INDUSTRY *range*

Owner's Manual



The FIRED UP KILNS Group

KILN CONTRACTS

FIRED UP KILNS and pottery supplies

Congratulations and thank you for purchasing an Industry Range Front Loading Kiln.

Our kilns are built from the highest quality materials by expert craftsmen to ensure you have many years of trouble-free operation.

This range of kilns is manufactured in our factory in Cape Town, South Africa.

Before installing or operating your kiln, please read this manual carefully. It contains important information on installation, safe operation and maintenance to ensure optimal performance and longevity.

If you have any questions or require assistance, please contact our team.

Contents:
Specials Notes
Locating your kiln
Health and Safety
Ventilation & Air Movement
Electrical Connections
The Firing Chamber
Elements
Thermocouple
Pyrometric Cones
Kiln Controller
Loading your kiln
1st Firing
Loading and Firing Bisque ware
Loading and firing Earthenware
Loading and firing Mid-fire – Stoneware
Cooling the kiln
Maintenance
Kiln Furniture
Disclaimer
Trouble Shooting
Kiln Firing Log
Pre-set Programs
Pyrometric Cones Chart

Special Notes



Please take special note of the following:

- Read this manual and the controller manual before operating your kiln.
- Contact us if you have any questions or queries. We are always happy to help.
- Do not exceed 1300℃ in your kiln. Doing so will lead to severe damage not covered under warranty. To extend element life, avoid exceeding 1260℃.
- Never alter or interfere with your kiln's electrical connections, there is the risk of electrocution.
- Be careful when working near an operating kiln as the external casing temperature can cause injury.
- Never leave a firing kiln unattended, there are multiple uncontrollable factors that can cause a kiln to overfire, your vigilance is the only reliable prevention.
- Use pyrometric cones, they provide invaluable information, particularly when glaze firing.
- Don't let ware touch the thermocouple as this can lead to disastrous over firing.
- Gaps between bricks, hairline cracks and browning are normal signs in a kiln due to repeated expansion & contraction, they are cosmetic and do not impact on function.
- Treat your kiln with care and make sure element channels are clear of debris before firing. Using a vacuum cleaner is best to avoid touching the elements.
- Have fun and enjoy using your kiln safely and creating wonderful pieces of art.

Locating your kiln

The location of your kiln is important and there are certain precautions that must be observed when choosing a suitable position for your kiln. Accessibility and safety are primary considerations.

- Select a dry, well-ventilated area that has good access to allow for easy loading and unloading.
- Ensure that the kiln is placed on a flat, heat-resistance, solid surface that allows air circulation beneath and around the kiln. For example, covered with linoleum, parquet or laminate, it is advisable to first cover it with tiles or cement sheets. This prevents any discoloration of the floor.
- Ensure a minimum of 30cm of clear space around the kiln and at least 1m of clearance above the kiln to allow for the radiation of heat.
- Make sure that the kiln and the stand are stable.
- The room must be well ventilated and able to sufficiently exchange the air during firing to get rid of any fumes.
- Working in a room with a firing kiln should only occur if the room is large, well-ventilated with good air exchange and you are not near the radiant heat.
- Carefully place the kiln in the frame at the height that suits you.
- Attach the controller and place it within easy reach, but not where it will be subjected to high heat.
- Ensure all combustible and flammable items such as curtains, plastic, paper, chemicals etc. are nowhere near the kiln. Do not rest or lean anything against the kiln or place objects under or on top of the kiln. Do not have cupboards or racks next to, below or above the kiln.
- The kiln is not a toy, ensure that children, pets and plants kept well away from the kiln, even when not in use.
- If you are positioning your kilns in an outdoor area, such as a verandah, outdoor shed, or carport, ensure it is always shielded from rain. A heavy-duty BBQ cover placed over the kiln when not in use is a good idea.
- It is vital that your kiln is not exposed to any water or moisture. This will damage the electrics, cause tripping of your safety switch and can lead to brick damage, as the kiln bricks will absorb moisture and crack on firing.
- As the bricks are hydrophilic (absorb moisture), if you are not using your kiln for prolonged periods, it's wise to fire it to 200c and soak for 2 hours to ensure any moisture that has built up over time is dried out.

Health & Safety

Kilns use a considerable amount of current and generate significant heat when operating. As a result, please ensure you operate your kiln with due care and attention.

- Always use appropriate protective clothing when operating or working with heat and near the kiln. The outside of the kiln will be hot when the kiln is operating so treat the kiln with caution.

Avoid looking into the kiln without protective eyewear when the temperature exceeds 1000°C and **NEVER** put your hand or face within 500mm of the vent when the kiln is operating.

