

# Confidential Technical Report 47582



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**PROJECT NO:** ABP060

## TESTING OF RITEC CLEARSHIELD COATING MATERIAL TO EUROPEAN FOOD CONTACT REGULATIONS

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## **TESTING OF RITEC CLEARSHIELD COATING MATERIAL TO EUROPEAN FOOD CONTACT REGULATIONS**

### **1. INTRODUCTION**

Glass slides coated with Ritec Clearshield coating were supplied for testing to examine compliance of the coating with European Regulations for Food Contact materials (received 16<sup>th</sup> March 2007). Details of the coating were provided on a confidential basis.

### **2. CURRENT EU REGULATIONS ON COATINGS**

The revised framework Directive Regulation (EC) No 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food and repealing Directives 80/590/EEC and 89/109/EEC has the following general requirements on all types of food contact materials including Coatings.

1. Materials and articles, including active and intelligent materials and articles, shall be manufactured in compliance with good manufacturing practice so that, under normal or foreseeable conditions of use, they do not transfer their constituents to food in quantities which could:

(a) endanger human health;

or

(b) bring about an unacceptable change in the composition of the food;

or

(c) bring about a deterioration in the organoleptic characteristics thereof.

2. The labeling, advertising and presentation of a material or article shall not mislead the consumers.

At present, with respect to the Ritec Coating, there is no harmonised European food safety requirements in place and therefore to demonstrate compliance with 1a) above it is necessary to demonstrate that the coating complies with one of the following;

a) National Regulations in an EU country (for example the German BfR Recommendations)

b) The US FDA regulations on Coatings (accepted in the UK and also in Europe under the treaty of Rome.

c) The Council of Europe resolutions on Coatings. Although these resolutions are not legally binding they are used to support European regulations on materials in contact with food.

### **3. TESTING PROTOCOL**

Based on the above, the following testing was undertaken to examine migration from the sample.

#### **3.1 Overall migration -EU**

The coated samples were tested using test conditions detailed in European Directive 2002/72/EC relating to Plastics, under conditions applicable for contact with food under any condition of time and temperature. This was for confirmation that the level of overall migration in each of these tests is less than 10mg/dm<sup>2</sup>. EN1186 methodology was employed.

Overall migration - 4 hour reflux with distilled water

Overall migration - 4 hour reflux with 10% ethanol

Overall migration - 4 hour reflux with 3% acetic acid

Overall migration – 4 hours at 60°C with isooctane (= 2 hours at 175°C with olive oil)

Testing was undertaken on the 22<sup>nd</sup> March 2007.

### **3.2 Extraction level FDA**

For use with fatty foods the FDA regulations (Chapter 21 Section 175.300 Resinous and polymeric coatings) differ from those in the EU in that heptane is the solvent of use for fatty foods. Therefore, further samples of coated glass slides were tested for 2 hours at 150°F with heptane (to check how the samples behave in relation to single and repeat use FDA restrictions). The level of extracted material was quantified gravimetrically.

Testing was undertaken on the 27<sup>th</sup> March 2007.

### **3.3 Examination of water-soluble material by infrared spectroscopy**

An infrared spectrum was recorded of dried water-soluble material from the 4-hour reflux extraction. This was to examine its composition. A Specac "Golden Gate" reflectance accessory fitted to a Nicolet Spectrometer was employed.

The spectrum was recorded on the 28<sup>th</sup> March 2007.

### **3.4 Examination of water-soluble material by combined liquid chromatography/mass spectrometry (LC/MS)**

The nature of water-extracted material was examined by LC-MS to examine its nature and molecular weight.

#### **3.4.1 Sample preparation.**

A 2-ml portion of a mixture of 70/30-methanol water was added to the dried water extract (Duplicate 1). This was then transferred to a 7-ml glass vial and sonicated in an ultra sonic water bath for 30 minutes. The extract did not fully re-dissolve and therefore was filtered into an auto sampler vial using a PTFE filter. This was repeated for the duplicate extract but methanol was used as the solvent.

The sample preparation was undertaken on the 3<sup>rd</sup> April 2007.

### 3.4.2 LC-MS conditions

The LC-MS conditions employed to analyse the sample extracts are shown in Table 1.

