

Central Michigan University-North Art Studio Ceramics Handbook 5th Edition
Recommended for Art 210-710 David Bolton NAS Coordinator

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Clay Room //

Clay Mixing with Soldner Mixer

I. Safety First

A. Attire

1. Wear a respirator or dust mask to prevent inhalation of dust.
2. Wear skid resistant shoes (example: sneakers).
3. Tie hair back.
4. Do not wear loose clothing that can be caught in mixer.

B. Operation

1. Be sure to turn on vents (yellow light will come on when vent is on).
2. Do not operate mixer with lid open.
3. Keep foreign objects such as your HAND and tools out of mixer when on.
4. Stay away from chain, gears, and the tub itself.
5. Do not over load mixer, total mix including water should not exceed 250lbs.

C. Lifting

1. Use your legs to lift not your back. Do not lift with your body bent over using just your arms.
2. Ask for help if you need it. Some clay bags are 100lbs.

D. Questions

- If you are not 100% sure of how to operate any equipment, ask the person in charge at the time you are mixing clay (example: your instructor or the Studio Tech.).

E. Cleaning

1. Take preventive measures by washing or wiping off hands before touching switches to lights, vents, clay mixer, wet vacuum, etc.
2. Return unused portions of clay materials to their storage location.
3. Fold open bags over. Put lids on reclaim barrels.
4. Put clay that you are not purchasing on gray shelves.
5. Clean out mixer, wipe down mixer, wash tools, wet vacuum floor.
6. Take empty bags to dumpster.

II. Signing Up

A. Clay Mixing Calendar

1. If mixing at non-class times, be sure to signup for a time slot.
2. If mixing during class, make sure the class itself is not mixing at that time.

III. Material Safety Information

- Hazards of specific ceramic materials can be found on the door of Storage Room 113. [A Ceramist's Guide to the safe Use of Materials](#) by Nancy Seegar and the [Material Safety Data Sheets](#) (MSDS) give information on specific glaze ingredients.

IV. Clay Mixing

With Water: *Use recipes for mixing with water on STANDARD CLAY RECIPES SHEET.*

1. Turn on vents.
2. Fill the mixer with water until there is approximately 4" of water. If using the old mixer the rudder coming from the center of the mixer will be completely submerged.
3. Let the clay in the mixer **slake** down. Also be sure to **slake** the clay on sides and on the rudders. An easy way to do this is to spray down the sides as you fill the mixer with water.
4. Weigh out and add the first ingredient from the recipe sheet, shut lid, and turn on mixer.
5. Weigh and add the rest of the ingredients through the screen in the order as they are listed on the recipe sheet. Be sure to check off the ingredients as you put them in. The second column gives you an idea of how many bags and scoops are needed to make the batch. The third column gives the actual amount in pounds. The last column has the ingredients measured by the scoop to make it easier to add a small amount to stiffen up the clay.
6. Periodically check the clay to see if it is the right consistency. If the clay becomes too stiff, trickle water through the grate towards the center while mixing. If the clay is too wet, add more dry clay by the scoop. It is better that the clay is on the wet side in the beginning. It is always easy to add dry clay, but very difficult to add water to dry stiff clay.
7. Let the mixer mix at least 15 minutes after the last ingredient was added.
8. Remove all clay from mixer and weigh out 25lb. Bags.
9. Clean out mixer thoroughly. Put clean clay chunks that are too dry into slip barrel. Be sure to break them up into small pieces.
10. Clean up area around clay mixer by using broom and sweeping compound and then mopping or by wet vacuuming. Clean tools and return them to cabinet.
11. Remove empty raw material bags to the Dumpster.

With Reclaim: *Use recipes for mixing with reclaim on STANDARD CLAY RECIPES SHEET.*

1. Turn on vents.
2. Dampen the mixer using the water hose; this will **slake** the dry clay in the mixer. Be sure to **slake** the clay on sides and on the rudders.
3. Put approx. 5 inches of **reclaim** into the mixer. Be sure to run your fingers carefully through the **reclaim** checking for foreign objects such as ribs and sponges.
4. Weigh out and add the first ingredient from the recipe sheet, shut lid, and turn on mixer.
5. Weigh and add the rest of the ingredients through the screen in the order as they are listed on the recipe sheet. Be sure to check off the ingredients as you put them in. The second column gives you an idea of how many bags and scoops are needed to make the batch. The third column gives the actual amount in pounds. The last column has the ingredients measured by the scoop to make it easier to add a small amount to stiffen up the clay.
6. Periodically check the clay to see if it is the right consistency. If the clay becomes too stiff, trickle water through the grate towards the center while mixing. If the clay is too wet, add more dry clay by the scoop. It is better that the clay is on the wet side in the beginning. It is always easy to add dry clay, but very difficult to add water to dry stiff clay.
7. Let the mixer mix at least 15 minutes after the last ingredient was added.
8. Remove all clay from mixer and weigh out 25 lb. Bags.
9. Clean out mixer thoroughly. Put clean clay chunks that are too dry into slip barrel. Be sure to break them up into small pieces.
10. Clean up area around clay mixer by using broom and sweeping compound and then mopping or by wet vacuuming. Clean tools and return them to cabinet.
11. Remove empty raw material bags to the Dumpster.

STANDARD CLAY RECIPES

*recipes for mixing with water

*recipes for mixing with reclaim

STONEWARE

Ingredient	by Bag	by Lbs.	by Scoop
HAWTHORN BOND FIRE CLAY	3/4 BAG	38	1 1/8
GOLD ART STONEWARE CLAY	1 1/2 BAGS	75	2 1/2
OM#4 BALL CLAY	1 1/2 BAGS	75	3
CUSTER FELDSPAR		20	1/2
GROG		5	
TOTAL		213	

STONEWARE

Ingredient	by Bag	by Lbs.	by Scoop
HAWTHORN BOND FIRE CLAY	3/4 BAG	19	1 1/8
GOLD ART STONEWARE CLAY	1 1/2 BAGS	38	2 1/2
OM#4 BALL CLAY	1 1/2 BAGS	38	3
CUSTER FELDSPAR		10	1/2
GROG		3	
TOTAL		108	

TERRACOTTA

Ingredient	by Bag	by Lbs.	by Scoop
RED ART EARTHENWARE CLAY	2 BAGS	100	3 1/3
OM#4 BALL CLAY	1 BAG	50	2
GOLD ART STONEWARE CLAY	1 BAG	50	1 2/3
SILICA		5	1/8
TOTAL		205	

TERRACOTTA

Ingredient	by Bag	by Lbs.	by Scoop
RED ART EARTHENWARE CLAY	2 BAGS	50	3 1/3
OM#4 BALL CLAY	1 BAG	25	2
GOLD ART STONEWARE CLAY	1 BAG	25	1 2/3
SILICA		3	1/8
TOTAL		103	

BROWN WOOD-FIRE CLAY

Ingredient	by Bag	by Lbs.	by Scoop
GOLD ART STONEWARE CLAY	2 BAGS	75	2 1/2
OM#4 BALL CLAY	2 BAGS	75	3
RED ART EARTHENWARE CLAY	3/4 BAG	37.5	1 2/3
CUSTER FELDSPAR		9.4	1/4
SILICA		9.4	1/4
TOTAL		206.3	

BROWN WOOD-FIRE CLAY

Ingredient	by Bag	by Lbs.	by Scoop
GOLD ART STONEWARE CLAY	2 BAGS	50	2 1/2
OM#4 BALL CLAY	2 BAGS	50	3
RED ART EARTHENWARE CLAY	3/4 BAG	25	1 2/3
CUSTER FELDSPAR		6.25	1/4
SILICA		6.25	1/4
TOTAL		137.5	

Note: Add approx. 4" of water to mixer.

Note: Add 5" of reclaim to mixer.

Wetness of mix may vary. If too wet add ingredients by the scoop.

If too dry trickle in water with hose towards the middle of the mixer through grate while mixer is on. Be sure to label Wood-Fire Clay so the bags will not be mistaken for Terracotta.

High Fire Stoneware Glazes

Δ9

Blue Celadon

Custer Potash Spar	4100
Wollastonite	2700
Dolomite	500
Grolleg China Clay	1300
Flint	1900
Red Iron Oxide	50

C. B. Yellow

Custer Potash Spar	4800
EPK	3000
Dolomite	2640
Whiting	480
Rutile (4%)	436.8
Bentonite (2%)	218.4

Copper Red

Kona F-4 Soda Spar	5760
EPK	200
Flint	3600
Whiting	360
Gerstley Borate	1200
Dolomite	1200
Zinc Oxide	240
Barium Carbonate	600
Tin Oxide	360
Copper Carbonate	100

Gustin Shino

Neph. Syenite	4500
Kona F-4 Soda Spar	1100
Spodumene	1500
Ball Clay	1500
EPK	1000
Soda Ash	400

Hennessy Blue Celadon

Custer Potash Spar	4400
Wollastonite	2000
Dolomite	400
Grolleg China Clay	1200
Flint	2000
Red Iron Oxide	500

Jimi Hendrix Blue

Custer Potash Spar	6350
Whiting	1950
EPK	1690
Rutile	400
Cobalt Carb	75
Bentonite	200

Mary's Cobalt

Custer Potash Spar	3500
Flint	3000
EPK	1500
Whiting	2000
Cobalt Carb.(3%)	300

Oil Spot Black

Custer Potash Spar	6600
Dolomite	500
Whiting	600
EPK	500
Flint	1700
Red Iron Oxide	800
Cobalt Oxide	200
Double if using Cobalt Carb.	
Bentonite (2%)	400

Shaner's Red

Custer Potash Spar	4570
Talc	370
EPK	2150
Bone Ash	350
Whiting	1870
Red Iron Oxide	540
Bentonite	190

Spodumene

Custer Potash Spar	2830
Spodumene	1890
Dolomite	2120
EPK	2360
Tin Ox	235
Zircopax	282
Whiting	330

High Fire Stoneware Glazes

Δ9

Staley's Green

Custer Potash Spar	5000
Whiting	1500
EPK	1300
Dolomite	200
Flint	2000
Copper Carb	800
Bentonite	200

Temmoku

Custer Potash Spar	5046
Flint	1837
Whiting	1441
EPK	651
Red Iron Oxide	968
Cobalt Carb.	57

