

Corrosion & Flash Rust on Bare Metal

Why Metal Becomes Exposed

- **All bare steel will rust.**
Any time raw steel is exposed to **oxygen + moisture**, it will begin to oxidize and form rust. Coatings only **delay** that process; once they're breached, rust is guaranteed—it's just a question of **how fast**.
- **Wear and tear unique to concrete trucks:**
 - Inside the drum, concrete, rock, chipping and hammering **physically impact the shell**.
 - Over time, this:
 - Wears away coating/paint on the **inside**
 - Creates **dimples** in the steel wall from repeated impacts
 - Those dimples telegraph to the **outside**, stressing the exterior paint
 - Eventually, paint on the outside **cracks or chips at those dimples**, exposing bare steel to the weather. That exposed steel will rust regardless of what cleaner is used.

How Acids React With Bare Steel

Concrete truck cleaning commonly uses acids to remove concrete, rust, or mineral scale. They all dissolve oxides, but not in the same way.

- **Muriatic (Hydrochloric) Acid**
 - Very strong and **highly aggressive**.
 - Strips rust and oxides **very fast**, but also attacks the base metal hard.
 - Leaves steel **bright, raw, and deeply etched**, often with **chloride contamination**.
- **Phosphoric Acid**
 - Moderately strong, **less aggressive** to the base metal than muriatic.
 - Converts red rust into **iron phosphate**, forming a **dark grey/black matte** "phosphated" surface.
 - This converted layer is a better base for paint and **slows** corrosion compared to raw steel but still needs coating.
- **Glycolic Acid**
 - An **organic, much milder** acid toward steel.
 - Dissolves rust and scale more gently, forming **soluble iron complexes** (no added chlorides).
 - Leaves a **clean, matte-satin surface** with less deep etching and more controlled metal loss.

Corrosiveness on bare steel (highest → lowest):

Muriatic > Phosphoric > Glycolic

What Is Flash Rust?

Flash rust is the thin orange-brown film that appears **shortly after cleaning** freshly exposed steel.

It happens when:

1. An acid removes rust and oxides.
2. You're left with **fresh, very reactive bare steel**.
3. That steel stays wet or sits in humid air.
4. Oxygen + moisture react quickly → **flash rust**.

By acid type:

- **Muriatic (HCl):**
 - Creates a very active, chloride-contaminated surface.
 - Commonly produces **flash rust within minutes to an hour** if not rinsed and protected.
- **Phosphoric:**
 - Forms a more stable **phosphate** layer.
 - Rust returns more slowly than after HCl, but **still returns** if left uncoated.
- **Glycolic:**
 - Less aggressive, no chloride load.
 - Under the same conditions, flash rust generally shows up **more slowly** (often hours instead of minutes), especially with proper rinsing and drying.
 - If glycolic is **left on to dry** or over-dwelled, it will still over-attack and set up flash rust and staining.

Keys to Limit Corrosion & Flash Rust

- Choose **milder acids (glycolic)** where possible for routine cleaning.
- **Control dwell time:** apply → let it work briefly → rinse while still wet.
- **Rinse thoroughly:** rinsing is the **off switch** for the acid and removes salts that attract moisture.
- **Dry as much as practical** to minimize wet time.
- Use a **follow-up protective step** (wash with wax, coatings, etc.) to slow new rust.
- Accept that **normal drum chipping and dimpling will eventually expose raw steel**—good chemistry and process only **slow and manage** that reality.