- Your kiln uses high voltage, and the control box has been labelled with a warning notice to advise you of this. Only suitably qualified electricians should access the control box.
- Please ensure you read both this manual and the controller manual before operating the kiln. Please contact us if you have any questions or queries.
- Do not attempt any repair work on the kiln.
- It is essential that you don't leave a kiln that is operating unattended. Any equipment has the potential to malfunction or be affected by power surges etc.
- The operator is responsible for monitoring, adjusting, and maintaining the kiln and controls. A malfunction that is undetected can result in overfiring, causing extensive damage to your kiln. Your warranty does not cover the effects of overfiring regardless of the cause.
- All our kilns are fitted with an automatic safety cut off switch. The switch works by shutting off power to the elements if the door is opened, to prevent potential electrical shocks when the kiln is opened whilst the power is on. **NEVER** attempt to bypass this switch.
- We recommend that you only open the door when you have isolated power to the kiln, by either removing the plug from the power point or ensuring that your isolator switch is in the OFF position and the kiln circuit is placed in the OFF position at the mains.

Ventilation & Air Movement

We can't over emphasise the importance of good ventilation, air movement & air exchange to the long term health of your kiln. Excessive corrosion, even after just a few months is often wrongly blamed on the quality kiln construction, however this is not accurate.

The cold-hot-cold cycle, plus water vapor and toxic gases (sulphur, fluorine, carbon, etc.) coming out of the clays and glazes all combine to create a very corrosive environment for metal. Living in areas of high humidity only exacerbate the problem and you'll need to be a lot more aggressive with your ventilation and air movement.

The only thing you can control is the rate at which it corrodes!

Consider that your green ware, even when you have diligently dried it out to prevent cracking in the kiln, still shrinks by up to 10% during firing… this is moisture trapped in the clay being expelled.

Corrosion isn't covered under warranty because it's considered a normal part of a kiln's life, and the speed or extent of corrosion is related to its use and location, not the kiln. Elements, contactors and electrical connections can all be damaged and cause you kiln to fail because of corrosion.

Although the types of clay and glaze used can have a big impact, the most common factor we find with sudden and extensive corrosion is that the ventilation, air movement and air exchange around the kiln isn't adequate to offset the volume of corrosive gases being released. We have FAQs on our website to give you tips and tricks to reduce the impact of corrosion.

It is imperative that:

- You locate the kiln in the largest room or space possible with good ventilation
    - Open all windows or doors when firing
- You have good air movement around the kiln while its firing
    - A floor fan blowing on the kiln is a good & affordable option
- You exchange the air 20 – 40 times per hour in the kiln room
    - Try and achieve this with positioning, fans and ventilation
    - Or install an extraction fan, that can expel fumes and drag in fresh air.
- The smaller the room & the larger the kiln the more interventionalist you'll need to be to slow down corrosion.



Electrical Connections

The following electrical considerations apply to our kilns;

- Ensure that all electrical connections are performed by a qualified electrician. **NEVER** attempt to perform this yourself. There is a considerable risk of electrocution. It is critically important that your kiln is connected to power in full compliance with all your local electrical regulations.
- **NEVER** attempt to alter the kiln wiring, electrical circuits, or controller wiring. Doing so will void the warranty.
- **NEVER** use an extension cord to run your kiln. If your kiln cord is not long enough, relocate the kiln or the electrical outlet.
- Our recommendation is that all kilns that draw greater than 20amp are hard-wired through an isolator switch (as per AS3000) directly to your power supply. This is the most efficient and safest means of powering your kiln. In this instance, your kiln will not be supplied with a plug.

The Importance of Voltage

The voltage available to your kiln can have a significant effect on its ability to reach temperature.

1 Kilns need the correct voltage to produce their rated heating power

Electric kilns rely on the correct voltage to produce their rated heating power. If the voltage is lower than expected, the kiln produces less heat.



2 A small drop in voltage can cause a large drop in heating power

For a kiln designed for 230V:

Supply voltage	Heating power (approximate)
230 V	100%
220 V	92%
210 V	84%

So, a kiln receiving 220V instead of 230V has around 8% less heating power.

3 Lower voltage can cause firing problems

With less heating power, your kiln may:

- Heat more slowly
- Struggle towards the end of the firing
- Take much longer to reach temperature
- Fail to reach the programmed temperature

4 Voltage can drop between the power point and the kiln

Voltage can drop as electricity travels through your property's wiring, particularly with long cable runs, undersized wiring, connections, or extension leads. The voltage can also drop further when the kiln switches its elements on and begins drawing a large amount of power.



5 Voltage at the kiln while operating is what matters

The voltage measured at a power point with the kiln switched off may not be the voltage the kiln receives while firing. For example, you might measure 230V at the power point with no load, but only 225V at the kiln, and this could fall to 220V while the elements are heating. This is why voltage should be checked at the kiln while it is operating under load when investigating firing problems.

6 Key takeaways

- A kiln **struggling** to reach temperature **does not necessarily** mean there is a fault with the kiln or its elements.
- **Voltage** is determined by the electrical **supply** to your property and **is not** something the kiln itself can control.
- Your kiln may fire perfectly during the day, but struggle at other times when there is **high local electricity demand**, as the voltage available drops.
- As your elements wear, they require **more voltage** to achieve the same results, making a low voltage issue become apparent over time.
- **Checking the actual voltage while the kiln is operating** can be an important part of diagnosing the problem.

Important: Voltage testing should **only** be carried out by a suitably qualified person.

