INSULATED CONRETE FORM General Information

ICF Construction

Source: ICF Construction: The Pros and Cons of Building with Insulating Concrete Forms - Architecture Adrenaline

Introduction

Insulating Concrete Form (ICF) construction is a growing trend in the construction industry, especially in North America. The technique involves building walls of reinforced concrete with polystyrene foam insulation. The result is a durable and energy-efficient structure that offers several advantages over traditional building methods. However, like any construction technique, it has its advantages and disadvantages. In this article, we will explore the pros and cons of building with Insulating Concrete Forms.

The Pros of Building with Insulating Concrete Forms

Energy Efficiency

The primary benefit of ICF construction is energy efficiency. The polystyrene foam insulation in ICF walls provides superior insulation, making the building more comfortable and more energy efficient. A building constructed with ICFs can save up to 50% on heating and cooling costs compared to traditional construction methods.

Noise Reduction

The thick walls of ICF construction also provide excellent soundproofing. The insulation and concrete work together to reduce sound transmission, making the building quieter and more peaceful.

Durability

ICF construction is also incredibly durable. The reinforced concrete walls can withstand fire, wind, and even earthquakes. In areas prone to natural disasters, the durability of ICF construction can be especially appealing.

Healthy Living Environment

ICF walls also create a healthier living environment. The insulation in ICF walls does not support mold growth or provide a food source for insects, providing a clean and healthy living space.

Design Flexibility

ICF construction provides design flexibility. The foam insulation can be cut into any shape necessary to achieve the desired building design. ICFs are also compatible with windows, doors, and other architectural features.

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The Cons of Building with Insulating Concrete Forms

Increased Cost

ICF construction can be more expensive than traditional construction methods. The cost of materials and labor can be up to 10% higher for ICF construction. However, the energy savings from using ICFs can offset the initial cost over time.

Installation Expertise

ICF construction requires specialized expertise during installation. The process involves stacking foam blocks and then filling the gaps with concrete, which can be challenging for inexperienced builders. Finding an experienced ICF contractor is essential for ensuring a successful build.

Construction Time

ICF construction can take longer than traditional construction methods. The process of stacking blocks and filling gaps with concrete can be time-consuming. However, the finished build is often more durable and energy-efficient, making up for the additional time invested.

FAQs

1. Is it safe to live in a house made of ICFs?

Yes, ICF construction is incredibly safe. The reinforced concrete and foam insulation create a sturdy and durable structure that can withstand natural disasters such as earthquakes, fire, and windstorms.

2. Are ICF houses energy efficient?

Yes, ICF houses are incredibly energy efficient. The thick walls and polystyrene foam insulation provide superior insulation, reducing heating and cooling costs by up to 50%.

3. How long does it take to build an ICF house?

Building an ICF house can take longer than traditional construction methods. The process of stacking foam blocks and filling gaps with concrete can be time-consuming. However, many builders claim that the additional time invested is worth it for the benefits of ICF construction.

4. Can I save money by building with ICFs?

ICF construction can be more expensive than traditional construction methods. However, the energy savings from using ICFs can offset the initial cost over time. Many builders also

claim that the durability and longevity of ICF structures make up for the initial cost over time.

5. Is ICF construction suitable for all types of homes?

ICF construction is suitable for most types of homes. The foam insulation can be cut into any shape necessary to achieve the desired building design, allowing for flexibility in design. However, specialized expertise is needed during installation, so finding an experienced ICF contractor is essential.

Conclusion

ICF construction is a construction technique that offers many benefits, including superior energy efficiency, durability, and soundproofing. However, like any construction technique, it has its advantages and disadvantages. The cost of materials and labor can be higher than traditional construction methods, and specialized expertise is needed during installation. However, the benefits of ICF construction often outweigh the drawbacks, making it an attractive option for builders looking to construct energy-efficient and durable homes and buildings.

