

Mivrag – The Finishing Department



Mivrag's quality system and control procedures are in compliance with international standards of the Automotive, Aerospace, and Defence Industries:
ISO 9001 • IATF 16949 • ISO 14001 • AS 9100-D
All lines are computer –controlled and allow process control and automatic documentation of all the variables.

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The automotive industry requires a wide range of coating and painting solutions to protect parts and accessories. Years of working with the world's automotive companies have led Mivrag to its position as Israel's leading provider of solutions for automotive parts requiring surface treatment, painting and thermal treatment, including control of the plating, thickness and resistance to corrosion.



Cataphoretic Coatings - Cathodic Dip Painting

Cataphoretic coating is an electrical process to coat metal parts **with** highly corrosion-resistant black epoxy paint, using environmentally-friendly materials.

Cataphoretic paint coating has a shiny appearance. It can be used as both an outer layer of color or as a base layer. Mivrag supply according to the customers' requirements, in two ways: either one layer or where the paint layer on top of an electrolytic zinc alloy coating. This double layer is called a "**duplex**" coating exhibit higher resistance to corrosion. The many benefits of cataphoretic coatings have made it a common coating in the automotive industry.



Process advantages:

- **Uniform distribution** and the ability to penetrate fully. It covers internal and external surfaces of a part with uniform thickness.
- **Corrosion-resistant** for over 168 hours in a salt chamber. Combined with a basic layer of zinc alloy (duplex coating). Can reach corrosion-resistance of up to 1000 hours, depending on the product and the coating thickness.
- **Low thickness.** Thickness ranges from 10-30µm. The thickness can be controlled at a level of ± 5µm. The low thickness level allows in the vast majority of cases the avoidance of an expensive screening process.
- **Can be applied to any conductive material:** steel, galvanized steel, stainless steel, aluminum, brass, various alloys, etc.
- **The process has no risk of hydrogen embrittlement**
- **The process is environmentally friendly and complies with REACH & RoHS Norns.**

Mivrag's painting line is unique in its application method (trays) and is particularly efficient and attractive for smaller products.

Maximum product dimensions – 1000 x 600 x 170 mm.

Neutral Hardening and Case Hardening

Continuous hardening line up to 350 kg per hour. The line is designed to thermally treat small and medium-sized parts made of carbon steels. The line operates continuously to ensure high uniformity of parts and maximum efficiency.

The line allows performance of the following thermal treatments:

- Oil Quenching and Tempering
- Carburizing

Additional technical data:

- The line is suitable for parts with a diameter of 3-20 mm and an overall length up to 200 mm.
- Austenitization temperature of 820°C - 930°C.
- Quenching oil temperature of up to 80°C.
- Tempering temperature up to 630°C.



Electrolytic coatings and conversion coatings in barrel lines

Various electrolytic zinc coatings are essential for corrosion protection and, if necessary, to reduce the coefficient of friction. These coatings are considered "sacrificial" coatings. The coating process is performed in several layers.

The base layer is an **electrolytic zinc** "sacrificial" coating. Electrolytic zinc types differ from one another in terms of their resistance to corrosion, hardness, and their ability to penetrate and coat uniformly.

The second layer, **passivation**, is a chromate conversion coating that provides a tint or color and improves the product's corrosion protection by protecting the zinc layer.

The third layer is the **sealer**, which is a "protective coating" that also improves durability and allows minimization/control of the final product's coefficient of friction (coefficient of friction: 0.08-0.1), depending on the type of sealer used.

All types of zinc coatings can be provided in a single layer or in up to three layers, as per the customer's requirements.

Applied coatings in barrel lines

- **Zinc electrolytic coating** - is the most common type of coating for carbon steel. The concentration of zinc in the layer is 99.99%. At Mivrag we have two chemical systems for zinc coatings. One system is for "acid zinc", which is characterized by a high sheen and is the preferred treatment for small parts. A second system is for alkaline zinc, which is characterized by uniform dispersion and is preferred for complex parts that require penetration.
- **Zinc-iron alloy electrolytic coating** - Provides exceptional corrosion resistance relative to the zinc coating. It also has an improved ability to resistance at high temperatures. Iron concentration of zinc layer is 0.7 to 1.3%.
- **Zinc-nickel alloy electrolytic coating** - Provides outstanding corrosion resistance for at least 1000 hours in a salt spray chamber. The process at Mivrag is characterized by a low risk of hydrogen embrittlement (LHE). The nickel alloy concentration 10-16 % range in the alloy and can be controlled on demand.
- **Zinc-Phosphate conversion coating** - with or without lubrication, for hard metals with no risk of hydrogen embrittlement. Also used as a base coat for products that requires painting.
- **Barrel Stainless Steel Passivation** - To increase corrosion resistance.

Equipment:

- Two barrel coating lines with a total production capacity of up to 1200 kg per hour.
- Three batch baking ovens for stress and hydrogen relief.
- Shot-blast – (mechanical cleaning machine) to reduce risk of hydrogen embrittlement.



| Coating | Coating Standard ¹ | S.S.T Durability ² Acc. (ASTM B 117) | Color | Hardness Vickers |
|-----------------------------|-------------------------------|---|---|------------------|
| | | Hrs. to RR | | |
| Stainless Steel Passivation | ASTM A 967 or AMS 2700 | 2 | | |
| Zinc Phosphate | MIL-DTL-16232 | 4-72 | Gray | |
| Cathodic Dip Painting | MIL-DTL-53084 | 72-168 | Black | |
| Zinc (alkaline/ chloride) | ASTM F-1941 | 48-360 | Sliver, Yellow ³ , Black | 60-80 |
| Zinc-Iron | ASTM B-842 | 48-480 | Sliver/Gray, Iridescent Yellow ³ , Black | 100-150 |
| Zinc-Nickel MIVRAG 759 | ASTM F 1941 | >1000 | Sliver, Black | 350-400 |
| Duplex Zn-Fe ⁴ | VW-13750 | >1000 | Black | |
| Duplex Zn-Ni ⁴ | VW-13750 | >1500 | Black | |

1. The standard specified is default in case customer does not provide a different standard.
2. The hours listed are for white corrosion (WR) and red corrosion (RR). The hours refer to optimal combination of coating layer, coating thickness, passivation type and the type of sealing that we use. Please note: the standard coating, which is common in the standard fasteners market is "White Zinc" coating with white corrosion resistance of 6 hours . and "Yellow Zinc" coating with white corrosion resistance of 48 hours.(Fasteners - Barrel plating)
3. The standard Iridescent and yellow passivation does not meet the RoHS standard.(Special yellow passivation RoHS Compliance, can be supply with advanced order).
4. Not suitable for threaded products under M-8.

It is possible to obtain a higher resistance to red corrosion than indicated in the metallic coating in the table above (if the customer specifies a target higher than 8µ).

It should be noted that the standard coating in the hard drive market, available on the shelf is a "white zinc" coating that resist white corrosion for 6 Hrs. "yellow zinc" coating that resists white corrosion for only 48 Hrs. (for barrel coating).