Client concerning the Client's obligations under this Clause 6 shall be or be deemed to be a credit facility but if any such facility is granted to the Client by Smithers Rapra, Smithers Rapra may withdraw it at its sole discretion at any time.

6.7 Smithers Rapra reserves the right to vary the payment terms of this Contract in the event that it considers payment in advance (in part or whole) is necessary.

6.8 No disputes arising under the Contract nor delays beyond the reasonable control of Smithers Rapra shall interfere with prompt payment in full by the Client.

6.9 In the event of default in payment by the Client Smithers Rapra shall be entitled at its option to treat the whole Contract as repudiated by the Client or to suspend all further Work on any contract or contracts between Smithers Rapra and the Client without notice and to charge interest on any amount outstanding at the rate of 8% per annum above the base rate of National Westminster Bank plc in force at the time when payment was due. Such interest shall accrue on a daily basis from the due date of actual payment of the overdue amount, whether before or after judgment. The Client shall pay the interest together with the overdue amount.

6.10 The Client shall also pay Smithers Rapra's cost of collection (including legal fees and disbursements). Payments received may be applied by Smithers Rapra against any obligation owed by the Client to Smithers Rapra. Smithers Rapra may refuse or delay further Services if the Client fails to pay promptly any amounts due to Smithers Rapra.

COMPLETION/CANCELLATION

7.1 Time for completion of Work for the Contract is not of the essence but is given as accurately as possible but is not guaranteed. The Client shall have no right to damages, to reject the Work and/or to cancel the Order for failure for any cause to meet any time stated for completion of Work.

7.2 Any estimate of the date of completion of Work shall in every case be dependent upon prompt receipt of all necessary information, samples, instructions or approvals from the Client. Variations or additions to the Work requested by the Client may result in delay in completion.

7.3 Either party may cancel the Contract on 30 days' written notice to the other on condition that all costs and expenses incurred by Smithers Rapra up to the time of cancellation and, where cancellation is at the insistence of the Client, all loss of profits and other loss or damage resulting to Smithers Rapra by reason of such cancellation, shall be paid forthwith by the Client to Smithers Rapra.

WARRANTY AND WARRANTY LIMITATIONS

8.1 Smithers Rapra warrants that all Services will be performed in a reasonable timely and workmanlike manner and in material conformity with the agreed upon specifications. If the Client establishes to Smithers Rapra's reasonable satisfaction that there is a defect in the materials or workmanship of the Services, if the Services have not been performed with reasonable care and skill, or there is some other failure by Smithers Rapra in relation to the Services the Client's sole and exclusive remedy shall be reperformance of the Services in question by Smithers Rapra at no additional cost to the Client. If re-performance is impossible or impractical, Smithers Rapra may, at its sole discretion, refund to the Client a proportion of the fees (to be determined at Smithers Rapra's sole discretion) attributable to the defective Services in question. This Condition 8.1 shall not apply unless the Client notifies Smithers Rapra in writing of the alleged defect within 7 days of the time when the Client discovers or ought to have discovered the defect and in any event within 3 months of the performance of Services to the Client or such other periods as agreed by Smithers Rapra in writing.

8.2 If Smithers Rapra elects to re-perform the Services pursuant to Condition 8.1, Smithers Rapra shall re-perform the Services for the Client at Smithers Rapra's own expense.

8.3 Smithers Rapra warrants that on delivery the Goods shall:

(a) conform in all material respects with their description and any applicable specification; and

(b) be free from material defects in design, material and workmanship.

8.4 Subject to Condition 8.5, if:

(a) the Client gives notice in writing to Smithers Rapra within a reasonable time of discovery that some or all of the Goods do not comply with the warranty set out in Condition 8.3;

(b) Smithers Rapra is given a reasonable opportunity of examining such Goods; and

(c) the Client (if asked to do so by Smithers Rapra) returns such Goods to Smithers Rapra's place of business at the Client's cost

Smithers Rapra shall, at its option, repair or replace the defective Goods, or refund the price of the defective Goods in full.

