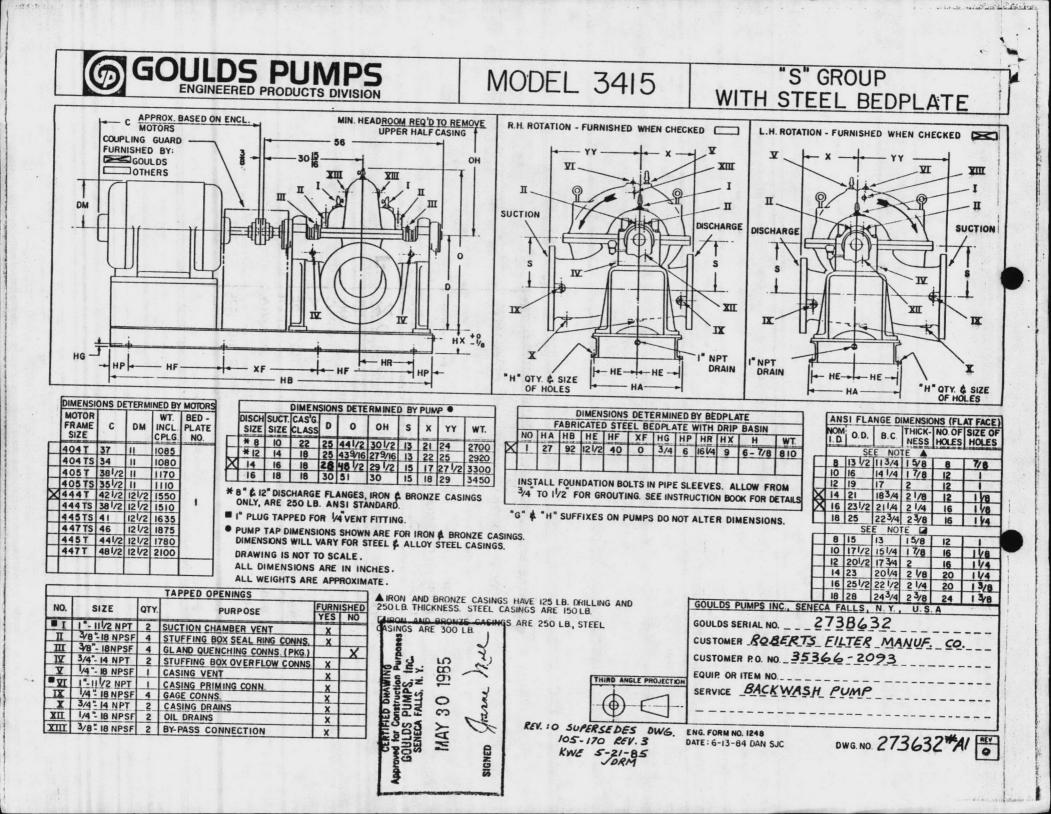
	NTRACTOR'S SL TDIV NORFOLK 4-43			CONTRACT NO N62470-82-	Patron in a constant of the	MITTAL NO	DATE 6/19/95
1	CONTRACTOR	a an an	Berlin and a star of the	PROJECT TITLE AND		~0	1 0/13/05
08	BERTS FILTER	MANUFACT	URING CO.		UIPMENT -	BUILDING	G 20
٧A	AL FACILITIES	ENGINEE	RING COMMAND	CAMP LE JE	UNE, NU.		
			CONTRACTOR USE ONLY	a start and the second	in the set	+	VIEWER USE ONLY
		*List o	nly one specification division p	per form.		and the second s	*ACTION CODES proved
	Li		the following categories on eac d indicate which is being subm			11	sapproved pproved as noted
] (Contractor Approved		OICC Approval		ation/Substitution or OICC Approval	C-Co R-Res	eceipt acknowledged. mments submit
Sumpany Contraction	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *		ITEM IDENTIFIC (Type, size, model no., M brochure nur	fg. name, dwg. or	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
1919	15440 Para. 2.7	WASH W	ATER PUMP				
	273632 #A1	Model :	3415 with Steel Bo	edplate	7	A	CCS 405 6/28/
	Carl Sold M	A market		a second		-	
+							
					-	1	
		4			a		
UTF	RACTOR'S COMMENTS	sed draw	ing with modified	base. Record	purposes (only.	
NTF		sed draw	ing with modified	base. Record	purposes of	only.	
		BMITTALS TO ROI		No.	purposes (
PY I	Rev1	BMITTALS TO ROI		No.	N.		I Porce
PY	Rev1	BMITTALS TO ROI	CC FROM (Reviewer)		TO ROBED	peson 273 1	I ROICC
PY 1	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER BUDMITTALS are returne tractor calls attention	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Reviewer) CAN TOLL dicated. Approval of an item doe s the deviation.	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-
PY 1	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER BUDMITTALS are returne tractor calls attention	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Beviewer) CAN TOLU dicated. Approval of an item doe	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-
PY 0	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER GOULT Submittals are returne tractor calls attention Submittals are forward	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Reviewer) CAN TOLL dicated. Approval of an item doe s the deviation.	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-
PY 0	Revi OF TRANSMITTAL AND SUL M. I. Kimba RECEIVED BY REVIEWER 60018 Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Reviewer) CAN TOLL dicated. Approval of an item doe s the deviation.	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-
Y I	Revi OF TRANSMITTAL AND SUL M. I. Kimba RECEIVED BY REVIEWER 60018 Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Reviewer) CAN TOLL dicated. Approval of an item doe s the deviation.	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-
	Revi OF TRANSMITTAL AND SUL M. I. Kimba RECEIVED BY REVIEWER 60018 Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Reviewer) CAN TOLL dicated. Approval of an item doe s the deviation.	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-
	Revi OF TRANSMITTAL AND SUL M. I. Kimba RECEIVED BY REVIEWER 60018 Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Reviewer) CAN TOLL dicated. Approval of an item doe s the deviation.	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-
	Revi OF TRANSMITTAL AND SUL M. I. Kimba RECEIVED BY REVIEWER 60018 Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Reviewer) CAN TOLL dicated. Approval of an item doe s the deviation.	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-
	Revi OF TRANSMITTAL AND SUL M. I. Kimba RECEIVED BY REVIEWER 60018 Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Reviewer) CAN TOLL dicated. Approval of an item doe s the deviation.	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-
	Revi OF TRANSMITTAL AND SUL M. I. Kimba RECEIVED BY REVIEWER 60018 Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROI 11 d with action in to and support	CC FROM (Reviewer) CAN TOLL dicated. Approval of an item doe s the deviation.	es not include approval of	ESENTATIVO Signature Thom To Rober any deviation from	273 f	requirements unless the con-

10 JUL 1985 13 44

and the standard and an area



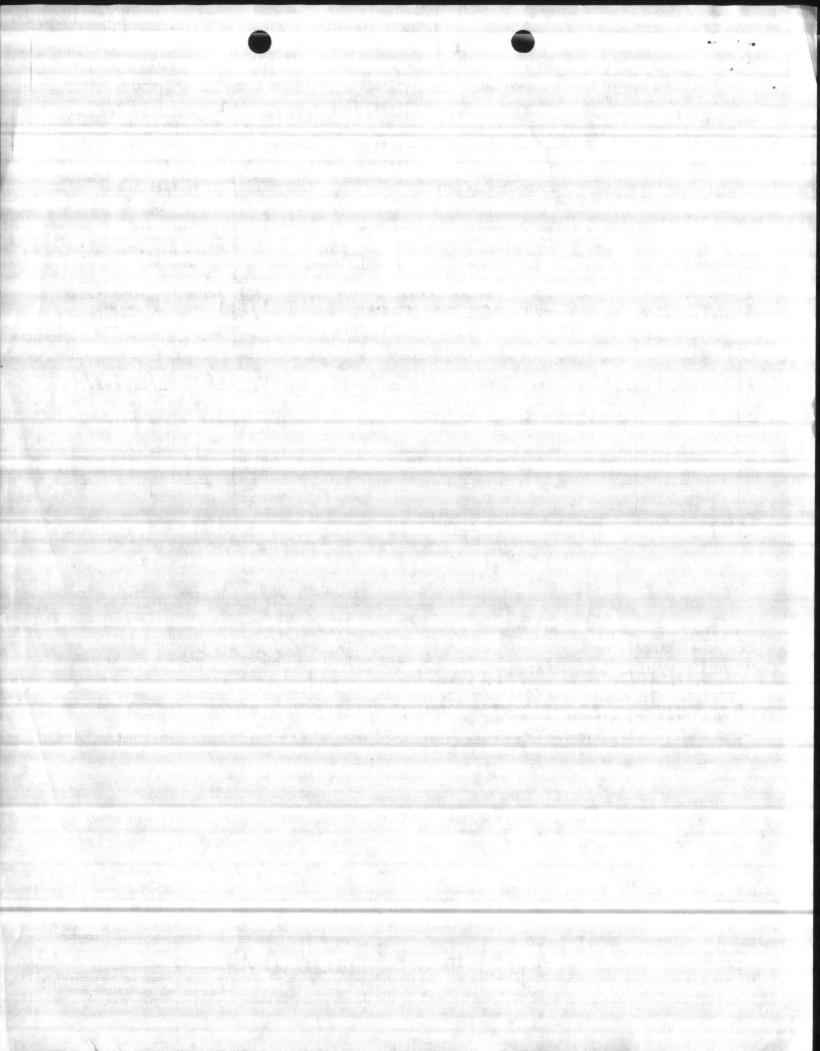
ATLANTIC DIVISION FACILITIES ENGINEERING COMMAND NORFOLK, VIRSINIA 23511 ED ED AS NOTED OVED TO THE REQUIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM FILE CONTRAC-
FACILITIES ENGINEERING COMMAND NORFOLK, VIRSINIA 23511 ED ED AS NOTED OVED TO THE REDUIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRACT
FACILITIES ENGINEERING COMMAND NORFOLK, VIRSINIA 23511 ED ED AS NOTED OVED TO THE REDUIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRACT
FACILITIES ENGINEERING COMMAND NORFOLK, VIRSINIA 23511 ED ED AS NOTED OVED TO THE REDUIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRACT
FACILITIES ENGINEERING COMMAND NORFOLK, VIRSINIA 23511 ED ED AS NOTED OVED TO THE REDUIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRACT
FACILITIES ENGINEERING COMMAND NORFOLK, VIRSINIA 23511 ED ED AS NOTED OVED TO THE REDUIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRACT
FACILITIES ENGINEERING COMMAND NORFOLK, VIRSINIA 23511 ED ED AS NOTED OVED TO THE REDUIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRACT
NORFOLK, VIRSINIA 23511 ED AS NOTED ED AS NOTED HOVED T TO THE REDUIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRACT
ED AS NOTED ED AS NOTED INVED T TO THE RECHIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC.
ED AS NOTED INVED T TO THE REQUIREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC.
TO THE REDUIREMENTS OF TO THE REDUIREMENTS OF TO THE REDUIREMENTS OF TO THE REDUIREMENTS UNLESS NOT INCLUDE AL OF ANY DEVIATION FROM THE CON-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF ANY DEVIATION FROM THE CON-
REQUIREMENTS UNLESS THE CONTRACT
IS ATTENTION TO AND SUPPORTS THE
ION-THE CONTRACTOR SHALL BE
and a second subscription and a second
VSIBLE FOR PROVIDING PROPER
AL DIMENSIONS & WEIGHTS, COMPANIA TRADES, ETC., AS REQUIRED 28 JUN 1985
LS ATTENTION TO AND SUPPORTS THE
and the social second
이 같은 것 같은
ION-THE CONTRACTOR SHALL BE
LS ATTENTION TO AND SUPPORTS THE
REQUIREMENTS UNLESS THE CONTRAC-
REQUIREMENTS UNLESS THE CONTRAC.
AL OF ANY DEVIATION FROM THE CON-
AL OF ANY DEVIATION FROM THE CON-
AL OF A SUBMITTAL WOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON-
AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON-
AL OF ANY DEVIATION FROM THE CON-
AL OF ANY DEVIATION FROM THE CON-
TO THE REQUIREMENTS OF 2552
ED AS NOTED INVED T TO THE REPUBREMENTS OF CT NO. AL OF A SUBMITTAL LOES NOT INCLUDE AL OF ANY DEVIATION FROM THE CON- REQUIREMENTS UNLESS THE CONTRAC.

