Construction of the lePanyol Wood-Fired Bread Oven
First edition 2002

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A few miles below Lyon, along the Rhone River in southeastern France (the region of Provence), is a famous deposit of white earth (Terre Blanche) that has been exploited for two purposes since Roman times. The color and minerals of the white earth produces some of the world’s finest vineyards (“Hermitage”) and also the very best all natural material for making fire bricks for ovens.

The white earth of the ancient quarry in Lanarge consists of two basic ingredients, feldspar and kaolin clay, a result of natural and exceptional underwater degradation of an ancient granite deposit that was once flooded when the waters of the Mediterranean were much higher that they are today. The Terre Blanche is removed from the ground with a large bucket loader and transported less than a kilometer to a huge modern plant that separates the large particles of feldspar from the smaller particles, then recombines the smaller particles of the feldspar with the kaolin clay in perfect proportions. Water is squeezed out of the new sheets of kaolin and feldspar and continuously recycled. The moist sheets are loaded into a lorry and carried over the hill to the historic factory next to the Rhone, where the fire brick shapes are made. With nothing added but a little water, to the recombined all natural quarry mix, the white earth is extruded into molds, dried and fired in a modern rotary kiln. When the shapes emerge from the kiln, they are ready to be assembled into beautiful, heat retaining, healthy, high performance ovens.

Whenever you travel in France, you can see in old villages and city shops, communal ovens and commercial bakeries. Inevitably, the name embossed on the large arch fire bricks defining the oven door opening, indicate that the material used to build the oven cores, is the famous Terre Blanche (white earth) of Lanarge.

Even at very high temperatures, the white earth cooks the food safely with no toxic emissions and has been given the highest possible rating as a cooking utensile by the French government.

Now, after over a century and a half of use in Europe, the famous Terre Blanche material is available to North America through the le Panyol oven core kits, made at the ancient factory site of T’ain Hermitage along the Rhone.

In the late 1970’s, the Maine Wood Heat Co., Inc. introduced to North America the concept of Finnish masonry heaters. Now, in the new millenium, the Maine Wood Heat Co., Inc. is proud to introduce to the New World another ancient, timeless, wonderful, wood fired product line, the le Panyol oven core series.
LE PANYOL OVENS AND THE LEGACY OF THE ROMAN EMPIRE

Fire has been used to cook food for human communities since well before the practice was recorded in the annals of history. Along with warmth and safety, the fire was a means to make food more easily preserved and digestable, not to mention palatable. The fire was a sacred phenomena to our earliest ancestors and soon became enshrined in the artifacts of their lives; the spit, tripod and brazier, and earliest of all simple ovens, were among the first inventions to harness the energies of fire.

The first ovens to be built were made of clay and therefore have not survived the ages intact. What we have of those earliest ovens is just enough to learn about the social structure of the communities that used them. Vitruvius, a Roman historian, recorded the shape and proportions of the ovens in use during his time. Since this first detailed record of wood fired bread ovens little has changed in the overall design because little has changed in the way wood burns.

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Fire requires oxygen to burn and must be able to expel the products of combustion as quickly as it receives oxygen. The size and shape of an oven can determine how efficiently the oxygen is delivered to the fire and expell its exhaust.

A properly proportioned oven will have a door that allows oxygen to enter without interfering with outflow of exhaust. However, if the door is too high then the efficiency of the oven will suffer because needed heat will escape.

An oven with a ceiling that is too low will force the incoming oxygen and the outgoing exhaust to mix creating turbulence that slows both flows. The net result is the fire will fail to burn vigorously and will smolder.

An oven with a ceiling that is too high will not give the the hot gases enough downdraft to allow them to escape and allow oxygen to replenish the fire. As with the oven that is too short, the fire will become starved of oxygen just as it is getting started and will smother itself in its own exhaust.

Fayol has adapted the canon of wood fired oven proportions devised by the Romans themselves and created a truly unique oven for today. Fayol has maintained the proper oven to door height proportions that are essential, but created an oven core that is simple and fast to assemble. With fewer pieces to assemble than brick-by-brick assemblies, the do-it yourselfer can build his or her oven core in under a day.

Another key element to a properly functioning oven has to do with the mass of an oven. Mass or the masonry that the oven is constructed of is its thermal storage. This is what makes an oven work. The heat generated by the fire is absorbed into to the masonry walls of the oven while the fire burns. As soon as the fire is removed the masonry begins to release the heat it has absorbed into the oven. If the walls of the oven are too thin then they will not be able to release enough heat for the time necessary to bake a batch of bread. This does not mean that the more mass there is the better. An excessive amount of mass will absorb too much heat and cause you to burn more wood than needed and for a longer time period in order to bring the oven up to baking temperatures.

