



MANATEE COUNTY FLORIDA

October 8, 2013

TO: All Interested Bidders
SUBJECT: Invitation for Bids #13-1674CD
Digester Modifications at the Southwest Water Reclamation Facility

ADDENDUM #3

Bidders are hereby notified that this Addendum shall be acknowledged on page 00300-1 of the Bid Form and made a part of the above named bidding and contract documents. Bids submitted without acknowledgment of the Addendum will be considered incomplete.

The following items are issued to add to, modify, and clarify the bid and contract documents. These items shall have the same force and effect as the original bidding and contract documents, and cost involved shall be included in the bid prices. Bids to be submitted on the specified bid date, shall conform to the additions and revisions listed herein.

1. **CHANGE** Article C.03, Completion of Work, on page 00030-1 of the bid documents to read as follows:

The Work will be completed and ready for final inspection within the specified calendar days from the date the Contract time commences to run. Two Bids shall be considered, **Bid "A"** based on **270 calendar days** and **Bid "B"** based on **330 calendar days**. The County has the sole authority to select the Bid based on the completion time which is in the best interest of the County. Only one Award shall be made.

2. **DELETE** Bid Form page 00300-1 and **DELETE REVISED** Bid Form pages 00300-2 thru 00300-3 issued with Addendum #1, and **INSERT** the REVISED bid Form pages 00300-1 thru 00300-3 that are attached to this Addendum #3.
3. **ADD** the Jet Manifold Aeration System Submittal Data dated September 10, 2013 that is attached to this Addendum #3 to the Bid Documents.

Financial Management Department –Purchasing Division
1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205
PHONE: 941.749.3014 * FAX: 941.749.3034
www.myanatee.org

4. **CHANGE** Article 3.02.A.10 issued in item #9 of Addendum #1 to read as follows:

3.02 .A

10. Schedules for completion of work shall be as follows:
 - a. Contractor may begin the draining of Digester No. 2 at any time after issue of Notice to Proceed. Contractor shall not begin any work on Digester No.4 until at least one of the other three digesters is fully operational with the new jet aeration equipment.
 - b. Demolition Contractor; under a separate contract may be on site draining and demolishing digesters No. 1 and No. 3. The successful Bidder cannot be fully mobilized and performing work, except for digester drainage and dewatering of digester No.2 until the Demolition Contractor has finished his work. It is anticipated that successful Bidder will be issued a Notice to Proceed in early January 2014 and that the Demolition Contractor will be off site by the end of January 2014.
 - c. Provide a cost for completing all work with system ready for start up 270 days after issue of Notice to Proceed.
 - d. Provide a cost for completing all work with system ready for start up 330 days after issue of Notice to Proceed.

5. **CHANGE** Article 1.05.G, in Section 26 05 02 Basic Electrical Requirements, to read as follows:

G. Furnish and install an equipment ground conductor sized per Table 250-122 of the NEC in all new and existing conduits as shown on the plans and cable schedules.

6. **CHANGE** the Bid Opening Date and Time to **Tuesday, October 15 , 2013 at 3:00 PM.**

The following questions have been presented by potential bidders:

QUESTION #1: The scale seems to be off on several drawings. Please confirm that the diameter of each existing digester is 75'0". Please confirm that the wall height of each existing digester is 30'0".

RESPONSE #1: This is confirmed.

QUESTION #2: Provide a structural drawing showing the dimensions of each new concrete pump and blower pad including their thickness and rebar requirements.

RESPONSE #2: Please see item #3 above of this Addendum #3.

QUESTION #3: Do any of the four existing digester tanks get painted or coated on the interior or on the exterior?

Response #3: No.

QUESTION #4: Provide the size of the suction and discharge flanges for the owner furnished pumps. Provide the size of the discharge flange for the owner furnished blower.

RESPONSE #4: Please see item #3 above of this Addendum #3.

QUESTION #5: Bid item #8 is a lump sum for each tank. Each tank has a different volume of solids. What is the height of the solids in digester tank #2? What is the height of the solids in digester tank #4?

RESPONSE #5: The Bid Form has been changed to reflect a separate lump sum cost for the removal and dewatering of residual solids for each digester. Please refer to item #9 in Addendum #1 for heights of solids in each digester. All bidders are encouraged to visit the site and perform sampling of each digester.

QUESTION #6: Can the unit of measure for the removal and disposal of solids in bid item #8 be changed from a lump sum to a per volume price? Such as a per ton or per gallon unit of measure?

RESPONSE #6: No.

QUESTION #7: Is a potable water source available for the dewatering of the digester tanks? We need 2" and a 1" supply for the dewatering and 2-2" supply for the cleaning process.

RESPONSE #7: Potable water is not to be used for dewatering digester tanks. Reclaimed water is available from hose bibs and/or reclaimed water fire hydrant in the vicinity of the digesters.

QUESTION #8: Is power available for the dewatering of the digester tanks or do we need to provide a temporary generator? Three phase, less than 100 amp is needed.

RESPONSE #8: Several 100 amp, three phase, 480V power sources are available. The contractor shall be responsible for making the connection from a source approved by plant maintenance staff or use a contractor supplied generator.

QUESTION #9: We need to know a discharge point for the filtrate water from the press. Can we pump the water back into another tank or can we gravity discharge it to a ground level manhole?

RESPONSE #9: The contractor shall return filtrate/centrate to the plant through a plant drain station. There are two plant drain stations and three grade/near grade level manholes connected to the drain stations in the vicinity of the digesters. The contractor shall consider placement of its equipment, dewatering rate, traffic for hose/pipe placement, to determine whether or not it needs to pump its filtrate/centrate.

QUESTION #10: Can the time frame for this project be extended beyond 250 days?

RESPONSE #10: Please see item #1 above of this Addendum #3.

QUESTION #11: What type of ductwork and air devices is required for the AHU in the generator electrical room? None is shown.

RESPONSE #11: No ductwork is required. Air discharge and return plenum with grilles shall be provided. The supply grille shall be located at front.

QUESTION #12: Can a lined supply air and return air plenum with sidewall air devices be used? None is shown.

RESPONSE #12: No ductwork is required. Air discharge and return plenum with grilles shall be provided. The supply grille shall be located at front.

QUESTION #13: In Spec Section 26 05 02 - 2 Under Scope Of Work Section 1.05 Letter G - It says to " Furnish and install an equipment ground conductor sized per NEC in all new and existing conduits in the entire plant." How are we supposed to figure this for existing conduits when they are not shown on the plans or on conduit and cable schedules?

RESPONSE #13: Please see item #5 above of this Addendum #3.

QUESTION #14: On Sheet 007-E-6002 the drawings show the two new medium voltage terminations referenced on this project and on notes 1-5. On the same page on the left and bottom of the page it shows new MCC's and terminations also being completed. Just wanted to confirm that these are part of a separate project and only the MCC-D4 & MCC-D5 and associated connections pertain to this project.

RESPONSE #14: All the new electrical equipment associated with the dewatering area of the plant and modifications to the existing main switchgear are required to be provided as shown. The new electrical equipment associated with the main plant are to be provided under a separated project as shown.

QUESTION #15: Is there an approved instrumentation integrator list for the County?

RESPONSE #15: The Contractor may use a qualified Subcontractor that meets the requirements of the bid documents

QUESTION #16: For the 20" sludge pump suction there are two slab penetrations per tank. One calls for detail 4027-620 but this detail cannot be found. Does detail 4005-620 on sheet 950-D-5001 apply to the new slab penetration at each tank?

RESPONSE #16: See Drawing 825-S-3001 for the penetration detail inside the tank. 4027-620 (should be 4005-620) does not apply to penetration inside the tank but to the penetration on the outside slab. Note that 4027- 620 should be replaced by 4005-620 on sheet 950-D-5001.

QUESTION #17: Will MJ fittings with Megalugs be allowed on all sizes up through 48" for this project?

RESPONSE #17: Per the specifications, fittings less than 16" for DI can be MJ, restrained by anchor gland followers, ductile iron anchor type, wedge action, with break-off tightening bolts. These fittings (Megalugs fall in that class) are not allowed for DI pipe 16" and larger.

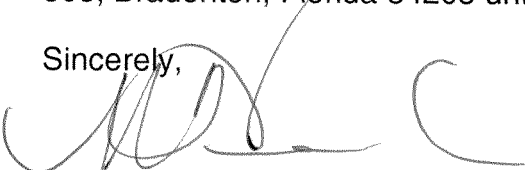
QUESTION #18: Could you please provide engineer's estimate for the project?

RESPONSE #18: The Engineer's estimate, including all Addendums issued to date, is \$2,200,000.00

END OF ADDENDUM #3

Bids will be received at Manatee County Purchasing Division, 1112 Manatee Avenue West Suite 803, Bradenton, Florida 34205 until **Tuesday, October 15, 2013 at 3:00 PM.**

Sincerely,


Melissa M. Wendel, CPPO
Purchasing Official

SECTION 00300
BID FORM
(SUBMIT IN TRIPLICATE)

For: IFB #13-1674CD- DIGESTER MODIFICATIONS AT THE
SOUTHWEST WATER RECLAMATION FACILITY

TOTAL BID PRICE (BID "A"): _____
Based on a Completion Time of 270 calendar days
TOTAL BID PRICE (BID "B"): _____
Based on a Completion Time of 330 calendar days

Two schedules for completion of the Work shall be considered. Each Bid for completion by the specified stated time shall be offered as a separate "Total Bid Price". The County has the sole authority to select the Bid based on the completion time which is in the best interest of the County. Only one Award shall be made.

We, the undersigned, hereby declare that we have carefully reviewed the Bid documents, and with full knowledge and understanding of the aforementioned herewith submit this Bid, meeting each and every specification, term, and condition contained in the Invitation for Bids, in its entirety.

We understand that the Bid package, in its entirety, including but not limited to, all specifications, terms, and conditions in their entirety shall be made a part of any Agreement or Contract between Manatee County and the successful Bidder. Failure to comply shall result in Contract default, whereupon, the defaulting Contractor shall be required to pay for any and all re-procurement costs, damages, and attorney fees as incurred by the County.

Communications concerning this Bid shall be addressed as follows: **(Complete all fields)**

BIDDER'S NAME: _____

MAILING ADDRESS: _____

TELEPHONE: (____) _____ FAX: (____) _____

EMAIL ADDRESS: _____

FL CONTRACTOR LICENSE# _____

LICENSE IN THE NAME OF: _____

STATE OF INCORPORATION _____ (if applicable)

I, _____ on [date] _____ attest that I have visited the project site(s) to familiarize myself with the full Scope of Work required for the Bid.

Acknowledge Addendum No. ____ Dated: _____ Acknowledge Addendum No. ____ Dated: _____
 Acknowledge Addendum No. ____ Dated: _____ Acknowledge Addendum No. ____ Dated: _____
 Acknowledge Addendum No. ____ Dated: _____ Acknowledge Addendum No. ____ Dated: _____

AUTHORIZED SIGNATURE(S): _____

Name and Title of Above Signer(s): _____

BID FORM

(Submit in Triplicate) Section 00300
SWWRF DIGESTER MODIFICATIONS

Bid "A" Based on Completion Time of 270 Calendar Days

ITEM NO.		DESCRIPTION	EST. QTY.	U/M	UNIT PRICE	EXTENDED PRICE
1		MOBILIZATION	1	LS	\$	\$
2		DEMOLITION AND CLEANING OF DIGESTERS #2 AND #4	2	LS	\$	\$
3		INSTALLATION OF COUNTY FURNISHED JET AERATION EQUIPMENT, INCLUDING FURNISHING AND INSTALLING PIPES, VALVES, PIPE SUPPORTS, CONCRETE WORK, AND HANDRAILS	4	LS	\$	\$
4		FURNISH AND INSTALL ELECTRICAL SYSTEM FOR COMPLETE OPERATING JET AERATION SYSTEMS	1	LS	\$	\$
5		FURNISH AND INSTALL INSTRUMENTATION AND CONTROL SYSTEM FOR COMPLETE OPERATING JET AERATION SYSTEMS	1	LS	\$	\$
6		FURNISH AND INSTALL HVAC SYSTEM FOR EXISTING GENERATOR BUILDING	1	LS	\$	\$
7		DEMOBILIZATION AND SITE CLEANUP	1	LS	\$	\$
8		REMOVE AND DEWATER RESIDUAL SOLIDS IN DIGESTERS :				
	a	Remove and Dewater all Residual Solids in Digester No.2	1	LS	\$	\$
	b	Remove and Dewater all Residual Solids in Digester No.4	1	LS	\$	\$
9		HAULING AND DISPOSAL OF DEWATERED SOLIDS IN DIGESTERS #2 AND #4 TO COUNTY LANDFILL	1,500	TON	\$	\$
		DISCRETIONARY WORK (USED ONLY WITH COUNTY APPROVAL)				\$85,000.00
		TOTAL PRICE FOR BID "A" - Based on Completion Time of 270 Calendar Days				\$

Bidder Name: _____

Authorized Signature: _____

BID FORM

(Submit in Triplicate) Section 00300
SWWRF DIGESTER MODIFICATIONS

Bid "B" Based on Completion Time of 330 Calendar Days

ITEM NO.	DESCRIPTION	EST. QTY.	U/M	UNIT PRICE	EXTENDED PRICE
1	MOBILIZATION	1	LS	\$	\$
2	DEMOLITION AND CLEANING OF DIGESTERS #2 AND #4	2	LS	\$	\$
3	INSTALLATION OF COUNTY FURNISHED JET AERATION EQUIPMENT, INCLUDING FURNISHING AND INSTALLING PIPES, VALVES, PIPE SUPPORTS, CONCRETE WORK, AND HANDRAILS	4	LS	\$	\$
4	FURNISH AND INSTALL ELECTRICAL SYSTEM FOR COMPLETE OPERATING JET AERATION SYSTEMS	1	LS	\$	\$
5	FURNISH AND INSTALL INSTRUMENTATION AND CONTROL SYSTEM FOR COMPLETE OPERATING JET AERATION SYSTEMS	1	LS	\$	\$
6	FURNISH AND INSTALL HVAC SYSTEM FOR EXISTING GENERATOR BUILDING	1	LS	\$	\$
7	DEMOBILIZATION AND SITE CLEANUP	1	LS	\$	\$
8	REMOVE AND DEWATER RESIDUAL SOLIDS IN DIGESTERS :				
	a Remove and Dewater all Residual Solids in Digester No.2	1	LS	\$	\$
	b Remove and Dewater all Residual Solids in Digester No.4	1	LS	\$	\$
9	HAULING AND DISPOSAL OF DEWATERED SOLIDS IN DIGESTERS #2 AND #4 TO COUNTY LANDFILL	1,500	TON	\$	\$
	DISCRETIONARY WORK (USED ONLY WITH COUNTY APPROVAL)				\$85,000.00
	TOTAL PRICE FOR BID "B" - Based on Completion Time of 330 Calendar Days				\$

Bidder Name: _____

Authorized Signature: _____



4 @ MT4JM-18 JET MANIFOLD AERATION SYSTEMS
SUBMITTAL DATA

FOR

MANATEE COUNTY SWWRF
Bradenton, Florida

MTS JOB NO. M13133

10 September 2013

MTS LOCAL REPRESENTATIVE

ENVIROSALES OF FLORIDA, INC.

Attn: Chuck Hlavach
4742 Old Farm Road
Sarasota, Florida 34233 USA
Tel: (941) 343-9244
Fax (941) 343-9245
Email: chuck@envirosalesofflorida.com

TABLE OF CONTENTS

- I. SYSTEM DESCRIPTION
- II. MATERIAL SPECIFICATION
- III. PUMP INFORMATION
- IV. BLOWER INFORMATION
- V. PROJECT DRAWINGS

I. SYSTEM DESCRIPTION

The MTS Jet Aeration System is designed to provide oxygen transfer and mixing for the specified application described in the following Design Parameters and Summary located in this section.

The aeration system equipment supplied by MTS for this project includes a total of four (4) MT4JM-18 jet aeration manifold systems (1 for each tank), four (4) Sulzer APT52-14 liquid recirculation pumps, and four (4) Aerzen GM035S positive displacement blower packages..

The jet aeration manifold system recirculates the liquid contents of the tank using a submersible recirculation pump. As the liquid enters the jet aeration manifold, it is dispersed into the jet aeration nozzles which consist of a primary (inner) and secondary (outer) jet nozzle. As the liquid passes through the primary nozzle, it comes in contact with the low pressure air supplied by the Sutorbilt blowers that is passing through the secondary jet nozzle. The result is a fine bubble stream discharged horizontally across the bottom of the tank at equally spaced intervals. This provides oxygen transfer and mixing throughout the aeration tanks.

Refer to the following MTS Design Parameters and Summary for additional design criteria.

**MTS - MASS TRANSFER SYSTEMS
JET AERATION SYSTEM DESIGN FOR
SWWRF NITROGEN REMOVAL AND DIGESTER MODIFICATIONS
MANATEE COUNTY, UTILITIES
MTS #M213133**

DESIGN PARAMETERS

Process	AERATION	
Number of Tanks/Basins	1	
	<u>ENGLISH</u>	<u>METRIC</u>
Total SOR	316 lb O ₂ /hr	143 kg O ₂ /h
Circular Tank		
Diameter	75 ft	22.9 m
Liquid Depth	25 ft	7.6 m
Volume Per Tank/Basin	826,196 gal	3,127 m ³
Total Aeration Volume	826,196 gal	3,127 m ³

Note: Some of the above parameters were supplied to or assumed by MTS and should be reviewed.

DESIGN SUMMARY

MTS Jet Aerators Required	1 @ MT4JM-18	1 @ MT4JM-18
Air Flow Rate per Aerator	792 SCFM	1,345 std m ³ /hr ¹
Total Air Flow Rate	792 SCFM	1,345 std m ³ /hr
Air Pressure Required at Manifold ²	10.2 psig	0.70 bar gauge
Standard Oxygen Absorption Efficiency	38.5 %	38.5 %
Liquid Flow Rate per Aerator	6,588 gpm	416 L/s
Total Liquid Flow Rate	6,588 gpm	416 L/s
Liquid Pressure Required at Manifold ³	16 ft TDH	4.9 m TDH
Total Blower Power ⁴	46.6 bhp	34.7 bkW
Total Pump Power ⁵	37.4 bhp	27.9 bkW
Total Power	84 bhp	62.6 bkW
Standard Aeration Efficiency	3.76 lb O ₂ /bhp-hr	2.29 kg O ₂ /bkW-h
Power Density	102 bhp/MG	20 bkW/1000 m ³

¹ A standard m³ of air defined at 20°C, 1 atm, and 36% RH.

² Does not include losses in the out-of-basin piping (typically 1 psi/0.07 bar).

³ Does not include losses in out-of-basin piping (typically 2 ft /0.6 m).

⁴ Assumes blower adiabatic efficiency of 70%.

⁵ Assumes pump hydraulic efficiency of 80%.

II. MATERIAL SPECIFICATION

JET AERATION MANIFOLD

- The jet manifold will be fabricated from machine filament wound fiberglass reinforced plastic (FRP) using an isophthalic fiberglass resin or equivalent. All fabrication will be performed in accordance with ANSI/ASTM Specification D-2996-088 and the National Bureau of Standards Specification PS 15-69.
- Each jet nozzle consists of an inner (primary) nozzle and an outer (secondary) nozzle. Each nozzle will be fabricated in accordance with the National Bureau of Standards Specification PS 15-69. All jet aeration nozzles are fabricated of fiberglass reinforced plastic (FRP) using an isophthalic fiberglass resin or equivalent. Each jet nozzle will have a nexus liner for added abrasion protection.

PIPE SUPPORT BRACKETS

- All pipe support brackets will be constructed of Type 316L stainless steel conforming to ASTM-A240 (plates) and ASTM-A312, ASTM-A376 (pipe). All welds will be continuous full penetration fillet style welds. All sharp edges and burrs will be removed. Pipe support brackets will require field installation of support base plates to allow field adjustment during installation.

GASKET MATERIAL

- All gasket material and pipe support clamp liners will be 1/8" thick BUNA-N elastomer conforming to ASTM specifications. Gasket material will be field installed between all flange connections and around pipe at all support bracket locations.

HARDWARE

- All cap screws, hex nuts, lock washers and flat washers supplied to assemble the liquid supply piping will be Type 316 stainless steel conforming to ASTM A193 Grade B8M. All cap screws, hex nuts, lock washers and flat washers supplied to assemble the pipe support brackets located inside the tank will be Type 18-8 stainless steel conforming to ASTM A193 Grade B8M. All cap screw heads and hex nuts will be standard finish type.

LIQUID RECIRCULATION PUMPS

- Refer to submittal information provided in section three of this submittal for material specifications, outline dimensions, etc.

POSITIVE DISPLACEMENT AIR BLOWERS

- Refer to submittal information provided in section four of this submittal for material specifications, outline dimensions, etc.

FIBERGLASS MATERIAL SPECIFICATION M213133-FRP-SPEC-ISO

Revision:0 Date: 6/17/2013

Sheet 1 of 2

PIPE:

All piping is to be machine filament wound fiberglass reinforced plastic (FRP) conforming to ANSI/ASTM specification D-2996. The resin is to be a thermosetting Isophthalic polyester resin with ultra-violet protection. The resin shall remain natural in color (No Pigment Allowed). A 10 to 20 mil "C" veil liner shall be applied to the inside and outside of all piping.

Filament Winding uses continuous roving reinforcement to achieve efficient utilization of fiber strength. Roving or single strands under tension are fed from a creel through a resin bath and wound on a suitably designed mandrel. The winding machine lays down glass in a predetermined pattern to give maximum strength in the directions required. When the desired number of layers have been applied, the wound mandrel is cured. When curing is complete, the mandrel is removed; the pipe is finished and ready for assembly.

JET NOZZLES:

The jet nozzles are to be fabricated from hand-lay-up fiberglass reinforced plastic using a Dow Derakane 470 vinyl ester resin (or equal) with ultra-violet protection. The resin shall be natural in color (No Pigment Allowed). A 10 to 20 mil "C" veil liner, shall be applied to the inside of all primary and secondary jet nozzles. A nexus liner will also be applied to the inside of all primary and secondary jet nozzle for added abrasion protection. All hand-lay-up will be performed in accordance with the National Bureau of Standards specification PS 15-69.

FLANGES AND FITTINGS:

All flanges and fittings will be fabricated from hand-lay-up fiberglass reinforced plastic using a Isophthalic polyester resin with ultra-violet protection. The resin shall be natural in color (No Pigment Allowed). A 10 to 20 mil "C" veil liner shall be applied to the inside and outside of all flanges and fittings. A nexus liner will be applied above the inside 10 to 20 mil "C" veil liner on all flanges and fittings for added abrasion protection. All hand-lay-up will be performed in accordance with the National Bureau of Standards specification PS 15-69. All flange connections are to be flat face ANSI 150# style configuration straddling centerlines, unless noted otherwise.

CONSTRUCTION AND MANUFACTURING:

All sharp edges, cuts and burrs are to be sanded and resin coated to seal exposed edges. All flange connections are to straddle the vertical and horizontal centerlines of the equipment in the installed position. Whenever possible, flange and fitting to pipe joints are to be hand-layup and resin coated internally so there are no internal seams. All external areas of the fiberglass equipment are to be resin coated after completion of all assembly and hand-lay-up procedures.

FIBERGLASS MATERIAL SPECIFICATION M213133-FRP-SPEC-ISO

Sheet 2 of 2

PHYSICAL PROPERTIES OF PIPE:

Hand-Lay-Up		Filament Winding	
Density (lb./cu. In.)	0.050 to 0.061	Density (lb./cu. In.)	0.064 to 0.070
Specific Gravity	1.3 to 1.7	Specific Gravity	1.7 - 2.0
Tensile Strength ASTM D.638	9,000 - 15,000	Tensile Modulus in Fiber Direction	4.5×10^6 psi
Flexural Strength ASTM D.790	16,000 – 22,000 psi	Tensile Strength in Fiber Direction	59,000 psi
Flexural Modulus ASTM D.790	$0.8 \times 10^6 - 1.0 \times 10^6$	Typical Winding Angle	54° 45°
Compressive Strength Edge ASTM D.695	18,000 – 24,000 psi	Compressive Strength	31,500 psi
Impact Strength IZOD ASTM D.256	30 – 40 ft. – lbs.	Impact	40 – 50 ft./lb.
Machinability	Good	Machinability	Good
Barcol Hardness	25 – 40	Barcol Hardness	25 – 40
Rockwell “M” Scale ASTM D.785	90 - 105		

Electrical Properties		Thermal Properties	
Dielectric Strength at 20° C (volts/mil) (step-by-step method)	450 - 500	Thermal Conductivity (BTU/sq. ft./hr./°F/in.) at 212° F	1.2 – 2.0
Electricity Resistivity	Infinite	Linear Co-efficient of Thermal Expansion (in./in/ deg. F) at 32 - 212° F	Hand Layup $15 - 20 \times 10^{-6}$ Filament Wound $6 - 10 \times 10^{-6}$
Dielectric Constant	3 - 4	Heat Distortion Temperature at 264 psi ASTM D.648	120° - 180° C

III. LIQUID RECIRCULATION PUMPS

SULZER PUMPS Model APT52-14

Design Point: 6,588 GPM at 18 ft TDH

Pump Motor: 50 HP 460V / 3 Phase / 60 Hz

Quantity = 4

Pump Performance Datasheet

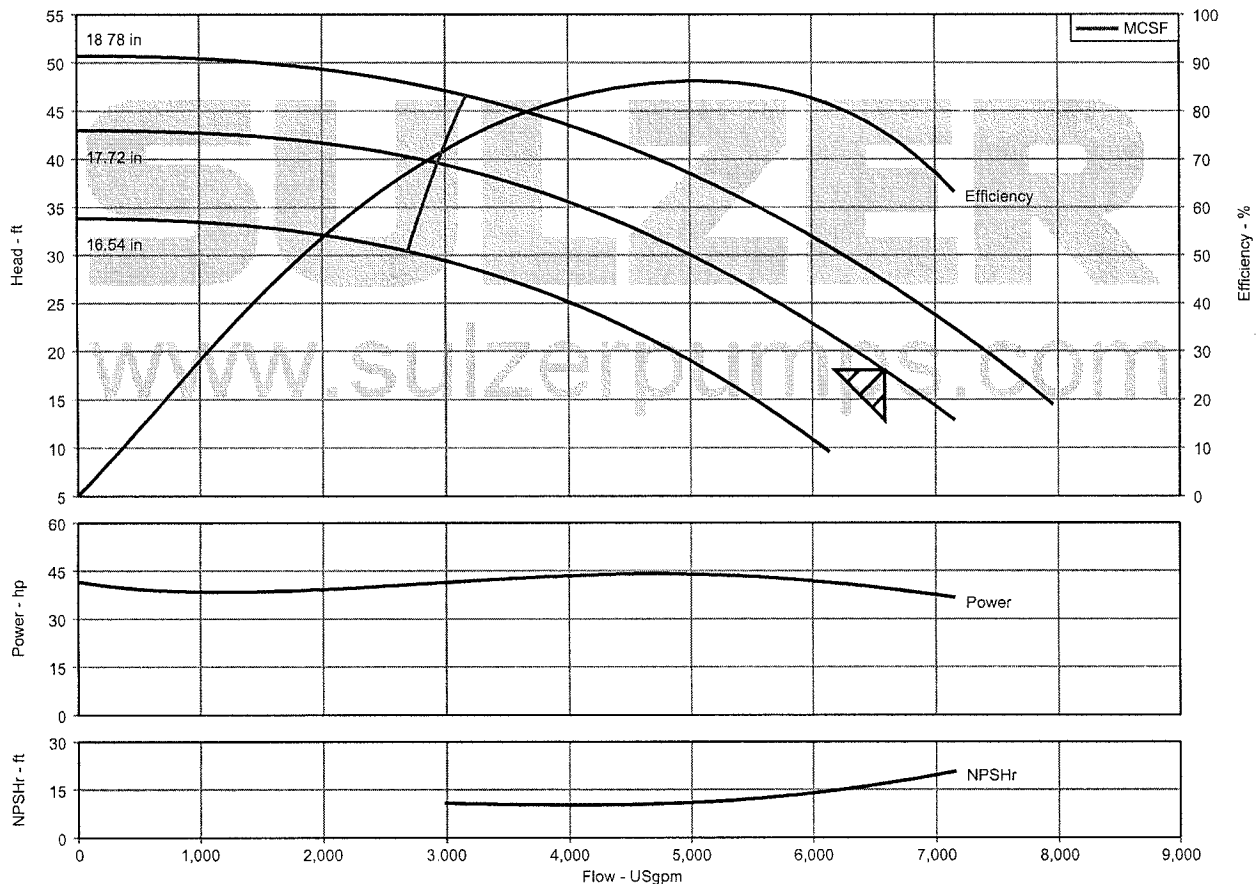
Customer	:		Sulzer Reference ID	:	
Inquiry Number/ID	:		Type / Size	:	APT 52-14 (O)
Item number	:	Default	Stages	:	1
Service	:		Based on curve number	:	K15889 Rev 1
Quantity	:	1	Date of Last Update	:	04/18/2013 3:40 PM

Operating Conditions		Liquid	
Flow, rated	: 6,588.0 USgpm	Liquid type	: Water
Differential head / pressure, rated (requested)	: 18.00 ft	Additional liquid description	:
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Solids diameter, max	: 0.00 in
NPSH available, rated	: Ample	Solids concentration, by volume	: 0.00 %
Frequency	: 60 Hz	Temperature, max	: 68.00 deg F

Performance		Material	
Speed, rated	: 710 rpm	Material selected	: 41 / J0265 ASTM A890 3A - Duplex SS
Impeller diameter, rated	: 17.72 in		
Impeller diameter, maximum	: 18.78 in		
Impeller diameter, minimum	: 16.54 in		
Efficiency	: 75.62 %		

		Pressure Data	
NPSH required / margin required	: 17.04 / 0.00 ft	Maximum casing/bowl working pressure	: 18.61 psi.g
nq (imp. eye flow) / S (imp. eye flow)	: 71 / 179 Metric units	Maximum allowable working pressure	: 232.1 psi.g
MCSF	: 2,938.3 USgpm	Maximum allowable suction pressure	: 232.1 psi.g
Head, maximum, rated diameter	: 43.01 ft	Hydrostatic test pressure	: 348.1 psi.g

		Driver & Power Data	
Flow, best eff. point (BEP)	: 5,060.6 USgpm	Driver sizing specification	: Rated power
Flow ratio (rated / BEP)	: 130.18 %	Margin over specification	: 0.00 %
Diameter ratio (rated / max)	: 94.34 %	Service factor	: 1.00
Head ratio (rated dia / max dia)	: 65.85 %	Power, hydraulic	: 29.93 hp
Cq/Ch/Ce [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00	Power, rated	: 39.59 hp
Selection status	: Acceptable	Power, maximum, rated diameter	: 44.12 hp
		Minimum recommended motor rating	: 40.00 hp / 29.83 kW

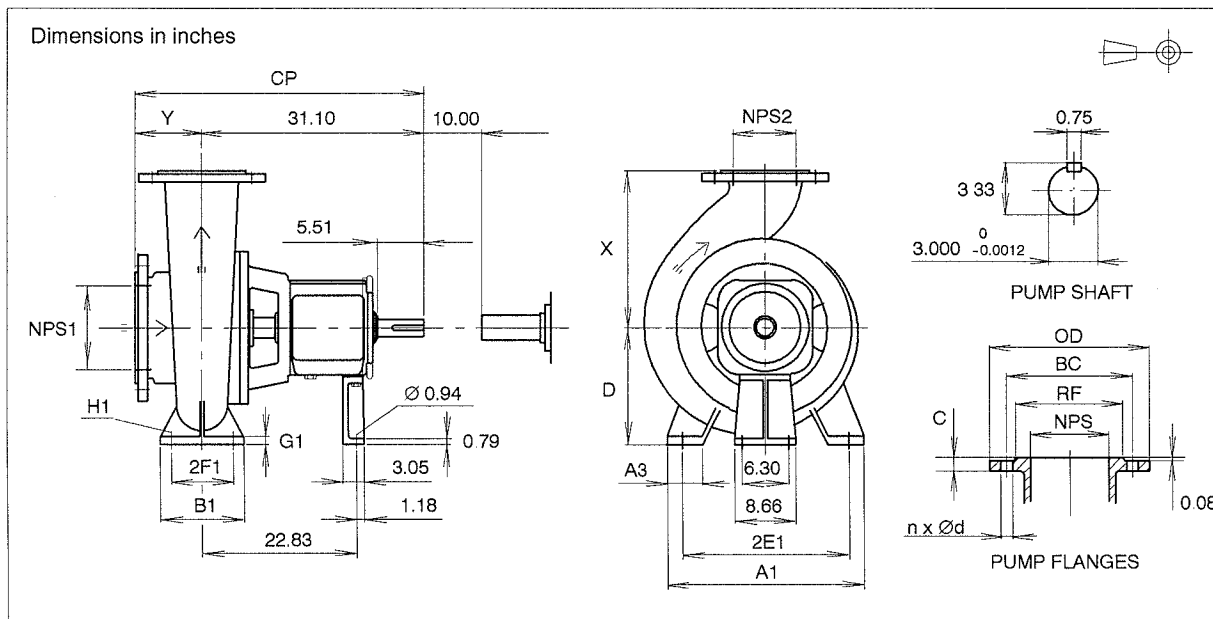


APT Process Pumps Dimensional drawing P10175

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Version 01 > / 981115 / Replaces 940314 / en / P10175

APT51-10 ... APT55-12 Bare Pump



DIMENSIONS

Type	NPS1	NPS2	CP	Y	D	X	A3	B1	2F1	A1	2E1	H1	G1	WR ² Lbft ²	Weight lb
APT51-10	12.00	10.00	38.97	7.87	17.72	22.05	3.54	9.84	7.48	22.44	19.69	1.10	0.98	23.730	960
APT51-12	14.00	12.00	40.94	9.84	17.72	26.38	3.54	9.84	7.48	22.44	19.69	1.10	0.98	30.489	1250
APT52-14	16.00	14.00	42.12	11.02	22.05	31.50	4.33	12.40	9.84	26.77	23.62	1.10	1.18	40.341	1650
APT52-16	16.00	16.00	42.12	11.02	24.80	33.46	5.31	15.75	12.40	37.01	33.46	1.38	1.18	61.698	1900
APT53-4	8.00	4.00	38.19	7.09	15.75	19.69	3.54	9.84	7.48	22.44	19.69	1.10	0.98	16.611	780
APT53-6	10.00	6.00	38.19	7.09	15.75	19.69	3.54	9.84	7.48	22.44	19.69	1.10	0.98	17.798	850
APT53-8	10.00	8.00	38.19	7.09	15.75	22.05	3.54	9.84	7.48	22.44	19.69	1.10	0.98	28.476	1100
APT53-10	12.00	10.00	38.97	7.87	17.72	24.80	3.54	9.84	7.48	22.44	19.69	1.10	0.98	37.968	1250
APT53-12	14.00	12.00	40.94	9.84	19.69	26.38	3.54	9.84	7.48	22.44	19.69	1.10	0.98	45.087	1350
APT54-16	20.00	16.00	45.08	13.98	24.80	33.46	5.31	15.75	12.40	37.01	33.46	1.38	1.18	85.428	2300
APT54-20	20.00	20.00	45.08	13.98	27.95	39.37	5.31	15.75	12.40	37.01	33.46	1.38	1.18	97.293	2600
APT55-8	12.00	8.00	38.97	7.87	19.69	24.80	4.33	12.40	9.84	26.77	23.62	1.10	1.18	73.563	1750
APT55-10	12.00	10.00	39.96	8.86	19.69	27.95	4.33	12.40	9.84	26.77	23.62	1.10	1.18	75.936	1950
APT55-12	16.00	12.00	40.94	9.84	22.05	31.50	4.33	12.40	9.84	26.77	23.62	1.10	1.18	90.174	2100

DRILLING OF FLANGES

NPS	OD	RF	C	ANSI B 16.1 Class 125			ASME B 16.5 Class 150		
				BC	d	n	BC	d	n
4.00	9.02	6.10	0.94	7.50	0.75	8	7.50	0.75	8
6.00	12.01	8.35	1.00	9.50	0.88	8	9.50	0.88	8
8.00	13.78	10.47	1.12	11.75	0.88	8	11.75	0.88	8
10.00	16.93	12.60	1.19	14.25	1.00	12	14.25	1.00	12
12.00	18.90	14.57	1.25	17.00	1.00	12	17.00	1.00	12
14.00	21.26	16.50	1.38	18.75	1.12	12	18.75	1.12	12
16.00	23.82	18.98	1.44	21.25	1.12	16	21.25	1.12	16
20.00	28.74	23.03	1.69	25.00	1.25	20	25.00	1.25	20

AHLSTAR™ Process Pumps

Sectional drawing N14987

SULZER

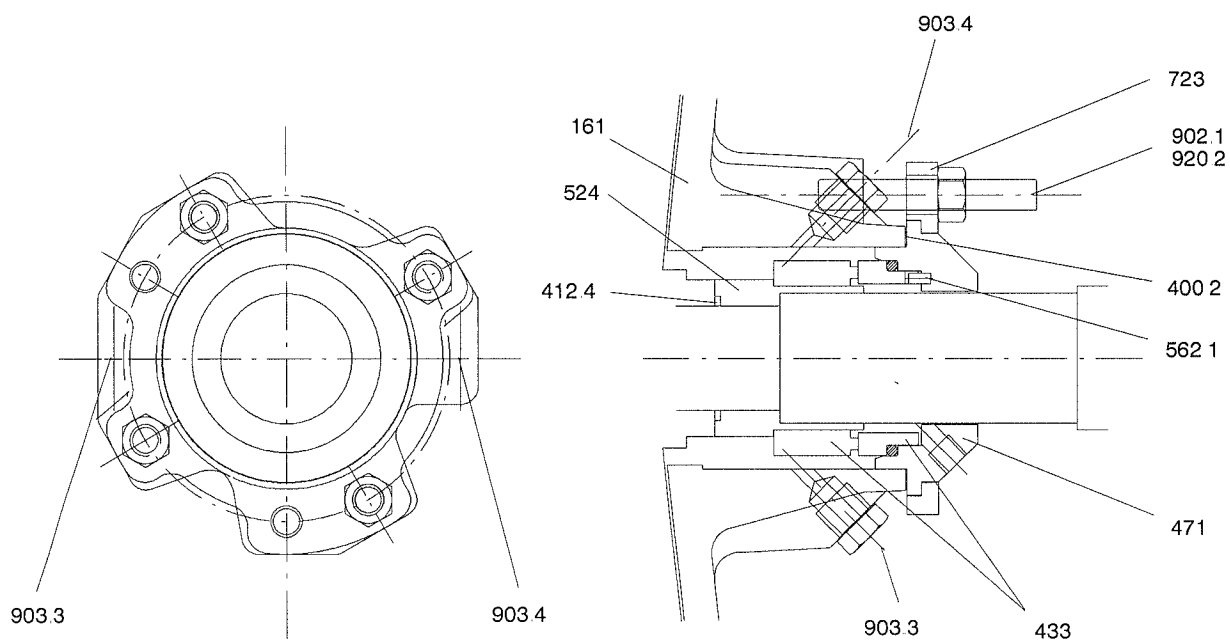
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Version 11 > / 20000301 / en / N14987

012 Shaft seal

~~APP/APT~~

Fitting ME01



CAD drawing 382381

AHLSTAR™ Process Pumps

Sectional drawing N14976

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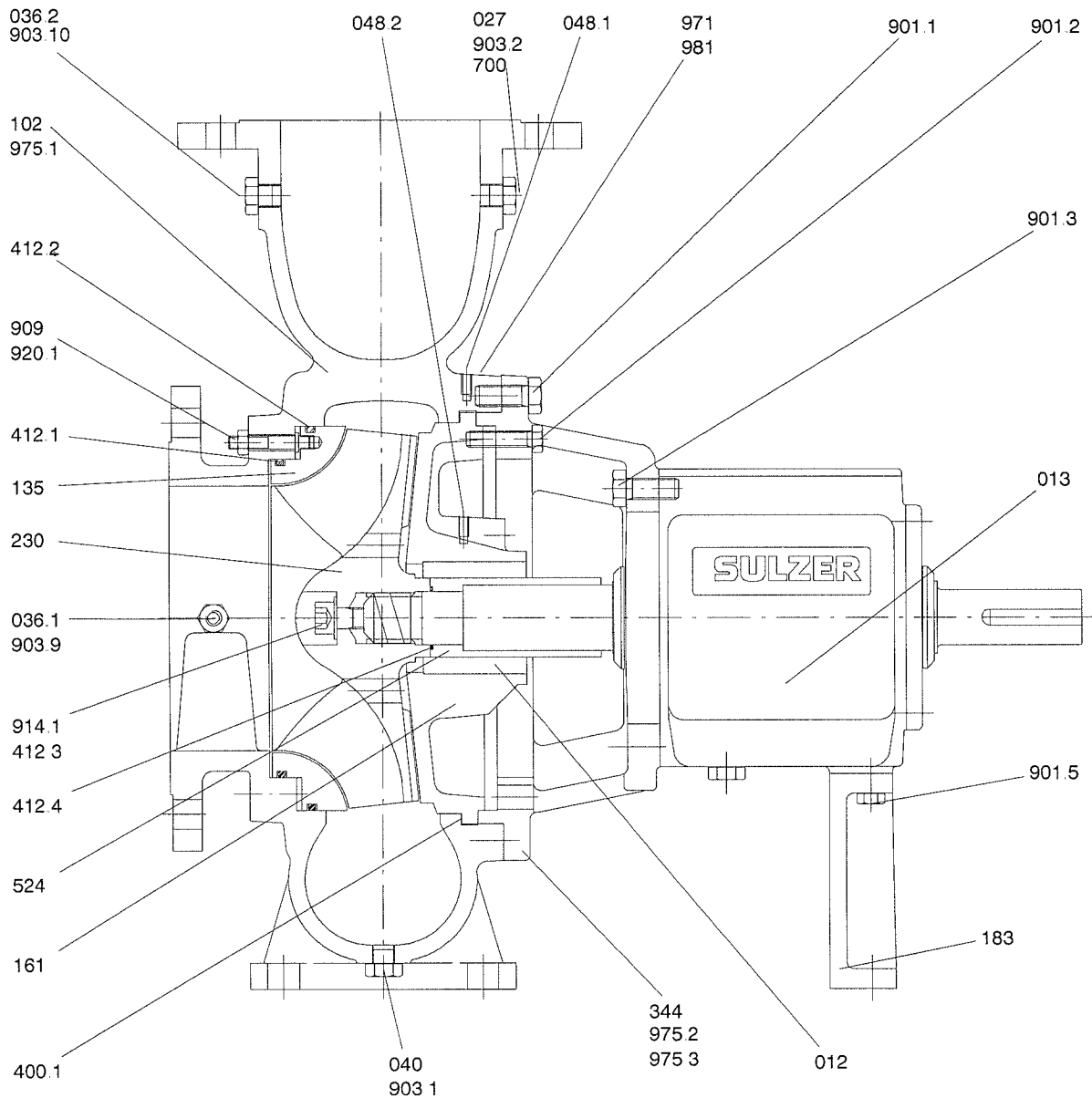
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Version 11 > / 20000301 / en / N14976

