Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services

John E. Baldacci, Governor Brenda M. Harvey, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
11 State House Station
Augusta, Maine 04333-0011
Tel: (207) 287-5674
Fax: (207) 287-5672; TTY: 1-800-606-0215

November 22, 2010

Consolidated Treatment Systems
Attn.: Jeff Coomer
1501 Commerce Center Drive
Franklin, OH 45005-1891

Subject: Product Registration, *Nayadic M-Series* Extended Aeration Wastewater Treatment Units

Dear Mr. Coomer:

The Division of Environmental Health has completed a review of a registration application for your company's product. This information was submitted pursuant to Section 1802 of the Maine State Plumbing Code, Subsurface Wastewater Disposal Rules (Rules), for code registration, for use in Maine.

The *Nayadic M-Series* consists of five models: M-6A, M-8A, M-1000A, M-1200A, and M-2000A. These are housed in cylindrical fiberglass reinforced plastic tanks, with conical lower portions, inner baffles, and access through the tops. All models include an air diffuser supplied by a external air pump.

According to the information you provided, the *Nayadic M-Series* has been certified by the National Sanitation Foundation (NSF) pursuant to ANSI/NSF Standard 40 for residential wastewater treatment systems. On the basis of the information submitted, the Division has determined that the *Nayadic M-Series* is acceptable for use in the State of Maine, provided that it is installed, operated, and maintained in conformance with the manufacturer's directions.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of *Nayadic M-Series*. Further, registration of this product for use in the State of Maine does not represent Division preference or recommendation for this product over similar or competing products. If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen
Project Manager, Webmaster
Division of Environmental Health
Drinking Water Program
Subsurface Wastewater Unit
e-mail: james.jacobsen@state.me.us

/jaj

xc: Product File

Maine Department of Health and Human Services
Bureau of Health
Division of Health Engineering
Wastewater and Plumbing Control Program

RECEIVED
OCT 13 2010
WASTEWATER & PLUMBING PROGRAM

APPLICATION FOR REGISTRATION OF EXPERIMENTAL SYSTEM/INNOVATIVE TECHNOLOGY OR ONSITE SEWAGE DISPOSAL SYSTEM PRODUCT

Please complete the following Sections. Please print or type.

Applicant

Company Name: Consolidated Treatment Systems, Inc
Contact Person: Jeff Coomer
Address: 1501 Commerce Center Drive
Town/City: Franklin State: OH Zip: 45005-1891
Country: USA
Telephone: 937-746-2727 e-mail: Jeff@Consolidatedtreatment.com

Product

Product Name: Nayadic M-Series

Model: M-6A, M-8A, M-1000A, M-1200A, and M-2000A

Product Classification (choose one)

Primary or Secondary Treatment Unit

[ ] Septic Tank [X] Extended Aerobic Treatment Unit [ ] Recirculating Aerobic Unit

[ ] Aerobic Fixed Film Unit [ ] Other:

Effluent Filter

[ ] Septic Tank Outlet Filter [ ] Post-Tank Filter [ ] Other (specify)

Disposal Device

[ ] Gravel-less Disposal Pipe [ ] Gravel-less Disposal Bed [ ] Chamber, Plastic

[ ] Chamber, Other [ ] Other (specify) _____

Miscellaneous

[ ] Pipe [ ] Effluent Flow Distribution Device [ ] Other (specify) _____

Claim

Describe the product's features (attach additional sheets if necessary).

The Nayadic M-Series is a completely-mixed continuous stirred extended aeration wastewater treatment system intended for residential and commercial applications. The series includes designed in accordance with generally accepted engineering principles related to extended aeration wastewater and clarification processes. The *Nayadic Engineering Manual* is attached.

Describe the product's performance (attach additional sheets if necessary).

The Nayadic M-Series is among the first products to be certified under ANSI/NSF Standard 40. Nayadic systerms are is designed to provide an effluent cBOD of 25 mg/L and TSS of 30 mg/L. ANSI/NSF Standard 40 certification identifies effluent cBOD of 9 mg/L and TSS of 15 mg/L each. ANSI/NSF Standard 40 certification testing is attached.

Has the product received National Sanitation Foundation or Canadian Standards Authority approval?

[ ] No [X] Yes (If "yes", enclose a copy of the certification.)

IMPORTANT NOTE!

Don't forget to enclose relevant product literature, engineering specifications, studies, and third party certifications with this application.

I, Jeff Coomer, am the [X] applicant [ ] agent for the applicant of the subject product.
Nayadic M-Series
I state that the information submitted is correct to the best of my knowledge and understand that any falsification is reason for the Department to deny registration for use of the product in Maine.

[X] Signature of Applicant
[ ] Signature of Agent for Applicant

October 7, 2010
Date

CONSOLIDATED
TREATMENT SYSTEMS
www.consolidatedtreatment.com

October 7, 2010

James A. Jacobsen, Project Manager and Webmaster
Subsurface Wastewater Unit
Drinking Water Program
Division of Environmental Health
286 Water Street
Augusta , ME 04333

Dear Sir:

Subject: Product Registration for Consolidated Treatment Systems, Inc.
Multi-Flo FTB-Series
Enviro-Guard ENV-Series
Nayadic M-Series

Attached you will find product applications and supporting materials for the three wastewater treatment product lines we manufacture and market. I request that you review and approve our applications.

Consolidated Treatment Systems, Inc., (CTS) manufactures and markets three lines of wastewater treatment products intended to serve residential and commercial occupancies not connected to municipal sewers. These products, Multi-Flo, Enviro-Guard, and Nayadic, provide superior performance. Multi-Flo and Nayadic systems have been manufactured for almost 40 years. Both are designed in conformance to generally accepted wastewater engineering principles. The Enviro-Guard is a specific configuration of the Multi-Flo than contain in a single tank three compartments intended to provide primary treatment, flow equalization and secondary treatment. All of our products are certified by NSF International as conforming to ANSI/NSF Standard 40.

Our application should be complete. Feel free to contact our consulting engineer, Bennette Burks, if you have any questions, concerns, or issues. He may be reached at 804-873-5000 and can provide whatever assistance you may need. I thank you in advance for your prompt review and approval of these applications.

Sincerely,

Jeff Coomer
Vice President

PERSONAL • RELIABLE • ACCOUNTABLE
1501 Commerce Center Drive • Franklin, Ohio 45005 • 1-800-503-0163 • 937-746-2727 • Fax: 937-746-1446

NSF International

OFFICIAL LISTING

NSF International Certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI Standard 40 - Residential Wastewater Treatment Systems

This is the Official Listing recorded on May 25, 2005.

CONSOLIDATED TREATMENT SYSTEMS, INC.
1501 COMMERCE CENTER DRIVE
FRANKLIN, OH 45005
937-746-2727

Facility: FRANKLIN, OH

Model Number	Rated Capacity Gallons/Day	Classification
Enviro-Guard ENV-0.75	750	Class I
Enviro-Guard ENV-0.75M[2]	750	Class I
Multi-Flo FTB 0.5	500	Class I
Multi-Flo FTB 0.6	600	Class I
Multi-Flo FTB 0.6-C	600	Class I
Multi-Flo FTB 0.75	750	Class I
Multi-Flo FTB 0.75-C	750	Class I
Multi-Flo FTB 1.0	1000	Class I
Multi-Flo FTB 1.5	1500	Class I
Multi-Flo FTB 1.0-C	1000	Class I
Nayadic M-6A[1]	500	Class I
Nayadic M-8A	600	Class I
Nayadic M-1050A	800	Class I
Nayadic M-1200A	1000	Class I
Nayadic M-2000A	1500	Class I

[1] Nayadic M-6A also a component of the Tank-N-Tank system. Complete Tank-N-Tank system has not been tested by NSF. Complete Tank-N-Tank system includes Nayadic M-6A 500 gpd treatment system surrounded by a pump chamber, creating a single tank system. Tank-N-Tank System is manufactured in both fiberglass and concrete.

[2] System consists of a modular design with the pretreatment and dosing tank as separate 500 gallon tanks or as one two-compartment 1000 gallon tank.

NOTE: This company may sell products complying with all applicable requirements for Certification nationally and internationally, but has advised NSF of authorized representatives physically located in the following:

Alabama	Arizona	Arkansas	Florida	Georgia
Hawaii	Illinois	Iowa	Maine	Mississippi
Missouri	New Jersey	New Mexico	New York	Ohio
Pennsylvania	Texas	Virginia	Washington	West Virginia
Wisconsin				

Contact the Listed company directly for further product information and availability in your area.

33220

NSF International

EXECUTIVE SUMMARY

The Nayadic, Inc. Model M-6A was tested under the provisions of ANSI/NSF Standard 40 for Individual Aerobic Wastewater Treatment Plants (1990), which was developed by the NSF Joint Committee on Wastewater Technology. The performance evaluation was conducted at the NSF Wastewater Technology Test Facility in Chelsea, Michigan, using wastewater diverted from the Chelsea municipal wastewater collection system. The evaluation consisted of six months of testing, during which a seven week stress test was conducted. The evaluation consisted of three weeks of dosing without sampling to allow for plant start-up, sixteen weeks of dosing at design flow, seven weeks of stress test and five weeks of dosing at design flow. Sampling started in the fall and continued through the winter and into spring, covering a full range of operating temperatures.

Section H. (3), in Appendix A of Standard 40, provides for exclusion of up to ten percent of effluent sample days, not to exceed one during stress testing, in completing the pass/fail determination. Other than samples collected for information only, no sample days were excluded in the pass/fail determination for this evaluation. The average effluent BOD_5 was 6 mg/L during the evaluation, ranging between <5 and 14 mg/L, and the average effluent suspended solids was 7 mg/L, ranging between <5 and 22 mg/L. The Model M-6A produced an effluent that successfully met the performance requirements established by NSF Standard 40 for Class I effluent:

The maximum arithmetic mean of seven consecutive sample days was 9 mg/L for BOD_5 and 12 mg/L for suspended solids, both well below the allowed maximum of 45 mg/L. The maximum arithmetic mean of 30 consecutive sample days was 8 mg/L for BOD_5 and 8 mg/L for suspended solids, both well below the allowed maximum of 30 mg/L. Removal rates ranged from 95 to 97 percent for BOD_5 and 96 to 98 percent for suspended solids, consistently above the requirement of 85 percent. The effluent pH during the entire evaluation ranged between 7.3 and 7.9, within the required range of 6.0 to 9.0. The plant also met the requirements for noise levels (less than 60 dbA at a distance of 20 feet) and color, threshold odor, oily film and foam.

SUMMARY OF ANALYTICAL RESULTS

	Average	Std.Dev.	Minimum	Maximum	Median	Interquartile Range
BOD_5 (mg/L)						
Influent	150	30	66	220	150	130-170
Effluent	6	2	<5	14	6	5-7
Suspended Solids (mg/L)						
Influent	194	66	52	480	180	150-220
Aeration Chamber	7,900	2,040	260	11,000	8,200	6,500-9,400
Effluent	7	3	<5	22	6	5-8
Volatile Suspended Solids (mg/L)						
Influent	160	46	58	390	150	130-180
Aeration Chamber	5,800	1,560	200	9,500	6,100	4,600-9,400
Effluent	6	2	<5	18	5	5-6
pH						
Influent	-	-	7.0	7.8	7.4	7.5-7.6
Aeration Chamber	-	-	7.0	8.0	7.4	7.4-7.5
Effluent	-	-	7.3	7.9	7.6	7.5-7.6
Dissolved Oxygen (mg/L)						
Aeration Chamber	1.3	1.8	0.1	7.6	0.4	0.1-1.5
Effluent	3.9	1.2	0.8	6.3	4.2	3.5-4.7

1/94

3475 Plymouth Road, PO Box 130140, Ann Arbor, Michigan 48113-0140 USA
Telephone: 313-769-8010 FAX: 313-769-0109 Telex: 753215 NSF INTL

WASTEWATER TECHNOLOGY

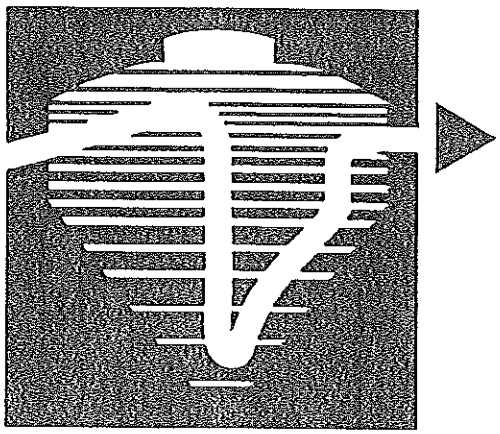
ANSI/NSF Standard 40 - *Residential Wastewater Treatment Systems*

Performance Evaluation Report:

Nayadic
Model M-6A
Wastewater Treatment System

NSF International
3475 Plymouth Road
PO Box 130140
Ann Arbor, Michigan 48113-0140 USA

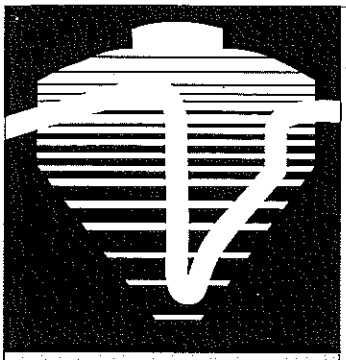
NAYADIC



WASTEWATER TREATMENT SYSTEMS

NAYADIC

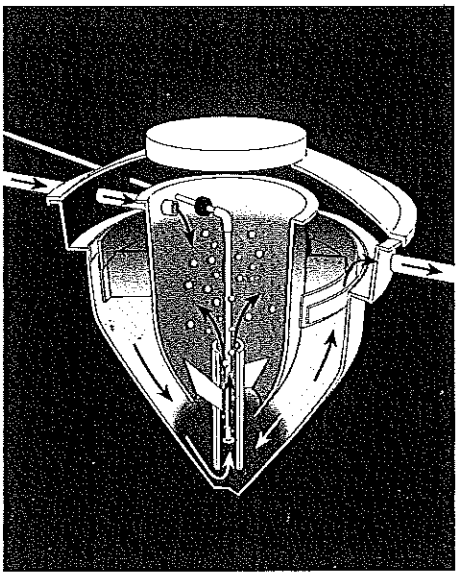
WASTEWATER TREATMENT SYSTEMS



The Nayadic Sewage Treatment Plant operates simply and efficiently. It is a valuable asset to any property. With a design chosen specifically for any building site or land structure, Nayadic is guaranteed to meet all your requirements, and, furthermore, provide satisfaction by continuing to operate at peak efficiency.

RESIDENTIAL & COMMERCIAL SEWAGE TREATMENT SYSTEM

Why Are Residential and Commercial Consumers Buying Nayadic Wastewater Treatment Systems?



IT'S SIMPLE

- No Internal Moving Parts to Maintain or Replace
- Durable, Lightweight Fiberglass Construction

IT'S EASY

- Minimal Space Requirements for Installation
- Several Plant sizes Available: 500, 600, 800, 1000, 1500 gpd

IT WORKS

- Quiet, Odorfree Operation
- Better than 95% Removal of Sewage contaminants
- Discharges Clear, Odorless Effluent
- Tested and Certified under ANSI/ NSF Standard 40 as a Class I System

NAYADIC is an efficient Wastewater Treatment Plant that has served the needs of residential and commercial customers all around the world. Specifically engineered to provide the highest degree of treatment with only minimum maintenance requirements, NAYADIC is your first choice to handle your wastewater treatment needs.

With over 30 years experience, NAYADIC is one of the oldest names in the wastewater industry. As such, NAYADIC continues to provide our customers with quality products backed by quality people.

NAYADIC

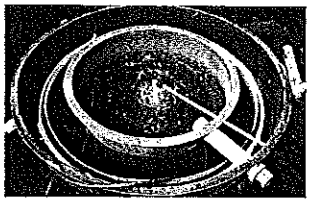
WASTEWATER TREATMENT SYSTEMS

IT'S SIMPLE

The unique design of the NAYADIC system enables it to provide an exceptionally high degree of treatment with only minimal maintenance requirements. The single tank concept requires no internal moving parts. The compressor, which supplies air to the plant, can be located either inside an adjacent building (i.e. basement, garage, etc.) or provided with a protective housing if it is to be installed outside.

IT'S EASY

The NAYADIC Wastewater Treatment System utilizes a design that is engineered to greatly exceed most nationally accepted standards. For example, the clarifier design provides more than 25 times the minimum surface settling area as required by the Great Lakes / Upper Mississippi River Board of State Sanitary Engineers: Recommended Standards for Sewage Works (10 States Standards).

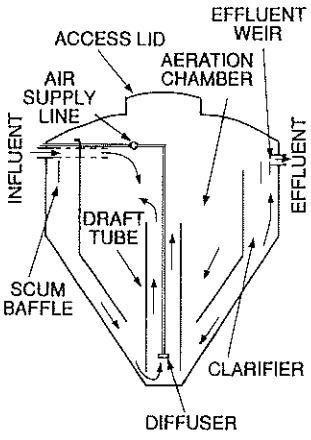


The NAYADIC system also incorporates a circular, perimeter clarifier that provides not only a large surface settling area, but also a 360 degree effluent weir. This critical aspect of the NAYADIC system further enhances the settling capabilities of the plant by reducing the hydraulic velocity through the clarifier, thereby dampening the effects of hydraulic surges. This feature which is unique to the NAYADIC system, helps insure continuous high performance with only minimal, easy to perform maintenance requirements.

IT WORKS

Because of its highly efficient design, the NAYADIC system is capable of producing a high quality effluent without the need of additional filtration equipment. The NAYADIC has been tested and certified under ANSI/NSF Standard 40 as a Class I System demonstrating a treatment efficiency of more than 95% removal of sewage contaminants.

THE PROCESS



The NAYADIC system consists of two treatment chambers in a single tank. The center aeration chamber is a circular tank with a sloped, open bottom which empties into the bottom of the outer clarifier chamber. Located in the center of the aeration chamber is an eight inch diameter draft tube which extends to four inches from the bottom of the clarifier. Air is released at the bottom of the draft tube through a disc plate diffuser. As the diffused air rises in the draft tube, it causes an upward flow of process fluid. This draws the settled solids from the bottom of the clarifier up through the draft tube where they are discharged at the surface of the aeration chamber. The design of the draft tube insures continuous and complete mixing of oxygen with the sewage. This allows for the growth of various aerobic organisms that biologically degrade the wastewater contaminants.

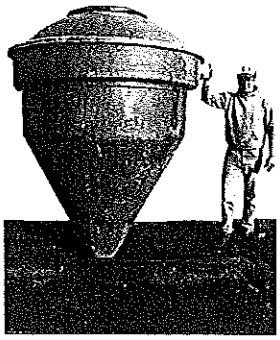
Gravity causes the aerated solids to settle back to the bottom of the tank where they are again drawn back up through the draft tube. As raw sewage enters the aeration chamber, it displaces biological solids from the aeration compartment to the clarifier. Quiescent conditions in the clarifier allow the digested solids to settle to the bottom of the clarifier where they are returned back to the aeration compartment. The clarified (treated) effluent flows slowly up through the clarifier and over a weir which extends around the periphery of the tank. The effluent collects in an outer trough where it discharges through a four inch pipe. A scum baffle located inside the overflow weir prevents floating solids from passing over the weir.

NAYADIC

WASTEWATER TREATMENT SYSTEMS

FEATURES

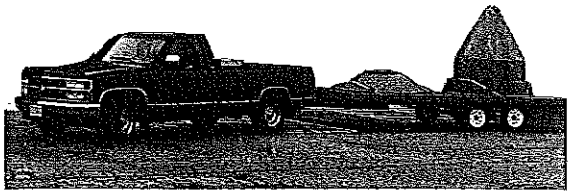
NSF Tested and Certified Class I System



Tested by NSF under the standard 40 protocol, NAYADIC has been certified as a Class I aerobic system. This is the highest performance standard established by NSF.

Five (5) Plant Sizes Available

To insure proper sizing of each plant, NAYADIC provides five individual treatment plant capacities: 500, 600, 800, 1000, 1500 gpd (gallons per day)



Low Installation Cost

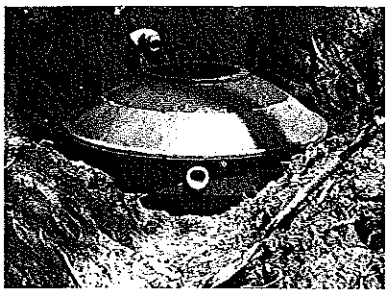
The lightweight, fiberglass construction eliminates the need for expensive equipment to transport and install the NAYADIC. Also, the single-tank design eliminates the need for pre-treatment tanks or secondary filter tanks.

Highly Treated Effluent

Based upon the ANSI/NSF Standard 40 test results achieved in 1991, the NAYADIC demonstrated a treatment efficiency of 96% removal of Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). Throughout the entire testing period (no results discarded), the mean effluent BOD was 6 mg/l, and the mean effluent TSS was 7 mg/l.

Minimal Space Requirements

The NAYADIC can be installed in a very small area (approx. 7' diameter). In addition, the sloped, "hopper-bottom" design of the outer basin requires an even smaller area at the bottom of the excavation. This is especially advantageous when digging in rocky soils or in areas with a high water table.



Two (2) Year Warranty

NAYADIC, Inc. warrants each treatment plant to be free of defects in workmanship for a period of two years from the date of installation.

Quiet, Odorfree Operation

The NAYADIC utilizes a totally "aerobic" process which eliminates the offensive "rotten egg" odors frequently observed with septic tanks.

Easy Access for Service

All necessary inspections and maintenance can be performed by simply removing the access cover of the NAYADIC plant. The NAYADIC does not have any moving parts or electrical components located within the tank. The compressor is located externally to allow for quick and easy access.

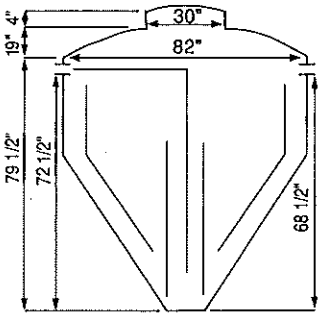
Low Maintenance Cost

Other than routine inspection and periodic pumping of excess solids, the NAYADIC requires very little maintenance. In many instances, repair of the compressor can be performed in the field, by an authorized NAYADIC service representative.

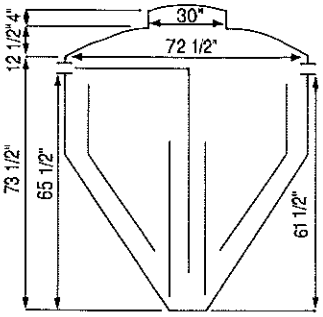
NAYADIC

WASTEWATER TREATMENT SYSTEMS

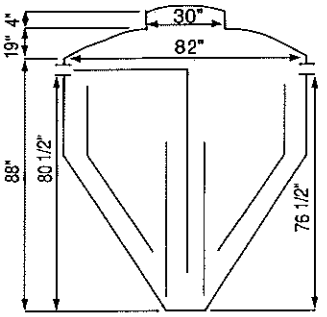
Model M-8A



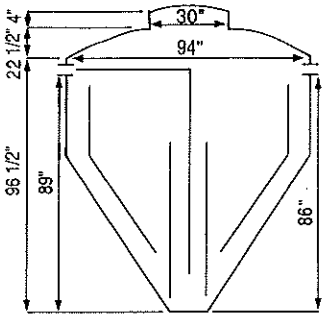
Model M-6A



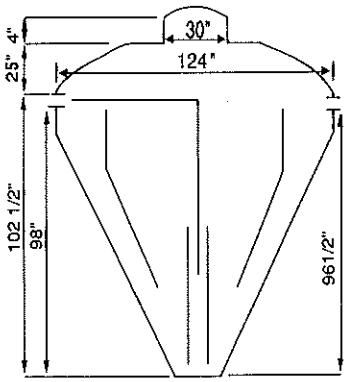
Model M-1050A



Model M-1200A



Model M-2000A



Specifications

Wastewater Treatment Test Results
(ANSI/NSF Standard 40 Test Evaluation)

Test Results	Influent Mean mgl	Effluent Mean mgl	Reduction
BOD (5 days)	150	6	96%
SS	195	7	95%

System Components and Materials

Wastewater Tank Dome and Cover: Fiberglass Reinforced Plastic
External Compressor: 1725 rpm, 115 Volts 60 cycle
Alarm System: Low voltage (12 Volt DC) Sensors Signal to the Control Box. Audio / Visual Signals Alert the Owner to loss of Air Supply or High Water Level in the Tank.

UNIT SPECIFICATIONS

ITEM	M-6A	M-8A	M-1050A	M-1200A	M-2000A
Treatment Gal/Day	500	600	800	1000	1500
Volume Gal	600	800	1050	1200	2000
Shipping Weight	265	350	450	525	900
Organic loading lb. BOD/day	0.5 - 1.5	1.0 - 2.0	1.7 - 2.4	1.7 - 2.5	2.4 - 4.2
Aeration Rate cf/lb. BOD/day	3000	2950	2900	2300	2710
Rated capacity CFM @ 8 psig	2 - 3.7	3 - 4	3 - 4	3 - 4	6 - 7
Diameter	73"	82"	82"	94"	124" x 98"
Total Height (Includind lid)	93 1/2"	106"	114 1/2"	126 1/2"	135"
Grade to inlet invert	20 1/2"	26"	26 1/2"	30"	37"
Grade to outlet invert	24 1/2"	30"	30 1/2"	33"	38 1/2"
Excavation Depth	86"	98 1/2"	107"	119 1/2"	127 1/2"
Inlet Invert*	65 1/2"	72 1/2"	80 1/2"	89"	98"
outlet invert*	61 1/2"	68 1/2"	76 1/2"	86"	96 1/2"

** From Bottom Excavation - See Drawing*

Distributed by:

NAYADIC
A Division of Consolidated Treatment Systems, Inc.
1501 COMMERCE CENTER DRIVE
FRANKLIN, OH 45005
937 746-2727 • Fax 937-746-1446
www.nayadic.com

NSF®
Certified to ANSI/NSF Standard 40
Class I

NSF *International*

EXECUTIVE SUMMARY

The Nayadic, Inc. Model M-6A was tested under the provisions of ANSI/NSF Standard 40 for Individual Aerobic Wastewater Treatment Plants (1990), which was developed by the NSF Joint Committee on Wastewater Technology. The performance evaluation was conducted at the NSF Wastewater Technology Test Facility in Chelsea, Michigan, using wastewater diverted from the Chelsea municipal wastewater collection system. The evaluation consisted of six months of testing, during which a seven week stress test was conducted. The evaluation consisted of three weeks of dosing without sampling to allow for plant start-up, sixteen weeks of dosing at design flow, seven weeks of stress test and five weeks of dosing at design flow. Sampling started in the fall and continued through the winter and into spring, covering a full range of operating temperatures.

Section H. (3), in Appendix A of Standard 40, provides for exclusion of up to ten percent of effluent sample days, not to exceed one during stress testing, in completing the pass/fail determination. Other than samples collected for information only, no sample days were excluded in the pass/fail determination for this evaluation. The average effluent BOD_5 was 6 mg/L during the evaluation, ranging between <5 and 14 mg/L, and the average effluent suspended solids was 7 mg/L, ranging between <5 and 22 mg/L The Model M-6A produced an effluent that successfully met the performance requirements established by NSF Standard 40 for Class I effluent:

> The maximum arithmetic mean of seven consecutive sample days was 9 mg/L for BOD_5 and 12 mg/L for suspended solids, both well below the allowed maximum of 45 mg/L. The maximum arithmetic mean of 30 consecutive sample days was 8 mg/L for BOD_5 and 8 mg/L for suspended solids, both well below the allowed maximum of 30 mg/L. Removal rates ranged from 95 to 97 percent for BOD_5 and 96 to 98 percent for suspended solids, consistently above the requirement of 85 percent. The effluent pH during the entire evaluation ranged between 7.3 and 7.9, within the required range of 6.0 to 9.0. The plant also met the requirements for noise levels (less than 60 dbA at a distance of 20 feet) and color, threshold odor, oily film and foam.