**Table 1- LC-MS Conditions**

Parameter	Set Point
Liquid Chromatograph	Agilent 1100 Series
Injection	5 $\mu$ l
Flow rate	0.400ml/min
Chromatographic column	Aqua C18 150mm x 2.00mm 3 $\mu$ 125A compartment @ 45°C
Mobile Phase	Solvent A: Water Solvent B: Methanol 70% B for 0.5minutes. 70% to 100% B over 4 minutes 100% B held until 30minutes. Post time 7minutes Total runtime 37 minutes.
Ultraviolet Diode Array Detector (UV-DAD)	Agilent 1100 series G1315B Serial No. DE30519156
UV Wavelength	Signal A: 210-nm BW = 16; Reference 360-nm BW = 100 Signal B: 254-nm BW = 16; Reference 360-nm BW = 100
Mass Spectrometer (MS)	Agilent G2445D Ion Trap Serial no. DE31806011
Ionisation	Atmospheric Pressure Chemical Ionisation (APCI) Positive
Spray chamber Conditions	Dry temp = 350°C Nebuliser= 35psi Vaporiser = 400°C Drying gas = N2 @ 4.0L/min HV Capillary = 3500V
MS Trap Conditions	Scan 100-2200 m/z

	Averages = 5 Spectra Target Mass = 1000 m/z Compound Stability = 100% Trap Drive Level = 100% Accumulation Time = 300000 $\mu$ s Max. Accu Time = 300000 $\mu$ s ICC Target = 30000 Charge Control = On Multiplier Voltage = 1811Volt Dynode = 7KV
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The analysis was undertaken on the 3<sup>rd</sup> April 2007.

## 4. RESULTS

### 4.1 Overall Migration

All data were well within the EU limit. Results obtained were as follows.

Maximum extraction was with the distilled water simulant.

Simulant	Test Condition	Migration (mg/dm <sup>2</sup> )	EU Limit (mg/dm <sup>2</sup> )
Distilled water	4 hour reflux	3.6, 3.4	10
10% ethanol	4 hour reflux	1.7, 2.0	10
3% acetic acid	4 hour reflux	1.1, 0.9	10
Isooctane	4 hours at 60°C with (= 2 hours at 175°C with olive oil)	0.3, 0.3	10

### 4.2 Heptane extraction

Amounts of material extracted with heptane were very low and below the limit of quantification by weighing.

Simulant	Test Condition	Migration (mg/dm <sup>2</sup> )
Heptane	2 hours at 66°C	< 0.1, <0.1

### 4.3 Examination of water extractables

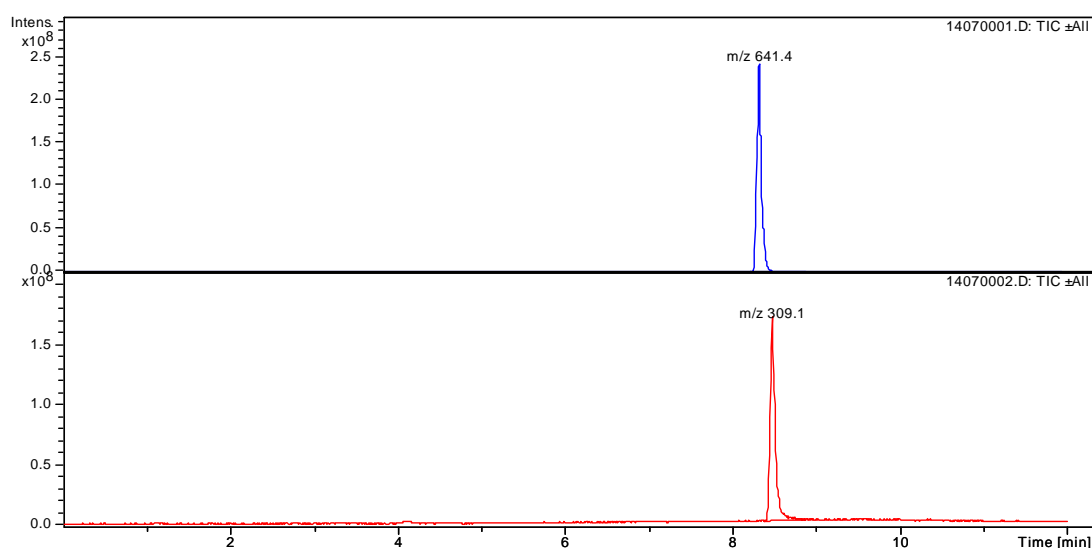
#### 4.3.1 Infrared spectroscopy

The infrared spectrum of the material extracted from the test samples during the reflux extraction suggested that not all of the water-soluble material is from the coating itself and some material extracted could be associated with the glass substrate.

