Basic Kilns

OWNER'S MANUAL

CONGRATULATIONS!

Congratulations on being the owner of a CRESS ceramic kiln! You have selected what we feel is the safest, most reliable kiln on the market today. We are proud of our products and gratified that you have joined the many thousands of ceramic enthusiasts who have compared and chosen a Cress kiln.

Behind every Cress kiln is a continuing personal interest in the ceramic hobbyist and professional artist. We sincerely wish you many years of creative and rewarding use of your Cress kiln.

CRESS MANUFACTURING COMPANY, INC.,
A Nevada Corporation
4736 Convair Dr., Carson City, NV 89706
(775) 884-2777 or (800) 423-4584

UNPACK SHIPMENT IMMEDIATELY

When this shipment was given to the carrier, the carton and contents were not damaged. In case of damage or loss (either obvious or concealed), save all packing material. Concealed damage or loss discovered by the consignee, who did not note damage at time of delivery, must report damage to the delivering carrier immediately upon discovery. At that time, an inspection of the merchandise by the carrier's representative should be requested. Failure to report such a damage or loss within 15 days places the burden of proof upon the claimant to show this damage or loss was caused while in the carrier's possession.

Our limited warranty covers manufacturing defects only. Call us if a freight problem occurs so we may help. Phone (775) 884-2777 or (800) 423-4584.

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IMPORTANT SAFEGUARDS!

Notice: Please read and observe the following safety warnings before operating your kiln.

1. Install kiln 18" or more from any wall or combustibles.
2. Fire only on stand or legs furnished.
3. Never fire hotter than the cone or temperature specified on the rating plate (Never hotter than cone 10 or 2350 ^{O}F).
4. Do not fire hotter than the manufacturer's recommendation for your clay, glazes, or decals or permanent damage may result to your kiln or ware.
5. Do not open lid until kiln has cooled to room temperature.
6. Before opening lid, turn off all switches and timer to "off", & Kiln Sitter button "out" then carefully open lid and lock lid brace securely. Gently test that lid is securely engaged before allowing lid to stand freely. Do not use kiln if lid brace or any other kiln part is not in perfect operating condition.
7. Do not leave kiln unattended while firing.
8. Never use an extension cord.
9. Operate kiln only in a well ventilated room. Breathing kiln smoke and fumes that may contain carbon monoxide or other toxic material is dangerous to your health.
10. Unplug kiln before servicing or cleaning.
11. ***Dangerous Voltage*** - Do not touch heating elements with anything.
12. Do not touch hot sides of kiln or hot lid - Burns may result.
13. Keep children away at all times.
14. Never store anything under kiln; never lean objects against kiln; never store anything between kiln and an adjacent wall or object. Keep kiln away from moving drapery.
15. **Do not store or use flammable liquids or sprays or gases in the same room with your kiln.**
16. Do not store or use your kiln outside - keep rain and moisture away from kiln.
17 Do not use kiln if cord is damaged or touching kiln case. Plug must stay cool to warm – not hot to touch. Replace cord and wall receptacle if plug gets hot. Keep wall receptacle dry.
18 Wall receptacle must not be corroded or fit the plug loosely. Do not fire kiln if cord plug gets hot.
19. Use kiln only with an adequate electrical supply - with the correct voltage, amperage and correct fuse size (not too large or small). Be sure the wire size is large enough (Never use aluminum wiring). Do not use a 208 volt kiln on 220 or 240 volts.
20. Kiln must be grounded properly.
21. Wear goggles when looking thorough peephole to protect eyes from infrared heat.
22. Wear protective gloves when handling hot peephole plugs. Never putt plug on a combustible surface.
23. Use only Orton or Bell small (junior) cones in the kiln sitter. Never use large cones or witness cones in the kiln sitter! Adjust the Kiln Sitter and remove firing gage before operating.
24. When firing objects to be used with food and drink, use only supplies tested and labeled "Safe" for such purposes. Use a witness cone next to each object for lead free firing. After firing, test objects before using them for food and drink. Lead from glazes can contaminate brick – so use a different kiln for unleaded and leaded glaze firings.
25. Lift kiln by handles only; kiln has sharp bottom edges.
26. Maintain kiln in perfect operating order, do not use kiln unless it is checked after each firing and in determined to be in perfect condition. Never use a kiln with a broken lid brace, hot cord cap, broken tube assembly, etc. Use only metal exhaust piping for optional exhaust system.

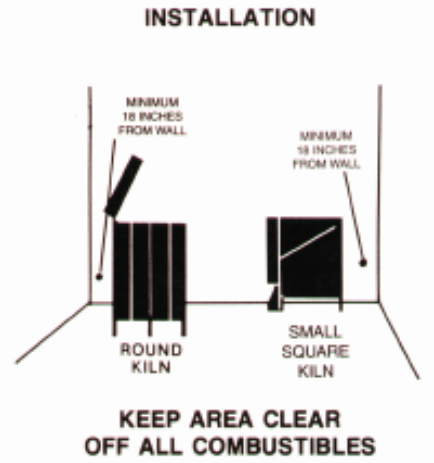
Please read all instructions before operating kiln.

KILN INSTALLATION

PLACEMENT

All kilns should be located in an area free from flammable materials such as drapes, boxes, paper, spray cans, paint, gasoline, etc. All kilns must be located a minimum of 18 inches from every vertical surface. Do not place any kiln under any overhead obstruction such as cabinets, shelves, drapes, hanging plastic, etc., and never lean anything against your kiln. Do not store anything under your kiln; keep this area clear at all times. Do not store anything between the kiln and a wall. Keep material off the top of your kiln; do not use the lid as a shelf. Do not put anything under your kiln as this area gets hot and needs free air movement for cooling. Good housekeeping must be observed at all times in the kiln area for safety.

Install 4" round metal dryer ducting to outside from OPTIONAL exhaust system. Keep ducting as short as possible and do not use more that one long radius 90 elbow. Do not use plastic dryer ducting for exhaust system venting.



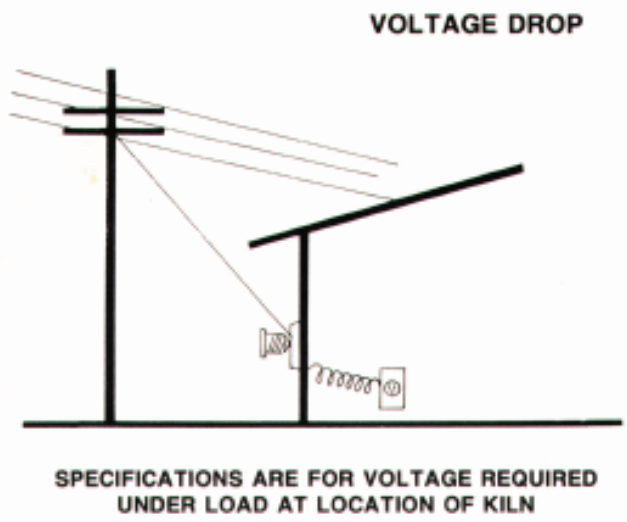
Choose a location on a cement floor, ceramic tile with cement grout, brick, or stone. If it is necessary to put your kiln on a synthetic or wooden floor, use a sheet of fireproof material underneath your kiln and extending 24" beyond the kiln in all directions. This material must be suitable for woodstove application. A layer of hard firebrick is also acceptable for this purpose. Note: floor coloration may be sensitive to heat and may change color.

Your kiln must be fired only on the metal stand provided; it has been designed specifically for the height and weight of your kiln. Do not use any other stand. Be sure to center the kiln on the stand so that it is stable, and position it so that the cord does not touch the sides of the kiln, which will be hot during firing. It is also important that the stand and kiln be level (use a bubble level for this purpose), otherwise there is a possibility of pieces falling during firing or the Kiln SitterR malfunctioning. Screw the stand to the kiln with the screws provided.