Source: ICF Construction: The Pros and Cons of Building with Insulating Concrete Forms - Architecture Adrenaline

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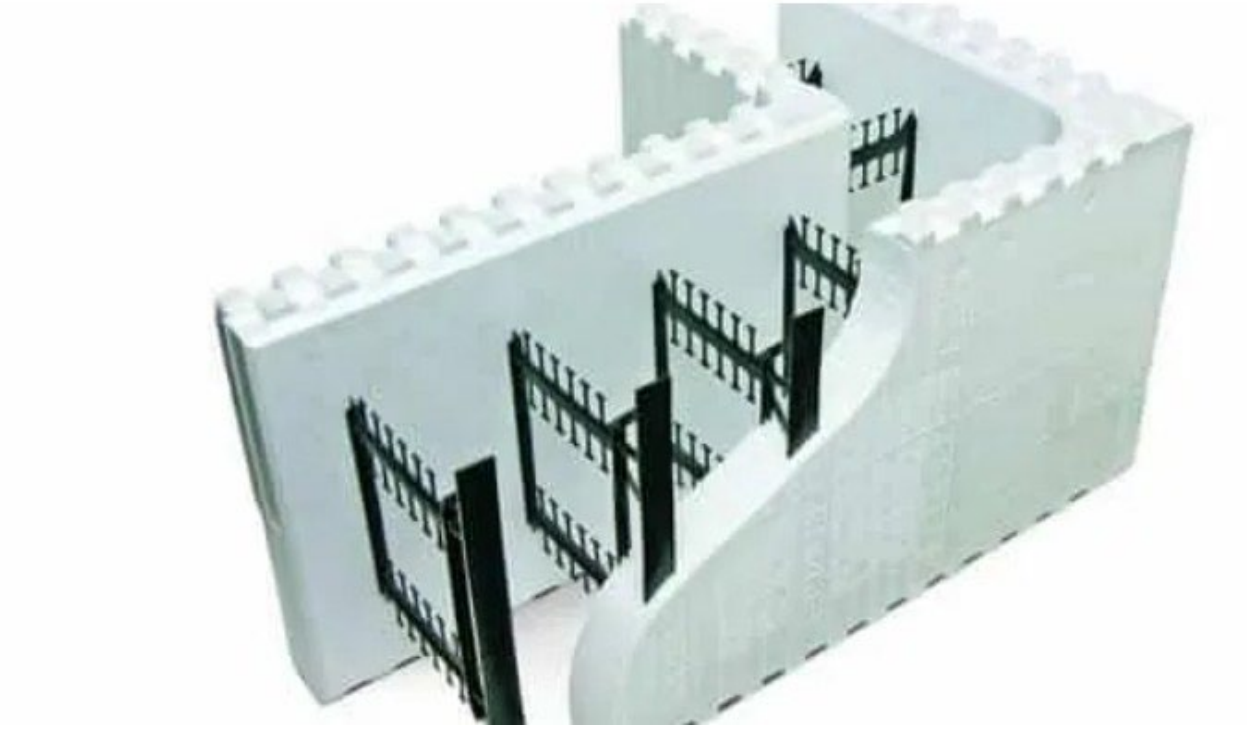
What Are Insulated Concrete Forms (ICF)?

Source: Insulated Concrete Forms: Pros and Cons - Jenkins Design Build



Insulated concrete formwork, commonly known as ICF, is a construction method used in home building that utilizes Styrofoam foundation forms to create a strong and well-insulated structure. It's an alternative to traditional wood-frame housing.

Instead of framing the walls with studs, the walls are formed by Styrofoam blocks, and the concrete is poured into those forms. Insulated concrete forms (ICFs) are the Styrofoam foundation forms. They are light, simple, and easy to work with–they simply snap together like Lego. They are permanent forms that stay put even after the concrete is poured, and they help insulate the home once the concrete is dry. The forms can be stacked and interlinked to form walls, ceilings, roofs, or pool walls that are filled with concrete.

