CIVIL ENGINEERING CONSULTANTS, INC. MARIETTA, GEORGIA 30068			
No Exceptions Taken	No Exceptions Taken With Comment	Make Corrections Noted	Rejected
✓			
DATE *Aug 10, 2022*			
BY			
APPROVED FOR DESIGN ONLY. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND QUANTITIES.			

Contractor note modified diffuser layout.

EDI Aeration/Mixing Equipment Submittal

For:

City of Jefferson, GA

EDI Project # 38117

Prepared For:

City of Jefferson

Prepared By:

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Local Representative:

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Date: July 15, 2022

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Notice

Project Special Notes

Submittal package contains detailed information on components furnished as well as installation and start-up guidelines. Operation and Maintenance Manuals will be provided at, or prior to, equipment delivery. Final O & M manuals will cover start-up, operation and maintenance procedures for the EDI Aeration-Mixing System and specific installation requirements not covered in Submittal Package.

Shipments shall be inspected for damage upon receipt. To file a claim against the freight company, a damage report must be submitted to EDI within 24 hours of delivery. A full inventory of shipped components shall be completed within 14 days of the receipt of shipment. Any deficiencies in the shipment that are clearly deemed to be the result of EDI will be reconciled by EDI when notified within this timeframe.

EDI will label all piping segments to match lateral layout drawing. The piping segments will be labeled with a sequence number that indicates that segment's position in the lateral run. Additionally, EDI will provide an arrow on the lateral piping. This arrow indicates the direction of airflow in the lateral segment. All arrows should point away from the header toward the lateral end at final installation.

EDI's scope of supply begins with a 6" diameter 150# flange connection at 24.25' above the tank floor. Reference EDI Drawing(s) #167053. The drop pipe is to be supported by the contractor such that no downward force is transmitted to the aeration piping system. The flange fasteners to connect the drop pipe to the air header piping are by others.

Note: Contractor to confirm EDI Layout is suitable for installation and will NOT conflict with other process piping and/or structural components.

EDI complies with the requirements of Specification Section(s) 46 51 21 and 01 79 01 with the following comments/exceptions:

TO SPECIFICATION SECTION 465121

1.7.B The Pressure at top of Drop Pipe would be 9.51 psig for both options A and B under operational condition A and 9.58 psig for both options A and B under operational condition B.

2.2.A.4 EDI's Magnum 84P-4 material is non-metallic.

3.1.B EDI has not included installation supervision as EDI does not believe this is required. EDI will inspect the system and assist with start-up, field start-up tests, and any troubleshooting that is required. EDI will provide a verification of general conformance to EDI's installation instructions but does not audit 100% of work performed by others and therefore cannot guarantee all work performed by others is fully meeting EDI's installation requirements.

3.3.A EDI training typically takes less than one hour for operators and maintenance personnel. If needed, EDI can provide multiple training sessions to train multiple shifts of operators. Training documentation is provided in our Operations and Maintenance manual.

TO SPECIFICATION SECTION 017901

EDI manufacturer services will be as described below. EDI does not supply resumes or qualifications of manufacturer's representatives. Representative may have less than 2 years of experience. All service representatives are trained, tested, and annually re-certified. The EDI O&M manual will serve as the training outline and lesson plan. EDI equipment does not require vibration monitoring or testing. Field services are made by an EDI Service Representative, and may include any of the following:

- Train onsite personnel in general installation and assembly of EDI equipment. This does not include supervision of installation services.
- Inspect EDI equipment for general conformance to EDI installation, instructions, and requirements. General conformance for the purpose of this statement is defined as an audit of work performed by others. Repairs are not carried by EDI. System adjustments made per EDI's instruction are the responsibility of the installing contractor. *EDI does not provide supervision of installation but instead inspects equipment after installation.*
- Provide Startup services to ensure that the equipment is operating satisfactorily.
- Train plant Owners/Operators in the long-term Operation and Maintenance procedures for the EDI equipment that has been installed.
- Provide EDI equipment troubleshooting inspections.

EDI service visits include the following documentation:

- An official EDI Service Report to be signed by Installer.

Mechanical – Parts Only, no Labor Warranty Statement

EDI Project No. 38117 – GA, Jefferson

This warranty provided by Environmental Dynamics International Inc., (EDI) is limited to the terms set forth in this Statement. All other warranties expressed or implied are excluded and disclaimed in their entirety. EDI gives no other warranty of any kind, nature, or description, expressed or implied, other than the limited warranties set forth herein, and this warranty exclusion includes but is not limited to warranties of merchantability and warranties of fitness for a particular purpose, both of which are excluded and disclaimed in their entirety. Equipment manufactured by EDI is warranted to be free from defects in materials and workmanship as applicable;

(a) Twelve (12) months from startup of the equipment or eighteen (18) months from shipment, whichever occurs first.

(b) Installed equipment requiring Substantial Completion or Owner Acceptance Certificate; thirteen (13) months from startup of the equipment or eighteen (18) months from shipment, whichever occurs first, exclusive of certificate issuance.

All equipment / systems must be stored, installed, operated, and maintained according to the Installation, Operation and Maintenance Manual (IO&M) provided.

Claims for damaged, improper material or for shortages upon delivery will not be allowed unless written notice, specifying the nature and extent of the damage or shortage, is received to EDI within fourteen (14) days from offloading. If the damage or shortage is of such a nature that it would not be reasonably discovered until the material is assembled and/or erected as a finished product, then the fourteen (14) days will commence from the date of assembly and/or erection.

The responsibility of EDI is limited to the cost of the defective equipment. EDI shall not be liable for any indirect, special, consequential, liquidated damages or penalties relating to the goods covered by or the transaction giving rise to this warranty.

Defective part(s) shall be remedied by repair or replacement of the defective part(s) only shipped freight included, FOB original shipping point[1]. Costs incurred by EDI (on or off site)[2] shall be reimbursed by the Purchaser / Owner[3] should EDI find a deficiency to not be due to equipment covered by this warranty. Defective is defined as faulty or deficient; to the project specifications, or to the purpose(s)/operation(s) it was originally designed for. The part design itself can evolve and physically transform from upgraded engineering modifications, but this physical transformation has no effect on the functionality of the part. The warranty therefore remains unaffected.

The following are excluded from this warranty, but shall not be considered to be limiting to other exclusions: cleaning and de-watering, labor[4], equipment manufactured by others[5], process and performance related to system design or biological process performance, decomposition, abnormal wear and/or damage caused by site conditions; chemical action, chemical precipitate, physical abrasion points or abrasive materials, water velocities greater than 2 ft/sec or as approved by EDI, blunt trauma forces, faulty or substandard structural components, faulty or inadequate maintenance/operation[6], equipment and services provided under a contract which is in a current state of default due to non-payment[7]. EDI exclusively assumes no responsibility of expense or liability for (a) equipment repairs made or contracted by Purchaser or Owner without EDI's written consent; (b) modifications to any of EDI's equipment made by others which are not approved in advance and in writing by EDI; (c) failure of the Owner to promptly notify EDI of observed defects and or deficiencies which occur during the warranty period; (d) field modifications to allow for removal or replacement of EDI components.

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[1] *FOB original shipping point indicates the point of which risk of loss passes*

[2] *Cost incurred include shall not be limited to; travel, housing, labor, and materials; that have been expended to research and repair such deficiency*

[3] *Responsible party for the equipment at the time of the warranty claim; generally dictated by project status, pre (Purchaser) or post (Owner) project hand over.*

[4] *Accessing/uninstalling/replacing/reinstalling any parts.*

[5] *EDI does not warranty equipment manufactured by others. "By others" includes but is not limited to blowers, DO probes, electrical panels, engines, motors, any electrical apparatus, etc. Such equipment bears warranties of the respective manufacturers. Labor costs associated with warranty repairs of equipment manufactured by others shall be borne by others*

[6] *Please refer to your EDI IO&M manual for maintenance and operation instructions.*

[7] *Default due to non-payment shall not include EDI approved holdbacks.*

MANUFACTURING COMMISSIONING SERVICES STATEMENT

Environmental Dynamics International commissioning services provide verification of general conformance[1] to the manufacturer's installation instructions only. EDI cannot audit 100% of all work performed by others and thereby cannot guarantee the work to fully meet the requirements of the Manufacturer's installation instruction.

EDI commissioning services do not provide an expressed nor implied warranty for the installation contractor's work or materials furnished or labor provided by any other contractor, subcontractor or material supplier.

Only those systems installed by Aeration Works (EDI's installation division), or by contractors or subcontractors working directly for and directly under EDI carry a full manufacturer's certification of installation.

Installation by others DOES NOT void EDI's mechanical warranty. Installation labor and services performed by others shall be covered by the warranty of the entity providing such labor and services.

Failure by the installer to fully meet the Manufacturers installation requirements may cause equipment and or performance failure. [2]Common installation errors not covered by the Manufacturers mechanical warranty include, but are not limited to; unseen anchor bolt installation error, internal materials damage (IE: metal hammer to wedges, over torqued fittings and hardware), use of improper ballast concrete material, improper air line cut lengths, poor quality welds, orifice installation error, non-stainless steel components installed within a stainless steel system, improper super strut installation and any installation error which may not be visible at the time of commissioning services due to submersion.

Scheduling Services:

EDI requires a minimum three (3) week notice for scheduling of commissioning services. Providing notice of less than three (3) weeks may result in an expediting fee.

Cancelling Services:

Amending a previously scheduled service trip may result in additional charges due to travel arrangements and fees.

Suspension of services:

EDI reserves the right to suspend scheduling; or cancel previously scheduled commissioning services on accounts which are in default for non-payment. In the event previously scheduled commissioning services must be cancelled due to non-payment, additional charges due to travel arrangements and fees may apply.

Services Contact:

Raylene Douglas, Services Manager Via email at servicedept@wastewater.com or via telephone at 573.474.9456

[1] *General conformance for the purpose of this statement is defined as an audit of worked performed.*

[2] *System adjustments made per EDI's instruction during or subsequent to Commissioning Services are the responsibility of the installing contractor. Failure to comply with these instructions may result in a voided mechanical warranty.*

Aeration System Equipment

Specification Section 465121

Design and Supply of all in-tank FlexAir™ aeration equipment required to make a fully functioning system (as per specifications and drawings) after the horizontal flange and including all in-water components including but not limited to:

AEROBIC DIGESTERS AERATION SYSTEM (2 TANK)

2	6" 304L Stainless Steel Drop Pipe. Drop pipe provided with flanged top connection and plain end bottom. The drop pipe is to be supported by the contractor such that no downward force is transmitted to the aeration piping system.
2	6" 304 Stainless Steel Coupling. Coupling joins plain ends of SS drop and SS manifold.
2	6" 304L Stainless Steel Air Header Assembly. Assembly provided factory assembled and shipped in sub-assemblies. Assembly includes flanged connections at all field joints, end cap and stainless steel flange fasteners.
4	4" 304L Stainless Steel Air Header Assembly. Assembly provided factory assembled and shipped in sub-assemblies. Assembly includes flanged connections at all field joints, diffuser outlet tees, drain leg, removable end cap and stainless steel flange fasteners.
Lot	304 Stainless Steel Pipe Supports. Anchor bolts included.
20	FlexAir™ Magnum 84P-4 duplex diffuser assemblies which include four diffuser units and saddle diffuser mount.
Lot	Start-up, commissioning, and initial training combined with other supplied equipment as per specifications (allowance of 1 trip with a total of 2 days on site)

Exclusions

GENERAL REQUIREMENTS

- Receiving/off-loading and secure on-site storage of all equipment
- Installation of all supplied equipment, including labor and materials

INCLUDED IN OVERALL SCOPE OF SUPPLY

- Aeration system design submittal and shop drawings
- American Iron and Steel materials
- Start-up, commissioning, and initial training
- 1 - year warranty from startup (or 18 months from shipment, whichever comes first)
- Operation & Maintenance Manuals

EQUIPMENT LEAD TIME / DELIVERY

- Aeration Equipment 10 – 12 weeks after EDI receipt of approved submittals

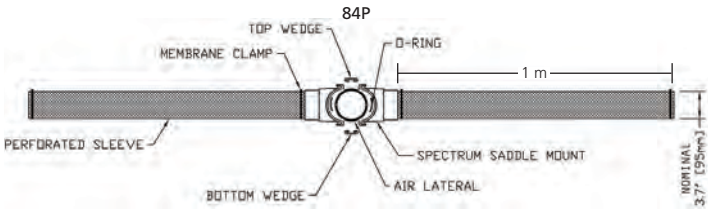
aeration for life

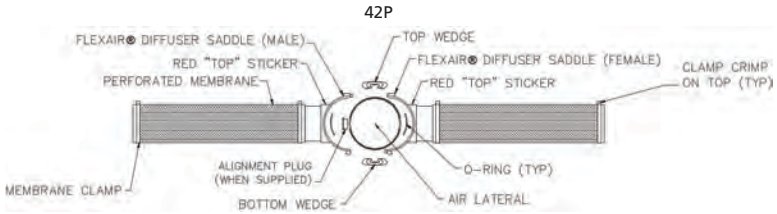
PRODUCT SPECIFICATIONS

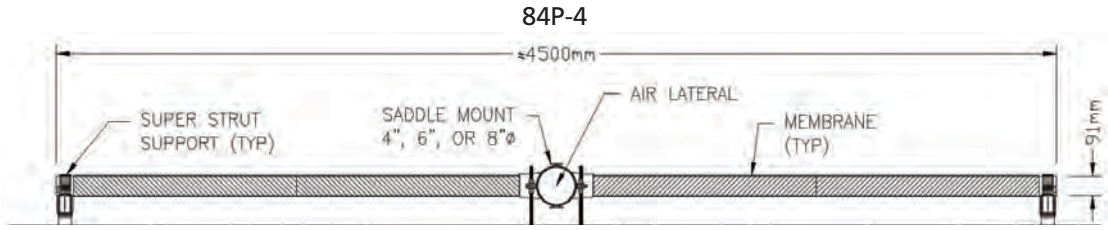
FlexAir™ Magnum

Fine Bubble Flexible Membrane Diffuser

- Ideal for fine-bubble aeration upgrades
- Efficient geometry supports high-density installations of over 65% floor coverage
- Non-buoyant design for reduced uplift and stress on mounting connection
- Premium quality membranes available in EPDM, urethane, and Matrix Plus™ for reduced fouling and minimum maintenance
- Non-metallic construction available for maximum chemical, temperature, and UV resistance
- Triple-check valve design minimizes entry of liquid/solids into piping. Ideal for on/off applications







METRIC					ENGLISH				
Model	Typical Airflow	Overall Length	Operational Weight	Dry Weight	Model	Typical Airflow	Overall Length	Operational Weight	Dry Weight
	m^3_N/h	mm	kg	kg		scfm	in	lb	lb
42P micro	0–16	1390	2.6	3.2	42P micro	0–10	54.8	5.8	7.1
42P high-cap	0–28	1390	2.6	3.2	42P high-cap	0–18	54.8	5.8	7.1
84P micro	0–32	2400	2.9	5.2	84P micro	0–20	94.3	6.3	11
84P high-cap	0–55	2400	2.9	5.2	84P high-cap	0–35	94.3	6.3	11
84P–4 micro	0–64	4880	16.6	10.4	84P–4 micro	0–40	192	36.7	23
84P–4 high-cap	0–110	4880	16.6	10.4	84P–4 high-cap	0–70	192	36.7	23

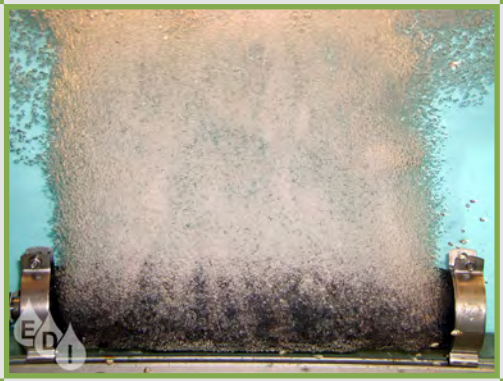
- * Values listed are per tube unless noted
- Optimum oxygen transfer efficiency is achieved when operating in the middle to low end of the airflow range.
- The approximate operating pressure of the diffuser at the mid-range is 10–22.5 inches H2O (2.5–5.6kPa).
- Operating the unit at the high end of the range will result in reduced performance and increased operating pressure.
- Use the maximum airflow value for short term operations such as peak loads or system maintenance.

Environmental Dynamics International

FlexAir™ Magnum: Tube Diffuser

Processes:
Biological Aeration
Activated Sludge Processes
Oxidation Ditch
Sequence Batch Reactors (SBR)
Membrane Bio Reactors (MBR)
Moving Bed Bio Reactors (MBBR)
Sludge Stabilization/Digestion
Package Plants

Applications:
Municipal Wastewater
Industrial Wastewater
Fixed Grid Systems
Lift-Out Systems
Floating Systems
Tank Mixing
High Oxygen Transfer
Low Head Loss



Industries:
Food and Drink
Dairy and Cheese
Pulp and Paper
Oil and Gas
Animal Processing
Leachate
Energy and Power
Pharmaceutical

EDI has demonstrated success in more than 7,000 installations in over 100 countries worldwide—serving over 400 million people.

Please contact your local office below for details of our proven products, systems, and processes.

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edi.Asia@EnvironmentalDynamics.com

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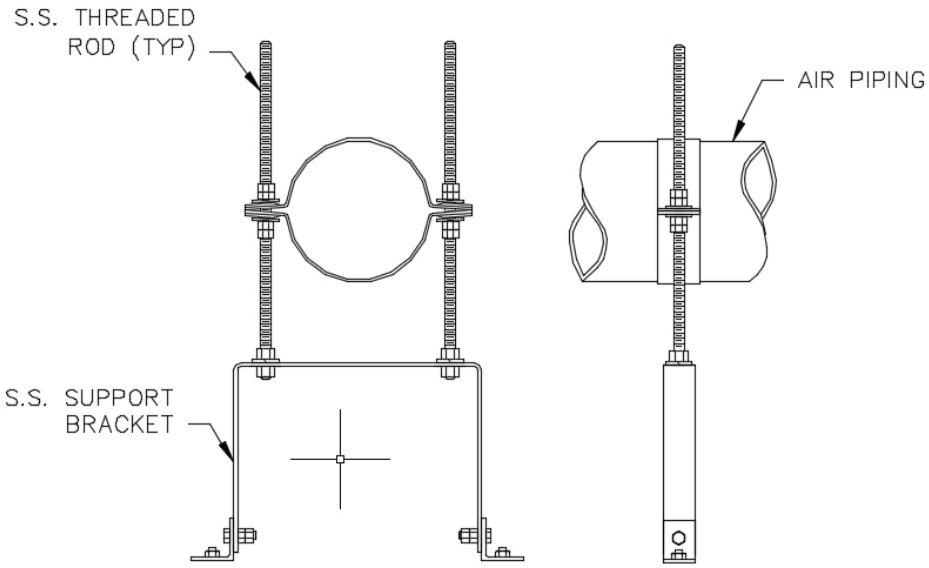
A Nexom BRAND

SPECIFICATION

HAT SUPPORT
Pipe Support

Material Features

- High degree of mechanical integrity
- Available in standard or metric pipe sizes up to 14" (356 mm)
- Adjustable C/L range +/-2" (50 mm)
- Prevents axial rotation while pivoting at the base to allow for expansion and contraction
- Available in 304 stainless steel or 316 stainless steel
- Available with additional bracing for high energy or other special applications.



Environmental DYNAMICS INTERNATIONAL

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wastewater.com

Wedge Type Anchors — (or equal)

SPECIFIED FOR ANCHORAGE INTO CONCRETE

Wedge anchors feature a stainless steel split expansion ring and a threaded stud bolt body and integral cone expander, nut and washer. Anchor bodies are made of type 304 stainless steel or type 316 stainless steel as identified in the drawings or other notations.

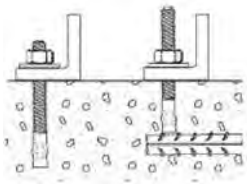
The exposed end of the anchor is stamped to identify anchor length. Stampings should be preserved during installation for any subsequent embedment verification.

Use carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994 to install anchors.

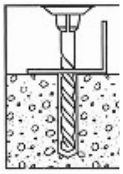
Anchors tested to ASTM E488 criteria and listed by ICC (formerly ICBO). Anchors are listed by the following agencies as required by the local building code: UL, FM, City of Los Angeles, California State Fire Marshal and Cal Trans.

ADVANTAGES

- Versatile fully threaded design is standard on sizes up to 3/4" diameter and 10" length
- Anchor diameter equals hole diameter
- One piece stainless steel expander clip resists corrosion
- Stainless steel anchors
- 360° contact with concrete assures full expansion for reliable working loads
- Non bottom-bearing, may be used in hole depth exceeding anchor length
- Can be installed through the work fixture, eliminating hole spotting
- Inspectable torque values, indicating proper installation

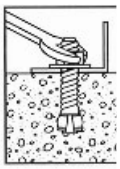


INSTALLATION STEPS



1. Using a bit whose diameter equals the anchor diameter, drill hole to any depth exceeding the minimum embedment. Clean hole.

2. Assemble anchor with nut and washer so that the top of the nut is flush with the top of the anchor. Drive anchor through material to be fastened so that nut and washer are flush with surface material.



3. Expand anchor by tightening nut to the specific torque requirement (see chart).

Trubolt Wedge Anchors (or equal)			*Ultimate Tension and Shear Values (Lbs/kN) in Concrete**		
ANCHOR DIA In. (mm)	**INSTALLATION TORQUE Ft. Lbs (Nm)**	**EMBEDMENT DEPTH In. (mm)**	**ANCHOR TYPE**	**f'c = 4000 PSI (27.6 MPa)**	
				TENSION Lbs. (kN)	**SHEAR Lbs. (kN)**
1/4 (6.4)	8 (10.8)	1-1/8 (28.6)	WW-304 S.S. or SWW-316 S.S.	1,780 (7.9)	1,400 (6.2)
3/8 (9.5)	25 (33.9)	1-1/2 (38.1)		2,240 (10.0)	2,620 (10.3)
1/2 (12.7)	55 (74.6)	2-1/4 (57.2)		5,100 (22.7)	4,760 (21.2)
5/8 (15.9)	90 (122.0)	2-3/4 (69.9)		7,180 (31.9)	7,120 (31.7)

* Allowable values are based upon a 4 to 1 safety factor. Divide by 4 for allowable load values.

Technical Data
Stepless® Ear Clamps
Product Group 167

1.0 Material

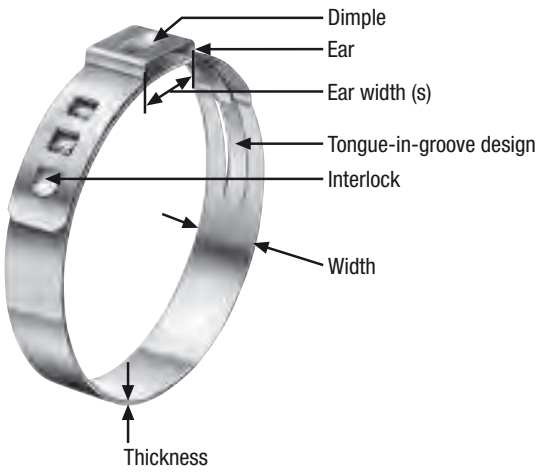
OETIKER Stepless® Ear Clamps are produced from austenitic grades of stainless steel. The primary composition being UNS S30400 / DIN 1.4301, an 18% chromium, 8% nickel alloy that is cold worked at the material processing and clamp manufacturing stages. This material exhibits exceptional properties such us toughness and ductility, providing good forming characteristics required for the clamp installation process. This chemistry provides excellent corrosion resistance to a wide variety of corrosive environments.

Alternative materials with elevated nickel contents are available for resistance to concentrated chloride or acidic exposure.

Edge condition

Stringent controls are maintained at the OETIKER strip processing facility, conditioning the slit material and forming a machined or rolled edge radius. This process reduces the potential for damage caused by sharp or square edges when the clamp compresses adjacent material.

2.0 Clamp Design



Material Thickness

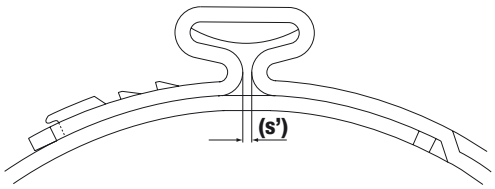
Stepless® Ear Clamps are produced from nominal widths and thickness. The selected material dimensions for a specific application are based on the stress required to obtain an adequate seal or load.

Clamp ear (closing element)

Using tools designed or endorsed by OETIKER, the clamp is closed by drawing together the lower radii of the “ear”. The maximum diameter reduction is proportionate to the open “ear” width (s).

The theoretical maximum reduction in diameter is given by the formula:

Max. diameter reduction = $\frac{\text{ear-width (s)}}{}$



Note: The above sketch symbolizes a closed “ear” (s’) geometry and is not necessarily indicative of an effective closed assembly.

As a rule, the clamp nominal diameter should be selected so that the outside diameter of the hose, after it has been pushed on to the component to which it is to be fastened (e.g. a hose nipple), is approximately in the middle of the diameter range of the chosen clamp (see pages 3/4).
A clamp can only be considered adequately closed when the ear width (s) has been reduced by at least 40%, and the correct closing force was used for assembly. Further information with assembly recommendations and closing force is available in Section 3.0.

Mechanical Interlock

The interlock is a mechanically jointed design for securing the clamp in the round condition. The strength of the lock is a calculation based on the mechanical properties of the raw material and the smallest cross sectional area through the clamp.
Individual interlock designs can be opened for radial installation prior to closure.

Stepless® Design

The unique “tongue-in-groove design” was developed to assure that the inner circumference is free of steps or gaps that could be detrimental to the sealing ability of the clamp.
The groove is extruded 1x material thickness on the outer surface and is approximately 1/3 the band width, the mating tongue provides a uniform inner circumference. During the clamp closing process, the tongue engagement increases in the groove, minimizing the reduced surface area, ensuring uniform compression or surface pressure over the full 360° of the assembled parts.

Ear Design

The integrated dimple in the ear effectively increases the clamping force and provides a spring effect when the diameter of the application contracts or expands due to thermal or mechanical influences.

STYLE CR1 SINGLE SECTION NORMAL RANGE

To Order: Determine desired range and length, then select corresponding catalog number.