Use your kiln only in a well ventilated room. Vapors containing poisonous gases are possible when firing certain materials. Do not breathe fumes from kiln when firing. The optional exhaust system may be overwhelmed if too much material reaction occurs inside the kiln during the firing or if a cross breeze or clogged vent pipe exists. Optional exhaust system exhaust pipe must be cleaned the same as a chimney for a wood burning stove.

ELECTRICAL SPECIFICATIONS

Proper electrical wiring is necessary to safely and efficiently operate a kiln. Even though the voltage is a full 234 volts at the meter, the voltage on which the kiln operates will be somewhat lower at the kiln location. Make sure your electrical outlet has the correct electrical capacity and voltage to handle your kiln. It is necessary to measure the voltage at the location of the kiln with the kiln turned on. Voltage drops occur on all wiring. Proper electrical wiring will provide an adequate operation voltage and current at the kiln without significant voltage drop. Voltage may be temporarily low during brownouts especially on a hot day in the summer when all your neighbors have their air conditioning turned on and during peak electrical usage periods in your area. If the wire coming from your power source to the kiln is too small or too long the kiln will not operate properly, even if the wire meets national electrical safety codes. If the voltage is low, the kiln may not reach the maximum desired temperature or will fire too slowly. This may reduce element life. 230 volt and 240 volt kilns may be used with 220 volt to 245 volt power. **Never use a 208 volt kiln on 220 volt or 240 volt power.**



SPECIFICATIONS ARE FOR THE VOLTAGE REQUIRED UNDER LOAD AT THE LOCATION OF THE KILN

Do not attempt to change the receptacle on an existing line without using the services of a licensed electrician. The electrician will know whether the wire size is correct. It is advisable to use a larger wire size than absolutely necessary to prevent voltage drop., especially if the run to the meter is long. The increase in cost is usually very small compared to the long term savings in firing times and line loss. Never cut the plug off and replace it. **If the plug becomes damaged, change the entire cord with a CRESS factory supplied cord which will meet temperature as well as electrical requirements. The outlet must be in good condition or heating of the cord and plug cap will occur. Do not use an extension cord at any time.** Your electrician must make sure all local codes are met with your house wiring.

KILN OPERATION

The kiln is used to apply a certain amount of heat over a period of time to a ceramic piece to produce a chemical change, resulting in a finished piece. Firing too fast causes stress to occur that can physically break the piece or stress the ceramic piece so that it breaks on its own sometime after the firing. The firebrick retains just enough heat so that when the cooling process starts, the bubbles from chemical gases from the vitrification process can escape the glazed surface. Rapid cooling fiber kilns can produce imperfections from trapped air in the glaze. Your ceramic pieces will achieve their best possible finish because you have the best firing equipment available. The maximum degree of heat and the length of time necessary vary widely according to many factors, such as the type of ware (porcelain, earthenware, stoneware, etc.) or glaze, paint or decal, the thickness of the piece, the size of the load being fired, and the voltage available.

SHUT-OFF DEVICES

KILN SITTER®

CAUTION: The Kiln Sitter® control is a valuable aid when firing your kiln and is engineered to give you years of trouble-free operation when it is properly adjusted and maintained as outlined in the Kiln Sitter® operating manual. It is, however, recommended that the Kiln Sitter® not be left unattended beyond the estimated firing time. An uncontrollable accident, such as green ware falling against the end of the Kiln Sitter® tube, may cause an over firing which could damage your kiln, Should this occur, the operator should be in attendance to shut off the kiln manually , using the witness cones behind the peepholes as a guide. The kiln must not be left unattended while it is firing (heating).
The Kiln Sitter® should be used mainly to achieve consistent firing from one firing to the next and not as a failsafe shut off device. Note: because the small cone is placed on its side in the Kiln Sitter® with the weight of the rod pressing down on it, the small cone may bend one to two cone numbers before the witness cone. With experience, you may use one or two cone numbers higher in the Kiln Sitter® than the actual cone you wish to achieve. It is a good idea to use a pyrometer to check on the progress of the firing during the process. Also, pay attention to the color generated by the heat so you learn when the temperature is being reached by color as a backup method to the witness cones, pyrometer, timer, and Kiln Sitter® to avoid over firing.

Never use lubricant of any kind on the Kiln Sitter®!
The Kiln Sitter® does not take the place of watching the large cones through peepholes, but can help achieve repeatable and uniform firings. It must be kept in good working order and adjustments checked before each firing.

Before leaving the factory, every Kiln Sitter® is adjusted and its operation carefully checked. However, it is possible that the adjustments have changed in shipment. Therefore, the following adjustments must be checked and readjusted if necessary before each firing.

WARNING: You are responsible for the adjustment and maintenance of the Kiln Sitter®. The warranty does not cover over firing regardless of cause. The kiln will not over fire if witness cones are watched and the kiln shut off manually. Because the infinite switches are very repeatable the timer should be used. These switches help compensate for voltage fluctuations and room temperature changes, but cannot correct for load variations. Heavy loads will take longer than very light loads.

ADJUSTMENTS

The firing gauge is used for adjustment only, and must never be left in place on the refractory tube during firing. Remove the rubber band to release the firing gauge. Store the firing gauge for future use after you complete the Kiln Sitter® adjustments.
Check the centering of the actuating rod with the firing gauge in place.
The actuating rod must travel freely in the center of the oblong slot without touching the sides at any point, or the rod will stick and the Kiln Sitter® will fail to operate. If additional adjustment is needed, loosen two screws that hold the guide plate and move the plate to the right or left as required. Re-tighten screws and recheck its position until the actuating rod is centered. Press down on the release claw and check full travel of the actuating rod. See that it does not touch the sides of the refractory tube.

Lift the Kiln Sitter® weight to its vertical position. The release claw should just barely clear the trigger. If not, loosen the set screw in the center of the weight and slide the trigger up or down and retighten set screw securely so that it does.

Make sure all switches are off., including the timer, Kiln Sitter®. Remove the firing gauge and store in a a safe place for future adjustment checks. Raise the weight to its vertical position with one hand, with your other hand raise the actuating rod on the inside of the kiln until the claw engages the trigger. Let go of the weight and push the plunger all the way in until it locks. (Limit timers must be set above the off position for this test) Slowly let the actuating rod down until the weight is released. The weight should not stick in the vertical position. It should fall freely and cause the plunger (button) to pop out into its original "off" position. Repeat several times to make sure all moving parts are free and functioning properly.
Now raise the weight only 1/2 of the way up. Push in plunger and allow weight to drop. Plunger should pop out to its original position. This checks that the weight's pivot is not too tight.

KILN SITTER® OPERATION

1. Check Kiln Sitter® adjustments.
2. Turn all switches to "off" position.
3. Remove firing gauge and store. Serious damage to the kiln and the Kiln Sitter® will result if the kiln is fired with its gauge in place on the refractory tube.
4. Apply a thin coat of high fire kiln wash to the top edges of the metal cone supports and the lower side of the actuating rod being careful not to apply any in the slot of the refractory tube. Warning: remove kiln wash from the actuating rod and cone supports and recoat with high fire kiln wash before each firing. Failure to do this will cause the cone to stick to the metal parts (when the cone softens at high heat) and will cause over firing.
5. Lift the weight up and press down on the release claw to hold it up in position.
6. While holding the release claw down with one hand, place a small cone (1 1/8" long) under the actuating rod using your other hand. Be careful not to knock any kiln wash off the metal parts while inserting the cone. The cone should be resting with a flat side down on the cone supports.

WARNING - KEEP THE CONE AWAY FROM THE REFRACTORY TUBE. IF THE CONE TOUCHES THE TUBE DURING FIRING, IT WILL STICK TO IT AND CAUSE OVER FIRING.

