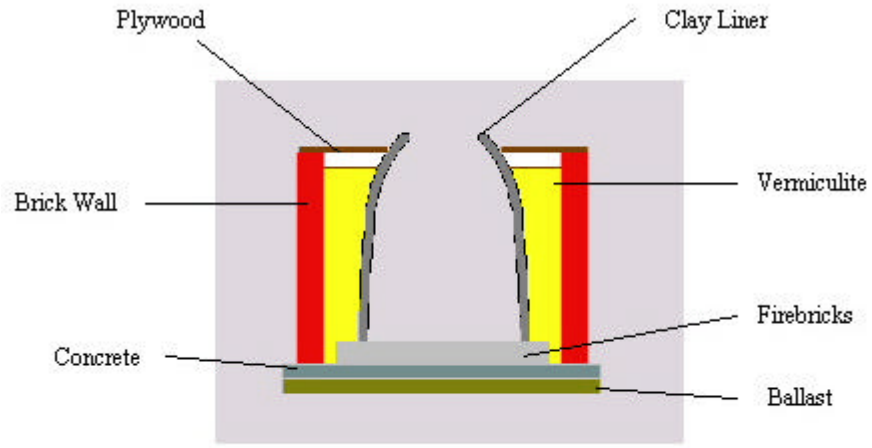
Tandoor Oven Installation

Planning

The tandoor needs to be firmly supported at a manageable working height. It needs to be supported on a heat resistant platform and surrounded by insulating material. The overall structure must be resistant to English weather conditions and must not be an eyesore. The structure should be robustly constructed so as to survive for many years.

The foundation is a one metre square concrete slab, approximately 75mm deep. This is supported by a 75mm layer of hardcore on top of compacted earth. The concrete slab provides a sturdy base for the tandoor and the brick enclosure. No damp proof membrane is included – time will tell if this is a mistake.

The tandoor stands on a layer of firebricks which are dry-laid directly onto the concrete base. These bricks protect the concerete base from the high temperatures at the base of the tandoor. The bricks are dry-laid so that they can be replaced individually if they bacome worn or damaged. The bottom of the tandoor is sealed to the firebricks with fire cement.



The tandoor is surrounded by vermiculite insulation, to a minimum thickness of 100mm. This reduces the rate at which heat is lost from the tandoor, reducing the fuel consumption. The insulation is retained by brick walls which also support the working surface on the top of the structure. The working surface is exterior-grade plywood with a hole through which the mouth of the tandoor protrudes.

The top of the structure is protected by a cover constructed from more plywood. It is important to keep the tandoor liner as dry as possible to prevent damage to the unfired clay. An air gap has been left around the cover to provide ventilation and safeguard against damp.

Materials

All materials were bought from builders' merchants or DIY stores.

The concrete pad is just over a metre square (1040mmx1040mm), 75mm thick and rests on 75mm of compacted ballast. That's approximately 0.08 cubic metres of both concrete and ballast. I improvised the ballast using gravelly spoil from a friend's garden renovations and bought the concrete as 10 maxi bags of dry-packed mix.

The concrete is held in place while it sets by wooden formwork. I made this from old kitchen cabinets but OSB (Oriented Strand Board, widely available) would be the obvious material. You will need a heavy, long bit of timber to tamp down the concrete. I used a length of old 2x4 which was lying around.

The brick walls are 10 courses high and there are 16 bricks per course, giving a total of 160 bricks before an allowance for wastage. If it were to be built in an exposed position then frost would be a concern and suitable frost-resistant bricks would be required.

Dry-packed bricklaying mortar was used in the construction of the brickwork. A builders' merchant will be able to advise on the number of bags required for 160 bricks. Buy generously since you are likely to waste some until you have got the knack of bricklaying. I used six maxi bags.

The tandoor itself rests on a layer of fire bricks. These are expensive so only just enough to fill the opening at the base of the tandoor were purchased. Thirty were required.

Some builders' sand was placed around the edges of the firebricks. Just one maxi bag was used.

The tandoor liner is surrounded by six cubic feet of loose vermiculite insulation. This was bought from a builders' merchant as two bags, each three cubic feet.

I used two tubs of fire cement to seal around the base of the tandoor and to construct the tunnel which allows air to enter the oven.

One sheet of 18mm exterior grade ply is needed to make the cover.

Tools required: spade, long level, small level, rule, bricklaying trowel, pointing trowel, brick bolster, lump hammer.

