FIRED UP KILNS

firedupkilns.com.au

Owner's Manual

Top-Loading models: FTS1.0, FTS1.5, FTS1.5W, FTS2.2, FTS2.9, FTS3.7
Front-loading models: FFL1.7, FFL2.7, FFL3.4, FFL5.2

Congratulations and thank you for purchasing a Fired Up Kiln.

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

The following are your kilns details.

Kiln Model:_____

Date of Manufacture: _____

Kiln Serial Number: _____

Controller Serial Number: _____

Electrical Details:_____

Please take special note of the following;

- Read this manual and the corresponding VT36 controller manual **before operating your kiln**.
- **Contact us** if you have any questions or queries. We are always happy to help.
- **Do not exceed 1300**℃ in your kiln. Doing so will lead to severe damage not covered under warranty. To extend element life, avoid exceeding 1280℃.
- Never alter or interfere with your kilns **electrical connections**, there is the risk of electrocution.
- Be careful when working near an operating kiln as the **external casing temperature can cause injury**.
- **Never** leave a firing kiln unattended.
- **Use pyrometric cones**, they provide invaluable information, particularly when glaze firing.
- **Don't let ware touch the thermocouple** as this can lead to disasterous over firing.
- **Treat your kiln with care** and make sure element channels are clear of debris before firing.
- **Have fun and enjoy** using your kiln safely and creating wonderful pieces of art!!

1. Locating your kiln

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

a. Select a dry, well-ventilated area that has good access to allow for easy loading and unloading. Ensure that the kiln is placed on a flat, solid surface that allows air circulation beneath and around the kiln.
b. Ensure there is 400mm of clearance around the sides of the kiln and at least 1000mm of clearance above the kiln.
c. Position the kiln with spy-holes visible and the VT36 controller within easy reach.
d. Ensure all combustible and flammable materials such as curtains, plastic, paper etc. are well removed from the kiln. Do not rest anything against the kiln or place objects under or on top of the kiln.
e. Keep children well away from the kiln.
f. If you are positioning your kilns in an outdoor area, such as verandah, outdoor shed or carport, ensure it is shielded at all times from rain. A heavy duty BBQ cover placed over the kiln when not in use is a good idea. It is vital that the kiln not be exposed to water. This will damage the electrics, leading to an electrocution risk and can lead to brick damage, as the kiln bricks will absorb moisture and crack on firing.

2. Health and Safety

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

a. Always use appropriate protective clothing when operating or working with heat and near the kiln. The outside of the kiln will be hot when the kiln is operating so treat the kiln with caution. Avoid looking into the kiln without protective eyewear when the temperature exceeds 1000℃ and NEVER put your hand or face within 500mm of either the vent or spy-hole when the kiln is operating.
b. Your kiln uses high voltage and the control box has been labelled with a warning notice to advise you of this. Only suitably qualified electricians should access the control box.
c. Please ensure you read both this manual and the VT36 Controller manual before operating the kiln. Please contact us if you have any questions or queries.
d. Do not attempt any repair work on the kiln.

e. Our recommendation is that you avoid leaving a kiln that is operating unattended. Any mechanical equipment has the potential to malfunction. The operator is responsible for monitoring, adjusting and maintaining the kiln and controls. A malfunction that is undetected can result in overfiring, causing extensive damage to your kiln. Your warranty **does not** cover the effects of overfiring regardless of the cause.
f. All of our kilns are fitted with an automatic safety cut off switch. The switch works by shutting off power to the elements if the lid/door is opened, in order to prevent potential electrical shocks when the kiln is opened whilst the power is on. **NEVER** attempt to bypass this switch. We recommend that you only open the lid/door when you have isolated power to the kiln, by either removing the plug from the power point or ensuring that your isolator switch is in the OFF position and the kiln circuit is placed in the OFF position at the mains.

3. Electrical Connections

The following applies to our single phase kilns.