Temple Orange

Custer Potash Spar	4800
Cornwall Stone	1700
Whiting	1700
Ball Clay	900
EPK	600
Zinc Oxide	300
Bentonite (2%)	200
Red Iron Oxide (6%)	600
Rutile (4%)	400

Transparent

Custer Potash Spar	3500
Flint	3000
EPK	1500
Whiting	2000

Temple White

Dolomite	1970
Whiting	260
Custer Potash Spar	3510
Om # 4 Ball Clay	2260
Flint	2000
Zircopax	1000

Low Fire Glazes

Δ04

Jacques Matt Base	Δ04
Gerstley Borate	38
Lithium Carb	10
Neph Sye	5
EPK	5
Flint	42
Bentonite	1
Total	101

Colors for Jacques Matt

Flasho Pink	3%	Rutile
	10%	Tin Oxide
Green/Green	2%	Copper Carb
	1%	Chrome Ox
Black	6%	Copper Carb
	2%	Chrome Ox
	2%	Cobalt Carb
Grey Blue	4%	Iron Chromate
	0.5%	Cobalt Carb
Peacock Blue	3%	Copper Carb
Dark Blue	3%	Cobalt Carb
Yellow	2%	Vanadium
	2%	Yellow Ochre
White	10%	ZircoPax
Orange	10%	Golden ambrosia Mason Stain
Brown-Orange	7%	Burnt Orange Mason Stain

Low Fire Glazes

Δ04

John's Soda Blue Base Δ04

Frit 3110	76.3
Gerstley Borate	5.7
EPK	7.1
Flint	10.0
Bentonite	1.0
Total	100.1

Colors for John's Soda Blue

Turquoise	3%	Copper Carb.
Dark Turquoise	6%	Copper Carb.
Blue	4%	Copper Carb.
	0.5 (1/2) %	Cobalt Carb.
Lime	2%	Copper Carb.
	0.125 (1/8) %	Chrome Oxide

Worthington Clear Base Δ04

Gerstley Borate	55
Flint	15
<u>EPK</u>	<u>30</u>
Total	100

Colors for Worthington Clear

Amber	6%	Burnt Umber
Green	6%	Copper Carb.
Straw	6%	Rutile

Note: Copper weakens glaze and is susceptible to acids. For food containers never use more than 1% Copper in a low fire glaze.

Low Fire Glazes

$\Delta 04$

Majolica ware consists of applying the white glaze over bisque ware (usually terracotta) and then painting over the white glaze with overglazes in various colors. The work is then fired to $\Delta 04$ to make the glaze hard and glassy. For more information and history look up majolica in your textbook. A contemporary artist that uses majolica is Linda Arbuckle.

Majolica White

$\Delta 04$

Frit 3124	83.40	8340
Ball Clay	8.30	830
EPK	8.30	830
	100.00	10000 5 gal. batch
+ Zircopax	15.00	1500

Majolica Overglaze

Frit 3124	60 grams
Mason Stain	30 grams
CMC Gum	5 grams (may use 10 grams to help suspend Overglaze)
	95
Hot Water	200 ml

Dry mix all ingredients thoroughly and then add to the 200 milliliters of hot water, blend together until smooth. Strain Overglaze into container.

Stains & Oxides

Turquoise	6221
Ivy Green	6223
Crimson Red	6006
Medium Blue	6313
Praseodymium Yellow	6450
Black	6600
Straw	Rutile
Red Iron	Red Iron Oxide

Other colors can be attained with use of other Mason stains.

Low Fire Slips

Δ04

DISCRIPTION & DIRECTIONS FOR USE

Slip or **engobe** is basically clay suspended in water for the purposes of applying decoration on the surface of unfired clay. Usually slip contrasts the color of the clay it is applied and has colorants. Apply slips to wet to **leather hard** clay. The slip should be the consistency of pancake batter so it can be brushed on. Other consistencies are possible for spraying, dipping, and slip trailing. (You must make your own slip, if you wish to have thicker or thinner slip. Do not alter the class slips.) Some common techniques used with slips are **mishima** – inlaying slip in carved out areas of the clay, **sgraffito** – carving through a layer of slip revealing the clay underneath, and **slip trailing** – using a squeeze bottle to apply lines of slip. After your work has been bisque fired glaze your work with a low-fire clear glaze.

Low Fire Slip Δ04 for leather-hard application

Talc	15	300
Frit 3124	10	200
Nepheline Syenite	15	300
Ball Clay (OM#4)	40	800
EPK	20	400
Total	100	2000 gram batch

Colors for Low Fire Vitreous Slip

<u>Color</u>	<u>%</u>	<u>per 2000g batch</u>	<u>Colorant</u>
Turquoise Green	12%	240g	6221 Mason Stain
French Green	15%	300g	6219
Cobalt Blue	3%	60g	Cobalt Carb.
Green Chrome	5%	100g	Chrome Ox. Green
Green Copper	5%	100g	Copper Carb.
Grey	10%	200g	6907
Golden Brown	12%	240g	6103
Praseodymium Yellow	15%	300g	6450
Vanadium Yellow	15%	300g	6404
Pink	20%	400g	6020
Salmon	15%	300g	6031
Orange	18%	360g	6402
Black	15%	300g	6600

Terra Sigillatas

Δ04

DISCRIPTION & DIRECTIONS FOR USE

Terra Sigillata (earth seal) is made of the smallest clay particles that can be easily burnished to a shine. It is applied to **greenware** that is almost **bone dry** (moisture in clay is still visible, but the clay is no longer flexible). TS is usually brushed on but it can be sprayed, dipped, etc. as long as the piece is not saturated with water. After TS is applied it can be burnished until shiny sealing the clay. It is common to pit fire TS pieces since the clay is still porous and easily effected by the reduction. For more information and history, look up Terra Sigillata in your textbook.

MIXING

Basic Formula (for 1 gallon)

	14 cups	Water
	6 grams	Calgon, Darvan #7, Trisodium Phosphate (water softener)
	1500 grams	Clay (including colorant)

Step One

Method A: Add dry ingredients to water in a gallon glass jar. Shake vigorously for 2 minutes, making sure all particles are suspended.

Method B: Add dry ingredients to water in a porcelain ball mill jar. Put in porcelain balls to fill 25% of jar's volume. Grind for 6 to 8 hours, then pour the slip through a sieve to catch balls into a gallon glass jar.

Step Two

Let slip settle undisturbed for at 36 hours. Siphon off any clear water and discard. Then siphon off the top third to half of the unsettled slip. The sludge at the bottom are the larger particles that will not burnish well, discard this also. The middle section of fine particle slip is the "Terra Sigillata".

TS Base Colors

*White

Ball Clay 1500

Hard White

EPK 750

Ball Clay 750

*Off White

Ball Clay 1400

Red Art 100

*Orange Red

Red Art 1500

Salmon Red

EPK 650

Ball Clay 750

Yellow Iron 100

*Black

Redart 1200

Mang. Diox. 80

Cobalt Carb. 140

Copper Carb. 80

Colorants

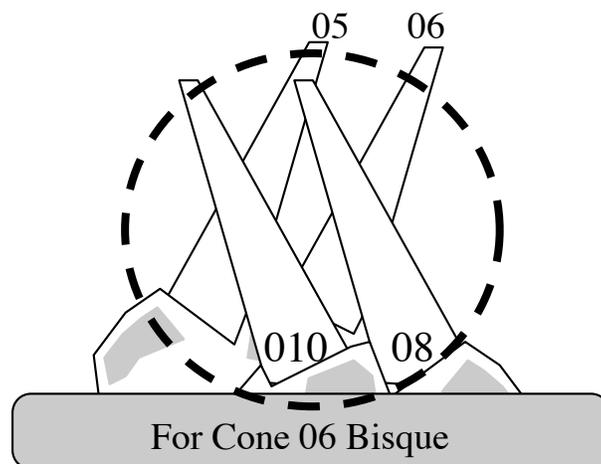
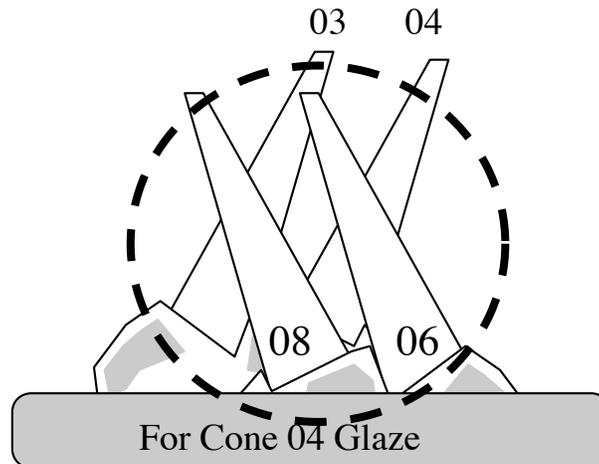
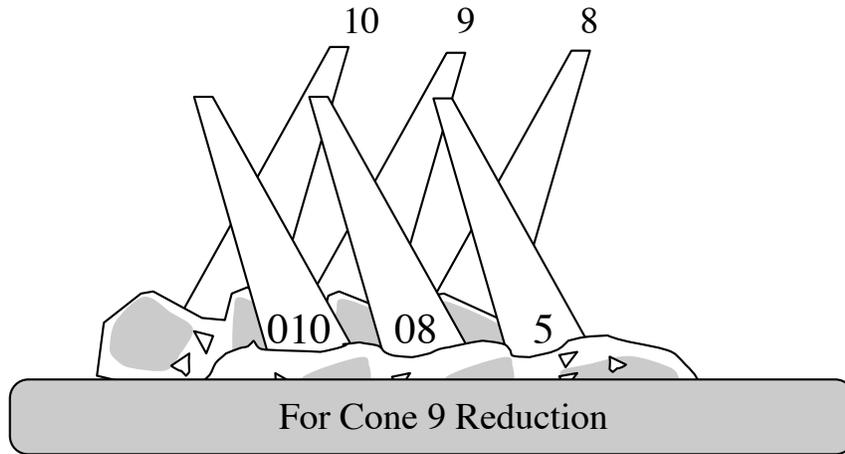
*Add to one cup ball milled **White TS***

<u>Color</u>	<u>Mason St. #</u>	<u>Teaspoon</u>
*Sky Blue	6363	2 tsp
*Pr. Yellow	6450	3 tsp
*Lavender	6319	2 tsp
*French Green	6219	2 tsp

Note: Other Mason stains can be added to White TS for more colors

*Terra Sigillatas that are maintained in the glaze room.