Masonry is masonry is not masonry. All masonry is not the same in it's ability to provide optimal baking performance in a wood fired oven. The property of masonry to be a good thermal storage medium is that it is actually a poor
conductor. Because masonry is slow to absorb heat/energy it is also slow to release it. What makes good masonry for wood fired bread oven different from poor masonry is its density. The more dense the masonry the better it will conduct heat into itself, but also the quicker it will release the heat giving a short hot cycle of baking. Masonry that is too porous is too insulative requiring longer burn cycles for inadequate bake cycles.

Since the era of the Roman empire the Terre Blanche has been celebrated for the natural balance of density/porosity that makes this clay excellent for creating the bricks and tiles of the best wood fired ovens in the world. Today, Fayol carries on the tradition of producing only the finest ovens from the same clay deposits once heralded by the Romans.

Fayol has gone to great lengths to create the best quality oven by combining the finest materials and time tested designs with modern techniques.

From top to bottom: too tall, too short, too thin, just right
THE PRINCIPLE OF THE LE PANYOL OVEN CORE

The le Panyol oven is a wood fired oven using the heat of the fire for baking breads, pizzas, pastries, meats, and vegetables. The fire is started directly on the hearth of the oven. Gradually, as the fire progresses, the embers are pushed to the rear of the oven so as to ensure even heating of the oven.

For baking loaf breads and other foods that require even temperatures over an extended period of time, retained heat of the fire by the oven walls and hearth is used to cook. Once the oven has achieved cooking temperatures, the remaining embers and ashes are removed, and the floor of the oven is quickly swabbed with a moist towel. Following a tempering to even the internal temperature to roughly 600 degrees, food is placed in the oven and cooked directly on the hearth.

Another technique of baking in the le Panyol oven is called the direct heat method. Pizzas benefit from this method because of the higher internal air temperatures that cook the cheese and toppings before the hearth can burn the bottom of the crust. As with the retained heat method, a fire is started near the front and progressively moved to the rear of the oven as it heats up. Instead of removing the fire entirely, leave some embers in the oven after swabbing the hearth and keep a small fire going in the rear or off to the side.
Models 66, 99 and 83 are small to medium volume ovens designed with the home baker in mind. They are a great introduction to the pleasures of baking with a wood fired oven, yet are large enough to be useful to the artisan baker as well.

Models 120 and 180 are large volume ovens designed for commercial restaurants pizza and for production bread and other pastry baked goods.
### Model 66 - Domestic oven cores

<table>
<thead>
<tr>
<th>Specification</th>
<th>Measurement</th>
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<tr>
<td>Inner diameter</td>
<td>26”</td>
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<tr>
<td>Weight</td>
<td>825 lbs.</td>
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<tr>
<td>Hearth tile footprint</td>
<td>39-3/8” x 39-3/8”</td>
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<td>Hearth tile thickness</td>
<td>2-1/2””</td>
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<tr>
<td>Total core height</td>
<td>19-5/8”</td>
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<tr>
<td>Inside height</td>
<td>12-3/4”</td>
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<tr>
<td>Cooking surface</td>
<td>3.7 sq/ft</td>
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<tr>
<td>Wall thickness</td>
<td>4-1/2””</td>
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<tr>
<td>Door opening</td>
<td>13-3/4” x 7-7/8”</td>
</tr>
</tbody>
</table>
Model 83 - Domestic oven core

- Inner diameter: 32-3/8”
- Weight: 1188 lbs.
- Hearth tile footprint: 52-1/2” x 52-1/2”
- Hearth tile thickness: 2-1/2”
- Total core height: 19-5/8”
- Inside height: 12-3/4”
- Cooking surface: 5.8 sq/ft
- Wall thickness: 4-1/2”
- Door opening: 13-3/4” x 7-7/8”
## Model 99 - Domestic oven core

<table>
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<td>26” x 39”</td>
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<tr>
<td>Weight</td>
<td>1100 lbs.</td>
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<tr>
<td>Hearth tile footprint</td>
<td>39-3/8” x 52-1/2”</td>
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<tr>
<td>Hearth tile thickness</td>
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<tr>
<td>Total core height</td>
<td>19-5/8”</td>
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<tr>
<td>Inside height</td>
<td>12-3/4”</td>
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<tr>
<td>Cooking surface</td>
<td>6.3 sq/ft</td>
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<tr>
<td>Wall thickness</td>
<td>4-1/2”</td>
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<tr>
<td>Door opening</td>
<td>13-3/4” x 7-7/8”</td>
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</table>