SUMMARY OF ANALYTICAL RESULTS

	Average	Std.Dev.	Minimum	Maximum	Median	Interquartile Range
BOD_5 (mg/L)						
Influent	150	30	66	220	150	130-170
Effluent	6	2	<5	14	6	5-7
Suspended Solids (mg/L)						
Influent	194	66	52	480	180	150-220
Aeration Chamber	7,900	2,040	260	11,000	8,200	6,500-9,400
Effluent	7	3	<5	22	6	5-8
Volatile Suspended Solids (mg/L)						
Influent	160	46	58	390	150	130-180
Aeration Chamber	5,800	1,560	200	9,500	6,100	4,600-9,400
Effluent	6	2	<5	18	5	5-6
pH						
Influent	-	-	7.0	7.8	7.4	7.5-7.6
Aeration Chamber	-	-	7.0	8.0	7.4	7.4-7.5
Effluent	-	-	7.3	7.9	7.6	7.5-7.6
Dissolved Oxygen (mg/L)						
Aeration Chamber	1.3	1.8	0.1	7.6	0.4	0.1-1.5
Effluent	3.9	1.2	0.8	6.3	4.2	3.5-4.7

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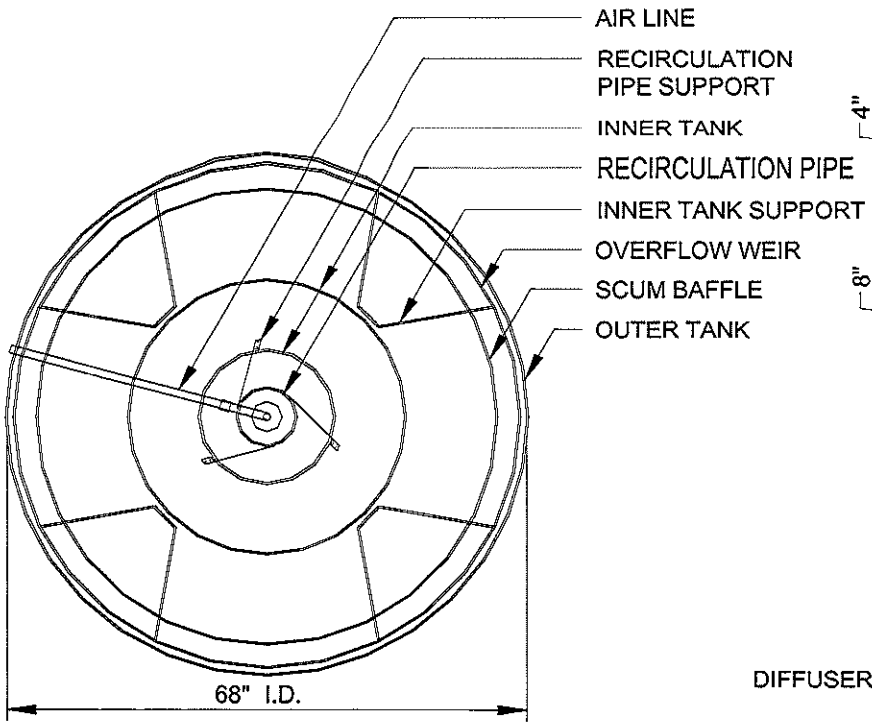
Telephone: 313-769-8010 FAX: 313-769-0109 Telex: 753215 NSF INTL



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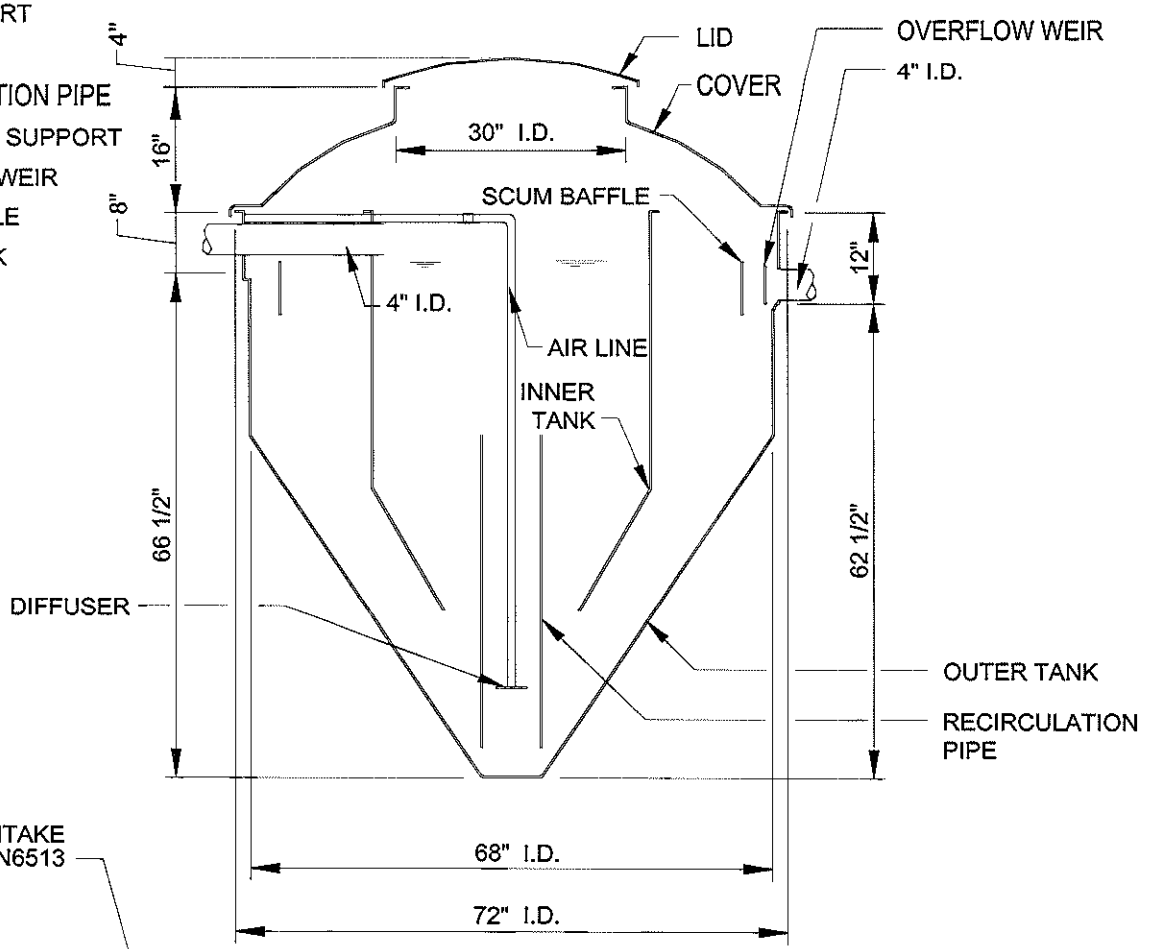
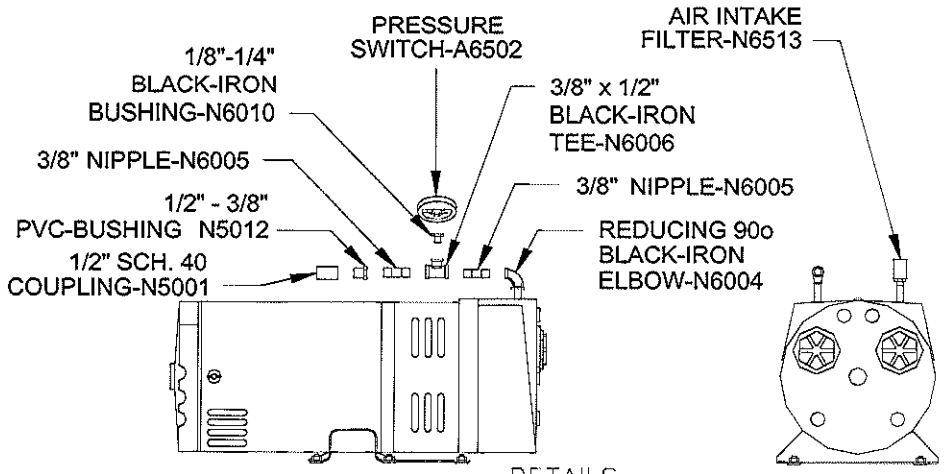


ELEVATION



DETAILS

NAYADIC M-6A	CONSOLIDATED TREATMENT SYSTEMS, INC. 1501 COMMERCE CENTER DRIVE FRANKLIN, OH 45005 WWW.NAYADIC.COM		
FRANKLIN, OHIO	DATE 12-1-01	BY BDB	DWG. NO. DWG. NO.

NAYADIC INC.

Aerobic Sewage Treatment Systems
General Specifications

MODEL M-6A

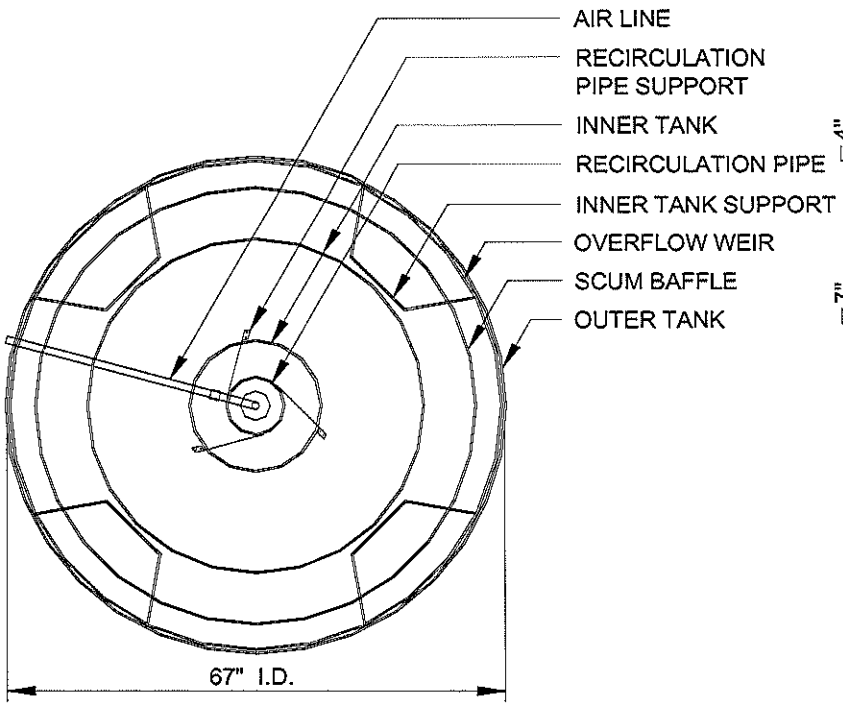
Treatment	Combination contact stabilization and extended aeration
Capacity	Holding – 600 gallons Treated – 500 gallons
Organic Capacity	.5 to 1.5 # BOD/Day
Efficiency	95% + Reduction (BOD, TSS)
Aeration Rates	3000 cf./lb. BOD/Day @ 3 psig
Weir Overflow Rate	31.8 Gallons / foot / Day
Compressor	¼ HP, 1725 rpm, 60 cycle, 115V Rated
Air Line	½" PVC Sch. 40
Diffusion	Diffuser: disc plate body w/ snap-on Check diaphragm
Warning Device	Visual / Audio-Visual
Treatment Tank	Fiberglass Construction
Height	73 ½" w/o Cover 93 ½" with Cover & Lid
Diameter	72"
Weight	485 lbs.
Maximum Depth of Installation:	65 ½" Inlet invert to Tank Bottom.
Inlet and Outlet Pipe Connection:	4" PVC opening
Material Specifications:	Polyester Laminated Glidden 4728 or Equal with over 33% glass content, Owens Corning fiberglass 825-DA-211, Producing typiem cured properties as follows: A) Flexural Strength – 36,350 PSI B) Flexural Modulus – 1.49 x 10^6 PSI C) Tensile Strength 16,210 PSI D) Heat Distortion temp – 183°F

NAYADIC INC.

Aerobic Sewage Treatment Systems
General Specifications

MODEL M-8A

Treatment	Combination contact stabilization and extended aeration
Capacity	Holding – 800 gallons Treated – 600 gallons
Organic Capacity	1 to 2 # BOD/Day
Efficiency	95% + Reduction (BOD, TSS)
Aeration Rates	2950 cf./lb. BOD/Day @ 3 psig
Weir Overflow Rate	32.8 Gallons / foot / Day
Compressor	1/3 HP, 1725 rpm, 60 cycle, 115V Rated
Air Line	½" PVC Sch. 40
Diffusion	Diffuser: disc plate body w/ snap-on Check diaphragm
Warning Device	Visual / Audio-Visual
Treatment Tank **Height** **Diameter** **Weight**	Fiberglass Construction 79 ½" w/o Cover 106" with Cover & Lid 82" 625 lbs.
Maximum Depth of Installation:	72 ½" Inlet invert to Tank Bottom.
Inlet and Outlet Pipe Connection:	4" PVC opening
Material Specifications:	Polyester Laminated Glidden 4728 or Equal with over 33% glass content, Owens Corning fiberglass 825-DA-211, Producing typiem cured properties as follows: A) Flexural Strength – 36,350 PSI B) Flexural Modulus – 1.49 x 10^6 PSI C) Tensile Strength 16,210 PSI D) Heat Distortion temp – 183°F



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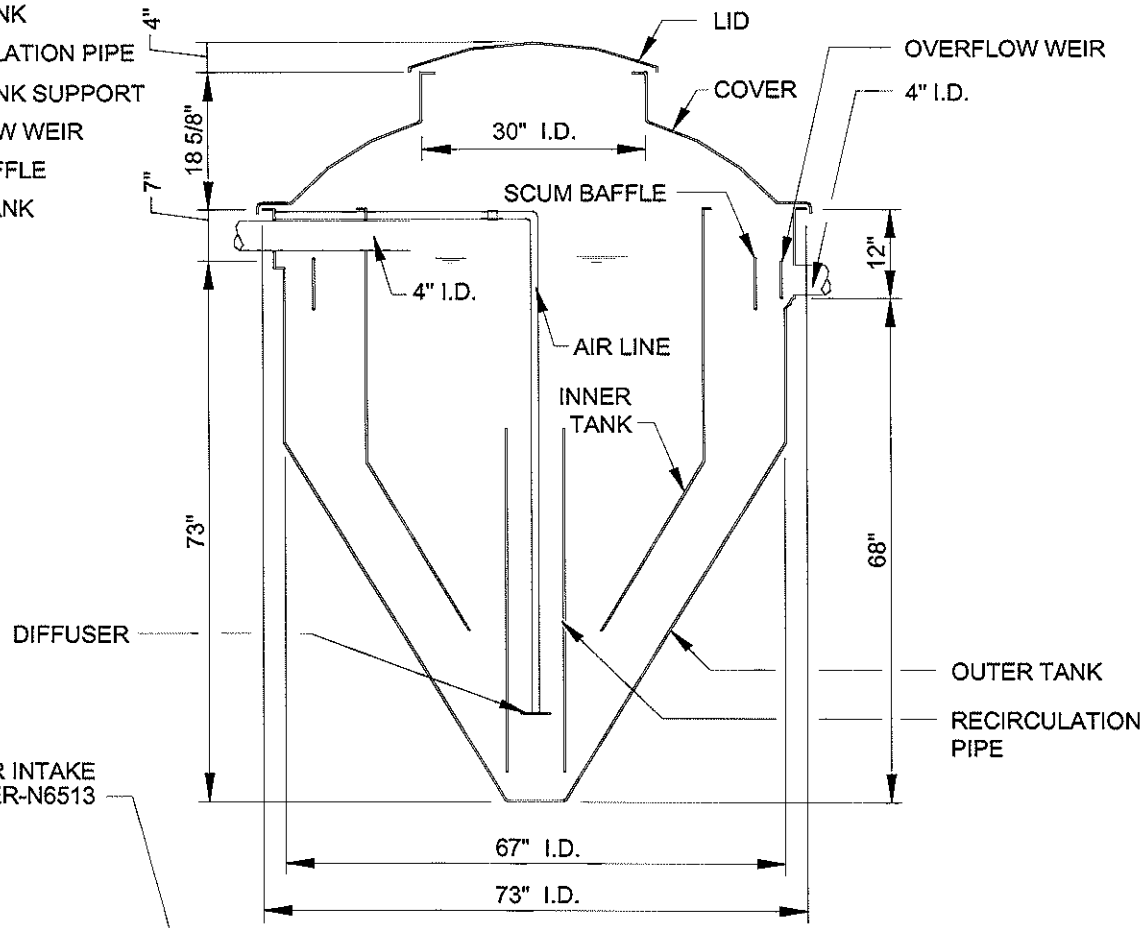

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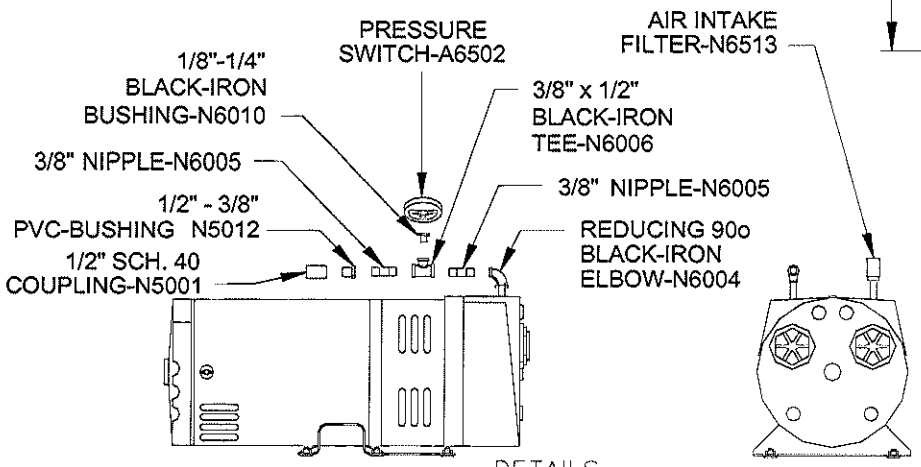


DETAILS

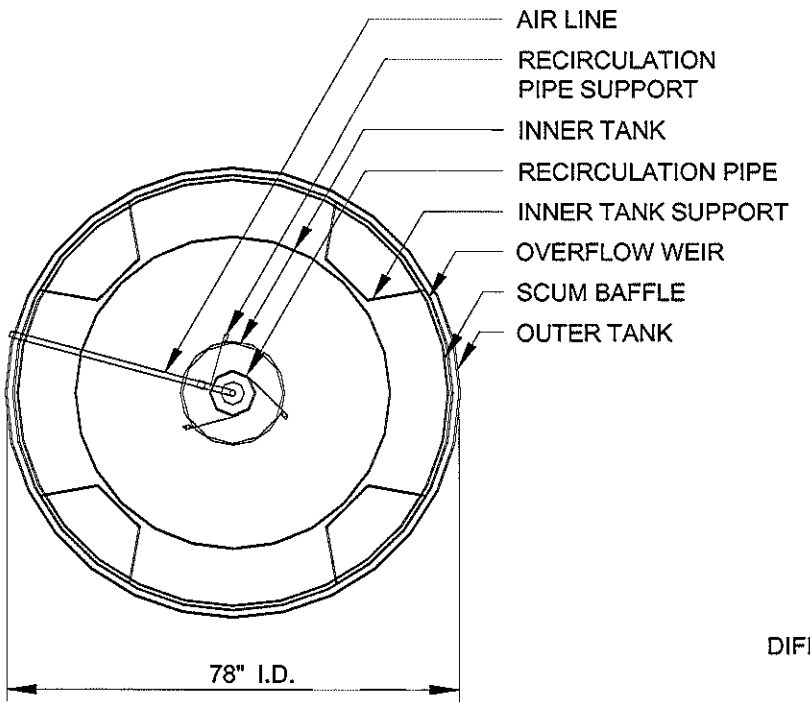
NAYADIC M-8A	CONSOLIDATED TREATMENT SYSTEMS, INC. 1501 COMMERCE CENTER DRIVE FRANKLIN, OH 45005 WWW.NAYADIC.COM		
FRANKLIN, OHIO	DATE 12-1-01	BY BDB	DWG. NO. DWG. NO.

NAYADIC INC.

Aerobic Sewage Treatment Systems
General Specifications

MODEL M-1050A

Treatment	Combination contact stabilization and extended aeration
Capacity	Holding – 1050 gallons Treated – 800 gallons
Organic Capacity	1.7 to 2.4 # BOD/Day
Efficiency	95% + Reduction (BOD, TSS)
Aeration Rates	2900 cf./lb. BOD/Day @ 3 psig
Weir Overflow Rate	41.9 Gallons / foot / Day
Compressor	1/3 HP, 1725 rpm, 60 cycle, 115V Rated
Air Line	½" PVC Sch. 40
Diffusion	Diffuser: disc plate body w/ snap-on Check diaphragm
Warning Device	Visual / Audio-Visual
Treatment Tank **Height** **Diameter** **Weight**	Fiberglass Construction 88" w/o Cover 114 1/2" with Cover & Lid 82" 760 lbs.
Maximum Depth of Installation:	80 ½" Inlet invert to Tank Bottom.
Inlet and Outlet Pipe Connection:	4" PVC opening
Material Specifications:	Polyester Laminated Glidden 4728 or Equal with over 33% glass content, Owens Corning fiberglass 825-DA-211, Producing typiem cured properties as follows: A) Flexural Strength – 36,350 PSI B) Flexural Modulus – 1.49 x 10^6 PSI C) Tensile Strength 16,210 PSI D) Heat Distortion temp – 183°F



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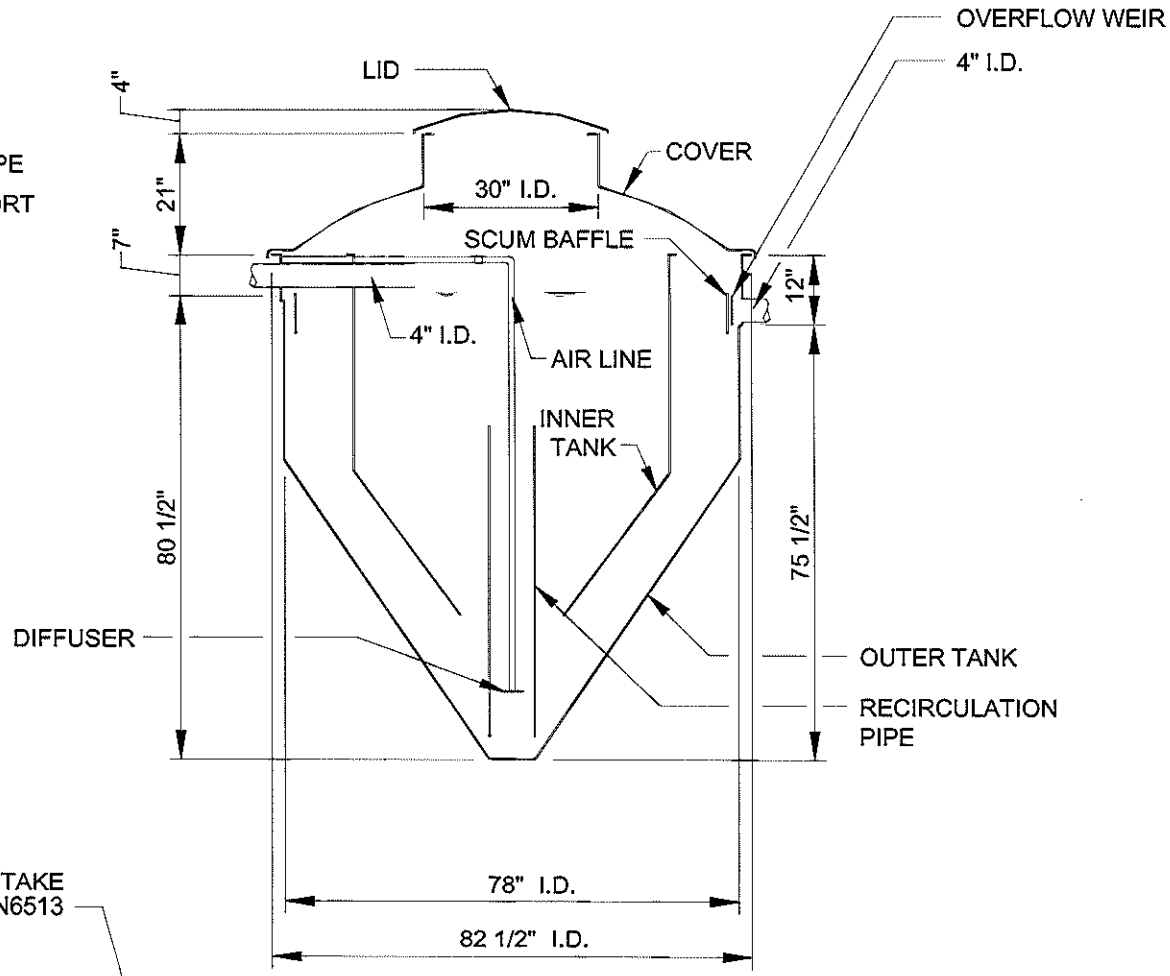

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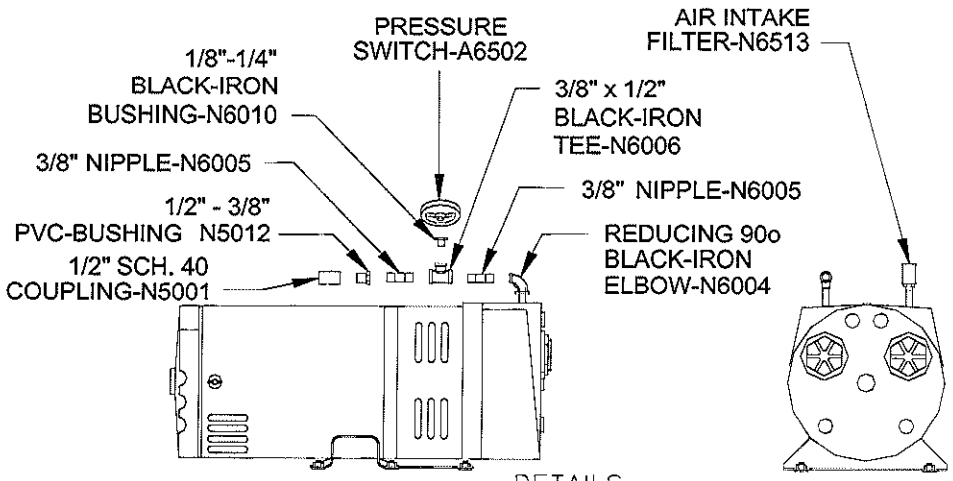


DETAILS

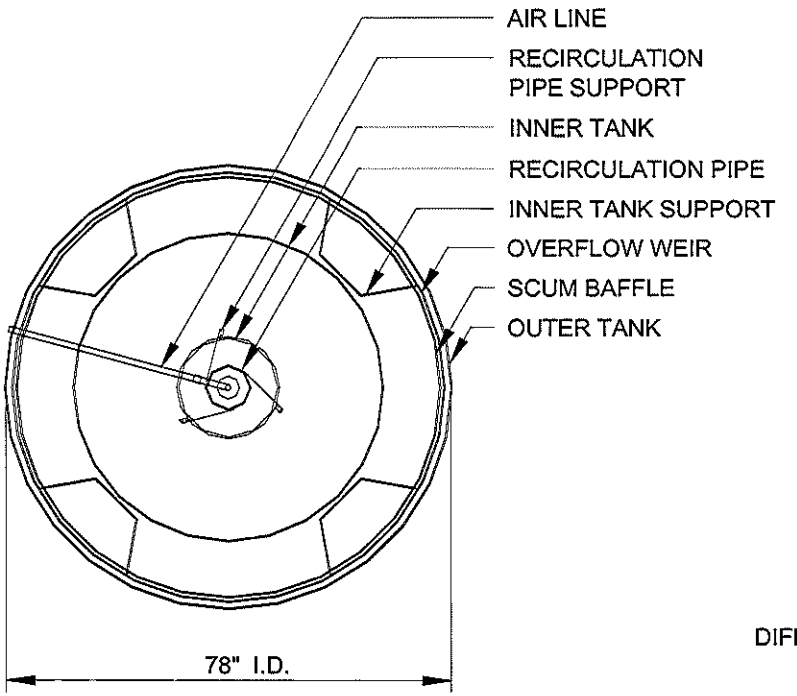
NAYADIC M-1050A	CONSOLIDATED TREATMENT SYSTEMS, INC. 1501 COMMERCE CENTER DRIVE FRANKLIN, OH 45005 WWW.NAYADIC.COM		
FRANKLIN, OHIO	DATE 12-1-01	BY BDB	DWG. NO. DWG. NO.

NAYADIC INC.