Official CMU Cone Pads



Note: You may vary your cones if you are firing to a different temp: cone 04 or 08 bisque, cone 6 glaze, etc.

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TABLE OF ORTON STANDARD CONES AND TEMPERATURES

Temperatures apply to large cones heated at the rate of 270 degrees F per hour in an air atmosphere.

<i>Cone</i>	<i>°C</i>	<i>°F</i>	<i>Color</i>	<i>What Happens to Clay</i>	<i>Type of Ware and Glazes</i>
	0	32		Water freezes	
	100	212		Water boils	
	470	878	Visible	Lowest point where red glow can be seen in the dark	
	573	1063		Quartz Inversion	
O22	605	1121		Lowest cone temperature	Metallic lusters (gold, platinum, etc.)
O21	614	1137			
O20	635	1175			
O19	683	1261			Overglaze colors or enamels
O18	717	1323	Dull		
O17	747	1377	Red		
O16	792	1458		Organic matter burns out	
O15	804	1479			
O14	838	1540			
O13	852	1566			Inglaze lusters
O12	884	1623	Cherry		
O11	894	1641	Red		Raku
O10	905	1661		Body reduction started	Chromium red glazes
O9	923	1693	Dark		Low-fire lead glazes
O8	955	1751	Orange	Kiln kept in neutral	Low-fire bisque
O7	984	1803			Low-fire earthenware
O6	999	1830			
O5	1031	1888		Some red clays mature	Average bisque
O4	1060	1940	Orange		
O3	1101	2014			Earthenware
O2	1120	2048		Buff clays mature	
O1	1137	2079	Dark		
1	1154	2109	Yellow		High-fire earthenware
2	1162	2124			Semi-vitreous ware
3	1168	2134		Some red clays melt	Sanitary ware
4	1186	2167	Yellow		Bone China glazes
5	1196	2185		Glaze reduction	Low-fire stoneware
6	1222	2232	Bright	Stoneware clays mature	Salt glazes
7	1240	2264	Yellow		
8	1263	2305			Stoneware
9	1280	2336			China bodies--bisque
10	1305	2381			
11	1315	2399	White	Porcelain matures	
12	1326	2419			Porcelain
13	1346	2455			
14	1366	2491			

Getting work Fired & Signing-up to Fire

1. In the glaze room there is a ware cart station. The **to be Bisqued** carts are for placing **bone-dry greenware** pieces and the **to be Low Fired** and **to be High Fired** carts are to be loaded with bisque pieces that have been glazed.
2. **Do not put low fire pieces on the High-Fire cart and do not put High Fire pieces on the Low-Fire cart.** Low-fire clay, red terra cotta, along with the low-fire glazes will melt all over the kilns if fired to high temperatures. High-fire glazes will not mature at lower temperatures and will have to be fired again. Also, if you do not put your work on the carts, your pieces will never get fired.
3. The carts in the glaze room will be moved to the kiln room when filled. The work will be loaded into the kilns and fired. The Studio Coordinator, your instructor, or advanced students will fire the kilns. Beginner students will assist others in firing to learn the process. Advanced students will fire their own work after passing the kiln test. When firing your own work, you must sign up to use a kiln on the **Kiln Sign-up Calendar** in kiln room. There will be no firings on weekends or holidays. If a Professor, instructor, or Studio Coordinator cannot be present while you are firing, you may not fire a kiln. Your likelihood of learning about kilns and **your grade depends on you participation in kiln firing.**
4. When you load and fire a kiln you may give your work first priority. Sign up for the kiln you wish to use with Instructor's approval on the **Kiln Sign Up Calendar** in the kiln room. Give the following information: type of firing and cone (Δ 06 for example), firer's name(s), and phone #. Also draw a line through the days you will be in the kiln. See Kiln Logs

Kiln Loading (also see pages 17 & 18)

1. Make cone pads if not already made (see standard cone pads for examples). Do this first so they have a chance to dry. Wet cone pads may explode. Place cones in view through the top and bottom peeps as you load. Before loading ware on the shelves with cone pads place a flashlight by the cones so can see the cones after you shut the kiln door. Once you can see all cones through the peeps remove the flashlight and finish loading the kiln.
2. Posts are arranged by size on the kiln post rack where they will be put back in an orderly manner after the firing.
3. The shelves are kept in carts and can be wheeled over to the kiln you are loading. Please keep the carts arranged in an orderly fashion.. **Be careful with the shelves they are heavy and fragile.**
4. Use 3 posts per shelf. The shelf will be supported at its two far corners on one side and the middle of the other side. 2 shelves can be supported by 4 posts. Be sure to use posts that are at least 1/4 inch taller than the tallest piece.
5. Put posts on shelves before loading greenware or glazeware to make sure there will be room for the posts.
6. Stack pieces evenly throughout the kiln for best results.
7. If doing a bisque, the clay pieces can touch. They can be stacked on top of each other, but do not stack heavy pieces on top of fragile ones that may crack. Also do not fit pieces inside of each other, if it is a tight fit. They could shrink at different rates cracking each other.
8. Glaze pieces must not touch. They will stick to each other. **Be sure the bottom of the pieces do not have glazes on them,** this will cause them to stick to the shelf. Also be sure that the pieces do not protrude from the front of the shelves, as the door will hit them when the kiln door is closed. On top loaders a ruler can be placed on top of the kiln to check that the pieces are not higher than the kiln walls allowing you to shut the lid without smashing your pieces.

Kiln Firing (see pages 19-41)

Kiln lighting and firing instructions are given for the various kilns in the NAS. Be sure to refer to the appropriate directions when firing.

Kiln Unloading

Where to Unload

1. Fired work will be unloaded onto the Unload Rack in the Kiln Room. Please remove your work as soon as possible from these shelves. If the pieces are not removed in two weeks they will be thrown away to make room to unload the next kiln load. A sign will be posted stating when the shelves will be cleared. It is your responsibility to put your work on your assigned shelves.
2. If unloading your work take your work to your assigned shelves immediately.
3. If unloading others work put them on the Unload Rack. Be sure you do not leave the work on the carts unless there isn't room on the Unload Rack. If you know to whom the work belongs, help each other out by taking it to their shelves. **Do not put other's work in with previously fired work that has been dated to be cleared away.**

How to Unload

1. After the kilns have cooled down below 400°F you may open the kiln to further cool the kiln for unloading. Turn off vents and make up air unless other kilns are firing.
2. Wear gloves, respirator, and safety glasses when dealing with kiln fiber, dust, and hot bricks, shelves, pieces, etc.
3. As you unload the fired work, place shelves and post that are free of debris in the **Shelf Carts** and on the **Post Rack**. Put posts back in a neat manner with posts of same size. Put shelves back in carts with the same size and shape shelves. There are round and half round shelves for the top loading electrics. There are 12x24" and 11x28 shelves for the kilns with doors. Keep them separate.
4. Use the grinder/sander in the Kiln Room to remove kiln wash from posts.
5. Chip glaze drips off shelves, smooth out surface with brick or black and red sanding block, remove dust, and reapply kiln wash.
6. Vacuum kiln to remove shards from blown up pieces, kiln wash chips, brick dust, etc.
7. Sweep floor using sweeping compound (oily sawdust usually kept by phone and coffee maker between Sculpture and Ceramics).

Warning If pieces are not removed from the Unload Racks within two weeks after unloading, they will be thrown away to make room to unload the next kiln load. **Monitor these shelves for your fired work!**

Loading Side Loading Kilns

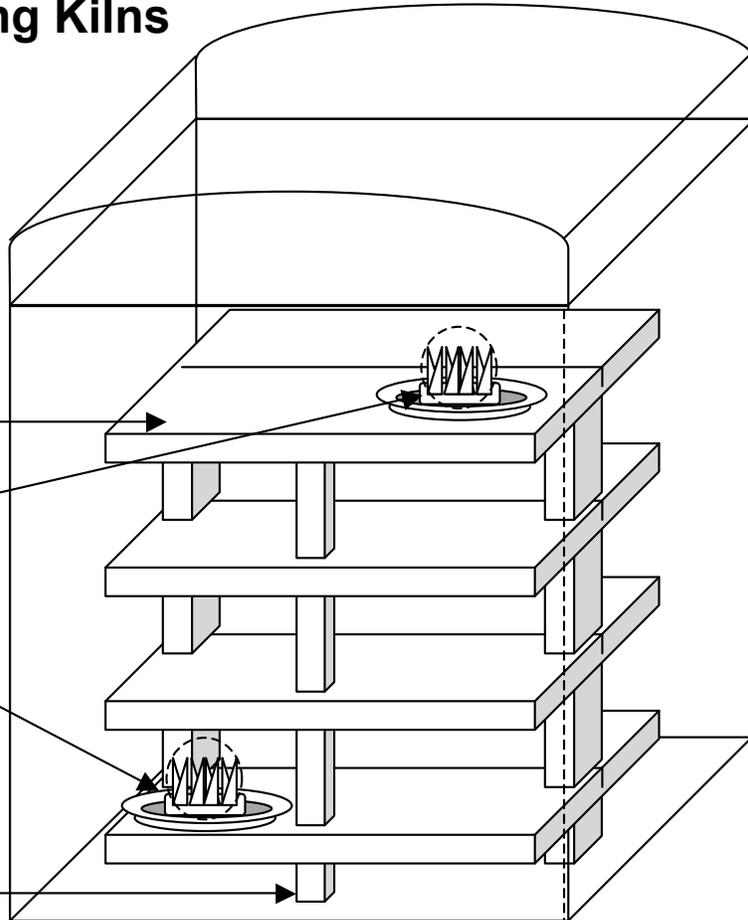
Example of shelf, post, and cone pad placement

Posts must be directly above each other. Set the shelves 1" from the back wall. There should be more space in front between the shelves and the door. Try to load the kiln evenly from top to bottom.

