GENERAL OPERATING INSTRUCTIONS

FOR

TOP LOADING ELECTRIC KILN

HARRIER RANGE

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KILNS & FURNACES

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GENERAL DESCRIPTION

The following recommended drying out firing MUST BE UNDERTAKEN before the kiln is fired for the first time with payload.

(A) Top Damper / Bung (s) Open

(1) Ambient temperature to 150°C not faster than 50°C per hour

(2) On reaching 150°C hold this temperature for 45 minutes.

(3) After holding period of 150°C increase the rate of temperature rise to 80°C per hour until the kiln reaches 650ºC

(B) Close Top Damper / Bung (s) at 650ºC

(4) Increase the rate of temperature rise to 125°C per hour until the kiln reaches 1100°C (This is to oxidise the heating elements).

(5) Hold 1100ºC for 3 minutes

(6) End programme and allow the kiln to cool to ambient temperature.

Example of the above drying out firing:
50°C to 150°C – 45 minute soak
80°C to 650°C – 0 minute soak
125°C to 1100°C – 30 minute soak
End

Cycle time 14 hours approximately

When the kiln has fully cooled the kiln will be ready for use.

MAXIMUM HEATING / COOLING RATES

The refractory insulation brick manufacturers recommend that the insulation bricks in the kiln should not be subjected to heating / cooling rates in excess of 200ºC per hour. At rates of heating / cooling above this the brickwork will be subject to loss of integrity of the lining resulting in early failure of the kilns lining.

1.1 GENERAL INFORMATION

POSITIONING AND VENTILATION
Ensure the floor is hard and heat resistant (concrete, clay or ceramic tiles). Under no circumstances should the kiln be installed onto a floor which has vinyl tiles, wood, carpet or any combustible material.

The kiln should always be positioned in a way that will still allow adequate space for any routine maintenance that will be required. In addition, a kiln is bound to radiate a certain amount of heat from all sides and the roof. Ensure that the room has continual circulation either by fresh air or, via an extractor type fan.

1.2 GENERAL WARNINGS

FIRE RISK
Under normal circumstances a kiln is not classified as a fire risk. However, it is not abnormal for the outside surface to become hot, especially when the kiln is being maintained at a high temperature.

KILN FIRING
Do not interfere with a kiln once firing has commenced.

LIMIT OF USE
This kiln has been built for a specific purpose and must not be used for any other purpose than that specified at the time of negotiating the purchase/sale contract. In addition, the kiln must be operated and maintained in full accord with this and any other instruction manual supplied.

MAXIMUM TEMPERATURE
Never allow the kiln to exceed the maximum temperature stated on the data label.

TEMPERATURE INDICATORS/CONTROLLERS
These instruments are comparatively delicate and therefore may have been subject to transit disturbance. To avoid the risk of a possible overfire resulting in loss of ware, it is advisable to check indicators and controllers against known values (either instruments or refractory samples) for the first firing.

MAINTENANCE
Always ensure that mains electricity has been completely isolated before removing connection covers.

INSTRUCTIONS
All instruction documents supplied for the kiln must be read and fully understood before the kiln is installed or operated.

SEALS
Seals are to be maintained in good condition at all times. Any leakage around the lid-to-kiln seal is to be repaired and NOT remedied by over tightening of the clamps.

<u>Health & Safety</u>
(See COSHH relevant information).

1.3 GUARANTEE

ALL kilns are covered by our normal terms of guarantee for **12 months against defective parts and/or faulty workmanship <u>subject to exclusions as listed below:-</u>**

1. Kilns damaged or malfunctioning due to incorrect electrical installation.

2. Kilns allowed to exceed maximum temperature stated on the date plate for whatever reason.

3. Replacement of insulation, elements, furniture and/or ware being distorted/damaged resulting from the kiln being allowed to exceed the intended maturing temperature of the ware being fired.

4. Kilns subjected to abuse, neglect, transit damage or improper storage.

5. Kilns used for reduction or salt glaze firings.

6. Kilns used for actually drying ware prior to firing.

7. The firing of the kiln is only one part of a specific process in producing the final ware. As such Kilns and Furnaces Ltd can not be held responsible whatsoever for faults that are caused by the end users production process. It is assumed that end user has furnished themselves with sufficient knowledge and skill to undertake their production process.

8. Parts subject to normal wear and tear e.g. elements, door seals, gaskets, brickwork.

KILNS AND FURNACES LIMITED will repair or replace any parts which become defective under normal and proper use during the specified period, providing the furnace has not been subject to misuse or the listed exclusions. KILNS AND FURNACES LIMITED will furnish and install replacement parts at the factory and following a factory examination of the defect, replacements complete with insulation instructions will be shipped post-paid to owner.