8.5 Smithers Rapra shall not be liable for Goods' failure to comply with the warranty set out in Condition 8.4, if:

(a) the Client makes any further use of such Goods after giving notice in accordance with Condition 8.5; or

(b) the defect arises because the Client failed to follow Smithers Rapra's oral or written instructions as to the storage, commissioning, installation, use and maintenance of the Goods or (if there are none) good trade practice; or

(c) the defect arises as a result of Smithers Rapra following any drawing, design or specification supplied by the Client; or

(d) the Client alters or repairs such Goods without Smithers Rapra's written consent; or

(e) the defect arises as a result of fair wear and tear, wilful damage, negligence, or abnormal storage or working conditions.

8.6 Except as provided in this Condition 8, Smithers Rapra shall have no liability to the Client in respect of the Goods' failure to comply with the warranty set out in Condition 8.3.

8.7 Conditions 8.4 to 8.7 shall apply to any repaired or replacement Goods supplied by Smithers Rapra.

8.8 Except as provided in this Condition 8, all warranties, conditions or other terms implied by statute or common law, whether written or oral, are to the fullest extent permitted by law excluded from the Contract.

8.9 Smithers Rapra shall be under no liability under the warranties contained in this Condition:

(a) in respect of any defect arising from fair wear and tear, wilful damage, negligence, abnormal working conditions, failure to follow Smithers Rapra's instructions (whether oral or in writing), misuse or alteration or repair of the Work without Smithers Rapra's approval;

(b) if the total price for the Work or Services has not been paid by the due date for payment;

(c) for any Work manufactured or appropriated to the Contract in accordance with any design, specification, instruction or recommendation made to Smithers Rapra by the Client or for any Services provided in accordance with specifications, instructions or recommendation issued by the Client;

(d) in respect of any type of defect, damage or wear specifically excluded by Smithers Rapra by notice in writing; or

(e) if the Client makes any further use of the Work after giving notice in accordance with Condition 8.1.

LIABILITY/INDEMNIFICATION

9.1 This Condition 9 together with Condition 3 and Condition 8 set out the entire liability of Smithers Rapra (including any liability for the acts or omissions of its subcontractors and any member of its group) in respect of any breach of these Conditions or the Contract and any representation, statement or tortuous act or omission including negligence arising under or in connection with the Contract.

9.2 Nothing in these Conditions shall exclude or limit Smithers Rapra's liability for:

(a) death or personal injury caused by Smithers Rapra's negligence, or the negligence of its employees, agents or sub-contractors (as applicable);

(b) fraud or fraudulent misrepresentation;

(c) breach of the terms implied by section 12 of the Sale of Goods Act 1979;

(d) any matter in respect of which it would be unlawful for Smithers Rapra to exclude or restrict liability.

9.2 Smithers Rapra is not responsible for the performance, adequacy, or safety of any material, product, or process of the Client being tested or evaluated by Smithers Rapra. Smithers Rapra is not responsible for the Client's use of the information or concepts generated as part of the Services, and shall not be liable for any loss or damage resulting from such use.

9.3 Subject to Condition 9.2 Smithers Rapra shall not be liable to the Client, whether in contract, tort (including negligence), breach of statutory duty, or otherwise, for any loss of profit or indirect or consequential loss arising under or in connection with the Contract.

9.4 The Client agrees to indemnify and hold harmless Smithers Rapra and each of its affiliates and their respective shareholders, directors, officers, employees, and agents (collectively the "Indemnified Parties") from and against any and all claims, liabilities, damages, and expenses, including, without limitation, legal fees, consultant's fees, costs of investigation and disbursements, incurred by any Indemnified Party as a result of or in connection with (a) the Client's breach of the Contract, (b) any attempt to impose upon an Indemnified Party any responsibility, liability, or obligation which under the terms of the Contract is not to be a

responsibility, liability, or obligation of Smithers Rapra and/or its affiliates, or (c) a product, service, process, operation, or activity of the Client.

9.5 Subject to Condition 9.2, Smithers Rapra's total aggregate liability to the Client arising out of, or in connection with the performance or contemplated performance of this Contract and any other agreements between the Client and Smithers Rapra whether in contract, tort (including negligence), breach of statutory duty or otherwise shall in no event exceed [£500,000] in any Year] [the Contract Price].

9.6 The price of the Work has been calculated on the basis that Smithers Rapra will exclude or limit its liability as set out in these Conditions and the Client by placing an Order agrees and warrants that the Client shall insure against or bear itself any loss for which Smithers Rapra has excluded or limited its liability in these Conditions and Smithers Rapra shall have no further liability to the Client.

