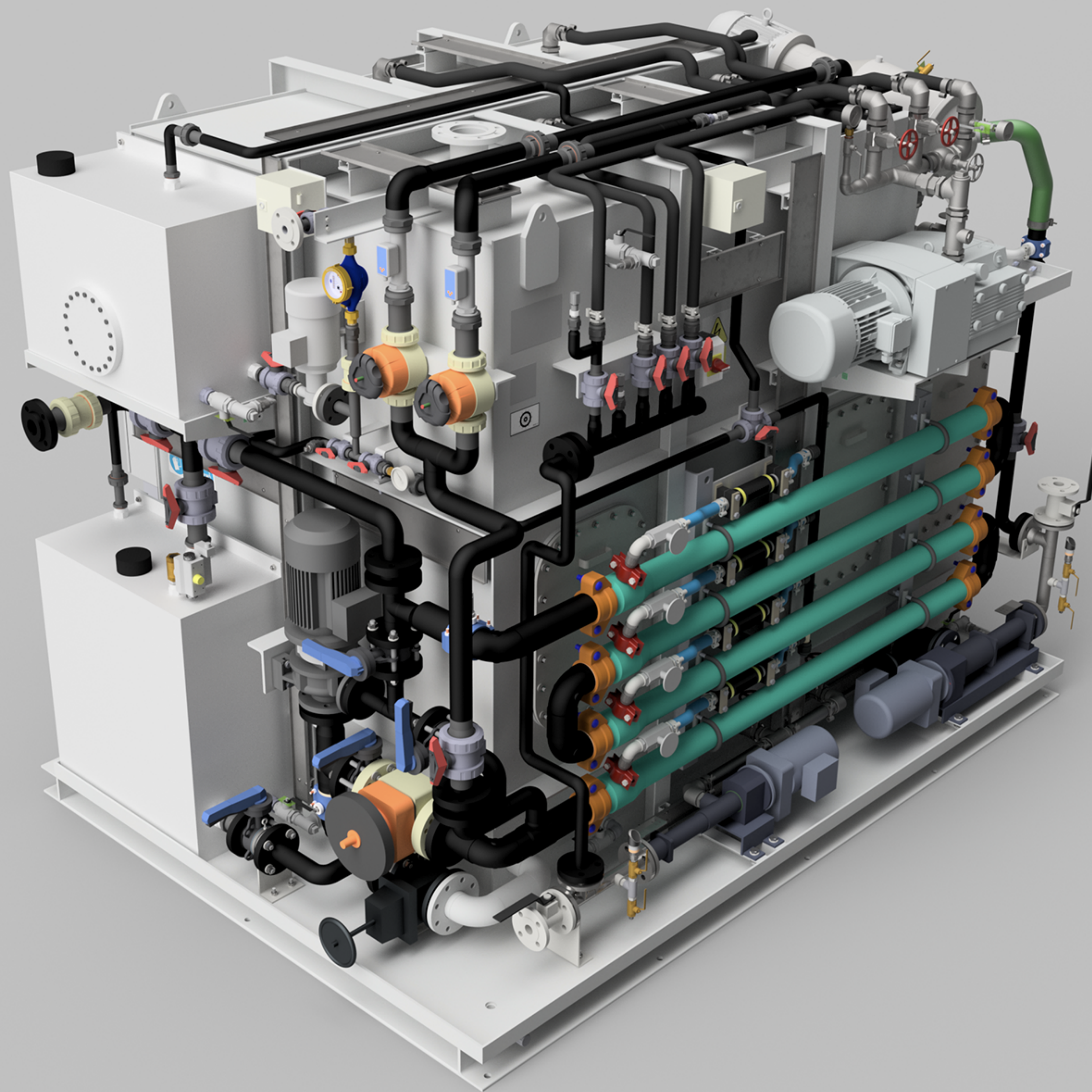


WASTEWATER TREATMENT

ULTRA TRIDENT (MBR)

ULTRA TRIDENT (MBR)