### 4.3.2 LC-MS

Figure 1 shows an overlay of the positive and negative APCI chromatograms obtained for a 10µg/ml standard of Irganox 1035, a phenolic antioxidant. (A standard of Irganox 1035 is analysed to check the sensitivity and performance of the instrument.) The observed response confirmed that the instrument was functioning as normal.

**Figure 1- Positive and negative APCI Chromatograms obtained for a 10µg/ml standard of Irganox 1035.**



The dried water-soluble material was found to be difficult to re-dissolve in either methanol/water or methanol and therefore some of the extracted material was possibly removed during the filtration stage.

Figure 2 shows an overlay of the positive APCI chromatograms obtained for the control methanol/water blank and the sample methanol/water extract solution.



Figure 2- Positive APCI chromatograms obtained for the control methanol/water and the sample extract.

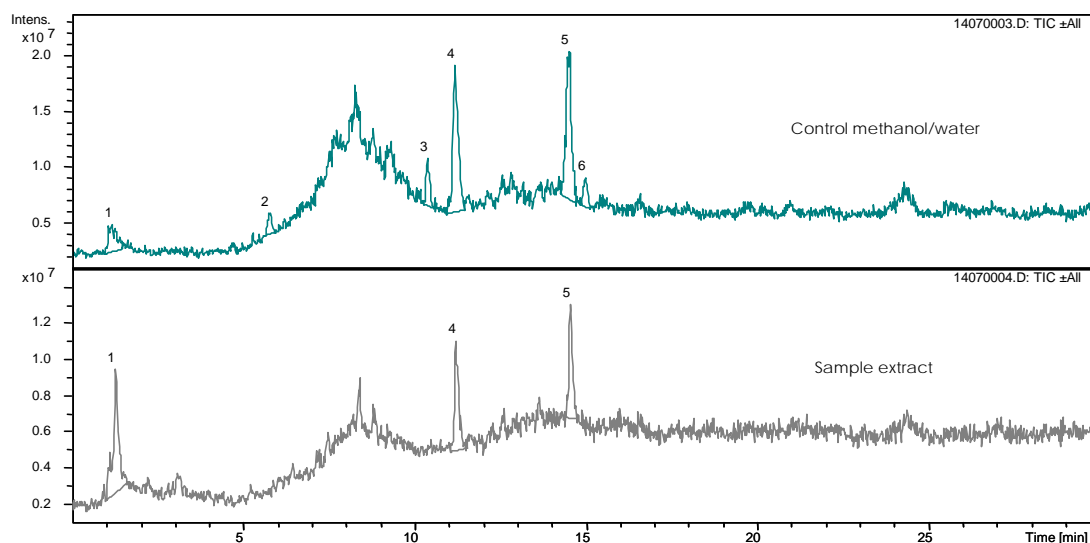
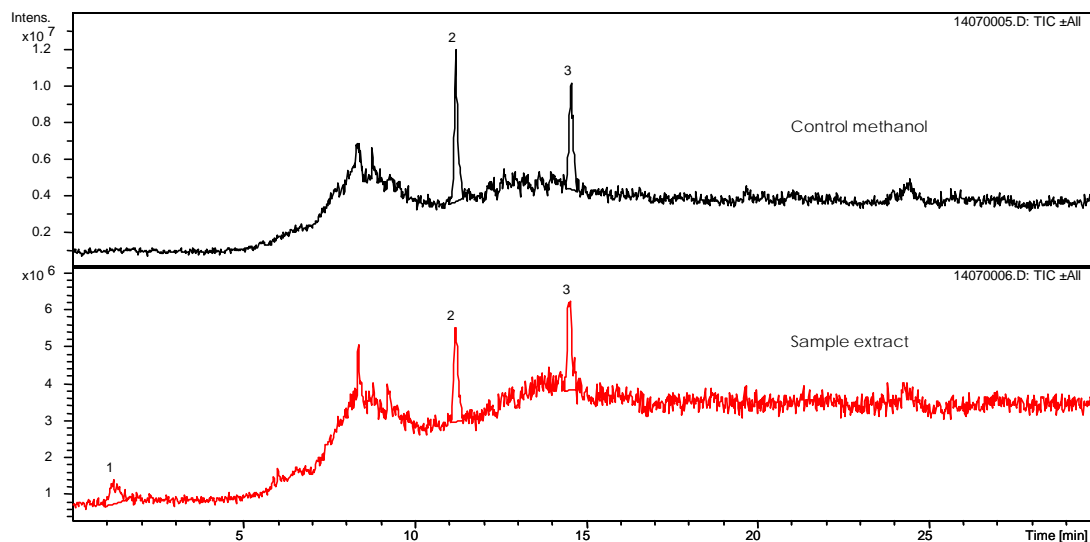


Figure 3 shows an overlay of the positive APCI chromatograms obtained for the control methanol blank and the sample methanol extract solution.

