Wood-Fired Barrel Oven

Build a super-efficient, easy-to-use backyard oven that'll never put cinders in your pizza.

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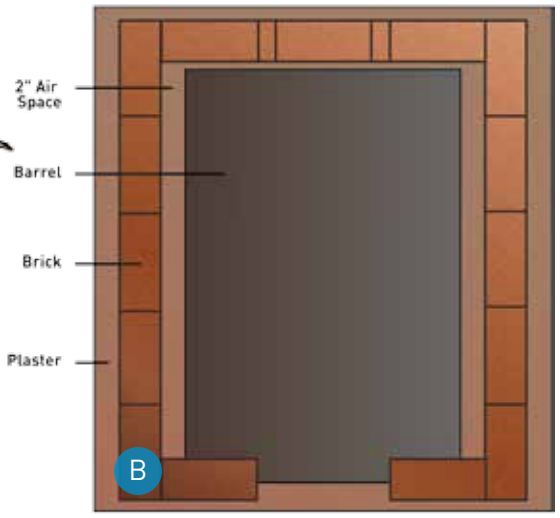
Illustrations by Max Edleson



Time Required:
A Few Weekends
Cost:
$100–$1,200

MAX EDLESON
is a professional artist/builder who is dedicated to using natural, local materials to create energy-efficient and spiritually uplifting elements of homes and public spaces, primarily masonry heaters and wood-fired ovens. He has a passion for farming, homesteading, and other traditional crafts.

EVA EDLESON
is a professional natural builder, cook, gardener, and craftswoman with more than a decade of experience specializing in natural wall systems, wood-fired cooking, and earthen paints and plasters. She has trained and worked with many of the most-respected natural builders in North America and Argentina.

A BARREL OVEN IS A VERSATILE AND HIGHLY EFFICIENT WOOD-FIRED OVEN THAT'S RELATIVELY EASY TO BUILD AND EASY TO USE. It can be the seed for a small-scale baking enterprise or the heart of a community's wood-fired cuisine. All kinds of food can be baked in the barrel oven, including bread, roasts, pizza, cookies, cakes, pies, casseroles, and stews.

The oven offers surprising convenience because it's hot and ready to bake within 15–20 minutes of lighting a fire, unlike traditional domed or vaulted pizza ovens that can take 2–3 hours! It's also easy to maintain at a desired temperature for long periods of time. With its highly conductive metal barrel surrounded by a thermal mass of masonry, this type of oven is often called a "mixed oven" because it has the capability to cook with direct as well as stored heat.

The barrel oven can be built from recycled materials or brand new parts. At its center is a steel barrel, with racks inside and a door at one end. Two deep shelves offer the ability to bake eight to ten 2lb (1kg) loaves of bread, four 12" (30cm) pizzas, or four cookie sheets at a time.

The secret to the barrel oven's efficiency is in its construction. The firebox is located beneath the barrel. The fire hits the bottom and wraps tightly around the barrel as it travels through the carefully constructed air space between the metal barrel and the surrounding bricks. This extended contact between fire and metal concentrates the heat for cooking inside the barrel and is what allows the oven to heat up so fast.

Since ash and carbon are not introduced to the cooking chamber, it stays clean and you can use baking pans interchangeably with other ovens. The wood-fired "smoky" taste is not present in the food cooked in it.

Building a barrel oven is a manageable project for experienced builders or beginners. Once made, it becomes a center point for good meals and good times. Your barrel oven could easily last for many generations.

1. Choose a site

Plan the area around the oven as a gathering place, so you can both tend to the cooking and participate in the entertainment. The easier it is for you to engage with your oven, the more likely you'll use it. Design an outdoor kitchen site with:

» a rough footprint of 38" wide × 42" deep for a 55gal barrel oven
» countertops for food preparation and service
» easy access to your indoor kitchen
» storage for some firewood right next to the oven, and a pathway to your main wood storage.

2. Plan a roof

A roof is essential to protect the oven, keep it dry, and offer a place to cook in rainy weather. We recommend covering enough space for a small gathering of people.