![Diagram of Model 99 - Domestic oven core]
Model 120 - Professional oven core

- Inner diameter: 47 1/4”
- Weight: 2420 lbs.
- Hearth tile footprint: 65” x 65”
- Hearth tile thickness: 2-1/2”
- Total core height: 26”
- Inside height: 17-5/16”
- Cooking surface: 12.1 sq/ft
- Wall thickness: 6-1/8”
- Door opening: 10-1/4” x 21-1/4”

www.lepanyol.com for more about wood fired bake ovens
### Model 180 - Professional oven core

<table>
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<td>Weight</td>
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<tr>
<td>Hearth tile footprint</td>
<td>90-1/2” x 90-1/2”</td>
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<tr>
<td>Hearth tile thickness</td>
<td>2-1/2”</td>
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<tr>
<td>Total core height</td>
<td>29-3/8”</td>
</tr>
<tr>
<td>Inside height</td>
<td>20-7/8”</td>
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<tr>
<td>Cooking surface</td>
<td>27.5 sq/ft</td>
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<tr>
<td>Wall thickness</td>
<td>6-1/8”</td>
</tr>
<tr>
<td>Door opening</td>
<td>13-3/8” x 25-3/13”</td>
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What your le Panyol oven will look like on the outside is limited only to your imagination. In this chapter you will learn the essential elements of the whole oven, how they affect performance and how to design your oven’s exterior.
CALCULATING THE HEIGHT OF YOUR HEARTH

The height of the oven hearth should be determined by the end user for his/her comfort and convenience. Traditional oven hearths are usually at a height of 36”-40” above the floor. When planning your oven, determine first the the oven hearth height you desire. The oven hearth tiles in addition to the bed of sand or grog they rest on will take a minimum of 3”-5”. The slab supporting your le Panyol oven will take up an additional 4”-6”. For the casual home user it is not necessary to insulate the hearth tile from the supporting slab as they heat up quite rapidly and provide a sustained baking. However, if you plan to use your oven frequently or wish to bake on a more than casual basis, 2 1/2”-3” of insulation is sufficient. Add the thicknesses of the supporting slab, insulation, the bed of grog or sand, and the hearth tile and subtract this sum from the height you wish to have your hearth.}

FOUNDATIONS

All masonry construction including walls, fireplaces, and ovens, requires a proper reinforced concrete footing. Masonry footings generally exceed the width of the wall or construction they are intended to support by 6” on all sides and consist of 12” of reinforced concrete placed on compacted soil or undisturbed soil below the frost level. (Check with your local building inspector for the depth of your frost level.)

The reinforcement should consist of a minimum of standard reinforcing wire mesh in
Typical concrete block foundation (top) and the Sono tube foundation with the flared footing accessory (above)

www.mainewoodheat.com for the latest design information

6” squares placed in the lower third and a second layer placed in the upper third of the footing. Stronger reinforcement (recommended) can be achieved using 3/8” or 1/2” diameter steel rebar tied together in a 6” grid and positioned in the footing in both the upper and lower third.

Bend and tie short sections of vertical rebar to stabilize during the concrete pour. Once the footing has been poured allow at least 24 hours before continuing. Concrete block or concrete filled Sono tubes can be used to bring the foundation up the level of the concrete slab that will support your le Panyol oven.

A relatively new product that is widely marketed has a flared plastic fitting that mounts on a Sono tube which allows the concrete and footing and column to be poured in one step. As these column and footing forms are set in the ground they must be carefully plumbed with a level and then trimmed to a uniform height. to lock these columns into a reinforced concrete hearth supporting slab. one or two lengths of rebar should be installed in each tube with an eight inch right angle bend three inches above the form that will later be tied into the rebar grid of the reinforced hearth slab.
Hearth slab depth (front to back)

The oven slab depth, front to back, should be determined somewhat by the user. Each model has its own standard hearth tile layout. You can see from the brochure, Fayol web site* and enclosed drawings, that there is room on the hearth tiles of each model (66, 99, 83) to lay the second full set of arch elements that have the 3 1/4" x 11" rectangular opening at their top. For example, with model #83, a 4" masonry veneer wall with no insulation in the front can therefore be laid out around the 52 3/8" x 52 3/8" hearth, creating a total layout of 60 3/8" x 60 3/8". The user is likely to want a shelf or extended hearth in front of the oven, but this can still be built off a 60 3/8" x 60 3/8" slab with cantilevered supports under the extended hearth slab.

If you use a non-structural skin, let us say a metal stud wall with a concrete board and stuccoed veneer, you'd still want to calculate the 60 3/8" x 60 3/8" for a nominal 4" wall. And finally, you'd need a code required clearance of 2" all around to combustible members and materials. Thus, the sides would need a space 64 3/8" wide and the depth to the back would increase to 62 3/8". The front, of course, opens into the room.

