BILL'S HOME TECH

Home & Small Business Tech Solutions

An Extended Guide · No. 1525

Penetrating vs. Ballasted Mounts

Fasten it down, or weigh it down — and when each fits

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! Read this first — this is professional, on-the-roof work

Putting solar on a roof is expert, permitted work — not a weekend project. It means drilling into your roof and sealing every hole against water for decades, or setting heavy ballast your roof has to carry, all while working at a height where a fall can be deadly and around wiring that is live whenever the sun is up. This guide is here to help you understand and judge that work — so you can hire the right people and ask good questions — not to walk you up a ladder to do it yourself. For any roof-mounted system, use a licensed, insured, properly credentialed solar installer, make sure the required permit and inspection actually happen, and protect your roof's warranty before the first hole is drilled. And please don't climb up to inspect or adjust anything yourself — the roof is their job, not yours. Whether an installer proposes bolting your array down or holding it in place with weight, both approaches happen at the same dangerous height and deserve the same professional care — this guide is for understanding the choice, not making it yourself.

Two ways to keep an array right where it belongs

There are really only two basic philosophies for keeping a solar array on a roof: fasten it down, or weigh it down. Most homes use the first. Some flat roofs use the second. This guide explains both, plainly.

I'm Bill, and I run Bill's Home Tech here in Portage County, Ohio. When a quote mentions 'ballasted' or 'penetrating' mounts, it can sound like a decision you're supposed to have an opinion about. Mostly, it isn't — it's an engineering call. But understanding both approaches helps you follow along and ask good questions.

We touched on this choice briefly in our overview guide on how racking works. Here we slow down and look at each approach on its own, including the real trade-offs each one carries.

As always: this is a guide for understanding the work, not doing it. Roof-mounted solar of either kind is professional, permitted work.

★ There's no wrong question here

If a quote mentions ballast, penetrations, or anything in between and you're not sure what it means for your roof, that's exactly the kind of thing I help sort out. Call or text (330) 200-8042.

The whole guide, on one page

If you remember only these points, you'll follow any installer's explanation of how your array will stay put.

- ❑ Two philosophies exist: fasten the array down and seal every hole (penetrating), or weigh it down with little or no penetration (ballasted).
- ❑ Penetrating is the strong, proven, most common approach on sloped roofs — and the sealing is exactly what makes it safe.
- ❑ Ballasted mounts trade holes for weight — weight the roof has to carry, and wind must never be able to lift.
- ❑ Ballasted approaches are mostly reserved for flat and low-slope roofs, and only where an engineer confirms it will work.
- ❑ Sometimes an installer blends the two into a hybrid approach when that's the best engineering fit for a roof.
- ❑ Which one is right for your roof is an engineering decision for your installer and the local building department — not a homeowner preference.

> **✔ Read it in any order**
> Curious about one approach more than the other? Skip straight to it. This guide is meant to be dipped into.

Same goal, two different strategies

Both approaches are trying to do the exact same job: keep a solar array exactly where it was installed, through wind, snow, and decades of Ohio weather.

A penetrating mount earns that stability by connecting into the roof's structure — the rafters or trusses underneath. A ballasted mount earns it differently, by using enough weight, spread the right way, so the array simply doesn't move.

Neither idea is exotic. One is like bolting a shelf to a wall stud. The other is like using a heavy enough base that a floor lamp doesn't need to be bolted down at all. Roofs just add height, weather, and building codes to the picture.

> **★ You don't have to pick — your installer does**
> This guide is here so the words make sense when your installer explains their reasoning, not so you can out-engineer them. Questions welcome any time — (330) 200-8042.

Penetrating mounts: fasten it down and seal it

This is the approach most homes use. The racking is bolted or lagged into the roof's structure, and every one of those openings is sealed.

Each attachment reaches through the roofing surface and anchors into a rafter or the top of a truss — real structure, not just the outer layer. That connection is what gives a penetrating mount its strength: it's physically tied to the frame of your house.

