

Building your own low-tech wood-fired pizza oven is a substantial undertaking. But the whole process can be reduced to a series of small steps. And you don't have to build the whole thing in a weekend. It is built from the ground up, starting with the base, the cooking surface and then the dome. The oven can be built on any flat site, or even on a terraced bank of earth behind a retaining wall, as long as it is well compacted and drained properly.

The oven is built with a raised, solid paver floor supported at a comfortable working height.

The massive floor provides a 'heatbank' in which the heat of the oven can be stored. While the supporting base could be built of various materials, bricks or masonry blocks are ideal.

As this low-tech oven is principally unfired adobe, it is not weather-resistant and will need to be sheltered from the rain. This can take the form of a plastic or vinyl cover (the chimney can be withdrawn), similar to a barbecue cover, or a small skillion roof can be built over the oven.



GATHER YOUR SUPPLIES

- 0.2 cubic metres of ready-mix concrete or concrete mix
- Old floorboards or framing timber for formwork
- 1400 x 1200mm piece of F62 steel mesh
- 37 masonry blocks, 400 x 200 x 200 mm
- 2 half blocks for base (see Diagram A)
- 3-4 bags of mortar mix
- Flat 1000 x 10mm thick galvanised steel lintel
- 4 lengths of 32 x 32 x 4mm or 50 x 50 x 6mm x 900mm angle iron
- 1000 x 800 x 12mm compressed fibre cement sheet
- 1/4 cubic metre decomposed granite or similar
- 1/2 cubic metre brickie's sand for oven floor and sand mould
- Smooth bricks or clay pavers for oven floor and skirt
- 40mm-thick tiles or pavers for oven surround
- Air-setting mortar or fireproof cement
- 32 or 16mm exterior grade plywood (2 or 4 of 300 x 500mm)
- 900 x 112mm diameter stainless steel flue pipe (4 1/2" is fine)
- Half wheelbarrow of clay or bags of powdered clay
- Half wheelbarrow of crusher or stone dust or 5mm minus aggregate
- 1-2 bags cement
- 500mm sisal rope
- 100 litre bag of vermiculite
- Plastic drop sheet
- Temperature gauge, 0 to 500°C, 75mm dial, 300mm probe
- Bondcrete (optional)
- Oxide colouring (optional)

YOU'LL ALSO NEED

Wheelbarrow; jigsaw; angle grinder with metal cutting disc; spade or hoe; brickie's trowel and float; rubber mallet; bucket and sponge; garden and kitchen sieves; measuring tape; straightedge and spirit level; hammer; screwdriver; safety goggles, ear muffs and dust mask; broad paintbrush

They'll be lining up at the garden gate for a table when you stoke your pizza oven and wonderful smells fill the air.