Figure 3- positive APCI chromatograms obtained for the control methanol and the sample extract.



It can be seen from the above chromatograms that there is very little difference between the solvent blank and sample extract solutions apart from the Peak 1. The mass spectral data of this peak showed ions with a mass difference of 44 suggesting that they relate to an ethoxylated surfactant (-CH<sub>2</sub>CH<sub>2</sub>O) possibly used in sample preparation. No water-soluble coating oligomers were observed.

#### 4. CONCLUSIONS

From the compositional information provided and from the extraction studies undertaken, it is possible to make the following comments on the food-contact regulatory status of the coating.

a) The constituents are all listed as components of or starting substances used in the manufacture of coatings.

b) Levels of overall migration into food simulants under severe migration test conditions representative of worst-case contact with all food types are all-low and well within limits prescribed by the EU and the FDA.

c) Maximum migration from the test samples provided was with the food simulant distilled water under reflux extraction conditions.

d) In the analysis undertaken to examine the composition of water-soluble material, no evidence has been found to indicate the formation of any new significant soluble extractable species formed during the resin curing and drying procedures that would be considered harmful to health. However, in view of the complex nature of the coating, it is recommended that additional studies be undertaken to help characterise the chemical nature of any potential reaction species.

**SMITHERS RAPRA LIMITED TRADING AS RAPRA TECHNOLOGY**  
**CONDITIONS OF BUSINESS – 19-10-06 (the “Conditions”)**

**DEFINITIONS**

“**Client**” means the persons, firm or company who purchases the Goods and/or Services from Rapra;

“**Contract**” means any contract between Rapra and the Client for the sale of goods and/or provision of service, incorporating these Conditions;

“**Goods**” means any goods agreed in the Contract to be supplied to the Client by 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;

“**Rapra**” means Smithers Rapra Limited trading as Rapra Technology registered number 5761324 registered office Shrewsbury Road, Shawbury, Shropshire, SY4 4NR;

“**Services**” means any services agreed in the Contract to be supplied to the Client by Rapra;

“**Work**” means Goods and Services;

“**Working Days**” 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 Rapra in writing.
- 1.2 Without prejudice to Rapra's right not to accept an order, quotations shall be available for acceptance for a maximum period of 30 days from the dates thereof
- 1.3 If any statement or representation has been made to the Client by Rapra, or its employees upon which the Client relies (other than in the documents enclosed with 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 Rapra may accept or reject the same and/or submit a new quotation.
- 1.4 Each order for Work by the Client from Rapra shall be deemed to be an offer by the Client to purchase Work subject to these Conditions. Rapra hereby objects to any additional, contradictory or different terms contained in any initial or subsequent order or communication from Client pertaining to the services. Any notice by Client objecting to these terms must be in writing separate from any form purchase order. Rapra's failure to object specifically to provisions contained in any communication from Client shall not be deemed a waiver of the provisions contained in this Agreement.
- 1.5 No order placed by the Client shall be deemed accepted by Rapra until a written acknowledgement of order is issued by Rapra or the Client supplies materials, products or information pursuant to the quotation whichever is the earlier.

**PRICES**

- 2.1 All prices are, unless otherwise stated, quoted exclusive of VAT or other similar taxes or levies and 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 Work and/or Services.
- 2.2 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 Rapra, Rapra shall be entitled to make an adjustment to the contract price fairly reflecting such variation or addition.

