WATCHER® WATCH WATER
a Water Company

FILTERSORB
FILTRATION
ADSORPTION
INSTANT PRODUCTS
OXY TREATMENT
SYSTEMS

FLUORIDE TRAPP

SELECTIVE INORGANIC FLUORIDE REMOVAL FOR DRINKING WATER & INDUSTRIAL WASTEWATER

INTRODUCING

A FOCUSED SOLUTION FOR A DIFFICULT ION

FluorideTrapp® is a regenerable, metal-functionalized macroporous medium engineered for the selective removal of dissolved inorganic fluoride.

Fluoride is a small, strongly hydrated anion. In real water, it must be captured in the presence of much larger concentrations of chloride, sulfate and bicarbonate - making dependable fluoride removal a water-chemistry and process-design challenge, not simply a filtration task.

THE CHALLENGE VS. THE RESPONSE

ENGINEERED TO MEET A WATER-CHEMISTRY CHALLENGE

THE CHALLENGE	THE FLUORIDETRAPP® RESPONSE
Competing background salts consume conventional anion-exchange capacity	Immobilized polyvalent-metal sites favor fluoride via ligand exchange
Low finished-water limits demand controlled breakthrough	Macroporous beads support hydraulic access and predictable operation
High-strength industrial streams create large loads and waste volumes	Regeneration enables repeated cycles vs. full media disposal

IAPMO R&T WATER QUALITY PLATINUM SEAL
IAPMO RESEARCH AND TESTING

PREMIUM QUALITY
MADE IN GERMANY

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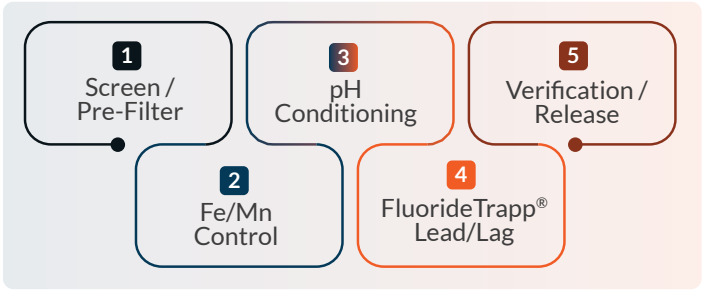
RECOMMENDED TREATMENT TRAIN

A BARRIER APPROACH FOR DRINKING WATER



A lead/lag arrangement permits the first vessel to approach its working capacity while the second vessel protects the outlet. Sample after each vessel. Switch, regenerate or replace the lead bed before the final-water limit is exceeded.

Not a Substitute for Bulk Neutralization

Extremely acidic, concentrated HF-bearing streams may require segregation, neutralization or precipitation first. Never expose the bed to an uncharacterized process discharge.

WORKED SIZING EXAMPLE

Illustrative Sizing — 20 m^3/h Duty

Input	Value
Flow Rate	20 m^3/h
Operating Time	24 h/day
Influent Fluoride	8.0 mg/L
Design Outlet	1.0 mg/L
Cycle Length	5 days
Design Capacity	10.0 g F^-/L media

Calculation	Result
Daily water volume	20 × 24 = 480 m^3/day
Daily fluoride removed	480 × (8.0 − 1.0) = 3,360 g/day
Five-day fluoride load	3,360 × 5 = 16,800 g
Required media volume	16,800 ÷ 10.0 = 1,680 L
Area at 1.2 m bed depth	1.68 ÷ 1.2 = 1.40 m^2
Equivalent vessel diameter	√(4 × 1.40 ÷ π) = 1.34 m
Linear velocity	20 ÷ 1.40 = 14.3 m/h

14.3 m/h falls within the 8–25 m/h design envelope.

SIZING METHOD

DESIGN FROM THE WATER ANALYSIS

A robust system begins with mass balance, hydraulics and a defined breakthrough criterion.

1. Characterize

Fluoride, pH, alkalinity, sulfate, chloride, silica, Fe, Mn, turbidity, TDS, temperature and flow profile.

2. Define target

Set the applicable finished-water or discharge limit and an earlier operational trigger.

3. Establish capacity

Use representative-water testing or approved design data; apply a safety factor for variability.

4. Size the bed

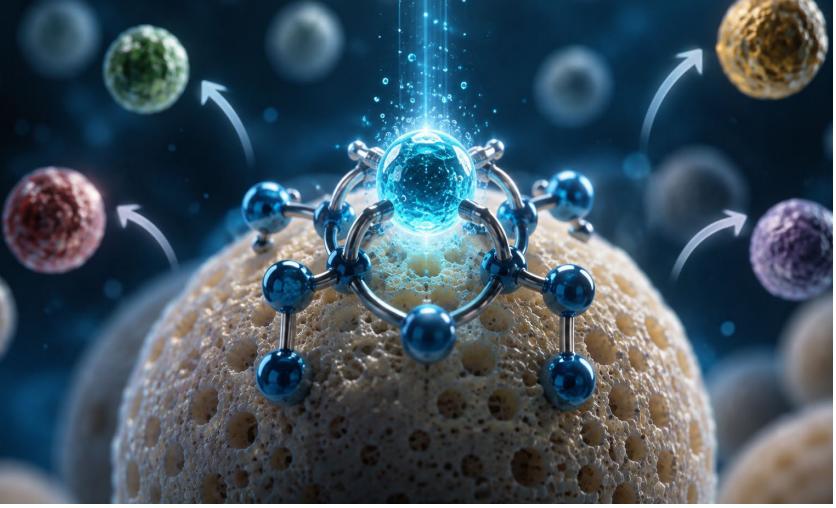
Calculate fluoride mass load, cycle capacity and media volume; then verify bed depth and linear velocity.