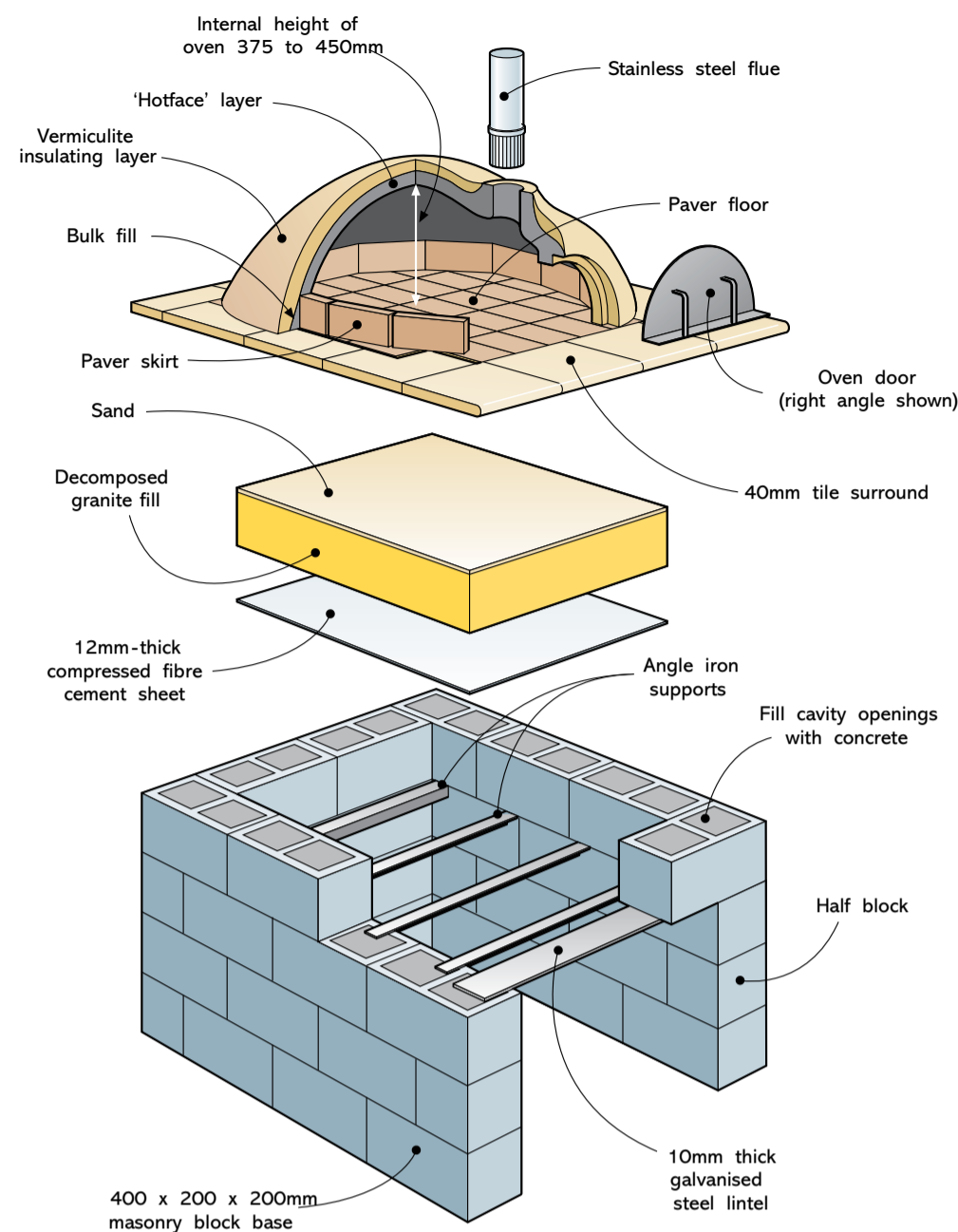


Diagram A

HERE'S HOW

STEP 1 (see Diagrams A and B) Pour a 1500 x 1300 x 75-100mm deep concrete slab in formwork made of old floorboards or framing timber. This is easiest if you order a small quantity of ready-mixed concrete once the formwork is prepared. To limit cracking, include a 1400 x 1200mm piece of F62 steel mesh in the centre of the concrete. Once the concrete has set, keep the slab wet to cure it properly. After 3-4 days, build a 1400 x 1200mm base made of 400 x 200 x 200mm hollow concrete blocks. Build up the first 3 courses as shown.

STEP 2 Install a flat 1000 x 10mm-thick galvanised steel lintel over the opening and 4 lengths of angle iron across the opening as shown in the diagram. You will need to grind off small vertical sections of the steel angles of each end so they sit flat on the blocks. Add the last course of blocks.

STEP 3 To support the thick oven floor, insert a sheet of 12mm compressed fibre cement onto the angle iron to form a well. You could also pour a suspended concrete slab but this would need formwork on the underside and reinforcing. Fill the hollows of the concrete blocks with concrete (with 5 or 10mm gravel size) or stuff paper into the hole of the top block to only fill the top 100mm or so.

STEP 4 Lay a bed of decomposed granite (granitic gravel with some clay content) to the level of the top of the blocks. Pack this down well so it is hard. Avoid using sand as it tends to shift and not pack down well. The function of this thick bed is to absorb the

heat while the oven is heating up but it also retains and returns heat to the oven once the fire is out. It is especially good when baking bread or cooking roasts.

STEP 5 Once the decomposed granite has been packed tightly into the well, spread and level a 10-15mm-thick layer of brickie's sand over the surface as a level bed for the oven floor. This is easy to do by placing a 10-15mm batten each side of the well and use this as screeding rails. The sand can extend a little over the block work. Then straighten the edges.

