

12th WOOD-FIRING TEMPLATE (6-7 Apr 2023) - HILLSBOROUGH "BUIDHEACHAS" WOOD KILN

HR	Time of Day	STAGE	Target Temp E	Actual Temp F.		REDUCT	Dampers		Air			Remarks
				T1 LOWER LEFT	T2 TOP RIGHT		AD	PD 5 Bricks	Primary	2nd	Hearth	
DAY 1												
0	1:00 PM	1	59				Open	Closed	Closed	Closed	Open Center Fully	Start fire outside center hearth air port - use propane burner in chimney base to enhance the draft if needed
1	2:00 PM	1	110				Open	0-3	Closed	Closed	Open Center Fully	Burn large knotty pieces while the front hearth air port is open; push fire to one brick in front of the exterior face of firebox. Keeping passive dampers open will slow up draw of chimney and allow ash to settle on pots in upper part of ware chamber
HR	Time	Temp					AD	PD	Primary	2nd Air	Hearth Air	
2	3:00 PM	2	177				Open	Closed	Closed	Closed	Open Center Fully	Push fire flush with front wall of firebox. Keep passive dampers open to facilitate ash accumulation in upper portion of ware chamber
3	4:00 PM	2	226				Open	0-3	Closed	Closed	30%	Push fire 4.5" inside front wall of firebox
4	5:00 PM	2	277				Open	Closed	Closed	Closed	30%	Open mouseholes - continue stoking large knotty pine pieces through the center hearth air port
HR	Time	Temp					AD	PD	Primary	2nd Air	Hearth Air	
5	6:00 PM	3	310				Open	0-3	Closed	Open	30%	Push fire inside exterior face of firebox. Keeping passive dampers open will slow up draw of chimney and allow ash to settle on pots in upper part of ware chamber. Suspend longer pieces of wood into firebox through secondary air ports and let the ends ignite across from the throat openings to facilitate ash transmission to warechamber
6	7:00 PM	3	372				Open	Closed	Closed	Open	30%	
7	8:00PM	3	424				Open	0-3	Closed	Open	30%	
8	9:00PM	3	457				Closed	All Open	Closed	Closed	Closed	Open 5 passive damper bricks; leave mouseholes closed; set center hearth air opening a crack before heading off to bed
DAY 2												
HR	Time	Temp					AD	PD	Primary	2nd Air	Hearth Air	
0	5:00 AM	2	272				Open	Closed	Closed	Closed	Center Open Fully	Start fire outside center hearth air port. Once started, move to 4.5" in front of firebox exterior face.
1	6:00 AM	2	373				Open	0-3	Closed	Closed	30%	Burn large knotty pieces while the front hearth air port is open; push fire inside exterior face of firebox. Keeping passive dampers open will slow up draw of chimney and allow ash to settle on pots in upper part of ware chamber
HR	Time	Temp					AD	PD	Primary	2nd Air	Hearth Air	
2	7:00 AM	3	564				Open	All Closed	Closed	Open	30%	Open mouseholes and start feeding wood through secondary air ports; Adjust passive damper settings to balance heat gain between top and bottom
3	8:00 AM	3	826				Open	All Closed	Closed	Open	20%	Rattle the ember bed to create increased ash flow through ware chamber
4	9:00 AM	3	1015				Open	All Closed	1/2"	1/2"	20% - Center and 50% Side	START SIDE STOKING two thin strips @ 1000 F; open primary air 1/2" - continue front/side stoking alternatively for about 15 minutes; adjust secondary air for gradual temp rise through quartz inversion at 1,063 deg F where silica molecules expand at greater proportion than other materials (creates stresses) and all water is removed from clay. Quartz inversion at 1,022 - 1,063 deg F (silica molecules expand or contract out of proportion with surrounding materials)
5	10:00 AM	3	1321				Open	All Closed	50%	1/2"	30% All 3 Ports	Heat, oxygen and fuel. If you aren't achieving peak temperature, you have an imbalance of oxygen and fuel. If the firebox is full above the arches and the temperature is not increasing, try adding more air through the primary or secondary air ports. See note # 15 below under "Firing".
HR	Time	Temp					AD	PD	Primary	2nd Air	Hearth Air	
6	11:00 AM	3	1567				Open	All Closed	50%	1/2"	30% All 3 Ports	DULL RED HEAT - Look for dark red color in wares.
ACK	11:30AM	4	1582			R	Close 3"	0-4	1/2"	Closed	30% All 3 Ports	Body REDUCTION at 1576 to 1582 to improve Shino glazes for about 60 minutes

