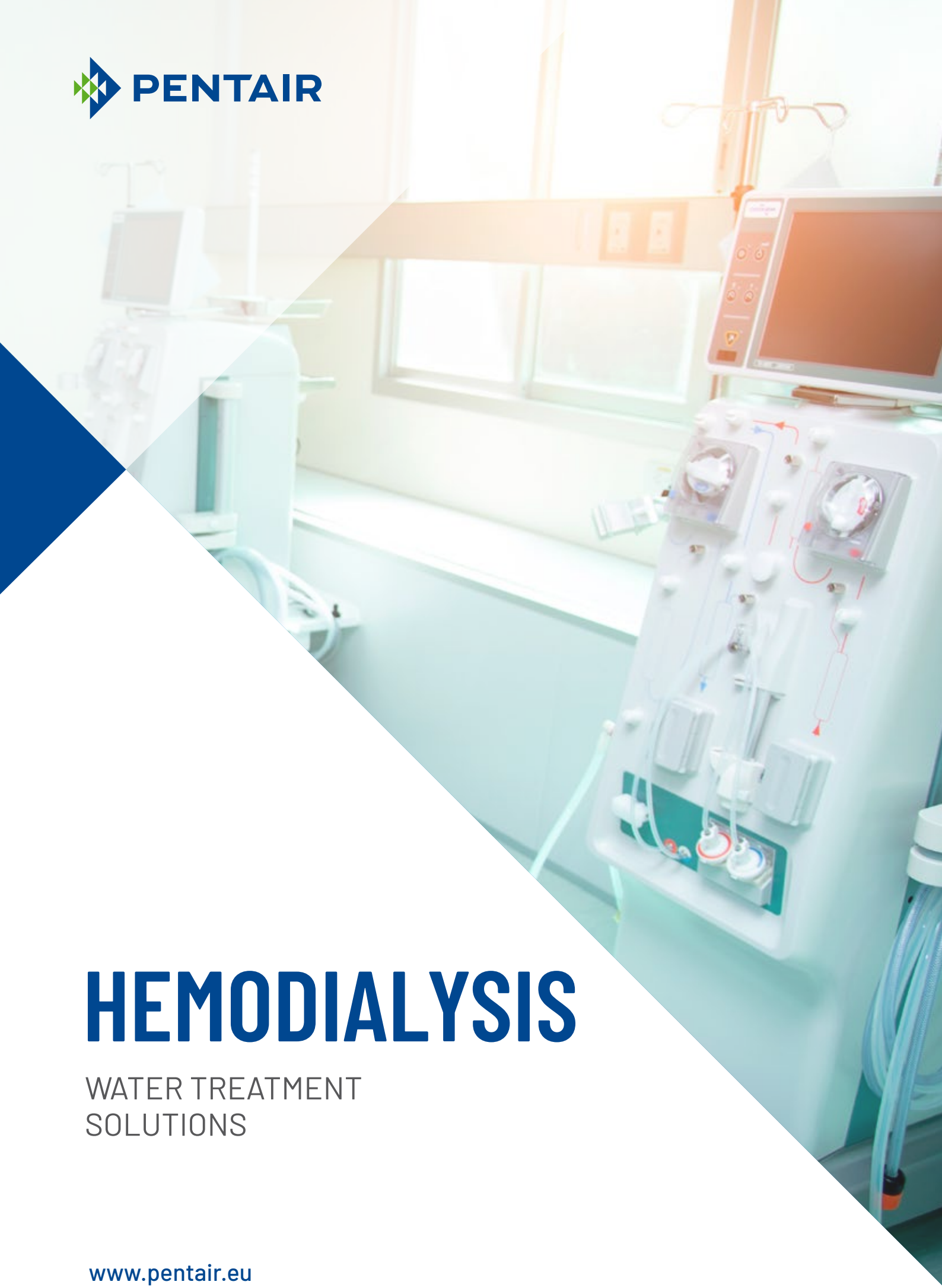
PENTAIR



HEMODIALYSIS

WATER TREATMENT
SOLUTIONS

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HEMODIALYSIS

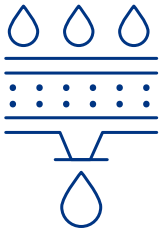
Dialysis is sustaining and saving literally millions of lives every year. When healthy kidneys stop fully functioning, dialysis can step in – filtering waste, removing a build-up of harmful toxins and keeping the body alive. This is a complex therapy and crucial to its success is a guaranteed supply of purified water.

Every dialysis unit creates its live-giving dialysate solution from a bath of purified water, electrolytes and salts. Any chemical or microbiological contamination in that water can have a serious impact on patients.