STEP 6 Mark in a front edge line, parallel to the front and set back enough to accommodate the tiles or other surrounding surface, to create a handy workbench in front of the oven opening. Also mark in a centre line from front to back.

Selecting the oven floor

Special firebrick or refractory tiles are ideal for the oven floor, but can be expensive. A suitable floor can be made from dry pressed brick pavers or bricks. Avoid extruded or wire-cut bricks or pavers as they rarely have smooth surfaces. If only wire-cut bricks or pavers are available, find the smoothest bricks you can. Don't be tempted to use fully-vitrified (glass-like) ceramic floor tiles, even though most have smooth surfaces and edges. They tend to crack with the uneven heating when firing up the oven.

STEP 7 Starting at the front set-out line, place the pavers upside down so that square sharp edges face up and there are no bevelled edges which would create grooves in the oven floor. There is no need for mortar between the pavers or bricks. Only cover the floor area of the oven with the pavers. An oval shape is much better for heat distribution than a circular plan.

STEP 8 Form a skirt of pavers-on-edge as the inner circumference of the oven without gluing them down at this stage. These pavers are strong enough to withstand the wear and tear of the oven broom and also protect the lower section from burning timber bumping into the oven wall. At this stage, make sure you leave plenty of room to the outside of the skirt to allow for the bulk fill and insulation, while still leaving space for the tiling. And don't forget to leave a gap of 65mm at the front of the oven to allow for the door mould.

STEP 9 Once you are happy with the layout, use a pencil to trace the position of the skirting pavers on the oven floor. Apply a thin coat of air-setting high-temperature mortar or fireproof cement to the base and edge of the pavers and set in place. Tap each paver in place with a rubber mallet.

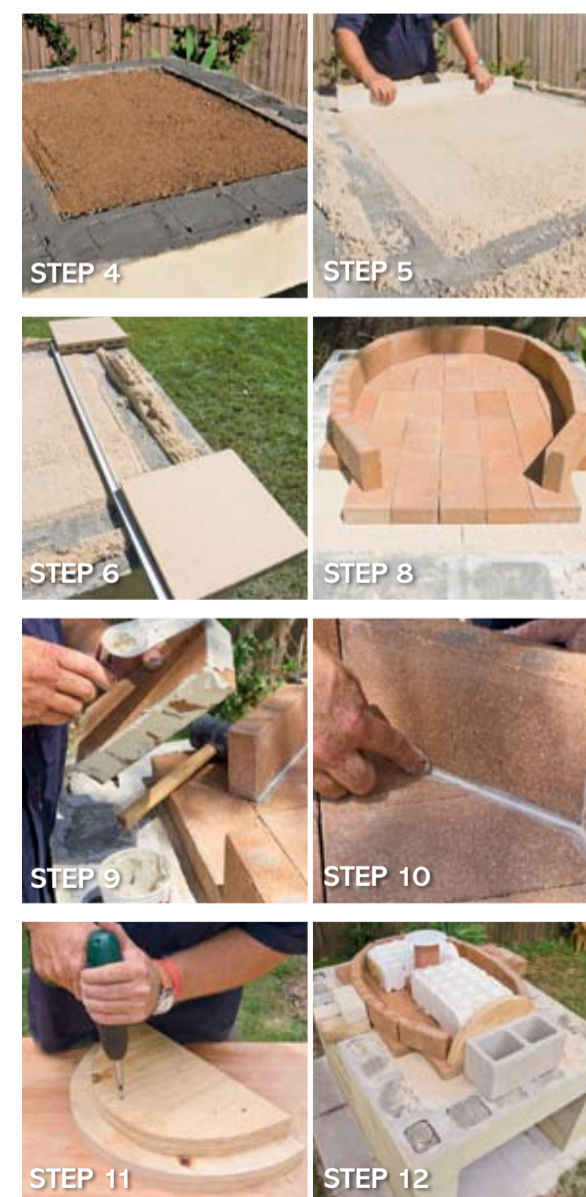
STEP 10 Wipe the bead of excess mortar with your finger to create a neat coving around the base of the skirt. Clean off any excess with a damp sponge. Fill any gaps between the floor and skirt with the same material, then sponge back to make a clean surface. Allow to dry.