All kilns are fitted with equipment to fully comply with EU regulations. It is essential that only spare parts supplied by KILNS AND FURNACES LIMITED are fitted in the future to ensure the continuation of the CE approval.

All replacement parts must be purchased from Kilns and Furnaces Ltd. Fitting of any unauthorised replacement parts may invalidate the Declaration of Conformity.

OPERATING INSTRUCTIONS

GENERAL INSTRUCTIONS

INTRODUCTION

Your Harrier kiln has arrived, we hope in safe and sound condition. Before unpacking, examine the container to ensure the damage has not occurred.

It is very important to notify Suppliers and haulier immediately in writing, if there are obvious signs of transit disturbance. No consideration can be given to a claim for apparent transit damage if this procedure is not strictly adhered to.

UNPACKING

Your Harrier kiln is not built like a tank and always needs to be handled carefully. The outside surfaces will score quite easily and the insulation material used in the side walls will chip off if not treated with utmost care, so be gentle when unpacking (and using).

With all packing and components removed check to ensure that the elements have not dropped away from the sides. If so, carefully replace them into position clipping the ends neatly into the purpose cut vertical slots.

ACCESSORIES

Included in your kiln will be the following:-

1. A control system.
2. An instruction manual.
3. Furniture set.
4. Ceramic plugs.

SITING

Some important considerations apply:-

A. Ensure that the floor is hard and heat resistant, i.e. concrete, clay or ceramic tiles. DO NOT allow the kiln to be placed on a vinyl tile, wooden or carpeted floor.

B. Site the kiln at least 12” (305mm) away from vertical surfaces always ensuring that no combustible material is in the immediate vicinity.

C. Ensure that the room has continual air circulation either by fresh air or via an extractor type fan.

D. Locate the kiln near to the power point.

E. Connect the controller plug to the control socket at the rear of the kiln.

IMPORTANT

1. ENSURE THAT THE CABLE LEADING FROM THE KILN TO THE MAINS SUPPLY IS ALWAYS KEPT WELL AWAY FROM THE RADIATING SURFACES OF THE KILN.

2. THE KILN WILL NOW BE READY TO SWITCH ON BUT BEFORE DOING SO, FULLY READ THE KILNS INSTRUCTIONS IN THE FOLLOWING PARAGRAPHS.

3. FOR THE FIRST 4 OR 5 FIRINGS IT IS ESSENTIAL THAT THE FIRING IS FULLY SUPERVISED UNTIL THE OPERATOR BECOMES FAMILIAR WITH THE KILN AND ITS CONTROL SYSTEM.

4. ON KILNS SUPPLIED WITH A SEPARATE CONTROLLER, ENSURE THAT BOTH THE CONTROLLER AND THE CONTROLLER CABLE ARE KEPT WELL AWAY FROM THE KILN OR HEAT RADIATED FROM THE KILN.

2.1 CONNECTING KILN TO MAINS SUPPLY

Consult an approved local electrical contractor for advice/quotations covering installation if needed.

For **SHTL 75**: The standard kiln requires to be connected to a fused 220/240-v, 32amp, single phase/neutral supply. It can be converted to accept three phase and neutral supply however; a connector block would be required for this conversion-supplied on request.

For **SHTL.115** and larger kilns: Each of these kilns is suitable for connection to 380/415-v, single phase/neutral and three phase.

The connection chamber cover should be removed to expose all electrical fittings. The connector blocks will be located in the base normally marked L1, L2, L3, N, onto which the incoming fused mains supply wires should be linked. Ensure that the connection chamber cover is properly replaced prior to switching the kiln on.

2.2 DRYING OUT PROCEDURE

CONTROL SYSTEMS

The microprocessor control system supplied is connected by plugging in the instrument power lead to its socket mounted in the front connection chamber. The plug is secured to the socket by the retaining clip. The controller should be mounted using the bracket supplied to an adjacent wall. Under no circumstances should it be fitted to the kiln body or used freehand in close proximity to any of the kilns outer surfaces.

The controller manual should be referred to before putting the kiln into operation.

FIRST FIRING

The following recommended drying out firing MUST BE UNDERTAKEN before the kiln is fired for the first time with playload.

a) Top Damper/ Bung Open:
    1) Ambient temperature to 150°C no faster than 50°C per hour.
    2) On reaching 150°C hold this temperature for ¾ hours.
    3) After holding period of 150°C increase the rate of temperature rise to 80°C per hour until the kiln reaches 650°C.

b) Top Damper/ Bung Close at 650°C
    1) Increase the rate of temperature rise to 125°C per hour until the kiln reaches 1100°C.
    2) Hold 1100C for 30 minutes.
    3) End programme and allow the kiln to cool to ambient temperature.