Note: Other ranges and lengths not listed are available upon request. For higher pressures, clamp length should be equal to or in excess of pipe O.D.

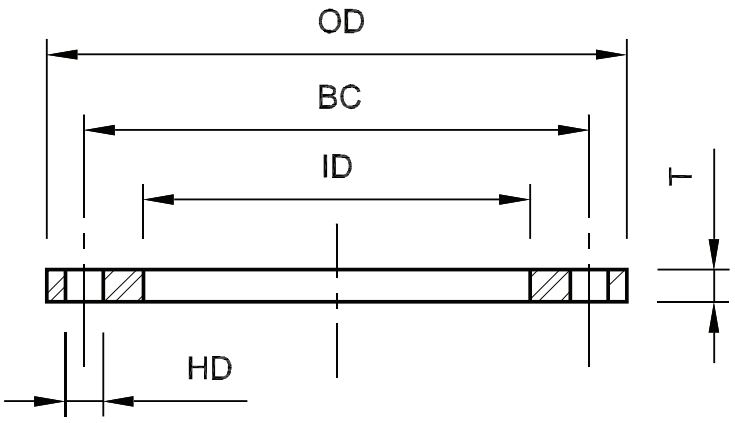
Conductivity Strips available upon request.

Nominal Pipe Size (Inches)	Clamp O.D. Range (Inches)	Catalog Number	Approximate Shipping Weight (lbs.) per length							
			6"	8"	10"	12"	16"	20"	24"	30"
2	2.32-2.63	CR1 - 263 - Length	4	5	6	7	10	—	—	—
2 1/4	2.57-2.87	CR1 - 287 - Length	4	5	6	7	10	—	—	—
2 1/4-2 1/2	2.70-3.00	CR1 - 300 - Length	4	5	6	7	10	—	—	—
3	2.95-3.25	CR1 - 325 - Length	4	5	6	8	10	—	—	—
	3.40-3.70	CR1 - 370 - Length	4	6	7	9	12	—	—	—
3 & 4	3.71-4.00	CR1 - 400 - Length	—	6	7	9	12	—	—	—
4	4.45-4.75	CR1 - 475 - Length	—	7	8	10	13	17	—	—
	4.75-5.15	CR1 - 515 - Length	—	7	8	10	13	17	20	25
4 & 5	4.95-5.35	CR1 - 535 - Length	—	7	8	11	14	18	20	25
	5.20-5.60	CR1 - 560 - Length	—	7	8	11	14	18	20	26
6	5.95-6.35	CR1 - 635 - Length	—	8	10	11	15	19	22	30
	6.55-6.95	CR1 - 695 - Length	—	8	10	11	15	19	23	30
	6.84-7.24	CR1 - 724 - Length	—	9	11	12	16	20	24	32
	7.05-7.45	CR1 - 745 - Length	—	9	11	12	17	21	25	32
	7.45-7.85	CR1 - 785 - Length	—	9	11	13	18	22	26	34
8	7.95-8.35	CR1 - 835 - Length	—	9	12	14	19	23	28	35
	8.59-8.99	CR1 - 899 - Length	—	9	12	14	19	23	28	35
	9.00-9.40	CR1 - 940 - Length	—	10	13	14	20	24	29	37
	9.30-9.70	CR1 - 970 - Length	—	10	13	15	20	25	31	38
8 & 10	9.75-10.15	CR1 - 1015 - Length	—	11	13	16	21	27	32	40
10	10.65-11.05	CR1 - 1105 - Length	—	11	14	17	22	28	34	42
	11.04-11.44	CR1 - 1144 - Length	—	12	14	17	22	29	36	44
	11.35-11.75	CR1 - 1175 - Length	—	12	14	17	23	30	37	45
	11.75-12.15	CR1 - 1215 - Length	—	13	15	18	24	30	37	46
	11.95-12.35	CR1 - 1235 - Length	—	13	15	18	26	31	38	47
12	12.65-13.05	CR1 - 1305 - Length	—	14	16	19	28	32	38	48
	13.10-13.50	CR1 - 1350 - Length	—	15	17	20	28	32	38	48
	13.40-13.80	CR1 - 1380 - Length	—	15	18	21	29	33	39	48
12 & 14	13.70-14.10	CR1 - 1410 - Length	—	16	18	21	29	33	39	48
	14.00-14.40	CR1 - 1440 - Length	—	16	19	22	29	35	41	52
		Number of Studs	2	2	3	3	4	5	6	8

PLATE FLANGES

304L & 316L STAINLESS STEEL

- Dimensions are given in inches.
- All plate flanges are flat face.
- Lap Joint application (as back-up) for use with flat or angle type face rings can be furnished upon request.
- Drilling is 150# class.
- For 14" and larger product, please refer to the appropriate pipe section in the front of the catalog.



NOMINAL TUBE SIZE	LBS	ID	OD	T (PLATE FLG)	T (SS BU FLG)	BC	HD	BOLT SIZE	NUMBER OF BOLT HOLES
1	1.80	1.030	4 /18	1/2	1/2	3 1/8	5/8	1/2	4
1 1/4	2.20	1.280	4 5/8	1/2	1/2	3 1/2	5/8	1/2	4
1 1/2	2.50	1.530	5	1/2	1/2	3 7/8	5/8	1/2	4
2	3.50	2.030	6	1/2	1/2	4 3/4	3/4	5/8	4
2 1/2	4.80	2.530	7	1/2	1/2	5 1/2	3/4	5/8	4
3	5.30	3.030	7 1/2	1/2	1/2	6	3/4	5/8	4
4	7.20	4.030	9	1/2	1/2	7 1/2	3/4	5/8	8
5	8.20	5.030	10	1/2	1/2	8 1/2	7/8	3/4	8
6	9.30	6.030	11	1/2	1/2	9 1/2	7/8	3/4	8
8	13.30	8.030	13 1/2	1/2	1/2	11 3/4	7/8	3/4	8
10	21.10	10.030	16	5/8	5/8	14 1/4	1	7/8	12
12	30.00	12.060	19	5/8	5/8	17	1	7/8	12

Garlock RUBBER TECHNOLOGIES®
an EnPro Industries company

Garlock 564

MATERIAL PROPERTIES*

Color:	Black
Composition:	EPDM
Durometer, Shore A:	55-65
Temperature, °F	
Minimum:	-20
Maximum:	+250
Finish Available	Smooth

Tensile Strength, psi:	
Minimum:	1000
Typical:	1200
Elongation, %:	
Minimum:	350
Typical	500
Avg. Wt. (lbs./sq.yd 1/16" thick):	3.6
Line Call Out:	ASTM D2000 2BA-610-C12

MADE IN THE USA

Notes:

This is a general guide and should not be the sole means of selecting or rejecting this material.

* Values do not constitute specification Limits

[2] When approaching the maximum or minimum ratings consult Garlock Applications Engineering Garlock

[4] For rubber compound only, not fabric

201 Dana Drive, Paragould, Arkansas 72450 870-239-4051 fax 870-239-4054
www.enprodindustries.com
www.grtco.com

COMMERCIAL MIP (MOLDED IN PLACE) COMPACT VALVE

MIP Compact Valves answer the need for an economically priced compact quarter turn ball valve for use in irrigation, water treatment, pool/spa, and commercial plumbing applications. Available in 1/2 - 4" sizes

Features and Benefits

Thermoplastic design eliminates process and atmospheric corrosion.

Pressure rated up to 150 psi, non-shock water at 73º F.

Socket dimensions meet all ASTM requirements.
PVC: D-2467, D-2464

Bi-directional: can be installed in either direction.

Replacement handle kits available.

NSF – 61 Approved for Potable Water Service

COLONIAL VALVE
A DIVISION OF COLONIAL ENGINEERING, INC.

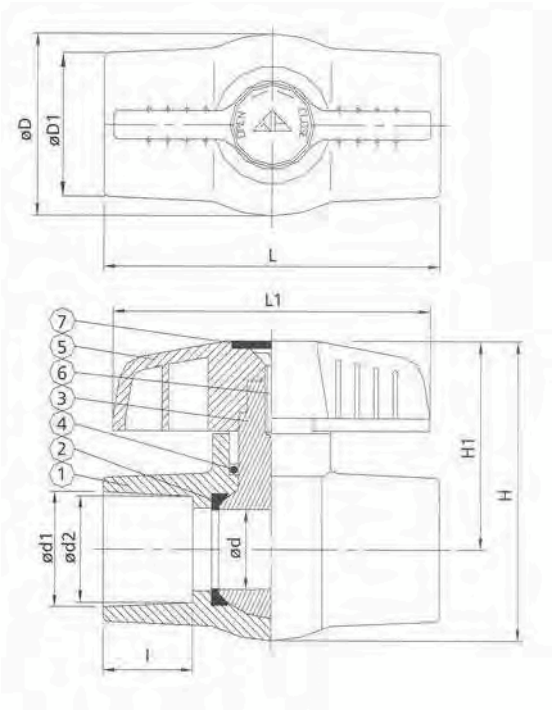
Revised 9/08

CUSTOMER SERVICE: 6400 Corporate Ave., Portage, MI 49002
Toll-free (800)374 0234, Phone (269)323 2495, Fax (269) 323 0630 www.colonialengineering.com

Size	White Socket	White Threaded	Gray Socket	Gray Threaded
½	V07491N	V07591N	V07691N	V07791N
¾	V08491N	V08591N	V08691N	V08791N
1	V10491N	V10591N	V10691N	V10791N
1-1/4	V14491N	V14591N	V14691N	V14791N
1-1/2	V17491N	V17591N	V17691N	V17791N
2	V20491N	V20591N	V20691N	V20791N
2-1/2	V27491N	V27591N		
3	V30491N	V30591N		
4	V40491N	V40591N		

Pressure rated up to 150 psi, non-shock water at 73º F.

Temp (ºF)	PVC
73	1.00
80	.88
90	.75
100	.62
110	.50
120	.40
130	.30
140	.22
150	NR
160	NR



NO.	Part	Material	Quantity
1	Body	PVC	1
2	Seat Seal	EPDM	2
3	Ball	PVC	1
4	O-ring	EPDM	1
5	Handle	ABS	1
6	Bolt	Zinc-Plated Steel	1
7	Cap	ABS	1

	1/2"	3/4"	1"	1-1/4"	1-1/2"	2	2-1/2"	3"	4"
d1	7/8	1-1/16	1-5/16	1-11/16	1-15/16	2-3/8	2-7/8	3-1/2	4-1/2
d2	13/16	1-1/16	1-5/16	1-10/16	1-7/8	2-3/8	2-7/8	3-1/2	4-1/2
l	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2	1-3/4	1-7/8	2-1/4
D	1-1/2	1-7/8	2	2-1/2	3	3-5/8	4-5/16	5-1/4	6-11/16
D1	1-1/8	1-1/2	1-3/4	2-1/8	2-1/2	3	3-5/8	4-3/16	4
d	1/2	3/4	1	1-1/8	1-3/8	1-7/8	2-3/8	3-1/16	4
L	3-1/4	3-3/4	4-1/8	4-1/2	5-1/8	5-3/4	8-1/16	9	11-13/16
L1	2-3/4	3-1/2	3-7/8	3-7/8	4-1/2	5-1/2	7	8-13/16	10-7/8
H	2-1/2	3-1/8	3-5/8	3-7/8	4-1/2	5-3/8	6-5/16	7-1/2	9-3/16
H1	1-3/4	2-1/8	2-1/2	2-5/8	3-1/8	3-1/2	4-1/8	4-7/8	5-13/16

COLONIAL VALVE
A DIVISION OF COLONIAL ENGINEERING, INC.

CUSTOMER SERVICE: 6400 Corporate Ave., Portage, MI 49002
Toll-free (800)374 0234, Phone (269)323 2495, Fax (269) 323 0630 www.colonialengineering.com

VALUFLEX GS *or equal	**Air and Multipurpose Hose**

Application: Valuflex/GS is one of the finest multipurpose air and water hose available, anywhere. Black Valuflex provides job/color coding possibilities for safety and other considerations. Valuflex is a very economical general service air and water hose. It can be used in numerous industrial, agricultural and construction applications where oil is not a factor. Valuflex is easy to handle and very flexible due to its multi-spiral layers of durable reinforcing polyester yarn. Available in a wide variety of sizes, Valuflex provides constant working pressures of 150, 200, 250 or 300 psi. It has an EPDM tube and cover that resists abrasion, heat and ozone. This hose is **not** for use as a steam hose.

Fuel Resistance: Limited

Construction

Tube: EPDM

Reinforcement: Spiral polyester yarn

Cover: EPDM

Temperature: -40°F to +200°F
-40°C to +93°C

Packaging: Reels or 50 ft length - 1 per carton

Colors: Black

Nominal I.D.		Nominal O.D.		Reinforcement Spirals	Working Pressure		Min. Bend Radius		Weight	
in.	mm	in.	mm		psi	Mpa	in.	mm	lb/ft	Kg/m
1/2	12.70	0.81	20.64	2	150	1.03	3.00	76.20	0.19	0.28
5/8	15.88	0.93	23.62	2	150	1.03	3.75	95.25	0.23	0.34
3/4	19.05	1.12	28.45	2	150	1.03	4.50	114.30	0.33	0.49
1	25.40	1.37	34.80	4	150	1.03	7.00	177.80	0.41	0.61
1-1/4	31.75	1.75	44.45	4	200	1.03	8.75	222.25	0.79	1.18
1-1/2	38.10	2.00	50.80	4	200	1.03	10.50	266.70	0.90	1.34
2	50.80	2.55	64.77	4	200	1.03	14.00	355.60	1.08	1.61

Compound N-7002

70 Durometer Nitrile Rubber

vs. ASTMD2000 M2BG714 B34 EA14 EF11 EF21 EO14 EO34 F17

Original Physical Properties	Spec	N-7002
Hardness, Shore A durometer points	70 ± 5	68
Tensile Strength, min psi	2030	2233
Elongation, min %	250	301
Compression Set: Test Method D 395, Method B, 22 hr @ 100°C		
% of Original Deflection, max	25	17
Water Resistance: Test Method D 471, Method B, 70 hr @ 100°C		
Hardness Change, max durometer points	± 10	-5
Volume Change, %	± 15	+11
Fluid Resistance: Test Method D 471, Ref Fuel A, 70 hr @ 23°C		
Hardness Change, max durometer points	± 10	-4
Tensile Change, %	-25	-12
Elongation Change, %	-25	-22
Volume Change, %	-5 to +10	+4
Fluid Resistance: Test Method D 471, Ref Fuel B, 70 hr @ 23°C		
Hardness Change, max durometer points	0 to –30	-14
Tensile Change, %	-60	-34
Elongation Change, %	-60	-28
Volume Change, %	0 to +40	+25
Fluid Resistance: Test Method D 471, IRM 901 Oil, 70 hr @ 100°C		
Hardness Change, max durometer points	-5 to +10	+8
Tensile Change, %	-25	+8
Elongation Change, %	-45	-22
Volume Change, %	-10 to +5	-10
Fluid Resistance: Test Method D 471, IRM 903 Oil, 70 hr @ 100°C		
Hardness Change, max durometer points	-10 to +5	-7
Tensile Change, %	-45	-18
Elongation Change, %	-45	-20
Volume Change, %	0 to +25	+5
Low Temp Resistance, Test Method D 2137 (A), 3 min @ -40°C	non-brittle	pass

The data shown here are shown as an engineering guide only and should not be used for the purpose of establishing performance limits. These values were obtained using established standard test procedures and are believed to be reliable. However, due to the variables that may be encountered in actual use, it is always advisable to test the material under actual service conditions before specification

PipeLife Jet Stream, Inc.

Post Office Box 190
Siloam Springs, AR 72761
479-524-5151 O
479-524-5464 F

PVC PLASTIC PIPE

POLYVINYL CHLORIDE — 20 FOOT LENGTHS

CS207-60 ASTMD1785

PIPELIFE JET STREAM, INC. SCH. 40 PVC 1120/1220

NOMINAL SIZE	O.D.	I.D.	WALL THICKNESS	WT. PER 100 FT.	PRESSURE RATING @ 73.4°	FT. PER BUNDLE
½"	.840	.622	.109	16.60	600	200
¾"	1.050	.824	.113	22.00	480	200
1"	1.315	1.049	.133	32.40	450	200
Δ 1¼"	1.660	1.380	.140	43.90	370	-
Δ 1½"	1.900	1.610	.145	52.50	330	-
Δ 2"	2.375	2.067	.154	70.20	280	-
2½"	2.875	2.469	.203	110.80	300	-
3"	3.500	3.068	.216	144.90	260	-
Δ 4"	4.500	4.026	.237	206.40	220	-
6"	6.625	6.065	.280	363.00	180	-
*8"	8.625	7.981	.322	584.50	160	-
10"	10.750	10.020	.365	774.50	140	-
12"	12.750	11.938	.406	1024.00	130	-

* Standard length 20 ft. Except 8 inch Diameter which is 20 ft. Laying Length.
Δ These sizes are dual marked 2665 and 1785.

Pipe produced in accordance with ASTM D1785 & D1784
COLOR OF PIPE —WHITE
USE ONLY PVC CEMENT
PVC Schedule 40 Not recommended for threading

PIPE

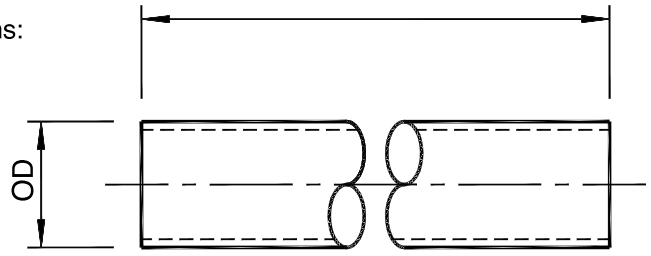
304L & 316L STAINLESS STEEL

Felker furnishes pipe in accordance with the following specifications:

ASTM A-312/ASME SA-312 2" through 24"
ASTM A-358/ASME SA-358 3" through 24"
ASTM A-778 3" and larger

- Sizes larger than 48” available upon request.
- OD and wall thickness are given in inches.
- Wall thickness is nominal.
- Available end configurations are described in the specifications section on page 46.
- ASTM A-312 pipe 3” and larger qualifies to ASME B31.1 90% joint efficiency requirements.
- ASTM A-312 pipe certified to Supplementary Requirement S5 radiographic examination is available upon request.

(See note below for length specifications.)



- Stock sizes in 21 foot random lengths through 12". 14" through 42" stock in 20 foot random lengths. Sizes larger than 42" are in 10 foot lengths. Special lengths are available upon request.
- Other alloys are available upon request.

NOMINAL PIPE SIZE	OD	A-312/A-778 SCHEDULE PIPE			A-778 GAUGE PIPE									
		SCH5S	SCH10S	SCH40S	14GA .078	12GA .109	11GA .125	10GA .140	8GA .172	3/16 .188	1/4 .250	3/8 .375	1/2 .500	5/8 .625
2	2.375	.065 1.62	.109 2.66	.154 3.69	-	-	-	-	-		-	-	-	-
2 1/2	2.875	.083 2.50	.120 3.56	.203 5.85	-	-	-	-	-		-	-	-	-
3	3.500	.083 3.06	.120 4.37	.216 7.65	SEE SCH5S	SEE SCH10S	-	-	-		-	-	-	-
3 1/2	4.000	.083 3.50	.120 5.02	.226 9.91	SEE SCH5S	SEE SCH10S	-	-	-		-	-	-	-
4	4.500	.083 3.95	.120 5.67	.237 10.89	SEE SCH5S	SEE SCH10S	-	-	-		-	-	-	-
5	5.563	.109 6.41	.134 7.84	.258 14.75	4.61	SEE SCH5S	SEE SCH10S	-	-		-	-	-	-
6	6.625	.109 7.66	.134 9.38	.280 19.15	5.50	SEE SCH5S	SEE SCH10S	-	-		-	-	-	-
8	8.625	.109 10.01	.148 13.52	.322 28.82	7.19	SEE SCH5S	11.45	SEE SCH10S	-		22.57	-	-	-
10	10.750	.134 15.34	.165 18.83	.365 40.86	8.97	12.50	SEE SCH5S	16.01	21.41		28.30	-	-	-
12	12.750	.156 21.18	.180 24.39	.375 50.03	10.66	14.85	17.01	19.03	SEE SCH10S		33.69	SEE SCH40S	-	-
14	14.000	.156 23.28	.188 27.99	.375 55.08	11.71	16.32	18.70	20.92	SEE SCH10S		37.06	SEE SCH40S	-	-
16	16.000	.165 28.17	.188 32.05	.375 63.16	13.39	18.67	21.39	23.94	SEE SCH10S		42.45	SEE SCH40S	-	-
18	18.000	.165 31.72	.188 36.10	.375 71.25	15.07	21.02	24.09	26.95	SEE SCH10S		47.84	SEE SCH40S	82.92	-
20	20.000	.188 40.15	.218 46.49	.375 79.33	16.75	23.37	26.78	29.97	SEE SCH5S		53.23	SEE SCH40S	105.11	-
24	24.000	.218 55.89	.250 64.01	.375 95.50	20.11	28.07	32.17	36.01	48.26		SEE SCH10S	SEE SCH40S	142.00	-
30	30.000	.250 80.18	.312 99.85	.375 119.76	25.16	35.12	40.26	45.06	60.42		SEE SCH5S	SEE SCH40S	159.01	197.91
36	36.000	-	-	-	30.20	42.17	48.34	54.12	72.58		96.35	144.01	189.57	236.13
42	42.000	-	-	-	35.25	49.22	56.43	63.18	84.74		112.52	168.27	223.69	278.76
48	48.000	-	-	-	40.29	56.27	64.51	72.23	96.90		128.69	192.52	256.03	319.19

BLUE = WALL THICKNESS
BLACK = POUNDS PER FOOT (LBS/FT)

EDI Special Tool List

Tool		EDI Part Number
TOOL,CRIMPING,STANDARD	QTY 1	00278

Environmental Dynamics International

Aeration and Mixing System Design Summary

Project Name: Jefferson GA I85 WRF
Location: GA

Design Brief #: cd10363.02C
Date: 4/18/2022

Calculated By: DB

General Notes

1) Each design calculation is for 1 tank only
2) System design under standard conditions in clean water according to ASCE standard.
3) System design based on limiting airflow requirement (oxygenation or mixing).
4) Cell values assumed by EDI are Bold and Underlined
5) Alternate inputs that differ from design inputs are highlighted blue
6) Estimated Blower Operating Pressure includes pressure to the top of the drop, estimated yard pipe and blower losses, and 0.5 psig overpressure.

aeration for life®

5601 Paris Road, Columbia, MO 65202 USA | +1 (573) 474 9456 | www.environmentaldynamics.com

Aeration Zone 1 (1 of 2) - Condition A Geometry:

	Design Scenario	Units	Design Condition
(1)	Length	ft	40.00
(2)	Width	ft	25.00
(3)	Outer Diameter	ft	-
(4)	Inner Diameter (For Donut Shape)	ft	-
(5)	Side Slope Ratio, Length / Height (if Applicable)	L/H	-
(6)	Water Depth	ft	21.00
(7)	Aeration Depth	ft	20.42
(8)	Aerated Tank Floor Area (AT)	ft2	1,000
(9)	Aerated Tank Volume (VT)	ft3	21,000

Aeration Zone 1 (1 of 2) - Condition A Diffuser Information:

	Design Scenario	Units	Design Condition
(10)	Diffuser Membrane Type	-	91-1003 Tube
(11)	Diffuser Assembly Type	-	Magnum 84P-4
(12)	Perforation Size	-	Macro
(13)	Quantity of Diffuser Membranes per Diffuser Assembly	-	4
(14)	Number of Diffuser Membranes Required	-	40
(15)	Number of Diffuser Assemblies Required	-	10
(16)	Perforated Membrane Area per Diffuser Membrane	ft2	2.64
(17)	Perforated Membrane Area per Diffuser Assembly	ft2	10.56
(18)	Total Perforated Membrane Area Requirement (AD)	ft2	105.60
(19)	Design Density - Floor Coverage (AD / AT)	-	0.11
(20)	Design Density - (AT / AD)	-	9.47

Aeration Zone 1 (1 of 2) - Condition A Mixing:

	Design Scenario	Units	Design Condition
(21)	Specific Airflow Rate for Mixing	scfm/ft2	0.43
(22)	Volumetric Airflow Rate for Mixing	scfm/1000ft3	20.48
(23)	Airflow Requirement for Mixing (Qmix)	scfm	430

Aeration Zone 1 (1 of 2) - Condition A Oxygen Requirement:

	Design Scenario	Units	Design Condition
(24)	Standard Oxygen Transfer Rate at Mixing Airflow	lb O2/hr	117
(26)	System Determining Airflow (Qmix)	scfm	430
(27)	Specific Airflow per Aerated Tank Floor Area	scfm/ft2	0.43
(28)	Airflow per Diffuser Membrane	scfm	10.75
(29)	Diffuser Membrane Flux Rate	scfm/ft2	4.07
(30)	Standard Oxygen Transfer Efficiency (SOTE)	%	25.95
(31)	Specific Standard Oxygen Transfer Efficiency (SSOTE)	%/ft	1.27
(33)	Estimated Pressure at Top of Drop Pipe	psig	9.51
(34)	Estimated Blower Operating Pressure	psig	10.66

Aeration Zone 1 (1 of 2) - Condition B Geometry:

	Design Scenario	Units	Design Condition
(70)	Length	ft	40.00
(71)	Width	ft	25.00
(72)	Outer Diameter	ft	-
(73)	Inner Diameter (For Donut Shape)	ft	-
(74)	Side Slope Ratio, Length / Height (if Applicable)	L/H	-
(75)	Water Depth	ft	21.00
(76)	Aeration Depth	ft	20.42
(77)	Aerated Tank Floor Area (AT)	ft2	1,000
(78)	Aerated Tank Volume (VT)	ft3	21,000

Aeration Zone 1 (1 of 2) - Condition B Diffuser Information:

	Design Scenario	Units	Design Condition
(79)	Diffuser Membrane Type	-	91-1003 Tube
(80)	Diffuser Assembly Type	-	Magnum 84P-4
(81)	Perforation Size	-	Macro
(82)	Quantity of Diffuser Membranes per Diffuser Assembly	-	4
(83)	Number of Diffuser Membranes Required	-	40
(84)	Number of Diffuser Assemblies Required	-	10
(85)	Perforated Membrane Area per Diffuser Unit	ft2	2.64
(86)	Perforated Membrane Area per Diffuser Assembly	ft2	10.56
(87)	Total Perforated Membrane Area Requirement (AD)	ft2	105.60
(88)	Design Density - Floor Coverage (AD / AT)	-	0.11
(89)	Design Density - (AT / AD)	-	9.47

Aeration Zone 1 (1 of 2) - Condition B Mixing:

	Design Scenario	Units	Design Condition
(90)	Specific Airflow Rate for Mixing	scfm/ft2	0.65
(91)	Volumetric Airflow Rate for Mixing	scfm/1000ft3	30.71
(92)	Airflow Requirement for Mixing (Qmix)	scfm	645

Aeration Zone 1 (1 of 2) - Condition B Oxygen Requirement

	Design Scenario	Units	Design Condition
(93)	Standard Oxygen Transfer Rate at Mixing Airflow	lb O2/hr	162
(95)	System Determining Airflow (Qmix)	scfm	645
(96)	Specific Airflow per Aerated Tank Floor Area	scfm/ft2	0.65
(97)	Airflow per Diffuser Unit	scfm	16.13
(98)	Diffuser Membrane Flux Rate	scfm/ft2	6.11
(99)	Standard Oxygen Transfer Efficiency (SOTE)	%	24.09
(100)	Specific Standard Oxygen Transfer Efficiency (SSOTE)	%/ft	1.18
(102)	Estimated Pressure at Top of Drop Pipe	psig	9.58
(103)	Estimated Blower Operating Pressure	psig	10.73

Aeration/Mixing System Headloss Calculations

Project Name: Jefferson, GA **Project #:** 38117 **Date:** 7-Jul-22

Basin: Aerobic Digester **Rev:** 2.75

System Design Conditions

		Design Airflow (scfm)	
Total System:		430.0	
Per Diffuser Unit:		10.75	

Diffuser Submergence Depth:	20.25	(ft)
Quantity of Diffuser Units:	40	
Active Surface Area:	5.28	(ft²)
Membranes per Orifice:	1	
Orifice Diameter:	0.5000	(in)

Estimated System Pressures & Uniformity

		Design Airflow		
Header Loss		0.11		(inwc)
+ Lateral Loss		0.04		(inwc)
Total Piping Loss		0.15		(inwc)
Membrane Loss		16.18		(inwc)
Orifice Loss		9.26		(inwc)
Liquid Depth		243.00		(inwc)
***Operating Pressure**		**9.70**		**(psig)**
****Uniformity**		97.9%		

* - at Top of Drop

All calculations included in these tables are estimates and should only be used as a guideline for design of the system. Specific operating condition such as initial start-up, aging of membranes, standby blowers started for emergency situations, etc., are not accounted for in these calculations. Provisions and/or safety factors to account for these conditions must be considered and added when designing the overall system. Also account for differences between positive displacement blowers and centrifugal blowers during design. Contact EDI for design assistance.