1

.

(BUILDINGS 139, 236, 540 & 2615) CONTRACTOR USE ONLY REVIEWER USE ONLY 'List only one specification division per form. List only one of the following categories on each transmittal form, and indicate which is being submitted "ACTION CODES Contractor Approved OICC Approval Deviation/Substitution For OICC Approval A:Approved as noted PROJ. SPEC. SECT. ITEM IDENTIFICATION (Type, size, model no., Mfg. name, dwg. or brochure number) 0'0'0'0'0'0'0'0'0'0'0'0'0'0'0'0'0'0'0'			BMITTAL TRANSMITTAL		CONTRACT NO	TRANSM	TTAL NO	DATE
	1		55/3 (Hev. 11-80)	<u></u>			21	3/21/85
		and the second	MANUFACTURING CO.		REPLACE EQUIPMEN	T IN	POOLS	
"List only one specification division per form. "ACTOM CODES List only one of the following categories on each transmittal form, and indicate which a being submitted "Actom Codes Contractor Approved OICC Approval Deviation/Substitution For OICC Approval "Actom Codes PROJ. SPEC. SECT. TEM IDENTIFICATION Deviation/Substitution For OICC Approval "Actom Codes PROJ. SPEC. SECT. TEM IDENTIFICATION Deviation/Substitution For OICC Approval Comments PROJ. SPEC. SECT. TEM IDENTIFICATION Deviation/Substitution Relaxing PROJ. SPEC. SECT. TEM IDENTIFICATION Deviation/Substitution Relaxing TSOIL POSTED OPERATING INSTRUCTIONS Code and Date Relaxing Para. 1.5 POSTED OPERATING INSTRUCTIONS 7 A JHL/Locs/3 A-8784-19 Menual Valve Sequence 7 A JHL/Locs/3 DIVERCTOR SCOMMENTS SEE SEPARATE SHEET SEE SEPARATE SHEET Submittals are attention to and supports the deproval of an item does not include approval of any deviation from the contract requirements unless the origination to any supports the deproval of an item does not include approval of any deviation from the contract requirements unless the origination to any supports the deproval of an item does not include approval of any deviation from the contract requirem		VAL FACILITIE	S ENGINEERING COMMAN	D	(BUILDINGS 139,	236,	540 & 20	515)
List only one of the following categories on each transmitted form, and indicate which is being submitted Approved	_	he water way to be a star				and the second s		and the second
15011 Para. 1.5 POSTED OPERATING INSTRUCTIONS 7 A A-8784-19 Manual Valve Sequence 7 A JML/402/3 SET SEPARATE SHEET SEE SEPARATE SHEET SEE SEPARATE SHEET Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor expression and in comments below on ONE COPY of transmittal form. Submittals are returned with action indicated. Approval of an IREVIEWER USE ONLY Section and in comments below on ONE COPY of transmittal form. Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of transmittal form.			st only one of the following categori and indicate which is be	ies on each trai eing submitted	nsmittal form,	and a second	oved oproved proved as noted ceipt acknowledged. ments	
A-8784-19 Manual Valve Sequence 7 A JHJ (Jos/3) Image: Second and Se	I EM NO.	& PARA. and/or PROJ. DWG. NO. * 15011	(Type, size, moo bro	del no., Mfg. na ochure number)	DN me, dwg. or		and the second second second	the second s
	1	Para. 1.5	POSTED OPERATING	INSTRUCT	IONS		1.11.11	li i li i
SEE SEPARATE SHEET		A-8784-19	Manual Valve Sequ	ence		7	A	JMJ/403/3/27/8
PY OF TRANSMITTAL AND SUBMITTALS TO ROICE CONTRACTOR REPRESENTATIVE (Signature) TE RECEIVED BY REVIEWER POM (Reviewer) Outstates are refurned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the deviation. Outstates are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of transmittal form. WEWER'S COMMENTS						d Street	•	
PY OF TRANSMITTAL AND SUBMITTALS TO ROICE CONTRACTOR REPRESENTATIVE (Signature) TE RECEIVED BY REVIEWER POCM (Review) O Submittals are refurned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the deviation calls attention to and supports the deviation. O Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of transmittal form.		. 7 T.						
PY OF TRANSMITTAL AND SUBMITTALS TO ROICE CONTRACTOR REPRESENTATIVE (Signature) TE RECEIVED BY REVIEWER PCM (Review) Submittals are refurned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the deviation. Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of transmittal form. PREVENTS				ana in Sea Na		a Blancas		
SEE SEPARATE SHEET					and the second		1	
DPF OF TRANSMITTAL AND SUBMITTALS TO ROICE CONTRACTOR REPRESENTATIVE/Signature: ME RECEIVED BY REVIEWER ROM (Review) Submittals are refurred with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the director calls attention to and supports the deviation. Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of transmittal form. WEWER'S COMMENTS	_	and the second				1.9		
Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the origination to and supports the deviation. Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of transmittal form. VIEWER'S COMMENTS	1 F 1		MITTALS TO ROICC		CONTRACTOR REPRESENTATIVE	Signature)	rson	
Tractor calls attention to and supports the deviation. Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of transmittal form. VIEWER'S COMMENTS PIES TO: DATE SIGNATURE	1	E RECEIVED BY REVIEWER	FROM (Reviewer)	iil	То)	X	
Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of transmittal form. VIEWER'S COMMENTS PIES TO Date Signature	7			an item does not	include approval of any deviati	on from t	ne contract re	quirements unless the con-
	-	Submittals are forward		dations indicate	d in REVIEWER USE ONLY Sec	tion and i	n comments t	below on ONE COPY of the
		and the second second				- and Balter		
Pies TO BOICC (2)	V	IEWER'S COMMENTS						
PIES TO: BOICC (2)		Ar Xa						
PIES TO BOICC (2)								A States
PIES TO ROICC (2) DATE SIGNATURE							4.30	
PIES TO BOICC (2) DATE SIGNATURE								
PIES TO ROICC (2) DATE SIGNATURE								
PIES TO: ROICC (2) DATE SIGNATURE								
			to an anna an a					