The Firing Chamber

The interior of your kiln is constructing using Morgan K23 light insulating firebricks. They have been selected for their quality as well as their excellent insulating properties. They are a very porous brick, filed with many air pockets. It is these numerous air pockets that make the bricks light and allow for their excellent insulating capabilities.

- Kiln bricks are fragile in nature and should be handled with great care.
  - After a few firings you may notice hairline cracks in some of the bricks. These are simply expansion cracks and in no way effect the functioning of the kiln.
  - We use pins (rather than mortar) in construction to prevent brick fracture, pins allow for brick expansion and movement during firing and helps prevent large brick fractures. When cool, you may notice small gaps (2mm) between bricks, this is normal and does not effect function.
  - Every time you fire your kiln it will expand by approx. 1 -2 %, therefore some movement of the bricks is inevitable during this 'kiln breathing'.
- It is important that you take care when loading and unloading your kiln so as not to bump the bricks with kiln furniture. **Always** close the kiln door gently.
- Our front load kilns are fitted with a 13mm ceramic fibre door seal. The ceramic fibre seal is held in place with refractory cement. Avoid over tightening the adjustable door latch to tighten/loosen the door seal. In time the fibre will compress or become damaged. It can be replaced by a competent handy man by removing the old fibre with a putty knife and preparing

a new fibre seal from fresh 13mm B128 fibrefrax. Apply refractory cement to the fibre and the exposed door bricks then close the door to allow the cement to set.

- **NEVER** open the kiln when the interior temperature is greater than 200℃. Doing so may cause thermal shock to the bricks and shearing of the surface as well as injury to you. Our kilns **ARE NOT** suitable for raku
- Kiln bricks expand roughly 5 mm per metre at 1000℃, this creates stress which is released through the lining cracking along bonded seams. This is normal.
- The roof of the kiln has been covered with a vermiculite mélange to allow the refractories to breath as the sides are cladded with 316 stainless steel. The movement of the refractories often cause cracks in the vermiculite mélange, this is normal

Elements

Your kiln is fitted with high quality Kanthal A1 (or equivalent) elements. These elements are fitted into element grooves in the bricks and pinned in place to prevent contraction, collapse and intrusion into the firing chamber.

- Over time kiln elements become brittle, as a result they can fracture if knocked whilst packing/unpacking the kiln.
- When you first turn the kiln on, you may notice a "hum" for a short time. This is normal as the elements begin to heat up.
- Element lifespan is directly related to the temperature that you are firing to. The higher the firing temperature, and the length of your final soak time will shorten the lifespan of the elements. You may expect 350 firings from a set of elements to 1050℃ but only 100 firings when firing to 1280℃. Our kilns have an absolute maximum firing temperature of 1300℃, however we advise NEVER exceeding 1280℃ to maximise element lifespan.
- The manufacturer of Kanthal A1 provide the following as a guide to illustrate the effects of operating temperature;

Element Temp (°C)	Kiln Temperature (°C)	Proportional Life (%)
1150	1120	100
1200	1170	46
1260	1230	22
1315	1285	12

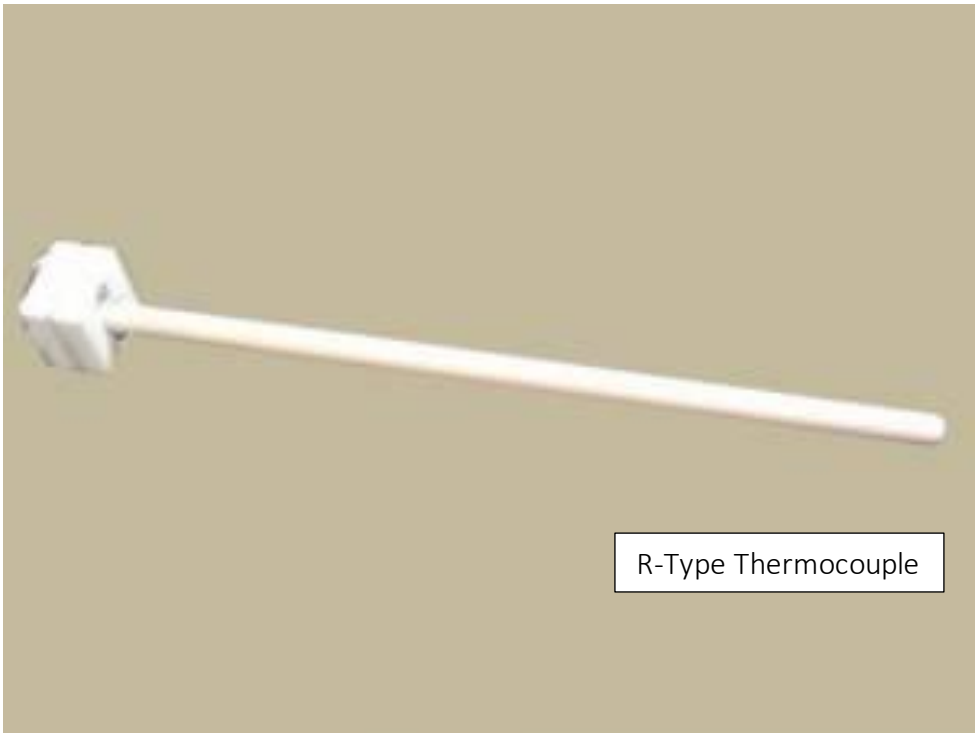
- Element lifespan is shortened considerably if the metal element comes into contact with glass, clay, glaze or kiln wash. As such always place ware 40mm from the elements and ensure that all element channels are vacuumed out prior to each firing. Use a soft vacuum attachment when vacuuming inside the kiln to prevent damage to the firebrick. Avoid touching the elements with the vacuum head as cold elements are very brittle and can break easily.
- If your kiln is failing to reach temperature, it is likely that you have either a failed or compromised element.

