

## T.C. 1890 Conversion Coating

### SCOPE

T.C. 1890 is a chromate-containing organic coating system for the prevention of white rust and storage corrosion on zinc coated and zinc alloy coated steels. The T.C. 1890 process improves corrosion protection, provides surfaces with anti-fingerprint characteristics, and improves performance in roll forming. T.C. 1890 was developed for use on continuous galvanizing lines, and may be applied at room temperature via roll coat application. It is not rinsed after application, but is dried on the surface prior to recoil.

### OPERATION SUMMARY

#### Product Bath

T.C. 1890A  
T.C. 1890B

#### Preparation/100 Gallons

95 gallons  
5 gallons

#### Operation and Control

|                               |  |
|-------------------------------|--|
| Bath temperature              | 50°-95° F                                |
| Hexavalent chromium titration | 3.5-4.0 ml                               |
| Application                   | Roll coater                              |
| Chromium coating weight       | 1.0 to 2.0 milligrams/square foot, as CR |

### PROCESS SEQUENCE

In continuous hot dipped galvanized steel production, the T.C. 1890 process consists of galvanized, quench, T.C. 1890 application, and drying.

In continuous electrogalvanized steel production, the process consists of plating, rinsing, T.C. 1890 application, and drying.

For operations where surfaces are oiled or otherwise soiled prior to T.C. 1890 application, a typical process would include cleaning, rinsing, drying, T.C. 1890 application, and drying.

### BATH MAKE-UP

**Caution:** Any contact of the T.C. 1890 bath solution, or the components used for bath make-up, with acidic material must be avoided in order to prevent irreversible damage to the bath solution.

Immediately prior to the application of T.C. 1890, mix the components according to ratio indicated below for every 100 gallons of T.C. 1890 bath. Add components in order indicated and mix to provide a homogeneous liquid.

|            |            |
|------------|------------|
| T.C. 1890A | 95 gallons |
| T.C. 1890B | 5 gallons  |

Depending on the method of application and the desired thickness of the dry film coating, the above solution can be diluted with deionized water, or a varied ratio of T.C. 1890A to T.C. 1890B can be used.

## TESTING AND CONTROL

### A. Coating Weight

The T.C. 1890 process is best controlled by determining the amount chromium coating weight, with a normal range of 1.0 to 2.0 milligrams per square foot as chromium. Chromium coating weight may be determined by analysis of the applied T.C. 1890 coating using X-ray fluorescence.

Total dry film coating weight for the applied T.C. 1890 is normally 80 to 150 milligrams per square foot, with a corresponding thickness of 0.03 to 0.05 mil (0.7 to 1.3 micron). Dry film coating weight may be estimated by multiplication of the chromium coating weight by a factor 75 for T.C. 1890 bath at make-up conditions of 95 parts T.C. 1890A and 5 parts T.C. 1890B.

### B. Hexavalent Chromium Concentration

The T.C. 1890B concentration may be confirmed by determination of the hexavalent chromium concentration of the T.C. 1890 bath. The titration procedure for hexavalent chromium determination is summarized below.

1. Pipet a 2 ml sample of the T.C. 1890 bath in a 250 ml Erlenmeyer flask and dilute with approximately 50 ml of deionized water.
2. Add 25 ml of 10% sulfuric acid and allow the sample to stand approximately 3 to 5 minutes. Bath solids will coagulate during this time.
3. Filter sample to remove coagulated solids and transfer to a clean 250 ml Erlenmeyer flask.
4. Add approximately 1 gram of Potassium Iodide crystals to the flask. Swirl to dissolve.
5. Titrate with 0.1 N Sodium Thiosulfate until color of sample changes to light yellow.
6. Add approximately 1 ml of Soluble Starch Solution. Sample will turn blueblack in color.
7. Continue slowly titrating with the Tru-Chem 43 until the blue-black color disappears. Record ml of Tru-Chem 43 used as the hexavalent chromium titration.
8. The hexavalent chromium titration for a T.C. 1890 bath at make-up conditions of 95 parts T.C. 1890A and 5 parts T.C. 1890B should be 3.5 to 4.0 ml.

C. Bath Replenishment

Bath replenishment is limited to the replacement of T.C. 1890 bath consumed during the processing of the coated steel. Any replacement solution should be made up at the ratios used for original solution make-up.

**APPLICATION**

The application of T.C. 1890 bath should be made immediately after make-up of the bath from the T.C. 1890A and the T.C. 1890B.

Preferred application method is via roll coat application.

Recommended application temperature for the T.C. 1890 bath is 50° to 90° F. Heating T.C. 1890 bath is not recommended.

**POST TREATMENT**

A. Drying

The treated surface must be dried immediately following application of the T.C. 1890 solution, with complete drying prior to recoil of coated steel strip. Drying depends on the temperature, air volume, and flow rates in the installation. A typical dryer installation would utilize air temperatures of 300° to 400° F. Typical PMT range of the coated strip is 140° to 212°F.

**CLEANING OF APPLICATION EQUIPMENT**

A. General Equipment Clean Up

Flush all parts of the application equipment wetted with the T.C. 1890 bath solution thoroughly with clean water immediately after completing application. T.C. 1890 bath solution, which has dried on application equipment surfaces, tends to form irreversible agglomerates and can only be removed with an organic solvent, such as T.C. 1890C.

B. T.C. 1890C

T.C. 1890C is used as received and is not diluted prior to removal of the dried T.C. 1890 from the equipment surfaces. T.C. 1890C may be manually applied by brush or may be used by immersion of the equipment surface in the T.C. 1890C.

|                         |  |
|-------------------------|--|
| Application Temperature | Ambient  |
| Application Time        | 10 to 60 minutes (varies with degree of contamination) |
| Removal                 | Rinse surface with clean water                         |

**Caution:** Any contact of the T.C. 1890C bath solution, or the components used for bath make up, with T.C. 1890C or other organic solvents must be avoided in order to prevent irreversible damage to the bath solution.

## **STORAGE REQUIREMENTS**

Indoor storage of all components and bath solutions is recommended. Keep all containers closed when not in use. Any contact with acidic materials must be avoided. Keep from freezing.

The T.C. 1890 bath solution may be retained for a maximum of 2 months after solution make-up. Retained T.C. 1890 bath solution should be stored at temperatures of 50° to 95° F.

T.C. 1890A and T.C. 1890B may be stored for a maximum of 6 months. T.C. 1890A and T.C. 1890B should be stored at temperatures of 40° to 95°F.

## **WASTE DISPOSAL**

Applicable local, state and federal regulations covering disposal and discharge of chemicals should be consulted and followed.

The process bath is alkaline and contains chromates. Waste treatment and neutralization may be required prior to discharge to the sewer to comply with local regulations.

The process bath can contain ingredients other than those present in the chemical as supplied and analysis of the solution and /or sludge may be required prior to disposal. Analysis should be performed by a laboratory certified for such analyses.

## **SAFETY AND HANDLING**

When handling any of the chemical products used in this process, the first aid and handling recommendations on the Material Safety Data sheet for each product should be read, understood, and followed.

## **TESTING AUXILLIARIES**

### A. Test Solutions/Salts/Indicators

Soluble Starch Solution  
10% Sulfuric Acid  
0.1N Sodium Thiosulfate  
Potassium Iodide Crystals

### B. Accessories

1 Pipet, 2 ml  
1 Pipet Bulb  
2 Erlenmeyer Flask, 250 ml  
1 Funnel  
1 Graduated Cylinder, 50 ml  
1 Filter Paper