The sealing at each opening, called flashing, is what keeps that strength from coming at the cost of a leak. We cover flashing in its own guide, because getting it right is what separates a good install from a future headache.

> **✔ The hardware itself has a guide too**
> The attachments, rails, and clamps that make up a penetrating mount are covered in depth in our rails-and-clamps guide, if you'd like the full parts list explained.

Why penetrating is the default on sloped roofs

On a sloped shingle, metal, or tile roof, fastening down into structure is simply the proven, standard approach — for good reason.

A slope already sheds water and snow reasonably well on its own, and a fastened connection resists wind and gravity directly, through solid structure rather than through weight sitting on a slope. It's a strong, well-understood, long-proven method.

The catch is that its strength depends entirely on the quality of the sealing. A small gap that lets in a little water during every rain can quietly cause damage for years before anyone notices a stain or a soft spot.

> **! Cheap sealing here is expensive later**
> The waterproofing at each attachment is exactly the place you never want an installer cutting corners to win a lower bid. Our flashing guide covers what good looks like.

Ballasted mounts: weigh it down instead

Instead of fastening through the roof, a ballasted system holds the array in place with weight — trays or frames loaded with heavy blocks.

The appeal is obvious: fewer holes in the roof, or sometimes none at all. For a roof surface that's hard or undesirable to penetrate, that's a real advantage.

But it only works where the roof and the engineering support it. It's not a workaround you get simply by asking for it — it's an option that has to earn its place on a specific roof.

> **✔ A mental picture**
> Picture a heavy planter sitting on a patio — it doesn't need to be bolted down because it's simply too heavy and low to move. A ballasted array works on the same basic idea, engineered carefully.

The trade-off ballast makes: real, lasting weight

Fewer holes sounds like a clear win, until you remember that weight has to go somewhere — and 'somewhere' is your roof's structure.

A ballasted system adds real, lasting weight across the roof surface, on top of whatever the roof already carries. That weight doesn't disappear because there are no bolts involved; the rafters, trusses, or structure below still have to be able to carry it, the same way they'd have to carry any other added load. Our structural-load guide covers that side of the picture in full.

This is exactly why ballasted systems need an engineer's involvement, not just an installer's judgment call.

> **★ Not a workaround for a weak roof**
> Ballast is sometimes assumed to be the 'gentler' option because there are no holes. On weight alone, it can actually ask more of a roof's structure, not less. That's worth knowing going in.

The trade-off ballast makes: wind must not lift it

Wind wants to lift a solar array the way it lifts a kite. On a fastened system, bolts resist that directly. On a ballasted system, only carefully engineered weight does.

That makes the engineering behind a ballasted layout especially important: enough weight, placed correctly across the whole array, so that no gust can start working it loose. This is not something an installer eyeballs — it's calculated for the specific roof and local wind requirements.

> **! This is engineering, not guesswork**
> A ballasted system that hasn't been properly engineered for wind uplift is a real hazard, to the roof and to anything or anyone nearby. This is exactly why it's licensed, permitted work, never a do-it-yourself layout.

Why this is mostly a flat-roof story

In practice, ballasted mounts show up almost entirely on flat and low-slope roofs — often the kind you'd see on a commercial-style building more than a typical house.

Sloped shingle, metal, and tile roofs — the kind on most Ohio houses — almost always use a penetrating mount. A slope simply doesn't hold loose weight and trays the way a flat surface can, and gravity works against a ballasted layout on an incline.

Flat and low-slope roofs, which behave more like a tabletop, are where ballast becomes a realistic option — still only after an engineer confirms the roof and the wind exposure support it.

> **✔ Our flat-roof guide goes deeper**
> If your home or outbuilding has a flat or low-slope roof, our flat-and-low-slope-roof guide covers drainage, tilt, and this choice in more detail.

Two kinds of homes, two sets of needs

Whether penetrating or ballasted even comes up as a real question often depends on what kind of roof you're standing under.