HR	Time	Temp	AD	PD	Primary	2nd Air	Hearth Air		
7	12:00 PM	3 1675	R	Close 3"	O-4	1/2"	Closed	30% All 3 Ports	CHERRY RED HEAT
8	1:00 PM	3 1909		Open	All Closed	Fully Open	1/2"	50%	ORANGE HEAT - Consider opening primary air ports fully for more rapid temperature rise and fire in oxidation; open hearth air ports to 50% to control ember build-up and use side cleanout ports if necessary
9	2:00PM	4 2020		Open	O-3	50%	1/2"	50%	YELLOW -ORANGE HEAT
10	3:00PM	4 2158		Open	All Closed	Fully Open	Closed	50%	For quicker temperature rise, stoke more frequently with fewer/smaller pieces of wood (oxidation) but keep hobs fully covered. Open primary air fully to lower reduction. Prepare for temperature stall around 1,900 to 2,000 deg F. YELLOW HEAT - Look for cone 5 to drop around now
11	4:00PM	4 2214		Open	O-2	50%	1/2"	50%	YELLOW WHITE HEAT
12	5:00PM	4 2286		Open	All Closed	Fully Open	Closed	50%	Open primary air ports fully to lower reduction and increase oxidation.
13	6:00PM	4 2345		Open	O-3	50%	Closed	50%	Start one hour soak; open passive dampers
14	7:00PM	5 2345		Open	All Closed	50%	Closed	Closed	FINISHED! After one-hour soak Let the wood on top of the firebox arches burn away. Close air ports starting from bottom to top. Close active dampers and passive dampers below active damper. Open passive damper bricks above active damper. Let kiln cool naturally.
General:									
1. PREHEAT: Start fire in center hearth air port and build up ember bed over 8 hour period; stoke with several large logs at end of preheat and close up port leaving adequate air for slow burn (pyrometer about 400 at close up);									
2. Cone packs: 012(1582), 02(2014), 5(2167), 9(2300), 10(2345) and 11(2361)									
Loading:									
1. Use 3" brick under bottom shelves. Use firm wadding mix to separate shelves from posts (too moist may cause posts/shelves to shift).									
2. Wadding for pots: steel cut oats or rice hulls, alumina, EPK & fire clay in equal amounts by volume; wadding for shelves/posts - alumina, kaolin (or fire clay) & silica in equal amounts.									
3. Loading of chamber takes approximately 5-7 hours. Bricking up door is extra.									
4. Configure setting to provide 1" spacing between shelves and at rear wall; use 18" x 18" shelves on upper portion (above bagwall) of two stacks nearest the firebox.									
5. Don't place re-fire pieces or iron-rich bodies near the firebox (cristobalite inversion)									
6. For stacked plates, put them directly on ware chamber floor and eliminate bottom shelf at that location.									
Firing:									
1. Close primary/secondary air ports fully at start. Bisqueware will allow quicker temperature rise.									
2. View firebox back wall through primary air port and stoke when murky atmosphere clears. Stoke when chimney smoke clears. Stoke when pyrometer reaches zenith of rise. Stoke when crackling sound of wood stops.									
3. Use some hardwood during early (front) stoking to build up ember bed.									
4. Keep hobs covered with wood during side stoking and stoke as needed when gaps occur; slow up stoking and let ember bed burn down if it gets too high and consider opening primary air ports more.									
5. When reducing hearth air openings, leave opening at hearth level and close upper portion of hearth air port to keep ember bed down.									
6. To pressurize kiln, increase stoke sizes, close down active damper, open passive damper or decrease primary air; this will also increase reduction and slow up flame and facilitate ash build-up.									
7. Oxidation firing keeps hues lighter and yellow, gold and brown natural ash glaze colors; fire in oxidation until 1582 deg F to remove organic material and minimize bloating; can result in quicker temp rise if small frequent small stokes are implemented.									
8. If kiln is in oxidation but temperature is not gaining, there is probably too much air.									
9. A one hour soak at Cone 10 should result in Cone 11 dropping.									
10. Slow up the temperature climb in the first half of the firing to create more even distribution of heat (slow up front).									
11. Closing passive dampers will tend to heat up lower portion of ware chamber by drawing flame/heat quickly through stack near the floor to exit flues.									
12. Conversely, opening passive dampers will tend to heat upper portion of ware chamber by drawing flame/heat slower through stack to chimney.									
13. Reduction flame can be achieved by stoking with more wood - this will slow temp rise and give more color to clay and melted ash glaze.									
14. Additional ash can be introduced through the secondary air ports.									
15. Heat, Oxygen, Fuel. If you aren't achieving peak temp, you have an imbalance in fuel/oxygen, as you already have heat (enough to combust at least). If you have wood in, but no increase in temp, you need oxygen. If you have plenty of									

oxygen, but no temp rise, you need more wood (fuel).