Aerobic Sewage Treatment Systems
General Specifications

MODEL M-1200A

Treatment	Combination contact stabilization and extended aeration
Capacity	Holding – 1200 gallons Treated – 1000 gallons
Organic Capacity	1.7 to 2.5 # BOD/Day
Efficiency	95% + Reduction (BOD, TSS)
Aeration Rates	2300 cf./lb. BOD/Day
Weir Overflow Rate	45.4 Gallons / foot / Day
Compressor	1/3 HP, 1725 rpm, 60 cycle, 115V Rated
Air Line	¾" PVC Sch. 40
Diffusion	Diffuser: disc plate body w/ snap-on Check diaphragm
Warning Device	Visual / Audio-Visual
Treatment Tank **Height** **Diameter** **Weight**	Fiberglass Construction 96 1/2" w/o Cover 126 1/2" with Cover & Lid 94" 950 lbs.
Maximum Depth of Installation:	89" Inlet invert to Tank Bottom.
Inlet and Outlet Pipe Connection:	4" PVC opening
Material Specifications:	Polyester Laminated Glidden 4728 or Equal with over 33% glass content, Owens Corning fiberglass 825-DA-211, Producing typiem cured properties as follows: A) Flexural Strength – 36,350 PSI B) Flexural Modulus – 1.49 x 10^6 PSI C) Tensile Strength 16,210 PSI D) Heat Distortion temp – 183°F



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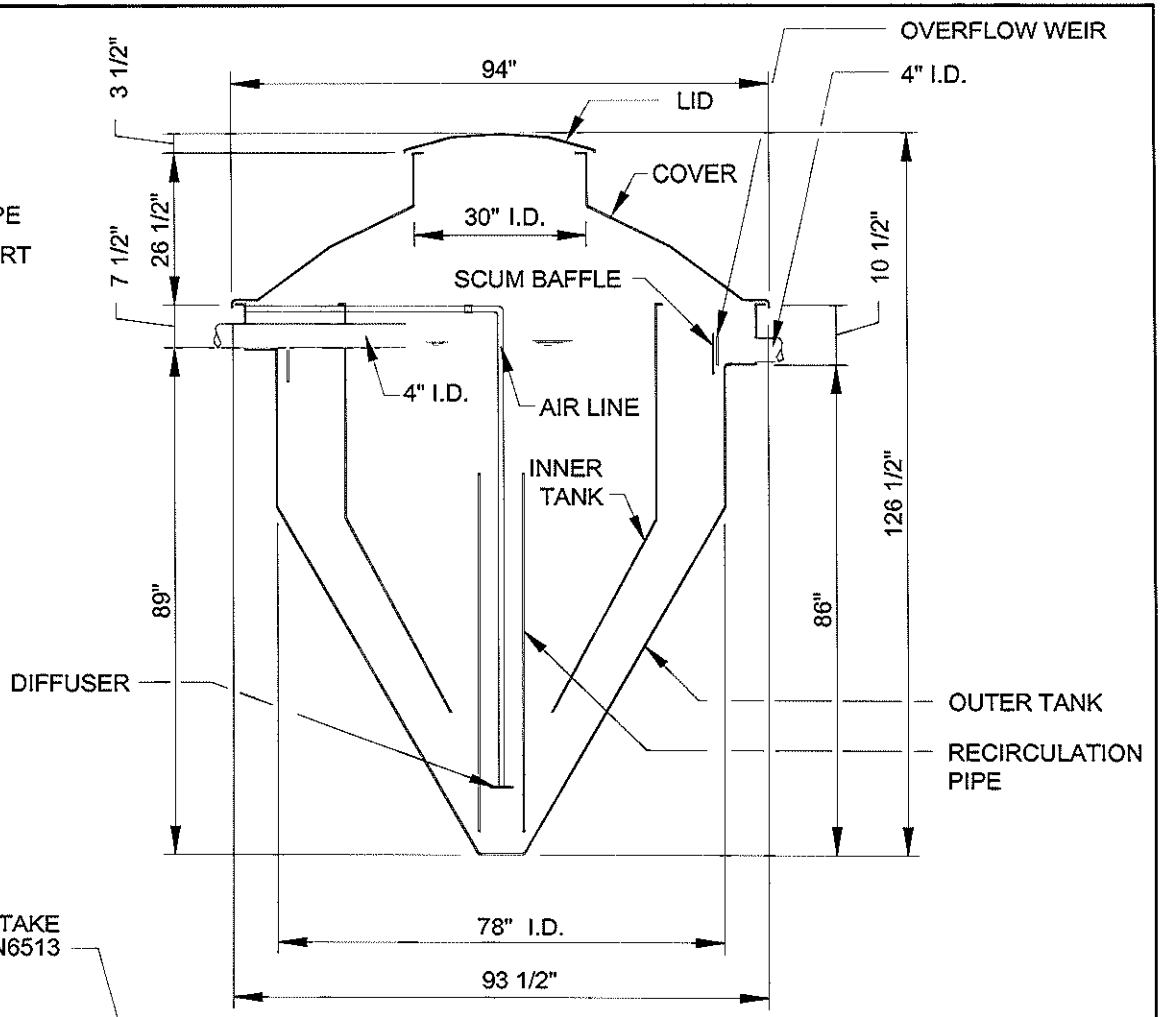

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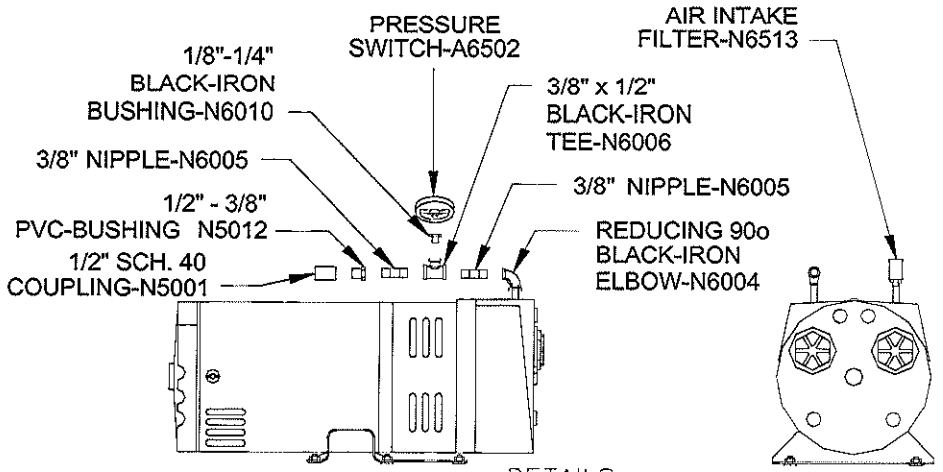


DETAILS

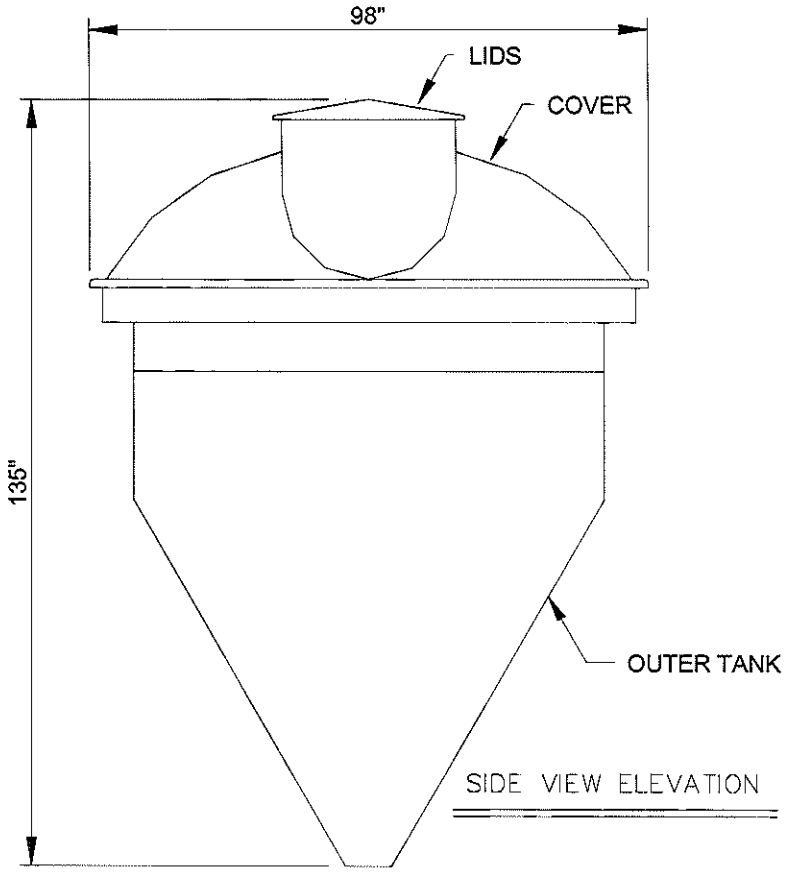
NAYADIC M-1200A	CONSOLIDATED TREATMENT SYSTEMS, INC. 1501 COMMERCE CENTER DRIVE FRANKLIN, OH 45005 WWW.NAYADIC.COM		
FRANKLIN, OHIO	DATE 12-1-01	BY BDB	DWG. NO. DWG. NO.

NAYADIC INC.

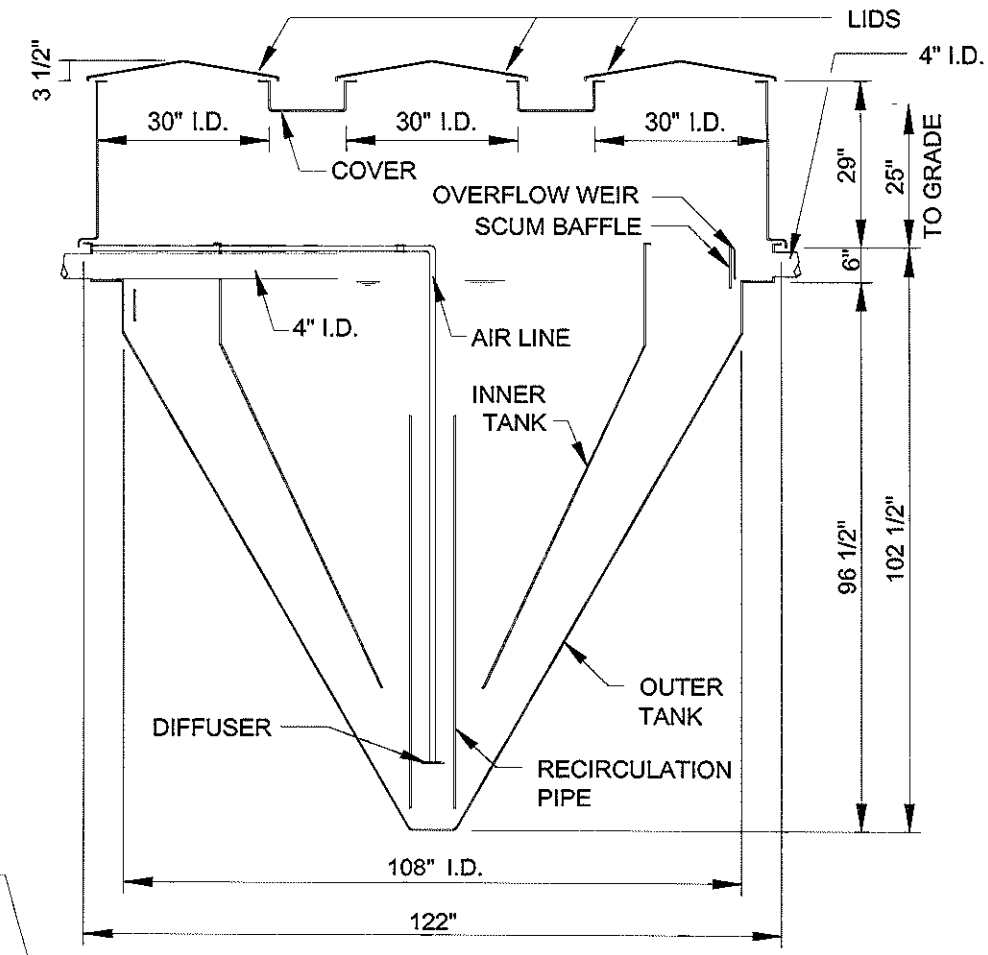
Aerobic Sewage Treatment Systems
General Specifications

MODEL M-2000A

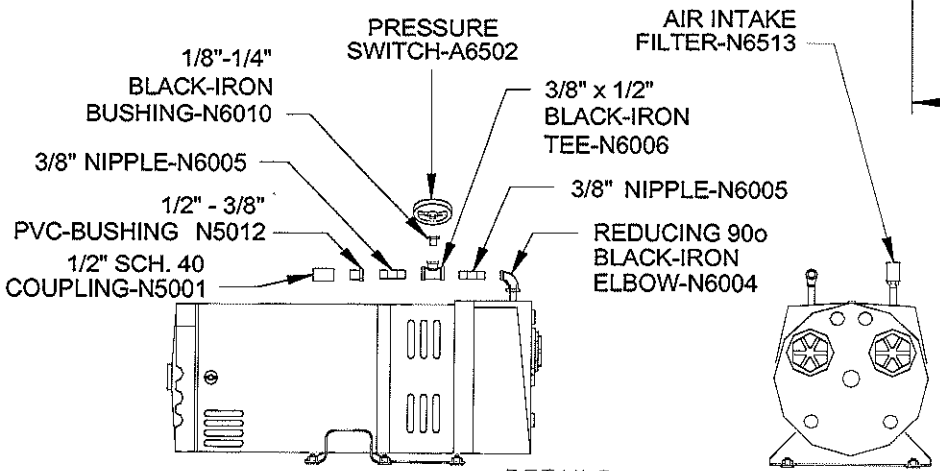
Treatment	Combination contact stabilization and extended aeration
Capacity	Holding – 2000 gallons Treated – 1500 gallons
Organic Capacity	2.4 to 4.25 # BOD/Day
Efficiency	95% + Reduction (BOD, TSS)
Aeration Rates	2710 cf./lb. BOD/Day
Weir Overflow Rate	50 Gallons / foot / Day
Compressor	1/2 HP, 1725 rpm, 60 cycle, 115V Rated
Air Line	1" PVC Sch. 40
Diffusion	Diffuser: disc plate body w/ snap-on Check diaphragm
Warning Device	Visual / Audio-Visual
Treatment Tank **Height** **Diameter** **Weight**	Fiberglass Construction 102 1/2" w/o Cover 135" with Cover & Lid 124" x 98" 1180 lbs.
Maximum Depth of Installation:	89" Inlet invert to Tank Bottom.
Inlet and Outlet Pipe Connection:	4" PVC opening
Material Specifications:	Polyester Laminated Glidden 4728 or Equal with over 33% glass content, Owens Corning fiberglass 825-DA-211, Producing typiem cured properties as follows: A) Flexural Strength – 36,350 PSI B) Flexural Modulus – 1.49 x 10^6 PSI C) Tensile Strength 16,210 PSI D) Heat Distortion temp – 183°F



SIDE VIEW ELEVATION



1 FRONT VIEW – SECTION



DETAILS

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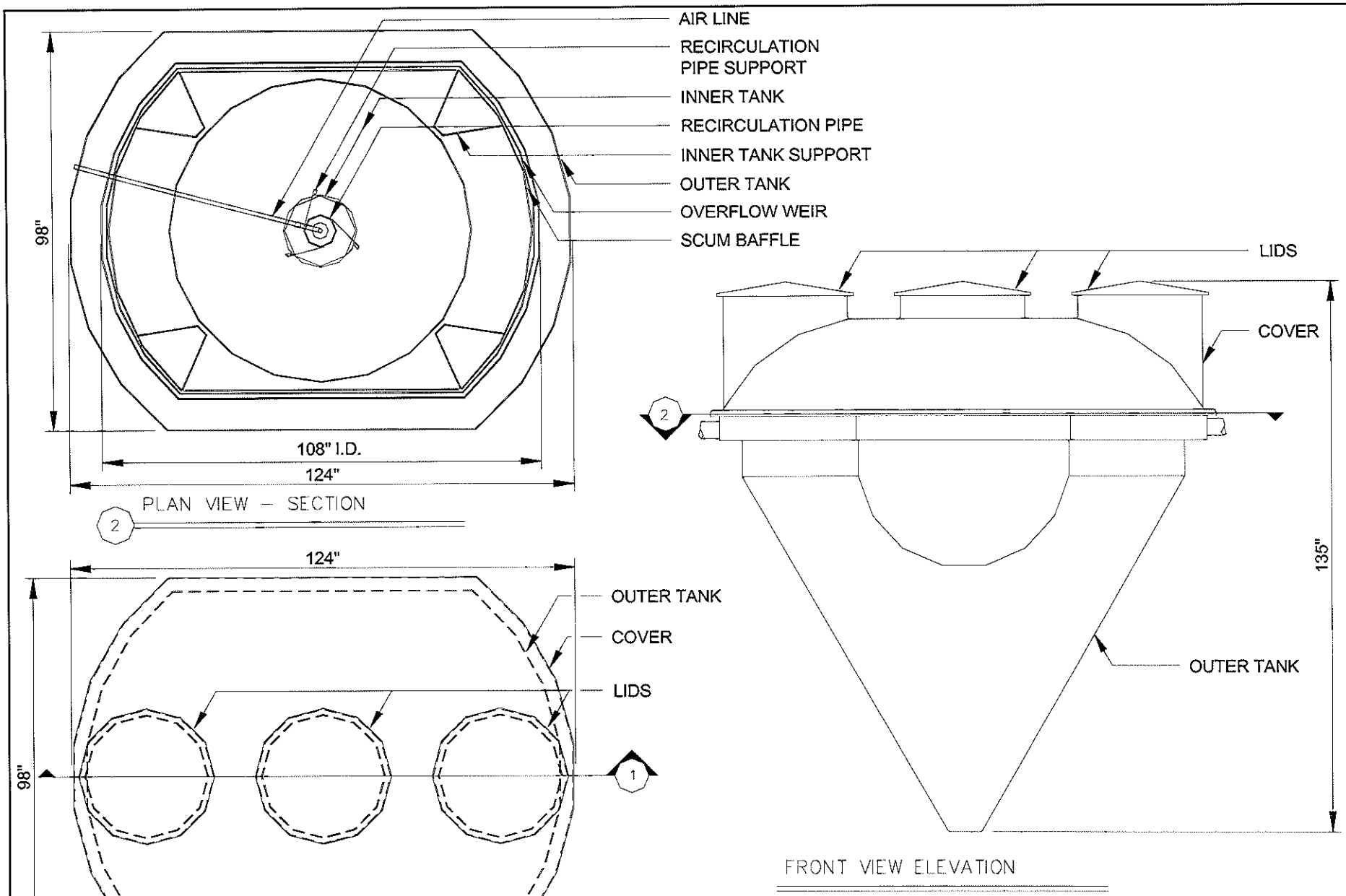

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NAYADIC

WASTEWATER

TREATMENT SYSTEMS

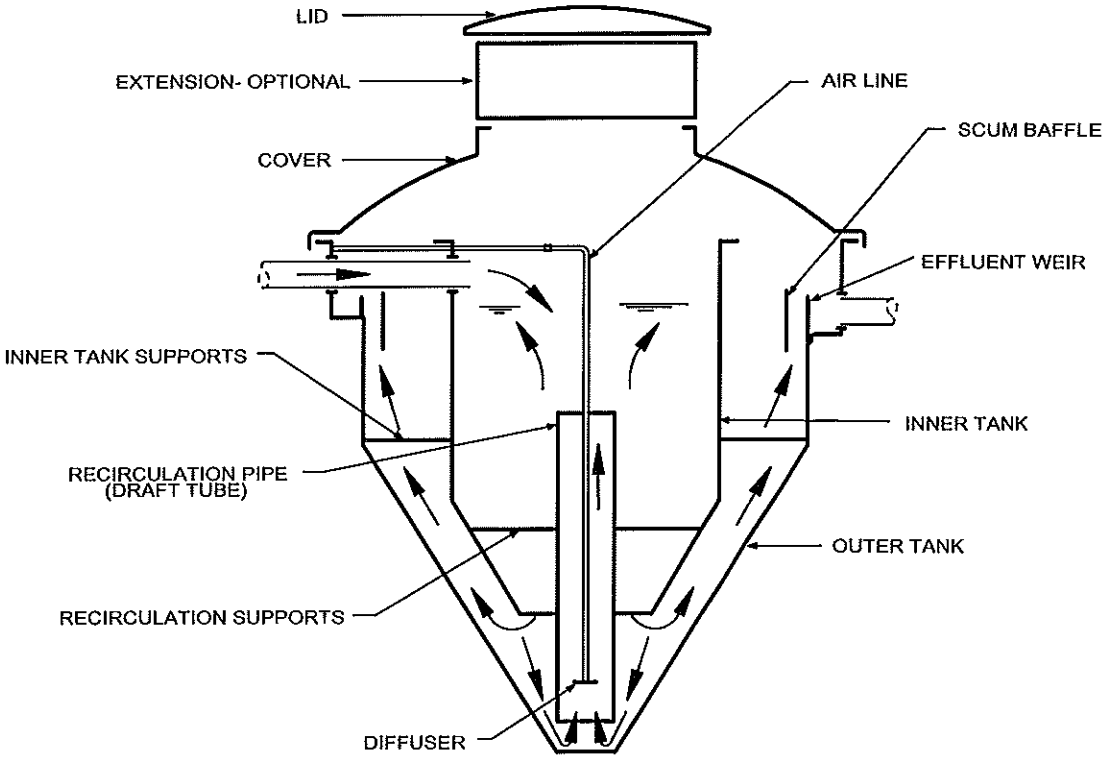
PROCEDURES FOR

ASSEMBLY AND INSTALLATION

A Division of Consolidated Trmt Systems, Inc.
1501 Commerce Center Drive
Franklin, OH 45005
Tel: 937-746-2727
Fax: 937-746-1446
www.consolidatedtreatment.com

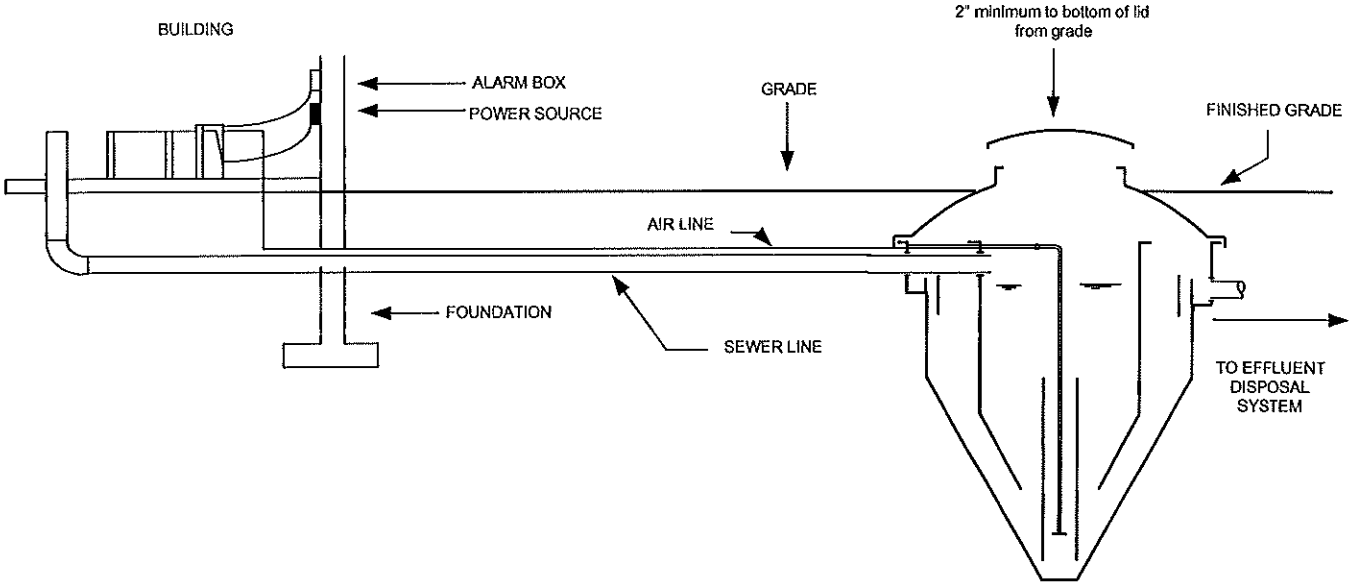
NAYADIC TANK COMPONENTS

Fig. 1.1



TYPICAL INSTALLATION
(Cross Section)

Fig. 1.2



Unless otherwise noted, the instructions within this manual may be used for all models (M6-A, M8-A, M1050-A, M1200-A and M2000-A) of the ***NAYADIC*** Waste Treatment plant.

The installation must comply with all state and local regulations.

SECTION 1.0 SITE PREPARATION

1.10 LOCATION

1.11 The site plan should show the desired location of the waste treatment plant and the location of the effluent disposal system. CAUTION: Check to make sure the site plan accurately reflects the conditions actually existing at the site and that all required set-backs (i.e., to wells, property lines, etc.) are being met.

1.20 GRADE AND GROUND COUNTOUR

1.21 Position the waste treatment plant so that surface water and effluent will drain to a lower grade under all known conditions.

1.30 COVER EXPOSURE

1.31 The access cover must be exposed at all times to permit the system to function properly and to allow for routine maintenance. There should be a minimum of (2) two inches between the bottom of the lid and the finished grade (refer to Fig. 1.2A and 1.2B).

1.40 BUILDING SEWER LINE

1.41 Carefully check all elevations to insure that the building sewer will have the proper fall (slope) to meet the inlet of the ***NAYADIC*** and maintain the grade requirements to insure proper exposure of the cover. The elevation of the outlet should also be checked to insure proper elevation of the effluent disposal system.

1.50 EXCAVATION PREPARATION

1.51 Clear an area at least two (2) feet larger than the dimensions of the ***NAYADIC*** system which is to be installed.

1.60 EXCAVATION (Refer to Fig. 1.3)

1.61 Determine the required depth of the excavation based upon the elevation of the invert of the inlet sewer line (B) or the elevation of the finished grade (D). These dimensions are given for each model in Figure 1.3. **NOTE: If the distance from the finish grade elevation to the bottom of the excavation exceeds the dimension (D) shown in Figure 1.3, a riser will be required** (refer to Section 2.40).

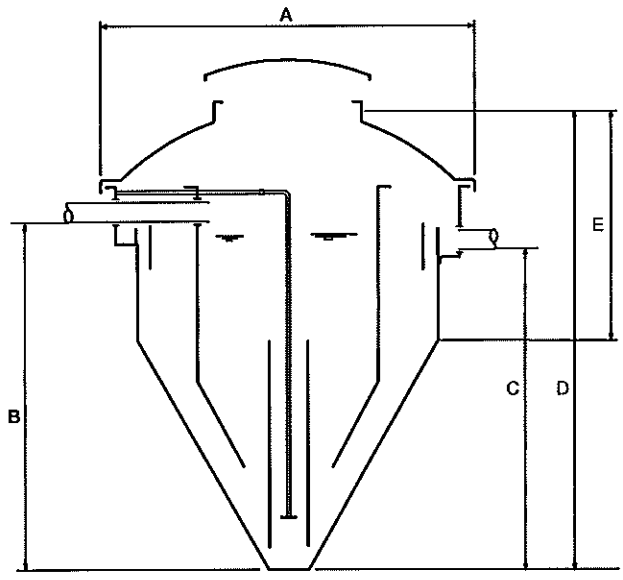
1.62 Excavate a hole approximately two (2) feet wider than the diameter (A) of the plant as specified in Fig. 1.3. The hole should be dug to the depth where the side of the tank begins to taper (E). **NOTE: If a riser will be required (refer to Section 1.61.), then the hole should be dug to the additional depth to allow for the riser.**

1.63 To complete the excavation, dig a single trench, approximately 3' wide in the center of the excavation. The trench should be dug to the depth at which the bottom of the tank will rest as indicated in column D of Fig. 1.3. To allow for the tapered sides, the trench should be gradually widened from approximately 3' at the bottom to a width equal to the diameter (A) of the tank (refer to Fig. 2.1).

1.64 Care should be taken to not dig too large (or too deep) of a hole. If the hole is dug too deep, fill in the bottom of the excavation with a minimum of 6" of sand, pea gravel or crushed stone to the required bottom depth. **This material should be well compacted to prevent settling of the tank when it is filled with water.**

NAYADIC TANK DIMENSIONS

Fig. 1.3



MODEL NUMBERS	DIMENSIONS				
	A	B	C	D	E
M6-A	72	66 1/2	62 1/2	90 1/2	45
M8-A	73	73	68	98 5/8	49 1/2
M1050-A	82 1/2	80 1/2	75 1/2	108 1/2	56
M1200-A	94	89	86	123	61 1/2
M2000-A	98	96 1/2	96 1/2	131 1/2	44 1/2

A = OUTSIDE DIAMETER
B = INLET INVERT FROM BOTTOM OF EXCAVATION
C = OUTLET INVERT FROM BOTTOM OF EXCAVATION
D = FINAL GRADE FROM BOTTOM OF EXCAVATION
E = FINAL GRADE TO BEGINNING OF TAPER

SECTION 2.0 INSTALLATION OF THE TANK

2.10 SETTING THE TREATMENT PLANT (Refer to Fig. 2.1)

2.11 Rig the basin to lift by tying a rope around the inlet coupling and the outlet pipe. **CAUTION: The model M2000-A is supplied with 4 lifting hooks which should be used to attach the rope.**

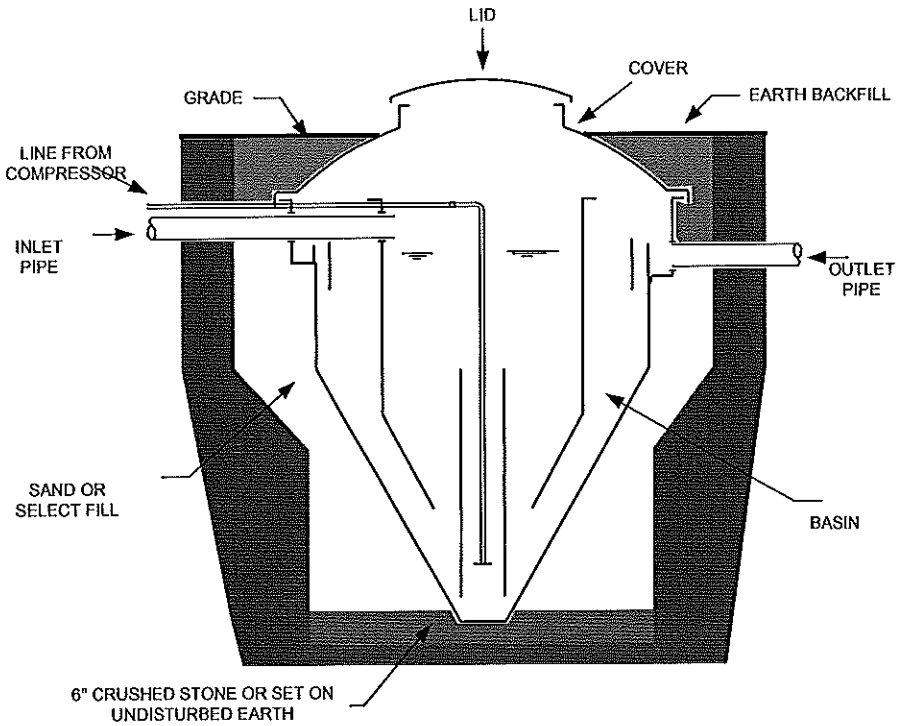
2.12 Slowly lower the ***NAYADIC*** basin (bottom section of tank) into the hole until the bottom is resting on undisturbed soil or appropriate bedding material. Make sure the inlet pipe is aligned with the building sewer.

2.13 Before filling with water or backfilling around tank, carefully re-check elevations and grades of inlet, outlet and building sewer. If elevations are not correct, remove tank and dig out additional material or add necessary amount of bedding material (refer to Section 1.64).

2.14 When the tank basin is properly set in the hole, begin filling the tank with water. Once there is approximately 3' of water in the tank, place the cover over the basin to prevent the accidental spillage of dirt into the tank and then backfill around the basin to a depth of 3', using selected fill or sand. **It is important that the fill material be compacted evenly around the basin to prevent uneven settling after the backfilling Is completed. With sandy fill materials, it is advisable to "water in" the fill as it is placed in the excavation.**

BACKFILLING PROCEDURES

Fig. 2.1



2.15 When the fill material reaches a depth of approximately 1' below the top of the tapered part of the basin, discontinue backfilling and level the tank (refer to Section 2.20).

2.20 LEVELING THE WASTE TREATMENT PLANT
CAUTION: The plant must be level to insure proper aeration and clarification.

2.21 Remove the cover and plug the 4" outlet pipe.

2.22 Fill the effluent trough with water until it flows over the top of the effluent weir.

2.23 Level the tank until the surface of the water in the trough is even with the effluent (outer) weir around the entire circumference of the tank.

2.24 **(Alternate leveling method)** Place a long (4' or greater) level across the top flange of the outer tank (basin). Check this at several locations and adjust the tank until it is level.

2.30 BACKFILLING THE TANK

2.31 Once the basin has been leveled, replace the cover and carefully continue backfilling with selected fill or sand until the lower (tapered) portion of the tank is backfilled. Making certain the tank is level, continue to backfill up to the outlet pipe (refer to Fig. 2.1).