Important: In all cases ensure that a proper earth connection has been made and that the cable leading from the kiln to the mains supply is ALWAYS kept well away from the radiating surfaces of the kiln.

HOW TO LOAD YOUR KILN

1) Kilns incorporating ceramic fibre in base: always ensure that hearth batt is resting properly on the 3 insulation bricks forming the base of the firing chamber. The props used for supporting all other batts within the chamber should be in a vertical line above these insulation bricks, so as to dissipate the weight correctly.
2) The heating elements are much hotter than the rest of the firing chamber, therefore, when placing pieces do nor allow them to be placed too close to the elements, otherwise scorching could occur.
3) Ensure that your greenware is completely dry. Wet ware can explode causing damage and frustration.
4) When loading/unloading, be careful not to disturb the sensing thermocouple (just above the base batt) The sensor element is protected by a ceramic sheath subject to breakage if mistreated.
5) Distribute the ware equally over each batt, try not to overfill a particular area or leave large spaces.
6) Keep all taller pieces together, likewise all shorter pieces, so as to create 2-3 layers, matching props available.
7) After gently placing, lower the kiln lid. Ensure that the ceramic plugs are removed from the observation ports in the casing and allowing for a thorough circulation of air during the early stages of firing time to be at customer's discretion.
8) The kiln is not designed for drying wet ware and should not be used for this purpose, as this will lead to rapid deterioration of elements and steel components used in the construction of the kiln.
9) Ventilation in the early stages of both biscuit and glaze firing is essential to ensure moisture and chemically combined water is cleared from the kiln chamber.

ELECTRO/MECHANICAL SAFETY INTERLOCK
All Harrier Top Loading Kilns are fitted with an electro-mechanical safety interlock. This comprises of a rotary isolator switch mounted in the front connection chamber operating in conjunction with a special captive key attached to the lid handle at the front of the lid.

Never switch the power off to the kiln by means of the interlock, always wait for the control system to switch off the power.

SWITCHING KILN ON
To switch the kiln on, the lid must be closed, allowing the key to be located with rotary switch. The key should then be inserted and turned in a clockwise direction, which will allow electrical supply to the kiln control system and elements. No attempt must be made to open the lid until the key has been turned anti-clockwise and removed from the isolator switch.

2.3 SPECIAL FIRING PROCEDURES

FIRING USING LOW TEMPERATURES
If using the kiln to low temperatures only, for example for china painting at around 800°C, it is advisable to dry out the kiln to 1100°C for the first drying out firing only which will assist in oxidising the high temperature elements, normally used in this type of kiln.

MAXIMUM HEATING/COOLING RATES
The refractory insulation brick manufactures recommend that insulation bricks in the kiln should not be subjected to heating/cooling rates in excess of 200°C per hour.

2.4 INFORMATION FOR MANAGEMENT

TRAINING AND SUPERVISION
Kiln operatives should be well trained and supervised and at least one electrician should be familiar with all the electrical aspects of the plant in order to deal promptly with any electrical faults.

RECORDS
Records of kiln firings should be kept at all times.

OPERATIONAL PROBLEMS
Should any difficulties occur at any time whilst operating the kiln, which cannot be immediately resolved, then the kiln operatives must call for specialised assistance or management assistance immediately.

ABNORMAL EVENTS
Any abnormal features or events occurring at any time, but not requiring immediate management attention, should be recorded by the kiln operative and brought to the attention of management as soon as possible.

MAINTENANCE
It is essential that all plant and equipment is maintained in first class working order to obtain reliable, efficient and safe working of the plant. To this end, operators should familiarise themselves with the instruction manuals for the various items of equipment. (supplied with these instructions)

2.6 MONITORING OF KILN DURING A FIRING

The kiln should be monitored at approximately half-hour intervals throughout the firing cycle. The following should be checked:

Programmer	Check that it is operating and that the kiln temperature is following the set programme.
Hot spots	Check that no leaks or hot spots are in evidence.
Electrical Supply	Check that the power is still being supplied to the kiln.

GENERAL MAINTENANCE

3.1 GENERAL MAINTENANCE

KILN LINING

Try to keep as clean as possible by using a vacuum cleaner and/or a soft brush when necessary. Maintenance of the kiln lining is an important aspect of running a high temperature kiln.
Fire cracks occurring in the lining are normal, however, they may require patch repair work, in which case high temperature cement can be supplied by Kilns & Furnaces Ltd. Never fill cracks in the lining with cement as this will usually make matters worse. Cut away damaged brickwork and replace with new material.

REPAIRS OF BRICKWORK

The refractory bricks used in the construction of your kiln are extremely efficient and can withstand a great deal of thermal shock before any signs of shrinking or distortion takes place. However, it is inevitable that fire cracks will occur whether the firing cycles are slow or fast. These fine cracks can occur quite early in the life of the kiln (even on the first firing), but the efficiency of the kiln will not be impaired, and the cracks can be ignored until general maintenance of the kiln takes place.

