

Weatherproofing is one of those disciplines that sounds straightforward until you've lived through a failure. The first time a door reader went intermittent in a light drizzle, the instinct was to blame software, wiring, or "a bad unit." The repair took longer than it should have because the root cause was mundane: the enclosure was rated on a label, but the cable entry was treated like an afterthought. After that, I stopped thinking of weatherproofing as a box with a gasket and started treating it like a system, from gland to finish coat to cable bend radius.

Reader hardware, access control readers, and any proximity device that sees outdoor air need the same mindset. The enclosure is the first line of defense, but it is rarely the last. Rain, wind-driven moisture, condensation cycles, UV exposure, and grime all conspire to find weak points. Your job is to design out those failure paths, and enclosure selection is where you either buy reliability or gamble against it.

This guide focuses on practical enclosure selection and weatherproofing decisions for reader installations. It's written for real jobs, not lab demos, with the trade-offs you only see when something fails late in the season.

Start with the environment, not the product spec

A common mistake is to match the reader's IP rating to the outdoor location and call it done. That approach ignores how the reader will be installed and how water actually behaves on a wall.

"Outdoor" can mean very different loading conditions:

- A sheltered porch with a roof overhang can still see windblown spray, but it often has lower direct rain impact.
- An unsheltered gate post can see frequent splash and continuous wetting during storms.
- Coastal environments raise the stakes because salts accelerate corrosion and can creep into cable jackets and terminal compounds.
- Shade and temperature swings drive condensation even on days with no rain.

When I help a team plan an enclosure, I begin by asking what the device faces: north or south, whether it is under a canopy, typical wind exposure, and whether the wall is painted or bare metal. If the installation uses conduit, I also ask how far the conduit run goes before it turns inside. Those details affect how moisture accumulates and where it ends up when the air cools at night.

Enclosure ratings like IP65 or IP66 are useful, but they are not a substitute for installation method. You can often make a "rated" enclosure fail if you choose the wrong cable entry, neglect drain paths, or trap humid air inside and then cycle it across temperature gradients.

How enclosures fail in the real world

Moisture intrusion is rarely a single-event disaster. It's usually a progression.

Air contains water vapor. Warm indoor air is expelled outdoors, or outdoor air cools and condenses inside the enclosure. Small droplets form at the coldest surfaces, then gravity moves them toward seams, terminations, and cable entries. If there is any path, capillary action will pull moisture along textured surfaces and into joints.

Then there's water that never becomes vapor. Wind-driven rain behaves like it's looking for seams. If the enclosure is mounted on a flat surface where water pools at the bottom edge, the bottom gasket area becomes the most stressed. Even if the enclosure is "watertight," pressure differentials and repeated wetting can overwhelm poor seals.

UV and thermal cycling matter too. Plastic enclosures can embrittle under UV if they are not formulated for outdoor exposure, and certain gaskets degrade faster than expected. In humid climates, you might not see a problem for months, but temperature and UV accelerate aging, and the failure may show up after the first summer.

I've also seen failure from mechanical choices. A cable strain relief that is "tight enough" during installation can loosen slightly over time because the cable relaxes, or because installers twist the cable when routing it. That minute movement can work a gasket edge or stretch a gland seal out of alignment.

Choose the right enclosure type for the reader mount

There are three enclosure categories that come up most often for reader installations: surface-mount weather hoods, sealed wall enclosures, and purpose-built reader housings with integrated mounting and cable entry. The best choice depends on whether you need maintenance access, how the reader will be oriented, and how much room you have for wiring and connectors.

Surface-mount weather hoods

Weather hoods can be excellent when the reader is mounted under a roof overhang and the primary concern is splash and minor exposure. They are typically lighter and easier to align. But they are not always ideal when the reader faces heavy rain and wind, because hoods can still allow water to reach cable entries if the cable route sits in the "wet zone."

If you go with a hood, I recommend treating the cable entry like a critical component, not a convenience. A hood may protect the reader face, but water can track along the cable sheath to the entry point, particularly when the cable lies in a position that holds drops.

Sealed wall enclosures

Sealed wall enclosures are the most robust approach when the reader is mounted in a way that cannot be sheltered. They work best when the enclosure is designed for outdoor use, has appropriately rated seals, and includes cable gland options that match the cable type.