You can create a small, independent roof structure that could also include work counters, a sink, benches, and wood storage (**Figure A**).

Or place the oven so the firebox and oven door are part of an indoor kitchen wall and the body of the oven is protected by a simple shed roof outside. This lets you use your oven indoors.

3. Lay out your oven

Draw on paper your barrel dimensions, and work out from there, including the width of the airspace and your bricks

Materials

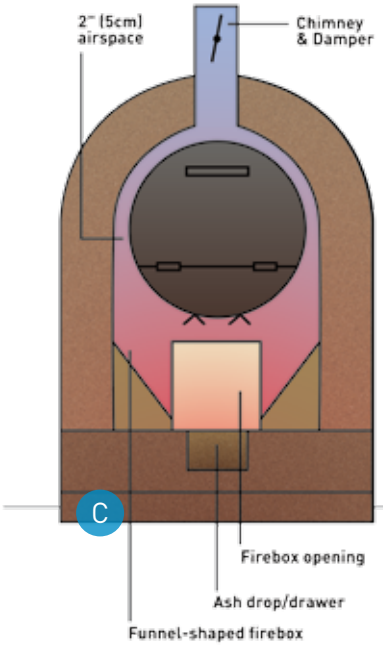
There are many ways to build a barrel oven. Here's a "ballpark" materials list based on successful builds.

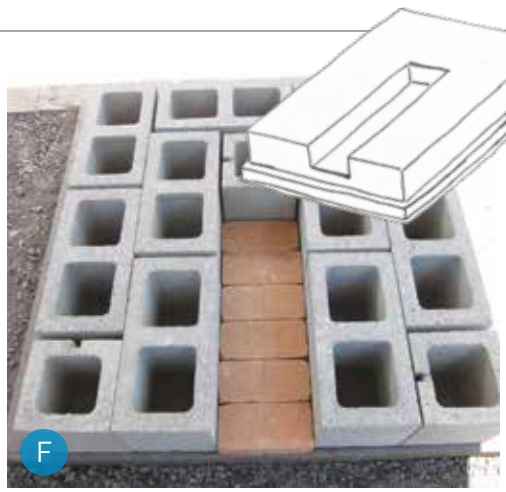
BARREL, DOORS & DRAWERS

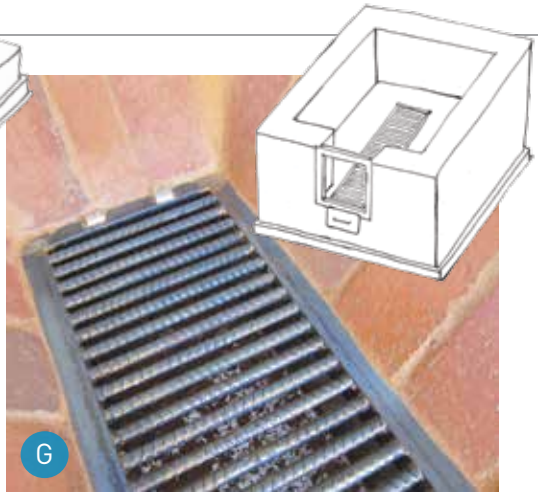
» **Steel barrel, 55gal, "open head" type, clean** Industrial Container Services (iconserv.com) cleans and re-sells barrels. Or find your own from backyards, salvage yards, or food-industry locations.

» **Sheet metal, angle iron, welded wire grid, hinges, and handles** for fabricating the oven door, racks, ash grate, firebox, and optional ash drawer. You can do this metal work yourself or find a local metal worker to help.
—OR—

» **Firespeaking Barrel Oven Kit** includes steel barrel with insulated door and oven racks ($430), and optionally, firebox with door, ash grate, and ash drawer ($860), from firespeaking.com/barrel-oven-kit







(**Figure B,** previous page). We generally use a 2" air space around the sides of the barrel and a ½" air space in the back.

Transfer your layout in full scale onto cardboard or scrap plywood. This will be a useful template throughout construction. Mark the dimensions and locations of the foundation, base pad, stone or brick walls, ash drawer, firebox door, chimney, and details like space for your plaster.

