XERXES CORPORATION
CENTURY FIBERGLASS™
HEIL PROCESS EQUIPMENT™
SFRP* STORAGE TANKS

February 1, 1984

Jacobs Engineering Group, Inc.
Lakeland, Florida 33802

Attention: Mr. Stash Janikowski

Subject: Sulfur/Hydrogen Sulfide Scrubber System

Reference: Heil Proposal #QN-1300

Gentlemen:

We are pleased to submit our confirming budget proposal to furnish a scrubber system to scrub off-gases from a sulfur melting pit operation. The proposed system will consist of a venturi scrubber, followed by a spray chamber, a fan, a recirculation pump & piping system, interconnecting ductwork, and a pH control system.

The design basis for the system is as follows:

Gas flow - 26,560 ACFM.
Temperature - 150°F.
Moisture content - 0.0928 lbs. water/lbs. dry air.
Hydrogen sulfide - 42 lbs. per hour.
Elemental sulfur - 4 lbs. per hour.

Individual equipment items are as follows:

ITEM I - Venturi

The venturi will be a Heil Model 728 vertical venturi scrubber, fabricated of Atlac 382 FRP resin in general accordance with NBS PS 15-69. Dimensions of the scrubber are shown on our attached bulletin. Based on a gas flow of 26,560 CFM at 150°F. The scrubber will operate at a static pressure drop of 20" w.c. The scrubber will remove 95% of the particulate matter 0.5 microns in size and 98% of the particulate matter 1.0 microns in size, and in addition, approximately 60 - 70% of the H_2S contained in the incoming gas stream, using a recirculated flow of 228 gpm of dilute caustic solution at a nozzle pressure of 20 psig.

ITEM II - Spray Chamber

Following the venturi, the gas stream will enter a modified 718 fume washer/spray tower. The unit will be 8' dia. by approximately 20' overall height. This unit will be fabricated of Atlac 382 FRP resin and also in general accordance with NBS PS 15-69. This unit will contain four (4) separate spray banks* spaced at approximately 2' intervals. Using the recirculated flow of dilute caustic solution at a flow rate of 100 gpm per spray bank, this unit will remove approximately * 90 - 92% of the hydrogen sulfide remaining in the gas exhausted from the venturi scrubber. In addition, this unit will also remove 99.9% of the entrained droplets

* Based on ~0.7 transfer units per spray bank. 5 spray banks = 96-97%
Overall H_2S efficiency w/5 spray banks = $100[0.6 + 0.96(0.4)] = 98.4\%$

AVON MANUFACTURING FACILITY/XERXES CORPORATION
34250 MILLS ROAD, AVON, OHIO 44011 • PHONE (216) 327-6051
Dan Himmel - Venturis

before exhausting the gas to the fan. The bottom of the scrubber will act as a sump for recirculated solution. Sump capacity will be approximately 2200 gallons. Also the unit will be complete with a mist eliminator. The mist eliminator will be a Heilex EB 2-Bend design fabricated of Noryl ENG 265 material.

ITEM III - Fan

The fan will be a Heil Model HCB-36 FRP centrifugal fan fabricated of Atlac 382 resin. The fan will be designed for 26,000 ACFM at 23" w.c. static pressure. The fan will operate at approximately 1130 RPM at 175 BHP. The fan will be complete with a 200 h.p. 1800 RPM TEFC motor and will also include an access door, a housing drain, a belt and shaft guard, flex connector for the inlet, a fixed speed V-belt drive, and a standard Neoprene shaft seal. The fan will be statically and dynamically balanced at operating speed prior to shipment.

ITEM IV - Recirculation System

The recirculation system will consist of a Vanton polypropylene centrifugal pump rated for 628 gpm at approximately 85' TDH. The pump will be complete with a baseplate coupling, coupling guard, mechanical seal with an external flush, and a TEFC motor. The recirculation piping will be SCH 80 CPVC and will include the necessary fittings and valves to circulate solution at the proper rate to each of the spray banks in both the spray chamber and the venturi scrubber. The recirculation piping system will also include a flow sensor (Signet paddle wheel type) and an FRP basket suction line strainer.

