

PAVCO

GLOBALLY DIRECTED

HyPro™ System

HyProBlack

HyProBlack is a trivalent black chromate conversion coating for zinc that provides 120 hours to white corrosion when used in conjunction with *HyProCoat Black S*.

- ❖ Provides glossy, uniform, deep black color
- ❖ No hexavalent chromium
- ❖ Achieves 120 hours white salt resistance
- ❖ Can be used over chloride, alkaline, and alloyed zinc
- ❖ Easily fits into current chromating operation
- ❖ Does not require “Break In” period
- ❖ ELV compliant
- ❖ RoHS compliant

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“HyPro” System



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Select the appropriate HyProBlack package by using the chart below.

<u>Process</u>	<u>Additive Packages</u>
Chloride Zinc Rack →	Package 1 or 2*
Chloride Zinc Barrel →	Package 2
Alkaline Zinc Rack or Barrel →	Package 3
Alloy—Chloride Zinc Cobalt Rack →	Package 1 or 2*
Alloy—Chloride Zinc Cobalt Barrel →	Package 2
Alloy—Alkaline Zinc Cobalt or Iron Rack or Barrel →	Package 3

Operating Parameters

	<u>Range</u>	<u>Optimum</u>
<u>Package 1</u>		
HyProBlack A	4 - 8%	6%
HyProBlack B	0.5 - 4%	1%
pH	1.5 - 1.8	1.6
Temperature	70 - 90°F (21 - 32°C)	80°F
Immersion time	20 - 45 seconds	30 seconds
<u>Package 2</u>		
HyProBlack A	1 - 3%	2%
HyProBlack C	10 - 15%	12%
HyProBlack D	0.25 - 0.5% **	0.25%
pH	2.0 - 2.4	2.2
Temperature	70 - 90°F (21 - 32°C)	80°F
Immersion time	30 - 75 seconds	45 seconds
<u>Package 3</u>		
HyProBlack A	3 - 6%	5%
HyProBlack B	1 - 4%	2%
pH:	1.5 - 1.8	1.6
Temperature:	70 - 90°F (21 - 32°C)	80°F
Immersion time	20 - 45 seconds	30 seconds

* The option serves to minimize HyProBlack Packages if more than one plating line is using the product.

**Used for White edge effect and worm tracks in chloride barrel applications only if needed..

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Typical HyProBlack Chromating Cycle

1. Zinc plate to a minimum thickness of 0.30 mil (8 microns).
2. Rinse
3. Activate the zinc using **Zinc Dip** at a concentration of 1%
4. Chromate the work in the appropriate **HyProBlack** solution.
5. Rinse
6. Seal the chromate with **HyProCoat Black S**
7. Spin dry at a minimum temperature of 140°F (60°C), maximum of 180°F (82°F).

Equipment

- Tank:** A regular steel tank lined with PVC, Koroseal, or fiberglass
- Agitation:** Mandatory. Solution movement by mixing, pumping or part movement is preferred. Air agitation is acceptable
- Ventilation:** Comply with local regulation or requirements.
- Temperature** 70 - 90°F (21 - 32°C). Colder temperatures will increase immersion times , warmer temperatures will make the chromate difficult to control
- Temp. Control** Teflon heaters are recommended
- Dipping Baskets:** Polypropylene baskets only. Steel or stainless steel baskets cannot be used.

Maintenance of the Solution

- HyProBlack A, B, C, D** Maintain by analysis
- pH Maintained by sulfuric acid or nitric acid additions or raised with caustic.

Bath Make Up Per 100 Gallons (378.5 l)

The tank should be clean. Leaching may be required in the case of new or previously used tanks that contained different processes.

1. Add 75 gallons (280 l) of de-ionized water .
2. Mixing well, add the required volume of **HyProBlack A, B, C &/or D**.
3. Bring the volume to the final working level with de-ionized water.
4. Adjust pH with sulfuric acid if necessary

*Do **not** premix **HyProBlack** additives before adding to the bath makeup

Analytical Procedures

pH Measurement

pH should be measured with a calibrated pH meter. Papers should not be used for measurement. Use a 1.0 pH standard to calibrate the pH meter.

Bath Analysis by AA

HyProBlack A, analyze for chromium or cobalt :

% **HyProBlack A** = ppm Chromium / 260

% **HyProBlack A** = ppm Cobalt / 105

HyProBlack B, analyze for iron

% **HyProBlack B** = ppm Iron / 200

HyProBlack C, analyze for nickel

% **HyProBlack C** = ppm Nickel / 870

HyProBlack D, analyze for copper

% **HyProBlack D** = ppm Copper / 60

Titration Procedure for HyProBlack A

This procedure is to be performed only if atomic absorption spectroscopy is not available.