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

   For our smaller kilns the following applies;

FTS1.0 is supplied with a standard 10A plug that can be plugged directly into a standard household power point without the need for power point modification.

FTS1.5/1.5W are supplied with a 15A 3-pin plug that will require the fitting of a corresponding 15A power point by a registered electrician.

FTS2.2 and FFL1.7 can be supplied for hard-wiring or with a 20A 3-pin plug that will require the fitting of a corresponding 20A power point by a registered electrician.

4. The Firing Chamber

The interior of your kiln is constructing using Morgan JM23 light insulating firebricks. They have been selected for their quality as well as their excellent insulating properties. They are a very porous brick, filed with many air pockets. It is these numerous air pockets that make the bricks light and allow for their excellent insulating capabilities.

a. Kiln bricks are fragile in nature and should be handled with great care. After a few firings you may notice hairline cracks in some of the bricks. These are simply expansion cracks and in no way affect the functioning of the kiln.
b. It is important that you take care when loading and unloading your kiln so as not to bump the bricks with kiln furniture. Always close the kiln door gently.
c. NEVER open the kiln when the interior temperature is greater than 200℃. Doing so may cause thermal shock to the bricks and shearing of the surface as well as injury to you.

5. Elements

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

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

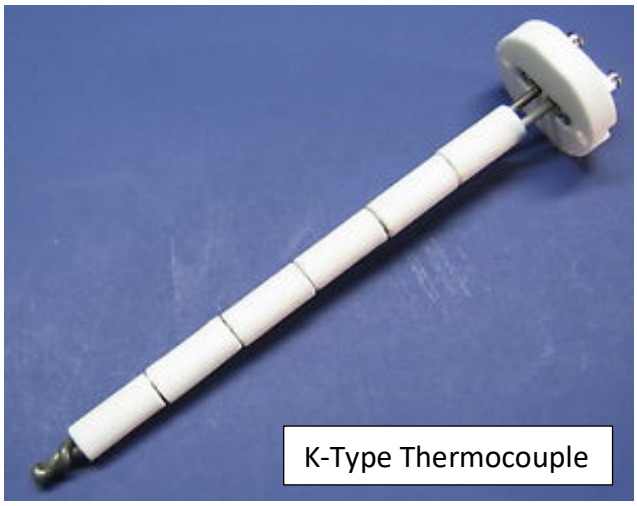
Element Temperature ℃	Kiln Temperature℃	Proportional Life %
1150	1120	100
1200	1170	46
1260	1230	22
1315	1285	12

e. Element lifespan is shortened considerably if the metal element comes into contact with glass, clay, glaze or kiln wash. As such always place ware 40mm from the elements and ensure that all element channels are vacuumed out prior to each firing. Use a soft vacuum attachment when vacuuming inside the kiln to prevent damage to the firebrick. Avoid touching the elements with the vacuum head as cold elements are very brittle and can break easily.
f. If your kiln is failing to reach temperature, it is likely that you have either a failed or compromised element.
g. We do not advise reduction firing in an electric kiln.
h. Elements will need to be replaced from time to time. We recommend this be performed by a registered electrician or kiln technician. We carry replacement elements for all of our kilns.