The pipe segments analyzed have the path of highest resistance to airflow. “Equivalent Length” refers to the pipe segment length plus the equivalent length of pipe due to fittings/valves (based on Crane Company data).

Lateral loss is pressure loss along the lateral piping, measured between the first and last diffusers on the lateral.

The airflow capacity of each Magnum diffuser unit in this application is 70 (scfm)
Operating the diffuser at the high end of the flow range will result in reduced performance and increased operating pressure. Use the maximum airflow range for short term operations such as peak loads or system maintenance.

Uniformity is a quantitative measure of the variation in flow throughout the system. The diffuser with airflow furthest from the design point is used for calculation:

Uniformity (%) = 100*(1 - (Q_design - Q_diffuser) / Q_design)

Piping System Headloss Calculations

Piping Segment	Type Of Piping	Equivalent Length (ft)	Diffusers Bypassed			Design Flow (scfm)	Design Loss (inwc)		
ɔ of Drop to Coupling Cla	SS 6" Sch10	21.00	0			215.0	0.045		
Coupling Clamp to L1	SS 6" Sch10	32.52	10			215.0	0.069		
L1 to M5	SS 4" Sch10	4.03	2			107.2	0.017		
M5 to M4	SS 4" Sch10	4.03	2			85.6	0.011		
M4 to M3	SS 4" Sch10	4.03	2			64.1	0.007		
M3 to M2	SS 4" Sch10	4.03	2			42.6	0.003		
M2 to M1	SS 4" Sch10	4.03	2			21.0	0.001		

Pipe Support & Expansion/Contraction Calculations

Project Name: Jefferson, GA **Date:** 7-Jul-22
Project #: 38117
Project Type: As Specified

Temperature Conditions	
Mean Wall Temp (°F) =	141
Temp Variation (±°F) =	50

	Column 1	Column 2
Basin/Zone:	Aerobic Digester	Aerobic Digester
Segment type:	Subheader	Lateral
Connecting branch:	NPS 4" Sch10 SS	N/A SS
I. Design Criteria		
1. Piping Size:	Standard NPS 6" Sch10	Standard NPS 4" Sch10
Piping Material	SS	SS
Operating weight of pipe (lb. per ft.):	5.64	1.27
Dry weight of pipe (lb. per ft.):	9.30	5.62
2. Diffuser type:	Column 2	84P C/L (VNB)
Minimum diffuser spacing (in.):	138.00	48.31
3. Estimated operating uplift force (lb. per ft.)	6.68	2.85
Estimated construction loading (lb. per ft.): (includes diffuser and piping)	12.39	8.46
4. Design modulus at design temp (ksi):	29000.00	29000.00
5. Allowable bending stress (psi):	23800.00	23800.00
6. Overall length of piping segment analyzed for expansion and contraction (ft.):	12.50	36.72
7. Distance from floor to pipe centerline (in.):	12.00	12.00
8. Support type:	6" SS Rgd/Smpl Supt	4" SS Rgd/Smpl Supt
Anchor bolt type:	3/8" Adhesive Ancr	3/8" Adhesive Ancr
Maximum pipe support spacing (ft.):	7.00	7.00
Lateral Max. Allowable (ft) 10.00		
9. Concrete assumption (psi):	2000	2000
Minimum anchor embedment (in.):	3.375	3.375
1 1/8" - 1 1/2"		
II. Pipe Support Conditions		
1. Estimated operating uplift per support (lb.):	46.75	19.93
Estimated construction loading per support (lb.):	86.72	59.21
14" - Maximum stress per support (psi):	311.65	132.87
3. Pipe support capacity, (lb.):	1865.00	1430.00
Factor of safety provided (minimum of 5):	40	72
Factor of safety during construction (minimum of 2):	22	24
4. Anchor bolt capacity (lb.):	5852.00	5852.00
Factor of safety provided (minimum of 10):	250	587
5. Minimum distance from subheader to first pipe support on lateral (ft.):	1.14	N/A
6. Linear pivot capability of pipe support (in.):	3.11	3.11
7. Vertical pivot capability of pipe support (in.):	0.41	0.41
III. Pipe Conditions		
1. Fiber stress at maximum design span (psi):	96.76	101.81
2. Fiber stress at maximum span during construction (psi):	179.50	302.45
3. Maximum pipe deflection at design span (in.):	0.00	0.00
Maximum pipe deflection at span during construction (in.):	*0.00*	*0.00*
Allowable Deflection (in 0.50		
4. Coeffecient of Thermal Expansion (in/in °F^{-1})	9.20E-06	9.20E-06
Expansion/Contraction at design temperature variation (in.):	0	0
5. Horizontal thrust (lb.):	1	5
6. Vertical drop at design temperature variation (in.):	0.00	0.00

Notes:
1. Continuous beam analysis used on fiber stress calculations.
2. Pipe support capacity based on full scale load testing.
3. For PVC piping, allowable bending stress and modulus safety factors per recommendations of the Plastic Pipe Institute and Uni-Bell PVC Pipe Association.

rev. 6/12/15

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Storage Instructions

Receiving Inspection

R.2015-06-17

(FOB EDI only)

Inspect shipments for damage upon receipt. The recipient/receiver is responsible for all damages. EDI offers to act on behalf of the recipient / receiver in filing a claim for damage incurred during shipment. To file a claim against the freight company, a damage report must be submitted to EDI within 24 hours of delivery.

(FOB Jobsite only)

Inspect shipments for damage upon receipt. Any damages observed upon receipt must be noted with the freight company at the time of delivery and reported to EDI within 24 hours of delivery. EDI will repair or replace damaged goods when notified within this notification period.

(Ex-Works only)

Inspect shipments for damage upon receipt. The recipient/receiver is responsible for all damages. To file a claim against the freight company, file a damage report directly with the shipping company.

Note

A full inventory of shipped components shall be completed within 14 days of the receipt of shipment. Any deficiencies in the shipment that are clearly deemed to be the result of EDI will be reconciled by EDI when notified within this time period.

Pre-Installation Storage Requirements

R.2021-12-14

Pipe sections are furnished with end caps to minimize the entry of foreign materials (dirt, debris, etc.) into the pipe. Any foreign materials that are allowed to contaminate the pipe will need to be removed from the system prior to installation and start-up.

Piping Storage Requirements:

- Piping and related components are to be shaded sunlight if stored longer than 6 months.
- Store Piping on a flat surface.
- Accessories must be protected from excessive moisture and rain.
- Storage is acceptable provided the ambient air temperature is below 140°F (60°C).
- Avoid impact loads and moisture when storing below 32°F (0°C).

Diffuser Storage Requirements:

- Storage of Diffuser Membrane and related components shall be limited to one year.
- Boxes must be protected from excessive moisture and rain.
- Storage is acceptable provided the ambient air temperature is below 100°F (40°C).
- Shade or move Components indoors if the Ambient air temperature exceeds 100°F (40°C).
- Indoor storage is acceptable if the ambient air temperature does not exceed 125°F (52°C).

In accordance with the applicable pre-installation storage requirements for Piping storage and or Diffuser storage; a gray fabric tarp may be used to shade the equipment. The tarp should be suspended above the equipment, approximately 6" (150 mm).

Warning ⚠

Do not use any form of plastic to cover or shade the aeration components. Plastic can create a hotter environment and/or fuse to the surface of the equipment.

Post-Installation Storage Requirements for a Flexible Membrane System

R.2021-12-14

If the reactor is drained and the aeration system is exposed for a short period of time (less than 4 weeks), the system shall be protected from foreign objects including but not limited to paint or weld splatter, falling objects, etc.

If SDM saddle mounted diffusers are being installed during large temperature swings (20°-40°) The Wedges should be loosely installed prior to Start-Up, then fully installed per the installation instructions.

A gray fabric tarp should be suspended above the aeration system approximately 6" (150 mm) if the ambient air temperature is above 100°F (40°C).

Warning ⚠

Do not use any form of plastic to cover the aeration components. Plastic can create a hotter environment and/or fuse to the surface of the equipment.

When the ambient conditions drop below 40˚F (4˚C) plastic aeration components may become brittle, protect the system

from falling objects and other impacts by covering the system with 4 feet of clean water. If temperatures drop below 32˚F, the water must be deep enough to prevent ice from contacting the aeration system. If water must be added to the aeration basin when ice is present, ensure that no aeration components are encased in ice, before proceeding. Do not attempt to break aeration components free of any ice in the aeration basin. If the aeration system is idle for an extended period of time (greater than 4 weeks), the system should be submerged in approximately 4 feet of clean water provided the ambient air temperature is greater than 32°F (0°C).

If the ambient air temperature is below 32°F (0°C), the water level may need to be increased so that the ice layer does not contact the aeration system.

When reactivating a system where ice exists, operate the system at a minimum airflow to avoid movement of ice and maintain this airflow condition until the ice is no longer present. The water level should never be lowered if ice is present. The weight of the ice may damage the system.

Installation Instructions

Air Piping Installation

R.2015-06-17

Confirm that the air piping is clean during installation of the laterals and swab out any debris found in the pipe before installing the diffuser units.

Dirt and debris may clog the diffuser unit requiring an extended start-up procedure and MAY require the Contractor to remove and replace diffuser unit at Contractor's expense.

If piping requires further cleaning before diffuser installation, Contractor may elect to perform water flush or air purge procedures described at the conclusion of this section.

Note

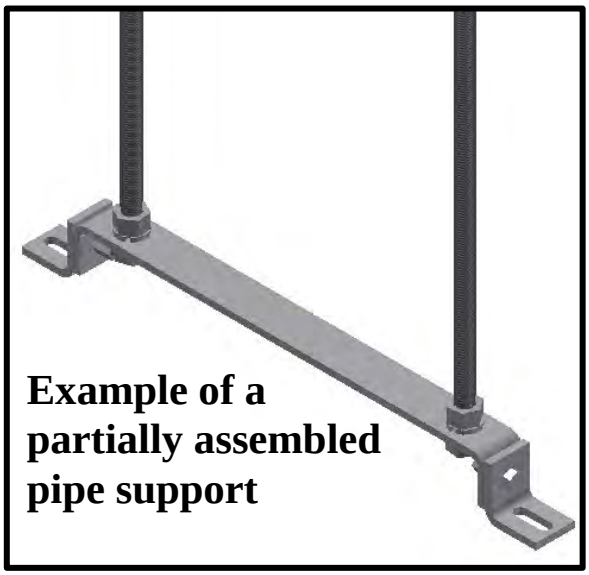
If either of these procedures are performed, do so before installing the diffusers.

Most types of plastic pipe will become brittle at temperatures below 32°F (0°C). Handle with care and avoid any impact loads to prevent damage.

Assemble the aeration piping per the EDI layout drawing. Start with the drop pipe section to ensure proper drop pipe alignment.

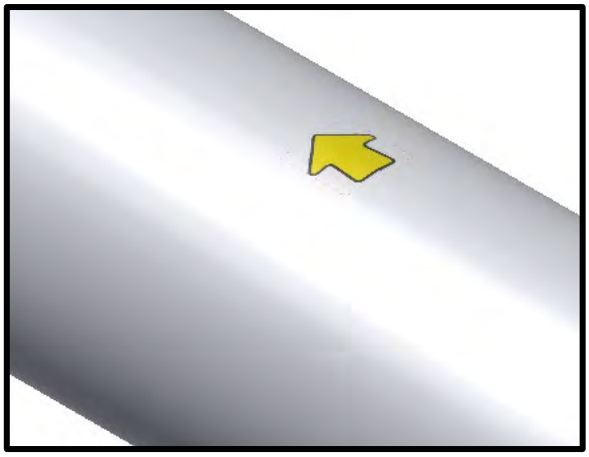
Transition from the drop pipe to the air header piping is typically made by a stainless steel coupling clamp provided by EDI and a drop stub designed to be field cut to length and solvent welded to the air header by Contractor.

Pipe supports should be partially assembled with the bottom pipe strap, then placed under the drop pipe section for support. Pipe support assembly instructions are in the following section. See the EDI layout drawing for pipe support locations. Do not install the anchor bolts until the final alignment is established for the complete aeration grid.



Example of a partially assembled pipe support

The remaining air lateral piping shall be installed using this same method. All piping segments will be labeled with a sequence number that indicates that segment's position in the lateral run. EDI provides an arrow on the lateral piping. This arrow indicates the direction of airflow in the lateral segment. All arrows should point away from the header toward the lateral end at final installation.



Installation Guide

For

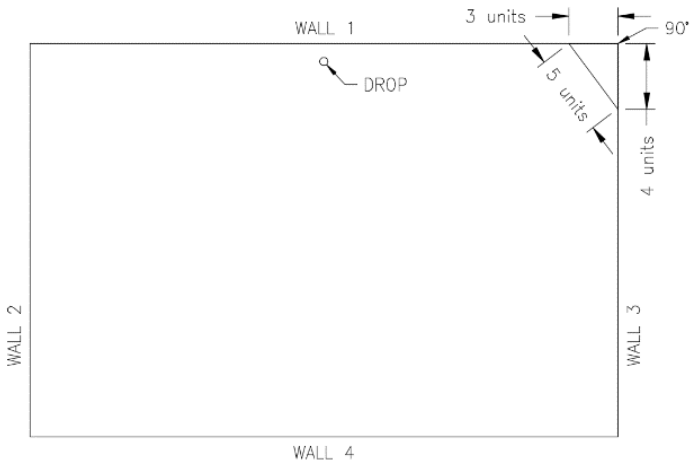
FIXED GRID SYSTEMS

This guide provides an ordered process for the installation of the aeration system. The following information references a rectangular basin that contains aeration grids composed of subheader piping laid along one wall, and lateral piping extending perpendicularly off one side of the subheader piping. The installation order outlined and techniques identified can be applied to the installation of other aeration grid configurations in basins of varying shapes.

Set base line perimeter of basin

(assume virtual vertical wall for sloped side walls)

Objective: It is ideal to define straight lines with squared corners prior to installation due to imperfections of a finished basin. The lines will run along the base of the walls, and be positioned as close to the walls as possible while remaining straight the full length of the wall. The straight lines with squared corners (referred to as base line) will make dimensions consistent during the complete installation process.



The base line should be maintained during the installation process for origin point of measurements. A marker at each end of the base line is suggested to ensure base line can be restored if lost.

1) Extend string or line laser level parallel to the base of wall 1 with drop location
   a) Move string or line laser level laterally until it touches the innermost face of the wall (if virtual vertical wall is assumed, the innermost point of the toe of the sloped wall).
   b) Set base line (secure string to floor or snap chalk line).
2) Extend string or line laser level parallel to wall 2 of the basin starting from the end of the base line set in step 1.
   a) Move string or line laser level laterally until it touches the innermost face of the wall (if virtual vertical wall is assumed, the innermost point of the toe of the sloped wall).
   b) Confirm the angle of the corner is 90° by using the 3:4:5 Triangle method[1].
   c) Set base line (secure string to floor or snap chalk line).
3) Extend string or line laser level parallel to wall 3 of the basin starting from the other end of the base line set in step
   a) Move string or line laser level laterally until it touches the innermost face of the wall (if virtual vertical wall is assumed, the innermost point of the toe of the sloped wall).
   b) Confirm the angle of the corner is 90° by using the 3:4:5 Triangle method[1].

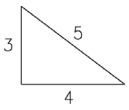
c) Set base line (secure string to floor or snap chalk line).

4) Extend string or line laser level parallel to wall 4 of the basin starting from the end of the base line set in step 2 or 3.
   a) Move string or line laser level laterally until it touches the innermost face of the wall (if virtual vertical wall is assumed, the innermost point of the toe of the sloped wall).
   b) Confirm the angle of the corner is 90° by using the 3:4:5 Triangle method[1].
   c) Set base line (secure string to floor or snap chalk line).
5) Measure the length and width of the base line perimeter (the distances should match the dimensions on the layout drawing ±6" [152mm]).

Place the drop pipes

1) Clear all dirt and debris from the air main.
   a) Aeration blowers may be used (reference blower operating requirements before proceeding for minimum back pressure requirements and proper operation).
2) Connect the drop pipes to the existing piping (refer to additional instructions and details for proper installation).
   a) Do not tighten the bolts at this time.
3) Install drop brace if required (refer to additional instructions and details for proper installation).
   a) Reference layout drawings for placement of drop brace.
   b) Do not tighten the bolts at this time.
4) Measure the drop locations from the set base lines (the distances should match the dimensions on the layout drawing ±6" [152mm]).

[1]3:4:5 Triangle method can be used with U.S. Standard or Metric units to create a 90° angle.



One unit = 1 inch or 1 foot or 1mm or 1cm or 1 meter

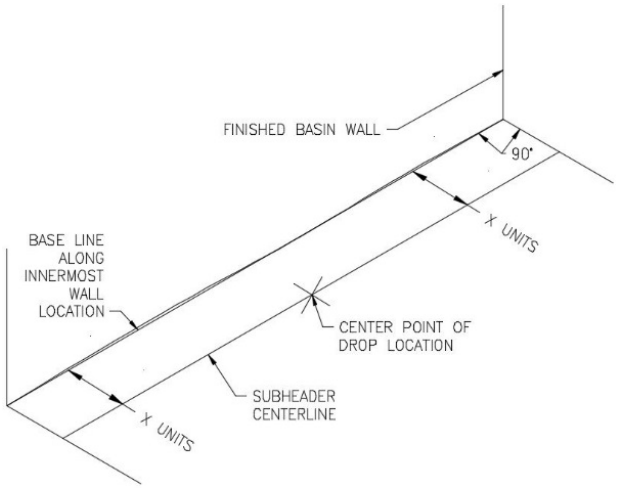
Mark 3 units from corner in one direction

Mark 4 units from corner in the other direction

Diagonal measurement between marks equals 5 units when the angle of the corner is 90°

Install subheader piping

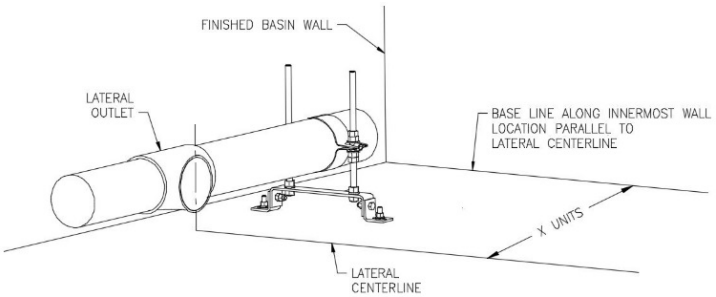
1) Mark the centerline of the subheader piping on the floor below the center point of the drop locations identified.
   a) The centerline mark will run parallel with the perimeter base line, and measure the same distance from the perimeter base line along the full length of the subheader piping.
2) Measure and mark the support locations along the centerline mark.
   a) Support location can be moved ±3" [76mm] to avoid obstructions (refer to layout drawings to determine the direction the support should move).
   b) Refer to additional instructions and details for proper placement of anchors relative to the centerline mark of the subheader piping.



3) Install anchors at marked locations (refer to additional instructions and details for proper installation).
4) Install subheader supports on anchors (refer to additional instructions and details for proper installation).
   a) Leave top strap off of support for placement of piping.
5) Place subheader piping on supports with the drop outlet aligned with the drop pipe.
   a) Contact EDI if aeration grid is closer than 6" [152mm] to basin walls or other obstructions in the basin.
6) Level subheader piping.
7) Adjust pipe elevation to the elevation identified on the layout drawings ±1/4" [6mm] horizontally.
8) Connect the drop pipe to the drop outlet on the subheader piping (refer to additional instructions and details for proper installation).
9) Tighten bolts of drop pipe connection (refer to additional instructions and details for proper installation).
10) Tighten bolts of drop brace if required (refer to additional instructions and details for proper installation).
11) Place the top strap on the support and tighten (refer to additional instructions and details for proper installation).

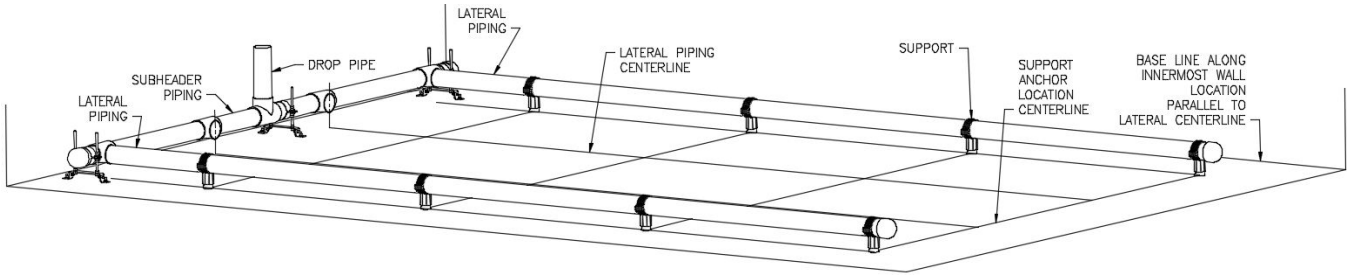
Install lateral piping

1) Measure from the centerline of the lateral outlets to the established base line parallel to the lateral piping.
2) Measure the same distance at the other end of the base line parallel to the lateral piping.
3) Mark the centerline of the lateral piping on the floor.



a) If the distance from the base line to the lateral centerline is greater than 30' [9144mm], confirm the angle of the lateral centerline and subheader centerline is 90° by using the 3:4:5 Triangle method.

4) Connect 2 identical laterals (same support spacing along the lateral piping) to opposite ends of the subheader piping (refer to additional instructions and details for proper installation).
   a) The distance between the lateral outlets used for connection should not be greater than 30' [9144mm].
   b) Do not tighten the bolts at this time.
   c) Contact EDI if aeration grid is closer than 6" [152mm] to basin walls or other obstructions in the basin.
5) Position the lateral supports along the lateral piping and mark anchor locations.
   a) Refer to the layout drawings for support locations.
   b) Support location can be moved ±3" [76mm] to avoid obstructions (support locations along the lateral piping will be identical for both laterals) (refer to layout drawings to determine the direction the support should move).



   c) Refer to additional instructions and details for proper placement of anchors relative to the centerline mark of the lateral piping.
   d) For aeration grids with dense diffuser placement along the lateral, it is suggested to install the diffusers on each side of the support location to ensure the support location is acceptable.
6) Mark the centerline of the support anchor location from one lateral to the other lateral.
   a) The centerline will run parallel to the subheader piping and perpendicular to the lateral piping creating a grid pattern on the basin floor.
   b) Refer to additional instructions and details for proper placement of anchors relative to the lateral centerline marks between the 2 laterals connected to the subheader piping.
7) Disconnect and move the 2 laterals and supports away from the lateral centerline.
8) Repeat steps 4 through 7 if necessary to mark anchor locations for lateral piping with different support locations.
9) Install anchors at marked locations (refer to additional instructions and details for proper installation).
10) Install lateral supports on anchors (refer to additional instructions and details for proper installation).
   a) Leave top strap off of support for placement of piping.
11) Place lateral piping on supports and connect to subheader piping (refer to additional instructions and details for proper installation).
12) Place the top strap on the support and tighten (refer to additional instructions and details for proper installation).

Install diffusers

1) Refer to additional instructions and details for proper installation.