**DELIVERY AND ACCEPTANCE OF GOODS**

- 3.1 Unless otherwise agreed in writing by Rapra delivery of the Work shall take place at Rapra's place of business in normal business hours and the Client shall take delivery of the Goods within [7] days of Rapra giving the Client notice that the Goods is ready for delivery.
- 3.2 Any dates specified by 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.
- 3.3 If for any reason the Client does not accept delivery of any of the Work when they are ready for delivery, or Rapra is unable to deliver the Work on time because the Client has not provided appropriate instructions, documents, licences or authorisations then the Work will be deemed to have been delivered, risk passing to the Client (including for loss or damage caused by the Client's negligence) and Rapra may: (a) store the Work 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 Work 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 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 Rapra shall be entitled at its discretion to make delivery of the Work by instalments and to invoice the Client for each instalment individually. Where the Work is to be delivered in instalments, each delivery shall constitute a separate contract and failure by 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 will be deemed to have accepted the Work as being in accordance with the Contract unless:
  - (a) within 14 days of the date of delivery of the Work, the Client notifies the Client in writing of any defect or other failure of the Work to conform with the Contract (which would be apparent upon reasonable inspection and testing of the Work within 14 days);
  - (b) or the Client notifies Rapra in writing of any defect or other failure of the Work 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 Work and Rapra shall have no liability for such defect or failure, and the Client shall be bound to pay the Contract price as if the Work has been delivered in accordance with 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 re-delivery 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 Rapra will 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 Work (even if caused by Rapra's negligence), nor will any delay entitle the Client to terminate or rescind the Contract.
- 3.10 Rapra shall only be liable for the non-delivery of Goods (even if caused by Rapra's negligence) if the Client gives written notice to Rapra within [7] 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 Rapra in accordance with Condition 3.10, the liability of 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 from the time of delivery.
- 4.2 Full legal, beneficial and equitable title to and property in the Goods shall remain vested in 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 Rapra; and
  - (b) all other money payable by the Client to Rapra on any other account or under the Contract or any other contract has been received by 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 Rapra's bailee;

- (b) the Client shall store the Goods at its premises in a proper manner in conditions which adequately protect and preserve the Goods and shall insure them, without any charge to 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 Rapra) and are clearly identifiable as belonging to Rapra and 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) Rapra may at any time, on demand and without prior notice, require the Client to deliver the Goods up to Rapra and Rapra may repossess and resell the Goods if any of the events specified in Condition 4 occurs or if any sum due to Rapra from the Client under the Contract or on any other account or under any other contract is not paid when due;
  - (d) for the purposes of this Condition 4 Rapra, its employees, agents and sub-contractors will 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) 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) 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 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 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 Rapra and shall immediately pay the proceeds of the sale into a separate bank account. At Rapra's request, the Client shall assign to Rapra all claims that the Client may have against purchasers of the Goods from the Client.
- 4.4 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 Rapra's other rights or remedies under the Contract or in law or equity.

#### PROVISION OF SERVICES

- 5.1 Where 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 Rapra's employees or agents in accordance with the demands of any applicable legislation and as Rapra shall reasonably require.

#### PAYMENT

- 6.1 Unless otherwise agreed by Rapra in writing the payment shall be due 30 days from receipt of invoice by the Client, which shall be deemed to be two Working Days after posting. 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 Rapra has received cleared funds.
- 6.3 Notwithstanding any other provision, all payments payable to 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 Rapra to the Client.
- 6.5 If payments received from the Client are not stated to refer to a particular invoice, the Company may appropriate such payment to any outstanding invoice addressed to the Customer from the Company.
- 6.6 No indulgence granted by the Company to the Customer concerning the Customer's obligations under this Clause 8 shall be or be deemed to be a credit facility but if any such facility is granted to the Customer by the Company, the Company may withdraw it at its sole discretion at any time.
- 6.7 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 Rapra shall interfere with prompt payment in full by the Client.
- 6.9 In the event of default in payment by the Client 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 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.
- 6.10 Client shall also pay Rapra's cost of collection (including legal fees and disbursements). Payments received may be applied by Rapra against any obligation owed by Client to Rapra. Rapra may refuse or delay further Services if Client fails to pay promptly any amounts due 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 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 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 Rapra by reason of such cancellation, will be paid forthwith by the Client to Rapra.

