ZERO CIVIL

ZERO WASTE TECHNOLOGIES

Non-conductive bollards protect electrical assets by using materials like advanced polymer plastics that prevent the transfer of electricity, reducing the risk of shock or fire. There are several options on the market that are indeed non-conductive but most fail under light impact. This document compares each option and the pros and cons of these options.

Protect Electrical infrastructure

Unlike steel bollards, Advanced Polymer Bollards are far more forgiving- able to absorb light impact and self recover. If secured using the Impact Recovery System Bollards and footings are reusable following even severe impact. Western Power Approved

Advanced Polymer Bollards

Highly durable Non-Conductive Bollards made from Advanced Polymers are impact, scratch , dent resistant, will not chip or fade like powder coated bollards. Western Power/ Synergy Approved.

In-ground Advanced Polymer bollards Western Power

Impact Resistant

You can choose to secure them in-ground and bollards absorb light impact making them self recover from small bumps.

To make resistant to even severe impact- refer to Impact Recovery system

Photo of Advanced polymer bollards

Why Electrical Assets **Need Special Bollards**

Electrical infrastructure — switchboards, cabinets, RMUs, transformers, traffic signal control boxes and substation equipment — cannot be protected with conductive materials.

Steel conducts electricity, creating a hazard in fault conditions and increasing the risk to maintenance staff, pedestrians, and vehicles.

This is why Western Power, Synergy, ATCO and most Australian utilities prefer (or require) Non-Conductive Bollards for their electrical safety zones.

Advanced Polymer is:

- **Non-conductive**
- **UV-stable**
- **Self-recovering**
- **Does not rust or dent**
- **Zero maintenance**
- **Impact-absorbing**
- **Safe for electrical environments**

If Steel Bollards are installed and both the bollard and concrete footings are in good working condition, they can be fitted with a full-height Advanced Polymer Cover making them non-conductive.

Non-Conductive Protection for **Electrical Assets**

Electrical cabinets, control boxes, switchboards, traffic signal cabinets and substation assets require non-conductive protection. Advanced Polymer Bollards are inherently non-conductive and eliminate the electrical hazards associated with steel and stainless steel.

If steel or stainless steel is used, it must be fitted with an Advanced Polymer Cover to eliminate conductivity. However, for medium–high impact protection, we recommend using Advanced Polymer Bollards on the Impact Recovery System with Heavy Duty or Extra Heavy Duty Resistance Cores. This provides full non-conductive protection with reusable bollards and footings.

Use Advanced Polymer (HD/XHD Impact Recovery) when:

- The asset is electrical
- You need non-conductive safety
- You want zero maintenance
- You want zero rust
- You want to avoid steel casing costs
- You want reusable footings
- You want better whole-of-life value

“Advanced Polymer is non-conductive. When protecting electrical cabinets, switchboards or power assets, always use Advanced Polymer with HD or XHD Impact Recovery for maximum safety and zero electrical hazard.”

Why non-conductive bollards are essential near electrical infrastructure

Steel and stainless steel:

- conduct electricity
- can energise during a fault
- extend the touch-potential zone
- can become live if a vehicle pushes them into energised equipment
- require equipotential bonding (which nobody wants to deal with)

Concrete

- conducts electricity when wet from rain/sprinklers
- can energise during a fault

Advanced Polymer:

- eliminates touch and step-potential hazards
- cannot become energised
- is permitted in “close approach” zones
- preferred by Western Power, Synergy, ATCO
- Can be made Impact Recovery

This lets you position bollards closer to assets without expensive earthing upgrades.