ITEM V - pH Control System

A pH control system is included for the purpose of controlling caustic make-up to the system. Based on the data provided, caustic make-up will be approximately 0.26 gpm of 50% solution. The pH control system will include a pH probe, a pH analyzer with control relays, a metering pump, and a 4000 gallon bulk caustic storage tank fabricated of FRP material. The probe and analyzer will be as manufactured by Great Lakes Instruments. The metering pump will be a Chem Tech Series 300. The bulk storage tank will be a Heil Standard FRP tank and will include a clear strip liquid gage.

ITEM VI - Interconnecting Ductwork

Ductwork is included to connect the exhaust of the fume washer/spray tower to the inlet of the fan. It is based on the fan and the scrubbers being located in close proximity to minimize the amount of ductwork involved. Ductwork will be fabricated of Atlac 382 resin in general accordance with NBS PS 15-69.

To provide the above described equipment, we are pleased to quote a budget price of $85,000.00. This price is quoted F.O.B. Avon, Ohio and/or Bartow, Florida and does not include any state or local taxes, should they be applicable.

Estimated delivery schedule will be approximately 6-8 weeks after return of approved drawings. Approval drawings would be submitted approximately 2-3 weeks after receipt of purchase order.

Heil standard terms and conditions, Form HTC-1079 including paragraph eleven-B are made a part of this proposal. Escalation policy Item A-2 in terms of payment in accordance with B-1 of Form HTE-1079 will also apply.

Terms and conditions substantially different from our standard terms, may require review to determine acceptability should we be favored with an order on the basis of this quotation.

We thank you for the opportunity to provide this budget proposal and assist you in selecting Heil Process equipment for this application. Should you have any other questions, or if we may be of further service during the course of this project, please contact our representative, Mr. Jack Terrell of Techni-Quip, or this office direct.

Very truly yours,

XERXES CORPORATION
HEIL PROCESS EQUIPMENT

Ernest Rosenberg
Product Manager

ER:es

cc: Techni-Quip, Inc.
P.O. Box 843
Palm Harbor, Fl. 33563
A.C. 813, 785-4904

SERIES 720
VENTURI SCRUBBERS

Series 720 Venturi Scrubbers

Heil Series 720 Venturi Scrubbers are designed to efficiently remove fumes, dust, solids and aerosols ranging in size down to 0.1 micron. This is accomplished by contacting the particulate laden gas stream with the scrubbing liquid (most commonly water) in a highly turbulent, high velocity venturi throat. As the droplets contact the particulate they begin to agglomerate in the diverging or evase section of the venturi. The entrained droplets now contaminated with particulate matter are removed from the gas stream by means of a cyclonic separator. The cleansed gas exits the top of cyclone while the recovered scrubbing liquid is returned to a separate sump tank for recycle. By selecting the appropriate pressure drop (which relates directly to throat velocity) efficiencies of 99%+ can be achieved over the entire range of particle sizes.

Although standardized in size and capacity, each individual unit is custom designed and engineered to meet the specific requirements of each application.

Series 720 Applications

Heil Series 720 Venturi Scrubbers have proven performance records for fume and dust control in the fertilizer industry (both in general ventilation and ventilation of specific processes), foundries, chemical plants, pulp and paper, food and food processing, smelting, frit and glass, dyestuff, aluminizing processing, galvanizing, and chemical waste incinerators.

In general, the Series 720 Scrubbers are effective for removal of submicron sized particulates (both solid and liquid), heavy particulate loads that would clog other devices, and removal of gummy, tacky or scaling materials.

Series 720 Features

Principal features of the Series 720 Venturi Scrubber are:

Low maintenance cost - no moving internal parts to wear. Large spray nozzles are used on the scrubbers to provide uniform distribution of liquid into the incoming gas stream. The spray nozzles have large orifices and are designed to be non-clogging. They are strategically located such that they can be removed for inspection and/or replacement without having to shut down the equipment.