011 Pump

~~APP/APT~~

Open impeller



CAD drawing 286265

AHLSTAR™ Process Pumps

Sectional drawing N10490

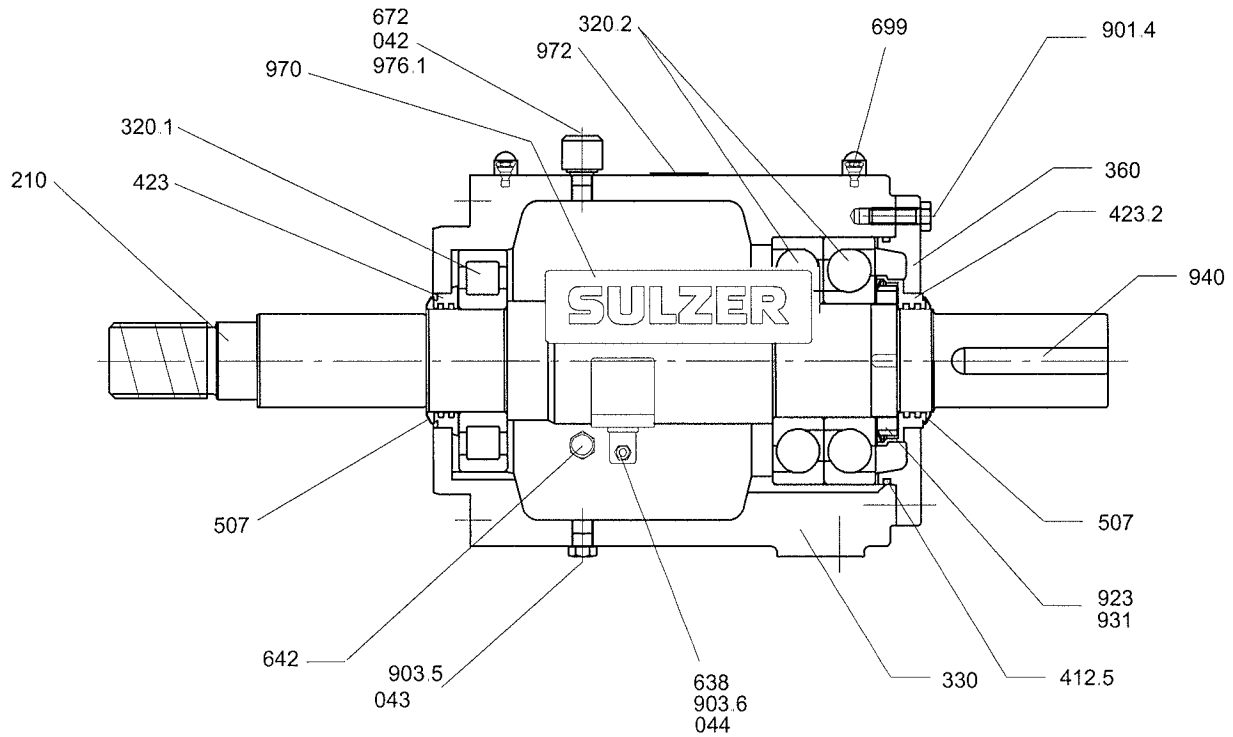
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Version 03 > / 20000301 / Replaces 960701 / en / N10490

013 Bearing unit

~~APP/APT, ARP/ART, ASP/AST, EPP/EPT, NPP/NPT, NRP/NRT, NSP/INST,
WPP/WPT, WRP/WRT, WSP/WST~~

Oil lubricated



CAD drawing 384696

APP/APT Process Pumps

Sectional drawing

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Version 11 > / 20010510 / Replaces 20000301 / en / N14962 / Page 2 (7)

Certificates

Part No.	Description	Spare part kits and sets							
		Wet end kit V01.1	Shaft seal kit V03.1	Bearing unit kit V04.1	Impeller set V51.1	Side plate set V52.1	Shaft seal set V53.1	Bearing unit set V54.1	Spare part documents
058.1	Declaration of quality								
059.1	Painting certificate								X
060	EC declaration of conformity								
076.1	Certificate, Performance								
076.2	Certificate, Material								X
076.3	Certificate, NPSH								
076.4	Certificate, Pressure pulsation								
076.5	Certificate, Finishing								X
076.6	Certificate, Washing								X
076.7	Certificate, other								X

Signs and Identifications

Part No.	Description	Spare part kits and sets							
		Wet end kit V01.1	Shaft seal kit V03.1	Bearing unit kit V04.1	Impeller set V51.1	Side plate set V52.1	Shaft seal set V53.1	Bearing unit set V54.1	Spare part documents
970	Sign			X					
971	Name plate	X							
972	Rotational arrow, Bearing unit			X					
975.1	Warning sign, Hot surface	X							
975.2	Warning sign, Rotating shaft			X					
975.3	Warning sign, Dangerous substances			X					
975.4	Warning sign, Coupling guard adjustment								
976.1	Mandatory action sign, Lubrication oil have to be added			X					
976.2	Mandatory action sign, Coupling alignment								
980	Swing jib								
981	Patent sign	X							

Connections

Part No.	Description	Spare part kits and sets							
		Wet end kit V01.1	Shaft seal kit V03.1	Bearing unit kit V04.1	Impeller set V51.1	Side plate set V52.1	Shaft seal set V53.1	Bearing unit set V54.1	Spare part documents
020	Sealing liquid inlet			X					
020.2	Sealing liquid inlet								

APP/APT Process Pumps

Sectional drawing

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Version 11 > / 20010510 / Replaces 20000301 / en / N14962 / Page 3 (7)

Part No.	Description	Spare part kits and sets							
		Wet end kit V01.1	Shaft seal kit V03.1	Bearing unit kit V04.1	Impeller set V51.1	Side plate set V52.1	Shaft seal set V53.1	Bearing unit set V54.1	Spare part documents
021	Sealing liquid outlet			X					
021.2	Sealing liquid outlet								
022	Flushing inlet			X					
022.2	Flushing inlet								
024	Cooling liquid inlet			X					
024.2	Cooling liquid inlet								
025	Cooling liquid outlet			X					
027	Discharge pipe connection	X							
028	Leakage outlet								
031.1	Outlet connection		X						
036.1	Pressure measuring	X							
036.2	Pressure measuring	X							
040	Draining of pump	X							
041	Grease filling			X					
041.2	Grease filling		X						
042	Oil filling			X					
043	Draining of lubrication			X					
044	Oil level setting			X					
048.1	Temperature measuring	X							
048.2	Temperature measuring		X						
049.1	Draining of shaft seal box		X						

Parts

Part No.	Description	Spare part kits and sets							
		Wet end kit V01.1	Shaft seal kit V03.1	Bearing unit kit V04.1	Impeller set V51.1	Side plate set V52.1	Shaft seal set V53.1	Bearing unit set V54.1	Spare part documents
102	Volute casing	X							
135	Side plate	X							
161	Casing cover		X						
161.2	Casing cover		X						
182	Foot								
183	Support foot	X							
210	Shaft			X					
230	Impeller	X							
230X	Substitute sleeve	X							
320.1	Antifriction bearing			X				X	
320.2	Antifriction bearing			X				X	
330	Bearing housing			X					
339	Bearing unit			X					
344	Adapter			X					

APP/APT Process Pumps

Sectional drawing

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Version 11 > / 20010510 / Replaces 20000301 / en / N14962 / Page 4 (7)

Part No.	Description	Spare part kits and sets							
		Wet end kit V01.1	Shaft seal kit V03.1	Bearing unit kit V04.1	Impeller set V51.1	Side plate set V52.1	Shaft seal set V53.1	Bearing unit set V54.1	Spare part documents
360	Bearing cover			X					
400.1	Gasket	X			X	X	X		
400.2	Gasket		X				X		
400.3	Gasket		X				X		
400.4	Gasket	X							
400.5	Gasket	X							
410.2	Profile gasket								
412.1	O-ring	X				X			
412.2	O-ring	X				X			
412.3	O-ring	X			X				
412.4	O-ring	X			X				
412.5	O-ring			X				X	
412.6	O-ring		X				X		
412.7	O-ring		X				X		
412.8	O-ring		X				X		
412.9	O-ring		X				X		
412.16	O-ring	X							
412.17	O-ring	X							
412.18	O-ring		X				X		
413	V-ring		X				X		
423	Labyrinth ring			X					
423.2	Labyrinth ring			X					
433	Mechanical seal		X						
435	Static seal		X				X		
442	Cooling insert		X						
451	Stuffing box housing		X						
452	Stuffing box gland		X						
456	Neck bush		X						
458	Lantern ring		X				X		
461	Gland packing		X				X		
471	Cover plate for seal		X						
471.2	Cover plate for seal		X						
471.3	Cover plate for seal		X						
475	Thrust ring		X						
475.2	Thrust ring		X						
502	Casing wear ring	X							
507	Deflector			X				X	
524	Shaft wearing sleeve		X						
542	Throttling bush		X						
542.2	Throttling bush		X						
542.3	Throttling bush		X						

APP/APT Process Pumps

Sectional drawing

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Version 11 > / 20010510 / Replaces 20000301 / en / N14962 / Page 7 (7)

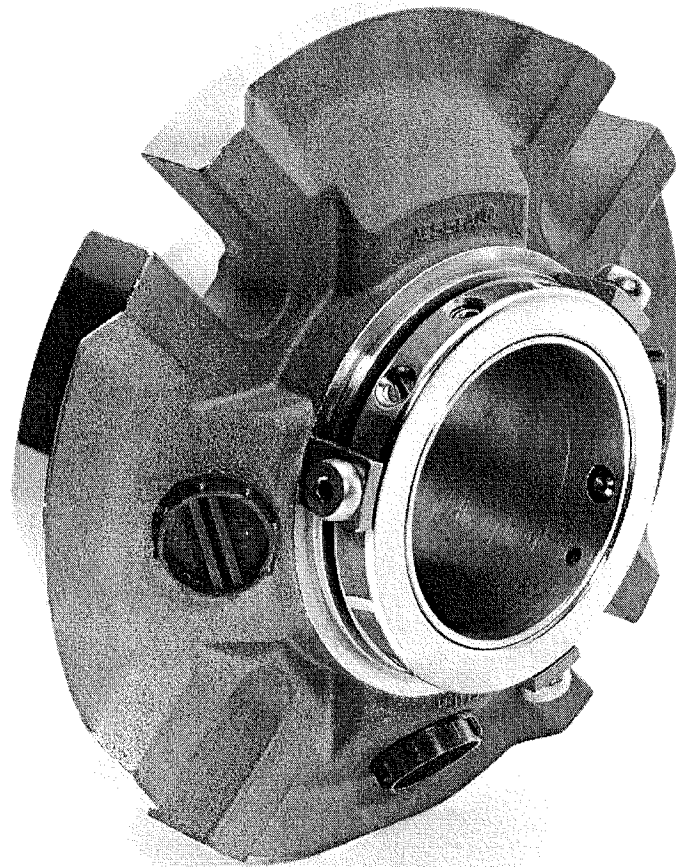
Part No.	Description	Spare part kits and sets							
		Wet end kit V01.1	Shaft seal kit V03.1	Bearing unit kit V04.1	Impeller set V51.1	Side plate set V52.1	Shaft seal set V53.1	Bearing unit set V54.1	Spare part documents
920.1	Hexagonal nut	X				X			
920.2	Hexagonal nut		X						
920.3	Hexagonal nut								
920.4	Hexagonal nut								
920.5	Hexagonal nut								
920.6	Hexagonal nut								
920.7	Hexagonal nut								
920.8	Hexagonal nut								
923	Bearing nut			X				X	
925.1	Lock nut								
931	Lockwasher			X				X	
940	Key			X					



EXPERIENCE THE EXCEPTIONAL

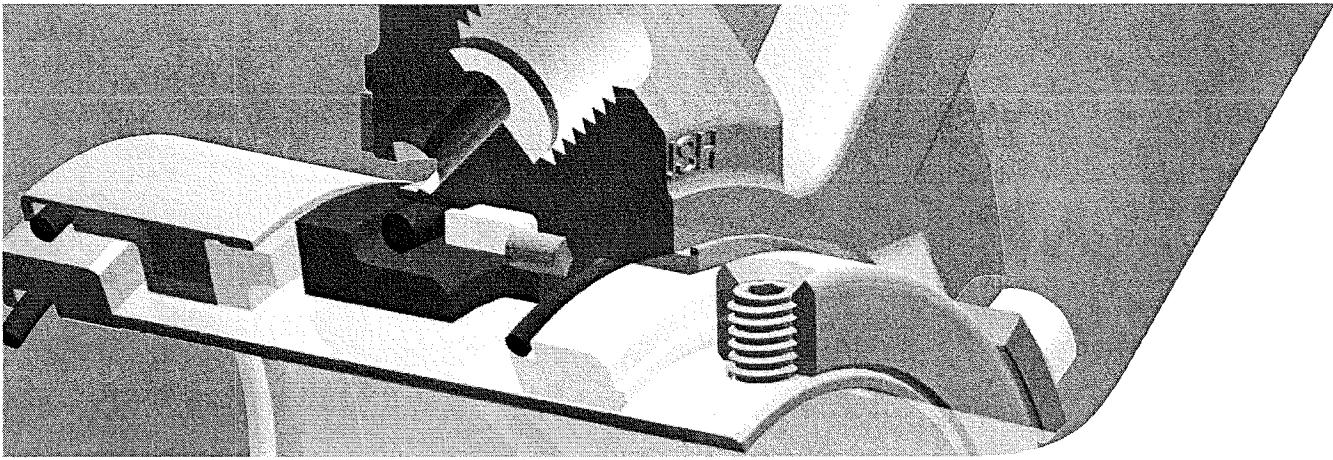
CURC™

Range of Single Cartridge Mechanical Seals



- CROC™ lip seal option
- CURE™ secondary seal option
- ANSI+ gland options
- Self-aligning faces
- Flush, quench and drain ports

www.aesseal.com



High Performance Sealing Solution

The AESSEAL CURC™, CRCO™ and CURE™ mechanical seals are part of a range of seals specifically designed to optimize the use of Silicon Carbide.

All these seals incorporate improved third generation self-aligning technology. The design objective was to minimize metal to Silicon Carbide impact, particularly on start-up.

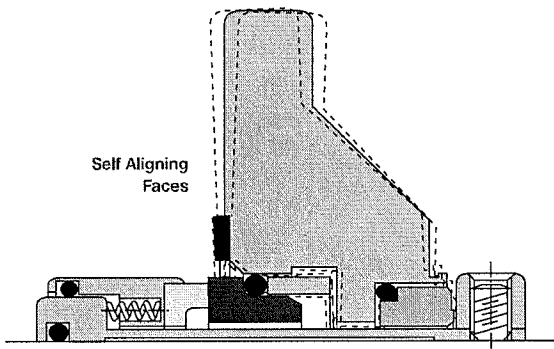
In some seal designs, impact between metal anti-rotation pins and Silicon Carbide can be sufficiently severe to induce stress cracking in the Silicon Carbide.

Silicon Carbide has many advantages when used in mechanical seals. The material has superior chemical resistance, hardness and heat dissipation properties compared to practically any other material used as a mechanical seal face. Silicon Carbide is, however brittle by nature, so the design of the self-aligning stationary in the CURC™ range of mechanical seals seeks to minimize this metal to Silicon impact on start-up.

Flexibility

There are seven modular face combinations in the range comprising: Carbon/Ceramic; Carbon/Solid Tungsten Carbide (TC); Carbon/Silicon Carbide (SiC); Carbon/Chrome Oxide and hard face options comprising: TC/TC; TC/SiC and SiC/SiC.

The benefit in the CURC™, CRCO™ and CURE™ design is extended mechanical seal life as the correct face combination can be selected for each individual application.



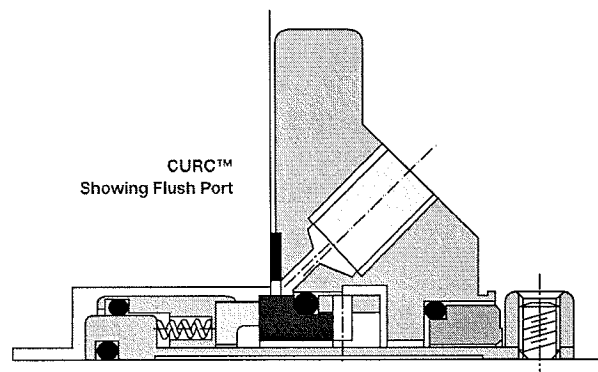
Self Aligning Faces

The next step in performance maximization is to ensure that the seal faces stay loaded and perpendicular to the axis of the rotating shaft. Insertion of gaskets in imprecise rotating equipment make this requirement critical to long-term seal life.

Self-aligning stationary designs incorporating a spring loaded rotary and a floating stationary face, address the angular misalignment problem. Building on the success of the "universal joint self-aligning system" the CURC™, CRCO™ and CURE™ developments incorporate improved third generation self-aligning technology.

Cartridge Construction

Cartridge seal construction is a proven reliability improvement. Seals pre-assembled at the factory, pressure tested and shipped as a unit dramatically increase performance as errors due to incorrect installation decline. It is no longer necessary to measure and set spring compression as assembled seals mean that faces are protected from damage during installation.



Design features

Single Seals with Environmental Control Options

General service applications are efficiently sealed with an 'O' ring mounted, balanced, self-aligning seal. The SAI™, CS™, USI™ and NSI™ component seals and the SCUSI™ and Converter II™ cartridge seals effectively seal all general service applications.

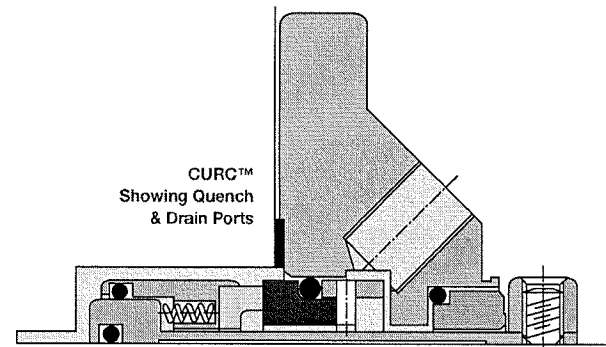
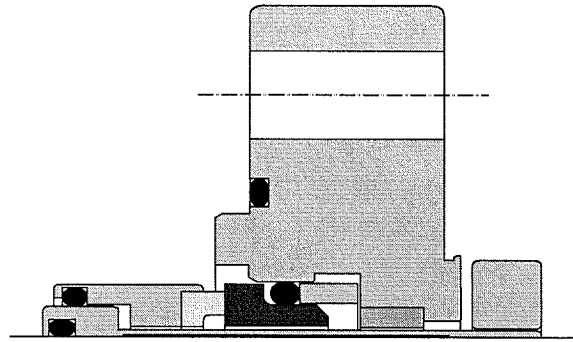
At the other end of the application spectrum, hazardous and dangerous products demand an engineered sealing approach. Double seals with closed-loop convection tank systems provide the necessary back-up protection.

Between these application extremes lie non-lubricating and/or non-hazardous fluids that alter their state with environmental changes.

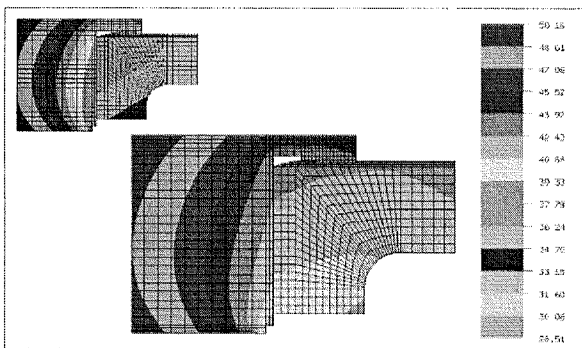
A single seal, with an API type gland provides temperature control and protection from atmospheric contact for these applications.

*This gland derivation comes from the American Petroleum Institute (API) specification.

Secondary fluids introduced through the Quench and Drain ports to the atmospheric side of the seal faces, control the environment without dilution of the process fluid. Water, steam, grease, oil and other suitable barrier fluids can be used.



*A version of the CURC™ can be supplied, with a fully machined gland, which conforms to the dimensional requirements of API 682. These can be used on applications where qualification tested, fully API 682 compliant seals are not required.



2D-Axisymmetric Finite Element Analysis review showing flatness of the seal face after shrink fit under different thermal and pressure conditions.

Finite Element Analysis and Design

With the aid of Finite Element Analysis (FEA) AESSEAL® designed a "universal joint self-aligning system". Modelling the effects of temperature, pressure and rotational shear stress were just a few of the considerations. A rigid back-up ring with radially mounted pins behind the stationary provides compensation for angular misalignment, offering higher pressure capabilities and optimum protection against anti-rotation pin shear stress. In addition, the spring loaded rotary centrifuges solids away from the seal face and resists clogging, increasing the effectiveness of the seal in slurries and some abrasives. Faces remain flat square to the shaft and suspended solids are prevented from crossing the flat seal faces.

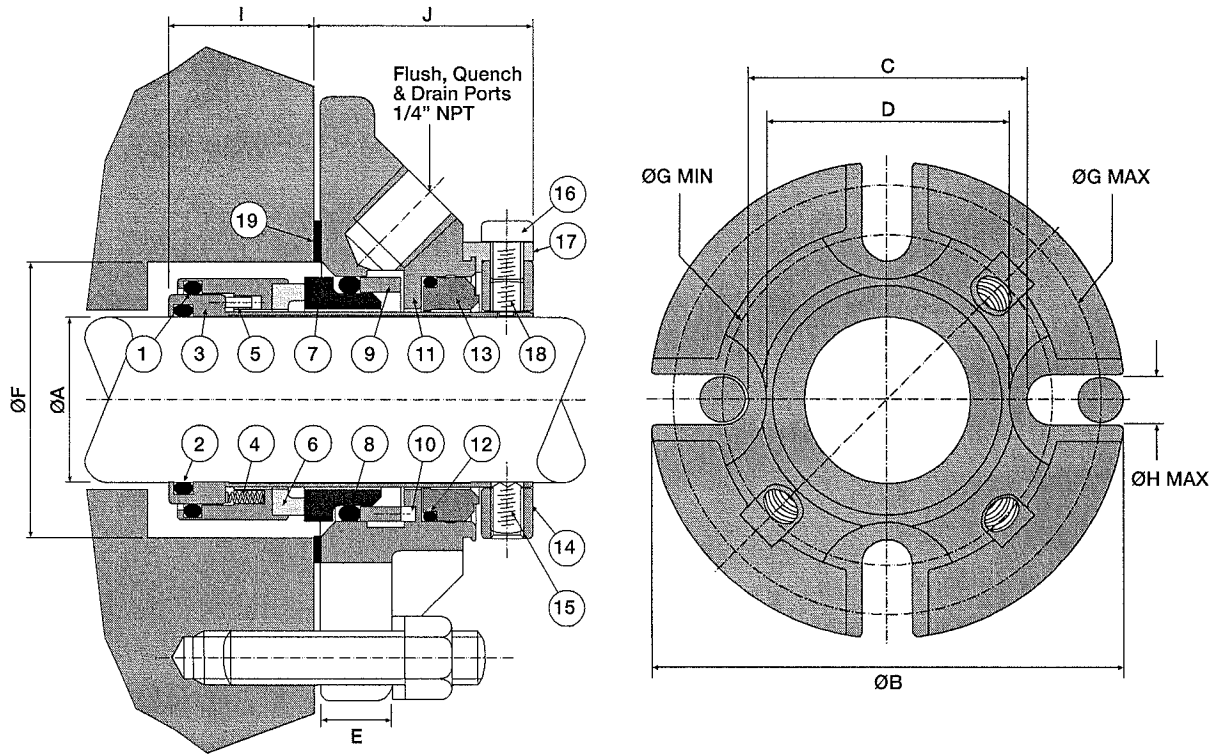
AESSEAL® Design and Testing

For every seal developed by AESSEAL®, we use state-of-the-art computational facilities and numerical tools to design and optimize seal performance prior to manufacture and testing.

These tools include Predictive Software Code developed in-house, Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD). Our numerical tools are used for seal design, performance optimization, special product application and troubleshooting. In combination with an extensive test programme the result is world-leading technology that keeps your equipment running longer.

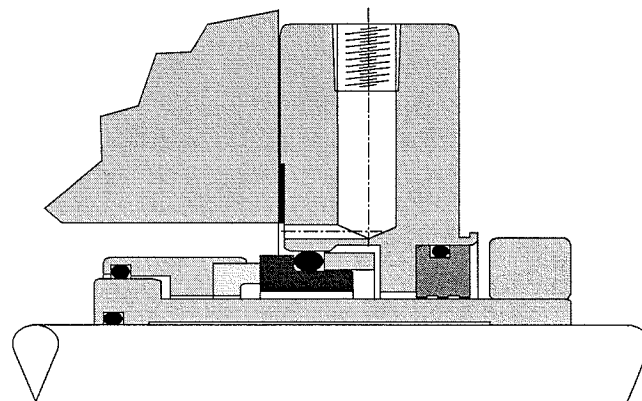
CURC™ Range

Sizes available: 1.000" - 5.000" (24mm - 125mm)



Item	Description	Material	Item	Description	Material
1	Rotary O Ring	Viton® / EPR / Kalrez® / Atlas®	11	Gland	316 Stainless Steel
2	Sleeve O Ring	Viton® / EPR / Kalrez® / Atlas®	12	R' Bush O Ring	Viton® / EPR / Kalrez® / Atlas®
3	Cartridge Sleeve	316L Stainless Steel	13	Restriction Bushing	Carbon
4	Springs	Alloy 276	14	Clamp Ring	316L Stainless Steel
5	Rotating Drive Pins	Stainless Steel	15	Drive Screws	Stainless Steel
6	Rotating Face	316L SS - Carbon / TC / SiC*	16	Clip Screws	Stainless Steel
7	Stationary Face	SiC / Ceramic** / TC	17	Radial Setting Clips	Brass
8	Stationary O Ring	Viton® / EPR / Kalrez® / Atlas®	18	Anti-Tamper Screws	Stainless Steel
9	Universal Pivot Ring	316L Stainless Steel	19	Gasket	AF 1 / GFT
10	Gland Pins	Stainless Steel			

CURC™ Range dimensions - 5.125" - 12.000" (130mm - 300mm)



CURC™ Dimensions

CURC™ Size Chart (inches)

A	B	C	D	E	ØFmin	ØFmax	ØGmin	ØGmax	ØHmax	I	J
1.000	4.125	2.125	1.937	0.519	1.625	1.937	2.687	3.562	1/2	1.125	1.590
1.125	4.250	2.250	2.063	0.519	1.750	2.062	2.812	3.687	1/2	1.125	1.590
1.250	4.375	2.375	2.187	0.519	1.875	2.187	2.937	3.812	1/2	1.125	1.590
1.375	4.375	2.500	2.312	0.519	2.000	2.250	3.062	3.937	1/2	1.125	1.590
1.500	5.000	2.812	2.562	0.644	2.250	2.375	3.375	4.437	1/2	1.125	1.752
1.625	5.000	2.812	2.562	0.644	2.375	2.500	3.375	4.437	1/2	1.125	1.752
1.750	5.500	3.187	2.812	0.644	2.500	2.750	3.750	4.937	1/2	1.125	1.752
1.875	5.500	3.187	2.812	0.644	2.625	2.875	3.750	4.937	1/2	1.125	1.752
2.000	6.000	3.562	3.063	0.644	2.750	3.000	4.125	5.437	1/2	1.125	1.752
2.000-AC	5.250	3.450	3.035	0.644	2.750	3.000	4.000	4.750	1/2	1.125	1.752
2.125	6.000	3.582	3.063	0.644	2.875	3.125	4.125	5.437	1/2	1.125	1.752
2.250	6.500	3.812	3.312	0.644	3.000	3.250	4.500	5.812	5/8	1.125	1.752
2.375	6.500	3.812	3.312	0.644	3.125	3.375	4.500	5.812	5/8	1.125	1.752
2.500	7.000	4.312	3.812	0.769	3.375	3.625	5.000	6.312	5/8	1.250	1.877
2.625	7.000	4.312	3.812	0.769	3.500	3.750	5.000	6.312	5/8	1.250	1.877
2.750	7.000	4.312	3.812	0.769	3.625	3.875	5.000	6.312	5/8	1.250	1.877
2.875	7.500	4.937	4.250	0.769	3.750	4.125	5.625	6.812	5/8	1.250	1.877
3.000	7.500	4.937	4.250	0.769	3.875	4.250	5.625	6.812	5/8	1.250	1.877
3.125	7.500	4.937	4.250	0.769	4.000	4.375	5.625	6.812	5/8	1.250	1.877
3.250	8.000	5.312	4.625	0.769	4.125	4.500	6.125	7.187	3/4	1.250	1.877
3.375	8.000	5.312	4.625	0.769	4.250	4.625	6.125	7.187	3/4	1.250	1.877
3.500	8.000	5.312	4.625	0.769	4.375	4.750	6.125	7.187	3/4	1.250	1.877
3.625	8.500	5.937	5.000	0.769	4.500	5.000	6.750	7.687	3/4	1.250	1.877
3.750	8.500	5.937	5.000	0.769	4.625	5.125	6.750	7.687	3/4	1.250	1.877
3.875	8.500	5.937	5.000	0.769	4.750	5.250	6.750	7.687	3/4	1.250	1.877
4.000	9.000	6.625	5.375	0.769	4.875	5.500	7.437	8.187	3/4	1.250	1.877
4.125	9.000	6.625	5.375	0.769	5.125	5.875	7.437	8.187	3/4	1.250	1.877
4.250	9.000	6.625	5.375	0.769	5.125	5.875	7.437	8.187	3/4	1.250	1.877
4.375	9.500	7.000	5.750	0.769	5.375	6.250	7.812	8.687	3/4	1.250	1.877
4.500	9.500	7.000	5.750	0.769	5.375	6.250	7.812	8.687	3/4	1.250	1.877
4.625	10.000	7.345	6.125	0.769	5.625	6.625	8.312	9.062	7/8	1.250	1.877
4.750	10.000	7.345	6.125	0.769	5.625	6.625	8.312	9.062	7/8	1.250	1.877
4.875	10.000	7.345	6.125	0.769	5.875	6.625	8.312	9.062	7/8	1.250	1.877
5.000	10.000	7.345	6.125	0.769	5.875	6.625	8.312	9.062	7/8	1.250	1.877

Seal sizes from 5.125" to 12.000" are designed to suit specific equipment using modular components.

Contact AESSEAL[®] technical department for dimensional information and availability.

For exotic alloy versions, add 0.125" to seal length inboard

Note that seal sizes 0.125" and above are supplied without a pivot ring

Factory repair program is available

Replacement seal kits are available

CURC™ Size Chart (mm)

A	B	C	D	E	ØFmin	ØFmax	ØGmin	ØGmax	ØHmax	I	J
24	104.8	54.0	49.2	13.2	40.0	46.0	67.0	90.5	12.0	28.6	40.5
25	104.8	54.0	49.2	13.2	41.0	49.0	67.0	90.5	12.0	28.6	40.5
28	108.0	57.2	52.4	13.2	44.0	52.3	70.3	93.6	12.0	28.6	40.5
30	111.0	60.4	55.6	13.2	46.0	55.5	73.5	96.8	12.0	28.6	40.5
32	111.0	60.4	55.6	13.2	48.0	55.5	73.5	96.8	12.0	28.6	40.5
33	111.0	60.4	55.6	13.2	49.0	55.5	73.5	96.8	12.0	28.6	40.5
35	111.0	63.5	58.8	13.2	51.0	57.5	76.6	96.8	12.0	28.6	40.5
38	127.0	71.5	65.0	16.4	57.2	60.4	85.7	114.3	12.0	28.6	44.5
40	127.0	71.5	65.0	16.4	58.0	60.4	85.7	114.3	12.0	28.6	44.5
43	139.7	81.0	71.4	16.4	61.0	69.9	95.3	127.0	12.0	28.6	44.5
45	139.7	81.0	71.4	16.4	63.5	69.9	95.3	127.0	12.0	28.6	44.5
48	139.7	81.0	71.4	16.4	66.7	73.0	95.3	127.0	12.0	28.6	44.5
50	152.4	90.5	77.8	16.4	68.0	76.2	104.3	139.7	12.0	28.6	44.5
53	152.4	90.5	77.8	16.4	71.0	76.2	104.3	139.7	12.0	28.6	44.5
55	165.1	96.8	84.1	16.4	74.0	82.5	114.3	149.2	16.0	28.6	44.5
58	165.1	96.8	84.1	16.4	76.2	82.5	114.3	149.2	16.0	28.6	44.5
60	165.1	96.8	84.1	16.4	79.4	85.7	114.3	149.2	16.0	28.6	44.5
63	177.8	109.5	96.8	19.6	85.8	92.1	127.0	160.3	16.0	31.8	47.7
65	177.8	109.5	96.8	19.6	88.9	95.3	127.0	160.3	16.0	31.8	47.7
68	177.8	109.5	96.8	19.6	92.1	98.4	127.0	160.3	16.0	31.8	47.7
70	177.8	109.5	96.8	19.6	92.1	98.4	127.0	160.3	16.0	31.8	47.7
75	190.5	125.4	108.0	19.6	98.5	108.0	142.9	173.0	16.0	31.8	47.7
80	190.5	125.4	108.0	19.6	101.6	111.1	142.9	173.0	16.0	31.8	47.7
85	203.2	135.0	117.5	19.6	108.0	117.5	155.6	182.5	20.0	31.8	47.7
90	215.9	150.8	127.0	19.6	114.3	127.0	171.5	195.2	20.0	31.8	47.7
95	215.9	150.8	127.0	19.6	117.5	130.2	171.5	195.2	20.0	31.8	47.7
100	228.6	168.3	136.5	19.6	123.9	139.7	189.9	207.9	20.0	31.8	47.7
105	228.6	168.3	136.5	19.6	130.1	149.2	189.9	208.0	20.0	31.8	47.7
110	241.3	177.8	146.1	19.6	136.5	158.8	198.4	220.6	20.0	31.8	47.7
115	254.0	186.6	155.6	19.6	142.9	168.3	211.1	230.2	22.0	31.8	47.7
120	254.0	186.6	155.6	19.6	142.9	168.3	211.1	230.2	22.0	31.8	47.7
125	254.0	186.6	155.6	19.6	149.2	168.3	211.1	230.2	22.0	31.8	47.7

Seal sizes from 130mm to 300mm are designed to suit specific equipment using modular components. Contact AESSEAL[®] technical department for dimensional information and availability.

For exotic alloy versions, add 3" to seal length inboard

Note that seal sizes 6.125" and above are supplied without a pivot ring

Factory repair program is available

Replacement seal kits are available

SIEMENS

NEMA Motor Data

Part Number: 1LA03264ES41

J751305005/PB

Nameplate Data				Bearing Data	
Type	RGZEESD	Rating	Cont	DE Bearing Size	6312
HP	50	Ins. Class	F	DE Bearing Type	Ball Bearing
Voltage	460	S F	1.15	DE AFBMA	60BC03JP3
Amps	/ 58	Amb. Temp	40 deg C	ODE Bearing Size	6312
FL RPM	1780	Temp. Rise	Class B	ODE Bearing Type	Ball Bearing
FL Efficiency	94.5%	kVA Code	G	ODE AFBMA	60BC03JP3
FRAME	326T	NEMA Des	B		
DE AFBMA	60BC03JP3	Mtr WT	700		
ODE AFBMA	60BC03JP3	Hertz	60 Ph 3		

Typical Performance Data					
Load	No Load	1/2	3/4	Full Load	
Efficiency		94.8%	95.0%	94.5%	LRA 363
Power Factor		0.74	0.82	0.85	
Current (A)	19	33.4	45.1	58	

Mechanical Data					
SAFE STALL TIME	HOT (s)	22	COLD (s)	45	
Rtr wt (lbs)	136	Rtr WK2		Ext Load Inertia (WK2) Capability	680 lb-ft²
FLT (ft-lbs)	147	LRT	170%	BDT	230%

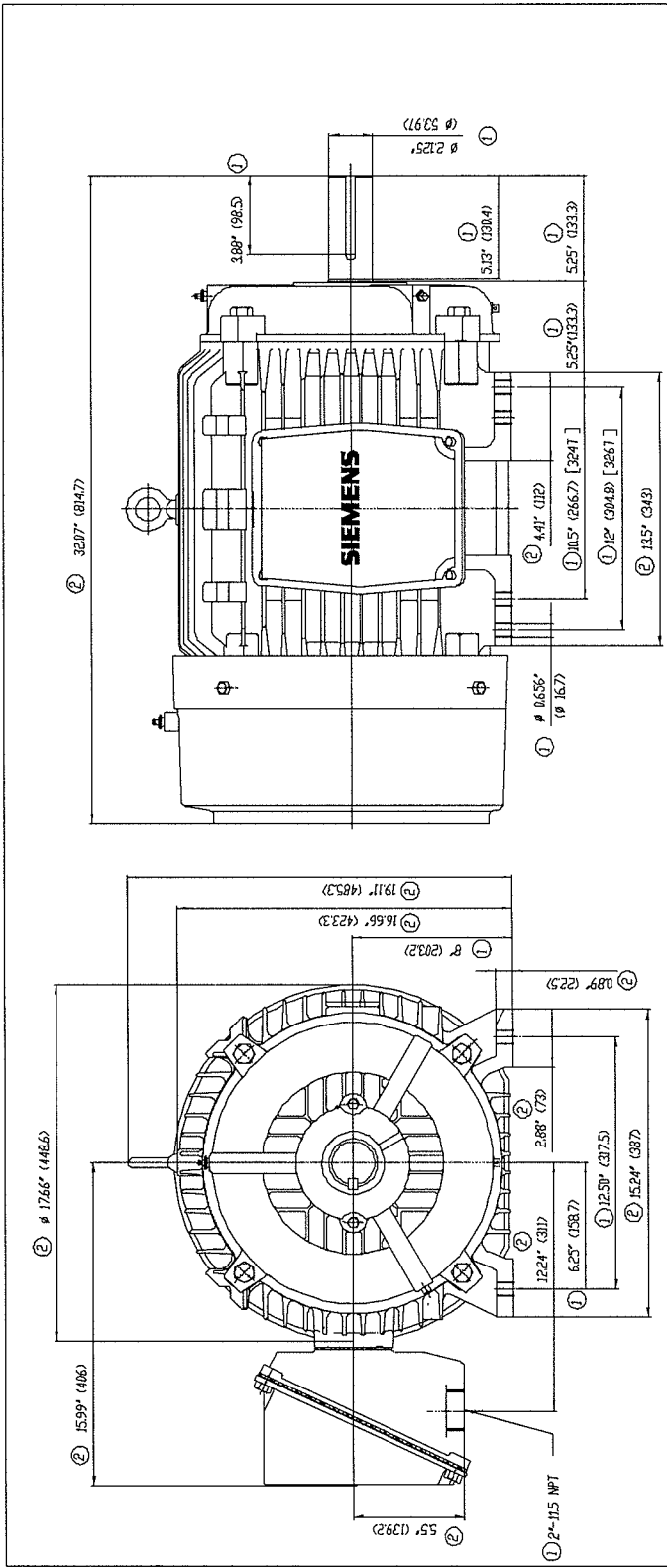
Typical Noise Data										
A-weighted Sound Pressure Level dB(A) at 3 feet	Octave Band Center Frequencies Hertz (Hz)									
	63	125	250	500	1000	2000	4000	8000	SPL	70
	22	40	51	61	60	68	54	41	SPwrL	80

Wiring Connection Information					
Description:	Voltage	L1	L2	L3	Connected Together
3 PHASE - 3 LEAD - DELTA	---	---	---	---	---
	HIGH	T1	T2	T3	---

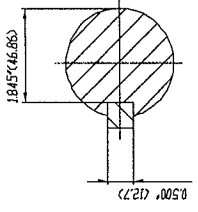
Lubrication Information			
Manufacturer:	Mobil Polyrex EM or equal	DE Capacity (oz.)	5.5
Type:	Polyurea grease	ODEnd Capacity (oz.)	5.5
Relubricate bearings every six months (more frequent if conditions require). See Instruction Manual.			

Recommended Spare Parts List			
Fan Housing	3MSP-720-114-901	Drip Cover	Not applicable
Fan Grid	Not applicable	DE Bearing Part #	51-380-865-012
Fan	51-817-700-005	ODE Bearing Part #	51-380-865-012

Data is subject to change without notice.



- ① Tolerances according to NEMA Std.
- ② All these dimensions corresponding to assemblies and castings shall have a tolerance as per DIN standard 1686-613 19



CERTIFIED PRINT			
DESIGNER	DATE	BY	AI
CHKD	VAL	BY	SI
APP	TIME		
PR	DATE		

Tolerance in mm according to DIN 1686-613-19	
to 18	± 4.5
Over 18 to 30	± 4.7
Over 30 to 50	± 5
Over 50 to 80	± 5.5
Over 80 to 120	± 6
Over 120 to 180	± 6.5
Over 180 to 250	± 7
Over 250 to 315	± 7.5
Over 315 to 400	± 8
Over 400 to 500	± 8.5
Over 500 to 630	± 9.5
Over 630 to 800	± 10

Quantity	Parts and Measure	Drawing No.	Material	Weight
14 (3) (2) (2)	Motor	Norm. No.		Lbs.
	Dimensions in inches			
	European Projection			
	Keyseat			
	Name	Dimension Drawing NEMA		Scale
	Date	07/20/03		M/D
	Checked	Gagliardi		
	Star. dia.	Type: R62EE50		
		3MSE 720 1155		2 / 2
		SIEMENS		
		GUADALAJARA FACTORY		
		Ref. 3MSE 720 0650		Replace.

Thermal Protective Devices

Thermostats (Klixons*)

Thermostats use a snap-action, bi-metallic, disc-type switch to open or close a circuit upon reaching a pre-selected temperature. When heated, the stresses in the disc cause it to reverse its curvature instantaneously when the bi-metal reaches a predetermined temperature. The action of the disc opens or closes a set of contacts in an energized control circuit. Thermostats are available with contacts for normally open or normally closed operation, but the same device cannot be used for both.

Thermostats are precalibrated by the manufacturer and are not adjustable. The discs are hermetically sealed and are placed on the stator coil end turns. A thermostat can either energize an alarm circuit, if normally open, or de-energize the motor contactor, if normally closed and in series with the contactor. Since thermostats are located on the outer surface of the coil end turns, they sense the temperature at that location. Thermostats are not considered suitable protection for stall or other rapidly changing temperature conditions.

For 140-250 frames, the trip temperature is set at 150°C; for 280 frames & up, the trip temperature is set for 180°C.

