PIRANHA WASTEWATER SYSTEMS

Photos of Actual Piranha Systems at the ACT2 Test facility near Cape Canaveral Florida
PIRANHA WASTEWATER SYSTEMS
(Some of our Vessels that Operate in Sensitive Waters)
PIRANHA WASTEWATER TREATMENT and WATER RECLAMATION SYSTEMS

True “Toilet to Tap”

Raw Sewage  Piranha Effluent  City Water
How Does it Work?

• Holding Tank
• Patented Aerobic/Anaerobic process to consume human waste
• Siemens PLC “Controlled Biomass”
• Biological Degradation of Byproducts
  • **Mostly H₂O**
  • CO₂
  • N₂ Gas +N₂ Compounds (ammonia, nitrites, nitrates)
  • Organic and Inorganic macro and micro nutrients

BIOLOGICAL BASED WASTEWATER TREATMENT SYSTEMS ARE THE MOST COST EFFECTIVE & UNDERSTOOD PROCESSES IN THE WASTEWATER TREATMENT INDUSTRY.
• Biomass is separated by Polymer
• Continuous Maceration of Biomass
• Clean water is removed from upper layer
• Water (supernatant) is sent to Piranha for de-contamination
• Suspended Solids are removed and sent to Holding Tank
• Digestion continues…
THE PIRANHA WASTEWATER SYSTEMS

Biomass Tank (Holding Tank)

First Stage:
• Maceration/Aeration
• Separation
• Digestion (sludge to water)

Holding Tank (simulated)

Actual Sample taken from a holding tank
(Raw sewage: courtesy of the Cocoa Beach Florida WTP influent supply line)
PIRANHA WASTE to WATER

- Piranha uses all proven technology
- First process is known as a Lamella Clarifier
- Second process is known as a DAF (Dissolved Air Flotation)
- Suspended Solids are skimmed and sent to Holding Tank
- Clean water is then sent through the UF (Ultra Filtration)
- All contaminants, coliform bacteria, viruses, suspended particles, organisms and compounds larger than 150,000 Daltons (~0.08 microns) are removed.
- **Optional** NANO Filtration (fresh water reverse osmosis) is used for any remaining contaminants down to ~0.02 microns.
- Both UF and NANO filters are automatically back-flushed to send contaminants back to the Holding Tank.
THE PIRANHA WASTEWATER SYSTEMS

Piranha System and Biomass (Holding) Tank

Second Stage:
- Separation of Solids
- Ultra Filtration
- Optional Reverse Osmosis (NANO)

Potable Water for Reuse

Proprietary Information: This document contains proprietary information. Possession and use is permitted solely at the discretion of ACT2 Technologies, LLC
THE PIRANHA WASTEWATER SYSTEMS

PIRANHA WRS-XX
Unit

- Laundry and Grease Traps are required but not shown.
- Shipyard Supplied Tank and Piping in Red (Optional Holding Tank Can be Supplied)
- Optional Re-Use Water Storage in Blue

Optional Reuse Tank

Overboard Discharge

Gravity INFLUENT

ACT2 Sensors

Vacuum INFLUENT

Return

Optional Use Water Storage in Blue

Piranha Supplied

Vessel Holding/Aeration
Black/Grey Tank

Suction Line

Laundry and Grease Traps are required but not shown.

Shipyard Supplied Tank and Piping in Red (Optional Holding Tank Can be Supplied)

Optional Re-Use Water Storage in Blue

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PIRANHA WATER QUALITY
SEWAGE WASTE TO REUSABLE WATER

ARRV SIKULIAQ
National Science Foundation
(98% Water Reuse)

Actual photos from Factory Acceptance Testing
See Separate Lab Results

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PIRANHA CONTAINERIZED SYSTEM
CONTAINERIZED WASTE TREATMENT SYSTEMS

Self Contained IMO/MEPC & USCG 227(64) Certified Marine Sanitation Device (MSD) for the Transocean Oil Rig, RATHER
PIRANHA SYSTEM
WASTE TREATMENT SYSTEMS

Small Compact Self Contained Units for up to 30 people.
(Discoverer Enterprise)
THE PIRANHA WASTEWATER SYSTEMS

