

Water Technologies

N<sub>x</sub>Clear<sup>®</sup>,  
Astrasand<sup>™</sup>,  
N<sub>x</sub>Clear Jr.<sup>™</sup>  
Denitrification  
Filters

**SIEMENS**



# Downflow Technology

With N<sub>x</sub>CLEAR® denitrification filters, Total Nitrogen (TN) can be reduced to desired levels, economically and on virtually any scale. This efficient approach to denitrification requires only minimum volumes of methanol for the maximum metabolism of nitrates into non-toxic nitrogen gas.

N<sub>x</sub>CLEAR® denitrification filters employ a downflow design for true deep-bed filtration. These filters employ both air scour and backwash cycles to manage bacteria populations, and encourage the release of nitrogen gas. The process is completely PLC controlled, which keeps operator attention at a minimum. In addition, the N<sub>x</sub>CLEAR® filter "multi-cell approach" allows individual cells to backwash, while other cells remain in service to provide continuous filtration/denitrification capability.

N<sub>x</sub>CLEAR® and N<sub>x</sub>CLEAR Jr.™ denitrification filters are available in steel packages for 25,000 gpd to 750,000 gpd. They are also available for concrete installations (See Chart) from 500,000 gpd to millions of gpd in multiple units.

The N<sub>x</sub>CLEAR® filter is available with the modular MULTIBLOCK® underdrain, which ensures a fully-balanced flow distribution during backwash and provides a high-strength, corrosion-free filter support.

