ACUMER™ Polymers for Cooling Towers

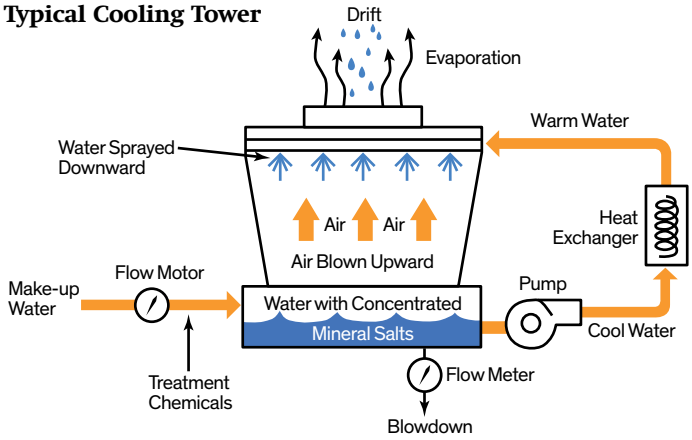
Scale Inhibition and Dispersants for Reduced Energy and Water Costs

Decrease Scale, Increase Efficiency

Power plants, refineries, food processing facilities and dozens of other industries use industrial cooling towers to remove heat that is absorbed within their circulating water systems. This recirculating water can build up impurities that can lead to the precipitation of salts and other particles accumulating on equipment, resulting in corrosion, increased water usage and reduced heat exchange.

ACUMER™ Acrylic Water Soluble Polymers from Dow offer excellent scale inhibition properties. They disperse particulate matter containing calcium, iron and kaolin and prevent their adhesion to heat transfer surfaces. That not only extends the life of equipment, it can also reduce operational expenses related to energy and water consumption.

Typical Cooling Tower



Even a Little Can Save a Lot

The addition of even small concentrations of ACUMER™ Polymers in the water system can increase salt solubility while keeping remaining precipitates dispersed in non- or less adherent forms. This will allow the cooling tower and cooling circuit system to continue operating at higher precipitate concentrations while keeping the circuit tubing and cooling tower clean and free of any deposits.

That means greater savings for you:

- *Water savings* – from significant decrease of the blowdown rate
- *Energy savings* – from increased heat exchange and cooling efficiency
- *Safety insurance savings* – from decreased bio-contamination risk
- *Maintenance savings* – from decreased circuit plugging risk
- *Productivity savings* – from less frequent circuit cleanings

ACUMER™ Polymers are delivered with a consistent high quality and provide 5 to 10 percent improved performance over competitive scale inhibitors. They offer an improved environmental profile when used as a replacement for, or in conjunction with, phosphate additives.

Scale Inhibitors for Specific Challenges

Dow offers a number of ACUMER™ scale inhibitors to address a variety of system challenges and needs.

Calcium Carbonate is a major scaling contributor that typically leads to system fouling and is introduced most often with the makeup water.

Silica scale is another major challenge for water treatment systems that can result in high costs for treatment and downtime. Dow offers silica scale treatment that can help reduce this tough scale buildup.

Phosphate additives help clear up corrosion issues and can be highly effective; however, with today's changing restrictions on water regulations, once the corrosion is mitigated, the phosphates used must also be remediated. ACUMER™ Polymers can help deal with these residual additives.

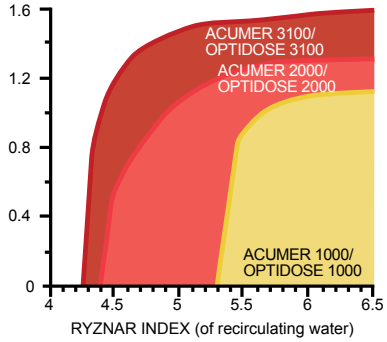
Scale Type	System Challenges/ Needs	Product Recommendation*
Calcium Carbonate	Normal scale buildup	ACUMER™ 1000 ACUMER 1010
	Improve the dispersing effect	ACUMER 1100 ACUMER 1110
	Harsh system conditions	ACUMER 2200
	Noticeable amount of iron salt present	ACUMER 2000 ACUMER 3100
Silica/Silicate Scales	Silicates precipitating with salt	ACUMER 5000
Zinc Hydroxide and Phosphate Precipitation	Normal zinc hydroxide and phosphate precipitate control	ACUMER 2000

*ACUMER 6600 is also available to help prevent or limit the formation and growth of the biofilm.

Stabilized Phosphate and All-Organic Water Treatment

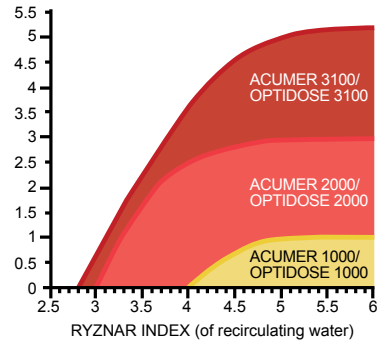
ACUMER™ 1000, 2000 and 3100 are superior performing polymers for use in stabilized phosphate and all-organic water treatment programs. Figures 1 and 2 provide recommendations for water systems with various Ryznar indexes and iron levels. [Both graphs are based on tests comparing polymer performance for inhibiting (>80% stabilization) the precipitation of calcium phosphate or phosphonate at different levels of iron, hardness, alkalinity and pH.]

Figure 1: Cooling Water – Stabilized Phosphate Program



Test Conditions	
Active Polymer:	10 ppm
Temperature:	49˚C
Test Duration:	20 hours
pH:	7-9
M-Alkalinity:	200 ppm
Ca as $CaCO_3$:	400 ppm
Mg as $CaCO_3$:	200 ppm
Orthophosphate as PO_4:	10 ppm

Figure 2: Cooling Water – All-Organic Program



Test Conditions	
Active Polymer:	10 ppm
Temperature:	49˚C
Test Duration:	20 hours
pH:	9
M-Alkalinity:	200-400 ppm
Ca as $CaCO_3$:	250-600 ppm
Mg as $CaCO_3$:	125-300 ppm
Phosphonate:	5 ppm

Ask the Experts

Dow has more than 50 years of experience in water treatment and anti-scaling products. Ask us to recommend the right ACUMER™ Polymer for your system's needs.

Note: At Dow, we want to be a resource for you in learning about solutions to cooling water challenges. Be sure to continue working with your service providers and distributors to purchase our products.

Traceable Option Available

OPTIDOSE™ Traceable Polymers (Dow's tagged, traceable version of ACUMER™ Polymers) offer equivalent performance with the benefit of traceability. Dow's patented OPTIDOSE dosage monitoring system facilitates safety without product overuse.

Dow's Commitment to Sustainability

Dow's commitment to sustainability is infused into the very DNA of our Company. In 2006, we launched our 2015 Sustainability Goals, which focused not only on the Company's footprint in our own operations but also our handprint through the positive impact of Dow products and their role in global sustainable development. Now we have introduced our 2025 Sustainability Goals. With these Goals, Dow seeks to advance the wellbeing of humanity by helping lead the transition to a sustainable planet and society. The seven commitments that comprise the 2025 Sustainability Goals represent the next step in our long-term strategic journey. For more information on how sustainability is integrated into all aspects of our business and operations, please visit www.dow.com/sustainability.

Product Stewardship and Safety

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

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