Install purge assembly

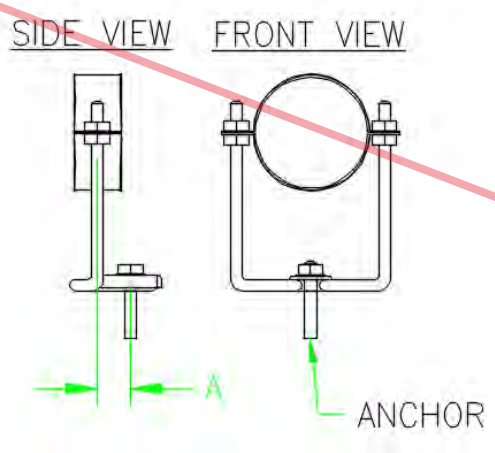
1) Refer to additional instructions and details for proper installation.

Support information

The determination of the proper support type was figured into the design of the aeration system. Use the support installation details when installing the supports and use the anchor manufacturer's instructions when installing the anchors.

There are 4 general support types:

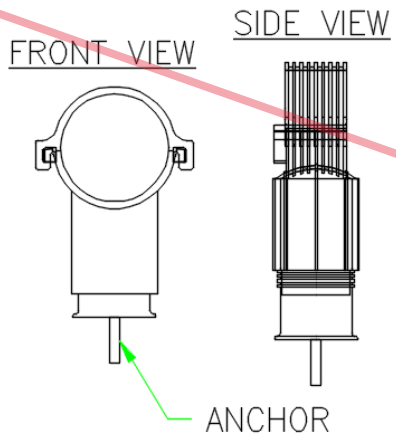
Guide Support – used on 3" & 4" aeration pipe.



ANCHOR LOCATION

PIPE SIZE	DIMENSION A	TOLERANCES
3"	7/8"	±1/8" RIGHT OR LEFT
4"	3/4"	±1/8" RIGHT OR LEFT

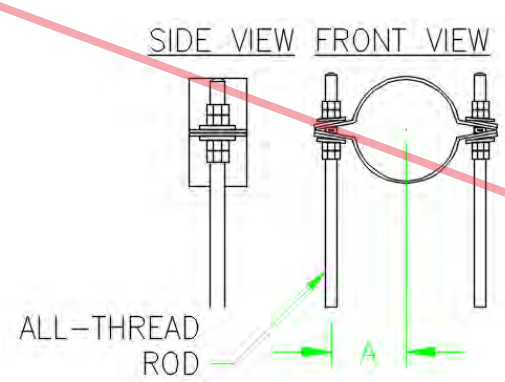
Super Strut (GFPP) – used on 3" & 4" aeration pipe.



ANCHOR LOCATION

PIPE SIZE	DIMENSION A	TOLERANCES
3"	N/A	±1/4" RIGHT OR LEFT
4"	N/A	±1/4" RIGHT OR LEFT

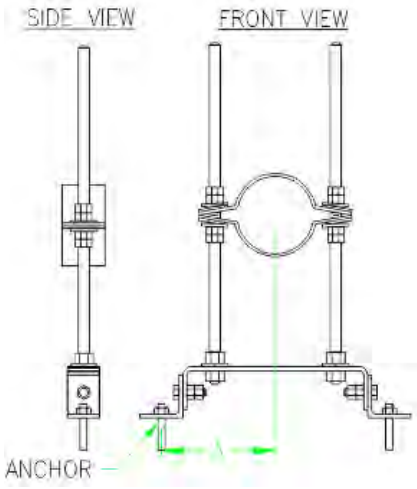
Rod-in-Floor (RIF) – used on 3" – 12+" aeration pipe.



ANCHOR LOCATION

PIPE SIZE	DIMENSION A	TOLERANCES
3"	2 3/8"	±1/8" RIGHT OR LEFT
4"	2 7/8"	±1/8" RIGHT OR LEFT
6"	4 1/8"	±1/8" RIGHT OR LEFT
8"	5 1/4"	±1/8" RIGHT OR LEFT
10"	6 1/4"	±1/8" RIGHT OR LEFT
12"	7 1/4"	±1/8" RIGHT OR LEFT

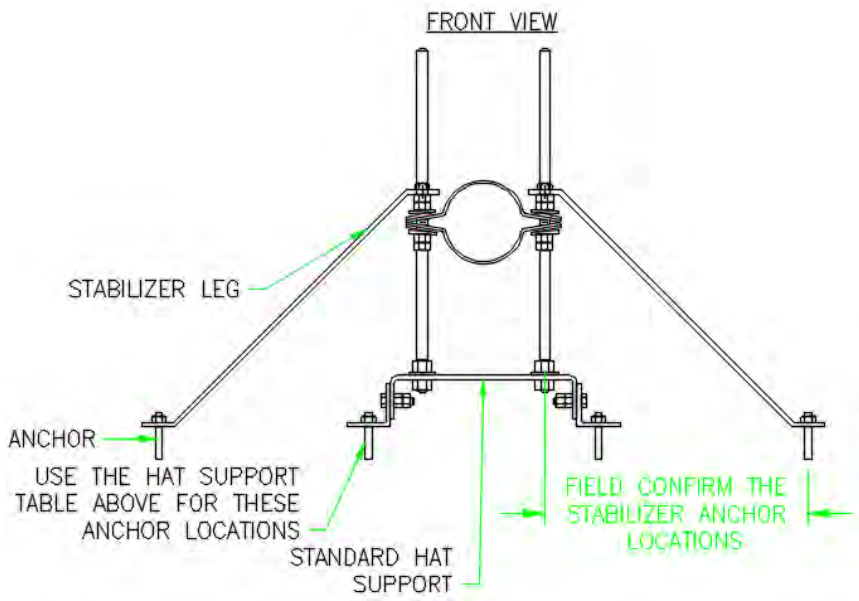
Simple – used on 3" – 12+" aeration pipe.



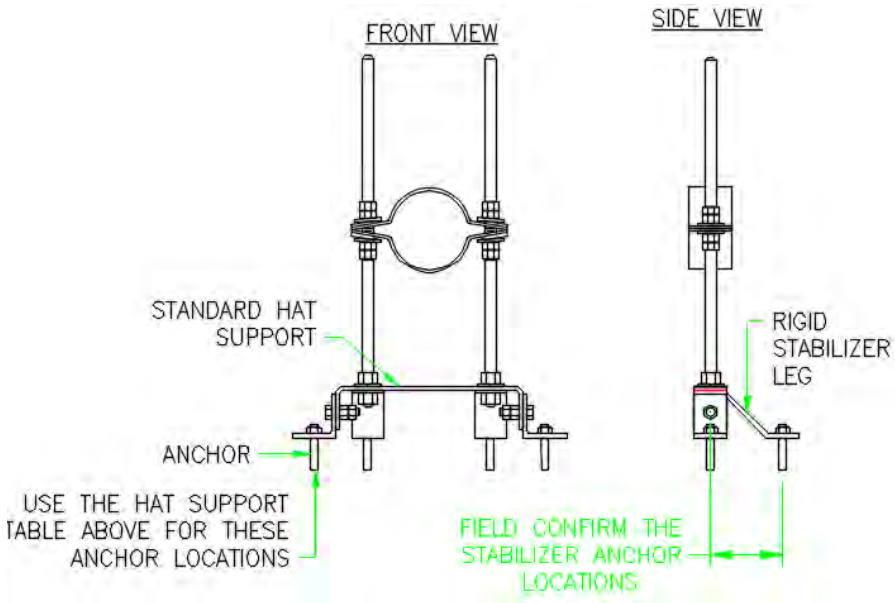
ANCHOR LOCATION

PIPE SIZE	DIMENSION A	TOLERANCES (3/8" ANCHOR)	TOLERANCES (1/2" ANCHOR)
3"	6"	±1/2" RIGHT OR LEFT	±7/16" RIGHT OR LEFT
4"	6"	±1/2" RIGHT OR LEFT	±7/16" RIGHT OR LEFT
6"	7"	±1/2" RIGHT OR LEFT	±7/16" RIGHT OR LEFT
8"	8"	±1/2" RIGHT OR LEFT	±7/16" RIGHT OR LEFT
10"	9"	±1/2" RIGHT OR LEFT	±7/16" RIGHT OR LEFT
12"	10"	±1/2" RIGHT OR LEFT	±7/16" RIGHT OR LEFT

The Guide Support, RIF Support, & Simple Support may also include one or more stabilizer legs depending on seismic calculations and basin pressure. The anchor locations of these stabilizer legs should be field verified due to the c/l of pipe elevation and concrete floor elevation. Install stabilizer legs per the provided installation details and mark and drill the locations. For embedment depth and torqueing refer to the anchor manufacturer's instructions.



All systems contain a rigid type support close to the drop location on the subheader. There is a rigid type support for the Guide Support, RIF Support, & Simple Support. The supports may vary on the attachment location of the stabilizer leg to the support. Install stabilizer legs per the provided installation details and mark and drill the locations. For embedment depth and torqueing refer to the anchor manufacturer's instructions.



Please contact EDI for any questions or issues regarding the installation of pipe supports.

Stainless Steel Coupling Clamp Installation

R.2018-05-11

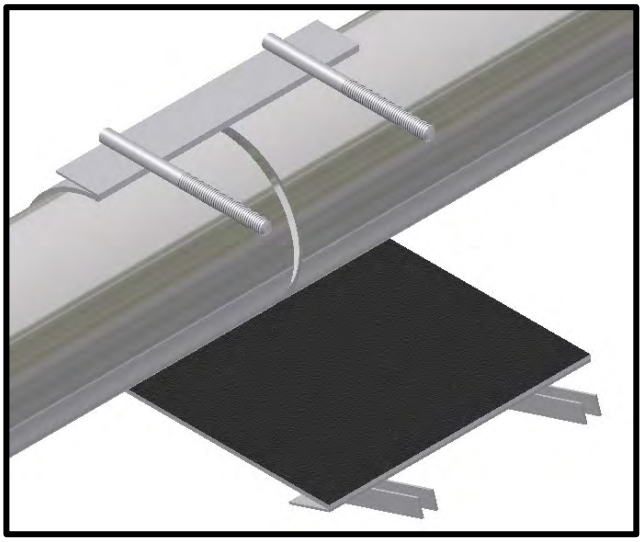
The stainless steel coupling clamp is provided by EDI to make the proper transition between two sections of pipe.

1) Ensure that both pipes are clean.
2) Center the pipes on one another.

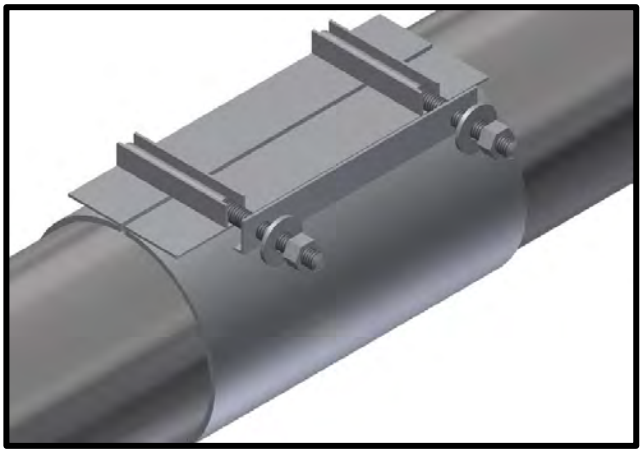
Note

*The gap between the two pipes shall be less than **0.25" (6.5 mm)** to ensure proper sealing of the coupling clamp.*

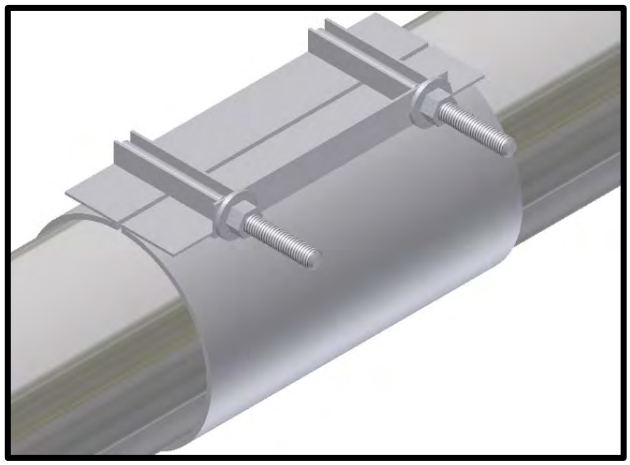
3) Place a reference mark on the both pipes at a measured distance from the center of the pipe ends.
4) Lubricate both the pipe and clamp gasket with soapy water. Do not use oil base pipe lubricant.
5) Center the clamp over the two pipes.
6) Loosen the nuts to the top of studs.



7) Wrap the clamp around the pipe snapping the washer plate over the receiver bar.



8) Squeeze the clamp together.
9) Finger tighten the nuts down.
10) Rotate clamp toward the threaded end of the studs to smooth out the gasket.



11) Torque nuts in accordance to the appropriate table below.

Imperial Pipe Chart		
Nom. Pipe Size	**Clamp Range**	**Torque**
2"	2.32" – 2.63"	70 ft-lb
3"	3.40" – 3.70"	
4"	4.45" – 4.75"	
6"	6.55" – 6.95"	
8"	8.59" – 8.99"	
10"	10.65" – 11.05"	85 ft-lb
12"	12.65" – 13.05"	
14"	13.70" – 14.10"	
16"	15.92" – 16.67"	

Metric Pipe Chart		
Nom. Pipe Size	**Clamp Range**	**Torque**
90mm	86mm – 94mm	95 N-m
110mm	105mm – 115mm	
160mm	151mm – 161mm	
200mm	195mm – 205mm	

12) Correct torque indicated by slight deformation of washer plate and nylon washers.

Flange Installation

R.2018-05-11

In-basin piping is connected with flanges and supported by partially assembled pipe supports.

Gaskets and stainless steel fasteners are provided by EDI for flanged connections. Recommended bolt-tightening torques are indicated in the torque table on the Flange Installation Detail Drawing.

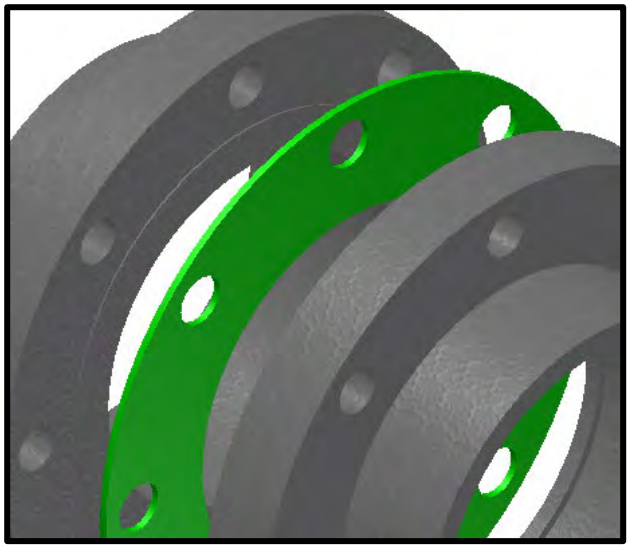
An industrial grade anti-seize lubricant **MUST** be used on stainless steel bolt threads to prevent galling. Contractor will be responsible for replacement of all damaged items resulting from not using anti-seize lubricant.

1) Lay out sections of pipe to be joined in order, ensure that the orifices are in the correct orientation to install diffusers as shown on the layout drawing.

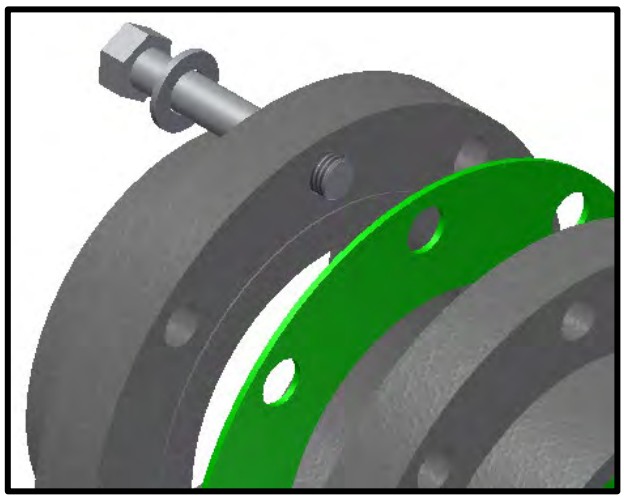
Note

EDI provides flow arrows and labels on pipe corresponding to labels on layout drawing.

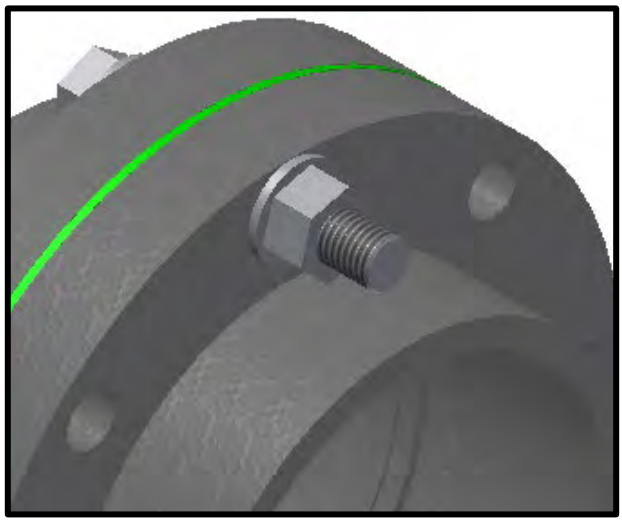
2) Rotate the loose ring of flange(s) to align the bolt holes with the gasket and the mating flange. *(This step does not apply to EDI slotted flanges)*



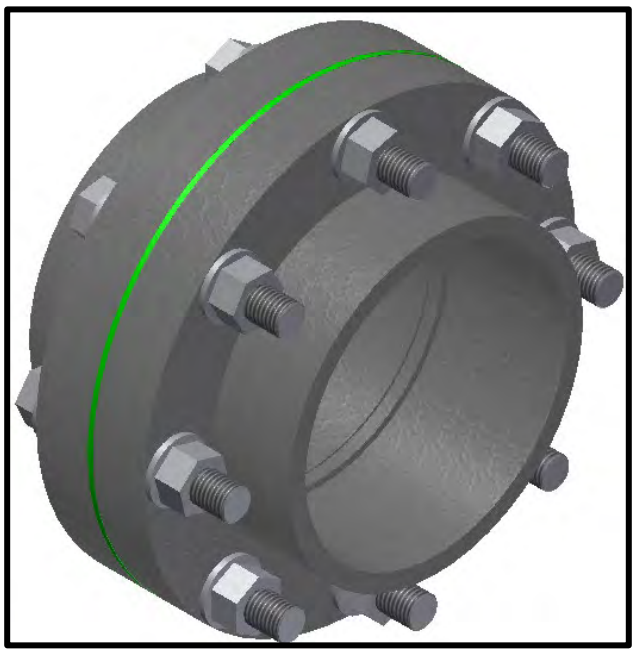
3) Insert a Stainless Steel bolt through the flange assembly in one of the bolt holes.



4) Apply anti-seize to bolt.
5) Place supplied hardware on bolt in accordance to the installation detail drawing.
6) Thread the Stainless Steel nut on the bolt. Ensure the nut **is not** tightened until remaining bolts have been installed.



7) Repeat steps 3-6 for remaining bolt holes around the flange.
8) Once all the bolts have been installed, insure that all components are properly aligned. Using the torque table on the Flange Installation Detail Drawing tighten the first pass to 30% of the value in the torque table.
9) Torque the assemblies to 60% of the value in a reverse sequence.
10) Tighten to 100% of the torque table value, using the first torque sequence. For best results insure that the torque tool used has recently been calibrated.



As piping sections are assembled, maintain correct alignment of the air outlets on the lateral so that diffusers will be level when installed.

If the specifications require the system to be pressure or leak tested, all openings are to be plugged before the system is tested. EDI recommends not exceeding 10 psi (69 kPa) during pressure or leak testing.

Pipe Support Installation Instructions

R.2020-07-16

EDI provides pipe supports to secure the aeration piping to the basin floor. EDI may provide a variety of supports depending on the application. Reference the EDI layout drawing(s) and installation detail drawings to follow the correct installation section before continuing.

Depending on project specific forces and/or turbulence anticipated in the basin, EDI may include additional support features. Please review all details shown in the EDI construction drawings to ensure all features are properly installed.

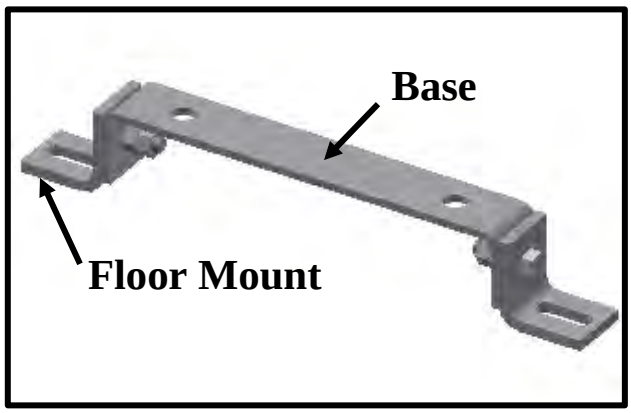
Rigid & Simple Pipe Support Installation

To maintain proper clearance for the diffuser mount, EDI recommends a minimum distance of **4" (102mm)** between any outlet hole and a pipe strap. When a support must be relocated due to the support clearance indicated, shorten rather than lengthen the support spacing.

1) See EDI layout drawing for proper pipe support spacing and locations.
2) Drill holes for the anchor as vertical as possible. To assure full holding power, do not ream the hole or allow the drill to wobble.
3) Clean the hole with a brush or air.

Skip step 4 if anchor studs are not supplied. Continue to step 5 if anchor wedges are supplied.

4) Adhere the anchor to the basin floor with Epoxy. Follow the Epoxy manufacturer's guideline.
5) Set the wedge in the hole using the anchor manufactures guidelines.
6) Attach a floor mount to the bottom of the base by using one bolt and two nuts.
7) Apply anti-seize to the bolt.
8) Insert the bolt through the **hole** in the floor mount and the base.
9) Thread both nuts onto the bolt.
10) Torque the first nut to **5 ft-lbs (6.8 N-m).**
11) Then jam the two nuts together using the required valued listed in the table below.

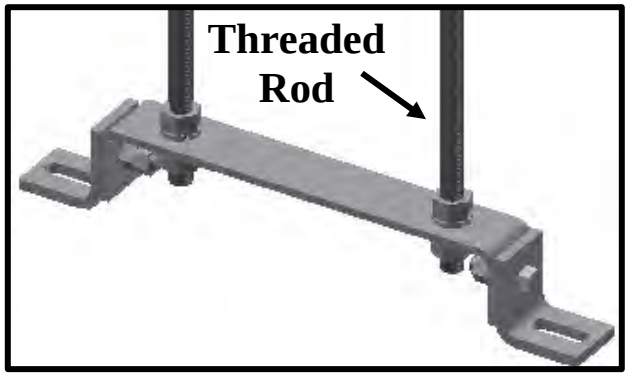


12) Repeat the steps listed above for the other end of the base and remaining supports.

Note

The foot piece should be allowed to pivot.

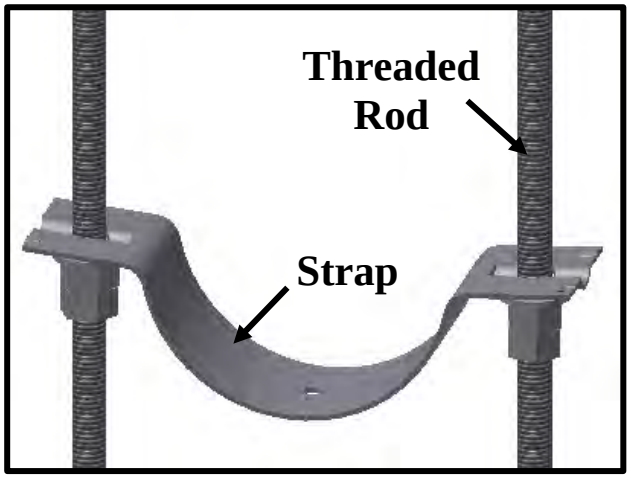
13) Apply anti-seize to the threaded rod.
14) Thread one nut approximately 1" on one end of the threaded rod.
15) Insert this assembly through one of the holes at the top of the base.
16) Thread a second nut on the threaded rod, underneath the top side of the base.
17) Torque the nuts to the required valued listed in the table below.



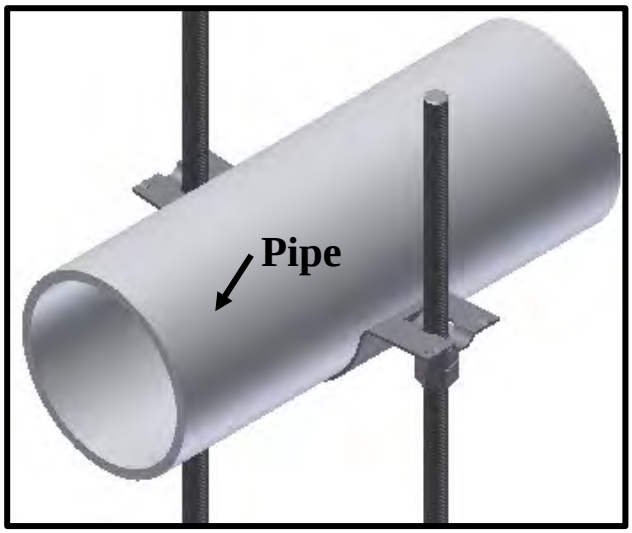
18) Repeat the steps listed above for the other end of the base and remaining supports.