Bollard **Options**

STEEL BOLLARD

Steel bollards were the go-to bollard, but nowadays they must be covered using a Poly Bollard cover, but there are far safer. More resilient options

103 PLASTIC BOLLARD + POLY COVER

This small diameter rigid bollard behaves like a thin, brittle version of a steel bollard**. C**ostly to replace

150MM RECYCLED PLASTIC 15 MM RIGID

Although they are Non-conductive, they fold under low impact and are costly to replace

ADVANCED POLYMER BOLLARD

The latest innovation-impact and rust resistant bollards and bollard covers are the new go-to for major authorities

ADVANCED POLYMER IMPACT RECOVERY

Bollards absorb impact up to 20 degrees. Bollards and footings become reusable following even severe impact

The most commonly used bollards are steel bollards, but these bollards are conductive, so no longer permitted for protecting electrical assets. If you want a purely esthetic non-conductive bollard then rigid recyled plastic bollards with 15 mm walls or Poly Covers can be fine, but most bollards are subject to occassional or regular impact. In this instance Advance Polymer inground/ or Impact Recovery are the new go-to for major authorities

Rank	Bollard Type	Recommended	Notes
1	Steel / Stainless Steel (bare)	✕ Not recommended	Conductive · Rigid · Footing failure · Not suitable for electrical zones
2	Steel / Stainless + Polymer Cover	⚠ Poor	Cover is non-conductive but steel core still conductive · Same impact failures
3	Rigid Plastic (15 mm wall, 150 mm Ø)	⚠ Limited	Non-conductive but brittle · Snaps/folds · Footing damage
4	103 mm Rigid Plastic Core + LDPE Sleeve (Competitor)	⚠ Limited	Too narrow · Weak · Sleeve cosmetic only · Low protection
5	Advanced Polymer – Direct In-Ground (Hollow)	⚠ Limited	Great for delineation · Safe failure · Not protective
6	Surface-Mount IRS + Advanced Polymer	✓ Recommended	Non-conductive · No footing required · Medium protection
7	350 mm IRS (HD Core) + Advanced Polymer	✓ Recommended	Medium protection · Ideal for carparks/light vehicles
8	650 mm IRS (HD Core) + Advanced Polymer	✓✓ Strongly Recommended	Strong containment · Utilities Utes · High reliability
9	650 mm IRS (XHD Core) + Advanced Polymer	☆ BEST	High-energy capable · Protects assets from Ute/small truck impacts · Reusable footing

Bollard Type	4–6 km/h	10 km/h	25 km/h
Steel In-Ground (Rigid)	✓ Post fine. **Footing takes the hit.**	⚠ **Footing cracks/rotates.**	✕ **Footing failure.** Bollard becomes a projectile. Very high repair cost.
Solid Plastic Bollard (Rigid Plastic / HDPE / LDPE)	✓ Slight flex. Cosmetic only.	✕ **Fails / snaps / folds.** No containment.	✕ Offers **zero real protection**. Vehicle passes through.
Advanced Polymer In-Ground (Hollow)	✓ Flexes & recovers.	⚠ Recovers but **not protective** at this speed.	✕ Not suitable — collapses / deforms.
IRS-HD — 350 mm Depth (HD Core)	✓ Bollard flexes, footing untouched.	✓ **Designed for this**. Vehicle slows/stops, bollard reusable.	⚠ High stress. Usually reusable. **Low–medium containment**, footing intact.
IRS-HD — 650 mm Depth (HD Core)	✓ Zero damage.	✓ **Very strong containment**. Footing rock-solid.	✓ Handles serious hits. **Medium–high containment** for light vehicles. Usually 100% reusable.
IRS-XHD — 650 mm Depth (XHD Core)	✓ Perfect.	✓ Strong, controlled deflection.	✓ **High-energy capable**. Real-world tested to stop a light vehicle up to ~21 km/h and performs well at 25 km/h. Footing stays intact, bollard usually reusable.

What fails & **what survives**

At 4–6 km/h (low-speed bump)

- **Steel In-Ground:** footing takes the hit → early cracking
- **Plastic bollard:** fine cosmetically → useless structurally
- **AP Hollow:** recovers → but not protective
- **IRS HD/XHD:** zero damage → designed for this

At 10 km/h

- **Steel In-Ground:** footing rotates or cracks
- **Plastic:** folds or snaps
- **AP Hollow:** recovers but no containment
- **IRS HD (350):** controlled stop
- **IRS HD (650):** strong containment
- **XHD:** excellent containment

At 25 km/h

- **Steel In-Ground:** catastrophic footing failure
- **Plastic:** no protection
- **AP Hollow:** collapses
- **IRS HD (350):** moderate containment, usually reusable
- **IRS HD (650):** strong containment
- **XHD:** performs extremely well; footing survives

Cost of **Failure**

A “cheap Bollard” can be very expensive to repeatedly replace.