- We strongly advise not to do reduction firing in an electric kiln.
- With continued use you will find that the elements will start to move in their channels. Sometimes they may pop out of the element channels. It is important not to attempt to replace them without first heating the element material to at least 350c-400c. Attempting to replace a cold element will cause it to break as they become very brittle with age. By heating the element, it will become pliable and may be replaced and repinned back in its groove.
- The elements in a new kiln (and replacement elements) need to be oxidized. The process of oxidation provides a protective layer on the surface of the element, shielding the element from the corrosive fumes that are generated during a firing. This happens when a kiln is rapidly fired to 1100C and held there for 3 hours with the bungs and vents open. Oxygen from the air that is allowed to flow through the kiln feed the oxidation process. During the life of the element it continues to feed the oxide layer until there is insufficient alumina left, at which point the element starts to consume its iron and turns red, this causes an increase in resistance and a drop in power.
- Its time to change your elements when they turn red, collapse, bunch up in the groove, show signs of pitting, or your firings are progressively slowing down due to a loss of power in the elements
- We carry replacement elements for all of our kilns, which can be replaced by a registered electrician or kiln technician.

Thermocouple

The thermocouple measures the temperature in the kiln and feeds this information to the controller thus allowing it to manage the selected firing program.

- Your kiln is fitted with an R-type thermocouple. R-type thermocouples are suited to continual high temperature use and should not require replacing unless broken by impact with kiln shelves etc.
- A thermocouple consists of two different metal wires – platinum & rhodium in the case of R-type. These metal wires are joined at the end to form a junction that is located in the kiln. The voltage different between the two metals is measured and converted to a temperature reading on your controller. These wires are usually shielded in a complete sheath in the case of R-type. A thermocouple will only sense the temperature in the **immediate vicinity** of the junction.
- In order to read the temperature in the kiln accurately, it is important that the thermocouple protrudes about 30-40mm into the kiln chamber. **Be careful** when loading the kiln that you do not push the thermocouple into the kiln wall or place any ware within 30mm of the thermocouple. This will lead to the controller registering a lower temperature than the actual kiln temperature and can lead to over-firing that can damage the kiln beyond repair.
- Important to note the red wire in the compensating cable has to be connected to the negative terminal of the controller and thermocouple.



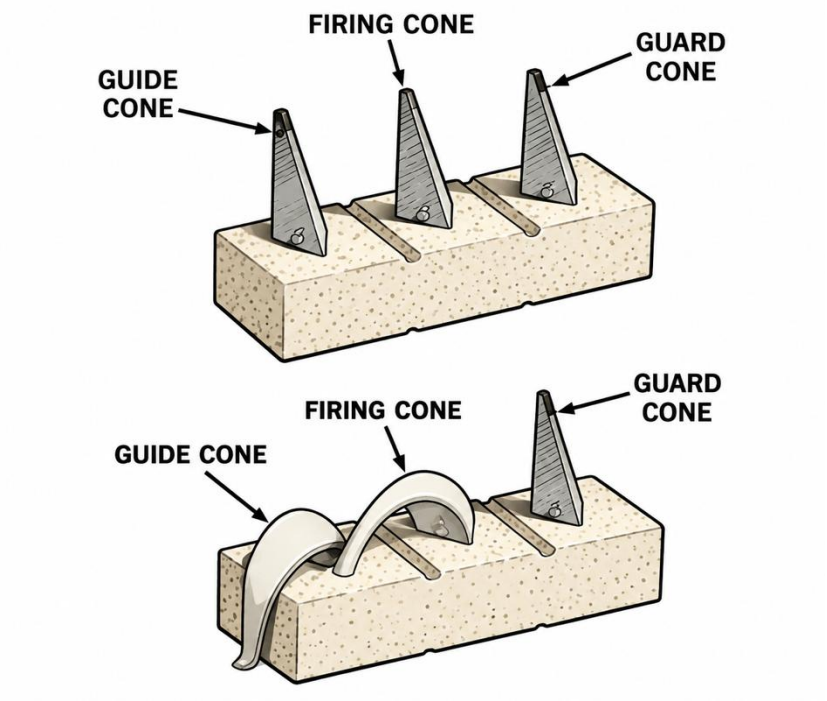
R-Type Thermocouple

Pyrometric Cones

Thermocouples measure temperature only, and they do so only in the immediate vicinity of the junction. Pyrometric cones measure “heat work” – this is a measure of time and temperature.