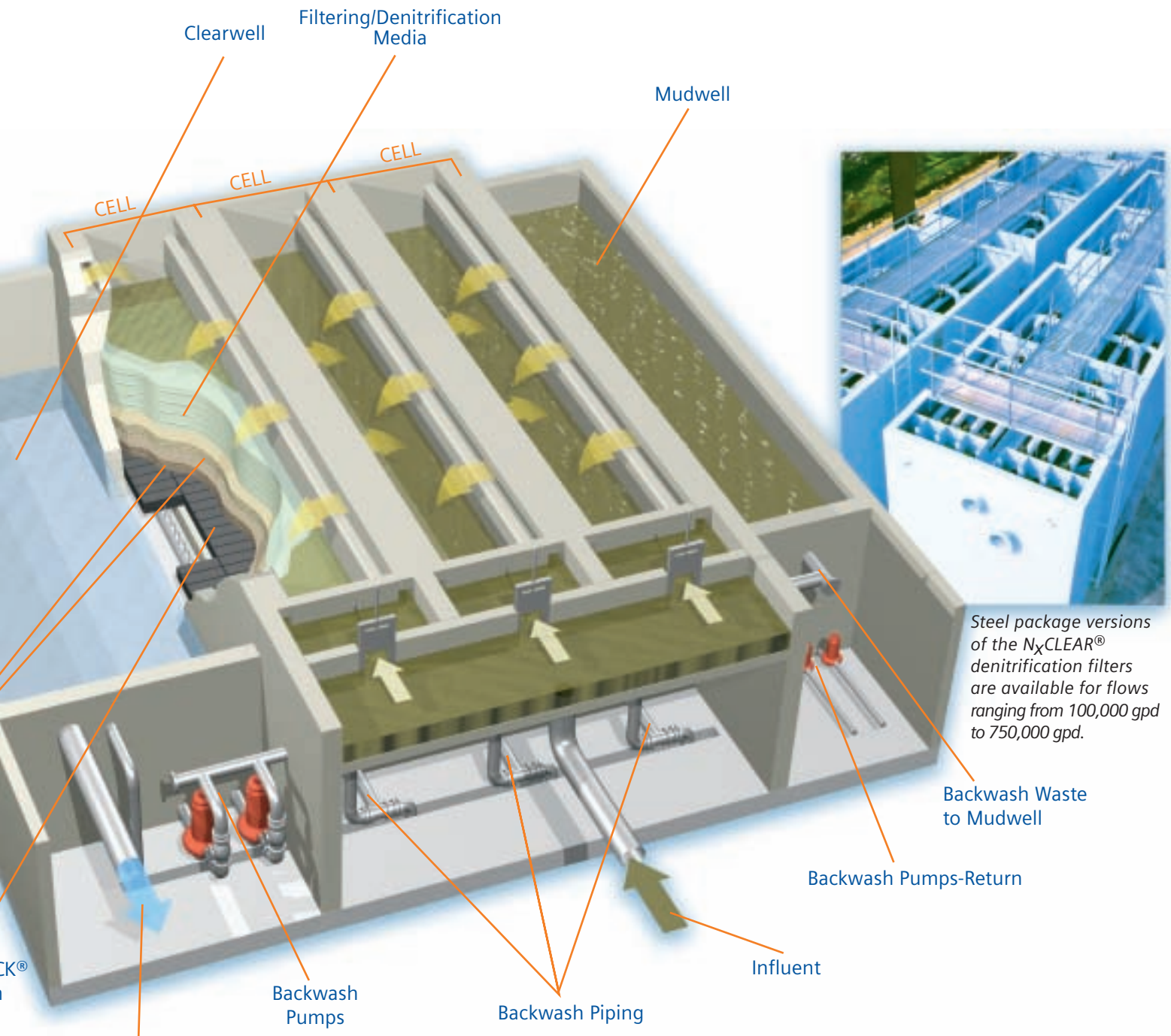


- A good choice when facing very low nitrate discharge limits
- Simpler and more cost-effective if treatment plant expansion is not an option
- The filtration approach enhances solids removal
- Maximum flow-rate flexibility
- Cells backwash individually for continuous availability

*MULTIBLOCK® modular underdrain components ensure an even distribution of backwash hydraulic energies as well as provide a durable, corrosion-free deep-bed support. MULTIBLOCK® underdrains are easy-to-install and are virtually maintenance free.*

Support  
Gravel

MULTIBLOCK  
Underdrain  
Option



Steel package versions of the N<sub>x</sub>CLEAR<sup>®</sup> denitrification filters are available for flows ranging from 100,000 gpd to 750,000 gpd.

Downflow Technology	Upflow Technology	Steel Package Gallons-Per-Day	Concrete Gallons-Per-Day	BEFORE Typical Feed mg/L NO <sub>x</sub> -N	Estimated Methanol (CH <sub>3</sub> OH) milligram per milligram of NO <sub>x</sub> -N removed	AFTER Typical Filtrate mg/L NO <sub>x</sub> -N
N <sub>x</sub> Clear <sup>®</sup>		100,000 to 750,000	500,000 +	5 to 25	3	<1
N <sub>x</sub> Clear Jr. <sup>™</sup>		25,000 to 100,000		5 to 25	3	<1
	ASTRASAND <sup>™</sup>	32,000 to 760,000	760,000 +	5 to 50	3	<1

# Upflow Technology



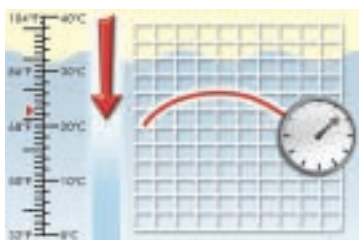
ASTRASAND™ denitrification filters employ a unique upflow technology for the management of bacteria populations. The upflow approach allows the filter to operate continuously, as backwashing of the media is an integral part of the filtering process (see diagram).

and are at the cutting-edge of upflow technologies.

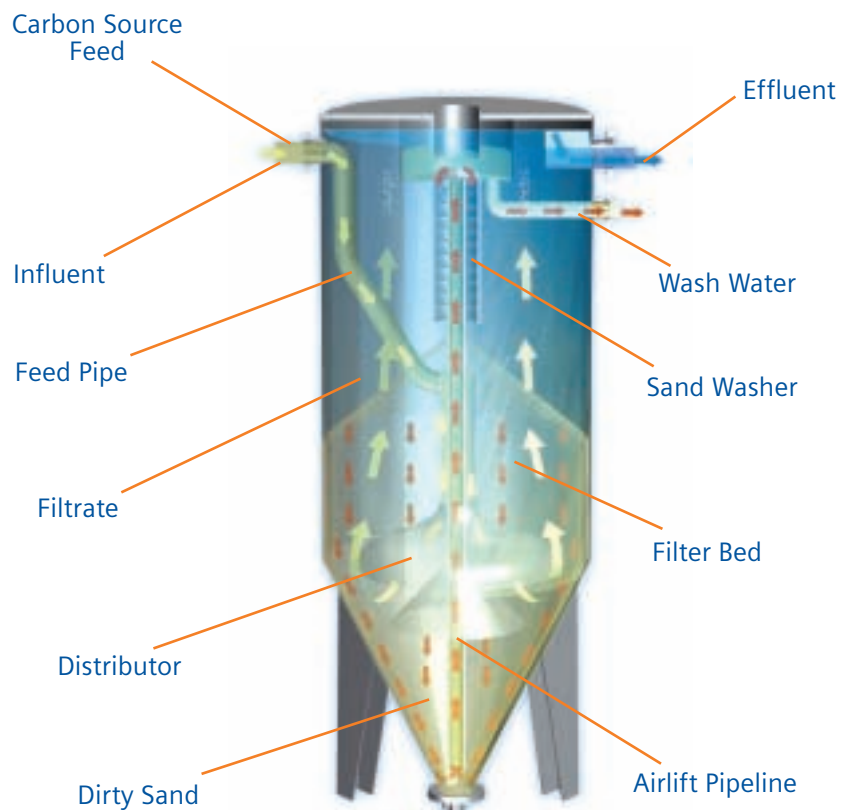
ASTRASAND denitrification filters are available in steel and concrete package designs from 32,000 gpd to 760,000 gpd, or millions of gpd in multiple units.