PIRANHA STAND-ALONE SYSTEMS

Piranha System with Holding Tanks for 60 persons (black and gray water)
Small Closed Treatment System
90 Gallon Black Water Tank on DOD Mobile Unit

Department of Defense (DOD) Unit
PIRANHA RESTROOM FACILITIES
(CLOSED LOOP TRAILER UNITS)
TURNING WASTE BACK INTO RE-FLUSHING WATER

Proprietary Information: This document contains proprietary information. Possession and use is permitted solely at the discretion of ACT2 Technologies, LLC.
PIRANHA RESTROOM FACILITIES
(CLOSED LOOP CONTAINERIZED UNITS)
TURNING WASTE BACK INTO RE-FLUSHING WATER
Membrane Location Can Change

MODEL A

3 m$^3$/day to 12 m$^3$/day

L = 1,3650 mm
W = 920 mm
H = 1,450 mm
Membrane Location Can Change

MODEL B

12m³/day to 24m³/day

L = 1,500mm
W = 920mm
H = 1,500mm

WRS-12 B Model

Proprietary Information: This document contains proprietary information. Possession and use is permitted solely at the discretion of ACT2 Technologies, LLC
Membrane Location Can Change

MODEL C

24 m³/day to 32 m³/day

L = 2,718 mm
W = 1,473 mm
H = 2,108 mm
Membrane Location Can Change

MODEL D

40m³/day to 60m³/day

L = 2,933mm
W = 1,728mm
H = 2,134mm

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Comparable Capacity Competitor and PIRANHA
Comparable Capacity Competitor and PIRANHA

Optional JETS Pumps
MEPC/USCG 227(64) CERTIFICATIONS

NOTE: No System Modifications were Required to Pass the New 227(64) Standards.
CERTIFICATE OF RESULTS

SUMMATION CERTIFICATE
TEST DATA AND RESULTS
OF TEST REPORT
TS-P00970

ACT2 Technologies, LLC
PIRANHA Type II Sewage Treatment Plant
Model WRS-6
Representing all PIRANHA models
Listed on Pages 2 – 3 of this Certificate

IMO Resolution MEPC.227(64) Annex 22 Revised Guidelines on Implementation of Effluent Standards and Performance Tests for Sewage Treatment Plants,

Notice of Policy Letter Federal Register Coast Guard Acceptance of Sewage Treatment Plants for Type-Approval to International Maritime Organization Resolution MEPC.227(64)

and

Title 33 Navigation and Navigable Waters Chapter I
United States Coast Guard, Department Of Homeland Security
Part 159 Marine Sanitation Devices
Section 159.127 Safety Coliform Count: Recirculating Devices

Prepared by TEI-Testing Services
PO Box 572455
Salt Lake City, UT 84157-2455
USA

TEST DATA

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U. S. Department of Homeland Security
United States Coast Guard
Certificate of Approval

Coast Guard Approval Number: 159.015/10168/0 Expires: 13 April 2021

SEWAGE POLLUTION PREVENTION EQUIPMENT

The following device has been tested in accordance with IMO resolution MEPC.227(64)

ACT2 TECHNOLOGIES LLC
3778 SW 30TH AVENUE
FT LAUDERDALE FL 33312

Series A, Models WRS-3, WRS-6, WRS-8, WRS-10 and WRS-12: 795, 1,585, 2,115, 2,645 and 3,175 GPD capacity respectively.

This is to certify the models listed above, having a designed hydraulic loading of 3, 6, 8, 10 and 12 m3/day, an organic loading of 1.45, 2.90, 3.90, 4.90 and 5.81 kg/day Biochemical Oxygen Demand (BOD) and of the design shown on drawings A-10027, A-10028, A-10029, A-10030 and A-10031 have been examined and satisfactorily tested in accordance with IMO resolution MEPC.227(64) to meet the operational requirements referred to in regulation 9 of Annex IV of the International Convention for the Prevention of Pollution from Ships (MARPOL).