- Cones consist of a mixture of carefully controlled ceramic materials that are designed to give a graduated scale of fusing temperatures. The most commonly available cones are manufactured by the Orton company, and they provide a chart that provides the fusing temperature with a corresponding cone number.
- Cones are mounted either in a specific refractory cone holder or alternatively embedded in a wad of clay, with each cone placed to the same depth and at an angle of 15° to the vertical. This is assisted by a slant on the base of the cone.
- A series of three cones is standard, the cone placed on the far left indicates 20℃ below the required temperature, the middle cone indicates the required temperature and the cone to the right indicates a temperature 20℃ above the required temperature. The collapse of the first cone serves as a warning that the required temperature is being reached, whilst the second cone collapse indicates the correct temperature. The third cone, or “guard” cone should remain upright as it serves to warn of potential over firing. The fusion point of any cone is indicated when the tip of the cone touches the base on which the cone is mounted.
- It is a good idea to place cones in a number of locations in your kiln so you can get a feel for the hot and cold spots. This is more important in larger kilns. Its important to position a cone within a 10cm radius of the tip of the probe, this will inform you if the controller behaved normally. We recommend that you do this with every glaze firing to help to identify the source of any problems (i.e. the cone looks normal, therefore it must be a glaze or clay related matter).

- Every kiln is different, and it may take some time to learn the idiosyncrasies of your kiln!



Kiln Controller

Please refer to the controller manual, care is taken to select a controller which offers flexibility, accuracy and the easy management of the firing process of your kiln.

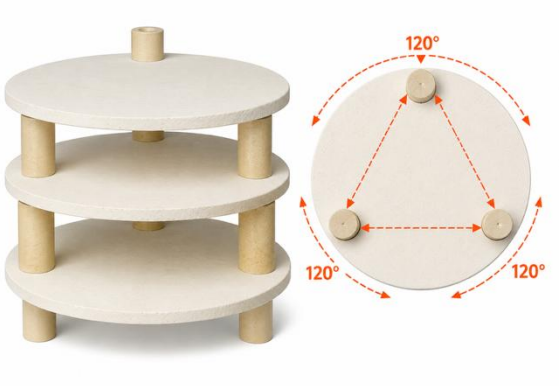
- If your kiln is stored outdoors (veranda, carport, balcony etc.) we recommend removing the controller when the kiln is not in use and storing it indoors to prevent moisture ingress and short circuiting of the board. Where the controller is permanently mounted to the side of the kiln, cover it with a water and dust proof cover.

Loading your kiln

Generally, kilns will fire more evenly when they are packed well, and a full load is fired. It is advisable to ensure your kiln is loaded evenly both across the width/depth and height of the kiln.

- Always ensure that your kiln is switched off at the isolator switch or unplugged whilst loading or unloading.
- Make sure that all element channels are clear of any debris and have been vacuumed out. Take adequate precautions when vacuuming, be gentle and don't knock the elements and always wear a mask.
- Check that your kiln shelves and props are sound and have no cracks that can cause them to collapse in the firing. Be sure the shelf bottoms are clean to prevent dust or dirt falling onto the ware below.

- If large flat pieces are being fired, the edges should be placed between the elements. This may eliminate possible cracking caused by uneven healing.
- It is advisable to put a shelf on the floor of your kiln before placing your props in the kiln, especially if you are packing to capacity as this will protect the soft insulation bricks on the floor of your kiln. In addition, it protects the floor of the kiln from possible glaze spills.
- Place the shelves in the kiln carefully so that the walls of the kiln are not bumped or damaged. Use 3 props per level, as this is the most stable configuration. Place them in a triangle at an equal distance from each other (see image)
- Stack the props in a straight line one above the other as much as possible, to achieve the greatest possible stability. To prevent inaccuracies in temperature measurement, space must be kept free around the thermocouple.
- **Ensure all ware and furniture are completely dry.** If they are wet, then as they heat up steam forming can lead to explosion of items.
- Do not jar or shake the kiln after loading has started since your products on the shelf could be knocked down or the shelves may collapse.



- Keep shelves and wares at least 30mm from the thermocouple probe in the kiln and 30 mm from the wall of the kiln.

> *WARNING: Contact between ware and the thermocouple can cause disastrous overfiring. When placing and loading the kiln shelves, make sure they do not touch the thermocouple.*

- Avoid positioning your shelves in line with the elements, as this can increase the risk of thermal shock and the referred heat from the edge of the shelf back onto the elements may damage them.
- **NEVER** attempt to unload your fired items until the kiln is cool enough (below 100°C), as serious burns could result.

Empty firing of the kiln on for first use

Before you start using your kiln, it must be fired empty.

- One empty firing is necessary to give the heating elements a protective oxide layer, which considerably extends the lifespan of the elements.
- Do this first firing with a completely empty kiln, we recommend the following program:
    - Firing up to 600°C in 8 hours (or 75°C / hr to 600°C.)
    - Thereafter 150°C (or SKIP – depending on the type of controller) per hour to 1100°C
    - Then hold this temperature and fire for 2 hours
- For the second firing, fill the kiln with completely DRY greenware and perform a bisque firing.