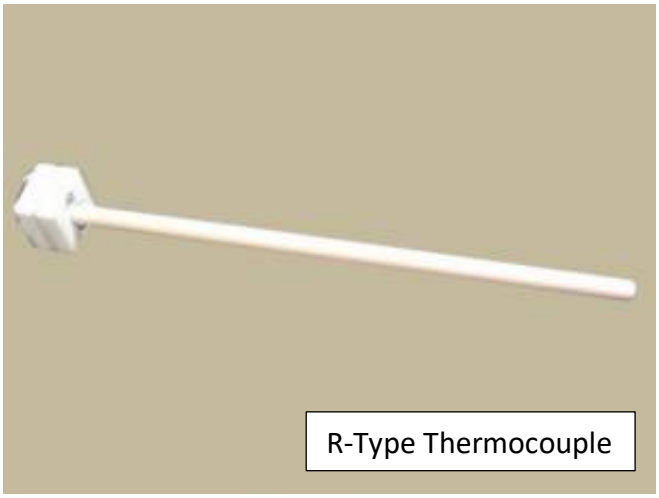
6. Thermocouple

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

a. Your kiln is fitted with either a K-type or R-type thermocouple. K-type thermocouples have a finite lifespan when used over 1100c. As a result they will need to be replaced periodically, depending on the temperature you fire to and the frequency of use. They are relatively inexpensive. R-type thermocouples are suited to continual high temperature use and should not require replacing unless broken by impact with kiln shelves etc..
b. A thermocouple consists of two different metal wires – alumel/chromel in the case of K-type and platinum/rhodium in the case of R-type. These metal wires are joined at the end to form a junction that is located in the kiln. The voltage different between the two metals is measured and converted to a temperature reading on your controller. These wires are usually shielded in a complete sheath in the case of R-type, whilst the junction is usually exposed in the case of k-type. A thermocouple will only sense the temperature in the **immediate vicinity** of the junction.
c. In order to read the temperature in the kiln accurately, it is important that the thermocouple protrudes about 30-40mm into the kiln chamber. **Be careful** when loading the kiln that you do not push the thermocouple into the kiln wall, or place any ware within 30mm of the thermocouple. This will lead to the controller registering a lower temperature than the actual kiln temperature and can lead to over-firing that can damage the kiln beyond repair.
d. Your VT36 kiln controller can accept, K, S and R type thermocouples. If changing the thermocouple type be sure to alter the setting in the system program of the controller.



K-Type Thermocouple

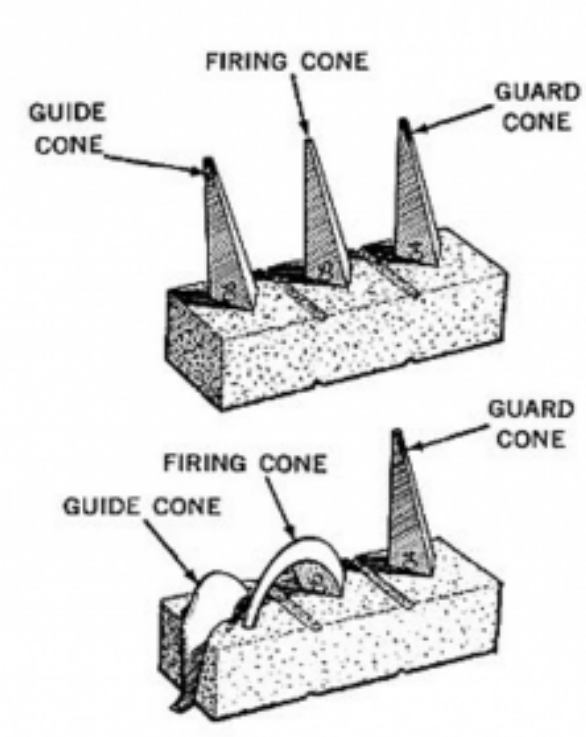


R-Type Thermocouple

7. Pyrometric Cones

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

a. Cones consist of a mixture of carefully controlled ceramic materials that are designed to give a graduated scale of fusing temperatures. The most commonly available cones are manufactured by the Orton company, and they provide a chart that provides the fusing temperature with a corresponding cone number. See page 18 for the chart.
b. Cones are mounted either in a specific refractory cone holder or alternatively embedded in a wad of clay, with each cone placed to the same depth and at an angle of 15° to the vertical. This is assisted by a slant on the base of the cone.
c. A series of three cones is standard, the cone placed on the far left indicates 20℃ below the required temperature, the middle cone indicates the required temperature and the cone to the right indicates a temperature 20℃ above the required temperature. The collapse of the first cone serves as a warning that the required temperature is being reached, whilst the second cone collapse indicates the correct temperature. The third cone, or "guard" cone should remain upright as it serves to warn of potential over firing. The fusion point of any cone is indicated when the tip of the cone touches the base on which the cone is mounted.
d. It is a good idea to place cones in a number of locations in your kiln so you can get a feel for the hot and cold spots. This is more important in larger kilns. Cones also provide a guide as to the accuracy of your thermocouple.
e. Every kiln is different and it may take some time to learn the idiosyncrasies of your kiln!