2.32 Glue and firmly insert the inlet and outlet sewer pipes (4" Sch. 40 PVC) into their respective fittings. **CAUTION: To prevent any damage to the inlet or outlet pipes due to settling or backfilling, make sure that both the inlet and outlet pipes are set on undisturbed or firmly-packed fill material prior to final backfilling procedures.**

2.33 Remove the cover and install diffuser and air supply line (see Section 3.0).

2.34 Place cover on top of unit. In order to prevent the infiltration of ground water, silt, sand, etc. into the ***NAYADIC*** effluent line, it may be advisable to seal the cover to the basin using silicone caulk or tar tape. If this is done in an area with a high water table or where the system may be subject to flooding, the tank should be anchored (refer to Item 2.50). **Note: Before cover is replaced, check to insure that the basin is still level and that any accumulations of mud, sand, gravel, etc., are flushed away and pumped out. Accumulations of mud or gravel with tank bottom will prevent proper operation of the draft tube.**

2.35 Finish backfilling to a level approximately 2" below the access lid (refer to Fig. 2.1). When landscaping is completed, the access lid should be at least 2" above the finished grade level.

2.36 Finish filling the tank with water until the water begins overflowing the effluent weir.

2.40 (OPTION) INSTALLING A RISER (LID EXTENSION)

2.41 It is necessary for the access lid to be above grade to allow for routine maintenance and to prevent the entry of surface water. For deep installations, ***NAYADIC*** provides risers (6", 12" and 24") to bring the lid to grade. DO NOT INSTALL SYSTEM WITH GREATER THAN 24 INCHES OF BACKFILL.

2.42 To install the riser, remove the access lid from the cover.

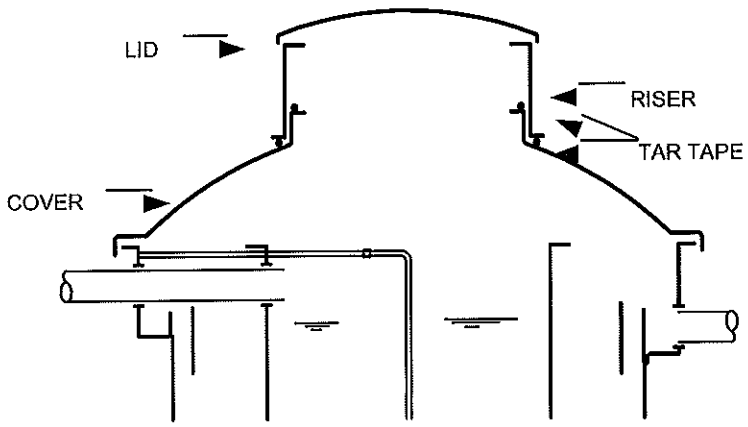
2.43 Carefully remove the 2 stainless steel backplates from inside of cover.

2.44 Place riser over the 30" access opening of the cover. Slide the riser down as far as it will go.

2.45 Apply a strip of ½" tar tape or silicone sealant under the bottom flange of the riser. Check to make sure that the tar tape has properly sealed the bottom of the flange to the top of the ***NAYADIC*** cover. Apply a second strip of ½" tar tape or silicone on the inside of the riser as shown in Fig. 2.2.

RISER INSTALLATION

Fig. 2.2



2.46 Place the lid on top of the riser. Using the holes in the lid as a guide, drill matching holes in the riser.

2.47 Remove the lid. Using stainless steel rivets, re-attach the backplates to the inside of the riser, making sure they align with the 2 drilled holes.

2.48 Replace access lid. Fasten with tamperproof bolts.

2.50 ANCHORING THE NAYADIC TANK

2.51 When installing the ***NAYADIC*** in areas with a high water table or in flood-prone areas, it may be advisable to anchor the tanks to prevent floatation or shifting. (see Fig. 2.3).

2.52 To anchor the tank, use four (4) $^{3}/_{8}$" galvanized steel eye bolts, four (4) 24-30" auger tie-downs, and $^{1}/_{8}$" galvanized or stainless steel cable (minimum 500 lb test).

2.53 Level the tank and backfill to approximately 12" below the inlet pipe.

2.54 Place the cover on the basin.

2.55 Drill (4) $^{3}/_{8}$" holes through the outer flanges of both the cover and basin. These holes should be drilled opposite the four inner tank support brackets.

2.56 Place a 1" washer on the eyebolt and insert into the hole previously drilled in the flange so that the "eye" is on the bottom. Place a second 1" washer on the eyebolt (top of flange) and fasten with nut. Do the same for the remaining 3 holes.

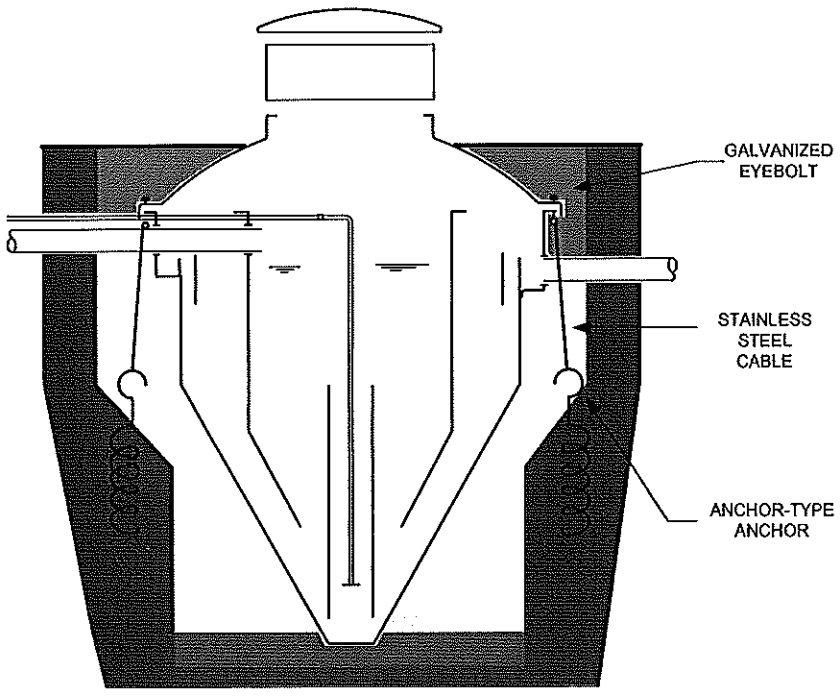
2.57 Screw each of the auger tie-downs into the ground below the 4 eyebolts. Care should be taken to insure the anchors are installed in either undisturbed soil or well-compacted backfill.

2.58 Using the stainless steel cable, fasten the four eyebolts to the respective tie-down. (Option: The cable may be fastened to concrete bumper guards which are buried in surrounding soil at a depth of at least 4' below grade.)

2.59 Finish backfilling around unit.

PROCEDURE TO ANCHOR NAYADIC

Fig. 2.3



SECTION 3.0 INSTALLATION OF COMPRESSOR, AIR SUPPLY LINE, AND DIFFUSER

3.10 ASSEMBLING THE COMPRESSOR

3.11 Check the compressor model number to insure the proper compressor is supplied with ***NAYADIC*** plant.

3.12 Open carton and remove compressor, base plate (foot support), air filter package and fittings ($^3/_8$" nipple, $^3/_8$" x ¼ " reducing elbow, $^3/_8$" x ½" threaded bushing, ½" female adapter, and $^3/_8$"" threaded tee with reducing bushing).

3.13 Attach the plate according to directions provided with compressor. Make sure the base plate is properly attached so that the compressor does not tip.

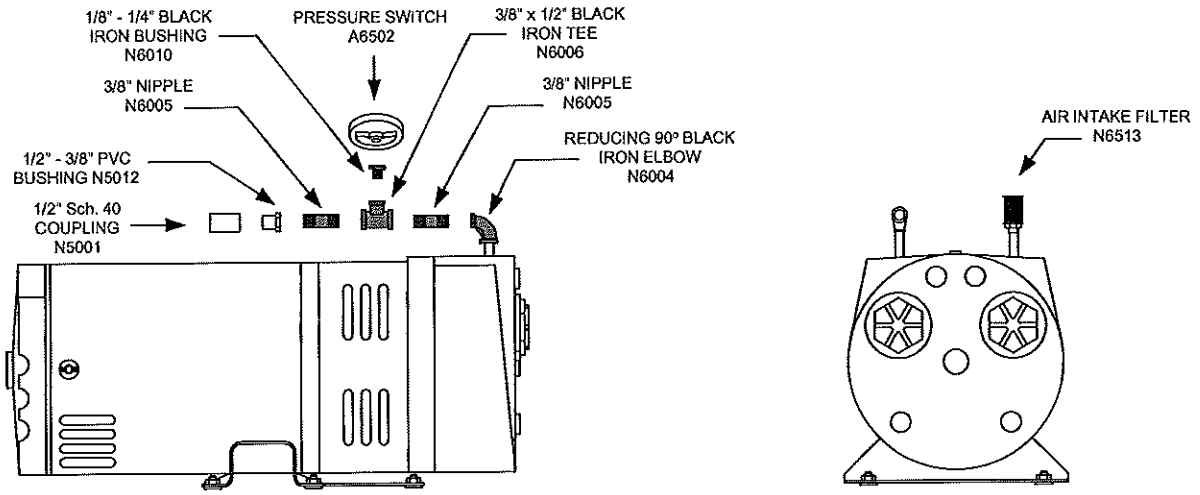
3.14 Remove plug from air intake opening and screw in air filter.

3.15 Remove plug from ¼" nipple (air discharge). Attach ¼" x $^3/_8$" reducing elbow. Screw $^3/_8$" threaded nipple into elbow. Next, screw the $^3/_8$" tee onto the nipple and screw a second $^3/_8$" nipple onto the other end of the tee. **Note: There is a reducing bushing screwed into the third opening of the tee. This will be for the attachment of the pressure switch.** To assure there is no leakage of air, use pipe dope or similar product on all threaded connections.

3.16 If rigid ½" PVC pipe is to be used for the air supply line to the treatment plant (standard), a $^3/_8$" (threaded) x ½" (slip) PVC reducing bushing should be screwed onto the $^3/_8$" nipple. A ½" x ½" Sch. 40 PVC coupling should then be glued onto the bushing in order to attach the ½" PVC pipe for the airline. (Refer to Fig. 3.1A) *The compressor is now ready to attach the PVC airline.*

COMPRESSOR/AIRLINE ASSEMBLY
(Option: PVC Airline)

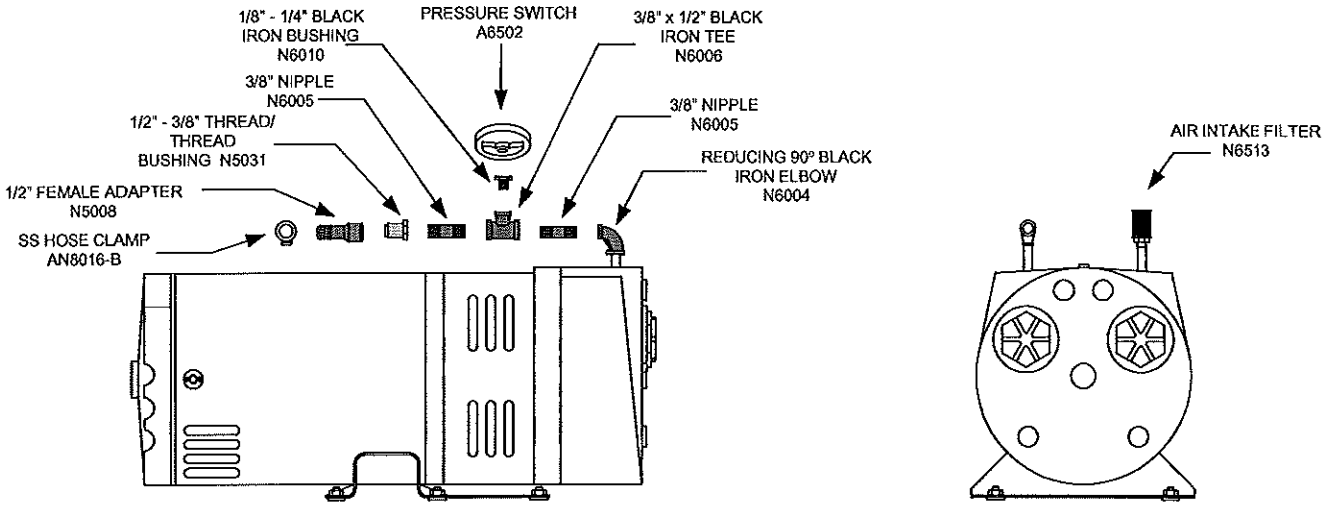
Fig. 3.1A



3.17 (OPTION) If the installer wishes to use ½" plastic tubing instead of PVC pipe, screw a $^{3}/_{8}$" x ½" reducing bushing onto the second $^{3}/_{8}$" nipple and then attach the ½" PVC barbed fitting. Secure the plastic tubing (airline) with the stainless steel hose clamp. **Note: The $^{3}/_{8}$" x ½" reducing bushing, barbed fitting, as well as the tubing must be ordered separate.** (Refer to Fig. 3.1B)

COMPRESSOR/AIRLINE ASSEMBLY
(Option: Plastic Tubing Airline)

Fig. 3.1B



3.20 ASSEMBLING THE AIR SUPPLY LINE AND DIFFUSER (Refer to Fig. 3.2A & B)

3.21 Remove the air supply line assembly that is taped to the draft tube (inner tank of basin). The assembly includes: a ½" Sch. 40 PVC air line with diffuser plate and a ½" Sch. 40 air line with female union. **All fittings necessary to attach airline from compressor to the airline/diffuser in the *NAYADIC* are enclosed in a plastic bag shipped with the compressor.** These include:

1) PVC Pipe Fittings (standard): ½" PVC slip coupling and a ½" PVC slip coupling with a short (1 ½") PVC extension.
2) Black Flexible Tubing (optional, order separate): ½" PVC (threaded) bushing with ½" PVC extension, ½" PVC slip coupling, $^{3}/_{8}$" barbed adapter and hose clamp.

3.22 Slide the shorter ½" diameter air tube (with female union) through the ½" hole in the inner tank. (The hole is located above the 4" inlet pipe.)

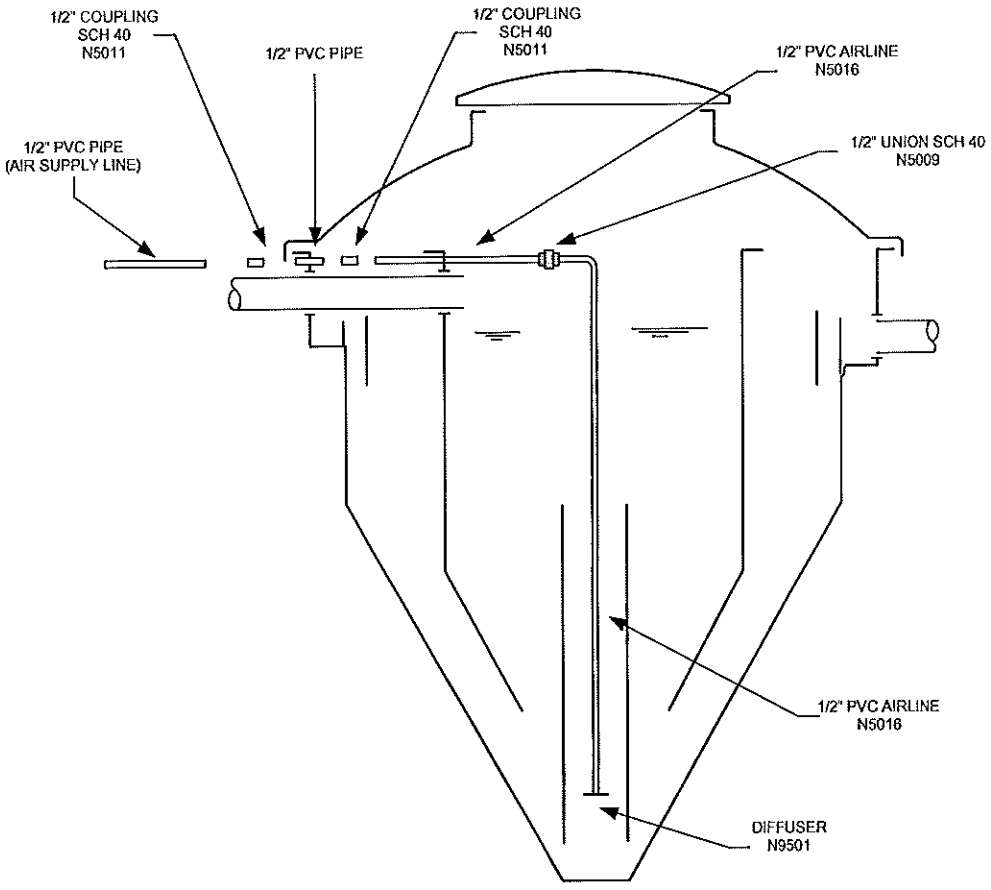
3.23 Insert the longer ½" air tube (with diffuser) into the 8" draft tube, so that the diffuser is located near the bottom of the tank. The male end of the coupling (top of air tube) should be aligned with the female end on the shorter air tube previously inserted through the inner tank.

3.24 Connect the two ends of the air supply lines and tighten the union as much as possible by hand. NOTE: The diffuser should be located in the center of the bottom portion of the 8" draft tube. Check to insure that the diffuser does not extend below the bottom of the draft tube.

3.25 Glue a ½" coupling to the outer end of the shorter (top) air supply line. Align the coupling with the ½" hole in the wall of the outer tank. Take the second ½" coupling (that has a ¾" piece of ½" pipe already glued in place) and insert the short piece of pipe through the ½" hole in the wall of the outer tank and glue into the coupling attached to the air supply line. *The unit is now ready to attach the ½" PVC airline from the compressor.*

ASSEMBLY OF AIRLINE/DIFFUSER
(Option: PVC Airline)

Fig. 3.2A

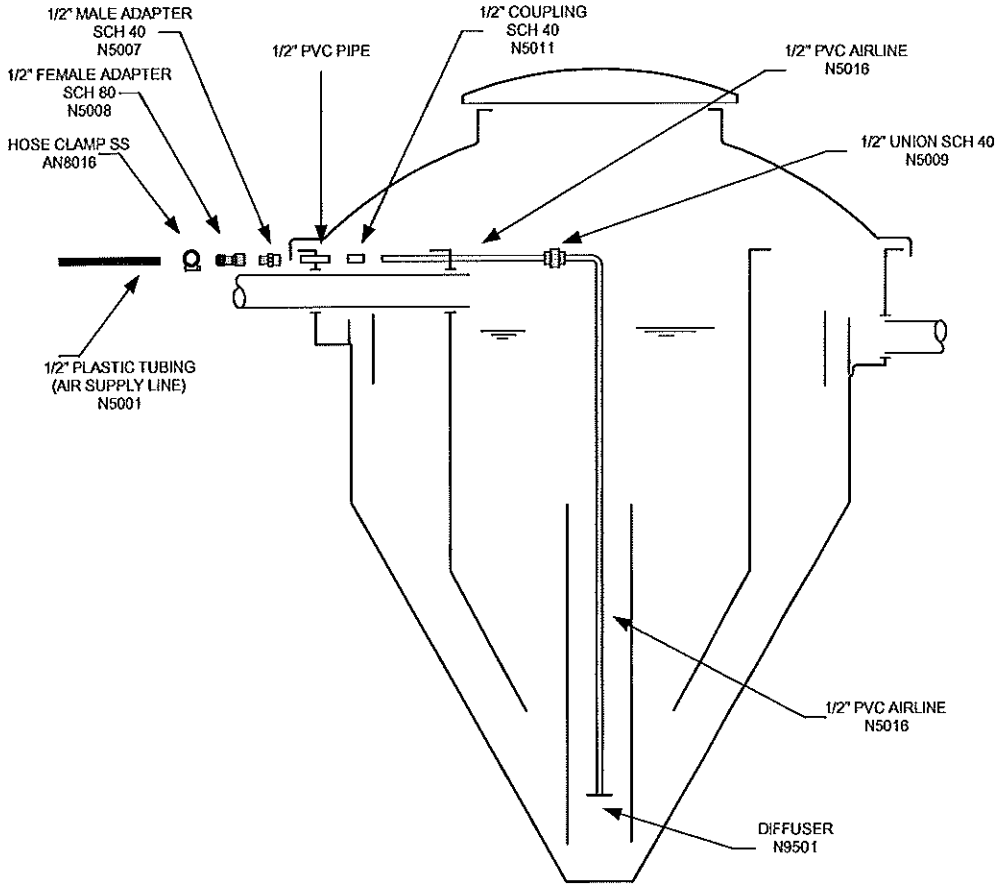


3.26 (*Option*) If ½" black flexible tubing is to be used for the airline (Refer to Fig. 3.2B) The threaded bushing that has a 1 ½" long piece of pipe already glued in place should be inserted through the hole in the outer tank and glued onto the coupling attached to the air supply line.

3.27 Screw $^{3}/_{8}$" barbed adapter onto the end of the bushing. *The unit is now ready to attach the black flexible tubing (airline).* Secure tubing with stainless steel hose clamp.

ASSEMBLY OF AIRLINE/DIFFUSER
(Option: Plastic Tubing Airline)

Fig. 3.2B



3.30 LOCATION OF THE COMPRESSOR

3.31 The compressor can be located either inside or outside. If located outside, a protective housing must be provided (see Item 3.33). The compressor can be located on the floor of a garage, utility building or in a crawlspace. (*Avoid locating the compressor in a tight, enclosed area).*

3.32 Do not attach compressor to the walls, framing, or support pilings of buildings.

3.33 (Outside location) If mounted outside, a protective housing must be provided to protect the compressor from excessive dirt, dust and direct rainfall. An approved housing can be purchased from ***NAYADIC*** for this use.

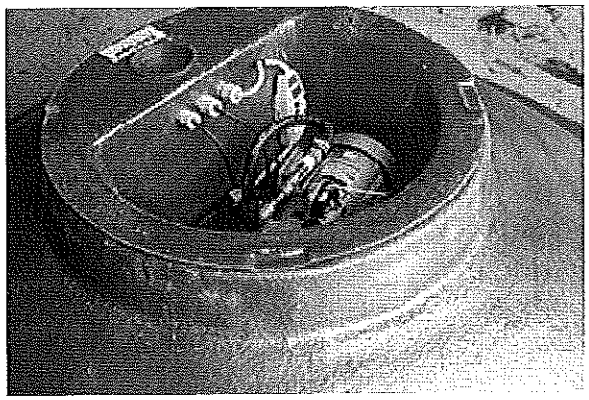
3.34 It is imperative that the compressor be protected from flooding or direct rainfall. If using the ***NAYADIC*** enclosed housing, it should be located in such a way as to prevent surface water from entering. If the compressor is mounted outside with an approved housing or in a building, it should be located above any possible flood elevations.

3.35 *Make sure the compressor is properly ventilated to prevent overheating.*

(*Option*) Internal Compressor Housing: ***NAYADIC*** supplies an internal compressor housing that allows the compressor to be mounted inside the ***NAYADIC***. Separate directions for the use and installation of this housing are available from the factory. (Refer to Fig. 3.3)

INTERNAL COMPRESSOR HOUSING

Fig. 3.3



3.40 INSTALLING AIR LINE FROM COMPRESSOR (Refer to Fig. 3.1 and 3.2)

3.41 PVC pipe, ½" Sch 40. (Refer to Fig. 3.1A) If PVC pipe is to be used, it is necessary to insure that all connections and fittings are properly glued to prevent leakage.

3.42 It is important to minimize the number of elbow fittings required to install the airline in order to minimize air loss. To assure proper air supply, no more than four (4) 90° couplings should be used.

3.43 (*Option*) Black plastic air line (Refer to Fig. 3.1B) If black plastic tubing is to be used for the airline, it must be ordered separate.

3.44 Slide one end of the tubing over the $^{3}/_{8}$" barbed fitting on the compressor.

3.45 Unroll the tubing and cut off a length sufficient to reach the ***NAYADIC*** plant. **CAUTION: Allow sufficient length to avoid sharp bends or excess strain on the tubing or fittings.**

3.46 Slide the loose end of the tubing over the barbed adapter which extends through the outer wall of the ***NAYADIC***. Hose clamps should be used to further secure both ends of the tubing.

3.47 **IMPORTANT:**

- The compressor should be located no further than 60' from the ***NAYADIC*** plant. An internal compressor housing should be used if the compressor will be more than 60' away.
- The airline (black plastic tubing or PVC pipe) should be installed on a solid base, either fastened to the inlet sewer or laid on undisturbed earth. Backfill carefully to avoid damaging the air supply line.

SECTION 4.0 ELECTRICAL SPECIFICATIONS FOR THE M6-A, M8-A, M1050-A, M1200-A and M2000-A INCLUDING ALARM AND COMPRESSOR INSTALLATION DIRECTIONS

4.10 GENERAL INFORMATION

4.11 The electrical power requirements are 120 volt, 60 Hz, 1 phase (unless otherwise specified).

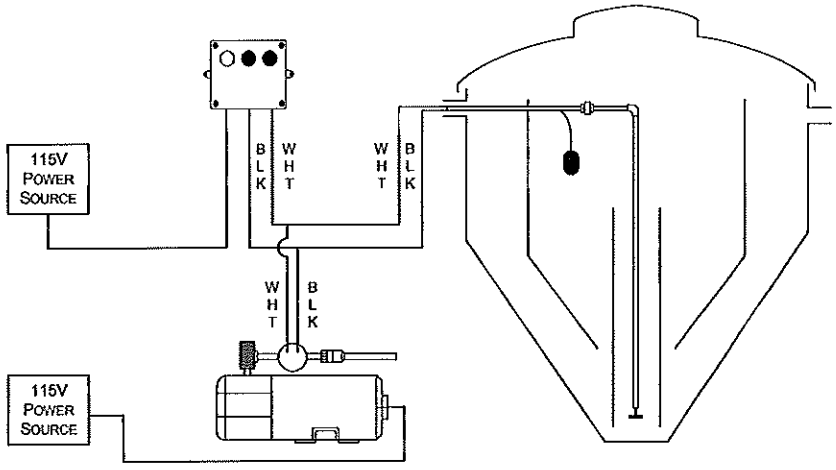
4.12 Provide a two wire with ground approved underground cable sized for the specific compressor model to be used and the length of cable from the power source.

4.13 Provide a minimum 15-amp circuit breaker at the main power source.

4.14 Study the wiring diagram (Fig. 4.1) which is also provided with each alarm (inside of alarm box).

WIRING DIAGRAM: STANDARD ALARM

Fig. 4.1



4.15 CONTENTS OF ALARM SYSTEM:

1 – standard ***NAYADIC*** alarm
1 – high level float (to sense high water condition)
1 – pressure switch (to sense electrical/mechanical failure)
1 – float clamp assembly
1 – flat cable connector (for cable thru tank)
1 – nylon locknut (for flat cable connector)
4 – wire nuts (2 orange for alarm, 2 yellow for pressure switch)
Note: Outdoor alarm contains 4 orange wire nuts for alarm and 2 yellow wire nuts for pressure switch for power cord connection.
2 – blue wire nuts (waterproof for float)
2 – jumper wires (connected to pressure switch)
1 – metal strain relief and metal locknut (for indoor alarm)
2 – plastic conduit adapters and metal locknuts (for outdoor alarm)

4.20 FLOAT ASSEMBLY (Fig. 4.2)

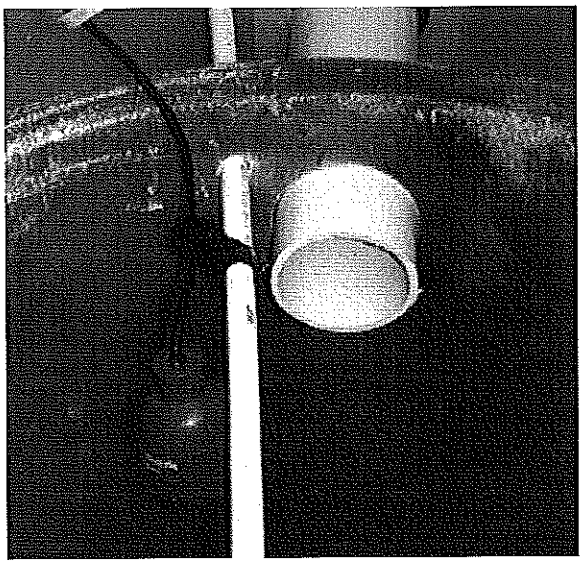
4.21 Install the flat cable connector through the pre-drilled hole next to the airline hole. After setting the outer tank in the excavation and leveling the tank, insert 3 feet of the flat U.F. underground cable through the cable connector. Tighten the cable connector. Provide sufficient U.F. cable to extend to the compressor.

4.22 Install the float with clamp on airline. Note: The float clamp is to the topside of the airline and away from the inlet pipe.

4.23 Connect the wire of the float to the incoming wire from the alarm system using the blue wire nuts. First strip wire ½" and align frayed strand or conductors. PRE-TWISTING UNNECESSARY. Place stripped wires together with ends even. Twist connector onto wires pushing firmly until tight. DO NOT OVER TORQUE. Since this connection if made within the tank, you will need to provide a sufficient length of electrical cable to allow for the connections to be made near the access cover.

FLOAT ASSEMBLY

Fig. 4.2



4.30 PRESSURE SWITCH ASSEMBLY (Fig. 4.3)

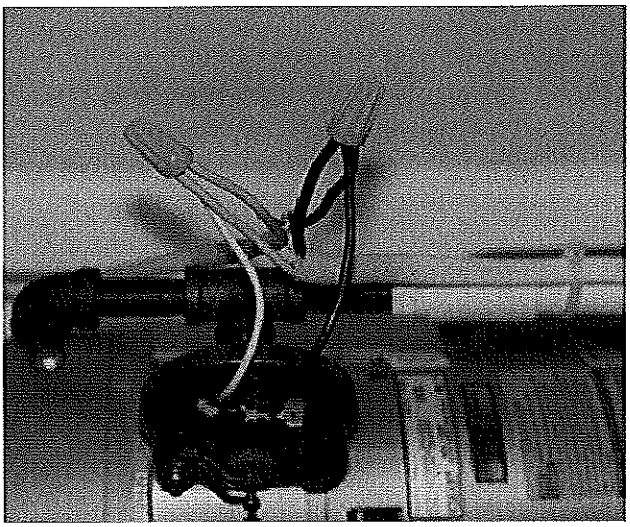
4.31 Thread the pressure switch into the reducing bushing in the tee located on the compressor discharge line (Refer to item 3.15). DO NOT OVERTIGHTEN for that could strip out the fitting from the pressure switch body. Use a wrench to secure the pressure switch into the tee. The pressure switch should be on an angle so that the pressure switch DOES NOT SIT ON THE COMPRESSOR.