STEP 11 To make the door mould (see Diagram C), use 32mm plywood cutouts or double layers of 16mm plywood. To make removal easier, the mould is not a perfect semicircle, rather a 250mm radius with the sides extended down for a total height of 300mm. The shape does not have to be perfect and you can even draw the shape freehand if you want to. The smaller inner piece is 30mm smaller all around. Now cut the shapes out with a jigsaw, then glue and screw them together.

STEP 12 Sit door mould on two 5mm-high wedges at the front of the floor and support with blocks or bricks. If you ultimately want to use a lean-to steel door for the oven, use the wedges to slope the moulding backwards slightly. For a vertical door with a flat base, set the mould vertically. To save on moulding sand, you can use polystyrene boxes as fillers. These will be broken up and removed through the door opening when the oven is finally completed. As an extra precaution to prevent the roof collapsing when the sand is removed, prop a 375-425mm post (height is not critical) with an old plate on top in the centre of the dome.

STEP 13 Gently shovel brickie's sand over the central post and foam boxes. Form it into a low-pitched dome using a trowel or float, so it just covers the central post.

STEP 14 Shape the dome so the sand just meets the inner edge of the door mould and the paver skirt all round. Trowel the sand to a smooth finish. Brush excess sand off the top of the perimeter pavers.



Photography: Phil Aynsley; diagrams: Steve Pollitt

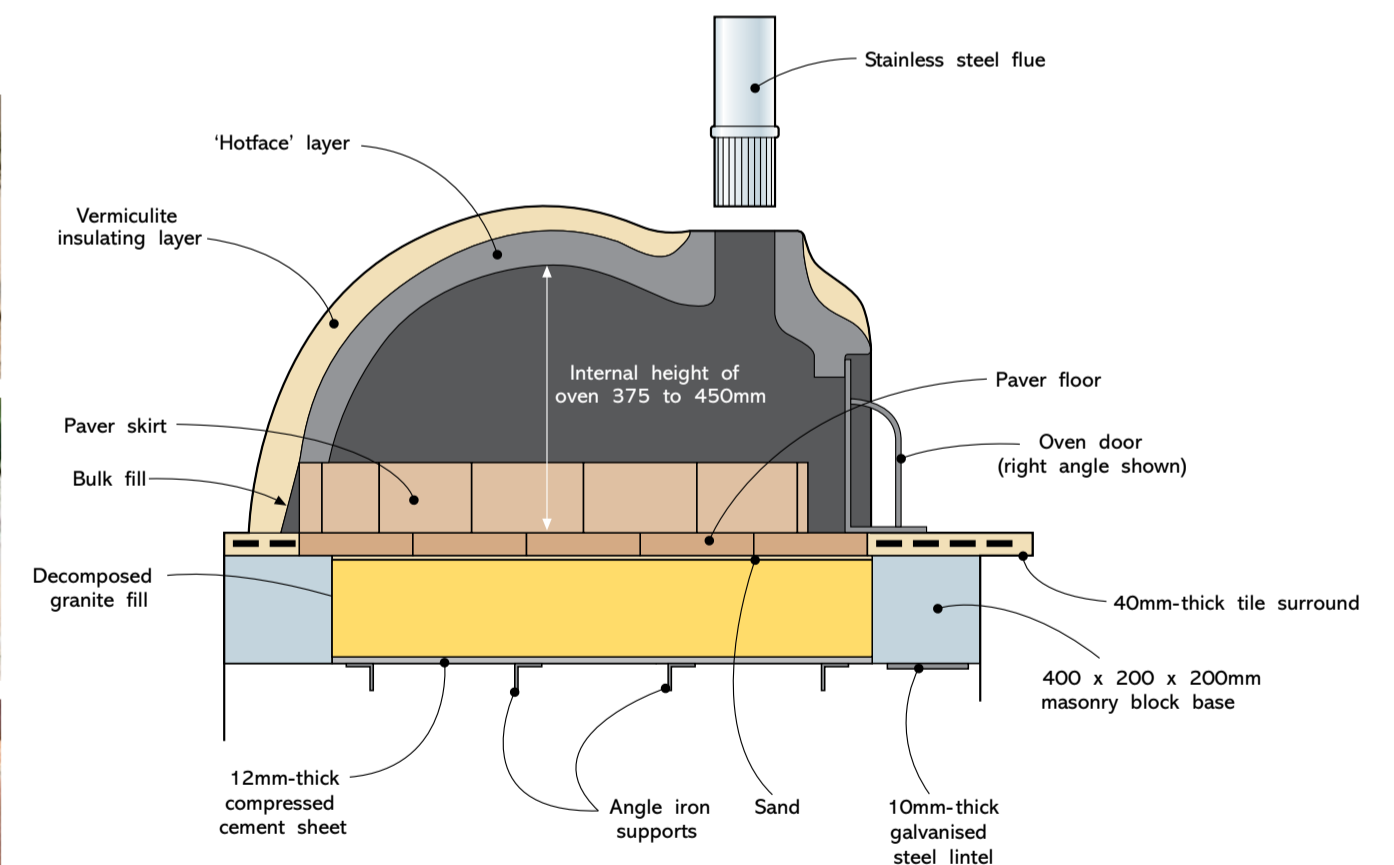


Diagram B

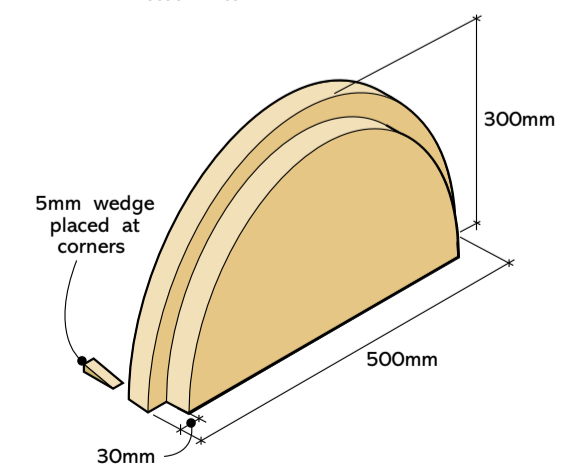


Diagram C

wood-fired oven



Do you love cooking and dining alfresco? Then move on from the backyard barbecue and build yourself a wood-fired pizza oven



Better Homes and Gardens

JULY 2008

STEP 15 Cut a 175mm length off the 112mm (or 4½") stainless steel flue pipe from the non-crimped end as a temporary chimney mould. Use a metal cutting disc, suitable for stainless steel, and wear appropriate eye and ear protection.