- **Concrete, Steel or Rigid Plastic** = replace footing and bollard upon impact ($500 -1,000)
- **AP Hollow Inground** = zero replacement cost at low speed. At high speed you must replace bollard and footing ($200+ $350)
- **IRS Bollards** = reuse footing & Bollard. Only cost is replacement core upon severe impact ($30-$100)

Rigid Bollards- Impact force

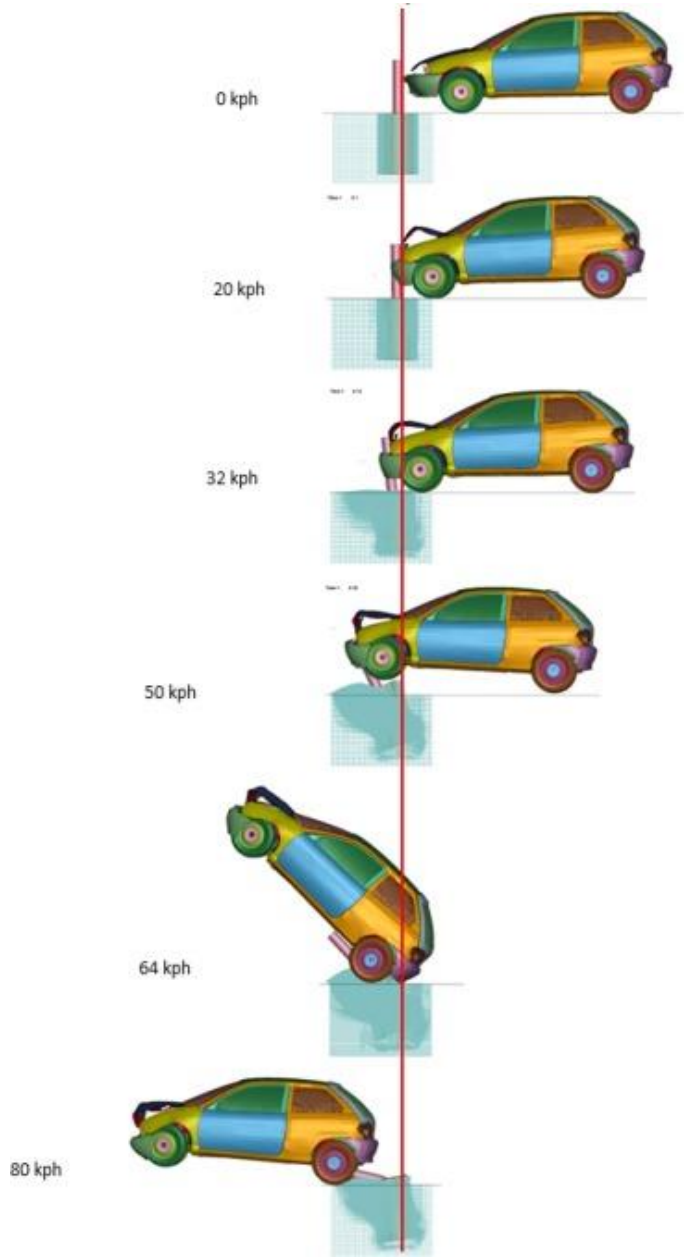
Solid inground bollards

have been the mainstay of the industry for decades, but in recent times with more pedestrians and vehicles on our roads there is a growing concern for the **safety factor** and on-going maintenance cost, when designing bollards.

A solid bollard provides no means of absorbing the energy, (impact force) as shown right when a bollard is impacted, in most instances at low speed the car is damaged and at higher speeds the **concrete footing is dislodged**, and the vehicle often becomes a **dangerous projectile.** The outcome of the force (especially when steel bollards are concrete filled) can be fatal.