#### WARRANTY AND WARRANTY LIMITATIONS

- 8.1 Rapra warrants that all Services will be performed in a reasonably timely and workmanlike manner and in material conformity with agreed upon specifications. If the Client establishes to Rapra's reasonable satisfaction that there is a defect in the materials or workmanship of the Work, if the Work has not been performed with reasonable care and skill, or there is some other failure by Rapra in relation to the Work the Client's sole and exclusive remedy shall be reperformance of the Services in question by Rapra at no additional cost to Client. If reperformance is impossible or impractical, Rapra may, in its sole discretion, refund to Client a proportion of the fees (to be determined in Rapra's sole discretion) attributable to the Services in question. The above warranties are exclusive and all warranties, conditions or other terms implied by statute or common law, whether written or oral, are excluded from the Contract. Condition 8.1 shall not apply unless the Client notifies 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 3 months of performance of Services to the Client or such other periods as agreed by Rapra in writing.
- 8.2 If Rapra elects to replace the Goods or re-perform the Services pursuant to Condition 8.1, Rapra shall deliver the replacement Goods to or re-perform the Services for the Client at Rapra's own expense at the address to which the defective Goods were delivered and the legal, equitable and beneficial title to the defective Goods which are being replaced shall (if it has vested in the Client) re-vest in Rapra and the Client shall make any arrangements as may be necessary to deliver up to Rapra the defective Goods which are being replaced or materials relating to the previously performed Services.
- 8.3 Rapra shall be under no liability under the warranty at Condition 8.1 above:
- (a) in respect of any defect arising from fair wear and tear, wilful damage, negligence, abnormal working conditions, failure to follow Rapra's instructions (whether oral or in writing), misuse or alteration or repair of the Work without 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 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 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 Rapra (including any liability for the acts or omissions of its sub-contractors and any member of its Group) in respect of any breach of these Conditions or the Contract and any representation, statement or tortious act or omission including negligence arising under or in connection with the Contract.
- 9.2 Nothing in these Conditions shall exclude or limit Rapra's liability for death or personal injury caused by Rapra's negligence or for fraudulent misrepresentation.
- 9.2 Rapra is not responsible for the performance, adequacy, or safety of any material, product, or process of Client being tested or evaluated by Rapra. Rapra is not responsible for Client's use of the information or concepts generated as part of the Services, and will not be liable for any loss or damage resulting from such use.
- 9.3 In no event shall Rapra's total aggregate liability to the Client arising out of, or in connection with the performance or contemplated performance of the Contract whether for negligence or breach of contract or any case whatsoever exceed the Contract price of the Contract.
- 9.4 The Client shall in no event be entitled to, and Rapra shall not be liable for, any economic loss of whatever nature (whether or not such loss or damage was foreseen, direct, foreseeable, known or otherwise), including loss of anticipated profits, loss of actual profits (direct or indirect), loss of anticipated savings, loss of business, or for any indirect, special, incidental or consequential damages howsoever causes or any losses arising as a result of any third party bringing such a claim.
- 9.5 The Client agrees to indemnify and hold harmless 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) 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 Rapra and/or its affiliates, or (c) a product, service, process, operation, or activity of Client.
- 9.6 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 Rapra whether for negligence or breach of contract or any case whatsoever shall in no event exceed £500,000 in any Year.

- 9.7 The price of the Work has been calculated on the basis that 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 Rapra has excluded or limited its liability in these Conditions and Rapra shall have no further liability to the Client.

#### **CONFIDENTIAL INFORMATION AND INDUSTRIAL PROPERTY RIGHTS**

- 10.1 All data, information and reports are produced for the benefit of the addressee only. Rapra accepts no liability arising from unauthorised use of such information or reports by a third party.
- 10.2 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 Rapra either expressly or by implication in any of its advertising or sales promotional material without the prior written consent of the Company Secretary of Rapra which Rapra may grant or withhold in its sole and absolute discretion.
- 10.3 All drawings, documents, confidential records, computer software and other information supplied by Rapra are supplied on the express understanding that any Intellectual Property Rights are vested in and shall remain the property of Rapra. Nothing in the Contract shall be deemed to have given the Client a licence or any other right to use any of the Intellectual Property Rights of Rapra unless expressly specified in the Order or Specification in which case their use shall be limited to that set out in the Order or Specification.
- 10.4 The Client will not, without the written consent of Rapra, either give away, loan, exhibit or sell any such drawings, documents, records, software or other information or extracts therefrom or copies thereof or use them in any way unless expressly specified in the Order or Specification in which case their use shall be limited to that set out in the Order or Specification.
- 10.5 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.
- 10.6 All title and ownership of, or relating to, any Intellectual Property Rights, including, but not limited to ideas, inventions, discoveries, creations, improvements or any other property subject to patent protection or Intellectual Property Rights as developed or resulting from Work under the Contract, shall be vested in and solely owned by Rapra, unless otherwise agreed to in writing by all participating parties.
- 10.7 In the event that Rapra does not wish to apply for or maintain patent protection for any invention owned by it in accordance with Condition 10 herein, it will on request assign its rights in respect of that patent to the Client but in any event Rapra shall be granted a royalty free, irrevocable, non-exclusive, world-wide right to use such Intellectual Property Rights assigned under this Condition 10.7.
- 10.8 Rapra may, on request grant rights to the Client for exploitation or patenting of the ideas, inventions, discoveries, creations, improvements arising from the Work, in the client's traditional or defined new areas of business. In all other areas, rights remain vested with Rapra.
- 10.9 Rapra's confidential and sensitive information including but not limited to information contained in any proposal, order acknowledgment, or invoice provided by Rapra to Client shall be kept confidential and shall not be disclosed by Client to any third party or otherwise make public the terms or existence of the Contract without Rapra's prior written consent, except as may be required by law in which case the Client shall notify Rapra of such disclosure, if legally possible, in good time prior to making the disclosure.