Shelves

Cone pads on tray to catch melting cones

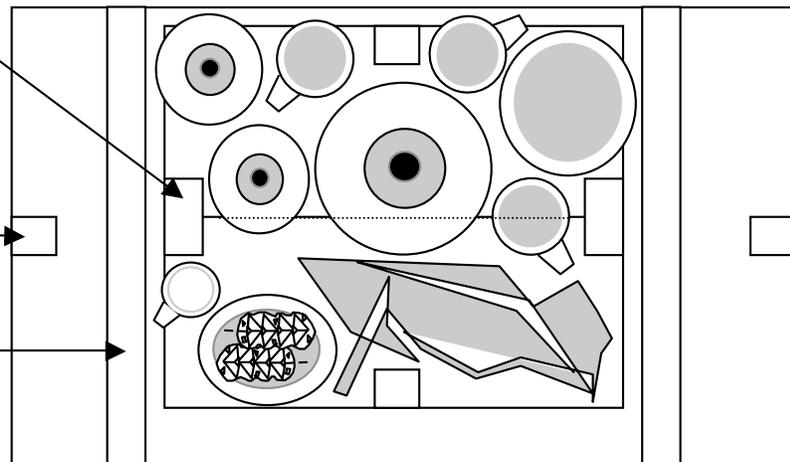
Posts



After posts are in place, load large pieces and then the small pieces around the big pieces.

Target bricks in gas kiln only

Bag wall in gas kiln only

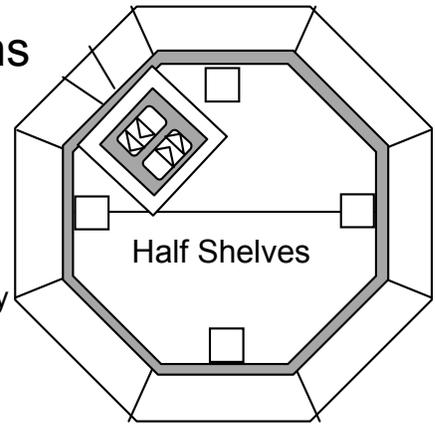


Front

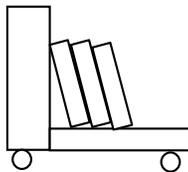
Loading Top Loading Electric Kilns

There are two types of shelves available: **half shelves** and **full shelves**. It is best not to combine the two. As you can see when using the 3 Post method of stacking, you would have to use 4 posts with wadding with the full shelves so the half shelf could be supported by 3 post and still have all posts line up. Using 3 posts allows the shelves to set flat even though one post may be slightly shorter or if a shelf is a little warped.

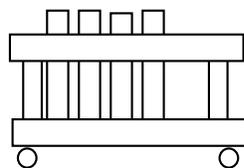
When finished with the shelves put them back on the appropriate cart.



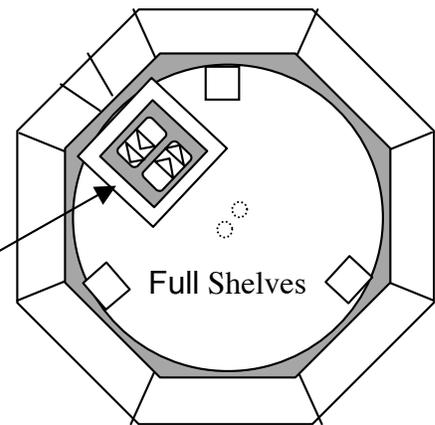
Full Shelves



Half Shelves



Use a clay tray under the cone pads to catch the melting cones that will stick to the shelves.

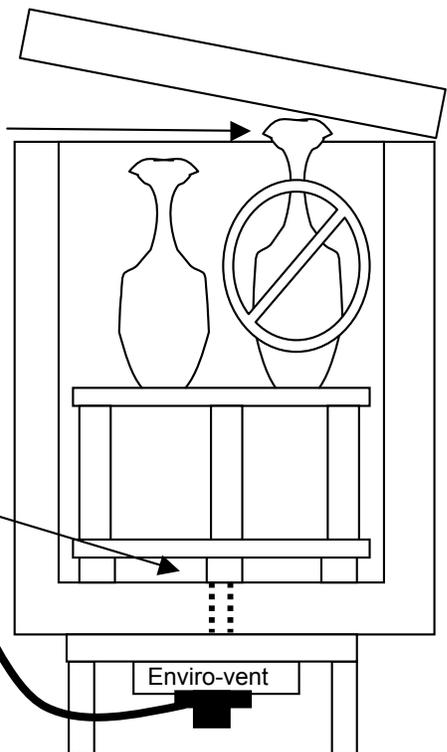


Make sure your pieces are lower than the walls of the kiln, so the lid does not crush your pieces.

Do not lay the first shelf directly on the floor of the kiln. This will block the ventilation holes for the kiln vent.

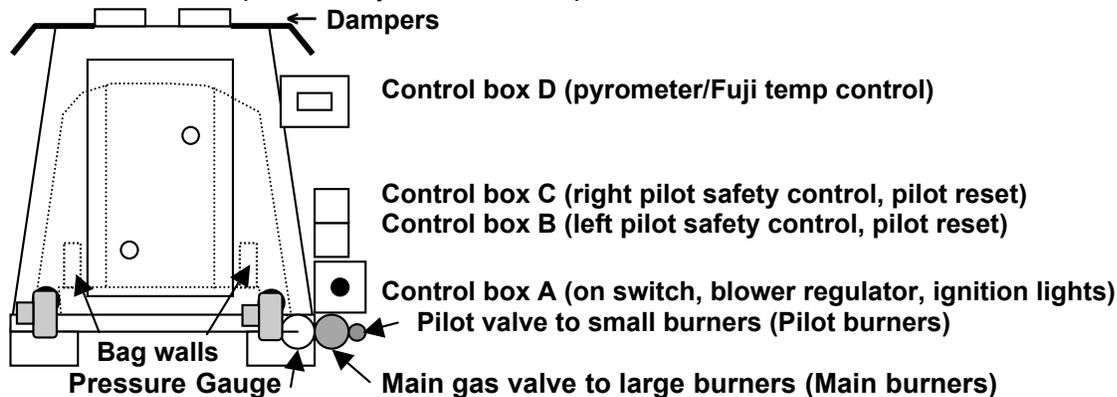
Vent switch to Enviro-vent

Remember to turn on the Enviro-vent and overhead vent for the Evenheat kilns when starting the kiln and to turn them off when you are finished firing. Leave the main vent on if another electric kiln is firing.



Alpine Gas Kiln Lighting Instructions

Turn Supply Fan on if not on in fuse box near floor furnace. Turn on vent marked **ALPINE HF-20** (smaller Alpine) or **ALPINE HF-50** (larger Alpine) to the right of kiln room as you exit kiln room. Kilns are kept locked, you must have permission to fire kilns.



1. First make sure main gas is turned off and that the pilot valve is turned on.
2. Open the damper at least 2 inches.
3. After this is done, **light** a propane torch, turn the toggle switch on **control box A**. The light next to it should turn on.
4. On top of **control box A**, you will see 2 red lights. When the right light comes on, ignite the small burner (pilot) under the big burner on the right, and when the left light comes on, ignite the pilot on the left. Do not place the torch at the pilot burners before their lights come on. After the pilots are on, the blowers and main gas can be turned on. If the control temp (SV) on **control box D** is set above the actual temp (PV) in the kiln. Power is sent to the main gas and blowers when the light marked (C) on **control box D** is on.
Note If the 2 red lights on **control box A** do not come on, reset the small burners (the pilots) at **control box B**. If the left light did not light up, reset **control box C**. If you missed your chance to light the small burners, you must wait 3 minutes before resetting **control box B & C**.
5. On **control box D**, use the up (^) and down (v) arrows to move the target temp above the actual temperature in the kiln. This will allow you to light the main burners. *The kiln will not fire above this target temp. For example, if the arrow is set on 200°F±10°F the kiln's temp. will rise to 200°F±10°F and then shut off the main burners until the temp. falls below 200°F±10°F. The main burners will then turn back on. For example for a high fire you can set it for 1650°F to make sure you do not miss the body reduction. Note: To prevent the kiln from constantly turning off and on the Fuji control is programmed to let the temp climb past the target temp by 10 degrees before it will shut off and to drop 10 degrees below the target temp before it comes back on. Also be aware the temp reading will continue to climb past the target temp since it takes longer to heat the thermocouple than the air inside the kiln.*
6. Turn the blowers up to 20% on **control box A**, and turn the gas on with Main valve up to a 1/2 wc inch. on the pressure gauge and turn it back down to 1/8. You can also adjust the air with the covers on the blowers. *Read warning if firing a bisque.*
7. The kiln is now firing. Consult Firing Standards, past kiln logs, your instructor, or NAS Coordinator on firing.

To shut kiln down: Turn off toggle switch on **control box A**, turn main gas and pilot gas valves to their off positions, and then close the damper. **Control box D** stays on so you can read the temp. **Control box D** will shut off if the key switch or the exhaust vent are turned off.

Warning: If you are firing a bisque in a gas kiln, great care must be taken not to blow up work. Set **control box D** above 300°F to prevent the blowers from shutting off. Light the pilot burners only, leave the main gas off with blowers running at 100%. Shut the kiln door and leave the damper at 1/2". This will build a gentle heat in the kiln.

Alpine HF-20 Gas Kiln Bisque Firing Instructions

Note: This sheet gives you a general idea of what the settings should be. Each firing will be different depending on the fullness of the kiln, the weather, etc.

Sign up to use the kiln on the Kiln Sign-up Calendar in the kiln room. Ask the Studio Coordinator to unlock the kiln. Document your firing using a firing chart. See the Standard Kiln Logs for an example.

After the kiln is loaded:

- Set **control box D** above 300°F to prevent the blowers from shutting off. Light the pilot burners only, leave the main gas **off** with blowers running at 100%. Shut the kiln door and leave the damper at 1/2". This will build a gentle heat in the kiln.

In the morning:

1. Set **control box D** to 1900°F to let the kiln continue to rise in temperature.
2. Turn the gas up to 1/2 WCI and the air at 30% with the flaps on the blowers 1/2 open to light the main burners and then turn the gas back down to 0 (gas is not off just on very low). You will see the flames shorten until they just barely reach the top of the bag wall, the bricks inside between your pieces and the flames. The flames are short and hot because the amount of gas compared to the amount air is low.
3. Put the peephole plugs in.
4. Let the kiln ride for two hours for a slow rise in temperature.

