New Products & Technologies

Dry-in-Place Chromate-Coated Electrogalvanized Steel Sheet with High Corrosion Resistance, "RIVER ZINC FX"*

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1 Introduction

RIVER ZINC FX is actually a new version of RIVER ZINC F, an organic composite-coated steel sheet with anti-fingerprint characteristics, which was a Kawasaki Steel's own development, featuring a thin organic coating added to the conversion-type chromate-coated electrogalvanized steel sheet. RIVER ZINC F was marketed for electrical appliances, utensils and construction material uses.

As the subsequent years came demanding new products having improved conductivity and solvent-resistance, both weak points of the resin-coated products including RIVER ZINC F, this set the ground for the development of dry-in-place PRIVER ZINC FX, which features these improvements on top of the known properties of the conventional chromate-coated, electrogalvanized steel sheet, such as fingerprint resistance and corrosion resistance.

This report describes the features, manufacturing method, and quality characteristics of RIVER ZINC FX.

2 Features of RIVER ZINC FX

(1) Attractive Surface Appearance
A new type of dry-in-place, chromate-coating agent has been developed which suppresses its reaction with the base electrogalvanized steel sheet and permits high-temperature drying. Compared with the previous conversion-type, chromate-coated material, the uniformity of color tone has been improved, and a white keytone has been obtained. The new dry-in-place, chromate-coated material also has outstanding fingerprint resistance, almost completely inhibiting fingerprints and oil from adhering to the surface during handling while working and assembling, and practically preventing any fouling from becoming conspicuous.

(2) High Corrosion Resistance and Solvent Resistance
Since the specially-developed, dry-in-place, chromate-coating agent is deposited and then dried at high temperatures, a highly stable chromate film is formed. As a result, steel sheets coated with this film have higher corrosion resistance than the conventional conversion-trype, chromate-coated material. The steel sheet is not given any organic resin coating that could dissolve in a solvent.

(3) Excellent Conductivity and Silk-Screen Printability
Unlike the conventional anti-fingerprint material, no organic resin processing is applied; hence, RIVER ZINC FX has the same excellent electric conductivity as an ordinary chromate-coated steel sheet. Furthermore, because of special reagent design for good silkscreen printability, the material ideally suited for silk screen printing.

3 Product Composition and Manufacturing Process

Figure 1 shows a schematic cross section of RIVER ZINC FX. It has a two-layer structure consisting of a dry-in-place chromate-coated layer over an electrogalvanized layer. The electrogalvanized steel sheet used is SECC, SECD or SECE, which made from ordinary or deep-drawing cold-rolled steel sheet, and its zinc coating weight is 40 g/m^2 or less.

The available sizes are 0.5 to 1.6 mm thick and 800 to 1 219 mm wide, but according to the type of basic steel

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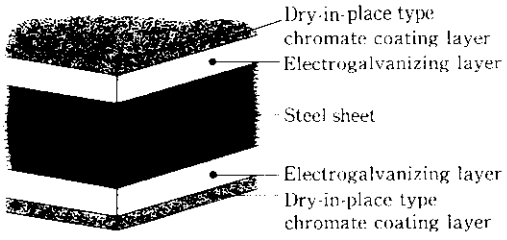

Fig. 1 Schematic diagram of RIVER ZINC FX

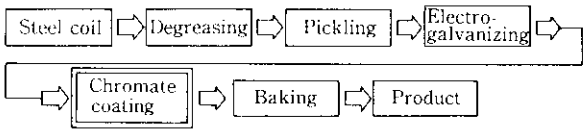

Fig. 2 Manufacturing process of RIVER ZINC FX

sheet, sizes exceeding the above-mentioned ranges are sometimes available.

A schematic diagram of the manufacturing process is shown in **Fig. 2**. The chromate coating is applied by the roll coater and dried at high temperatures.

4 Quality Characteristics

Table 1 shows the quality characteristics and testing methods for RIVER ZINC FX, in comparison with RIVER ZINC F of the organic-resin-processed type and RIVER ZINC C of the ordinary conversion type of chromate-coated steel sheet.

Characteristics of RIVER ZINC FX are as follows:

(1) Fingerprint Resistance

The fingerprint resistance was evaluated by coating the steel sheet with an artificial sweat solution and by using the color difference (ΔE) before and after the coating. The fingerprint resistance of RIVER ZINC FX is close to that of RIVER ZINC F, and is much better than that of RIVER ZINC C, and the fingerprint trace on the coated surface is practically unnoticeable by the naked eye.

(2) Corrosion Resistance

The onset time of RIVER ZINC FX for 5% of the surface to be covered by white rust in the salt spray test (JIS Z 2373) is 200 h or above, indicating that RIVER ZINC FX has the same high corrosion resistance as RIVER ZINC F.

(3) Solvent Resistance

The solvent resistance was evaluated by immersing RIVER ZINC FX in the solvent vapor for 4 min

Table 1 Performance of "RIVER ZINC FX"

Test item	Test condition	Result		
		RIVER ZINC FX	RIVER ZINC F*	RIVER ZINC C**
Finger print resistance	Discoloration mesurement with artificial sweat solution	1.0 under	0.8 under	3.5 under
Corrosion resistance	Salt spray test 5% NaCl at 35°C (JIS Z 2371)	200 h over***	200 h over***	48 h over***
Chemical resistance	Immersion test in gaseous trichloroetylene at 50°C for 4 min	No change	Slightly changed	No change
	Immersion test in gaseous trichloroetylene at 90°C for 4 min	No change	Slightly changed	No change
Conductivity	Electric resistance measurement on the surface	0.1 Ω under	0.5 Ω over	0.1 Ω under

* Finger print resistant steel sheet (resin coated type)

** Conventional chromate treated steel sheet

*** Time to generate white rust covered more than 5% of the surface

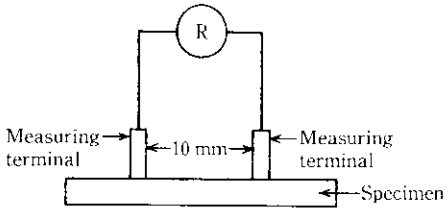

Fig. 3 Method for measuring electric resistance on the steel surface

and assessing the dissolved quantity of the film. RIVER ZINC FX has the same high solvent resistance as RIVER ZINC C, and did not dissolve in the solvent.

(4) Electric Conductivity

The electric conductivity was measured by the surface resistance measuring method shown in **Fig. 3**. The surface resistance value of RIVER ZINC FX is 0.1 Ω or less, which is the same as the electric resistance of RIVER ZINC C, indicating that RIVER ZINC FX has the same easy groundability as RIVER ZINC C.

5 Concluding Remarks

RIVER ZINC FX is a new dry-in-place, chromate-coated steel sheet having high corrosion resistance, high fingerprint resistance, high solvent resistance and good electric conductivity, making the material ideally suited to such components as chassis and motor covers for electrical home appliances.

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