Required Bolt/Nut Torque Values	
Bolt Sizes	**Torque**
3/8 in.(10 mm)	25 ft-lb (33.9 N-m)
1/2 in. (12 mm)	55 ft-lb (74.6 N-m)
5/8 in. (16 mm)	90 ft-lb (122 N-m)

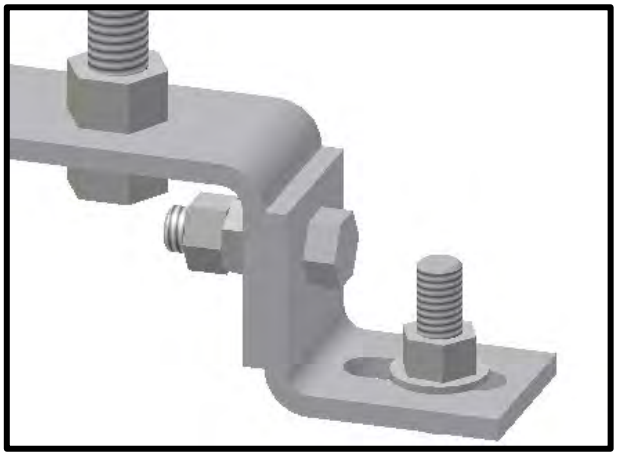
19) Apply anti-seize to the exposed ends of the threaded rod.
20) Thread two nuts on both threaded rods just below the pipe center line.
21) Place one flat washer on each threaded rod.
22) Place the bottom stainless steel pipe strap onto the threaded rods. The strap should rest on the nuts and washers placed on the rod from the previous step.



23) Place the support over the anchors.



24) Set the air piping on the bottom pipe strap.
25) Level the piping.
26) Adjust the pipe elevation by "tightening" or "loosening" the nuts that were previously installed.
27) Place the top stainless steel pipe strap onto the threaded rods around the air piping.
28) Place one flat washer on each threaded rod.
29) Loosely thread two nuts on each rod over the top pipe strap.
30) Apply anti-seize to anchor.
31) Place a flat washer over the anchor.
32) Thread a nut onto the anchor, reference the table above for the proper torque values.



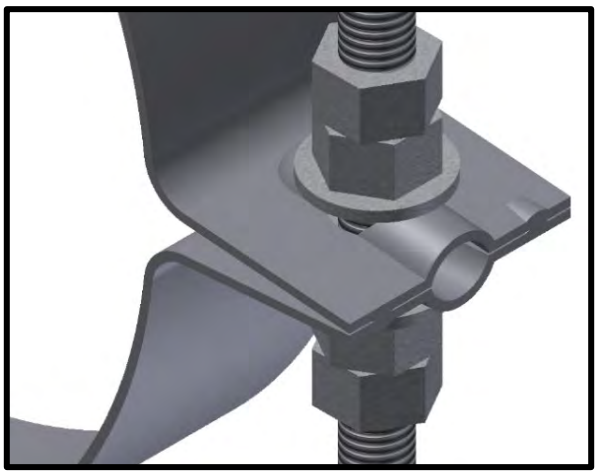
33) Equally tighten the nuts directly above and below the straps until the ends of "ears" touch.

Warning

Misalignment of the straps will hinder proper operation of the strap through the full range of motion the straps are designed to provide. It takes less than 1ft-lb (2 N-m) to reach this position.

Care should be taken to not over tighten the straps, as this can cause irreversible damage to the straps and in some instances, the pipe.

34) While securing the hex nuts that are in contact with the washers, jam the second nuts to the proper torque value indicated on the table above.
35) Continue for remaining supports.



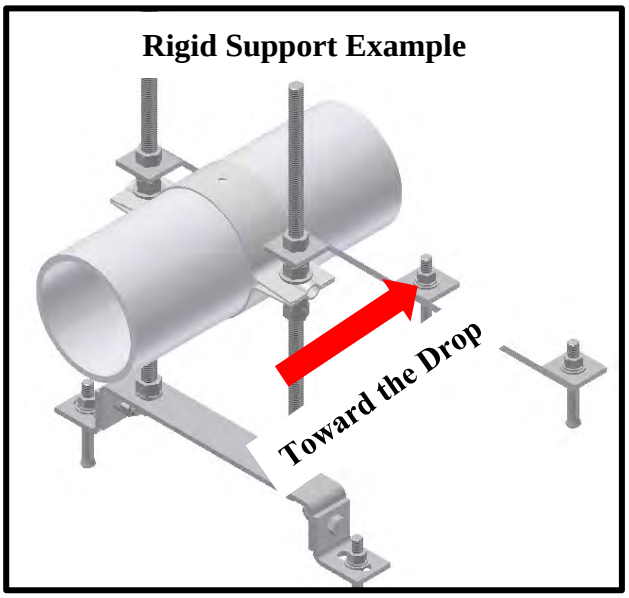
To properly install rigid stabilizers or side bracing, follow the steps below. Stabilizers can be installed above or below the pipe centerline. Check the fitment of the parts prior to installation to ensure the exact location of these stabilizers.

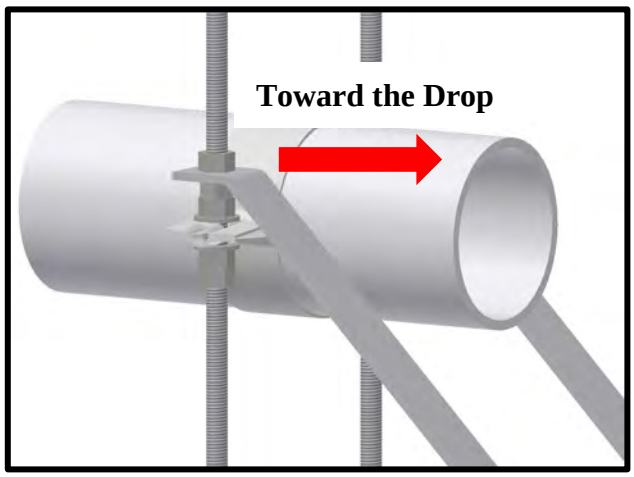
1) Place the stabilizer on the threaded rod. The stabilizer should be resting on the jam nuts.
2) Mark hole locations for anchors.
3) Install the anchor.

Note

Follow the same anchoring instructions used for the support in the instructions above.

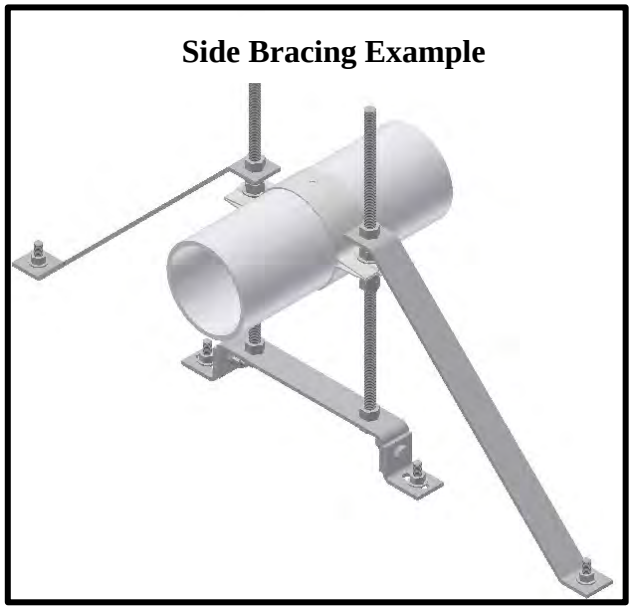
4) Thread a nut on the threaded rod.
5) While securing the hex nut below the stabilizer, jam the second nut to the proper torque value indicated on the table above.
6) Typical Hat style rigid stabilizers will be installed as depicted below.





Note

The Rigid stabilizers should be installed toward the drop pipe.



Warning ⚠

EDI recommends trimming any excess threaded rod from above the Pipe Support Assembly. At a minimum 1" (25mm) of threaded rod should be left above the top nut, not to exceed 3" (76mm). Any Project Specification, Engineer's Specification, Contract Documents, State or Local Safety Regulations, will take precedence over this supplementary guideline.

Installation Guide

For

ADHESIVE ANCHORS

The information below is intended for reference ONLY. Follow the manufacturers guidelines and installation methods when installing Adhesive Anchors. The methods and Data listed below is a synopsis of Red Head and Hilti installation instructions.

Installation Depths:

Threaded Rod Diameter		Drill Hole Diameter		Minimum Embedment Depth	
In.	(mm)	In.	(mm)	in.	(mm)
0.375	(9.5)	0.438	(11.1)	3.375	(85.7)
0.500	(12.7)	0.563	(14.3)	4.500	(114.3)
0.625	(15.9)	0.750	(19.1)	5.625	(142.9)
0.750	(19.1)	0.875	(22.2)	6.750	(171.5)

Installation Steps:

1. Drill Hole. *(Reference Table Above)*
2. Extract Debris from Hole[1]. *(Vacuum, Compressed Air [50-100psi], Etc.)*
3. Brush the Hole[2].
4. Repeat Step #2.
5. Dispense Anchor Adhesive into **60%** *(about 2/3)* of the hole depth.
6. Insert Threaded Rod.
7. Wait for the Adhesive to Cure. *(Reference Table Below)*

Curing Times:

Concrete		Adhesive		Full Cure Time
F°	(C°)	F°	(C°)	
110	(43)	110	(43)	45 Minutes
90	(32)	90	(32)	45 Minutes
70	(21)	70	(21)	45 Minutes
50	(10)	50	(10)	90 Minutes
32	(0)	32	(0)	4 Hours
14	(-10)	32	(0)	24 Hours

[1] Submerged or Damp Installations may require more cleaning. To help mitigate airborne dust, it is recommended to wet the concrete prior to using compressed air or use a drill dust extractor with the pneumatic nozzle.
[2] Submerged or Damp Installations may require more brushing.

SDM MiniPanel and Magnum Installation

R.2020-05-13

Prior to installing the diffusers and accessories, ensure that the air laterals are installed with the orifice holes in the horizontal position.

Each duplex diffuser assembly consists of:

- One "Male" Diffuser.
- One "Female" Diffuser.
- Two Wedges.
- Two O-rings.
- One alignment plug *(if provided).*

If simplex diffusers have been provided, EDI will supply a "Blank Saddle" to replace one of the diffusers. The installation of the assembly will remain the same.

Tools required for installation include:

- Non-metallic mallet (Not provided by EDI).
- Bubble/laser level (Not provided by EDI).

Due to project specific turbulences EDI may supply supplemental end supports for diffusers. For these instances the Alignment plugs will not be required at those locations. If so, please ignore the section below. Reference the Diffuser End Support detail drawing (located in the detail drawing packet) for instructions for installing the end supports.

If Alignment plugs are not required, an alignment tool (or an SDM saddle) will be needed to mark the location of the saddle for proper diffuser alignment on the orifice hole(s). Place the saddle over the orifice hole and trace along the outside of the saddle with a permanent marker.

Installation of Alignment Plug (if provided)

If Aeration equipment is supplied for multiple basins, each basin may not use the same alignment plug.
Reference the table below to determine what plugs have been supplied.

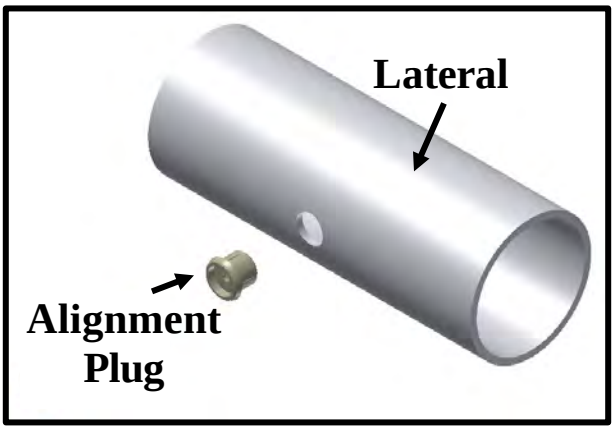
Orifice Identification	
Orifice Diameter	**Plug Color**
6.35mm (0.250")	White
7.94mm (0.312")	Purple
9.52mm (0.375")	Red
11.11mm (0.438")	Yellow
12.70mm (0.500")	Green
14.29mm (0.562")	Tan
15.88mm (0.625")	Black
17.46mm (0.688")	Orange
19.05mm (0.750")	Blue
20.64mm (0.812")	Pink

1) Locate the 1"Ø holes in the lateral(s).

Note

The alignment plugs should only be installed on one side of the lateral.

2) With the ribs facing the orifice hole, place the alignment plug on the 1"Ø hole.



3) Push the Alignment Plug into the orifice hole.

Note

A rubber mallet can be used to set the alignment plug. If used, ensure that the plug is properly seated and was not damaged. Damaged plugs will need to be replaced.

Installation of Diffuser Assemblies

Diffuser assemblies feature a red "TOP" sticker factory installed on the SDM saddle. The sticker should be facing up when properly installed.

Warning ⚠

Metal mallets or hammers may crack or shatter the wedge assembly or damage the Diffuser. Do not use metal hammers directly on plastic parts or fittings.

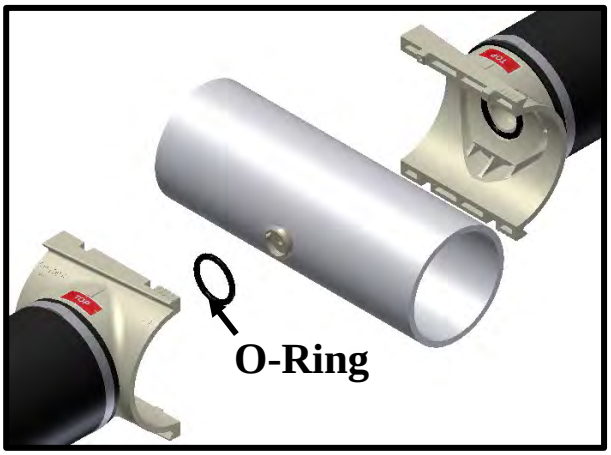
1) Place an O-ring in the Male and Female diffuser assemblies.

Note

The O-ring must be able to move to seal when pressure is applied. During cold weather installation, it is advisable to keep the O-rings warm.

2) Place the first Diffuser (Male or Female) on the side with the alignment plug.

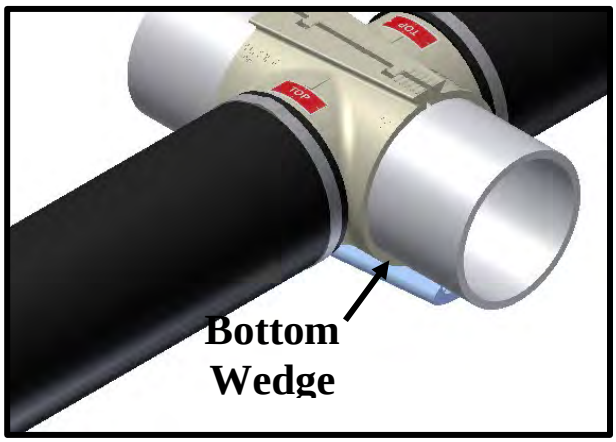
3) Place the mating Diffuser on the opposite side.



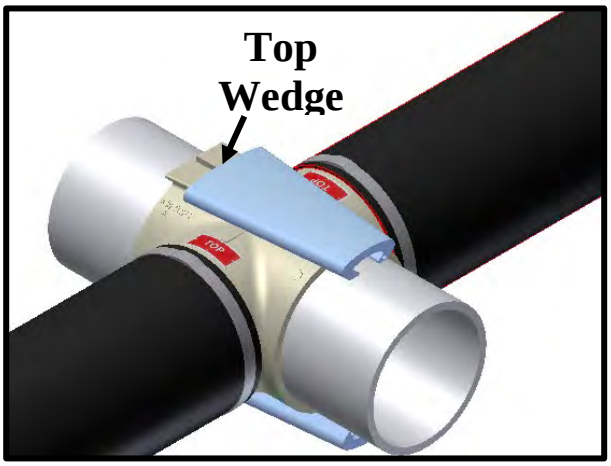
Note

Ensure that the saddles' alignment pins mate properly when installing the opposing saddle before sliding on the wedges. The red "TOP" stickers should face up.

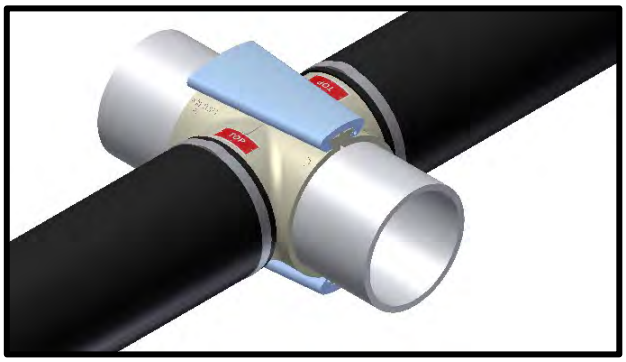
4) While holding the top connection, slide the bottom wedge on 3/4 inches from being flush.



5) Slide the top wedge 3/4 inches from being flush.



6) Using a non-metallic hammer, equally tighten the top and bottom wedge until flush.



Warning

Extra care is needed during cold weather installation, below 40°F (4°C). Plastic components become brittle and may fracture with excessive impact force.

Over-tightening wedges can cause irreversible damage to the diffuser saddle.

Note

If supplemental diffuser end supports have been provided, please reference the installation details provided in this packet and follow the proper installation instructions on the drawing.

Leveling of Diffusers

Air distribution through the aeration system is a function of the relative elevation of the individual aeration units and the leveling tolerance of the air supply piping. Excessive variation in pipe elevation (see Start-up Instructions) may result in poor air distribution during normal operation.

As a guideline, EDI recommends that aeration units be installed as level as practical, preferably no more than ±1.5°, and in any case no more than ±3°.

See the following table for equivalent distances at the tip of the diffuser for these values:

Diffuser Type	Variation at Tip of Diffuser to equal 1.5°	Variation at Tip of Diffuser to equal 3°
Magnum (std. length)	±1-1/4"	±2-1/2"
MiniPanel (std. length)	±1-1/2"	±3"
9" Disc	±1/8"	±1/4"
12" Disc	±5/32"	±5/16"

Purge Installation Instructions

R.2019-04-16

EDI will provide either a Manual or a Continuous purge to remove accumulated condensation from the EDI aeration system. Please review all details shown in the EDI construction drawings to ensure all features are properly installed.

Tools required for installation/maintenance include:

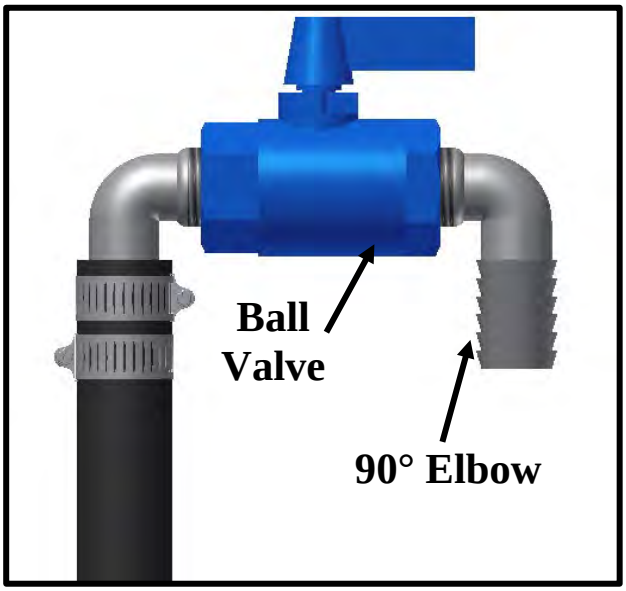
- Pipe thread sealant specifically intended for use with ABS, PVC, and CPVC (Not provided by EDI).
- Screw Driver (Not provided by EDI).
- Box Cutter/Knife (Not provided by EDI).

Warning ⚠

Avoid excessive torque on plastic threaded fittings as this may cause thread damage. If damage to the ejector pipe or factory installed threaded outlet occurs, contact Diffuser Express for replacement parts.

Manual Purge Installation Instructions

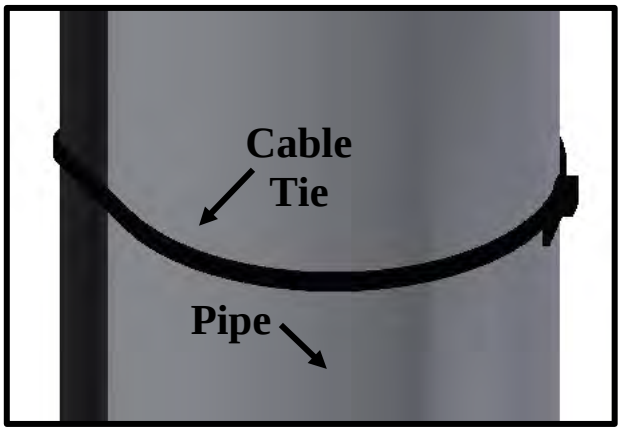
1) Apply pipe dope to MPT threads of the 90° elbows.
2) Thread the elbows in both sides of the ball valve one to two threads past hand tight.
3) Mount the valve at a desired location with PE pipe straps. (Anchorage components by others.)
4) Insert the airline (hose) on the barbed end of the inlet elbow until the airline contacts the base of the barbed fitting.
5) Secure the airline connection with two hose clamps offset at 180 degrees.



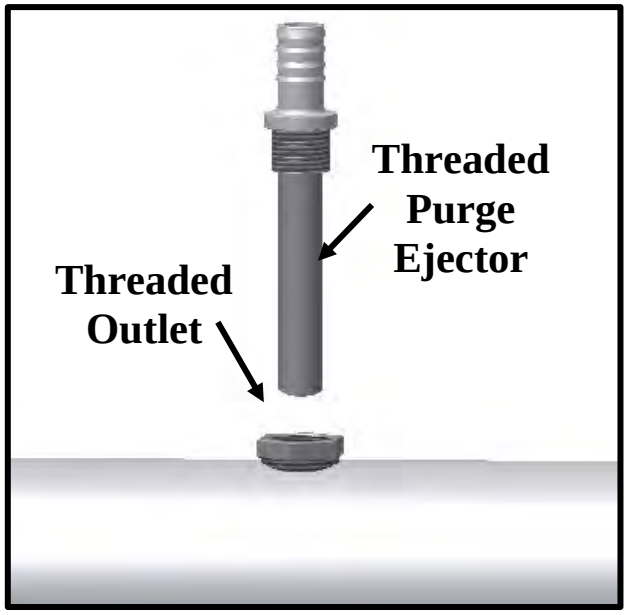
6) Extend the airline from purge valve to the header pipe with minimal bends. Do not cut the hose to final length at this time.
7) Once the orientation of the airline is confirmed, secure the airline on minimum 3-foot (1m) centers using the provided cable ties.

Note

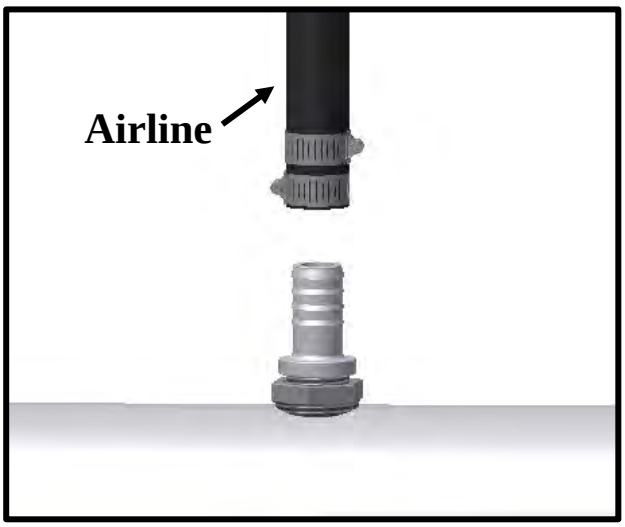
If sufficient tie off locations are not available, additional anchorage points may be required and are to be supplied by others.



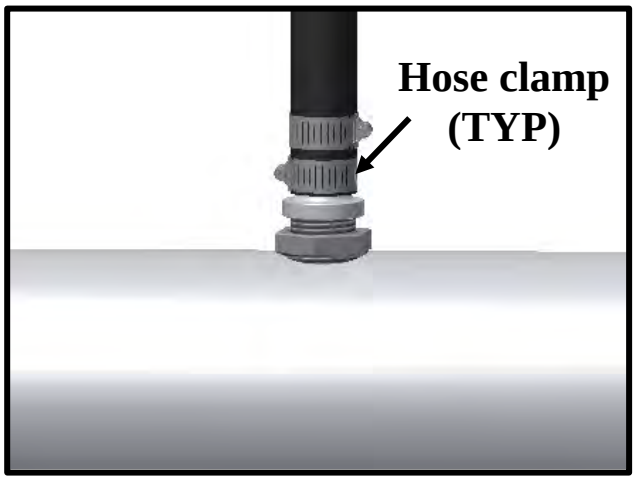
8) Apply pipe dope to the purge ejector.
9) Thread the purge ejector pipe into the factory installed threaded outlet one to two threads past hand tight.



10) Confirm the required length to secure the airline to the ejector pipe and cut the airline to final length.



11) Insert the airline onto the barbed end of purge ejector.
12) Secure the airline connection with two hose clamps offset at 180 degrees.



Start-Up Instructions

General Aeration/Mixing Systems Start-Up Instructions

R.2017-09-06

These instructions cover the general start-up requirements for the aeration system. Special start-up requirements outlined in the Engineer's specifications, contract documents, or instructions offered by EDI shall be supplementary to or take precedence over these general instructions.

General Air Piping Inspection

Contractor is to confirm the cleanliness of the air piping. If existing header piping is used, the air purge or water flush cleaning procedure is recommended prior to installation of diffuser units to remove any internal debris that may have accumulated in the header piping.

Inspect air piping and diffuser connections for loose fittings or damaged pipe. Damaged piping sections and connections should be repaired prior to commencing system operations.

Confirm that piping and diffusers are level by filling the basin with water until the diffusers are 1" to 2" under water. Diffuser elevation tolerance should be within the approved tolerance for the respective diffusers. Adjust supports as required to level the air supply piping (on which the diffusers are mounted) to within a tolerance of ±1/4".

Blower Components

See the blower installation and start-up instructions to assure all blower components are mounted properly and ready for operation. When EDI provides the blower assemblies, detailed installation and start-up instructions are provided in the blower submittal package.

Blower components should be fully installed and fully serviced prior to making final electrical connections and starting up the aeration system.

Precautions should be taken throughout system installation to minimize the discharge of airborne particles to the aeration system. As a minimum, an air inlet filter should be installed and operated during blower servicing procedures. EDI recommends a filter efficiency of 93% of 10-microns. Any solvents used to clean blower should be bypassed from the aeration piping. The discharge of airborne particulate matter or solvent into aeration piping may result in damage to diffuser membranes.

Upon completion of blower manufacturer's recommended service, the subsequent start-up procedures may be followed.

