VERZINKSHOP V-BRITE 200 COPPER ELECTROLYTE INSTRUCTION MANUAL

Manual for electrolyte and complete kit

The step-by-step plan in this manual is written for the complete kit, in which all necessary materials are included. If you only have the electrolyte, you can use this step-by-step plan as an example.

table of contents

Quick Start

Use this step-by-step plan as a quick reference once you have read the manual completely.

1. **Degrease workpiece with an alkaline degreaser.**
2. **Rinse thoroughly with clean water.**
3. **(optional) remove any rust/contamination mechanically.**
4. **(optional) etching / activating – then rinse thoroughly.**
5. **Prepare the galvanizing bath.**
6. **Check the electrolyte level and place a mark.**
7. **Wrap anodes in PP anode filters.**
8. **Hanging anodes in 2:1 ratio opposite each other in the bath.**
9. **Turn on circulation or air agitation.**
10. **Hang workpiece with unvarnished copper wire on the nylon rod.**
11. **Black minus wire on the workpiece, red positive wire on the anodes.**
12. **Calculate area in cm².**
13. **Set starting current: approx. 0.2 a per 10 cm² total surface.**
    1. **(electroforming on conductive paint) starts at ~10–20% of the calculated current; wait until copper is visible; Step by step up to the target flow.**
14. **± 15-30 minutes or more electroplating until the desired result.**
15. **Spray the workpiece above the bath with demi/diwater.**
16. **Dip briefly in baking soda water to neutralize residual acid.**
17. **Rinse well again with clean water.**
18. **Dry at room temperature or with blow dryer/heat gun on low setting.**
19. **Protect: apply sealer, clear coat (1k/2k) or wax/oil in thin layers according to product label.**
20. **Close bath with lid; workplace cleaning.**

Important information

WHAT IS V-BRITE 200 copper electrolyte

Vbrite 200 is an acidic copper-electrolyte for electrolytic electroplating (copper-plating) of objects. The electrolyte gives a thin, clear and shiny copper deposit and is very suitable for fine details. This bath is ideal as an adhesive layer before nickel/chrome.

The applied copper layer is soft and ductile with a low internal voltage, which makes it extremely suitable for copper-plating plastic and other non-conductive materials after applying a conductive coating.

Works at room temperature; Optimal operation around 25 °C.

The electrolyte is suitable for direct copper-plating:

- Copper
- Brass
- Nickel
- Non-conductive objects such as plastic or organic material after applying a conductive layer.

Not suitable for direct use on other metals such as:

- Steel, zinc and aluminum.
- The electrolyte is too acidic for this. First, use an alkaline copper electrolyte as an adhesive layer.

Required equipment

The following materials are required for the use of v-brite 200:

(these materials are included in the kit and can be ordered separately on the webshop)

Always work in a well-ventilated room or use an extraction system.

Needed for the tank

- **Tanks/baths**: acid-resistant PVC, PE or PP. Large tanks should be reinforced to prevent bulging. Also suitable: steel tanks with rubber or plastic (pp/pvc) inner lining.
- **Copper anodes**: DHP / SF-CU copper with a phosphorus content of 0.025% to 0.06%.
- **Anode filter**: polypropylene filters to limit contamination of the bath.
- **Thick copper or titanium wire**: hang the anodes in the electrolyte with this.
- **(filter) pump**: a circulation pump or filter pump for agitation and filtration for smooth, clear copper deposits. Minimum throughput: one tank turnover per hour.
    - The pump can be replaced by a filter pump where you replace the sponge in the housing with a 5 or 10 µm polypropylene filter cloth for continuous filtering.
    - Filter parts must be acid-resistant (PE, PP or stainless steel 316). Do not use cellulose filters.
- **Agitation**: Required to avoid roughness, burning, or streaking. Possible via air pump or circulation pump.
- **Hanging system**: hang workpiece on a nylon or copper rod with copper wire or wire hooks.
- **Power supply**: adjustable DC power supply.