* www.lepanyol.com
INSULATING YOUR HEARTH

The hearth tiles laid in 1-1/2” to 3” of grog are naturally semi-insulative, providing a sustained baking period without the addition of a structural heat-proof insulation beneath the tiles and grog. A casual baker, one who bakes infrequently or for only a couple hours a week will be satisfied with the performance of the oven without any additional floor insulation. Insulating your hearth, however will extend the period during which you can bake from a single firing.

If you plan on turning your hobby into an artisan bakery someday, then you should plan to insulate under the your hearth now while it is accessible and easy to do. For commercial production bakers, it is especially important to have sufficient insulation under their hearths for optimal performance.

There are several materials we have used with equal success.

“Skamol”

A commercial non-toxic product now available as a load bearing insulating prefabricated block is a Danish product made from vermiculite and waterglass pressed under 40,000 lbs., called “Skamol”. We are now using this product on some of our installations.

Vermiculite concrete slab

A low cost insulation slab can be made from vermiculite mixed 3-4 parts vermiculite (fine grain particle) to 1 part portland cement plus adequate water. Large grain particle vermiculite (attic insulation) is usable, but it will result in a much softer slab. A 3” thick slab is sufficiently thick.

“Ytong” (also called foamcement)

Long used in Europe, this lightweight structural insulation is made from autoclaved calcium cement (no portland cement.) It can be easily cut with a hand saw. It is available from the Maine Wood Heat Company.
SMOKE THROAT ELEMENTS AND ADAPTORS

For the American market, with only modest masonry familiarity with traditional French “hood” style smoke exhaust, Fayol has developed a second set of arch door elements, also made of Terre Blanche, the famous fired “white earth” of Lanarge, along the Rhone Valley in France. This new, made-for-America, set of paired elements, when mounted, has a rectangular opening at its top which measures 3 1/4” x 11”. To complement these new elements, the Maine Wood Heat Co. Inc., has designed and developed a heavy gauge stainless steel adaptor which is mounted with tap con screws and high temp silicone or refractory mortar to this horizontal surface. The adaptor makes the transition from 3 1/4” x 11” to an 8” round in 10 “ height. Using locally available elbows and stainless pipe, the exhaust can be vented in any direction, into either a masonry chimney or a pre-fab chimney.
ADDITIONAL MASS AND INSULATION

Our friends in France suggest that the thickness of the oven elements should be added to with an equivalent thickness of grog or sand. Thus, if the wall thickness of the module is approximately six inches, then they would add 6" of grog or sand all around. Grog is 30% more effective as a thermal mass and insulator than sand. Grog, we think, is much more readily or cheaply available in France than here in the US and sand is often offered as the cheaper alternative, but this loose fill layer of mass has a couple of cautions associated with it. Maine Wood Heat Company will be stocking grog made from Terre Blanche along with the oven cores.

1. Once the oven core is up, we suggest building the veneer skin and placing 2" thick walls of semi-rigid mineral wool batts up inside the veneer wall between the hearth stones (tile) and veneer block. This leaves little room at the base of the oven modules for grog fill, but still plenty of room as the voissoirs curve in to put extra mass on the shoulders and top of the dome. One can also drape aluminum foil down the inside face of the mineral wool layer.

2. Loose fill mass such as sand or grog might get into and through any crack and into the oven chamber. Even though the oven dome is entirely covered with the refractory clay provided, and allowed to cure, a strong earthquake might cause a crack and allow this loose fill mass to migrate into the oven or around the throat adaptor.

In an active seismic zone we would therefore recommend, after the refractory mortar layer is troweled or hand pargetted on, adding a thin skin (1/16 - 1/8") of a refractory fabric for which there are local suppliers (We can help to find one). This "skin" or tent over the dome will keep the sand or grog out should any cracks develop. Such a ceramic fiber skin is NOT commonly used in any French installation we are familiar with. The refractory mortar seems to be sufficient to create a permanent skin over the dome in non-seismic conditions.

In a Model 120 installation, we laid down overlapping sheets of aluminum foil on top of the dome, before adding loose fill vermiculite insulation, because we were concerned that particles might trickle down like sand in an hourglass. We were trying to be extremely cautious.