To overcome this problem

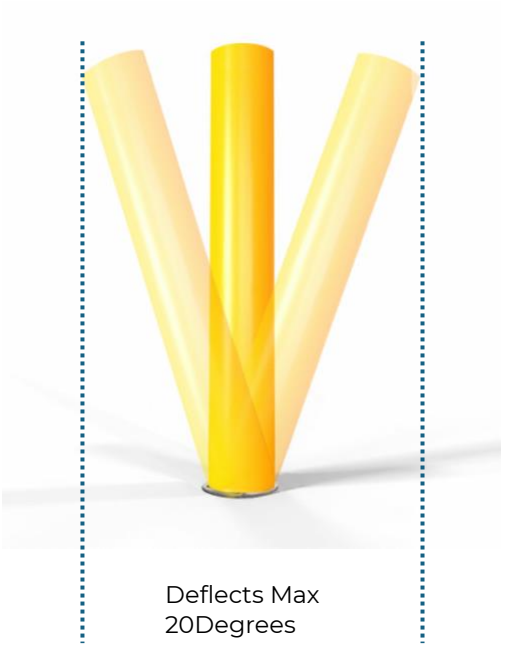
we have incorporated a highly efficient energy absorbing mechanism and secured our bollards on a safe secure footing that remains intact when a bollard is severely impacted.



Bollards for Electrical **Safety Zones**

- **For low-impact environments** use Advanced Polymer direct in-ground.
- **For medium protection** use Advanced Polymer with Impact Recovery (HD) inground or surface Mount
- **For superior protection** against Utes and trucks use the in-ground 650 mm Extra Heavy Duty Impact Recovery System.

Requirement	Best Choice	Why
Non-conductive	**Advanced Polymer Bollard (HD/XHD)**	No electrical hazard, no earthing required
High-impact protection	**Advanced Polymer + XHD Core**	Stops utes/trucks at low–medium speeds
Medium-impact	**Advanced Polymer + HD Core**	Carparks, industrial, substations



Deflects Max 20Degrees

Advanced Polymer **Bollard Selection**

Use this 3-step rule to pick the right level of protection.

Low-Impact Environments

Advanced Polymer —
Direct In-Ground (Hollow)

Use for:

- Footpaths
- Walking trails
- Cycle paths
- Internal zones
- Visual delineation
- Areas where vehicle speed is very low

Why:

- The polymer body flexes on impact
- Self-recovers from bumps
- No rust, no paint, no dents
- Lowest cost installation
- Non-conductive (safe near electrical assets)

Impact level:

☆ *Low speed only*

Medium Protection (Cars / Light Vehicles)

Advanced Polymer — Impact Recovery
(Surface Mount or 350 mm In-Ground, HD Core)

Use for:

- Carparks
- Retail precincts
- Council parks
- Shopping centres
- Internal power-station zones
- Slow traffic areas

Why:

- Stops passenger vehicles at low–medium speeds
- HD core provides controllable resistance
- Bollard + footing are reusable after severe impact
- Perfect for areas with frequent bumps
- Much safer for drivers & pedestrians

Impact level:

☆☆☆ *Medium protection (cars & light utilities)*

High Protection (Utility Vehicles / Trucks)

Advanced Polymer — Impact Recovery
(650 mm In-Ground, XHD Core)

Use for:

- Power stations
- Substations
- Transformer compounds
- Warehouses
- Truck access zones
- Industrial yards
- Anywhere Utes, fleet vehicles or small trucks operate

Why:

- XHD 5.5 mm steel core = maximum resistance
- Highest stopping power in the polymer range
- Deflects up to 75° in heavy impacts with zero footing disturbance
- Protects expensive assets (transformers, cabinets, switchgear)
- Fully non-conductive external casing

Impact level:

☆☆☆☆☆ *High protection (utility vehicles & light trucks)*

Why concrete bollards are a **poor choice for electrical boxes**

1. They shatter under lateral impact

When struck sideways, concrete behaves like ceramic:

- Cracks
- Breaks
- Sends shards
- Footing fails
- Leaves the box unprotected

This is *not* acceptable around high-risk or energised equipment.

2. Footing failure is almost guaranteed

Concrete bollards transmit *all* impact energy straight into the footing. At 10–15 km/h, the footing rotates or cracks → you lose the bollard, and now you need:

- Excavation
- Removal
- New footing
- Labour
  = $500–$1,000+ per strike

3. They don't absorb energy

Utilities prefer systems that *flex*, *deflect*, *recover*, and *don't explode* under load. Concrete explodes.