Additional

- **Sinks**: tank or container with demi/di water for rinsing between steps. (not supplied in the kit)
- **Workpiece wire**: unpainted copper wire for hanging small parts.
- Anode connection cable
- **Filter Media**:
    - Liquid filters.
    - PP filter media (5–10 µm). (not supplied in the kit).
    - Activated carbon (do not apply activated carbon during production, this removes the glazing agent, not supplied in the kit).
- **Personal protection**: chemical resistant (nitrile, pvc or neoprene).
- **Neutralization bucket**: sodium bicarbonate (baking soda) dissolved in water for a short dip after acid treatment to neutralize the acid.
- **Heating (optional):** immersion or aquarium heater to bring the electrolyte to the ideal process temperature; use chemically resistant version (PP/PTFE/titanium) with thermostat, never run dry. (not supplied in the kit)

V-brite 200 GLOSS SYSTEM

The v-brite 200 copper electrolyte uses the v-brite 200s & v-brite x glazing system and is delivered ready to use.

When preparing a new bath, no rinse aid needs to be added, but the v-brite x rinse aid must be refilled periodically after you start using the bath.

V-brite x provides the high shine. If there is too little v-brite x, surfaces become matt while edges and corners still shine.

(V-Brite: 200s is already added, and doesn't need to be tracked)

Dosage

Dosage: 1 ml v-brite x per liter.

In case of decreasing shine: dose in small steps, test, and only then dose again.

- For a 3 liter bath, start with an addition of 1-2 ml
- For a 6-litre bath, start with an addition of 3 ml

Do not over-dose; Too much polish can cause problems and make the copper brittle. If the copper does not become shiny after adding sufficient glazing agent, another cause must be considered.

Consumption and calculation

V-brite x is consumed: approximately 1 ml per 2 ampere hours.

Calculation tool consumption = ampere × hours ÷ 2.

Example: 4 to × 3 hours = 12 ah is approximately 6 ml of v-brite x consumed.

After standstill

After a longer period of downtime, a small dose may be required to reactivate the rinse aid. Test on a test piece first and assess the gloss. Then dose in small steps, briefly electroplating and re-assessing in the meantime. Repeat this until the finish is evenly high gloss again. Don't overdose.

After filtering with activated carbon

Activated charcoal removes brightener because this is an organic product. After filtering with activated carbon, always add v-brite 200s and v-brite x again.

Temperature of the electrolyte

The electrolyte works at room temperature.

- Working temperature between 21–32 °c.
- Ideal temperature is 24–28 °C.
- Higher temperature possible (up to 32–38 °C), but consumes more glazing agent.

Heating the electrolyte

- **Immersion heater**: for PP/PE plastic baths, a glass or titanium immersion heater with thermostat is suitable. Preferably choose a titanium immersion heater and place it in a place with current.
- **Water jacket**: put the pp/pe process tank in a larger container with warm water and regulate it with an immersion heater.
- **Increase room temperature**: a warm workspace reduces the cooling of small baths.

Preparation

Metal cleaning & degreasing

Use an alkaline degreaser. It removes oil, grease, coolants and drawing compounds, polishing paste and similar contamination. This type of cleaner is recommended as a standard step before metal surface treatments.

- Examples (practically available): st. Marc, blue wonder, dasty
- Professional: kärcher rm 31, zep industrial purple degreaser

Apply generously, leave on briefly and then rinse thoroughly with clean water.

Perform a **waterbreak test** : a clean surface allows water to flow evenly. In the event of grease or other contamination, the water will break up.

Rust removal

Make sure that the object to be treated is completely free of rust, dirt and grease. This is very important to get a good result. Parts that are rusty can be derusted with:

- Mechanical processing
- Verzinkshop Metal Activator (flash rust)

Etching services, metal

Remove oxide and get an active, clean metal surface.

Copper

- Sulfuric acid - 10–20 % at room temperature, 5–20 seconds; Then rinse immediately and go to the bath without drying.
- Citric acid - 5–10 % at 40–60 °C, 30–60 seconds; then rinse.
- Verzinkshop Metal Activator - 30–120 g/l, 30–60 seconds; then rinse.