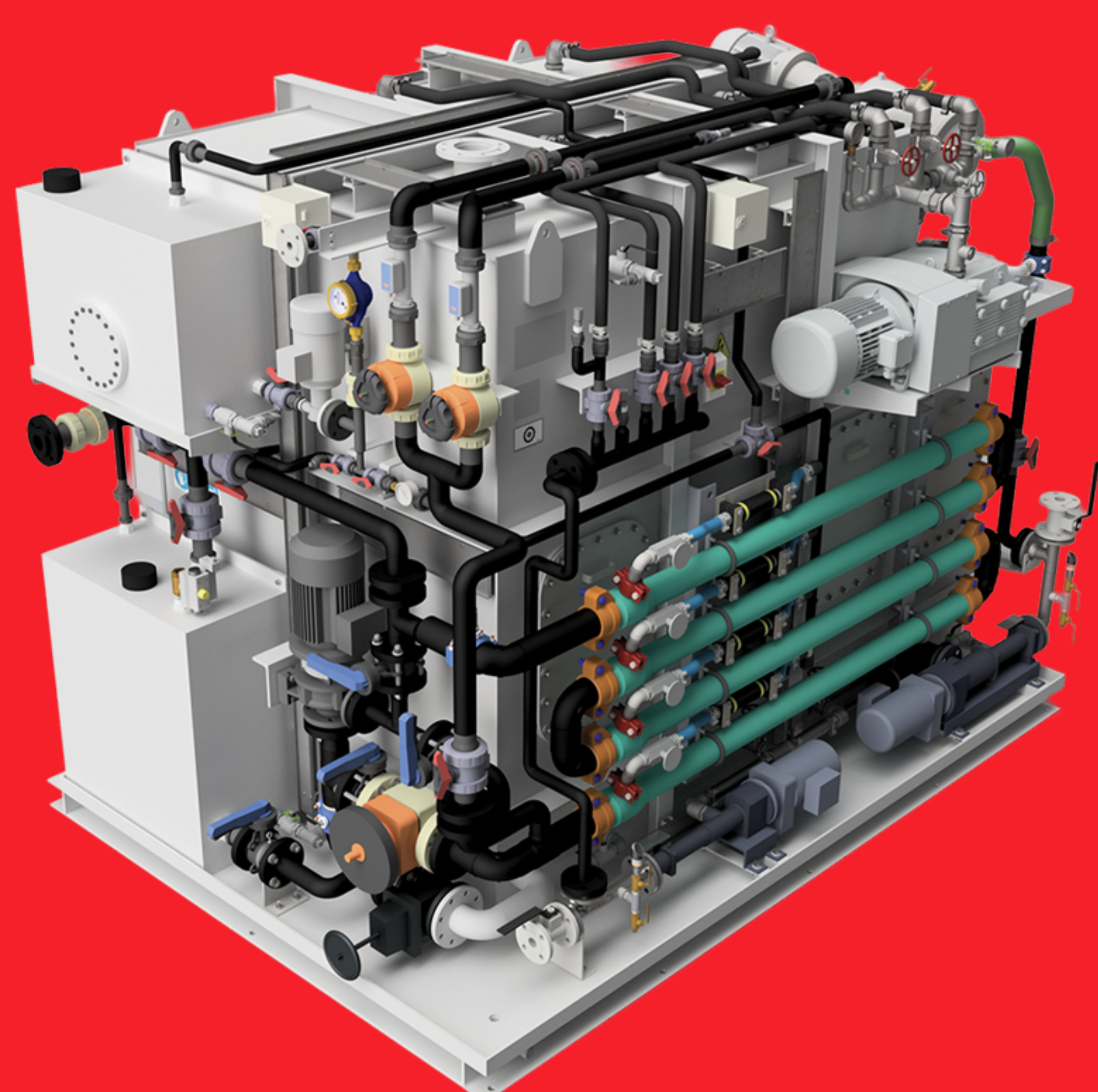


Hamworthy has supplied wastewater treatment systems to the marine & offshore market for over 50 years.

As environmental regulations continue to evolve, ensuring that your ship's effluent is clean and safe is an operational priority. Understanding and keeping up with these legislative requirements can be a challenge.

Hamworthy has a proven track-record in developing technology that meets anticipated environmental standards and has set the global benchmark in shipboard wastewater management.

