



Dow Oil, Gas and Mining

ACUMER™ Scale Inhibitors

Antiscalants and Dispersants for Optimisation of Reverse Osmosis Membrane Processes



KEEP UP YOUR PROCESS FOR SUCCESS!

ACUMER™ Antiscalants:

- prolong the life of reverse osmosis membrane by inhibiting scale formation and deposit;
- maintain a stable recovery rate, preventing the deposition of inorganic particles;
- enable high recovery and minimal level of discharge;
- need little or no acid control when used to inhibit scale common to reverse osmosis systems such as calcium carbonate;
- are non-hazardous, suitable for areas subject to strict phosphorus emission regulations for environmental protection;
- are in line with NSF 60 certification* suitable for potable water treatment uses.

* Please refer to the appropriate section

Reverse Osmosis Membranes for Water Purification

For fresh water purification, food liquids processing, desalination or wastewater recovery, industrial water purification processes are increasingly based on reverse osmosis membranes. Such important investments necessitate meticulous care for known issues, in particular scaling and fouling. Deposits on membranes can reduce permeate flow and increase pressure drop, significantly reducing yield of the system (i.e. % recovery).

- By limiting flow to less scaled areas, they may cause channeling through membranes;
- Hard scales can puncture membranes, allowing salt passage and microbiological contamination in the permeate.

Running an optimum maintenance program, with the right products, enables smooth operations and maximise longevity of the membrane.



Different Waters, Different Scales

Typical scales encountered are calcium carbonate, calcium sulfate, barium sulfate, strontium sulfate and reactive silica.

Carbonates scale

Carbonates (particularly calcium, but also barium and strontium) naturally present in water have very low solubility. In reverse osmosis, water is concentrated and this favors precipitation of these salts if antiscalant is not used.

Sulfates scale

Sulfates are slightly more soluble than carbonates in water. However, they can also precipitate in the concentrate for the same reason noted above. Use of antiscalants can help prevent silicate precipitation.

SiO₂ scale

Some waters can contain high level of silica which is not very soluble. After concentration, silicate scaling can occur, which is then very difficult to remove. Antiscalant can help preventing silicate precipitation.

Iron dispersion

Iron can be present in the feed water mainly under the form of iron oxide as corrosion by-product. It is important to disperse iron oxide to avoid membrane scaling.

In order to prevent these and other scales, Dow offers designed ACUMER™ Antiscalants to insure your water purification operation and ward off the membrane from potential degrading conditions.

Benefits	All round scale inhibitors & formulation performance boosters			Specialty scale inhibitors and dispersants		
	ACUMER™ 4035	ACUMER 4200	ACUMER 4450	ACUMER 5000	ACUMER 5100	ACUMER 6600
Carbonate Inhibition (calcium, magnesium)	••	••	•	•		
Sulfate inhibition (calcium)	•	••	•	•		
Barium sulfate inhibition		•	••	•		
Silicate inhibition (magnesium)			•	••	••	
Iron scale inhibition			••	••		•
Bio-dispersancy						••

•• Highly recommended • Suitable

More particularly:

- ACUMER™ 4450 Antiscalant is also the best inorganic granular dispersant.
- ACUMER™ 6600 Bio-dispersant effectively limits the build-up of biological material, which can reduce sludge deposit.

Scale Inhibitor Dosing and Blending

In general, an addition of 0.5 to 5 mg/L (ppm) is recommended in the reverse osmosis feed water. Process setup simulation tools and support are available, please contact your Dow technical representative.

Process recovery can be increased with the addition of polymers such as ACUMER™ Antiscalants versus systems operated with common phosphorus based chemistries. This helps minimize the level of discharged water.

In more complex water compositions, having several type of scales to be tackled, complementary ACUMER™ Antiscalants can be used as components of tailored formulations.

Scale Build-up Prevention Mechanisms

ACUMER™ Antiscalants inhibit scale formation and build-up on surfaces through at least three mechanisms:

- Solubility enhancement or threshold effect, which reduces precipitation of low solubility inorganic salts.
- Crystal modification, which deforms the growing inorganic salt crystals to give small, irregular, readily fractured crystals that do not adhere well to surfaces.
- Dispersing activity, which prevents precipitated crystals or other inorganic particles from agglomerating and depositing on surfaces.



Certifications

ACUMER™ Antiscalants 4035, 4450, 5000 and 6600 are suitable for potable water uses. The complete product listing for NSF / ANSI 60 Drinking Water Treatment Chemicals certification can be found on <http://info.nsf.org/Certified/PwsChemicals/>

As Dow is as well a world leader in FILMTEC™ Reverse Osmosis Elements manufacturing, comparability of ACUMER™ Antiscalants with the membranes is well understood. Please contact your Dow Technical Representative for support.

Handling, Storage

Most ACUMER™ Antiscalants are stable for two years if kept in their original containers under normal storage conditions. ACUMER 4450, 5000 and 5100 have a shelf-life of their original containers under normal storage conditions. When the containers are opened, the products should be used within one month.

For convenience of use, a selection of grades is offered in 20kg pails.

Commitment to Sustainability

Dow's commitment to sustainability is infused into the very DNA of our Company. In 2006, we launched our current set of 2015 Sustainability Goals, which focus 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. Focused on addressing global challenges like water, food, climate change and energy, Dow has made significant progress against these goals. 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.

Complementary Product Offering

Further water treatment chemicals are offered, such as AQUICAR™ MEM 20 Water Treatment Microbiocide* non-oxidizing antimicrobial to help control microorganisms and preventing biofilm. Please read more on www.DowMicrobialControl.com.

Besides FILMTEC™ Reverse Osmosis (RO) Membrane, Dow has as well a comprehensive portfolio of water purification and separation technologies, setting industry standards for quality and reliability. Product information from the TEQUATIC™ PLUS to the FILMTEC™ Nanofiltration (NF) Membrane and ion exchange resins can be found on www.DowWaterSolutions.com.

* Please refer to the appropriate conditions of use in the NSF / ANSI 60 Drinking Water Treatment Chemicals certification.

Interested in Learning More?

For more information on Dow's water treatment polymers, biocides or water purification and separation technologies, please contact us at the number for your region listed below, or visit our website at www.dow.com.

U.S., Canada and Mexico 800-447-4369

North Africa (Cairo) +202 2 480 1466

www.dow.com

Europe +800-3-694-6367*

Asia Pacific +800-7776-7776

Middle East (Dubai) +971 4 453 7000

From Latin America +55-11-5188-9222



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