Initial System Start-Up

To start the system, completely open all valves in the air supply system, including blower shut-off valves, header valves and lateral isolation/throttling valves. This instruction assumes that uniform water level is present in all aerated basins served by a common blower. If varying water levels are present, basins with lower water levels will need to have the valve to that basin throttled back to avoid improper air distribution. Failure to completely open all valves may result in over-pressuring blower unit, release of pressure relief valve, motor overload, or poor air distribution in aeration system with the potential of exceeding airflow capacity to diffuser units and damaging the diffuser membranes.

Once valve positions have been confirmed, the blower unit may be started. EDI does not recommend starting multiple blower units at initial system start-up. Subsequent blowers should be brought on-line after the system has equalized and uniform diffuser activity is observed throughout the system.

Use the blower manufacturer's recommended start-up procedures. EDI recommends that initial pressure surge be reduced through PRV or blow-off valve.

Start-up procedures should follow the basic guidelines as listed below:

- When starting initial blower, the PRV or blow-off valve should be used to reduce the start-up pressure surge. This is accomplished by removing weights and the cap from the PRV or by opening the blow-off valve.
- When the basin has been filled, note the operating pressure at the blowers. The pressure relief valve should be adjusted to free-flow at approximately 1 psig above the normal operating pressure of the system.
- To confirm the PRV operates, partially close blower shut-off valve until PRV releases air. Reopen the shut-off valve to confirm that PRV will reseat. If

required, readjust the PRV to the recommended setting per instructions in the Blower IOM manual.

- To properly assess the airflow distribution on the aeration system, the blower system must be operating at the design operating point. On dual blower systems, design airflow is typically achieved by operating one blower at 100%. On three-blower systems, design airflow is typically based on operating two blowers at 100%.
- Airflow distribution adjustment between aeration grids should not be conducted until the full operating depth is obtained and the blower system has been in operation for several days. Small adjustments may be made to the isolation/throttling valves on the laterals receiving the most air. System balancing should be completed on an incremental basis. Changes in airflow distribution may require 2-8 hours to fully stabilize when fine-tuning a system. In addition, in situations where multiple basins are employed and varying water levels exist, adjustments of lateral valves will be required to maintain air distribution in the tanks.

EDI recommends that the system Operator contact EDI at 573-474-9456 prior to making any adjustments to the airflow distribution.

Active Aeration Inspection

With the blower system active, operate the aeration system at 50% design air capacity. At this setting, check piping and diffusers for obvious leaks, and repair as required. Open any manual purge valves to expel water that may be in the piping. Close the purge valves once all water has been expelled.

Note

It is typical for Polyurethane (PU) membranes to leak at the stainless-steel clamp location. Once hydrated, the leaks will disappear.

Check for minor leaks by completing the following steps:

- Turn the airflow down to very minimal release. If the system employs separate drop valves, each grid can be checked separately by throttling the valve one at a time. Again, take care not to exceed airflow capacities in neighboring aeration grids when reducing airflow by this method.
- The airflow will not be uniform at this low level. This is acceptable, as this test is only used to check for small leaks that are not visible with the design amount of airflow. Check for any observed leaks and repair as required.

Leaks commonly occur due to:

- Missing or misaligned O-ring
- Torn membranes
- Loose disc retainer ring

Optional Water Flush and Air Purge Cleaning of Piping

R.2015-06-17

These instructions cover the general procedure that may be used to clean the piping in a fine or medium bubble diffuser system prior to diffuser installation. Special pipe cleaning requirements outlined in the Engineer's specifications, contract documents, or instructions offered by EDI shall be supplementary to or take precedence over the general instructions outlined below.

If both water flush and air purge cleaning are used, the water flush procedure should be implemented first.

Water Flush Cleaning

To water-flush the system, connect a water supply to the air header or make individual connections to each lateral. If flush water is piped to the header, it is imperative that the header be valved or stubbed such that water does not flood the blowers.

Clean water must be used. It is not necessary to use potable water, but the flush water must be free of silt or debris.

Flush header assembly prior to water flushing the laterals. To flush the header, fill it with water and open the end lateral to create a flush velocity in the header of at least two feet per second.

The laterals are to be individually flushed at a recommended velocity of five to six feet per second. This is done by sequentially opening and closing the isolation valves on the individual laterals.

Opening one isolation valve will produce a significant flushing action in the lateral as water is pumped through the header. One or two drilled air outlet holes should be uncapped to allow water and debris to be flushed out of the piping.

As an alternative to using the main header/lateral flush procedure, the individual laterals may be cleaned independently of the main header. For this operation, the laterals are disconnected from the main header and cleaned individually.

Air Purge Cleaning

Remove weights and cap from the pressure relief valve during initial start-up of the system. This prevents potential damage to the blowers from blocked valves or obstructions in piping system. Cap and weights can be added back to the pressure relief valve as necessary to provide proper operating pressure capability.

Note

When a blow-off valve is provided for the blower system, it may be operated in lieu of using the pressure relief valve procedure listed above.

Open all lateral valves prior to start-up of the blowers. Provide an opening at the end of the air laterals to allow air and foreign materials to be discharged from the system. The opening may be made at the end of the air lateral by leaving the end cap off of the lateral or by removing two orifice/outlet plugs at the end of the lateral.

In order to increase the velocity of air through the header and air laterals, it may be desirable to operate at maximum blower capacity. In addition, it may be necessary to close some of the lateral throttling valves to achieve a high velocity through the balance of the laterals that are open to the atmosphere. A high velocity is required in order to blow out any accumulated foreign materials.

As laterals are consecutively cleaned, the isolation valves are operated in a manner that allows the remaining laterals to be cleaned by an air purge.

Upon completion of the air purge, the blowers are shut down and the laterals are capped. Diffuser units are installed on the laterals and all isolation valves are opened prior to filling the basin with water.

If only an air purge is used to clean the piping, the basins are now ready to be filled with water to check the operation of the diffuser units

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Safety Considerations

General Safety Considerations

R.2015-06-17

The diffused aeration system supplied on this project has no moving parts and poses little to no risk of injury. However, routine maintenance may expose personnel to potential hazards. EDI has listed below potential hazards and recommended precautions when maintenance procedures are required for the aeration components.

Tank Hazards (at full liquid depth):

- *Turbulent liquid action.*

Precautions:

- *Provide access to emergency throw rope or life ring.*
- *Use buddy system and follow standard safety procedures.*

Tank Hazards (empty):

- *Falling into tank.*
- *Objects falling onto personnel in the tank.*
- *Slippery basin floor.*

Precautions:

- *Avoid access ways without railings.*
- *Provide emergency exit/access.*
- *Appropriate personal safety equipment*

Personal Protection Measures

Wastewater has a potential for health hazards because it may carry disease producing organisms and a variety of chemical wastes. It is important to employ good personal hygiene practices to prevent oral and skin contact with wastewater.

The following is a list of methods to prevent direct contact entry of pathogenic organisms:

- Wash hands frequently with soap and water after contacting wastewater, visiting restrooms, before eating, drinking, or smoking; and at the end of jobsite visit. When soap and water are not available use anti-bacterial hand wash specifically formulated for use when soap and water is not convenient.
- Promptly treat cuts and abrasions using appropriate first aid measures.
- Handle sharp items with extra care to prevent accidental injuries.
- Clean contaminated tools after use.
- Follow good common sense and exercise extra caution whenever there is contact with contaminated water or sludge.
- Never touch face, mouth, eyes, ears, or nose while working with wastewater or sludge.

Personal Protective Equipment

Wear heavy-duty gloves (or double gloving) and boots that are waterproof and puncture resistant. When practical, use thin disposable latex gloves for light work. Use reinforced rubber gloves for heavy activities.

Discard gloves that become torn and try not to submerge hand below top of glove during service activities. When it is not feasible to use gloves while installing or inspecting equipment, make sure to follow personal hygiene practice listed above.

Wear goggles in the presence of heavy aerosols, dust, or when splashing of wastewater might occur.

Wear protective clothing; if possible, shower and change clothes before leaving plant site. If work clothes are washed at home, separate from the family wash and use chlorine bleach.

Confined Space Hazard

Verify the designation of the tank before entering. Wastewater tanks or basins can be considered confined spaces and contain potential hazards. Flammable, explosive, toxic, or other hazardous substances or the absence of sufficient oxygen could cause injury, acute illness, disability, or death.

Particular care should be exercised to assure NO hydrogen sulfide, chlorine or other heavier than air gases have accumulated in the basins or tanks. DO NOT ENTER ANY CONFINED SPACE until your supervisor has verified that proper safety precautions have been met. Do not enter a confined space without someone else present on the outside and do not enter a confined space without proper rescue equipment outside the confined space. Every confined space entry has a unique set of hazards, but atmospheric monitoring and proper entrance procedures can minimize the hazards entry personnel typically encounter.

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Operation Instructions

Description of the Aeration-Mixing System

R.2017-08-22

The aeration-mixing system employs a main air header and valved lateral piping system to distribute air throughout the basin. EDI normally designs the aeration system piping to provide uniform air distribution without adjustment to the isolation/throttling valves on the laterals. However, these valves are typically provided for direct control of airflow distribution on large aeration systems or for process control. If process demands dictate a revised airflow distribution pattern, contact EDI for guidance on modification to the system.

Normal Operation of the Aeration System

The following procedures should be followed on a regular basis to assure consistent and satisfactory performance of the aeration-mixing system.

The air rate to the system may be adjusted to maintain the desired dissolved oxygen levels in the basin. When adjusting the airflow rate, the diffusers should be operated within the normal operating range of the diffuser. Excessive airflow rates will result in high pressure drops across the diffuser and reduced oxygen transfer performance. Low airflow rates may result in incomplete utilization of the diffuser membrane and reduced air distribution.

The aeration-mixing system is designed to provide uniform aeration. Positive dissolved oxygen concentrations should be present throughout the entire system during normal operation.

A dissolved oxygen profile analysis may be used to confirm the performance of the aeration system. Typically, the dissolved oxygen levels are measured at the inlet, the outlet, and the midpoint locations of each basin to determine the aeration system performance. In regulating the system airflow to control dissolved oxygen levels, the diffuser units should be operated within their minimum and maximum airflow limits.

In applications where water level variations may exist between aeration basins supplied by a single blower, the isolation valves may need to be adjusted to maintain adequate airflow distribution. This normally requires valving back the air to the basin with the reduced water level.

Note

It is important to confirm the operating airflow range of the diffuser units before valving back any isolation valve. Damage could result to the aeration diffuser if airflow is above the recommendations noted in the Product Specification Sheet. Please consult EDI to confirm operating procedure before adjusting any aeration isolation/throttling valve.

Normal Operation of the Blower System

The Aeration-Mixing System normally utilizes a centrifugal or positive displacement (PD) blower system consisting of one or more blower units for normal operation plus one on-line spare unit. All blower units including the spare unit must be operated on a regular basis to maintain their proper working condition. EDI recommends that blower units be operated sequentially with idle blower units brought on-line weekly. EDI does not recommend the simultaneous operation of on-line and spare blowers for an extended period. This operating condition may deliver airflows exceeding the air capacity of the diffuser units.

All blower components should be serviced on a regular basis. For additional information concerning proper blower operation, service requirements or service intervals, reference the Blower Operation and Maintenance manual.

Shutdown Conditions

If air service is interrupted at any time, it should be restored as soon as possible. When restarting positive displacement blower units, the start-up pressure surge should be reduced by down-weighting the pressure relief valve (PRV) or operating the blow-off valve. Once the blower is operational, reset the PRV or slowly close the blow-off valve over a five- to ten-minute period. The PRV must be set properly to prevent overloading of the blower system. Operate manual water purge devices if provided. If the PRV releases air for an extended period, the relief setting should be checked.

Normal Operation of the Diffuser Unit

The diffuser unit has no moving parts and requires very little maintenance for long-term operation. EDI recommends that the air supply to the diffusers be operated within the ranges noted in the Product Specification Sheet to provide optimum operating characteristics of the diffuser assembly.

For Fine Bubble Diffusers; application of high airflows, greater than denoted for normal operation, may result in physical damage to the diffuser membrane.

Note

Use caution when adjusting several lateral throttling valves in the same piping system. This procedure can result in elevated airflows

in sections of the basin, exceeding the maximum allowable airflow to each diffuser unit.

Normal Operation of the Purge Assembly

Condensation will accumulate in the subheader and lateral piping due to the cooling of the air when it reaches the aeration system. EDI has provided a purge assembly to remove this accumulation from the pipe while the system is in operation. If a manual purge assembly has been provided, open the ball valve at the top of the purge assembly on a monthly basis. Allow the water to exit through the valve until only air remains. Close the ball valve once the purging process has been complete

Preventive Maintenance

Maintenance Schedule

R.2015-06-17

In order to be covered by the manufacturer's warranty the FlexAir aeration system must be maintained. EDI recommends to visually inspect the overall system and clean the membranes to remove any accumulated foulants on an annual basis. This activity is beneficial to the Owner, as a reduction in the uniformity of air release or an increase in backpressure will impact the power use. The FlexAir aeration system is designed to allow the system to be accessed by dropping the water level in the basin being serviced.

Note

To prevent solids from entering the system, it is important to keep the air flowing through the system until the water level has dropped below the lateral piping.

The air to the basin being serviced should be turned off after the water has dropped below the lateral piping and diffusers to prevent the possibility of excessive airflows to the units or damage to the blower unit.

The following items may be helpful in servicing the FlexAir aeration system during periodic inspections or maintenance procedures:

- Protective gloves and clothing
- Long-handled soft bristle brush for cleaning assembly for observation
- Spare FlexAir membranes

All system components should be inspected for general wear or damage. This includes but is not limited to:

- Pipe supports including anchor bolts, pipe straps and fasteners.
- Pipe connection including fasteners, shifts in alignment of pipes and joints.
- Diffuser assembly including position, membrane integrity, membrane clamps / retainer ring, etc.
- Purge assembly components including all connections, anchor points, and wear at any contact points.
- Any worn or damaged components need to be repaired or replaced. Please contact EDI for assistance in identifying a root cause and solution.

In Situ Acid Cleaning

When standard cleaning methods do not produce desired results, inorganic scaling may be present and may require an alternate cleaning technique. Inorganic scaling is a granular mineral-like precipitate that can form on the membrane surface.

Warning

Read all applicable SDS (Safety Data Sheets) carefully and follow all instructions given therein. Always have new users familiarize themselves with the SDS before handling chemicals. Wear personal protective equipment (including, but not limited to, rubber gloves, safety goggles, and other protective clothing) as required.

The foulant adhered to a membrane can be tested with a solution of muriatic acid (20° Baume Hydrochloric Acid, 31.45% by weight HCl) for reactivity. This may indicate the nature of the foulant and its propensity for chemical cleaning. Ensure that the air supply has been turned off from the diffusers being serviced. Afterwards, place a small amount of acid on the surface of the membrane where fouling is most prevalent. If the foulant is reactive to acid, this is indicative of inorganic fouling, such as calcium deposits, and acid cleaning is recommended. Otherwise, the foulant is typically organic and acid cleaning may not prove effective.

If it is determined that the foulant does respond to acid, the membrane may be cleaned with acid in addition to manual cleaning. This technique involves applying Muriatic Acid directly to the membrane surface after the manual cleaning procedure followed by rinsing with a low-pressure hose. In the case of ceramic diffusers, the acid is typically applied both on the surface and pumped through the diffuser using air.

Note

EDI can provide an acid injection system, upon request, for cleaning aeration systems without process interruptions. Contact EDI for more information.

Membrane Protection

The diffuser membranes should be protected from chemicals that may be harmful to the material. If using a cleaning aid or other substance on or around the membranes, please contact EDI for chemical compatibility.

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Corrective Maintenance

Troubleshooting

R.2015-06-17

The FlexAir aeration system requires very little maintenance for long-term operation. Periodic visual inspection of the system should allow the Operator to determine if the system is performing at optimum levels.

Operating airflows below the design condition will also reduce the uniformity of air distribution. If operating conditions warrant airflow rates below the design condition, contact EDI for additional operational guidelines.

Below are symptoms and procedures to follow if inspection of the aeration system reveals abnormal operating characteristics:

Large volume of air in localized area	
Possible Cause	**Procedure**
Air leak in aeration piping.	Access area in question. Inspect joints for evidence of breakage.
Diffuser membrane damaged or missing.	Inspect diffuser units for membrane damage. Repair as required.

Decreased diffuser activity and increased back pressure noted at blower	
Possible Cause	**Procedure**
Diffusers becoming fouled or deformed.	Access diffusers and inspect for external or internal fouling or deformation.
Reduced blower discharge air volume.	Confirm blower operating point and rpm reading.
Restriction in air header.	Confirm isolation valve position on header and drops.

Dissolved oxygen profile not satisfactory throughout basin	
Possible Cause	**Procedure**
Increased loading to system.	Confirm loading to system.
Reduced blower discharge air volume.	Confirm blower operations.
Improper distribution of air in system.	Inspect piping for leaks, both in-basin piping and out of basin piping leading from the blower system.
Air leak in system.	
Excessive foulant accumulated on diffuser.	Access diffusers and inspect for external fouling.

Replacing Diffuser Assembly

R.2015-12-15

If routine inspections reveal the need to replace a diffuser assembly, revert back to the installation instructions for the removal and reinstallation of components. Any parts damaged during removal should be replaced.

Questions regarding the aeration-mixing system operation, maintenance, etc. should be forwarded to Environmental Dynamics International, 5601 Paris Road, Columbia, Missouri 65202. +1(573)474-9456.

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ITEM	TYPE	DETAIL
DIFFUSER	FLEXAIR 84P-4 MAGNUM	128093
PURGE	MANUAL	162689
TRANSITION CONNECTION	COUPLING CLAMP	25945
LATERAL CONNECTOR	15# S.S. FLANGE	113883
DROP BRACE	SIMPLE SUPPORT	143312
SUBHEADER SUPPORT	RIGID/SIMPLE SUPPORT	143301/143312
LATERAL SUPPORT	SIMPLE SUPPORT	143312
END CAP	REMOVABLE	30194

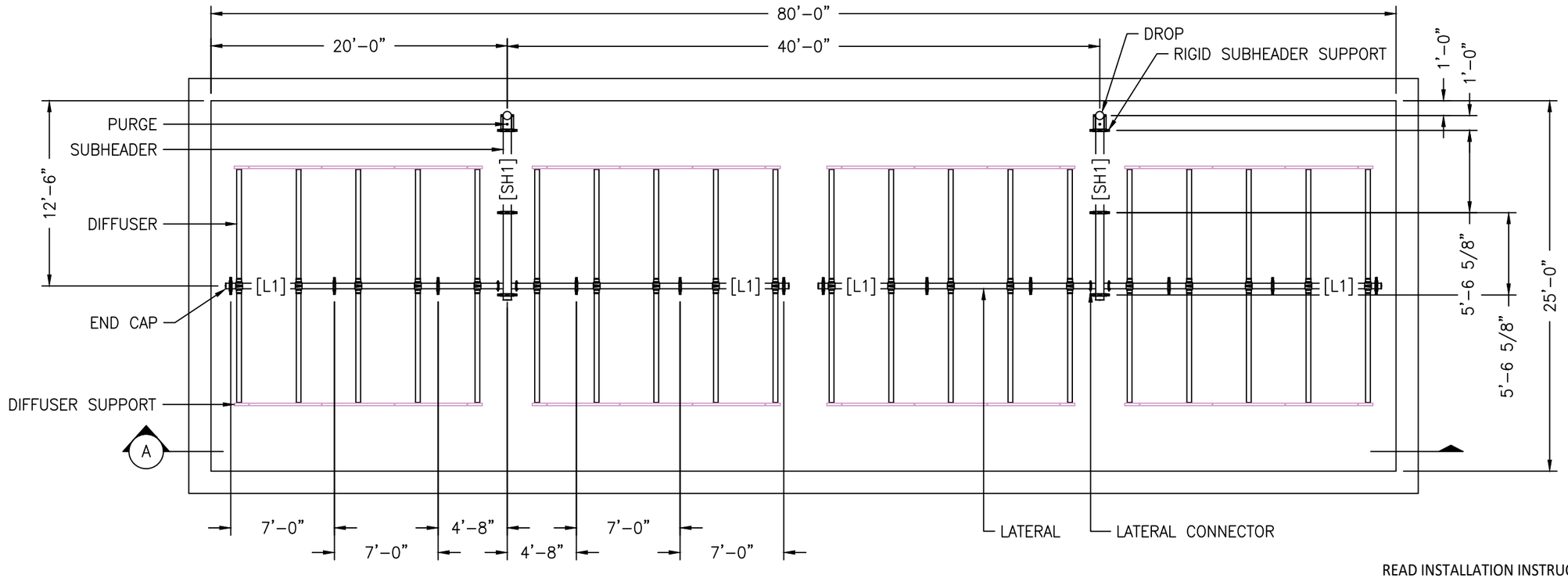
ITEM	MATERIAL
TOP OF DROP	6" 150# FLANGE
DROP	6" SCH10 304L S.S.
SUBHEADER	6" SCH10 304L S.S.
LATERAL	4" SCH10 304L S.S.
SUPPORT	304 S.S.
ANCHOR	3/8" 304 S.S.

	# OF DIFFUSERS
TOTAL	20

REVISION HISTORY

REV	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	7/8/22	TEM

Contractor note modified diffuser layout



GENERAL NOTES:
1. LIQUID DEPTH IS 21.5 FT.
   DIFFUSER DEPTH IS 20.5 FT.

2. 1 OF 1 BASINS SHOWN.

SUPPORT INSTALLATION NOTES:
1. PIPE SUPPORTS SHOULD BE PLACED AS SHOWN.
2. SUPPORT DIMENSIONS SHOWN FOR REFERENCE. FIELD CONFIRM PRIOR TO DRILLING ANCHORS. TOLERANCE: ±3"
3. FOR MAXIMUM PIPE SUPPORT SPACING REFERENCE PIPE SUPPORT SCHEDULE.
4. CANTILEVERED DIFFUSERS ALLOWED ONLY AS SHOWN ON PROJECT PLAN DRAWINGS.

PIPE SUPPORT SCHEDULE		
LOCATION	TYPE	MAX. DIST. BETWEEN SUPPORTS
SUBHEADER	RIGID	PLACE NEXT TO DROP AS SHOWN STABILIZERS POINTED TOWARD DROP
SUBHEADER	SIMPLE	7'-0"
LATERAL	SIMPLE	7'-0"

READ INSTALLATION INSTRUCTIONS PRIOR TO INSTALLING SYSTEM

NOTE: CONTRACTOR TO CONFIRM EDI LAYOUT IS SUITABLE FOR INSTALLATION AND WILL NOT CONFLICT WITH OTHER PROCESS PIPING AND/OR STRUCTURAL COMPONENTS.

PROJECT NAME: JEFFERSON, GA

PROJECT DESCRIPTION: AEROBIC DIGESTER - LAYOUT

EDI FLEXAIR® AERATION-MIXING SYSTEM

FOR:	BY:	DATE:	SCALE:
TEM	KPR	7/7/2022	1/8"=1'-0"

Environmental Dynamics International, A Nexom Brand
wastewater.com
P: +1 573 474 9456
F: +1 573 474 6988
5601 Paris Road
Columbia, MO 65202

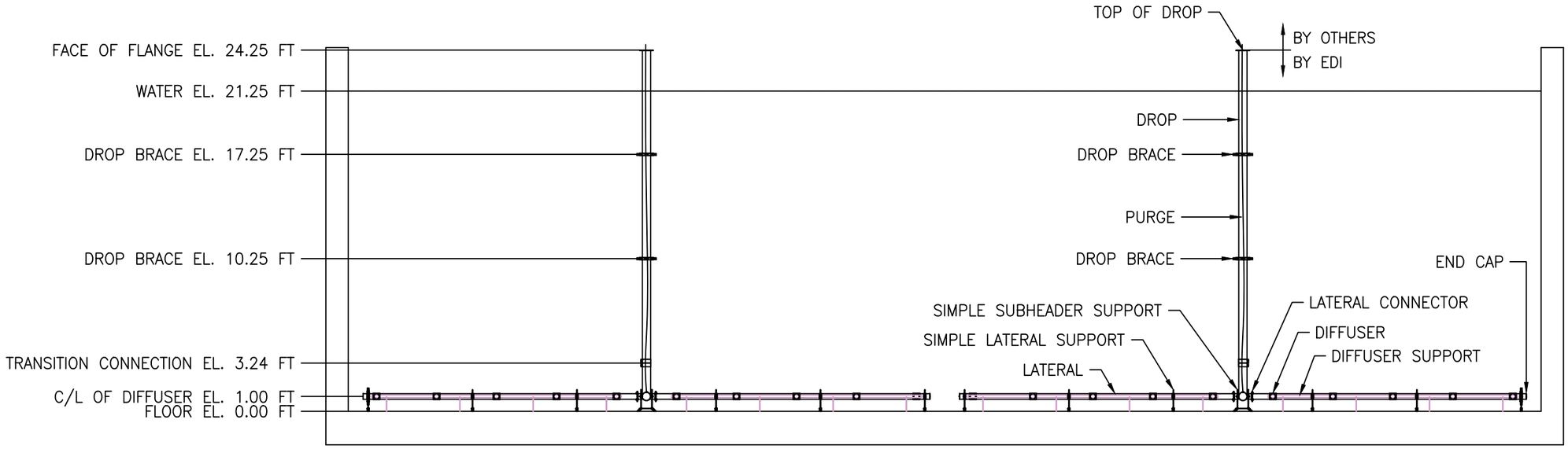
PROJECT NUMBER	SHEET NUMBER	DWG NUMBER
38117	1 OF 2	167053

ITEM	TYPE	DETAIL
DIFFUSER	FLEXAIR 84P-4 MAGNUM	128093
PURGE	MANUAL	162689
TRANSITION CONNECTION	COUPLING CLAMP	25945
LATERAL CONNECTOR	15# S.S. FLANGE	113883
DROP BRACE	SIMPLE SUPPORT	143312
SUBHEADER SUPPORT	RIGID/SIMPLE SUPPORT	143301/143312
LATERAL SUPPORT	SIMPLE SUPPORT	143312
END CAP	REMOVABLE	30194

ITEM	MATERIAL
TOP OF DROP	6" 150# FLANGE
DROP	6" SCH10 304L S.S.
SUBHEADER	6" SCH10 304L S.S.
LATERAL	4" SCH10 304L S.S.
SUPPORT	304 S.S.
ANCHOR	3/8" 304 S.S.