4. Electrically, concrete is unreliable

Utilities require non-conductive bollards that stay non-conductive**,** not "**conductive when wet."**

Concrete fails this.

5. Concrete has no certification path

It is:

- not AS/NZS 3845.2 compliant
- not crash-tested
- not frangible
- not IRS-compatible
- not recognised as a safety barrier for electrical assets

In a utility yard, concrete bollards just create another hazard.

What actually provides **protection**

- It’s the Resistance Core that provides impact resistance — not the casing.
- Steel casing doesn’t stop a car. Stainless casing doesn’t stop a car. **The internal resistance core does**.
- Advanced Polymer absorbs and reduces impact force, but the strong resistance *core* provides the stopping power.

Direct in-ground = replace footing every severe impact.
Impact Recovery System = reusable bollard + reusable footing = thousands saved.

1. **Advanced Polymer Hollow In-Ground** sits → *Delineation*

2. **Advanced Polymer IRS** sits → *Protective Bollards*

3. **Steel / Stainless + IRS** sit → *Protective / High Impact*

Using steel bollards to protect electrical assets is dangerous unless they are fitted with a non-conductive polymer cover. Advanced Polymer eliminates this risk entirely.

Advanced Engineering
overcomes these problems

Bollards self-recover

Upon low-speed impact bollards absorb the impact force and slowly self -recover and are removable and reusable following severe impact

No damage to footings

ZERO WASTE Foundations remain pristine condition for the entire lifespan of a development and are reusable following severe impact

Bollards Impact Resistant

ZERO Bollards are made from Australian heavy-duty materials designed to withstand impact without damage, remaining in good condition

Footings reusable

ZERO WASTE foundations remain in pristine condition and surface mount base plates are reusable following severe impact, saving thousands

Bollard re-usable

Both surface mount and inground bollards can be made removable and reusable following severe impact, saving thousands over the life of a development

Simple replacements

Bollards are low cost to maintain. If badly impacted, they are removed and replaced in less than 5 minutes without the need for digging or heavy labour.

Impact resistant base plate

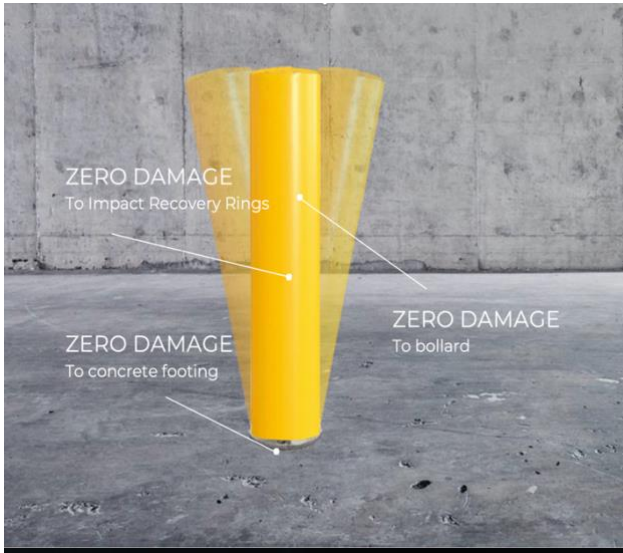
With square base plates the impact force is concentrated on one anchor- with heavy duty round base plates the impact force is evenly distributed, reducing the risk of damage

Superior protection

Unlike flexible bollards that can over-flex, the strong resistance core provides superior protection against errant vehicles, greatly improving safety

Advanced Polymer Bollards

The advanced polymer bollards (and bollards covers) provide excellent resistance against denting, chipping and fading- extending the potential lifespan



Four levels of **extreme protection**

1. You can surface mount your bollards using our reusable base plate or secure inground using our ZERO WASTE Unbreakable ground sockets. Both options continue working impact after impact, year after year

2. Unlike spring loaded bollards that over-flex, when impacted by a vehicle a heavy-duty resistance core prevents deflection of the bollard beyond 20 degrees and with excellent memory properties it self-recovers returning the bollard to upright position following hundreds and hundreds of impacts

3. Unlike springs that quickly wear out, creating dangerous litigation risks, our re-usable energy absorbing Impact Recovery Rings create a permanent shock absorbing cushion that absorb the impact force and self-recover, with no reduction in capacity following hundreds of impacts, greatly improving safety and resilience

4. Our heavy-duty galvanised steel and impact resistant stainless-steel pipe bollards provide an impact resistant surface, but we highly recommend using our advanced polymer bollards to substantially reduce maintenance on your bollards

We get knocked down, but we get up again. You're never going to keep us down!

