

# SHERARDIZING

## THERMAL DIFFUSION GALVANIZING

# SHERARDIZING

- ➔ Sherardizing is named after its inventor Sherard O. Cowper Coles and it has been used since 1900
- ➔ Sandblasted parts are inserted into the drums that contain metallic zinc dust and fine non metallic abrasive
- ➔ The drum is heated up in a furnace up to a temperature just below the melting point of zinc. The drum is tempered in the furnace for a few hours with constant rotation. Zinc evaporates and diffuses in to the surface layers of the steel substrate forming diffusion bonded Zn Fe adhesive alloy coating
- ➔ The coating is even over the entire surface of the part. The coating also has a high corrosion resistance and high abrasion resistance

# SHERARDIZING PROPERTIES

- ➔ Adhesive alloy coating, Zn diffuses steel
- ➔ High corrosion resistance, over 1000 hours in the salt chamber
- ➔ Pretreatment does not require acid treatment – there is no risk of hydrogen embrittlement of the steel
- ➔ Relative low process temperature 380 °C – minimal changes of the crystalline structure of the steel
- ➔ We can influence the thickness of the coating layer during the process

# SHERARDIZING APPLICATION

- ➔ Small steel and cast iron parts with high demands for accuracy
- ➔ Parts with threads
- ➔ Fasteners
- ➔ Chains
- ➔ Strength steel elements























# CORROSION RESISTANCE IN THE SALT CHAMBER

according to the standard ČSN EN 9227

- ➔ The corrosion test was performed by an accredited laboratory VÚHŽ a.s. based in Dobrá 240, Dobrá u Frýdku Místku
- ➔ Requirement: Corrosion tests performed in neutral salt spray according to the standard ČSN EN ISO 9227 with exposure time approx 1500 hours
- ➔ Testing methodology: Corrosion test in salt spray working procedure PP 624 4.5, method NSS (ČSN EN ISO 9227)
- ➔ Corrosion test conditions: The test was performed in a corrosion chamber SKB 400 A TR under the following test conditions:
  - ➔ concentration of the spray solution NaCl 50 ( $\pm 5$ ) g/l
  - ➔ temperature 35 ( $\pm 2$ ) °C
  - ➔ average amount of the accumulated saline solution 1.4 ml/80 cm<sup>2</sup>.h
  - ➔ average pH of the accumulated saline solution 6.9
  - ➔ average concentration of the NaCl of the accumulated saline solution 52.2 g/l
  - ➔ slope of the sample approx. 20°  $\pm$  5° from the vertical axis



# SAMPLES BEFORE INSERTION TO THE SALT CHAMBER

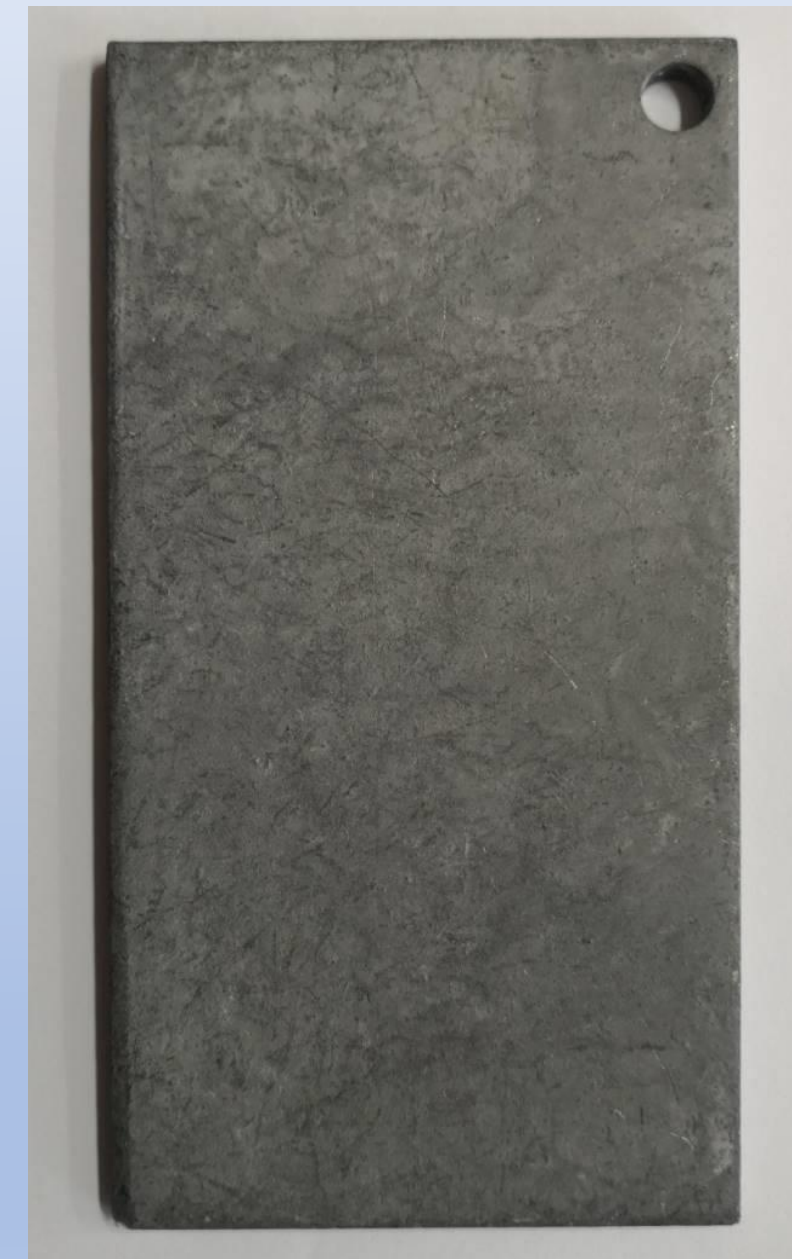
GALVANIZED Zn  
15.5 microns



HOT DIP GALVANIZED Zn  
73 microns



SHERARDIZED Zn  
61 microns





168 hours





504 hours





# 840 hours





# 1344 hours





# 1512 hours – End of the test





# RESULTS OF THE CORROSION TEST OF DELIVERED SAMPLES

in neutral salt spray according to ČSN EN ISO 9227, total exposure time 1512 h

Sample identification	Evaluation <sup>1)</sup>	
	Time until 1 <sup>st</sup> KP <sub>Fe</sub> occurrence	Condition after exposure (1512 h)
761 G-Zn	168	KP <sub>Fe</sub> occurrence on area > 50% of evaluated sample + KP <sub>Zn</sub> occurrence
761 ŽZ-Zn	672	KP <sub>Zn</sub> occurrence + corrosion spots and stains KP <sub>Fe</sub> on area ca (3 to 5)% of evaluated sample
761-TD-Zn	840	KP <sub>Zn</sub> occurrence + isolated corrosion spots KP <sub>Fe</sub> on area << 1% of evaluated sample

Explanations:

1) Assessment of the exposed area

KP<sub>Fe</sub> Fe corrosion products (meaning dark brown corrosion products)

KP<sub>Zn</sub> Zn corrosion products



# RAILWAY SUPERSTRUCTURE COMPONENTS

2500 hours of corrosion test in a salt chamber





# RAILWAY SUPERSTRUCTURE COMPONENTS

2500 hours of corrosion test in a salt chamber



Sherardized Zn

Hot-Dip Zn with centrifuging





## CONTACT

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