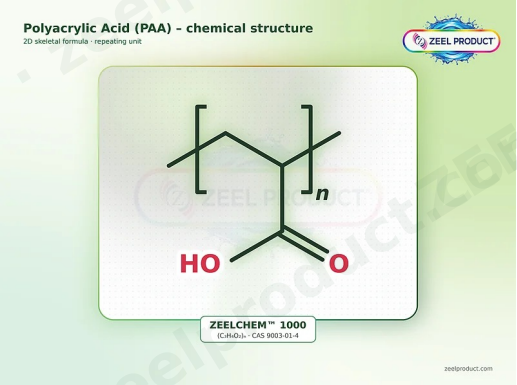
TECHNICAL DATA SHEET (TDS)

Polyacrylic Acid (PAA) — ZEELCHEM™ 1000

Low molecular weight polyacrylic acid for calcium carbonate scale inhibition and dispersion in cooling, boiler and RO water.



Product code	ZEELCHEM™ 1000
Chemical type	Polyacrylic Acid
CAS No.	9003-01-4
HS Code	3906 90 90

1. Product description

ZEELCHEM™ 1000 is a low molecular weight polyacrylic acid (PAA) homopolymer supplied as a clear aqueous solution. Its chain carries one carboxylic acid group on every repeat unit. That high charge density makes it a strong threshold scale inhibitor and dispersant: a few mg/L keeps calcium carbonate, calcium sulphate and suspended mud, silt and corrosion products from depositing on heat-exchanger tubes, cooling-tower fill, boiler surfaces and membranes.

PAA is the most widely used polymer in industrial water treatment. It is used alone in light-duty systems and, more often, blended with phosphonates such as HEDP, ATMP and PBTC and with zinc to build complete cooling water and RO antiscalant formulations. ZEEL PRODUCT manufactures ZEELCHEM™ 1000 in Vadodara, Gujarat, under ISO 9001:2015, ISO 14001:2015 and ISO 22000:2018 systems, and dispatches it across India.

2. Typical properties

Parameter	Typical value
Appearance	Colourless to light yellow, clear viscous liquid
Chemical name	Polyacrylic acid (homopolymer of acrylic acid)
Solid content	≥ 48.0 %
Free monomer (as acrylic acid)	≤ 0.50 %
pH (1 % aqueous solution)	2.0 – 3.0
Density at 20 °C	≥ 1.15 g/cm³
Average molecular weight (Mw)	1,800 – 5,000
Solubility	Completely miscible with water
CAS No.	9003-01-4
HS Code	3906 90 90

Values are typical and not a specification for any particular batch. Each dispatch is supplied with a batch Certificate of Analysis (COA).

3. Chemical identity & synonyms

Chemical name	Polyacrylic acid (homopolymer of acrylic acid)
Formula / structure	$(C_3H_4O_2)_n$
Molecular weight (Mw)	1,800 – 5,000 (low molecular weight)
CAS No.	9003-01-4
Also known as	PAA; poly(acrylic acid); acrylic acid homopolymer; low molecular weight polyacrylic acid; polyacrylic acid 50 %; 2-propenoic acid homopolymer

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4. Mechanism of action

- Threshold inhibition. Polymer anions adsorb on growing $CaCO_3$ nuclei at sub-stoichiometric doses (well below the amount needed to chelate the calcium). This delays crystal growth so the water can hold more scale-forming salt than its saturation limit.
- Crystal modification. Adsorbed polymer distorts the crystal lattice. Hard, adherent calcite turns into soft, irregular crystals that are swept away by flow instead of building a hard scale layer.
- Dispersion. Carboxylate groups add negative charge to particles of clay, silt, iron oxide and precipitated salts. Electrostatic repulsion keeps them suspended so they leave with blowdown instead of settling as sludge.

5. Applications

Application	Function
Open recirculating cooling towers	$CaCO_3$ scale control and dispersion at 2–8 cycles of concentration; base polymer for phosphonate/zinc programs.
Low and medium pressure boilers	Sludge conditioner and dispersant in internal treatment; keeps precipitated hardness fluid for blowdown.
RO / NF membrane antiscalant formulations	Polymer component that controls $CaCO_3$ and disperses colloids in blended antiscalants.
Detergents and cleaners	Anti-redeposition and scale control agent (usually neutralised in situ).
Textile processing	Sequestering and dispersing aid in scouring, bleaching and dyeing baths.
Mining and mineral slurries	Low-cost dispersant for grinding and slurry transport.

6. Recommended dosage

Application	Typical dosage
Cooling tower (continuous)	5 – 15 mg/L as product in recirculating water
Cooling tower in phosphonate blend	20 – 40 % of the blend (blend dosed at 30 – 100 mg/L)
Boiler internal treatment	2 – 10 mg/L in feed water
RO antiscalant formulation	10 – 30 % of formulation
Industrial cleaning/detergent	0.5 – 3 % of formulation

Optimum dosage depends on water analysis, temperature, cycles of concentration and system design. Contact ZEEL PRODUCT for a program recommendation.

7. Benefits

- Excellent calcium carbonate threshold inhibition at low dose
- Strong dispersion of mud, silt and corrosion products
- Fully compatible with phosphonates, zinc, molybdate and azoles
- Non-toxic polymer with no phosphorus, supports low-P discharge
- Easy to blend; clear, low colour solution
- Cost-effective base polymer for formulators

8. Compatibility & formulation

ZEELCHEM™ 1000 is compatible with other ZEELCHEM™ polymers, phosphonates (HEDP, ATMP, PBTC), zinc salts, molybdate, azoles (BTA, TTA) and common oxidising and non-oxidising biocides at use concentrations. Always run a compatibility test before blending concentrated products.

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9. Handling, storage & shelf life

Store in original HDPE carboys or barrels in a cool, shaded, ventilated area between 5 °C and 40 °C. Keep containers closed. Avoid contact with mild steel, copper and aluminium when undiluted, because the acid form is corrosive to them. Use HDPE, PP, PVC or SS316 pumps and lines. Shelf life is 12 months from the date of manufacture in unopened containers.

Safety: Acidic (pH 2–3). Causes eye irritation and may irritate skin. Wear chemical goggles, nitrile/PVC gloves and an apron. On contact, rinse with plenty of water for 15 minutes. Refer to the ZEELCHEM™ 1000 MSDS for full GHS classification.

10. Packing

Standard packs	60 kg HDPE carboy · 240 kg HDPE barrel
Documents	TDS, GHS MSDS and batch COA with every order
Supply	Pan-India dispatch from Vadodara, Gujarat

11. Quality & disclaimer

Manufactured under ISO 9001:2015, ISO 14001:2015 and ISO 22000:2018 certified management systems.

The information in this data sheet is based on our present knowledge and laboratory experience and is given in good faith. It does not constitute a warranty of properties for a specific application. Users must determine the suitability of the product for their own use and comply with applicable laws and regulations.

Prepared by: Technical Department

Approved by: QC Manager / Authorised Signatory

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