Product Introduction

Brightener for alkaline zincate type zinc barrel plating Hyperzinc 310

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Introduction

Surface treatment of iron and steel bolts, nuts, and other fastening parts requires various characteristics such as rust prevention, appearance, dimensional accuracy, and coefficient of friction. For these requirements, electro-galvanization is a surface treatment method that can be mass-produced at low cost with high quality.

When bolts and nuts made of high-carbon steel or nickel steel are treated with electro-galvanization, hydrogen embrittlement becomes a problem. Hydrogen embrittlement is a phenomenon in which the metal absorbs hydrogen gas generated during the pretreatment and plating processes, causing a decrease in the metal of ductility or toughness. When an embrittled bolt is tightened with a constant load and time elapses, it may suddenly be fractured, commonly called delayed fracture. Delayed fracture is difficult to prevent by inspection in the case of bolts, etc., because it is accompanied by little or no deformation in appearance, and may lead to a major accident. Therefore, it is necessary to remove the hydrogen absorbed during the plating process. As a method for this, "baking treatment" in which treated products are heated to around 200°C that is a common degree, and the Japanese Industrial Standards (JIS H 8610) indicates the heating temperature, heating time, and other conditions.

There are three types of baths for zinc plating: cyanide bath, acid bath, and zincate bath. Bolts and nuts used for automotive parts come in various sizes and complex shapes, and it is desirable to have a uniform plating film thickness for each individual part. For this reason, zincate baths with excellent throwing power are often used. Conventional brightener for zincate baths has reduced the brightness of the plated appearance when baking treatment is performed after plating, especially in high current density areas such as bolt heads, which can cause white discoloration, resulting in a significant loss of appearance and a decrease in product value.

Product Summary

JASCO Hyperzinc 310 is an alkali zincate-type baking compatible brightener for barrel baths that does not degrade plating brightness during the post-plating baking process. Table 1 shows the hyperzinc 310 lineup.

Features of the Hyperzinc 310

- No degradation in appearance after baking.
- Excellent uniformity of electrodeposition.
- Good compatibility with trivalent chromium conversion coatings.
- Iron plate anodes can be used.
- Easy bath management with a wide control range.

Table 1: Lineup of Hyperzinc 310

Product name	Use
Hyperzinc 310AM	Brightener for make-up
Hyperzinc 310A	Brightener for replenishment
Hyperzinc 310B	Brightener for make-up and replenishment
Hyperzinc 310C	Brightener for make-up and replenishment
Hyper soft	Additive for make-up
H-0624	Additive for make-up

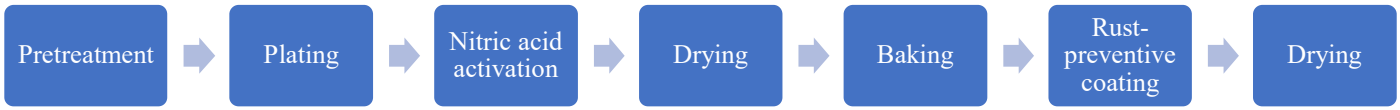

Figure 1: General treatment process for baked galvanized products

Treatment process

The general treatment process for baked galvanized products is a series of processes from pretreatment such as degreasing and pickling to plating, nitric acid activation, and drying. Then, after baking and cooling, rust-preventive coatings such as trivalent chromium conversion coat products. (Figure 1)

Mechanisms

In zincate-type alkaline zinc plating baths without brighteners, the electrodeposited film is spongy or dendritic (dendrite structure) and no dense film is deposited. To obtain a bright and uniform appearance depends almost entirely on the ability of the brightener. Hyperzinc 310 inherits the technology of the existing Hyperzinc series brightening agents, and by introducing a newly developed brightening component, it is now possible to obtain a uniform and bright plating appearance without deterioration of appearance even at baking temperatures around 200°C. (Figure 2)

	Hyperzinc 310	Conventional bath
Bolt heads		

Figure 2: Appearance after baking of Hyperzinc 310 and conventioal bath (Plating thickness: 15 μm)

Baking condition: 200°C, 4 hours

Hyperzinc 310 is also resistant to degradation in the plating solution. In conventional mass production plating lines, there are cases where brightener is added to compensate for the decrease in brightness that occurs when work resumes after holidays, which is one of the reasons for the decrease in workability. Figure 3 shows the results of a comparison test of brightener degradation. Hyperzinc 310 brightener and conventional brightener were added to a zincate zinc plating bath and allowed to stand at 50°C for 96 hours, and a Hull cell plating test was conducted before and after heating the plating solution to compare the Hull cell patterns. While conventional brightener shows degradation of components after prolonged heating, resulting in brightness degradation in the Hull cell pattern, Hyperzinc 310 shows no brightness degradation, confirming that it is a brightener that does not deteriorate easily.

Hull cell plating test condition: 2A, 10 minutes

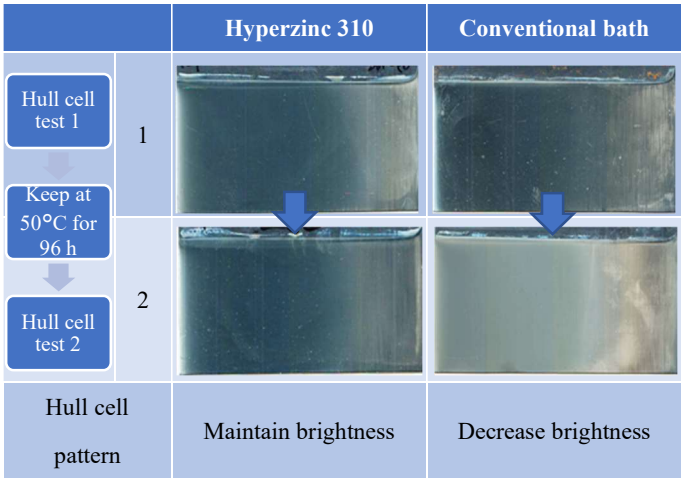

Figure 3: Comparison of degradation of brightener due to plating solution allowed to stand at 50°C for 96 hours

Since it is a brightener that does not deteriorate easily, it does not easily upset the balance of its components even after long-term operation. This improves chemical management, as there are few cases where separate additives are required, and management can be done only by automatic replenishers.

In closing

The JASCO Hyperzinc series have been sold for more than 20 years in Japan and overseas as a pioneer of uniform electrodeposition type brightener for zincate baths, and have been well received by many customers. Hyperzinc 310 is a brightener that overcomes the challenges of baking processes by combining the technical know-how developed accumulated to date.