7. When loading, keep shelves and objects at least 1/2" from the tube, cone supports, cone and actuating rod (interior of kiln), also keep the area around the kiln and Kiln Sitter® (exterior) clear of all objects. Nothing must interfere with the weight when it falls or the kiln will over fire.
8. Push plunger in so that it remains locked in. The indicator pointer on the limit timer must be above the "off" position to allow the button lock to engage.
9. FIRE WARE CHECKING LARGE PYROMETRIC CONES BEHIND PEEPHOLES. (SEE METHODS OF TEMPERATURE INDICATION) DO NOT USE KILN SITTER® AS AN AUTOMATIC SHUT OFF BUT ONLY AS AN AID TO REPEATABLE FIRING.
10. TURN TIMER "OFF" MAKING SURE THE PILOT LIGHT GOES OUT. MAKE SURE THE Kiln Sitter® BUTTON POPS OUT AND TURN THE SWITCHES TO "0FF". UNPLUG THE KILN IF THE KILN WILL NOT BE USED FOR LONG PERIODS OF TIME.

(OPTIONAL) LIMIT TIMER)

The limit timer is a clock motor driven device that causes the Kiln Sitter® to shut power off to the kiln after a preset number of hours. It is not a substitute for firing with cones, but a backup to the Kiln Sitter® to help prevent severe damage to the kiln caused by Kiln Sitter® failure. The timer may be set for any period up to 20 hours and may be readjusted during firing. Of course, to be of use as a backup device, the unit must be set properly for a time great enough to fire your ware, but for a time less than required to over fire. It should be set 20 minutes longer than the estimated firing schedule. The infinite switches are so repeatable that the timer will have significant value as a backup device.

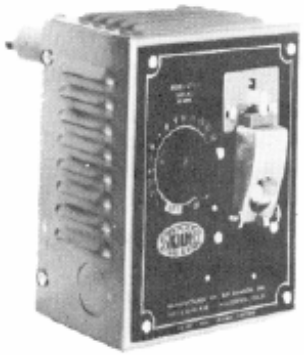
WARNING: We can not extend our warrantee to cover damage caused by over firing for any reason, since we have no control on proper use of the limit timer. **DO NOT LEAVE ANY KILN UNATTENDED WHILE FIRING. WATCH PYROMETRIC CONES PLACED BEHIND PEEPHOLES, TO PREVENT OVER FIRING.**

SWITCHES AND PILOT LIGHTS

Power is switched on and the amount of power flowing to your kiln is controlled by the infinitely variable switch. This is accomplished by cycling "off" and "on" which causes an intermittent snapping or popping noise. When the "high" setting is reached (or "100" on some model dials),the switch is 100% on and therefore no longer cycles(so you will not hear any snapping or popping noise). Viewing inside the dark panel through the top of the panel a blue light may be seen flashing as the contacts make and break. This is the same thing that happens every time you switch a light on or off in your home. Turning the switch to higher numbers on the dial increases the power that is applied to your kiln.

PILOT LIGHTS

Neon pilot lights are provided next to each infinite switch to indicate when each switch is "on" and another one to indicate when the Kiln Sitter® is "on". All power is off when the Kiln Sitter® and timer are "off" so the pilot lights next to the switches are also off when the Kiln Sitter® is off even if the switches are "on". So double check that the switches are each turned "off" after each firing in addition to checking that the Kiln Sitter® if "off" and the Kiln Sitter® button is in the "out" or off position.



PREPARATION FOR FIRING

Before loading the kiln, there are several things you should do to prepare for a firing:
Remove all dust and chips that may have resulted from shipping (or previous firing). A small vacuum cleaner is very useful in keeping your kiln clean. Dust in the kiln could cause imperfections in glazed ware.

Prepare a small amount of kiln wash. Kiln wash is a refractory material that prevents glazed pieces from sticking to shelves. It is usually purchased as a dry powder and is then mixed with water to the consistency of skim milk. Use only high fire kiln wash. Clean all your new shelves, then kiln wash only the top side of each shelf and the floor of the kiln, applying with a paint brush. This will seal the dust and prevent glazes from adhering to these surfaces. Apply a paper thin coat, or it may chip off. When the kiln wash wears off, bare spots only should be recoated keeping the kiln wash thin but the top of the shelves covered. If glaze has dripped onto shelves, chip it off, smooth and re-apply kiln wash to these areas. Sandpaper may be used to smooth these small areas before reapplying kiln wash. CAUTION: Do not coat the sidewalls, lid or bottom of shelves. Take care to keep kiln wash off of the elements to avoid burning them out.

PLUG THE KILN IN, MAKING SURE THAT THE CORD DOES NOT TOUCH THE KILN CASE WHICH WILL BECOMEHOT DURING FIRING.

KILN BREAK -IN

The purpose of the first (break in) firing is to get rid of any moisture in the kiln, and to burn off the protective coating on the elements. (This will produce some smoke) Be sure to read all safeguards (page 2) and study directions on firing before you test fire your kiln. We recommend firing the kiln with the shelves and posts but empty of ware to cone 05.
This firing will produce a good oxide coating on the elements which will help protect them and increase element life.

We do not recommend firing ware in the first kiln firing (the fumes could be hard on the unprotected elements). The first firing will test the shelves, a very small percentage of which may crack on the first firing. (Test firing shelves is a wise precaution for any new shelves.)

LOADING

Careful loading of ware in the kiln is important for satisfactory results. You need to plan the placement and distribution of the items to be fired. Careless, hurried loading might result in mishaps which could ruin hours of work. Also be sure your hands are clean since dirt or oil may contaminate colors or affect the finish of your ware.

Remember that the insulating firebrick used in ceramic kilns is soft and fragile. Care should be taken to avoid damaging the liner when loading (or unloading) the kiln. After several firings the brick may show fine cracks, particularly if the kiln is fired to high temperatures (such as cone 6). This is normal and will not affect the function or structural integrity of your kiln.

The lid brace locks the lid in the open position for loading and unloading the kiln. Pull the lid up until the lid brace engages the slot on the arm, and then lower until the lid is solidly braced before letting go. To unlock, pull the lid brace arm up while raising the lid a few inches, then lower the lid past the locking slot and gently close the lid. Do not drop the lid, as the firebrick is fragile.

Make sure that any ware you put into your kiln is bone dry (not cold to the touch). If pieces are hand molded make sure that no air pockets remain in the clay. This causes small “explosions” when fired, since the air expands and the moisture turns to steam. Hollow out the solid pieces whenever possible. Thick solid pieces can be fired safely only at very slow heating and cooling rates. Solid pieces tend to crack and break more easily during firing than hollowed pieces.

Your kiln is designed to provide as uniform a heat as possible throughout the firing chamber. The kiln should be loaded in a balanced manner; mix heavy pieces and light pieces. When firing in the same load, light and heavy ware should be alternated on the same shelf and distributed throughout the kiln to help the kiln heat evenly. This will assure that all pieces receive the same heat treatment.

Your ware will fire more evenly if you allow for sufficient air circulation around pieces. If it is necessary to place pieces on the floor of the kiln, it is recommended that you stilt them to allow for air circulation underneath. It is best to fire with a shelf at least 1/2" off the floor of the kiln. Never place ware closer than 1/2" from the elements in the kiln. One inch is preferable. Place large, flat pieces that take up the full width of the kiln so that their edges are between element grooves. This will prevent the edges from heating up before the center of the piece, causing possible damage by cracking from uneven expansion. To prevent unstable objects from falling during firing use stilts to make sure they do not wobble. Take care that stilts will not strain rims and other delicate areas.

It is important to always place shelves so that there is at least one element groove between shelves or between a shelf and the lid. This will allow each compartment to heat evenly up to the proper temperature. WHEN PLACING POSTS, LINE THEM UP SO THAT EACH POST IS DIRECTLY ABOVE THE POST BELOW TO PREVENT STRESSING AND POSSIBLE WARPING OF SHELVES. POSTS MUST RUN IN COLUMNS THROUGHOUT THE KILN.

Remember when loading to place a large (witness) cone behind each of the peepholes for each firing so that you can monitor the progress of that firing. For an accurate reading, cones should be placed 2" to 3" behind peepholes to avoid a cooling draft. For more information on cones and their use, see the section on pyrometric cones.

There are variations in loading techniques depending upon the type of ware being fired. The following are recommendations for loading different kinds of ware.