STEP 16 Wrap the flue section with thin cardboard to make later removal easier. Tap the pipe into the sand centred over the door opening and about 50mm back from the door mould, leaving about 150mm protruding from the sand mould. Then cover the whole dome with a single thickness of thin plastic sheet, such as a painter's drop sheet. This prevents the next coating from sticking to the sand mould. Cut a small hole in the plastic to accommodate the chimney pipe and tape in place.

STEP 17 The 'hotface' layer of the oven dome is in direct contact with the flames. It is a mixture of plastic clay, brickie's sand and crusher dust with a little cement and fibre added. If buying powdered clay by the bag ask for a 'plastic' clay such as terracotta or ball clay. Avoid fire clays as these tend to be less plastic. A cheaper alternative is clay dug or reclaimed from excavations, earthworks or swimming pool projects. Check with local contractors. See Choosing and testing your clay (below), to determine whether the clay you are using is suitable. To prepare natural clay, break it up with a hammer and work it through a garden sieve, making sure it is very dry. You will need about half a barrow of sieved clay for the whole project.

STEP 18 The other ingredients are brickie's sand, which is used by bricklayers and contains a small amount of clay to make it

'fatty', and crusher dust or stone dust, which is the finest grade of aggregate available at most landscape suppliers (less than 5mm in size). The standard mix when using plastic clay is equal parts of clay, sand and crusher dust to make up half-a-wheelbarrow load at a time. If the clay you are using is only partly plastic, reduce the amount of sand and crusher dust. To help bind the mixture and minimise cracking, add a cup full of chopped sisal fibre to half a barrow of mix. Simply cut sisal (not synthetic) rope into 25-35mm lengths and tease out the rope into single fibres. Mix thoroughly while dry and set aside half a bucket for use later on.

STEP 19 Add up to 5% builder's (Portland) cement to the other ingredients and dry mix again. Then add water slowly, mixing with a spade or hoe, until you have a soft, but not sloppy, mix.

