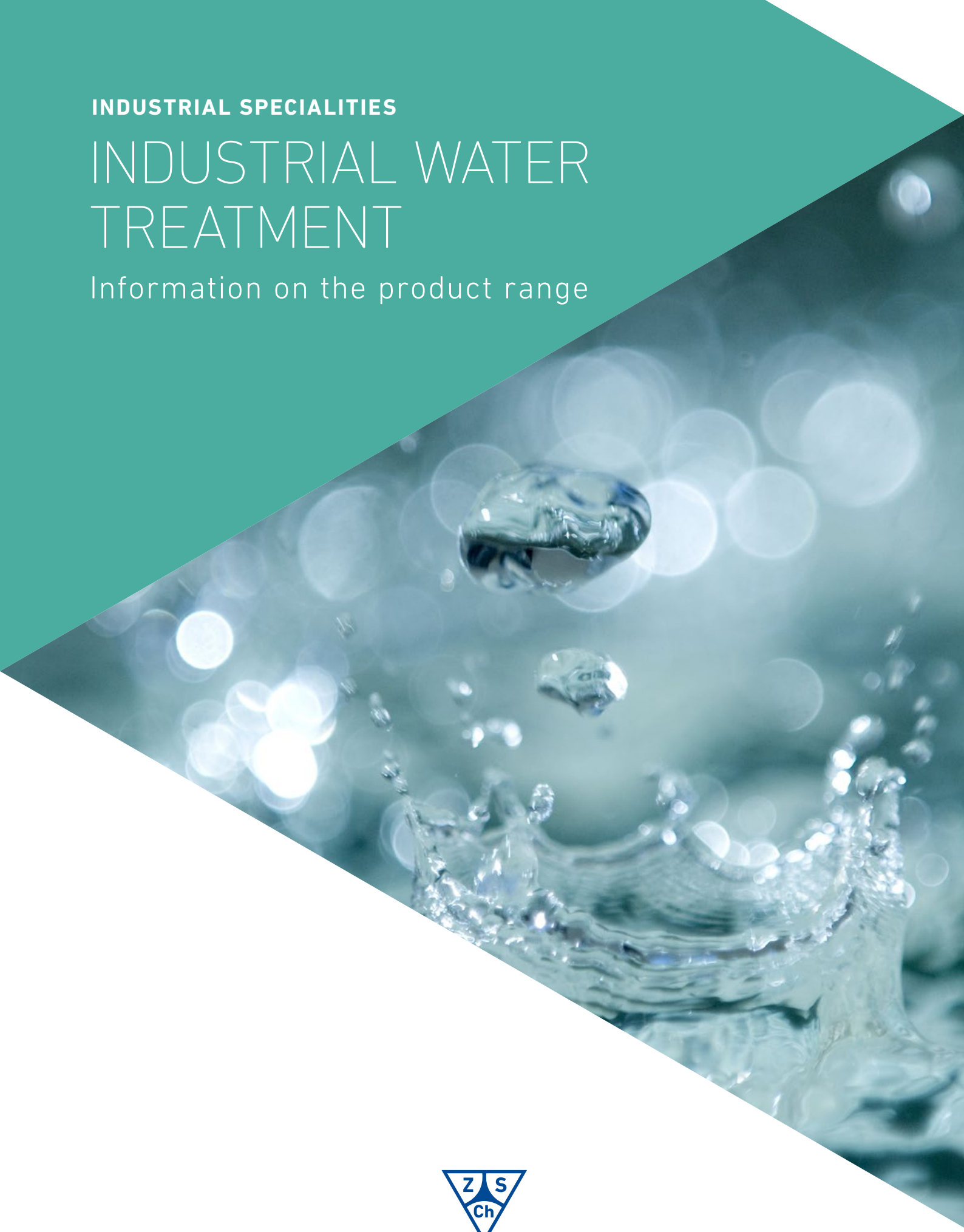
INDUSTRIAL SPECIALITIES

INDUSTRIAL WATER TREATMENT

Information on the product range



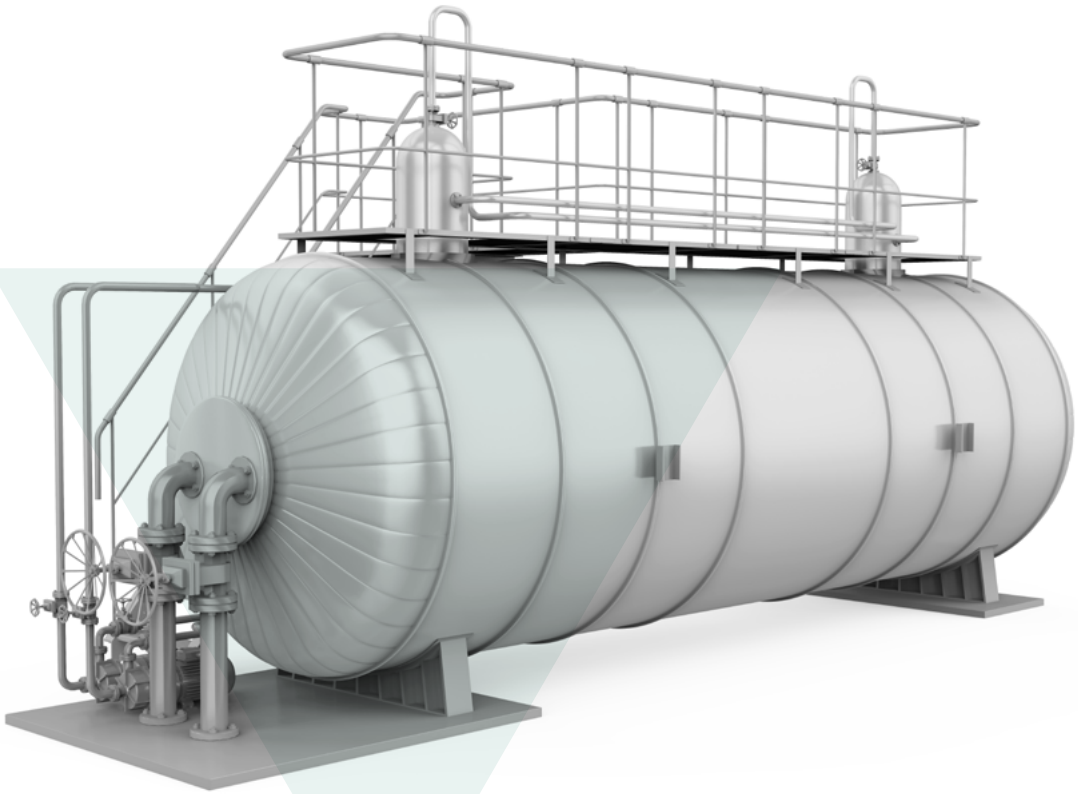
ZSCHIMMER & SCHWARZ

INDUSTRIAL WATER TREATMENT

Information on the product range

Water is a vital resource. Although about 70 percent of the earth's surface is covered with water in the form of bodies of water, seas and oceans, only a very small part of it is directly usable for the supply of industrial and drinking water. Only just 3 percent of the world's water resources are fresh water – a large part of which (including snow-covered Arctic, Antarctic and permafrost soils) remains inaccessible. Global population growth and a general increase in living standards is leading to an increased demand for usable water. Therefore, both the efficient use of water and the conversion of seawater into industrial and drinking water are becoming increasingly important.

During the extraction, purification and recycling of water, problems, in particular those associated with scale and corrosion, must be avoided or at least reduced. With its products and services, Zschimmer & Schwarz wants to make an important contribution to meeting this challenge.