Brass

- Sulfuric acid - 10–20 % at room temperature, 5–15 seconds; then rinse.
- Citric acid - 5–10 % at 40–60 °C, 30–60 seconds; then rinse.
- Verzinkshop Metal Activator - 30–120 g/l, 30–60 seconds; then rinse.

Nickel

- Sulphuric acid 10–20 % - 10–30 seconds; then rinse.
- Citric acid 5–10 % - at 40–60 °C, 30–60 seconds; then rinse.
- Electrolytic 10 % - 2–5 a/dm², 10–30 seconds; then rinse.

Do not use hydrochloric acid in this step. This is often too aggressive.

Do not let dry between steps; directly through to the bath to prevent oxidation.

Acid neutralization

Residual acid from the etching agent or the copper electrolyte can cause oxidation if it is not properly rinsed and neutralized.

Only neutralize if the object comes out of the acidic copper electrolyte or if the part is not immediately copper-plated after acid treatment.

If you are going to electroplate immediately after an acidic pre-treatment, do not neutralize but rinse thoroughly and go straight to the bath.

- Dissolve 1–2 tablespoons of baking soda in 2 litres of water.
- Briefly immerse the object in the solution a few times and leave it in the solution for 10-30 seconds.
- Then rinse it thoroughly with clean water.

Do not allow to dry between steps.

Preparing the Seller's Bath

- Prepare the box provided.
  - Make sure it is dust-free and clean.
- Attach the separate circulation pump to the bottom or side of the bucket or place it in loosely.
  - The loose parts in the box of the pump do not need to be used.
- Carefully pour the electrolyte into the bath. (watch out for splashes)
  - Mark the waterline with a marker.
  - The water from the electrolyte can evaporate by heat - when you have finished the electroplating process, fill the bath with distilled or demi water up to the marked line.
- Wrap the anode filters around the anodes and attach them with an elastic band.
  - This prevents contamination of the bath.
- Hang the anodes, opposite each other, in the bath so that they hang in the electrolyte.
  - By bending the anode and hanging it in the bucket by the edge.
  - A hole has been drilled through the anode, with which the anode can be hung in the electrolyte with the included thick wire. Try to prevent the wire from hanging in the electrolyte as well.
- Connect the anodes with the included connection cable.
- Make sure the power supply is off and connect the red positive wire of the power supply to the anodes.
- Attach the nylon staff to the bucket. The objects are hung on this.
  - Cut 2 v-shaped notches in the rim of the bucket with a pair of wire cutters where you can put the nylon rod.
  - Use tape to attach the ends of the wand to the bucket.
  - Drill 2 holes at the top of the bucket and put the staff through them.
- Prepare an extra bucket with water and baking soda to neutralize the objects immediately after copper-plating.

Tip. Provide an extra drip tray under the electroplating tank, or put the tank in a larger tank. If it ever leaks, the electrolyte will leak into the collection tank and not over the workplace or floor.

Calculating area and setting current

The v-brite 200 copper electrolyte operates at ± 0.2 ampere per 10 cm².

Calculating surface examples

- Slab (both sides): 2 × length × width (cm²)
- Cube (all sides): 6 × side × side (cm²)
- Cylinder (side only): 3.14 × diameter × length (cm²)
- Cylinder (total, with both ends): 3.14 × diameter × length + 2 × 3.14 × (diameter/2) × (diameter/2) (cm²)
- Disc (two faces): 2 × 3.14 × (diameter/2) × (diameter/2) (cm²)
- Disc edge: 3.14 × diameter × thickness (cm²)

Breaking down complex shapes

There is no need to calculate the exact surface; An estimate is sufficient.

- If the power supply is much too low, you will get a dull, salmon-colored finish.
- If the food is much too high, dark burn marks will appear on corners of the object.

Divide the part into simple pieces (plates, cylinders, discs), calculate each piece separately and add up the results.

Example of splitting:

- One dumbbell = two discs + one cylinder
- One bolt = shaft (cylinder) + head (disc + edge)

Anode & cathode ratio

The ideal ratio between the surface of the anode and the object is 2:1. The anode surface is therefore twice as large as the workpiece.

Only include the **anode surface facing the workpiece** (the back contributes little in small arrangements).