If you live in town or the suburbs

In town and the suburbs, the roof in question is almost always the sloped house roof itself — asphalt shingle, sometimes metal — so penetrating mounts are the near-automatic answer.

- A typical sloped house roof means the fasten-and-seal approach is standard; ballast rarely enters the conversation.
- A flat-roofed addition, porch, or garage section is the main place ballast might come up in a suburban setting.
- The sealing quality at each attachment matters more here than which philosophy is used, since penetrating is the default.
- An HOA may still have opinions about visible hardware, even though the mounting method itself is usually settled by the roof.

If you are out in the country on a well

Out in the country, you're more likely to have a genuine choice on the table — a sloped house roof plus flatter-roofed barns, shops, or pole buildings that behave more like a commercial-style roof.

- A sloped house roof still almost always calls for a penetrating mount, the same as in town.
- A flat or low-slope outbuilding roof — a shop or machine shed, for example — is where a ballasted approach might genuinely be considered, if an engineer confirms it.
- Either way, verifying the structure underneath matters even more on farm buildings — see our guide on structural load.
- A rural property on a well has extra reason to think through which roof and which approach keeps power reliable — tie this into your whole-home-solar planning.

> **★ More than one roof to weigh? Let's talk it through**
> Rural families often have a real choice between roofs and approaches. I'm glad to help you think it through before you're deep into quotes. Call (330) 200-8042.

Sometimes it's both: hybrid approaches

Roofs aren't always simple, and neither is every solution. Sometimes the right engineering answer blends both philosophies on one roof.

An installer might fasten down in one section of a roof and use ballast in another, if that's what the structure, the roof material, or the layout calls for. A mixed or complex roof — several planes, different ages, a partly flat and partly sloped design — is a common reason a hybrid makes sense.

A hybrid proposal isn't a sign of indecision. Done for the right reasons and explained clearly, it can be the most honest answer to a roof that doesn't fit neatly into one category.

> **✔ Ask them to walk you through it**
> If a proposal mixes approaches, ask your installer to explain which sections get which method, and why. A confident answer is a good sign.

Why this isn't something to pick by feel

It's natural to have a gut reaction — 'fewer holes sounds better' or 'bolted down sounds sturdier.' Neither reaction should drive the decision.

Which approach fits your roof depends on its slope, its structure, its condition, local wind and snow requirements, and what the local building department will approve. That's an engineering question with a right answer for your specific roof, not a matter of taste.

A good installer will explain their reasoning in plain terms. If the explanation boils down to 'that's just what we always do,' it's fair to ask a follow-up question.

> **★ A fair question to ask any installer**
> 'Why is this approach the right engineering fit for my roof, specifically?' You deserve a real answer, not a shrug.

Where flashing fits into the penetrating story

If penetrating is the chosen approach, its success rests almost entirely on one detail: the waterproofing at each opening.

Every fastened attachment is a hole in your roof that has to stay sealed for decades. Flashing — a piece tucked under the surrounding roofing so water sheds over the hole instead of into it — is what makes that possible. Sealant alone, without proper flashing, is not a substitute.

This matters enough that we give it a full guide of its own. If your installer is proposing a penetrating mount, the flashing conversation is just as important as the mounting hardware conversation.

> **! The most important small detail in the job**
> A strong, tidy penetrating mount can still be a bad install if it leaks where it fastens through the roof. Our flashing guide covers exactly what good work looks like.

Structural load matters to both stories

It's tempting to think only ballast raises structural questions. Both approaches ultimately ask the same thing of your roof: can it carry what's being added?

A penetrating mount spreads its load across many attachment points, concentrated right where each one fastens into structure. A ballasted mount spreads its weight more broadly across the roof surface itself. Different pattern, same underlying question.

Either way, a good installer looks at the actual structure — in the attic or through a structural review — rather than assuming it can be worked out later. Our structural-load guide walks through how that check happens.

> **! Never assumed, either way**
> Whether the plan is bolts or ballast, 'the roof will probably be fine' is not an engineering answer. Ask how your structure was actually verified.

