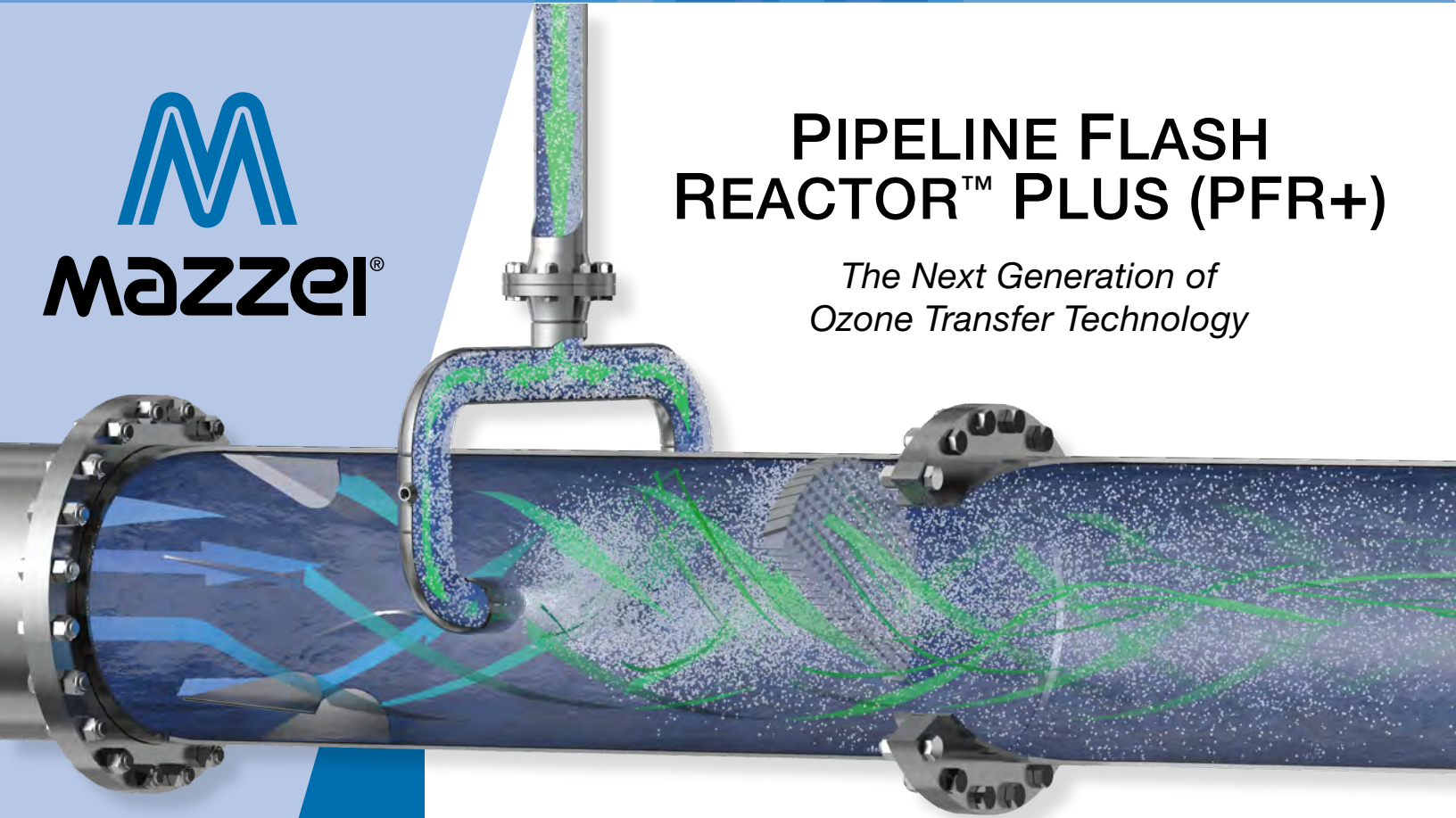




# PIPELINE FLASH REACTOR™ PLUS (PFR+)

*The Next Generation of  
Ozone Transfer Technology*



## PIPELINE FLASH REACTOR PLUS (PFR+)

### Pipeline Flash Reactor Plus (PFR+)

Today's high dosage ozone systems, such as those required by water reuse projects, place extraordinary energy and mixing demands on ozone mass transfer. Mazzei utilized multiphase computational fluid dynamics (CFD) analyses to develop the new PFR+ to address these challenges. CFD modeling was used to design, position and validate performance of the new, patented flow conditioning vanes and post-injection blending grid. The same, proven mass transfer mixing nozzles used in the original pipeline flash reactor (PFR), are also part of the PFR+.