Every hour:

1. Check the kiln and document the firing.
2. Turn the kiln up in 1/2 or 1/4 increments. Also be sure to increase the air accordingly. There is no need to turn up the gas past 2 for a bisque firing.
3. Check the damper if the kiln is reducing open the damper if the kiln is still very uneven close the damper, but not less an 1/2 an inch.
4. Check your cones through the peeps, after the first cone has gone down check every 15 minutes.
5. Wait until all cones have gone down except the last cone. It is acceptable to turn off the kiln after 08 has fallen on top and bottom in a bisque, but is best to bisque terracotta to cone 04 and stoneware to cone 06.

To shut kiln down:

- Turn off toggle switch on **control box A**, turn main gas and pilot gas valves to their off positions, and then close the damper. **Control box D** stays on so you can read the temp. **Control box D** will shut off if the key switch or the exhaust vent are turned off.

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Gas Kiln Log

Kiln fired: HF-50			Type of firing: △ 06 Bisque			Cones Used: 010, 08, 06, & 05		
Fired by: Dave Bolton			Phone #: 774-7448			Dates: (load, fire, cool, unload) 3-9-04, 3-10, 3-11, 3-12		
Other Comments: Thick work						Unload Time: Friday 12th at noon		
Int	Hrs	Time	Temp T/B	Gas	Air	Damper	Notes	
DB		6pm	60/60	Pilots	100%	1/2"	Meter set at 300. Main gas off with pilots on.	
DB	1	9am	200/150	Gas on 0	30%	2"	Gas gauge reads 0 but main gas is on. Short flames at bag wall. Meter at 1800.	
DB	2	10	500/175	3/4	30%	1 1/2"	Trying to even out temps by closing damper.	
DB	4	12	725/300	1	50%	1"	Trying to even out temps by closing damper.	
DB	5	1	850/425	2	60%	"		
DB	6	2	1100/675	3 1/2	"	"		
DB	7	3	1300/875	4	70%	"	Blowers increased speed drastically at 70%. Used flaps on blowers to fine tune blowers.	
DB	8	4	1525/1250	5	75%	1 1/4"	Some flame at top opened damper slightly to get rid of flame.	
DB	9	5	1650/1450	"	"	"	010 down on top	
DB		5:30	1775/1525	"	"	"	08 down on top	
DB	10	6	1850/1600	OFF	OFF	Closed	06 half down on top 010 down bottom. Shutting kiln down to prevent over firing the top.	

Alpine HF-20 Gas Kiln High-fire Reduction Instructions

Note: This sheet gives you a general idea of what the settings should be. Each firing will be different depending on the fullness of the kiln, the weather, etc.

Sign up to use the kiln on the Kiln Sign-up Calendar in the kiln room. Ask the Studio Coordinator to unlock the kiln. Document your firing using a firing chart. See the Standard Kiln Logs for an example.

After the kiln is loaded:

1. Start the kiln and set the gas at 1/2 and the air at 30% with the flaps on the blowers 1/2 open, turn the gas back down to 1/8 (almost down to 0). You will see the flames shorten to just above the bag wall.
2. After the burners are set, close the door and put in the peephole plugs.
3. Leave the dampers (the shelves with handles on top) open 1". Make sure the opening is centered and even from front to back.
4. Also set **control box D** to 1650-1700°F to prevent over shooting body reduction.

In the morning:

1. Move the target temp to 2400°F on the **control box D**. If the kiln is at 1650°F, check to see if cone 010 is down. If cone 010 is not down, turn up the gas to 1 and check the cones until cone 010 is down.
2. When cone 010 goes down, start reducing the atmosphere in the kiln by closing the dampers to 1/2. You will also need to turn up the gas to 3 and the air to 40% to increase backpressure. *You should see yellow purple flames at the top of the kiln and at the top and bottom peeps. You should feel heat coming out of the bottom peep. If air is going in the bottom peep turn up the blowers. Once you have backpressure at the bottom peep you can turn up the gas to get a flame at the bottom peep. If you see black smoke and dark red flames you are reducing too much. If the flames turn blue you are not reducing enough. The flames at the burners will be blue with yellow fingers. This is a reducing flame. If the flame is short and blue, it would be an oxidizing flame. The kiln should not climb in temp. If the kiln climbs a little that is okay, but it should not reach cone 08. If you are past cone 08 you missed the best time for a body reduction. You will notice that the kiln has an odor from the reduction.*
3. **Be aware that a deadly odorless gas (CO) will be produced. There is a carbon monoxide detector on the bulletin board. It has a loud beeping alarm that will go off when the CO level reaches 100ppm or more during reduction. If the CO detector reads near or above 50ppm, open the doors at the end of the kiln room. This will let in fresh air. If the alarm is sounding push the reset button, after opening the doors. Read the posting next to the detector for more information.**

After a half to one hour:

- Take the kiln out of heavy reduction by turning down the gas to 2 and the air up to 50. The flames will turn blue and will be coming out of the flue and barely out of the bottom peep. The kiln is in neutral, a lightly reducing atmosphere. At this point you may leave the kiln as is for 2 hours. Then check every hour.

Every hour:

1. Check the kiln and document the firing.
2. If the kiln stalls or is uneven you may have to make minor adjustments like opening the damper a 1/4" or adjusting the gas or air. If it stalls give the kiln more air by opening the damper or turning up the blower. Increasing air will make the kiln hotter in the bottom. Turning up the gas will make the kiln reduce more and bring the heat to the top. It is hard to catch the top up with the bottom without stalling the kiln.
3. Check your cones through the peeps. After cone 5 has gone down, put the kiln back into reduction (most likely it is already reducing on it's own). This is the glaze reduction. The flames will be green by this time. After cone 8 is down check the kiln every half hour.
4. Wait until all cones have gone down except the last cone. It is acceptable to turn off the kiln after cone 9 has fallen on top and bottom and 10 is soft but still standing.

To shut kiln down:

- Turn off toggle switch on **control box A**, turn main gas and pilot gas valves to their off positions, and then close the damper. **Control box D** stays on so you can read the temp. **Control box D** will shut off if the key switch or the exhaust vent are turned off.

Sprung Arch Down Draft Lighting Instructions

Get permission to fire kiln, kiln will be unlocked. Turn **Supply Fan** on in fuse box near floor furnace. Turn **on vents** marked **SPRUNG ARCH DOWN DRAFT STACK** and **ARCH** vents to the right of kiln room as you exit kiln room.

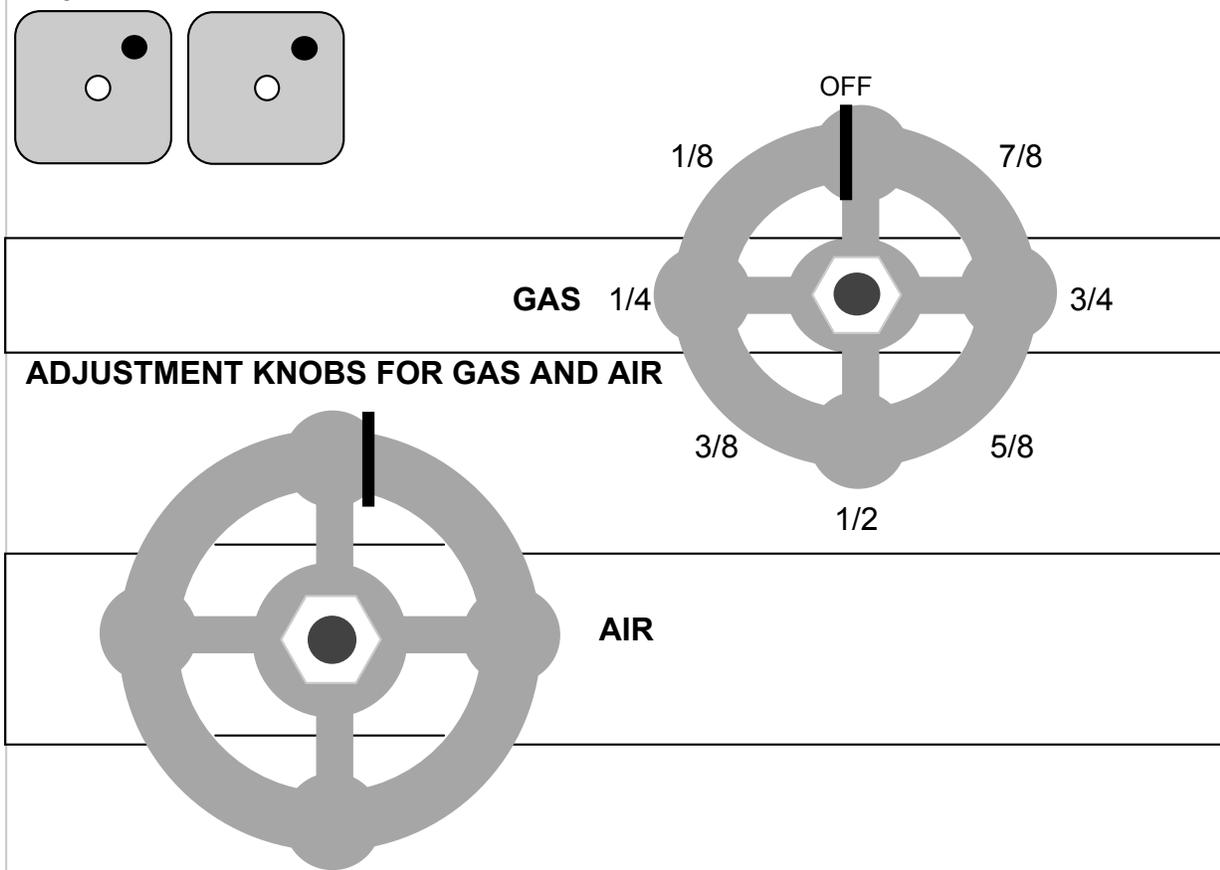
Brick door (see door bricking sheet). If firing a bisque (not recommended) leave the top two or three rows out to dry out work and set controller at 200°F. If firing a glaze, plan ahead and make cone pads in advance and set controller at 1600°F. To continue firing the controller must be moved past the final temp to be reached.