Base

First decide where your tandoor is going to be. Consider at least the following factors:

- Easy access from the kitchen
- Prevailing wind direction takes the smoke away from you and your neighbours
- Fire risks
- Ease of construction (soil makeup, access to the site from all sides)

Mark out the area of the concrete base. The books suggest that you use string and pegs for this. I found this difficult to do accurately and later in the project abandoned the marker strings which I had laboriously positioned. At this stage a rough mark-out using a straight edge and a spade is all that is required.

Excavate a hole for the ballast and concrete slab, 150mm deep so that the top of the slab will end up at ground level. Allow an additional clearance of 100mm all round the slab to allow space for the formwork. Make sure that the bottom of the hole is roughly level.

Cut four pieces of wood for the formwork. The pieces should all be 75mm wide. Two should be exactly the length that the slab will be wide, two should be 100mm longer. The short pieces will form two opposite sides of the formwork, as will the long pieces. Cut pegs and screw two pegs to each piece of formwork such that the top of the peg is level with the top of the form.

Take the first form and hammer the pegs into the ground so that the form is exactly where you want one side of the concrete block to be. Repeat with the other three forms so that an accurate square is formed: top exactly flat and level with the surrounding ground, bottom approx 75 mm above the bottom the the hole, each side 1040mm long. Pack waste soil around the outside to hold the formwork very firmly in place. It must be secure in order to withstand the weight of the wet concrete later.

Tip ballast into the formwork until it reaches the bottom of the forms. Compact it by jumping up and down on it then check that it's level and adjust accordingly. Line the hole with a layer of polythene (the bags that the sand and concrete came in are fine) to slow down the loss of moisture from the curing concrete into the soil. You're now ready to pour the concrete.

The amount of concrete is small enough to mix by hand but it must all be poured within two hours so don't start just before lunch! Mix the concrete according to the instructions on the bags then pour it into the formwork and spread it out with a rake or shovel. Keep pouring until it is just above the top of the formwork. Use a heavy length of timber, just longer than the formwork is square, to tamp down the concrete to fill any voids. Add more concrete as necessary. Then use the same piece of timber in a sawing motion across the top of the formwork to remove the excess concrete down to the level of the top of the forms.

Cover the concrete with a sheet of polythene and leave to cure for at least 24 hours before staring to build on it.

Walls

The walls should be exactly a metre square and nine courses high (if your tandoor liner is the same size as mine). The bricklaying is extremely straightforward with the possible exception of the air hole which requires a brick to be cut using the brick bolster (or trowel if you're man enough – you'd better buy extra bricks if you're going to try!).

Check before building exactly how high the air hole and top of the oven will be in the final construction. I didn't check carefully enough and ended up having to lift the oven on shims (thick old floor tiles) and to hack out a larger air hole with hammer and chisel. The top of the oven should protrude about 30mm above the top course of bricks to allow the very top to be clear of the 18mm ply which will form the top.

Lay the fire bricks, on their sides, directly on top of the concrete slab, taking care that they are tight together. Ram sand around the perimeter to help hold the firebricks in place.

Lift the tandoor liner into the enclosure and check carefully that everything lines up. The air hole must line up with the corresponding hole in the walls and the top of the oven must protrude by 30mm or so above the top course of bricks.

Cut a piece of 18mm ply to exactly fit the top of the construction (1 metre square if you're accurate in your bricklaying – mine ended up being 1000x995mm). You need to cut a circle in the centre of the sheet large enough for the top of the tandoor to fit through. You'll need to know exactly what part of the tandoor is on a level with the top of the top course of bricks then measure the diameter of the tandoor at this point (and check that it's exactly round) before marking the hole and cutting it with a jigsaw.

Put the plywood over the mouth of the tandoor and adjust the position until the sides of the ply are flush with the brickwork. Check that the air hole is aligned with the corresponding hole in the brickwork. When you're satisfied with the positioning you can carefully remove the ply and cement the tandoor into place.

Use a small trowel to apply fire cement all around the inside of the bottom of the tandoor. Make sure that you stick it well to both the tandoor and to the fire brick floor.

Make a tunnel between the air hole in the tandoor and the one in the brick. Use bits of bricks held together with mortar or fire cement. Try to ensure that all crevices are filled and the tunnel is airtight.

Insulating and Finishing

Once the vermiculite is in place it would be messy and awkward, though not impossible, to remove it. Now is a good time to check that everything is OK before pouring the insulation.

Light a small fire in the tandoor using just a handful of charcoal. Keep it going all day until the tandoor liner is thoroughly hot.

A hot fire might crack the relatively damp liner at this point so be careful to keep the fire small. When the tandoor has cooled check that the liner is still intact and that the fire cement looks secure.

Pour in the vermiculite around the liner. Put the plywood top on.