Why neither approach is a do-it-yourself project

It bears repeating: whichever philosophy fits your roof, this is still professional, permitted, on-the-roof work.

- **The height.** Both approaches are installed at a height where a fall can be life-changing.
- **The sealing (penetrating).** Waterproofing every opening for decades is skilled roofing work.
- **The engineering (ballasted).** Getting the weight and its placement right takes real calculation, not guesswork.
- **The structure.** Confirming either approach is safe for your specific roof takes training to assess.
- **The paperwork.** Permits, inspections, and your roof warranty depend on the chosen approach being done to code.

> **★ Where I fit in**
> I don't climb roofs or make the fastened-versus-ballasted call myself — that's licensed, insured installer territory. I help you understand the choice and evaluate the proposal. Call or text (330) 200-8042.

What good work looks like from the ground

You won't inspect either approach up close — but there are honest signs of quality visible from below, for each.

- **For a penetrating mount:** tidy, evenly spaced attachments, no visible gaps, and no streaking near where hardware meets the roof.
- **For a ballasted mount:** neat, evenly distributed trays or blocks, nothing scattered, shifted, or crowding a roof edge.
- **For either:** a clean worksite afterward, and paperwork — permits, inspection sign-offs, written warranties — handed over without you having to chase it.

> **✔ Trust your eyes, then trust the paper**
> Tidy usually means careful, for either approach. But passed inspections and a written warranty are the proof that really matters.

Questions worth asking your installer

You don't need to know the engineering. You need a clear, confident explanation — which itself tells you a lot.

Q: Are you proposing penetrating, ballasted, or a hybrid, and why?
A good installer ties the answer to your roof's slope, structure, and condition — in plain language, not a shrug.

Q: If it's penetrating, how will every opening be sealed?
You want to hear about proper flashing at each attachment, not just sealant applied on top.

Q: If it's ballasted, who confirmed my roof can carry the weight and resist wind uplift?
The answer should involve an engineer, not just the installer's judgment.

Q: Will you confirm my roof's structure either way?
Yes should be the answer, through an attic look or a structural review — never an assumption.

> **★ Bring the answers to me**
> If anything you're told leaves you unsure, that's a great reason to call before signing anything. (330) 200-8042.

Permits are where the engineering gets checked

Whichever approach your roof needs, the permit process is your assurance that someone independent reviewed the engineering behind it.

Rooftop solar normally requires a building permit, and often a structural review, before the first attachment or ballast tray goes down. For a ballasted system especially, expect the wind and weight engineering to be part of what's reviewed.

Your installer typically handles this paperwork, but it's your project, so it's fair to ask to see it. An inspector confirming the chosen approach was done to code is exactly the independent check you want.

> **! Skipping this step is a red flag**
> If anyone suggests skipping the permit or structural review to save time — for either approach — treat it as a serious warning sign, not a convenience.

Your roof's warranty, whichever approach is used

It's easy to assume only penetrating mounts raise warranty questions. Both deserve a conversation with your roofer before work starts.

A penetrating mount obviously affects your roof warranty — it's putting holes through the surface. A ballasted mount skips most or all of the holes, but it still places real, lasting weight directly on the roof surface for decades, which is worth discussing with your roofer too.

Either way, coordinating with your roofer, and getting the warranty answer in writing before work begins, is the kind of homework that pays off later.

> **★ Ask before, not after**
> This is exactly the kind of question I help families get answered up front. Our roof-warranty guide digs in further — (330) 200-8042.

Common Questions

The questions about penetrating versus ballasted mounts I hear most often, answered plainly.

Q: Isn't no holes always the better choice?
Not necessarily. It swaps one set of risks (leaks) for another (weight and wind uplift) — it's an engineering trade-off, not a clear winner.

Q: Can I request ballast on my sloped shingle roof to avoid holes?
You can ask, but ballasted mounts are mostly a flat-roof solution. Ask your installer to honestly explain why penetrating fits your specific roof.