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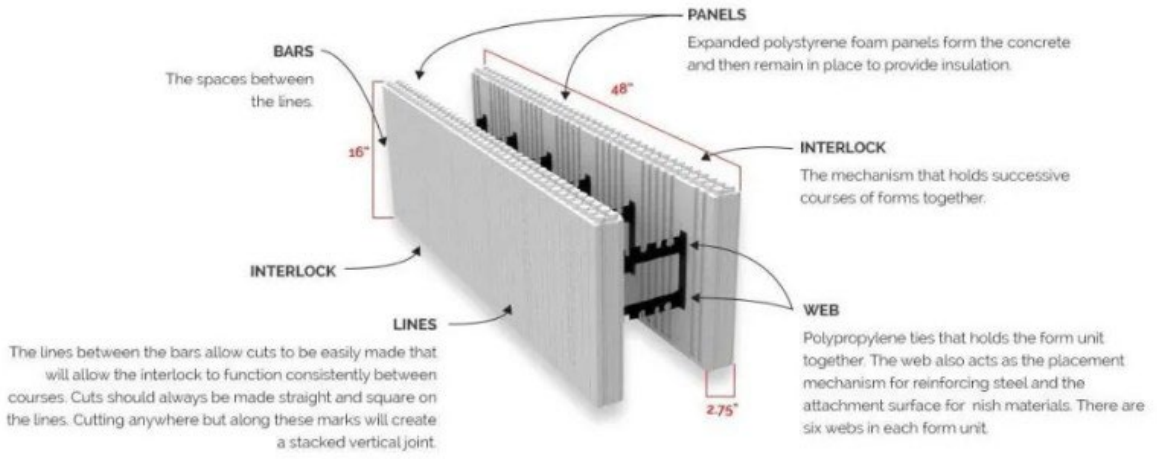

Photo by LogixICF

What Is ICF Made From?

There are two main parts to an ICF: expanded polystyrene for the insulation and webs or cross ties that are usually made of polypropylene plastic.

Here are some specs and benefits of insulated concrete forms:

- Type II, closed-cell foam
- High R-value per inch (R4) – the higher the R-value, the greater the insulation performance
- Moisture-resistant and non-absorbent
- Resistant to rot and mold
- Recyclable
- Contains a flame-retardant
- Non-toxic smoke

ICF Benefits

There are a wide variety of benefits to using ICF compared to wood-frame building.

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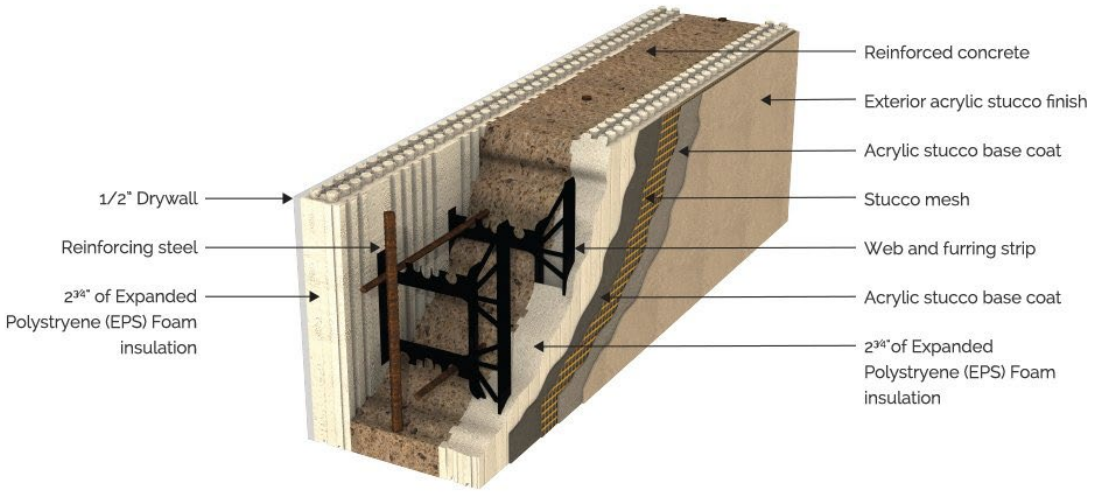
Faster Build Time