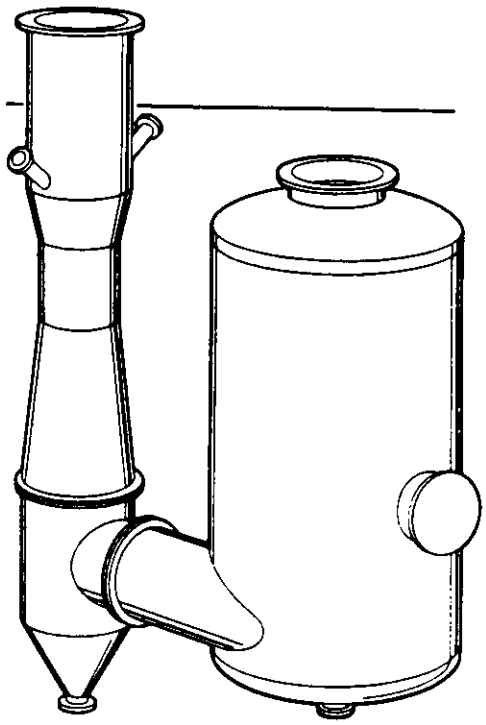
High efficiency - Proper sizing and selection of pressure drop will result in efficiencies exceeding 99% for particles ranging in size down to 0.1 micron. Since the throat section is made removable, new inserts can be provided to either increase or decrease the pressure drop to meet changing gas stream conditions.

Low initial cost - Pre-engineered standard designs are available in capacities from 1800 CFM to 67,000 CFM.

Extended service life - Individual units are designed with maximum corrosion resistance as a primary consideration. The wide selection of corrosion resistant materials feature Rigidon FRP (fiberglass reinforced plastic) as a standard material with stainless steel and other alloy construction available.

Series 720 Equipment Selection

The air or gas volume required to ventilate the process is the principal guide in selecting the proper sized scrubber. Where the specific volume of air required is not already known, references such as the Industrial Ventilation Handbook should be consulted.