CONFIDENTIAL INFORMATION AND INTELLECTUAL PROPERTY RIGHTS

10.1 All data, information and reports are produced for the benefit of the addressee only. Smithers Rapra accepts no liability arising from unauthorised use of such information or reports by a third party.

10.2 All Intellectual Property Rights belonging to or otherwise in the control of either party prior to entering into the Contract shall remain the property of the party owning such Intellectual Property Rights.

10.3 Unless expressly agreed in writing by Smithers Rapra and set out in the Order:

10.3.1 the Client shall not reproduce or abstract for the purpose of advertising or otherwise any report or other information from the Work or use the name of Smithers Rapra either expressly or by implication in any of its advertising or sales promotional material.

10.3.2 all title and ownership of, or relating to, any Intellectual Property Rights, including, but not being limited to, ideas, inventions, discoveries, creations, improvements or any other property subject to patent protection or Intellectual Property Rights in or arising out of or in connection with the Work under the Contract, shall be vested in and owned by Smithers Rapra.

10.3.3 all Intellectual Property Rights in all drawings, documents, confidential records, computer software and other information supplied by Smithers Rapra ("Documents") are vested in and shall remain the property of Smithers Rapra.

10.3.4 nothing in the Contract shall be deemed to have given the Client a licence or any other right to use any of Smithers Rapra's Intellectual Property Rights.

10.3.5 the Client will not give away, loan, exhibit, sell or in any way use any Documents or extracts therefrom or copies thereof.

10.4 For the avoidance of any doubt if Smithers Rapra agrees to an assignment of any of the Intellectual Property Rights owned by Smithers Rapra, Smithers Rapra shall be granted a royalty-free, irrevocable, non-exclusive, worldwide right to use such Intellectual Property Rights assigned under this Condition 10.3 by the Client.

10.5 Smithers Rapra's confidential and sensitive information including, but not limited to, information contained in any proposal, order acknowledgment, or invoice provided by Smithers Rapra to the Client shall be kept confidential and shall not be disclosed by the Client to any third party or otherwise made public the terms or existence of the Contract without Smithers Rapra's prior written consent, except as may be required by law in which case the Client shall notify Smithers Rapra of such disclosure, if legally possible, in good time prior to making the disclosure.

CLIENT'S INFORMATION/SAMPLES

11.1 The Client shall be solely responsible for ensuring that all drawings, information, advice and recommendations given to Smithers Rapra, either directly or indirectly by the Client or by the Client's agents, servants, consultants or advisers, are accurate and sufficient for completion of the Work. Examination or consideration by Smithers Rapra of such drawings, information, advice or recommendations shall in no way limit the Client's responsibility hereunder unless Smithers Rapra specifically agrees in writing to accept responsibility.

11.2 Smithers Rapra shall not disclose to any third party any knowledge or information relating to the Work which is, on receipt by Smithers Rapra, marked 'confidential' by the Client unless and until such information becomes public knowledge.

11.3 Smithers Rapra retains the right to return or dispose of the samples at the Client's cost after a period of 6 months unless otherwise agreed with the Client. Storage of the samples beyond the initial 6 month period will be charged for, invoiced in advance for the agreed period (minimum additional 6 months).

TERMINATION

12.1 Smithers Rapra may, as it thinks fit, (without prejudice to any other rights or remedies it may have against the Client) immediately suspend further performance of the Contract or cancel any outstanding provision of the Work by notice in writing to the Client or any other contract between the Client and Smithers Rapra without incurring any liability to the Client and all outstanding sums in respect of the Work delivered to the Client shall become immediately due if:

(a) the Client suspends, or threatens to suspend, payment of its debts or is unable to pay its debts as they fall due or admits inability to pay its debts or (being a company) is deemed unable to pay its debts within the meaning of section 123 of the Insolvency Act 1986, or (being a partnership) has any partner to who any of the foregoing apply;

(b) the Client commences negotiations with all or any class of its creditors with a view to rescheduling any of its debts, or makes a proposal for or enters into any compromise or arrangement with its creditors other than (where the Client is a company) these events take place for the sole purpose of a scheme for a solvent amalgamation of the Client with one or more other companies or the solvent reconstruction of the Client;