Building with ICF may cut 2-4 months off the construction time of your home. That's because ICF saves steps in both the exterior and interior construction. Also, one of the most time-consuming and yet important aspects of wood framing are all the many steps required to protect a wood frame from moisture. Wood will degrade and rot if not properly protected from moisture. So, there are dual-layer and even triple-layer protection systems involved in protecting a wood frame from moisture. Concrete, however, is not subject to the same degradation. Plus, the ICF system is designed to allow moisture to exit the frame inherently. So, the time savings can be significant, depending on the design of the home.



Credit: [ICF Pro-Link | ICF Blocks, Forms & Construction]

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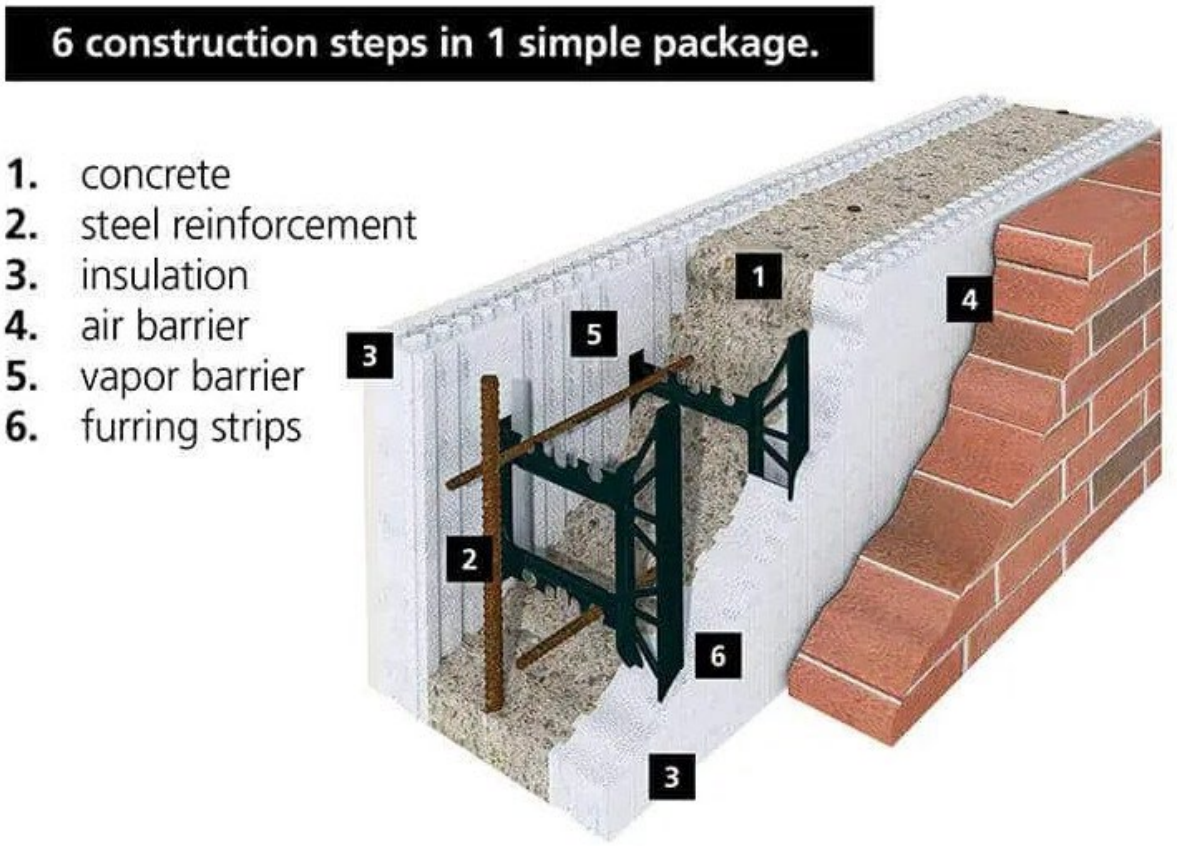

Credit: ICFMA

ICF Cost

While it used to be considered expensive to build with ICF, lumber framing labor has finally all but caught up with the cost of ICF construction, making it a comparable and affordable option for homeowners.