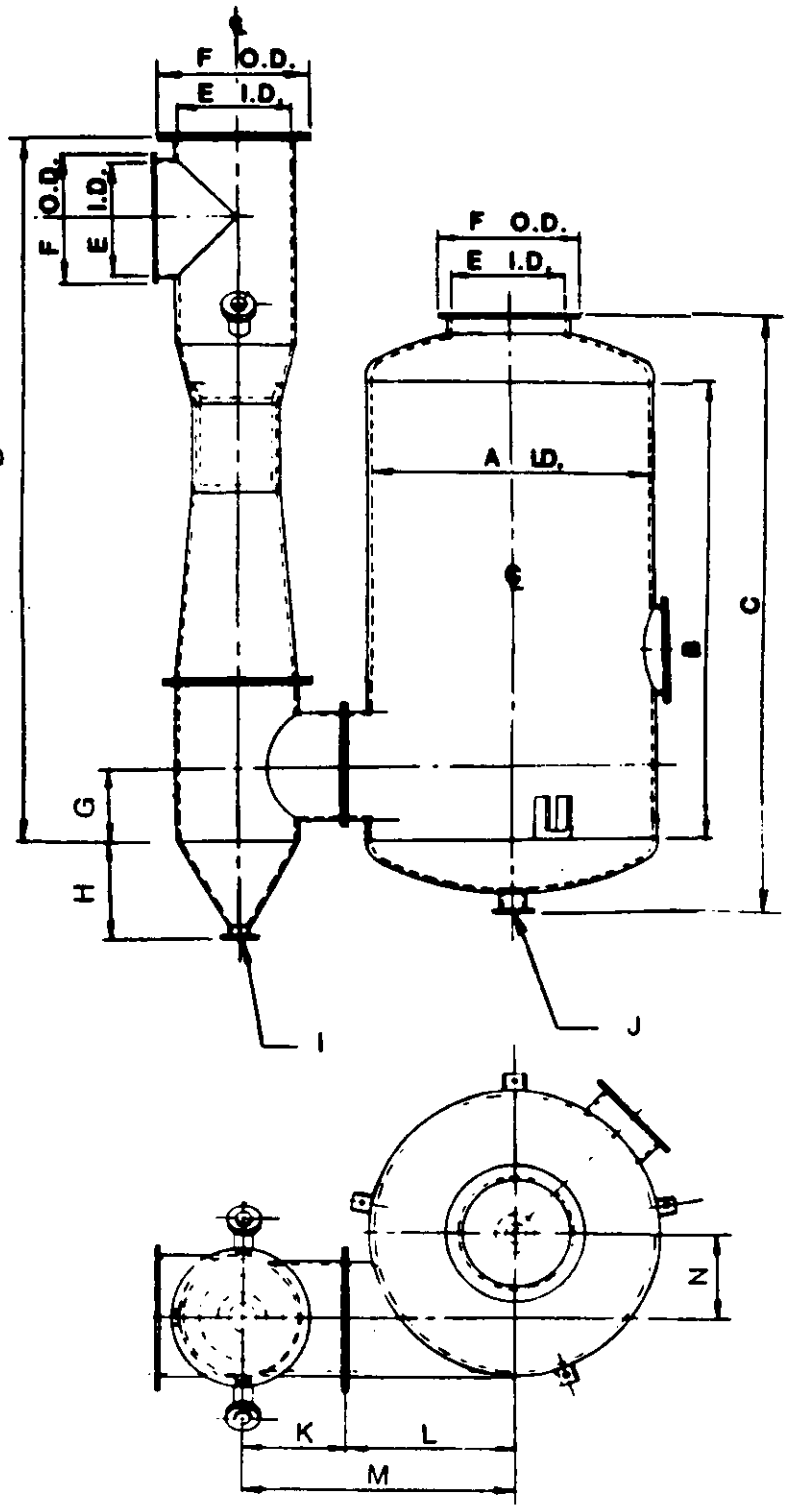


After determining the total air volume to be scrubbed, the efficiency of the unit must then be selected. The required efficiency will depend upon several factors including type of particulate, size distribution, quantity, concentration, plant environment, local, state and federal codes.

Heil's engineers will then assist in determination of pressure drop, recirculation rate, specific material selection, as well as sizing and specification of accessory items (pumps, recirculation tanks, fans, etc.) to make the system complete. Heil's engineers will then provide a specific quotation on the appropriate scrubber and/or system.

NOTE: All dimensions are approximate.

Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Gas Flow	Water Rate
722	24"	40	60	68	10	14⅜	8	11	2	2	10	16	26	7	1800	14
723	36"	60	84	82	14	18⅛	11	13	3	3	12	24	38	11	4200	30
724	48"	80	108	115	20	24⅜	15	18	3	4	20	30	50	14	7500	54
725	60"	100	132	133	24	28⅜	17	20	4	4	24	36	60	18	11500	80
726	72"	120	154	163	30	34⅜	19	26	4	6	30	42	72	22½	16500	114
727	84"	140	178	193	36	40⅜	21	29	6	6	36	48	84	27	23000	168
728	96"	160	205	230	42	46⅜	24	34	6	8	42	54	96	30	30000	228
729	108"	180	228	212	42	46⅜	27	34	8	8	42	60	102	33	38000	280
7110	120"	200	253	239	48	52⅜	27	39	8	8	48	66	114	39	47000	354
7111	132"	220	277	277	54	58⅜	30	44	8	10	54	72	126	42	57000	420
7112	144"	240	302	309	60	64⅜	33	49	8	10	60	78	138	45	67000	486



HEIL PROCESS EQUIPMENT

Heil Process Equipment™
34250 Mills Road
Avon, Ohio 44011
216/327-6051
Telex: 24-3446

XERXES

Xerxes Corporation™
Corporate Offices:
7901 Xerxes Avenue South
Minneapolis, Minnesota 55431