5. Protect operation

Provide sampling points, flow control, pressure gauges and suitable residual handling.

Core sizing equations

$mF = Q \times (Cin - Cout) \times t$	$Vmedia = mF \div Cdesign$
$A = Vmedia \div Hbed$	$v = Q \div A$



CONTROL FACTORS

HOW SELECTIVE FLUORIDE CAPTURE WORKS

A practical explanation of the binding mechanism and the water conditions that control performance.

The supplied active form contains immobilized polyvalent-metal complexes on a chelating aminomethylphosphonic-acid matrix. Fluoride interacts strongly with these metal centers. The simplified reaction below represents the exchange concept; it is not intended as a complete surface-speciation model.

$$\equiv M\text{–}OH + F^- \rightleftharpoons \equiv M\text{–}F + OH^-$$

Factor	What Happens	Design Response
pH	pH affects fluoride speciation and hydroxide competition, influencing binding capacity.	Preferred window pH 5.5–8.0; condition feed if justified
Alkalinity	Bicarbonate/carbonate alter speciation and usable capacity	Include alkalinity in bench/pilot testing
Sulfate / chloride	High ionic strength changes mass transfer and capacity	Test the complete water matrix
Iron / manganese	Precipitates coat active surfaces, raise pressure loss	Target Fe <0.10 mg/L, Mn <0.05 mg/L upstream
Suspended solids	Solids foul the bed and shorten run length	Filter to <2 NTU at the media inlet
Hydraulics	Excess velocity/channeling reduces contact	Even distribution, adequate depth, verify ΔP

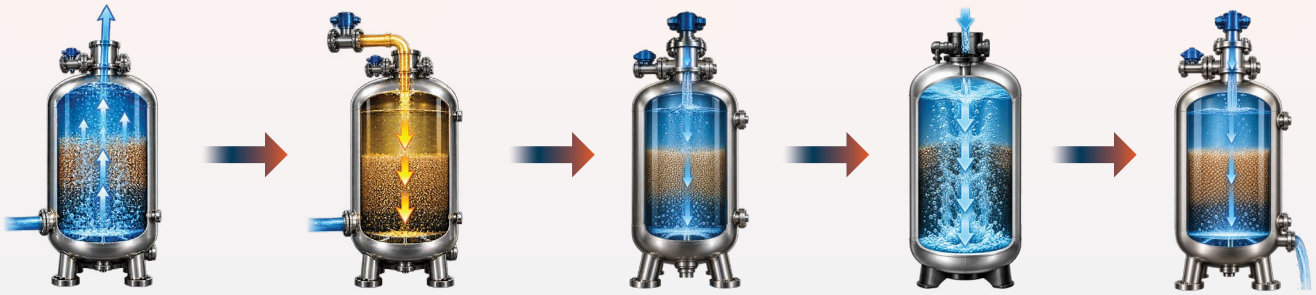
SPECIFICATIONS

MEDIA SPECIFICATIONS & DESIGN ENVELOPE

Parameter	Reference Value
Media Type	Macroporous Polyvalent-Metal-Functionalized Trapp Media
Functional Chemistry	Chelating aminomethylphosphonic acid matrix
Physical Form	Spherical Beads; Beige / Opaque
Bead-Size Distribution	0.40–1.25 mm
Uniformity Coefficient	≤ 1.4
Bulk Density	750–830 g/L
Indicative Operating Capacity	8–14 g F^-/L media
Moisture Retention	50–60%
pH Stability Range	1.0–10.0 (preferred 5.0–8.0)
Max. Operating Temperature	80 °C (176 °F)

Hydraulic Parameter	Preliminary Guidance
Minimum Bed Depth	800 mm
Preferred Industrial Bed Depth	1,000–1,200 mm
Service Linear Velocity	8–25 m/h (8–12 m/h drinking-water start)
Volumetric Service Rate	8–20 BV/h
Freeboard	50–75%
Backwash Water	Treated water preferred

FIVE-STEP REGENERATION CYCLE



Backwash
12–18 m/h for 10–15 minutes.

Elute + Reload
2–4% NaOH plus approved activator.

Slow Rinse
2–3 BV displacement.

Fast Rinse
4–6 BV at service rate.

Return
Verify quality, then return to service.

TROUBLESHOOTING & STEWARDSHIP // OPERATING GUIDANCE

Observation	Likely Cause	Corrective Action
Early fluoride breakthrough	High pH; overload; excess velocity; channeling	Confirm analysis/flow; inspect distribution; review capacity basis
Increasing pressure drop	Solids, precipitate, inadequate backwash	Check ΔP; improve pretreatment; backwash within range
Declining capacity after cycles	Fe/Mn fouling; incomplete reload; matrix change	Analyze feed/regenerant; confirm sequence; inspect media
Unexpected outlet result	Sampling error; contaminated rinse; bypass leakage	Resample with validated method; isolate bypass; verify rinse endpoint

APPLICATIONS // WHERE FLUORIDETRAPP® FITS

- Municipal drinking water
- Community drinking water
- Chemical manufacturing
- Semiconductor and photovoltaic production
- Glass etching and finishing
- Private and decentralized supplies

Standard Packaging

Packaging	Weight of product	Quantity/ pallet	Gross Wt./ pallet
Bag (25 L)	20 kg	40	825 kg

★ *Other packaging can be considered on request*

Storage: Keep sealed indoors in a dry area at 5–40 °C. Prevent freezing and dehydration.

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