TUS.	GOP:	1983 -	739-003/2122	Region	3-11

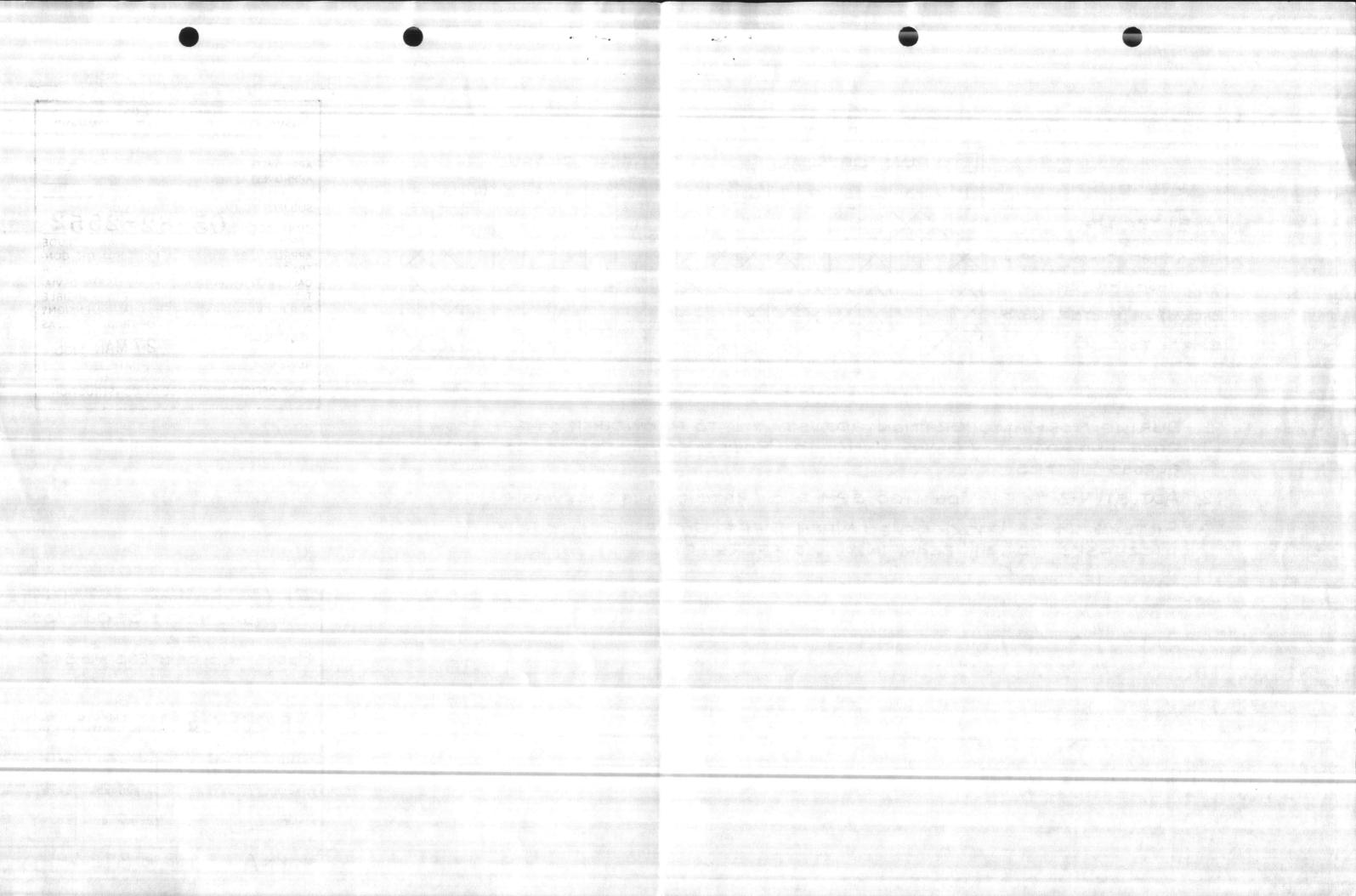


MANUAL		AL	VE	5	EG	UE	NC	E								-	1		
		VF	ALV	EC	OPE	·N		Age.			\boxtimes	VA	LVE	CI	-05	SED			
OPERATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
FILTERING		X	X	1	1.2						X						27.5		
BACKWASH FILTER No. 1	X			X		34	X	X	X	X	1							X	X
BACKWASH FILTER No. 2	X	1		X	X	X			X	X	1							X	X
BACKWASH FILTER No.3	X	1		X	X	X	X	X										X	X
EMPTY POOL	1 pr	X	1.34	in the	X		X	1.58	X				1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1			1	1	X	X

NOTES

- 1. DURING NORMAL OPERATION ADJUST V-1 TO PROVIDE 1200 GPM FLOW RATE AND ADJUST V-6, V-8 & V-10 TO PROVIDE EQUAL PRESSURE DROPS ACROSS FILTERS
- 2. ADJUST V-3 TO PROVIDE IIGO GPM FLOW RATE DURING BACKWASH
- 3. FILTERS TO BE BACKWASHED WHEN DIFFERENTIAL PRESSURE INCREASES TO PSI FROM INITIAL DIFFERENTIAL

ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED APPROVED AS NOTED SUBJECT TO THE REQUIREMENTS OF CONTRACT NO. 05-82-25 APPROVAL OF A SUBMITTAL APPROVAL OF ANY DEVIATION FROM TRACT REQUIREMENTS UNLESS THE CONTRACTOR CALLS ATTENTION TO AND SUPPORTS THE DEVIA **TION-THE CONTRACTOR SHALL BE RESPONSIBLE** FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINATION OF TRADES, ETC., AS REQUIRED. 27 MAR 1985 REVIEWER_ FOR OFFICER IN CHARGE OF CONSTRUCTION REVISION DATE MANUAL VALVE SEQUENCE FOR POOLS IN BLOG'S 236 AND 540 FILTER MEG. COMPANY DARBY, PENNSYLVANIA 19023 ROBERTS DRAWN DATE CHECKED DATE Jer 3-21-85 TRACED DATE APPROVED DATE SCALE CONTRACT 5.0. DWG. NO. 8784-19 SECTION A

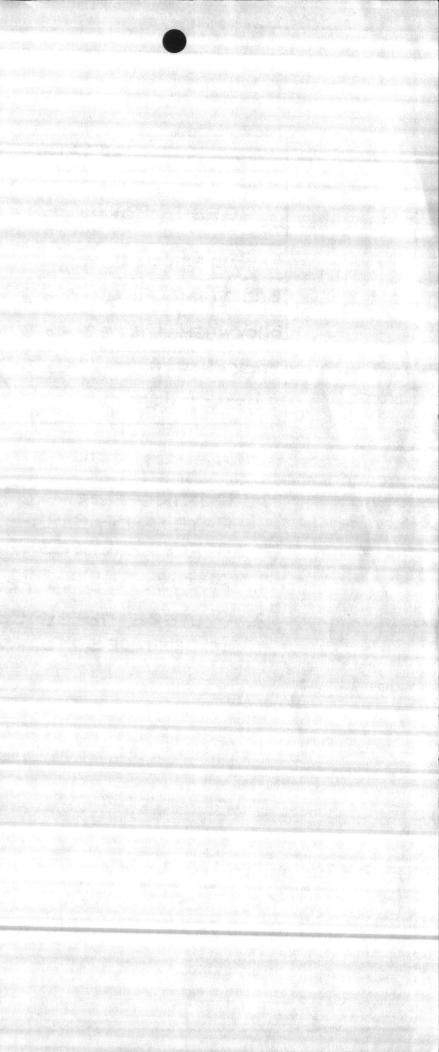


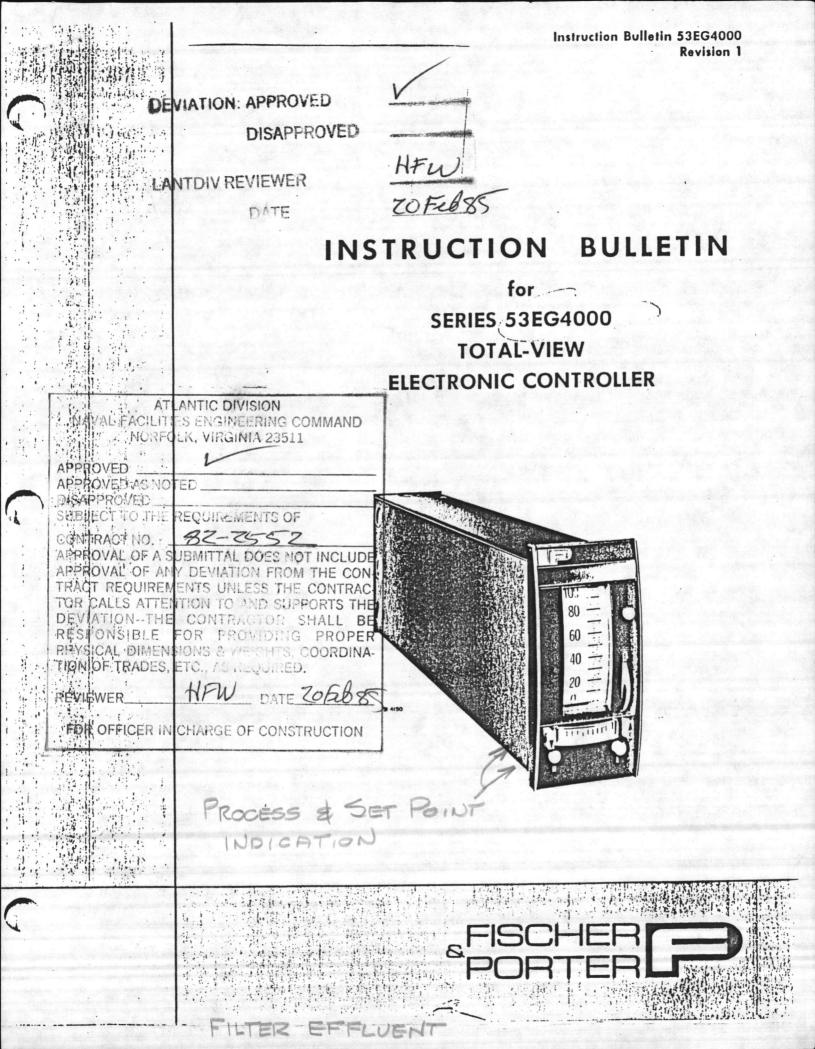
MANUAL	1.1	AL	VE	Ş	EG	UE	NC	E							lan _{ter}				
		VF	ALV	E (OPE	5					\boxtimes	VA	LVE	CI	-05	SED			
OPERATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
FILTERING		X	X								X								
BACKWASH FILTER No. 1	X	1		X		1997. 1997 - 1997	X	X	X	X	1						1.3	X	X
BACKWASH FILTER No. 2	X	1		X	X	X			X	X	1							X	X
BACKWASH FILTER No.3	X	1	day.	X	X	X	X	X									à cò c	X	X
EMPTY POOL		X	1		X		X		X				1					X	X