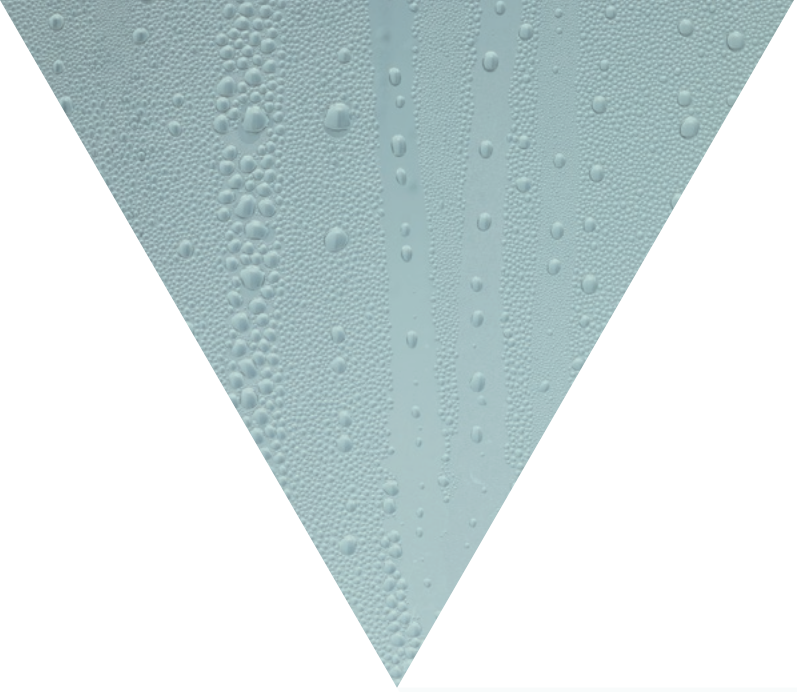
RANGE OF PRODUCTS

Explore our wide range of efficient and eco-friendly additives which are tailored to your requirements and benefit from our flat hierarchies as well as cross-disciplinary collaboration. Our team will assist you in finding the right products for every challenge.

COOLING WATER TREATMENT

The importance of cooling water treatment is evident from the fact that almost half the water required in Germany (approx. 50 billion cubic metres) is used as cooling water in power plants. The generation of energy in thermal power plants is based on heating and evaporating high-purity water (by burning coal or gas) in a special circuit and its sudden cooling. The resulting considerable change in gas-liquid volume allows energy to be generated using turbines and generators. The necessary cooling is attained in condensers by a second circuit (cooling circuit), which is usually connected to one or more cooling towers (recooling). This results in water losses (evaporation, spray water), which have to be compensated for with a circulation capacity of several hundred cubic metres of water per hour and cooling tower. Power plants obtain 90 percent of the large quantities of water required for daily cooling from dams, rivers and lakes, mostly untreated. Recirculation cooling along with the supply of fresh water causes the salts present in the water to become concentrated ("thickening") and leads to precipitation and deposits (scale) in the cooling circuit. This reduces the energy yield in particular, the resultant corrosion also causing plant damage.

The cooling water treatment is systemic, whereby the individual components for scaling and corrosion inhibition, dispersion and prevention of biological fouling must be well balanced.



BOILER WATER TREATMENT

Typical problems associated with boiler systems involve the formation of deposits of poorly soluble salts such as calcium and magnesium carbonate and the corrosion of metal parts. As in the case of cooling water treatment, specially tailored formulations are used here as well.

Boiler water treatment usually involves closed systems, whereby the temperature resistance of the treatment agents naturally plays a greater role.

CLOSED HEATING AND COOLING CIRCUITS

In contrast to the petrification problems in open systems, supersaturation effects driven by evaporation often play only a minor role in closed circuits. Instead, the focus is on efficient corrosion inhibition, which – in conjunction with dispersing characteristics – minimises material erosion to the greatest possible extent, while at the same time counteracting sludge accumulation due to sedimenting turbidities. Different treatment concepts are applied depending on the quality of the raw water used and the type of installation.

RAW WATER TREATMENT – MEMBRANE SEPARATION PROCESS

The membrane separation methods of reverse osmosis and nanofiltration involve a selective "filtration of molecules" using special polymer membranes. The membrane is more permeable for small water molecules, while larger molecules and ions (such as cations and anions of inorganic salts) are prevented from passing through. Concentration on the raw water side causes supersaturation effects, resulting in precipitation of poorly soluble salts. Antiscalants suppress these precipitations and significantly extend the cleaning intervals. Periodic cleaning cycles remove both the biofouling and the mineral deposits from the membrane.