4.32 Bring together the three (3) sets of black and white wires from the float, alarm and pressure switch. Using the yellow wire nuts, connect all three white wires and all three black wires.

4.33 Secure the wires from the alarm and float to the airline with the two wire ties.

PRESSURE SWITCH ASSEMBLY

Fig. 4.3



4.40 ALARM ASSEMBLY (Fig. 4.1)

4.41 Remove alarm from packing box. Remove faceplate by unscrewing 4 screws in corners of the faceplate. Turn the faceplate over in order to have access to the wiring components.

4.42 Indoor Alarm (standard): Using the metal locknut fasten the metal strain relief to the opening for the wire from the float and pressure switch. Fasten the two white wires together and the two black wires together with the yellow wire nuts. **Note: The indoor alarm is provided with a power cord to plug into any 115V outlet.**

4.43 Outdoor Alarm (optional): Using the metal locknuts, fasten the two conduit adapters to the alarm box openings. Using conduit (as required by local electrical codes) bring the wires from the pressure switch, float and the 115V power source into the alarm box. Using the yellow wire nuts, connect the two wires from the float switch to the two wires marked "to float and pressure switch" (white to white, black to black); and the three wires from the 115V power source to the three wires from the alarm marked "115V in" (white to white, black to black, green to green /ground).

4.44 Mount the alarm box in a visible location. **CAUTION: Do not connect the power source to the compressor and alarm until all electrical connections have been completed.**

4.45 Carefully replace the faceplate onto the alarm, pulling the excess cable through the metal strain relief. Leave sufficient slack to allow for future removal or service.

4.46 Replace the four faceplate screws.

4.47 Tighten the metal strain relief (on indoor alarm).

4.48 Push "TEST" button to check if the alarm is activated. **Hold for at least 15 seconds.** Reset alarm before leaving.

4.49 The wiring of the ***NAYADIC*** plant is now complete. *Be sure to place the service sticker of the appropriate service representative on the bottom of the alarm faceplate.*

SECTION 5.0 START-UP PROCEDURES

5.10 CHECKING COMPRESSOR AND AIR LINE

5.11 Once the compressor and alarm control have been installed and all electrical work is completed, power should be supplied to the compressor.

5.12 Check the compressor to insure proper operation. If the motor is humming, but the rotor assembly is not moving or is moving slowly, immediately disconnect the power source. **Refer to Item IA of the Trouble Shooting Checklist for corrective action.**

5.13 If the motor runs but provides insufficient air pressure check the internal filters to insure they are properly tightened. Make sure "o" rings are properly sealed.

5.14 Check the ***NAYADIC*** aeration chamber to insure proper aeration (turbulence) is occurring. If sufficient turbulence is not observed, check union on airline to insure it is properly tightened.

5.15 If no turbulence is observed in the aeration chamber, remove the lower air supply line (with diffuser) by unscrewing the union on the air supply line. If no air is observed coming from the air supply line when the compressor is running, check the air line between the compressor and the ***NAYADIC*** (including all connections and fittings) to check for leaks or damaged air line. Replace or repair as necessary.

5.20 CHECKING THE ALARM

5.21 With power being supplied to the compressor and alarm, press the "test" button to activate the alarm.

5.22 If the alarm is not activated when the test button is pressed, refer to section II of the Trouble Shooting guide for the proper corrective action to be taken.

5.30 PLANT START-UP

5.31 Once the compressor and alarm have been checked and are operational, the plant is ready to receive sewage flows.

5.32 Normally, it is not necessary to add any chemicals or enzymes to facilitate plant start-up. It is helpful, however, to restrict the discharge of excessive amounts of gray water from showers and laundry during the initial 6-8 weeks of use.

5.33 If the ***NAYADIC*** system exhibits a gray dishwater appearance in the aeration chamber or has a noticeable odor, contact the factory or the local authorized representative for the proper procedure to follow to attain normal operation.

SECTION 6.0 USE OF A PRE-TANK

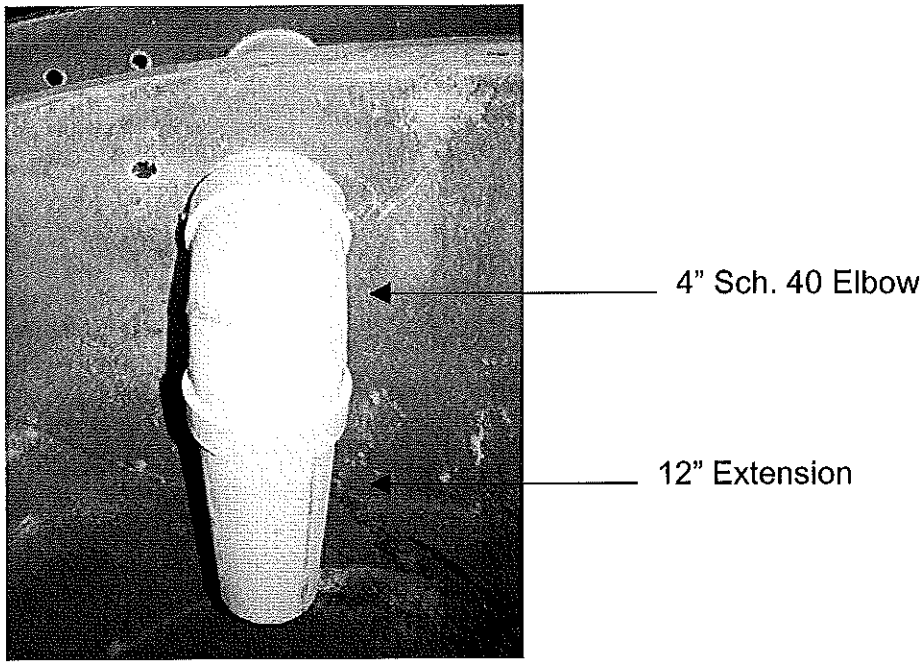
The ***NAYADIC*** has been designed and listed (certified to function without the use of a pre-treatment tank. However, installation of a pre-treatment tank, if used to address local requirements or to reduce maintenance problems, will not adversely affect plant performance if properly sized and installed.

6.10 If a pre-treatment tank is installed, the liquid capacity of the pre-tank should be between 50 - 100% of the treatment capacity of the ***NAYADIC***. Slightly larger tanks can be used with the M6-A and M8-A.

6.11 The use of a pre-tank may cause septic odors to escape from the ***NAYADIC*** during periods of heavy water usage (i.e., laundry). In these cases, a 4" Sch. 40 elbow can be installed on the inlet pipe to the ***NAYADIC***. A 12" piece of pipe should be added to extend below the surface of the water. (Refer to Fig. 6.1)

NAYADIC **INLET DEVICE WHEN INSTALLED AFTER A PRE-TANK**

Fig. 6.1



NAYADIC

A Division of Consolidated Treatment Systems, Inc.

OWNER'S MANUAL

MODEL NUMBERS
M-6-A
M-8-A
M-1050-A
M-1200-A
M-2000-A

Consolidated Treatment Systems, Inc.
1501 Commerce Center Drive
Franklin, OH 45005
Tel: 937-746-2727
Fax: 937-746-1446
www.nayadic.com

THE NAYADIC ONSITE WASTEWATER TREATMENT SYSTEM

CONGRATULATIONS! You are the owner of a complete wastewater treatment system that combines aeration and solids separation in one compact unit. Your system is tested and certified under NSF, International, ANSI/NSF Standard 40, as a Class I system. The Nayadic system meets the needs for onsite wastewater treatment beyond the capabilities of septic tanks. Like all onsite wastewater treatment alternatives, your Nayadic unit must be operated and maintained in accordance with the Manufacturer's requirements and service provider's instructions. When properly operated and maintained, your unit will produce an effluent that meets all certification requirements.

HOW DOES THE NAYADIC OPERATE?

One of the features of the Nayadic is that the entire treatment process takes place within a single tank. Wastewater flows into the tank. A compressor blows air to a diffuser that disperses the air. This process transfers oxygen throughout the system. The oxygen, which is dissolved in the water, provides an environment conducive to the growth of aerobic bacteria. These bacteria effectively consume the organic materials.

Unlike other products, Nayadic incorporates a 360° weir that encompasses the circumference of the tank. The result is efficient gravity separation of solids from the effluent.

IMPORTANT ITEMS TO REMEMBER

Nayadic units have an initial break-in period of four-to-six weeks, during which time bacteria establish themselves in the unit. The development of these biological colonies occur naturally with the addition of sanitary wastes, so we recommend you use all your plumbing facilities in a normal manner from initial start-up. You may notice a tendency for the unit to foam from laundry wastes during this period. This is normal, and it should cease by the sixth week. You can help by using moderate amounts of low-sudsing biodegradable detergents. Break-in can be accelerated by "seeding," which is a process by which microbial growth is introduced from another Nayadic unit.

Nayadic units are designed to treat typical domestic wastewater. Flows from and materials in garage catch basins, storm water drains, sumps, and the like will adversely affect Nayadic operation. Excessive amounts of cleaners, solvents, paints, greases, etc., will lead to a failure and service calls.

Following these simple rules will decrease or eliminate maintenance problems and prolong the life and efficiency of your unit.

- Obtain and maintain a service agreement with an authorized Nayadic service provider.
- Check that your unit's access lid is securely tightened down.
- Check the alarm by pressing the button to activate the light and buzzer on the audio-visual alarm.

- Keep the surface water from ponding around the unit.
- Call your service provider at the first sign of trouble.
- Follow your service provider's advice. He/she is trained to ensure that your unit operates at its maximum efficiency.
- Use low-sudsing, low phosphate biodegradable detergents.
- Contact your service provider if the system is to be used intermittently or if extended periods of non-use is anticipated.
- Keep un-disposable items out of your system. These items include, but are not limited to: wet strength paper towels, disposable baby diapers, sanitary napkins, rubber and plastic products, rags, grit, and coffee grounds.
- Avoid placing grease into your system. Excessive grease may impede normal operation.
- Do not pour solvents, paints, etc., into your system. These substances will harm the bacteria.
- Always keep your compressor running unless instructed otherwise by your service provider.
- Do not service the unit yourself. Contact your service provider to maintain your Nayadic unit.

ALARM SYSTEM and ALARM CONDITION

Every Nayadic unit comes equipped with an audio-visual alarm system. This alarm should be mounted in a conspicuous location. If an abnormal condition develops, you will be notified by a light and buzzer. Silence the buzzer by pressing the "silence" button on the alarm. If the light should stay on, call your service provider.

Check your audio-visual alarm periodically by holding the "test" button for approximately 10-to-12 seconds or until the light flashes and the buzzer sounds. Contact your service provider if your "test" button fails to activate the alarm.

If your alarm goes off, there are several steps you can take to determine the possible nature of the malfunction.

1. Is the alarm activated during a non-flow period, i.e., late at night, early morning? If so, the probable cause is the compressor.

2. Is the alarm activated intermittently while washing clothes or taking a shower? If so, high water may exist in the system.

MAINTENANCE PROGRAM

YOUR NAYADIC UNIT REQUIRES PERIODIC SERVICING.

Maintenance of your Nayadic is essential to ensure its proper operation and longevity.

During your initial two-year warranty, an authorized service representative will inspect your unit at six-month intervals and make any necessary adjustments to it at no cost to you. The only exception is for the replacement of "out of warranty" and "physically abused" parts or abuse to the treatment process. Moreover, this warranty will not cover other treatment and dispersal components and devices.

For continued service, your service provider will offer an annual service contract at the end of the warranty. Please contact your service provider for details.

In the event a problem arises or service is required, refer to the unit's data plate (located on the alarm and access lid) or the service label for instructions on contacting your closest service provider. Occasional pumping is required due to accumulation of solids. The pumping cost may not be covered under your maintenance and service program. If you need parts or service, please contact the factory for the name of the service provider nearest you.

Your Nayadic system is designed and intended to treat typical domestic wastewater (i.e., human bodily waste and liquid waste generated by the occupants of dwellings). To insure optimum performance and longevity, do not discharge any type of non-residential wastewater or other high-strength waste, including commercial food service waste, without contacting the manufacturer to determine if this will be acceptable without additional treatment.

IMPORTANT: Nayadic units must be installed and maintained in compliance with all state and local laws and regulations. This includes compliance with all regulations concerning proper effluent disposal and the pumping and disposal of solids and byproducts pumped from the unit.

NAYADIC WARRANTY DOES NOT COVER THE COST OF SERVICE CALLS, LABOR, OR MATERIALS REQUIRED DUE TO THE FOLLOWING:

1. Misuse, abuse, or any repair or alteration performed by anyone other than authorized Nayadic service provider.

2. Use of components other than authorized Nayadic replacement components.

3. Non-wastewater flows caused by infiltration, storm water connections, leakage from improperly maintained plumbing fixtures, water softener backwash, etc.

4. Failure to maintain electrical power to the treatment system in accordance with the requirements of the Manufacturer or the authorized Nayadic service provider.

5. Disposal into the Nayadic of non-biodegradable materials (i.e., plastics, coffee grounds, etc.) chemicals, solvents, grease, oil, paint, or any other substance, including but not limited to medicines, metals, toxins, volatile substances, and the like that are deleterious to the development and maintenance of the biological treatment process.

6. Short-term or daily wastewater flows to the Nayadic that exceeds the unit's hydraulic or organic design capabilities.

7. Any usage contrary to Nayadic owner's manual and/or the Nayadic representative's recommendations.

NAYADIC MODEL SPECIFICATIONS

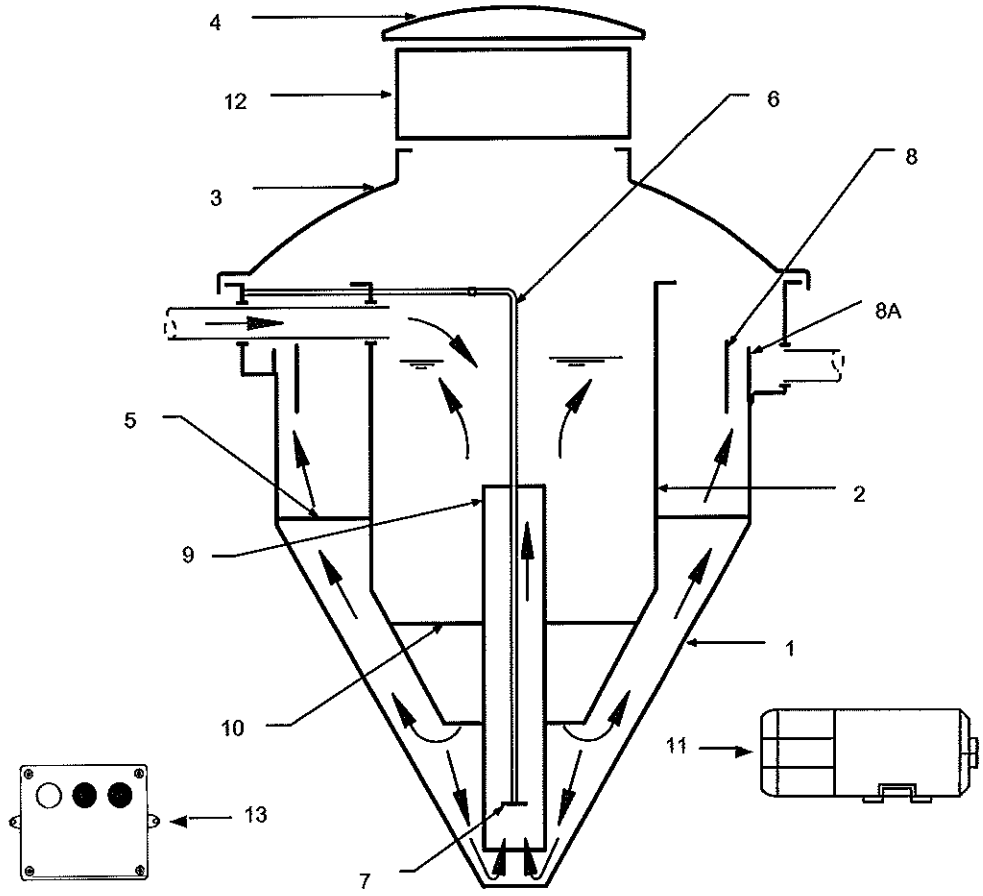
Item	M-6-A	M-8-A	M-1050-A	M-1200-A	M-2000-A
Treatment (gal/day)	500	600	750	1000	1500
Volume (gal)l	600	800	1050	1200	2000
CBOD (lb/day)	1.5	2	2.4	2.5	4.2
Maximum Diameter (in)	72"	82"	82"	94"	124"x98"
Total Height (in)	93"	106"	115"	127"	135"
Shipping Weight (lb)	485	625	760	950	1180
Inlet Invert* (in)	65"	72"	81"	89"	98"
Outlet Invert* (in)	63"	70"	79"	87"	96"
* From Bottom of Excavation – See Drawings for Details					

NAYADIC WASTEWATER SYSTEM SPECIFICATIONS

Wastewater Treatment Performance (ANSI/NSF Standard 40 Evaluation)

TEST RESULTS (Mean Results)	INFLUENT (mg/L)	EFFLUENT (mg/L)	REDUCTION (%)
$CBOD_5$	150	6	96
TSS	195	7	96

NAYADIC COMPONENTS AND SPECIFICATIONS



Item.	Description	Number
1	OUTER TANK	1
2	INNER TANK	1
3	COVER	1
4	LID	1
5	INNER TANK SUPPORTS	1
6	AIR LINE	1
7	DIFFUSER	1
8	SCUM BAFFLE	1
9	OVERFLOW WEIR	1
10	RECIRCULATION PIPE	1
11	RECIRCULATION SUPPORTS	3
12	COMPRESSOR	1
13	ELECTRICAL ALARM	1

WARRANTY

Consolidated Treatment Systems, Inc., warrants the parts in each aerobic treatment unit to be free from defects in material and workmanship for a period of two (2) years from date of installation for treatment of household wastewater when properly registered with the manufacturer. Consolidated Treatment Systems, Inc., sole obligation under this warranty is as follows: Consolidated Treatment Systems, Inc., shall fulfill this warranty by repairing or exchanging any component part, FOB Factory, that shows evidence of defects, provided said component part has been paid for and is returned through an authorized dealer, transportation prepaid. The warrantee must also notify Consolidated Treatment Systems, Inc., of the defect complained of. There is no informal dispute settlement mechanism available under this LIMITED WARRANTY.

No warranty is made as to the field performance of any unit. This LIMITED WARRANTY applies only to the parts manufactured by Consolidated Treatment Systems, Inc., and does not include any portion of the household plumbing, drainage, or installation of disposal system. Components or accessories supplied by Consolidated Treatment Systems, Inc., but manufactured by others, are warranted only to the extent of and by the terms and conditions of the original manufacturer's warranty. In no event shall Consolidated Treatment Systems, Inc., be responsible for delay or damages of any kind or character resulting from, or caused directly or indirectly by, defective components or materials manufactured by others.

Recommendations for special applications will be based on the best available experience of Consolidated Treatment Systems, Inc., and published industry information. Such recommendations do not constitute a warranty of satisfactory performance.

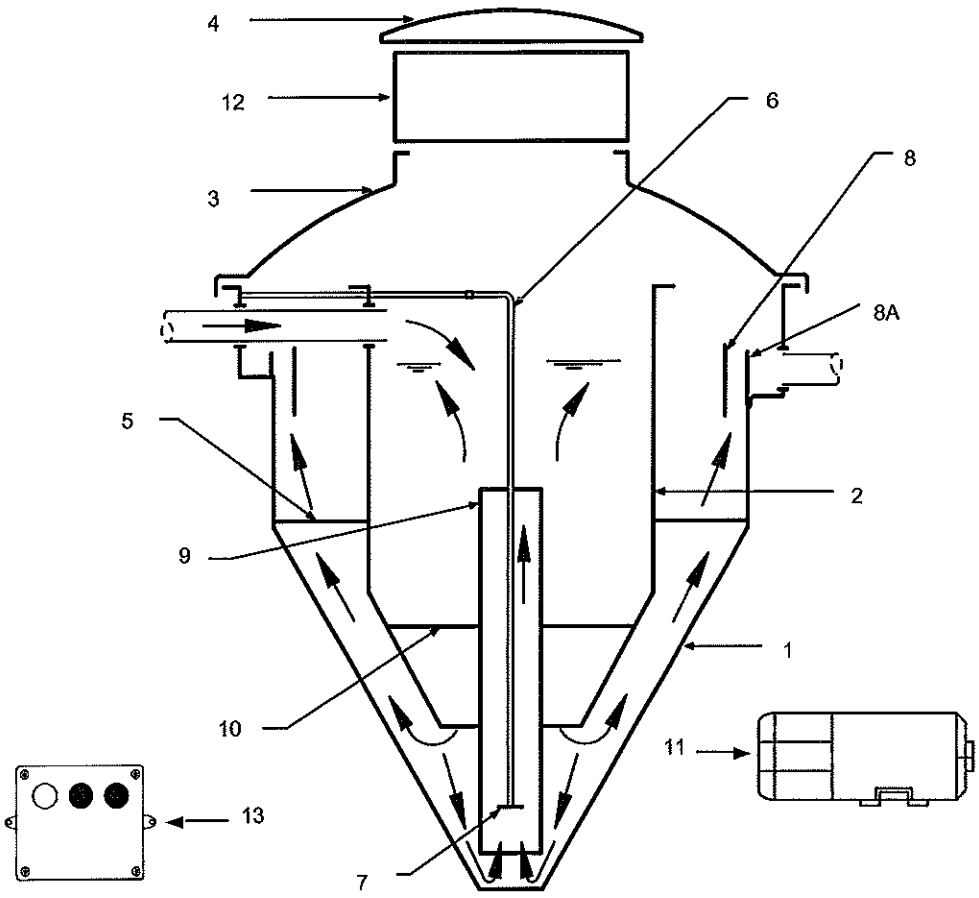
This LIMITED WARRANTY extends to the consumer of the product. As used herein, "consumer" is defined as the purchaser who first uses the unit or the subsequent user(s) for the 2 years after its initial installation. It is the first user's or servicing dealer's obligation to make known to the subsequent user(s) the terms and conditions of this warranty.

This warranty is a LIMITED WARRANTY and no claim of any nature shall be made against Consolidated Treatment Systems, Inc., unless and until the consumer, or his legal representative, notifies Consolidated Treatment Systems, Inc., in writing of the defect complained of and delivers the product and/or defective part(s), freight prepaid, to the factory or an authorized service station.

Consolidated Treatment Systems, Inc., reserves the right to revise, change, or modify the construction and design of the aerobic treatment units for household wastewater, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in equipment previously sold. Consolidated Treatment Systems, Inc., also reserves the right, in making replacements of component parts under this warranty, to furnish a component part which, in its judgment, is equivalent to the part replaced.

UNDER NO CIRCUMSTANCES WILL CONSOLIDATED TREATMENT SYSTEMS, INC., BE RESPONSIBLE TO THE WARRANTEE FOR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOST PROFITS, LOST INCOME, LABOR CHANGES, DELAYS IN PRODUCTION AND/OR IDLE PRODUCTION, WHICH DAMAGES ARE CAUSED BY A DEFECT IN MATERIAL AND/OR WORKMANSHIP IN ITS PRODUCT OR PARTS. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS, AND OF ANY OTHER OBLIGATION ON THE PART OF CONSOLIDATED TREATMENT SYSTEMS, INC. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIAL LEGAL RIGHTS AND YOU MAY HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE.



COMPONENT PARTS

Part No.	Description	No. Req'd	Material
1	OUTER TANK	1	FIBERGLASS
2	INNER TANK	1	FIBERGLASS
3	COVER	1	FIBERGLASS
4	LID	1	FIBERGLASS
5	INNER TANK SUPPORTS	1	FIBERGLASS
6	AIR LINE	1	SCH. 40 ½" PVC
7	DIFFUSER	1	FIBERGLASS
8	SCUM BAFFLE	1	FIBERGLASS
9	OVERFLOW WEIR	1	FIBERGLASS
10	RECIRCULATION PIPE	1	SDR – 41 PVC
11	RECIRCULATION SUPPORTS	3	STAINLESS STEEL
12	COMPRESSOR	1	CAST IRON ALUM. ALLOY
13	EXTENSION – optional	1	FIBERGLASS
14	ELECTRICAL ALARM	1	PLASTIC

Rev: 4/00

NAYADIC

A Division of Consolidated Treatment Systems, Inc.

	M6A	M8A	M1050A	M1200A	M2000A
Max BOD_5 (lb/day)	1.5	2	2.4	2.5	4.25
Design Flow Rate (DWF) (gal/day)	500	600	800	1000	1500
Max Diameter	72 ½	82	82	94	124
Max Height	93 ½	106	114 ½	126 ½	135
Inlet Height (Invert)	65 ½	72 ½	80 ½	89	98
Outlet Height (Invert)	62 ½	70 ½	78 ½	87	96
Compressor Rating	.25 hp	.33 hp	.33 hp	.33 hp	.50 hp
Weight (lbs.)	265	350	450	525	900
Sludge Storage	N/A	N/A	N/A	N/A	N/A

NOTE: Nayadic units are continuously stirred activated sludge designs. Separate sludge storage is not applicable. The units should be pumped every two years or as indicated during routine maintenance.

Consolidated Treatment Systems, Inc.
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www.nayadic.com

NAYADIC

WASTEWATER

TREATMENT SYSTEMS

MANUAL
FOR
OPERATION AND MAINTENANCE
AND
TROUBLESHOOTING GUIDE

A Division of Consolidated Treatment Systems, Inc.
1501 Commerce Center Drive
Franklin, OH 45005
Tel: 937-746-2727
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I. BASIC OPERATION AND MAINTENANCE REQUIREMENTS

The following is a description of the normal maintenance required to insure continuous satisfactory operation of the ***NAYADIC*** systems:

START UP:

Allow 6-8 weeks for sufficient numbers of bacteria to develop in the ***NAYADIC*** in order to provide proper treatment of the wastewater. During this period there may be some sudsing due to laundry wastes. *The sudsing can be decreased by reducing the number of loads done at one time and by using a low sudsing detergent.* In situations where excessive grey water is expected, it may be necessary to seed the ***NAYADIC*** with mixed liquor from another aerobic waste treatment plant. To prevent short-term hydraulic overloads, homeowners should be advised to spread out laundry during this period.

PUMPING EXCESS SOLIDS:

Due to normal accumulation of inorganic solids and dead bacterial cells it is necessary to pump out the excess solids periodically in order to maintain adequate aeration capacity. For a typical single family residence, the ***NAYADIC*** will require pumping at 2-4 year intervals. ***NAYADIC*** representatives should advise customers when the ***NAYADIC*** should be pumped. On heavily used systems or residences with garbage disposals, the provision of a trash trap will reduce pumping frequencies.

COMPRESSOR REPLACEMENT:

The normal life expectancy of the compressor is 3-5 years. For all new installations, there is a two-year warranty on the compressor. For replacement compressors, there is a one-year warranty period. Compressors can also be repaired and/or rebuilt.

ALARM:

The ***NAYADIC*** alarm system indicates both loss of air and high water conditions. To prevent unnecessary maintenance costs, the homeowner should contact the service representative as soon as the alarm is activated or unusual odors are noticed.

SERVICE CONTRACT:

The ***NAYADIC*** system requires periodic servicing to prevent major operational difficulties. With the purchase of each ***NAYADIC***, the owner receives a two-year service contract that provides warranty on all parts and service, including a minimum of two inspections of the unit each year. After the initial two years of operation, the homeowner is urged to maintain a service contract to insure regular inspection and service of the ***NAYADIC*** system.

REPLACEMENT PARTS/SERVICE:

Contact the factory for the name of the closest sales/service representative.

SUMMARY OF RESIDENTIAL MAINTENANCE REQUIREMENTS

Start up period ..... 6-8 weeks after sewage first enters unit

Pumping frequency ..... 2-4 years

Compressor replacement ..... 3-5 years

Routine inspection frequency ..... every 6 months or as required by state/local regulatory authorities

NOTE: Due to differences in raw wastewater strength, increased user abuse and hydraulic surges, additional pre-treatment facilities and/or increased maintenance may be required on non-residential or commercial facilities. Please check with your ***NAYADIC*** representative.

II. EQUIPMENT AND MATERIAL ESSENTIAL FOR SERVICING THE NAYADIC SYSTEM

100' garden hose with spray nozzle

100' extension cord

1/4 hp submersible pump with outlet made of flex pipe.

Small utility pump with 1/2 - 5/8" garden hose (6') on inlet and outlet (Teal model IP 579E, Simer Minivac Model M40 or equal.)

Pliers - standard with insulated handles

Pliers - channellock

Caulking gun

Caulking, silicone

Hammer

Electrical tape

Wire nuts

Knife

Screwdriver

Replacement parts:
- compressor
- diffusers
- compressor repair kit
- pressure switches, high level float switch (alarm)

alarm

Wiping rags

Sample collection jars (quart size)

Volt ohm amp meter

Allen key for lid

III. PROCEDURES FOR ROUTINE INSPECTION AND MAINTENANCE

The ***NAYADIC*** system requires routine, periodic inspection and maintenance to insure continuous, trouble-free operation. At a minimum, the ***NAYADIC*** should be inspected every six (6) months, assuming it is serving a typical single family residence. More frequent inspections may be required if mandated by local or stated regulatory authorities; or, if the ***NAYADIC*** is used on a non-residential application.

During the routine inspections, the following items are checked:

COMPRESSOR

1. Check filters for cleanliness. Replace if the filters are dirty or clogged.
2. Check housing and air line fittings for signs of overheating.
3. Check for air leakage at fittings or in air supply line.
4. Check for excessive noise or vibration.
5. Check for moisture or mud accumulations which could indicate possible flooding or direct rainfall on compressor.
6. Check air flow (with gauge), especially if odors or septic conditions are observed. A minimum of 3.0 cfm should be provided on all models <u>except</u> the M2000A.
7. Check carbon vanes for excessive wear. Replace as needed (approx. 2-3 years).