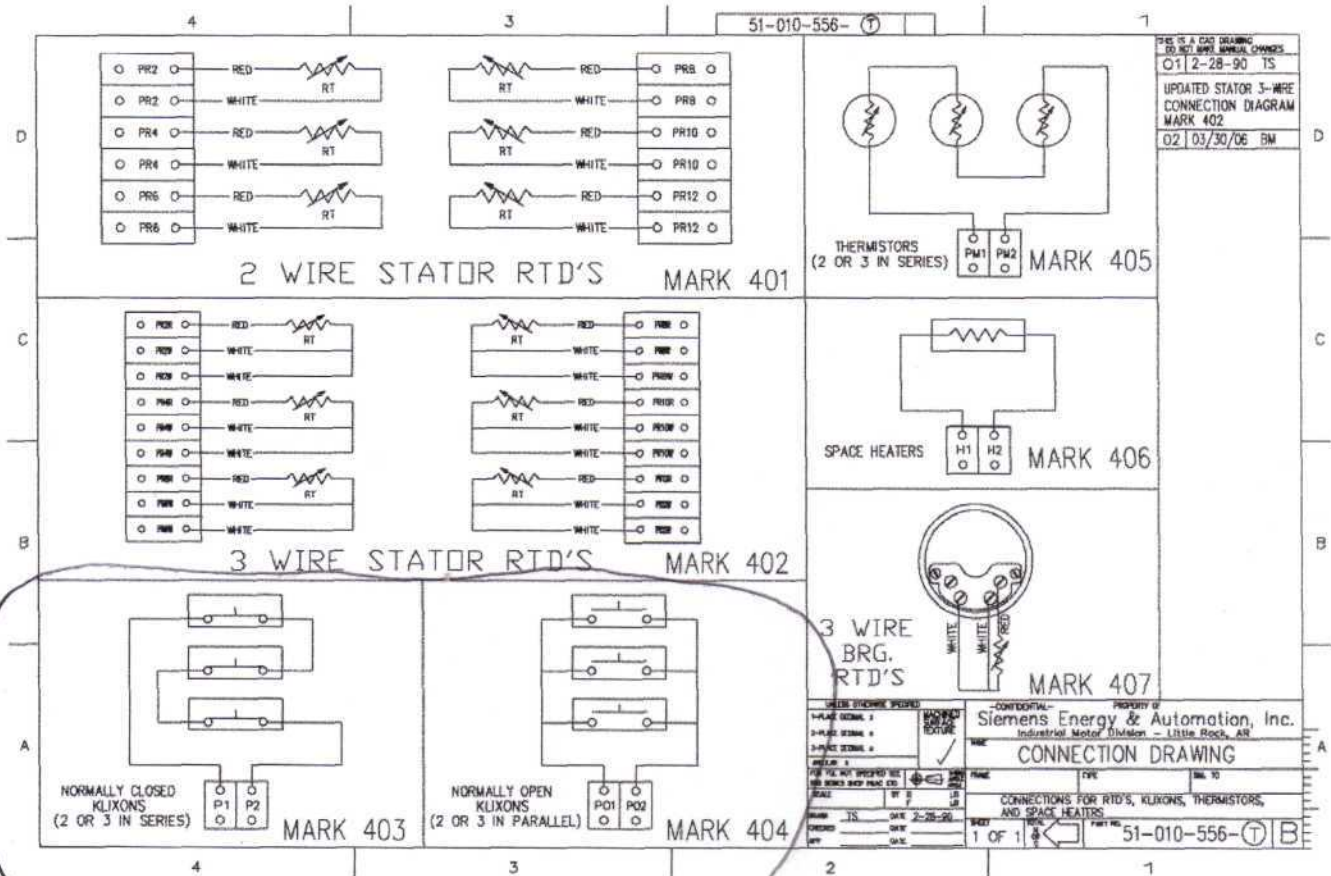
Thermostat leads will normally be brought to the main conduit box of low voltage (600 volts and below), but can optionally be terminated in a condulet or auxiliary terminal box.

Thermostats are available for all NEMA frame size motors.

Thermostats are standard on all NEMA size explosion-proof and dust-ignition-proof motors.

*Klixon is a registered trademark of Texas Instruments, Inc.

Wiring Diagrams



IV. POSITIVE DISPLACEMENT BLOWERS

Roots EasyAir X2 Blower Packages

Design Point: 940 SCFM at 11.7 PSIG discharge pressure

Blower Motor: 75 HP 460V / 3 Phase / 60 Hz

Quantity = 4



Submittal

Manatee County Southwest WWTP

Positive Displacement Blowers

Spec Section 44 45 18

Contractor

**Mass Transfer Systems
23 Walpole Park South
Walpole, MA 02081
508-660-9150 (tel)
508-660-9151 (fax)**

Manufacturer/Service/Parts

**Aerzen USA Corp.
108 Independence Way
Coatesville, PA 19320
800-444-1692 (tel)
610-380-0278 (fax)
www.aerzenusa.com**

Blowers • Compressors • Vacuum Pumps

108 Independence Way Coatesville, PA 19320 USA

Telephone: (610) 380-0244 Fax: (610) 380-0278
inquiries@aerzenusa.com www.aerzenusa.com



One Step Ahead

May 23, 2013

Mass Transfer Systems
23 Walpole Park South
Walpole, MA 02081

RE: Clarifications to Specifications for Mass Transfer Systems project no.M21077
Manatee County Southwest WWTP

COMMENTS TO SPEC SECTION 44 45 18 Blowers and Accessories

2.04 A. The blowers provided for the Aerated Sludge Holding Tanks shall be provided with a special sound attenuating enclosure that will limit the sound to a maximum level of 75 dBA from each blower when measured at a distance of 3 feet in free-field conditions.

2.04 B. Not possible to guarantee onsite.

2.05 F. Noise suppression devices shall be provided such that the noise level measured at 3 feet from each blower shall not exceed 80 dBA in free-field conditions.

2.07 F. 14. Each package shall be supplied with one check valve that shall be installed on the discharge line. It shall be of the full-bore low pressure-drop, flapper type design with a steel body, and steel flap embedded in EPDM with full-contact seal.

2.07 G. By Others

2.09 C. By Others

Regards,

Jill Gouert
Project Administrator
Aerzen USA



Aerzen USA Project:
SO-13-01264

Customer:
Mass Transfer Systems

Purchase Order No.
12112

Project:
Manatee County Southwest
WWTP

SECTION 1

Aerzen Blower Model GM 35S
Performance Data
Bill of Material
General Arrangement Drawing
Pressure Curves

SECTION 2

Blower Literature

SECTION 3

Blower Package Accessories

SECTION 4

Blower Instrumentation

SECTION 5

Motor Spec
Motor Data

SECTION 6

Corrosion Protection/Paint Spec

SECTION 7

Warranty Conditions & Terms of Sale

SECTION 1



Aerzen USA Corporation

108 Independence Way – Coatesville, PA 19320

Tel: (610) 380-0244 Fax: (610) 380-0278

Service Hotline (800) 444-1692

e-mail: Aerzen@AerzenUSA.com website www.aerzenusa.com

Job Specific Data Package

DATE

Aerzen Job #

Page

10-Sep-12

SO-13-01264

1 of 3

Revision Letter

-

CUSTOMER	Mass Transfer Systems	
CUSTOMER PO #	12112	
EQUIPMENT IDENTIFICATION	Jet Mixing/Aeration Systems 830-BLR-003-01, 830-BLR-004-01, 830-BLR-007-01, 830-BLR-0010-01	
BLOWER MODEL #	GM 035S -00	SERIAL # -
PACKAGE DESCRIPTION	Pressure Unit w/ Enclosure	ORDER QTY 4
PROCESS CONNECTIONS	150# ANSI Discharge Connection & No Inlet Connection	
TOTAL PACKAGE WEIGHT	3424 lbs.	F3 Conduit Box Location
DOCUMENTATION	GB-005452	general arrangement drawing
	IA-004545	motor cable routing
	G4-006	operation & maintenance manual
	A2-001-USA	warranty terms & conditions
PERFORMANCE DATA		
MEDIUM	AIR	
INLET CAPACITY	1001	ICFM
INLET CAPACITY	940	SCFM
INLET PRESSURE	14.68	PSIA
DISCHARGE PRESSURE	11.7	PSI
INLET TEMPERATURE	95	°F
DISCHARGE TEMPERATURE	244	°F
NOMINAL BLOWER SPEED	2920	RPM
POWER @ BLOWER SHAFT	65.7	BHP
MOTOR RATING	75	HP
MOTOR SPEED	1775	RPM
SOUND PRESSURE LEVEL *	73	dB(A)
* measured in free field at 3 foot distance from the outline of the unit (tol. +/- 2 dB(A))		

Tolerance on Power & Flow is +/- 5%



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Job Specific Data Package

DATE	Aerzen Job #	Page
10-Sep-12	SO-13-01264	2 of 3
Revision Letter		-

CRITICAL INFORMATION / NOTES

- 1 PRIOR TO SHIPMENT - AERZEN DOES THE FOLLOWING
Removes V-Belts from the motor sheave and wraps them around the blower sheave
Locks the motor hinge plate
Fills both bearing compartments with Mobil SHC 627
- 2 LIFTING PACKAGE
Without Sound Enclosure: lifting eye holes in the corner of the base frame
With Sound Enclosure: lifting through slots in base with fork lift
- 3 READ OPERATION MANUAL FOR INSTALLATION INSTRUCTIONS
Call Aerzen After-Sales / Service if you have any questions
- 4 AT COMMISSIONING - CUSTOMER / CONTRACTOR IS TO
Check oil level (refer to operations manual) - and adjust if necessary
Anchor the base or sound enclosure
Make grounding connections
Connect motor cable per Aerzen Drawing IA-004545
Verify correct rotation of motor (counter-clockwise, looking at drive shaft)
Remove locking device from motor pivot plate
Reinstall V-belts
- 5 ALL CUSTOMER PIPING TO BE INDEPENDENTLY SUPPORTED
- 6 Recommended MINIMUM clearance at front and rear of package for "normal"
(i.e. inspect machine, change oil, replace belts, etc.) maintenance is 30 inches.



Aerzen USA Corporation

108 Independence Way – Coatesville, PA 19320
 Tel: (610) 380-0244 Fax: (610) 380-0278
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 e-mail: Aerzen@AerzenUSA.com website www.aerzenusa.com

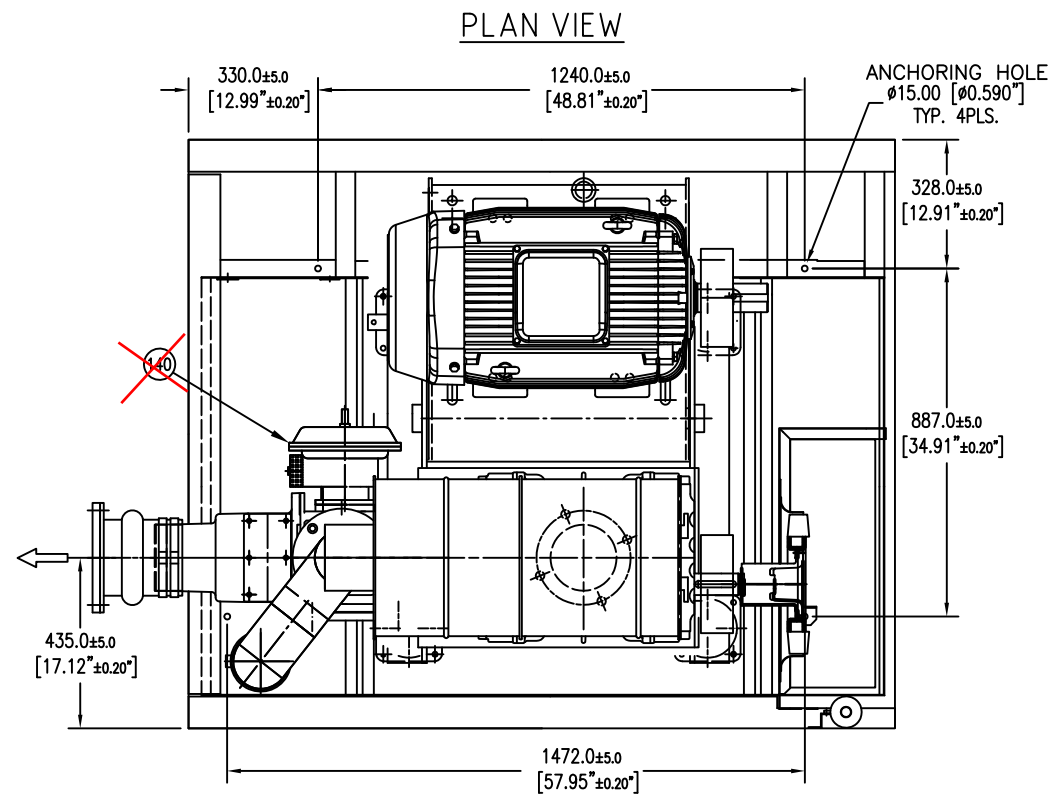
Job Specific Data Package

Date	Aerzen Job #	Page
10-Sep-12	SO-13-01264	3 of 3
Revision Letter		-

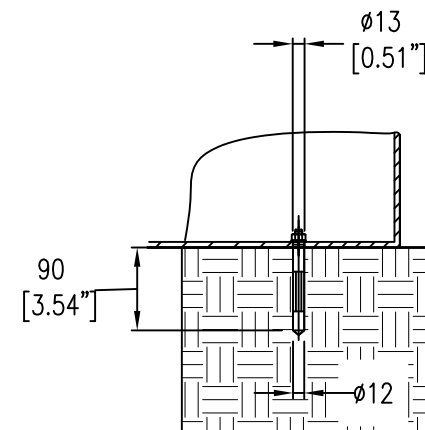
BILL OF MATERIAL for GB-005452

ITEM #	QTY / UNIT	DESCRIPTION	PART #
1	1	Delta Blower Stage	GM 035S-00
2	1	Electric Motor Ultra X\$D Extra Severe Duty NEMA Prem/75HP/1800RPM/TEFC 365T Frame/480V/60Hz/Ph3/T-Stats/Space Heater	GE Motor
3	1	Combination Base Frame / Silencer	176048
4	1	Sound Enclosure (S.E.) w/ Dial Gauges	180740
5	1	Inlet Filter / Silencer Assembly	182116
6	1	Discharge Connection Housing	178666
10	1	Filter Element	* 175241
20	3	Drive Belts	* 165672
30	1	One-way Valve EPDM Flap	** 178655
40	1	Expansion Joint - Discharge 6" 150# ANSI Flange	** 21-003168-06X06EG
50	2	Clamps for Discharge Connection for Rubber Exp. Joint	21-000910_187-200
90	1	Safety Relief Valve set @ 1050 mbar	** 167375
100	-	Instrumentation	-
	1	Filter Maintenance Indicator	21-000799
	1	Discharge Pressure Gauge	21-000814
	1	Discharge Pressure Switch	21-000746-02
	1	Discharge Temperture Gauge/Switch	21-000816
140	-	Unloading Valve (optional)	Not Installed
150	1	S.E. - Ventilation Fan 2000-3000 rpm	158236
170	1	Motor Sheave Bushing	165692
180	1	Motor Sheave 300 mm	174892
190	1	Blower Sheave Bushing	156246
200	1	Blower Sheave 180 mm	163831
250	4	Vibration Isolators	177128
260	1	Safety Relief Valve Hose	184096
270	3	Safety Relief Valve Hose Clamps	162923
	1	Oil Drain Valve	159298
	1	Oil Drain Hose	159665
		PROVIDED SPARE PARTS	
	1	Set of V-Belts per Unit	
	1	Inlet Filter Element per Unit	
	1	Shaft Sleeves	121827
	2	Shaft Seal Rings	153337
	1	5 Gallon Pail of Oil	21-001411

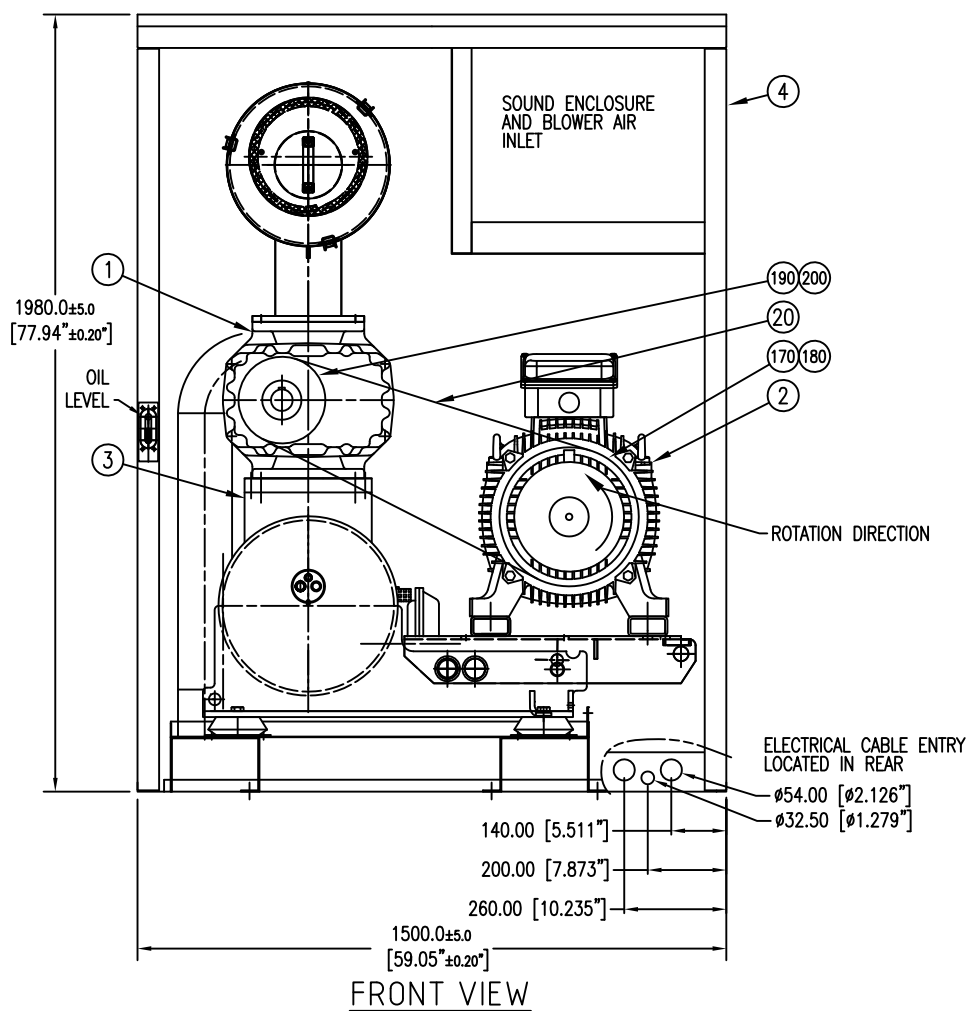
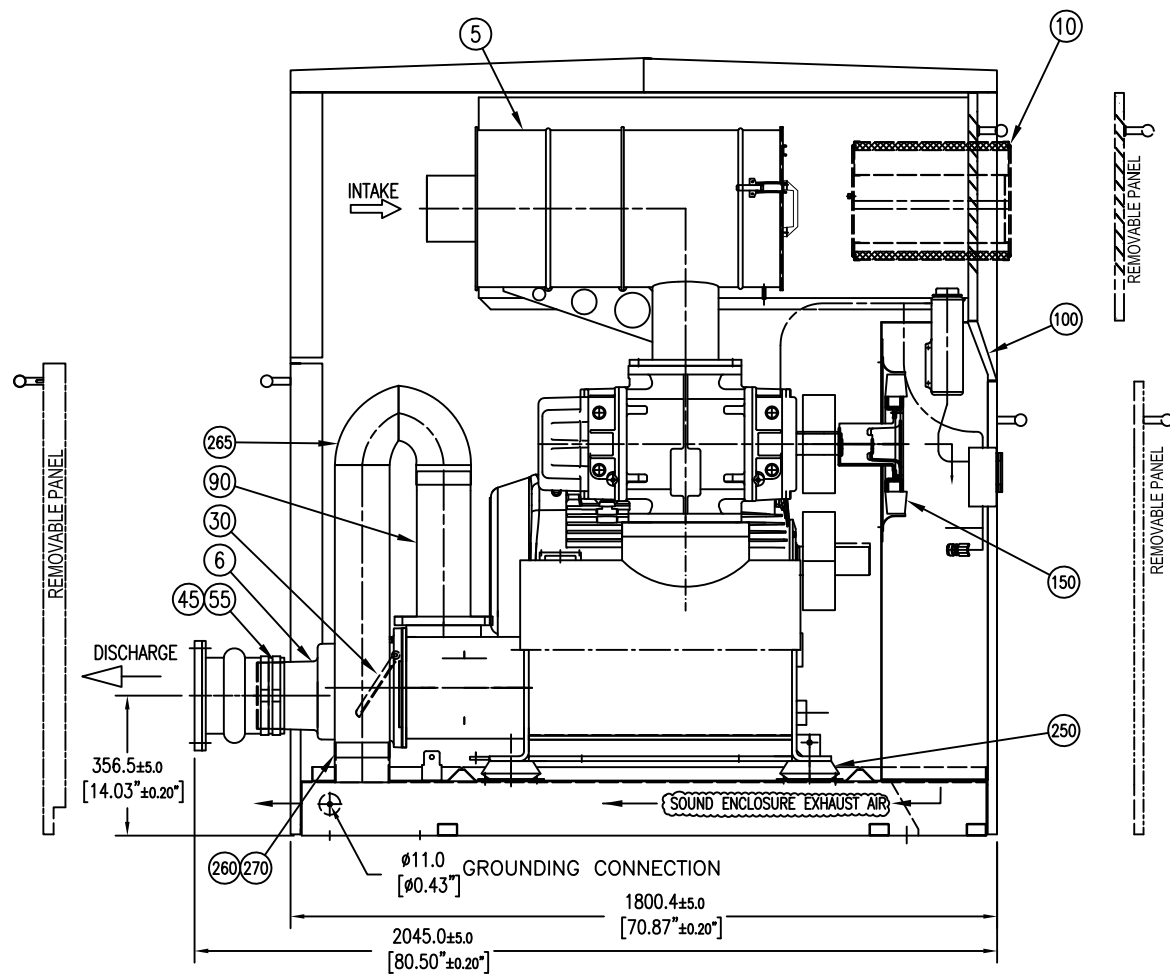
NOTE Always reference the blower s/n & the Aerzen Job # (if known) when ordering spare parts



RECOMMENDED SOUND ENCLOSURE ANCHORING
 SHOWN WITH OPTIONAL LIEBIG #AB 12/15
 AERZEN P/N 120813



ITEM	QTY.	DESCRIPTION
1	1	BLOWER
2	1	MOTOR, SHOWN WITH WEG 405T-F3 FRAME
3	1	BASE FRAME
4	1	SOUND ENCLOSURE (S.E.)
5	1	INLET FILTER/SILENCER ASSEMBLY
6	1	DISCHARGE HOUSING
10	1	INLET FILTER ELEMENT (SHOWN REMOVED)
20	-	DRIVE BELTS (SEE JOB SPECIFIC DATA)
30	1	ONE-WAY VALVE
45	1	EXPANSION JOINT - 6" 150# ANSI FLANGE
55	2	CLAMPS FOR EXPANSION JOINT
90	1	SAFETY RELIEF VALVE
100	-	INSTRUMENTATION (SEE JOB SPECIFIC DATA)
140	1	UNLOADING VALVE (OPTIONAL)
150	1	S.E. VENTILATION FAN (MOUNTED ON BLOWER SHAFT)
170	1	MOTOR SHEAVE BUSHING
180	1	MOTOR SHEAVE
190	1	BLOWER SHEAVE BUSHING
200	1	BLOWER SHEAVE
250	4	VIBRATION ISOLATORS
260	1	SAFETY RELIEF VALVE HOSE
265	1	SAFETY RELIEF VALVE TUBE
270	3	SAFETY RELIEF VALVE HOSE CLAMPS



NOTES

- TOLERANCE ON DIMENSIONS = ±12mm [0.5"]
- WEIGHT: BLOWER PACKAGE WEIGHT 1070 Kg. (2354 Lbs.)
 MOTOR WEIGHT
 TOTAL
- REMOVABLE PANEL WEIGHT:
 PANELS DO NOT EXCEED APPROX. 20 Kg (45 Lbs)
- CUSTOMER PIPING TO BE INDEPENDENTLY SUPPORTED
- LIFTING OF PACKAGE: AFTER REMOVING FRONT & REAR DOORS, FROM FRONT SIDE THROUGH FORK LIFT POCKET IN BASE
- FREE SPACE FOR MAINTENANCE WORK AT FRONT AND REAR SIDE OF UNIT APPROX. 800mm [32"]
- FOR ADDITIONAL INFORMATION SEE: JOB SPECIFIC DATA PACKAGE

NOTICE:
 THIS DRAWING AND ALL INFORMATION HEREIN IS THE PROPERTY OF AERZEN USA INC. AND ITS SUBSIDIARIES AND SHALL NOT BE REPRODUCED BY ANY MEANS IN WHOLE OR IN PART OR USED AS THE BASIS FOR MANUFACTURE WITHOUT WRITTEN PERMISSION.

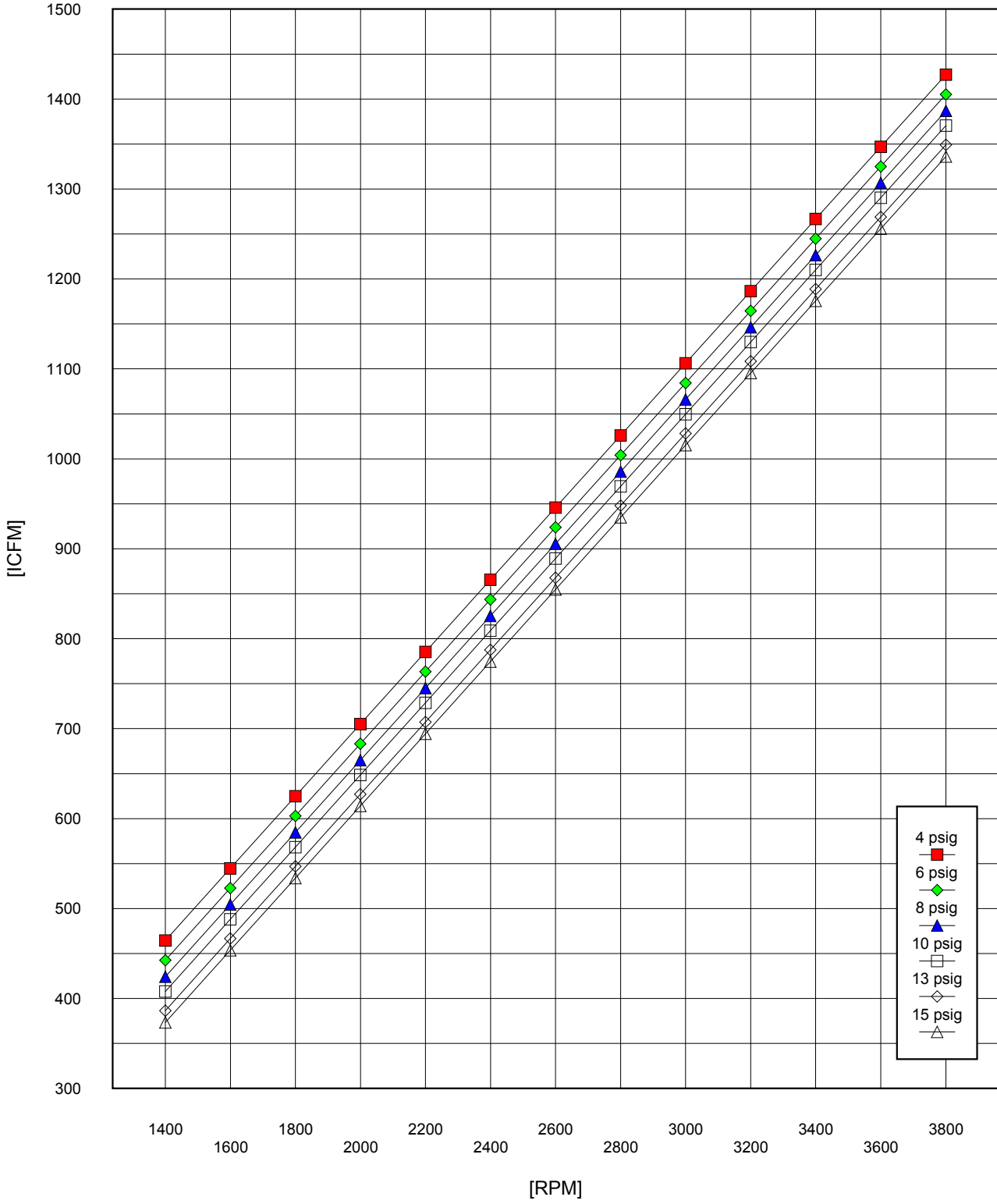
AERZEN USA CORP.
 108 Independence Way, COATESVILLE PA 19320
 (610) 380-0244 PH, (610) 380-0278 FX

TITLE
**GM 35S - GENERATION 5
 DN-150 PRESSURE w/ S.E.
 ANSI DISCHARGE CONNECTION (F3 MOTOR)**

DATE 09/05/2007	DRAWN BY: JPS	CHECKED BY: DLM	P.M APPROVAL: X.X.X.	SCALE: MODEL SPACE 1:1
DRAWING NO: GB-005452			REVISION NO: D	SHEET: 1/2

AERZEN GM 35S DELTA PACKAGE, PRESSURE

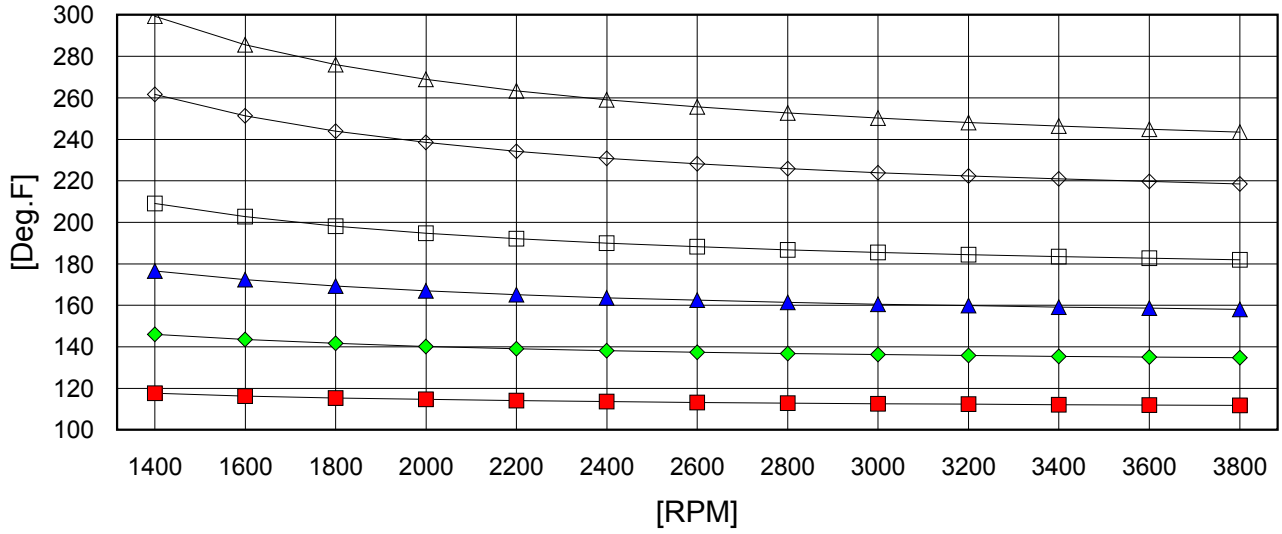
INLET FLOW



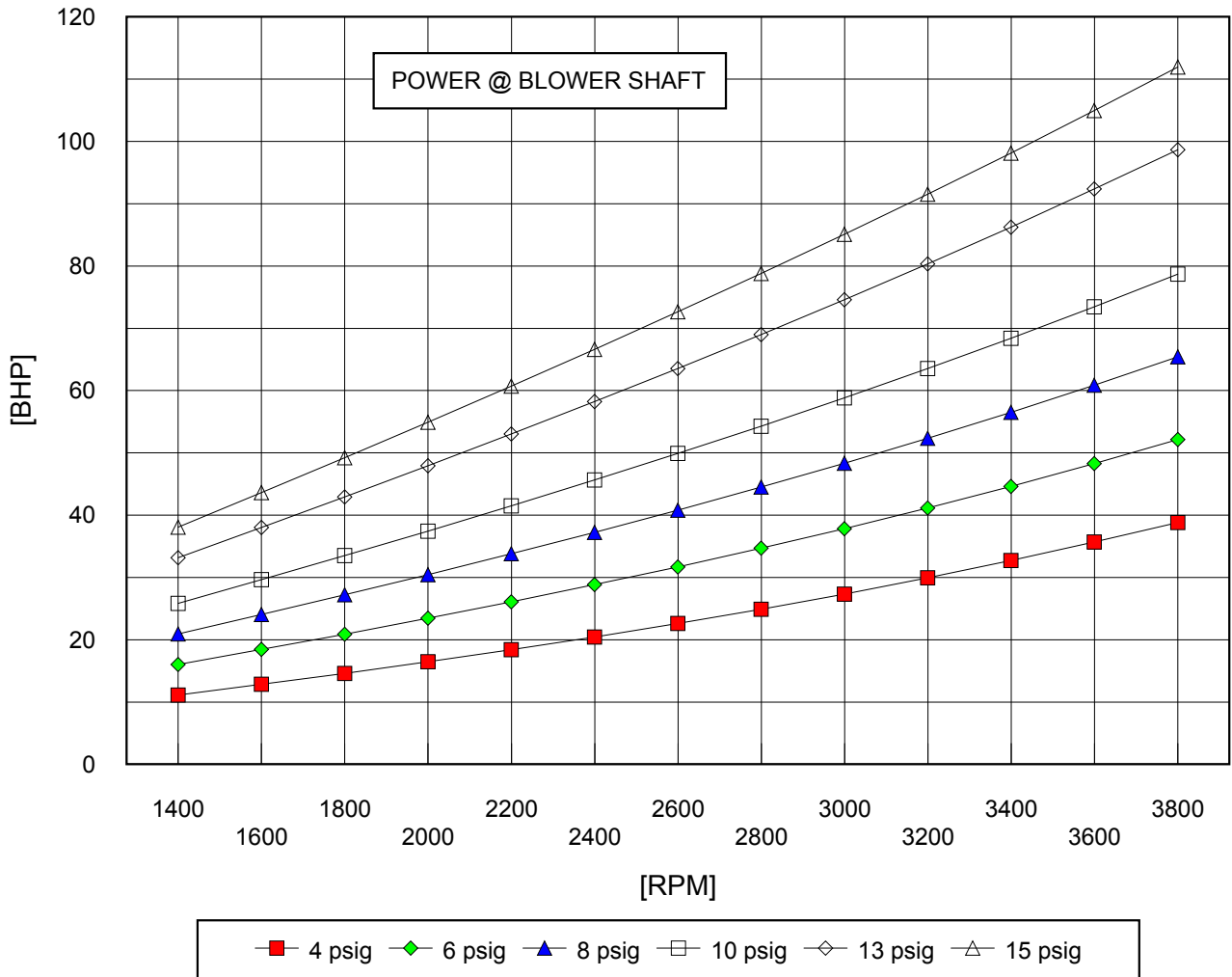
Performance data based on air @ 68 deg.F/ 14.7 psia inlet.

See temperature chart on second sheet for allowable operating range.

AERZEN GM 35S DELTA PACKAGE, PRESSURE DISCHARGE TEMPERATURE



MAXIMUM ALLOWABLE DISCHARGE TEMPERATURE: 285 deg.F
Performance data based on air @ 68 deg.F/ 14.7 psia inlet.



SECTION 2



AERZEN

Delta Blower⁵

Generation

PACKAGES
GS BLOWER

One
step
ahead.



Quiet
Compact
Energy Efficient



Aerzen's Generation 5 Delta Blower

The 5th generation of Aerzen modular compact packages combines tradition and innovation.

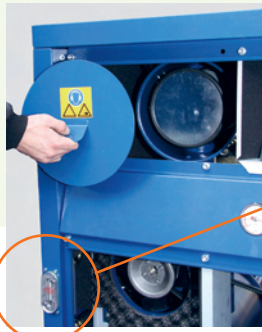
- 1 Easy installation with forklift or pallet jack for placement



- 2 Room-saving, compact, side-by-side installation



- 3 Easy access to all components with one oil drain/oil fill point



- 4 Oil level can be observed from the outside



- 5 Automatic belt tension - No adjustment required



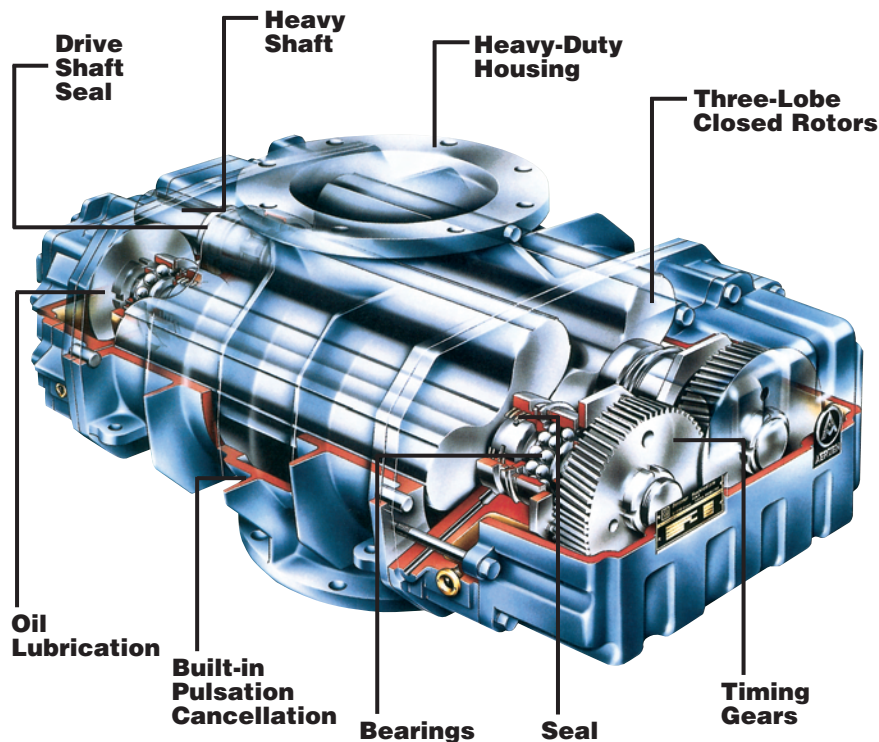
- 6 Typical machinery noise average SPL 75-80 dB(A) with acoustic hood



Aerzen Delta G5 Blower Stage

The details that set Aerzen Blowers apart.

Active Noise Cancellation Built In



- 7 No need for additional electric motor and interlocks with shaft-mounted cooling fan for forced ventilation of the enclosure



- 8 "Aerzen 10 Combi-Mount" Discharge Silencer eliminates the need for absorption material inside the silencer.



The accessories that make the difference.

Inlet Filter/Silencer

Washable filter element. Easily removable internal parts. The filter element is downstream of the silencer for cleanliness.

Instrumentation

Standard filter maintenance indicator and p2 gauge

Belt Guard

Designed for easy access to the drive. OSHA standard.

NEMA F3 High Efficiency TEFC Motor

Hinged Motor Plate

Steady alignment and consistent tension provided by the motor weight. No springs needed. Constant high efficiency.

Reactive Discharge "Aerzen 10 Combi-Mount Silencer"

Machined support surface for blower. Stiff for installation on vibration isolating mounts. Low pressure drop design. No absorption packing material. ATEX spark arrestor.

Pressure Safety Valve

Spring-loaded. Specifically designed for low pressure applications. Mounted vertically downstream of the silencer for longevity. *(hidden in photo)*

Aeromat Start-Up Unloading Valve (Optional)

Allows startup of the main motor with no load. The valve is completely self activating and does not need any auxiliary electrical or pneumatic power source.

Discharge Manifold

With integral full bore check valve for low pressure drop. The check valve can be inspected without disconnecting the piping.

Vibration Isolating Mounts

Rubber-type. Located under the supporting base. No special foundation required.

Discharge Flexible Connector

Reinforced rubber. Downstream of discharge silencer to reduce transmission of structure-borne noise.



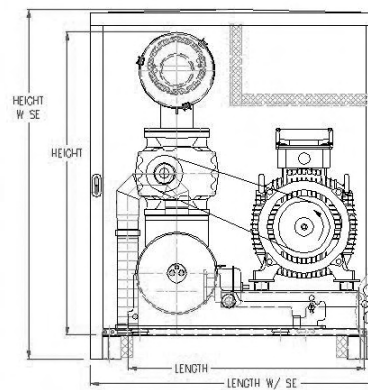
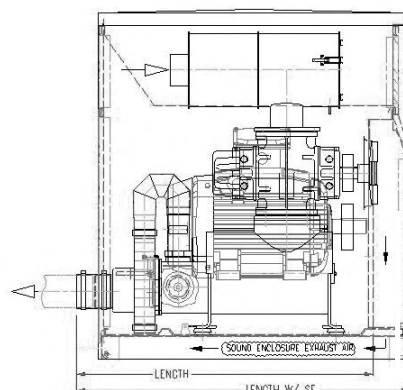
Optional ASG200 Blower Controller
Control continuously monitors machine

G5 Blower W/O Motor					Nominal			
Aerzen Blower Model	Length Inches	Width Inches	Height Inches	Weight lbs.	Discharge Pipe Inches	Flow CFM	Pressure Rise	
GM 3S	31	31	42	484	DN-50	2	106	Up to 15 psi
GM 4S	46	36	50	693	DN-80	3	141	Up to 15 psi
GM 7L	46	36	50	704	DN-80	3	242	Up to 10 psi
GM 10S	46	36	50	757	DN-80	3	353	Up to 15 psi
GM 10S	53	49	59	1118	DN-100	4	353	Up to 15 psi
GM 15L	53	49	59	1151	DN-100	4	529	Up to 10 psi
GM 25S	57	49	59	1276	DN-125	5	883	Up to 15 psi
GM 30L	76	59	78	2002	DN-150	6	1059	Up to 10 psi
GM 35S	76	59	78	2156	DN-150	6	1236	Up to 15 psi
GM 50L	76	59	78	2376	DN-150	6	1766	Up to 10 psi
GM 50L	86	67	83	3014	DN-200	8	1766	Up to 10 psi
GM 60S	86	67	83	3278	DN-200	8	2119	Up to 15 psi

Larger sizes up to 8,500 cfm available on request

Notes

1. For informational use only. Dimensions shown are close estimates and are subject to change without notice. Contact Aerzen USA if certified dimensions are required. Dimensions are in inches, weights are in lbs.
2. Weight notes: motor not included.
3. Oversize/overweight motors may require hinge plate support; dimensions and weights may vary. Consult Aerzen USA with specific application.
4. Packages available w/o sound enclosure. Consult Aerzen USA.