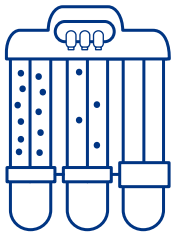
Water for dialysis must meet the most exacting quality standards, requiring softening, carbon filtration, reverse osmosis and deionization before it can be used.

The components used to treat the water, along with the storage and distribution loop, must be of the highest possible grade. Here, we explore the water purification process for dialysis and the important part played by Pentair products.

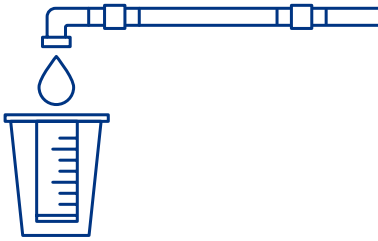
DIALYSIS WATER TREATMENT PROCESS



PRE-TREATMENT
Tap water is preliminary softened to remove naturally occurring minerals. It is also subject to carbon filtration to remove any added chlorine and chloramines.



PURIFICATION
Reverse osmosis involves pumping through a membrane. As a back-up, and further purification stage, water can be deionized before use in the dialysate solution.



TESTING
Regular testing of the water takes place at every stage. Pre-treated water can be tested daily for chlorine and chloramines. Purified water should be constantly monitored for bacteria and endotoxin levels against strict threshold levels.

IMPORTANCE OF A COMPLIANT DIALYSIS WATER TREATMENT SYSTEM

- Meeting of international and national safety standards*
- Consistency of supply with minimal downtime
- Reduced risk of infection from contamination
- Improved patient outcome

BENEFITS OF PENTAIR DIALYSIS WATER TREATMENT SYSTEM

- World-leader in water treatment solutions with portfolio of leading brands
- Integrated end-to-end water treatment solution from single-source supplier
- Proven track record in exacting clinical environments†
- Mission to build sustainability into water treatment products and operations

WATER TREATMENT PROCESS FOR DIALYSIS

The next page illustrates how Pentair products work together to provide a safe and effective water treatment solution for dialysis.

DIALYSIS WATER TREATMENT PROCESS

1 SOFTENING

Removal of calcium and magnesium

The valve is key to a softener's performance. Pentair Autotrol Performa Cv Logix is designed for multiple softener tanks and its backwash capabilities accommodate a wide range of sizes. A time-tested 'flapper' provides a frictionless sealing for a long service life and stored programming will not be lost due to power outages.

MORE INFO

Pentair Autotrol Performa Cv Control Valve 278

2 CARBON FILTRATION

Removal of chlorine, chloramines and organic compounds

Pentair carbon filtration products include a wide range of filter housings and carbon cartridges. Pentair Big Blue Polypropylene housings accommodate its FloPlus cartridges which offer a unique dirt holding capacity with no fine release and are shown to reduce cysts and bacteria.

MORE INFO

Pentair FloPlus

3 REVERSE OSMOSIS

Further purification step takes care of dissolved solids and contaminants

Pentair RO systems offer the finest level of water filtration available – filtering particles as small as 1/1000 of a micron. Thanks to its customizable design, the Modular Pro series can be easily set up into various configurations to meet a wide range of water filtration needs and applications.

MORE INFO

Pentair Modular Pro Series

4 DEIONIZATION

Ion exchange process removes ionized or ionizable foreign substances

This chemical process will remove ionized or ionizable foreign substances from water and provides an additional back-up step for dialysis systems. Pentair offer a range of suitable tanks and valves including the state-of-the-art SIATA valves that simplify the process of operating and maintaining deionization tanks.