The clay tandoor liner must be protected from rain. A tarpaulin might be sufficient but it wouldn't look good and might result in condensation. I constructed a simple top out of 18mm exterior grade plywood which will eventually be varnished and then should be sufficiently weatherproof. Thinner ply would probably be a good idea since my cover is too heavy for me to remove and replace easily single handed.

Firing

Tandoors can be fired using wood, charcoal or gas. Restaurant ovens are invariably gas-fired. Gas is clean and controllable. A gas tandoor could be installed within a domestic kitchen if suitable extraction were supplied.

Wood and charcoal are the traditional fuels of the tandoor. Wood, or specifically hardwood, has the theoretical advantage that the smoke generated will flavour anything which cooks in the oven. Wood burns with and intense flame so will quickly heat the tandoor to cooking temperature. Wood used in the tandoor must be untreated since there is a danger of toxic treatment chemicals contaminating the food. I have so far been unable to locate a source of cheap, untreated hardwood.

That leaves charcoal. Charcoal is cheap, readily available and gives excellent results. It is relatively smoke-free which may be an advantage in some areas (although fat dripping from food will still generate a great deal of smoke).

I use about half a kilogram of charcoal to start the fire. I've found that it's best to light the fire at three separate points around the circumference of the bottom of the tandoor rather than lighting one large fire in the middle. When the fire is established I add more charcoal and partially cover the top of the oven. I've found that it's best to leave the air vent fully open while pre-heating.

With an industrial, high-temperature thermocouple I have monitored the temperature of the oven. It heats very quickly to 100 C then the temperature climbs over a couple of hours. The highest temperature so far recorded in my oven is 384 C (723 F) which was shortly after being refuelled after a couple of hours of pre-heating. The temperature plummets when the top is fully uncovered, I've seen it drop 100 C in just a couple of minutes. However, with a second thermocouple I have monitored the temperature of the outside skin of the clay liner and this stays high - allowing the interior temperature to recover quickly when the top is covered after loading.

The oven should be ready to cook about an hour and a half to two hours after lighting the charcoal. If you can't hold your hand in it for more than a few seconds then it's probably ready. You could cook sooner but you would be relying on the radiated heat of the charcoal rather than the stored heat of the clay liner.

How to cook breads

Bread is cooked in the tandoor by being stuck to the side of the pre-heated oven. This requires a deft hand and some tolerance to high temperatures (or thick, non-flamable gloves).

The oven must be pre-heated. Experience will tell you when it's at the right temperature (at least, that's what I assume - I haven't completely mastered this yet). I heat the oven with the mouth partially covered because I think that the top of the oven gets hotter that way. I consider it to be hot enough when I can't hold my hand inside the oven for more than 5 seconds or so. If you've got a high temperature thermometer then about 300C (570F) is probably about right.

Separate the prepared dough into portions and roll it out. I do this in the kitchen before carrying it out to the tandoor. Have a small bowl of water alongside the tandoor for wetting the breads just before they go into the oven. Make sure that you have bread removal tools (supplied with the oven - comprising a long hook and spatula) ready to hand. The other piece of equipment needed is a tea towel. Then you're ready to cook.

Make a ball with the tea towel and hold it, scrunched up, in one hand. With the other hand drape one rolled out piece of dough on top of the towel then rub the upper side with water from the bowl to help make the dough sticky. Now swiftly reach down into the oven and press the bread against the side. If you're lucky the bread will stay in place. If you're unlucky it will drop straight off into the embers and you'll know to press it into place better next time!

Repeat with all the breads, or as many as you can fit into the oven at one go. They should puff up very quickly and be cooked in about three minutes (it's a guess - I'll try to remember to time it next time I have a go). Remove by sticking the hook into the bread then levering it from the side of the oven with the spatula.

Recently a friend from Delhi came for lunch and I cooked him Naan. He helped out and his most useful comment was that in India they use a cushion rather than a balled tea-towel to put the bread in the oven. I can see why this is a good idea since it will apply pressure to more of the bread as it's being stuck to the side of the tandoor and so reduce the possibility of the bread stretching, breaking and falling into the bottom of the oven. I plan to make myself a cushion for the next cooking session. I used the recipe below and my friend was very complimentary about the results.

Naan

This recipe is adapted from Madhur Jaffrey. It is written for the domestic kitchen but is easily adaptable to the tandoor.