Q: Does ballasted mean no sealing is needed at all?
Often few or no penetrations, but any fasteners or flashing that remain still need to be done correctly.

Q: How do I know my roof can actually carry ballast weight?
That's exactly what a structural review or engineer's letter is for — never something to assume either way.

Q: Is a hybrid approach a sign of a sloppy installer?
No. For a mixed or complex roof, a hybrid can be the most honest engineering answer, not a shortcut.

> **★ Still have a question I didn't cover?**
> That's what I'm here for. Call or text me at (330) 200-8042 — there's no such thing as a silly question about your own home.

Bringing it all together

Two philosophies, one goal: keeping your array exactly where it was installed, safely, for decades.

Penetrating mounts fasten down into your roof's structure and rely on careful sealing to stay watertight. Ballasted mounts weigh the array down instead, trading holes for weight the roof must carry and the wind must never lift. Sometimes a roof calls for a blend of both.

Which one is right for your roof isn't a preference to bring to the table — it's an engineering decision, made by a licensed installer, checked by a permit and inspection, and ideally explained to you in plain English along the way.

> **★ Let's make sense of your proposal together**
> Whether a quote says penetrating, ballasted, or hybrid, I'm glad to be your patient second opinion — no sales pressure, ever. Call or text (330) 200-8042.

You don't have to do this alone

You just have to remember that a friendly, patient person is one call away.

I hope this guide made weighing penetrating versus ballasted mounting feel a little less daunting and a lot more doable. Keep it in a drawer with your other home papers, come back to a page whenever you need it, and don't worry about memorizing anything.

When you'd rather have a hand, that's exactly what I do. I come to your home, work at your pace, and never make you feel rushed or silly for asking. A first visit is a flat $99, and for the parts that don't need me on-site I can often help right on your screen for $49. Every visit comes with a 30-day, come-back-free guarantee. I don't climb on roofs or do the licensed solar, roofing, or electrical work myself — for that I'll help you line up a trustworthy, properly credentialed local pro.

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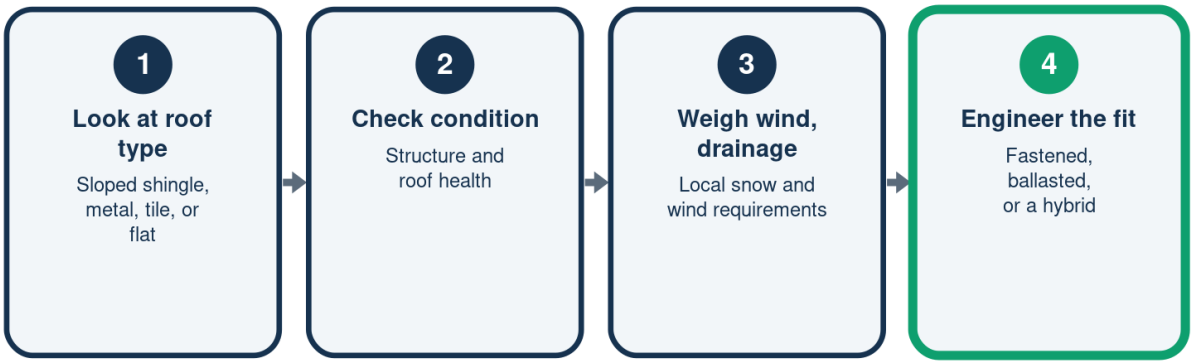
> Call or text me at (330) 200-8042, or visit BillsHomeTech.com. Serving Atwater and all of Portage County. 30+ years of patient, plain-English tech help — and if you're ever not 100% happy with a visit, I'll make it right or refund it. That's a promise. — Bill

How an Installer Decides

The roof, not a preference, drives the choice



The roof, not a preference, drives which approach your installer proposes.

What Each Approach Requires

The real trade-off behind each philosophy

	Penetrating	Ballasted
Key requirement	Careful sealing	Engineered weight
Main risk if rushed	A slow leak	Wind uplift
Structural check	Always needed	Always needed
Typical roof	Sloped shingle, metal	Flat, low-slope

Both still start with an honest look at your roof and its structure.

