

# RIAG Pass 441

## Trivalent black chromate passivation without cobalt on zinc-nickel layers

The **RIAG Pass 441** is a new trivalent black chromate process that produces a black colour finish on zinc-nickel plated surfaces. The coating has high stability while tempered at 200 °C in terms of loss of colour and brightness. The coating so obtained provides high corrosion resistance **without the presence of hexavalent chrome and cobalt**.

The **RIAG Pass 441** additives are supplied in easy to use liquid concentrates.

### Make up

Barrel	Range	Optimum
<b>RIAG Pass 441 Additive 1</b> (density = 1.17 g/mL)	50 mL/L	50 mL/L
<b>RIAG Pass 441 Additive 2</b> (density = 1.15 g/mL)	10 – 40 mL/L	10 – 40 mL/L
Sodium nitrate	40 g/L	40 g/L
pH	1.7 – 1.9	1.8

  

Rack	Range	Optimum
<b>RIAG Pass 441 Additive 1</b> (density = 1.17 g/mL)	50 mL/L	50 mL/L
<b>RIAG Pass 441 Additive 2</b> (density = 1.15 g/mL)	5 – 20 mL/L	5 – 20 mL/L
Sodium nitrate	40 g/L	40 g/L
pH	1.7 – 1.9	1.8

The quantity of **RIAG Pass 441 Additive 2** depends on the zinc process used and the equipment.

### Procedure for a make up of 100 litres

Put 80 L water in the process tank. Add 4 kg of sodium nitrate and 5 L **RIAG Pass 441 Additive 1** and the minimum quantity of **RIAG Pass 441 Additive 2** and mix well until the sodium nitrate is dissolved. Adjust the pH with diluted nitric acid (or increase with a 10 % solution of sodium hydroxide) and top the volume up to 100 litres. Now the bath is ready for operation.

## Operating conditions

Temperature:	18 – 22 °C (room temperature)
Time:	30 – 120 sec.
pH-Value:	1.7 – 1.9 (optimum 1.8). Frequent control is recommended.
Agitation:	Air or parts movement
Fume extraction:	Recommended
Equipment:	Mild steel tank with polypropylene lining
Heating:	Glass or teflon tube heaters
Pre dip activation:	This will decrease the corrosion resistance and therefore is not recommended.
Post treatment	We recommend our RIAG post treatment for enhanced corrosion protection

## Process sequence

1. Zinc-nickel plating
2. Water rinse
3. Water rinse
4. **RIAG Pass 441**
5. Drag Out
6. DI water rinse
7. **RIAG Seal \***                      \* different options possible
8. Dry

## Replenishment

**RIAG Pass 441 Additive 1** is added on the basis of analysis. The replenishment ratio of the two parts **RIAG Pass 441 Additive 1** and **RIAG Pass 441 Additive 2** should be made according to the make up ratio. Sodium nitrate is not added when replenishing.

## Effluent control

The **RIAG Pass 441** chromate conversion coating solution is acidic and contains trivalent chromium salts. Spent solution has to be treated and discharged according to local wastewater laws.

## Safety considerations

Protective gear such as face shields and gloves should be worn during bath make up and operation. Chemicals shall not be stored below 10 °C.

## Liability

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## Analysis

### Sample preparation

Take the sample at a homogeneously mixed position and let it cool down to room temperature. If turbid, allow to settle and decant or filter.

### Chromium (III)

Reagents	10 % Sodium hydroxide 30 % Hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> ) Hydrochloric acid conc. Potassium iodide 0.1 mol/L sodium thiosulphate 1 % starch solution (freshly prepared)
Process	<p>Pipette</p> <p>10 mL passivation bath into a</p> <p>250 mL Erlenmeyer flask, add</p> <p>50 mL DI water and sodium hydroxide to a pH-value of about 10 (colour change), then add</p> <p>10 mL Hydrogen peroxide and boil the solution for 30 – 40 min. It is very important to evaporate excessive H<sub>2</sub>O<sub>2</sub> (boil and reduce until shortly before crystallisation)</p> <p>100 mL Cool the solution, add DI water up to and acidify with hydrochloric acid (colour change from yellow to orange), add</p> <p>1 g potassium iodide, titrate with 0.1 mol/L sodium thiosulphate until the solution is only slightly yellowish, then add</p> <p>Some mL starch solution and titrate until the blue colour disappears.</p>
Calculation	mL/L <b>RIAG Pass 441 Additive 1</b> = Consumption in mL x 6.8