

Table 14: Corrosion Protection Methods for **ds** Disc Springs

Specification	Coating Thickness μm	Degree of Protection	Field of Application	Method of Application
Corrosion Protection Oil	2–4	12–18 months in dry atmospheres (no condensation).	Inside storage. Protection for disc springs with no surface finish (blank disc springs).	Dipping Spraying Brushing
Zinc Phosphate with Corrosion Protection Oil	3–8	Permanent protection in dry atmospheres; short term protection outside (under shelter) – no condensation.	Corrosion protection during transit, during long term inside storage or when used in machinery.	Phosphating in a series of baths of temperatures ranging from +70° C to + 90° C.
Corrosion Protection Grease	50–500	Minimum of 18 months inside storage. 6–12 months of outside storage.	Corrosion protection for statically loaded ds disc springs in normal atmospheric conditions.	Dipping or brushing in a pre-warmed condition.
Pigmented Zinc Dust	15–100	Surface layer thickness and choice of binding agent dependant upon the temperature range involved: – 40° C to + 60° C in high humidity or warm water; up to + 120° C in dry atmospheric conditions.	Coating condition suitable for weak chemical and adverse atmospheric conditions.	Spraying Brushing
Barrel Plating: ds Mechanical Zinc Plating and Chromate Passivate	≥ 20	Durability in salt spray mist testing to SS DIN 50 021 is approximately 240 hours. Temperature range – 50° C to + 60° C in high humidity and warm water, – to + 280° C in dry atmospheric conditions. Use in acids: pH < 6.5	Coating condition suitable for weak chemical and adverse atmospheric conditions. Disc springs from \varnothing 10–100 mm (max. 250) Problematic: Disc springs < \varnothing 10 and very thin disc springs.	ds Mechanical Zinc Plating
Zinc Plating by Dacromet 320® Grade "A" Grade "B"	About 5 > 8	Durability in salt spray mist testing SS DIN 50 021 > 250 hours > 480 hours Temperature range: – 50° C to + 280° C	Coating condition suitable for weak chemical and adverse atmospheric conditions. Barrel Plating: Disc springs from \varnothing 10–90 mm Problematic: < \varnothing 10 Disc springs and very thin disc springs. Rack Plating: Disc springs up to \varnothing 425 mm	Dip-Centrifuge Method Dip-Drip Method followed by heating at + 320° C for 20 minutes
Polyamide Coating	Polyamide coating approximately 200 μm on surfaces and approximately 50 μm on edges	Durable in all forms of water conditions, salt, fat and oil solutions, other solution mediums, carbonated chloride water and oxydizing solutions. At room temperature, the protection afforded in dilute acidic conditions is still adequate. Temperature range: To – 55° C, there is no change to the chemical properties; in dry atmospheric conditions, the coating is suitable up to approximately + 100° C (constant temperature) and (for short term) + 140° C.	Coating suitable for mildly aggressive chemical and atmospheric conditions. Acceptable for all areas of the food industry. Good abrasion resistance, impact resistance and adhesion to applied surfaces. Porous free layers beginning at approximately 200 μm .	Minicoat Method Whirl Sintering Electrostatic Powder Spraying If necessary, the surface finish of the parts can be smoothed (finished) by heat treatment.
Nickel Plating	40–50	Durability in salt spray mist testing to SS DIN 50 021: > 4500 hours Temperature range: – 250° C to + 180° C Coating composition Nickel-Phosphate-Alloy	Coating with excellent resistance against attack by numerous chemical agents. Coating is wear resistant and does not erode in use. For outdoor atmospheric conditions, nickel is only marginally useful. Nickel is especially susceptible to damage by sulfides. Barrel Plating: Disc springs to \varnothing to 30 mm Rack Plating: Disc springs to \varnothing 950 mm	Electroless Nickel Plating Temper at + 180° C (to harden the plated nickel layer).