Aerzen means trouble-free compression.

Aerzen's modular blower packages have been offered since the 1960s. Aerzen Delta Blower packages have been in successful operation since the 1990s. They are just one of the offerings in our single stage positive displacement program. Whatever your application and installation requirements, be sure to consider Aerzen.

G5 Delta Care Maintenance Agreement.

Warranty: 5 years optional with our G5 Care Maintenance Agreement.

For Pressure

- Up to 15 psi: G5 Blower packages
- 10 to 51 psi: Oil-free and air-cooled VM and VML screw compressors

For Vacuum (Dry)

- Up to 15 Hg: G5 Blower packages
- Up to 25 Hg: G5 Blower packages with pre-inlet cooling
- Up to 25.5 Hg: Oil-free and air-cooled VM screw compressors at same flow (30% more efficient than PD blowers)
- Vacuum boosters to 10⁻³ mbar absolute

For Extended Pressure/Vacuum

- Up to 40,000 cfm available
- For other gases, higher pressure / vacuum consult factory

Cover photo: Delta Blower Generation 5
Similar design available for gases other than air.



AERZEN
One step ahead.

Aerzen USA

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AERZEN DELTA BLOWER GENERATION 5

North American Standard

Positive Pressure

Standard range

Blower sizes:GM 3S to GM 90S
 Package nominal sizes:.....2" (DN 50) to 10" (DN 250)
 Medium:Air
 Flow range:35 to 3178 icfm (1.0 to 90 m³/min)
 Differential pressure:15 psi (1000 mbar) for "S" and 10 psi (700 mbar) for "L" machines
 Maximum operating temperature:.....285°F (140°C)
 Drive:.....V-belt drive with totally automatic belt tension adjustment


Introduction

The Aerzen Blower is renowned for its performance and its reliability. There is no secret: From the blower-stage through the accessories, Aerzen enhances key features of each component by applying sound engineering, precision machining, and superior workmanship.

The Delta Blower Generation 5 (G5 for short) is the synthesis of four previous Aerzen blower package generations combined with an array of new technical innovations to provide five key advantages to our customers:

- The machinery noise level has been lowered yet another 6-8dBa¹ on average compared to the previous Delta Blower
- The blower package is even more user friendly especially in transport, installation, operation, and maintenance
- The oil level is visible from the outside of the package so the blower does not need to be shut down
- No absorption material is used in the discharge combination silencer; this eliminates the possibility of foreign objects contaminating the air or gas stream
- Use of a shaft mounted cooling fan, which reduces installation and operating costs by eliminating extra wiring, motor starters, and its interlocking with the main blower motor
- The compact footprint allows units equipped with sound enclosure to be mounted side-by-side since there is only one main maintenance access side

¹ Measured in 1m free-field conditions

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Aerzen Delta Blower Generation 5 are pre-engineered modular compact packages, which offer a wide range of options from proven and standardized components at reasonable costs and short delivery times.


Shipped completely assembled, the Aerzen Delta Blower Generation 5 is indoor and outdoor rated. There is no extensive installation work - neither grouting nor special anchoring is required, just simply level it and bolt it to any standard industrial flooring or surface.

Scope of supply: basic configuration

- Aerzen Rotary Lobe Blower stage
- Combination Base Frame / Silencer combined with hinged motor plate for automatic belt tensioning – with 2 ½” diameter discharge pressure gauge
- Set of vibration isolating mounts under the entire blower package
- Inlet silencer – filter with filter maintenance indicator
- Narrow V-belt drive and protection guard
- Pressure safety valve
- Discharge manifold with integral check valve and flexible pipe connector
- Standard paint system
- NEMA electric motor TEFC, EPACT efficiency, with conduit box on top
- First oil fill and “Service kit”
- Packaging for domestic trucking
- Standard documentation in electronic format: English language, drawings with US-customary and metric units of measure

Standard options include (not limited to)

- Inlet pipe connection kit
- Sound enclosure with skid / oil-drip pan and forced ventilation
- Start-unloading valve Aeromat, with or without solenoid valve
- Pressure modulating valve Aeropress or Aeropress10S, pilot operated
- Other motors, e.g. Premium Efficiency with conduit box on top
- Instrumentation & controls, e.g. ASG200 Aerzen blower controller

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Description of the main components

The combination of key components marked with a * in the description below significantly contribute to the reliability and performance of the Aerzen Blower:

At the heart of the package: The Aerzen Rotary Lobe Blower

Low vibration and low pulsations - a key feature:



Internal pulsation interference channels in conjunction with 3-lobe rotors reduce the pulse in the discharge air stream by as much as 90% or 20 dB at the lobe-passing frequency. This significant attenuation contributes strongly to reducing vibrations in the entire package and lowering the noise emitted by the downstream piping.

Positive displacement characteristic:

- The blower moves a fixed volume of gas with each shaft rotation, nearly independently from the operating pressure.
- At constant differential pressure, the load torque remains constant.
- For a given pressure, the power is directly proportional to the speed.

Flow across the blower stage:

- Vertical from top to bottom

Drive shaft location:

- On the left when facing the blower shaft

Rotation:

- Counterclockwise when facing the blower shaft

Housing:



- The central section, “the cylinder” and the two side-plates house the rotors, while a gear case and a drive end cover contain the lubricating oil for bearings and gears. Individual side plates allow for optimal setting of the radial rotor clearances: a valuable feature on blowers with the gas flowing perpendicular to the rotors.
- Connections: full-size, flat-faced flanges
- Maintaining internal alignment under all operating conditions is paramount for the reliability of any rotating equipment. The housing is, for this purpose, designed to support the entire blower stage on its outlet flange only; no need to worry about a “soft foot” or uneven base support
- Materials: Gray cast iron EN-GJL-200 equivalent to ASTM A48 Cl.30 AISI A278 Cl. 30



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Rotors:

- Up to and including the model GM 80L, rotors and shafts are made of a single, drop forged steel piece made from C45 steel equivalent to AISI Type 1045. Model GM90S are made from a single piece of EN-GJS-500-7 nodular cast iron equivalent to ASTM A 536. Solid or dust-tight rotors do not have any open cavities that can trap contaminants. This is particularly important in food applications and applications requiring high purity. Moreover, rotor balance is maintained and vibration is therefore minimized.
- Stiff rotor design: the rotors' first critical speed is always at least 10% above the maximum operating speed.
- The rotors meet or exceed the ISO 1940 / ANSI S2.19 G6.3 criteria of dynamic balancing

Timing gears:

- Helical gears with hardened and ground teeth to meet AGMA 12 quality standard with an AGMA service factor of 1.70.
- To maintain the advantage of high quality gears, the gear wheels are secured onto the shafts by means of a tapered interference fit. Optimum concentricity is achieved and neither gear hub nor shaft keys are used. To prevent damaging the seats, gear installation and removal are carried out using hydraulic pressure to expand the gear wheels within their elastic limit.

Bearings:

- The rotors are supported by anti-friction bearings
- The bearings are housed in the side-plates and are sized for an expected 5 years between overhauls.
- The drive-shaft bearing is a cylindrical roller bearing whereas the other bearings are selected to achieve the proper clearances between rotors and housing, axial loads from the helical bearings: smaller machines up to GM 50L feature double angular ball bearings.

Lubrication:

- Oil splash lubrication of all bearings and gears through oil spray disks on both blower ends
- An oil sight glass is provided on each oil sump.
- An oil drain valve is provided on each oil sump. The oil drain valves are directly mounted to the oil sump covers for clean, easy and fast oil change.
- Units with sound enclosure are plumbed together to an oil reservoir that serves as oil fill and drain device, and its oil sight glass is visibly mounted to the maintenance side of the enclosure.
- Aerzen USA provides the first oil fill with a lubricant as recommended in the operating manual as well as a service-kit containing hydraulic bottle jack, oil fill funnel, and oil drain hose.

Seals at the rotor chamber:

- The rotor chamber is sealed from the oil chambers by four, all metal, non-rubbing seals, each consisting of the following components and in that sequence:
 - Oil slinger ring
 - Two restrictive piston-rings in a labyrinth
 - "Neutral chamber" located between the piston rings used for venting the seal
 - Two restrictive piston-rings in a grooved labyrinth bushing

Seal at the drive shaft:

- Double, permanently lubricated Viton seal ring
- Shaft sleeve: replaceable, hardened steel

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Testing

- Each blower stage is subject to a full-load test to verify the volumetric flow and power values.
- * — Acceptance criteria are +5% on power and –5% on flow for all machine sizes.
- Orifice flow measurement and conversion of results to the operating conditions in accordance with ISO 1217, simplified

The package component Aerzen Rotary Lobe Blower

Intake air silencer & filter

- * — Absorption-type silencer upstream of the air filter element. For reasons of cleanliness, there is no silencing material between the filter and the inlet blower flange.
- The carbon steel housing is powder-coated. Quick-release latches for quick access to the filter element
- Filter performance: G4 per EN 779 (greater than 90% of synthetic dust particles), equivalent to ASHRAE 52.2 MERV 7 (50-70% @3-10 microns)
- Progressively compressed, thermally bound polyester fibers, free of PVC, smoothed and compressed on the clean airside for highest dust separation and retention capacity. The filter media is made of a single, 30 mm thick continuous mat, sown without glue.
- Included is a filter maintenance indicator. If the sound enclosure option is selected, the filter maintenance indicator is mounted to the enclosure wall.

Base with integral discharge silencer:

- In addition to the blower's internal pulsation cancellation feature, the combination discharge, three-chamber reactive silencer is used to further reduce the noise and residual pulsation in the air stream across a wide range of operating speeds. The residual pulsation downstream of the silencer meets or exceeds the API 619 recommended 2% peak-to-peak of the absolute line pressure.
- * — The discharge silencer is combined with the support base into one compact rugged unit. It is made from pressure vessel steel it forms a torsion resistant cylindrical vessel supporting the blower stage and other components.
- * — The mounting surface for the blower is a full-size steel flange machined and continuously welded to the base with the full number of tapped holes for the studs to fasten the blower to the base - no need to align blower feet or to worry about a soft-foot condition. A surface sealant is used instead of a gasket.
- * — Maximum operating pressure: 1.1 bar gauge (16 psig) and 150°C (300°F), built and certified to the latest European Pressure Vessel Code, PED. Test pressure: 1.9 bar g. (27.6 psig)
- The base is mounted on four vibration-isolating mounts²

² Three foot mounts are used on DN50 units



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Belt drive

- Narrow, anti-static V-belts
- Selected for a minimum service factor of 1.4 times operating power (BHP), or 1.1 times the motor nominal power (nameplate HP), whichever is larger³
- * — The Aerzen Delta Blower Generation 5 package provides entirely automatic tensioning of the belts. Thanks to the package configuration, the drive geometry is such that the motor hinges parallel to the motor shaft centerline, using the only the motor mass to maintain this tension without need for adjustments or springs. This not only reduces maintenance, it also reduces the potential for operating with too little (slipping belts) or excessive belt tension (excessive bearing and shaft load).
- The maintenance kit provided by Aerzen USA also includes a hydraulic jack used for lifting the motor to change V belts.
- Sheaves and bushings are dynamically balanced to ISO 1940 / ANSI S2.19 G6.3. For linear tip speeds > 6500 ft/min (33 m/s), nodular cast-iron, ventilated sheaves are used.

Belt guard

- OSHA compliant personnel guard, made of galvanized steel: either perforated steel or solid sheets with vents, depending upon the model.
- Units with sound enclosure feature hand protection fan and belt guards, and the enclosure itself serves as the ultimate protection device. The removable maintenance panels comprise lockable latches that help facilitate OSHA prescribed tag-out-lock-out procedures.

Vibration isolating mounts

- A set of vibration isolating mounts are located under the blower package to hinder the transmission of structure borne noise from the blower and the discharge silencer into any structure the package is installed on, such as a mounting skid if supplied with acoustic enclosure.

Discharge manifold

- Flange-mounted to the discharge silencer, the discharge manifold serves for mounting the pressure safety valve, an optional start-unloading valve and for connecting the blower package to the discharge piping.
- Materials of construction: welded carbon steel (Aluminum stub pipe for DN50)
- The discharge manifold houses the discharge check-valve

Pressure safety valve

- DN100-250 blower packages have a vertically mounted, spring loaded, safety pressure valve sized for the full flow of the blower. DN50 and DN80 blower packages feature horizontally mounted safety relief valves.
- * — The valve's characteristic is nearly proportional. It not only opens, but also closes at the set pressure
- * — The valve has a built-in dampener that allows the valve to actuate smoothly, which prevents the "pop-off" effect commercially available valves exhibit.
- Pressure rise up to 10% at full flow. Certification of conformity to PED
- Being an all-metal valve, it is not suitable as a pressure modulating valve. If this function is needed use an Aerzen pilot operated Aeropress or Aeropress10S pressure modulating valve.

³ Higher values are not necessarily better as they could lead to belt slippage due to excessive stiffness, and also shaft damage (deflection) caused by higher tension values required by over sized v-belt drives.



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- Materials: seat of gray cast iron and, depending on the size, a brass or anodized aluminum bell and piston, galvanized spring, steel spring rod, and an aluminum or fabricated external steel cylinder.
- Standard set points are 15.2 psig (1050 mbar) for “S” model blowers operating above 10 psi (700 mbar), and 10.9 psig (750 mbar) for all machines operating under 10 psi (700 mbar), including all “L” model blowers⁴.
- The valve protects the blower stage against line surges, and spikes. It does not protect against prolonged overloads or excessive discharge temperature. Therefore, it is not an absolute protection device, nor is it “bubble tight”.

Discharge check valve



- A full-bore check valve that can be easily removed for inspection and maintenance without disconnecting the discharge piping⁵
- With its horizontal top-located steel shaft⁶, the check valve naturally closes by gravity at no-flow.
- Without any springs, the check valve will not chatter, even at low flow conditions (for example in adjustable speed applications)
- Flap material: EPDM on steel for operating temperatures up to the blower limit
- Optional check valve flap material: Silicone rubber

Discharge flexible connector



- A reinforced silicone-rubber discharge flexible connector with heavy-duty clamps connects to the discharge piping.
- It prevents the transmission of structure-borne noise from the blower and its discharge silencer to the discharge piping.
- Located downstream of the silencer and with only a small gap (~1/2”) between the package and the pipe, the noise sent to the outside is maintained at a minimum.
- The sleeves are sized for standard, schedule 40 pipe diameters.

Discharge pressure gauge

- Liquid filled, 2 ½ “ dial. Units: mbar and psi
- If the sound enclosure option is selected, the discharge pressure gauge is mounted to the sound enclosure wall.

⁴ The valves are adjustable, and different springs are available for other set points depending upon operating conditions, motor limitations, or customer’s requests.

⁵ Except DN50

⁶ Except DN50



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Optional sound enclosure

- Covering the entire blower package with the drive motor, the enclosure provides suitable protection for outdoor installation up to 50 mph winds and 25 lb/ft² snow load and rain at 45°
- * — The enclosure and the blower package are both mounted on a skid / oil-drip pan, designed for meeting environmental protection standards as well as for easy transportation and installation.
- * — The unique Aerzen package design makes it possible to mount multiple blowers side-by-side without hindering access to the maintenance side (front). All pipe and wiring connections are made from the backside. This offers the best use of available floor space.
- * — All maintenance activities can be carried out from the front of the package, e.g. air filter, belts, and oil maintenance. The oil level is visible from the outside and eliminates any guesswork. Oil can be filled and drained from a common reservoir that also houses the oil level gauge. The oil level check can be done with the blower in operation.
- The enclosure reduces the package noise level to less than 80 dB(A) – 75dB(A) in most cases- at 1 m, free field, per DIN 45635.
- * — Quick release panels, each less than 50 lb (as mandated by MSHA) provide quick and easy access to the blower and the package components for routine maintenance.
- Blower packages are fitted with a shaft-mounted cooling fan for sufficient heat removal. There is no need for a separate electric driven fan and required interlock and controls.
- * — Aerzen mounts the blower package in the sound enclosure at our factory prior to shipment.
- Panels are made of galvanized steel sheet, with packing self-extinguishing, non-dripping high-density polyester foam as absorption material.
- The enclosure is powder coated in a UV resistant Aerzen Royal Blue color, accented with light gray maintenance panels



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Positive Displacement Blowers

1. **Standard lubricating oil requirements:** When choosing a lubricant, please consider the blower performance and application data first. Lubrication oils recommended by Aerzen USA Corporation have been pre-approved for use within their respective operating applications. The following basic lube oil requirements apply:
 - 1.1. Kinematic viscosity at 100°C / 212°F: ≥ 13 cSt (mm²/s)
 - 1.2. Kinematic viscosity at 100°C / 212°F: ≥ 28 cSt (mm²/s) (only with continuous oil temperatures above 120°C / 248°F), see also point 4
 - 1.3. Kinematic viscosity at -10°C / 14°F: ≤ 3500 cSt (mm²/s)
 - 1.4. The oil additives must possess the minimum properties:
 - 1.4.1. EP-wearing protection additives for the application in roller bearing gearboxes
 - 1.4.2. Oxidation stability up to an oil sump temperature of 110°C / 230°F, in case of continuous oil temperatures above 120°C / 248°F oxidation stability up to an oil sump temperature of 220°C / 428°F – see application 4
 - 1.4.3. Foam suppressant
 - 1.4.4. Detergent additive preventing deposits from forming
 - 1.4.5. Neutral characteristics in conjunction with seal materials made from Fluor-Propylene-Methyl (Viton)
 - 1.4.6. Neutral characteristics of lubricant in contact with single-component synthetic resin primer.
2. **Single- or double-shift operation / intermittent operation**
 - 2.1. Application conditions:
 - 2.1.1. Intake temperature: up to 50°C / 122°F
 - 2.1.2. Discharge temperature: up to 140°C / 284°F
 - 2.1.3. Ambient temperatures: $\leq 10^\circ\text{C} / 50^\circ\text{F}$ Lubricating oil (minimum temperature: $-10^\circ\text{C}/14^\circ\text{F}$)
 - 2.1.4. PAO-gearbox-oils / fully synthetic Poly-Alfa-Olefin. **For example: Mobil SHC 627** (p/n21-001411)
 - 2.1.5. Fully synthetic PAO motor oil of the viscosity class SAE 5W-40 (p/n160754000, 160755002). Oil specification acc. to API CF or higher - ACEA B3 / E3 or higher.

Other examples:

Mobil Delvac1 5W-40 Chevron Delo400 5W-40


Castrol Syntec 5W-50 Texaco/ Havoline Formula 3 5W-40

Ashland Petroleum / Valvoline SynPower 5W-40

Quaker State Synchron Ultra Premium 5W-50

KendallElite 5W-50

Royal Purple SynFilmGT GT100 (single grade machinery oil)

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3. Continuous operation 24 hours per day

3.1. Application conditions:

- 3.1.1. Intake temperature: up to 50°C / 122°F
- 3.1.2. Discharge temperature: up to 140°C / 284°F
- 3.1.3. Ambient temperatures: ≤ 10°C / 50°F Lubricating oil (minimum temperature: -10°C/14°F)
- 3.1.4. PAO-gearbox-oils / fully synthetic Poly-Alfa-Olefin. **For example: Mobil SHC 627 or Mobil SHC 629** (p/n21-001411 or 21-001410 / 177968000 respectively).
- 3.1.5. Fully synthetic PAO motor oil of the viscosity class SAE 5W-40 (p/n160754000, 160755002). Oil specification acc. to API CF or higher - ACEA B3 / E3 or higher. Example: Mobil 1 Delvac 5W40. Change oil at least twice a year.

4. Operation with continuous oil temperatures above 120 °C / 248°F

4.1. Application conditions:

- 4.1.1. Continuous oil temperature: > 120°C / 248°F Lubricating oil
- 4.1.2. Synthetic lubricating oil with a primary oil of type Polyglycol of the viscosity class ISO VG 220.
- 4.1.3. For instance: ESSO Glycolube 220, ARAL Degol GS 220 In case of oil temperatures above 160°C / 320°F the period between the oil changes have to be halved

5. Lubricating oils in the food and pharmaceutical industry as per USDA H1: Please find below a list of approved oils. Other oils require Aerzen USA Corporation's approval, which must be verified by oil analysis after 1000 operating hours.

5.1. Application conditions:

- 5.1.1. Conveying discharge temperature: up to 100°C / 212°F Lubricating oil:
 - 5.1.1.1. Viscosity acc. to ISO VG 100
 - 5.1.1.2. Oil make Klüber 4UH1-100

5.2. Application conditions:


- 5.2.1. Conveying discharge temperature: 100°C – 140°C / 212°F - 248°F Lubricating oil:
 - 5.2.1.1. Viscosity acc. to ISO VG 220
 - 5.2.1.2. Oil make Klüber 4UH1-220

6. In case of oxygen service, where corrosive or reactive gases are used

6.1. Application conditions:

- 6.1.1. Pressure operation
- 6.1.2. Lubricating oil: - Fomblin Y 45 or Y 25, Messrs. Solvay Solexis

7. Changing of oil brands and grades: Generally, PAO synthetic motor oils and PAO-gearbox oils are compatible. Upon changing-over from one oil brand to another, no special measures need to be taken. However, an oil change should be carried out after an operating period of 24 hours. For consequent oil changes, only the same oil should be used. Oils based on Polyglycol must not be mixed with motor oils or PAO-oils. In case of doubt, the oil chambers are to be opened and decontaminated.

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SECTION 3

G-5 Combination Base - Discharge Silencer

Description: Combination base - discharge silencer

Base/discharge silencer includes three-chamber reactive silencer built as a pressure vessel, blower mounting-flange with studs, discharge connection with integrated check valve, hinged motor plate, entirely supported on vibration isolating feet.

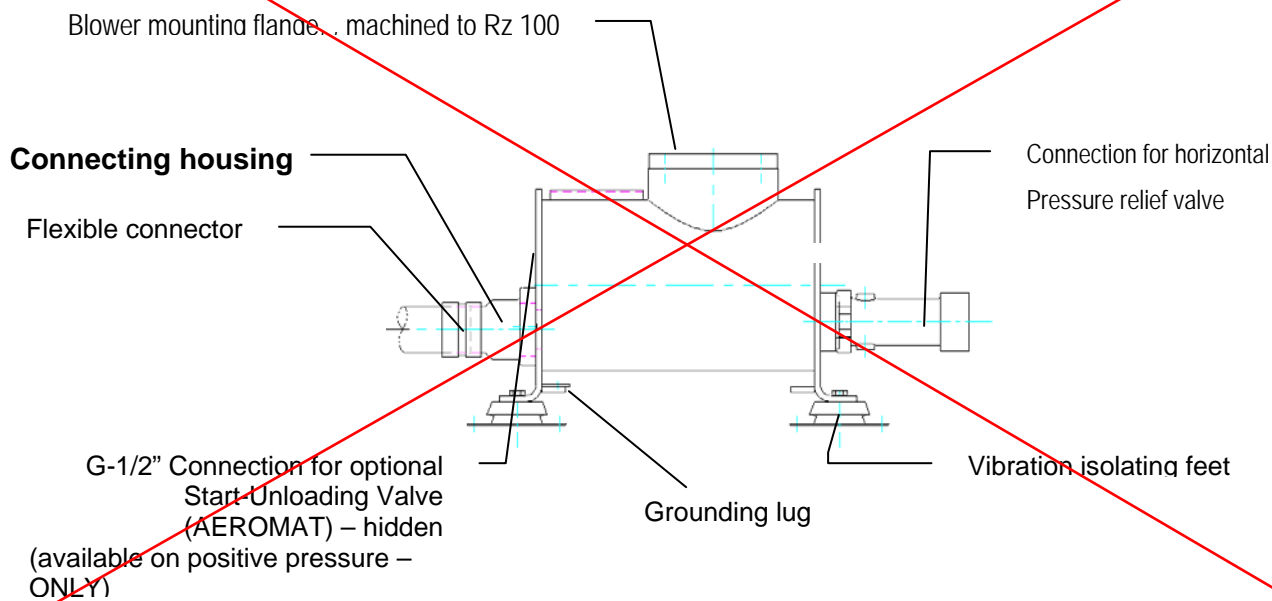
Materials of construction:


Silencer: Pressure vessel quality carbon steel S 235 JR (St 37-2) equivalent to ASTM A 283 Grade B
 Pressure vessel code: PED (European directive) PED – AD 2000, DGRL 97/23/EG with consideration given to static and dynamic stress (fatigue resistance)
 Maximum operating data: 150 °C (300 °F) and 1.1 bar gauge (16 psig)
 Test pressure: 1.9 bar gauge (27.5 psig)
 Shell wall thickness: depending on size: 6mm (1/4”) for DN-50 → 15mm (5/8”) for DN-300

Performance:

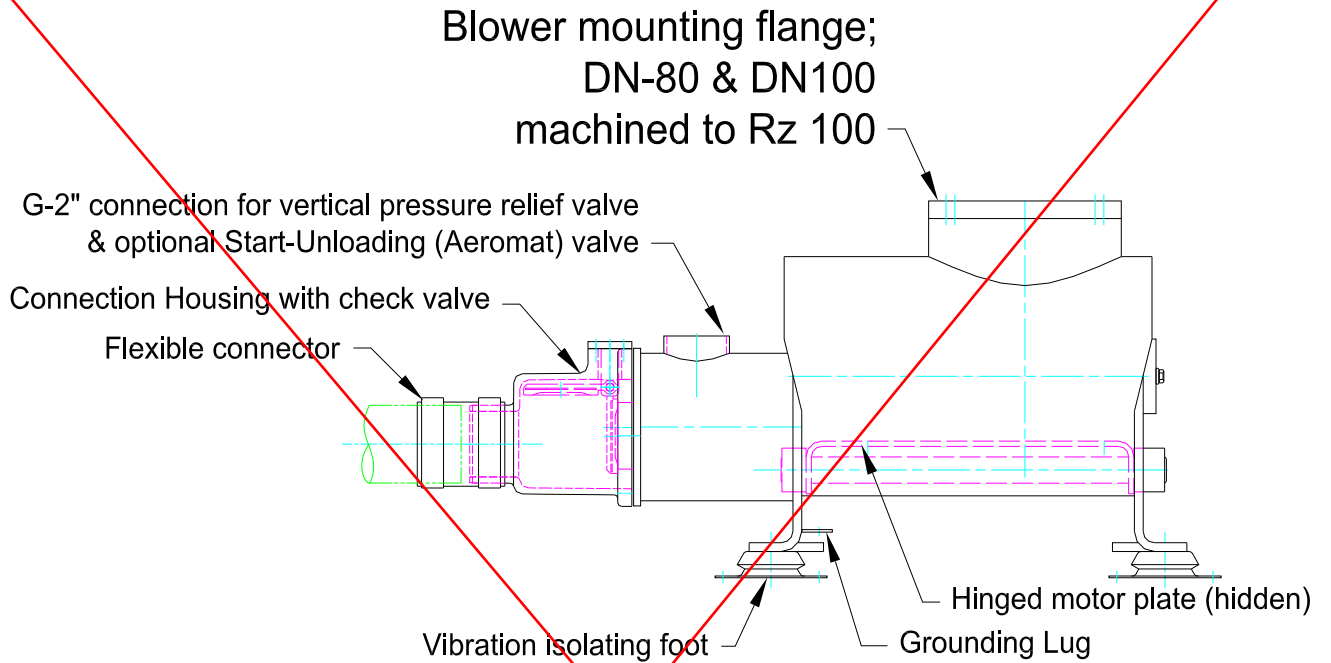
Pulsations in the air stream are reduced below the API 619 standard of 2% peak-to-peak of the mean line pressure.
 Pressure drop of the entire Base-Silencer with connecting housing and check valve, at the maximum allowable flow: 35 mbar (0.5 psi); included in the power calculations of the Delta Blower package

Combination Base - Discharge Silencer DN50

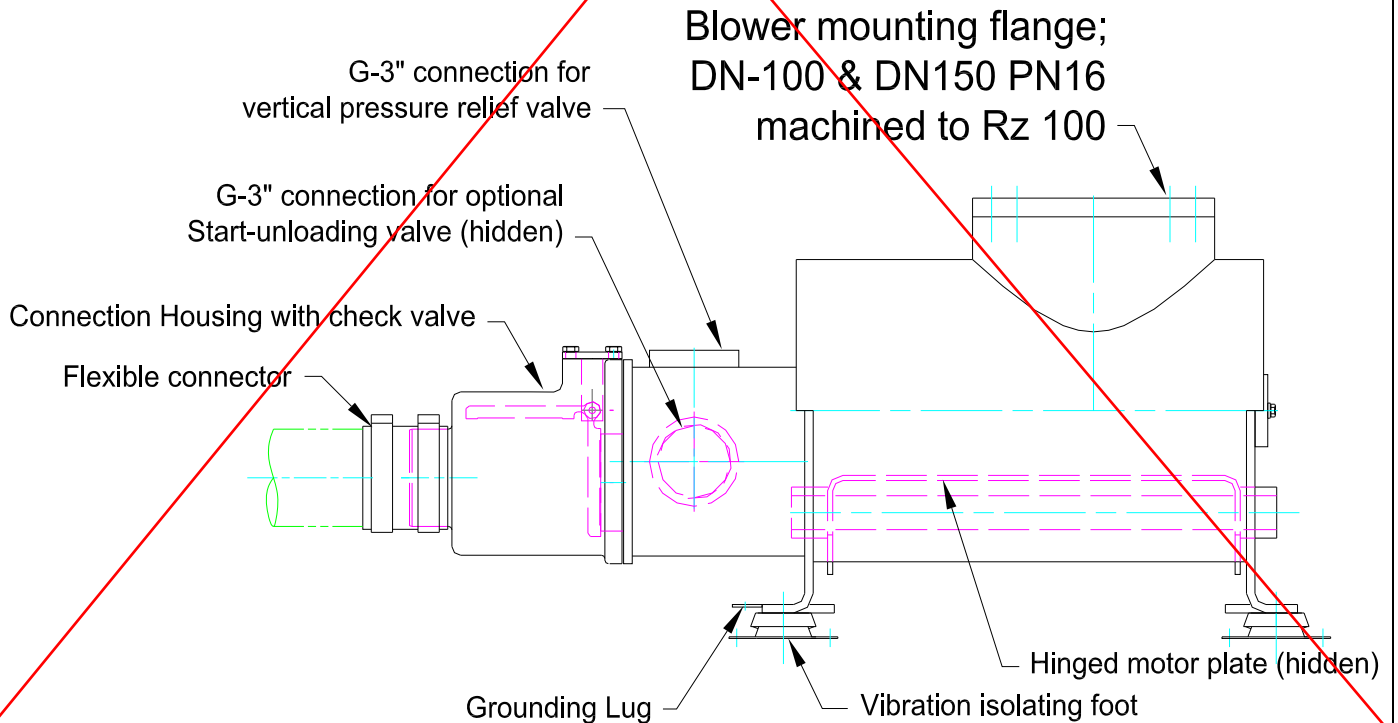


	Aerzen USA Corporation 108 Independence Way – Coatesville, PA 19320 Tel: (610) 380-0244 Fax: (610) 380-0278 www.aerzenusa.com		Combination Base Frame – Silencer Delta Blower Generation 5		
	Date 05/31/2011	Doc # B-6-0199	revision "C"	Page 1 of 3	

Combination Base - Discharge Silencer DN80



Combination Base - Discharge Silencer DN100/125



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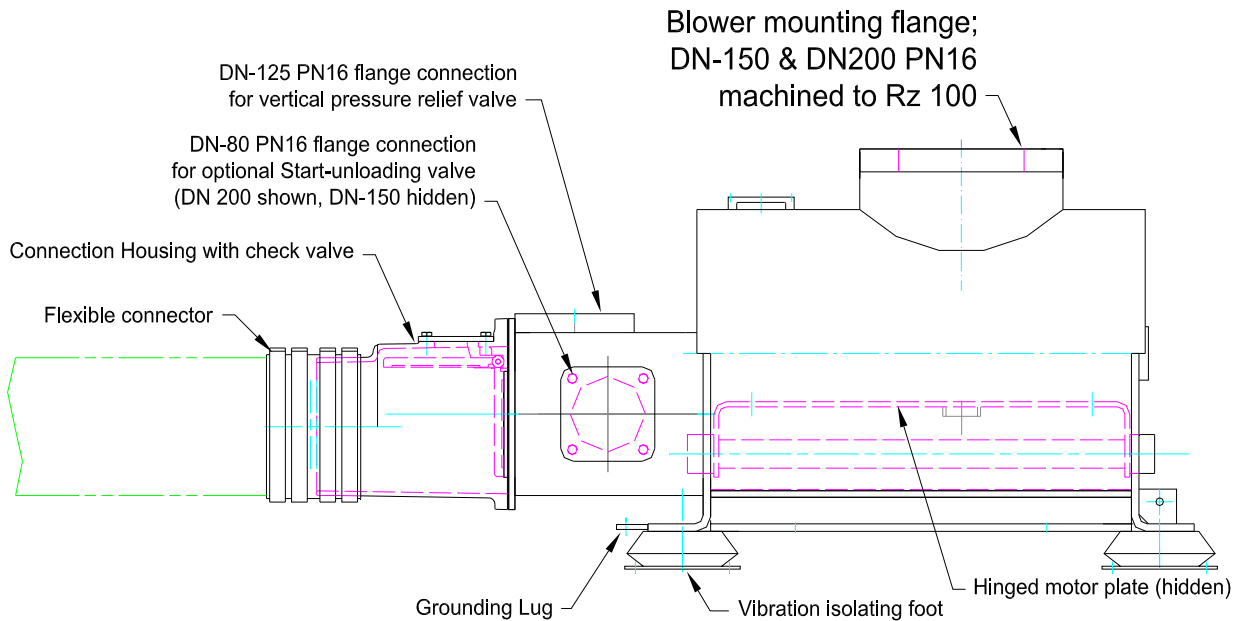
108 Independence Way - Coatesville, PA 19320

Tel: (610) 380-0244 Fax: (610) 380-0278 www.aerzenusa.com

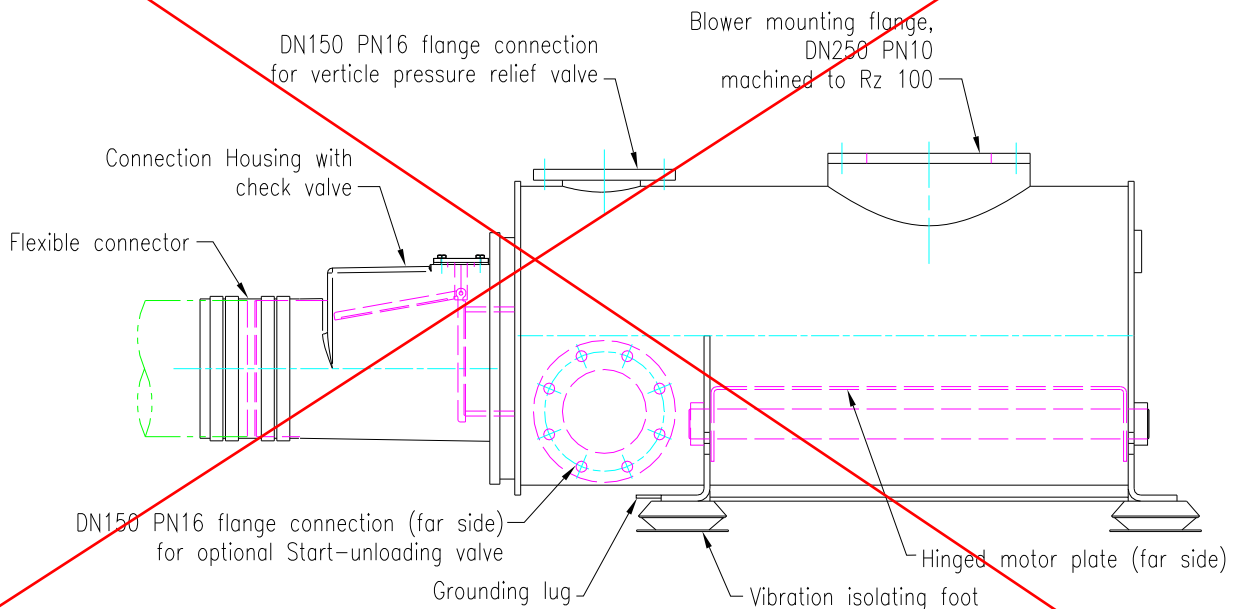
Combination Base Frame - Silencer Delta Blower Generation 5

Date	Doc #	Page
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Combination Base - Discharge Silencer DN150 & ~~DN-200~~



~~Combination Base-Discharge Silencer DN-250~~



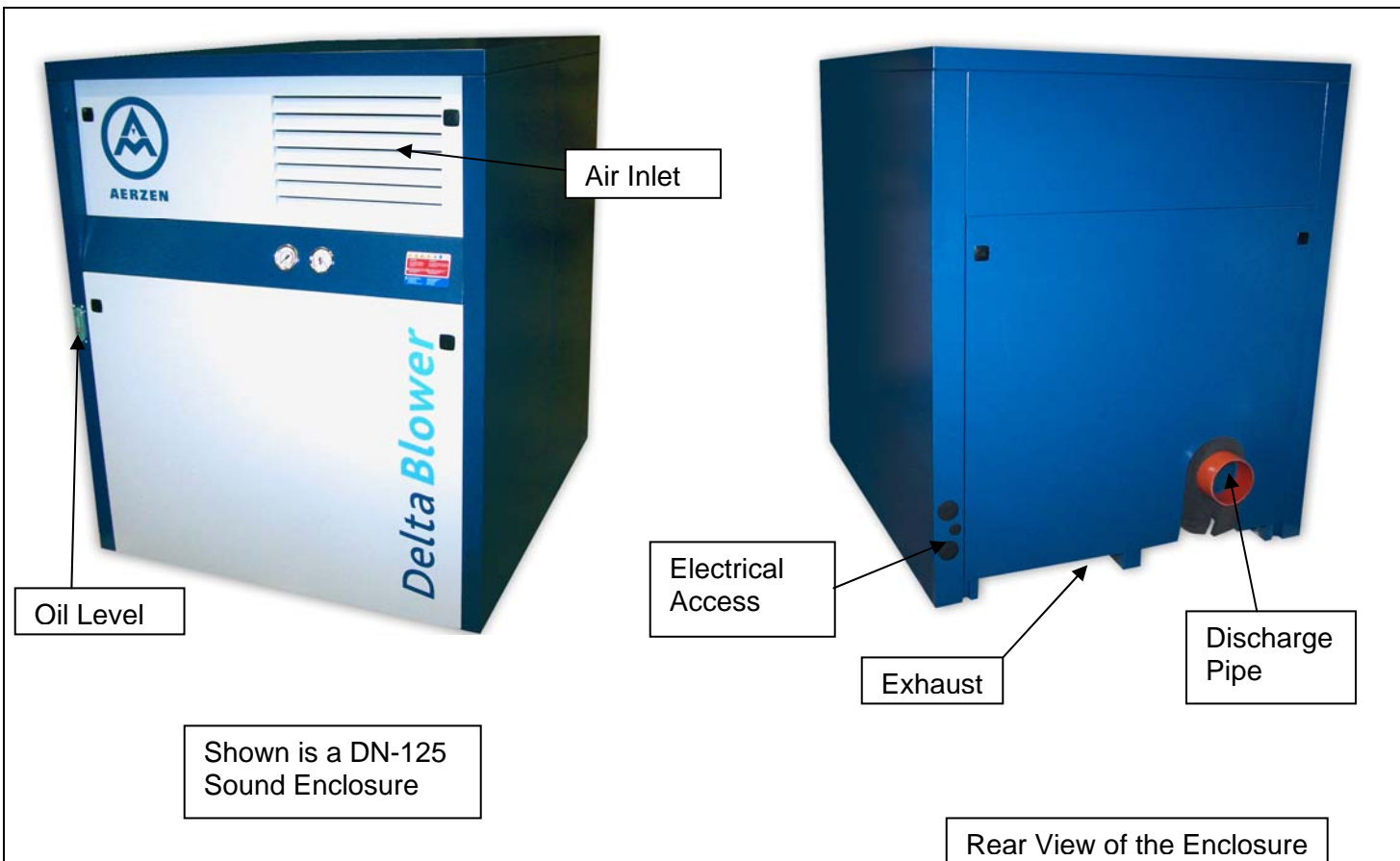
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Combination Base Frame – Silencer Delta Blower Generation 5

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Description: The sound enclosure surrounds the entire blower package to reduce noise and protect the machine from the weather while allowing easy access for maintenance. The base of the enclosure supports the entire blower package and contains an oil drip pan for environmental protection. Aerzen mounts the entire blower package within the sound enclosure at the factory prior to shipment. Transportation and installation are simplified by having the entire package supported and contained within the enclosure. The unit may be moved with a pallet jack or forklift.

The sound enclosure is designed with strategic consideration for airflow through the unit. A fan is mounted on the end of the blower shaft, so there is no need for a separate electric motor driven fan. From the cool, front side of the blower, air is drawn in through a sound trap. The air then passes over the motor and blower housings and finally is exhausted through the floor at the rear of the unit.

Quick release panels, each less than 45 lbs., provide access for routine maintenance of the blower and the package components. All maintenance and connections are located in the front and rear, allowing multiple machines to be placed side-by-side.

The oil level gauge is visible from the outside of the sound enclosure in sizes GM 4S DN-80 through GM 90 S DN-250 with the oil fill port and drain mounted to the enclosure just inside a removable panel.

	Aerzen USA Corporation 108 Independence Way – Coatesville, PA 19320 Tel: (610) 380-0244 Fax: (610) 380-0278 www.aerzenusa.com	Sound Enclosure Delta Blower Generation 5 – DN 50 to 250		
		Date 11/16/2011	Doc # B-6-0198 revision "D"	Page 1 of 2




The smallest size, GM 3S DN-50, has an easily removable roof to facilitate maintenance.