The tests on the equipment were carried out ashore at TEI-Testing Services, LLC, and completed on 16MAR2016. The equipment tested produced an effluent which did not exceed the geometric mean of 100 thermotolerant coliforms per 100 mL, Total Suspended Solids of 35 mg/L, a geometric mean of 5-day biochemical oxygen demand without nitrification of no more than 25 QL/Pe mg/l, a geometric mean of chemical oxygen demand (COD) of no more than 125 QL/Pe mg/l and a pH between 6 and 8.5; a geometric mean of total nitrogen of not more than 20 QL/Pe mg/l or at least 70% reduction; and a geometric mean of total phosphorus of not more than 1.0 Qe mg/l or at least 80% reduction.

This equipment does not meet the hazardous location requirements specified in 46 CFR 111.105, and therefore, may not be installed in hazardous locations on U.S. flag vessels.

The Administration is satisfied that the sewage treatment plant can operate at angles of inclination of 22.5 degrees in any plane from the normal operating position.

Details of tests and results obtained are shown on the Appendix to this Certificate.

A copy of this certificate should be carried on board any ship equipped with the above described sewage treatment plant.

This certificate documents compliance with 33 CFR Part 159.

*** End ***

THIS IS TO CERTIFY that the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date herein unless sooner canceled or suspended by proper authority.

GIVEN UNDER MY HAND THIS 13TH DAY OF APRIL 2016, AT WASHINGTON D.C.

S. T. BRADY
Chief Engineering Division
BY DIRECTION OF THE COMMANDANT

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U. S. Department of Homeland Security
United States Coast Guard
Certificate of Approval

Coast Guard Approval Number: 159.015/10168/0 Expires: 13 April 2021

SEWAGE POLLUTION PREVENTION EQUIPMENT

The following device has been tested in accordance with IMO resolution MEPC.227(64)

ACT2 TECHNOLOGIES LLC
3778 SW 30TH AVENUE
FT LAUDERDALE FL 33312

Series B, Models WRS-12, WRS-18, and WRS-24: 3,175, 4,755, and 6,345 GPD capacity respectively.

This is to certify the models listed above, having a designed hydraulic loading of 12, 18 and 24 m3/day, an organic loading of 5.81, 8.71 and 11.61 kg/day Biochemical Oxygen Demand (BOD) and of the design shown on drawings B-10032, B-10033, and B-10034 have been examined and satisfactorily tested in accordance with IMO resolution MEPC.227(64) to meet the operational requirements referred to in regulation 9 of Annex IV of the International Convention for the Prevention of Pollution from Ships (MARPOL).

The tests on the equipment were carried out ashore at TEI-Testing Services, LLC, and completed on 16MAR2016. The equipment tested produced an effluent which did not exceed the geometric mean of 100 thermotolerant coliforms per 100 mL, Total Suspended Solids of 35 mg/L, a geometric mean of 5-day biochemical oxygen demand without nitrification of no more than 25 QL/Pe mg/l, a geometric mean of chemical oxygen demand (COD) of no more than 125 QL/Pe mg/l and a pH between 6 and 8.5; a geometric mean of total nitrogen of not more than 20 QL/Pe mg/l or at least 70% reduction; and a geometric mean of total phosphorus of not more than 1.0 Qe mg/l or at least 80% reduction.

This equipment does not meet the hazardous location requirements specified in 46 CFR 111.105, and therefore, may not be installed in hazardous locations on U.S. flag vessels.

The Administration is satisfied that the sewage treatment plant can operate at angles of inclination of 22.5 degrees in any plane from the normal operating position.

Details of tests and results obtained are shown on the Appendix to this Certificate.

A copy of this certificate should be carried on board any ship equipped with the above described sewage treatment plant.

This certificate documents compliance with 33 CFR Part 159.

*** End ***

THIS IS TO CERTIFY that the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date herein unless sooner canceled or suspended by proper authority.

GIVEN UNDER MY HAND THIS 13TH DAY OF APRIL 2016, AT WASHINGTON D.C.

S. T. BRADY
Chief Engineering Division
BY DIRECTION OF THE COMMANDANT

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Model A

Model B
U. S. Department of Homeland Security
United States Coast Guard
Certificate of Approval

Coast Guard Approval Number: 159.015/10170/O  Expires: 13 April 2021

SEWAGE POLLUTION PREVENTION EQUIPMENT

The following device has been tested in accordance with IMO resolution MEPC.227(64)

ACT2 TECHNOLOGIES LLC
3778 SW 30TH AVENUE
FT LAUDERDALE FL 33312

Series C, Models WRS-24, WRS-32, and WRS-60: 6,345, 8,455 and 10,570 GPD capacity respectively.