Loading and Firing Bisque ware (850°C - 1000°C)

When firing your bisque ware, it is essential that all items are “bone” dry. If they are not, then as the kiln heats up and moisture in the ware converts to steam you may experience explosion of your ware. If your ware feels cool, then it is probably damp. To minimize damage to greenware, it is best to use a temperature rise of no more than 60°C/hr over the first 2 hours of the firing to allow any moisture to escape gradually. For very thick or large pieces it may be worth doing a drying out firing at 40°C for 12 hours. The rule of thumb is ‘bigger & thick go low & slow’.

- Generally, when packing "greenware" in your kiln, items can touch each other, and items can be packed inside one another.
- It is best to fire a piece in its natural position, however, large flat items such as wall plaques or clocks should be fired on a flat side to prevent warpage.
- Thin cups may be fired upside down or stacked lip to lip, if the rim is strong enough.
- Cannisters and other pieces with lids should be fired with the lids in place to ensure a good fit.
- Always leave your kiln bungs out until you have reached a temperature of 250°C-300°C. This will allow all the moisture to escape from the kiln. They can be replaced for the rest of the firing.

Loading and firing Earthenware (1060°C - 1080°C)

- Do not load families of red, green, yellow, or yellow-green glazes or any metallic or luster glazes with greenware. Allow a minimum of 50mm of space around red glaze pieces.
- If it is necessary to mix loads, always try to place the red glaze separately on a shelf below the items which it may contaminate.
- Glazed pieces must not touch, or they will stick together. At least 15mm should be allowed between glazed pieces to prevent contamination from the release of bubbles and gases from other glazes.
- The tops of the shelves should have batt wash applied to protect against drops or runs of glaze. The kiln roof and the underside of the shelves should be clean to prevent dust particles from falling on the glazed ware.
- Glazed ware must be stilted (earthenware) or dry footed to prevent sticking to the shelves. For low fire glazes (cone 04,05,06) stilting is recommended.
- If a piece wobbles when stilted, it may fall during the firing, be sure all stilted pieces are solid.
- It is a good idea to soak the kiln at temperature for 30 min to allow the temperature to even up throughout the kiln.
- Orton cones provide invaluable information about "heat work" that cannot be provided by a controller and so we would always recommend doing a glaze firing with the guidance of cones.



Loading and firing Mid-fire – Stoneware (1200°C - 1280°C)

- Stoneware cannot be placed on stilts as the item is likely to slump at higher temperatures.
- For glaze firing, the top of the shelves must be coated with kiln wash and the ware should be dry footed (this involves removing all unfired glaze from the foot of the piece as well as a reasonable margin above the foot to prevent glaze running onto a shelf).
- Orton cones provide invaluable information about "heat work" that cannot be provided by a controller and so we would always recommend doing a glaze firing with the guidance of cones.

Cooling the kiln

As a result of the insulating materials used in your kiln it may seem to take a considerable amount of time to cool sufficiently. Care should be taken when cooling any product, be it pottery, glass or metal.

- Do not open the kiln if the internal temperature exceeds 100℃. This can cause serious damage to the bricks through thermal shock.
- If you wish to speed up the cooling of the kiln, then bungs can be removed at 300℃. Wait until the temperature is below 100℃ before opening the lid further. It is best to open the lid slowly and in stages if the kiln has not cooled to room temperature so as to avoid thermal damage to your ware.
- Be careful when unpacking the kiln as the furniture and ware are often hotter than the interior temperature. Heat resistant gloves are advised.

Maintenance

The life of a kiln can include many trouble-free years of service if the kiln is treated with due care and routine maintenance performed. These are a few suggestions to ensure you get the most from your kiln.

- Examine the interior of the kiln to ensure it is clean and free of dust, vacuum the interior to remove any dust or debris near the elements.
- Check the roof and walls for loose fragments of firebrick that might fall, pin and seek repair.
- Check that kiln shelves are adequately coated with kiln wash.
- Check the condition of your shelves and props for warping or cracks, flip regularly.
- Remove glaze spots from the walls, bottom, or shelves of the kiln prior to the next firing. If this is not done, glaze will re-melt and spread with each firing.
- Elements can also be damaged by glaze contamination, bunching up or popping out from the grooves.
- Avoid moving your kiln un-necessarily. Over time the bricks will "bed down" and become brittle. Constant movement may cause the bricks to break apart.
- Hinges and moving parts will benefit from lubrication with WD-40.
- Do not allow your kiln to get wet – moisture is your enemy!



Pinning Elements

Due to the constant heating and cooling cycle, the kiln elements elasticity will decrease over time.

Despite careful assembly and the fastening of the coils during manufacturing, movement of the elements cannot be completely prevented.

As an extra security for the coils, we have special pins which you can use to secure elements that are jumping grooves or moving. These are made of the same wire material as the coils.

> ***WARNING**: never use random wire to make pins yourself.*
> *This wire may not be resistant to high temperatures and will cause damage to your kiln and the elements.*

Use flat-nose pliers to insert pins into the soft refractory bricks, positioning each pin across a turn of the heating element coil. Pins should be installed in the element grooves, immediately to the left and right of each kiln corner, to secure the elements.