Materials:

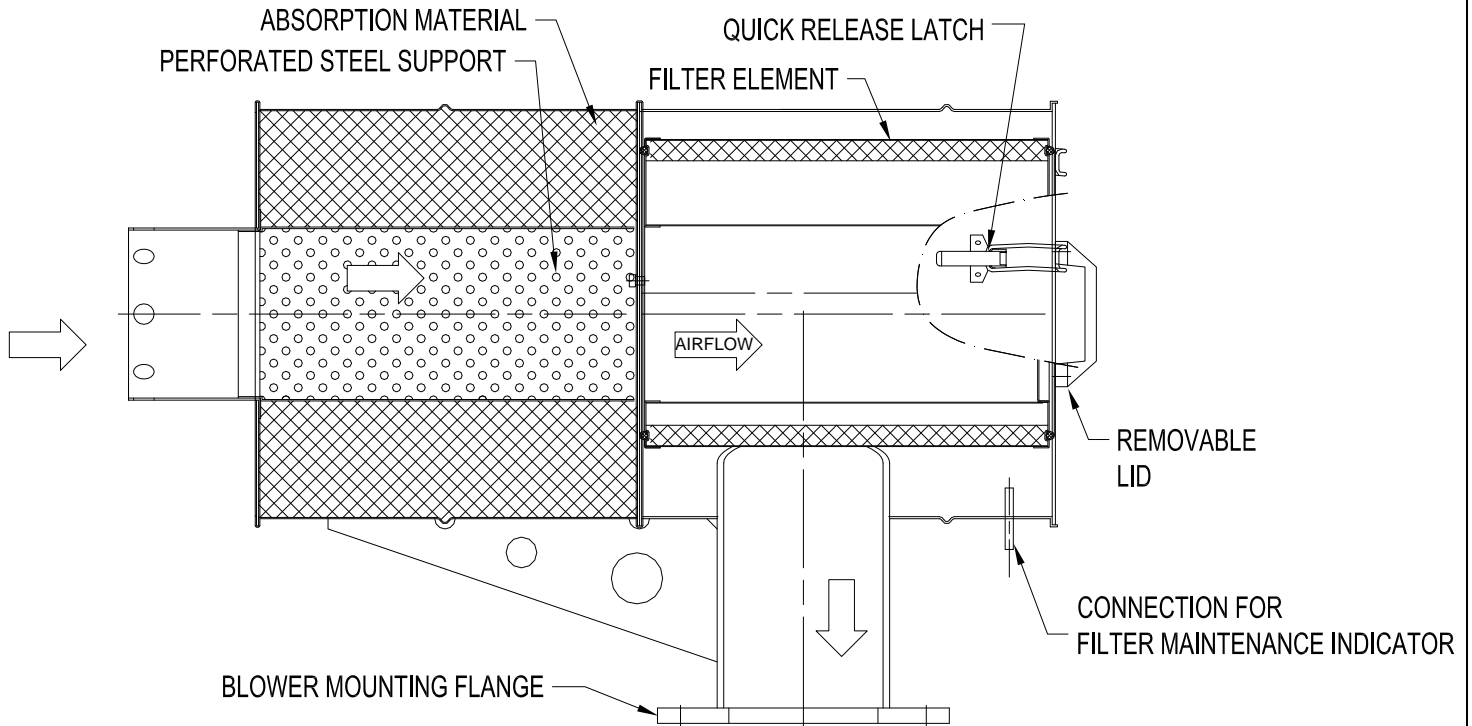
- Base pan – Polyester based powder coated steel weldment, 3 to 5 mm thick
- Exterior panels - Polyester based powder coated galvanized steel
- Sound insulation -Fire-retardant, self-extinguishing, non-dripping high-density polyester foam

Technical:

- Package noise level reduced to 80 dB, or less, at 1 m, free field, per DIN 45635.
- Snow Load – 122 kg / m² (25 lbs / ft²)
- Wind Load – 80.4 km / hr (50 MPH)
- Suitable for indoor or outdoor installation

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G5 Pressure Inlet Filter/ Silencer DN 50 - DN 300




Description: Combination dry air intake filter and absorption type silencer with filter (or strainer) element located downstream from the silencer chamber

Materials of construction:

- Casing:** Powder coated (RAL# 5001) Carbon Steel
 Maximum operating data: 60 °C (140 °F) and – 70 mbar (-2.07"Hg)
 Removable maintenance lid is held in place with quick release clamps
- Absorption material:** Flame retardant, polyester based urethane foam, grey in color, secured in place with perforated steel
- Filter element:** Thermally bound, food safe, polyester fibers, free of PVC, white in color
 Filter element mounts with a quick release turn and lock arrangement.

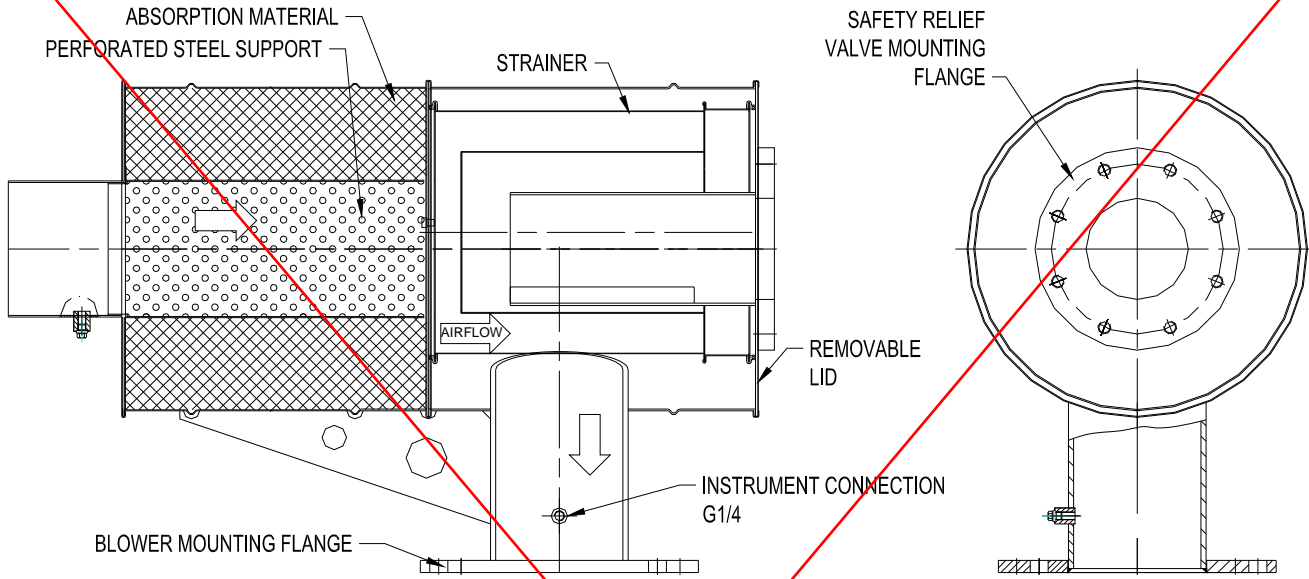
Performance:

- Filtration class: G4 per EN 779 (greater than 90% of synthetic dust particles), equivalent to ASHRAE 52.2 MERV 7 (50-70% @3-10 microns)
- Pressure-drop of the entire silencer and clean filter at the maximum allowable flow: 10 mbar (0.15 psi)
- Pressure drop filter element: 5 mbar (2" WC) clean, or replace at 45 mbar max. (18" WC)
- Noise reduction: 10-15 dB mean noise reduction across audible octave bands

	Aerzen USA Corporation 108 Independence Way – Coatesville, PA 19320 Tel: (610) 380-0244 Fax: (610) 380-0278 www.aerzenusa.com	Delta Blower Generation 5 Inlet Silencer DN-50 to DN-300		
		Date 05-21-2012	Doc # B-6-0196 revision "J"	Page 1 of 3

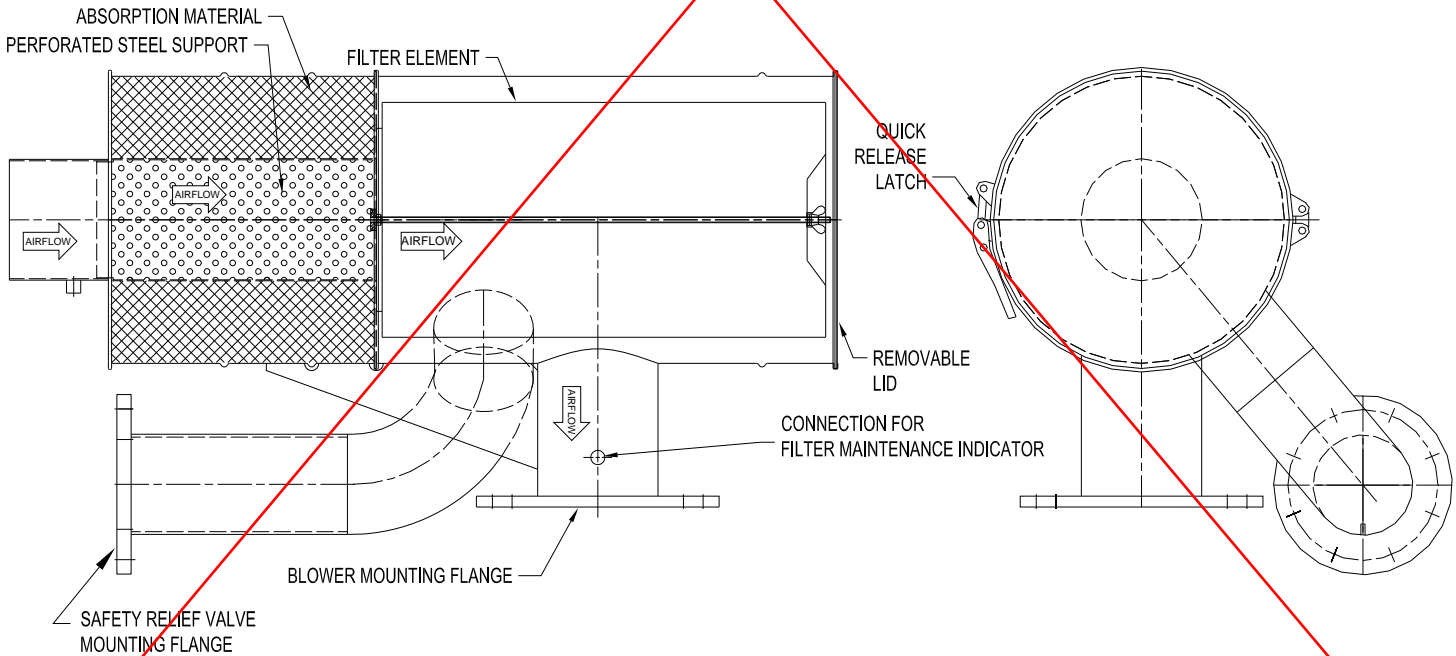
G5 Vacuum Inlet Silencer w/ Internal Strainer (No Filter)

DN 80 - DN 200



G5 Vacuum Inlet Filter/ Silencer

DN 80 - DN 200



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Delta Blower Generation 5 Inlet Silencer DN-50 to DN-300

Date

05-21-2012

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G5-WA Inlet Silencer Part Numbers

Filter nominal size	DN50	DN-80		DN-100	DN-125	DN-150		DN-200	DN-250	DN-300
Blower size	GM3S	GM 4S GM 7L	GM 10S	GM 10S GM 15L	GM 25S	GM 30L GM 35S	GM 50L	GM 50L GM 60S	GM 80L GM 90S	GM 130L GM 150S
Pressure Filter / Silencer Assembly	182111	182112	182113	182114	182115	182116	182117		182118	177707
Pressure Replacement Filter Element	175884	175239		175240		175241	176206		170836	170837
Vacuum Inlet Silencer Assembly (No Filter)	182119	182120	182121	182122	182123	182124	182125		N/A	
Vacuum Filter / Silencer Assembly	N/A	184238001	184239001	184234001	184235001	184236001	184252001		N/A	
Vacuum Replacement Filter Element	N/A	123275		123276		123273	123520		N/A	

~~G5 (Original) Inlet Silencer Part Numbers~~

Filter nominal size	DN50	DN-80		DN-100	DN-125	DN-150		DN-200	DN-250	DN-300
Blower size	GM3S	GM 4S GM 7L	GM 10S	GM 10S GM 15L	GM 25S	GM 30L GM 35S	GM 50L	GM 50L GM 60S	GM 80L GM 90S	GM 130L GM 150S
Filter / Silencer Assembly	175018	178810	173924	173882	173883	174143	173925		176294	N/A
Replacement Filter Element	175884	175239		175240		175241	176206		170836	



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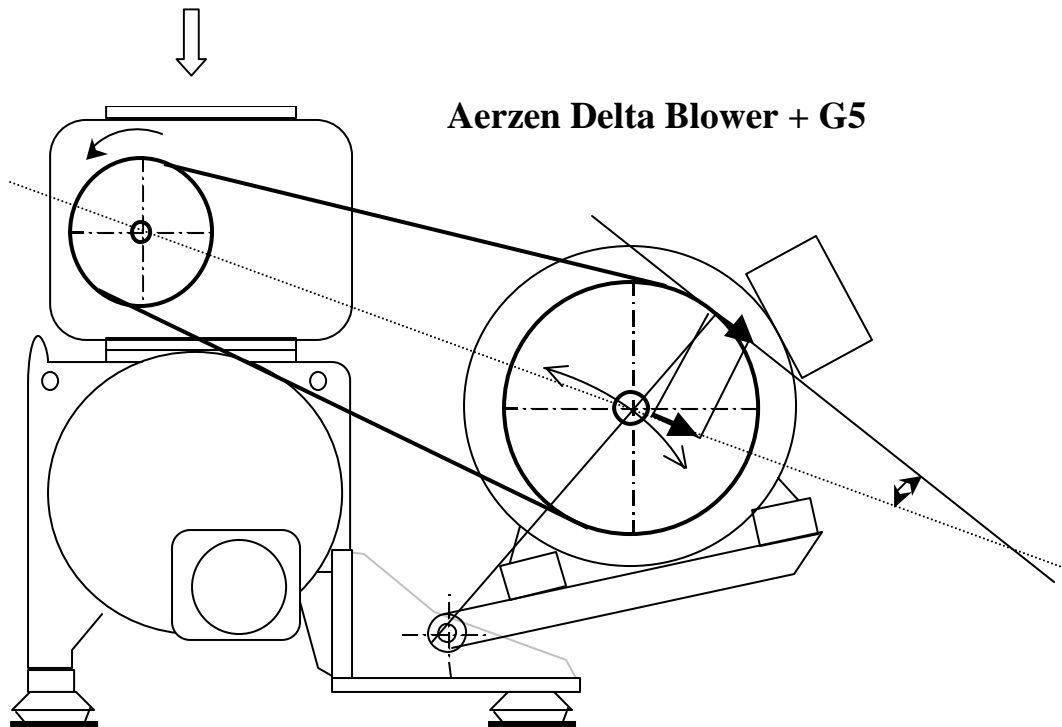
Tel: (610) 380-0244 Fax: (610) 380-0278 www.aerzenusa.com

Delta Blower Generation 5 Inlet Silencer DN-50 to DN-300

Date
05-21-2012

Doc #
B-6-0196 revision "J"

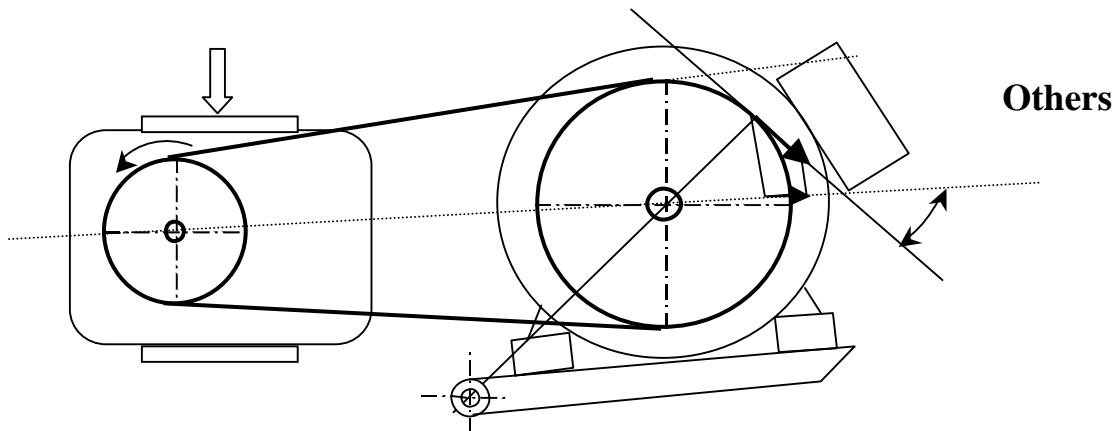
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The drive configuration of the Aerzen Delta Blower is such that any change in the belt length (due to belt stretching) results in a nearly proportional displacement of the motor. Therefore, the motor weight alone can be used reliably for automatic belt tension adjustment.

This, however, is not achievable with a different geometry, such as shown below: In such cases, a slight change in the belt length requires a much greater displacement of the motor making a manual adjustment necessary. Improper adjustment leads to belt failure and other, more significant damages can follow.

Our belt tensioning principle offer two more benefits to the user, which are superior to any other system offered: We do not need any other tensioning mechanisms to tension the belts. This eliminates further wear and tear items that the user does not have to maintain or even check up on. Secondly, we have eliminated the need for re-aligning the motor upon changing belts. The motor stays put and is merely pivoted up and down during a belt change.



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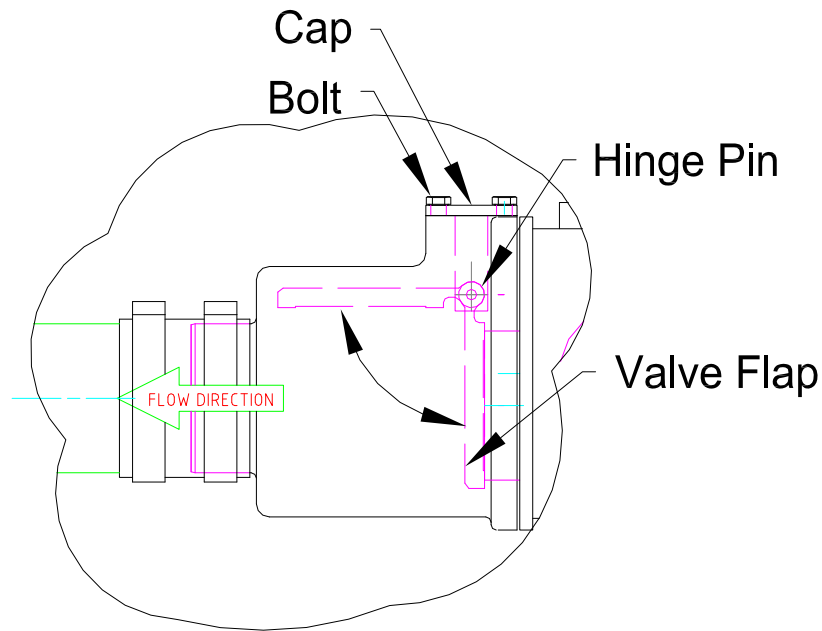
645 Sands Court – Coatesville, PA 19320
 Tel: (610) 380-0244 Fax: (610) 380-0278
 Service Hotline (800) 444-1692
 e-mail: aerzen@aerzenusa.com website: www.aerzenusa.com

V-Belt Tensioning Principle - Delta Blower

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10/23/07	B-6-0014 revision "a"	1 of 1

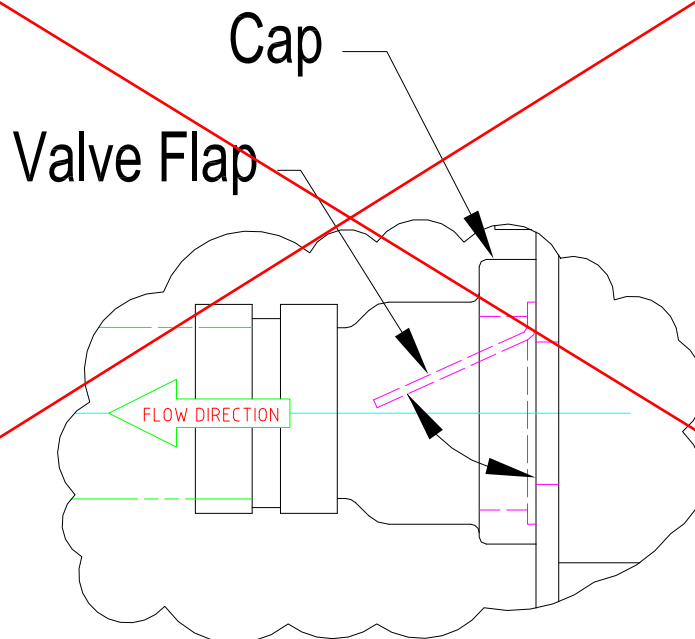
Check Valve - DN-80 through DN250

Description: Housed in the connecting housing is a full-bore, steel embedded in rubber check-valve that closes naturally by gravity without use of spring. The check-valve flap can easily be pulled out for inspection, maintenance or replacement without disconnecting the piping: removing the bolts and lifting the cap.



DN-50 Check Valve

Description: The DN-50 check valve is a full-bore, steel embedded in rubber flap sandwiched between the connection housing and the baseframe with the hinge integrated to the rubber. It closes naturally by gravity without use of a spring.



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Delta Blower Generation 5 – Check Valve

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07/15/2010

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B-6-0197 revision "F"

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1 of 2

Materials of construction:

Seat: steel (2" / DN 50 through 12" / DN300)

Flap: steel embedded in EPDM up to 135°C (275°F) – Option: Silicone rubber, good to 200°C (392°F)

Size DN	Check Valve Assembly w/ standard EPDM flap P/N	EPDM flap only P/N	Check Valve Assembly w/ optional silicon flap P/N	-Optional- Silicone flap only P/N
50	145852	146756	N/A	N/A
80	178653	178647	180877	178650
100	178654	178648	180878	178651
125	178654	178648	180878	178651
150	178655	178649	180879	178652
200	178655	178649	180879	178652
250 (AMD)	168705	n/a	168711	n/a
250 (NEMA)	157067	n/a	158845	n/a

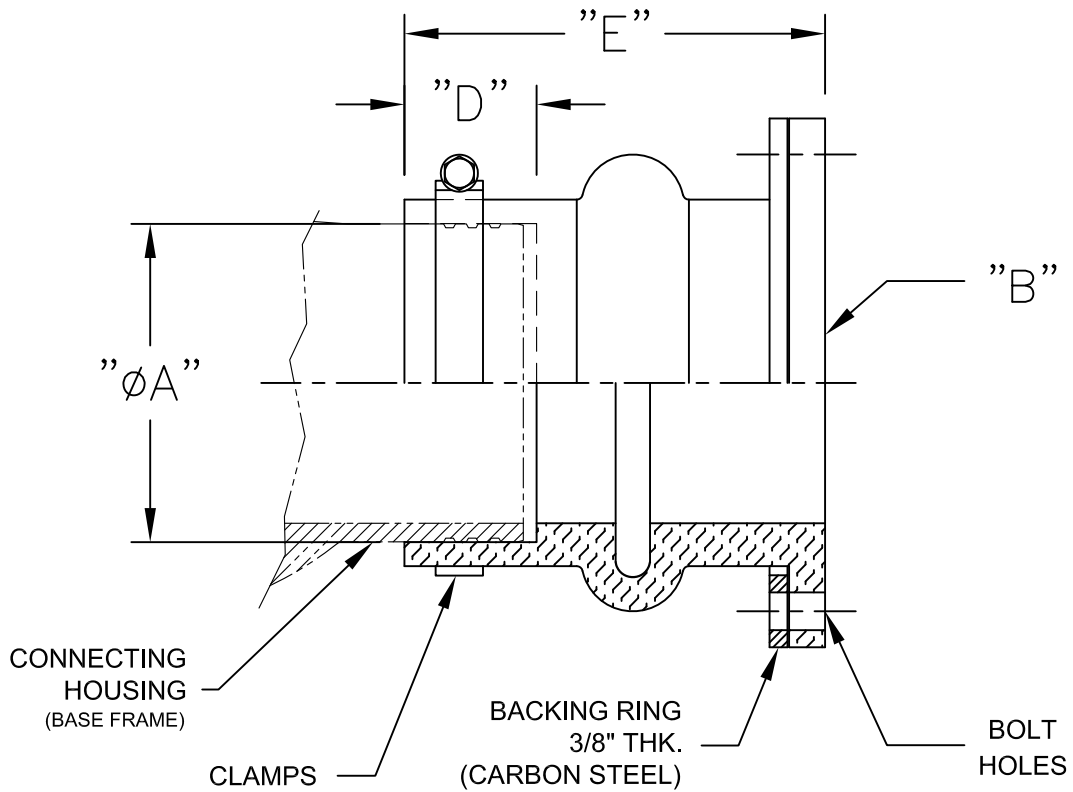


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Delta Blower Generation 5 – Check Valve

Date	Doc #	Page
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MEDIA BEING CONVEYED = AIR OR NITROGEN

BACKING RING INCLUDED WITH JOINT

AVAILABLE MATERIALS =

- EPDM WITH POLYESTER REINFORCEMENT
- SILICONE WITH ARAMID KEVLAR REINFORCEMENT

MATERIAL	MAX. TEMP.	DESIGN PRESSURE
EPDM	300°F	-15"Hg to 25 psig
SILICONE	500°F	-15"Hg to 25 psig

PACKAGE SIZE	Ø A (Sleeve ID)	B (150# ANSI Flange size)	C (Length)	D (Pipe Engagement)	PART No. 21-003168-____		EXPANSION JOINT SPECIFICATIONS				CLAMPS	
					MATERIAL EPDM	MATERIAL SILICONE	AXIAL COMPRESSION	AXIAL EXTENSION	LATERAL OFFSET	ANGULAR ROTATION	QTY	PART No. 21-000910-____
DN-050	2 ³ / ₈	2	8.00	1.50	-02X02EG	-02x02SG	0.50	0.25	0.50	2°	1	_079-085
DN-080	3 ¹ / ₂	3	8.00	2.00	-03X03EG	-03x03SG	0.50	0.25	0.50	2°	1	_104-112
DN-080	3 ¹ / ₂	4	8.00	2.00	-03X04EG	-03x04SG	0.50	0.25	0.50	2°	1	_104-112
DN-100	4 ¹ / ₂	4	8.00	2.00	-04X04EG	-04x04SG	0.50	0.25	0.50	2°	1	_130-140
DN-125	5 ³ / ₁₆	5	9.00	2.75	-05X05EG	-05x05SG	0.50	0.25	0.50	2°	2	_150-162
DN-125	5 ¹ / ₂	5	9.00	2.75	-05X05EG-A1	-05x05SG-A1	0.50	0.25	0.50	2°	2	_150-162
DN-125	5 ³ / ₁₆	6	9.00	2.75	-05X06EG	-05x06SG	0.50	0.25	0.50	2°	2	_150-162
DN-125	5 ¹ / ₂	6	9.00	2.75	-05X06EG-A1	-05x06SG-A1	0.50	0.25	0.50	2°	2	_150-162
DN-150	6 ³ / ₈	6	9.00	2.75	-06X06EG	-06x06SG	0.50	0.25	0.50	2°	2	_187-200
DN-150	6 ³ / ₈	8	10.00	2.75	-06X08EG	-06x08SG	0.50	0.25	0.50	2°	2	_187-200
DN-200	8 ⁵ / ₈	8	10.00	3.00	-08X08EG	-08x08SG	0.75	0.25	0.50	2°	2	117191 (AMD)
DN-200	8 ⁵ / ₈	10	10.00	3.00	-08X10EG	-08x10SG	0.75	0.25	0.50	2°	2	117191 (AMD)
DN-250	10 ³ / ₄	10	10.00	4.00	-10X10EG	-10x10SG	0.75	0.25	0.50	2°	2	_290-305
DN-250	10 ³ / ₄	12	10.00	4.00	-10X12EG	-10x12SG	0.75	0.25	0.50	2°	2	_290-305

* Dimension in INCHES



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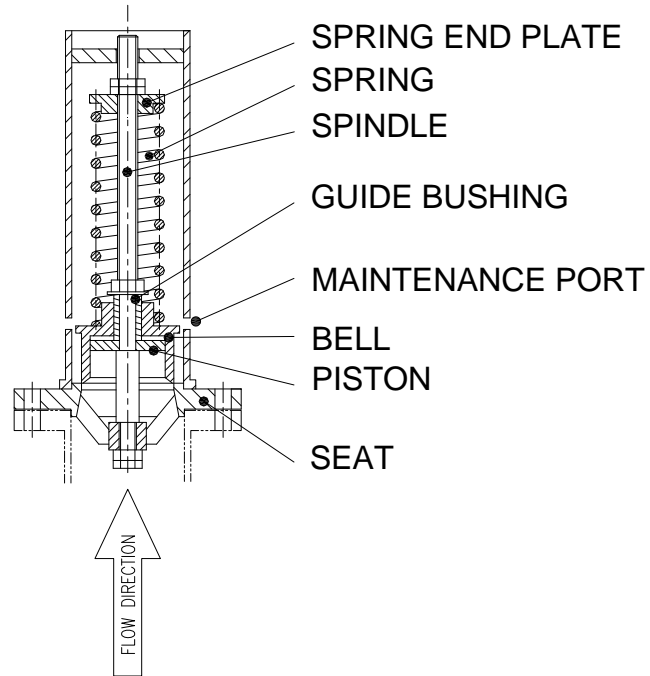
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EXPANSION JOINT WITH CLAMPS
 PIPE SLEEVE TO ANSI FLANGE

DATE	DOCUMENT NO.	REVISION	SHEET
05-10-05	XA-005207_XX	E	1 of 1

Description:

The Pressure Relief Valve is designed for use with air or inert gases to protect the blower and its accessories from damage in the event of excessive pressure. It is not to be used as a pressure regulating device. It contains a spring-loaded valve guided by a spindle and surrounded by a protective sheath that is capable of venting the entire volume flow of the blower. In positive pressure machines, it is installed downstream from the positive displacement blower and before the check valve or any shut-off valve. In vacuum applications, it is installed on the intake side of the blower.



QTY	DESCRIPTION	MATERIAL
1	Connection Flange or Thread with Valve Seat	Grey Cast Iron
1	Valve Spindle	Carbon Steel
1	Bell	Brass
1	Spring End Plate	Carbon Steel
2	Hex Nut	Carbon Steel

QTY	DESCRIPTION	MATERIAL
2	Guide Nut	Carbon Steel
1	Spring	Spring Steel
1	Valve Disc / Piston	Brass
1	Valve Guide / Bushing	Brass
1	Cover	Aluminum

Technical Data:

- Maximum Temperature: 150° C (302° F)
- Conforms to PED 97 / 23 / EG
- Maximum Pressure: 1.1 Bar (15.9 PSIG)
- Valve Characteristic: Proportional
- Pressure Rise: 10%

Relief Valves

Nominal Package Size	Blower Designation	Valve Size	Positive Pressure Valve Connection	Vacuum Valve Connection
DN-50	GM 3S	DN -50	G-2" External	DN-50 PN 16 Flange
DN-80	GM 4S			
	GM 7L			
DN-100	GM 10S	DN-80	G-3" External	DN-80 PN 16 Flange
	GM 15L			
DN-125	GM 25S	DN-125	DN-125 PN 16 Flange	DN-125 PN 16 Flange
DN-150	GM 30L			
	GM 35S			
DN-200	GM 50L			
	GM 60S			
DN-250	GM 80L	DN-150	DN-150 PN 16 Flange	DN-150 PN 16 Flange
	GM 90S			

Maintenance:

Periodically inspect for free movement of the valve. While the machine is stopped and the motor locked out, insert flat blade screw drivers into both maintenance ports and lift the valve. Remove the screw drivers and visibly ensure the valve is properly seated. When operated in clean environments, inspect valve either every six months or 1000 run hours, whichever occurs sooner. In dusty conditions, inspect every month. Refer to document G4-002 for complete operating instructions.



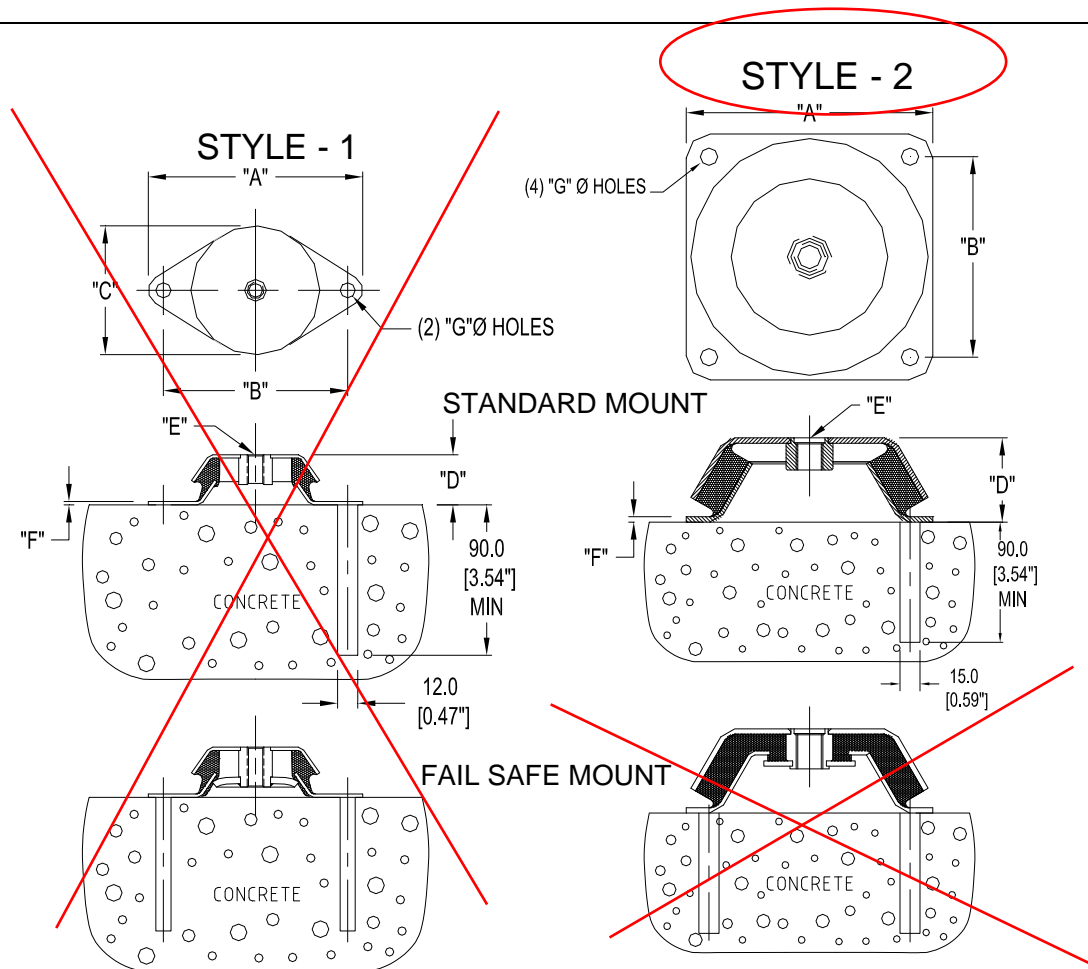
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G5 Blower – Pressure Relief Valve

Date	Doc #	Page
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Only (1) anchor per foot is required for Standard mounts, anchor each hole ("G") for Fail-safe mounts.

Standard mounts are not recommended for use where negative loads occur, (marine or earthquake zones) use Fail-safe mounts or contact Aerzen for alternates.

All vibrations isolators have a natural frequency that will not interfere with the fundamental blower package frequencies.

Baseframe	Standard P/N	Fail Safe P/N	Style	A (mm)	B (mm)	C (mm)	D (mm)	E	F (mm)	G (mm)	Maximum Load Per Foot		Recommended Anchor
											KN	Lbf	Aerzen P/N
DN-50	175802	N/A	1	127	110	77	30	M10	2	9	1,4	315	120813
DN-80	176394	176394_FS	1	127	110	77	30	M10	2	9	2	450	120813
DN-100													
DN-125													
DN-150	177128	177128_FS	2	168	132	-	50	M16	4	13	4	899	120835
DN-200	177129	177129_FS	2	184	150	-	60	M20	4.5	13	9	2023	120835
DN-250	118879	N/A	2	184	150	-	60	M20	4.5	13	15	3372	120835
DN-300													



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Vibration Isolators – G5 Blowers

Date

06/30/2010

Doc #

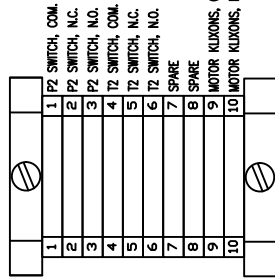
B-6-0194 revision "D"

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SECTION 4

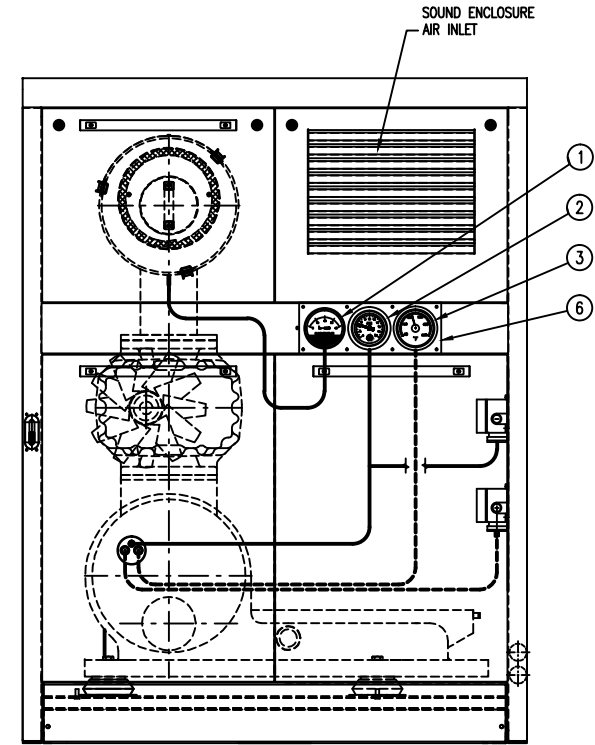
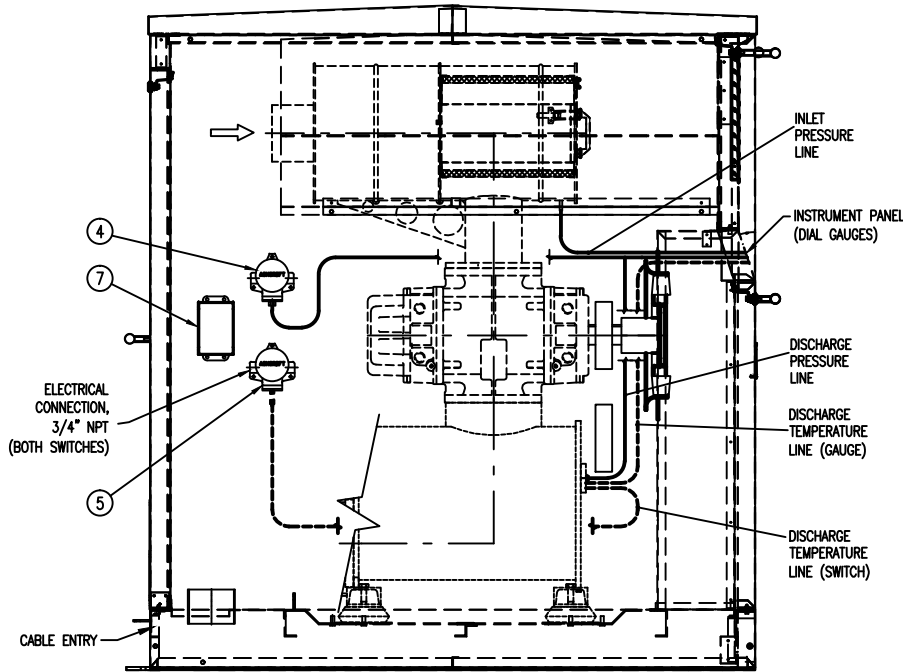
P2 = DISCHARGE PRESSURE
T2 = DISCHARGE TEMPERATURE



ONLY IF KILVOLTS ARE
INSTALLED ON MOTOR

CUSTOMER CONNECTION SIDE
RATED: 30VDC/250VAC @ 2.0A

DETAIL
TERMINAL BLOCK DIAGRAM
FOR JUNCTION BOX



FRONT PANEL

NOTICE:

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MAIN COMPONENTS

ITEM	DESCRIPTION	PART NO.	DRAWING NO.
1	GAUGE, INLET PRESSURE (FILTER MAINTENANCE INDICATOR)	21-000799	32-0044-02
2	GAUGE, DISCHARGE PRESSURE	21-000814	32-0053-02
3	GAUGE, DISCHARGE TEMPERATURE	21-000702-07-10	32-0014-07
4	SWITCH, DISCHARGE PRESSURE (EXPLOSION-PROOF)	21-000804-02	32-0048-02
5	SWITCH, DISCHARGE TEMPERATURE (EXPLOSION-PROOF)	21-000724-08-10	32-0018-08
6	JUNCTION BOX, 6" x 4"	21-000990_06X04_01	55-0023_04X06



AERZEN USA CORP.

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TITLE

G-5 BLOWER - INSTR. (S.E.)

FILTER MAINTENANCE INDICATOR
DISCHARGE PRESSURE GAUGE & SWITCH
DISCHARGE TEMPERATURE GAUGE/SWITCH

DATE 04.30.2013	DRAWN BY: RJP	CHECKED BY: DLM	P.M. APPROVAL : -	SCALE: MSPACE 1 :1
DRAWING NO: G5-IM-PS07-4009-00			REVISION NO: -	SHEET: 1/1

Blowers • Compressors • Vacuum Pumps

108 Independence Way Coatesville, PA 19320 USA

Telephone: (610) 380-0244 Fax: (610) 380-0278
inquiries@aerzenusa.com www.aerzenusa.com



One Step Ahead

July 11, 2013

Mass Transfer Systems
23 Walpole Park South
Walpole, MA 02081

RE: Clarifications/Exceptions for CH2MHill Project #457133
Manatee County SW WWTP

**Responses and Comments To Submittal Proj# 457133 Positive Displacement Blowers
CH2M Hill June 24, 2013 email – Additional responses to the response submittal of
7/9/13.**

Submitted 7/9/13

1. **Winding thermostats are listed under motor adders, but no current voltage is indicated for automatic reset. Provide data on current voltage rating for thermostat contacts.**

FAILS TO INDICATE CURRENT VOLTAGE RATING FOR AUTOMATIC RESET IN WINDING THERMOSTAT. THE INFORMATION IN THE RESPONSE WAS INSUFFICIENT.

**Thermostat voltage- 110-120V,
Thermostat Current- 5-7 Amps.**

- 2. **Provide pressure gauge as specified in Section 40 99 90.**

SELECTED INSTRUMENT FAILS TO MEET THE ACCURACY REQUIREMENT (1% OF SCALE REQUIRED, 1.5% INDICATED). THE SPECIFIED INSTRUMENT IN 40 99 90 SHOULD BE USED.

Please see attached Instrumentation Drawing and cut sheets.