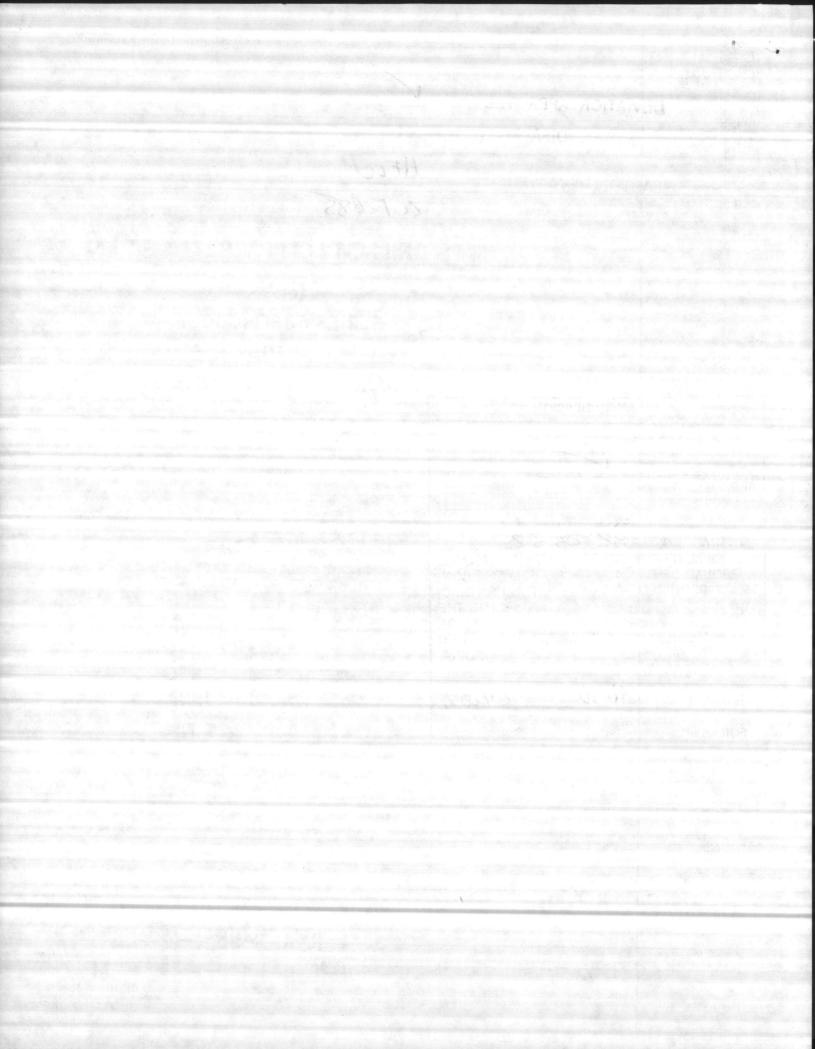
NOTES

- 1. DURING NORMAL OPERATION ADJUST V-1 TO PROVIDE 1200 GPM FLOW RATE AND ADJUST V-6, V-8 & V-10 TO PROVIDE EQUAL PRESSURE DROPS ACROSS FILTERS
- 2. ADJUST V-3 TO PROVIDE IIGO GPM FLOW RATE DURING BACKWASH
- 3. FILTERS TO BE BACKWASHED WHEN DIFFERENTIAL PRESSURE INCREASES TO PSI FROM INITIAL DIFFERENTIAL

NAV	AL FACILITIES E	TIC DIVISION INGINEERING C VIRGINIA 2351.	
APPRO	VED	an an an an a	
	VED AS NOTED		
SUBJE	CT TO THE REQ	UIREMENTS OF	
CONTR	ACT NO. 05	-82-2	552
APPMO	VAL OF A SUBM	ITTAL DOES NO	DT INCLUDE
	VAL OF ANY DE		
	REQUIREMENTS ATTENTION TO /		
TION-T	HE CONTRACTO	R SHALL BE RE	SPONSIBLE
	ROVIDING PROP		
REQUI	HTS, COORDINA		
	nan	27 MA	R 1985
REVIEW	VER GIRL	DATE_	
FOR	OFFICER IN CHA	RGE OF CONST	RUCTION
		March Street Street	
		and the second	the state and a
		and the second	
	6		
	¢		
	6		
	6		
	6		
	6		
1	REVISI	The second se	DATE
MAN		The second se	
I	REVISI UAL VALV FOR	E SEQU	
	UAL VALV	IE SE-QU	ENCE
	UAL VALV	IE SE-QU	ENCE
	UAL VALV	IE SE-QU	ENCE
DOLS	UAL VALV FOR IN BLOG	15 236 AND	ENCE 540
OLS	UAL VALV FOR IN BLOG	IE SE-QU	ENCE 540
RO	UAL VALV	IE SEQU 5 236 AND FILTER MFG. DARBY, PENNSYL	COMPANY
DOLS	UAL VALV FOR IN BLOG	IE SEQU	ENCE 540
RO	UAL VALV	IE SEQU 5 236 AND FILTER MFG. DARBY, PENNSYL	COMPANY
RO	DAL VALV	CHECKED	ENCE 540 COMPANY VANIA 19023







Other Ranges:

$$Rx = \frac{\text{Instrument Voltage Span (1-5V)}}{\text{Signal Current Range (.004-.020A)}}$$

$$Rx = \frac{4}{.016} = 250 \,\Omega$$

On ac powered units, facilities are provided to power a primary transmitter of the two-wire type. Connect terminals 9 (+) and 10 (—) to the remote transmitter.

3. Output

The 4-20 mAdc output signal from Controller into a 0 to 750 Ω load is obtained from terminals 4 (+) and common. When an Output Isolator is used, the output load capacity is 0 to 1000 Ω , and the load is wired between 4 (+) and 3.

4. Integral Alarm Option

Facilities may be provided (if the 10th character of the model number is the letter F, G, H, J, K or L) to include either one or two alarm lights actuated by internal alarms. The integral alarms may be furnished as an option, operation determined by preset limits with respect to high, low or deviation.

The Integral Alarm circuitry is contained on an auxiliary circuit board that mounts to the left hand side rail of the chassis. This board is covered with a protective vinyl shield, its circuits interconnected to the main board via wiring harness. For details, refer to the applicable Instruction Bulletin.

5. Valve Holder

Facilities may be provided (if the 9th character of the model number is the letter K, L, M or N), to connect an overriding Portable Manual Control Station (known as a Valve Holder). This instrument will assume command of the Controller output to provide smooth, uninterrupted operation of the process when the Controller is to be removed for replacement or service.

In this instance the Valve Holder plugs into the receptacle at the lower front of the Controller instrument case by means of a connecting cable furnished with the Valve Holder.

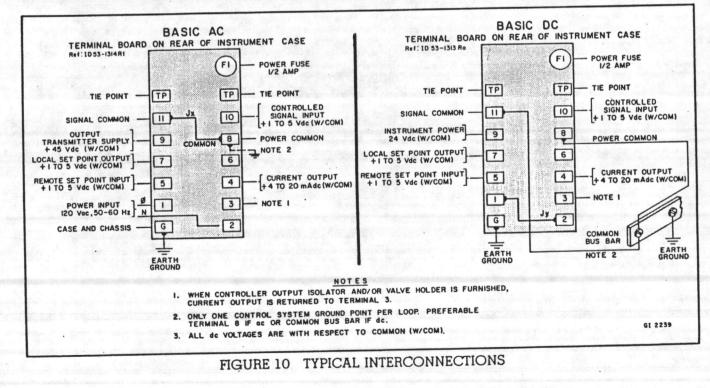
In addition, a pair of Valve Holder connector pins connect internally to the process variable input lines and are used primarily as a connection for a trend recorder. The trend recorder is useful when making initial adjustments, in addition to its prime function of recording the value of a critical process variable.