Draw a vertical cross-section (**Figure C**); it helps anticipate materials needs and the roof height.

4. Prepare your barrel

The minimum amount of metal work necessary for a barrel oven is to fashion at least one rack on which to place baked goods, and a door with a latch that provides a tight seal to keep the heat in (**Figure D**). For the racks, we typically use angle iron and 2"×2" welded wire grid. This work can be done using welding gear, or using simple hand tools including a drill, with nuts and bolts for attaching metal pieces. Or you can use our kit (see Materials list) and let us do the work.

5. Foundation and pad

Prepare a level, well-drained site. Draw the perimeter of your template on the ground, then dig it out, about 12" deep, to reach compacted subsoil. Fill it in with drain rock up to 3"–5" below grade.

We recommend building a "pad" that provides connection and continuity at the base of the oven. You can pour concrete or explore alternatives such as stone, "urbanite" (recycled concrete), or other repurposed materials. An existing concrete slab, patio, or driveway can also serve as a pad.

The pad should be made of units that are as wide as possible (or of one piece). This will unify the load of the smaller bricks that you'll place above. Ensure that your pad is square, level, and nestled partly below grade so it won't slide in the event of earth movement (**Figure E**).

6. Ash drawer and grate

Lay the first layer of masonry around a long, relatively narrow cavity as shown in **Figure F**. This allows you to collect the ash that accumulates from firing your oven. Our kit includes an ash drawer that fits the space snugly and doubles as an air register. If you're building with adobe brick, use concrete block or fired brick for this first layer to protect the adobe above from ground moisture.

Across the ash cavity, place a metal grate with ¼"–⅜" openings. You can fabricate this from steel plate or from ½" rebar, welded or tied with wire.

7. Firebox and outside walls

To create the funnel-shaped firebox, first build the outside walls (**Figure G**) to rest the diagonally placed bricks against. This shape helps keep the fire organized, burning well, and concentrated over the grate, and begins the sculptural form that takes the heated gases up and around the barrel.

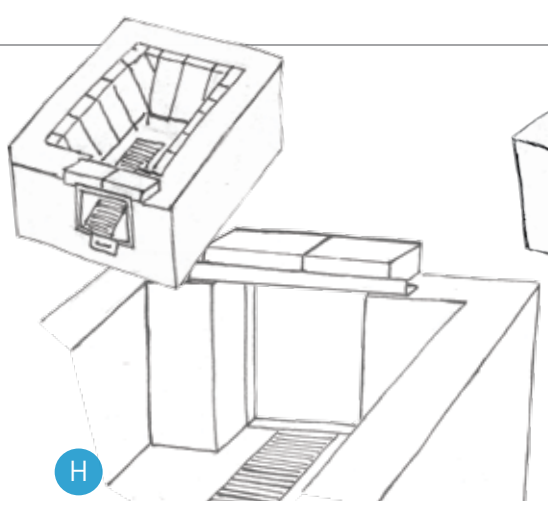
Mortar all points of contact and fill the triangular spaces behind each brick with sand, clay and sand, rocks and clay, etc.

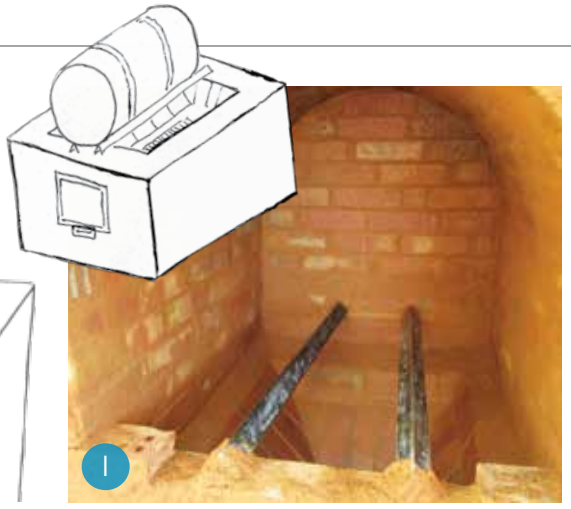
8. Firebox door and lintel

Plan for the top of a course of brick to coincide with the top of your firebox. This will enable you to place a lintel across the firebox opening at the right height. We generally make a lintel across the