(c) a creditor or encumbrancer of the Client attaches or takes possession of, or a distress, execution, sequestration or other such process is levied or enforced on or sued against, the whole or any part of its assets and such attachment or process is not discharged within 14 days;

(d) an application is made to court, or an order is made, for the appointment of an administrator or if a notice of intention to appoint an administrator is given or if an administrator is appointed over the Client;

(e) a floating charge holder over the assets of the Client has become entitled to appoint or has appointed an administrative receiver;

(f) a person becomes entitled to appoint a receiver over the assets of the Client or a receiver is appointed over the assets of the Client;

(g) any event occurs, or proceeding is taken, with respect to the Client in any jurisdiction to which it is subject that has an effect equivalent or similar to any of the events mentioned in Condition 12(a) to 12(l) (inclusive);

(h) the Client suspends, threatens to suspend, ceases or threatens to cease to carry on all or substantially the whole of its business;

(i) the financial position of Smithers Rapra deteriorates to such an extent that in the opinion of the Client the capability of Smithers Rapra adequately to fulfil its obligations under the Contract has been placed in jeopardy;

(j) the Client commits a material breach of any of its obligations under the Contract which is incapable of remedy;

(k) any sum payable under the Contract is not paid within 7 days of its due date for payment in accordance with this Contract;

(l) the Client fails to remedy a breach of its obligations under the Contract (except as to payment) which is capable of remedy, or persists in any breach of any of its obligations under the Contract after having been requested in writing by Smithers Rapra to remedy of desist from such breach within a period of 14 days.

FORCE MAJEURE

13 Smithers Rapra shall not be in breach of this Contract or liable for delay in performing, or failing to perform any obligation under this Contract arising from or attributable to acts, events, omissions or accidents beyond its reasonable control, including but not being limited to any of the following: by direction of government, war, industrial dispute, strike, breakdown of machinery or plant, acts of God, terrorism, riot, flood, storms, earthquakes, extreme adverse weather conditions, lock-outs, accident, fire (any one a "Force Majeure Event"). If the Force Majeure Event prevails for a continuous period of more than 2 months, Smithers Rapra may terminate this Contract by giving 14 days' written notice to all the other parties. On the expiry of this notice period, the Contract will terminate. Such termination shall be without prejudice to the rights of the parties in respect of any breach of this Contract occurring prior to such termination. Smithers Rapra shall be entitled to recover all sums owing to it in respect of Goods provided and costs incurred prior to the date of termination.

GENERAL/LEGAL

14.1 All agreements contained herein shall apply to and bind the assignees and successors in interest of Smithers Rapra and the Client. Facsimile signatures or other reliable means of authentication by which the Client signifies its assent to this Agreement shall be effective to bind the Client to this Contract.

14.2 The waiver by Smithers Rapra of any right or remedy under the Contract is only effective if given in writing and shall not be deemed to be a waiver of any later breach or default. No failure or delay by Smithers Rapra to exercise any right or remedy provided under the Contract or by law shall constitute a waiver of that or any other right or remedy, nor shall it preclude or restrict the further exercise of that or any right or remedy. No single or partial exercise of such right or remedy shall preclude or restrict the further exercise of that or any other right or remedy.

14.3 If any court or competent authority finds that any provision or part provision of this Contract is invalid, illegal or unenforceable, that provision or part provisions shall to the extent required, be deemed to be deleted, and the validity and enforceability of the other provisions of the Contract shall not be affected. If any invalid, unenforceable or illegal provision of the Contract would be valid, enforceable and legal if some part of it were deleted, the provision shall apply with the minimum modification necessary to make it legal, valid and enforceable.

14.4 The headings are used for the convenience of the parties only and shall not affect the construction or interpretation of this Contract. Any clerical errors are subject to correction.

14.5 The Contract and any dispute or claim arising out of or in connection with it shall be governed and interpreted exclusively according to the Law of England and shall be subject to the exclusive jurisdiction of the English Courts to which the parties irrevocably submit.

14.6 Notwithstanding any different or additional terms or conditions contained in the Client's purchase order or other communication, Smithers Rapra accepts the Client's order only on the condition that the Client expressly accepts and assents to the terms and conditions contained in this Contract. The Client's acceptance of any Work shall be deemed to be acceptance of these Conditions.