Lighting the kiln (controls are behind the kiln on the left)

1. Make sure controller is set above your desired temp.
2. Open **Damper** at least to 3" open.
3. Turn the gas and air knobs 1 and 1/4 turns from their off positions (1 turn = 360°).
4. Make sure the blower cover is wide open (**NEVER PUT FINGERS IN BLOWER!**)
5. Make sure the controller is set above the temp. you want to reach.
6. Push the **START** button, the blower comes on, the gas solenoid opens, and then the electrodes ignite the burners. (The **STOP** button shuts off kiln. When shutting kiln off turn off gas and air knobs also.)
7. The kiln is now firing. Consult past kiln logs, your instructor, or the NAS Coordinator on firing.

Note: If the kiln did not light reset the safeties by pressing both red reset buttons on the Fireye units. If you tripped the Fireye units you must wait 3 minutes to reset.

Fireye Units



Sprung Arch Down Draft Door Bricking Instructions

After the kiln is loaded, bricking up the door is next. The bricks for the door and peeps have been kiln washed white. Put the bricks back in their proper places after firing the kiln, especially the bricks that are cut to fit the arch. Do not place kiln post on the door bricks or its shelving unit. Put them back on the kiln post shelving rack.

Alternate the bricks starting with 3 full bricks in the inside row with 2 half bricks and 2 full bricks on the outside row. Do the opposite with the next row.

Also alternate the gaps between bricks. If you put them together it makes a clear passage for air and heat to escape. The gaps serve as expansion joints allowing the brick to expand without pushing the doorjamb further apart. Do not wedge small pieces of brick into these gaps. Fiber may be used if necessary.

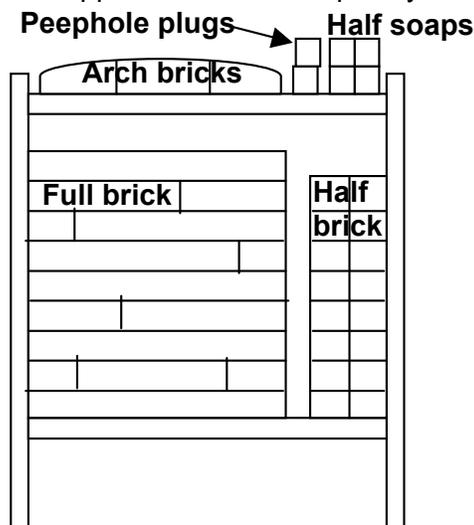
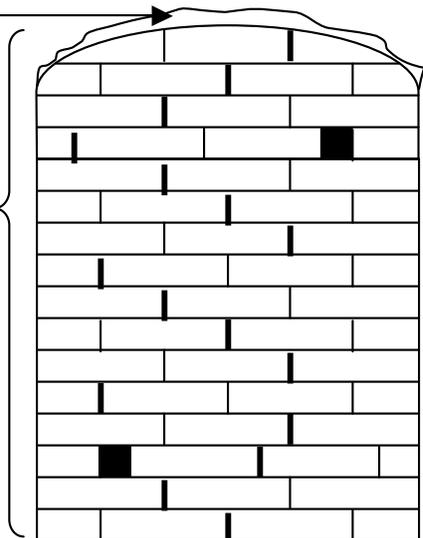
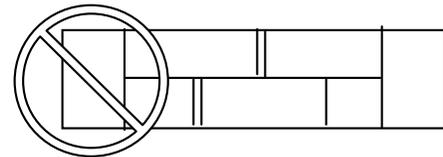
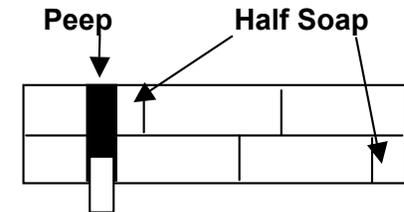
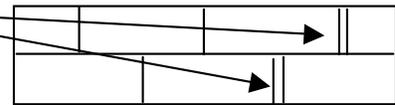
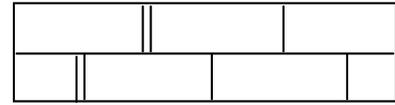
The peeps can be put wherever your cones happen to be. There are half soap bricks (1/4 of a full brick) to deal with the peeps.

Do not span the interior wall and exterior wall with a brick. You should be able to unstack the exterior wall without disturbing the interior wall. This allows you to unstack one layer to help cool the kiln. Also it helps preserve the brick.

Use Kiln Fiber to seal the top of the door. Be sure to wear a respirator, goggles, and gloves when handling kiln fiber. Also wash hands immediately. Put all useable fiber back in its container. Throw unusable fiber in the trash.

This is how the door should appear after it is completely bricked up.

This is how the shelving unit should appear when the bricks from the door are stored there.



Sprung Arch Down Draft Bisque Firing Instructions

Note: This sheet gives you a general idea of what the settings should be. Each firing will be different depending on the fullness of the kiln, the weather, etc. Also, this kiln is not the best kiln to bisque fire. A better choice would be any of the electric kilns or an updraft kiln like the Alpine HF-20.

Sign up to use the kiln on the Kiln Sign-up Calendar in the kiln room. Ask the Studio Coordinator to unlock the kiln. Document your firing using a firing chart. See the Standard Kiln Logs for an example.

After the kiln is loaded:

- Start the kiln in the evening. Set the gas to 1 1/8 turns and the air to 1 1/2 turns. The flames at the burner tips should have a blue cone shaped flame inside a more transparent blue flame. The flame will be short and will not reach beyond the bag wall. Pull the damper out to 4". To avoid blowing up unfired pieces, you may leave the top 2 rows of bricks out overnight to allow moisture to escape and to prevent the kiln from getting too hot.

In the morning:

- Complete the door. Be sure to wear gloves since the air coming out of the kiln will be very hot. Also be sure to wear safety glasses or goggles and a respirator, since you will be stuffing fiber in the top of the door. Leave the top peep out to release any remaining moisture.

After an hour:

- Put the top peep in. If the kiln is reducing (has flames coming out of the peeps or the stack) turn up the air or open the damper.

After the second hour:

- Turn the gas and air up: the gas to 1 1/4 and the air to 2. Close the damper to 3".

Every hour:

- Check on the kiln. If the kiln is very uneven, push in the damper. Make sure the kiln does not go into reduction. If it does, turn up the air or open the damper.
- After the cones start to get soft, which is around 1600°F, monitor the kiln every 15 minutes. Once cone 06 is down at the top and bottom, you may turn off the kiln.

Shutting off the kiln:

- Push the **STOP** button, everything on the kiln will shut off. Turn both knobs to their off positions. Push the damper in all the way. Leave the vent on to draft off the heat of the kiln.

The next day:

- Turn off the vent. To aid the kiln in cooling you may remove the bricks from the front of the door. Be careful, they will be hot. Do not open the second layer until the kiln is below 400°F. It is actually best to leave the kiln alone with a full day to cool off.

Sprung Arch Down Draft High-fire Reduction

Note: This sheet gives you a general idea of what the settings should be. Each firing will be different depending on the fullness of the kiln, the weather, etc.

Sign up to use the kiln on the Kiln Sign-up Calendar in the kiln room. Ask the Studio Coordinator to unlock the kiln. Document your firing using a firing chart. See the Standard Kiln Logs for an example.

After the kiln is loaded:

- Start the kiln in the evening. Set the gas and air to 1 1/2 turns. Pull the damper out to 3" and leave the top peep out. Set the controller to 1650-1700°F to prevent missing the body reduction.

In the morning:

1. Put the top peep in. If 010 is down set the dial on the controller to 2400°F. If 010 is not down, let the kiln continue rising in temperature. If you needed, raise the meter another 50°F and the air to 2 turns.
2. When cone 010 goes down, start reducing the atmosphere in the kiln by turning up the gas. Turn up the gas to 1 3/4 turns and the air to 2 1/8 turns to increase backpressure. *You should see purple flames with a mixture of yellow at the top and bottom peeps. If black smoke is coming out you are reducing too much. If the flames turn blue you are not reducing enough. The flames at the burners will be blue with yellow fingers. This is a reducing flame. If the flame is short and blue, it will be an oxidizing flame. The kiln should not climb in temp. If the kiln climbs a little that is okay, but it should not reach cone 08. If you are past cone 08 you missed your body reduction. You will notice that the kiln has an odor from the reduction.*
3. **Be aware that a deadly odorless gas (carbon monoxide-CO) will be produced. There is a carbon monoxide detector on the bulletin board. It has a loud beeping alarm that will go off when the CO level reaches 100ppm or more during reduction. If the CO detector reads near or above 50ppm, open the doors at the end of the kiln room. This will let in fresh air. If the alarm is sounding push the reset button, after opening the doors. Read the posting next to the detector for more information.**

After an hour:

- Take the kiln out of heavy reduction by turning the gas down to 1 5/8 turns. The desired color of the flame is blue. The flame should be coming out of the top and barely at the bottom peep. The kiln is in neutral, a lightly reducing atmosphere.

Every hour:

1. Check the kiln and document the firing.
2. Turn the kiln up in 1/8, 1/4 or 1/2 increments. Also be sure to increase the air accordingly. There is no need to turn up the gas past 2 turns or the air past 3 1/2 turns.
3. Check the damper if the kiln is reducing too much open the damper if the kiln is uneven close the damper, but not less than an inch.
4. Check your cones through the peeps. After cone 5 has gone down, put the kiln back into reduction. This is the glaze reduction. The flame will appear green. At this point be sure to monitor the kiln very closely, every 15 minutes. If you look in the space above the damper, you should be able to see flames going by the damper at this point, which shows you have flames throughout the kiln.
5. Wait until all cones have gone down except the last cone. It is acceptable to turn off the kiln after cone 9 has fallen on top and bottom and 10 is soft but still standing.

Shutting off the kiln:

- Push the **STOP** button, everything on the kiln will shut off. Turn both knobs to their off positions. Push the damper all the way in. Leave the vent on to draft off the heat of the kiln.

The next day:

- Turn off the vent. To aid the kiln in cooling you may remove the bricks from the front of the door. Be careful, they will be hot. Do not open the second layer until the kiln is below 400°F. It is actually best to leave the kiln alone with a full day to cool off.