Penetrating vs. Ballasted

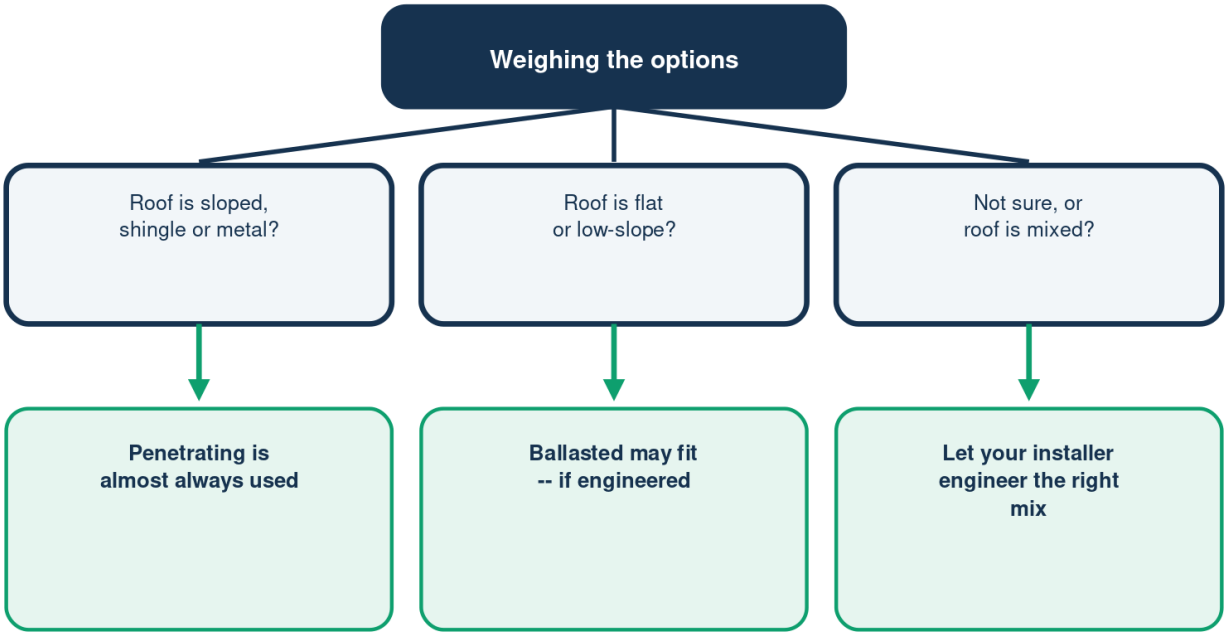
Two ways an array stays put, side by side

	Penetrating	Ballasted
How it holds on	Bolted to structure	Held down by weight
Roof holes	Sealed penetrations	Few or none
Weight added	Mostly the hardware	Real, lasting weight
Most common on	Sloped roofs	Flat, low-slope roofs

Which fits your roof is an engineering call, not a preference.

Which Fits Your Roof?

Three honest starting points



This is your installer's engineering call, not a preference to shop for.

Illustration - a schematic, not to scale. Your setup may differ.

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A Note From Bill

A quick note from Bill.

I write these guides to make home tech a little less frustrating, and I do my best to keep every step accurate and up to date. Still, every home, device, and setup is a bit different, so I can't promise a guide will match yours exactly or fix your particular problem. These guides are for general information only — they're not professional, legal, or financial advice, and they don't replace your device's own manual or the manufacturer's instructions. Please go slow, use your own good judgment, and use everything here at your own risk. If a step involves electrical wiring, a gas appliance, a water heater, plumbing, or climbing a ladder — or if anything just doesn't feel safe — please stop and call a licensed professional (or give me a call at 330-200-8042). Bill's Home Tech and Bill Davis can't be responsible for any damage, data loss, or injury that comes from using these guides. Thanks for reading, and stay safe out there.

— Bill

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