TIP:

METAL EXPANDS MORE THAN MASONRY WHEN HEATED. MORTAR THE LINTEL BRICKS ONLY TO THEMSELVES (NOT TO THE ANGLE IRON) AND BEFORE THE MORTAR SETS, TAP THE ANGLE IRON SO THAT IT MOVES ¼"–½" IN EITHER DIRECTION, TO CREATE AN EXPANSION GAP.





top of the firebox door with a length of steel "angle iron," then place a single course of brick on the lintel to span across (**Figure H**).

9. Barrel supports

Place 2 lengths of angle iron, pipe, or other strong metal across the firebox, from the lintel to the rear wall (**Figure I**). Make sure they're centered and level — shim them with pieces of brick or rock if necessary — then mortar them in place.

Test-fit the barrel on the supports and check that the cooking shelves are level in all directions. You don't want to make slanted birthday cakes!

10. Build the vault

There are a few ways to support the bricks of the vault while you lay them. You can make an arch-shaped armature from metal rod covered with diamond mesh and leave it in place, but we suspect this may contribute to expansion cracks in the plaster later on. Or you could make a rustic arch form out of flexible branches or saplings, and just burn it out on the initial firings of the oven.

We like a removable wooden form for the arch. Cut 2 plywood semicircles with a radius 2" (5cm) greater than the radius of your barrel. Connect these 2 faces with boards the same length as your barrel (**Figure J**). Cover the form with a membrane of lath, mesh, melamine, or cloth to create a solid skin that assists in laying the brick.

Place the arch form so that its top corresponds to the height of the barrel sitting on its supports plus the additional 2" (5cm) of air space above (**Figure K**). Lay your masonry to cover the arch form (leaving room for the chimney), and complete the back wall of the oven. **Figure L** shows a completed vault (after plastering).

11. Chimney

Locate the chimney at the top of the oven, centered along the length of the barrel.

Materials, continued

FOUNDATION & PAD

- **Gravel, drain rock, or fill rock, about 40gal**
- **Cinder blocks, stone, and/or reclaimed concrete** to cover roughly 4'×4' area
- **Solid bricks, 8"×4"×2½" (10–16)** for ash drawer area
- **Mortar mix, 80lb (optional) —OR—**
- **Concrete mix, 90lb (4) (optional)** for a poured pad
- **Steel rebar, ½"×20' (2) (optional)** for a poured pad
- **Lumber, 1×4, 8' long (2) (optional)** for form boards, for a poured pad

OVEN BODY

- **Stone or brick** You can use adobe, compressed earth, or traditional fired brick. Plan on about 300 standard bricks, depending on your design.
- **Clay, ½ cubic yard** for mortar
- **Sand, ½ cubic yard** for mortar
- **Scrap plywood and boards** to build a removable arch form

LINTEL & BARREL INSTALLATION

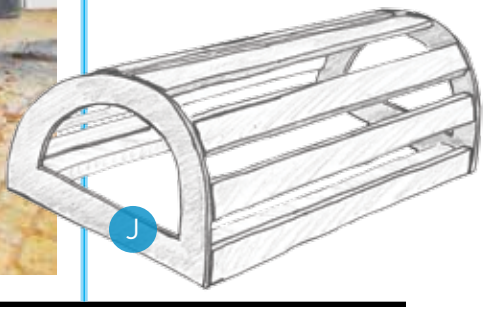
- **Angle iron, 3/16"×2", 17"**
- **Angle iron, 3/16"×1½", 10'**
- **Ceramic wool**

CHIMNEY

- **Stove pipe, 6" dia. × 5'–6' length**
- **Chimney top, 6"**
- **Cast-iron damper, 6"**
- **Chimney flashing**
- **Storm collar**
- **Trim plate**
- **Stove paint, black**

EARTHEN PLASTER

- **Local clay, red or brown, 20gal**
- **Sand, 50gal**
- **Chopped straw, 15gal**




M


N

» **If you used a metal armature**, cut a hole in the mesh, then attach the chimney to the armature and lay the final bricks around it.
» **If you used a removable arch form**, you'll need to notch the final bricks on top of the oven so that the chimney has a stable seat. Carve them with an angle grinder, then mortar the bricks and chimney securely in place (**Figure M** and **Figure N**).