Example: For a workpiece of 250 cm², you need an anode area of about 500 cm² .

If there is too little anode surface, the anode current density increases and more brightener is consumed. The anode polarizes, dissolves worse and replenishes the copper more slowly. The power supply must then supply more voltage to keep the same current. This causes current concentration at edges (burn marks) and poorer coverage.

Set up flow

Calculate the total area of the object in cm².

The sum is: (area in cm² ÷ 10) × 0.2 amps

Example with an object of 280 cm²:

- 280 cm² ÷ 10 = 28
- 28 × 0.2 amps = 5.6 amps on the power supply.

This is a starting value that often works well. Is the object not shiny everywhere, or do you have dark corners that seem burnt? Due to circumstances such as working temperature, conductivity of the object and the electrolyte, distance of object to anode and the condition of the electrolyte, the ideal value may deviate from this. Go up or down in small increments (e.g. 0.05 amps per 10 cm²) and assess the result after 15–30 minutes to determine the best value for your bath.

Testing with a calibration plate

With a new bath, you can first use a dummy plate as a calibration plate. Take one or more copper plates with a fixed value, for example 20 cm². Here you test the 0.2 ampere per 10 cm² (so 0.4 ampere total). Go down in increments of 0.05 or 0.1 amps, or higher, and assess the result after 15–30 minutes. For example, if you tested a range of 0.3 to 0.5 amps, choose what gives the best result.

For example, if this is 0.18 amps, you can use this value for any project.

The example with an object of 280 cm² then becomes:

- 280 cm² ÷ 10 = 28
- 28 × 0.18 amps = 5.04 amps on the power supply. (rounding is allowed)

The electroplating process

Before you start the process, you first set the power supply. Make sure the red positive wire is disconnected.

- Turn on the power supply and turn the ampere knob all the way to the lowest setting.
- Turn the voltage knob (volts) all the way up to the highest position.
- Turn off the power supply again.

As a result, the power supply will automatically supply the necessary voltage required by setting the calculated ampere for the surface of the object.

By adjusting the power supply to 0 amps, you cannot accidentally turn on the power supply with a setting that is too high, which can cause the workpiece to burn.

Step-by-step plan for selling

1 - Hang the object and connect the power supply

- Turn on the circulation pump.
- Attach copper wire to the workpiece (long enough to hang from and fully submerge).
- Hang the workpiece on the nylon rod in the electrolyte. Attach the copper wire to the wand with the clips provided.
- Attach the black wire (min) from the power supply to the copper wire of the workpiece.
- Attach the red wire (plus) from the power supply to the copper anodes.

2 – Set up flow and start the process

- Calculate the surface of the object in cm².
    - Use 0.2 amps per 10 cm² as the starting value.
    - Example: 250 cm² object
        - 250 ÷ 10 = 25
        - 25 × 0.2 A = 5.0 A
- Turn on the power supply and set to the calculated current. The process starts now.

3 - Time and thickness

The coating thickness increases due to the time of the process and the height of the flow adjustment. Stick to the desired time based on your application.

- 15-30 minutes = 0.005 – 0.020 mm
- For thicker layers, use v-brite 100 electrolyte.

4 - Removing and rinsing

- Remove the workpiece from the bath.
- Spray it well with a water spray with demi/di water over the bath. This will cause most of the electrolyte to run back into the bath.

5 - Neutralize

- Dip briefly in water with baking soda to neutralize any remaining acid.
- Then rinse well again with clean water.

6 - Drying

- Let the object dry or use a heat gun/hair dryer on low setting.
- Do not use compressed air from a compressor (risk of oil/water impact and rings).

The object is now ready and can be treated with a patina, another metal or a coating, lacquer or other sealer of your choice.

Electroforming? Please note!

Are you going to copper-plate a non-conductive object treated with a conductive paint?

- Start with a low adjustment (e.g. ~10–20 % of the calculated current).
- Wait for visible copper to form around the contact point.
- Then increase in 2 to 4 steps, depending on the size and speed of the process, towards the calculated value.

This prevents burn marks from too much tension due to a small contact surface.