Element Pin

Do not insert pins directly into the corners, as expansion and contraction of the heating elements during firing may eventually pull the pins out of the bricks.

Kiln Furniture

Follow these tips to get the most out of your kiln furniture.

- **Always store your kiln shelves on their end.** Never store kiln shelves flat and certainly never flat stacked on top of each other. Doing so significantly increases the risk of shelves cracking.
- **Always use kiln wash** to minimise the risk of glaze runs ruining a shelf. Regularly scrape off and reapply your kiln wash.
- **Always flip** kiln shelves when using them in the kiln. This will minimise warping. All shelves will begin to warp, particularly at temperatures exceeding 1260c. Thicker shelves minimise warpage, but may also be excessively heavy, so making loading them difficult. The best solution is to use shelves that you can manage easily and regularly flip them. This may require the application and sanding of kiln wash on alternative sides of the shelf (if the underside of a shelf is kiln washed, then you risk having flakes of kiln wash drop onto your glazed ware, causing damage, so best to remove and clean the underside).
- **Always** make sure you kiln shelves are **bone dry** when using them. If there is moisture in the shelves, as they heat, they are likely to suffer expansion cracks.
- **Always use moderate ramp rates** in the initial stages of firing up until 200c (generally rates below 120c/hr are safe). Fast ramp rates may cause rapid expansion of the shelves, leading to cracking. The same applies when cooling your kiln. Avoid rapid cooling below 250c as sudden drops in temperature will cause thermal shock and cracking.
- **Always use 3 props** to support a shelf. This is the most stable configuration. Ensure the props are placed in line vertically, so that the load of each shelf is passed down the props.

- **Always check your shelves** carefully when packing your kiln. If a shelf is showing signs of cracking DON'T use it. Better to replace a suspect kiln shelf than risk a collapse of furniture and ware in the kiln.

Sadly, kiln shelves don't last forever, but by sticking to the above pointers you will prolong the life you get from them. The higher you fire, the more likely you are to experience warping and cracking of your shelves even with the best of kiln shelf care.

Fired Up Kilns offer not only traditional Cordierite-Mullite shelves but also Oxygen Bonded Silicon Carbide (OBSiC), Nitrogen Bonded Silicon Carbide (NBSiC) and Sintered Silicion Carbide (SSiC) shelves.



Disclaimer

Please note that your kiln has been designed and manufactured for precision work. Your kiln must be operated in accordance with both this operating manual as well as the manual provided for the controller. Use that violates the above preconditions, shall immediately void all warranties. Fired Up Kilns Group makes no representations, guarantees whether expressed or implied, other than those as contained within the respective operating manuals.

For detailed information on the warranty or to review the Terms & Conditions, please refer to the resources section of the Cape Pottery Supplies website.

www.capepotterysupplies.co.za

Trouble Shooting

The problem	The possible cause	The solution
Increase in firing time	1. Check program 2. Defective or ageing element/s 3. Check for burned or discoloured connections in kiln, wiring or wall receptacle 4. Ramp rate higher than kiln capability (this is not uncommon in programs with high ramp rates i.e. Greater than 150c/hr above 1150c)	1. Adjust program 2. Replace 3. Clean or replace as necessary 4. Reduce ramp rate
Kiln will not heat up as programmed	1. Fuse or breakers blown 2. Controller not activated or is faulty 3. Burned power cord or isolator 4. Limit switch has disengaged	1. Replace or reset 2. Ensure temperature is set on auto controllers or that the correct program has been selected on your controller. Check thermocouple and replace if necessary. 3. Consult a qualified electrician 4. Ensure kiln lid/door is firmly engaging limit switch.
Wall receptacle or plug heats up	1. Loose connection in wall receptacle	1. Consult a qualified electrician
Safety switch or circuit breakers trip immediately after the kiln is turned on	1. Moisture has built up in the kiln bricks 2. Short circuit in kiln	1. Place moisture absorbent material (Damprid) in the kiln and use heaters around the kiln to dry it out. To avoid in future, fire kiln to 200c and soak for 3 hours every 2-3 weeks 2. Consult a qualified electrician to check wiring of the kiln for burn or discoloured connections, check for contact of a hot wire with the grounded portion of the kiln
Elements hum when the kilns is first turned on	1. Normal – This is a 50 cycle hum which may resonate in the element until it is hot enough to soften	1. No action
Kiln over fires	1. Firing time to long 2. Incorrect temperature set 3. Thermocouple issue	1. Check your selected program 2. Choose correct temperature setting

