Zapp 316-SW Data Sheet Wire

Zapp is certified according to ISO 9001

Zapp 316-SW
is an austenitic stainless steel alloy with very good corrosion resistance and is recommended for service in dynamic electrostatic precipitator (ESP) environments. Wire in Zapp 316-SW is manufactured with a bright, lustrous finish, which provides both increased fatigue strength and corrosion resistance over matt finish materials.

Service temperature for Zapp 316-SW is -200 to 300 °C (-330 to 570 °F). The grade has a PRE* value of minimum 25.

* PRE, Pitting Resistance Equivalent = % Cr + 3.3 x % Mo + 16 x % N

Standards

- ASTM: 316
- UNS: S31600
- EN Number: 1.4436
- EN Name: X3CrNiMo 17-13-3
- W.Nr.: 1.4436

Chemical composition (nominal) %

C	Si	Mn	P	S	Cr	Ni	Mo
≤ 0.04	≤ 0.6	≤ 1.2	≤ 0.030	≤ 0.015	17.0	11.0	2.6

Forms of supply
Zapp 316-SW ESP for dynamic Electrostatic Precipitators is supplied bright drawn and degreased, in continuous lengths, without welds, on metallic spools.

Dimensions
Standard dimension for the product is 2.70 mm.
Other dimensions can be manufactured on request.

Tolerances
Standard diameter tolerance: ± 0.020 mm
Roundness tolerance: max 0.020 mm

Surface purity
Wire is supplied with a cleaned surface with a maximum chloride ions content of 0.2 mg/dm^2.

Mechanical properties

Zapp 316-SW ESP is tested and certified in accordance with a minimum nominal tensile strength. Proof strength is in the range of 85 % of the tensile strength.

At 20 °C (68 °F)	
Proof strength	Tensile strength
$R_{p0.2}$	R_m
MPa	MPa
min.	min.
830	975

Physical properties

Density	8.0 g/cm^3 , 0.29 lb/in^3
Specific heat capacity	485 J/kg °C, 0.12 Btu/lb h °F
Thermal expansion	30 - 100 °C, 16.5 *10^{-6}/°C, 86 - 210 °F, 9.5 *10^{-6}/°F
Thermal conductivity	15 W/m °C, 9 Btu/ft h °F
Permeability, at 20 °C (68 °F)	1.004
Resistivity, at 20 °C (68 °F)	0.80 µΩm, 31 µΩin.
Modulus of elasticity, at 20 °C (68 °F)	180,000 MPa, 26,100 ksi

Corrosion resistance

Zapp 316-SW ESP has good resistance in

- Organic acids at high concentrations and moderate temperatures
- Inorganic acids, e.g. phosphoric and sulfuric acids, at moderate concentrations and temperatures. The steels can also be used in sulfuric acid of concentrations above 90 % at low temperature.
- Salt solutions, e.g. sulfates, sulfides and sulfites
- Caustic environments

The risk of general corrosion in sulfuric acid during shut down periods has to be taken into account. In naturally aerated sulfuric acid the corrosion rate is below 0.1 mm/year provided the temperature is not higher than 50 °C in10 % solution.

Pitting and crevice corrosion

Resistance to these types of corrosion improves with increasing molybdenum content. 5R60 ESP, containing about 2.6 % Mo, has substantially higher resistance to attack than steels of type AISI 304 and also better resistance than ordinary AISI 316 steels with 2.1 % Mo.

Stress corrosion cracking

Austenitic steels are susceptible to stress corrosion cracking. This may occur at temperatures above about 60 °C (140 °F) if the steel is subjected to tensile stresses and at the same time comes into contact with certain solutions, particularly those containing chlorides. Such service conditions should therefore be avoided. Conditions when plants are shut down must also be considered, as the condensates which are then formed can develop conditions that leads to both stress corrosion cracking and pitting. In applications demanding high resistance to stress corrosion cracking, please contact us for alternative solutions.

Gas corrosion

Zapp 316-SW ESP can be used in

- Air up to 850 °C (1560 °F)
- Steam up to 750 °C (1380 °F)

Creep behavior should also be taken into account when using the steel in the creep range. In flue gases containing sulfur, the corrosion resistance is reduced. In such environments the steel can be used at temperatures up to 600 - 750 °C (1,110 – 1,380 °F) depending on service conditions. Factors to consider are whether the atmosphere is oxidizing or reducing, i.e. the oxygen content, and whether impurities such as sodium and vanadium are present.

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