ICF forms cost an average of $3.50 to $4.00 per square foot. Once you factor in additional costs like concrete, rebar, hardware, labor, insurance, etc, the average total cost using ICF forms can be around 15-20% more than stud framing. However, there are significant savings realized from using ICF, and that will be discussed later.

Fire Retardant

ICF will not combust. Even if a fire ravages the inside of your home, the walls will stand through a fire. That also helps prevent the spread of fire from your home to another, stopping the fire when it reaches your exterior walls.

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California Wildfires

This home built with Insulated Concrete Forms narrowly escaped destruction in 2018's California's wildfires, which burned 18,804 structures and took 85 lives.

Other homes in the neighborhood were completely consumed by flames, but this one, built with ICF, survived.

Energy Efficiency

With insulation on both sides of the concrete, your wall temperatures won't change throughout the day, achieving a consistent R-23. Whereas wood frame walls do not have consistency and max out at R-19, but typically range from R-9 to R-15. That means less energy is required to heat and cool your home – a savings of 20% to 50%!

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An independent study conducted by CLEB Lab concluded that an ICF wall provided **58% greater R-value** and **43% energy-savings** compared to the wood-frame wall. Rastra walls, made from rastra blocks, are an innovative alternative to conventional construction materials. These blocks are composed of recycled materials and provide excellent thermal insulation.

ICF walls are also less drafty than wood-frame walls. In fact, it takes almost three days for radiation, convection, or thermal heat transfer to make it through the exterior wall. The benefit of a less drafty home is the way the home feels and lives. With a more consistent temperature throughout the home, there is typically less need to change the thermostat up and down.

Quieter

Walls made with Insulated Concrete Forms insulate sound better than traditional walls, so your home will be quieter. Standard wood framed walls have a Sound Transmission Class (STC) rating of 33-38, whereas an ICF home has a consistent STC rating of 54, which means that even shouting is not heard outside of the ICF walls.

STC Rating	Privacy Afforded
25	Normal speech easily understood
30	Normal speech heard but not understood
35	Loud speech heard and somewhat understood
40	Loud speech heard but not understood
45	Loud speech barely heard
50	Shouting barely heard
55	Shouting not heard

Source: Quieting: A Practical Guide to Noise Control, NBS Handbook 119, National Bureau of Standards, U.S. Department of Commerce, Washington, DC, 1976.

“1,000-Year Homes”

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Homes made with ICF are sometimes called “1,000-year homes” because there’s little to prevent them from surviving intact for hundreds of years. The walls are strong enough to withstand up to 250 mph hurricane winds and tornadoes, earthquakes, and are fire-resistant for up to 4 hours. They’re unlikely to suffer from slow degradation the same way wood-frame walls do, so they stand the test of time.

Here are a few examples of how ICF homes weathered the storm…

ICF Home Survives Hurricane Dorian

One of the worst natural disasters to hit the Bahamas, even Hurricane Dorian could not take down this ICF home on Grand Abaco Island after 36 hours of punishing hurricane winds.

Hurricane Michael Survivor

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This ICF home in the Florida Panhandle was virtually the last home standing after 150+ mph hurricane winds hit it. Hurricane Michael completely destroyed 54% of homes in the area and another 23% were severely damaged, even though most Florida homes are built to withstand hurricanes (using concrete block and other systems to withstand wind loads). This home was built only a few hundred feet from the water's edge and weathered the ferocious wind and storm surge with ease.