In the first Model 120 installation outside of Boston, our master oven builder friend, Christian Pozzar, used loose fill mineral wool,
It is not recommended that a heavy masonry mass be built resting on any part of the masonry core. Any masonry chimney built should be supported by the veneer walls, not by the oven core. If a short (2’ to 6’) masonry chimney is built directly above the throat and supported by angle iron and the veneer walls, a standard clay flue tile 8.5” x 12.5” can be centered over the throat and then rest on the refractory elements. Flue tiles should be set with refractory mortar and be free to move relative to the surrounding masonry. To protect an outdoor oven’s sole plates beneath the chimney from freeze/thaw cycles, the outdoor chimney should be fitted with a cap.

The oven floor dimensions for each model are the space required for the oven core and a thermal mass “insulating” layer of grog or sand around the oven. The oven floor dimensions do not include space for a masonry shell veneer. If a masonry shell veneer is used, it should be a minimum of 4” thick with 2” of clearance to combustibles. If a non-combustible “structural skin” is used instead of masonry, it must be constructed in such a way that it can contain any grog or sand fill and any loose fill or blanket insulation you might choose to add outside of the grog.
ASH DUMPS

Ash dump channels on either the large or smaller models can be easily notched into the front centered hearth tile of any model or placed in front of the hearth tiles. Dump channels and covers can be readily fabricated from steel or stainless steel. Cast iron ash dumps are also available. Ash can be carried to an ash drawer or an easily accessible, properly vented ash pit. Non-combustibility and proper venting of such an ash pit is essential because live coals still emitting carbon monoxide, may well be raked into the ash pit.

STONE HEARTHS

Aesthetics and stone hearth shelf extensions are also explored a bit on the web site and are in the purview of the owner, baker, architect, mason and designer. We’ll happily review any plans or drawings with special details of this sort that a client might wish to add or incorporate.

CAPPING YOUR LE PANYOL OVEN

Caps over the mass can be made out of sheet metal. Check with local code enforcement officers for any special requirements the chimney connector and chimney must be built to in order to meet standard chimney codes. There is considerable step by step documentation of real world oven kit and veneer assemblies on the Maine Wood Heat web site (www.mainewoodheat.com).
The Domestic family of le Panyol oven cores are exceptionally quick and easy to assemble.
Chapter 4: Assembly of the le Panyol Oven core: models 66, 99, and 83

1. Place the hearth tile on a bed of grog or sand and ensure they are level.

For this unique installation of the Model 83 oven the hearth tiles were trimmed to fit within a modified wagon wheel.

2. Center the oven entry approximately four inches from the front edge of the hearth.

The oven entry is seen in place to the left of the chimney adaptor made especially for the American market.
Chapter 4: Assembly of the le Panyol oven core: models 66, 99, and 83

Before we made the final assembly we set the oven up on the back of Albie’s trailer and scribed a circle on the hearth tiles that when trimmed would allow the whole assembly to fit within the wagon wheel platform.

Starting on one side of the oven entry, place the voussoirs. Support each voussoir as necessary with a piece of wood. Adjust by tapping with a rubber mallet.

Place metal pins into the holes provided on each side of the oven entry. Circle the whole oven with metal wire and secure to each pin. The wire should be snug, but not tight.

Masonry screws work best for the pins. Common steel bailing wire works great. The oven will expand when heated and needs a place to go, so don’t over-tighten the wire.

Chapter 4: Assembly of the le Panyol Oven core: models 66, 99, and 83

5

Put the key stone in place. Ensure that the lower part is at the same level as the inside of the roof. Carefully adjust all elements to obtain a good circle inside the oven.

Rob Zajac and Chris are gently lowering the keystone into its home.

6

An optional modification that has been made by Albie in installations of the Model 120, but is not necessary for Models 99 and smaller, is to fabricate “stops” for the voussoirs above the oven entry. They can be made from light gage steel angles, available at any hardware store, secured in place with masonry screws. A masonry drill will also be required for this operation.
Chapter 4: Assembly of the le Panyol oven core: models 66, 99, and 83

7

Block the assembly by tightening the metal wire by inserting pieces of brick or stone between the wire and the voussoirs.

8

Protect the inside of your oven core with paper or plastic before pargetting with the refractory mortar.

Wet the outside of the oven using a watering can or spray-nozzled garden hose making sure all joints are thoroughly wet.

Take 1/4 of the refractory mortar from the bag provided with the oven kit and mix just enough water to create a thin paste. Pour this around the keystone and down along the joints make sure all opening have been sealed.

Albie is beginning to fill the joints
Chapter 4: Assembly of the le Panyol oven core: models 66, 99, and 83

With the remaining portion of the refractory mortar, mix enough water to create a slightly thicker mixture than before and spread by rubber gloved hand, starting from the bottom, to complete the installation of the oven.

Avoid contact with the refractory mortar or any cement based product as they are caustic and can cause damage to the skin. Chris has chosen to use a trowel to spread the mortar.