This is to certify the models listed above, having a designed hydraulic loading of 24, 32 and 40 m³/day, an organic loading of 11.61, 15.60 and 19.60 kg/day Biochemical Oxygen Demand (BOD) and of the design shown on drawings C-10035, C-10036 and C-10037 have been examined and satisfactorily tested in accordance with IMO resolution MEPC.227(64) to meet the operational requirements referred to in regulation 9 of Annex IV of the International Convention for the Prevention of Pollution from Ships (MARPOL).

The tests on the equipment were carried out ashore at TEI-Testing Services, LLC, and completed on 16MAR2016. The equipment tested produced an effluent which did not exceed the geometric mean of 100 thermotolerant coliforms per 100 mL, Total Suspended Solids of 35 mg/L, a geometric mean of 5-day biochemical oxygen demand without nitrification of no more than 25 Ql/Qe mg/L, a geometric mean of chemical oxygen demand (COD) of no more than 125 Ql/Qe mg/L and a pH between 6 and 8.5; a geometric mean of total nitrogen of not more than 20 Ql/Qe mg/L or at least 70% reduction; and a geometric mean of total phosphorus of not more than 1.0 Qe mg/L or at least 80% reduction.

This equipment does not meet the hazardous location requirements specified in 46 CFR 111.105, and therefore, may not be installed in hazardous locations on U.S. flag vessels.

The Administration is satisfied that the sewage treatment plant can operate at angles of inclination of 22.5 degrees in any plane from the normal operating position.

Details of tests and results obtained are shown on the Appendix to this Certificate.

A copy of this certificate should be carried on board any ship equipped with the above described sewage treatment plant.

This certificate documents compliance with 33 CFR Part 159.

*** End ***

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

GIVEN UNDER MY HAND THIS 13TH DAY OF APRIL, 2016, AT WASHINGTON D.C.

S. J. BRADY
Chief Engineering Division
BY DIRECTION OF THE COMMANDANT

Model C

U. S. Department of Homeland Security
United States Coast Guard
Certificate of Approval

Coast Guard Approval Number: 159.015/10171/O  Expires: 13 April 2021

SEWAGE POLLUTION PREVENTION EQUIPMENT

The following device has been tested in accordance with IMO resolution MEPC.227(64)

ACT2 TECHNOLOGIES LLC
3778 SW 30TH AVENUE
FT LAUDERDALE FL 33312

Series D, Models WRS-40 and WRS-60: 10,570 and 15,850 GPD capacity respectively.

This is to certify the models listed above, having a designed hydraulic loading of 40 and 60 m³/day, an organic loading of 19.60 and 29.0 kg/day Biochemical Oxygen Demand (BOD) and of the design shown on drawings D-10038 and D-10039 have been examined and satisfactorily tested in accordance with IMO resolution MEPC.227(64) to meet the operational requirements referred to in regulation 9 of Annex IV of the International Convention for the Prevention of Pollution from Ships (MARPOL).

The tests on the equipment were carried out ashore at TEI-Testing Services, LLC, and completed on 16MAR2016. The equipment tested produced an effluent which did not exceed the geometric mean of 100 thermotolerant coliforms per 100 mL, Total Suspended Solids of 35 mg/L, a geometric mean of 5-day biochemical oxygen demand without nitrification of no more than 25 Ql/Qe mg/L, a geometric mean of chemical oxygen demand (COD) of no more than 125 Ql/Qe mg/L and a pH between 6 and 8.5; a geometric mean of total nitrogen of not more than 20 Ql/Qe mg/L or at least 70% reduction; and a geometric mean of total phosphorus of not more than 1.0 Qe mg/L or at least 80% reduction.

This equipment does not meet the hazardous location requirements specified in 46 CFR 111.105, and therefore, may not be installed in hazardous locations on U.S. flag vessels.

The Administration is satisfied that the sewage treatment plant can operate at angles of inclination of 22.5 degrees in any plane from the normal operating position.