REVISION HISTORY

REV	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	7/8/22	TEM



A SECTION

READ INSTALLATION INSTRUCTIONS PRIOR TO INSTALLING SYSTEM

NOTE: CONTRACTOR TO CONFIRM EDI LAYOUT IS SUITABLE FOR INSTALLATION AND WILL NOT CONFLICT WITH OTHER PROCESS PIPING AND/OR STRUCTURAL COMPONENTS.

PROJECT NAME: JEFFERSON, GA

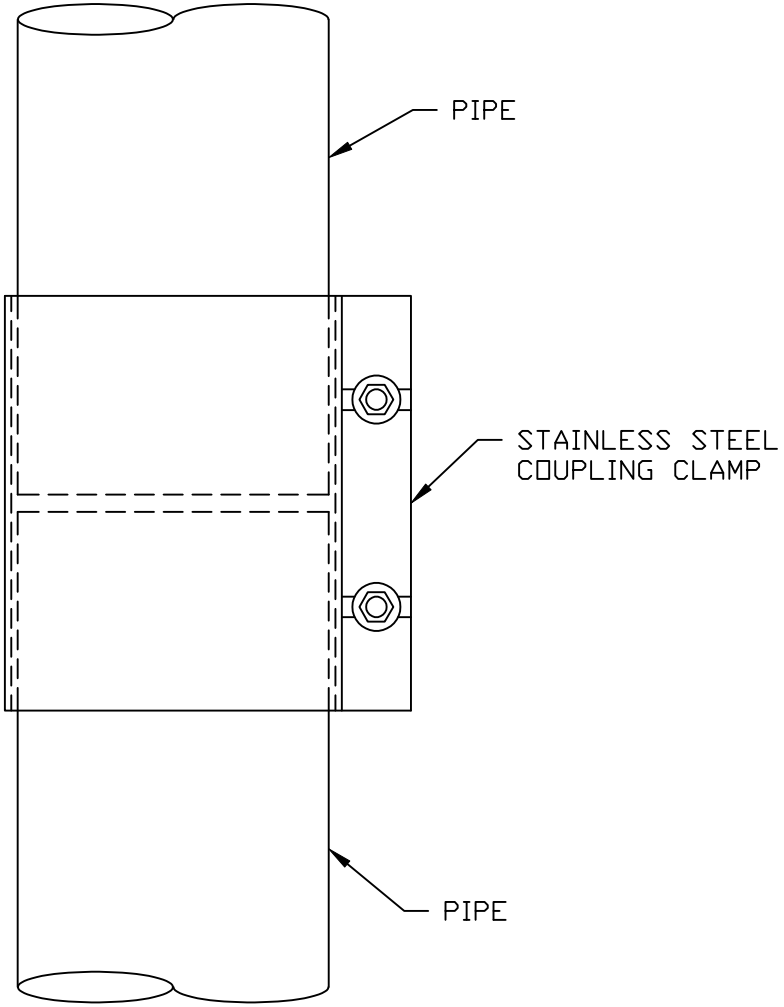
PROJECT DESCRIPTION: AEROBIC DIGESTER - SECTION A

EDI FLEXAIR® AERATION-MIXING SYSTEM

FOR:	BY:	DATE:	SCALE:
TEM	KPR	7/7/2022	1/8"=1'-0"

Environmental DYNAMICS INTERNATIONAL A NEXOM BRAND
wastewater.com
P: +1 573 474 9456
F: +1 573 474 6988
5601 Paris Road
Columbia, MO 65202

PROJECT NUMBER	SHEET NUMBER	DWG NUMBER
38117	2 OF 2	167053

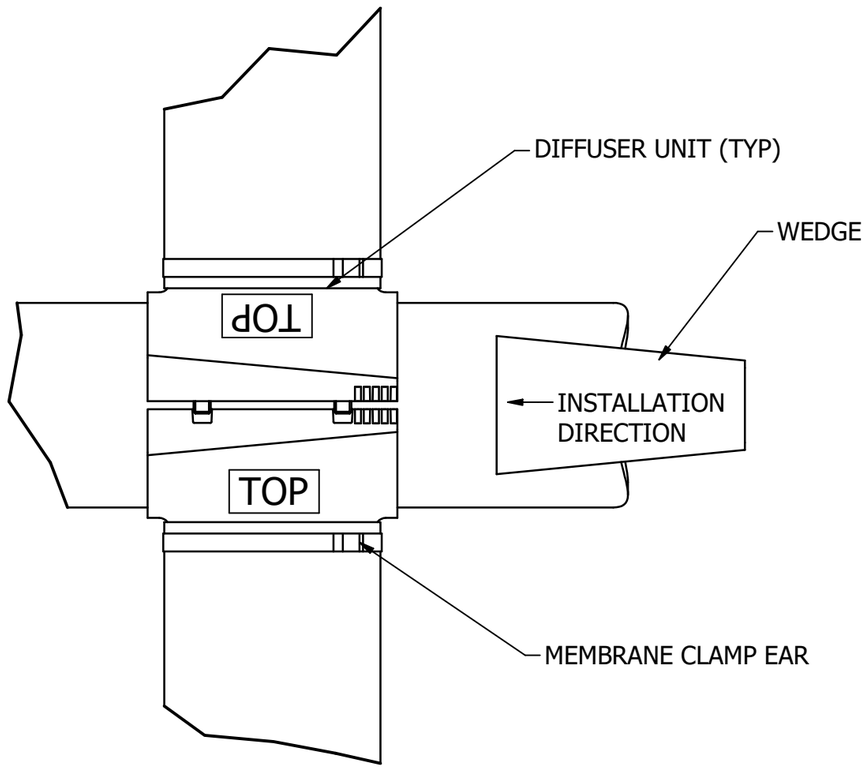


NOTES:
1. COUPLING CLAMP TO BE INSTALLED MIN. OF 2FT. BELOW WATER LEVEL.
2. GAP BETWEEN PIPES MUST BE LESS THEN 0.25".
3. REFER TO IO&M MANUAL/ SUBMITTAL FOR DETAILED INSTRUCTIONS.
4. MATING PIPES SHALL HAVE THE SAME OUTSIDE DIAMETER.

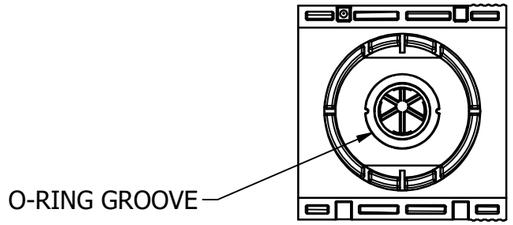
S.S. COUPLING CLAMP	ENG. BY: WCF	DWG. BY: MLB
TYPICAL INSTALLATION DETAIL	REV: E	DATE: 5/11/18
DATE: 1/17/2007 / SCALE: N.T.S.	DWG NO: 25945	

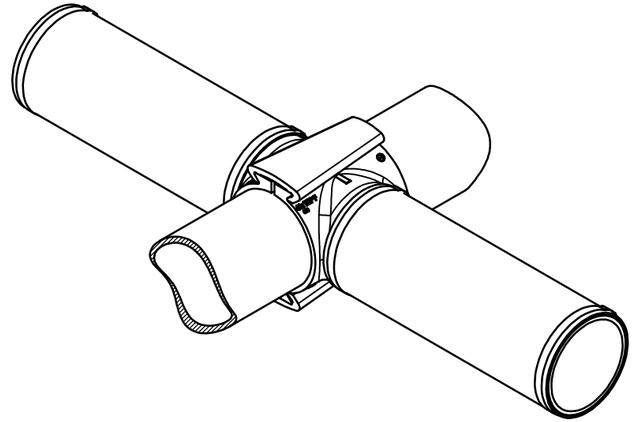
ENVIRONMENTAL DYNAMICS INT'L.
5601 PARIS ROAD
COLUMBIA, MISSOURI 65202
PHONE: 573-474-9456
FAX: 573-474-6988
WWW.WASTEWATER.COM

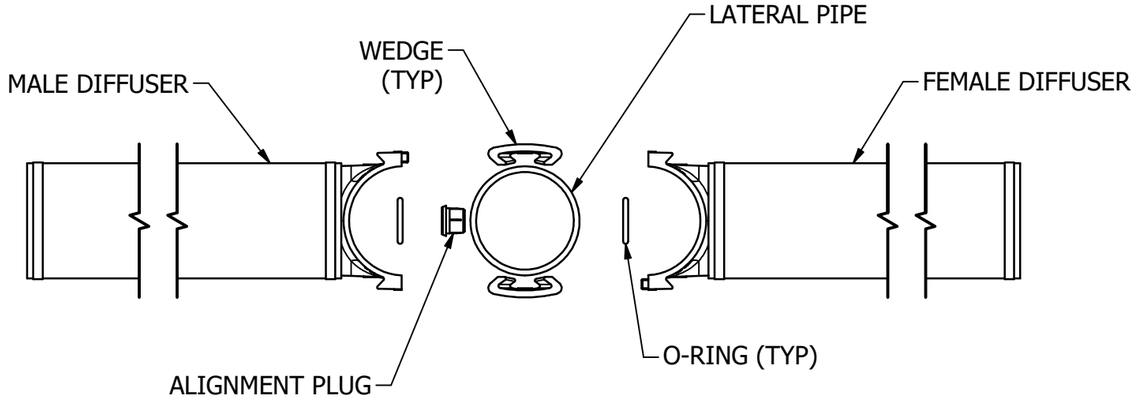
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	5/27/2016	JS
B	New Alignment Plug	6/6/2017	RKH
C	Change Drawing Title	7/12/2017	AAR



DETAIL A







Notes:
1. Insert the plug into the 1” hole.
   a. Warning! Verify that orifice diameter of the alignment plug matches the orifice diameter on the other side of the lateral (for duplex assemblies).
2. Ensure that the plug is correctly seated and was not damaged during the installation.
3. O-Rings should be placed in the internal groove on the saddles.
4. Ensure TOP stickers are facing up on both Male and Female Diffusers.
5. Do not use mastic or any other adhesive on any of the Diffuser Unit parts or accessories.
6. Reference the EDI IO&M manual for further installation instructions.
7. Depending on project specific forces and/or turbulences, EDI may include diffuser end supports. Reference the EDI layout drawings for the locations of these supports and installation details for the type of end support.
   a. Warning! If end supports are required, alignment plugs are not required at these locations.

Orifice Identification	
Hole Diameter	Marker Color
6.35 mm (.25)	WHITE (none)
7.94mm (.312)	PURPLE
9.52mm (.375)	RED
11.11mm (.438)	YELLOW
12.70mm (.500)	GREEN
14.29mm (.562)	TAN
15.88mm (.625)	BLACK
17.46mm (.688)	ORANGE
19.05mm (.75)	BLUE
20.64mm (.812)	PINK

PROJECT NAME: C/L SDM Saddle Installation Detail

PROJECT DESCRIPTION: For Duplex Diffuser Assembly

EDI FLEXAIR® AERATION-MIXING SYSTEM

FOR:	BY:	DATE:	SCALE:
	AAR	5/27/2016	N.T.S.

Environmental Dynamics International

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wastewater.com

Worldwide Headquarters:
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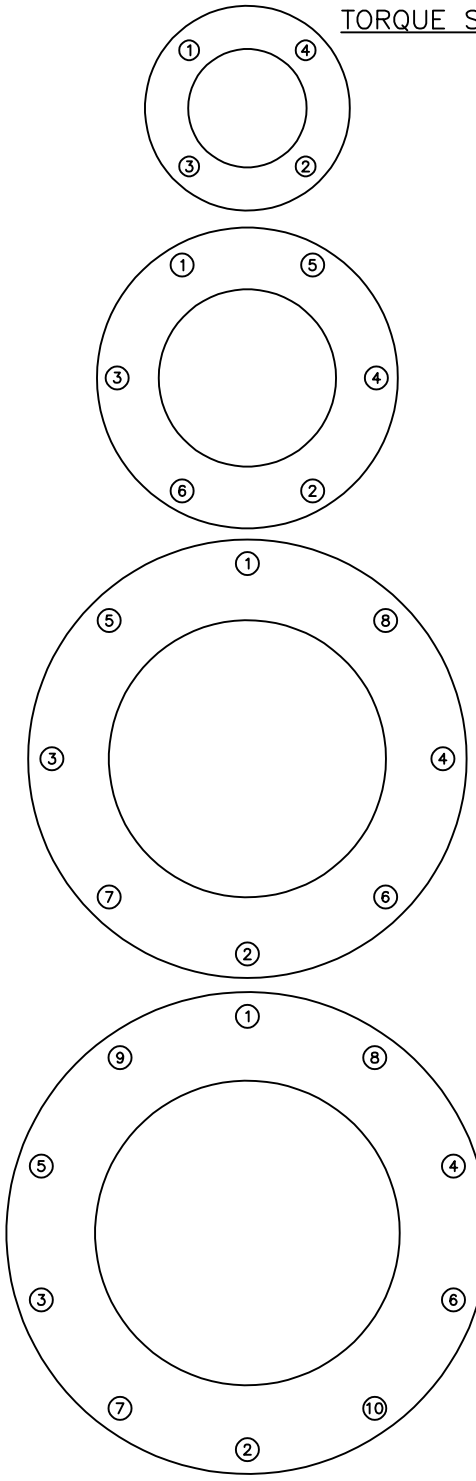
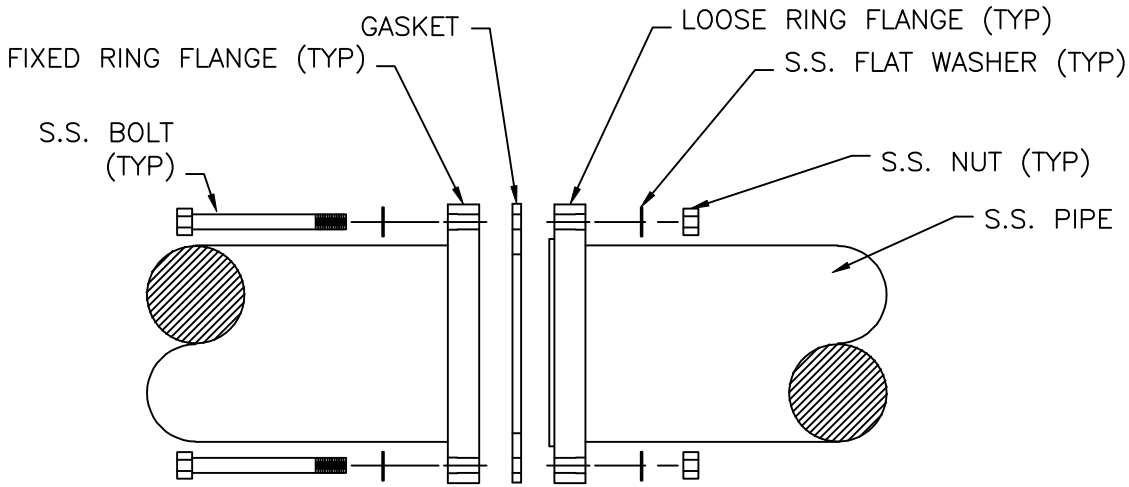
PROJECT NUMBER	SHEET NUMBER	DWG NUMBER
	1 OF 1	128093.idw

TORQUE SEQUENCE





SIZE	BOLT CIRCLE	BOLTS REQ'D	BOLT DESCRIPTION	TORQUE
3	5.88 (149mm)	4	0.375"–16 (M10–1.50)	20 Ft–Lbs (27 Nm)
4	7.13 (181mm)	4	0.375"–16 (M10–1.50)	20 Ft–Lbs (27 Nm)
6	9.53 (242mm)	4	0.375"–16 (M10–1.50)	20 Ft–Lbs (27 Nm)
8	11.53 (293mm)	4	0.375"–16 (M10–1.50)	20 Ft–Lbs (27 Nm)
10	14.15 (369mm)	6	0.375"–16 (M10–1.50)	20 Ft–Lbs (27 Nm)
12	16.66 (423mm)	6	0.375"–16 (M10–1.50)	20 Ft–Lbs (27 Nm)
14	17.70 (450mm)	6	0.500"–13 (M12–1.75)	50 Ft–Lbs (68 Nm)
16	19.70 (500mm)	8	0.500"–13 (M12–1.75)	50 Ft–Lbs (68 Nm)
18	21.70 (551mm)	8	0.500"–13 (M12–1.75)	50 Ft–Lbs (68 Nm)
20	23.75 (603mm)	10	0.500"–13 (M12–1.75)	50 Ft–Lbs (68 Nm)
24	28.75 (730mm)	10	0.500"–13 (M12–1.75)	50 Ft–Lbs (68 Nm)

NOTES:
1. USE ANTI–SEIZE ON ALL STAINLESS STEEL FASTENERS.
2. BOLT THREADS SHOULD BE WELL LUBRICATED.
3. NUT AND BOLT THREADS SHOULD BE FREE RUNNING DURING ASSEMBLY.
4. FOLLOW ILLUSTRATED BOLT TIGHTENING SEQUENCE.
5. IN SOME INSTANCES, BOTH FLANGES MAY BE LOOSE RING.

TITLE: Stainless Steel 15# Flange

DESCRIPTION: Typical Installation Detail Stainless Steel 15# Flange

EDI FLEXAIR® AERATION-MIXING SYSTEM

PROJECT ID: | SHEET NO: 1 OF 1 | DWG NO: 113883

FOR: BLM

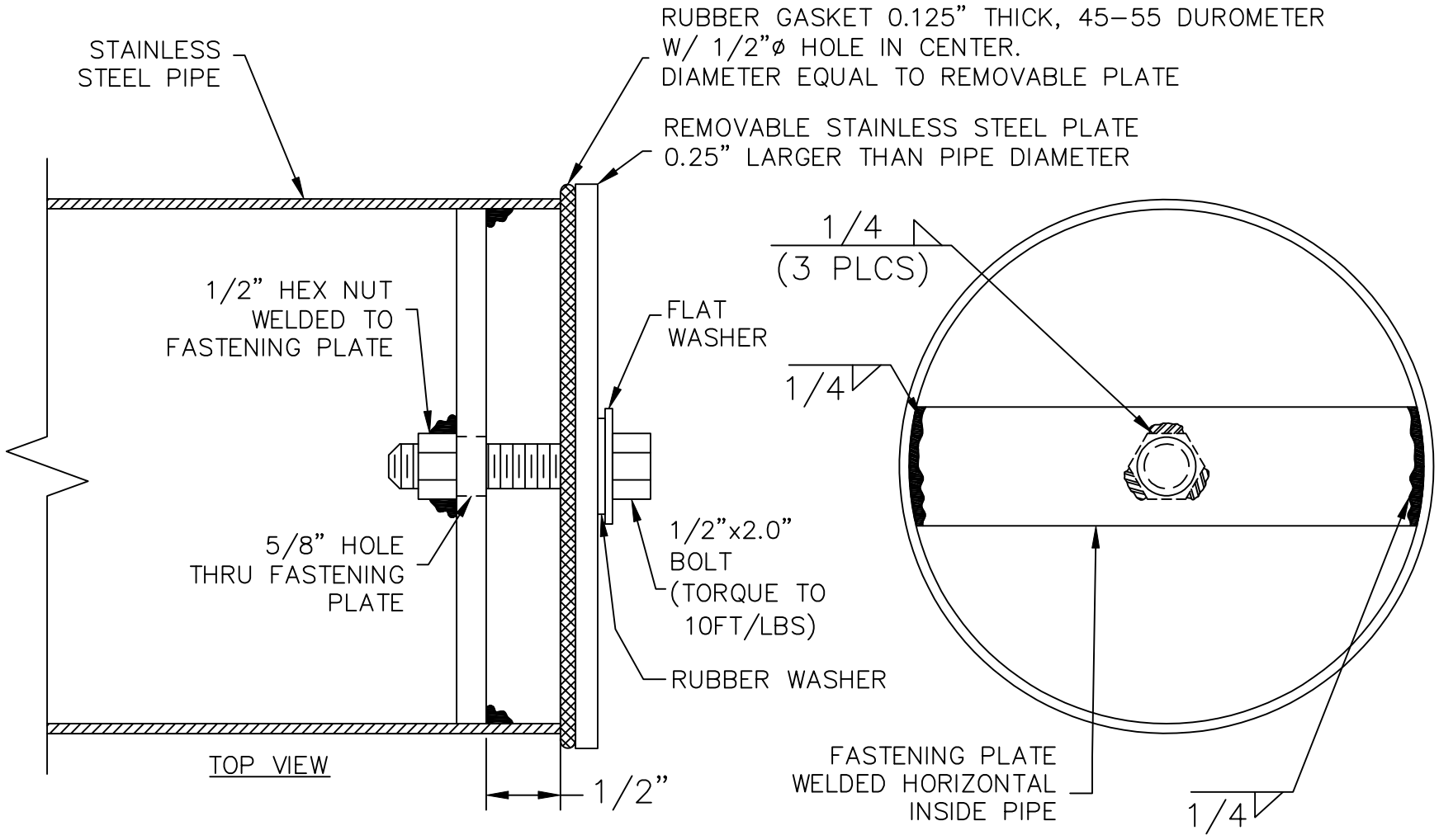
BY: BLM

DATE: 1/17/2014

SCALE: N.T.S.

ENVIRONMENTAL DYNAMICS INT'L
5601 PARIS ROAD
COLUMBIA, MISSOURI 65202
PHONE: 573-474-9456
FAX: 573-474-6988
WWW.WASTEWATER.COM

REV.	DATE
B	5/4/15
C	7/19/19



NOTES:
1. 3", 4", & 6" DIAMETER PIPE
   .25x1.00 INNER BAR
   .219 COVER
   .38" HARDWARE

2. 8" & 10" DIAMETER PIPE
   .25x1.50" INNER BAR
   .219 COVER
   .50" HARDWARE

3. APPLY ANTI–SEIZE TO ALL INSTALLED THREADED PARTS

STAINLESS STEEL REMOVABLE ENDCAP		ENG. BY: WCF	DWG. BY: MAP
FABRICATION DRAWING		REV K	DATE 11/1/18
DATE: 05-07-07	SCALE: N.T.S.	DWG NO: 30194	

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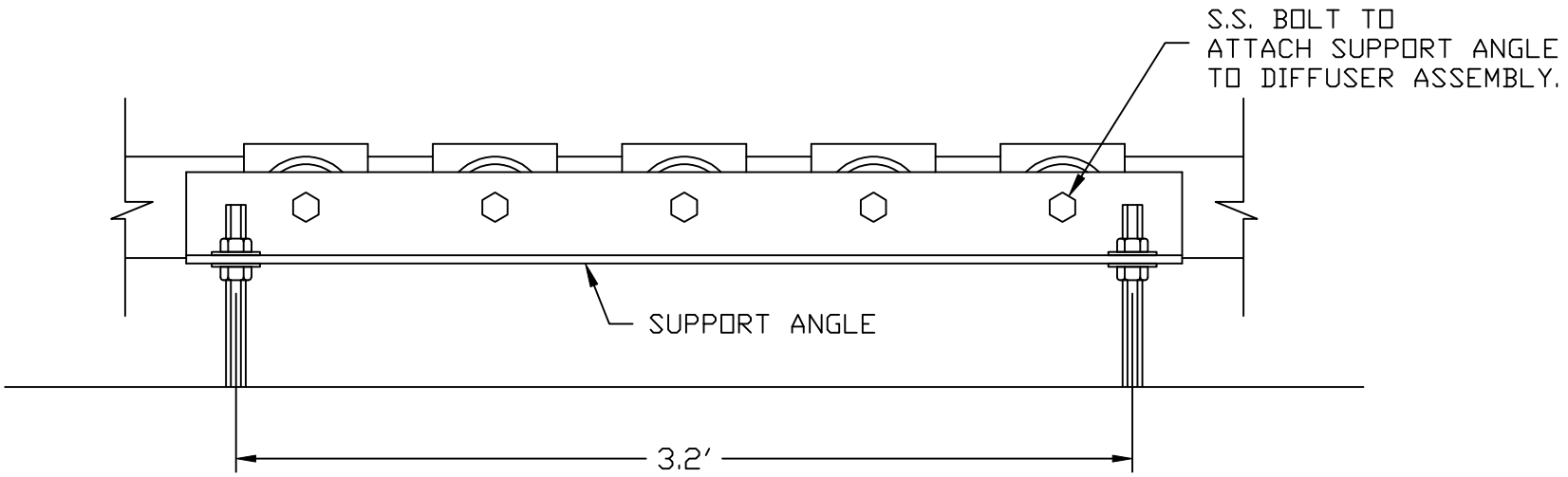

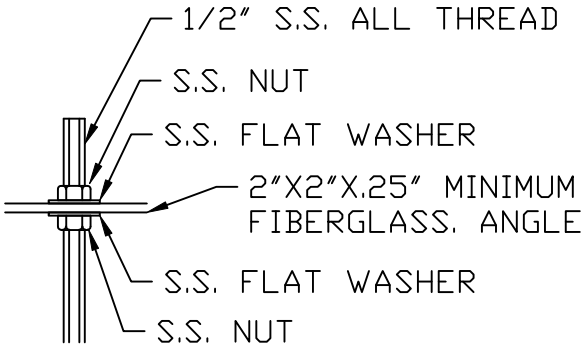

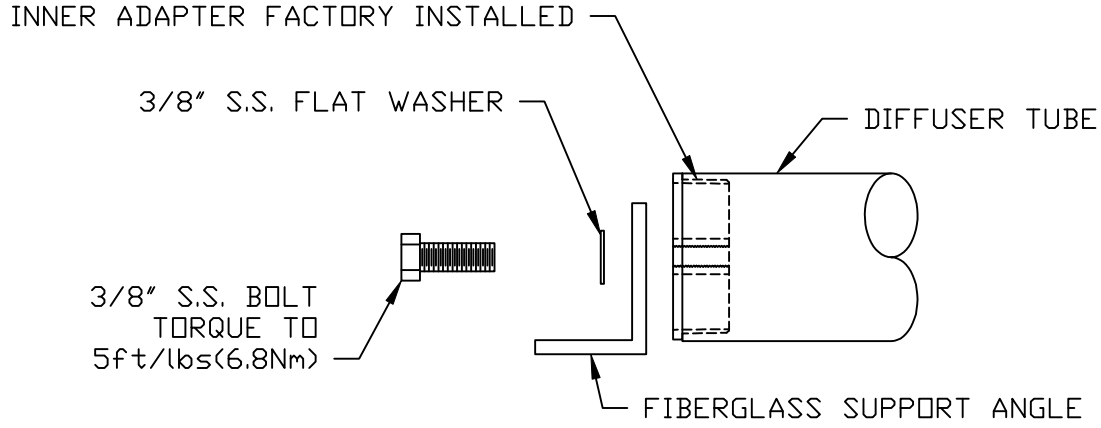

NOTES:

1. ADAPTER WILL BE FACTORY INSTALLED INTO THE END OF DIFFUSER TUBES.

2. THREADED ROD SUPPORTS ARE REQUIRED FOR EACH PIECE OF FIBERGLASS SUPPORT ANGLE.

FIBERGLASS DIFFUSER SUPPORT		ENG. BY: ELM	DWG. BY: JKM
FIXED GRID		REV B	DATE 2/14/20
TYPICAL INSTALLATION DETAIL		DWG NO: 148916	
DATE: 4/19/18	SCALE: N.T.S.		