- 3. **Provide thermometer and temperature switch as specified in Section 40 99 90.**

SELECTED INSTRUMENT FAILS TO MEET THE ENCLOSURE RATING REQUIRED (NEMA 4X REQUIRED, NEMA 4 INDICATED). ADDITIONALLY, THE INSTRUMENT FAILS TO MEET THE REQUIRED ACCURACY (SAME AS ABOVE COMMENT). FINALLY, IT IS NOT RECOMMENDED TO USE A DUAL-PURPOSE INSTRUMENT IN THE EVENT OF A FAILED CONDITION. THE SPECIFIED INSTRUMENTS IN 40 99 90 SHOULD BE USED.

Please see attached Instrumentation Drawing and cut sheets.

4. **Resubmit the motor space heater wattage.**

ACCEPTED.

Blowers • Compressors • Vacuum Pumps

108 Independence Way Coatesville, PA 19320 USA

Telephone: (610) 380-0244 Fax: (610) 380-0278
inquiries@aerzenusa.com www.aerzenusa.com



One Step Ahead

Submitted 7/9/13

- 5. Resubmit description, ratings and wiring diagram for the motor thermal protection (T-Stats).**

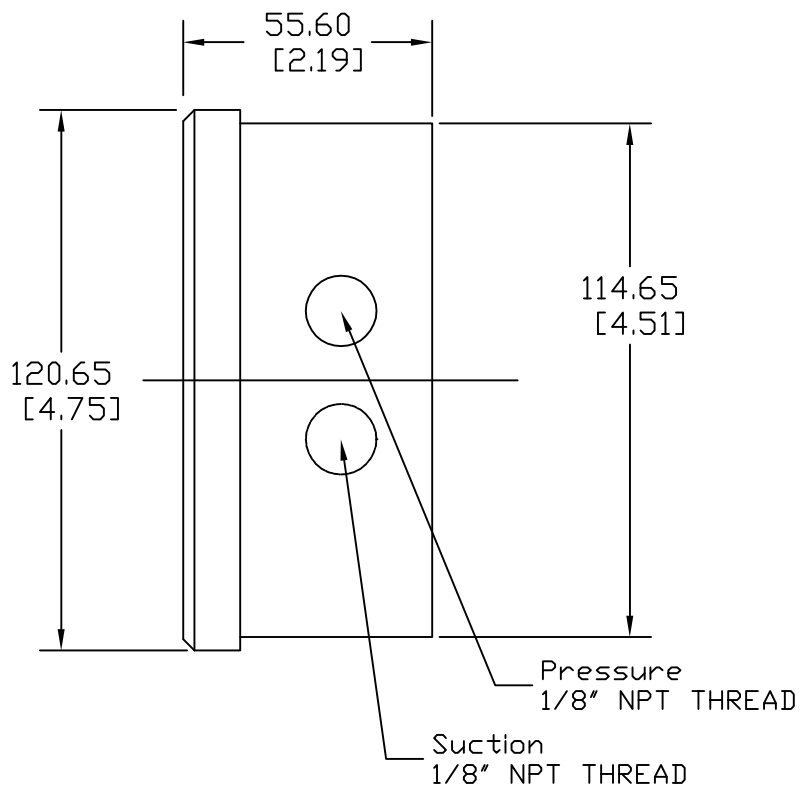
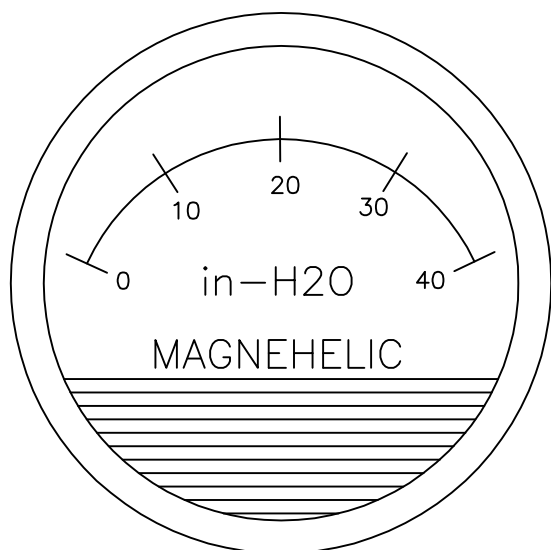
**Only the wiring diagram was included, not descriptive information.
Provide description.**

**There is nothing great about thermostat connection diagram.
We provide the connection diagram in datapack, same as I had
provided earlier. There will be two leads only. Customer have
to just connect there two control circuit cable/wires in these
leads.**

Regards,

Jill Gouert
Project Administrator
Aerzen USA

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DWYER # 2040

Dial Size: 4"

Magnehelic Differential Pressure Gage

Ambient Temperature Range: 20°F to 140°F

Test Pressure Range: -20" Hg to 15 psig

Connections: 1/8" NPT

Housing: Die Cast Aluminum

** ACCURACY = 2% OF FULL SCALE

Panel Cutout = 4.540/4.580"



Aerzen USA Corp.

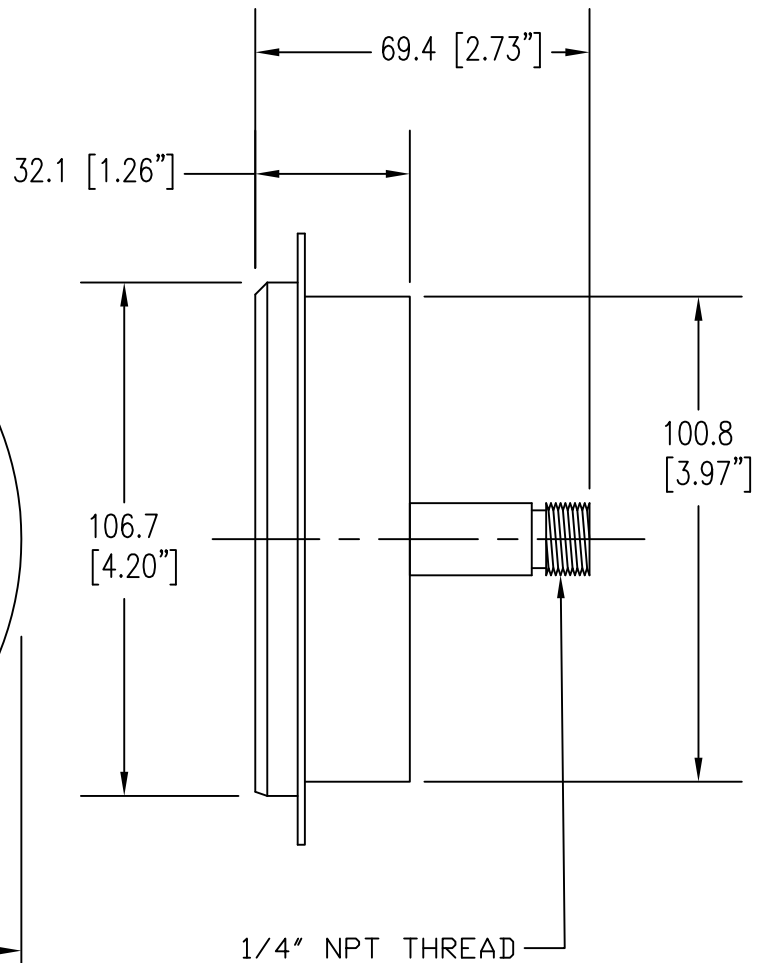
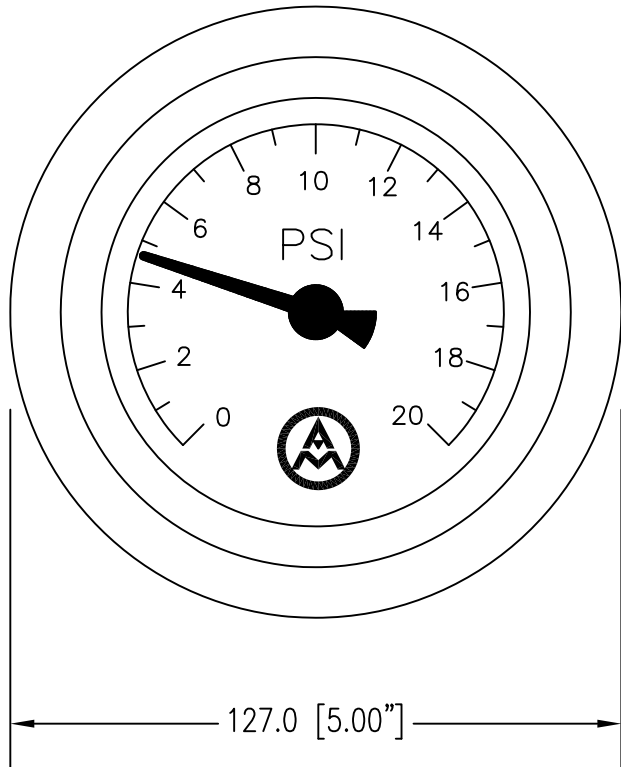
645 SANDS CT, COATESVILLE PA 19320
 (610) 380-0244 PH, (610) 380-0278 FX
www.aerzenusa.com

GAUGE-INLET PRESSURE (4", -40 to 0" H2O)

Date
 Oct. 2002

Doc #
 32-0044-02 revision -

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VENDOR – AERZEN

4" DIAL

SS U-Clamp for Panel Mounting (Not Shown in Drawing)

1/4" MNPT, Center Back Connection

Polycarbonite Lens

Glycerin Filled

Stainless Steel Case Material

Copper Alloy Wetted Parts

Range 0 to 20 psi (accuracy: 1.5% ANSI/AMSE Grade B)

panel cutout = 4.120/4.080"



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GAUGE – DISCHARGE PRESSURE (4")

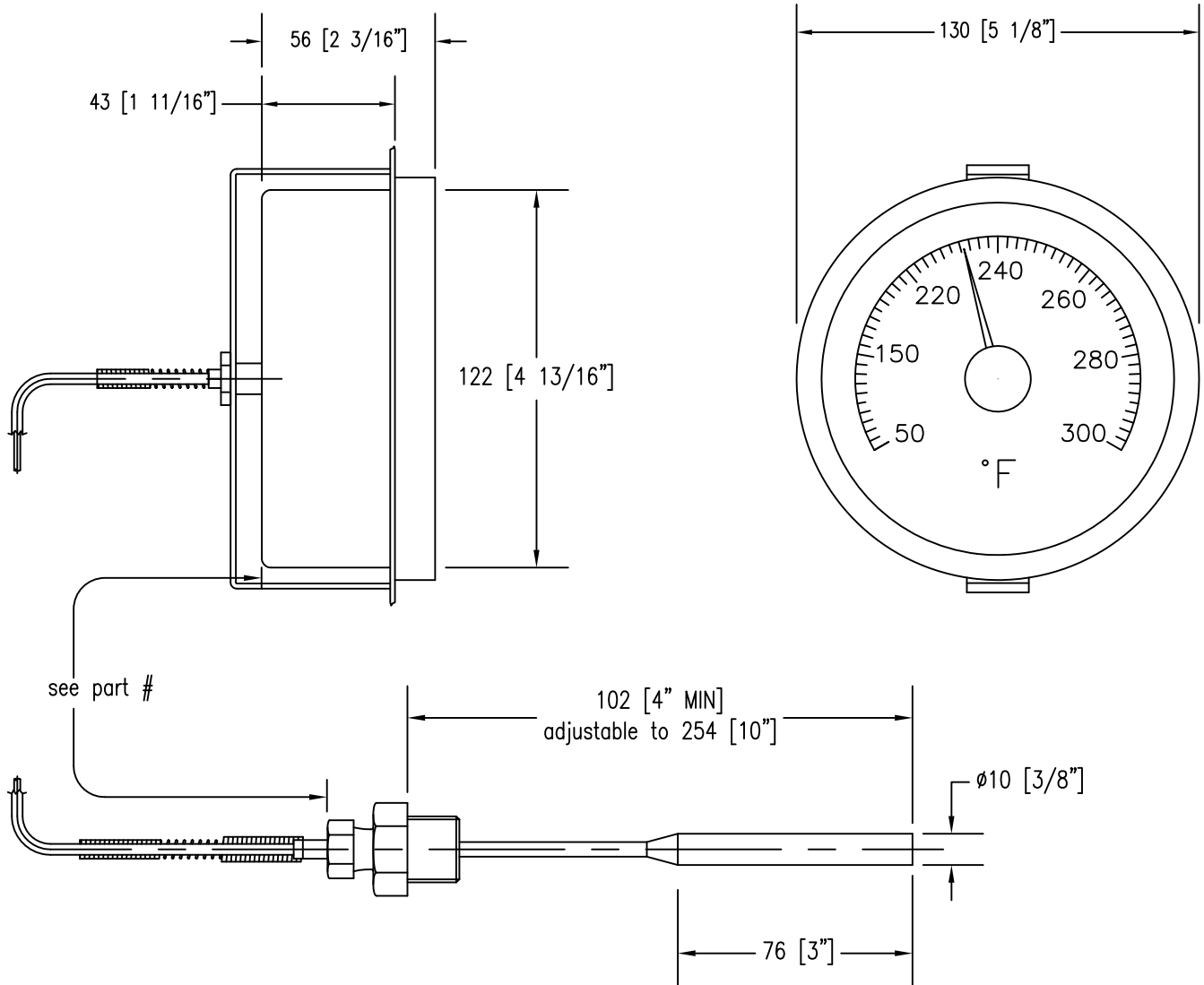
Date
11/01/05

Doc #
32-0053-02 revision "A"

Page
1 of 1

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ASHCROFT # 600A-01-C11-B01-A1-???-AL

Accuracy: +/- 1% of range

600A = VAPOR ACTUATED DURATEMP THERMOMETER

01 = Stainless Steel Case, Bayonet Ring

C11 = 4-1/2" dial, flush mounting, back connection

B01 = 12" bendable bulb extension w/ 1/2" union conn.

A1 = Stainless Steel Spring Capillary Armor

??? = L03 = 10 ft long capillary (21-000702-07-10)

L07 = 20 ft long capillary (21-000702-07-20)

AL = 50 to 300 °F Temperature Range

Panel Cutout = 4.820/4.860"

** USE THERMOWELL 32-0011-06

AERZEN P/N: 21-000702-07-length (in ft)

DRAWING NO.: 32-0014-07 REV "B"

AERZEN USA CORP.

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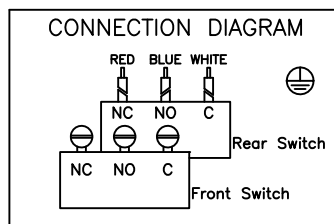
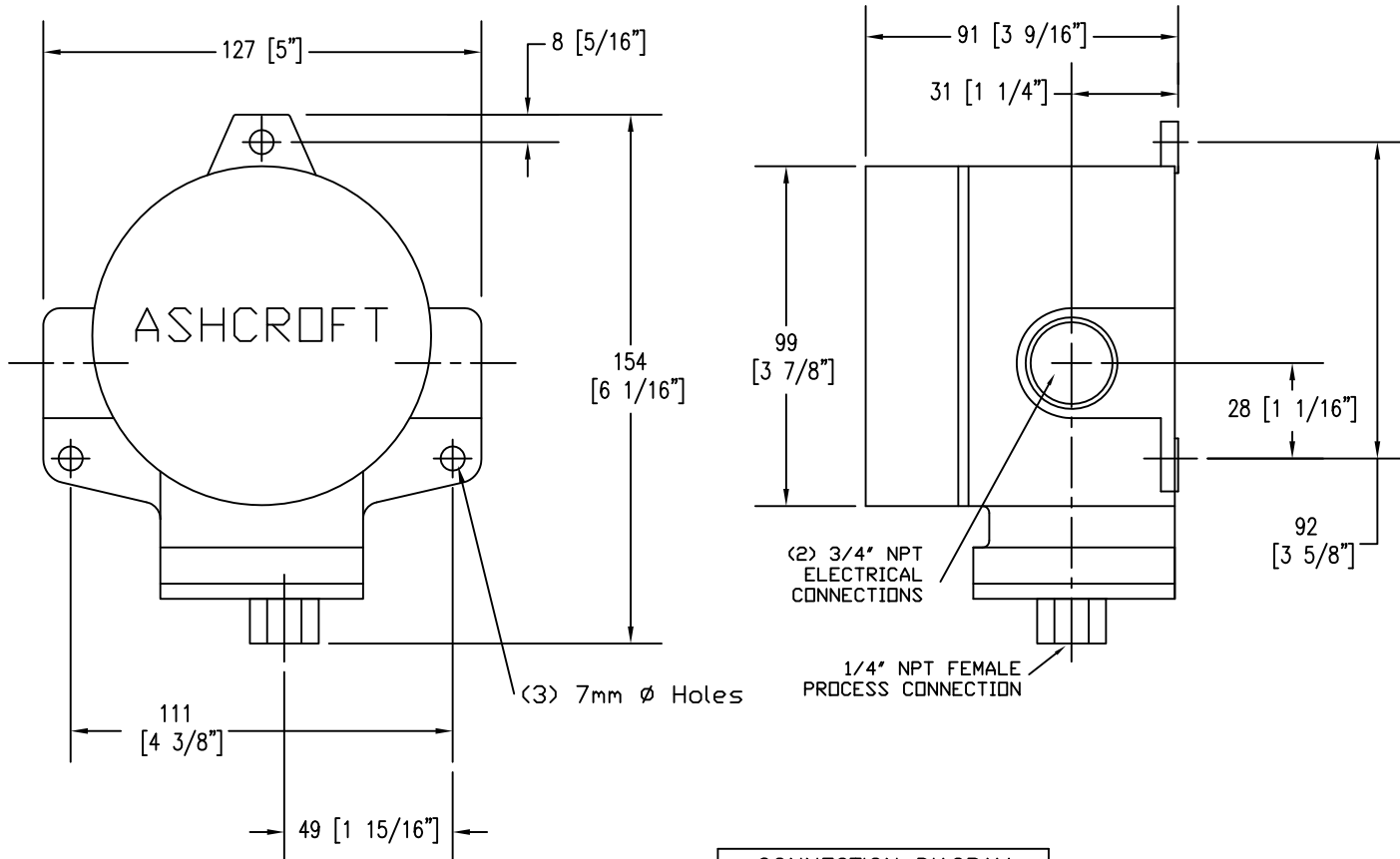
TITLE:

GAUGE - DISCHARGE & OIL TEMPERATURE

Page
1 of 1

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ASHCROFT TYPE B7-64-V-(0 TO 15 PSI)

B7 = Type 700 Pressure Switch in NEMA 7/9
 Explosion Proof Enclosure

64 = DUAL general purpose 15A, 110-480V switches
 (2) SPDT snap-acting, NOT independently adjustable.

V = Viton Actuator Seal (good for 20 to 300°F)

(0 to 15 PSI) = Operating Range

* AERZEN USA to set @ _____ psi



Aerzen USA Corp.

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SWITCH - PRESSURE (X-Proof)

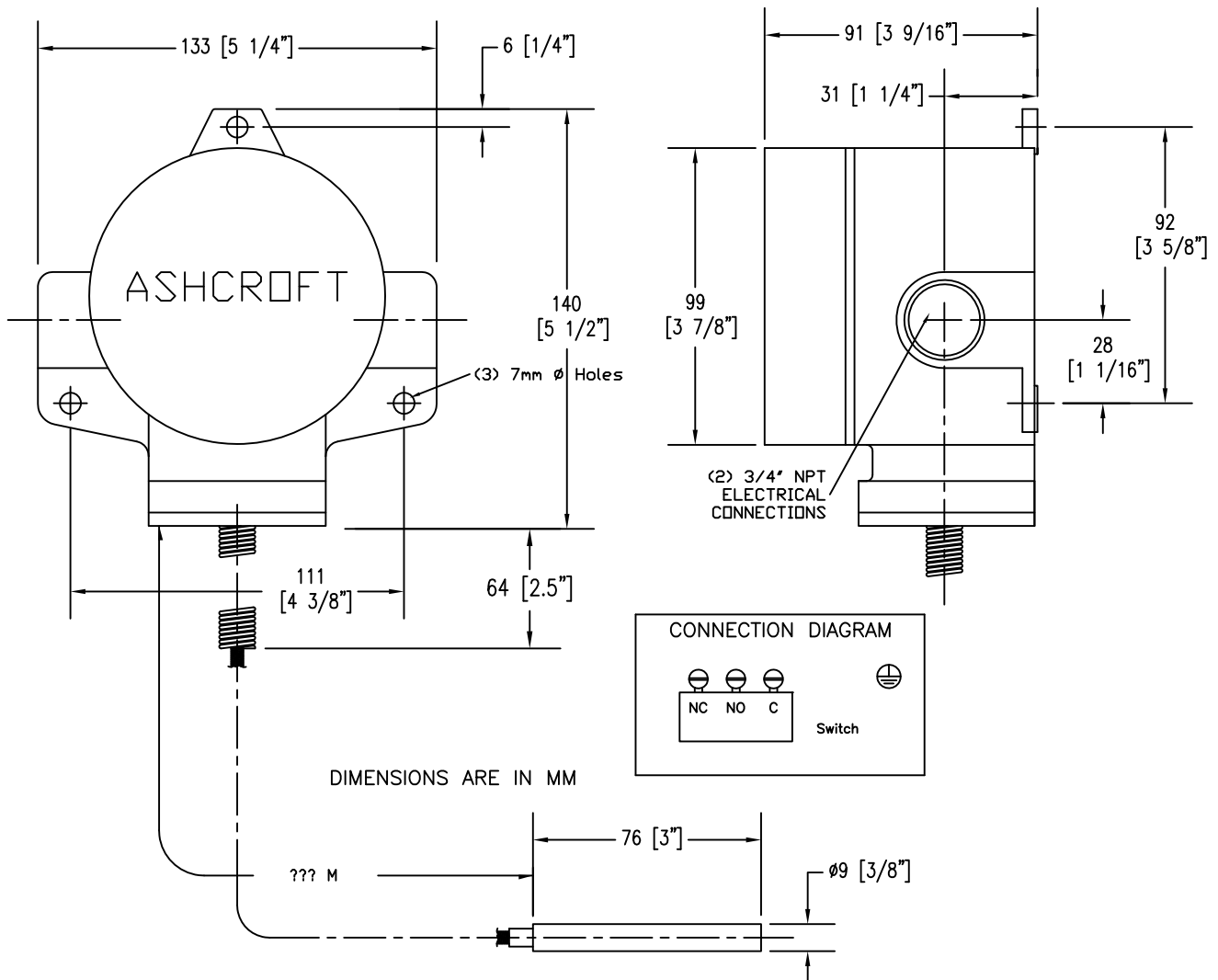
Date
 Oct 2002

Doc #
 32-0048-02 revision -

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ASHCROFT TYPE T7-24-T05-030-(235-375°F)

T7 = Type 700 Temperature Switch in NEMA 7/9
Explosion Proof Enclosure

24 = Single general use 15A, 110-480V switch SPDT snap-acting

T05 = Remote Mounting with 5 foot capillary

030 = Remote Mount (S=3") & (U=2-1/2")

(235 to 375°F) = Operating Range

Use Thermowell # 32-0011-02(4") or 32-0011-04(7")



Aerzen USA Corp.

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www.aerzenusa.com

DISCHARGE TEMPERATURE SWITCH

Date
Jul. 2013

Doc #
32-0018-08

revision A

Page
1 of 1

SECTION 5

GE Energy

X\$D Ultra[®]

NEMA Premium Extra Severe Duty Motors

TEFC
143-449 Frame
0.75-300 HP
230/460V, 460V, 575V
60 Hz



Expect more.

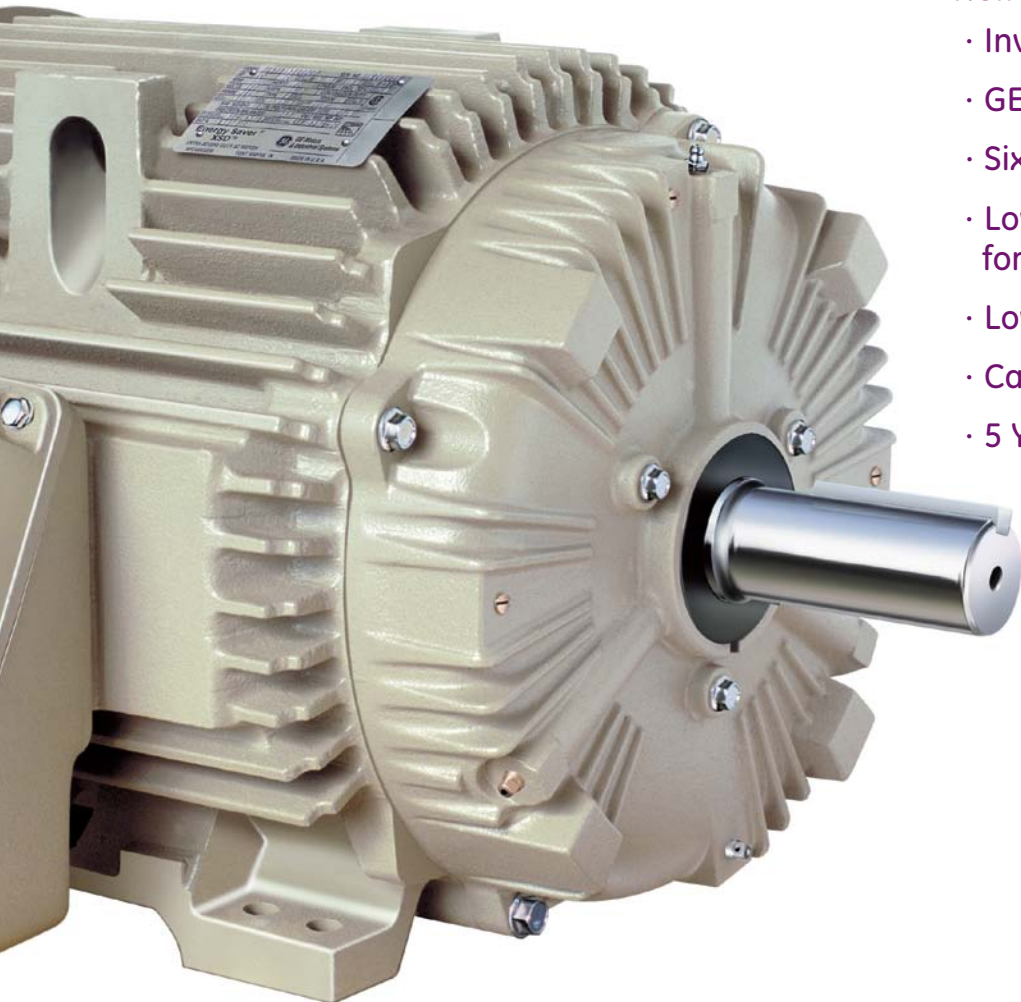
a product of
ecomagination



imagination at work

Expect more from your motor

The GE X\$D Ultra[®] meets the demands of your application with efficient, long-lasting and reliable performance. Built to the highest industry standards, it will exceed your expectations for years to come—you can count on GE.



Key features

Efficiency

- NEMA Premium Efficiency

Reliability

- Inverter duty capability
- GEGARD2400™ insulation system
- Six Star Bearing System™
- Low vibration / provisions for monitoring
- Low Class B temperature rise
- Cast iron construction
- 5 Year Warranty

Safety

- 4-point Cast-in lifting lugs
- Extended grease fittings

Get more for your application

Maximizing your investment means getting the most from the motors you choose. More than just getting the job done, motors must be dependable, rugged and built to last. Your application demands the best, and GE delivers.

Industries

- Petrochem / Oil & Gas
- Mining
- Metals
- Utilities & Power Generation
- Water / Wastewater
- General Process Industries
- Pulp & Paper

Applications

- Fans, pumps, compressors, conveyors and many others

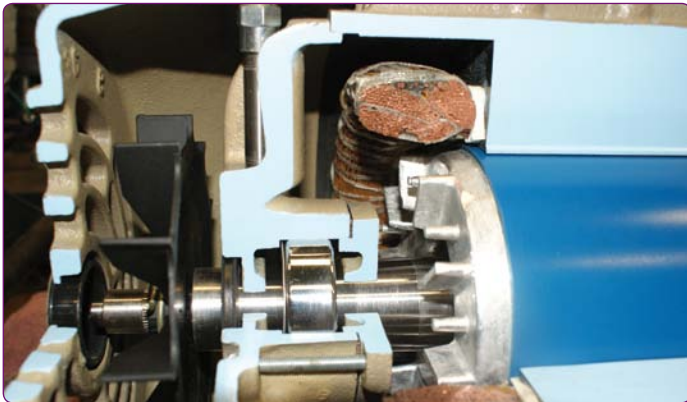


X\$D Ultra motors— built to a higher standard

Six Star Bearing System™

Bearings, the life force of a motor, are what keep the X\$D Ultra running smoothly. These features protect and lubricate the bearings, adding to the durability and longevity of the X\$D Ultra.

- Single shielded bearings on both ends open toward the grease cavity to allow maximum opportunity for grease circulation.
- Cast-iron bearing caps with gaskets retain lubrication and protect the bearing system from contaminants.



- Low temperature rise designs— 15% cooler on average than IEEE standards— increase bearing life.
- Overall vibration of 0.04 ips peak results in smooth, reliable operation and extends bearing life.



Rotor assembly balanced to ISO 1940 Grade 1.0 for low vibration.

The vibration level is 50% lower than the requirement of IEEE 841 - 2009 Standard and 3.75 times better than NEMA Standard balance.



- 130,000 hour L10 direct connected and 50,000 hour L10a belted bearing life increases uptime and decreases repair costs.
- Full charged lubrication system with a temperature resistant polyurea grease suitable for a wide temperature range (-40°C to +130°C).

Safety

- Safer lifting is possible with a four point lifting system versus a single eyebolt. Cast-in lifting lugs eliminate eyebolts that may strip, shear, get lost or be improperly selected.
- Extended grease fittings for easy and safe access.



Extra severe duty construction gives you more assurance

The XSD Ultra has a rugged, all cast iron construction with corrosion resistant SAE Grade 5 hardware. A recessed steel reinforced neoprene slinger is used on both the drive end and opposite drive end for better protection from outside elements (IP55).

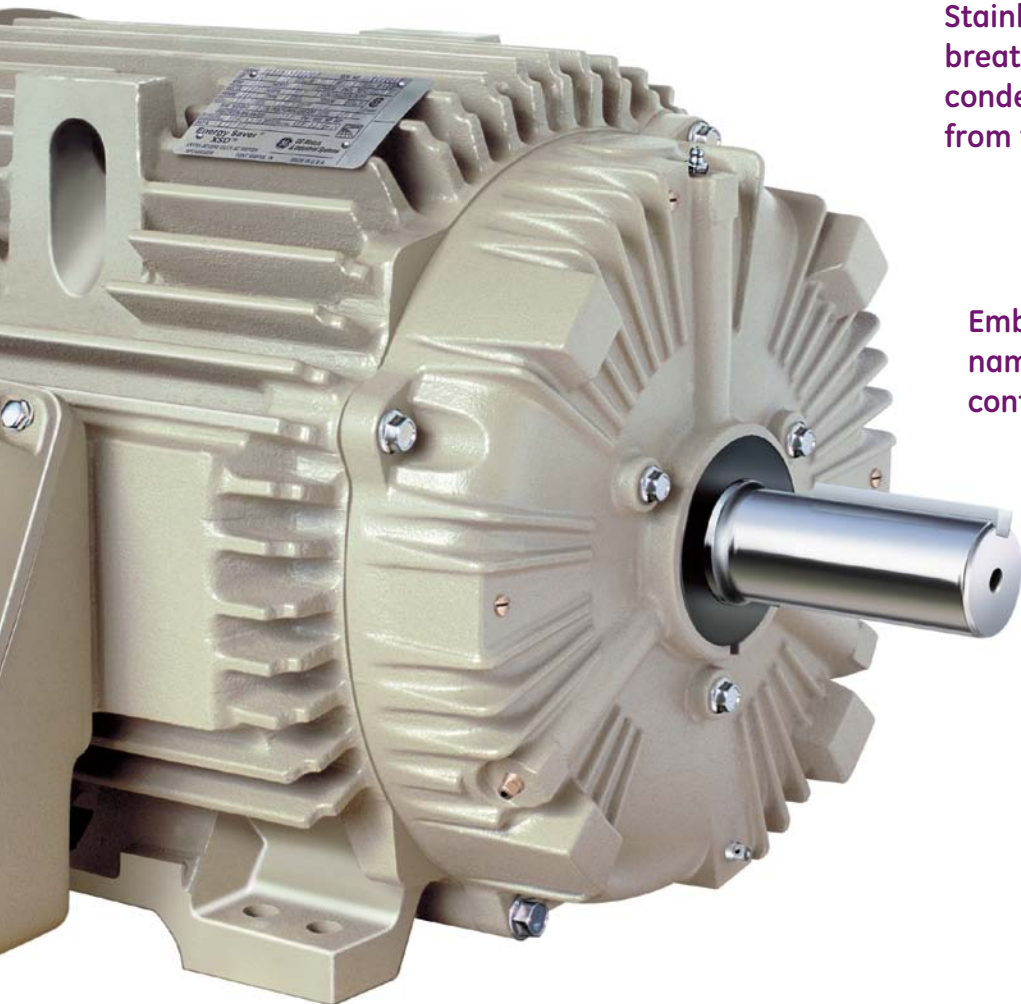


Oversized, gasketed conduit box with lead separation gasket and conduit box cover gasket restricts moisture and contaminants from entering the motor.

Epoxy ester paint system stands up to corrosive environments and meets the IEEE 841 paint requirements.



Stainless Steel combination breather/drain allow condensation to drain from the motor.



Embossed 316 stainless steel nameplate on the motor contains alternate 50Hz data.

Premium energy efficient motors deliver more bottom line savings

NEMA Premium Efficiency

One of the greatest benefits of the X\$D Ultra is its efficiency rating. X\$D Ultra motors exceed all NEMA minimum guaranteed efficiency levels, and GE guarantees the minimum efficiency levels stamped on the nameplate.

X\$D Ultra motors comply with the US Energy Independence and Security Act which requires general purpose motors to meet or exceed all NEMA Premium nominal efficiency levels based on NEMA MG1 table 12-12 as of December 19, 2010.

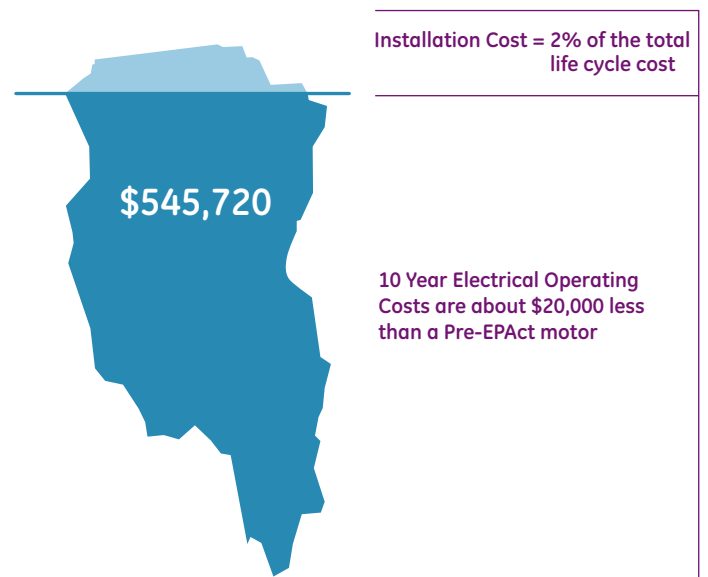
- A new 100HP 1800RPM X\$D Ultra motor can pay for itself in energy savings in 1.5 years if used to replace an equivalent Pre-EPAct motor.*
- Finned endshield for improved heat dissipation and long bearing life (324-449 frames).
- The GE Premium efficiency design lowers annual energy cost and extends motor life without any sacrifice in NEMA B performance.

* Statements based on 8400 hr/yr runtime and \$0.065/kWh electrical cost.



What could you save?

How about \$20,000 and 150 metric tons of CO₂ per motor over a 10 year period.



GE reliability means more uptime operation

Insulation System

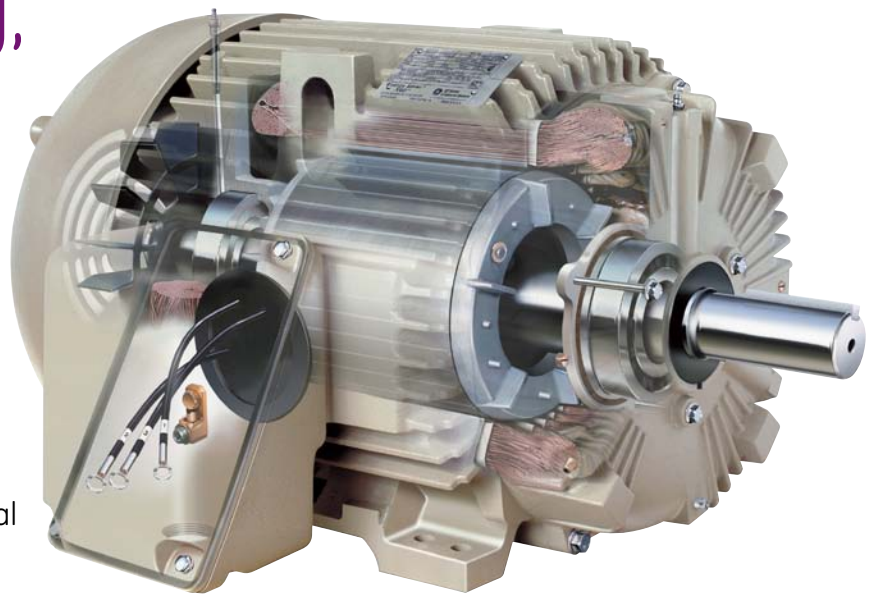
GEGARD2400™ insulation systems feature Class H insulation materials and a 1.25 service factor. This system increases motor protection against IGBT drive voltage spikes up to 2400 volts @ 0.1 microsecond rise time, which exceeds NEMA MG1-31 standards. All motors are tested to verify the corona inception voltage prior to shipment.

- Low temperature rise designs maximize the bearing and winding life of the motors.

Better built,
better performing,
better motors.

GE X\$D Ultra®
NEMA Motors—
You can expect more.

5-year manufacturer warranty is standard for the X\$D Ultra motors. This comprehensive warranty program covers mechanical, electrical and efficiency performance. Further proof that you can expect more from GE.



Find out more about GE X\$D Ultra® NEMA Motors at:

www.gemotors.com



With **ecomagination**, GE imagines and builds innovative solutions that help customers meet environmental challenges and improve their operating performance, while also benefiting the company and the world. As a global leader in energy, technology, manufacturing and infrastructure, GE is uniquely suited to help solve environmental dilemmas— today and for generations to come.

If a U.S. industrial user replaces one 100HP 1800RPM Pre-EPAct motor with an X\$D Ultra, greenhouse gas emissions can be reduced by as much as 15 metric tons per year.*

* Statements based on 8400 hr/yr runtime and \$0.065/kWh electrical cost.

For more information, contact your GE sales representative.

GE Energy
800 541 7191
Fort Wayne, IN 46801
www.gemotors.com



imagination at work

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GEA17458 6/11



Motors

Customer Information:

Name	: Bruce Burns	Date	: 29-May-2013
Company	: AERZEN USA CORP	Project Name	: WF-91457437
Address	: 108 INDEPENDENCE WAY	EBG Quote #	: EBQ229159
	: COATESVILLE, PA - 19320	EBG Item #	: ITM352520
Index #	: 7092202	Model #	: NOCAT360MH
		Created By	: Halder, Pankaj

General Electric is pleased to offer the following motor quotation.

General Description of the AC Motor:

Output = 75 HP	Phase = 3	NEMA Design = B	Product Name= ULTRA XSD Extra Severe Duty NEMA Premium
Synch RPM = 1800	Frequency = 60	DE E/S & Mtg= Standard E/S & Foot Mounted	GE Type = Premium Efficiency - NEMA Design B, KS
Voltage = 480	Shaft Orientation = Horiz. Shaft	C-face Dia. = NA	Ambient Temp. = 40 C
Enclosure = TEFC	Hazardous Loc.= Non-Hazardous	Frame Material = Cast Iron	Insulation Class = H
IP & IC Code = IP55, IC411	Class and Group = NA	Estimated Frame= 365	Service Factor = 1.25
Load Type =N/A	Var. Freq. Speed Range= N/A	DE Shaft Extension = T	Load Connection= Direct
Motor Application: Non-Nuclear		Warranty = 5 Years	Est. Weight = 1070 LB

Motor Adders:

- Winding Thermostats(Trip) ; Normally Closed, In Series , Insulation Class ; F , Quantity ; 3
- Box Size ; Oversized
- Fittings ; Hydraulic & Auto-relief
- Space Heater Type ; Standard ; 110 - 120 V
- Fastener Material ; Stainless Steel
- Nameplate, additional data ; : Guaranteed Efficiency; Full Load Nominal Power Factor; Kvar
- Floor Mounting ; Top Mounted(f3)
- Class B rise @ 1SF

GE Comments:

General:

1. Quoted motor assuming horizontal foot mounted motor. Conduit box mounting is assumed as F3 mounting.

Specification: Section 26 20 00; Low voltage Induction motors

1. Sec.1.02. Quoting motor as per NEMA MG-1 and IEEE 112. ANSI C50.41 is not applicable to requested rating. Compliance to IEEE 841 is not specifically requested, not offered.
2. Sec.1.03: Quoted motor in TEFC enclosure. Customer to advise for requote if differed enclosure is required.
3. Sec.1.04.A. Quoting motor with GE standard data pack as per annexure-1.
4. Sec.1.04.B. GE standard O & M manual will be furnished with the data pack. Section 01 78 23 is not furnished for review, not considered.
5. Sec.2.03.C: Pump sizing is others responsibility.
6. Sec.2.05.D: Quoted motor will be suitable for Full voltage start. Customer to furnish load inertia value & load speed vs. torque characteristic for reviewing starting suitability at 65% or 80% rated voltage, acceleration time & number of safe hot and cold successive starts.
7. Sec.2.15.E. Anchor bolts others responsibility.
8. Sec.2.16. This section is not considered.
9. Sec.2.17. Quoting motor with non-witnessed routine only.
10. Sec.3.0. Execution is others responsibility.

The Standard Data Pack contains:

- Customer, Customer Order Number, GE Requisition Number, GE Job Number, and Distribution list.
- Special Project Marking / Identification requirements.
- Motor Model Number, outline drawing number, installation instruction number, and motor nameplate data such as:
- GE Type, Frame identification, enclosure type, estimated weight, DE and ODE bearing type, horsepower, full-load speed, phases, voltage, frequency, service factor, time rating, maximum ambient temperature, insulation system class, NEMA Design Code (if appropriate), full-load current, full load power factor, maximum KVAR for power factor correction, and NEMA starting code (if appropriate). If the motor is an Energy Saver® then both NEMA nominal efficiency and guaranteed full load efficiency will be provided.
- Connection diagrams for motor power and accessories such as heaters, bearing temperature detectors, winding thermistors and thermostats.
- Outline drawing of the motor.
- Performance characteristic data including: Motor efficiency, current and power factor at 0, 25, 50, 75, 100, 115 and 125% of load at rated voltage, locked rotor current, locked- rotor torque, full - load torque, breakdown torque, power factor at locked rotor, starting limitations, starting time with maximum NEMA inertia, open and short circuit AC time constants, short circuit DC time constant, reactance to resistance ratio, and speed vs. torque and current curves.