#### PFR+ Benefits

- Aggressive Mixing
- High Ozone Mass Transfer
- Minimal Head Loss
- Exceptional Turndown
- Compact Design

#### **PLUS...**

- Ideal for High Ozone Dosage  
and Large Plant Turndown Designs

*World Leader  
in Mixing and  
Contacting  
Technologies*

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Flow Conditioning Vanes



Post-injection Blending Grid



Mass Transfer Mixing Nozzles

By folding, blending and mixing without obstructing the flow, the PFR+ facilitates thorough contacting at a wide range of flow rates and velocities without creating a significant pressure drop through the system. The result is a mixing design that makes more efficient use of ozone—reducing the need for excess ozone production along with the associated energy and oxygen costs—while also minimizing energy demand.

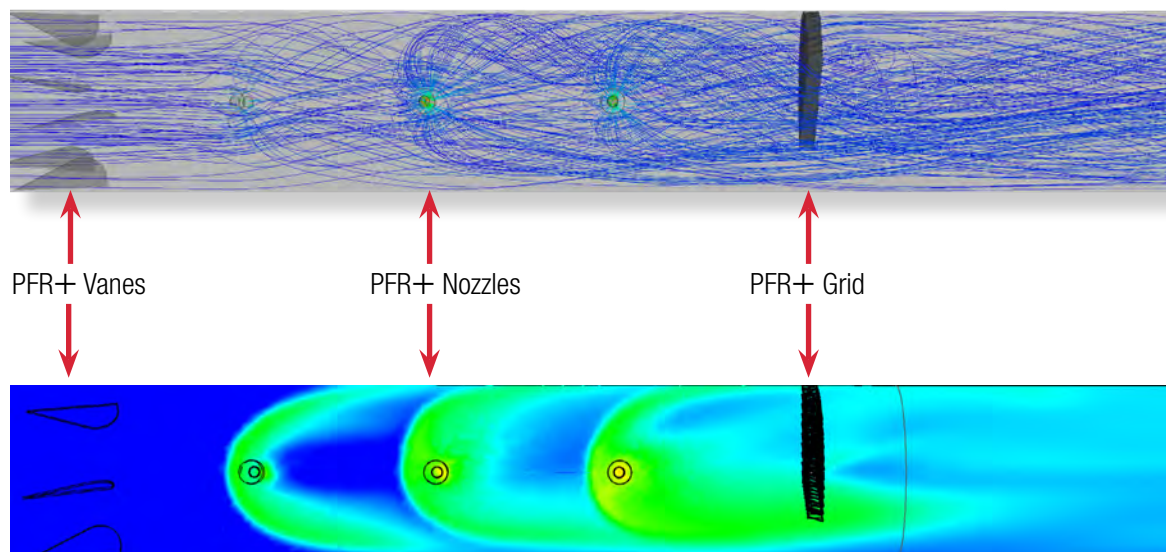
### Mazzei Sidestream Gas Injection

The PFR and the PFR+ are widely used with a Mazzei sidestream gas injection skid for a complete ozone dissolution system for disinfection and advanced oxidation. In these systems, a small portion of the main pipe water flow is diverted into a sidestream. Using Mazzei venturi injectors, ozone gas is injected into the sidestream. This two-phase flow is then sent to the PFR or PFR+ which then utilizes high velocity mixing to transfer the ozone enriched sidestream into the bulk water flow. Ozone mass transfer occurs within seconds and eliminates the need for additional basin gas contacting.

#### Benefits of Both the PFR and PFR+

- Small Footprint
- High Mass Transfer
- Advanced Turndown Capability
- Stable Residual
- Lower Bromate Formation Than Gas Diffusion

#### Flow Patterns and Mixing in the PFR+



To get a better understanding of how the PFR+ works, [check out this animation](#)



Contact us today.

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