If you go too high, you will see small bubbles forming along the copper wire and the copper will get a brown color due to combustion.

Dummy plating

The first few times you use the bath, contamination may come from the electrolyte or anode. This can be visible on the result.

To remove any contamination from the tub or anodes, it is recommended that you copper plate a piece of dummy metal before starting your own project. For example, hang a 25 cm² piece of copper in the bath and let it electroplated for 30 to 60 minutes at 0.5 amps. This will remove any contamination.

Protecting the copper

After the process, protect the copper finish with a sealer, lacquer, or wax to prevent oxidation and discoloration and preserve the color.

Sealers

- **Verzinkshop DeepSeal**: maintainable transparent, water-repellent and rust-resistant oil-based sealer for copper and other metals; protects and deepens the color.
- **Verzinkshop Acrylic Sealer**: clear lacquer layer for hard, glossy protection.

Lacquer

- **Clear coat**: (1k or 2k) provides a hard, durable protective layer.

Wax or oil

- **Wax** provides a thin, maintainable protective layer with a natural look.
- **Light oil** or a product such as **wd-40** provides temporary protection.

Application

- Clean and degrease the workpiece.
- Apply thin layers; Allow each layer to dry according to the product label.
- For outdoor or high loads: choose a sealer or 2k clear coat instead of just wax or oil.
- For patinated copper: first achieve the desired color, then fix with sealer or lacquer.

Maintenance, contamination & filtering

Dirt in the bath is usually caused by dust, metal particles, loosened oxides or organic contamination from degreasers or the poor preparation of objects.

Most solid contamination sinks to the bottom and has little influence on the electrolyte.

Refilling evaporated water

After use, heating can cause the distilled water to evaporate. Top this up with distilled or demi water up to the marking line that you placed when filling the bath.

Filtering (solid particles)

Pour the electrolyte into:

- Included filters
- 5 or 10 µm polypropylene fine filter

Activated carbon (organic pollution)

If filtering with a fine filter does not help or contamination remains visible, there is a good chance that it is organic contamination. Then filter with activated carbon (this also removes the rinse aid).

Procedure:

- Remove anodes and cables from the bath
- Circulate the bath through a carbon cartridge or use an aquarium filter filled with activated carbon
- Pump for 1–2 hours
- Then filter through a 5 or 10 µm polypropylene fine filter.
    - Important: no activated carbon should remain in the electrolyte.
- Then carefully dose the rinse aid again according to the guideline.

Dissolved metal ions

Mechanical filtering and activated carbon filtering do not remove dissolved metal concentrations. If the bath is contaminated with another metal, remove it with a dummy: hang a piece of metal, for example a 20 cm² copper plate, in the electrolyte and let it galvanize on 1 ampere for a few hours.

Replace

Electrolytes with a lot of organic contamination or dissolved metal ions are not always easy to repair. Replacing is then the best choice.

Storage

The electrolyte is acidic and metal objects on and around the bath will oxidize.

Store the electrolyte in the electroplating bath closed with a lid or in sealable, chemically resistant bottles. Label content and date.

After several months of storage, it may be necessary to re-add v-brite x rinse aid at start-up.

Will the bath not be used for more than a day? Remove the anodes and pump from the bath and rinse them in a container of clean water.

Do not leave metal parts hanging in or above an acidic bath to prevent oxidation. Also, do not place other metal objects directly next to it.

Save pump

Rinse the pump well with clean water before storing it. Acid residues can attack plastic.

You can put the pump in a bowl of clean water to protect the plastic.

Storing anodes

Anodes should be rinsed and dried, or stored in water with 5% sulphuric acid so that they do not oxidise. Do not leave in the bath as this will increase the copper content of the electrolyte.

If the anodes are oxidized after a longer period of storage, you can lightly sand or etch them in a bath of water with 5% sulfuric acid so that they are clean again. Rinse them well and run the bath for 15 minutes on a piece of waste metal to remove contamination from the anodes.

Rinse them well before placing them back in the bath.

Waste & disposal

Never pour anything down the sink. Collect all process fluids and rinse water as chemical waste.