Successful antiscalant treatment results in long cleaning intervals, thus increasing the service life of the membrane modules with safe scaling removal and lowest possible membrane attack. In the case of drinking water production using membrane separation processes, the use of scaling inhibitors is regulated by country-specific drinking water regulations and transregional ordinances.

SEAWATER TREATMENT – MSF

While reverse osmosis occurs at normal temperatures, MSF (Multi-stage flash evaporation) involves a gradual evaporation of saltwater at temperatures above 100° C and under reduced pressure. The resulting isolated condensate is salt-free and can be reused, while the water remaining in the evaporator is returned to the sea with a greatly increased salt load. Problems are caused by salt deposits on the evaporators and the corrosion caused mainly by high salt loads. The main component of the salt load is sodium chloride (common "salt"), whose share – with related compounds – in seawater can be up to 30 percent ("Dead Sea").

GEOTHERMAL ENERGY – ENERGY PRODUCTION

Another field of water treatment involves the generation of energy from geothermal energy using near-surface or deep geothermal energy. Groundwater reservoirs, so-called aquifers, are tapped via probes. Part of the thermal energy of the geothermal water pumped up in a closed system is extracted by means of heat exchangers. The cooled water is returned to the formation. The geothermal energy obtained is either fed into heating networks or used in connected power plants to generate electricity.

A main focus is on the prevention of sulphidic and/or sulphate-based crusts, which can significantly impair the efficiency of the respective energy production within the heat exchangers, even at the smallest deposit thickness. In addition, measures to prevent corrosion contribute to extending the operating time, especially on the water side of the respective process. A careful selection of suitable process chemicals with regard to stability under process conditions is essential due to circulation of the treated geothermal water.

SPECIAL APPLICATIONS

CORROSION INHIBITION

Most consumers are not aware that water itself is a highly corrosive medium. This is especially true for distilled or condensed water, which has a very low electrical conductivity due to its low electrolyte content. Better known is the salt-water corrosion, which is especially noticeable at the phase boundaries metal/water/air. Water-bearing systems can exhibit both surface corrosion (abrasion corrosion) and the dreaded pitting corrosion, often induced by chlorides. Both a careful selection of materials and the application-optimised use of corrosion inhibitors are necessary to prevent damage to the system and its functionality.

FOAM SUPPRESSION

Foam on the surface or finely dispersed air inside an aqueous phase can lead to disturbances in water-based production processes by reducing the heat exchange surface as well as unwanted increases in volume. A basic distinction must be made between the prevention of foam formation (antifoamers) and foam destruction (defoamers). Different defoamers represent highly effective products based on long-chain fatty alcohols, alkoxylates and esters as well as mineral oils and silicone compounds, depending on the area of application and task.

DISPERSION

Various solid contaminants in water-bearing systems (cooling or heating circuits) require additives that make them more compatible with aqueous systems. They must also prevent rapid settling of the solids or suspended solids and allow them to be discharged by means of blowdown. A range of polymeric or molecular dispersants are available to overcome these challenges both in an economical and ecological way.

Z&S PRODUCTS FOR WATER TREATMENT APPLICATIONS (EXAMPLES)

APPLICATION	SUITABLE STRUCTURE	PRODUCTS
Cooling water treatment	Phosphonic acid blend	CUBLEN MA, CUBLEN P 40
Reverse osmosis	Phosphonic acids	CUBLEN AP 5, A 4015, ROT 152, D 5113
Antiscalants for drinking water production using membrane separation processes	ANSI NSF 60 certified and DIN EN 15040 compliant phosphonic acids	CUBLEN K 60, AP 5, A 4015, D 5113, F 3016
MSF	Phosphonic acids	CUBLEN K 2222, K 4023, A 4015
Geothermal energy	Phosphonic acids	CUBLEN BTP 480, D 5113
Corrosion inhibition	Phosphoric acid ester	PHOSFETAL 201, 205, 213, 218
	Phosphoric acid ester	PHOSPHETAL 2-EH, 2280, DA, TDA
	Blends	CUBLEN H, CUBLEN HK
Foam suppression	Various	CONTRASPUM 300, M 4053, W CONC.
Dispersion	Polycarboxylates, blends	CUBLEN MD 70 N, CUBLEN PAA 40 TN

Chemistry tailor-made

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