When maintenance becomes necessary, it may be an ideal opportunity to repair any oversize cracks, or if necessary repair damaged element grooves. This can be accomplished by using special high temperature cement, together with small sections of matching refractory bricks. Materials can be supplied by Kilns & Furnaces Ltd.

Cutting away the damaged brickwork until it is satisfactory to receive a replacement section, which will have to be formed correctly to match the area. When the replacement section matches with the cut-away area then the high temperature cement is applied, which is already in plastic form and requires no additive. Apply cement to a thickness of no more than 1/16” (1.5mm) and gently compress the section into position ensuring that all excess cement is removed especially where it may meet heating elements.

Allow the cement to dry for a period of 1 or 2 hours and then rub down any oversize part with a coarse carborundum disc or similar. The kiln can then be fired as normal without restriction.

Complex or extensive repairs could be carried out by Kilns & Furnaces Service Department.

ELECTRICAL

When carrying out electrical maintenance always ensure that mains isolator is turned OFF.
All electrical connections within the control panel should be checked for tightness at least twice per year.

3.2 HEATING ELEMENTS

Definite life figures for elements cannot be given, whether working under normal oxidising conditions or under reducing conditions. It should be noted that steam from the kiln load affects the oxide layer which can lead to a reduced element life. Ventilation during the early stages is therefore essential to ensure that moisture and chemically combined water is cleaned from the firing chamber.

Elements tend to hum particularly when the kiln is first switched on and does not indicate any abnormality.

If the kiln is only going to be used for low temperature it may be necessary to oxidise the spiral wound heating elements by firing the kiln empty to 1100°C. Failure to do this may result in the elements failing away from the support grooves. If in doubt, consult Kilns & Furnaces Ltd. technical department.

APPARENT ELEMENT BREAKDOWN

Ensure that mains supply is switched off and visually check all elements looking for any evidence of failure as black cinder marks surrounding the coils, or broken elements.
Remove the rear connection cover of the kiln and gently pull on each connector clamping the element tails. If a tail has broken, then the connector will pull easily. Replace where necessary.

If all above checks prove negative and no obvious fault can be located, check on general condition of the elements, which due to age, may require a set for complete replacement. Check also for low voltage which can extend the firing cycle well beyond the norm. Call a local electrician to check voltage and request an ammeter reading for each bank of elements.

When replacement elements are required, always quote the label details. Sometimes hairpin elements vary, therefore it is important to locate the position in the position at the walls of the kiln.

WHEN TO CHANGE ELEMENTS

Elements can be changed individually or in complete sets; the latter being recommended when they are all beginning to show signs of extensive coil collapse or have become badly discoloured or pitted.

Approximately every 3 months remove the connection chamber cover and check, tightening, if necessary, all screws and connectors thus preventing arcing. This is particularly important after new elements have been fitted and the check should be made after 2 or 3 firings.
When replacement elements are required, always quote the label details. I.e.; Kiln serial number and type.

REPLACEMENT

Remove damaged elements and fittings. If a single element is to be replaced, take special care not to disturb the other elements, as they will be extremely fragile after they have been fired.
The following procedure should be strictly adhered to:

1) Switch off the electricity to the kiln at all times.
2) Remove the connection chamber covers.
3) Locate the element that has failed, loosen the corresponding connectors, and withdraw the element from the front of the kiln.
4) Remove all cinder or burn marks from the element groove. This is very important.
5) Fit new element into grooves and thread the element tails through the holes in the wall, replacing ceramic fibre wool (and refractory tube where fitted) surrounding the tail. At this stage DO NOT allow crossover loop to rest in position (otherwise the element tail will be difficult to pull). Ensure that the element is not twisted whilst lying in the grooves.
6) Fit connectors on the element tail. Pull element tail with one hand whilst the connector screws are tightened, cut off surplus element tail.
7) Pull crossover loop over the front face of grooves, which should then render a certain amount of element tension. Replace connection chamber cover.
8) To enable a new element to acquire its protective coating, it is advisable for the first firing to be carried out under oxidising conditions.

3.3 OPERATORS EXPOSURE TO HAZARDOUS MATERIALS

To fully comply with C.O.S.H.H. (Control of substances hazardous to health) regulations, it is our duty to bring to the attention of our customers any hazardous substances used in the construction of our kilns which the operator may be exposed to during the loading/unloading processes or even in minor repair work needed during the lifetime of the kiln.