The trade-off is that you must handle installation quality carefully. If the enclosure has too much internal space, you can trap warmer air and increase condensation cycles. If the enclosure is too small, connectors may be stressed, and you risk pinched cables or strain on the reader lead.

Purpose-built reader housings

Some reader manufacturers offer housings designed specifically for their reader model, including correct gasket geometry, cable entry locations, and mounting alignment. Those systems are often the least painful because tolerances match the reader's form factor.

Even then, you should still verify that your cable entry method is compatible. A housing designed around a particular gland size or connector style can become unreliable if installers deviate.

Ratings: what they mean, and what they do not

IP ratings are based on standardized tests for solid and water ingress. The "IP" framework is helpful because it forces you to think about both dust and water, but it does not tell you how the enclosure will be used.

A few practical cautions:

- A high water rating does not protect you from poor cable entry. If moisture can wick in around a gland or pass through a poorly sealed conduit end, the enclosure is only as good as the weakest seal.
- Some enclosures tolerate temporary splashes better than continuous wetting. If the device will sit where water pools or where the gasket will be regularly soaked, you need confidence in continuous exposure, not just occasional spray.
- Condensation is not explicitly solved by an IP number. IP addresses liquid intrusion and dust ingress, but condensation is about internal air and temperature cycling.

So the goal is to pick an enclosure with a rating appropriate for your exposure, then build the installation details that make that rating achievable.

Cable entries are where projects succeed or die

If you want one lesson that saves money, it's this: cable entry design is weatherproofing design.

Your enclosure's water integrity is typically maintained by gaskets and gland seals, and those parts depend on correct assembly. The cable jacket must be the right diameter, the gland threads must match, and the gland needs a proper compression pattern. If the cable is too large, the gland may not seal evenly. If it's too small, it can loosen or allow leakage paths.

Routing also matters. Water follows gravity and capillary effects. If the cable comes into the enclosure and then loops up before entering the reader termination, you risk creating a "drip ledge" that catches condensate. Better designs allow cables to slope so that any moisture drains away from sensitive interfaces.

Conduit termination practices are also part of the story. Conduit fittings and conduit ends can be sources of leakage, especially where flexible conduit segments are used outdoors. If you use conduit, make sure the conduit-to-enclosure coupling and any end fittings are appropriate for outdoor environments and seal properly.

A practical selection rule I use

When choosing between two enclosure options, I look at what each one makes **access control companies** easy to assemble correctly in the field. The enclosure that forces the installer into correct cable routing, has compatible gland sizes, and offers clear gasket surfaces tends to be more reliable than the enclosure that appears "similar" on paper but requires improvisation.

Improvisation is where silicone goes to die, where plumbers tape replaces proper sealing, and where installers use whatever gland they found in the van that morning. If the hardware kit is designed so that "the right way" is also the easiest way, reliability goes up dramatically.

UV, materials, and thermal behavior

Enclosures for outdoor readers live through sunlight and temperature swings. Plastics and metals behave differently, and both can fail if you ignore the environment.

Plastic enclosures: UV exposure can degrade many plastics over time, especially if the enclosure was not intended for outdoor use. Even if the enclosure survives, gaskets can harden or lose elasticity. That matters because weatherproofing depends on gasket compression. If UV shrinks the gasket or makes it brittle, water paths open.

Metal enclosures: metals handle UV well, but corrosion becomes the enemy, especially with coastal salts or industrial pollutants. If the enclosure uses screws and fasteners, those fasteners must be corrosion-resistant too. A small corrosion point around a fastener can become a leak path or create enough surface damage to undermine gasket contact.

Temperature cycling: any enclosure can experience internal condensation. A more robust enclosure system helps you manage that risk by minimizing trapped humid air and by keeping internal surfaces from becoming the cold sink. In practice, that means good thermal conduction and correct gasket design can help, but it still doesn't eliminate condensation in every climate. Sometimes you accept that condensation can occur and design the reader wiring and electronics so that moisture intrusion does not become catastrophic.

If you're installing in areas with frequent freeze-thaw cycles, check how the enclosure and gasket handle expansion and contraction. A gasket that seals perfectly at room temperature may lose compression after repeated cycles unless it is specified for that use.