ALARM

1. Check "test" button to insure proper operation.
2. Check alarm function by raising float in tank.
3. Check alarm function by disconnecting airline union in tank.

TREATMENT PLANT AERATION CHAMBER

1. Check for presence of septic odor.
2. Check for color of aeration chamber contents.
3. Check for excessive sudsing or foaming.
4. Check for excessive accumulation of grease balls and non-biodegradable material. Using a wire skimmer basket, remove such material and dispose of it in a proper manner.
5. Check air supply at aeration chamber, especially if odors or septic conditions exist. Air check can be performed by observing amount of

turbulence; or, by using an air flow meter. If necessary, check diffuser for clogging.

6. Check aeration chamber solids (MLSS) by collecting a sample of aeration chamber contents while compressor is running. Observe rate of settling, volume of settled solids and clarity of supernatant.

CLARIFICATION CHAMBER

1. Check color and depth of scum layer.
2. Check color and clarity of effluent. An effluent check can be done by running water from a garden hose into the aeration (center) chamber.
3. Check level of effluent weir.

MISCELLANEOUS ITEMS TO BE CHECKED

1. Check access cover to insure that it is properly fastened.
2. Check all peripheral equipment such as chlorinators, dosing pumps, filters, etc.
3. Check effluent disposal system.
4. Check compressor housing if installed outside. The housing should be adequately fastened over the housing; be well ventilated and protect the compressor from direct rainfall.

LABORATORY OR FIELD TESTS

Normally, laboratory testing is not required for the routine operation and maintenance of the ***NAYADIC*** system. Occasionally testing may be necessary to identify the source of an operational problem or to satisfy the requirements of the state or local regulatory agency.

SAMPLE COLLECTION

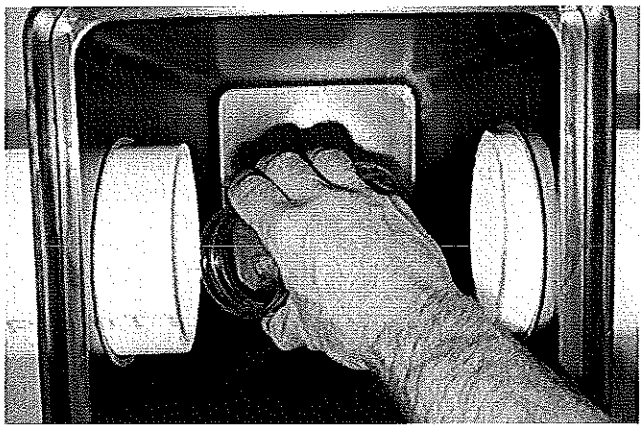
The ***NAYADIC***, when properly sized and maintained, will produce an effluent exceeding the performance requirements of NSF Standard 40 (Class I) for aerobic treatment plants: 30 day average of <25 mg/l CBOD and <30 mg/l TSS.

To collect sample from the ***NAYADIC***, care must be taken to get a reliable and uncontaminated sample of the **effluent that is being discharged from the plant at the time of the sampling.** To accomplish this, the following steps must be taken:

1. Provide a suitable sampling port on the outlet of the ***NAYADIC*** (see Fig. 1). The port should be at least 6" in diameter, with a minimum depth of 8" below the effluent line.
2. Using a clean cloth, wipe the interior of the effluent line where it enters the sampling port. This is to remove any debris that may have accumulated.
3. By opening a faucet or inserting a garden hose into the cleanout before the ***NAYADIC***, generate a flow through the plant. Allow the flow to continue for approximately one (1) minute in order to flush the line.
4. Shut off the water and dip the water out of the sampling port.
5. Turn on the water and collect a sample as the plant effluent flows into the sampling port. Do not collect water that has accumulated in the sampling port. Care needs to be taken to avoid catching dirt or other debris while collecting the sample.

Fig. 1

Treatment Plant Effluent →



→ To Disposal

IV. MAINTENANCE PROCEDURES: Pumping (wasting) sludge

Bacteria and other microorganisms present in the wastewater utilize the soluble organic material as a food source, converting it into a non-soluble mass. This non-soluble mass or floc is comprised of living microorganisms, sewage particles, as well as inert (non-biodegradable) material. As the process matures, the numbers of micro-organisms increase until there is an adequate biomass to metabolize or digest all of the soluble organic material in the incoming sewage. At this point, competition for food results in the dying (due to starvation) of organisms as new organisms are formed. These dying organisms, in turn are metabolized, thereby reducing the overall sludge volume.

The volume of solids will gradually increase due to the accumulation of the inert remains of dead organisms (ash), combined with the non-degradable material in the raw wastewater. As the solids increase, the mixed liquor (i.e., contents of the aeration chamber) becomes thicker, developing an increasing darker brown color. Periodically, the excess solids must be pumped (wasted) from the ***NAYADIC*** in order to insure continued plant efficiency.

PUMPING FREQUENCY

The rate at which the solids (biomass) accumulates in the ***NAYADIC***, and the subsequent rate at which the excess solids must be pumped out, is dependent upon the total volume and strength (i.e., BOD) of the wastewater entering the plant. The typical residential system will need to be pumped every 2-3 years. Commercial systems or systems that receive close to their design loading may need to be pumped every 1-2 years. Conversely, weekend cottages or systems serving only 1 or 2 people may go 4-5 years or longer.

DETERMINING PUMPING FREQUENCY

In order to insure optimum treatment efficiency and effluent quality, it is necessary to maintain the level of aeration solids (MLSS) within a suitable range (refer to Operational Control Chart). A low level of solids in the aeration chamber (i.e., during the plant start-up) reduces the treatment plant's ability to provide adequate treatment during peak operating periods. Excessive solids, on the other hand, may result in poor settling during periods of hydraulic surges; or, in the development of septic conditions in the plant. In order to determine when the ***NAYADIC*** system should be pumped it is necessary to perform a settleable solids test (30-minute) during each semi-annual service check:

Procedure:

1. Mark a quart jar into 10 equal portions.
2. While the compressor is running, fill the jar with the liquid (MLSS) from the aeration chamber. This sample should be collected at mid-depth in the tank. **Do not collect a sample from within the draft tube.**
3. Allow the sample to sit for 30 minutes. If the sample settles slowly, allow it to sit for 24 hours in order to insure complete settling.
4. Measure the volume of the settled sludge as a percentage of the total volume of the sample. Occasionally, after the sample sits, a portion of the settled sludge may float to the top of the sample. If this occurs, add together the volume of settled sludge and the volume of floating sludge.
5. Compare the percent of settled sludge (i.e., sludge volume) to the figures given in the "Operational Control Chart". The optimum level of settleable solids is normally between 5-50%. Whenever the sludge volume exceeds 50%, the plant should be pumped.

PROCEDURE FOR PUMPING THE NAYADIC

1. Remove 30" access cover.
2. Carefully lower the pumper hose into the inner (aeration) chamber. Slide the hose down the wall of the inner tank until it rests on the bottom of the outer tank (clarifier). **Do not insert the hose down the draft tube unless the airline and diffuser are removed.**
3. Pump solids from the bottom of the outer tank. This will lower the liquid level in both the inner tank and outer tank simultaneously.
4. As the liquid level drops, the scum layer between the inner tank and scum baffle will normally break loose and drop to the bottom of the tank where it can be pumped out. With a garden hose, flush any remaining scum or residue to the bottom of the tank. **If the scum layer is more than 2" thick, it should be removed first.**
5. **In areas with a high-water table, immediately re-fill the tank with clear water to prevent shifting or floatation.**

SLUDGE CHARACTERISTICS

It is important to observe the MLSS (mixed liquor suspended solids) sample that is collected from the aeration chamber. As the sample settles you should note the following:

1. What is the color of the sludge?
2. Do the sludge particles clump together in a dense floc, which settles rapidly?
3. Is the liquid above the settled sludge (supernatant) clear?
4. Does the sample have a noticeable odor?

A good healthy sludge should have a chocolate brown color. It should form a dense floc that settles rapidly leaving a clear, odorless supernatant. A sludge sample that has a grey/black color, settles slowly, has a cloudy supernatant, or has a supernatant containing very fine, suspended particles, usually indicates poor treatment plant operation. Therefore, it is important to compare your observations of the ***NAYADIC*** plant, as well as the sample of mixed liquor suspended solids to the conditions described on the "Operational Control Chart" to determine if the plant is operating properly or if any corrective action needs to be taken.

V. COMPRESSOR REPLACEMENT

Procedure:

1. Disconnect power before working on compressor.
2. Remove the compressor housing if located outside.
3. Disconnect the airline from the compressor air discharge fitting.
4. Disconnect the compressor's power cord from the electrical service line that goes to the alarm.
5. Remove the compressor.
6. Take the new compressor out of its packing carton. Remove the plywood shipping base and assemble the base plate (foot support) in accordance with the enclosed directions. NOTE: Keep the box and shipping base to return compressor for warranty.
7. Transfer the air discharge fittings from the original compressor to the replacement unit.
8. Remove plug from the air intake opening and screw in air filter (supplied with compressor).
9. Set the new compressor in place and re-connect the airline and electrical power cord.
10. Replace the housing, if applicable.
11. Re-connect the power and check for proper operation (refer to Section 5.0)

VI. ALARM REPLACEMENT

Procedure:

1. Disconnect power before working on alarm.
2. Unscrew the faceplate of the alarm.
3. Remove the wire nuts and disconnect the following wires:
    a) black and white to float and pressure switch
    b) black, white and green to compressor
4. Remove the alarm faceplate and replace with a new alarm.
5. Reconnect the wires described in item 3.
6. Replace the faceplate and restore power to the alarm.
7. Check alarm by pressing test button and by raising float in the NAYADIC plant.

VII. PRESSURE SWITCH REPLACEMENT

Procedure:

1. Remove the housing from the compressor (if applicable).
2. Disconnect the two sensor wires from the old pressure switch.
3. Unscrew the pressure switch from the airline and replace with a new one.
4. Re-attach the two sensor wires.
5. Check alarm by shutting off the compressor.
6. Replace housing.

VIII. DIFFUSER REPLACEMENT

Procedure:

1. Remove the access lid on ***NAYADIC***.

2. Using a garden hose, wash down the interior surfaces of the center (aeration) tank and airline, including the union on the top of the airline.
3. Unscrew the union and remove the lower portion of the air supply line (with diffuser).
4. Unscrew the diffuser from the end of the airline and replace with a new one.
5. Re-install the airline being careful to insert the airline and diffuser into the draft tube.
6. Tighten union and check to insure that there is adequate turbulence in the tank.
7. Replace the access lid.

IX. FLOAT REPLACEMENT

Procedure:

1. Remove the access lid on ***NAYADIC***.
2. Using a garden hose wash down the interior surfaces of the center (aeration) tank, airline, float, cord and cable connectors.
3. Remove the wire nuts on the float cord and disconnect the two wires.
4. Loosen the clamp on the airline and remove the old float.
5. Replace with a new float, making sure that the float is set at the same distance from the clamp and that the clamp is fastened securely to the topside of the airline and away from the inlet pipe.
6. Reconnect the two wires of the float making sure to use approved water resistant wire nuts.
7. Check the alarm by raising the float.
8. Re-secure the access lid.

NAYADIC
TROUBLE-SHOOTING CHECKLIST

PROBLEM/CONDITION OBSERVED	*POSSIBLE CAUSE*	*CORRECTIVE ACTION*

(IMPORTANT: Disconnect power to compressor or alarm before attempting repairs.)

I. COMPRESSOR

A. New compressor will not start but motor hums when power is turned on.	1. Rotary assembly is locked up due to prolonged storage time.	1. Remove internal filters, muffler box and head plate. Using the palm of your hand turn the rotary assembly until it moves freely. Replace head plate, muffler box and filters. If motor still does not run, return to factory (***NAYADIC***).
B. New compressor runs but provides insufficient air pressure.	1. Internal filters are not properly tightened.	1. Tighten filters by hand. If this does not correct problem, return compressor to factory for repair or replacement.
	2. Kinked or crushed airline. Check with air flow meter at compressor and at ***NAYADIC*** tank to detect pressure loss.	2. Replace airline.
C. Compressor will not start (or hum) when power is turned on.	1. Breaker is tripped.	1. Re-set breaker. Check for other appliances connected to breaker.
	2. No power at electrical receptacle.	2. Check receptacle with voltage meter. If no voltage or low voltage, check with electrician.
	3. Wiring leads are not properly connected.	3. Check and reconnect if necessary.
	4. Power cord is cut or damaged.	4. Inspect cord for cut and test with meter for continuity. Replace if necessary.
D. Used compressor does not run but motor hums.	1. Rotary assembly is locked up. This may occur if compressor is not in use for	1. Remove internal filters, muffler box and head plate. Check carbon

NAYADIC
TROUBLE-SHOOTING CHECKLIST

PROBLEM/CONDITION OBSERVED	*POSSIBLE CAUSE*	*CORRECTIVE ACTION*
	several days.	blades to see if they move freely. If not, clean blade path; check for broken carbon blades. If necessary replace using repair kit (N6508 or N6510).
	2. Rotary assembly is locked up. Compressor shows evidence of being exposed to excessive moisture or flooding.	2. Remove internal filters, muffler box and head plate. Remove 2 allen bolts from cylinder and remove cylinder shield. Clean rusted parts with light grit sand paper. Replace cylinder shield. Install repair kit (N6508 or N6510) If compressor still does not run, return to factory (***NAYADIC***). **CAUTION: Locate compressor in area protected from flooding.**
E. Used compressor runs but provides insufficient air pressure. (Check with air gauge).	1. Filters are clogged.	1. Remove and check both external and internal filters. Clean or replace, if necessary. Provide protective enclosure around compressor to protect from dust if located in an exposed area.
	2. Internal filters are not properly tightened.	2. Tighten by hand.
	3. Internal filter o-ring hard or cut.	3. Replace.
	4. Muffler box loose.	4. Tighten bolts
	5. Head plate loose.	5. Remove internal filters and muffler box. Tighten head plate bolts and reassemble

PROBLEM/CONDITION OBSERVED	*POSSIBLE CAUSE*	*CORRECTIVE ACTION*
	6. Worn or broken blades in rotory assembly.	6. Disassemble and install repair kit (N6508 or N6510). If compressor still provides insufficient air pressure, return to factory for repair.
F. Compressor with old style alarm does not run.	1. ON/OFF switch of the alarm is in the "off" position.	1. Turn switch to "on" position. Re-set "test" button.
II. ALARM (New Installation)		
A. Light and buzzer do not come on when pressing test button.	1. Alarm is not properly energized	1. Check to make sure power cable is plugged into 115 vac outlet.
B. Alarm remains activated after TEST button is pressed. Compressor is running properly.	1. Float activated.	1. Make sure float is in down position.
	2. Faulty float.	2. Replace float.
	3. Pressure switch.	3. Check wiring, making sure connecting wires are on terminal #'s 1 & 2.
	4. Faulty pressure switch.	4. Replace pressure switch.
	5. Alarm is faulty.	5. Replace alarm.
C. Alarm is not activated when float is raised.	1. Float is not properly wired in alarm system.	1. Check wiring diagram provided and reconnect if necessary.
	2. Wiring connections are loose.	2. Tighten all wiring connections.
	3. Float is faulty.	3. Replace float.
D. Alarm is activated, but the compressor is operating properly and the water level is normal.	1. Float is set too low in ***NAYADIC***.	1. Raise float (alarm) so that it is at or slightly above the normal water level.
E. (Old Style Alarm) Alarm remains activated after TEST/RESET button	1. Alarm is improperly wired. Black wires marked "To 115 vac" and "To Compressor"	1. Rewire alarm so that the black wire from the 115 vac is connected to the

PROBLEM/CONDITION OBSERVED	*POSSIBLE CAUSE*	*CORRECTIVE ACTION*
is pressed. Compressor is running properly.	are reversed.	ON/OFF switch. The black wire from the compressor should be connected to the TEST/RESET button.
F. (Old Style Alarm) Light does not come on when pressing test button.	1. Alarm is not properly energized.	1. Turn ON/OFF switch to "on" position.
G. (Old Style Alarm) Compressor shuts off when float (in pump tank) is raised.	1. Float is improperly wired to black wires in alarm box.	1. Rewire float so that one wire from float is connected to white (neutral) wire; and the second wire from the float is connected to the red wire.
III. AERATION CHAMBER (Inner Tank)		
A. Compressor is running but little or no turbulence is observed in aeration. chamber. Aeration contents have greyish (dishwater) appearance. Noticeable odor. Poor effluent quality.	1. Insufficient air supply due to compressor failure, Check with air flow meter.	1. Refer to Trouble-Shooting Checklist, Section I: A-E.
	2. Plugged diffuser.	2. Disconnect union on airline and remove lower airline with diffuser. Clean or replace diffuser.
	3. Loose connections on airline. Leakage of air at these locations is reducing air to plant.	3. Check and tighten all airline connections, including union and connections at the compressor and tank.
	4. Damaged airline. To determine, check with air flow meter at compressor and at plant for a drop in cfm.	4. Expose airline and replace damaged or crushed sections.
B. Aeration chamber contents has a greyish-brown to black appearance. Slight to strong septic odor observed. Compressor is running and good turbulence is noted. Poor quality	1. Heavy hydraulic surge flows due to excessive grey water discharges from laundry or kitchen activities. Generally this problem observed only on commercial applications.	1. For commercial applications, provide surge tank to eliminate surge flows. Residential systems may improve operation by reducing frequency of laundry to 1-2 loads per day.

PROBLEM/CONDITION OBSERVED	*POSSIBLE CAUSE*	*CORRECTIVE ACTION*
effluent has a grey color.	Residential systems will usually be characterized by light or sporadic usage comprised mostly of laundry.	**NOTE: The use of a large pre-tank may increase the severity of the problem because of the shock load caused by heavy short-term water usage (ie., laundry).**
C. Aeration chamber has a clear appearance with very few solids (MLSS<5%). Effluent is clear, no odor. White suds observed in aeration chamber.	1. Light loading to ***NAYADIC*** resulting in complete oxidation (digestion) of solids in plant.	1. No action required if effluent is clear. Typical of intermittent use. (See also Section III - D).
D. Aeration chamber has the same appearance as III-C (above). However, the effluent is somewhat turbid. Settleable solids test indicates <5% solids with very fine suspended particles in supernatant.	1. Excessive aeration due to light loading of plant. Turbidity in effluent due to "ash" particles that settle very slowly.	1. Reduce air by providing timer on compressor. Settings should cause the compressor to run 2 hours and be off for 2 hours. **Contact factory before making this change.**
E. Aeration chamber has greyish appearance with a slightly septic odor. Systems has been in use for less than 6 months.	1. Oversized septic tank preceeding the ***NAYADIC*** causing slow start-up. This problem is more noticeable during cold weather.	1. Seed plant with 100 gal. of fresh activated sludge to help initiate start-up.
	2. Excessive surge flows (grey water) due to heavy laundry activities. (Problem is worse when ***NAYADIC*** is preceeded by a large septic tank).	2. Spread out laundry and limit to 2-3 loads/day. Once the plant achieves normal operation, the laundry usage may be increased somewhat. Extreme condition (or commercial application) may require flow equalization.
F. Aeration chamber has a grey, dishwater appearance. Effluent has a grey septic odor. Accumulation	1. Organic overload due to excessive use of garbage disposal (See also cause #3 below).	1. Eliminate discharge of food scrap, grease, oil, etc. into garbage disposal.

PROBLEM/CONDITION OBSERVED	*POSSIBLE CAUSE*	*CORRECTIVE ACTION*
of grease balls are observed.	2. Excessive laundry usage.	2. See Section III-E corrective action.
	3. Insufficient air being supplied. The minimum air flow on all models except the M2000A should be at least 5.0 cfm. NOTE: Older M6A plants may have a Gast 323 compressor which would have a minimum air flow of 3.0 cfm.	3. Check airflow (cfm) at compressor and at ***NAYADIC***. If appropriate for specific Model, check dissolved oxygen in aeration tank. Shut off compressor 10-15 minutes before test. If DO is less than 1.0 ppm during peak usage period, contact factory for assistance.
IV. CLARIFIER (Settling Chamber)		
A. (Start-up) Effluent is slightly turbid or cloudy. Slight odor detected. Plant is in the first 3 months of operation. Excessive amount of white suds in aeration chamber.	1. Normal start-up period of 6-8 weeks is required to attain sufficient numbers of bacteria. During this period treatment efficiency may not be at its highest, especially during periods of hydraulic surge loading, (ie. laundry periods).	1. No major action is required. Reducing the frequency of laundry will help. Re-check plant in 4-6 months unless other problems develop sooner.
	2. Septic tank is installed prior to the ***NAYADIC***. This problem is usually apparent when the daily flow is light or when excessive laundry usage occurs.	2. Reduce frequency of laundry until plant achieves normal operation (6-8 weeks). Seeding the ***NAYADIC*** with 100 gallons of fresh "activated" sludge may reduce start-up period. Extreme cases may require the removal of septic tank.
B. Effluent has very fine suspended particles which settle slowly leaving a clear supernatant.	1. Over-aeration	1. Refer to Section III-D.

NAYADIC
TROUBLE-SHOOTING CHECKLIST

PROBLEM/CONDITION OBSERVED	*POSSIBLE CAUSE*	*CORRECTIVE ACTION*
C. Effluent contains brown suspended solids. Condition is more noticeable during periods of heavy water usage. System has not been pumped in 2-3 years. Settleable solids test indicates sludge volume > 50%.	1. Heavy build-up of MLSS (mixed liquor suspended solids) due to normal, long-term usage.	1. Pump ***NAYADIC***. Refer to "Maintenance Procedures: Pumping (wasting) sludge".
D. Excessive (>5 inches) of scum has accumulated in 6-12 months of use. Grease balls may be observed in aeration chamber. System requires pumping on a frequent basis.	1. Over-use (or abuse) of garbage disposal.	1. Discontinue dumping grease, food scraps, etc. into the disposal. This material should be put in garbage can.
	2. Excessive use of powdered laundry detergent.	2. Use liquid detergent or the "concentrated" powders.
E. Excessive (>5") of scum has accumulated in 6 – 12 months of use. Noticeable odor from scum layer. Aeration chamber has very low suspended solids (MLSS).	1. Settled sludge or inorganic solids (i.e., paper, trash, etc) may be restricting return of solids into aeration chamber. This may be caused by the draft tube being too close to the bottom of the tank.	1. Contact the factory for advice and the proper equipment to shorten the draft tube. **This can be done without pumping the tank.**
F. Excessive solids carry-over with effluent aeration chamber has normal color but sludge (MLSS) settles slowly, forming a light floc that does not compact. Most common with commercial (especially food service) facilities.	1. Overabundance of "filamentous" micro-organisms that prevent compaction and settling of sludge. The presence of these organisms should be confirmed by laboratory (micro-biological) examination.	1. Contact the factory for specific recommendations.

NAYADIC WASTE TREATMENT SYSTEM
OPERATIONAL CONTROL CHART

OPERATION CONDITION	COLOR: AERATION TANK	ODOR	SLUDGE VOLUME	EFFLUENT QUALITY	AERATION TANK	POSSIBLE PROBLEM	CORRECTIVE ACTION
Plant start up 0-6 weeks	Clear to light brown	None	Settleable solids <5% Scum <1"	Slightly turbid to clear	Good turbulence White foam/suds	No problem: Normal start-up condition	No action required Re-check in 6 months
Plant in operation for More than 3 months	Clear to light brown	None to slight	Settleable solids <5%; very fine suspended particles Scum <1"	Slightly turbid to clear	Good turbulence White foam/suds	Light loading to plant; Insufficient food for organisms	Refer to Troubleshooting Section III-C & III-D
Plant in operation for 0-6 months (Plant preceded by septic tank)	Light grey	Slightly septic	Settleable solids <5% Scum <1"	Slightly turbid with slight odor	Good turbulence	Slow start-up due to septic tank; probable hydraulic surges (i.s., laundry)	Check air pressure at diffuser; reduce laundry frequency to 3x day. Refer to Trouble-shooting Section III-E
Normal operation: Typically less than 2 years of use since last pumping	Light brown to medium brown	None	Settleable solids = 5-30% with clear supernatent scum <2"	Clear	Good turbulence with light brown foam	No problem	None, re-check in 6 months (routine)
Normal operation: Typically, 2-3 years of use since last pumping	Very dark brown	Slight	Settleable solids = 20 – 50% Scum > 6"	Clear	Good turbulence with heavy brown foam	No immediate problem; anticipate pumping tank in 6-12 months	None; re-check in 6 months (routine) (Pumping recommended if not on service contract)
Plant in operation for more than 3 months Poor treatment	Grey (similar to dishwater)	Slight to moderate septic or ammonia odor	Settleable solids <5% Scum > 4" Scum has yellowish color and noticeable odor	Turbid to bluish-grey	Slight to moderate turbulence; patches of foam across tank surface	Insufficient aeration due to reduced air flow at plant	Refer to Troubleshooting Section III-E
					Good turbulence but minimal solids buildup	Settled sludge restricting return to aeration chamber	Draft tube may need to be shortened: Section IV-F Contact factory
Plant in operation for more than 3 months Poor treatment	Greyish-brown to Grey to black	Slight to strong septic odor	Settleable solids <5% Scum > 4" Possible presence of grease balls	Grey	Good turbulence; 4-6" ring of foam around circumference of inner tank	Organic overload	Refer to Troubleshooting Section III-F
						Excessive greywater; heavy hydraulic surge flows	Refer to Troubleshooting Section III-E
Previous plant operation has been normal; Sudden, unexpected development of poor treatment and operation	Grey to black	Strong, may be septic or from some type of chemical	Settleable solids = 0-50% Scum > 4"	Turbid to bluish-grey	Good turbulence Possible presences of grease balls or oil	Plant die-off due to discharge of toxic materials or oil/grease	1. Identify source of toxic material 2. Eliminate above source 3. Pump plant completely and allow to start up

NAYADIC WASTEWATER TREATMENT SYSTEMS

DESIGN MANUAL

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Nayadic M-Series Onsite Wastewater Treatment Systems

Introduction

Onsite wastewater treatment refers to the process of treating and disposing, dispersing, or recycling of wastewater at or near its point of generation. Historically, the phrase has been synonymous with "septic system" because that was the only design alternative available. With the advent of different design technologies, septic systems are just one of several available alternatives. Because treated wastewater—effluent—is a valuable resource, owners have the flexibility in how they use this resource. Nayadic systems provide owners with options as to how they treat and recycle wastewater.

The suitability and design of septic systems rely upon native soils to treat *and* disperse wastewater. In fact, treatment and dispersal are essentially combined in the same process. For this reason, septic system use is limited to those soils where both functions can be accomplished. Nayadic units allow owners to separate treatment and dispersal and address each separately. If soil is the selected dispersal alternative, the design can be based solely upon the ability of the soil to transmit water from the site. Owners may have options, depending on local codes, to use the treated wastewater for beneficial purposes such as recycling into plumbing systems or irrigating gardens and turf. The Nayadic series provides owners with alternatives unavailable to those who rely solely upon septic systems.

The Nayadic M-series is capable of treating typical domestic wastewater at a daily flow equal to rated capacities, which are shown in Table 1. The Nayadic M-series design is based on the same principles as many municipal wastewater treatment plants. These design principles have been adapted for the small flows developed by individual residences or small commercial/residential developments.

Table 1—Nayadic M-Series

Model	Rated Flow (gpd)	O_2 Transfer (Max., lb/day)
M-6	500	3.5
M-8	600	4.0
M-1050	800	4.6
M-1200	1000	4.8
M-2000	1500	7.7

This manual serves as a guide to design an onsite wastewater treatment system using Nayadic units. The manual includes recommendations for both residential and commercial applications. The recommendations include typical flow data and component suggestions. A failure to consider these recommendations may result in poor unit operation or additional maintenance.

Definitions

The following definitions are critical to understanding the design, installation and operation of Nayadic units. These definitions have been purposely simplified so they can be understood by a wide range of readers. Those desiring detailed information may examine the references listed in the appendix.

ANSI/NSF Standard 40: A performance certification standard intended for onsite wastewater treatment systems having a flow for between 400 and 1500 gpd (gallons per day) and a single point of discharge.

$CBOD_5$: The concentration of oxygen (expressed as mg/L) utilized by microorganisms in the non-nitrogenous oxidation of organic matter during a five-day period at a temperature of 20°C.

Clarify: A process of separating from wastewater fats, oils, grease, and floatable materials, which float to the surface; and solids, which sink to the bottom.

Commercial Occupancy: A building used for commerce or industry.

Dispersal: A process for recycling treated wastewater back into the environment.

Dosing: A process for periodic discharge of wastewater to a Nayadic unit.

Effluent: The discharge from a treatment component or system.

Flow Equalization: A process for mitigating variations in flow by holding wastewater in a tank and dosing the wastewater into the Nayadic unit.

Flow Equalization Tank: A watertight, airtight tank, timer, and pumping system having a detention time of from 16-to-24 hours and used to capture and retain solids, grit, and scum and then meter the water into the Nayadic unit through periodic dosing.

FOG: Fats, oils, and grease in wastewater.

Frequenter: A visitor to and/or customer of a commercial occupancy.

Grease Trap: A tank for capturing and retaining fats, oil, and grease.

Maintenance: Periodic activities intended to maintain the efficiency and effectiveness of the system.

Mixed Liquor. The contents of the Nayadic aeration chamber consisting of, but not limited to, partially treated wastewater and microbial colonies that oxidize the organic material in the wastewater.

Onsite Wastewater Treatment System. A device or combination of devices, which may include tanks, vessels, pumps, aerators, compressors, and other mechanical equipment, intended to treat and disperse wastewater at or near the point of generation.

Pre-aeration: Aeration of wastewater to reduce the $CBOD_5$ prior to discharge to the Nayadic unit.

Pre-Aeration Tank: A tank used to reduce partially the $CBOD_5$ of the wastewater before the wastewater enters the Nayadic unit.

Pretreatment Tank: A watertight, airtight tank having a detention time of from 12-to-24 hours and used to capture and retain solids, grit, and scum before the wastewater enters the Nayadic unit.

Residential Occupancy: A building used to house individuals and families.

Septic System: An onsite wastewater treatment system comprised of a septic tank and soil absorption system.

Septic Tank: A watertight, airtight tank having a detention time of from 24-to-48 hours, or more, and used to clarify wastewater and capture fats, oil, greases, and inert solids.