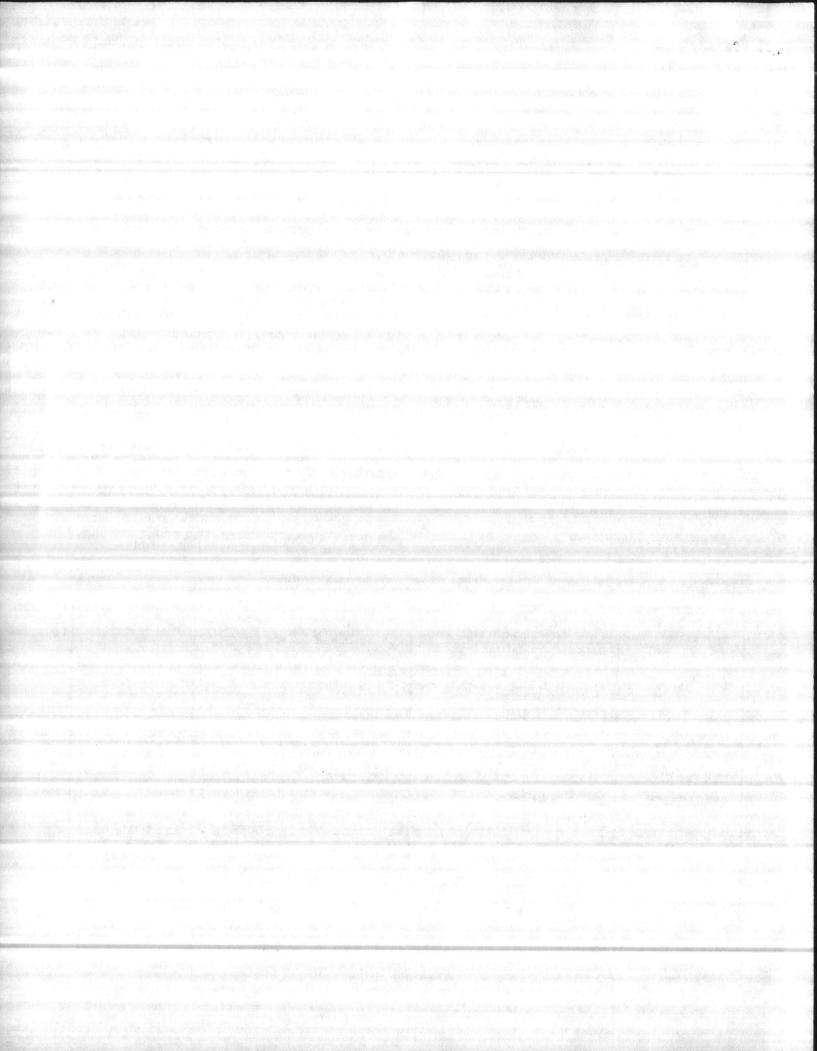
6. Feed Forward & Anti-Reset Windup Option

Facilities may be provided (if the 10th character of the model number is the letter D or M) to include anti-reset windup circuitry or feed forward circuitry thru the addition of an auxiliary circuit board which mounts to the left hand side rail of the chassis. This board is covered with a protective vinyl shield, its circuits interconnected to the main board via wiring harness. For details, refer to the applicable Instruction Bulletin.

PLACING IN OPERATION

The Controller has been specifically designed for automatic control of a process variable in accordance with preset parameters. A prime requisite for proper service is a clear understanding of the operating controls and possible options as outlined under Functional Description. Refer to Figures 2 thru 5 as an aid to the following discussion.





the set point so that the proportional action changes the Controller output by 15% of span. If the process is held steady in this position, the reset action will produce a further change of the Controller output. If the reset dial were set at 3.0 minutes, then, reset action will repeat the proportional action once every three minutes; i.e., change the output an additional 15%.

Reset action will continue until the deviation between set point and process is eliminated.

The reset switch is replaced with a continuously adjustable potentiometer for 'manual reset' control and is located in the same physical position. This reduces the deviation to zero when the output equals the potentiometer setting.

5. Direct-Reverse Switch

This 2-position toggle switch provides facilities for establishing a 'direct' or 'reverse' acting Controller.

Direct action is defined as — for increasing process (error signal) with set point constant, — Controller output current is 'increasing'.

Reverse action is defined as — for increasing process (error signal) with set point contant, — Controller output current is 'decreasing'.

6. Other Controls

Additional calibrating controls are conveniently located on the circuit board and are discussed in subsequent sections of this bulletin.

Auxiliary circuits such as, anti-reset windup, feed forward, alarm circuitry, etc. are mounted to another circuit board that fastens to the left side rear of the chassis. This board is covered with a protective vinyl shield, its circuits interconnected to a) the main board via harness assemblies, and b) to the customer connection terminals via a flexible cable.

INSTALLATION

. Inspection

All reasonable precautions have been taken in packing the Controller to prevent damage to the instrument during shipment. Carefully remove the instrument from its packing case. Any instructions given on tags attached to the instrument, should be followed carefully. The instrument should be inspected immediately for indications of damage which may have occurred during shipment. All damage claims should be made to the shipping agent involved before attemptir:g to install or operate the instrument.

II. Location

The location chosen to mount the Controller should be well lighted and relatively vibration-free. Ambient temperature is preferably between 16°C (60°F) and 43°C (110°F). Temperature conditions are not critical and have less than 0.5% effect per 28°C (50°F) change. Ambient temperatures between 4°C (40°F) and 52°C (125°F) are satisfactory. The standard instrument should be placed in a non-explosive atmosphere. If an ac model instrument, a source of 120 Vac \pm 10% must be provided; if a dc model instrument, a 24 to 26 Vdc supply must be provided.

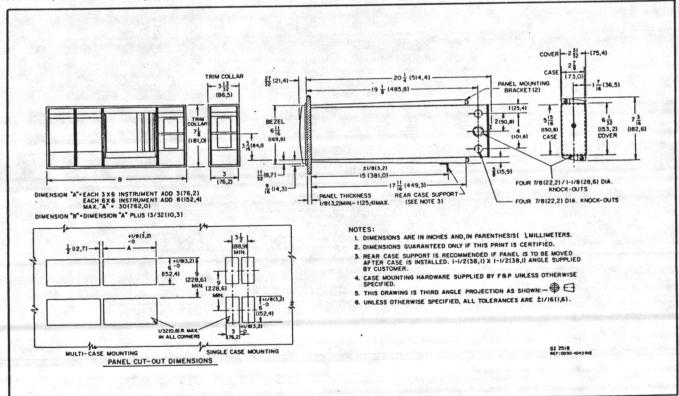
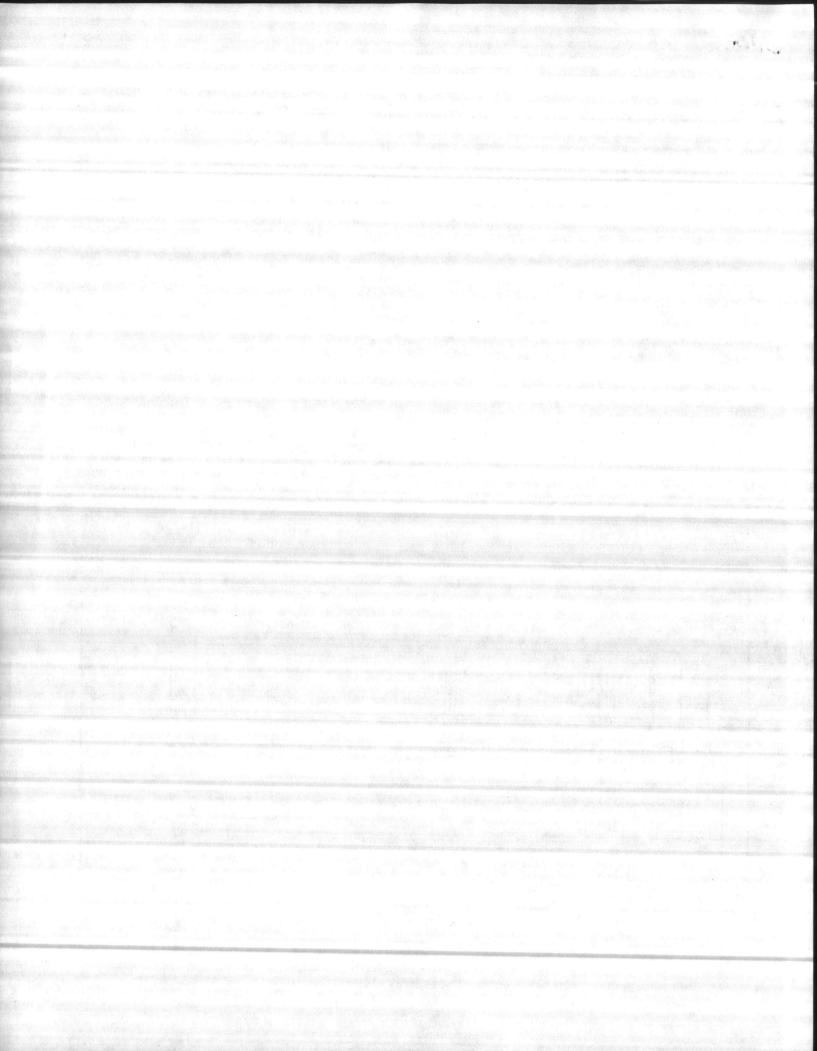