Storm Surge and Debris

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This Cayman Islands ICF home survived the storm surge from Hurricane Ivan in 2004 despite being battered by cars, rocks, and other debris.

The storm surge forces and battering waves of Super-storm Sandy in 2012 were too much for the homes in Union Beach, New Jersey, but the family who

built this ICF rode out the hurricane in their home while waves broke on the house itself.

Nontoxic and Healthier Air Quality

ICF contains no HCFC, formaldehyde, fiberglass, or asbestos and doesn't suffer from off-gassing. And, no harmful CFCs (chlorofluorocarbons) are used in their manufacture.

ICF walls provide a tight, low air filtration wrap to your home. This is the first step in controlling the indoor air environment.

- ICF walls reduce air infiltration by 75%.
- Eliminate dust mites.
- Prevent dangerous and costly mold.
- The effects of hay fever, asthma, and other airborne allergies can be greatly alleviated as a direct result of the reduced leakage of outside air, which brings dust, pollen, and other pollutants.
- Indoor air pollution is a great health concern today. ICF walls are non-toxic. The measurement of air contents of actual ICF houses shows an almost complete absence of any emissions.

Year-Round Building

Unlike using traditional forms, concrete can be poured into an insulated concrete form any time of year, regardless of how hot or cold it is. That means your home can be built at any time of year.

Lower Homeowner's Insurance Premiums

Since walls made with ICF are so resistant to wind, fire, and flooding, your homeowner's insurance premium will be lower than it would be with traditional wood-frame walls.

ICF Disadvantages

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While ICF is a wonderful building material, it does have a couple disadvantages. These include:

- **Difficult remodeling.** Adding doors or windows in the future will be tricky since you'll be cutting into concrete. You need to plan ahead when designing your floor plan, and it is best to use an Architect who has experience designing an ICF home.
- **Floor space.** Walls made with ICF are typically thicker than traditional walls, which means you'll have less usable square-footage inside your home, but this is an insignificant difference.
- Note: these are just two of the reasons why it's best not to construct all the *interior* walls with ICF.

Frequently Asked Questions

Here are answers to some of the most frequently asked questions about insulating concrete forms.

How Do Insulated Concrete Forms Work?

Insulated concrete forms are like hollow Lego blocks. Exterior walls are built using the forms, which go together like Lego blocks, the steel is placed in the built-in slots inside the ICF blocks, and then they're filled with concrete. The forms stay in place and act as additional insulation. ICF blocks are usually 96 inches long and 16 inches high, but they come in varying shapes and sizes to accommodate corners and other needs.

What Do ICF Forms Cost?

As mentioned previously, ICF forms cost an average of $3.50 to $4.00 per square foot. Once you factor in additional costs like concrete, rebar, hardware, labor, and more, the average total cost using ICF forms is around 15-20% more than traditional stud framing. To put that into perspective, if the framing on a home is in the range of, say, 20% of the home's overall cost, a 20% additional cost of the framing would equate to a 4% additional cost of the overall project. What is harder to quantify is the savings realized from using

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ICF. In addition to the ongoing energy savings and insurance savings, there are savings during the build. For example, waterproofing systems used on the exterior walls of the structure are all but eliminated since both the ICF blocks and the concrete are waterproof and weatherproof. Take, for example, house wrap. There is no need for house wrap on an ICF home. There is also no need for exterior sheathing in most cases. If there are exterior balconies, the waterproofing systems are modified for ICF. These are just a couple of examples. Depending on the design, an ICF home can be quite cost-effective, especially if the specialty labor for performing the ICF framing is in-house, as ours is.

How long will an ICF house last?

Hundreds of years – they're called "1000-year-homes" by some. ICF homes' walls and EPS insulation lasts for centuries and doesn't break down, collapse, decay, or fail when protected behind wall finishes.

Source: Insulated Concrete Forms: Pros and Cons - Jenkins Design Build