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- A** 1. Have approval of instructor.
- L** 2. Sign up to use kiln on Kiln Sign-up Calendar by writing down your name, the type of firing (in this case a bisque), and the days you'll be in the kiln you are using.
- P**
- I** 3. Load Kiln.
- N** 4. Use cone pads. Use a broad range of cones so you know when the kiln is near completion (see *Official CMU Cone Pads* sheet). It is best to have cones at the top and bottom peeps so you know you had an even firing.
- E**
- E** 5. Document the kiln firing. Write down what you did and what was happening throughout the firing. Look at the Firing Chart Examples.
- L** 6. Leave door open 4" and leave the peeps open. This will allow all the moisture to escape.
- E** 7. Turn on vents marked **ALPINE EF-24** to the right of kiln room as you exit the kiln room.
- C** 8. Flip the toggle switch on the kiln to the on position and set the target temp on the pyrometer to 200°F to prevent the kiln from getting to hot. The kiln will heat up if the temp inside the kiln is below the target temp.
- T**
- R** 9. Turn on the bottom switch (#6). Your kiln is now ready to dry out overnight.
- I**
- C** 10. In the morning turn on second switch (#5), close the door, the peeps, and set the target temp to 1800°F. At this point the kiln should be dry, but if there is moisture coming from the kiln do not turn up the kiln. An easy test is to place a piece of glass at the top peep. If it fogs up, there is still moisture in the kiln and you should reopen the kiln and wait before turning it up any further.
- B**
- I** 11. Turn on another switch every hour until all the switches are on. After all switches are on, monitor the kiln every 1/2-hour.
- S**
- Q** 12. When your cones start going down monitor the kiln every 15 minutes.
- U**
- E** 13. When your kiln is done, turn off all switches on kiln. Leave the vent on until the kiln is cool.
- F** 14. Clean up your mess after loading and unloading the kiln. That means scraping glaze off the shelves and re-kiln washing shelves, vacuuming shards out of kiln, returning shelves and post to their proper place, and sweeping up your mess off the floor.
- I**
- R** **Note:** If you do not sign up for kilns on the Kiln Sign-up Calendar or document your firing on a Kiln Log, you risk having your kiln shut down by your instructor or the NAS Coordinator.
- I**
- N** **Warning:** Before opening any kiln, make sure the kiln is turned off and cool. Also, the exterior surfaces of the kiln get very hot, be sure not to touch the main body of the kiln while firing kiln. If you do not follow instructions, you could be severely burned or electrocuted.
- G**

Central Michigan University-North Art Studio Ceramics Handbook 5th Edition
Recommended for Art 210-710 David Bolton NAS Coordinator

Electric Kiln Log

Kiln fired: Alpine EF-24 Electric			Type of firing: 06 Bisque		Cones Used: 010, 08, 06, 05	
Fired by: David Bolton			Phone #: 774-7448		Dates: (load, fire, cool, unload) 9/9/04, 10, 11	
Other Comments:					Unload Time: By 6pm on the 11th.	
Int	Hrs	Time	Timer	Switch	Temp T/B	Notes
DB		4 pm	-	#6 on	75/75	Door open 3", peeps open, meter set at 200. Selector switch set on bottom thermocouple.
DB		8 am		"	175/200	Some moisture on glass will wait to start
DB	1	9 am		#5 on	175/200	Closed door and peeps in, no moisture. Set meter at 1850.
DB	2	10		#4 on	450/700	
DB	3	11		#3 on	775/950	Visible glow on bottom
DB	4	12		#2 on	1100/1250	
DB	5	1		#1 on	1200/1325	
DB		1:30			1400/1425	
DB	6	2			1525/1540	
DB		2:30			1600/1620	010 soft bottom
DB	7	3			1760/1780	08 down top and bottom 06 soft top and bottom
DB		3:30		Off	1850/1850	06 down top and bottom

ALPINE ELECTRIC GLAZE FIRING

1. **Have approval of instructor.**
2. **Sign up to use kiln on Kiln Sign-up Calendar by writing down your name, the type of glaze firing, and the days you'll be in the kiln you are using.**
3. **Load Kiln.**
4. **Use cone pads.** Use a broad range of cones so you know when the kiln is near completion (see *Official CMU Cone Pads* sheet). It is best to have cones at the top and bottom peeps so you know you had an even firing.
5. **Document the kiln firing.** Write down what you did and what was happening throughout the firing. Look at the Firing Chart Examples.
6. **Close door and peeps.** The kiln does not need to pre-heat over night unless you have freshly made cone pads in the kiln. In that case follow the Alpine Electric Bisque Firing Instructions.
7. **Turn on vents marked **ALPINE EF-24** to the right of kiln room as you exit the kiln room.**
8. **Flip the toggle switch on the kiln to the on position and set the pyrometer to the target temperature (04= 1950°F, 9=2350°F), to prevent the kiln from getting to hot.** The kiln will heat up if the temp inside the kiln is below the target temp.
9. **Turn on the bottom switch (#6).** Your kiln is now firing.
10. **Turn on another switch every hour until all the switches are on. After all switches are on, monitor the kiln every 1/2-hour.**
11. **When your cones start going down monitor the kiln every 15 minutes.**
12. **When your kiln is done, turn off all switches on kiln and leave the vent on until the kiln is cool.**
13. **Clean up your mess after loading and unloading the kiln.** That means scraping glaze off the shelves and re-kiln washing shelves, vacuuming shards out of kiln, returning shelves and post to there proper place, and sweeping up your mess off the floor.

Note: If you do not sign up for kilns on the Kiln Sign-up Calendar or document your firing on a Kiln Log, you risk having your kiln shut down by your instructor or the NAS Coordinator.

Warning: Before opening any kiln, make sure the kiln is turned off and cool. Also, the exterior surfaces of the kiln get very hot, be sure not to touch the main body of the kiln while firing kiln. If you do not follow instructions, you could be severely burned or electrocuted.

Central Michigan University-North Art Studio Ceramics Handbook 5th Edition
Recommended for Art 210-710 David Bolton NAS Coordinator

Electric Kiln Log

Kiln fired: Alpine EF-24 Electric			Type of firing: 04 Glaze		Cones Used: 08, 06, 04, 03	
Fired by: Dave Bolton			Phone #: 774-7448		Dates: (load, fire, cool, unload) 9/9/04	
Other Comments:					Unload Time: By 5pm on the 11th	
Int	Hrs	Time	Timer	Switch	Temp T/B	Notes
DB		10 pm	-	#6 on	75/75	Vent on, door closed and peeps in. Meter set at 1950
DB	1	9 am		#5 on	500/750	
DB	2	10		#4 on	775/1000	
DB	3	11		#3 on	1100/1300	
DB	4	12 noon		#2 on	1250/1400	
DB	5	1		#1 on	1325/1500	
DB	6	2			1425/1600	
DB	7.5	3:30			1700/1750	010 down top and bottom, 08 down on bottom and soft on top
DB	8.5	4:30			1850/1850	
DB	8.75	4:45		Off	1925/1925	04 down top and bottom, 03 soft on top and bottom

Basic ConeArt Firing Instructions

Before starting kilns turn on vent above ConeArt Kilns at Kiln Room door. Turn on switch box. Turn all switches on High. Turn switch box and vent off when done. Lock switch box.

Even though the kilns control themselves, you must use cones and monitor the kiln. You should be around to make sure the kiln shuts off. Document your firing in the logs in the [ConeArt Kilns Firing Instructions](#).

The ConeArts have two basic firing options: CONE FIRE and USER PROGRAM. Use the CONE FIRE option for glaze firing and the USER PROGRAM option for bisque firing.

Using CONE FIRE

1. Press CONE FIRE. A temperature and a cone # will alternately flash.
2. Press \blacktriangle or \blacktriangleright to select a cone temperature to fire.
3. Press ENTER. The hold time will flash.
4. Press \blacktriangle or \blacktriangleright to select a hold time in 5 minute increments. (**Enter 15 minutes**)
5. Press ENTER. **IdLE** will flash.
6. Press START/STOP. The kiln will start firing. You will hear the kiln turn on and off.
7. The kiln will flash **CPLt** when the kiln is done firing. It will also flash the temperature reached and the current temp.

Note: It takes about 6hrs 45minutes to fire to Δ 04, 9hrs to fire to Δ 6, and 9.5 hrs to fire to Δ 10.

Using USER PROGRAM

1. Press USER PROGRAM. **USr1, 2, 3, or 4** will appear.
2. Press \blacktriangle or \blacktriangleright to select a program. (**See ConeArt Firing Program Sheet. Program 1 is a Δ 06 Bisque with drying time (the drying time runs until Step 1 is skipped). Program 2 is a Δ 04 Bisque with drying time (the drying time runs until Step 1 is skipped). Program 3 is a Δ 06 Bisque with 10 hours drying time. Program 4 is a Δ 04 Bisque with 10 hours drying time.)**)
3. Press USER PROGRAM. **IdLE** will flash. (**If START/STOP is pressed at the beginning of USER PROGRAM the program will be erased.**) Press START/STOP only if **IdLE** is flashing.
4. Press START/STOP. The kiln will start firing. You will hear the kiln turn on and off.
5. The kiln will flash **CPLt** when the kiln is done firing. It will also flash the temperature reached and the current temp.

IMPORTANT NOTE FOR USER PROGRAM 1 AND 2

To end the drying step of the bisque, press OPTIONS. Then press the \blacktriangle or \blacktriangleright until you see **SStP** displayed. Press ENTER. You will see a **1** displayed. Press the \blacktriangle then a **2** will be displayed. Press ENTER. At this point the kiln will switch back to normal operation mode on its own and will continue on to step 2. Be sure to shut the lid to prevent firing the kiln with the lid open.

IMPORTANT NOTE FOR USER PROGRAM 3 AND 4

When you begin the bisque firing shut the lid to prevent firing the kiln with the lid open. Leave peeps open to vent moisture. If the peeps are left open it will not damage the kiln. Firing with the lid open will damage the kiln.

See [Orton AutoFire Controllers Quick Start Reference Card](#) for other options in the orange binder next to the ConeArt kilns. If you wish to change one of the firing programs or the firing speeds consult the NAS Studio Coordinator.

ConeArt Orton Firing Programs

Program 1 06 Bisque with infinite drying time				
Step#	Ramp Rate (rA: °F/hr)	Temp (°F)	Hold Time (Hd: min.)	Elapsed Time
1	100F/hr	175	9.9999	infinite hrs
Skip Step #1 when dry & continue bisque. (see instructions)				
2	150F/hr	1125	0	6 hrs. 10 min.
3	250F/hr	1625	0	2 hrs.
4	108F/hr	1828	15	2 hrs. 8 min.
				10 hrs. 18 min.

Warning: Remember to shut lid after skipping drying step!