Proprietary ASTRASAND™ filter components have proven their reliability in more than 300 installations worldwide

Advanced monitoring and management systems ensure optimum control and optimum nitrogen removal.



- Continuous upflow design
- No interruptions for backwash
- Small footprint
- No moving parts
- Low headloss
- Low air consumption



# Why Denitrification Is Important

left:

Denitrifying bacteria convert nitrates into free-nitrogen through the metabolism of a carbon source, such as methanol. The process of converting organic nitrogen into nitrogen gas is often referred to as The Nitrogen Cycle.

Below:

Where appropriate, Siemens denitrification filters incorporate the advanced Siemens S7-200 programmable logic controller and touchscreen systems. Setpoints, filter status viewing and other operational information are provided along with customizable operator input to facilitate fully automated process control.



Nitrogen is usually present in wastewater, and though it may change forms during treatment, it can only be effectively removed through the use of a denitrification process.

When nitrogen is not effectively removed, and treatment plant effluent containing appreciable amounts of nitrogen is discharged, the excess nitrogen can cause a dramatic increase in algae and plant growth in the receiving waters. When this excessive growth dies and decays, it rapidly consumes most of the available oxygen and literally suffocates naturally found organisms—such as fish and other small waterborne invertebrates. For this reason, regulators in many areas of the country are requiring that the release of nitrogen compounds be dramatically reduced.

Fortunately, Siemens Water Technologies has a complete selection of denitrification filter technologies that are both efficient and well proven. These technologies are advanced wastewater treatment processes that convert harmful nitrate-nitrogen into nitrogen gas and—in the process—remove suspended solids from secondary effluent.

Here's how it works: effluent from a secondary treatment plant or other source is introduced into the filters. Methanol is injected as a carbon source to sustain the growth of denitrifiers. The conversion of nitrate to free-nitrogen (a gas) is accomplished by denitrifying bacteria that grow on a media surface. The bacteria consume the injected methanol and use the oxygen in the nitrate molecule. As a result, the nitrogen is released from the water as a gas.



N<sub>x</sub>CLEAR Jr.<sup>™</sup> denitrification filters are ideal for flows ranging from 20,000 gpd to 100,000 gpd. They are provided as steel packages for quick installation and simplified operation. N<sub>x</sub>CLEAR Jr.<sup>™</sup> filters have all of the process advantages of N<sub>x</sub>CLEAR<sup>®</sup> filters but are designed specifically for smaller-scale applications.

N<sub>x</sub>CLEAR Jr.<sup>™</sup> filters offer steel package convenience and economy with the added benefit of quick delivery.



**TYPICAL EFFLUENT LIMITS**  
Siemens Denitrification Filters can help to meet all of these Advanced Treatment Effluent Requirements.

5	5	1	3	1
mg/L BOD	mg/L TSS	mg/L NH <sub>3</sub> Ammonia Nitrogen	mg/L Total Nitrogen	mg/L Phosphorus

## DENITRIFICATION FILTER TECHNOLOGY IS IDEAL FOR:

- Upgrading Existing
- Secondary Treatment
- Plants to Advanced
- Wastewater Treatment and Tertiary Filtration

For further information please  
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The information provided in this brochure contains merely general descriptions or characteristics of performance which in actual case of use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of the contract.

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