



ZINCALLOY ZFE 535

ALKALINE ZINC/IRON

INTRODUCTION

Zincalloy ZFE 535 is an alkaline zinc-iron alloy plating process giving exceptional corrosion resistance. Deposits have a consistent alloy of 0.4 – 0.7% iron. Zincalloy ZFE 535 ensures excellent metal distribution, high covering power, bright finish, stress-free and ductile deposits. The process is suitable for either rack or barrel plating installations.

BENEFITS

- Stable, economical system.
- Excellent metal distribution and covering power
- Low stress deposits
- High brightness
- Easy to passivate
- Suitable for barrel and rack

SOLUTION MAKE -UP

Zinc oxide	13.8g/L
Sodium hydroxide	125g/L
Zincalloy ZFE 535 Base	8ml/L
Zincalloy ZFE Additive	14ml/L
Zincalloy ZFE Carrier	20ml/L
Zincalloy ZFE Buffer	5ml/L

1. Clean the process tank with water then leach with a 50g/L solution of sodium hydroxide overnight, pumping through all filters, pumps and pipework. Pump out and rinse thoroughly with water.
2. Fill the tank approximately one quarter full with deionised water. Add the required amount of sodium hydroxide carefully with stirring.
3. While the solution is hot (80-90°C) add zinc oxide gradually and stir until dissolved. The hotter the solution the easier the dissolution.
4. Top up with deionised water to 80% of final volume.
5. Cool the solution to approximately 25°C then add the calculated quantities of Additives.
6. Make up to final volume with DI water.

OPERATING DATA

Zinc	9 – 12g/L
Iron	140 - 180mg/L
Sodium hydroxide	115 – 135g/L
Temperature	22 – 30°C
Cathode CD	0.5 – 3.0 asd
Anode CD	5.0 – 15.0 asd
Agitation	Solution and work movement
Plating rate	~0.3µm/min @ 2asd



EQUIPMENT

Tanks	Polypropylene, PVC or rubber lined steel
Heaters	PTFE or mild steel immersion with thermostatic control. Cooling may be required.
Anodes	Low carbon steel, in conjunction with an external zinc dissolving cell
Filtration	Continuous filtration is important in order to avoid roughness. This should be 1-3 turnovers/hr.
Extraction	Required

MAINTENANCE AND CONTROL

The solution should be analysed regularly and replenished as necessary.
The addition rates for the additives will vary depending on the required brightness, drag-out etc, but the following can be used as a guide:-

Zincalloy ZFE 535 Base	100 – 250ml/KAhr
Zincalloy ZFE 535 Additive	150 – 300ml/KAhr
Zincalloy ZFE 535 Carrier	100 – 200ml/KAhr
Zincalloy ZFE 535 Buffer	0 – 50ml/KAhr*

*Zincalloy ZFE 535 Buffer is not normally required. In rack applications this can improve the brightness.

NOTES OF THE USE OF ZINCALLOY ZFE 535

Iron: The percentage of iron incorporated into the deposit controls the corrosion resistance.

Low iron-concentration will result in a decrease of the corrosion resistance.

High iron-concentration will not passivate easily and be prone to blistering.

The iron concentration is adjusted with additions of Zincalloy ZFE 535 Base.
1 ml/L Zincalloy ZFE 535 Base increases the iron concentration by 20mg/L Fe.

IMPORTANT: The iron concentration of the bath must be maintained below 180 mg/L, otherwise the corrosion resistance will be reduced

Sodium hydroxide: This maintains the bath conductivity. A concentration of 115 - 135 g/L is recommended. Too low a concentration will decrease the deposition rate and the bath conductivity.

Zincalloy ZFE 535 Carrier: This controls the iron incorporation in the plated deposit and maintains the deposition rate. Too high concentration decreases the iron build-up and reduces plating efficiency.



Zincalloy ZFE 535 Additive: This improves distribution gives high throwing power and brightness.

Zincalloy ZFE 535 Buffer: This helps to control the iron incorporation in the deposit and maintains efficiency.

Trouble Shooting

Problem	Cause	Correction
Brittle deposits	Fe-content in the deposit is too high	Control Fe and Carrier concentration in bath
Adhesion problems, blistering formation	Insufficient pre-treatment	New pre-treatment
	Too low Carrier concentration	Control concentrations in the bath and correct if necessary
Too high iron concentration and brittle deposits	Too low Carrier	Control concentrations in the bath and correct if necessary
	Too high Fe concentration	
	Too low Zn concentration	
	Temperature too high	Check bath temperature
Plating time is longer than usual	Too low Zn concentration	Control concentrations in the bath and correct if necessary
	Temperature too low	
	Too high Additive concentration	
	Too high Carrier concentration	
	Too high carbonate concentration (> 70 g/L)	Freeze out carbonate
Dark, bright deposits	Fe-content in the deposit too high	Control concentrations in the bath and correct if necessary
Matt and dark yellow chromates	Fe-content in the deposit too high	Control concentrations in the bath and correct if necessary
	Polluted rinses	
	Metallic impurities in the Zn/Fe deposit	
Grey-matt deposit at low current densities	Zn content too high > 12g/L	Decrease zinc concentration
	Too low Carrier concentration	Correct Carrier concentration
	Too low Additive concentration	Check with hull cell test, correct Additive concentration
Insufficient brightness at high current densities and poor throwing power	Bath temperature too high	Correct bath temperature

	Too low Additive concentration	Check with hull cell test, correct Additive concentration
	Zn content too high > 12g/L	Decrease zinc concentration

PRODUCT FAMILIES

The following products are referred to in this data sheet.

PRODUCT NAME	PRODUCT NUMBER
Zincalloy ZFE 535 Base	587031
Zincalloy ZFE 535 Additive	584030
Zincalloy ZFE 535 Carrier	585022
Zincalloy ZFE 535 Buffer	585023

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