FIGURE 6 OUTLINE & MOUNTING DIMENSIONS

7



SERIES 53EG4000 & 53EH4000

MOL	DEL NUMBERING
53EG4000 Electronic Total View Controller	(Cont'd.) 53 EG 4 0 0 0 A A A A A A
Series	Output Options
$\frac{53 \text{ EG } 4 \text{ 0 } 0 \text{ 0 } \text{ A}}{1 \text{ T } $	TTTTT
Electronic Total View Controller; Fixed Scale w/Process & Set Point	A = Reserved; Specials, Series, etc. B = Standard Chassis; No Output Options D C = Output Signal Isolation
Indication	
Design Designation: 3 x 6 SCAN-LINE Bumpless-Balanceless Transfer (BBT) All Solid State Electronics; 20" Long Case	besign Level: Letter assigned by factory; letter i changes when some part is no longer interchangeable.
Control Mode	Paint Color
	A = Special Paint Color
Prop. Band, % Reset Derivative	L E = F&P Black
3. 3-500 Auto None	
4 3-500 Auto Yes 5 3-500 Manual None	e <u>53EH4000</u> Series Electronic Total View Controller
6 3-500 Manual None	
Power	
10wer	Electronic Total View Controller
Operating Voltage X-mitter Supply	w/ Supervisory Computer Control
3 120 Vac 50-60 Hz 45 Vdc	Design Designation: 3 x 6 SCAN-LINE Concept
5 24 Vdc None	Bumpless-Balanceless Transfer (BBT)
6 220 Vac 50 Hz 45 Vdc	All Solid State Electronics; 20" Long Case
Input Signals	Control Mode g n
Process Variable Remote Set Point	
1 1-5 Vdc 1-5 Vdc	Prop. Band, % Reset Derivative 3 3-500 Auto None
	4 3-500 Auto Yes
Frontal Display	5 3-500 Manual None v
Alarm Lights(s) for	6 3-500 Manual, Yes
Integral Alarm(s) Receptacle for	
Top Bottom Valve Holder	Power
B	Operating Voltage X-mitter Supply
D Yes	3 120 Vac 50-60 Hz 45 Vdc
F Yes H Yes Yes	5 24 Vdc None
H Yes Yes K Yes	6 220 Vac 50 Hz 45 Vdc
L Yes Yes	
M Yes Yes	Input Signals Input Signals
N Yes Yes Yes	Process Variable Remote Set Pt. Comp. Sig.
Circuit Board for Options	1 1-5 Vdc 1-5 Vdc Two Form A
B = No Board D = Board w/Anti-Reset Wind-up	Frontal Display
D = Board w/Anti-Reset wind-up E = Blank Board (for future modifications)	B = No Options
Integral Unpowered Alarm Circuit	K = Receptacle for Valve Holder
(Contact Closure Output)	Circuit Board for Ortiges
Alarm Number of Alarm	Circuit Board for Options
Type Contacts Calibration	B = No Options
F Process Single 0-100%	Case Equipment
G Process Dual Linear H Process Single 0-100%	
J Process Dual Sq.Rt.	K = Standard Case
K Deviation Single ±25%	L = Cord Set
L Deviation Dual Linear	Output Online
M = Board w/feed forward (with Auto Reset Only)	Output Options
Case Equipment	B = Standard Chassis; No Output Options C = Output Signal Isolation
A = Reserved; Specials, Series, etc.	Continued
Auto-Man Pushbuttons Auto-Man Pushbuttons	Next Design Level: Letter assigned by factory; letter
Mechanically Coupled Lighted	Column changes when some part is no longer interchangeable.
K Standard Case M Standard Case	Paint Color
L Cord Set N Cord Set	
P Connector Type R Connector Type	A = Special Paint Color
Cord Set Cord Set	E = F&P Black