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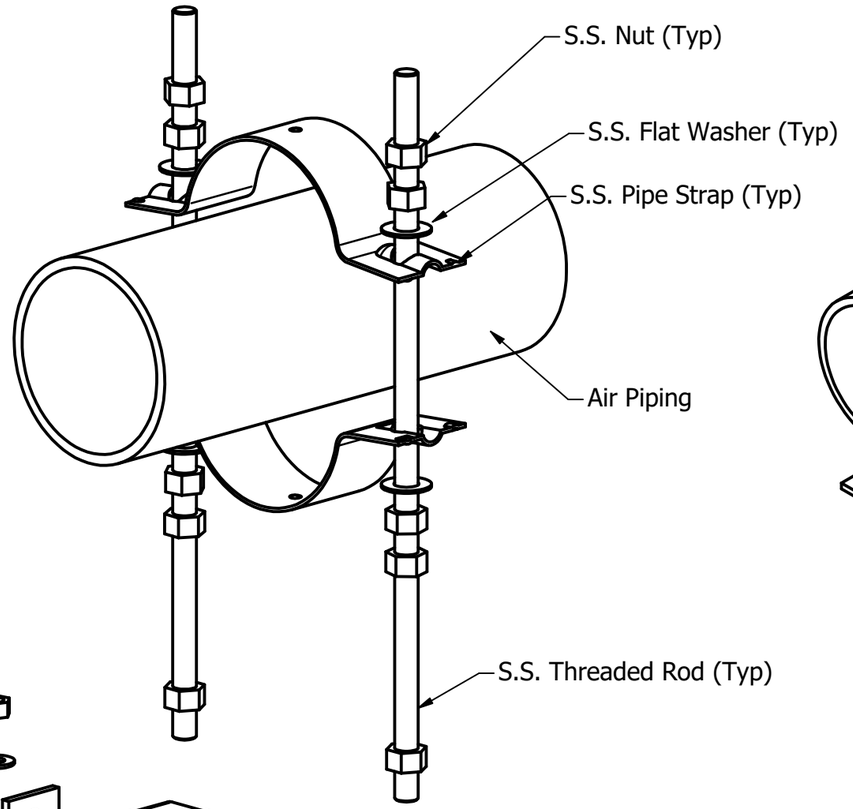
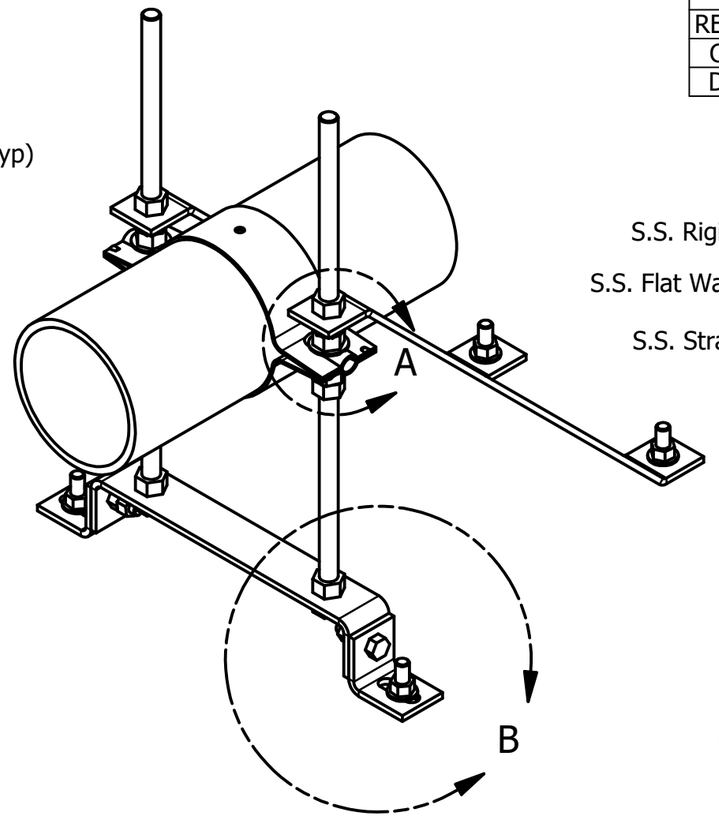
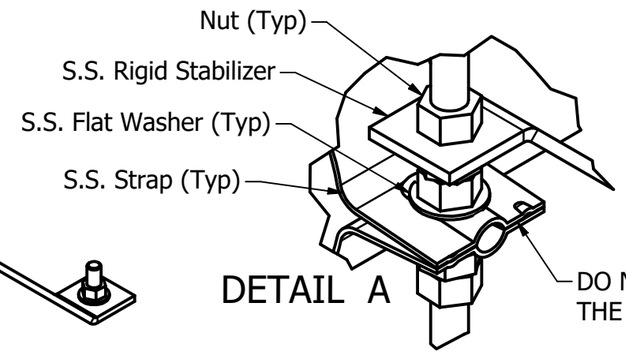
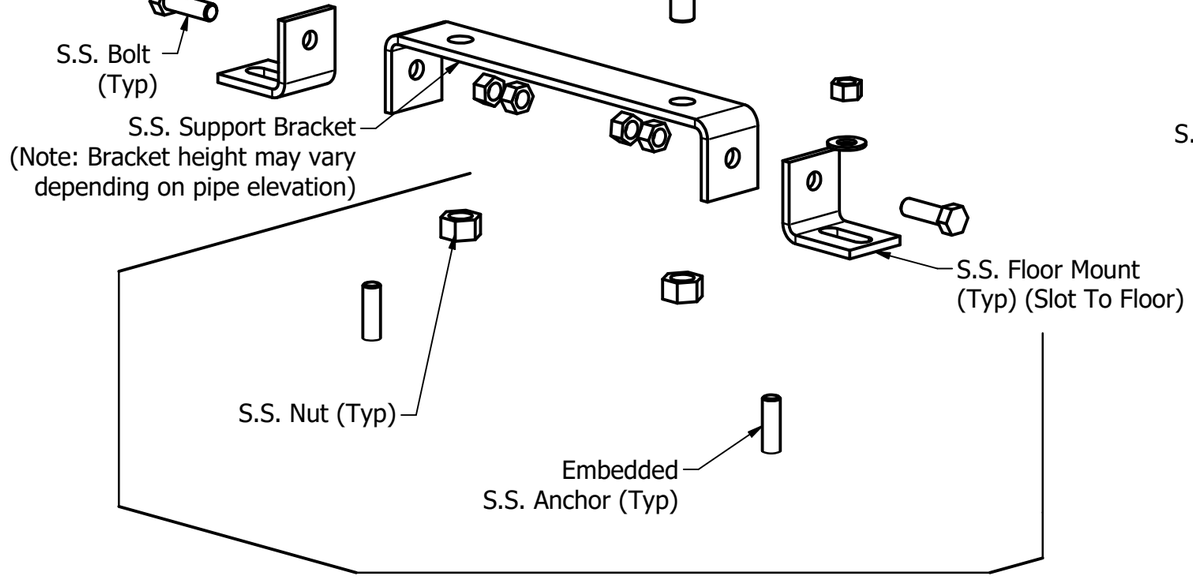
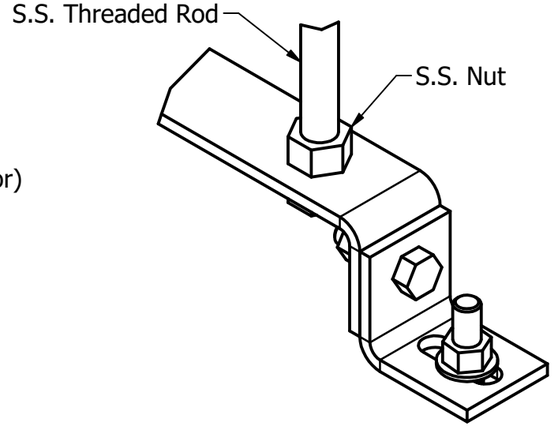
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
C	REMOVE LOCK WASHER	10/3/2018	JS
D	ADD CRUSH NOTE	5/6/2021	JS











DETAIL B

NOTES:

1. FLOOR MOUNTS ARE SECURED TO THE BASIN FLOOR BY EMBEDDED CONCRETE ANCHOR BOLTS.

2. A COMMERCIAL GRADE ANTI SEIZE LUBRICANT MUST BE USED ON ALL STAINLESS STEEL THREADED CONNECTIONS.

3. TIGHTEN THE NUTS DIRECTLY ABOVE AND BELOW THE STRAPS UNTIL THE EARS TOUCH. OVER TIGHTENING WILL DAMAGE THE STRAPS.

4. REFER TO EQUIPMENT SUPPLY LIST TO DETERMINE PROVIDER OF ANCHOR HARDWARE.

5. REFERENCE EDI IO&M MANUAL FOR MORE DETAILED INSTRUCTIONS.

PROJECT NAME
Rigid Pipe Support Installation

PROJECT DESCRIPTION
For 2", 9" & 15" Tall Support Brackets

EDI FLEXAIR® AERATION-MIXING SYSTEM

FOR:	BY:	DATE:	SCALE:
RKH	MLB	7/14/2017	

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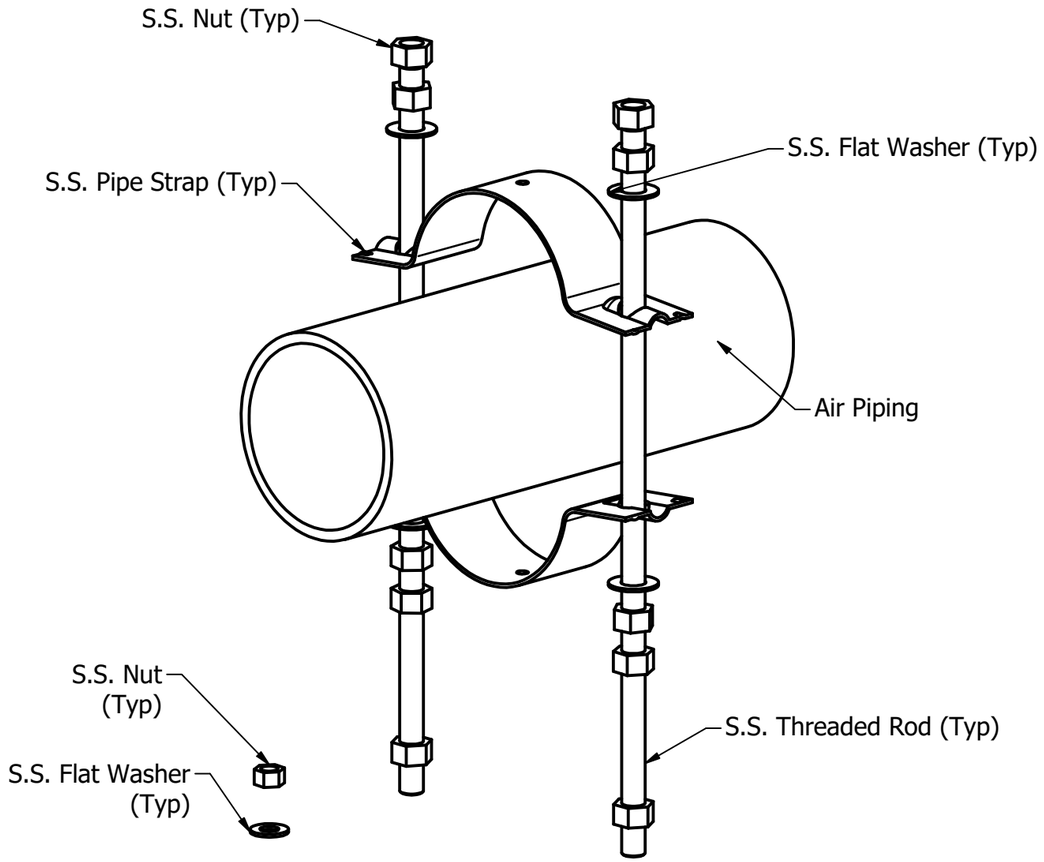
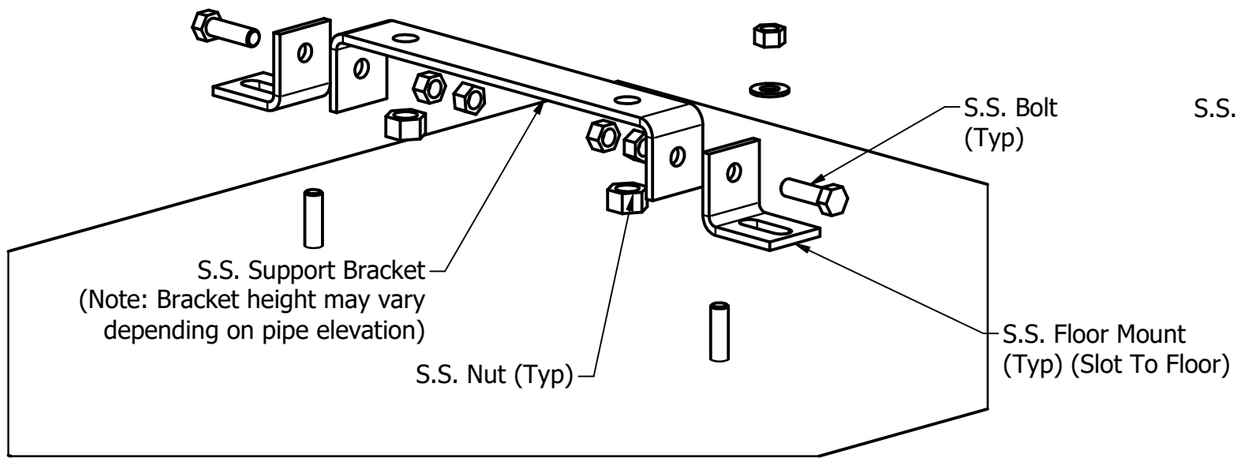
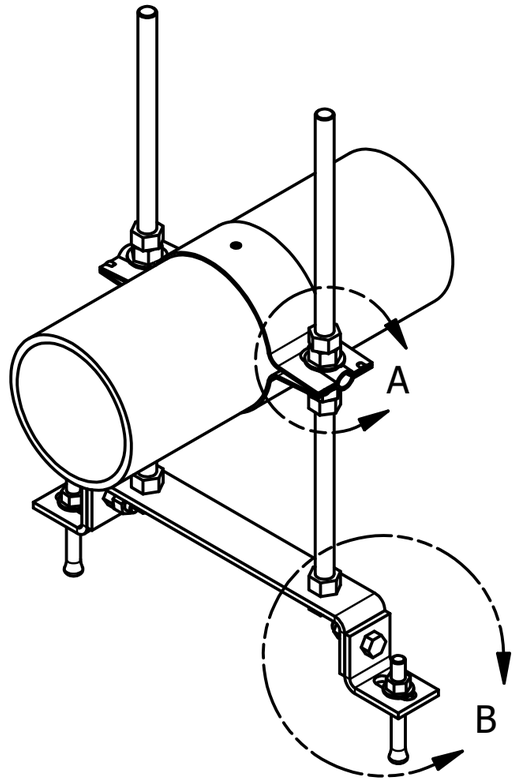
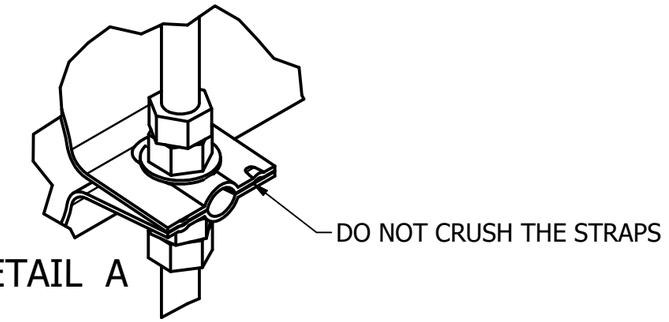
PROJECT NUMBER	SHEET NUMBER	DWG NUMBER
	1 OF 1	143301.idw

REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
C	REMOVE LOCK WASHER	2/13/2020	JS
D	ADD CRUSH NOTE	5/6/2021	JS









DETAIL A

NOTES:

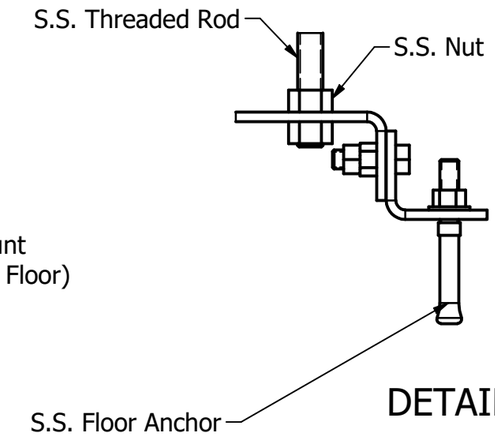
1. FLOOR MOUNTS ARE SECURED TO THE BASIN FLOOR BY CONCRETE ANCHOR BOLTS.

2. A COMMERCIAL GRADE ANTI SEIZE LUBRICANT MUST BE USED ON ALL STAINLESS STEEL THREADED CONNECTIONS.

3. TIGHTEN THE NUTS DIRECTLY ABOVE AND BELOW THE STRAPS UNTIL THE EARS TOUCH. OVER TIGHTENING WILL DAMAGE THE STRAPS.

4. REFER TO EQUIPMENT SUPPLY LIST TO DETERMINE PROVIDER OF ANCHOR HARDWARE.

5. SEE INSTALLATION INSTRUCTIONS FOR PROPER TORQUE VALUES.



DETAIL B

(Note: Wedge Anchors Shown, Studs or Drop-In Anchors may be provided per the specifications.)

PROJECT NAME: Simple Pipe Support Installation

PROJECT DESCRIPTION: For 2", 9" & 15" Tall Support Brackets

EDI FLEXAIR® AERATION-MIXING SYSTEM

FOR:	BY:	DATE:	SCALE:
RKH	MLB	7/14/2017	

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Worldwide Headquarters:
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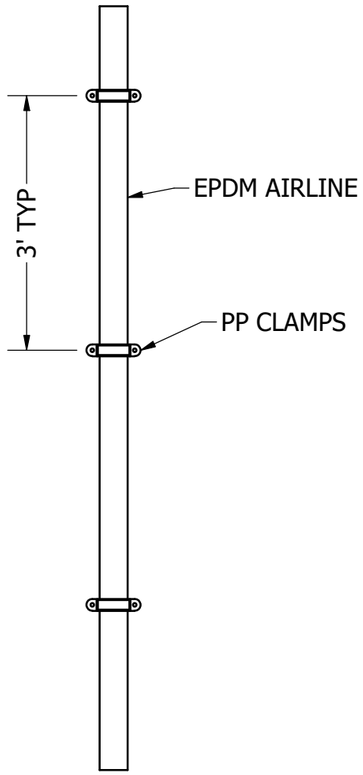
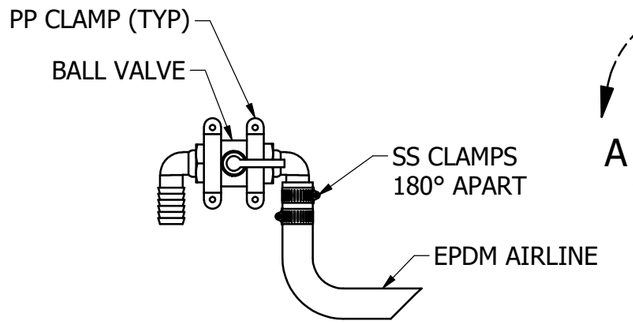
PROJECT NUMBER	SHEET NUMBER	DWG NUMBER
	1 OF 1	143312.idw

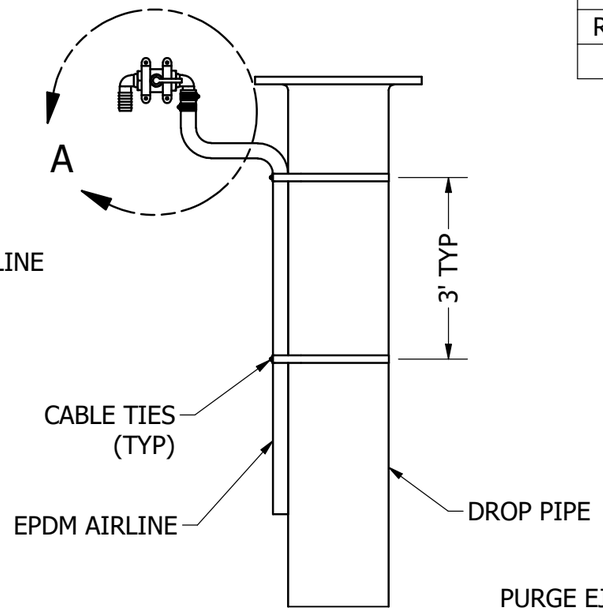
REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	3/1/2021	

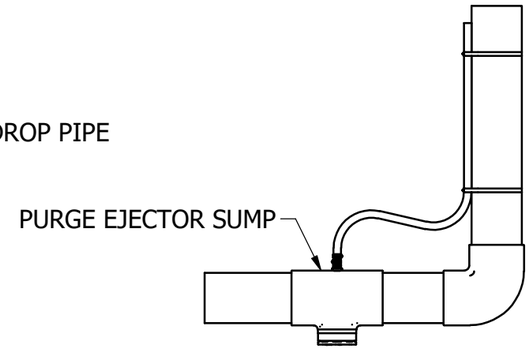


WALL MOUNT OPTION

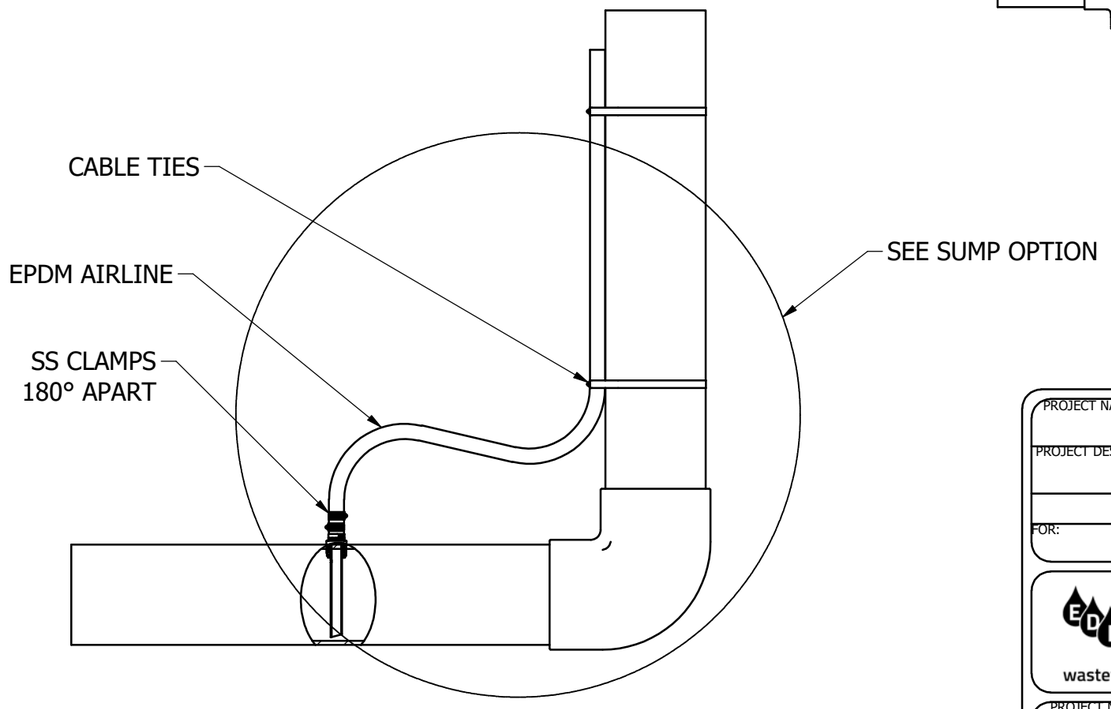


DETAIL A





SUMP OPTION



NOTES:
1. OTHER AERATION COMPONENTS ARE NOT SHOWN FOR CLARITY.
2. WALL MOUNT AND SUMP OPTIONS MAY BE INCLUDED DEPENDING PROJECT SPECIFICATIONS.
3. WHEN ASSEMBLING THREADED CONNECTIONS USE PIPE DOPE, AND ENSURE THE CONNECTIONS ARE NOT OVER TIGHTENED.
4. ROUTE AND SECURE AIRLINE IN A MANOR TO PREVENT KINKS OR POTENTIAL CONTACT WITH ANY SHARP OBJECTS.
5. LOCATE THE PURGE VALVE IN AN AREA THAT'S EASILY ACCESSIBLE.
6. REFERENCE THE EDI IO&M MANUAL FOR DETAILED INSTRUCTIONS AND GUIDELINES.

PROJECT NAME

PROJECT DESCRIPTION
Manual Purge EPDM Line

Typical Installation Detail

FOR:	BY:	DATE:	SCALE:
	areinhart	3/1/2021	N.T.S.

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Columbia, MO 65202

PROJECT NUMBER	SHEET NUMBER	DWG NUMBER
	1 OF 1	162689.idw