Prior to firing

After firing

8. Kiln Controller

Our VT36 programmable controller has been specifically designed to offer flexibility, accuracy and easy management of the process of firing your kiln.

a. A display guides you through every stage of the programme cycle. The settings and progress are displayed in a graph format.
b. This controller has the facility to hold up to 36 individual programmes. Pre-set programmes (1 to 12) are loaded into the unit, these should be considered as guides and may be changed or removed depending on your requirements.
c. The ability to program in delays, temperature ramps-ups and downs, including soaks, make your firing schedule much simpler and easy to manage.
d. Please refer to the separate VT36 Controller manual for comprehensive information.
e. The VT36 controller can be retrofitted to any kiln.

9. Loading your kiln

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

a. Always ensure that your kiln is switched off at the isolator switch or unplugged whilst loading or unloading.
b. Make sure that all element channels are clear of any debris and have been vacuumed out. Take adequate precautions when vacuuming, be gentle and don't knock the elements and always wear a mask.
c. Check that your kiln shelves and props are sound and have no cracks that can cause them to collapse in the firing. Be sure the shelf bottoms are clean to prevent dust or dirt falling onto the ware below.
d. If large flat pieces are being fired, the edges should be placed between the elements. This may eliminate possible cracking caused by uneven healing.
e. Place the shelves in the kiln carefully so that the walls of the kiln are not bumped or damaged. Use 3 props per level, as this is the most stable configuration.
f. Ensure all ware and furniture is completely dry. If they are wet, then as they heat up steam forming can lead to explosion of items.

g. It is advisable to put a shelf on the floor of your kiln before placing your props in the kiln, especially if you are packing to capacity as this will protect the soft insulation bricks on the floor of your kiln. In addition it protects the floor of the kiln from possible glaze spills.
h. Do not jar or shake the kiln after loading has started since your products on the shelf could be knocked down or the shelves may collapse..
i. Keep shelves and wares at least 30mm from the thermocouple probe in the kiln and 30 mm from the wall of the kiln.

<u>WARNING:</u> CONTACT BETWEEN WARE AND THE THERMOCOUPLE CAN CAUSE DISATEROUS OVERFIRING.

j. Avoid positioning your shelves in line with the elements, as this can increase the risk of thermal shock.
k. NEVER attempt to unload your fired items until the kiln is cool enough (below 100℃), as serious burns could result.

10. Loading and Firing Bisque ware (920℃-1060℃)

Refer to VT36 manual (page 15) for specific firing patterns .

When firing your bisque ware it is essential that all items are “bone” dry. If they are not, then as the kiln heats up and moisture in the ware converts to steam you may experience explosion of your ware. If you ware feels cool then it is probably damp. To minimize damage to greenware , it is best to use a temperature rise of no more than 60℃/hr over the first 2 hours of the firing to allow any moisture to escape gradually.