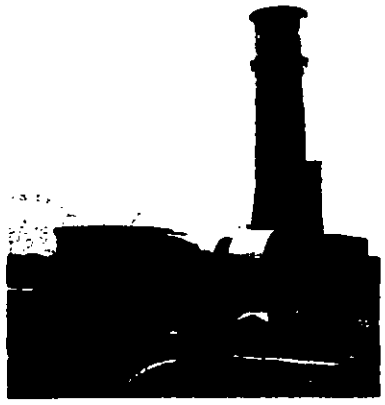
Specialists in . . . CHEMICAL-PROOF CONSTRUCTION

Engineering Notebook

FUME SCRUBBERS
IMPINGEMENT TYPE—SERIES 710

Designed Specifically to Eliminate Corrosive Effluents for Effective Air Pollution Control

- ★ Tested and Proved in Actual Applications
- ★ Complete Ventilation Installations or Individual Units Only
- ★ Efficient Fume Removal
- ★ Wide Range of Applications
- ★ Low Initial Cost & Operating Cost
- ★ Maximum Corrosion Resistance
- ★ Less Than 2" Static Pressure Drop



Series 710 Fume Scrubbers are designed to remove undesirable contaminates from process gases. They combine efficient fume removal with low initial cost, low installation cost and low operating cost. The 710 Series is highly efficient for washing fumes from plating, anodizing, pickling, laboratories and other operations producing corrosive fumes.

The fume laden air receives two separate washings. The cleaned, washed air then passes through a mist eliminator that removes more than 99% of the entrained moisture.

Series 710 Fume Scrubbers can be manufactured in plain steel, coated steel, lined steel, stainless steel and Heil RIGIDON solid plastic construction to meet a wide range of fume washing requirements. The adjacent chart shows the material that best meets the corrosive environment encountered in common operations.

EFFICIENCIES WASHING VARIOUS FUMES AND PREFERRED MATERIALS OF CONSTRUCTION

SOLUTION	TYPICAL REMOVAL EFFICIENCY	Materials of Construction				
		RIGIDON PLASTIC	Plain Steel	Coated Steel	Lined Steel	Stainless Steel
Chromic Acid Plating	98 - 99%	A	B	A	A	A
Cyanide	95 - 99%	A	C	A	A	A
Anodizing	97 - 99%	A	E	C	A	D
Sulfuric Acid Pickle	97 - 99%	A	E	C	A	D
Hydrochloric Acid	70 - 85%	A	E	C	A	E
Phosphoric Acid	97 - 99%	A	B	A	A	A
Phosphate	95 - 98%	A	B	A	A	A
Alkaline Cleaning	97 - 99%	A	B	A	A	A
Caustic Soda	97 - 99%	A	B	A	A	A
Detergent	97 - 99%	A	B	A	A	A
Sodium Glutenate	97 - 99%	A	B	A	A	A
*Aluminum Bright Dip	65 - 95%	A	E	E	A	B
*Nitric Acid	50 - 55%	A	E	E	A	B
*Nitric - Hydrofluric Acid	50 - 55%	A	E	E	A	D

A - Excellent; B - Good; C - Fair; D - Poor; E - Not Recommended

*For more efficient removal of oxides of nitrogen fumes, a Heil 730 Series packed fume washer is recommended.

For solutions not listed, please write giving details—

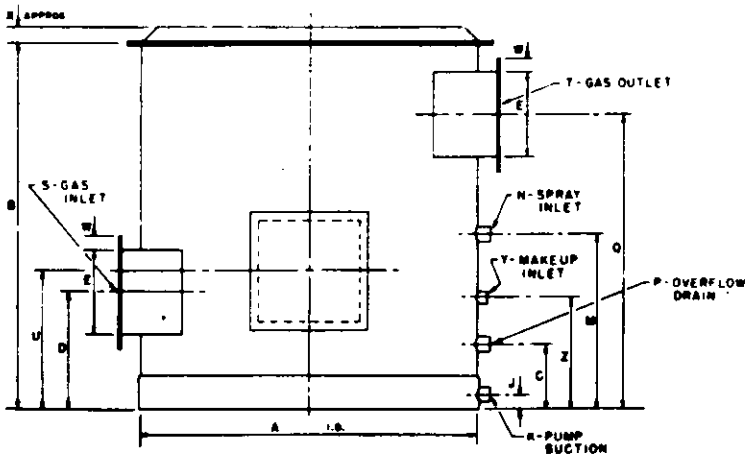
CFM Req'd. — Temperature
Solution — Tank Sizes
Percent Concentration — Material of Construction