LOADING BISQUE

Low fire ceramic greenware pieces will not adhere to each other when fired; therefore they may touch one another. They may be stacked and set directly on shelves without sticking. In some cases they may be nested or placed on top of one another, if the weight is evenly distributed on the piece below. Do not, however, place a heavy piece upon a small piece or the weight may cause the lower piece to warp or crack. Tile and large flat pieces should be fired flat on a shelf so they do not warp. Slow firing is required in such cases because the shelf mass effects the temperature uniformity across the flat piece. Strain on any delicate portion of a piece could result in distortion. Fire bisque items with their lids in place to assure a good fit. Remember that although low fire greenware pieces may be touching there must still be enough room for sufficient air circulation around pieces for even firing results.

LOADING FOR GLAZE FIRING

Glaze is finely ground glass suspended in a liquid. Two glazed pieces, if allowed to touch each other will adhere to one another when the glazes melt and re-solidify. Glaze will also adhere to the kiln or kiln shelf. Therefore stilts are used when firing most glazed pieces. Stilts are small ceramic or pointed metal supports; a wide variety is available. In some cases a piece may be dry footed (the base left unglazed). Be sure that the glaze is not applied too heavily, or it may "run" and stick to the shelf or the bottom of the kiln.

Remember to prepare the kiln with kiln wash, as described earlier, especially when firing a glaze to prevent any glaze from permanently adhering to the kiln bottom or shelves. Never apply kiln wash to the kiln lid, kiln sides, or bottom of the shelves.

Glazed pieces should not be placed closer than 1/2" to one another since glaze bubbles before it smoothes to its final surface. Bubbles and fumes from this process will contaminate adjacent pieces if spacing is not at least 1/2". We do not recommend that glazed pieces and bisque be fired in the same load, since they are normally fired at different temperatures and since this could cause discoloration. Bisque is normally fired one cone hotter than the same piece when glazed fired.

Do not stack or nest glazed pieces. Do not fire glazed pieces requiring lids with the lids in place as they will stick together permanently.

LOADING OVERGLAZE, CHINA PAINT, LUSTERS, AND GOLD

Loading for overglaze pieces is the same as for your glazed ware, except that luster's should be spaced at least 1" apart to avoid cross contamination.

Loading stoneware and porcelain

It is necessary to fire stoneware and porcelain at a much higher temperature than that used for low fire ware or glaze. At this heat the ware becomes much softer than ceramic bisque. For this reason it may stick to other pieces and so should not be stacked or nested. It will also tend to distort in shape unless the maximum temperature is accurately controlled and the piece is properly supported. Hollow greenware pillars made of the same material as the ware are often used for support so that the expansion and shrinkage of the support is the same as that of the ware. Do not support high-fire ware on ordinary stilts. Often simpler shapes are supported by a reusable "setter" shaped for a particular piece. Do not place ware closer than 3/4" from the elements to avoid uneven heating and distortion of the piece. Kaowool may be used for support material.

Glazed porcelain and stoneware pieces, because of the high temperatures used, are always dry-footed to prevent them adhering to the shelves. Use high fire kiln wash. Some prefer to load stoneware unto surfaces sprinkled with silica flour, sometimes called "flint". Keep "flint" away from the elements - it will cause them to burn out.

Loading glass

Do not fire small thin pieces of glass and large thick pieces in the same load. Glass sagging is very sensitive to variation in temperature. Load only one or two shelves; keep the bottom shelf 3" or more off the kiln floor and keep glass pieces at least 3" or more from the kiln top. Do not crowd pieces at any time. Terra cotta molds, dusted with whiting (calcium carbonate) to prevent the glass from adhering to the mold, are used in sagging sheet glass to shape. Do not use ceramic bisque molds for sagging glass.

PYROMETRIC CONES

The most widely used method for monitoring the temperature achieved inside a kiln is the pyrometric cone. A cone is a small elongated pyramid shaped indicator made of ceramic material which is formulated to melt when subjected to a sufficient amount of heat. It does not indicate temperature per se but the effects of temperature over a period of time. Cones react very similarly to the ceramic ware, since they are similar in composition. They deform as a result of the influence of heat, time, and kiln atmosphere, revealing what is happening in the kiln and when the proper firing temperature has been reached. A whole series of cones is available (see cone number - temperatures chart), made to melt at different temperatures. Cones are available in two sizes. The large (senior or witness) cones may be used at any location in the kiln to check temperature uniformity and firing progress. Small (junior) cones are used specifically in kilns equipped with Kiln Sitterr mechanical shutoff devices.

It is a good idea to make use of witness cones during firing, especially if exact temperatures are critical. They are helpful both during the firing, allowing you to check on how the firing is progressing and enabling you to turn the kiln off should maturity be reached before the kiln shuts off, and after the firing, when you can make notes of the results to use in adjusting the timer and increasing the accuracy of future firings. Witness cones also monitor the accuracy of the thermocouple, which may degrade over time and eventually need replacing.

Always use a large cone of the number corresponding to the maximum desired temperature behind each peephole during every firing in order to monitor firing progress and check the operation of the control. Place the cone 2" to 3" behind the peephole to avoid cooling drafts and obtain an accurate indication. Do not unplug the lower peepholes for more than a few seconds to avoid creating a convection draft which can cool the cones and shock the ware. Do not place the cone too close to the elements. Be sure to position it so that you will be able to see the tip when it bends and so that it will not contact any ware when it bends. At high temperatures it is difficult to see the cones; using dark glasses when looking through the peephole may help.

It is important always to stand pyrometric cones at the pre-cut angle provided by the base of each cone; this should be approximately 8 degrees away from vertical in the direction the cone is expected to bend. Setting the cones consistently at this angle assures that each cone (of the same number) will bend at uniformly the same temperature. Cone plaques or wire cone holders are commercially available. Holders may also be made from brick or clay. Holders made from fire brick are generally reusable and trouble free. Standard cones may also be purchased with wider self-supporting bases.

Periodically view the witness cones during firings. The kiln should shut off at about the time the cones bend to a 90 degree angle. This cone will continue to bend a little after the kiln is shut off as the cooling is slow. This effect is more dominant at lower cone numbers.

Placing at least one cone (more if you wish to check temperature uniformity) in each firing, even if not visible from a peephole, is a good idea since noting its condition when you unload the kiln will confirm that the load was properly fired.

An excellent way to check the temperature on any shelf in any location in the kiln is to use a cone plaque containing three large cones. One is for the desired maximum firing temperature. The other two should be numbered above and below the firing cone. For example, if firing to cone 06, use a cone 07, 06, and 05. These are often referred to as the guide cone, firing cone, and guard cone. The lower temperature (guide) cone bends as a warning that the desired temperature will soon be reached. The firing cone should bend until the tip is at a 90 degree angle, and the guard cone, if bent too far, signals overtiring.

Be sure to keep pyrometric cones bone dry so that they will not crack in the kiln. Once dropped, roughly handled or exposed to moisture, cones develop small cracks which tend to make them bend prematurely and give an inaccurate temperature indication.

The cones generally used in firing clays and glazes in pottery work are numbered ranging from 07 to 04. A very common one which works satisfactorily in most cases is 06. Cones used to fire china paint, gold, and decals range from 015 to 019. Cone 4 to cone 6 are used for porcelain. Stoneware may be fired to cone 8 or cone 10. All clay and glaze manufacturer's recommend the correct heat treatment for their products. Clays and glazes do vary so check labels or ask your local ceramic supply dealer for advice on the proper cones to use, since they know the characteristics of the clays and glazes handled.

FIRING

A kiln is designed to produce the extremely high temperatures necessary to chemically alter ceramic materials. Use caution and common sense to avoid burns when the kiln is in operation, since the kiln surfaces will be hot. It is therefore imperative that you read and observe all safety precautions.

SAFETY CAUTIONS

Do not leave the kiln unattended, such as firing over night. Even though your kiln has a timer and Kiln Sitter control, it is advisable to use a large cone visible through the peephole to check firing progress. Check witness cones at (1/2) hour intervals through firing, at the expected shutoff time and every quarter hour thereafter until the cone is properly bent or the Kiln Sitter has turned off. Always monitor the progress of each firing.