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

11. Loading and firing Earthenware (1040℃-1080℃)

Refer to VT36 manual (page 15) for specific firing patterns .

a. Do not load families of red, green, yellow or yellow-green glazes or any metallic or luster glazes with greenware. Allow a minimum of 50mm of space around red glaze pieces.
b. If it is necessary to mix loads, always try to place the red glaze separately on a shelf below the items which it may contaminate.
c. Glazed pieces must not touch or they will stick together. At least 15mm should be allowed between glazed pieces to prevent contamination from the release of bubbles and gases from other glazes.
d. The tops of the shelves should have batt wash applied to protect against drops or runs of glaze. The kiln lid and the underside of the shelves should be clean to prevent dust particles from falling on the glazed ware.
e. Glazed ware must be stilted (earthenware) or dry footed to prevent sticking to the shelves. For low fire glazes (cone 04,05,06) stilting is recommended.
f. If a piece wobbles when stilted, it may fall during the firing, be sure all stilted pieces are solid.

g. It is a good idea to soak the kiln at temperature for 30 min to allow the temperature to even up throughout the kiln.
h. Orton cones provide invaluable information about “heat work” that cannot be provided by a controller and so we would always recommend doing a glaze firing with the guidance of cones.

12. Loading and firing Mid-fire – Stoneware (1220℃-1280℃)

Refer to VT36 manual (page 15) for specific firing patterns .

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

13. Cooling the kiln

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

a. Do not open the kiln if the internal temperature exceeds 200℃. This can cause serious damage to the bricks through thermal shock.
b. If you wish to speed up the cooling of the kiln, then bungs can be removed at 300℃, and the door opened by 5mm. Wait until the temperature is below 200℃ before opening the door further. It is best to open the door slowly and in stages if the kiln has not cooled to room temperature so as to avoid thermal damage to your ware.
c. Be careful when unpacking the kiln as the furniture an ware are often hotter than the interior temperature. Heat resistant gloves are advised.

14. Maintenance

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

a. Examine the interior of the kiln to ensure it is clean and free of dust. Check the roof and walls for loose fragments of insulating firebrick which might fall onto your products. Vacuum the interior to remove all dust and any objects from around the elements.
b. Check that kiln shelves are adequately coated with kiln wash.
c. Check the condition of your shelves and props for warping or cracks.
d. Remove glass or glaze spots from the walls, bottom, or shelves of the kiln prior to the next firing. If this is not done, glass will re-melt and spread with each firing. Elements can also be damaged by direct glass or glaze contamination.
e. Avoid moving your kiln un-necessarily. Over time the bricks will “bed down”, and become brittle with firing. Constant movement may cause the bricks to break apart.
f. Lid-stays on our top-loading kilns and hinges on both the top and front-loading kilns will benefit from lubrication with WD-40.
g. Do not allow your kiln to get wet – moisture is your enemy!

15. Trouble Shooting

PROBLEM	POSSIBLE CAUSES	SOLUTION
1) Increase in firing time.	Defective Energy Regulator. Defective Element Check for burned or discoloured connections in kiln, wiring or wall receptacle	Replace Replace Clean or replace as necessary
2) Kiln will not heat up as programmed	Power cord not plugged in. Fuse or breakers blown. Controller not activated or faulty Burned power cord or isolator.	Plug kiln into wall receptacle Replace or reset Ensure temperature is set on auto controllers or that the correct program has been selected on your Micro Processor Controller. Check thermocouple and replace if necessary. Consult a qualified electrician.
3) Wall receptacle or plug heats up	Loose connection in wall receptacle	Consult a qualified electrician.
4) Fuse or circuit breakers fails immediately after the kiln is turned on	Short circuit in kiln.	Consult an electrician to check wiring of the kiln for burnt or discoloured connections, check for contact of a hot wire with the grounded portion of the kiln.
5) Elements hum when the kiln is first turned on	Normal - This is a 50 cycle hum which may resonate in the element until it is hot enough to soften.	No Action.