You have completed the assembly of your le Panyol Oven core. LEAVE IT TO DRY FOR THREE WEEKS, PROTECTED FROM BELOW FREEZING TEMPERATURES.

Information on building the oven veneer and dimensions can be found starting on page 19.

Chapter 4: Assembly of the le Panyol oven core: models 66, 99, and 83

Model 99: Plan

Model 99: Front Section

Model 99: Side Section

Chapter 4: Assembly of the le Panyol Oven core: models 66, 99, and 83

Model 83: Plan

Model 83: Front Section
Model 83: Side Section

- Stone cap
- Oven core elements
- Ceramic fiber
- Smoke throat adapter
- 2" Mineral wool
- Hearth extension
- 4" Concrete block
- 8" Concrete block
- Grog
- 6" Reinforced concrete slab
- 63" - 75" Top of oven structure
- 36" - 48" approx. hearth height
Assembly of the le Panyol Oven core: Models 120 and 180
INTRODUCTION

The 120 and 180 are made from the same Terre Blanch (white earth) as the smaller model (66, 99 & 83) and follow the same classic French round oven design, but the larger ovens have larger chambers and thicker walls. Instead of single voussoir elements that reach from floor to capstone, the professional model voussoir elements are divided into stacking tapered tongue and groove segments. The model 120 has three stacking tongue and groove segments in each voussoir and the model 180 has four stacking tongue and groove segments in each voussoir. This allows each element to be manufactured and handled in the factory, as well as in the field installation by one person. Each element also has very slight freedom of movement from every other element, so while the combined system has a very stable form, the system also has built in flexibility and great ability to absorb differential heat expansion and minor movement.

From the center point of the center tile of each hearth assembly, a large compass (or anchored string and pencil) can scribe both the inside and outside diameters of the oven base course on the hearth assembly (#120 47 1/4" i.d., 59" o.d.) (#180 70 7/8" i.d., 82 5/8 o.d.). A plastic sheet the diameter of the inner diameter of the oven is laid atop the scribed inner circle.

SUPPORTING THE VOUSSOIR SECTIONS DURING CONSTRUCTION

Traditional French ovens were laid up course by course with brick, stone or firebrick on a wet sand or wet clay-sand dome, which could be shaped to a moveable convex template matching the inside curve of the intended oven dome.

Le Panyol oven core kits, because they are already formed, only need to be supported under each voussoir section as they go together. A cardboard template is provided with each oven that matches the inside curve of each oven model. Using the template, the oven builders or builder/buyer can cut 1/2" plywood replicas of this pattern. The model 120 requires 18 plywood “ribs”, cut to match its pattern, whereas the model 180 requires 22 ribs, cut to fit it’s unique pattern. The three ribs for each oven that fit over the door lintel have to be additionally notched where they rise past the inside of the door opening lintel. This can be done easily on site with trial and error cutting and placement of these three notched “ribs”.

Early le Panyol oven kit assemblies were accomplished using ribs and a wooden post against which the ribs could lean. All were burned out during the first fire. More recently, this system has been improved by creating similar ribs that slot onto a circular plywood disc with u-shaped metal channels mounted atop a simple scissors jack (cf. www.mainewoodheat.com, chatfield #120 oven)

The jack is placed on an 18" x 36" piece of plywood (to distribute the weight
over several hearth tiles) and both the jack and plywood weight distributor are centered over the middle tile. Each of the ribs \((120 = 18)(180 = 22)\) is eventually placed in the plywood disc and channels with the base of each rib just touching the inside diameter circle scribed on the oven tile hearth floor. The three elements opposite the arch lintel elements must be notched to fit the back side of the arch lintel elements. The back (not front) outside corners of each arch lintel element should touch the scribed inner diameter dome circle. All of the base course elements are equal and can be set on both sides of the arch lintel elements following the inside scribed circle. Once the first course of elements is set and tapped with a rubber mallet snugly into position, a pair of tap con screws, 2 1/2" - 3" long can be set in the lower exposed side faces of the arch lintel elements, and to these screws a double or triple strand of tie wire \((3/32')\) can be attached, binding the base course into place all the way around the base.

Once the base course is in, the plywood ribs can be carefully placed and the jack post raised, lowered, or centered as necessary. The ribs behind the arch elements can be notched to fit the back side of the elements.

For the model 120, courses two and three can be dry stacked and rapidly laid, with each piece resting on a centered plywood rib. For model 180, a fourth course of voussoir sections is laid, then either model is ready to receive its respective keystone.