14.7 Smithers Rapra may at any time assign, charge, subcontract, transfer or deal in any other manner with all or any of its rights or obligations under the Contract or any part of it to any person. The Client may not assign, charge, subcontract, transfer or deal in any other manner with all or any of its rights or obligations under the Contract without the prior written consent of Smithers Rapra.

14.8 A person who is not a party to the Contract (including without limitation any employee, officer, agent, representative or subcontractor or either party) shall not have any right to enforce any term of the Contract which expressly or by implication confers a benefit on that person without the express prior written agreement of Smithers Rapra and the Client.

14.9 All notices between the parties relating to this Contract must be in writing and sent pre-paid first class or sent by facsimile to:

(a) in the case of the Client the registered office of the addressee (if it is a company) or (in any other case) to any address of the Client set out in any document which forms part of this Contract or a Contract or such other address as shall be notified to Smithers Rapra by the Client in writing; and

(b) in the case of Smithers Rapra, the address set out below:

Smithers Rapra and Smithers Pira Limited
Shawbury
Shrewsbury
Shropshire SY4 4NR
UK

or other such address as shall be notified to the Client by Smithers Rapra in writing.

14.10 Notices shall be deemed to have been received: in the case of first class post, 2 days after posting (exclusive of the day of posting) and if sent by facsimile transmission, at 10:00 am local time on the first usual Working Day in the country of receipt following transmission, subject to being able to show that the notice was sent to the correct facsimile number.

14.11 Nothing in this Contract is intended to, or shall be deemed to, establish any partnership or joint venture between any of the parties, constitute any party the agent of another party, nor authorise any party to make or enter into any commitments for or on behalf of any other party.

14.12 The Contract constitutes the entire agreement between the parties. The Client acknowledges that it has not relied on any statement, promise or representation made or given by or on behalf of Smithers Rapra which is not set out in the Contract. Any samples, drawings, descriptive matter or advertising issued by Smithers Rapra and any descriptions or illustrations contained in Smithers Rapra's catalogues or brochures are issued or published for the sole purpose of giving an approximate idea of the Services described in them. They shall not form part of the Contract or any other contract between Smithers Rapra and the Client for the sale of the Goods.

14.13 In performing the Services, Smithers Rapra shall operate as, and have the status of, an independent contractor and shall not operate or have the status of agent, employee or representative of the Client.

ANTI-BRIBERY

15.1 The Client shall:

(a) comply with all applicable laws, statutes, regulations and codes relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010 ("Relevant Requirements");

(b) not engage in any activity, practice or conduct which would constitute an offence under sections 1, 2 or 6 of the Bribery Act 2010 if such activity, practice or conduct had been carried out in the UK;

(c) comply with any Anti-Bribery Policy as Smithers Rapra may provide to it from time to time ("Relevant Policy");

(d) have and shall maintain in place throughout the term of this Agreement its own policies and procedures, including adequate procedures under the Bribery Act 2010, to ensure compliance with the Relevant Requirements, the Relevant Policy and Condition 15.1(b) and will enforce them where appropriate;

(e) promptly report to Smithers Rapra any request or demand for any undue financial or other advantage of any kind received by the Client in connection with the performance of this Agreement;

(f) immediately notify Smithers Rapra in writing if a foreign public official becomes an officer or employee of the Client or acquires a direct or indirect interest in the Client, and the Client warrants that it has no foreign public officials as officers, employees or direct or indirect owners at the date of this Agreement;

(g) the Client shall provide such supporting evidence of compliance as Smithers Rapra may reasonably request.

15.2 The Client shall ensure that any person associated with it who is performing services or providing goods in connection with this Agreement does so only on the basis of a written contract which imposes on and secures from such person terms equivalent to those imposed on the Client in this Condition 15 ("Relevant Terms"). The Client shall be responsible for the observance and performance by such persons of the Relevant Terms, and shall be directly liable to Smithers Rapra for any breach by such persons of any of the Relevant Terms.

15.3 For the purpose of this Condition 15, the meaning of adequate procedures and foreign public official and whether a person is associated with another person shall be determined in accordance with section 7(2) of the Bribery Act 2010 (and any guidance issued under section 9 of that Act), sections 6(5) and 6(6) of that Act and section 8 of that Act respectively. For the purpose of this Condition 15, a person associated with the Client includes but is not limited to any Sub-Contractor.