Soil Absorption System: A system consisting of trenches and pipes—or equivalent "gravelless" devices—used to disperse water into the soil where additional treatment may occur and the water is dispersed from the site.

Trash Trap: A watertight, airtight tank for capturing and retaining solids.

Seeding: A process for facilitating bacterial growth by providing mixed liquor from another Nayadic unit.

TKN (Total Kjeldahl Nitrogen): The quantity of organic nitrogen and ammonia (expressed in mg/L) found in wastewater.

TN: The total quantity of nitrogen (expressed in mg/L-N) that exists in the wastewater. Nitrogen may be in the form of ammonia, TKN, nitrate or nitrite.

TSS: The quantity of solids (expressed in mg/L) that can be readily removed from a well-mixed sample with standard laboratory filtering procedures.

Typical Domestic Wastewater: Wastewater having the characteristics as shown in Table 2:

Table 2—Typical Domestic Wastewater	
constituent	**value**
CBOD5	100-300 mg/L
TSS	100-350 mg/L
FOG	30 mg/L
TKN	60 mg/L

Wastewater: Water generated as a result of human activities and containing feces, urine, blood, food byproducts, rinse water, laundry water, process water, and the like.

Design Principles

The goal of wastewater treatment is to return to the environment water that does not pose a public health or environmental threat. The role of the Nayadic in this process is to remove from water organic materials and pathogens through biological treatment.

Each model of the Nayadic M-Series has a specific design rating. Each rating is intended to identify the volume of *typical domestic wastewater* that the system can treat in a 24-hour period. The flow during this 24-hour period, as tested under ANSI/NSF Standard 40, is shown in Table 3.

Table 3—Typical Flow Regime Under ANSI/NSF Standard 40	
Time of Day	**Percent of Total Hydraulic Load**
6:00 AM-9:00 AM	35
11:00 AM-2:00 PM	25
5:00 PM-8:00 PM	40

Additional treatment may be necessary where the flow regime varies from Table 3 and/or the wastewater does not meet the criteria of typical domestic wastewater.

Typical domestic wastewater may include small quantities of medicines, cleaners, antibiotics, and other substances that, in large quantities, will adversely affect the operation of the system. The water will have a pH of approximately 7.0 and may have minute concentrations of heavy metals. If the pH is above 9.0 or less than 6.0, and/or there are high concentrations of harmful substances and heavy metals, additional treatment will be necessary.

Depending on the occupancy, an additional tank may be installed upstream of the Nayadic. This additional component may be a "trash trap," "pretreatment tank," "flow equalization tank," or "pre-aeration tank". The name will vary with the intended function of the tank, and the function of the tank is related to its capacity and components. A trash trap is the smallest of these, and its function is simply to capture and retain large solids such as tampons, disposable diapers, and so forth. No additional treatment or function is expected, and the capacity of the tank may be as small as 250 gallons.

A pretreatment tank is larger than a trash trap, and its function is to capture and retain fats, oils, grease, and smaller solids such as dental floss. The capacity of a pretreatment tank is related to the flow from the occupancy. A flow equalization tank serves as a pretreatment tank, but its primary function is to retain wastewater for periodic dosing into the Nayadic. A pre-aeration tank is intended to provide additional oxidation. This tank will contain additional aerators to facilitate a partial digestion of organic material prior to its discharge to the Nayadic unit. A pre-aeration tank may also serve as a flow equalization tank.

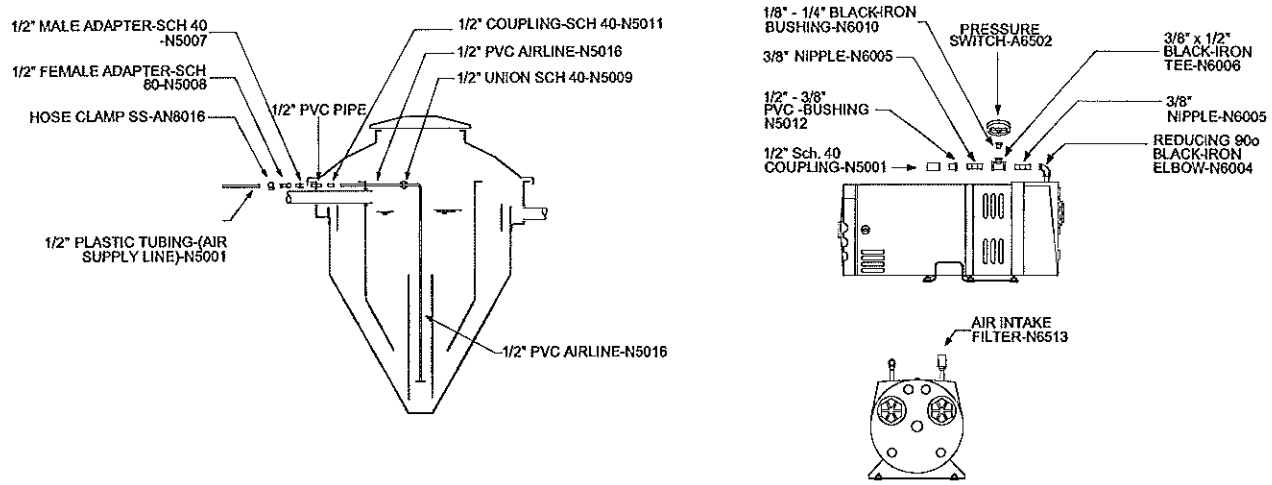


Figure 1—Typical Nayadic Details

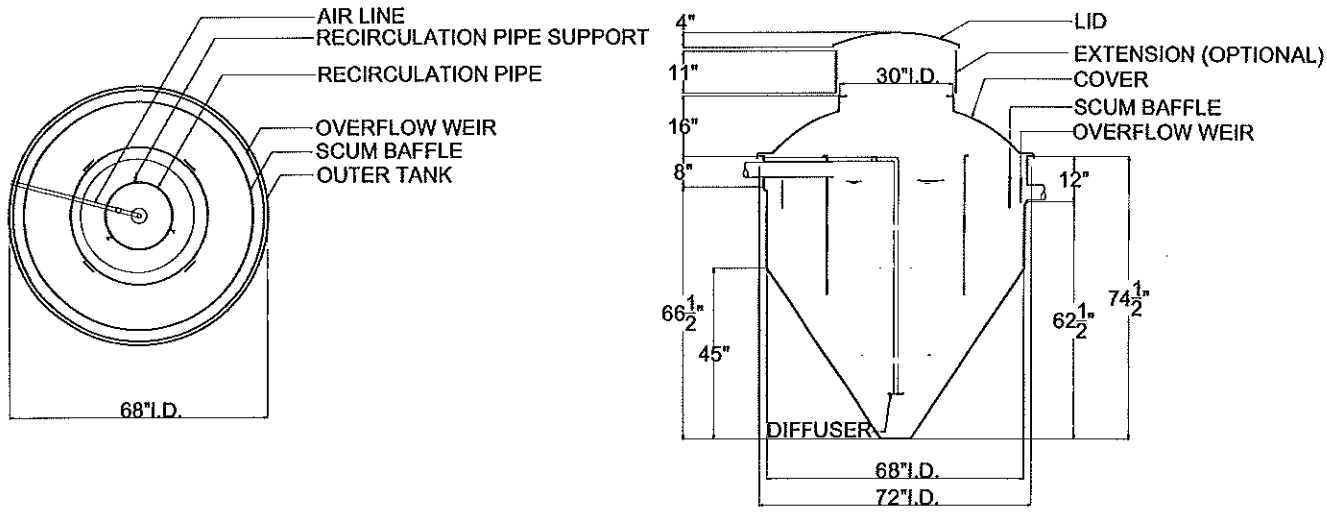


Figure 2—Nayadic M6A

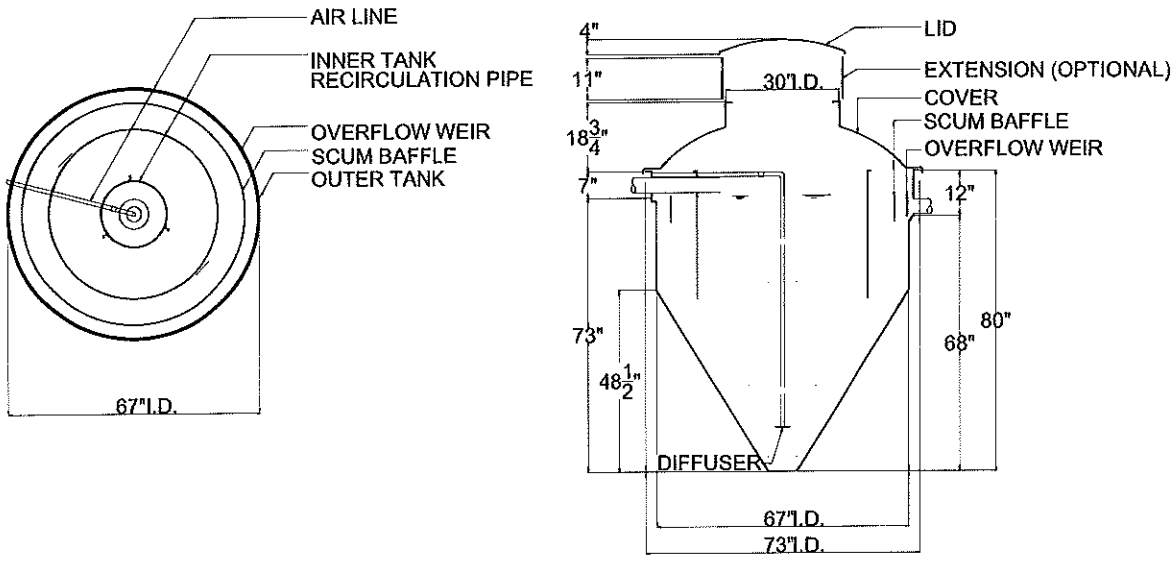


Figure 3—Nayadic M8A

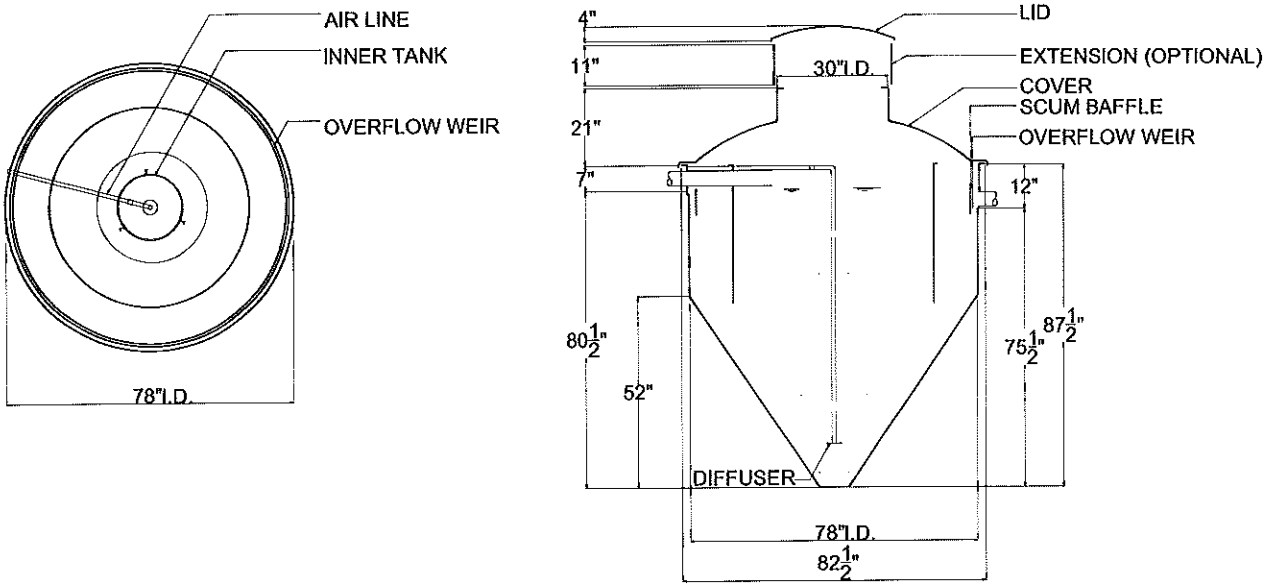


Figure 4—Nayadic M1050A

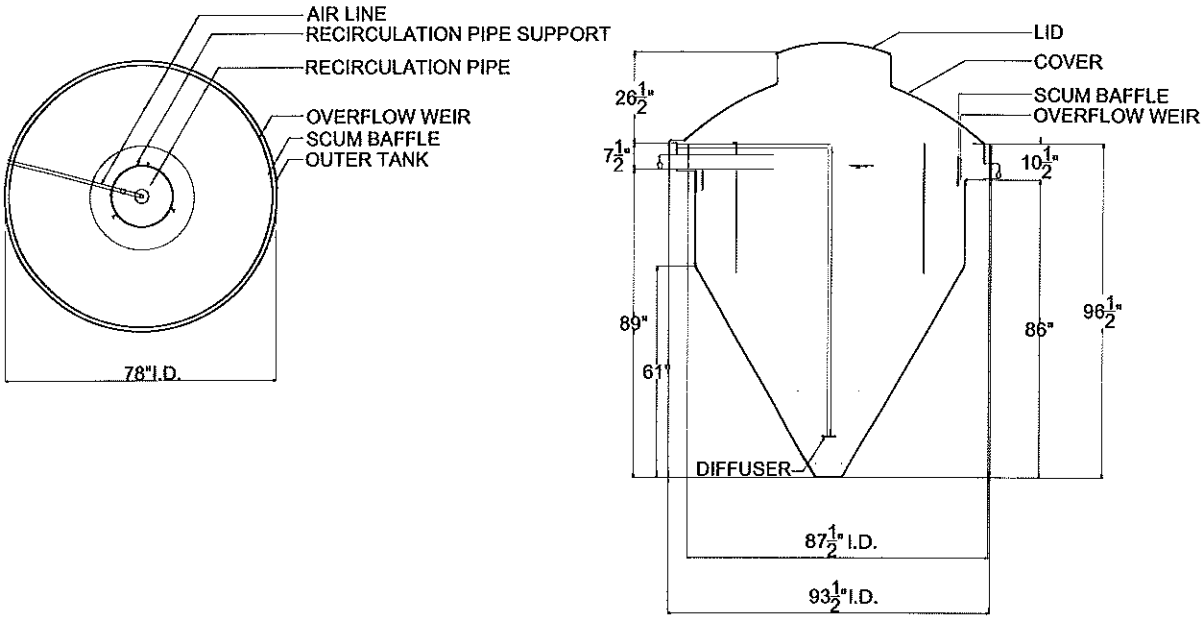


Figure 5—Nayadic M1200A

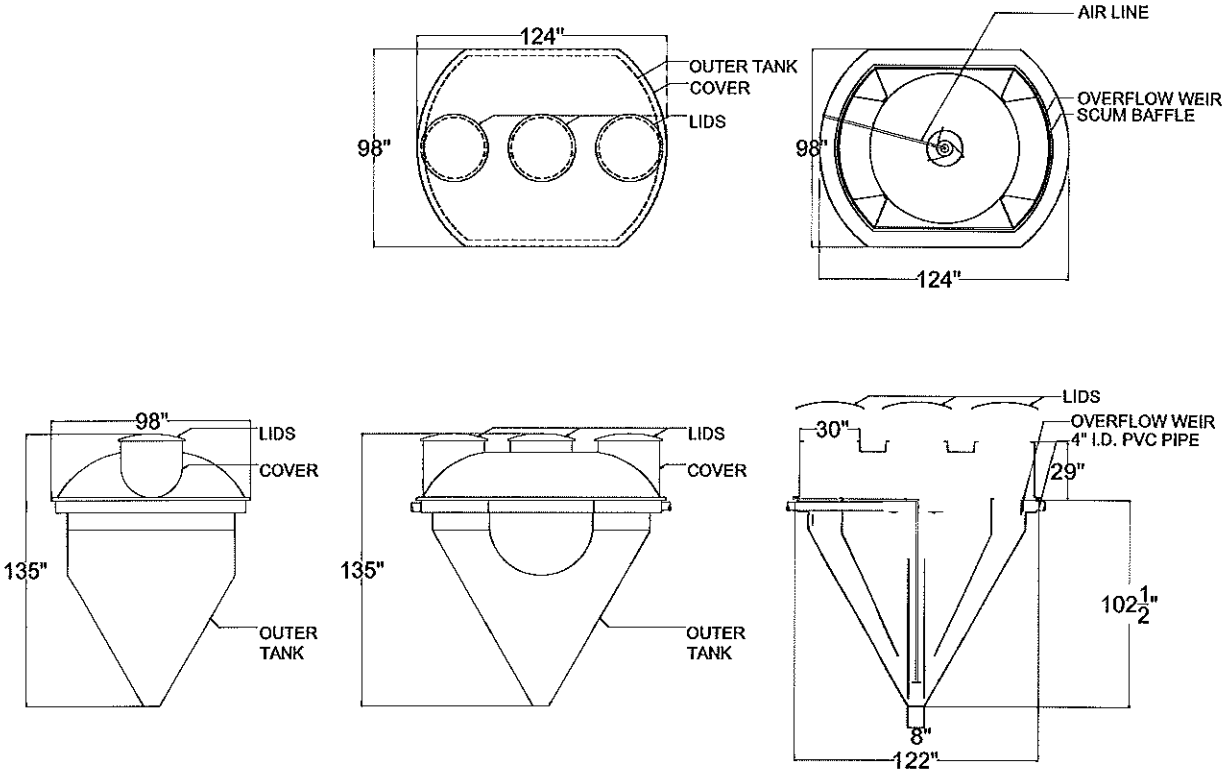


Figure 6—Nayadic M2000A

Every county of almost every state regulates the design, installation, operation, and maintenance of onsite wastewater treatment systems. Some counties have few regulations while others maintain comprehensive programs that include licensing, certifications, plan review, and mandatory maintenance. Generally, these regulations mandate residential system sizing, based on the number of bedrooms. Commercial occupancies generally use building code parameters to establish design flow. These parameters are based on number of patrons, square footage of retail space, restaurant seats, and other indicators of potential wastewater generation. Some codes may consider alternative values to establish flow, such as actual water use for similar facilities, but most codes are prescriptive in setting design flows.

Listed in Table 4 are recommended sizing and components for single-family dwellings based on a design flow of 150 gpd/bedroom.

Multi-family occupancies are more susceptible to abuse by tenants, who may be unaware that they are using onsite wastewater treatment. For these occupancies, a pretreatment tank may eliminate maintenance issues related to grease and solids put into the system. Table 5, which is based on a flow of 150 gpd/bedroom, illustrates recommended components, volumes, and ratings for multiple family dwellings.

Table 4—Nayadic Sizing for Single-Family Dwellings

Number of Bedrooms	Garbage Disposal?	Recommended Size of Pretreatment Tank	Required Capacity of Nayadic (gpd)
1-2	No	Optional	500 gpd
1-2	Yes	Optional	500 gpd
3	No	Optional	500 gpd
3	Yes	Optional	500 gpd
4	No	Optional	600 gpd
4	Yes	Optional	600 gpd
5	No	Optional	750 gpd
5	Yes	500 gallon	750 gpd

Table 5—Nayadic Sizing for Multi-Family Dwellings

Number of Bedrooms Served	Recommended Size of Pretreatment Tank if needed, (gal)	Required Capacity of Nayadic (gpd)
1	Optional	500
2	500	500
3	500	500
4	500	600
5	500	750
6	750	1000
7	750	1200
8	750	1200
9	750	1500
10	1000	1500

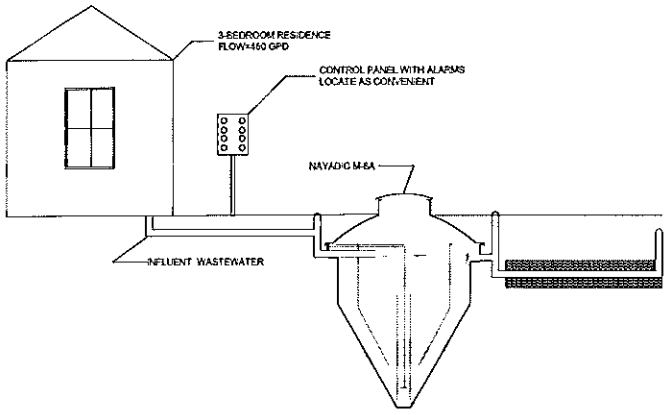


Figure 7 - Basic Nayadic Installation

Figure 7 shows a basic installation. In this example, the Nayadic M-6A serves a three-bedroom residence. It receives and discharges flow by gravity. Effluent is dispersed through a drainfield sized in accordance with applicable codes. In this example, the Nayadic provides both the storage of a septic tank and wastewater treatment normally associated with the drainfield. The soil acts to "polish" the effluent of residual pathogens, solids, and organic material.

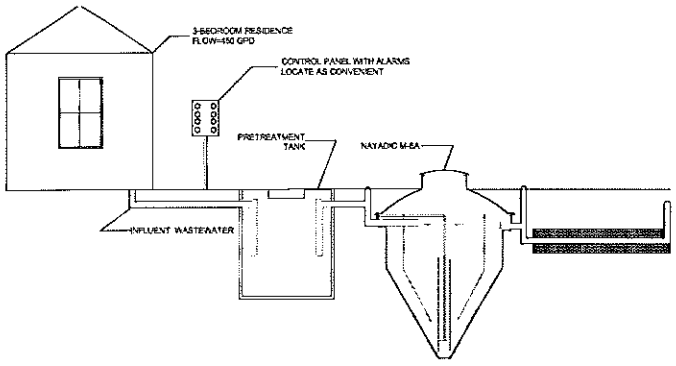


Figure 8 - Nayadic Installation With Pre-Treatment

Figure 8 shows a basic Nayadic installation with the addition of a pretreatment tank. "Pretreatment" is essential when the wastewater is laden with solids or has other unusual characteristics. Pretreatment accomplishes several functions: capture and storage of solids, homogenization of the wastewater, and partial removal of organic material. Pretreatment may enhance treatment is generally not essential for successful performance.

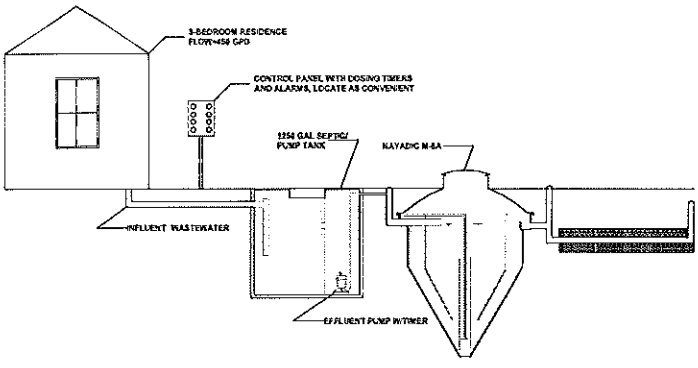


Figure 9 - Nayadic Installation With Flow Equalization

Flow equalization may be needed when high variation exists. Such cases arise when much or all of the flow is generated during one or two short periods of a day or week. As an extreme example, flow equalization would help when all wastewater is generated in the morning and evening, there are parties on Friday evenings, and all laundry is washed on Saturdays. Flow equalization provides a method to capture, homogenize, and meter wastewater into the Nayadic, maximizing operational efficiency.

Flow equalization functions by placing a pump on a timer that operates over a 24-hour cycle. The design flow will be divided into 48 or 96 equal doses, each of which will be discharged at 15-to-30 minute intervals, depending on the design. For example, a 500 gpd M-6A can receive 48 doses of about 10.4 gallons, each dose discharged at 30-minute intervals.

Flow equalization also provides the benefits of pretreatment. As shown in Figure 9, the flow equalization tank is actually a two-compartment septic tank-pump chamber. The septic tank portion acts as a pretreatment tank while the pump chamber holds partially treated water for dosing into the Nayadic.

Design Requirements for Commercial Occupancies

Although the Nayadic has been used primarily for residential facilities, including both single-family and multiple-family dwellings, Nayadic can be effectively used for commercial occupancy including various types of food services. Because of hydraulic surges, grease, use of chemicals and cleaning agents, additional treatment facilities may be required when the Nayadic is used for certain types of commercial facilities.

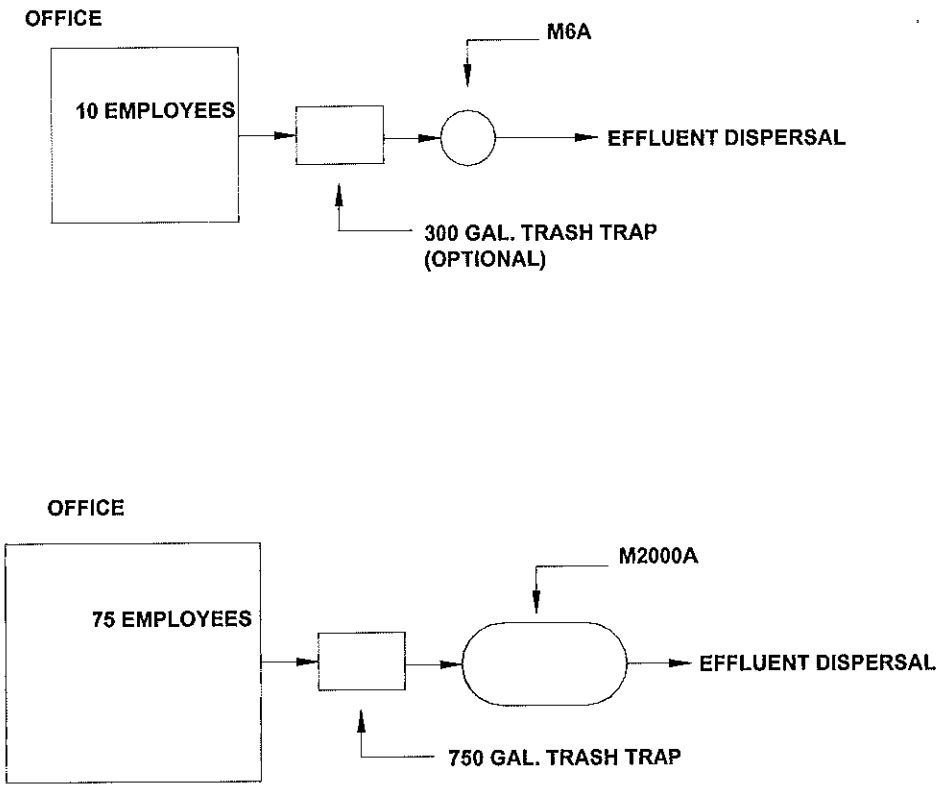


Figure 10—Commercial Occupancy Nayadic Installation with Flow Equalization

Design Flow and Loads for Commercial Occupancies

Essential to proper design of commercial systems is a characterization of the flow and organic and solids loadings the occupancy will generate. These values may be obtained from several sources. If the facility is existing, meter readings may provide the answers. For new facilities, design values may already be established in plumbing or sanitary codes. Standard engineering texts also provide values. Listed below in Table 6 are typical design values.

Table 6—Wastewater Flow and Organic Load

Type of Facility	Flow Gal/Unit/Day	$CBOD_5$ mg/L	$CBOD_5$ lb/DAY/UNIT
Apartment	150 gal/bedroom	240	.30 lb/bedroom
Assembly Hall (no kitchen)	5 gal/seat	240	.01 lb/seat
Bowling Alley (no kitchen)	75 gal/lane	240	.15 lb/lane
Church (no kitchen)	3 gal/sanctuary seat	240	.01 lb/seat
Country Club	50 gal/member	400	.17 lb/member
Country Club	20 gal/employee	240	.04 lb/employee
Drive-In Theaters	5 gal/car space	240	.01 lb/car space
Employee (no showers)	20 gal/employee	240	.04 lb/employee
Employee (showers)	35 gal/employee	240	.07 lb/employee
Food Service			
Ordinary Restaurant	50 gal/seat	600-800	.35 lb/seat
24-Hour Restaurant	75 gal/seat	600-800	.50 lb/seat
Freeway Restaurant	100 gal/seat	600-800	.70 lb/seat
Tavern (limited food)	30 gal/seat	400	.10 lb/seat
Carry-out (single-service)	50 gal/100 sq.ft./floor sp.	600-800	.70 lb/100 sq.ft./fl. sp.
Carry-out	20 gal/employee (add'l)	240	.04 lb/employee
Fast Food Chain	100 gal/seat	1000	.80 lb/seat
Hospital (not incl. Personnel)	200 gal/bed	400	.70 lb/bed
Hospital personnel (additional)	20 gal/employee	240	.04 lb/employee
Laundry (coin-operated)	400 gal/machine	600	2.00 lb/machine
Mobile Home Park	200 gal/space	240	.40 lb/space
Motel and Hotel, regular	150 gal/room	240	.30 lb/room
Resort hotel, cottage	75 gal/room	240	.15 lb/room
Add for self-service laundry	400 gal/machine	600	2.00 lb/machine
Nursing Home (not incl. Kitchen or laundry)	100 gal/bed	400	.30 lb/bed
Office Building (per 8-hr shift)	20 gal/employee	240	.04 lb/employee
Service Station	250 gal/water closet	240	.50 lb/fixture
Schools			
Day/type	15 gal/student	240	.03 lb/student
Add for showers	5 gal/student	240	.01 lb/student
Add for cafeteria	5 gal/meal	600	.03 lb/meal
Add for school employees	15 gal/employee	240	.03 lb/employee
Boarding school	75 gal/student	240	.15 lb/student
Shopping Center (no food service or laundry)	100 gal/1000 sq.ft./floor sp	400	.30 lb/1000 sq.ft.fl.sp.

Table 6—Wastewater Flow and Organic Load			
Type of Facility	Flow Gal/Unit/Day	$CBOD_5$ mg/L	$CBOD_5$ lb/DAY/UNIT
Travel Trailer or RV Park			
W/out water/sewer hook-up	75 gal/space	400	.25 lb/space
With water/sewer	100 gal/space	400	.30 lb/space

Four flows must be considered during the design: maximum month average daily flow, minimum monthly average daily flow, peak daily flow, and peak hourly flow. Each of these will be different, and the combination of these flows is essential developing the most efficient design. Typically, the Nayadic unit will be sized to treat the maximum month average daily flow. If there are multiple Nayadic units operating in parallel, they will be placed into service depending on how the flow varies over a year's time. Flow equalization must be sized to hold the peak daily flow. And if the peak hourly flow is high, flow equalization must be sufficient to hold this additional flow above the peak daily flow.