STEP 20 To slightly stiffen and thoroughly blend the mix, knead small batches of the mix on a flat surface that has been 'floured' with some of the dry mix previously set aside (it's just like rolling out pastry). Once the mix is kneaded like dough it's ready to use.

STEP 21 Now break off a small portion of the kneaded clay and pat it into a thin pancake shape about 10-15mm thick. Starting at the top, apply the clay pancakes to the dome and begin spreading outward and downward. Each pancake should slightly overlap the previous one and the two are pressed together.

STEP 22 Build up the clay mixture around the chimney mould and press firmly into the rebate of the door mould. Build up around

Remove the central supporting post only once you are sure that the hotface layer is sufficiently firm to be self-supporting. At this stage you should pull the plastic liner from the ceiling of the dome and let the whole structure dry completely. Repair any small cracks which could develop where the shrinking clay mix meets the non-shrinking paver skirt, by painting over and filling the crack with a thin slurry of 1 part clay to 4 parts sand. It's best to pass this wet mix through a kitchen sieve first.

STEP 27 Remove the short piece of flue pipe from the cardboard liner to allow any shrinkage to take place, then remove the cardboard liner. Paint the internal surface of the chimney hole with the same thin slurry of clay and sand to fill any creases or gaps.

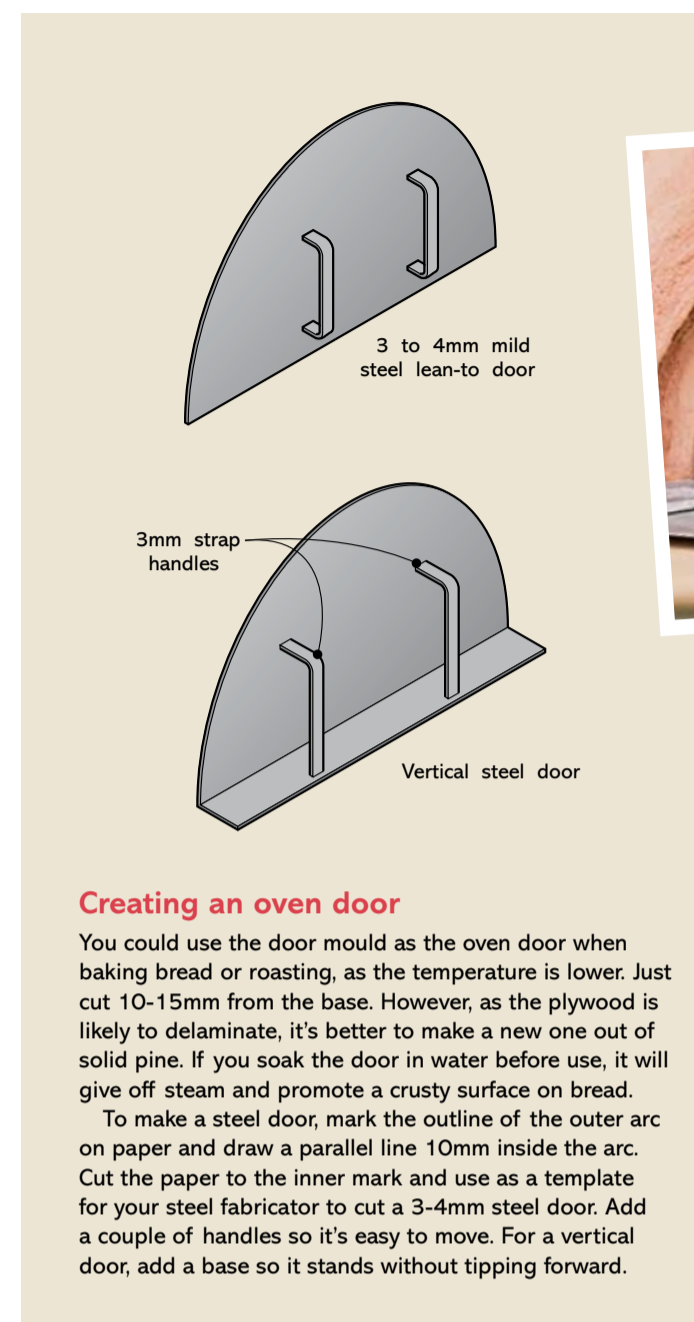
STEP 28 While the dome is drying completely, lay the tile surround. Use thick tiles or paving tiles that will bring the level of exterior tiles to the level of the oven floor. Before tiling, sweep any loose material from around the oven. It's actually not necessary to take the tiles right up to the paver skirt, as the insulation layer will cover any gaps. Fill gaps with sand.