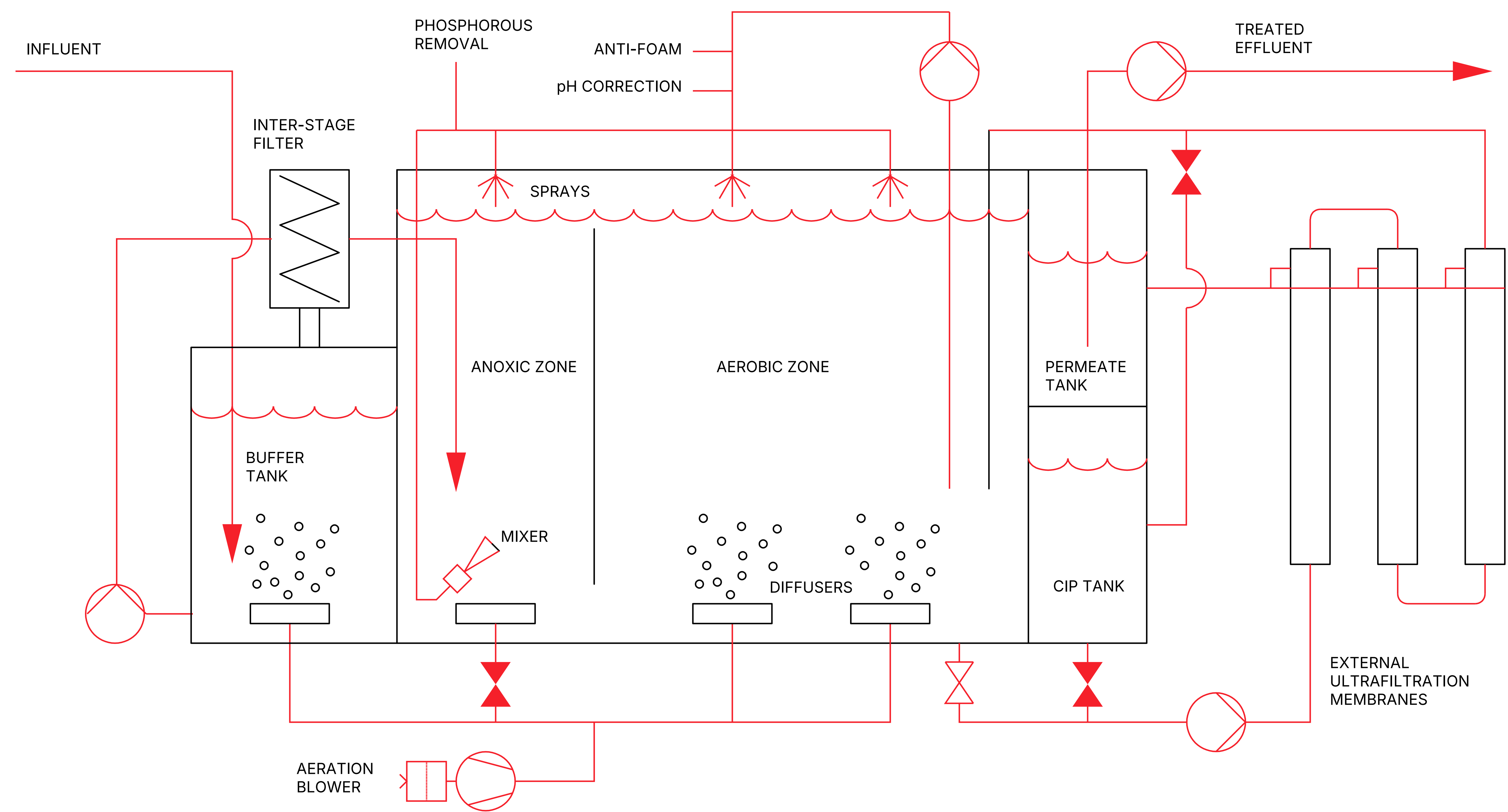
The Hamworthy Ultra Trident MBR is a compact advanced waste treatment system which allows for the complete treatment of black and grey water through biological degradation and membrane separation, in accordance with MEPC.227(64) & Alaska Permit GP2013DB000 standards.



STANDARD FEATURES

- Externally mounted membranes for safe, easy access and operational flexibility
- Membrane Clean-in-Place system as standard for simplified maintenance and sustained performance
- Ultra-low chemical consumption compared with other technologies reduces through life costs & environmental impact
- Advanced low-fouling membrane design for improved energy efficiency
- Elimination of microplastics from treated effluent
- Robust process control system provides ease of operation and minimal manning requirements
- Predictable and optimised lifecycle cost backed by Hamworthy's global support network
- Hamworthy MBR technology has a proven track record for reliably meeting the most stringent discharge requirements

Fig 1: Process sketch



OPERATION

Black and Grey water enters the 1st stage of the bioreactor which provides a buffer and mixing zone for the influent wastewater.

From the 1st Stage, flow passes through the 2nd stage having been screened through an interstage filter, to ensure all unwanted solids are removed from the system. In the 2nd stage, the active biomass degrades the organic material before being circulated through ultrafiltration membranes to produce clean permeate which can be

discharged overboard.

The Hamworthy Ultra Trident MBR can be configured for either carbonaceous treatment or nutrient removal. For nutrient removal, the plant is configured for NDN (nitrification/denitrification) treatment which removes ammonia from the influent by transforming it into nitrogen gas which can be vented into the atmosphere. Nitrogen and phosphorus are removed from the wastewater by dosing Sodium Aluminate.

DESIGN DATA

ULTRA TRIDENT MODEL	MAXIMUM HYDRAULIC LOADING (m³/day)	MAXIMUM ORGANIC LOADING (kg/day)
UT-0.6	3.7	2.60
UT-1.3	7.4	6.08
UT-2.0	12.47	9.33
UT-2.6	14.93	12.15
UT-5.0	30	24.96
UT-7.0	47.27	34.94
UT-11	68.36	50.56
UT-16	100.28	74.00
UT-24	152.76	112.41
UT-36	197.28	164.05
UT-70	200	173.6