MORE INFO

Pentair SIATA V250

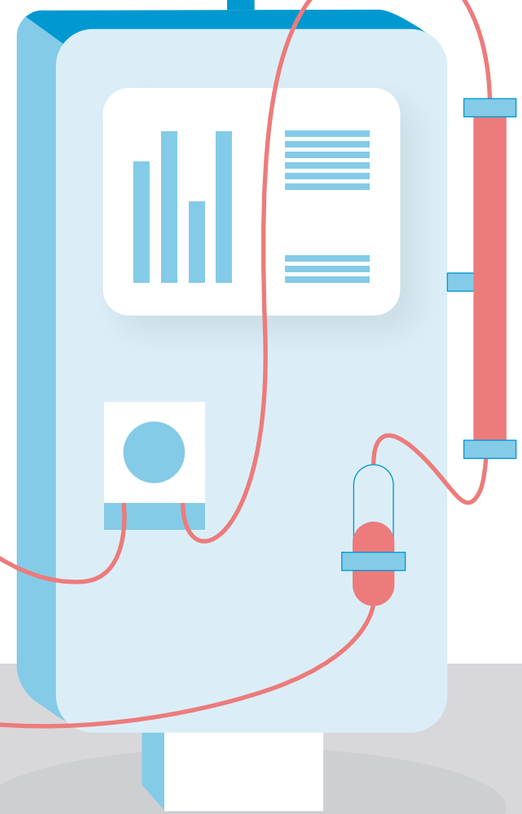
5 STORAGE AND CIRCULATION

Tanks, pumps and pipework constructed from inert materials and easy to disinfect

Storage and circulation to the dialysis stations must be free from contamination. For storage, Pentair WellMate tanks provide a high-density polyethylene inner liner and an epoxy resin-sealed outer shell, with no steel so they will not rust. Half the weight of steel, they are easy and fast to install and maintain. Pumps circulate the dialysate solution, meeting the most exacting standards for hygiene and reliability.

MORE INFO

Pentair WellMate Boosting pressure tanks



Fact and figures

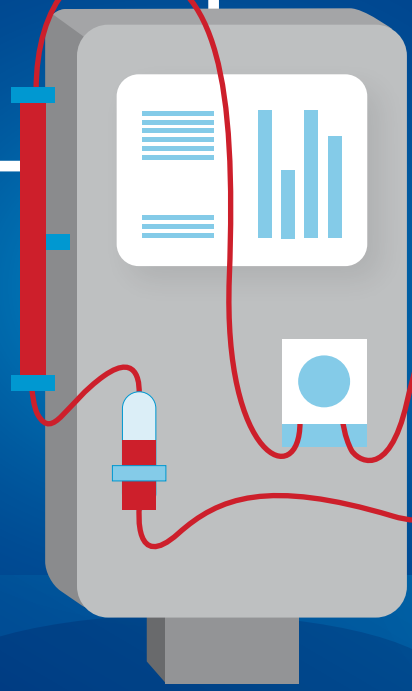
560
liters per week
Water required for typical dialysis patient

180
liters per day
Blood filtered by working kidneys

10%
Worldwide population affected by chronic kidney disease

204
billion liters annually
Estimated freshwater consumed by dialysis treatment

3.4
million
People worldwide benefitting from dialysis



PROCESSES

- **Carbon tank absorption**
  Water is exposed for at least 10 minutes for chloramine to bind to the carbon filters. The allowable concentration of chloramine is <= 0.1 parts per million.
- **Reverse Osmosis**
  Reverse osmosis can remove 95% of ionic contaminants
- **5 Angstrom**
  Size of particles removed by reverse osmosis
- **1 Million Angstrom**
  Size of a human hair
- **260 psi**
  Pressure exerted in reverse osmosis tank

Did you know?

Chemicals in drinking water can have serious health effects so the levels permitted in dialysis water are greatly reduced.

Chemical	Drinking water limit *(milligrams per liter)*	Dialysis water limit *(milligrams per liter)*	Potential effect in dialysis
Aluminum	0.05 – 0.2	0.01	Dialysis dementia
Chloramine	4.0	0.1	Acute hemolytic anemia
Fluoride	4.0	0.2	Toxicity, bone disease
Lead	0.015	0.005	GI pain, muscle weakness
Nitrate	10	2.0	Nausea, metabolic acidosis

MKT-BRO-060-EN-A

About us

At Pentair, we believe the health of our world depends on reliable access to clean water. We deliver a comprehensive range of smart, sustainable water solutions to homes, business and industry around the world. Our industry leading and proven portfolio of solutions enables people, business and industry to access clean, safe water, reduce water consumption, and recover and reuse it. We help ensure water is clean when returned to the environment. Whether it's for fitness and fun, healthier homes, better flood control, safer sky rises, more sustainable ways to farm, or safe drinking water for those who need it most, we won't stop until the world's water is managed the best way possible.

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Sources

*Quality requirements for the water and concentrates for dialysate are provided in a series of standards issued by the International Organization for Standardization, The British Standards Institute and the Standards Council of Canada.

- ISO 23500-1:2019: Preparation and Quality Management of Fluids for Haemodialysis And Related Therapies
- BS EN ISO 23500: 2015: Guidance for the preparation and quality management of fluids for haemodialysis
- CSA Z23500-1-2020: Preparation and Quality Management of Fluids for Haemodialysis And Related Therapies

† Pentair products are used for Dialysis water treatment at Lausanne University Hospital and Neuchatel Hospital in Switzerland.

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