12. Set the barrel

Let your masonry set at least overnight, then remove the arch form and place the barrel. We place a 4"-wide strip of ceramic wool insulation between the barrel and the seal that surrounds it. Create this seal by filling in the space between the barrel and the arch with cob or carefully placed brick pieces joined with mortar (**Figure O**). A stiff mix made of 1 part clay and 3 parts sand will help to prevent cracking.

13. Plaster (optional)

We plaster our ovens with an earthen plaster. Cement and lime-based plasters are also options. The color for your earthen plaster will come from the beautiful natural colors of the clay and sand you use. Mineral pigments such as oxides and ochre can also be added. Below is a basic recipe.

Mix well and apply with your hands or a trowel (**Figure P** and **Figure Q**). To ensure good adhesion, wet the oven surface thoroughly before applying

EARTHEN PLASTER RECIPE

» 1 part clay or clay-rich subsoil
» 2–3 parts sand
» ½–1 part fiber (short chopped straw or manure)
Mix well and apply with your hands or a trowel.


R


Q


O


P

plaster. We find that 2 coats or more work best.

Tiles and other decorations can be embedded in the wet plaster (**Figure R**).

14. Cook!

Make a few small fires over a week or so to season your oven and prevent any initial shocks. Now you're ready to cook.

You can bake, roast, toast, warm, and dehydrate in a Barrel Oven. Imagine your oven filled with 4 cookie sheets at a time, pizza stones with bubbling pies for your party, stockpots filled with soups and stews, and cast iron skillets baking your cornbread and frittatas to perfection. Casseroles and Dutch ovens are well suited to the barrel oven for long, slow cooking.

The Barrel Oven is hot and ready to bake (350°F–400°F) within 15–20 minutes of getting that good full fire going in the firebox. It can get to 500°–700°F by making a hot, blazing fire and maintaining it — ideal for pizzas, which cook best hot and fast (**Figure S** and **Figure T**).

Once your oven reaches the desired temperature, you can keep a much smaller fire going to maintain the heat as you bake. Use an oven thermometer and experiment!

The Barrel Oven is a very simple pattern that can be modified and varied to improve the cooking experience. What we've presented here is just an overview. For detailed construction tips and materials lists, FAQs, and troubleshooting tips, improvements suggested by other barrel oven builders, and table-tested barrel oven recipes, pick up our book *Build Your Own Barrel Oven*, available in print or PDF ($10) from handprintpress.com/barrel-oven.

See more build photos and share your tips at makezine.com/wood-fired-barrel-oven

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Tools

- **Wheelbarrow**
- **Buckets (3–5)**
- **Shovels (2)**
- **Mortar board, pan, or tub**
- **Machete or brick hammer**
- **Levels (2–3)** We use a 2', a 4', and a small 1' speed level.
- **Sledgehammer, small**
- **Cold chisel**
- **Trowels, diamond shaped (2–3)** for cement and mortar work
- **Hacksaw**
- **4½" angle grinder** with masonry (diamond) and metal cutting disks
- **Eye and ear protection**
- **Sponges, cleaning brushes, rags**
- **Welding equipment (optional but recommended)** if you're fabricating your own doors, racks, and drawers. You can drill and bolt these pieces if you don't wish to weld.

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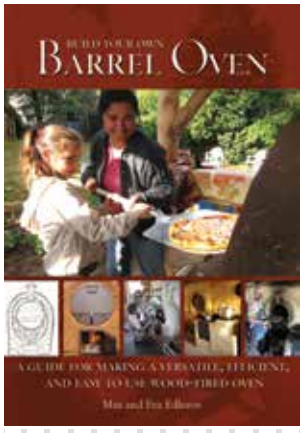

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