Corrosion resistance. Temperature resistance. Antistatic/Electrically conductive. Chemical resistance.

Corrosion resistance

Steel surfaces of wheel and castor components are zinc-plated or provided with a protective lacquer coating.

The salt spray test in acc. to DIN EN ISO 9227 is one of the most common test methods used to check the corrosion protection of different substances. A salted solution is sprayed on the components, producing a corrosive attack and the time is measured (in hours) until white and red rust appears.

Surface protection	White rust	Red rust
Zinc-plated, blue	~48 h	~96 h
Zinc-plated, yellow	~144 h	~240 h
Zinc-nickel		~720 h
Powder coating		~192 h

In case of small damages zinc-plated surfaces have the advantage that zinc starts to corrode before steel due to electrochemical processes. Therefore the bright spot does not rust. The zinc-plated components undergo an additional chemical treatment which is called passivation. A distinction is made between blue and yellow passivation as the yellow passivation provides a better protection against corrosion than blue passivation.
All of our products are in compliance with ✓**RoHS** (directive 2011/65/EU), i.e. they are Cr6-free.
Advantages of zinc-nickel plating, which can be additionally passivated and sealed, are high temperature resistance and prevention of white rust.
Lacquered components lose their corrosion protection when the lacquer coating is damaged. The rust also damages intact layers which are located directly next to the affected area.
The cathodic dip painting is an electrochemical process which is used to coat complicated structures equally in a dipping bath. High temperature resistance and good surface quality are two benefits of this process.
With electrostatic powder coating the powder used for the coating is sprayed on the component and fired afterwards.

INOX Stainless steels have a well-known good corrosion behaviour. The primary used material (1.4301/AISI 304) is a high-alloyed chromium-nickel steel.

Synthetics are characterized by a very high corrosion resistance. Mainly the materials nylon and polypropylene are used.

Temperature resistance

The correct function of a wheel or castor also depends on the temperature influence.
The relevant tread temperature results from the combined effects of ambient temperature and the heat caused by friction. The degree of friction is determined by the material, shape and load of the tread as well as by direction, length and condition of the covered distance.

For example the load capacity and the stability of synthetics are reduced under cold temperature or heat.
The load capacity and service life of treads considerably decrease with higher temperatures. Further, with high static load and high temperatures the danger of wheel flattening is increased. For this reason, special treads and wheel materials were developed which are also suitable for higher temperatures (refer to heat-resistant wheels and castors on page 376-400).
With lower temperatures the rigidity and hardness of many elastomer treads, especially rubber- and many polyurethane-elastomers, increase considerably, limiting the elastic spring characteristics. As special options polyurethane-elastomers are available which remain elastic and flexible at temperatures down to -30° C as the hardness only slightly increases.

Antistatic/ Electrically conductive

Antistatic/electrically conductive wheels and castors serve to provide electrostatic discharge which is generated by transport units or the goods being transported.

A wheel or castor is deemed to be electrically conductive if the resistance does not exceed 10^4 Ω (product code suffix: -EL or -ELS).
A wheel or castor is deemed to be antistatic if the resistance does not exceed 10^7 Ω (product code suffix: -AS).

In order to ensure the conductivity of lacquered components such as rims or wheel centres, the paint at the fixing points (the connection to the transport unit) can be removed.
The effectiveness of the conductivity during operation can be affected by a dirty tread or other environmental influences and therefore has to be checked by the operator periodically.

Chemical resistance.

The chemical resistance of wheels or castors must be considered especially in cases where the components have direct contact with aggressive substances.
The table below shows orientation values concerning the chemical resistance of some materials to chemical substances.
Please note that the chemical resistance does not only depend on the type of aggressive substance, but also on the concentration and the duration of contact as well as other environmental conditions such as temperature and humidity.

Chemical compounds may have completely different effects than indicated in the table. We do not accept any legal liability. In case of doubts, questions or concerns, we recommend that you contact us for further technical assistance.