Details of tests and results obtained are shown on the Appendix to this Certificate.

A copy of this certificate should be carried on board any ship equipped with the above described sewage treatment plant.

This certificate documents compliance with 33 CFR Part 159.

*** End ***

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

GIVEN UNDER MY HAND THIS 13TH DAY OF APRIL, 2016, AT WASHINGTON D.C.

S. J. BRADY
Chief Engineering Division
BY DIRECTION OF THE COMMANDANT

Model D
Dear Craig,

Sorry for this delay to inform you about the performance of the Piranha system on board. During this period of time which the unit have been operating on board of the ship we are very happy decided to choice Piranha among the other alternative units.

The unit had demonstrated during these years, reliability and quality, with low maintenance cost and the zero discharge performance.

Especially considering that the unit process (9 tons a day) of black and grey water, 300 days a year with non-stop.

We had opened the unit for inspections and maintenance (2 times) and today the structure and components are in excellent conditions.

The ship’s holding and clarified tanks are in good conditions, these tanks are opened for inspection every year and didn’t accumulate any substantial solids, neither corrosion, as a result of no more chemicals into the systems, which this is a plus for the integrity of the ship’s hull, and reducing the maintenance cost.

As well to mention and thanks to ACT2tech for the support, providing products and advice whenever we requested.

Best Regards
Andres Mussio
C/E
M/Y Fortunate Sun
Present time: GMT +2
Ship’s Tel. +1 (904) 240 3112
Mobile +39 339 875 3582

Unit Installed in 2012
UNITS BUILT FOR
TRANSOCEAN DRILLING
RIGS and SHIPS
Preliminary Request for Information

Thank you for your inquiry regarding the ACT2 Technologies Piranha, WRS (Water Reclamation Systems) units. ACT2 Technologies has 13 different systems from 3m³/day to 60m³/day that are USCG, IMO/MEPC 227(64) Compliant. These systems can be configured, to a certain extent, to fit in various vessel locations and spaces.

Please take a few minute to complete our request for information below and we will get back to you as soon as possible.

Contact Person: _____________________
Position: __________________________

Contact Info: ________________________________
Vessel Name: _______________________

Builder: __________________________
Refit/New Build: _________________________

Classification Society: _____________________
Flag: ______________________________

Max Crew: __________
Max Pass: ____________

Central Holding Tank (Y/N): _____
Capacity (m³ or gal): ______
No. of Tanks: ____________

Vacuum or Gravity Feed: ____________
Gray, Black or Both: ____________

Lint Trap Installed (Y/N): ______
Grease Trap Installed (Y/N): ______

Known or calculated daily average of wastewater discharge: __________ USG or __________ M³

Present System Make: __________
Model: __________
Capacity: __________

Available Footprint and Height in L: __________
W: __________
H: __________

Available Power (3 Phase) Volts: __________
Amps: __________
Hz: __________

Will you be reusing the discharge water as Technical Water or other (Y/N)? ______

Will you require a digital or analog output to an existing Vessel Alarm System (Y/N)? ______

Will the vessel have the ability to have an internet connection at the Piranha system for real time troubleshooting, diagnostics and crew training if needed (Y/N)? ______

Thank you for your time,

ACT2 Technologies
ACT2 Technologies

Additional Projects and Capabilities

• Hog and Dairy Farm Wastewater Reclamation
• Landfill Leachate Wastewater Reclamation
• Animal Carcass Digestion to Water (100%)
• Disaster Relief Water Purification Units
• RV Zero Dump (discharge) systems
• Runoff Water Filtration
• Nitrogen and Phosphorus Reduction (up to 98%)
• Well Water Purification from Fracking Contamination
• Portable Water Purification Systems
• Portable Water Purification Units
• Portable Sewage Treatment Plants (10m³/2,640gallons/day)
• Closed Loop Water Reclamation Systems
• US Coast Guard/IMO/MEPC Approved Demo Unit on Site
  (You are invited to see Titusville Sewage Turned into Drinkable Quality Water)

ACT2 Technologies LLC, 1355 White Drive, Titusville, FL 32780
+1 (954) 791-1812 / (321) 567-4915 / info@ACT2Tech.org