PROBLEM	POSSIBLE CAUSES	SOLUTION
6) Kiln over fires.	Firing time to long. Incorrect temperature set. Faulty Element Faulty Controller.	Check your selected program. Choose correct temperature setting. Have element replaced. Consult supplier or kiln manufacturer.
7) Kiln shuts off before desired temperature is reached.	Thermocouple failure Power Failure	Replace thermocouple Reactivate your controller. (Note the VT36 Controller will reactivate itself warning you that there was a power interruption).
8) Elements becoming loose from the brick groove	Due to loosening of the pin caused by expansion and contraction of the element during heating and cooling.	Repin the element. Be sure to heat the element to above 350°C to avoid breaking due to the element becoming brittle over time.

16. Warranty

Your Fired Up Kiln is fully tested in the factory before being dispatched. It is fired twice. A test firing to 350℃, and a complete firing cycle to 1285℃. Your kiln is guaranteed against faulty workmanship or materials for a period of one year from the date of supply and is subject to the kiln being used within its specified parameters. Elements and thermocouples are excluded as they are considered consumables. Please refer to the separate warranty form for further details.

17. Disclaimer

Please note that your kiln has been designed and manufactured for precision work. Your kiln must be operated in accordance with both this operating manual as well as the manual provided for the VT36 controller. Any unauthorized use that violates the above preconditions, shall immediately void all warranties. Fired Up Kilns makes no representations, guarantees whether expressed or implied, other than those as contained within the respective operating manuals.

18. Kiln Firing Log – VT36 Controller

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

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

19. Pyrometric Cones Temperature Chart

Temperature Equivalents for Orton Pyrometric Cones (°C) Cone Numbers 022-14

	Self Supporting Cones						Large Cones				Small
	Regular – SSB			Iron Free – SSK			Regular – LRB		Iron Free – IFB		Regular
Heating Rate*	15°C/hr	60°C/hr	150°C/hr	15°C/hr	60°C/hr	150°C/hr	60°C/hr	150°C/hr	60°C/hr	150°C/hr	300°C/hr
Firing Speed	Slow	Medium	Fast	Slow	Medium	Fast	Medium	Fast	Medium	Fast	Fast**
Cone #											
022		586	590								630
021		600	617								643
020		626	638								666
019	656	678	695				676	693			723
018	686	715	734				712	732			752
017	705	738	763				736	761			784
016	742	772	796				769	794			825
015	750	791	818				788	816			843
014	757	807	838				807	836			870
013	807	837	861				837	859			880
012	843	861	882				858	880			900
011	857	875	894				873	892			915
010	891	903	915	871	886	893	898	913	884	891	919
09	907	920	930	899	919	928	917	928	917	926	955
08	922	942	956	924	946	957	942	954	945	955	983
07	962	976	987	953	971	982	973	985	970	980	1008
06	981	998	1013	969	991	998	995	1011	991	996	1023
05½	1004	1015	1025	990	1012	1021	1012	1023	1011	1020	1043
05	1021	1031	1044	1013	1037	1046	1030	1046	1032	1044	1062
04	1046	1063	1077	1043	1061	1069	1060	1070	1060	1067	1098
03	1071	1086	1104	1066	1088	1093	1086	1101	1087	1091	1131
02	1078	1102	1122	1084	1105	1115	1101	1120	1102	1113	1148
01	1093	1119	1138	1101	1123	1134	1117	1137	1122	1132	1178
1	1109	1137	1154	1119	1139	1148	1136	1154	1137	1146	1184
2	1112	1142	1164				1142	1162			1190
3	1115	1152	1170	1130	1154	1162	1152	1168	1151	1160	1196
4	1141	1162	1183				1160	1181			1209
5	1159	1186	1207				1184	1205			1221
5½	1167	1203	1225								
6	1185	1222	1243				1220	1241			1255
7	1201	1239	1257				1237	1255			1264
8	1211	1249	1271				1247	1269			1300
9	1224	1260	1280				1257	1278			1317
10	1251	1285	1305				1282	1303			1330
11	1272	1294	1315				1293	1312			1336
12	1285	1306	1326				1304	1324			1355
13	1310	1331	1348				1321†	1346†			
14	1351	1365	1384				1388†	1366†			

Cones made with red iron oxide
Cones made without iron oxide

* Heating Rate during the last 100°C of Firing ** Fired in a gas kiln

Pyrometric cones have been used to monitor ceramic firings for more than 100 years. They are useful in determining when a firing is complete, if the kiln provided enough heat, if there was a temperature difference in the kiln or if a problem occurred during the firing.