+ resistant **0** conditionally resistant **x** not resistant **L** pitting, stress cracks **-** not specified	Concentration %	Rubber	TPE	Nylon	Polypropylene (PP Copo)	Polyurethane (Ester) Extrathane/Softhane	Polyurethane (Ether) Besthane/Besthane Soft	Stainless steel (V2A, 1.4301, AISI 304)
Acetaldehyde	40	0	+	0	+	0	+	0(L)
Acetic Acid	10	0	+	x	x	x	x	+
Acetone		+	0	+	+	0	x	+
Acetylene		+	+	+	+	+	+	-
Acrylic Acid >30° C		-	+	x	+	x	x	-
Alcyl Alcohol		+	+	0	+	0	0	+
Alcyl Benzene		x	0	+	0	-	-	+
Aluminium Acetate (aq)		+	+	+	+	x	0	+
Amines, aliphatic		0	0	+	+	x	x	+
Amino Acids		-	-	+	+	-	-	-
Ammonia (aq)	20	+	+	+	+	x	x	+
Ammonium Bicarbonate		-	-	-	+	-	-	+
Ammonium Carbonate (aq)		+	+	-	+	x	x	+
Ammonium Chloride (aq)		+	+	-	+	x	x	0(L)
Ammonium Hydroxide (aq)	10	-	+	-	+	x	x	+
Ammonium Nitrate (aq)		0	+	+	+	0	+	+
Ammonium Rhodanide (aq)		-	-	0	+	0	+	+
Ammonium Salts (aq)		-	-	-	+	-	-	-
Ammonium Sulfate (aq)		0	+	+	+	+	+	+
Amyl Acetate		0	+	+	0	x	x	+
Amyl Alcohol		0	0	+	+	0	0	+
Aniline		x	0	0	+	x	x	+
Anthraquinone		-	-	+	+	-	-	-
Antiliming (aq)	10	-	-	+	+	0	+	+
Aqua Regia		x	x	x	x	x	x	x
Barium Salts		+	+	0	+	+	+	0(L)
Beer		+	+	+	+	+	+	+
Benzene		x	x	+	x	x	x	+
Blast Furnace Gas		0	-	-	-	x	x	+
Borax		+	+	+	+	+	+	+
Boric Acid (aq)	10	+	+	0	+	0	+	+
Bromine		x	0	x	x	x	x	x
Butane		x	x	+	+	+	+	+
Butter		x	+	+	+	+	+	+
Calcium Salts (aq)		+	+	x	+	0	0	+
Carbolineum		x	-	+	+	x	x	-
Carbon Monoxide		0	+	+	0	x	x	+
Carbon Tetrachloride		x	x	+	x	x	x	+
Carbonic Acid		+	+	+	+	+	+	+
Casein		-	-	+	-	-	-	-

Corrosion resistance. Temperature resistance. Antistatic/Electrically conductive. Chemical resistance.

+ resistant 0 conditionally resistant x not resistant L pitting, stress cracks - not specified	Concentration %	Rubber	TPE	Nylon	Polypropylene (PP Copo)	Polyurethane (Ester) Extrathane/Softhane	Polyurethane (Ether) Besthane/Besthane Soft	Stainless steel (V2A, 1.4301, AISI 304)
Chlorine (aq)		x	0	x	x	x	x	x
Chromic Acid (aq)	10	x	0	0	+	x	0	+
Citric Acid (aq)	10	+	+	+	+	+	+	+
Citrus oils		x	-	+	-	-	-	-
Clophen		x	0	+	x	x	x	+
Cobalt Salts (aq)	20	-	+	0	+	-	-	-
Coconat Oil		x	0	+	+	+	+	+
Cottonseed Oil		x	x	+	+	+	+	+
Cresol		x	x	x	0	x	x	+
Cupric Chloride (aq)		+	+	0	+	0	+	x
Cupric Salts (aq)	10	-	+	x	+	0	+	-
Cupric Sulfate (aq)		0	+	0	+	+	+	+
Cyclohexanol		0	0	+	0	0	x	+
Cyclohexanone		0	0	+	0	0	x	+
De-icing salt		+	+	+	+	0	+	+(L)
Dichlorbenzene		x	x	+	0	x	x	+
Dichlorbutylene		x	0	-	-	x	x	-
Diethylen Glycol		+	+	0	+	0	0	+
Dimethyl Aniline		x	0	0	x	x	x	+
Dimethyl Ether		0	0	+	x	+	+	+
Dimethyl Formamide		0	+	+	+	x	0	+
Diphyl, 80° C		x	0	+	x	x	x	+
Ethanol		+	0	0	+	+	+	+
Ethanolamine		0	+	(0)	+	x	x	-
Ether (Diethyl Ether)		x	0	+	x	+	+	+
Ethyl Acetate		0	0	+	0	x	x	(+)
Ethylene		x	x	+	0	+	+	+
Fatty Acids		x	0	+	+	0	+	+
Ferrous Chloride (aq)	10	0	+	x	+	0	+	x
Ferrous Sulfate (aq)	10	+	+	(+)	+	0	+	+
Fluorine		x	x	x	x	x	x	x
Formaldehyde	30	+	+	+	+	0	0	+
Formamide		+	0	+	+	x	x	+
Formic Acid	10	0	+	x	+	x	x	+
Fufural (Furfurol)		x	x	0	x	x	x	+
Gelatin		+	+	+	+	0	+	+
Glacial Acetic Acid	30	x	0	x	x	x	x	+
Glucose		+	+	+	+	+	+	+
Glue		+	+	+	+	+	+	+
Glycerin		+	+	+	+	+	+	+
Glycol		+	+	0	+	0	0	+
Hexane		x	0	+	0	+	+	+
Hydraulic Oil		x	x	+	0	x	x	+
Hydrochloric Acid (aq)	30	0	+	x	+	x	0	x
Ink		+	+	+	+	+	+	+
Iodine Solution		+	+	x	+	x	x	+(L)
Isopropyl Chloride		x	0	+	0	x	x	-
Isopropyl Ether		0	0	x	x	+	+	+
Lactic Acid		x	+	x	+	x	x	0
Lead Acetate (aq)	10	0	+	+	+	0	+	+
Lead Nitrate (aq)		+	+	-	+	+	+	+
Magnesium Salts (aq)	10	+	+	+	+	0	+	+(L)
Malic Acid		0	+	+	+	x	0	+
Manganese Salts (aq)	10	-	+	0	-	-	-	+(L)
Mercury		+	+	+	+	+	+	+
Mercury Chloride (aq)		+	+	x	+	+	+	0(L)
Methyl Alcohol / Methanol		0	+	0	+	+	0	+
Methyl Ethyl Ketone		x	0	+	0	x	x	+
Methylene Chloride		x	x	x	x	x	x	+
Methylpyrrolidone		x	+	-	-	0	0	-
Milk		+	+	+	+	0	+	+
Mineral Oil		x	x	+	0	+	+	+