1. Pipette a 10 ml. sample of **HyProBlack A** working bath into a 250 ml. Erlenmeyer flask.
2. Add 100 mls. of de-ionized water
3. Add 2 grams of sodium hydroxide to the flask and swirl until dissolved.
4. Add 2 mls. of 30% hydrogen peroxide.
5. Boil for at least 15 minutes (**Important**).
6. Cool to room temperature
7. Add 10mls. of 1:1 sulfuric acid.
8. Add 5 mls. of 10% potassium iodide.
9. Titrate with 0.1 N standard sodium thiosulfate to a straw color which persists for 30 seconds
10. Add 2 mls. of starch solution
11. Continue titration with 0.1 N standard sodium thiosulfate until the dark blue color disappears.
12. Calculation: ml. X N X 6.74 = % **HyProBlack A**

Troubleshooting Guide for HyProBlack A & B Processes:

Suggestions prior to running production work-

- ❖ Always run simulation off line with small amount of working chromate bath.
- ❖ Do not use topcoat when troubleshooting black chromate.
- ❖ Set immersion time at 30—60 seconds.
- ❖ If making a new chromate tank, start on low end of Part A.
- ❖ Start with low or no Part B and add in ½% increments.
- ❖ When adjusting pH up, use dilute caustic added slowly and never raise above 1.8.

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<u>Problem</u>	<u>Cause</u>	<u>Correction</u>
Parts are black with some green & red iridescence- Chromate film cannot be rubbed off after drying	Ideal chromate conditions	None. Make similar adds to line & incorporate topcoat
Chromate taking to slow	Low Part A	Increase Part A in 1/2% increments
	Low temperature	Raise temperature
	No agitation	Use mild air agitation
Parts are not black — have rainbow color	Low Part B	Increase Part B in 1/2 % increments
	pH too high	Adjust with sulfuric acid to 1.5 - 1.8
Parts have powdery look	Part A too high	Cut chromate
Chromate film can be rubbed after drying	Part B too high	Cut chromate
	pH too low	Adjust with dilute caustic to 1.5 - 1.8
	Agitation too high	Reduce agitation

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Troubleshooting Guide for HyProBlack A, C & D Processes:

Suggestions prior to running production work:

- ❖ Always run simulation off line with small amount of working chromate bath.
- ❖ Do not use topcoat when troubleshooting black chromate.
- ❖ Set immersion time at 30—60 seconds.
- ❖ If making a new chromate tank, start on low end of Part A (1.0 - 1.5%).
- ❖ Start with 10% Part C and add in 1% increments.
- ❖ When adjusting pH up, use dilute caustic added slowly and never raise the pH above 2.4.

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<u>Problem</u>	<u>Cause</u>	<u>Correction</u>
Parts are black with some green & red iridescence- Chromate film cannot be rubbed off after drying	Ideal chromate conditions	None. Make similar adds to line & incorporate topcoat
Chromate taking to slow	Low Part A	Increase Part A in 1/2% increments
	Low temperature	Raise temperature
	No agitation	Use mild air agitation
Parts have rainbow color	Low Part C	Add Part C in 1% increments
	pH too high	Adjust with sulfuric acid to 2.0 - 2.4
Barrel parts have white edges	Low Part D	Add Part D in 0.1% increments up to 0.5% maximum
Parts have a powdery look	Part A too high	Cut chromate
Chromate film can be rubbed off after drying	Part B too high	Cut chromate
	pH too low	Adjust with dilute caustic to 2.0 - 2.4
	Agitation too high	Reduce agitation

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Waste Treatment

Dispose of the concentrates or solutions thereof according to local waste treatment regulations.

Safety

Handling– Pavco mandates that the following safety equipment be used when handling chemicals in an electroplating environment: safety glasses, face shield, plastic or rubber apron, rubber gloves and safety shoes. Chemicals should only be handled by trained and experienced personnel.

Storage– Store Pavco products in a clean, well ventilated room which temperature remains above 45°F (7°C). Pavco products should remain in their original container with the lid or cap tightened. Drum pumps or pails must be clean prior to dispensing Pavco products to prevent contamination. If any **HyProBlack** product freezes during shipment or storage, warm the product and mix it well before use.

Emergency Procedures– Refer to the MSDS for detailed emergency procedures

Eye Contact– Seek immediate medical attention. Flush the eyes with water for 15 m minutes.

Skin Contact– Remove all contaminated clothing. Wash the skin with soap and water. Seek medical attention

Inhalation– Remove the person to an area with fresh air. Seek medical attention if *necessary*

Ingestion– Seek immediate medical attention

Spill– Dike the area to contain the spill. Refer to the MSDS for clean-up. Notify the proper authorities if required.

Product Description and Shipping

HyProBlack Part A (ZC215) is a purple liquid with a specific gravity between 1.0 and 1.2.

HyProBlack Part B (ZC315) is a pale green or yellow liquid with a specific gravity between 1.1 and 1.2. and a pH less than 2

HyProBlack Part C (ZC318) is a green liquid with a specific gravity between 1.0 and 1.4 and a pH less than 3.

HyProBlack Part D (ZC415) is a light blue liquid with a specific gravity between 1.0 and 1.1.

All 4 products are available in 5 gallon containers or 55 gallon drums.

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