It may be helpful to leave out the three sets of voussoirs over the arch lintel until the keystone conical plugs are set. Leaving out these over-lintel sections allows one to more easily see the space and fit being created for the cone section keystone. Once the keystone is snugly in position, then the over-lintel voussoir sections can be easily laid into place. Because these sections do not continue directly to the oven floor, there is a higher likelihood that lateral thrust will slide their bases out over towards the outer face of the lintel stones and away from the cone section keystone at the top. To ensure that those voussoir sections do not slide, it is possible to cut short lengths, 5-7" of galvanized slotted angle iron, \(3/32''\times 1/8''\times 1 1/2''\), which when slid under the bottom edge of each of these partial voussoir

- Modified scissor jack

sections, can be anchored securely with two tap con screws, each, drilled into the lintel elements.

**APPLYING THE REFRACATORY MORTAR**

The refractory mortar covering over the whole dome is the traditional way of securing the whole assembly, but these simple slotted angle iron sections are an insurance policy against any slippage on the three partial voussoir sections.

At the outside base of the dome elements of each of the larger models, we recommend that a small dike of relatively stiff Fayol refractory mortar be placed as a “collar” to assure the dome of stability and very limited movement at its base. Once this modest collar is troweled down, then a thinner paste of the mortar can be drooled on, and into, each seam and then the entire mass is covered with a thin coat of the mortar.

With the refractory mortar skin on, the factory oven core kit is complete, but the full oven assembly is not.

**CURING**

Once up the exterior of the oven should be parged with a loose mix of Fayol 1,100 Mortar. This will fill any large joints between the voussoirs. One bag of Fayol 1,100 mortar should be mixed with 4 liters of water. The exterior of the vault should be wet slightly before pargetting, to prevent the mortar drying out too fast. The remaining mortar can be hand applied (rubber gloved) to the exterior of the vault. Allow the oven to dry for three weeks. (do not allow to freeze during this time).

Make a series of small fires to cure the oven.

**ADDITIONAL MASS**

For the 120 and 180 models we recommend adding an additional layer of mass around the dome. The advantage of additional mass is an extended baking time between firings. See page 25 for design considerations.
Chapter 5: Assembly of the le Panyol Oven core: models 120 and 180

Model 120: Plan

Model 120: Front Section
Chapter 5: Assembly of the le Panyol oven core: models 120 and 180

Chapter 5: Assembly of the le Panyol Oven core: models 120 and 180

Model 180: Plan

Model 180: Front Section
Chapter 5: Assembly of the le Panyol oven core: models 120 and 180

Model 180: Side Section

<table>
<thead>
<tr>
<th>MODEL</th>
<th>WEIGHT</th>
<th>TILE LAYOUT</th>
<th>HEARTH TILE DIMENSIONS</th>
<th>HEARTH TILE THICKNESS</th>
<th>INSULATING SLAB DIMENSIONS</th>
<th>TOTAL CORE HEIGHT</th>
<th>INSIDE HEIGHT</th>
<th>COOKING SURFACE</th>
<th>WALL THICKNESS</th>
<th>DOOR OPENING</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>825 lbs. (375 kg.)</td>
<td>3 wide x 3 deep</td>
<td>39 3/8&quot; x 30 3/8&quot; (1 m x 1m)</td>
<td>2-1/2&quot; (63 mm)</td>
<td>3&quot; thick x same width and depth</td>
<td>19 5/8&quot; (50 cm)</td>
<td>12-3/4&quot; (32.5 cm)</td>
<td>3.68 sq/ft (0.35 sq/m)</td>
<td>4 1/2&quot; (11.5 cm)</td>
<td>13 3/4&quot; x 7 7/8&quot; (35cm x 20cm)</td>
</tr>
<tr>
<td>99</td>
<td>1100 lbs (500 kg.)</td>
<td>3 wide x 4 deep</td>
<td>39 3/8&quot; x 52 1/2&quot; (1m x 1.3m)</td>
<td>2-1/2&quot; (63 mm)</td>
<td>3&quot; thick x same width and depth</td>
<td>19 5/8&quot; (50 cm)</td>
<td>12-3/4&quot; (32.5 cm)</td>
<td>6.3 sq/ft (0.56 sq/m)</td>
<td>4 1/2&quot; (11.5 cm)</td>
<td>13 3/4&quot; x 7 7/8&quot; (35cm x 20cm)</td>
</tr>
<tr>
<td>83</td>
<td>1188 lbs (540 kg.)</td>
<td>4 wide x 4 deep</td>
<td>52 1/2&quot; x 52 1/2&quot; (1.30m x 1.30m)</td>
<td>2-1/2&quot; (63 mm)</td>
<td>3&quot; thick x same width and depth</td>
<td>19 5/8&quot; (50 cm)</td>
<td>12-3/4&quot; (32.5 cm)</td>
<td>5.8 sq/ft (0.54 sq/m)</td>
<td>4 1/2&quot; (11.5 cm)</td>
<td>13 3/4&quot; x 7 7/8&quot; (35cm x 20cm)</td>
</tr>
<tr>
<td>120</td>
<td>2420 lbs (1100 kg.)</td>
<td>5 wide x 5 deep</td>
<td>65&quot; x 65&quot; (1.65m x 1.65m)</td>
<td>2-1/2&quot; (63 mm)</td>
<td>3&quot;-6&quot; thick x same width and depth</td>
<td>26&quot; (66 cm)</td>
<td>17 5/16&quot; (44 cm)</td>
<td>12.09 sq/ft (1.13 sq/m)</td>
<td>6-1/8&quot; (15.5 cm)</td>
<td>10 1/4&quot; x 21 1/4&quot; (26cm x 54cm)</td>
</tr>
<tr>
<td>180</td>
<td>4620 lbs (2100 kg.)</td>
<td>7 wide x 7 deep</td>
<td>90 1/2&quot; x 90 1/2&quot; (2.30m x 2.30m)</td>
<td>2-1/2&quot; (63 mm)</td>
<td>3&quot;-6&quot; thick x same width and depth</td>
<td>29-3/8&quot; (74.8 cm)</td>
<td>20 7/8&quot; (53 cm)</td>
<td>27.5 sq/ft (2.54 sq/m)</td>
<td>6-1/8&quot; (15.5 cm)</td>
<td>13 3/8&quot; x 25 3/13&quot; (34cm x 64cm)</td>
</tr>
</tbody>
</table>
Ash Dump, Dampers and Chimney Caps