Maintenance access without sacrificing the seal

Readers often get replaced during lifecycle changes, firmware updates, or periodic inspections. An enclosure that requires complete removal of seals or that invites loose reassembly can become unreliable over time.

When I evaluate an enclosure, I think through the maintenance workflow. Will a technician be able to open it, service the reader, then close it with consistent gasket compression? Do they need to replace gaskets every time? Is there a hinge or a fastener design that ensures alignment when closed?

A common failure mode is "it was fine when new" and "it was fine after the last service call" until the third or fourth opening. Fasteners loosen slightly, gaskets shift, dirt gets into the gasket groove, and water finds that gap. Enclosures that minimize opening and make proper closure repeatable tend to last longer.

If the installation requires frequent service, consider whether a serviceable compartment design is available, rather than forcing every technician to break the same sealed interface.

Install orientation and water paths

Orientation sounds like a minor detail, but water is relentless. Where a reader sits relative to sun and wind can change whether water runs across the face and drains away or pools at a bottom seam.

If your enclosure has a flat back and a gasketed perimeter, mounting it in a position where water pools at the bottom edge can be risky. Ideally, you want to avoid creating a "collection shelf" where water lingers on the gasket surface.

Also consider the cable entry location. If the gland is on the bottom or near the lowest point, any leak, condensation droplet, or wash-down water has a direct path into the enclosure. If the gland must be on the lower side, pay extra attention to proper slope, drip loops outside the enclosure where possible, and the integrity of external routing.

Wind-driven rain introduces a different challenge. Water can be pushed up and around edges. That's why enclosures should have a mounting arrangement that does not create sharp gaps or bypass routes behind the enclosure.

Weatherproofing tactics that work when you must improvise

Sometimes you inherit an installation, and the enclosure choice was made long ago. In those cases, you are often stuck with the cable type, conduit routing, and mounting holes. The goal becomes restoring integrity, not only replacing parts.

The biggest wins are usually:

- Replacing compromised gaskets, not stretching them back into place.
- Correctly reseating the enclosure cover and ensuring fasteners compress the gasket evenly.
- Upgrading cable glands to match cable jacket size and material.
- Sealing conduit ends properly with fittings designed for outdoor use.

Be cautious with sealants. Silicone can be useful when used correctly, but over-reliance on sealant can also hide problems. If water is entering through a gland because the cable size does not match, sealant might temporarily mask the issue, then fail later. In my experience, a gland and cable match is more reliable than adding sealant around a poor seal. That said, a thin, appropriate sealant use in gasket-contact areas can be justified in some designs, but only when compatible with the enclosure and gasket material.

If you are dealing with an existing enclosure, inspect for dirt in gasket grooves. Dust and grit can create a microgap. A “looks clean” gasket groove can still have grit that pushes the gasket out of even compression. Cleaning and dry inspection can matter as much as replacing parts.

Condensation management: the quiet failure driver

Condensation is the invisible problem that makes outdoor readers unreliable without showing dramatic damage.

It tends to happen when internal air cools below its dew point. That can occur at night, after sunset, or in climates with strong day-night temperature swings. Even on days with no rain, humid air can condense inside the enclosure and collect near terminations.

A few field-tested approaches help reduce condensation risk:

- Use enclosures that are designed to minimize trapped air volumes or to allow internal air to equilibrate with fewer cold surfaces.
- Ensure the cable entry does not create internal pockets where moist air can accumulate.
- Avoid routing that creates internal high points where moisture can collect.

Some systems use internal desiccants. Whether that is appropriate depends on the enclosure volume and maintenance schedule. If you use desiccant, you must plan for replacement intervals and ensure the desiccant location does not interfere with airflow or condensation formation patterns. It's not a set-and-forget fix unless the manufacturer's guidance supports it.

If you've ever opened an outdoor reader enclosure after a temperature swing and found water droplets near the reader leads, you've seen condensation's fingerprints. The fix is not just drying it once. It's addressing the installation details that create repeated dew point conditions.

A simple selection workflow that stays grounded

When you're choosing an enclosure for a reader, you need a method that fits how projects actually get executed. Here's a workflow that reduces rework.

1. Define the weather exposure honestly. Consider shelter, wind-driven rain, splash zones, and the wall type.

2. Select an enclosure rating appropriate for your exposure and the planned installation method, not just the reader's stated rating.
3. Confirm compatibility of cable glands, cable jacket diameter, connector style, and available cable routing space.
4. Plan for service access and repeatable closure, including gasket condition and fastener type.