STEP 29 To provide extra bulk and to help shape the oven prior to the application of the insulation layer, apply a stiff, dense 3:2:1 mix of crusher dust, sand and cement or clay to the outside of the skirt perimeter. Apply the stiff mix around the base of the oven, sloping it gradually up to the top of the skirt of pavers so it covers the pavers and continues the curved line of the dome. Remember to leave plenty of tile surround showing to accommodate the insulating layer.

be reapplied from time to time as the oven is constantly expanding and contracting through repeated use.

STEP 33 Sweep the interior of the oven clean of any remaining sand and remove any excess plastic liner. Fit the remaining longer-length flue pipe into the chimney hole using a little clay/sand mix, if necessary, to secure a tight fit.

STEP 34 When you are ready for the initial firing of the oven, start with a very small fire using very dry hardwood in the middle of the oven floor so you raise the temperature extremely slowly. Small gas and electric heaters are also suitable for initial drying as they are easy to control. Even though the oven may seem completely dry, it will still contain moisture in the structure. Any rapid heating will cause the moisture to turn to steam with disastrous results. Partially block the doorway with bricks or pavers to retain the heat in the oven as it heats up. The small fire can be gradually built up over many hours until the fire is spread evenly over the floor. You should continue heating to a temperature where the carbon is seen to begin burning off the ceiling of the dome. However, it is unnecessary to take this cautious approach each time, once the oven is initially heated. In normal use, when 'firing up' the oven the chimney should be fully open but as the fire dies down for pizza cooking the top may be partially closed with a thin metal plate to act as a damper. For baking bread and delicious roasts when the fire is out, or removed, the chimney should be totally blocked to retain the heat and the doorway should be fully closed. Bon appetit!

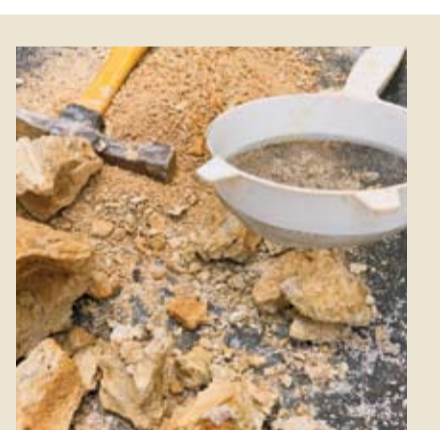


Creating an oven door

You could use the door mould as the oven door when baking bread or roasting, as the temperature is lower. Just cut 10-15mm from the base. However, as the plywood is likely to delaminate, it's better to make a new one out of solid pine. If you soak the door in water before use, it will give off steam and promote a crusty surface on bread.

To make a steel door, mark the outline of the outer arc on paper and draw a parallel line 10mm inside the arc. Cut the paper to the inner mark and use as a template for your steel fabricator to cut a 3-4mm steel door. Add a couple of handles so it's easy to move. For a vertical door, add a base so it stands without tipping forward.

When setting the fire, you will need lots of heat to bring up the hearth's temperature. For great pizzas, let the oven heat up for about an hour. The oven can reach more than 500°C at its hottest! Scrape the fire to the back and away you go.



Choosing and testing your clay

You will need to test clay from natural sources to make sure the final mix will be plastic enough. This means it can be easily moulded and will hold its shape. Natural clay is common in many areas. To test it for suitability, sieve (a kitchen sieve is ideal) about a cup full of dry clay into a container. Gradually mix in enough water to form a soft mouldable clay that can be kneaded and rolled in the hands without stickiness. Roll out a small 'rope' slightly thicker than a pencil, and try rolling it around your finger. If the clay rolls around the finger without breaking then it is regarded as highly plastic. If it cracks but doesn't break, then it is partly plastic. And if it breaks and falls from the finger it has low plasticity and is therefore 'short'. For this project you ideally need clay that is highly plastic.

the door mould to the face of the mould. Once the dome is covered in the first thin layer of clay, beat it with a piece of timber to make the layer tight and homogeneous.