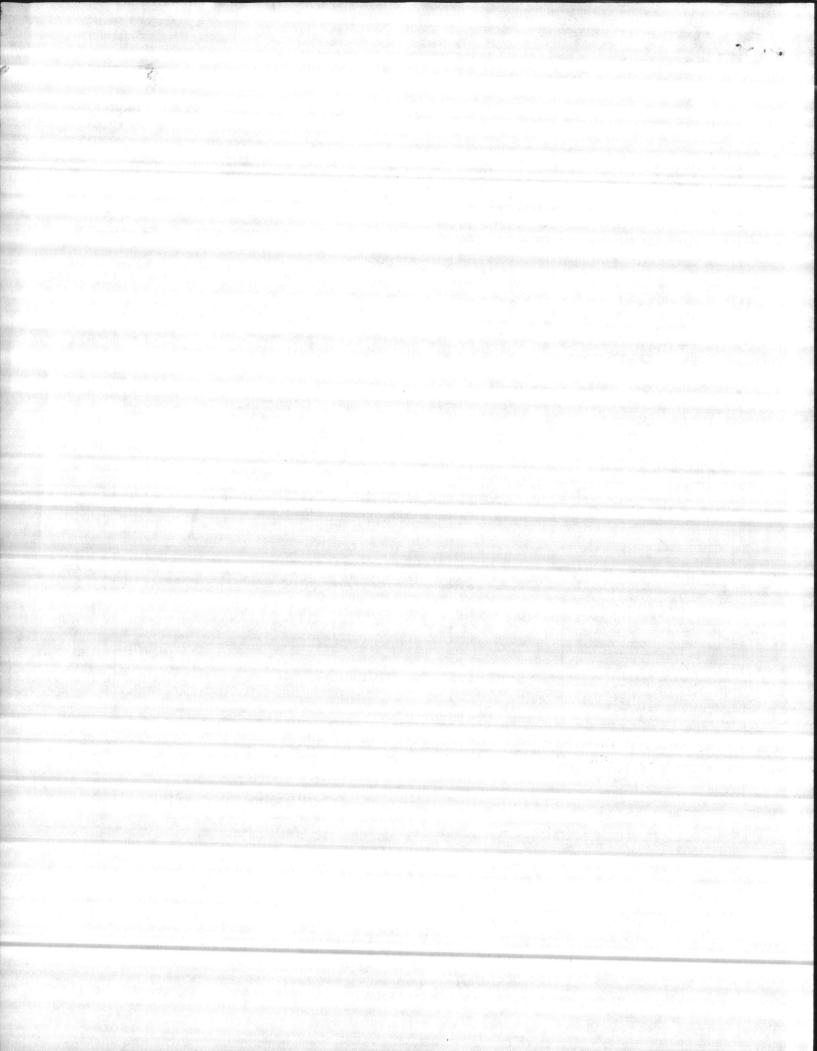
l

MODEL



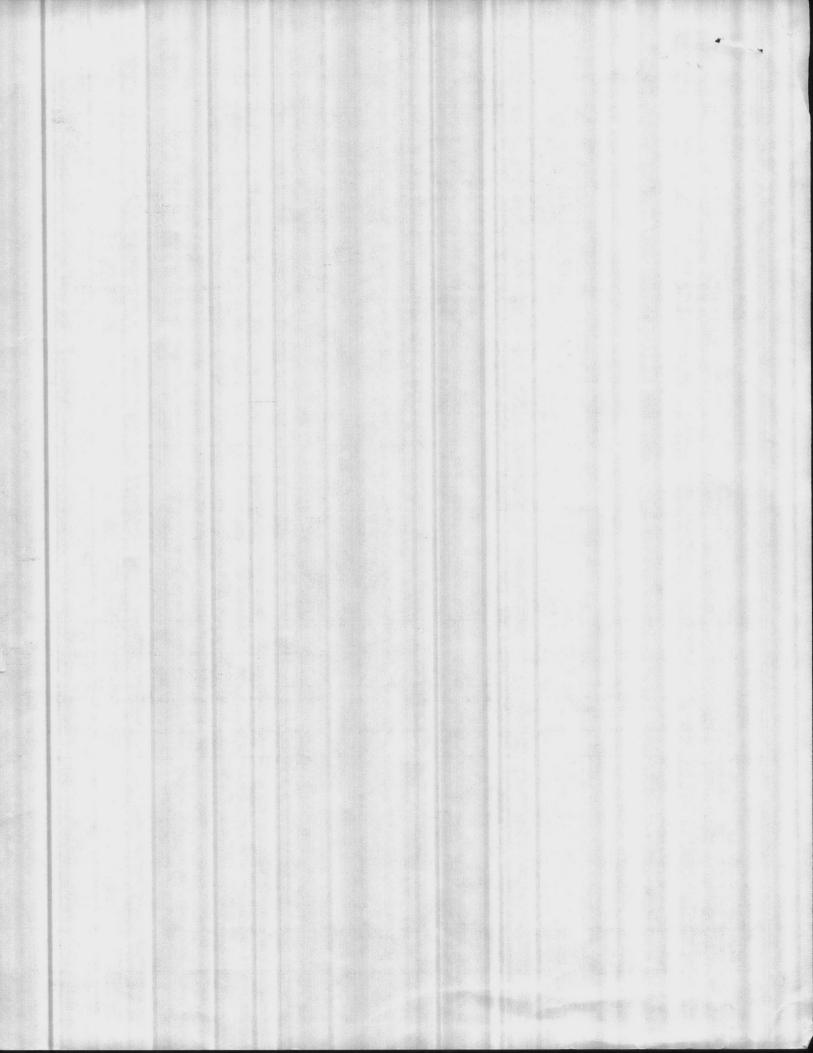
53EG4331 BDK BKE

Pub. No. 21305



ONTRACTOR'S S		NTRACT NO			Terre
NTDIV NORFOLK 4-4		2552	TRANSM 45	- A	DATE 12-17-8
OM CONTRACTOR	PRC	DJECT TITLE AND LOCATION	10		1.00,11,0
GALLAR FILTER	WARTEACTURING CO.	THE ACCUPATION OF			
		REPLACE ZQUMPLE Dame le desta	111 ····	AUTE VIN	u u
ACT ITL	CONTRACTOR USE ONLY	and the second state		DEVI	EWER USE ONLY
	*List only one specification division per form.				CTION CODES
L	ist only one of the following categories on each transmit and indicate which is being submitted	tal form,		A-Appr D-Disa	
Contractor Approved	OICC Approval	Deviation/Subst		RA-Rec C-Com R-Resu	
PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICATION (Type, size, model no., Mlg. name, i brochure number)		NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
15440	11051 in port P			1	
- dra. d.7	WASH WATER PUMP				
and the second				KA.	1
	Refer Compliance Sur Eguant		1		
and the second					白花花二月末
			1.1.1.1.1.1.1.1	Closed 1 Th	
	i amonto i la completa di dag				
	p lemmats langentital des 5 des				
PY OF TRANSMITTAL AND SU		TRACTOR REPRESENTATIVE (S		721	
Y OF TRANSMITTAL AND SU	BMITTALS TO ROICC		pso	2	
Y OF TRANSMITTAL AND SU	BMITTALS TO ROICC	TRACTOR REPRESENTATIVE (S	pso	<u>n</u>	Koppers
PY OF TRANSMITTAL AND SU	BMITTALS TO ROICC	TRACTOR REPRESENTATIVE (S	psi GI	< </td <td></td>	
Y OF TRANSMITTAL AND SU E RECEIVED BY REVIEWER 2 2 4 Submittals are returne tractor calls attention	BMITTALS TO ROICC	TRACTOR REPRESENTATIVE (S C TO TO de approval of any deviation	<u>fs</u>	e contract req	uirements unless the co
PY OF TRANSMITTAL AND SU TE RECEIVED BY REVIEWER 7 7 2 4 Submittals are returne tractor calls attention	BMITTALS TO ROICC	TRACTOR REPRESENTATIVE (S C TO TO de approval of any deviation	<u>fs</u>	e contract req	uirements unless the co
PY OF TRANSMITTAL AND SU TE RECEIVED BY REVIEWER 2 2 4 3 Submittals are returned tractor calls attention 3 Submittals are forward transmittal form.	BMITTALS TO ROICC	TRACTOR REPRESENTATIVE (S C TO TO de approval of any deviation EVIEWER USE ONLY Secti	for the second s	e contract req	uirements unless the co
PY OF TRANSMITTAL AND SU TE RECEIVED BY REVIEWER 2 2 4 3 Submittals are returned tractor calls attention 3 Submittals are forward transmittal form.	BMITTALS TO ROICC	TRACTOR REPRESENTATIVE (S C TO TO de approval of any deviation EVIEWER USE ONLY Secti	for the second s	e contract req	uirements unless the co
PY OF TRANSMITTAL AND SU TE RECEIVED BY REVIEWER 224 Submittals are returned tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROICC	TRACTOR REPRESENTATIVE (S C TO TO de approval of any deviation EVIEWER USE ONLY Secti	$\frac{p_{so}}{q_{1}}$	e contract req	uirements unless the co
PY OF TRANSMITTAL AND SU TE RECEIVED BY REVIEWER 2/24 Submittals are returned tractor calls attention Submittals are forward transmittal form. TEWER'S COMMENTS	BMITTALS TO ROICC	TRACTOR REPRESENTATIVE (S C TO TO S de approval of any deviation EVIEWER USE ONLY Section S TR TR TR TR	p_{so}	e contract req e contract req n comments but T 2 7 7 7 7	uirements unless the co
PY OF TRANSMITTAL AND SU TE RECEIVED BY REVIEWER 3/24 Submittals are returned tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROICC BMITTALS TO ROICC BROM (Reviewer) LANTDLY CANTON FROM (Reviewer) LANTDLY CANTON FROM (Reviewer) LANTDLY LANTDLY LANTDLY LANTDLY LANTDLY CON CON CON CON CON CON CON CON	TRACTOR REPRESENTATIVE (S C TO TO TO TO TO TO TO TO TO TO	p_{s_0}	e contract req e contract req n comments be T i	elow on ONE COPY of I
PY OF TRANSMITTAL AND SU TE RECEIVED BY REVIEWER 3/24 3/24 3/24 3/24 3/24 3/24 3/24 3/24	BMITTALS TO ROICC	TRACTOR REPRESENTATIVE (S C TO TO TO TO TO TO TO TO TO TO	p_{s_0}	e contract req e contract req n comments be T i	elow on ONE COPY of I

Tt.



Roberts

CABLE: WATERFILT PHILA. TELEX: 831-439

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-C-2552

PROJECT SPECIFICATION SECTION 15440

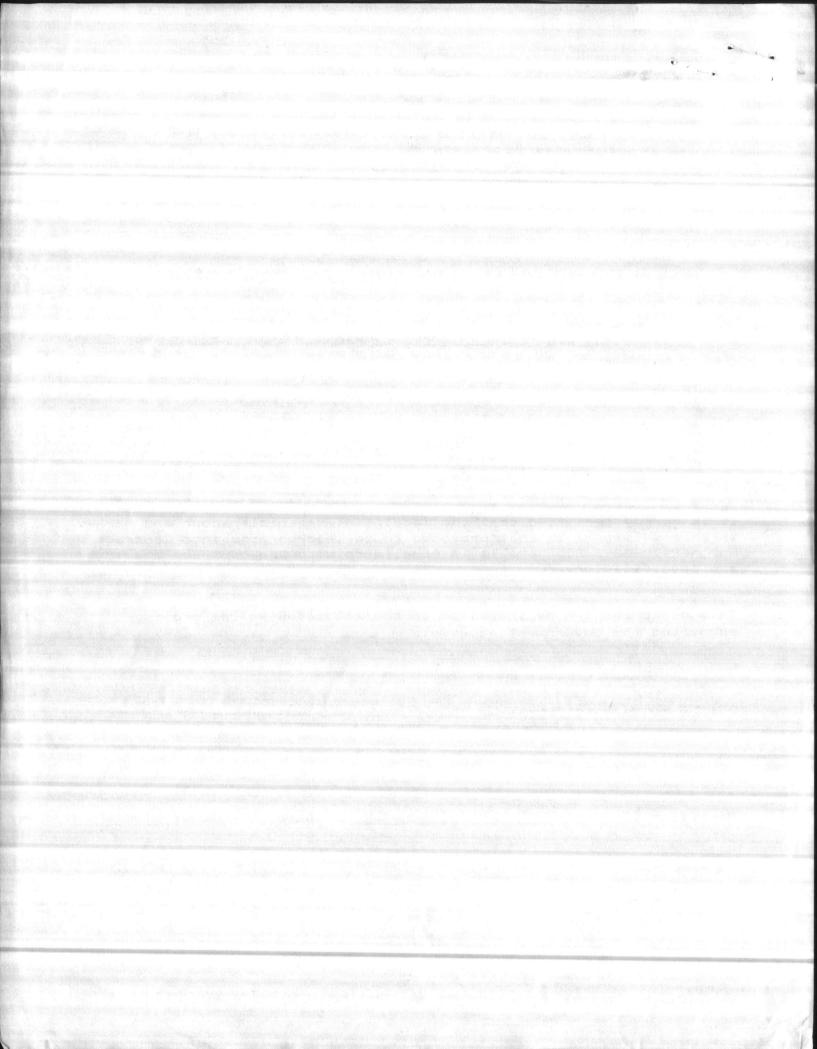
PARAGRAPHS 2.7

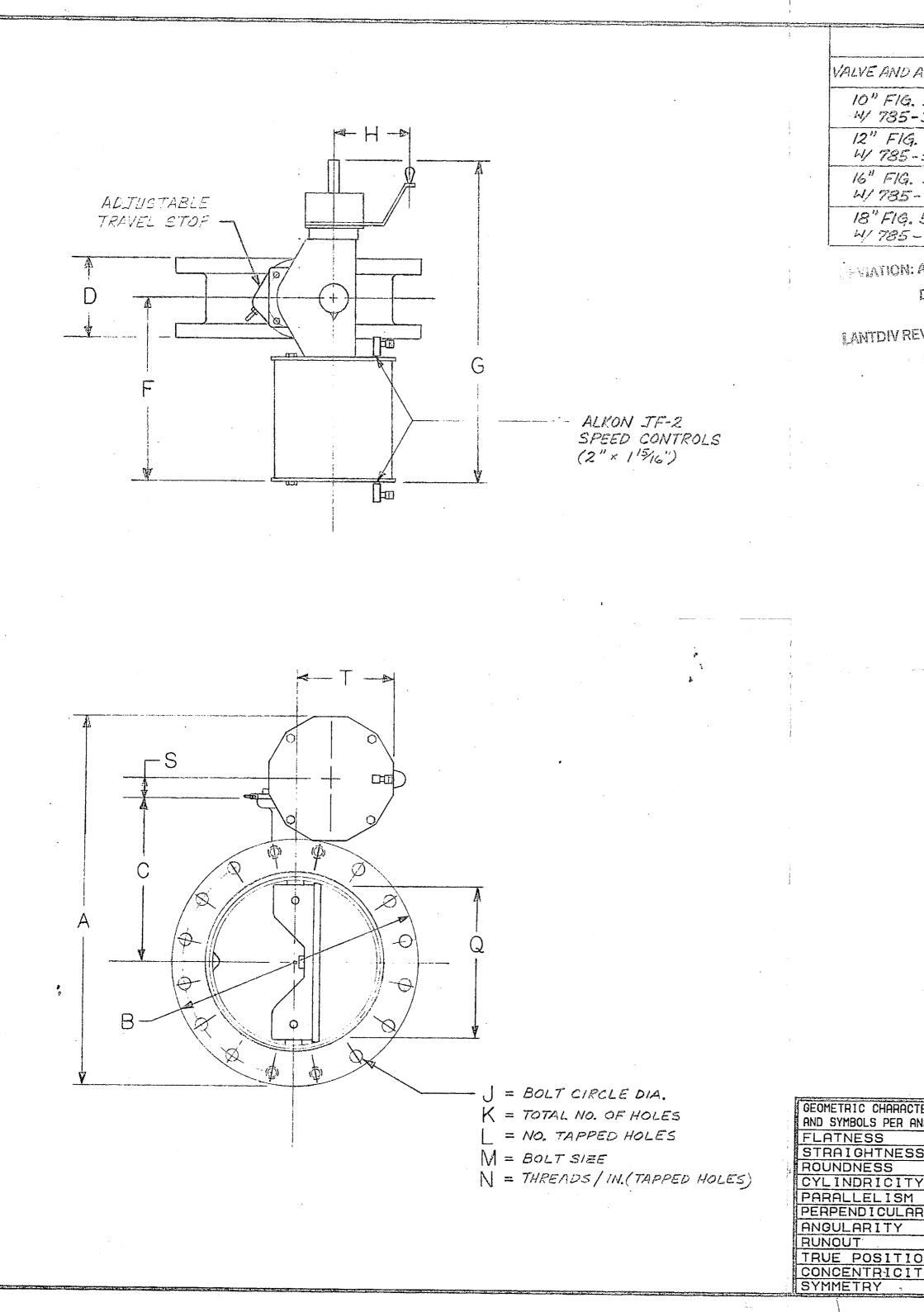
It is hereby certified that the (equipment/material) shown and marked in this submittal is that proposed to be incorporated into Contract No. N62470-82-C-2552 and is in compliance with the contract drawings and specifications.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