That sequence sounds basic, but it prevents the common trap of selecting the enclosure first, then forcing the cable entry later with whatever parts are on hand.

Common mistakes and how to avoid them

Most failures I've investigated share patterns. These are not theoretical issues, and they are rarely fixed by "trying again with a better gasket." The fixes usually require correcting the full assembly.

One recurring mistake is selecting an enclosure that does not match the cable entry needs. For example, using the wrong gland thread type or using an adapter that was not intended for outdoor wet locations. Another is mounting the enclosure in a way that creates a "water shelf" where droplets sit against the gasket for hours during storms.

Another trap is neglecting how the enclosure is cleaned during maintenance. If someone power-washes near the enclosure, water can be driven into seams at pressure levels that exceed what the enclosure is tested for under gentle spray. That doesn't mean you can't clean outdoor readers. It means you should provide maintenance guidance that respects the enclosure and cable entry design.

Finally, there's the "temporary" closure. A loosened cover after a service call is the simplest path to future water ingress. It's why repeatable fastener design matters. If the cover fasteners are easy to misalign or difficult to torque consistently, reliability suffers over time.

Reader enclosure pairing with wiring practices

Even the best enclosure cannot overcome bad wiring practices, especially at terminations.

If the reader uses pigtails, quick connects, or terminal blocks inside the enclosure, you want to ensure that connections are protected from moisture, protected from corrosion, and mechanically stable. Wire strain relief should prevent movement. Movement at the reader leads can rub insulation and create paths for moisture.

If there are multiple cables entering the enclosure, think about how bundles behave when water flows along the outside surface. A bundle can create capillary bridges if the jacket is cut or damaged near entry points. Cable jackets should remain intact until inside the protective area and should not be nicked during routing.

If you're using cable that is rated for outdoor direct burial or direct outdoor exposure, that rating helps. But inside an enclosure, what matters more is the cable jacket integrity where it passes through glands and the quality of the gland seal. Outdoor-rated cable and an ill-fitting gland can still allow intrusion.

When to oversize the enclosure, and when not to

Oversizing sounds like it should be safer, more space for routing, easier maintenance, fewer pinched wires. In some cases it is safer. In others, bigger internal volume means more trapped air and a greater condensation surface area. It can also make it harder to ensure consistent positioning of internal components.

A well-sized enclosure supports clean cable routing, stable connectors, and correct internal placement of glands and grommets. Too small, and you end up pressing connectors against gasket edges or bending cables tighter

than their minimum bend radius. Too large, and you create slack loops that can catch condensation and complicate closure alignment.

So choose enclosure size based on a practical layout, not on guesswork. If you have access to the reader model dimensions and connector specs, build a simple internal layout plan and ensure that, when the cover closes, no cables are pinched or pulled.

A short checklist you can actually use on site

When I walk an outdoor enclosure job and want to verify that the weatherproofing logic has held, I focus on assembly points that are visible and correctable.

- Verify cable gland size and compression are matched to the installed cable jacket.
- Confirm conduit and enclosure coupling points are sealed with outdoor-appropriate fittings.
- Check gasket seating and fastener alignment, especially after any service opening.
- Inspect cable routing so there are no internal high points where condensation collects.
- Look for water-trapping mounting surfaces, or any orientation that pools at the gasket.

That checklist catches the highest-impact issues, the ones that tend to cause repeated call-backs.

Final thoughts: reliability comes from details, not labels

Weatherproofing and enclosure selection for readers is a chain. The **Extra resources** enclosure rating is only one link. Cable entry design, mounting orientation, gasket integrity, internal routing, and maintenance behavior all determine whether the reader performs through seasons or becomes an intermittent nuisance.

When you plan properly, the installation becomes boring in the best way. The reader works in heavy rain. The enclosure doesn't fog up and leak. The technician can open it years later, service a component, and close it without turning a clean seal into a new leak path.

If you take one thing forward, make it this: design the water path. Decide where water should go if it reaches the enclosure exterior. Then choose the enclosure and install method that makes that outcome repeatable, even after temperature swings, wind-driven spray, and normal site work.

Boring performance is the goal, and the details are how you earn it.