Generally, the only material falling into this category is the insulation itself and specifically CERAMIC FIBRE. We detail below brief extracts from our suppliers concerning ceramic fibre material:

PLEASE NOTE THAT THIS INFORMATION RELATES TO MATERIALS BEING CONSTANTLY HANDLED i.e. DURING MANUFACTURE OR REPAIR WORK- NOT IN THE GENERAL DAY TO DAY OPERATION OF THE KILN

MATERIAL	Ceramic Fibre Blanket/Bulk, Refractory Fibre Blanket/Bulk
CHEMICAL FAMILY	Vitreous Alumino Silicates Fibres/ Vitreous Zirconia/ Alumino Silicates Fibres
INTENDED USE	High Temperature Thermal Insulation
APPEARANCE	White fluffy blanket or fibrous mass

PRODUCT HAZARD SUMMARY

HEALTH	Refer to ECFIA bulletin 11 and Code of Practice, copies of request.
FIRE	Non-Combustible
REACTIVITY	Stable

PRODUCT HEALTH HAZARD INFORMATION

ROUTE OF EXPOSURE	EFFECTS OF EXPOSURE
INGESTION	May cause gastrointestinal disturbances. Symptoms may include irritation, nausea, vomiting and diarrhoea.
SKIN	May cause irritation and inflammation due to mechanical reaction to sharp, broken ends of fibres.
EYES	Abrasive action may cause damage to the outer surface of the eye
INHALATION	May cause respiratory tract irritation. Pre-existing medical conditions may be aggravated by exposure, specifically bronchial hyper-reactivity and chronic bronchial or lung disease.
SPECIAL TOXIC EFFECTS	Refer to the ECFIA bulletin 11

FIRST AID

INGESTION	Seek medical attention if irritation persists.
SKIN CONTACT	Rinse area of contact thoroughly with cold water. Do not rub or scratch exposed skin. Using a skin cream or lotion after washing may help, seek medical attention if irritation persists.

EYE CONTACT	Flush immediately with large amounts of water. Eyelids should be held away from eyeball to ensure thorough rinsing. Do not rub eyes. Seek medical attention if irritation persists.
INHALATION	Remove affected person from source of exposure. Seek medical attention if symptoms persist.

PERSONAL PROTECTION INFORMATION

The following guidelines should be followed, especially where engineering controls (e.g. dust extraction) are not possible, or do not reduce the airborne dust concentration below the Maximum Exposure Limit

EYES	Wear Goggles to prevent eye contact. Do not wear contact lenses. Have irrigation facilities readily available where eye contact can occur.
SKIN	Wear gloves if necessary. Wear overalls which are loose fitting at the neck and wrist

Use separate lockers. Wash work clothing separately from other clothing. Other items (e.g. respirators, gloves, helmets, goggles and safety footwear) should also be cleaned or replaced as appropriate.

OTHER INFORMATION

For amplification or additional information relating to ECFIA codes of practise and EFCIA Bulletin 11, Please write to the Sales Department.

IMPORTANT

Always close the door/lid of your kiln gently, thus avoiding unnecessary dust being emitted from the ceramic fibre seals. For reasons of safety it is advisable to wear a heatproof glove when removing vent plugs or damper bungs from a kiln when at high temperature.

IMPORTANT NOTICE

It is important that all kilns be serviced on a regular basis to ensure that they continue to give you the best possible results and at the same time give many years of service.

The service intervals do vary depending on how often they are fired and their maximum temperature cycle. We therefore recommend, based on our vast experience, the following service intervals be given in consideration:

- Light use 1 to 2 firings per week
  Service period – annually.

- Up to 4 firings per week
  Service period – every 6 months

- Heavy use i.e. above 4 firings per week
  Service period – every 3 months.

Minor repairs of course may be carried out by yourself. Please refer to the kiln general operating instructions for advice.

Genuine spare parts/ materials for self – fitting is available from our spares department.

Our service department will be pleased to quote for service visits either on an ad hoc basis or on a rolling contract basis.

When contacting our spares and service department, to help us quickly identify your needs please have ready the kiln serial number, kiln type and electrical details, this information can be found on the data plate attached to the kiln.

CONDITIONS OF SALE

1. Definitions – "Company" means Kilns and Furnaces Limited "Customer" means the customer of the company "Contract" means any contract entered into for the sale of Goods by the company to the Customer "Goods" means any goods forming the subject manner of any Contract and the parts and materials comprised in them and shall include services.

2. Quotations, contracts and variations – No contract shall come into existence before the Company has given its written acknowledgement of the Customer's order. These conditions shall be incorporated in all Contracts to the exclusion of any terms or conditions referred to by the Customer and supersede any previous conditions of business of the Company. Acceptance of any delivery or performance by or on behalf of the Customer shall in any event be conclusive evidence of the Customer's acceptance of these conditions. Each Contract supersedes all previous oral or written communications between the Company and the Customer not expressly referred to in any order acknowledgement given by the Company and the company does not authorise the giving of representations on its behalf by any person. No amendment of any Contract shall bind the Company unless confirmed by it in writing.