+ resistant 0 conditionally resistant x not resistant L pitting, stress cracks - not specified	Concentration %	Rubber	TPE	Nylon	Polypropylene (PP Copo)	Polyurethane (Ester) Extrathane/Softhane	Polyurethane (Ether) Besthane/Besthane Soft	Stainless steel (V2A, 1.4301, AISI 304)
Monobrombenzene		x	x	+	0	x	x	+
Mortar, cements, lime		+	+	+	+	0	0	+
Mustard		-	-	+	+	+	+	+(L)
Naphthalene		x	0	+	0	0	0	+
Nickel Chloride (aq)	10	+	+	0	+	0	+	+(L)
Nickel Salts (aq)	10	+	+	0	+	0	+	-
Nickel Sulfate (aq)	10	0	+	0	+	0	+	+
Noble gases		+	+	+	+	+	+	+
Oleic Acid		x	0	+	+	0	+	+
Oxalic Acid (aq)	10	0	+	0	+	x	x	0
Ozone, atmospheric concentration		x	0	x	0	+	+	-
Palmitic Acid		x	0	+	0	0	+	+
Paraffine		x	0	+	+	+	+	+
Petrol, Gasoline, Petroleum Ether		x	x	+	0	+	+	+
Petroleum		x	x	+	+	+	+	+
Phenyl Ethyl Ether		x	0	+	0	+	+	+
Phenylbenzene		x	x	-	-	x	x	+
Phosphoric Acid (aq)	10	0	+	x	+	0	+	+
Pine needle oil		x	0	0	+	+	+	+
Pottasium Chloride (aq)	10	0	+	+	+	+	+	+
Pottasium Hydroxide (aq)		0	+	+	+	0	+	+
Pottasium Sulfate		+	+	+	+	+	+	+
Propane		x	0	+	+	+	+	+
Propyl Alcohol		+	0	+	+	0	0	+
Rizinol		+	+	+	+	+	+	+
Seawater		+	+	+	+	0	0	+(L)
Sewages		-	+	+	+	0	0	-
Silver Nitrate (aq)		+	+	+	+	+	+	+
Skydrol		x	x	+	+	x	x	+
Sodium Carbonate (aq)	10	+	+	+	+	x	x	+
Sodium Chloride (aq)	10	0	+	+	+	0	+	+(L)
Sodium Hydroxide (aq)	10	+	+	+	+	x	x	+
Sodium Hypochlorite (aq)	10	x	+	x	0	x	0	0(L)
Sodium Nitrate (aq)	10	+	+	+	+	+	+	+
Sodium Phosphate (aq)	10	+	+	+	+	+	+	+
Sodium Silicate (aq)	10	+	+	+	+	x	0	+
Sodium Sulfate (aq)	10	0	+	+	+	0	+	+
Sodium Sulfide (aq)	10	0	+	+	+	0	0	+
Sodium Thiosulfate (aq)	10	0	+	+	+	0	+	+(L)
Stearic Acid		x	+	+	0	x	+	+
Suds, 80° C		+	+	+	(+)	x	0	+
Sulfurous Acid (aq)		0	+	x	+	x	x	+
Tannic Acid	10	+	+	+	+	0	+	+
Tar, Bituminous		x	0	+	+	+	+	+
Tartaric Acid (aq)	10	+	+	0	+	0	+	+
Toluene		x	x	+	x	x	x	+
Trichlorethylene		x	x	0	0	x	x	+
Turpentine		x	x	+	x	x	x	+
Uranium Fluoride		-	-	x	-	-	-	-
Uric Acid (aq)	10	+	+	+	+	0	-	+(L)
Urine		+	+	+	+	0	+	+(L)
Vaseline		x	0	+	0	+	+	+
Vegetable Oil		x	x	+	0	+	+	+
Water, hot		0	+	+	(+)	x	+	+
Water, cold		+	+	+	+	+	+	+
Wax, 80° C		-	-	+	(+)	+	+	+
Xylene		x	x	+	x	x	x	+
Zinc Chloride (aq)	10	+	+	0	+	x	x	x
Zinc Rhodanide (aq)	30	-	-	x	-	-	-	-