An indoor oven should include an ash dump. When cooking pizza or other live flame foods, no raking out of coals is required, but when preparing to bake bread, ashes and some small live coals will need to be raked out at the end of a burn.

The hearth is then further swept and swabbed with a wet cloth or mop.

Pivoting ash dumps made of cast iron, approximately 9" x 4.5", are readily available at building supply yards. These dumps are usually placed in front of the oven door beneath the throat. A knockout form for the ash dump can be made for the concrete slab with pieces of styrofoam, duct taped together and perhaps with a cedar shingle spacer in the center.

When laying the thermal block insulating layer, cut out a 4.5" x 9" hole aligned with the hole in the concrete slab. Calculate the exact height of the hearth and lay up a thin mortared level dike wall of firebrick, ytong, or common brick strips around the hole. This will keep the grog layer underneath the hearth from spilling into the hole.

Grog is then filled to the height of the “dike” around the hole and the balance of the hearth tiles are laid and leveled on the grog. The tiles around the ash dump should be carefully cut to receive the ash dump rim so that it lays level with the hearth floor. The ash dump can be set in using refractory mortar.

An outdoor oven installation is less in need of an ash dump, but it can still be useful. The ashes should dump out in an airtight, fireproof space, such as the hollow core of the foundation or base of the oven and be accessible with a clean out door.
Damper

Outdoor ovens do not require a chimney damper, but will benefit from a chimney cap. The terre blanche hearth tiles (especially at the door opening) and oven core must be protected at all times from moisture from rain or snow. If the tiles get overly wet in the winter, frost can get into the tiles and cause them to crack. If the tiles are saturated in any weather, a hot fire can cause thermal shock from steam expansion. Protect your hearth and dome by creating a waterproof roof for the oven and a cap for the chimney.

An indoor oven benefits greatly from a damper in order to assist in draft regulation, but also to avoid heat loss when the oven is not in use. When using an 8" round pipe exhaust, there are three readily available damper solutions. One is to use a standard cast iron pivoting stove pipe damper. Some air will still escape past this damper, but fully closed, it will greatly reduce air flow and heat loss up the chimney.

A custom made solid damper can also be fabricated by the MWH Co. or another fabricator. A second option is an airtight spring loaded chimney top damper. These are usually cast aluminum and are fitted to the chimney flue tile at the top of the chimney. They double as a cap device for the flue and will keep water out of the flue and off the hearth. They are operated by a stainless steel cable, which snakes down through the flue liner and/or can be sleeved out through a metal tube near the oven throat to a lever handle or can be mounted to the inside of the throat wall. Custom handles can be fabricated if the factory handle is not aesthetically pleasing.

A third option is to fabricate a second light weight door with a gasketed lip that is slightly larger than the factory supplied bake oven door. The oven door lips against the inner arch elements. A second door can lip against the outer arch elements effectively sealing off the chimney.

The Maine Wood Heat Co., Inc. can assist in the location of supplies of any of the above mentioned components.