Unlike spring-loaded bollards, Impact Recovery Bollards cannot be deflected by hand, remaining perfectly aligned safe and secure year after year.

When impacted by a vehicle they deflect to a max of 20 degrees and self-recover. When severely impacted (truck or utility vehicle) replacements take less than 5 minutes and the bollard, expensive concrete footings and Impact Recovery Rings are reusable impact after impact, saving thousands over the life of a development.

Impact Recovery System

At low-speed vehicle contacts, the Impact Recovery System allows controlled deflection, reducing the risk and severity of vehicle damage.

At higher impact speeds, the bollard is designed to significantly limit forward vehicle movement to protect pedestrians and fixed assets.

ZERO WASTE Unbreakable Foundations absorb impact energy protecting the surrounding foundations when a bollard is impacted and continue working effectively keeping bollards safe and secure for the entire lifespan of a development (100 years)

Energy Absorbing Impact Recovery Rings then absorb the impact force allowing the bollard to deflect up to twenty degrees and self-recovering, without damage.

Strong Resistance Core If the impact forces the bollard beyond twenty degrees the resistance core takes the reduced impact force bending up to a maximum of 75 degrees, leaving the resistance core lodged in the footing providing a barrier to further forward movement of the vehicle

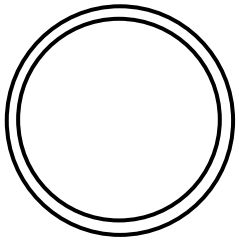
VIEW VIDEO & SPECS

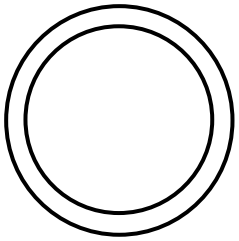
STANDARD RESISTANCE CORE

This is sufficient to stop a passenger vehicle at low speed and reduce the risk of injury to drivers and vehicles. Suitable for all installations (Surface Mount/ 350mm and 650mm depth footings.)

WHEN TO CONSIDER EXTRA HEAVY DUTY

If you find the internal resistance core is bending too frequently (Due to trucks or heavy utility vehicles) you can increase the inner core to Extra Heavy Duty. This will increase the resistance by around 150% and reduce the incidence of having to replace the inner core, but this strength internal resistance Core can only be used with 650 mm depth solid 30MPa concrete footings





HEAVY DUTY

A Heavy-Duty Resistance Core is strong enough to stop a passenger vehicle and can be used with Surface Mount and 350 / 650 mm depth footing

EXTRA HDUTY

Extra Heavy-Duty Pipe is substantially stronger so can only be used with 650 mm Depth footings

Compliance Statement

Zero Civil Impact Recovery System

Meets the following applicable standards and design requirements:

- **UK PAS 13** – Impact Test Specification for Workplace Safety Barriers
- **AS/NZS 1170** – Structural Design Actions

ZERO WASTE Foundations

- Certified independent testing conducted
- Field-tested under vehicle impact speeds ranging from **10 km/h to 110 km/h**.
- **Foundations remained structurally sound** and in continued operational condition following testing.

ZERO WASTE Removable Bollards

- Field-tested under impact speeds from **10 km/h to 110 km/h**.
- **Footings remained undamaged** and fully functional.
- Bollard units were **easily replaceable** following high-severity impact, as intended.
- MRWA Specified for highways

Impact Recovery Bollards

- Field-tested under impact speeds from **10 km/h to 60 km/h**.
- Both **bollard and footing remained in serviceable condition** following testing.

Nationally Approved

Nationally approved for use by Australian Road Authorities, Western Power, DoT, PTA, and MRWA, and deployed extensively by local authorities and leading developers across Australia