Cones are made from carefully controlled compositions. They bend in a repeatable manner (over a relatively small temperature range - usually less than 40° F). The final bending position is an indication of how much heat was absorbed.

Behavior of Pyrometric Cones

Pyrometric cones deform due to the formation of glass and the pull of gravity as they are heated to their designed operating temperature. This is known as pyro plastic deformation. Careful control over the shape and composition allows Orton to provide a standardized product that reliably performs to known heating conditions. Cones bend and deform in an arc as they start to develop glass within. This behavior is gradual at first, and hastens as the cone reaches its maximum operating temperature. The time interval from when a cone begins to deform until the tip of the cone reaches the shelf is typically 15-25 minutes. The interpretation of the location of the tip of the cone along the bending arc can be done in a couple of ways. One method of interpretation is to correlate the position of the tip to the numbers on a clock face. Initially, the cone is in the 1 o'clock position and continues to deform until the tip is in contact with a shelf, the 6 o'clock position. A more precise method of interpretation is to use the Orton measuring template. The template measures the angle of deformation along a protracted scale numbered from 0 to 90°. The endpoint temperature for a cone is considered to be when the tip is measured with a 90° bend, or in the 5 o'clock position.

The difference in temperature between cones in the 90° (or 5 o'clock) position to one where the tip is touching the shelf is typically only a few degrees and is considered insignificant.

Temperatures shown on the Orton charts were determined using precisely controlled kilns in an air atmosphere. Cones do not measure temperature alone. They measure heatwork, the combined effect of time and temperature. The role that heating rates have on the endpoint temperature is observed to be that the temperature required to cause a cone to bend will be higher for faster heating rates and lower for slower rates. Heating rates that simulate fast, medium, or slow firings were tabulated.

Temperatures shown for small cones were determined using a heating rate of 300C/hr (540F/hr) in a gas fired kiln. Small cones will come close to duplicating the results of self-supporting cones if mounted upright, properly simulating the position of a self-supporting cone. Typically, small cones will deform 7-10 degrees C earlier than a self-supporting cone, so the temperature values for a self-supporting cone can be used to determine an equivalent small cone temperature by subtracting 7-10 degrees C (or 12-18 degrees F). Placing a small cone or bar cone into a kiln shutoff device (Kiln sitter), will not always produce the desired temperature stated on the cone chart. To produce a properly fired result, the next cone higher in sequence is placed into the shutoff device and the result is confirmed by a cone placed inside the kiln on a kiln shelf.

Reducing atmospheres can affect the bending behavior of cones, especially the red colored cones manufactured between numbers 010-3. If these cones are used in the absence of oxygen, the red iron oxide used in the formulation can reduce and change the appearance so the cone will appear matte, green, or bloated. Orton recommends using the Iron free series for all reduction firings between cones 010 – 3.

For more information on pyrometric cones, contact Orton or visit us at www.ortonceramic.com

Orton®
The Edward Orton Jr. Ceramic Foundation
P.O. Box 2760 • Westerville, OH 43086-2760
(614) 895-2663 • (614) 895-5610 fax
info@ortonceramic.com
www.ortonceramic.com

These tables provide a guide for the selection of cones. The actual bending temperature depends on firing conditions. Once the appropriate cones are selected, excellent, reproducible results can be expected. Temperatures shown are for specific mounted height above base. For Self Supporting - 1¾"; for Large - 2"; for Small - 15/16". For Large Cones mounted at 1¾" height, use Self Supporting temperatures. † These Large Cones have different compositions and different temperature equivalents.

20. Notes

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