Designed and manufactured by:
HEIL PROCESS EQUIPMENT
34250 Mills Road • Avon, Ohio 44011
Phone: 216-327-6051 • Telex: 24-3446

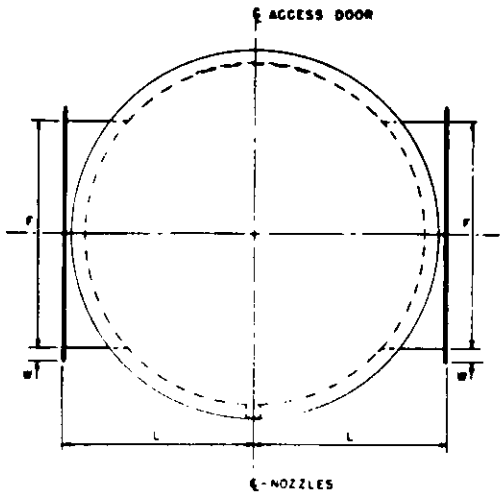
Offering over 50 years' experience

FUME SCRUBBERS

IMPINGEMENT TYPE-SERIES 710

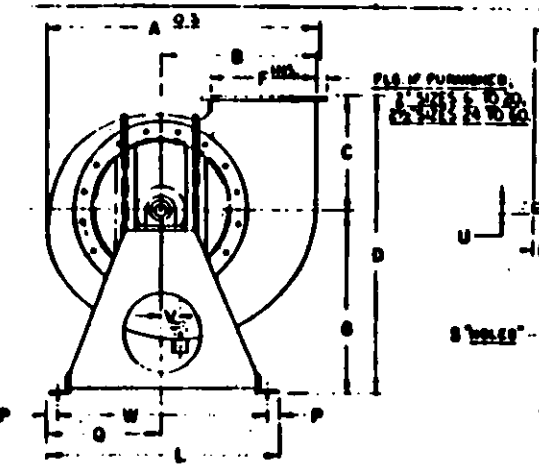


ELEVATION VIEW



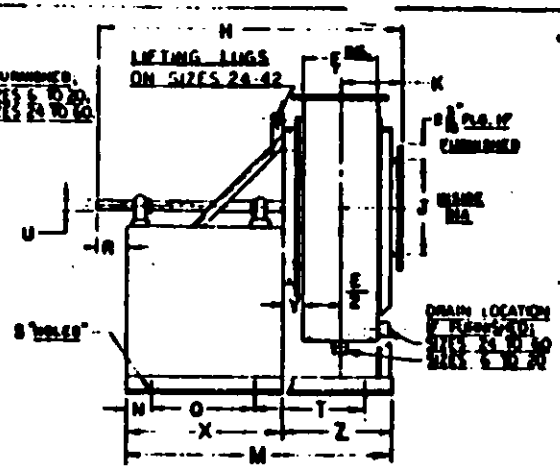
PLAN VIEW

710-P APPROXIMATE DIMENSIONS								
SIZE	712	713	714	715	716	717	718	719
A	24	36	48	60	72	84	96	108
B	48	60	60	72	72	72	72	72
C	4	7-1/2	7-1/2	11	11	11	11	11
D	12	17	17	25-1/2	25-1/2	25-1/2	25-1/2	25-1/2
E	12	12	12	15	15	15	15	18
F		24	30	40	48	60	72	72
J	2	2	2-1/2	2-1/2	2-1/2	2-1/2	2-3/4	2-3/4
K	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2
L	16	22	28	34	40	46	52	58
M	21	27	27	39	39	39	39	39
N	1	1-1/2	1-1/2	1-1/2	2	2	2	2
P	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2	2
Q	40	48	48	60	60	60	60	60
U	16	21	21	25	25	25	25	25
W	2-3/16	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	3	3
X	3	3	3	3	3	3	3	3
Y	1	1	1	1	1	1	1	1
Z	12	20	20	20	20	20	20	20
RIG. WT.	150#	375#	500#	650#	850#	975#	1200#	1400#
STL. WT.	450#	1125#	1500#	1950#	2550#	2925#	3600#	4200#
C.F.M.	1,600	3,500	6,500	10,000	14,000	19,000	25,000	32,000
G.P.M.	1	3	6	10	14	20	25	30