Program 2 04 Bisque with infinite drying time				
Step#	Ramp Rate (rA: °F/hr)	Temp (°F)	Hold Time (Hd: min.)	Elapsed Time
1	100F/hr	175	9.9999	infinite hrs
Skip Step #1 when dry & continue bisque. (see instructions)				
2	150F/hr	1125	0	6 hrs. 10 min.
3	250F/hr	1625	0	2 hrs.
4	108F/hr	1945	15	3 hrs. 10 min.
				11 hrs. 20 min.

Warning: Remember to shut lid after skipping drying step!

Program 3 06 Bisque with 10 hours drying time				
Step#	Ramp Rate (rA: °F/hr)	Temp (°F)	Hold Time (Hd: min.)	Elapsed Time
1	175F/hr	175	540	10 hrs.
2	150F/hr	1125	0	6 hrs. 10 min.
3	250F/hr	1625	0	2 hrs.
4	108F/hr	1828	15	2 hrs. 8 min.
				20 hrs. 18 min.

Warning: Shut lid at start up!
Leave peeps open!

Program 4 04 Bisque with 10 hours drying time				
Step#	Ramp Rate (rA: °F/hr)	Temp (°F)	Hold Time (Hd: min.)	Elapsed Time
1	175F/hr	175	540	10 hrs.
2	150F/hr	1125	0	6 hrs. 10 min.
3	250F/hr	1625	0	2 hrs.
4	108F/hr	1945	15	3 hrs. 10 min.
				21 hrs. 20 min.

Warning: Shut lid at start up!
Leave peeps open!

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1. Have approval of instructor.
2. Sign up to use kiln on Kiln Sign-up Calendar by writing down your name, the type of firing (in this case a bisque), and the days you'll be in the kiln you are using.
3. Put a 06 cone in the kiln sitter and turn timer to 20 hrs. Do not turn timer past the timer's range or the kiln will shut off immediately. Ask for a demonstration on setting up the kiln sitter from your instructor or the NAS Coordinator.
4. Load Kiln.
5. Use cone pads. Use a broad range of cones so you know when the kiln is near completion (see *Official CMU Cone Pads* sheet). It is best to have cones at the top and bottom peeps so you know you had an even firing.
6. Document the kiln firing. Write down what you did and what was happening throughout the firing. Look at the Firing Chart Examples.
7. Prop the lid open and leave the peeps open. Use the 2 1/2" side of a half soap (4 1/2 x 2 1/2 x 2 3/8 brick). This will allow all the moisture to escape.
8. Turn on the bottom switch (#1). Your kiln is now ready to dry out overnight.
9. In the morning turn on second switch (#2), close lid, close peeps, turn on Enviro-vent, turn on overhead vent to the Evenheat Kilns, and put 10 hrs on the timer. This should be enough time for the kiln to reach temperature. At this point the kiln should be dry, but if there is moisture coming from the kiln do not turn up the kiln. An easy test is to place a piece of glass at the propped open lid. If it fogs up, there is still moisture in the kiln and you should wait before turning it up any further.
10. Turn on a switch every hour until all the switches are on. After all switches are on monitor the kiln every hour to make sure the kiln shuts off when temperature is reached. If the sitter is not properly set the kiln could over fire.
11. When your kiln is done, turn off all switches on kiln. Also, turn off the Enviro-vent and the overhead vent to the Evenheat kilns unless another Evenheat kiln is being fired.
12. Clean up your mess after loading and unloading the kiln. That means scraping glaze off the shelves and re-kiln washing shelves, vacuuming shards out of kiln, returning shelves and post to there proper place, and sweeping up your mess off the floor.

Note: If you do not sign up for kilns on the Kiln Sign-up Calendar or document your firing on a Kiln Log, you risk having your kiln shut down by your instructor or the NAS Coordinator.

Warning: Before opening any kiln, make sure the kiln is turned off and cool. Also, the exterior surfaces of the kiln get very hot, be sure not to touch the main body of the kiln while firing kiln. If you do not follow instructions, you could be severely burned or electrocuted.

Central Michigan University-North Art Studio Ceramics Handbook 5th Edition
Recommended for Art 210-710 David Bolton NAS Coordinator

Electric Kiln Log

Kiln fired: Evenheat #1			Type of firing: 06 Bisque		Cones Used: 010, 08, 06, 05	
Fired by: David Bolton			Phone #: 774-7448		Dates: (load, fire, cool, unload) 4/5/04, 6, 7	
Other Comments: Thick work					Unload Time: By 5 pm on 7th	
Int	Hrs	Time	Timer	Switch	Temp T/B	Notes
DB		4 pm	20 hrs.	#6 on bottom	-	Lid propped open 2" to dry out wet work.
DB		8 am	4			Moisture still coming out, condensation on glass.
DB	1	9	10	#5 on		Closed lid and peeps, turned enviro-vent on. Timer reset to 10 hrs.
DB	2	10	9	#4 on		
DB	3	11	8	#3 on		
DB	4	12	7	#2 on		
DB	5	1	6	#1 on		
DB	6	2	5			
DB	7	3	4			
DB	8	4	3			
DB	9	5	2			
DB	10	6	1 1/2	Off		06 cones down. Kiln Sitter shut kiln off. Turned vents off and switches.
						Timer stopped with 1 1/2 hours left, so kiln shut off at 5:30 pm

EVENHEAT ELECTRIC GLAZE FIRING

1. Have approval of instructor.
2. **Sign up to use kiln on Kiln Sign-up Calendar by writing down your name, the type of glaze firing, and the days you'll be in the kiln you are using.**
3. **Put a 04 cone in the kiln sitter and turn timer to 20 hrs. Do not turn timer past the timer's range or the kiln will shut off immediately.** Ask for a demonstration on setting up the kiln sitter from your instructor or the NAS Coordinator. Evenheats are for Low-fire only.
4. **Load Kiln.**
5. **Use cone pads.** Use a broad range of cones so you know when the kiln is near completion (see *Official CMU Cone Pads* sheet). It is best to have cones at the top and bottom peeps so you know you had an even firing.
6. **Document the kiln firing.** Write down what you did and what was happening throughout the firing. Look at the Firing Chart Examples.
7. **Close lid and peeps.** The kiln does not need to pre-heat over night unless you have freshly made cone pads in the kiln. In that case follow the Evenheat Electric Bisque Firing Instructions.
8. **Turn on the bottom switch (#1).** Your kiln is now firing.
9. **Turn on a switch every hour until all the switches are on. Monitor the kiln every hour to make sure the kiln shuts off when temperature is reached.** If the sitter is not properly set the kiln could over fire.
10. **When your kiln is done, turn off all switches on kiln and turn off the Enviro-vent.**
11. **Clean up your mess after loading and unloading the kiln.** That means scraping glaze off the shelves and re-kiln washing shelves, vacuuming shards out of kiln, returning shelves and post to their proper place, and sweeping up your mess off the floor.

Note: If you do not sign up for kilns on the Kiln Sign-up Calendar or document your firing on a Kiln Log, you risk having your kiln shut down by your instructor or the NAS Coordinator.

Warning: Before opening any kiln, make sure the kiln is turned off and cool. Also, the exterior surfaces of the kiln get very hot, be sure not to touch the main body of the kiln while firing kiln. If you do not follow instructions, you could be severely burned or electrocuted.

Central Michigan University-North Art Studio Ceramics Handbook 5th Edition
Recommended for Art 210-710 David Bolton NAS Coordinator

Electric Kiln Log

Kiln fired: Evenheat #1			Type of firing: 04 Glaze		Cones Used: 08, 06, 04, 03	
Fired by: David Bolton			Phone #: 774-7448		Dates: (load, fire, cool, unload) 4/19/04, 20, 21	
Other Comments:					Unload Time: Noon on the 21st	
Int	Hrs	Time	Timer	Switch	Temp T/B	Notes
DB		6 pm	20	#6 on bottom	-	Enviro-vent and main vent on.
DB	1	9 am	5 / 10	#5 on		Reset timer to 10 hrs.
DB	2	10 am	9	#4 on		
DB	3	11	8	#3 on		
DB	4	12	7	#2 on		
DB	5	1	6	#1 on		
DB	6	2	5			
DB	7	3	4			
DB	8	4	3			08 down top and bottom, 06 soft on top
DB	9	5	2			04 almost down on top
DB	10	6	1 1/2	Off		Timer shut off kiln with 1 1/2hrs left, so kiln sitter shut the kiln off at 5:30.
						04 down on top and bottom. 03 cones did not bend at all. Shut off all switches and vents.

Kiln Safety Alerts:

CAUTION!

Kaowool, Fiberfax, & Spun Silica are the white refractory blankets and rope used to seal and insulate kilns. It is used in the Raku kiln and around the doors of some of the kilns. It is asbestos-like, so extreme care should be taken. Be sure to wear gloves, safety glasses, and a respirator when handling the fiber. Wash hands after touching fiber.

CAUTION!

Always assume that kilns, bricks, and shelves are HOT and could burn you if touched. Never open a kiln unless you know it is below 400°F

CAUTION!

If you are removing a Peephole Plug, assume there will be a lot of backpressure that will spit a hot flame at you. Do not have your face too close to the Peephole. If you blow into the kiln to make the cones more visible, it will blow right back out at you. KEEP YOUR DISTANCE! Use welding goggles to look into the kiln when it is bright to help you see and to protect your eyes. Also, wear a glove when holding the plug.

If you wear contact lenses or plastic lens glasses, take precautions. REMOVE THEM!

CAUTION!

When reducing the kiln be aware that you are producing carbon monoxide (CO). CO is poisonous. If the CO detector is reading near 50 or above open the exterior doors to the kiln room to let in more fresh air. If the alarm on the CO detector is sounding off hit the reset after opening the doors.

KEEP IT CLEAN

Leave the kiln room neat and organized. Clean up your mess after loading and unloading the kilns so you do not trip over posts, shelves, etc. Also sweep up spun silica, brick, clay, and glaze dust. Like in the rest of the studio, inhaled dust causes health problems from eye irritation to silicosis.

MORE SAFETY INFORMATION

Hazards of specific glaze materials can be found on the door of Storage Room 113. A Ceramist's Guide to the safe Use of Materials by Nancy Seegar and the **Material Safety Data Sheets (MSDS)** give information on specific glaze ingredients.