Never open the lid while the kiln is firing. This could cause serious burns as well as damage to the ware and kiln. After firing always allow the kiln to cool with the lid closed until it is cool enough for you to unload it with your bare hands.

A two position lid prop is provided. The highest lid prop position is used for normal venting at the beginning of the firing cycle. It operated simply by rotating a prop to engage the catch mounted on the lid. After the kiln reaches 1000 degrees F (use a pyrometer), release the prop by raising the lid by the handle (use protective high temperature gloves) so that the prop swings out of the way, and gently lower the lid. The lowest lid prop position is used for the later portion of the firing cycle for china, lusters, and gold firing to obtain the best results.

The peepholes, as the name implies, allow you to look into the kiln and, along with witness cones placed on the shelves, to monitor firing progress. In most instances, the kiln is fired with the lower peephole plugs in place and the top most peephole open. Always wear protective eye protection when viewing thru peepholes. If you are firing your kiln with an optional exhaust system, leave both peephole plugs inserted.

FIRING SPEED

The main consideration for firing speed is that you should not fire faster than the ware will absorb heat, and you should not cool faster than the ware will release heat. A specified amount of heat over a certain amount of time is necessary to produce the chemical changes that result in a finished piece. Firing and cooling rapidly will result in stressing and even cracking or crazing the ware due to uneven expansion. Very thick pieces, such as hand molded sculptures, require very slow heating and cooling. Slow heating also allows moisture to escape without damaging the ware, and slow cooling allows glazes, which may bubble when gases escape during the vitrification process, to return to a smooth finish.

The maximum degree of heat and the length of time necessary vary widely according to many factors such as the type of ware (porcelain, earthenware, stoneware, etc.) or glaze, paint or decal, the thickness of the piece, the size of the load being fired, the voltage available and the condition of the elements.

Remember that during firing you will not endanger your ware by turning the kiln off before maturity. If you ever hear pieces cracking or falling, or if your kiln has been jarred, turn the kiln off. Wait until it is cool, then open and check for problems that may have developed. Replace all cones with new ones before firing again.

Element life varies depending upon the frequency and temperature of firings. They will last for many firings if treated properly. Keep the element grooves free of debris of any sort which will eat through the element and cause it to burn out. Also keep in mind that after repeated firings elements become brittle and will break if struck or scraped. Do not fire your kiln hotter than the temperature for which it is rated.

VENTING

Conventional venting consists of propping the lid during the first part of the firing cycle and firing with the top peephole unplugged to allow fumes to escape. The optional Cress "Clean Air" exhaust system is an excellent way to provide ventilation and has many advantages. Besides removing fumes coming off the ware from the kiln room and eliminating the need to prop and then lower the lid during firing, the exhaust system provides for less cross contamination of colors during glaze firings, and achieves the clearest, brightest and purest colors possible.

FIRING GLASS

Glass is very sensitive to variations in temperature of only a few degrees. Glass must be allowed to pass through the lower temperatures slowly to prevent shattering, then it may be fired rapidly up to temperature (firing rapidly at this point helps preserve colors). Glass softens quickly once the critical temperature is reached and sagging begins (usually approximately 1500 ^{o}F for glass slumping); it is wise to check it often at this point (at 10 minute intervals) and when it has slumped properly, turn off all switches, crack the lid at the lower lid prop position for up to ten minutes to prevent over softening of the glass, then close the lid and allow to cool completely.

Glass is slumped onto terra cotta molds dusted with whiting (calcium carbonate) to prevent sticking. Be sure to the glass loading section.

AFTER FIRING

When the firing cycle has been completed, check the limit timer (if your kiln is equipped with one). There should be approximately 20 minutes left (before shutoff) on its dial. If this reading is not 20 minutes, either the Kiln Sitter has not operated correctly, or you have incorrectly estimated the firing time and you should record the difference and correct your time setting the next time your kiln sitter is used. It is used for added safety and for controlled repeatable firings – but it is not fail proof and cannot be guaranteed to turn off every time. You must use a cone behind the peep hole and double check it as well as use the safety time set properly to prevent "over-firing" your kiln.

Always allow plenty of time for the kiln to cool (at least twice as long as it took to fire) before opening the lid. Do not unload it until you can do so with bare hands.

Also check the kiln sitter®. Observe the pilot lights (they should be off) and the position of the kiln sitter weight: make sure it has fallen and has actually turned the kiln off. Correct any miss-adjustment problems early even when the kiln sitter appears to have functioned correctly.

If you want to monitor the temperature as the kiln is cooling, use a pyrometer to check on the progress. A pyrometer also is a useful tool to monitor the heating of the kiln. Allow the kiln to cool naturally, and do not open the peepholes or prop the lid (unless working with glass, metallic, or luster's in which case some special venting techniques may be necessary) until the kiln has cooled to at least 130 °F and you can unload it using your bare hands. If the kiln is opened prematurely, the ware and even the kiln could be damaged. You should expect the cooling period to take at least twice as long as the firing cycle took to complete.

FIRING FOR BEST RESULTS

The following suggestions are general good practices to be observed for the most satisfactory results.

* Don't try to hurry the firing or cooling of your ware. It can absorb and release heat only so fast without damage to the ware. Slow heating and cooling rates add quality and minimize crazing, cracking and breakage problems. Let the kiln cool at least over night. then crack the lid and let pieces cool until they may be handled with bare hands. If this suggestion is not observed you will put permanent stress in your pieces making them weaker and more subject to breaking and crazing.

* Watch firings closely to protect from overfiring. Firing too hot will damage fine detail and fade colors.

* Keep the inside of your kiln free from dust and chips, which cause imperfections in pieces. A vacuum cleaner is useful in this regard.

* Always fire only bone dry ware.

* A cone plaque containing three cones (guide cone, firing cone, and guard cone) Temperature indicating cones are very useful to monitor your firing. Always place witness cones uniformly at an 8 degree angle from vertical.

FIRING
METHODS OF TEMPERATURE INDICATION
PYROMETRIC CONES

There are two basic devices for monitoring the temperature inside the kiln. The first, most essential and most widely used method is the pyrometric cone. A cone is a small elongated pyramid shaped indicator made of ceramic material which is formulated to melt when subjected to a sufficient amount of heat. It does not indicate temperature per se but the effects of temperature over a period of time. Cones react very similarly to the ceramic ware, since they are similar in composition. They deform as a result of the influence of heat, time, and kiln atmosphere, revealing what is happening in the kiln and when the proper firing temperature has been reached. There is a whole series of cones available (see cone number - temperatures chart), made to melt at different temperatures. Cones are available in two sizes (see illustration). The large (senior or witness) cones may be used at any location in the kiln to check temperature uniformity and firing progress, and the small (junior) cones are designed for use in the Kiln Sitter^{R} (shutoff).

Always use a large cone of the number corresponding to the maximum desired temperature behind each peephole during every firing in order to monitor firing progress and check the operation of the Kiln Sitter^{R}. Place the cone 2" to 3" behind the peephole to avoid cooling drafts and obtain an accurate indication. Do not place it too close to the elements. Be sure to position it so that you will be able to see the tip when it bends. It is important always to stand pyrometric cones at the pre-cut angle provided by the base of each cone; this should be approximately 8 degrees away from vertical in the direction the cone is expected to bend. Setting the cones consistently at this angle assures that each cone (of the same number) will bend at uniformly the same temperature. Cone plaques or wire cone holders are commercially available. Holders may also be made from brick or clay. Holders made from fire brick are generally reusable and trouble free.

An excellent way to check the temperature on any shelf in any location in the kiln is to use a cone plaque containing three large cones. One is for the desired maximum firing temperature. The other two should be numbered above and below the firing cone. For example, if firing to cone 06, use a cone 05, 06, and 07 (use a small cone 06, 05 or 04 in the Kiln Sitter^{R}. (The weight of the rod and adjustment of the Kiln Sitter^{R} may require the hotter small cone in the sitter to achieve the desired firing temperature.) These are often referred to as the guide cone, firing cone, and guard cone. The lower temperature (guide) cone bends as a warning that the desired temperature will soon be reached, the firing cone should bend until the tip is level with the base of the cone, and the guard cone, if bent too far, signals overfiring, See illustration for the proper degree of deformation.