STEP 23 If you want to include an optional pizza-oven temperature probe, insert a 6mm timber dowel or metal rod covered with a sheet of gloss paper through the clay into the sand mould, about one-third the distance back from front to back and about half the height of the internal height of the oven. Place it at an angle so that the dial can be easily read from the front of the oven.

STEP 24 As soon as the first thin layer is complete, apply slightly thicker layers of clay pancakes until the whole dome is covered by 50mm of clay. It can be slightly thicker around the door and chimney. Work fairly quickly, because if layers start to dry it will prevent a good bond between the layers. Compact and smooth the edge surrounding the door mould using a trowel. Avoid using water if you can.

STEP 25 Once the clay mix has begun to harden to the consistency of firm cheese, through a combination of air-drying and cement-setting action, remove the door mould, to limit the amount of cracking as the clay mixture shrinks around the opening. Drive 2 screws into the timber mould, remove the wedges beneath the door mould and use the screws to gently pull outward. As the mould and plastic are pulled away, the door rebate may require some tidying up using a small amount of soft clay/sand mix.

STEP 26 As the clay becomes firmer, start removing the sand mould and foam boxes.

STEP 30 The insulation layer is designed to retain the heat contained in the dense hotface layer. While there are several choices of materials to use, the easiest to shape over this 'igloo' is vermiculite. You will need a full 100-litre bag of vermiculite, available from refractory suppliers and hydroponic suppliers. Whatever you use, it has to be low density and loosely packed, because it is the tiny air pockets that do the insulating. To give it some stability and allow you to shape the material, make a 6:1:1 mix of vermiculite, sieved clay and cement. Avoid adding more clay or cement, as adding too much dense material reduces the efficiency of the insulation material.

STEP 31 Thoroughly mix the ingredients dry, then add water until the mix is damp enough to bind together. Apply the mix loosely in thin layers, gradually building to a total thickness of at least 50mm. The vermiculite mix actually offers no strength to the oven and if you pack the material too tightly or apply too much pressure with the trowel it will increase the density, thus reducing the insulation properties. However, if it proves too difficult to apply this mix to the steep sides of the oven you may need to add a little more clay and cement. Once all the material has been applied, it's time to lightly trowel it to a smooth finish.

STEP 32 When the dome appears dry again, give it a final brushable render coat of a sieved 1:4 mix of clay and sand. You can add a little oxide colouring if you want more colour. You can also add a little Bondcrete or cement to act as a binder if you like. This fluid render will fill any small cracks that may have occurred, and will need to

For great pizzas, let the oven heat up for an hour. The oven can reach more than 500°C at its hottest! Scrape the fire to the back and away you go

Stockists: Pizza oven built by **Wood Fired Oven Workshops**, (02) 6494 0015 or www.woodfiredovenworkshops.com Dry clay powder (ball clay or terracotta), **Walker Ceramics**, (03) 9725 7255 with distributors Australia wide or **Pottery Supplies**, (02) 8756 5900 or (07) 3368 2877. High temperature air-setting mortar and vermiculite, **Field Furnace Refractories**, (02) 97291799; **Refractory and Ceramics**, (03) 95604477; **The Clay Shed**, (07) 54765977; **Sila Australia**, (08) 9455 3133. Pizza oven temperature probes, 0-500°C (BL 3), **Temperature Controls**, (02) 9721 8644 or (03) 9687 0000. One-third cubic metre brickie's sand; clean sharp sand; crusher dust; decomposed granite; cement, from landscape suppliers or sand, soil and gravel suppliers. Masonry blocks; bricks; clay pavers or tiles, from brick and block suppliers or brick and paver outlets. Compressed thick sheet (cut to size); angle iron; cement; sisal rope; plastic drop sheet, from builder's hardware outlets or large hardware stores. Angle iron and steel door, from local steel fabricators. Vermiculite, from hydroponic suppliers. Stainless steel flue, from wood stove and heating specialists. Fireproof cement, from builder's suppliers or refractory suppliers. Plywood offcuts, **Mister Ply&Wood**, 1300 138 771 or www.misterplywood.com.au