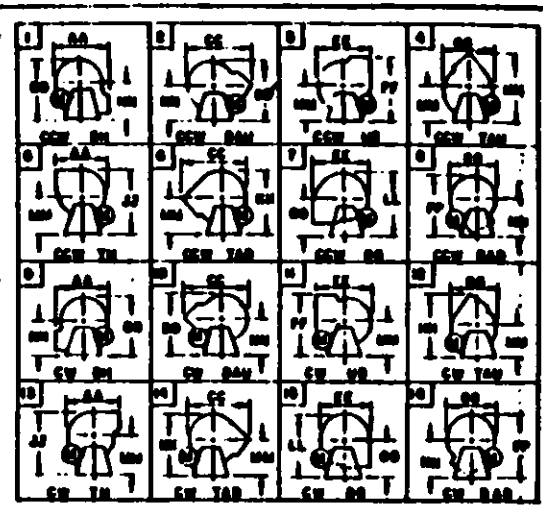
DRIVE END ELEVATION

POSITION 3 SHOWN

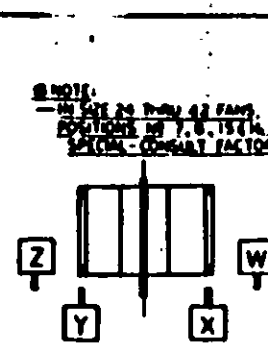


SIDE ELEVATION

— MODEL HCB —



DISCHARGE POSITION DRIVE END VIEW



DIMENSIONAL DATA

FOR ESTIMATE ONLY — CERTIFY FOR CONSTRUCTION

ADJUSTABLE MOTOR BASE

SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	OO	PP
6	19½	11	8⅛	24⅛	4	6	16	30½	6	5⅛	21⅞	–	2	12	¾	10½	5	1⅛	0	1	¾	20	16	2	–	18	24	22½	23½	19	24⅛	18	30	27½	26⅛	25½	16	16	16	24½	¾
8	26	14½	11	29	6	8	18	34½	8	5⅛	24	–	2	14	1	12	5	1⅛	0	1⅛	1½	22	18	2	–	23½	29⅛	30	28	25	29	24	36½	33	31¾	30½	18	18	18	29½	¾
10	29½	16½	11½	31½	8	10	20	38½	10	7⅛	29	–	2	16	1	14½	5	1⅛	0	1⅛	1½	27	20	2⅛	–	25½	32½	33½	31½	29½	31½	27½	40	37	35½	34½	20	20	20	33½	1
12	35	20	13½	37½	9½	12	24	43⅛	12	8½	29	–	2	18	1	14½	5½	1⅛	0	1⅛	1½	27	22	2⅛	–	30½	38½	39½	38	34½	37½	32½	48	44½	42½	41½	24	24	24	39½	1
14	40½	23½	15½	42½	11⅛	14	27	45⅛	14	9⅛	34	–	2	18	1	17	5½	1⅛	0	1⅛	1½	32	22	2⅛	–	35½	44	46	43½	40½	42½	37½	54½	50½	48½	47	27	27	27	45½	1
16	46½	26½	17½	47½	13	16	30	51⅛	16	11	39	–	3	19	1	19½	6	1⅛	0	1⅛	2½	37	25	2⅛	–	40½	49⅛	52½	48	46⅛	47½	43½	61½	56½	54½	52½	30	30	30	50½	1
18	52½	30½	20	53	14½	18	33	59	18	11⅛	44	–	3	24	1½	22	6½	1⅛	0	1⅛	2½	41	30	3⅛	–	45½	54½	59½	53½	51⅛	53	48½	68½	63½	60½	58½	33	33	33	56½	1
20	58½	33½	22	58	16½	20	36	60½	20	12½	45½	–	3	25	1½	22½	5½	1⅛	0	1⅛	2⅛	42½	31	3⅛	–	50⅛	60⅛	65½	58½	57½	58	53½	75½	69½	66½	64⅛	36	36	36	62½	1
24	70½	38½	24	61	19½	24	37	65⅛	24	14½	56	59½	8	22½	1½	28	6	1⅛	22½	2 1/16	3	53	32½	3½	27	66½	73½	75½	72½	65⅛	61	60½	81⅛	75 1/16	72	*	37	47	*	*	1½