Ideally, flow should be spread over a 24-hour period. The minimum effective capacity of the treatment tank should be two-thirds the peak daily flow. Churches and meeting halls may have only one or two days each week during which they are in use. Flow equalization may spread the large single-day flows over two or three days, depending on the maximum month average daily flow.

When flow equalization is used, a separate trash trap is generally not needed. For greater efficiency, a two-compartment septic tank should be considered for use as the flow equalization tank.

The size and pumping frequency of the pump depends upon the volume of wastewater to be treated. Typically, an 11-gallon dose is given over a five-minute interval. Such low loading minimizes the need for larger pumps. The following table gives recommended pumping frequency and volume/dose:

Table 7—Dose Volume		
Flow (gal/day)	Doses/Day	Gal/Dose
250	24	11
500	48	11
750	72	11
1000	96	11
1500	96	16

For food service occupancies, grease traps will also be required. The capacities of these grease traps may be set in local plumbing codes. Generally, the minimum capacity is 750 gallons. When the required capacity exceeds 1000 gallons, two or more tanks located in series should be considered. Only plumbing fixtures located in the kitchen should be connected to the grease trap.

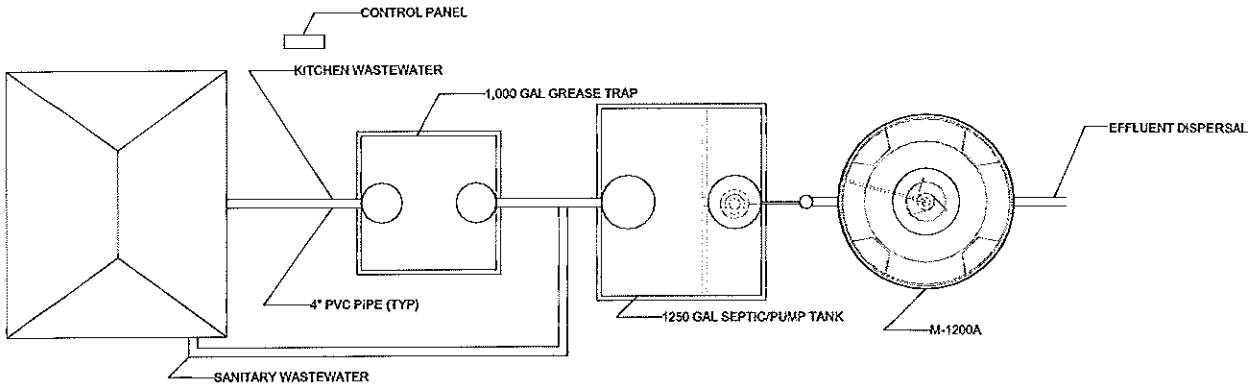


Figure 11—Plan View Showing Grease Trap

Even if flow equalization and a grease trap are not required, a trash trap is recommended to capture fats, oil, grease, and other material from entering the Nayadic. Such material includes, but is not limited to, tampons, sanitary napkins, cleansing pads, contraceptives, dental floss, and so forth.

The following recommendations address designs for different applications:

- **Single Family Residence**: A trash trap is optional a garbage disposal is installed. If a trash trap is provided, it should have a capacity of 300-to-500 gallons.
- **Rental Housing, Multiple Family or Mobile Home Parks**: A trash trap having a capacity of 50 percent of the average daily flow should be provided.
- **Offices and Public Buildings without Kitchen Facilities**: A trash trap with a capacity of 25-to-50 percent of the daily average flow should be provided. Although such facilities do not have a grease problem, they do frequently experience problems with paper towels and sanitary napkins.
- **Gas Stations, Garages or Auto Repair Shops**: A trash trap having a capacity of 50 percent of the average daily flow should be provided. Wash bays, floor drains, or oil separators should not be connected to the Nayadic.
- **Campgrounds**: A trash trap with a capacity of 50 percent of the daily flow should be installed. It is not advisable to discharge the contents of the dump station into the Nayadic since there is usually a large amount of bacterial retardants and other chemicals that may kill the bacteria in the Nayadic.
- **Weekend Cottages or Winter Homes**: Trash traps are optional for facilities with small daily flows, intermittent flows, or seasonal usage.
- **Restaurants, Hospitals, Nursing Homes or Schools**: Facilities having kitchen and laundry facilities require trash traps or grease traps. Contact your Nayadic representative for specific recommendations on the design of systems to serve the above types of facilities.

- **Facilities Served By Two Or More Nayadic Plants in Parallel:** A trash trap before a distribution box is essential if the flow is to be split between two or more Nayadic units.

The treatment capacity of each Nayadic unit is based upon the oxygen requirements necessary to treat typical domestic wastewater. The Nayadic compressor is designed to treat a minimum of 1.5 lb-$CBOD_5$/day. Where wastewater has a higher organic concentration, additional oxidation capacity will be required. Often this additional capacity is provided by adding aeration to the pretreatment tank. For example, foodservice wastewater frequently has a $CBOD_5$ greater than 1000 mg/L due to soluble grease, cleaning agents, etc. Because of the higher oxygen demand, a longer retention in the aeration stage is required. Pre-aeration meets the additional oxygen requirements. Pre-aeration can usually be accomplished by installing one or more Nayadic compressors in either the grease trap or trash trap.

Pre-aeration provides benefits beyond oxidation. Some chemicals may be volatilized or directly oxidized by exposure to oxygen. Air aids in cooling and emulsifying fats, oil and grease so that they float to the surface. Generally, the wastewater will be homogenized so that the Nayadic does not experience sudden changes in wastewater character.

The microbes that perform the wastewater treatment occur naturally. When started, these bacteria take from six-to-eight weeks to acclimate themselves to the wastewater and colonize in sufficient concentration that measurable treatment occurs. "Seeding" can be used to eliminate this start-up performance lag. Seeding is accomplished by obtaining about 50 gallons of mixed liquor from another Nayadic unit. The already-acclimated, concentrated colony should experience no delay in acclimating to the new unit so that a performance lag may be circumvented.

Cellular activity varies with the temperature. Microbes are less active in the winter, so seeding is essential for winter-time startup.

Table 8 should be used to determine the minimum hydraulic capacity of Nayadic systems to serve commercial facilities that do not have kitchen or laundry wastes. In some cases, pretreatment facilities may be required if average wastewater strength exceeds 300 mg/L $CBOD_5$ or if large volumes of wastewater are generated during peak periods. Whenever the daily wastewater flow is great enough to require more than one Nayadic unit, flow splitting should be used for even flow between or among units. Nayadic are not operated in series, nor should the flow be split between or among units of different capacities.

Please contact a local factory representative to determine if additional facilities may be required.

Table 8—Recommended Nayadic Selections		
Average Daily Flow	**Recommended Size of Pretreatment-Tank**	**Nayadic Unit(s)**
0 – 500 gpd	300 gallon	M-6A
501 – 600 gpd	300 gallon	M-8A
601 – 750 gpd	500 gallon	M-1050A
751 – 1000 gpd	500 gallon	M-1200A
1001 – 1200 gpd	750 gallon	Two M-8A's
1201 – 1500 gpd	1000 gallon	M-2000A
1501 – 2000 gpd	1000 gallon	Two M1200A's
2001 – 2250 gpd	1000 gallon	Three M-1050A
2251 – 3000 gpd	1500 gallon	Two M-2000A
3001 – 4500 gpd	2000 gallon	Three M-2000A
4501 – 6000 gpd	2000 gallon	Four M-2000A

In designing a system for a commercial occupancy, the designer should consider the following:

- Maximum Month Average Daily Flow
- Minimum Month Average Daily Flow
- Peak Daily Flow
- Peak Hourly Flow
- Concentration and Mass of $CBOD_5$ for Flows
- Concentration and Mass of TSS for Flows

Operation and Maintenance Procedures for Seasonal Or Intermittent Use Facilities

Frequently, Nayadic systems are installed at facilities that are used intermittently or seasonally. Because of the reduced or sporadic loading that these installations receive, the routine service and maintenance requirements are different from that normally expected of a year-round residence. The following recommendations are for the operation and maintenance of both residential and commercial systems that will not be operated on a full-time basis.

Seasonal Facilities are characterized by regular usage for several consecutive months, followed by several months during which no flow enters the unit. If the periods of non-use exceed three months, the Nayadic should be shut down and "winterized" by the following procedures:

1) Disconnect the unit at the breaker box and unplug alarm.
2) Completely pump out all sludge and liquids from the basin.
3) Flush and clean effluent filters, if installed.

4) Fill unit with clean water.
5) Take the compressor from unit and clean it by lightly coating it with oil to prevent rusting. Store the compressor until the next season when operation resumes.

Upon resuming normal use, reconnect the compressor, plug in the alarm, re-connect the unit at the breaker box, and seed the unit. Winterizing and start-up should be performed by an authorized Nayadic distributor to insure proper operation of the system.

Intermittent use facilities are characterized by periodic occupancy followed by periods of vacancy. Typically, the vacancy will not last longer than three months. If the unit will be unused for less than three months, timed aeration may be better during periods of non-use. Timed aeration consists of connecting the compressor to a timer that limits aeration operation at from two-to-four hours daily. Timed aeration will prevent anaerobic conditions and reduce the power consumption.

1) Weekend use: If the system will be used for short periods but on a regular basis (i.e., every weekend throughout the year), timed aeration may be provided during periods of non-use.
2) Vacation homes: If the system will be used for several weeks followed by several months of vacancy, the Nayadic may be shut off during vacancies. Pumping is generally unnecessary. If possible, the Nayadic should be allowed to run a few days after flow has stopped to oxidize any remaining organic material. As a part of start-up, the Nayadic distributor should check the unit to insure that the system is operational.

During periods of occupancy, the Nayadic unit must be operated in accordance with the manufacturer's recommendations and NSF certification.

During start-up, units may be prone to "sudsing," which is the production of foam from laundry detergents. Laundering should be limited during this period.

Where freezing is a danger, the Nayadic should be pumped during vacancies. Where uplift is a possibility, the uplift restraint must be provided.

Design Examples

Examples 1, 2, and 3: Residential Occupancies—Residential occupancies are generally designed based on the number of bedrooms, the daily flow assigned for each bedroom. Figure 12 shows typical layouts for single- and multiple-family dwellings. A trash trap is generally optional for single-family, owner-occupied dwellings. A trash trap is advisable for all rental property.

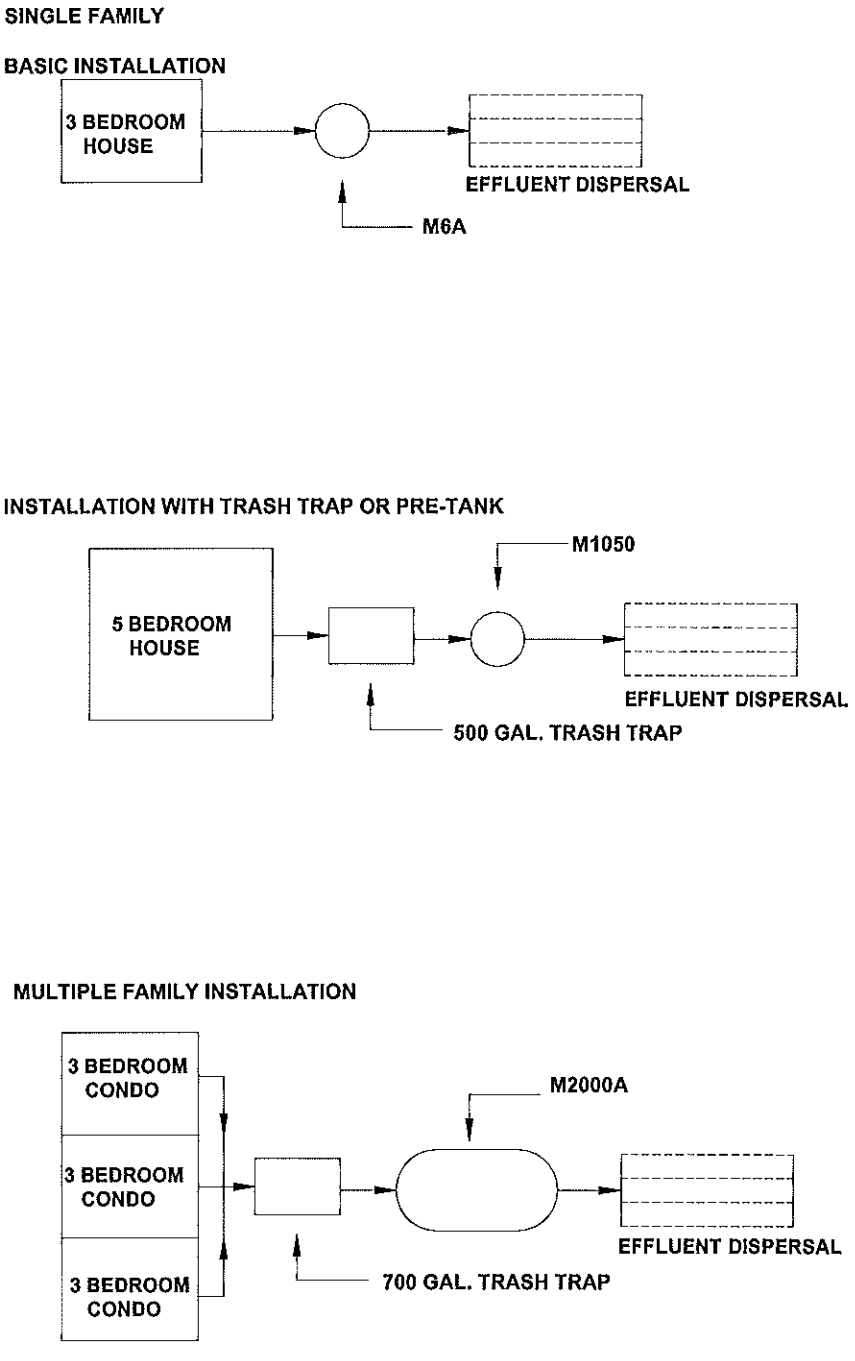
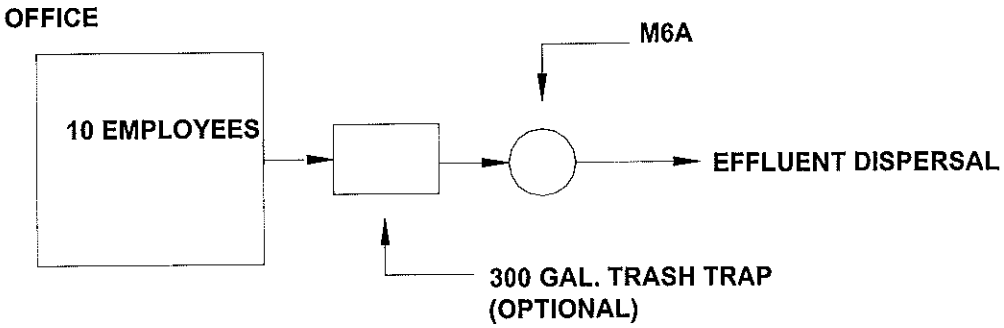


Figure 12—Examples 1, 2, & 3

Example 4: Commercial Occupancy, Office Buildings—Office buildings are designed based on the number of employers, frequenters, and based upon the presence of foodservice facilities. In designing a system for an office building, consideration must be made for the fact that the design flow may be generated within an 8-to-10 hour period. Thus, flow equalization may be essential to address surges into the Nayadic unit. Figure 13 illustrates two typical office building layouts.

Table 9—Example 4 Information	
Parameter	**Value**
Hydraulic Loading	20-25 Gal/Employee 20-25 Gal/Parking Space
Organic Loading	.04 Lb $CBOD_5$/Employee (240 mg/L $CBOD_5$)
Grease Trap	Not Required
Trash Trap	500 Gallon
Pre-Aeration:	Not Required
Flow Equalization	Recommended



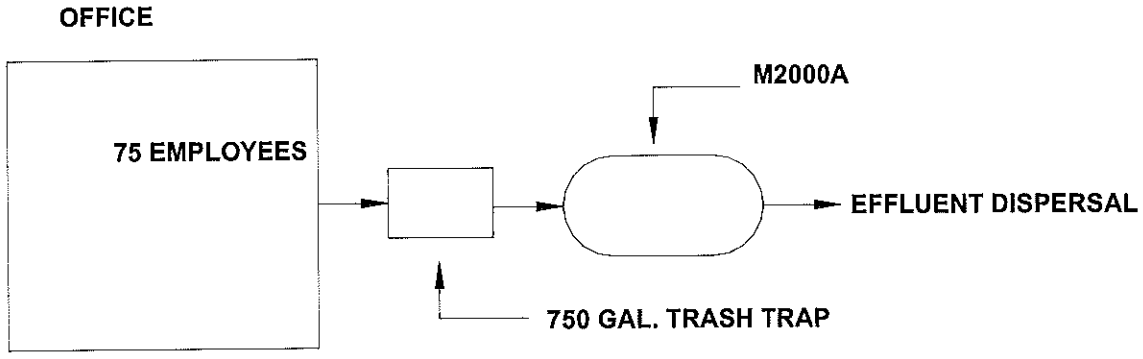


Figure 13—Example 4

Example 5: Commercial Occupancy, Retail Shopping Center Without Foodservice—Retail space wastewater flow is generally calculated based on the number of employees and number of frequenters. Often, the number of frequenters is estimated from the area of retail space.

Table 10—Example 5 Information	
Parameter	**Value**
Hydraulic Loading	(Retail Sales) 0.1 gal per sq. foot (Office Space) 20-25 gal per employee
Organic Loading	Retail Sales: .3 lb BOD per 1000 sq ft of floor space Office Space: .04 lb BOD per employee
Grease Trap	Not Required
Trash Trap	750 Gallon
Pre-Aeration:	Not Required
Flow Equalization	Recommended

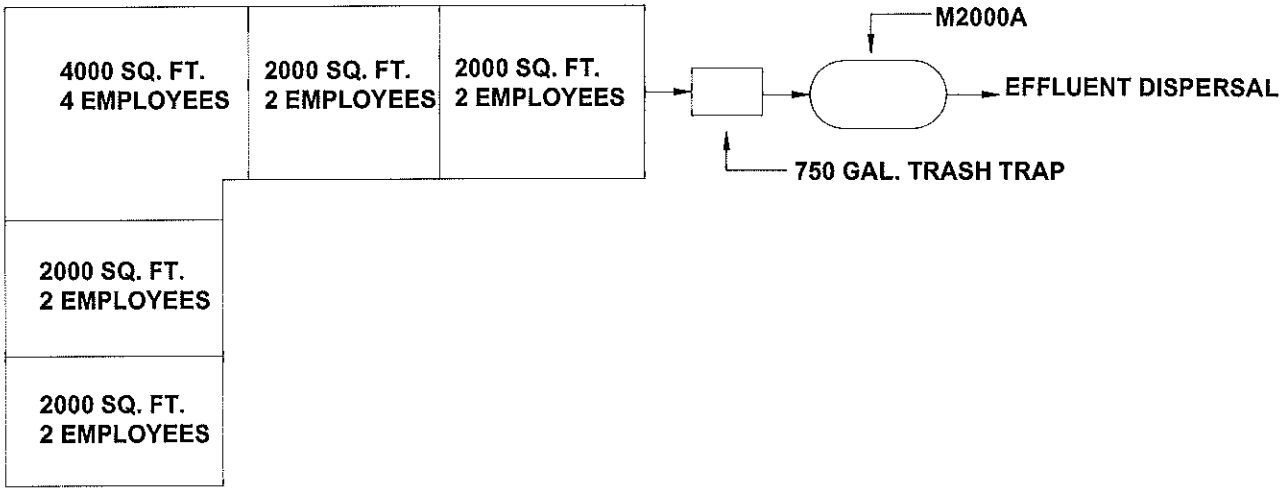


Figure 14—Example 5

Example 6: Commercial Occupancy, With Retail Shopping Plaza With Food Service/Laundry — It is important to provide adequate treatment (and pre-treatment) capacity for mixed-use occupancies. The initial analysis should consider whether or not a food service or laundromat is proposed so the Nayadic system can be properly designed. Failure to properly design the treatment system will result in a system failure.

Table 11—Example 6 Information		
Parameter	**Value**	**Total**
Hydraulic Loading	20,000 sq. ft. @ 0.1 gal/sq.ft.	2000 gal.
	20 seat restaurant @50 gals/seat	1000 gal.
	6 machine laundromat @ 400 gal/machine	2400 gal.
		5400 gal/day
Organic Loading	BOD of 600-800 mg/L for new facility	
Example	20,000 sq.ft.@0.03 lb/BOD/1000 sq.ft.	6.0 lb BOD
	20 seats(restaurant) @0.35 lb BOD/seat	7.0 lb BOD
	washing machines @ 2.0 lb BOD/machine	12.0 lb BOD
		24.4 lb/day
Grease Trap	required	
Trash Trap	required: min. capacity of 2700 gal.	
Anticipated Service Requirements	routine inspection	1-2 months
	pumping	6-12 months
	filter cleaning	3-12 months

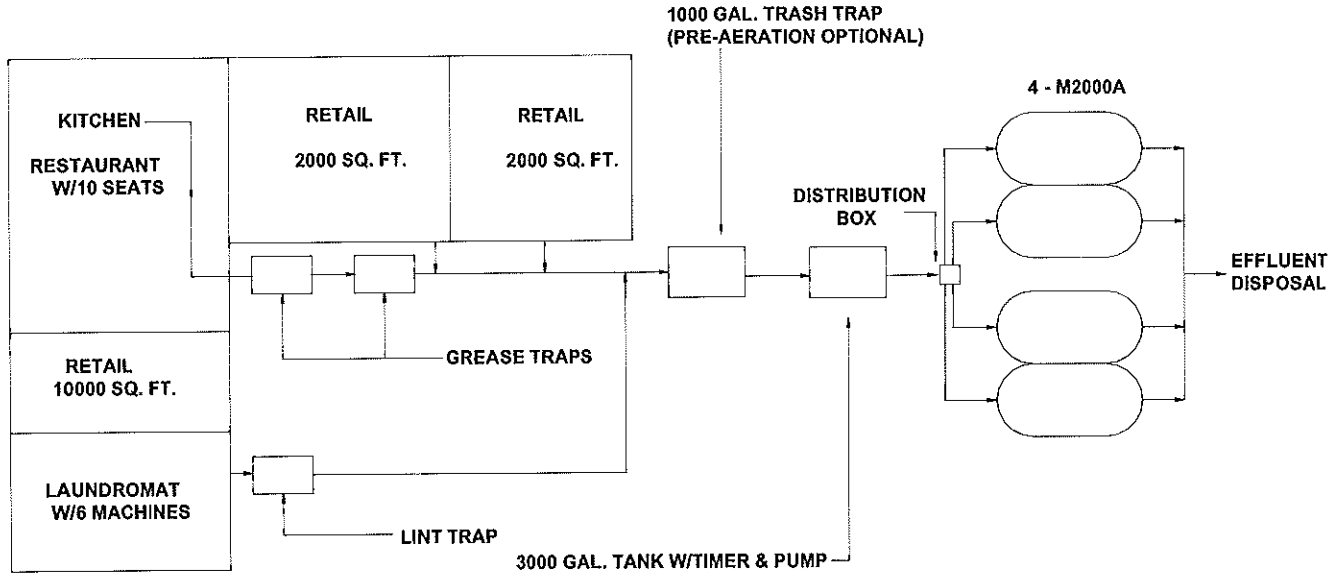


Figure 15—Example 6

Example 7: Commercial Occupancy—Mobile Home Park — Mobile home parks are usually characterized by relatively low (100 – 200 gpd) wastewater flows from each mobile home. For this reason, it is advisable, as well as cost effective, to group several mobile homes on one Nayadic system.

Table 12—Example 7 Information

Parameter	Value	Total
Hydraulic Loading	1400 gal./day	
Organic Loading	0.40 lb BOD per space per day	
Pre-aeration	not required	
Flow equalization	not required unless there is a separate laundry building	
seeding for start-up	not required	
Anticipated Service Requirements	routine inspection	3-6 months
	pumping	1-2 years
	filter cleaning	1-2 years

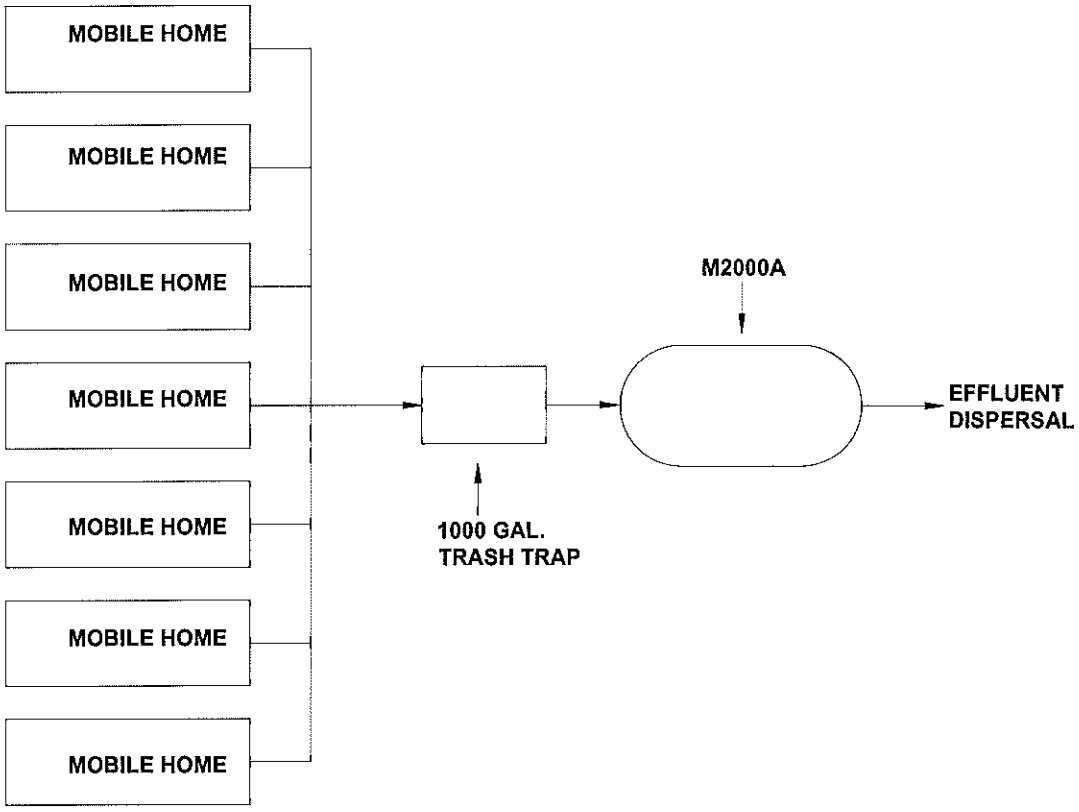


Figure 16—Example 7

Example 8: Commercial Occupancy—Institution— Institutional facilities present several issues that must be addressed. Depending upon the occupancy involved, consideration must be given to possible food service, laundry facilities, showers, and high water usage during heavy peak flows.

Table 13—Example 8 Information		
Parameter	**Value**	**Total**
Hydraulic Loading	hospital	200 gal/bed
	nursing home	100 gal/bed
	school	15 gal/student
	employee	20 gal/person
	kitchen	5 gal/person
	showers	5 gal/student
	laundry	400 gal/machine
Organic Loading	hospital	0.7 lb BOD/day per bed
	nursing home	0.3 lb BOD/day per bed
	school	0.03 lb BOD/day per student
	employee	0.04 lb BOD/day per employee
	kitchen	0.03 lb BOD/day per meal
	showers	0.01 lb BOD/day per student
	laundry	2.0 lb BOD/day per machine
grease trap	required	
trash trap	required	3,000 gal.
Pre-aeration	required if oxygen requirements exceed the capacity of the Nayadic unit	
Flow equalization	"	
seeding for start-up	"	
Anticipated service	routine inspection	monthly
requirements	pumping	6-12 months
	filter cleaning	6-12 months

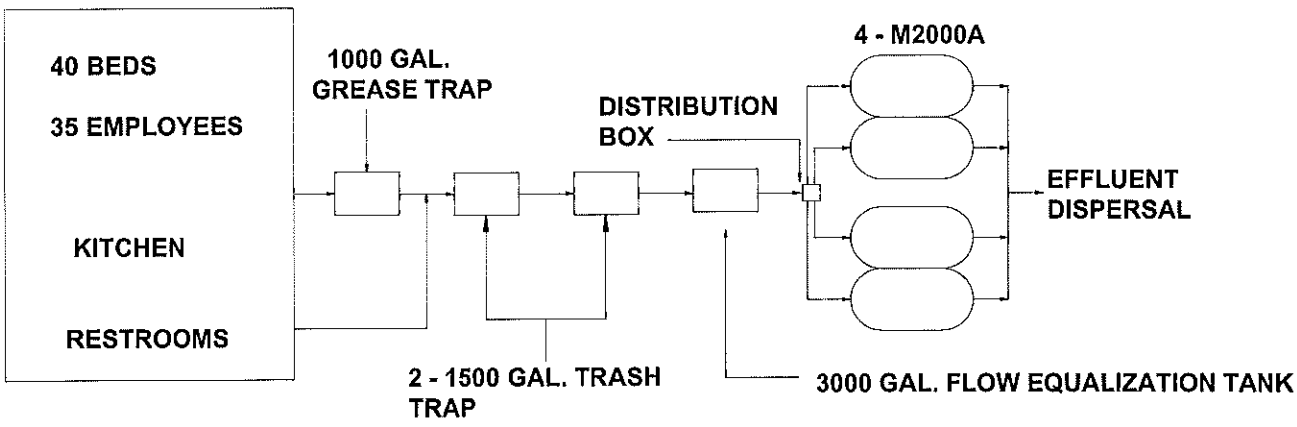


Figure 17—Example 8

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