Web site: www.gemotors.com

Conditions of Sale:

Please refer to GE Motors & Controls Conditions of Sale ([ES104](#) (Rev.4) (1/1/2011)).

The quotation is valid for 30 days after the Created Date or if displayed above, 30 days after the Modified Date.

Quoted materials are not intended for use in connection with any nuclear facility.

Trade Terms for Delivery, Title Transfer, and Risk of Loss:

North America (USA, Can, Mex): FOB Point of Shipment (Factory of Origin or Seller's Warehouse -- to be determined by Seller).

Other: Ex Works (Incoterms 2000).

Transportation charges for 143 to 5013 Frames - A charge of 6% of the net selling price will be applied to Buyer's invoice as a separate item to cover the transportation and handling expenses to the first Continental U.S. destination point.

When, at Buyer's request, shipment is other than as selected by Seller, all freight and/or handling charges will be to Buyer's account.

In addition, any expense incurred by Seller because of special delivery arrangements requested by Buyer shall be billed to Buyer. This quote/proposal is submitted with the understanding that no government funds including American Recovery & Reinvestment Act (ARRA) funding is to be used to purchase the item and/or service.

For more information, contact your GE account specialist.

Thank you for giving GE the opportunity to quote this motor.

SECTION 6

Component Breakdown

Components	Protection Method
Base / silencer	Carbon steel, painted externally
Belt Guard	Galvanized sheet metal
Belt Guard – Supports	Galvanized carbon steel
Blower Stage	Painted casting (external surfaces)
Connecting Housing	Cast aluminum – no coating (DN-50) Carbon steel (DN-200 to DN-400) painted externally DB and G5 Carbon steel (DN-80 to DN-150) painted externally G5 Casting (DN-80 to DN-150) painted externally DB
Fasteners - Bolts, Studs, Nuts	Zinc coated
Flex Connector	Silicone – no coating
Hose Clamps	Zinc coated
Inlet Filter Housing	Powder coated carbon steel (DN-50 to DN-300) DB and G5 Cast aluminum – no coating (DN-200 & 300) Painted carbon steel (DN-250)
Inlet Hose	Reinforced rubber
Inlet Silencer – vacuum	Painted carbon steel (externally)
Motor Mounting Hardware	Galvanized carbon steel
Piping	Galvanized carbon steel Painted carbon steel
Pressure safety valves, vacuum breaker valves	Painted flange
Sound Enclosure – Base	Powder coated carbon steel
Sound Enclosure	Powder coated galvanized sheet metal
Vent Silencer – vacuum	Painted carbon steel

Painted cast iron and carbon steel

The machine castings are fettled, cleaned and primed, the primer used is specially developed for machinery parts and is particularly notable for its excellent bonding characteristic and elasticity. Its base is a quick drying synthetic resin binder possessing a high degree of water resistance. The proportion of pigment to binder is such to ensure the best protection for the machines.

Total dry Film Thickness: 70 µm (2.75 mil)



Aerzen USA Corporation

108 Independence Way – Coatesville, PA 19320

Tel: (610) 380-0244 Fax: (610) 380-0278 www.aerzenusa.com

Delta Blower – Corrosion Protection

Date

10/23/07

Doc #

B-6-0010 revision "G"

Page

Page 1 of 2

Surface Preparation	Sand blasting, mechanical cleaning to near white surfaces per SA 2,5 acc. to DIN ISO 8501 or SSPC10	
Primer	Alkyd Resin: RAL 6006	Manufacturer: Relius Coatings (BASF)
Final Coat	Alkyd Resin: RAL 5001 (Blue)	Manufacturer: Relius Coatings (BASF) or Dr. Demuth GmbH

Powder Coating

Exterior grade Polyester base

POLYFLEX Powder Paint, PES-135 TRIBO Coarse Structure, Silk Gloss

Enclosure and enclosure base: color RAL 7032 (light gray); dry film thickness: 80 µm

Inlet Filter Housing – color RAL 5001 (blue); dry film thickness: 100 µm

NOTE:

The following materials are left unpainted: galvanized parts, stainless steel, aluminum, brass, machined surfaces as well as the inside of vessels such as silencers.

SECTION 7



TERMS AND CONDITIONS OF SALE

New Equipment Packages

The **AERZEN USA CORPORATION** (hereinafter called "Seller") agrees to sell equipment (hereinafter called the "Goods") to the Purchaser (hereinafter called the "Buyer") on the following terms and conditions of sale. Any alteration of these terms and conditions shall have no force or effect unless agreed to in writing by an officer of Seller or such other authorized signatory of Seller as designated in writing by Seller.

The terms and conditions as set forth herein and our quotation or as modified by written agreement shall constitute the entire agreement (hereinafter called the "Agreement") between Seller and Buyer. A failure by either party to enforce any rights under this Agreement shall not be deemed to constitute a waiver of those or any other rights under this Agreement.

1. ORDERS

All orders are subject to acceptance and approval by Seller's credit department and are not binding until and unless so approved and accepted. Written acknowledgement of an order shall constitute acceptance and will thereby be a binding contract which cannot be modified or cancelled by Buyer without written consent of Seller.

2. PRICES AND PAYMENTS

All prices are quoted and payable in U.S. dollars. Quoted prices shall remain valid for thirty days acceptance only. Unless otherwise noted in the quotation and agreed to by Seller; delivery terms are FCA Aerzen, Coatesville, PA, USA, and progress payment terms are required. Seller reserves the right to restrict or modify the terms of payment or to require payment prior to shipment if, in Seller's opinion, the Buyer's financial condition or other circumstances do not warrant shipment on the terms originally specified in the Agreement.

Interest at the rate of one and one-half percent (1 ½%) per month or at the highest rate allowed by law, whichever is less, shall be charged to all overdue accounts. Buyer will reimburse Seller for all costs and expenses (including attorney's fees and the costs of bringing any action) incurred in collecting any amounts past due.

3. BOND PREMIUMS

In the event Seller shall be required as a condition of the manufacture and sale of Goods to furnish a price performance bond, the Buyer shall pay in addition to the purchase price of said Goods all bond premiums and expenses in connection herewith.

4. TAXES

The prices quoted do not include any taxes. Any sales tax, use tax, excise tax, goods and service tax (GST), value added tax (VAT), customs tax, or other tax of any nature whatsoever imposed by any government authority on the transaction between Seller and Buyer (plus interest and penalties thereon, if any) shall be paid by the Buyer in addition to the prices quoted and invoiced. In the event that Seller is required to pay any such taxes, Buyer shall reimburse Seller on demand. At the time of an order, Buyer shall provide Seller with any tax exemption certificates or other documents acceptable to the taxing or customs authorities.

5. PRODUCT CHANGES

All description and illustrations and particulars of weights and dimensions issued by Seller in catalogues, advertising materials, or over the internet are by way of general descriptions and approximate only and shall not form part of any contract or give rise to any liability on the part of the Seller. It is the policy of the Seller to endeavor to develop and improve its products and accordingly



the Seller reserves the right to change all specifications without prior notification or public announcement. Nothing in the Condition shall oblige the Buyer to accept Goods which do not reasonably comply with the purchase order.

6. LIABILITY

Seller's liability with respect to the Goods sold hereunder shall be limited to the warranty provided in Section 8 of these Terms and Conditions and shall be limited to the contract price. In no event shall Seller be liable for special, indirect, incidental, consequential or punitive damages, or expenses incurred by Buyer, Buyer's customers or any third party, whether arising from breach of contract, warranty, negligence, strict liability in tort or other theories of law or equity, including, but not limited to, loss of profits or revenue, loss of use, cost of capital, cost of substitutes, downtime, service interruption, or any other type of economic loss.

7. SHIPPING DATE

Shipping dates are estimates and not a guarantee of a particular day of shipment. Seller shall not be liable in any way for any default or delay in shipping due to contingencies beyond its control which prevent or interfere with Seller making delivery on the date specified, including, but not limited to, war, restraints affecting shipping, delivery of materials or credit as a result of war or war restrictions, non-arrival, delay or failure to procure materials as a result of war or war restrictions, rationing of fuel, strikes, lockouts, fires, bombings, terrorism, accidents, floods, droughts and any other contingency affecting Seller, its suppliers, or subcontractors: and Seller shall have the right to cancel a contract of sale or to extend the shipping date in the event that one or more of such contingencies prevents or delays shipment.

8. DELIVERY

a. **Title and Risk of Loss:** All products will be delivered FCA Aerzen, Coatesville, PA unless otherwise agreed by both parties in writing. In no event shall Seller be liable for any delay in delivery or assume any liability in connection with shipment, nor shall the carrier be deemed an agent of Seller.

b. **Acceptance of Products:** Buyer shall inspect all products promptly upon receipt. All claims by Buyer, except only those provided for under Warranty clauses, must be asserted in writing by Buyer within a 5-day period from receipt or they are waived.

c. **Delays by Buyer:** In the event that Goods cannot be shipped to Buyer when ready due to any cause not attributable to Seller, upon notice to Buyer, Seller may ship such Goods to storage. If such Goods are placed in storage, including storage at the facility where manufactured, the following conditions shall apply: (i) all risk of loss or damage shall thereupon pass to Buyer; (ii) any amounts otherwise payable to Seller upon delivery shall be payable upon presentation of Seller's invoice; (iii) the Goods shall be deemed as shipped and the warranty time period shall commence; (iv) all expenses incurred by Seller, such as preparation for and placement into storage, handling, inspection, preservation, insurance, storage and removal charges and any taxes shall be payable by Buyer; and (v) when conditions permit and upon payment of all amounts due hereunder, Seller shall resume delivery of Goods to the originally agreed point of delivery.

d. **Partial Shipment:** Partial shipment of an order will not be made without Buyer's knowledge or consent. In the event a complete shipment cannot be made by the required date, Buyer will be notified and asked whether entire shipment shall be held or partial shipment made. If partial shipment with Buyer's approval is made, excess freight charges, if any, will be billed to the Buyer.

9. CANCELLATION, POSTPONEMENT OR CHANGE ORDERS

Orders are not subject to Buyer's cancellation, postponement or change in specifications, shipping schedules or other conditions originally agreed upon without Seller's written consent and then only upon agreement to compensate Seller for any or all losses caused by such cancellation, postponement or changes.



Cancellation charges of between twenty percent (20%) and one hundred percent (100%) of the total price of the contract will be invoiced depending on the status of completion plus Seller's non-recoverable costs attributed to the Buyer order.

If Seller's manufacturing is delayed or postponed by Buyer, Seller shall be entitled to an equitable price adjustment. If Buyer delay extends for more than ninety (90) days and the parties have not agreed upon a revised basis for continuing the work at the end of the delay, including adjustment of the price, then upon written notice, Seller may terminate the order whereupon Buyer shall promptly pay Seller its cancellation charges as described herein.

Seller may terminate the Agreement without liability to Buyer if (i) Buyer shall materially breach any of the terms and conditions of this Agreement and shall fail to cure such material breach within five (5) days after written notice from Seller describing the breach and requesting its cure; or (ii) Buyer shall become insolvent; or (iii) a petition under the Bankruptcy Act or any other insolvency law shall be filed by or against Buyer; or (iv) Buyer shall make assignment for the benefit of creditors; or (v) Buyer shall fail to make timely payment of any obligation owed by it to Seller; or (vi) in the event Seller reasonably believes that Buyer is unable to make full and prompt payment as required hereunder.

Buyer agrees that it shall, no later than thirty (30) days following the effective date of termination of this Agreement, pay all monies owed to Seller at the time of any such termination regardless of any terms of payment that may have otherwise been granted to Buyer by Seller. Seller shall not by reason of its termination of this Agreement in accordance with the terms hereof, be liable to Buyer for compensation or reimbursement of any damages on account of loss of profits or prospective profits on anticipated sales, or on commitments in connection with the business or goodwill of Buyer or otherwise or for direct, indirect, punitive, special or consequential damages.

10. LIMITED WARRANTY thirty-six (36) forty-two (42)

Unless otherwise stated in Seller's quotation, Seller warrants the products and parts that it manufactures will be free from defect in materials and workmanship for ~~twenty-four (24)~~ thirty (30) months from the date of start-up, but not to exceed forty-two (42) months from the date of readiness to ship. Performance warranties (if any) are limited to those specifically included in Seller's proposal and identified as such. Equipment (including accessories, components and parts thereof) furnished by Seller but manufactured by others is not warranted by Seller and such equipment shall carry the warranty (if any) which the manufacture has conveyed to Seller to the extent it can be passed on to the Buyer. Seller shall, upon prompt written notice by the Buyer, correct such non-conformities, at Seller's option, by either repair or replacement. All such defective Goods shall be sent at Buyer's expense directly to Seller at 108 Independence Way, Coatesville, PA, USA, 19320. Shipment of repaired or replacement goods will be at Seller's expense. Seller warrants any Equipment repaired or replaced pursuant to the above warranty to be free from defects in materials and workmanship for the longer of: (x) a period of ninety (90) days after the start-up of such repaired or replaced Equipment or (y) the period remaining on the Equipment warranty.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL OR IMPLIED, INCLUDING ANY WARRANTY OF PERFORMANCE, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO REPRESENTATION, CONDITION OR WARRANTY, INCLUDING, BUT NOT LIMITED TO, STATEMENTS OF CAPACITY, SUITABILITY FOR USE, OR PERFORMANCE, WHETHER MADE BY SELLER, EMPLOYEES OR REPRESENTATIVE PERSONNEL, SHALL BE CONSIDERED TO BE A WARRANTY BY SELLER FOR ANY PURPOSE OR GIVE RISE TO ANY LIABILITY OF SELLER WHATSOEVER AND ALL SUCH IMPLIED WARRANTIES ARE HEREBY DISCLAIMED BY SELLER AND EXCLUDED FROM ANY CONTRACT RESULTING OR ARISING FROM OR OTHERWISE EVIDENCED BY THIS AGREEMENT.

Failure to notify Seller of any unsatisfactory operation, improper maintenance or installation shall terminate this Warranty. The above warranties do not apply to products which are (a) repaired, modified or altered by any party other than Seller or Seller's Authorized Service Center; (b) subjected to unusual physical, thermal, or electrical stresses, corrosion or erosion, improper installation or maintenance, lack of lubrication, misuse, abuse, accident or negligence in use, improper storage, transportation or handling, or (c) considered a consumable item or an item requiring repair or replacement due to normal wear and tear. SELLER SHALL NOT BE LIABLE FOR SPECIAL OR CONSEQUENTIAL DAMAGES WHICH MAY ARISE UNDER HIS CONTRACT WHETHER SUCH LIABILITY IS IN CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, AND IN NO CASE SHALL SELLER'S LIABILITY EXCEED THE PRICE OF THE GOODS.



11. NONCONFORMING GOODS

Any rejection of nonconforming Goods must be made by the Buyer within five (5) days of delivery and Buyer must give written notice to Seller within that period. Such notice shall contain a brief description of the alleged non-conformity. Upon receipt of such notification, Seller will immediately arrange for the return of the Goods, at Seller's expense, and upon confirmation of the nonconformity, Seller, at Seller's expense, will ship conforming Goods to Buyer.

12. RETURNS AND REPAIRS

When Goods are returned for repair, the Buyer must contact Seller's customer support department for shipping instructions and a return material authorization (RMA#). Buyer must ship back product in original packaging or equivalent, with the RMA # clearly marked on the outside of the package, freight prepaid. Seller shall not be responsible for any damage occurring in transit or obligated to accept products returned without RMA #. Buyer bears all risk of loss or damage to the returned product until delivery at Seller's designated facility. Any return shipment received by Seller without a RMA # and/ or whose contents are not received in their original condition, may be reshipped by Seller freight collect to Buyer.

13. RETURNS FOR CREDIT

No returns for credit will be accepted unless Seller's permission has been obtained in each case in advance. Only sizes and designs taken from Seller's regular line, which are in active demand, can be accepted for credit. Credit will be based on prices prevailing at the time of return, or invoiced price, whichever is lower, subject to deduction for handling costs and additional deduction for expenses incurred in restoring Goods to saleable condition. Obsolete or specially manufactured Goods can be accepted for return or credit only the extent of their value to seller in each case. No credit will be issued to other than the original Buyer.

14. APPLICABLE LAWS

This Agreement and the respective rights and obligations of the Buyer and Seller with regard hereto shall be governed by and construed according to the laws of the Commonwealth of Pennsylvania, without regard to the principles of conflicts of law thereof.

15. NOTICE

Any and all notices or other communications or deliveries required or permitted to be provided hereunder shall be in writing and shall be sent to Aerzen USA, 108 Independence Way, Coatesville, PA, 19320 or faxed to (610) 380-0278, Attn: Sales Manager.

16. ASSIGNMENT

Neither party may assign or transfer this Agreement without the prior written consent of the other party.

17. CONFIDENTIAL INFORMATION

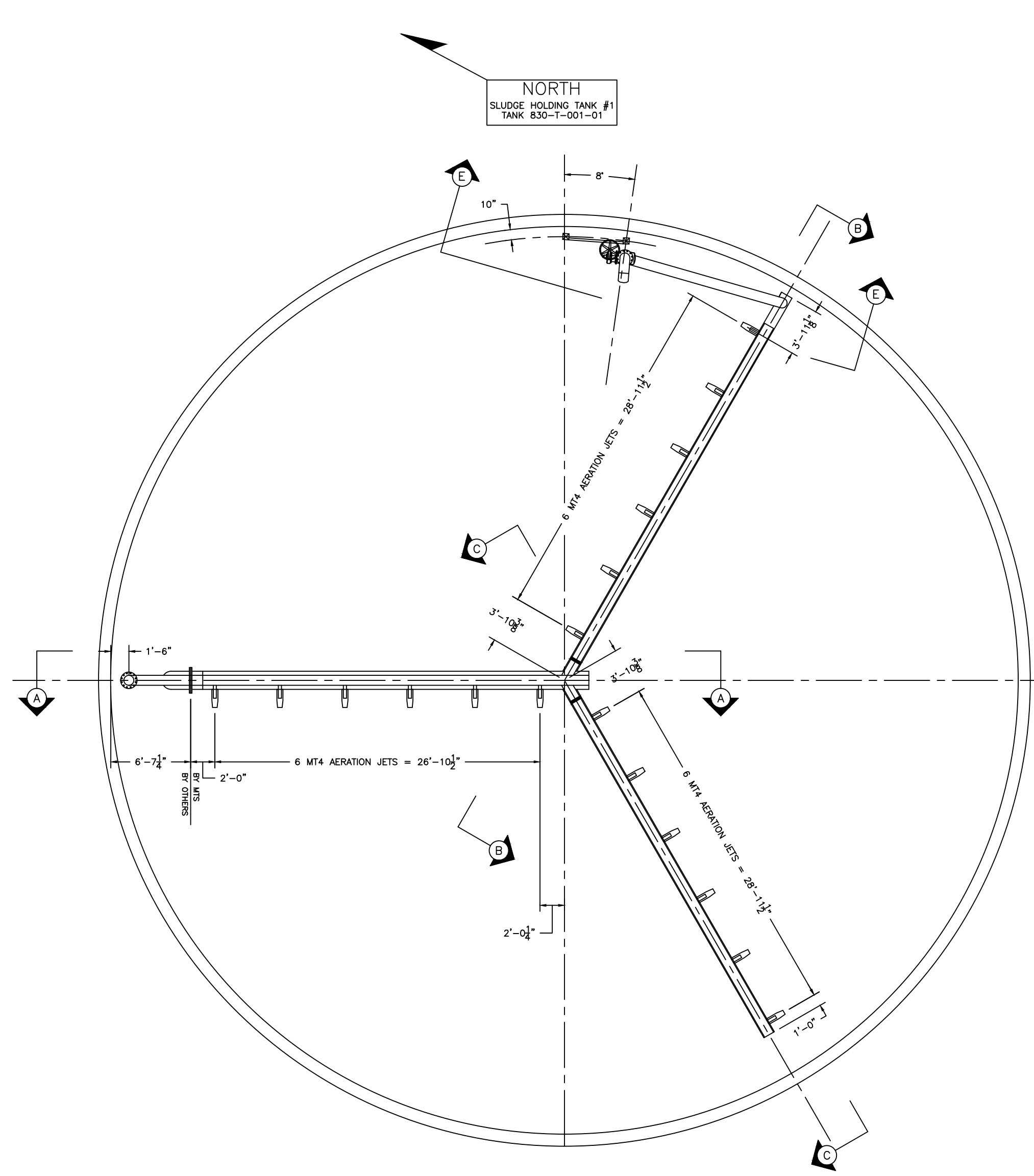
Any design specifications, manufacturing drawings, technical data or other information or materials submitted to Buyer and identified by Seller as confidential are and shall remain the exclusive property of Seller. Buyer agrees to treat such information as confidential and shall not reproduce or disclose such information without the express prior written consent of Seller.

V. PROJECT DRAWINGS

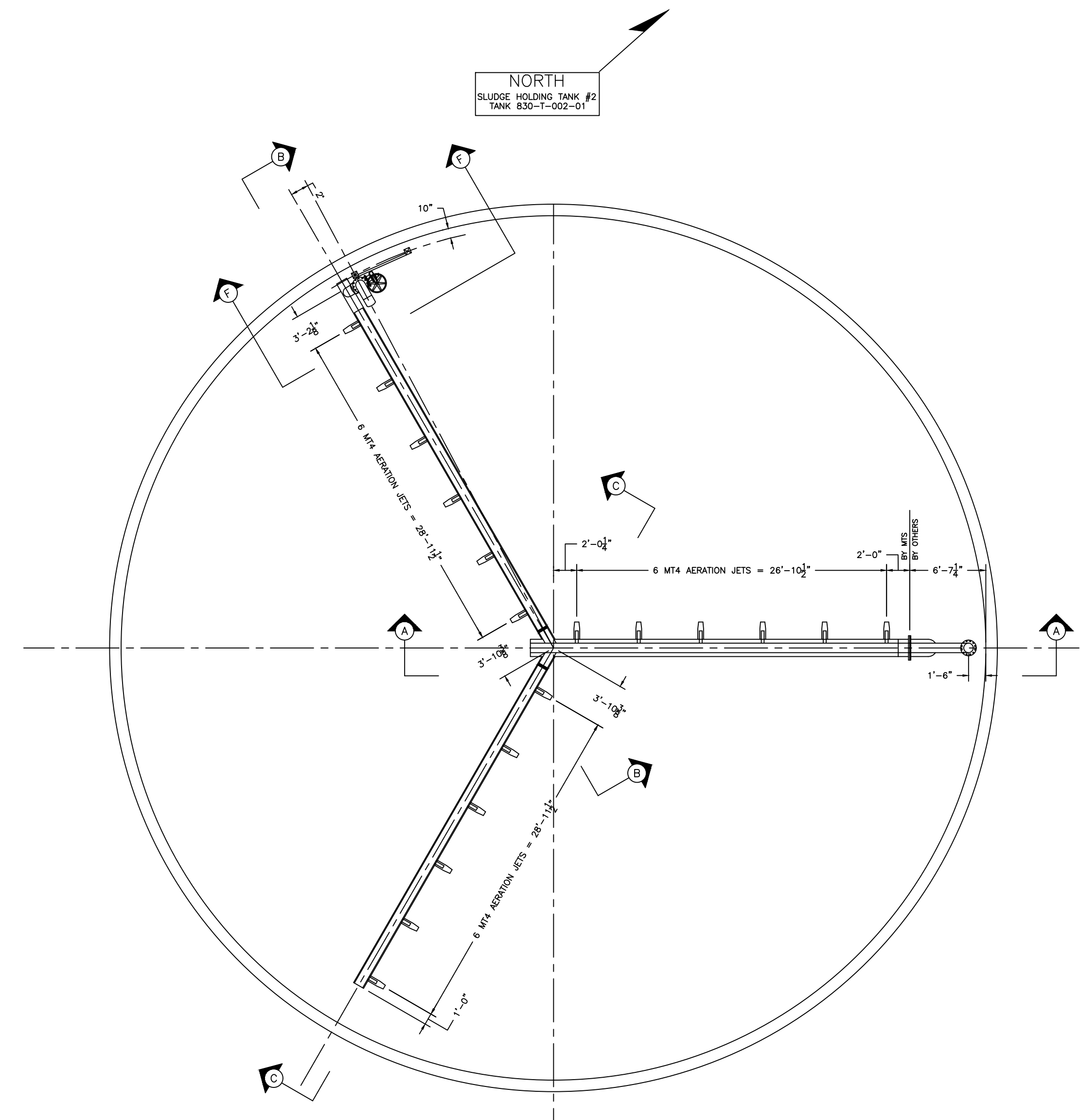
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1	CHANGES PER ENGINEER'S COMMENTS	21JUN13	DCD

GENERAL NOTES

1. THE LOCATIONS SHOWN FOR EACH PIECE OF EQUIPMENT MUST BE CONFIRMED BY THE CUSTOMER OR PROJECT ENGINEER TO INSURE THAT NO INTERFERENCE IS ENCOUNTERED WITH OTHER PIPING SYSTEMS AND/OR EQUIPMENT. THE MATERIALS OF CONSTRUCTION FOR THE TANK BOTTOM AND SIDE WALL MUST ALSO BE SPECIFIED TO INSURE PROPER PIPE SUPPORT DESIGN. ANY CHANGES IN ELEVATION THAT MAY EXIST IN THE TANK BOTTOM FOR DRAINAGE, ETC. MUST BE DETAILED ON MTS PROJECT DRAWINGS DURING DRAWING REVIEW PROCESS AND REFERRED TO AS DRAWING REVIEW COMMENTS.
2. AN ALARM SIGNAL AND/OR PUMP SHUT-OFF SYSTEM SHOULD BE INCORPORATED INTO PUMP CONTROL PANEL TO PREVENT PUMP OPERATION AT IMPROPER WATER LEVEL. REFER TO PUMP MANUFACTURER'S OPERATING INSTRUCTIONS TO DETERMINE MINIMUM OPERATING WATER LEVEL.
3. CUSTOMER MUST ADVISE LOCATION OF THE TANK INFLUENT AND EFFLUENT TO INSURE JET AERATION MANIFOLD LOCATIONS SHOWN WILL NOT SHORT CIRCUIT THE JET AERATION PROCESS. UNLESS OTHERWISE REQUESTED ALL OF THE SYSTEMS EQUIPMENT WILL BE MANUFACTURED AS DETAILED ON THESE DRAWINGS. THE OPERATING LIQUID SURFACE DEPTH SHOULD ALSO BE CONFIRMED DURING DRAWING APPROVAL CYCLE.
4. THE JET AERATION MANIFOLD AND IN-BASIN PIPING WILL BE FABRICATED FROM FIBERGLASS REINFORCED PLASTIC (FRP) USING A ISOPHTHALIC RESIN. ALL FABRICATION WILL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL BUREAU OF STANDARDS SPECIFICATION PS 15-69 AND ANSI/ASTM SPECIFICATION D-2996-08B. THE JET AERATION NOZZLES WILL HAVE AN INTERNAL NEXUS LINER FOR ADDED ABRASION PROTECTION.
5. THE CONTINUATION OF THE AIR SUPPLY PIPING SYSTEM IS TO BE SUPPLIED BY OTHERS. A BUTTERFLY VALVE SHOULD BE PROVIDED FOR EACH AIR SUPPLY RISER PIPE TO ALLOW BALANCING OF THE AIR FLOW. A SIPHON BREAK SHOULD ALSO BE PROVIDED TO PREVENT THE BACK FLOW OF LIQUID THROUGH THE AIR SUPPLY PIPING SYSTEM. ALL CONNECTIONS ARE TO STRADDLE VERTICAL CENTER LINES OF BASIN. HARDWARE AND GASKETS REQUIRED TO ASSEMBLE FLANGE CONNECTIONS AT MTS/CUSTOMER EQUIPMENT INTERFACE ARE SPECIFICALLY EXCLUDED FROM MTS SCOPE OF SUPPLY.
6. WHEN INSTALLED PUMP SUCTION AND DISCHARGE PIPING SHOULD INCORPORATE ISOLATION VALVES AND EXPANSION JOINTS WITH FULL PORT DESIGN (NON RESTRICTIVE FLOW). GAUGES WITH SHUT-OFF AND BLEED VALVES SHOULD ALSO BE PROVIDED. ALL FLANGE CONNECTIONS ARE TO BE 150# ANSI STYLE CONFIGURATION STRADDLING CENTER LINES. HARDWARE AND GASKETS REQUIRED TO ASSEMBLE FLANGE CONNECTIONS AT EQUIPMENT INTERFACE ARE TO BE SUPPLIED BY OTHERS. PUMP SUCTION AND DISCHARGE PIPING SHOULD BE DESIGNED IN ACCORDANCE WITH HYDRAULIC INSTITUTE STANDARDS. ALL PIPING MUST BE FULLY SUPPORTED TO PREVENT PIPE STRAIN AT RECIRCULATION PUMP. THE VERTICAL LOCATION OF THE PUMP SUCTION AND DISCHARGE PIPING IS TO BE CONFIRMED PRIOR TO RELEASE TO MANUFACTURE.
7. (FW) DENOTES FIELD WRAP JOINT LOCATION. ALL FIELD WRAP JOINTS ARE TO BE INSTALLED BY OTHERS USING FIELD WRAP JOINT KITS AND INSTRUCTIONS SUPPLIED BY MTS. INSTALLATION CONTRACTOR SHOULD CONTACT MTS PRIOR TO THE INSTALLATION OF FIELD WRAP JOINTS TO INSURE FIELD WRAP JOINTS WILL COMPLY WITH MTS SPECIFICATIONS. MTS WILL REJECT ALL FIELD WRAP JOINTS THAT DO NOT MEET SPECIFICATION DURING FIELD INSPECTION. REPAIR AND/OR REPLACEMENT WILL BE THE INSTALLERS RESPONSIBILITY.
8. MTS IS PROVIDING FOUR (4) 50 HP SULZER END SUCTION RECIRCULATION PUMPS. EACH PUMP IS SIZED TO DELIVER 6,586 (GPM) AT 18 FEET (TDH). REFER TO PUMP INFORMATION LOCATED IN MTS SUBMITTAL DATA AND/OR L.O.M. MANUAL FOR DIMENSIONAL DETAILS AND MATERIAL SPECIFICATIONS. ALL INTERCONNECTING PIPING REQUIRED TO INSTALL THE RECIRCULATION PUMP IS TO BE SUPPLIED BY OTHERS UNLESS OTHERWISE NOTED. THE HEAD LOSS ASSOCIATED WITH THE RECIRCULATION PUMP SUCTION AND DISCHARGE PIPING MUST NOT EXCEED 2 FEET.
9. MTS IS PROVIDING FOUR (4) 75 HP BAERZEN ROTARY POSITIVE DISPLACEMENT BLOWERS. REFER TO BLOWER INFORMATION LOCATED IN MTS SUBMITTAL DATA AND/OR L.O.M. MANUAL FOR DIMENSIONAL DETAILS AND MATERIAL SPECIFICATIONS. ALL INTERCONNECTING PIPING REQUIRED TO INSTALL ROTARY BLOWERS IS TO BE SUPPLIED BY OTHERS. EACH BLOWER IS SIZED TO DELIVER 940 (CSFM) AT 11.2 (PSIG) DISCHARGE PRESSURE AT AN INLET CONDITION OF 25 (°F) ELEV. AT 90 DEGREES FAHRENHEIT AND 36% RELATIVE HUMIDITY. AIR SUPPLY PIPING SYSTEM PRESSURE DROP FROM BLOWER INLET TO BASIN EDGE MUST NOT EXCEED 1.0 (BARG).



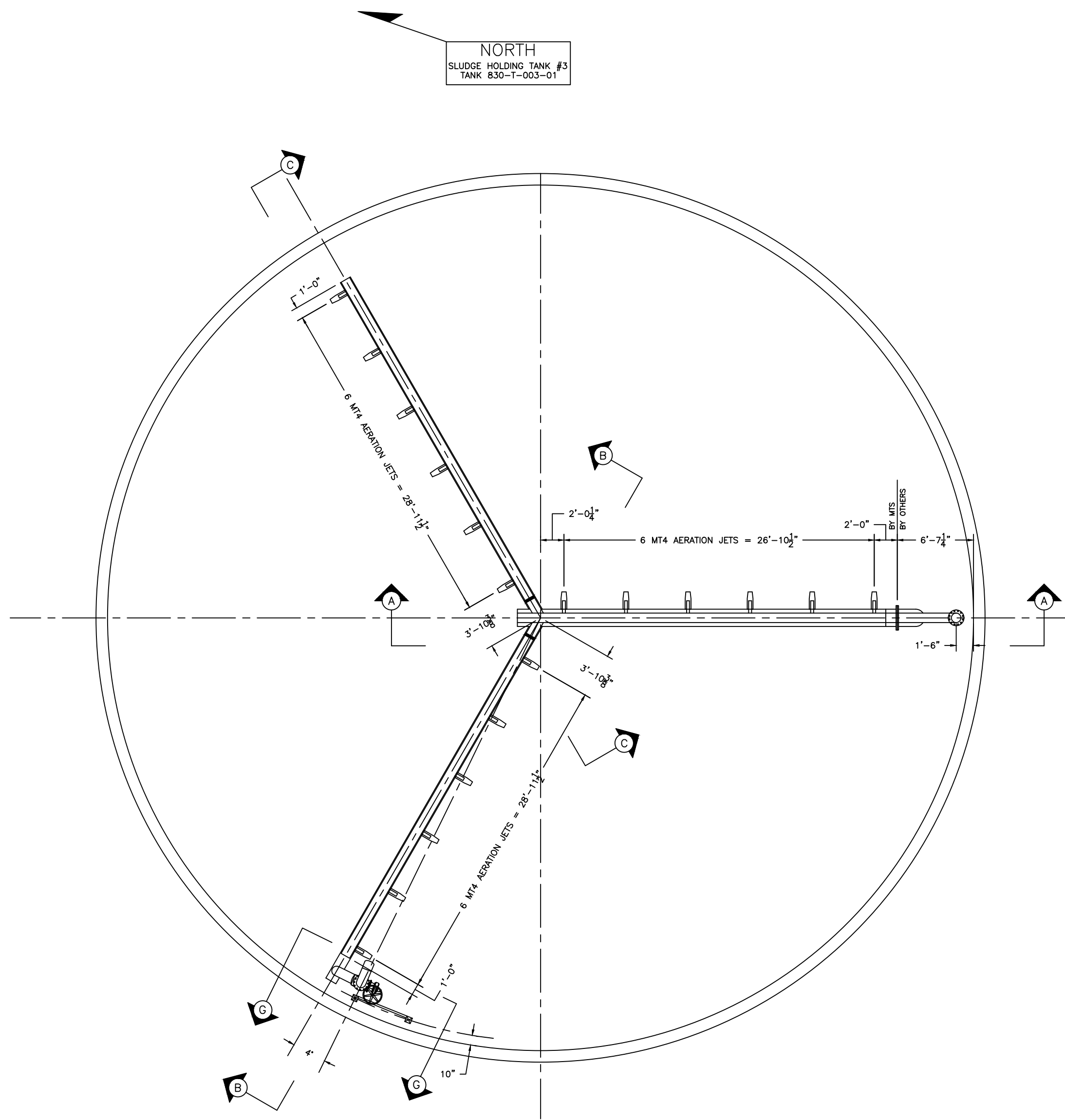
PLAN VIEW - SLUDGE HOLDING TANK 1
1/8" = 1'-0"



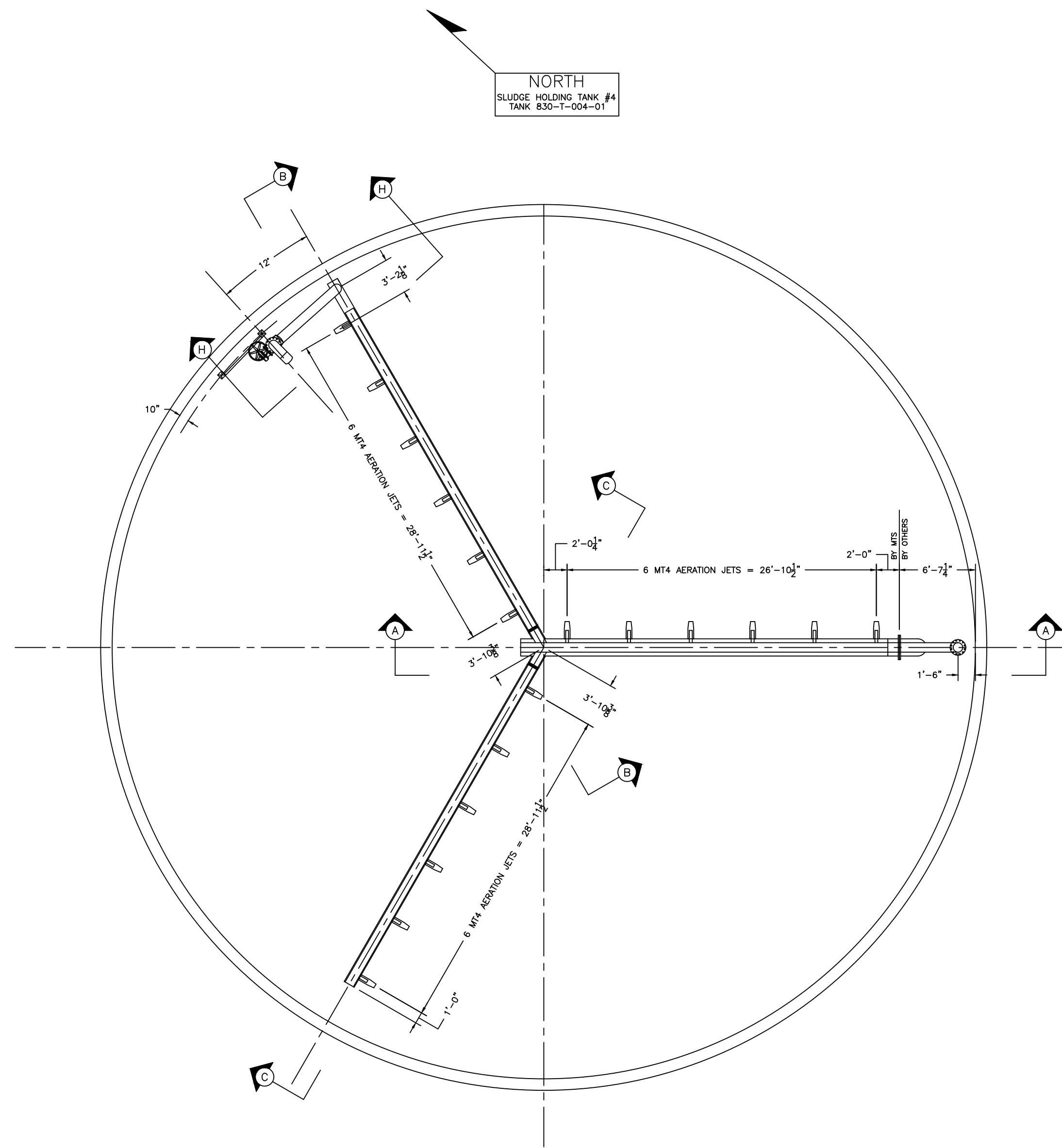
PLAN VIEW - SLUDGE HOLDING TANK 2
1/8" = 1'-0"

		23 WALPOLE PARK SOUTH WALPOLE, MA 02081-2558 PHONE: (508) 660-9150 FAX (508) 660-9151 www.mtjets.com		DRAWN DCD REV 1
		4 @ MT4JM-18 JET AERATION SYSTEMS SLUDGE HOLDING TANKS		
BRADENTON FLORIDA	MANATEE COUNTY SWWRP	DWG. NO. M213133AMB	1 OF 4	


REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1	CHANGES PER ENGINEER'S COMMENTS	21JUN13	DCD



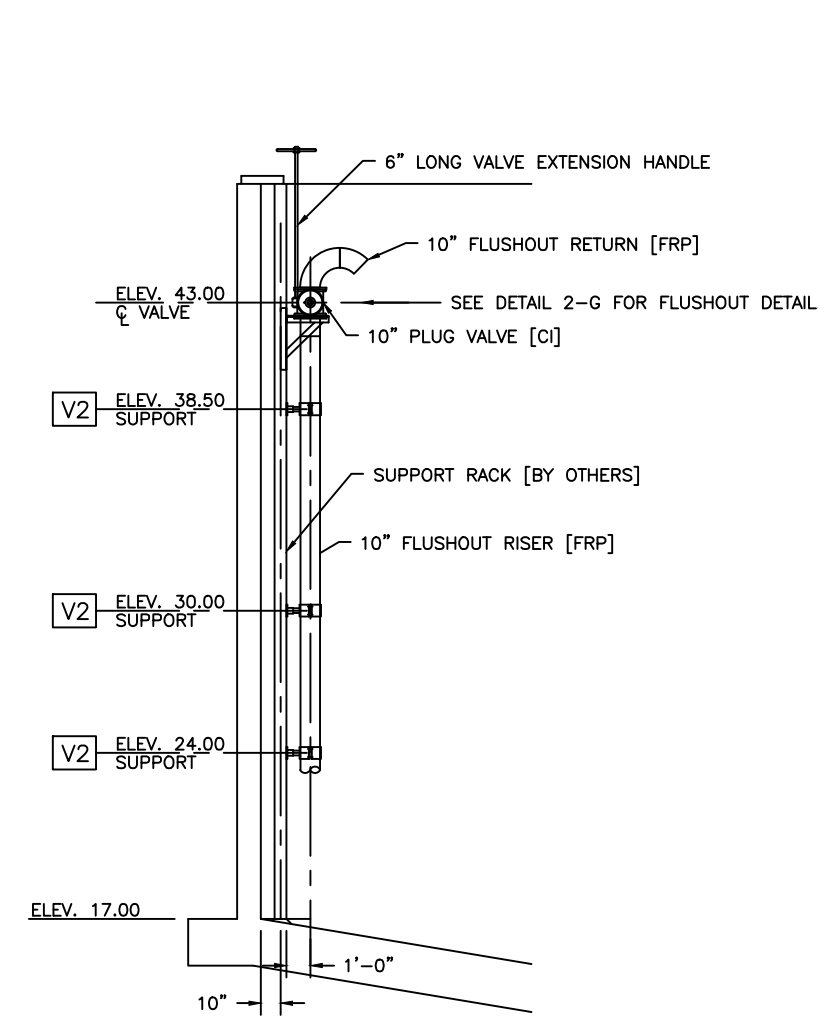
PLAN VIEW - SLUDGE HOLDING TANK 3
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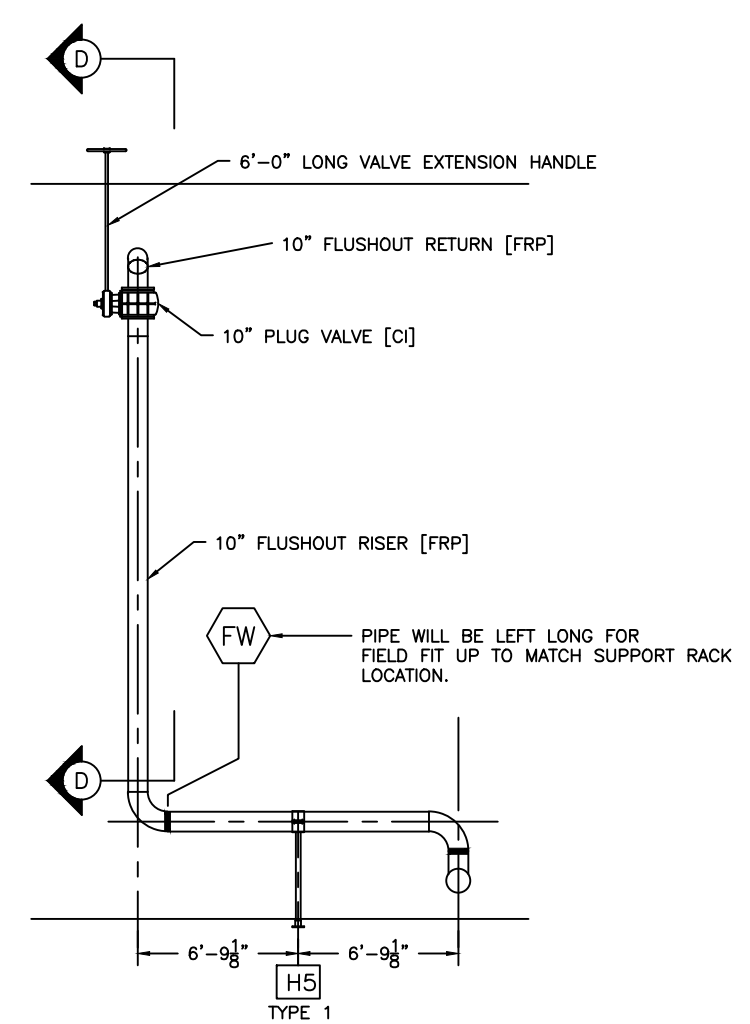
PLAN VIEW - SLUDGE HOLDING TANK 4
1/8" = 1'-0"