27	73½	42⅛	27	68	21½	27	41	71½	27	15⅛	62	64	8	25	1½	31	7½	1⅛	25	2 1/16	3½	59	34⅛	3½	29½	63½	82⅛	81½	81	73½	68	68½	90 3/16	84 1/16	80¼	*	41	52	*	*	1½
30	81½	47½	30	75	24½	30	45	76½	30	18½	68	67½	8	26½	1½	34	6½	1⅛	25½	2 1/16	4⅛	65	35	3½	32½	71	89½	90½	88½	81½	75	75½	100 1/16	92 1/16	88½	*	45	56	*	*	1½
36	98½	57½	36	89	29½	36	53	86	36	21	77	76⅛	9	30	1½	38½	8	1⅛	30	2 1/16	4⅛	75	38½	3½	35½	85	106½	109½	103½	98	89	89½	119 1/16	110 1/16	106½	*	53	66	*	*	1½
42	114½	66½	42	103	34½	42	61	91	42	23½	82½	80½	9	36½	1½	41½	8	1⅛	32½	3 1/16	6	80½	38½	3½	42½	99	123½	127½	119½	114½	103	104½	138 1/16	127 1/16	121⅛	*	61	76	*	*	1½

FAN DATA

ITEM NO.	IDENTIFICATION	QTY REQ'D	FAN SIZE	CLASS	MATERIAL	ROT	DISCH	POS	SP FEATURE

PERFORMANCE

C F M	SU	S P	RPM	H P	TEMP	ELEV

MOTOR DATA

MFG	H P	RPM	TYPE	FRAME	CURRENT

DRIVE DATA

MOTOR PULLEY	FAN PULLEY	BELTS	CENTER	MOTOR RPM

SPECIAL FEATURES

- INLET FLANGE — UNDRILLED
- OUTLET FLANGE — UNDRILLED
- INLET FLANGE — DRILLED
- OUTLET FLANGE — DRILLED
- INLET GASKET
- OUTLET GASKET
- DRAIN
- ROUND FLEXIBLE CONNECTOR
- ACCESS DOOR
- DISCHARGE TRANSITION (SEE NOTES)
- MOTOR RAILS OR BASE

SPECIAL FEATURES

- VIBRATION MOUNT
- MOTOR & DRIVE CANOPY (SEE NOTE)
- V - BELT DRIVE (SEE DRIVE DATA)
- MOTOR (SEE MOTOR DATA)
- SHAFT SEAL
- BELT GUARD
- SHAFT GUARD

NOTES

CUSTOMER & JOB

CUSTOMER

RO NO

JOB NAME

ARCHITECT

ENGINEER

CERTIFIED

DO NO

NO	DATE	BY	REVISION

HEIL PROCESS EQUIPMENT

XERXES FIBERGLASS INC.

MODEL HCB, SERIES A
SOLID PLASTIC FANS
SIZES 6 THRU 42

SCALE NONE

CB-