Makes 6 large breads

- 0.25 pint hand-hot milk
- 2 teaspoons castor sugar
- 2 teaspoons dried active yeast
- 1 lb plain flour
- 0.5 tsp salt
- 1 teaspoon baking powder
- 4 tablespoons vegetable oil plus a little extra
- 5 fl oz plain yoghurt, lightly beaten
- 1 large egg, lightly beaten

Put the milk in a bowl. Add 1 teaspoon of the sugar and the yeast. Stir to mix. Set aside for 15—20 minutes or until the yeast has dissolved and the mixture is frothy.

Sift the flour, salt, and baking powder into a large bowl. Add the remaining 1 teaspoon sugar, the yeast mixture, the 2 tablespoons vegetable oil, the yoghurt, and the egg. Mix and form a ball of dough.

Empty the ball of dough on to a clean work surface and knead it for 10 minutes or more, until it is smooth and satiny. Form into a ball. Pour about ¼ teaspoon oil into a large bowl and roll the ball of dough in it. Cover the bowl with a piece of cling film and set aside in a warm, draught-free place for 1 hour or until the dough has doubled in bulk.

Preheat your oven to the highest temperature. Put the heaviest baking tray you own to heat in the oven. Preheat your grill.

Punch down the dough and knead it again. Divide it into 6 equal balls. Keep five of them covered while you work with the sixth. Roll this ball into a tear—shaped naan, about 10 inches (25.5cm) in length and about 5 inches (13cm) at its widest. Remove the hot baking tray from the oven and slap the naan on to it. Put it immediately into the oven for 3 minutes. It should puff up. Now place the baking tray and naan under the grill, about 3—4 inches (7.5—10cm) away from the heat, for about 30 seconds or until the top of the naan browns slightly. Wrap the naan in a clean tea towel. Make all the naans this way and serve hot.

Boti Kebabs

Lamb can be used rather than mutton for this recipe. Cooking time should be less than 10 minutes in the tandoor.

Ingredients

- 1 kg mutton (cut into 2 cm cubes)
- 6 level tbsp curd
- ¼ cup lemon juice
- salt to taste
- ¼ cup vegetable oil
- 3 level tbsp tomato paste
- 2 tsp dry English mustard

Grind together

- 1 tbsp coriander seeds
- 1 tbsp turmeric
- ½ tsp cloves
- ½ tsp cinnamon
- 10 cloves garlic
- 1 tbsp cumin seeds
- 1 tbsp garam masala
- ½ tsp mace
- 2 cm sq piece ginger

Method

1. Add the tomato paste, curd, mustard, salt, '/4 cup oil, lemon juice to ground masalas and mix to a smooth paste.
2. Remove any fat from meat pieces.
3. Stab pieces with point of sharp knife, then place them in a glass bowl.
4. Pour marinade over meat.
5. Mix well, cover and refrigerate at least 4 hours or preferably overnight.

Tandoor Chicken

Probably the most famous recipe from the Tandoor is Tandoori Chicken. The skinned whole chicken is rubbed with salt and lime (or lemon) and marinated for at least six hours in a mixture of yogurt and a masala. Masala is kind of the Indian equivalent of a spice rub (wet or dry). Typically it is made of ginger, garlic, chilies and saffron (for color).

After the chickens have marinated they are placed on long thick iron skewers and placed inside the Tandoor to cook. Because of the Tandoor's intense and even heat, it only takes about 20 minutes for the chickens to cook. Few things receive more praise than chicken cooked in an old and well-used Tandoor. The Tandoor itself is a vital ingredient to the recipe because it imparts a mellow smoke flavor to the chicken.

INGREDIENTS:

- 2 pounds chicken
- salt
- 2 tablespoons lemon juice
- 1/3 cup vegetable oil
- 1 large onion cut into rings
- 8 cloves minced garlic
- 3 tablespoons almond slivers
- 2 tablespoons minced ginger
- 2 teaspoons garam masala*
- 1/3 cup plain yogurt
- 1/2 teaspoon cayenne pepper

PREPARATION:

Prick chicken with a knife on both sides. Rub with lemon and salt. Let sit one hour in refrigerator. Heat oil in a medium saucepan. Add onions and garlic. Cook until opaque. Reduce heat and remove onion and garlic.

Add almonds to oil until brown. Drain and retain oil. Add almonds, ginger and 2/3 cup of water to onions and garlic. Put in blender and blend until smooth. Put in bowl. Add Garam Masala, yogurt, cayenne and 1/2 teaspoon of salt. Mix. Add chicken, covering each piece with marinade and let sit over night.

*Garam Masala can be made by placing 1 tablespoon cardamom seeds, 1 teaspoon black cumin seeds, 1 teaspoon whole cloves, 1 teaspoon black peppercorns, 1/3 teaspoon nutmeg and a 2" cinnamon stick in a coffee grinder. Grind as finely as possible.