Secondary Air:
1. Can open to 1/2" once primary air ports are in use to keep in oxidation.
2. Controls temperature rise. Keeping open results in oxidized firing. Closing down results in reduced firing.
Dampers:
1. Any adjustments to active damper should be gradual - 1" increments at 15 minute intervals.
2. Passive dampers - allows cold air to flow into chimney (once kiln is operating), decreasing the amount of primary air that will enter the system - use @ reduction or to slow temperature rise. Open passive damper if flame appears at top of chimney. Opening passive damper will cut draft by up to 30% and result in slower flame & encourage ash accumulation on wares; use to adjust length of flame; wide open dampers will create reduced atmosphere within kiln.
3. If windy conditions, close up passive dampers to reduce back pressure.
4. Open passive dampers during "soak" to keep internal pressure and hot part of flame within the kiln. Open passive dampers (to slow draw of chimney during cooling) and close active dampers at end of firing.
5. Use dampers to reduce smoke from chimney (open active - close passive).
6. Use passive dampers to keep chamber pressurized and keep heat/flame inside kiln; passive damper is excellent tool to regulate flame speed; alternate flame speed in stages 4 and 5; fast results in distinct line at transition (side) while slow speed results in ash/flame wrapping around pottery.
7. Close passive dampers after top cones go down to draw heat/flame to BOTTOM rear of kiln.
8. At the end of the firing, close the active dampers and open all passive damper bricks above the active damper and then close up all air ports from the bottom up.
Reduction:
1. Reduction is characterized by a "murky" atmosphere inside the firebox as viewed through the primary/secondary air holes, and by black smoke at the chimney. At temperatures below 1582 deg F it is unlikely to effect ash glaze color.
2. During reduction phase, stoke heavier and cut down the air supply. Can also pull PD bricks.
3. Reduction amplifies effect of any irons in clay bodies if done lightly as scheduled above - over reduction early in firing could cause bloating in iron rich clay bodies. Close down secondary air and open passive dampers when in reduction.
4. Smoke not essential in reduction. Temperature rise of 50 - 100 deg F still possible/desirable.
5. Reduction period of about 4 hours is required to achieve green colors in natural ash deposits.
6. Reduction under 1920 deg F has little effect on glazes except Shinos.
Wood:
1. Hardwood ash is heavier and grittier requiring more time and heat to melt. Increase use of sawmill wood toward the end of the firing.
2. Moisture content of wood should be 25% maximum. Season for 6-9 months.
3. Estimate 1 cord of wood per firing.
4. At side stoking, if possible use mix of hardwood and pine in early part of firing and exclusively pine toward the end of firing to benefit from its fine ash.
5. The cambium layer (bark) contains the greatest concentration and diversity of minerals.
6. BTU content (million btu/cord): Red oak - 22.1; white oak 24.2; yellow pine 20.5; poplar 15.9; white pine 13.3; osage orange 30.0; black locust 23.2; white ash 21.6
7. Green wood can be used when kiln temperature reaches 1,832 deg F.
Finish:
1. Consider re-oxidizing kiln before shutting it up. Reduction cooling may spoil iron glazes. After final soak, crash cool to 1850 deg F if desired (shiny glazes).
2. Crash cooling (down to 1850 deg F in about 25 minutes) will result in glossy jewel green natural ash glaze on pieces near front of kiln. Slow cooling with some reduction (2 hours) near finish will result in colorful matte finishes.
3. Reduction cooling: two options, either: a) add 3 pounds of charcoal at 2050 deg F and again at 1800 deg F. with all ports closed and all passive damper bricks open OR b) fill firebox with thin pieces of pine then shut down all ports and open all passive damper bricks - when firebox clears, stoke one or two thin pieces of wood at every 25 degree drop in temperature until 1900 deg F then stop.
4. For Crash Cooling , stop stoking and open all primary and secondary air ports. Let temperature drop to 1850 deg F (over 20-30 minute period) and then close up all ports and all passive dampers. Will result in crisper colors and glossier surfaces. It also minimizes crystal growth in glazes.
5. Open kiln on the 4th day after the firing.