3. Prices. The Company's prices exclude VAT where applicable and all other imposts of whatsoever kind and unless otherwise agreed in writing by the Company are ex the Company's works exclusive of carriage, insurance and packing. The Company's prices may be varied at any time, at the Company's discretion, for any increases in costs incurred by the Company after the date on which they were quoted, from fluctuations (including currency variations) in the cost of materials, equipment, labour, transport or utilities arising from whatever cause, any alterations in specifications or quantities or production, delivery or performance schedules or any suspension of work requested by the Customer, or any delay in the supply by or on behalf of the Customer of any instructions, data or materials (including "free issue" items) or any inaccuracy, insufficiency or defect in them.

4. Payment. All amounts due to the Company, unless otherwise agreed in writing, shall be payable in pounds sterling by the last day of the month following that of the date of the Company's invoice, without any discount, set-off or other deduction whatsoever. Without prejudice to any other rights of the Company, if the invoice is not paid in full by the due date interest shall be payable on any overdue amount from the date on which payment was due to that on which it is made (whether before or after judgement) on a daily basis at the rate of three per cent over the base rate from time to time quoted by NatWest Bank Plc compounded monthly. The customer shall also pay all legal and other costs incurred by the Company in recovering any amounts owing from the Customer and any Goods in which title has been retained by the company. Such costs shall be due for payment immediately on invoice. Without prejudice to any other of its rights and notwithstanding any other agreement or arrangement with the Customer, the Company shall be entitled by giving written notice to the Customer at any time to require the Customer to render the price of the Goods in a manner satisfactory to the company and to refrain from delivering the Goods until the price has been so tendered. If the customer fails to make any payment when and as due or other circumstances entitling the Company to terminate the Contract arise then the price of all such goods as have been delivered to manufacturers for any order or orders of the Customer shall forthwith thereupon become immediately due and payable.

5. Delivery, risk and performance. Unless otherwise agreed in writing by the company goods shall be delivered and risk in them shall pass to the Customer when they are made available to the Customer at the Company's works. Where goods are made available at a point other than the Company's premises, unless otherwise agreed in writing, the Customer shall be responsible for all off-loading and the Company reserves the right to deliver the Goods at the nearest point of suitable access. Where goods are consigned to a destination outside the United Kingdom mainland any trade terms referred to in the company's order acknowledgement shall, to the extent consistent with these conditions, be as defined in the edition of "Incoterms" then current and the Goods shall be delivered and risk in them shall pass to the Customer as therein provided. The Company will endeavour to comply with any date proposed or confirmed by it and to advise of any adjustment but shall not be liable for any loss, damage or expense arising from any delay or failure in delivery or performance from any cause whatsoever nor shall any such delay or failure entitle the Customer to refuse to accept any delivery or performance or repudiate the Contract. If the Customer fails to take delivery of any Goods on the due date or provide adequate delivery instructions the Company may store the Goods at the risk of the customer who shall pay all storage, transportation, handling or other charges incurred by the company as a result of such failure and the Company shall be entitled to payment as though delivery had taken place. The Company may determine the form of packing and transport of any Goods the price of which includes packing and carriage and charge extra for any special arrangements requested by the Customer. The Company may deliver the Goods by instalments each of which shall be deemed to be the subject of a separate contract and, unless otherwise agreed in writing no failure by the company in any one or more instalments shall entitle the Customer to repudiate any Contract for Goods previously delivered or to refuse to accept any undelivered Goods

6. Title. Notwithstanding the earlier passing of risk, title in the Goods shall remain with the Company and not pass to the Customer (who shall, nevertheless, subject to the conditions stated below, be entitled to resell them as principal only and to use them in the ordinary course of business) until the Company has received in cash or cleared funds payment in full of the price of the Goods and of all other debts for any other goods or services owed to it by the Customer on any account. Until the title passes: The customer shall hold the Goods as bailee for the Company and ensure that they are at all times clearly identified as the property of the Company. The Company shall be entitled at any time on demand to repossess, remove from other equipment (without being liable for any damage thereby occasioned) and sell all or any of the Goods and thereby terminate (without any liability to the Customer) the Customer's right to use or sell them, and enter any premises where the Goods are located for the purpose of inspecting or repossessing them. The Company shall, without prejudice to any other remedy, be entitled to maintain an action for the price of the Goods although title in them has not passed to the Customer. The Company transfers to the Customer only such title and rights of use as the Company has in any Goods and in the case of material provided by any third party shall transfer only such title and rights as that party had and has transferred to the company.