Junior size cones are intended specifically for use with the Kiln Sitter^{R} (automatic shutoff) mechanism (see section on Kiln Sitter^{R} operation). It may be that there will be a slight difference in the reaction of the cone in the sitter^{R} relative to the large cone of the same number in a holder, due to the fact that the large cone is heavier, more upright, and bends under its own weight, while the small cone in the sitter is encouraged to bend slightly sooner by gravity and the weight of the Kiln Sitter^{R} rod on top of it. If you find this to be true, it may be necessary to use a small cone one number hotter in the Sitter^{R} than the correct large cone number to achieve the desired results. Normally if firing to cone 04 or colder you will need one cone hotter in the Kiln Sitter^{R}. If firing to cone 5 or hotter you will normally use the same cone number. When you get to know your kiln and the typical cone reactions you will be able to achieve consistent firing results.

Be sure to keep pyrometric cones bone dry so that they will not crack in the kiln. Once dropped, roughly handled or exposed to moisture, cones develop small cracks which tend to make them bend prematurely and give an inaccurate temperature indication.

The cones generally used in firing clays and glazes in pottery work are numbered ranging from 07 to 04. A very common one which works satisfactorily in most cases is 06. Cones used to fire china paint, gold, and decals range from 015 to 019. Cone 4 to cone 6 is used for porcelain. Stoneware may be fired to cone 8 or cone 10. All clay and glaze manufacturer's recommend the correct heat treatment for their products. Clays and glazes do vary, so check labels or ask your local ceramic supply dealer for advice on the proper cones to use, since he knows the characteristics of the clays and glazes he handles.

PYROMETER (OPTIONAL

The second commonly used device for reading the temperature in the kiln is the pyrometer. This consists of a temperature sensing device (thermocouple) connected to a meter which indicates the temperature inside the kiln. Its principle value to the hobbyist is as a monitoring device which gives warning when the maximum firing temperature is neared. It is also very valuable in working with glass, which is extremely sensitive to differences in heat of only a few degrees. In firing ceramic materials, the ideal situation is to fire with both pyrometric cones and a pyrometer, since cones reveal what is happening to the ceramic in the kiln only at the final firing stage and the pyrometer shows the actual air temperature continuously through the firing. The pyrometer does not take into account the effects of time on the firing process as does the cone.

When using a pyrometer, be sure that the meter is hung on a wall or shelf near the kiln (not on the kiln itself) away from the radiated heat of the kiln and away from drafts to obtain a more accurate reading.

Another way of gaging the approximate temperature is by the color produced by different heats. A kiln can be fired visually with sufficient experience and a knowledge of the corresponding colors and temperatures. For example, the temperature of the lowest visible red heat (observing the entire kiln atmosphere not just the elements) is 1060^{o}F. See the temperature-color chart for the temperatures corresponding to other colors.

KILN BREAK IN:

The purpose of the first (break in) firing is to get rid of any moisture in the kiln, to burn off the oil coating on the elements, and to test the operation of the Kiln Sitter^{R}. Read all safe guards (page 1-0) and study directions on firing before breaking in your kiln. Fire the kiln empty to cone 020 or 019 (using the cones supplied). This should take approximately 4 hours. Set your limit timer for 4 hours.
On the second firing , we recommend that you fire up to cone 05 to get a good oxide coating on the elements which will help protect them. This firing should take about 5 hours; Set the timer for 5 1/2 hours.

We do not recommend firing glaze in the second kiln firing. (the fumes could be hard on the unprotected elements). We also recommend that you fire with the kiln furniture in place. This will test the shelves, a very small percentage of which may crack on the first firing. (Test firing shelves is a wise precaution for any new shelves.)

FIRING:

A kiln is designed to produce the extremely high temperatures necessary to chemically alter ceramic materials. It is therefore imperative that you observe all safety precautions.
Safety cautions:
Do not leave the kiln unattended, such as firing over night. Even though your kiln has a Kiln Sitter^{R}, and limit timer, it is required to use a large cone visible through the peephole to check firing progress. Check witness cones at (1) hour intervals throughout firing, at the expected shutoff time and every half hour thereafter until the cone is properly bent or the Kiln Sitter^{R} has turned off. Always check to see that the shutoff devices have operated correctly and manually turn the timer to “off” and the thumbwheel to “^” and check that both pilot lights are out. Always monitor the progress of each firing. Never open the lid while the kiln is firing. This could cause serious burns as well as damage to the ware. After firing always allow the kiln to cool with the lid closed until it is cool enough for you to unload it with your bare hands.
Firing Speed:

The main consideration for firing speed is that you should not fire faster than the ware will absorb heat, and you should not cool faster than the ware will release heat. Firing and cooling rapidly will result in stressing and even cracking the ware due to uneven expansion. Very thick pieces, such as hand molded sculptures, require very slow heating and cooling.

Remember that during firing you will not endanger your ware by turning the kiln off before maturity. If you ever hear pieces cracking or falling, or if your kiln has been jarred, turn the kiln off. Wait until it is cool, then open and check for problems that may have developed. Replace all cones with new ones before firing again.

BEFORE FIRING:

A. Turn all switch dials to "off" position.
B. Turn timer to "off" position so Kiln Sitter button is "out" in the "off" position with all pilot lights off (not lighted).
C. Raise lid and lock in place. Gently test that lid is locked in open position before standing alone.
D. When necessary, kiln wash cone supports and allow drying. Keep kiln wash out of porcelain tube assembly.
E. Place desired junior cone in Kiln Sitter^{R}. Do not use large or witness cone here.
F. Load kiln Placing senior (witness cone is the large one) cone behind peepholes. Lower lid to closed position.
G. Raise lid to highest lid prop position; Insert all peepholes except the top one.

FIRING:

STEP 1 Set timer on Kiln Sitter^{R} to 20 minutes beyond expected firing time, if your kiln is equipped with timer.
STEP 2 Push in plunger button on Kiln Sitter^{R} to engage mechanical power relay.

STEP 3

A) Rotate infinite switches to desired position as follows.
B) Turn switches to "low". Fire for one hour.
C) Turn all switches to "medium". Fire for two more hours.
D) Insert top peephole plug.

E1) For Firing Ceramic Ware (Bisque or Glazes),

1) Close lid.
2) Turn all switches to "high".

E2) For Firing Overglazes (Gold, Decals, Luster, China Paint).

1) lower lid to low lid prop position.
2) Turn all switches to "high".

E3) For Firing Porcelain and Stoneware.

1) Close lid.
2) Turn all switches to "high".

STEP 4 Periodically check senior cone located behind a peephole inside the kiln: when senior cone bends or Kiln Sitter^{R} turns off, manually turn off all switches and timer on Kiln Sitter^{R} to "off". Allow to cool before opening.
NOTE: Switches will click on and off during its operation. This audible noise is caused by a contacts lowering average power as required. The blue-white flash which can be seen in the panel vents is caused by the power contacts interrupting power as necessary for its proper operation.

BENEFITS OF THE CRESS CERAMIC KILN INCLUDE:

Elements are all electrically tuned for excellent temperature uniformity.
Manual kiln infinite switches all have automatic voltage compensation circuit to help even out results when your house voltage varies during operation.
There a metal safety covers under kiln bottom.

