

Economical. Effective. Safe.

Water Treatment for Unconventional Oil & Gas



ClorTec® On-site Sodium Hypochlorite Generator



Economical Water Treatment

The water required for unconventional oil & gas development already exceeds the freshwater availability in many areas. The demand will continue to grow as more and more unconventional wells are drilled, making produced water recycling critical in most of the major shale plays. The produced water not recycled for fracking must be disposed of safely and economically.

De Nora ClorTec® technology brings significant cost savings to unconventional oil and gas water treatment with a simple but extremely effective process. On-site sodium hypochlorite generation (OSHG) for frack water disinfection and produced water recycling is highly effective, economical, and safe. The proprietary DSA® cells used in the electrochlorination process were developed by De Nora. As pioneers of electrochlorination solutions, De Nora offers the technical experience and the most advanced technology on the market.

ClorTec® OSHG systems have been deployed at hundreds of frack stages for on-the-fly disinfection of frack water, multiple central batteries, recycling centers and saltwater disposal wells (SWDs). The technology, a critical component of a cost-effective produced water recycling process, is being successfully used by multiple operators, service companies, and water management entities.

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For both produced water recycling and frack water disinfection, ClorTec® OSHG generates a disinfectant that provides 100% bacterial kill, a long-lasting residual, inorganic contaminant removal including heavy metals and hydrogen sulfide, and costs less than conventional disinfection methods...without requiring or generating hazardous chemicals. Salt Water Disposal (SWD) facilities and wells will realize less buildup of solids, reducing SWD well pressure, and decreasing the number of SWD well workovers.

Salt + water + electricity =
DISINFECTANT

Significant cost reduction when compared to other disinfection methods

No hazardous chemicals generated

No hazardous precursors required – just salt and water



ClorTec® DN Gen II
On-site sodium hypochlorite generator

De Nora is a global leader in sustainable technologies, offering energy-saving products and water treatment solutions for nearly 100 years. Pioneering the development of electrodes for electrochemical processes, the company now has more than 6,000 installed electrochlorination systems around the world, serving clients in 119 countries. De Nora's intellectual property portfolio contains 355 patent families with more than 3,000 territorial extensions and 90 trademarks around the world.

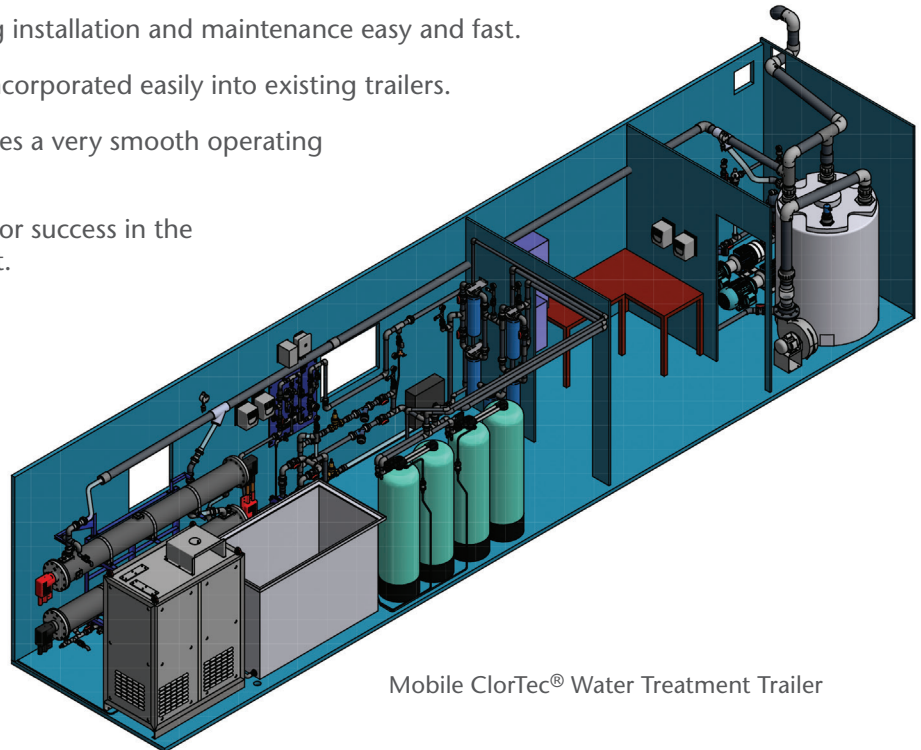


Fully Contained Mobile Units

ClorTec® OSHG systems generate a 0.8% sodium hypochlorite disinfection solution, a chlorine equivalent, using three common consumables: salt, water, and electricity. Systems are housed in fully automated trailers with remote monitoring and control.

ClorTec® OSHG offers specific advantages over other systems:

- The cells are very easy to access, making installation and maintenance easy and fast.
- A small footprint allows systems to be incorporated easily into existing trailers.
- Minimal controls and equipment provides a very smooth operating experience.
- Systems are simple but rugged, crucial for success in the unconventional oil and gas environment.
- Flexible payment options include lease-to-own, pay-as-you-go, and pay-only-what-you-produce.
- Unmatched efficiencies in on-site sodium hypochlorite generation in the oilfield.



Mobile ClorTec® Water Treatment Trailer

Produced Water Recycling

- 98%+ Iron removal
- 85%+ TSS removal
- 100% bacterial kill
- 100% H₂S removal
- Involved in millions of barrels of recycled water

Frack Water Disinfection

- 100% bacterial kill (SRB and APB)
- Removes H₂S from well water
- Fully automated trailerized units
- Remote monitoring and control
- Over 15 million barrels of frack water successfully disinfected to date

* Operating costs per barrel in terms of salt, power, and water – does not include labor



Global Aftermarket Support

To provide a premium customer experience, De Nora offers after-sale support program in four areas:

Technical Service and User Training

Anywhere in the world, De Nora factory-trained technicians train to properly use and maintain your products. De Nora provides a 24/7 contact center so that you can reach us wherever you are.

Spare Parts and Consumables

Supplied directly from De Nora Water Technologies and guaranteed to be produced to the original specifications and tolerances for exact form, fit and function.

Upgrades & Retrofits

De Nora will guide you through the process of bringing your facility up to current specifications.

Asset Management and Solutions

De Nora Water can help to assess the performance of your water treatment system in respect to your current and future throughput/capacity and quality goals.

