Product Introduction

Heat-resistant topcoat 5K189

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Introduction

In Japan, most zinc plating and zinc alloy plating are generally treated with a conversion coat after plating. However, there are specifications in which a topcoat treatment is further applied after the conversion coat treatment to improve corrosion resistance and adjust/ improve fastening characteristics.

Although there are various types of topcoats, aqueous organic-mineral topcoats are currently the most widely used for zinc plating and zinc alloy plating because they can be selected according to the required friction coefficient, are easy to handle, and do not require exhaust facilities. [1]

However, organic-mineral topcoats have low heat resistance of the film, and if they are exposed to high temperatures after treatment, discoloration will be cased and corrosion resistance decreases.

Nippon Hyomen Kagaku has developed a new aqueous organic-mineral topcoat 5K189 that provides excellent corrosion resistance even after heating. We will now introduce the technology behind this agent.

Product Summary

5K189 is aqueous topcoat for zinc plating and zinc alloy plating. 5K189 is treated on trivalent chromium conversion coatings to win excellent corrosion resistance and maintain performance after heating.

Features

- Excellent corrosion resistance and glossy appearance can be obtained by treating over trivalent chromium conversion coatings.
- High corrosion resistance can be maintained even after heating (up to 200°C) with little change in appearance.
- Since it is dip treatment, it can be treated with the same level of facilities as post-treatment of plating (no need for exhaust or explosion-proof facilities).

Treatment process

5K189 can be treated using the same process as conventional organic-mineral topcoats.

Zinc-based plating → Chemical passivation →

(Post dip) → Drying → **5K189** → Stand →

Centrifugal drying → Drying

* Of the above treatment processes, water rinsing is performed after zinc-based plating and chemical passivation.

Mechanisms

Aqueous organic-mineral topcoats consist of a base resin (water-soluble resin, resin emulsion, resin dispersion, etc.) combined with an inorganic binder and wax for friction modifier as necessary. Base resins and wax used in general organic-mineral topcoats have many heat-sensitive components, causing thermal degradation of the topcoat film. 5K189 uses a newly developed base resin with high heat resistance, and by reviewing the component ratio with the inorganic binder, excellent heat resistance was achieved. Figure 1 shows a structure model of general organic-mineral topcoat and 5K189 film.