Save

- Use closed HDPE canisters or screw-top bottles (chemical resistant), preferably un-approved.
- Always label: content, date, contact.
- Place bottles or jerry cans in a drip tray/tub.
- Cool, dry, out of sunlight; out of reach of children/pets.

Don't save

- No beverage bottles, glass jars without protection, open buckets or metal cans.
- No fragile PET/PP bottles of consumer products.

Solid residues

Drain used filters, anode sludge, cloths and gloves, then collect separately in a sturdy, sealable bag/bucket and dispose of as chemical waste.

Drain

- Take everything to the municipal RCA collection or an approved processor. Do not mix waste streams to "dilute".

What to avoid at all costs

- Do not mix with bleach or ammonia (dangerous reactions).
- no compressed air in waste containers; don't build up pressure.

Technical characteristics

Electrolyte	Copper vbrite 200
Metal	Copper
Works on	Copper, brass, nickel
Tanks/baths	• Acid-resistant PVC, PE or PP. • Steel tanks with rubber or plastic (pp/pvc) inner lining. • Large tanks must be reinforced to prevent bulging.
Anode	Phosphorous copper 0.03 % – 0.05 % phosphorus Optimal ratio: 2:1 anode:object
Anode filter	5-10 µm polypropylene filter (bags)
Anode hook	Copper or titanium pendant/basket. Do not use as a hook: steel/stainless steel.
Recommended Flow Density	0.2 amps per 10 cm² - (2 a/dm²) Range: 0.01 – 0.75 amps per 10 cm²
PH value	<1
Rinse aid	Add 1 ml/L Vbrite x Rinse aid periodically
Time	10+ minutes
Agitation	Pump or air (no unfiltered compressor air due to oil/water) 1-2 bath revolutions per hour
Operating Range Temperature	21 – 32 degrees °C
Optimal temperature	± 25 degrees °C
Shelf life	Long shelf life with proper maintenance
Metal issued by	Anode
Filter media	5-10 µm polypropylene filter 5-10 µm PP filter cartridge Diatomaceous earth (only for an external filter installation)

Problems and solutions

Problem	Cause	Solution
Electrical / Current Density		
General dullness	Too little polish	Dose and test the V-BRITE X **rinse aid** in small steps (start: small, reassess).
	Bath contaminated (organic or particulate)	Fine filtering (5–10 µm). For organic: **activated carbon**; then add rinse aid(s) **again** (**200S + X**).
	Too low temperature	Heat to **24–28 °C** (operating range **21–32 °C**).
	Too low current (current density)	Increase current slightly; starting value **0.20 A per 10 cm²**.
	Insufficient agitation	Improve agitation (circulation or air; 1–2 bath revolutions/hour).
	Poor pre-treatment / oxide	Re-clean/activate workpiece; Do not allow to dry between steps.
Dark Edges / Burn Marks (High Flow Zones)	Current too high	Reduce current or build it up in steps.
	Anode too close / unfavorable geometry	Increase Anode distance or use screens/power thieves.
	Too little anode surface	Insert additional anode surface (**2:1** anode: workpiece, facing workpiece).
	Insufficient agitation	Increase agitation/make it more constant.
	Electroforming: too fast to full current (small contact surface)	Start at **~10–20 %** of target current; wait for visible copper deposits; in 2–4 steps to calculated current.
Dull low in depths (low flow zones)	Too little polish	Dosing and testing V-BRITE X.
	Anode position unfavorable	Reposition anodes or use auxiliary anodes.
	Too low current	Increase current slightly.