		23 WALPOLE PARK SOUTH WALPOLE, MA 02081-2558		DRWN	DCD
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4 @ MT4JM-18 JET AERATION SYSTEMS SLUDGE HOLDING TANKS					
BRADENTON	FLORIDA	DRW. NO.	2 OF 4		
MANATEE COUNTY SWRF			M213133AMB		

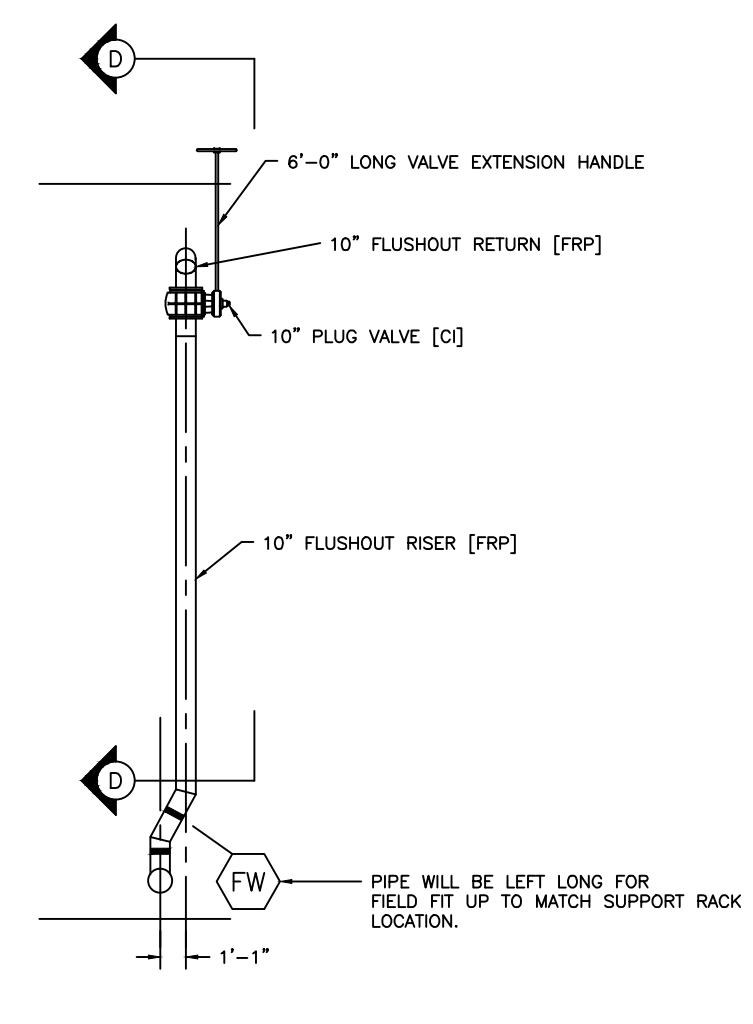
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1	CHANGES PER ENGINEER'S COMMENTS	21JUN13	DCD



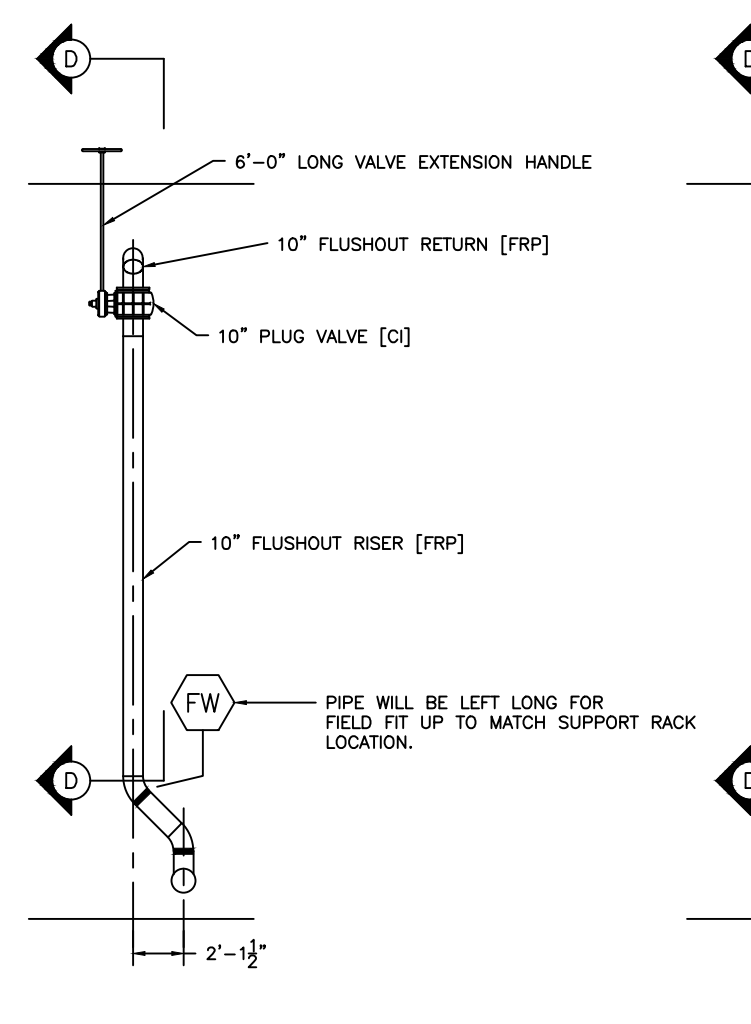
SECTION D
1/8" = 1'-0"



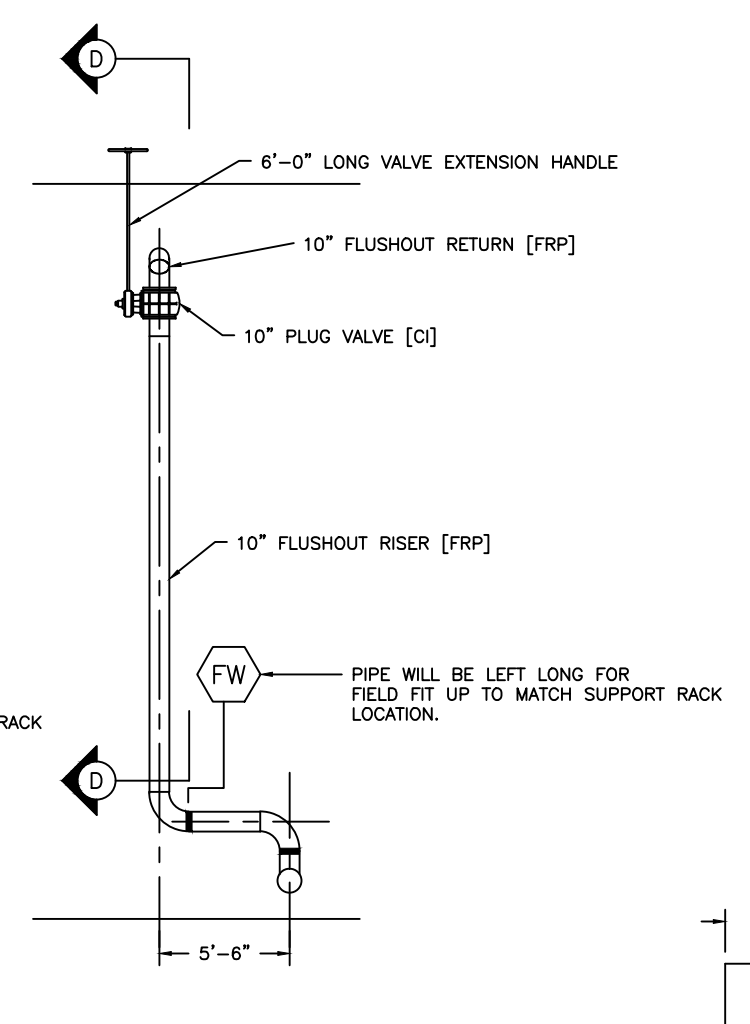
SECTION E
1/8" = 1'-0"



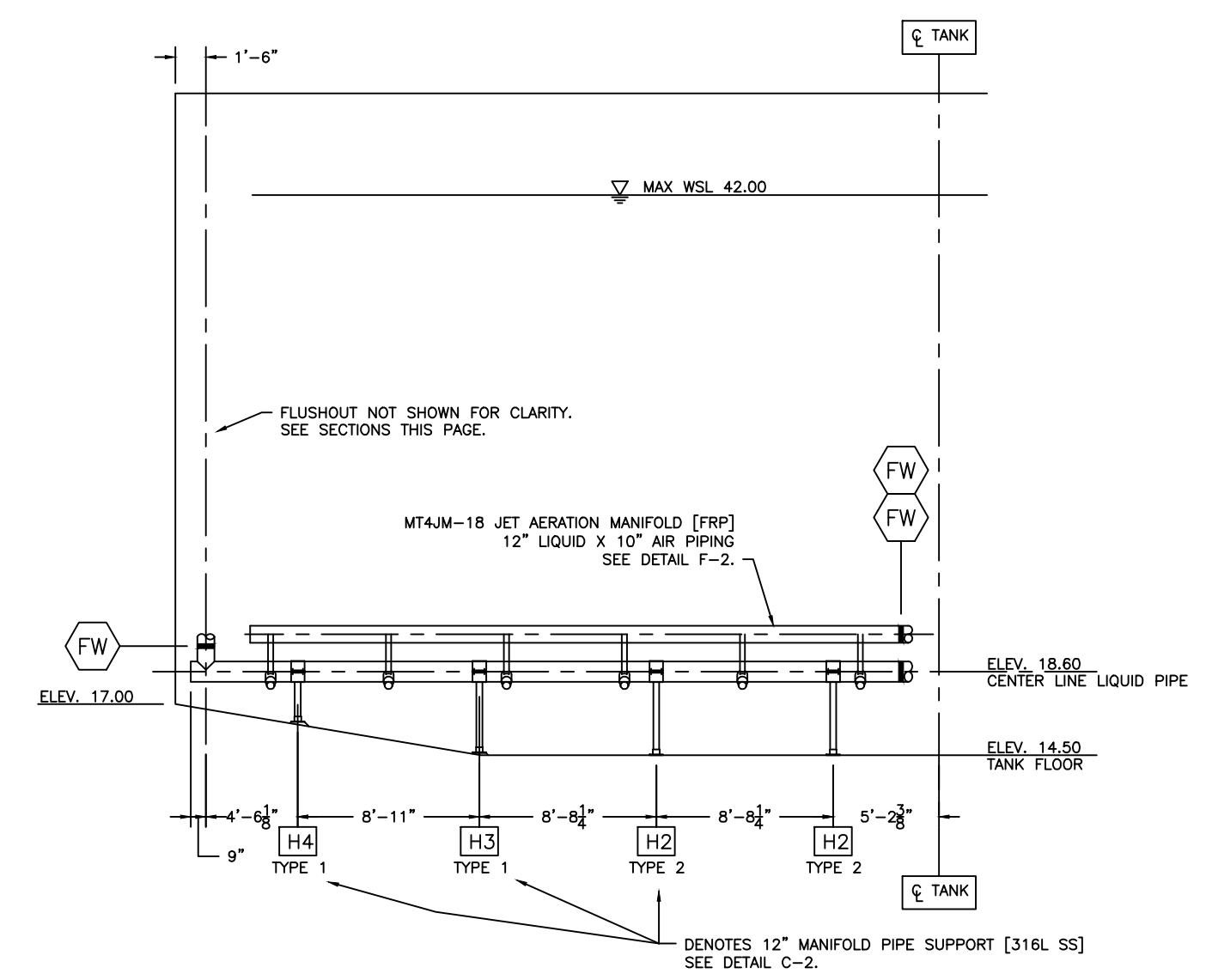
SECTION F
1/8" = 1'-0"



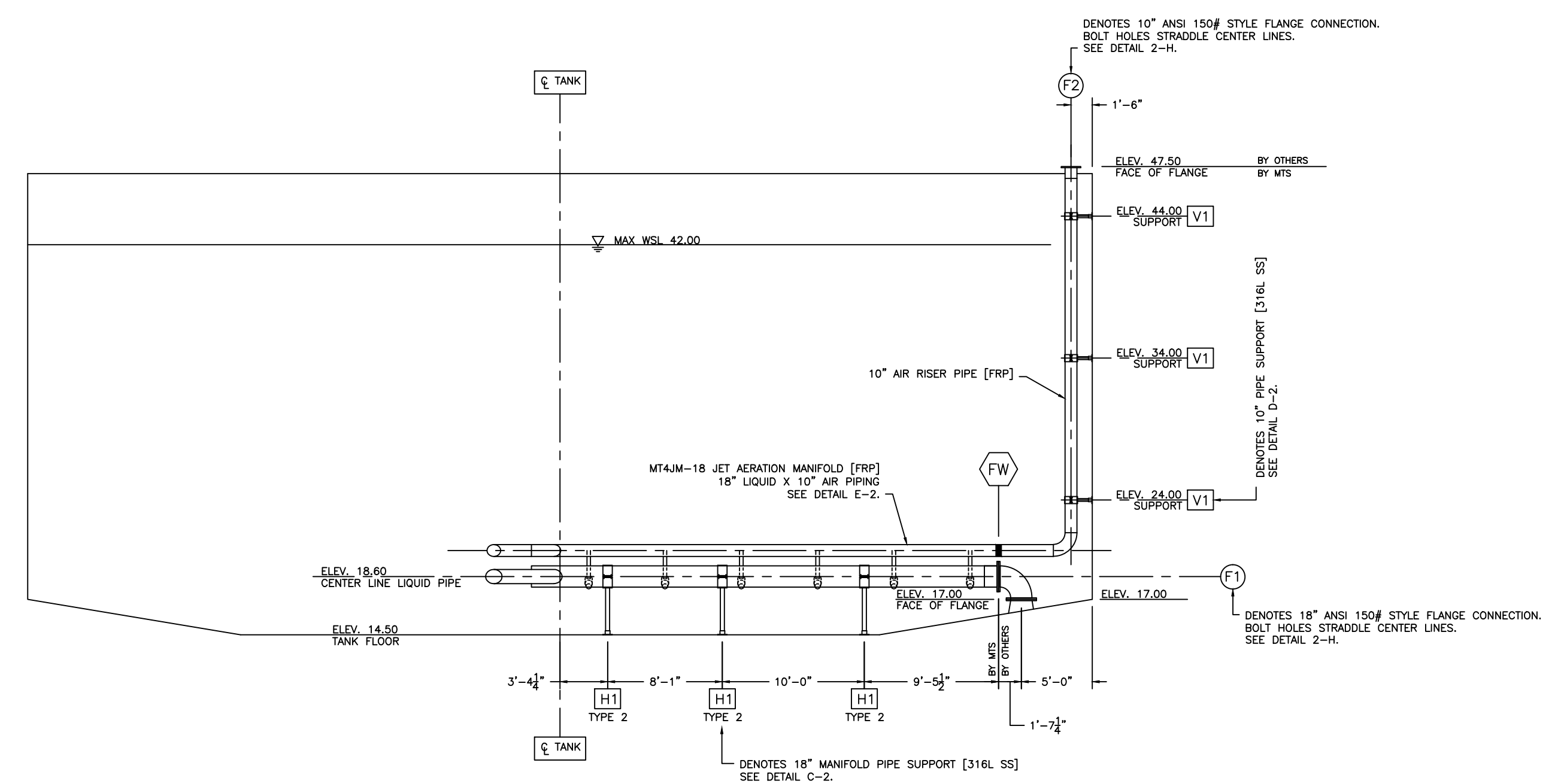
SECTION G
1/8" = 1'-0"



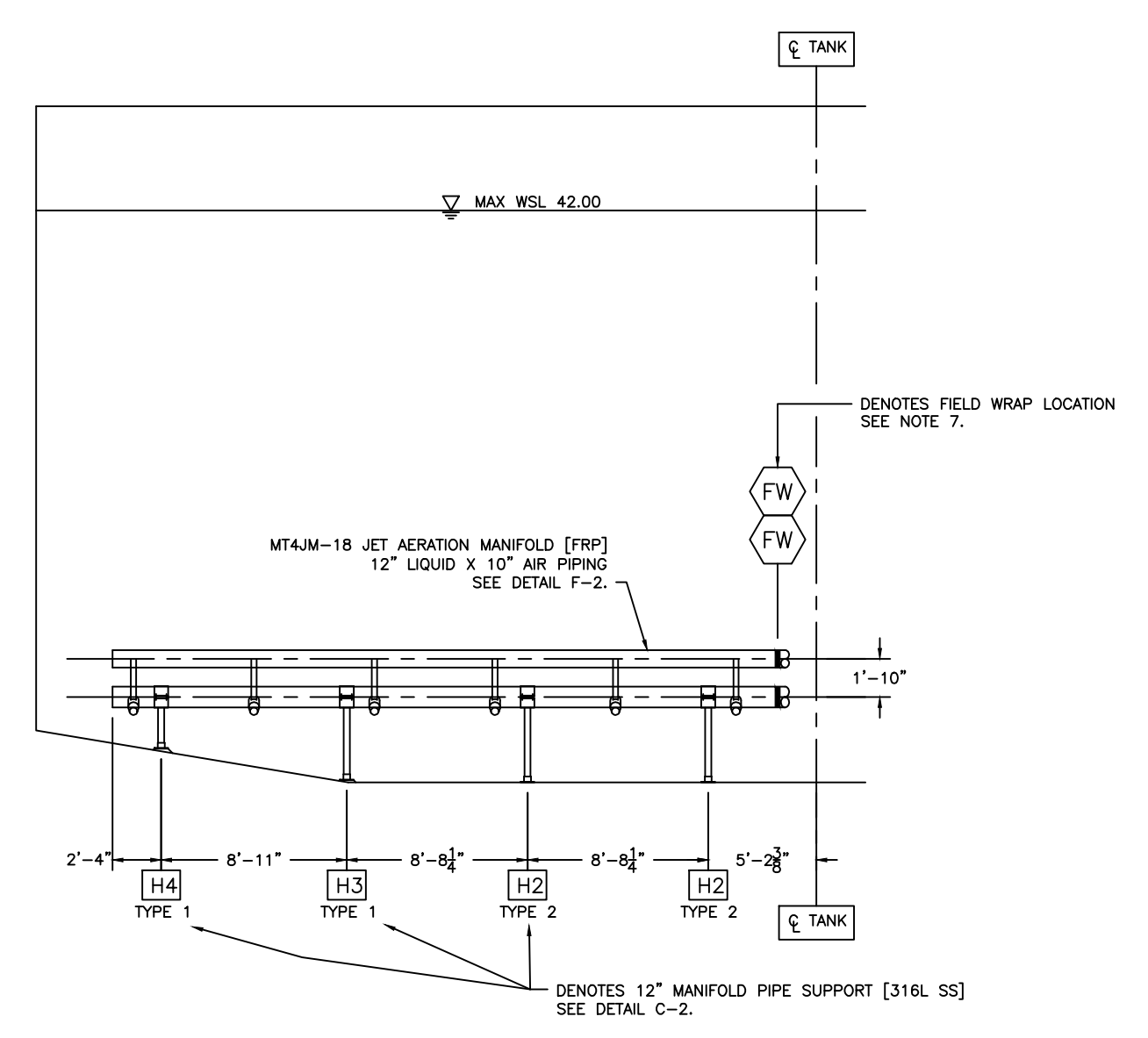
SECTION H
1/8" = 1'-0"



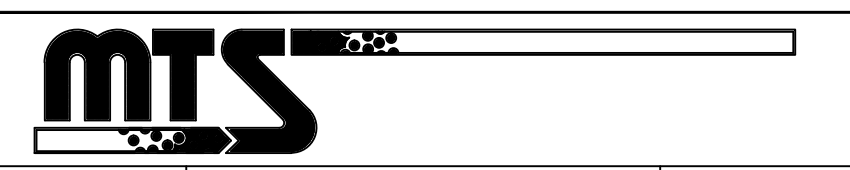
SECTION B
1/8" = 1'-0"



SECTION A
1/8" = 1'-0"

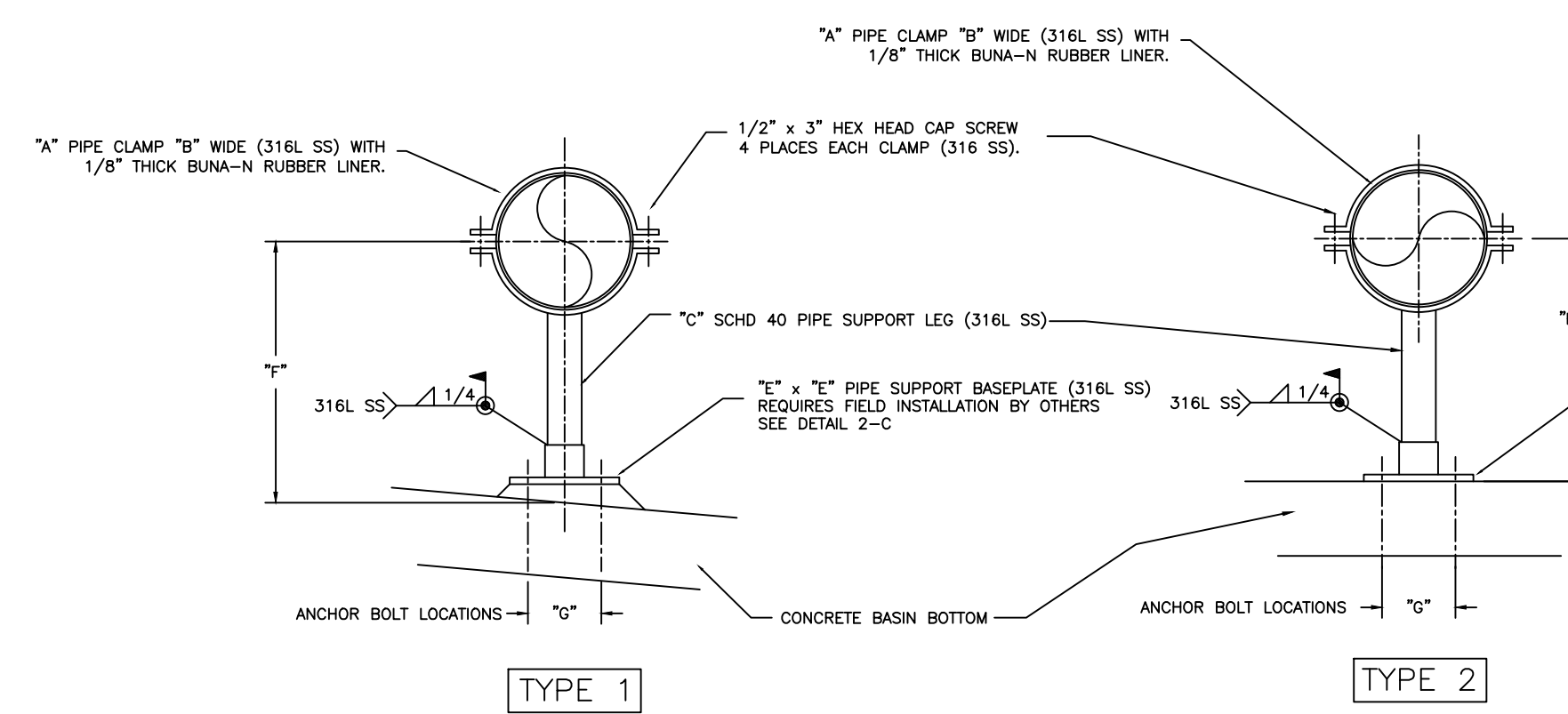


SECTION C
1/8" = 1'-0"



SCALE	AS NOTED	23 WALPOLE PARK SOUTH WALPOLE, MA 02081-2558	DRAWN	DCD
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4 @ MT4JM-18 JET AERATION SYSTEMS SLUDGE HOLDING TANKS				
BRADENTON	FLORIDA	DWG. NO.	3 OF 4 M213133AMB	

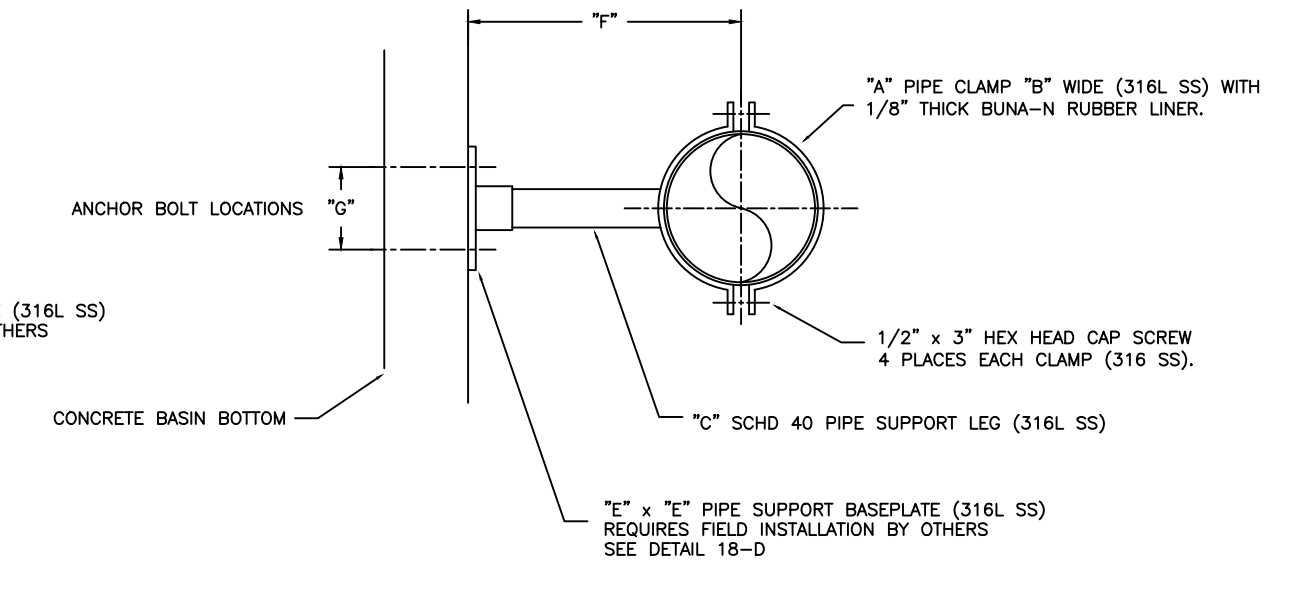
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	1	CHANGES PER ENGINEER'S COMMENTS	21JUN13	DCD



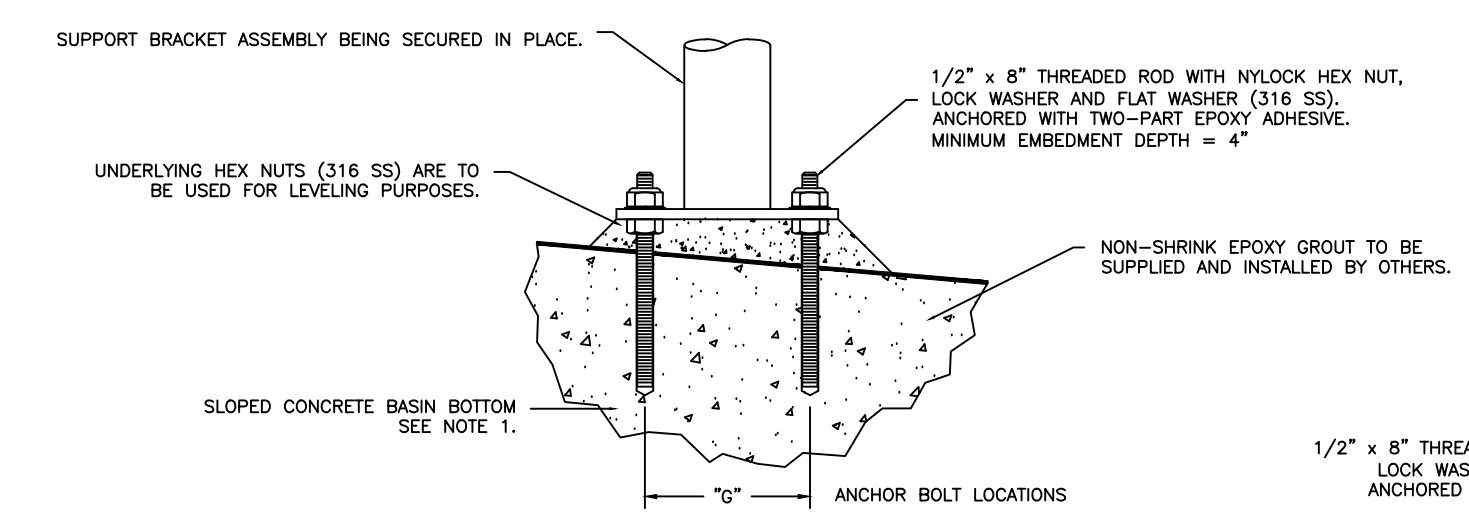
TYPE 1

TYPE 2

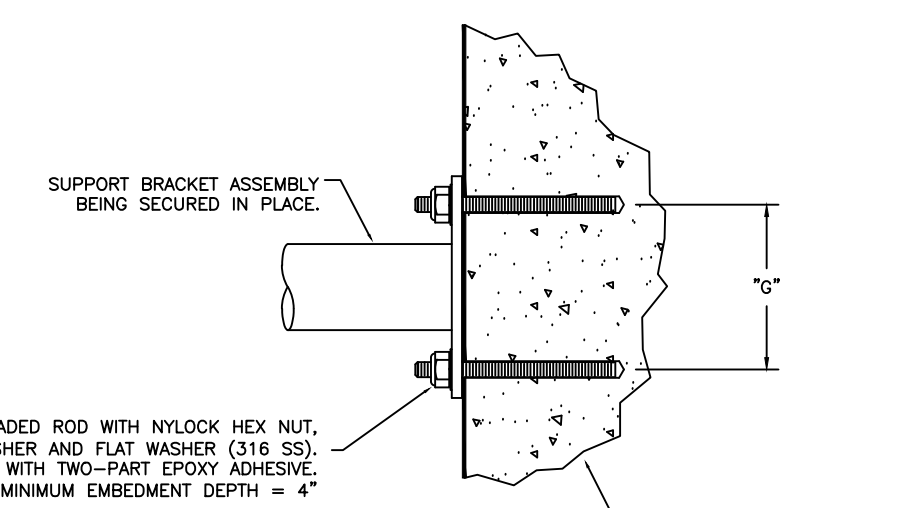
DETAIL 2/A
NTS



DETAIL 2/B
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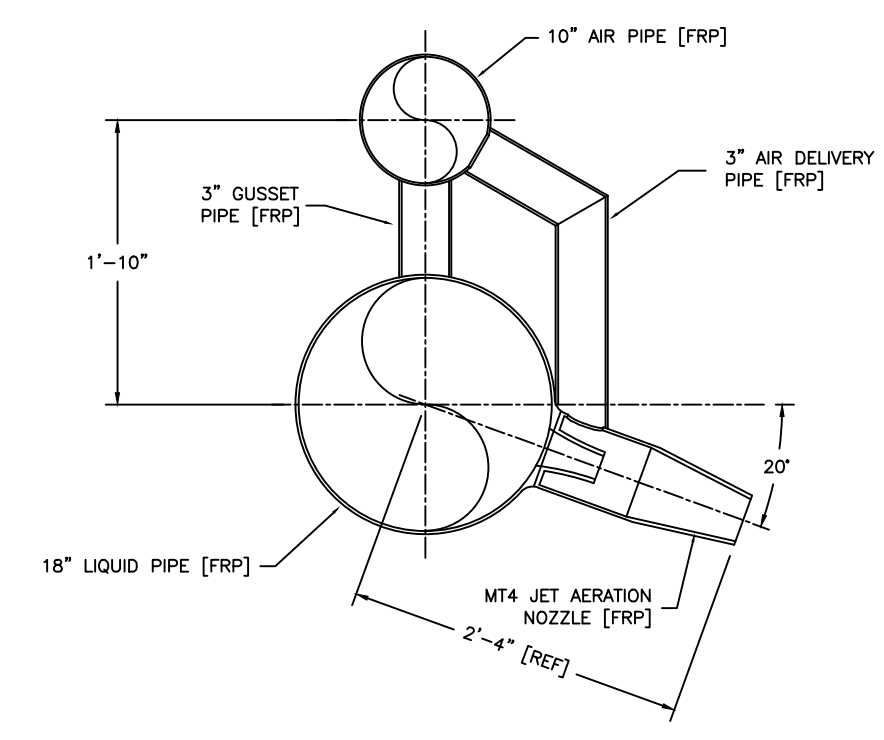


DETAIL 2/C
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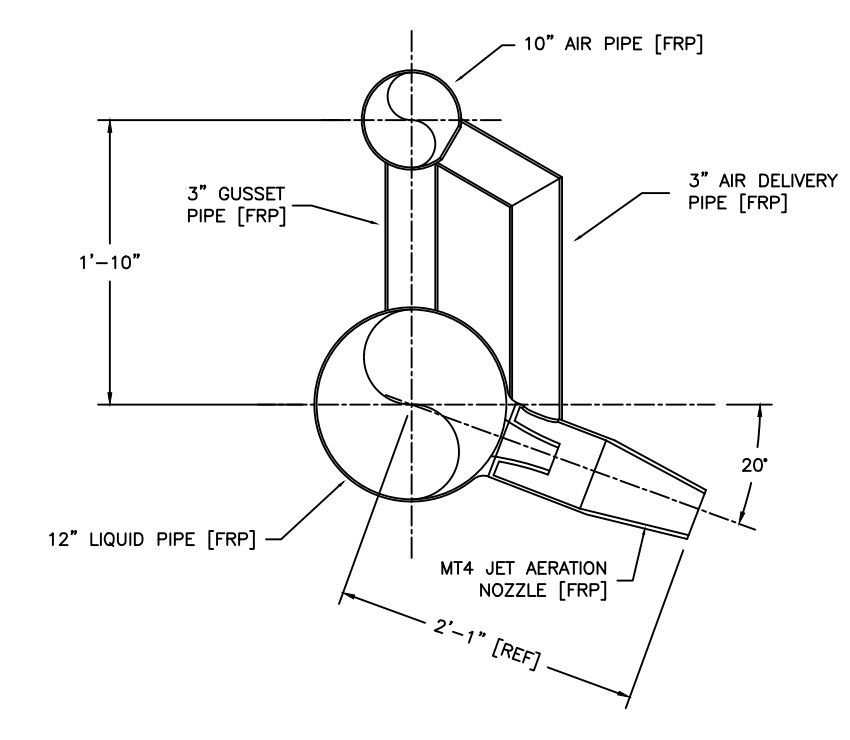


DETAIL 2/D
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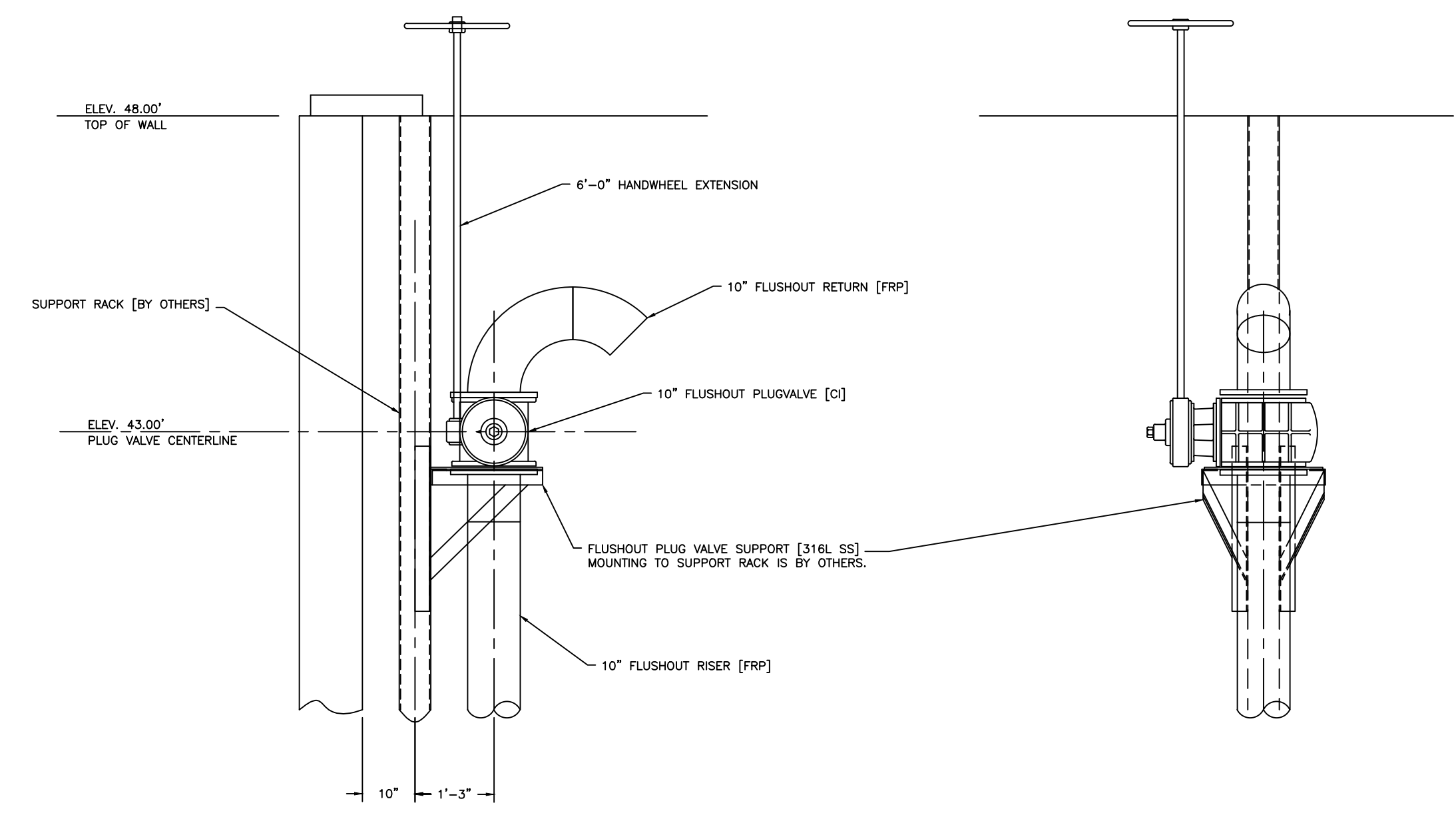
IDENT. NO.	DIM "A"	DIM "B"	DIM "C"	DIM "E"	DIM "F"	DIM "G"	QTY	LOCATION
H1	18"	8"	3"	8"	4'-1 1/4"	6"	12	18" LIQUID PIPE SUPPORT (3 PER TANK)
H2	12"	6"	2"	8"	4'-1 1/4"	6"	16	12" LIQUID PIPE SUPPORT (4 PER TANK)
H3	12"	6"	3"	8"	4'-1 1/8"	6"	8	12" LIQUID PIPE SUPPORT (2 PER TANK)
H4	12"	6"	2"	8"	2'-7 1/4"	6"	8	12" LIQUID PIPE SUPPORT (2 PER TANK)
H5	10"	6"	2"	8"	4'-5"	6"	1	10" FLUSHOUT PIPE SUPPORT (TANK 1 ONLY)
V1	10"	6"	2"	8"	1'-6"	6"	12	10" AIR PIPE SUPPORT (3 PER TANK)
V2	10"	6"	2"	8"	1'-3"	6"	12	10" FLUSH OUT RISER SUPPORT (3 PER TANK)



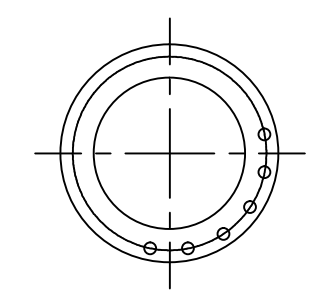
DETAIL 2/E
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DETAIL 2/F
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DETAIL 2/G
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DETAIL 2/H
NTS

FLANGE I.D.	FLANGE SIZE	FLANGE O.D.	FLANGE THICKNESS	NUMBER OF HOLES	HOLES SIZE	BOLT CIRCLE	REMARKS:
F1	18"	25 1/2"	1 1/4"	16	1 1/4"	22 3/4"	AERATION MANIFOLD FLANGE
F2	10"	18 1/2"	7/8"	12	1"	14 1/4"	AIR PIPE FLANGE
F3	10"	18 1/2"	7/8"	12	1"	14 1/4"	FLUSHOUT VALVE FLANGE

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4 @ MT4JM-18 JET AERATION SYSTEMS SLUDGE HOLDING TANKS		
BRADENTON	FLORIDA	DWG. NO. 4 OF 4 M213133AMB