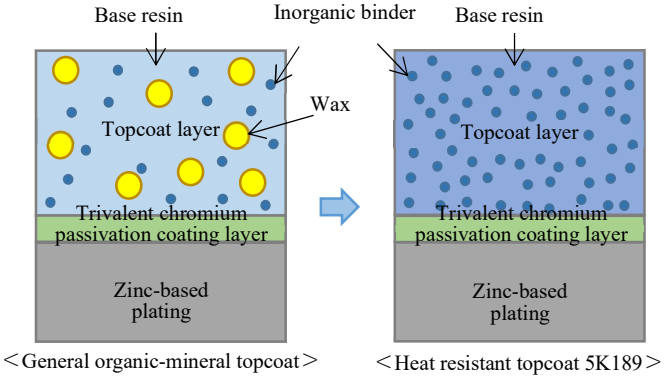

Figure 1: Film Structure of Aqueous Organic-mineral Topcoat

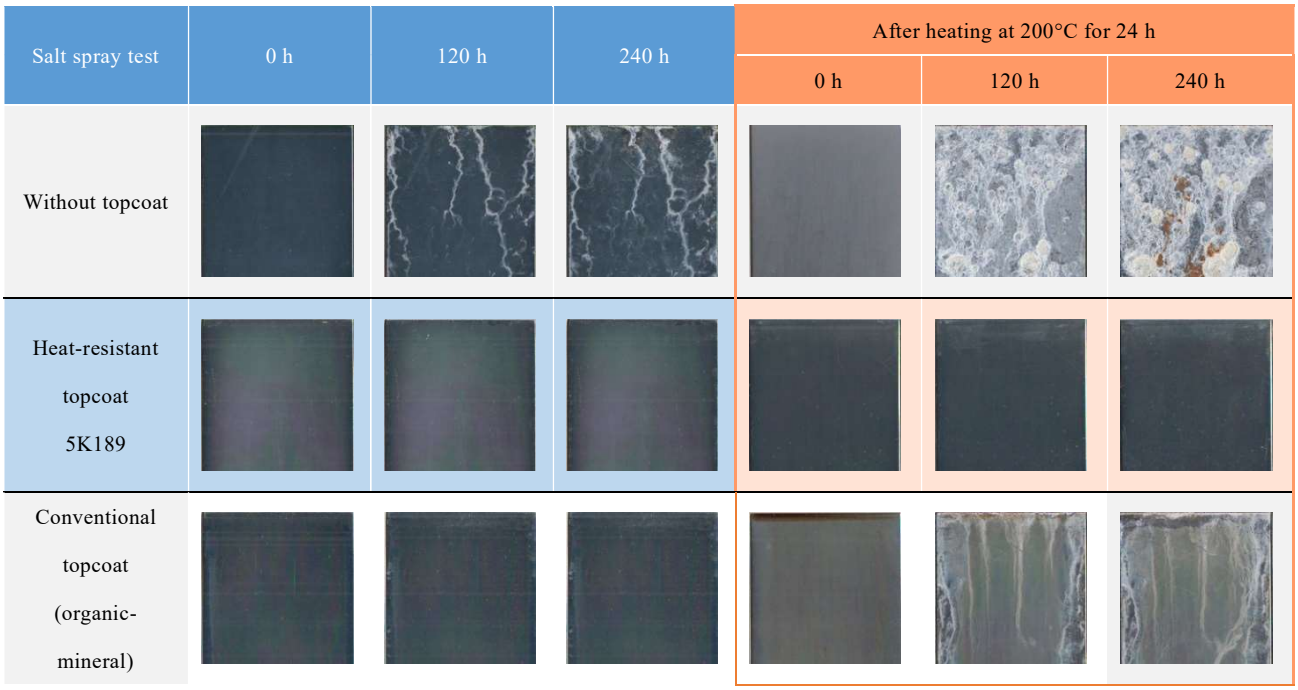

Figure 2: Salt Spray Test (JIS Z 2371) Results of 5K189 Treated Products

Figure 2 shows the salt spray test results of 5K189 treated products. Treatment with 5K189 and conventional organic-mineral topcoat improves corrosion resistance in salt spray tests. However, the conventional organic-mineral topcoat discolors when heated at 200°C, resulting in a significant decrease in corrosion resistance. On the other hand, 5K189 shows almost no change in appearance and maintains its corrosion resistance even after heating at 200°C.

Figure 3 shows the measured coefficient of friction of 5K189 treated products. The total coefficient of friction of 5K189 is 0.3 to 0.4. 5K189 tends to have a higher coefficient of friction than conventional organic-mineral topcoats because it does not contain friction modifiers such as wax. 5K189 friction modification is a future task.

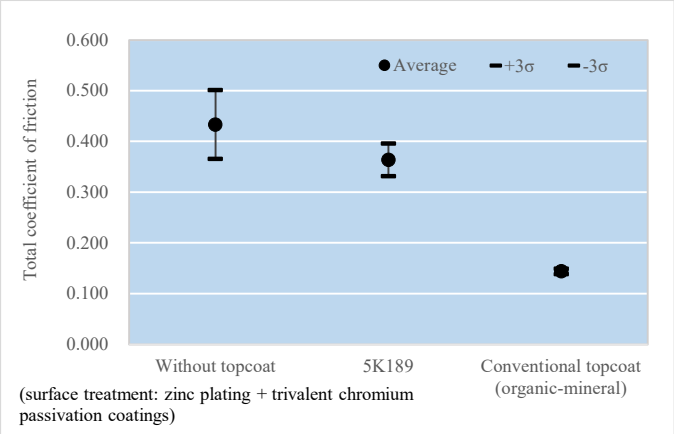

Figure 3: Coefficient of Friction (JIS B 1084) of 5K189 Treated Products

In closing

5K189 is aqueous organic-mineral topcoat that is easy to handle and can dramatically improve the corrosion and heat resistance of galvanized products simply by dipping treatment. Although sufficient verification is needed, new solutions may be created, such as application to heat-resistant parts that have been difficult to handle with zinc plating. We will continue to closely monitor trends in topcoat technology and the market, and as a chemical manufacturer, we intend to conduct further research to propose new technologies and products.

Literature

1: Hideo Susa; *J. Surf. Finish. Soc. Jpn.* Vol.70, No. 8, pp. 388-393 (2019)