Problem	Cause	Solution
	Insufficient agitation	Improve agitation.
Surface / cleanliness		
Holes / pinholes	Grease/dirt on workpiece	Better cleaning/degreasing (waterbreak test).
	Air bubbles / impact	Quiet loading/unloading; avoid air ingress.
	Particles in the bath	Fine filtering (5–10 µm); Check anode filters.
	Residual acid/oxidation after bath	**Neutralize briefly** in baking soda water; then rinse well.
Rough/granular surface	Poor filtration	Filter change (5–10 µm) and filter through; improve continuity.
	Anode Glue or Cracks in Anode Cover	Check or replace PP anode covers.
	Coarse metal particles	Filter through (5–10 µm) to clear.
	Current too high at edges	Reduce current slightly or increase distance; screens.
Suture		
Poor adhesion / blisters	Insufficient cleaning/activation	Re-perform pre-treatment; Do not allow to dry between steps.
	Substrate unsuitable: directly on steel/zinc/aluminium	**Not** directly in acid copper: first **apply alkaline copper strike** (bonding layer), then V-BRITE 200.
Gloss / appearance		
No gloss / satin on surfaces (edges are shiny)	Rinse aid used up or removed by activated carbon	Dose and test V-BRITE X; after activated carbon, also **add 200S** again (variant dependent).
	Too low temperature	Heat to **24–28 °C**.
	Too low current	Increase the current slightly (towards **0.20 A/10 cm²**).
Brittle/powdery deposits	Too much polish	(Partially) refresh or filter with activated carbon; then carefully

Problem	Cause	Solution
		remove V-BRITE X in small steps; reduce the current slightly.
Opacity/Geometry		
Uneven thickness / shading	Anode position or distance unequal	Repositioning anodes; make distance uniform.
	Too little anode surface	Insert additional anodes or auxiliary anodes.
	Large parts without auxiliary anodes	Use auxiliary anodes or screens/current thieves.
Lines / stripes / banding	Insufficient or irregular agitation	Making agitation constant.
	Gas streaks	Move the workpiece slowly; check hanging.
Bath condition / contamination		
Contamination with other metals	Incorrect suspension/clamps (steel/stainless steel)	Copper/titanium or plastic-coated suspension; no bare (stainless) steel over acid bath.
	Corrosion of metal parts above bath	Remove source; keep the area clean.
	Introduction from pre-treatment	Improve rinsing.
	Dissolved foreign metals in solution	Dummy plating on waste piece (e.g. copper) for an extended period of time at low-to-moderate current.
Concentration / Level		
Too high a concentration due to evaporation	Water level dropped; components relatively too high	To mark with demi/DI water; check gloss image; Dosing rinse aid according to the guideline
Electrical/hanging issues		
Electrical problems	Bad contact points / too thin suspension wire / unstable power supply	Contacts clean and firm; use suitable wire; check power and cables.

Problem	Cause	Solution
Anodes / hardware	Wrong anode material or no anode cover	Use **phosphorus-containing copper DHP (0.025–0.06 % P)** in **PP covers**; condition/replace anodes in case of contamination.

Warning!

The electrolyte is acidic. Avoid contact with eyes, skin and clothing. Wear eye protection (goggles, goggles, or face shield), protective rubber gloves, and aprons when preparing solutions and while working with the solutions. Do not mix the electrolyte with cyanide or alkaline materials, or other chemical substances. The electrolyte is toxic when used internally.

- Do not work with the electrolyte or other products without first reading and understanding the safety information.
- The safety data sheet can be found on the product page or can be requested from verzinkshop.nl by e-mail: info@verzinkshop.nl
- Do you have any questions? Contact us via:
  - Mail: info@verzinkshop.nl
  - Whatsapp or call: +31 6 28090022
  - www.verzinkshop.nl

Safety

- Always wear a dust mask, respirator, gloves, and apron when necessary.
- Always treat any chemical as if it could kill you.
- Always label buckets and storage containers with a permanent marker so that you and others know what's inside.
- Never pour water into acid; it can heat up and explode. Always pour acid into water.
- Never leave electroplating baths or other systems that use power unattended. These products may cause a short circuit and cause a fire.
- Never come into direct contact with chemicals. They can cause serious burns or other damage and are very dangerous substances if not treated with respect.
- Never think you can get away without taking safety precautions! That is not possible!
- Never leave the lids off the tanks when not in use.
- Always work safely and ensure good protection and ventilation.
- The safety data sheet can be found on the product page or can be requested from verzinkshop.nl by e-mail: info@verzinkshop.nl

Disclaimer

Did you find an error or something unclear in the manual? Please let us know via info@verzinkshop.nl

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