FIRING GLASS:

Glass is very sensitive to variations in temperature of only a few degrees. We strongly recommend that you use a pyrometer to measure temperature when working with glass. Glass must be allowed to pass through the lower temperatures slowly to prevent shattering, then it may be fired rapidly up to temperature (firing rapidly at this point helps preserve colors). Glass softens quickly once the critical temperature is reached and sagging begins (usually approximately 1500 ^{0}F for glass slumping); it is wise to check it often at this point (at 10 minute intervals) and when it has slumped properly, turn off all switches, crack the lid at the lower lid prop position for up to ten minutes to prevent over softening of the glass, then close the lid and allow to cool completely.
Glass is slumped onto terra cotta molds dusted with whiting (calcium carbonate) to prevent sticking. Be sure to read the glass loading section.
For firing glass (slumping or stretching):

STEP 1 Set lid at lower lid prop position.
STEP 2 Set switches to low. Fire to 700 ^{O}F (approximately one hour.)
STEP 3 close lid. Turn switch to high.
STEP 4 Fire to approximately 1500 ^{O}F, checking at intervals for proper slumping.
STEP 5 When proper slumping is reached, turn switch off and timer to "off", crack lid at the lowest lid prop position for up to ten minutes.
STEP 6 Close lid. Allow to cool completely.
The standard firing schedules given above may be varied when necessary depending upon individual circumstances. If your voltage is high and your kiln is firing too rapidly, or if you are firing an extremely thick, heavy piece and you wish to fire very slowly, you may use slower firing in step 3 above by leaving switches on low. This will allow the temperature to gradually increase for a slower less heat shocking firing schedule.

AFTER FIRING:
After every firing, check the limit timer, there should be approximately 10 to 15 minutes left at time of Kiln Sitter^{R} shut off. You should correct the timer on the next firing if there is more than 30 minutes left on the timer so that the timer works as an effective backup on the firing. Should the Kiln Sitter^{R} fail and you forget, this could be a very important safety factor in saving the kiln and your work from destruction.
Also check the Kiln Sitter^{R}. Observe the pilot lights (they should be off) and the position of the Kiln Sitter^{R} weight: make sure it has fallen and has actually turned the kiln off. Correct any adjustment problems early before damage is done to the kiln and ware. Always turn the switches to off and the limit timer to "off" after each firing even if the Kiln Sitter appears to have functioned correctly. The Kiln Sitter is used for added safety and for controlled firing; it is not fail proof and can not be guaranteed to turn off every time.
Always allow plenty of time for the kiln to cool (at least twice as long as it took to fire) before opening the lid. Do not unload it until you can do so easily with bare hands. Do not assume ware is cool enough to touch – be careful not to burn yourself. Wait until kiln is cool before checking that the ceramic or glass articles are also cool.

REQUIRED KILN MAINTENANCE
You can protect your kiln and add many extra years to its life by using this maintenance guide.
Before each loading:

VISUALLY CHECK KILN AND ITS FURNITURE.

REMOVE GLAZE SPOTS ON SHELVES, POSTS, KILN BOTTOM OR KILN SIDEWALLS.
Clean kiln by removing chips and dust. A vacuum cleaner works well for this purpose.

CHECK KILN SHELVES FOR CRACKS. Sand any rough spots on shelves and recoat with kiln wash. Also recoat areas where the kiln wash has worn off. Avoid thick kiln wash layers. There is no need to kiln wash shelves every time you fire.

KILN WASH FLOOR WHERE IT HAS WORN THIN. This may not be required every firing. Sand rough spots, recoat. Keep a smooth layer not over 1/16" thick. Kiln wash built up to a thick layer may damage kiln floor by pitting due to differential thermal expansion. Whenever possible, use a clean kiln-washed shelf on the kiln floor to protect it.

KEEP THE OUTSIDE OF THE KILN CLEAN. It is easier to clean before burning contaminants onto the stainless jacket. Use glass cleaner when kiln is cool.

LID BRACE: Be aware of lid brace operation every time the kiln is fired. Replace lid brace if it becomes bent, or does not function perfectly. WARNING - Do not use kiln if lid brace is not in perfect operating condition. This part must be replaced with a new one from Cress Kiln for your exact model. A brocken lid brace is not repairable.

LID BAND: Tighten lid band when necessary. The normal differential expansion and contraction of the brick and lid band cause a gradual loosening of the lid band. Replace lid band if bent or corroded with a new one from Cress Kilns. Never attempt to repair a lid brace or substitue a lid brace. Replace a lid brace with a new genuine Cress lid brace for the Cress model that you have.

Stainless Steel Case: Ordinarily the case does not need tightening from normal use, but tighten if needed. If the case becomes corroded or damaged, replsce with a brand new case from Cress Kilns.

INFINITE POWER SWITCH: Replace switch if it fails, is damaged or fails to operate with an exact duplicate. Temperature as well as current and voltage specfication must be maintained for your safety.

CORD: Check the cord and cord plug every month for heating. If cord or cord plug becomes hot during firing, replace cord and wall receptacle. Check cord for heat near wall plug after the kiln has been firing for over three hours. Have a licensed electrician replace the entire cord and plug with a CRESS cord and replace the receptacle to make sure the heat specification as well as the amperage and voltage specifications are met. Do not unplug by pulling on cord; pull on cord cap (plug) only when unplugging.

TUBE ASSEMBLE: Replace the Kiln Sitter tube assembly is the end breaks or chips near the cone supports.

REPLACE THE KILN SITTER ROD if it becomes bent even slightly.

KEEP YOUR KILN IN PERFECT OPERATING CONDITION. NEVER FIRE ANY KILN UNLESS IT IS IN PERFECT OPERATING CONDITION.

GLOSSARY

BISQUE - Any fired undecorated clay object.
CERAMICS - a general term applying to any fired piece of clay material.
CHINA - A translucent high fire ceramic body.
CLAY - Earth that is relatively pure silica and alumina; usually a blend of different clays and minerals, combined to achieve various effects and different properties.
CONE - see pyrometric cone.
CRATERING - Imperfections in glaze caused by rapid cooling, which "freezes" bubbled glazes before they can smooth out, leaving pits.
CRAZING - A network of hairline cracks in a glazed surface which appears after firing.
DECAL, CERAMIC - A design or picture, usually overglaze, which is applied to and fired onto the ware.
DRY-FOOTING - Wiping glaze off of the base of objects before firing. This is an alternative to stilting glazed ware to keep the piece from sticking to the shelf when firing.
EARTHENWARE - Porous ware made of low fire clays.
ELEMENTS - Coils of wire having high electrical resistance and resistance to high temperatures which serve to convert electrical energy to heat in the kiln.
ENAMELING - Application of finely ground colored glass to metals (usually copper or silver) resulting in a glaze-like finish after firing.
FIREBRICK - refractory blocks used in making the insulating firing chamber of the kiln.
FIRING - Applying heat to ceramic materials to cause a change in their chemical composition (see maturity).
FIRING CHAMBER - The space in the interior of the kiln where the ware is heated.
FURNITURE, KILN - See KILN FURNITURE.
GLAZE - Finely ground glass, suspended in liquid, applied to ceramic ware to give it a glossy (usually) glass-like surface when melted by firing.
GREENWARE - Any unfired clay object.
HIGH FIRE - Firing to very high temperatures; anything over cone 4. Commonly (cone 6) used with porcelain and stoneware.