	4. Faulty controller	3. Check that the thermocouple is protruding at least 30mm into kiln and is not in contact with any ware 4. Consult supplier or kiln manufacturer
Kiln shuts off before desired temperature is reached	1. Thermocouple failure 2. Power failure	1. Replace thermocouple 2. Reactivate your controller. Some controllers are set to automatically restart when power returns. Refer to the attached controller manual
Elements becoming loose from the brick groove	1. Due to loosening of the pin caused by expansion and contraction of the element during repeated heating & cooling	1. Repin element. Be sure to heat element to above 300c to avoid breaking due to the element becoming brittle over time & when cool.
No power to the kiln	1. Blown circuit breaker/tripped safety switch 2. Blown internal fuse 3. Over temperature controller (if fitted) has tripped the onboard mains isolator	1. Check power board and reset breakers 2. To protect the kiln electrics from power surges, there is a fuse in the electrical terminal block located in the kilns terminal box as well as two fuses in the controller. 3. Thermocouple has failed on the OT controller - replace 4. OT controller is set below the top value of the fired program. adjust the set value on the OT controller to be 5 -10c above this value.
Kiln heating up rapidly and not responding to controller inputs	1. Jammed contactor	1. TURN POWER OFF AT THE ISOLATOR SWITCH OR UNPLUG KILN IMMEDIATELY and consult an electrician

Kiln Firing Log

Date	Firing No.	Cone / Temp	Start Time	End Time	Program No.	Temp. Reached	Errors Displayed	Comments / Notes

This Kiln Firing Log is downloadable from the resources section of www.firedupkilns.com.au

Pre-loaded Firing Schedules

			Segment one			Segment 2			Segment 3			
Number	**Name**	**Program Description**	**Ramp Rate °C per hr**	**Soak Temp °C**	**Soak Time Hrs: Min**	**Ramp Rate °C per hr**	**Soak Temp °C**	**Soak Time Hrs: Min**	**Ramp Rate °C per hr**	**Soak Temp °C**	**Soak Time Hrs: Min**	**Ramp Rate °C per hr**
1	First Firing	Run this program as the first firing in your new kiln. This will coat your elements in aluminium oxide which acts as a protective layer between the elements and fumes & vapours released from clays and glazes. Leave bungs in until 1000c, then take bungs out for the rest of firing.	50°c	100°c	00:45	150°c	1100°c	02:00	END			
2	Slow Bisque	For thick work which may be uneven in thickness – usually used when work will be then fired to stoneware temperatures. (If firing to earthenware temps for glaze, use High Fire bisque)	55°c	100°c	00:30	60°c	600°c	00:10	150°c	1000°c	00:10	END
3	Medium Bisque	For even thickness work / work which is completely dry.	80°c	200°c	00:00	100°c	600°c	00:10	150°c	1000°c	00:10	END
4	Earthenware glaze or High Fire Bisque	First firing for work which is made with earthenware clay	60°c	100°c	00:15	110°c	930°c	00:00	60°c	1030°c	00:25	END
	Earthenware glaze or Low Fire Bisque	Lower temperature, use this firing to bisque work which uses low fire glazes (1020 – 1080 glaze)										
5	Mid Fire	Mid-fire: Cone 6	80°c	80°c	00:05	110°c	1080°c	00:00	60°c	1180°c	00:25	END
6	Stoneware	Stoneware: Cone 9 - 10	80°c	80°c	00:05	110°c	1145°c	00:00	60°c	1245°c	00:25	END
7	Lustre / Decal (Earthenware / Bone China)	Use for Earthenware or Bone China - used after a bisque and glaze firing to apply metals or on-glaze decals to work. See manufacturer's advice for specific temperature on products.	80°c	80°c	00:00	100°c	700°c	00:15	END			
8	Lustre / Decal (Stoneware / Porcelain)	Use for Stoneware or Porcelain – used after a bisque and glaze firing to apply metals or on-glaze decals to work. See manufacturer's advice for specific temperature on products.	80°c	80°c	00.00	100°c	790°c	00:15	END			
9	Candling (Drying)	Candling program to run prior to bisque firing/to dry out wares	60°c	95°c	04:00	END						
10	Empty	Left free to create your own program										

Recommendations only, also double check every step of your pattern before firing.

FIRED UP KILNS
and pottery supplies

CONE CHEATSHEET

Large Regular Orton Pyrometric Cones

Bisque - Cone 09 - 03

Earthenware - Cone 05 - 01

Low Fire Vitrification - Cone 3 - 6

Mid Fire Vitrification - Cone 5 - 7

Stoneware Vitrification - Cone 7 - 11

Porcelain Vitrification - Cone 9 - 12

Cones #	60°C/hr Rate Medium Firing Speed	150°C/hr Rate Fast Firing Speed
09	917	928
08	942	954
07	973	985
06	995	1011
05	1030	1046
04	1060	1070
03	1086	1101
02	1101	1120
01	1117	1137
1	1136	1154
2	1142	1162
3	1152	1168
4	1160	1181
5	1184	1205
6	1220	1241
7	1237	1255
8	1247	1269
9	1257	1278
10	1282	1303
11	1293	1312
12	1304	1324

Bisque

Mid-Fire

Porcelain

Low Fire (LoStone)

Earthenware

Stoneware

Lustres Cone 022 – 018 (Low Temp)

Stains Cone 06 – 10 (wide variability between stains)

Adapted for easy reference from: 'Using Orton Pyrometric Cones', Orton Ceramic Foundation, Westerville, OH 43086-2760, 2016, www.ortonceramic.com



Kiln Contracts
Unit A2, 11 Celie Road, Retreat Industria, Retreat, Western Cape, 7945,
Cape Town, South Africa
Phone: +27 21 701 6682
Email: info@kilncontracts.co.za