#### **CUSTOMER'S INFORMATION/SAMPLES**

- 11.1 The Client shall be solely responsible for ensuring that all drawings, information, advice and recommendations given to 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 Rapra of such drawings, information, advice or recommendations shall in no way limit the Client's responsibility hereunder unless Rapra specifically agrees in writing to accept responsibility.
- 11.2 Rapra shall not disclose to any third party any knowledge or information relating to the Work which is, on receipt by Rapra, marked 'confidential' by the Client unless and until such information becomes public knowledge.
- 11.3 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 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 terminate the Contract without liability to the Client if:
- (a) the Client becomes bankrupt or under the provisions of Section 123 of the Insolvency Act 1986, is deemed to be unable to pay its debts or compounds with creditors or in the event of a resolution being passed or proceedings commenced for its administration or liquidation (other than for a voluntary winding up for the purposes of reconstruction or amalgamation) or if a Receiver or Manager is appointed of all or any part of its assets or undertaking;
  - (b) the Client commits a material breach of any of its obligations under the Contract which is incapable of remedy;
  - (c) any sum payable under the Contract is not paid within [7] days of its due date for payment in accordance with this Contract;
  - (d) 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 Rapra to remedy or desist from such breach within a period of 14 days.

#### **FORCE MAJEURE**

- 13 In the event of the performance of any obligation accepted by Rapra being prevented, delayed, or in any way interfered with by direction of government, war, industrial dispute, strike, breakdown of machinery or plant, accident, fire or by any other cause beyond Rapra's control Rapra may at its option suspend performance or cancel its obligations under the Contract without liability for any damage or consequential loss resulting therefrom, such suspension or cancellation being without prejudice to Rapra's right to recover all sums owing to it in respect of Work performed and costs incurred prior to the date of suspension or cancellation.

#### **GENERAL/LEGAL**

- 14.1 All agreements contained herein shall apply to and bind the assignees and successors in interest of Rapra and Client. The Contract is not assignable by Client without Rapra's prior written consent. Facsimile signatures or other reliable means of authentication by which Client signifies its assent to this Agreement shall be effective to bind Client to this Contract. The waiver by Rapra of any breach or default shall not be deemed to be a waiver of any later breach or default. The exercise or failure to exercise any remedy shall not preclude the exercise of that remedy at another time or of any other remedy at any time. If any provision or portion of this Contract is held to be invalid or unenforceable, the other provisions and portions shall not be affected. 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.
- 14.2 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.
- 14.3 Notwithstanding any different or additional terms or conditions contained in Client's purchase order or other communication, Rapra accepts Client's order only on the condition that Client expressly accepts and assents to the terms and conditions contained in this Contract. Client's acceptance of any Work shall be deemed to be acceptance of these Conditions.
- 14.4 Rapra may assign, charge, subcontract or transfer the Contract or any part of it to any person.
- 14.5 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 in writing of Rapra and the Client.
- 14.6 All notices between the parties relating to this Contract must be in writing and sent pre-paid first class or sent by facsimile to, in the case of the Client to 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 Rapra by the Client in writing and in the case of Rapra, the address set out below:
- Smithers Rapra Ltd**  
**Shawbury**  
**Shrewsbury**  
**Shropshire SY4 4NR**  
**UK**
- 14.7 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 business day in the country of receipt following despatch, subject to being able to show that the notice was sent to the correct telephone number.
- 14.8 In performing the Services, 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.