KILN SITTER® - A mechanical device for shutting off the kiln at the desired temperature using pyrometric cones. It is intended for consistent controlled firing. This device does not always shut off due to operator induced mechanical variables and must be checked manually.
KILN WASH - Kiln wash is a refractory material that is used as a coating on parts of the kiln and kiln shelves to prevent ware or glazes from adhering to them. It is usually purchased as a dry powder, and then is mixed with water to the consistency of heavy cream and applied with a brush.
LIMIT TIMER - Primarily a safety shutoff device (backup) which turns off the kiln should the kiln sitter fail. It operates strictly by time, rather than temperature and does not exclude the requirement to attend the kiln when firing. This safety device works best with the Firemate kiln because the firings are so repeatable that the set time can be set close to the expected firing time.
KILN FURNITURE - Kiln furniture consists of shelves and posts (available in a variety of shapes and heights). They are used so that ware may be fired in several layers to take full advantage of the space in the firing chamber of the kiln. Kits containing the most commonly needed assortment of furniture for each kiln model are available.
LOW FIRE - Ware fired only to medium temperature as for earthenware, pottery, or terra cotta.
LUSTER - An overglaze giving an iridescent finish.
MATURITY - The point at which bisque is completely fired and glazes reach the intended smooth, glassy state.
NESTING - Stacking one piece of greenware inside another, a technique used in loading for bisque firing.
OHMMETER - An electrical measuring device for measuring electrical resistance. This is used to check elements for aging or an open circuit.
OVERGLAZE - Decorative material applied on top of a glazed surface. Examples are decals, gold and other metallics, lusters, and china paints. They are always low fired (cone 018 to cone 014)
PEEPHOLE PLUG - A piece of refractory material used to close the peephole.
PINHOLES - Imperfections in a glazed surface characterized by tiny holes.
PINS - Short pieces of high temperature wire used to anchor elements in place.
PORCELAIN - A type of clay body which becomes vitreous and translucent when high fired.
POST - Columns of refractory material used to support shelves in the kiln. They are available with square, triangular or circular cross sections and in many different heights.
PYROMETERS - This is an excellent device to measure the progress of a firing and temperature profile of a kiln.
A pyrometer consists of a temperature-sensing device (thermocouple) in the kiln connected to a meter on which the temperature in the kiln is displayed. It is useful in showing how rapidly the kiln is heating and in warning when the desired temperature is neared. It is especially valuable when firing glass, which is sensitive to differences in temperature of only a few degrees. Do not use a pyrometer as a substitute for cones. A pyrometer measures only air temperature - and not the time/temperature relationship essential for firing ceramics.
PYROMETRIC CONES - are the most widely used method of indicating temperature in the kiln. They are small elongated-pyramid shaped indicators made of ceramic material especially formulated to melt at various specific temperatures (see methods of temperature indication for a more detailed discussion of cones). They are available in two sizes (large for any location in the kiln and small for use with kiln sitters) and in a wide range of temperatures. They are a measure of temperature / time facturing in the cones slow absorbtion of heat similar to the ware being fired. They do not measure air temperature well, but are a better indication of the ceramic temperature reached after absorbing heat. There are also bar shaped cones for use in the Kiln Sitter. Various types of holders for the large cones are available to insure that they are held uniformly at the correct angle. Also available in some cone numbers are self-supporting large cones with wide bases, which do not require cone holders. Cones are the most accurate measurement method available for firing ceramics, however an electronic control is now available to similate a cones control ability using a time/temperature program.
SHELVES -Slab of refractory material used in the kiln to support ware being fired (see furniture).
SILICA - (SILICAFLOUR, FLINT) a mineral powder used to prevent sticking of porcelain and other high fire clays during firing.
SLIP - Liquid clay used in casting shapes with molds.
SOAKING - Heat treating objects in a kiln by keeping them at a particular temperature for a period of time.

STILTS - Stilts are small (high temperature) metal or ceramic prong supports used to raise glazed or overglazed ware off the kiln shelf to avoid sticking problems. They are available in a wide variety of shapes and sizes.

STONEWARE - A ceramic body which is vitreous but not translucent when high fired. It usually contains a high percentage of grog (fired clay particles) and is usually made of native clays.

TERRA COTTA - natural, low fire red clay.

THERMAL SHOCK - the result of putting ware through sudden changes in temperature.

THERMOCOUPLE - Two wires of different metals which are inserted into the kiln and comprise the temperature sensing part of the pyrometer. It produces a very small voltage in proportion to the difference in temperature between the tip (hot junction) of the thermocouple inside the hot kiln and the cold junction on the outside of the kiln.

UNDERGLAZE - Decorative material applied to greenware or bisque.

VENTING - Allowing air into the kiln and vapors to escape by propping the lid slightly open and sometimes opening the peepholes. Usually done only in the early stages of firing.

VITRIFY - To fully fuse ceramic material to a glass-like state so that it is nonporous and watertight without glazing.

WARE - General term for any shaped ceramic object whether or not it is in a finished state.

WARPAGE - Deformation of ware during firing, usually due to over firing or to improper placement in the kiln.

HRESS FIRING CHART

KILN #

FIRING NUMBER	DATE	CONE NUMBER	SMALL SITTER CONE	LARGE WITNESS CONE			WEIGHT AND TYPE OF LOAD	SAFETY TIMER SETTING	SPEED CONTROL SETTING	TOTAL FIRING TIME		FIRING CONE APPEARANCE			REMARKS
				GUIDE	FIRING	GUARD				HRS	MIN	TOP	MID	BOT	
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															

Junior size cones are intended specifically for use with the Kiln Sitterr (automatic shutoff) mechanism (see section on Kiln Sitterr operation). There will be a difference in the reaction of the cone in the sitterr relative to the large cone of the same number in a holder. The fact that the large cone is heavier, more upright, and bends under its own weight, while the small cone in the sitter is encouraged to bend slightly sooner by gravity and the weight of the Kiln Sitterr rod on top of it. It may be necessary to use a small cone one (or two) number(s) hotter in the Sitterr than the correct large cone number to achieve the desired results. Normally if firing to cone 04 or colder you will need one or two cone numbers hotter in the Kiln Sitterr. If firing to cone 5 or hotter you will normally use a junior cone that is one cone number hotter in the kiln Sitterr. When you get to know your kiln and the typical cone reactions you will be able to achieve consistent firing results.

FIRING CHARTS

It is a valuable practice to keep a written record of each firing, noting the settings, (even the degree of deformation of witness cones and their locations). This firing chart allows you to repeat good results and successful firings and avoid repeating less than satisfactory firing with undesirable results.

LIMITED KILN WARRANTY

Your Cress kiln is warranted for three years from the date of purchase to the original purchaser. If any defects in workmanship or material appear during this time, Cress Manufacturing Company, Inc. will replace or repair defective parts. Written proof of purchase date is required. This warranty is limited to the original purchaser. Warranty repairs are normally handled through the dealer from whom the kiln was purchased. Otherwise, the purchaser may return the defective part to Cress Manufacturing Company, Inc., 4736 Convair Dr., Carson City, NV 89706 along with serial number, model number, voltage, proof of purchase date, and statement of what is thought to be wrong with the product. If a defect is confirmed, a new or repaired part will be shipped, postage paid by Cress Manufacturing Company. A Cress kiln may be returned for warranty work to Cress Manufacturing Company 4736 Convair Dr., Carson City, NV 89706. All transportation costs will be borne by the purchaser. Before shipment, the purchaser will notify Cress Manufacturing Company (phone (775) 884-2777) so that we may help advise in order to keep costs at a minimum, should it not be necessary to ship the entire kiln to us. An RMA (return material authorization) number is required before a return may be accepted. This number must be placed on the outside of the returned part or kiln. Repair or replacement of defective kiln parts shall be considered as complete fulfillment of this warranty. Warranty does not cover overfiring (exceeding the melting temperature of the material being fired) regardless of cause, kilns damaged by transporting, abuse, improper use, reactive materials being fired (i.e. reduction firing, salt firing, or carbon contamination), moisture, contents being fired, improper electrical installation, kilns used for any purpose other than firing ceramic materials, or ware, kiln furniture or contents being over fired. Kiln elements warranted during the 3 year period is limited to one set - the second set is not warranted for any reason.

Cress Manufacturing Company is not responsible for consequential damage to contents being fired. Cress Manufacturing Company does not authorize any wholesaler, retailer, or employee to assume any other obligation or liability in regard to Cress kilns.

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CONE NUMBER	LARGE CONES 60 DEG. C per hour	106 DEG. F. per hour
O22	576 C.	1069 F.
O21	602	1116
O20	625	1157
O19	668	1234
O18	696	1285
O17	727	1341
O16	764	1407
O15	790	1454
O14	834	1533
O13	869	1596
O12	866	1591
O11	886	1627
O10	897	1629
O9	915	1679
O8	945	1733
O7	973	1783
O6	991	1816
O5	1031	1888
O4	1050	1922
O3	1086	1987
O2	1101	2014
O1	1117	2043
1	1136	2077
2	1142	2088
3	1152	2106
4	1168	2134
5	1177	2151
6	1201	2194
7	1215	2219
8	1236	2257
10	1288	2350