7. Lost or damaged goods etc. If at the time of delivery any Goods are missing, lost or damaged or otherwise not in accordance with the Contract the Company will at its expense make good the discrepancy within a reasonable period by the replacement of the Goods concerned at the original point of delivery or, in its discretion, their repair or, at its option, allow credit for their invoice value subject to these conditions and all other requirements of the company current from time to time. The Company shall have no liability in respect of any discrepancy (in case of any Goods which are missing, damaged or otherwise not in accordance with the Contract) written notice is given within three (3) working days of receipt of the consignment or (in case of any loss or damaged could have occurred in transit and where the company has agreed in writing to assume responsibility for carriage) with such period and in such manner as will enable the Company to comply with time limits or other requirements imposed by any carrier of which written notice has been given by the Company to the Customer, or (in case of loss of a whole consignment) written notice is given to the Company within seven (7) days from the date of invoice.

8. Warranty. The Company will subject to these conditions within a reasonable period at its option make good free of charge by replacement at the original point of delivery or repair or give credit for the invoice value or any kiln structure, insulation materials or workmanship or (to the extent only the Company is responsible therefore) design which appears during a warranty period of 12 months from the date of despatch by the Company (normal wear and tear accepted) provided the customer has given the Company written notification of the defect immediately upon the occurrence of such failure and in any event within the said warranty period. The Company shall have no liability for any Goods which have been installed, used, maintained, served, adjusted or stored otherwise than by the company or in accordance with its recommendations (or the recommendations of any supplier of any item with which the Goods are used) or have suffered any excessive wear, overloading, misuse, neglect or accident or may have been subjected to operating temperatures in excess of those for which the Goods are designed any accessories or proprietary parts or fittings and if any item which is not of the Company's manufacture is alleged to be defective, the Company's liability shall be limited to assigning to the customer (so far as it is able to do so) any warranty given by the manufacturer of that item any Goods which have been repaired modified or interfered with in any way or in or with regard to which any part not of the company's manufacturer or supply has been used without the Company's prior written approval or the Customer has failed to carry out any modification or improvement recommended by the Company or any defect has occurred in any design provided or approved by or on behalf of the Customer any Goods whose serial number or other identification mark or plate has been removed, defaced or tampered with the costs (including travel) of the Company's representatives involved in carrying out repairs on site and all such costs shall be borne by the Customer, any defect in any replacement Goods which appears after the warranty period applicable to the original Goods has expired. Heating elements, bearings, fibre seals and any similar parts or items or any damage resulting from the kiln being allowed to exceed the intended maturing temperature of the ware being fired. Except as expressly provided in this condition the Company accepts no liability, express or implied, for any life or wear of any Goods or their merchantability or suitability for any particular purpose or use under specific conditions whether or not known to the Company).

9. Claims. The company shall have no liability in respect of any claim by the customer under these conditions unless the Customer has afforded the company reasonable opportunity and facilities for the investigation of any claim and the making good of any discrepancy or defect and complied with any request by the Company for a written report of any alleged defect and any photographic or other evidence or maintenance or operating records and, if the Company so requests, the return, securely packed, of any Goods (including the packing) for examination or rectification by the company, the cost of transportation to be borne by the customer but credited by the Company if the claim is accepted and the Customer has paid the full amount of all invoices due prior to the date of the claim. Where a claim is accepted, any replaced items shall belong to the Company and may be disposed of only in accordance with the Company's instructions.

10. Extent of liability. Except to the extent stated in these conditions or otherwise agreed in writing by it, the company shall have no obligation, duty or liability in contract, tort (including negligence or breach of statutory duty) or otherwise howsoever under or in connection with the Contract other than for death or personal injury resulting from its negligence. The Company shall have no liability for any indirect or consequential loss or damage suffered by the customer under or in

connection with the Contract, including but not limited to wasted time or expenditure, loss of profits, production, business revenue expected savings or goodwill or any claim against the Customer by any person and the Customer shall be solely responsible for any such claim. The Company shall be discharged of all liability to which these conditions apply unless proceedings are begun with six (6) months after the Customer became aware (or should reasonably have become aware) of the facts giving rise to such liability. Any claim by the Customer or acceptance of liability by the company in respect of any particular Goods shall not entitle the Customer to reject or refuse to pay for any other Goods comprised in the same or any other Contract.

11. Termination or suspension. If the Customer fails to make any payment when and as due or otherwise defaults in any of its obligations under the Contract or any other agreement with the Company, is unable to pay its debts in the ordinary course of its business, has a receiver, manager, administrator, administrative receiver or trustee in bankruptcy (as the case may be) appointed for all or any part of its undertaking, assets or income, is the subject of any bankruptcy order, has a resolution passed for its winding up, has a petition presented to any court for an administration order or for its winding up, enters into any composition or arrangement with its creditors (whether formal or informal), has any distraint or execution levied on any of its assets, suffers any action similar to any of the foregoing in any jurisdiction or ceases to trade or the company bona fide believes that any of the foregoing matters may occur, then, in any such event, the Company shall, without prejudice to any other remedy, be entitled, at its discretion, by giving the Customer written notice at any time, to forthwith suspend its performance of or terminate such Contract without liability to the customer. The rights of the Company shall not be prejudiced or restricted by any indulgence or forbearance extended to the Customer and no waiver by the Company in respect of any breach shall operate as a waiver in respect of the same or any subsequent breach.

12. Force majeure. The Company shall not be liable for any delay or other failure to perform the whole or any part of the Contract resulting from any cause whatsoever beyond the Company's control existing at the date of the Contract or arising thereafter including but not limited to fire, explosion, breakdown or failure or plant or machinery, lack of failure of transportation facilities, supply of labour, materials, power or supplies, strike, lockout or labour dispute (whether or not at the Company's works), illness, epidemic, flood, drought, war, civil commotion, or restriction of any authority or governmental agency and the time for performance shall be extended by the period of any such delay.

13. Tests. Where any tests are to be conducted or carried out at the Customer's premises and the Customer fails upon reasonable notice of up to fourteen (14) days to carry them out or permit them to be carried out or has commercially operated the Goods before the dated for testing such tests shall be deemed to have been successfully carried out.

14. Site works. Where any services including attendance are undertaken by the company on the Customer's premises the Customer shall at its expense provide such facilities, foundations, services and equipment and do all things as the Company requires for the performance of its services and ensure that the same are safe and suitable to enable such services to be performed and comply with all legislative and other requirements of whatsoever nature applicable at the Customer's premises. Be responsible for obtaining all consents of whatever nature which are necessary for the performance of the company's services. Afford access to the Customer's premises at such dates and times and provide such assistance (including the obtaining of any visas) as the Company requires, and be responsible for all civil engineering work, making good and clearing away any material consequent upon the performance of the Company's services.

15. General. Any specifications, drawings, particulars of weights and dimensions and other technical information contained in the Company's quotations, catalogues, price lists, advertisements or elsewhere are approximate only and intended merely to present a general idea of the Goods and (unless otherwise agreed in writing by the Company are not to form part of the Contract. The Company reserves the right to discontinue the sale of particular products or alter their designs and specifications without notice and to deliver Goods conforming to the altered design or specification in fulfilment of any Contract. No Contract shall constitute a sale by sample notwithstanding that any products may have been exhibited to or inspected by the Customer. Any performance figures given by the Company are based upon experience, trials or testing but unless expressly agreed in writing by the Company no liability is accepted if such performance figures are not achieved. All drawings, designs or other data (whether or not patentable or patented) and all rights therein (including copyright and design rights) and all materials, tools, patterns, or other items prepared or made available by the Company for the Contract shall, unless otherwise agreed by the Company, be and remain the Company's property and the Customer shall not copy or reproduce the same in whole or in part in any form or allow others to do so. The Customer shall indemnify the Company against any and all claims, proceedings, costs, damages, liabilities and expenses incurred or suffered by the Company arising from any instructions, data, drawings, specifications, tooling, equipment, goods, services or other items supplied by or on behalf of the Customer to the Company or from any failure to supply the same or from any infringement or alleged infringement of the rights of any third party claimed under or in relation to any patent, registered design, trademark, copyright, design right, breach of confidence or otherwise howsoever resulting from the Company's use of any of the foregoing items. The Company shall have no liability for any inaccuracy or inadequacy of such items and shall be entitled to charge extra for any costs resulting therefrom. The Company may at its discretion sub-contract all or any of its obligations under the Contract but the Contract shall not be assigned by the Customer without the Company's prior written consent. The Company shall have a lien on any goods in the Company's possession for all sums due at any time from the Customer on any account and shall be entitled to keep possession of or at its option sell or dispose of the same as agent for and at the expense of the Customer and apply any proceeds in and towards the payment of such sums on twenty eight (28) days written notice to the Customer. The customer shall treat the contract and all information which is acquired thereunder as confidential.

16. Law, jurisdiction and construction. The contract shall be governed by English law and the parties consent to the exclusive jurisdiction of the English courts in all matters relating to the Contract except to the extent the Company involves the jurisdiction of the courts of any other country. The headings of conditions are for convenience of reference only and shall not affect their interpretation.

17. Notices. Any notice to be given under the contract shall be in writing and if sent be prepaid registered mail to the receiving part at its business address as last notified in writing to the other party shall be deemed to have been given 2 working days (or 7 working days in the case of Customers outside the United Kingdom) following the date of posting.

Registered Office:

Cinderhill Trading Estate
Weston Coyney Road
Longton
Stoke on Trent
ST3 5JU.