Certified By J.C. Kompson Date 12-17-84

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897





		1 / P ²⁰	<u> </u>					antina antina filman								
	<u> </u>	LVE	1	[1				1	1	}	ICHE.	1		1
ACTUATOR	A $25\frac{7}{8}$	B	C 10 3/2	0	F 124	G	H	J 14 1/2	K	6	M 7	N	Q	S	7	
-309 9.504				8	ļ,	· · · · · · · · · · · · · · · · · · ·			12		2 3 7			23		
-309	287		12 7	8	12-4	22	72	17	12		8		8		676	
5-409	35 <u>8</u>	232	15	8	16	29 8		214	16		1		/3		3 7	
. 504 -459	38 <u>7</u> 16	25	16-2	8	16 \$	295	7/2	$22\frac{3}{4}$	16	4	13	7	15.12	38	9/3	
I: APPROVED									1 (11) og	:· •						
DISAPPRO	VED	1)7							ſ		AT	LANTIC	DIVISIO)N		
EVIEWER	DESC	RIPT	ION d	\langle		MAT	TERIA	LÉ	1		FACILIT NORF	IES EN(OLK, VI	NINEERI REIMIA	MG CO 23511	WIWAND 	
DATE		<u> </u>	Feb 0	CAS	T IR = AS	ON		RNISH	AP	PROVE		DTED				
- P				0.D.	= 211	IG Ch	IROM		a Di	SAPAR	NSO_	- Recto		13-0F		
	D1	5C				_		4 12.	-16 CA	DNTRAC	TINO. Li <u>qua</u>	<u> </u>	TAL DO	ES NO	INCLU	DE
	\$7	ΈM		18-	8 55				TF	PROVA RACT RI DR CALL	EQUIPS		HATION UNLES TO AM	SIGE	CONTRA	AC-
-	SE	AT		BUN	VA -	N			D	EVIATE	DM-TH SIREE	E COI FOR	NTRACI FROV	IOR S IDING	HALL PROP	BE
L.							~		TI	ON OF	TRADES	s, etc.,	<u>a wek</u> As reç	OIRED.		
,	NOTE	S:							R	EVIEWE	R <u>H</u> 7	-n/		DATE_	1120	85
7	2) TAGS: 10	AG VA ⁵ Fic	4. 50	5T D ;5-IN 4	FLIL	4E V L CO	IHEN KELI	>!SC I OPE A1/CE	THING E MIN	т ТНЕ ГН АШ	VAL	IE.	80.			
			ξ ΝΟ. Ε °					462 F	, SG:	2						
	12		5. 50		<u>,</u>			و مر ک	ر مر مستز							·
			G NO		-		ر ۱۹۲۱	461,	3 <i>Ģ</i> /							
	16'	TAC	4. 50 4 NO. E ° E	. ° 10	-			,49.	3, 5c	¥ 3						
	18'	TAC	4.50 4 NO. E: 1	₫ /6	14,2 TE	G4,3	3G4,	464	, 544	1				~		
٨	DEPAR IAVAL	FA	CILI	TIES	EN	•	ERIN	169 C	OMM	NE	þ					
C F	1AR11 1AMP 20, 3 (V 98	LE3 535	TEUN	1E, N 093			·							•		
CTERISTICS		2.2.3.3.5.5	ATIC	C.C.S.S.S.S.S.S.S.S.S.S.S.S.S.S.S.S.S.S				N 1		DWG/	0ccv		koper	(1000		
ANSI Y14.5			ICES						Fab (67)			NF 1	ALVI	····	DWG/A	
Y Q		S OTHE								7		TONE	INTE			
1 //	FRACTI DEC1MA			-	3522	30 0	12 1/2-1		DWN.	- 10	", 12"	", <i>16</i> "	¢ 18"			
	ANGULA				ECN	BY CH	IK DAT						ss % ¢ ove			
		RFACE	FINIS S	CONFID	Formation H Hilal R:D The	PROPERTY OF I	A PROPRIETOR	Y KATURE.	ENGR	SIZE	PART		r 480			
	BREAK	SHARP	EDGE	S HHAD	10 others for 1 20 09 olgo.csb	AHESED RAPO MIRAN KITTER	±5 GLY RD S Remission of t	HL MI E A	SCALI	- C	(CA-O	274:	50		

str = 1

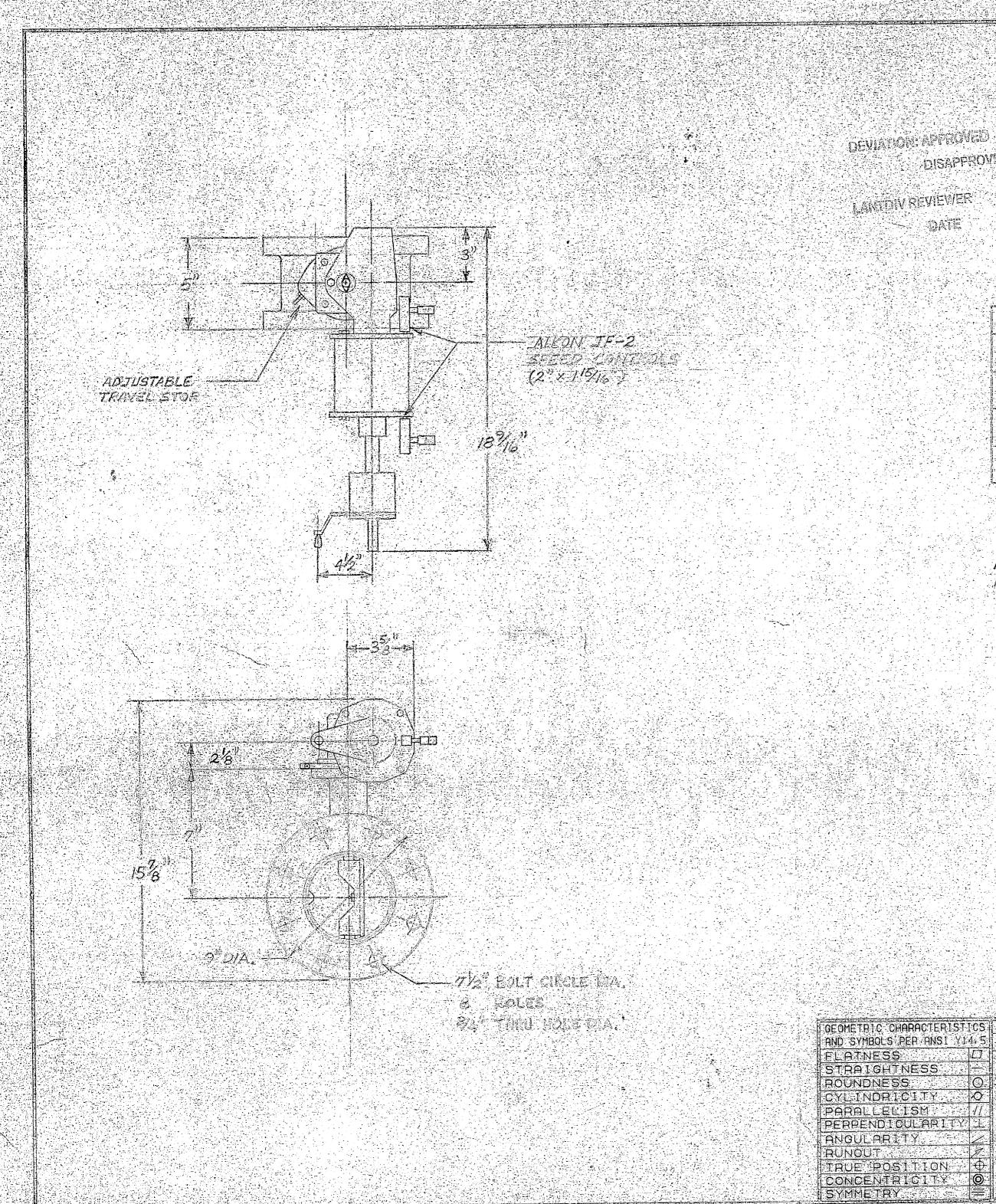
the is a second second

τ. .

• · · · · ·

e.

· · · · · · · •



Science of Mision NAVAL FACILITIES CHARACTERING CO NORFOLK, VIBGINIA 23511 APPROVED -APPROVED AS NOTED DISAPPROVED SUBJECT TO THE REQUIREMENTS OF CONTRACT NO APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRAC-TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION-THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & TEICHTS, COORDINA-TION OF TRADES, ETC., AS REQUIRED. DISAPPRONED HFW 14Feb 875 DATE REVIEWER AFW DATE 14Fab 85 FOR OFFICER IN CHARGE OF CONSTRUCTION

D	ESCRETION	MARERIAL & COATING
E	<i>.07%</i>	CAST IRON 1.6 REMART MEMBER 12-16 MILS. 0.6 BUNC CHRONING 4-6 MILS.
		ESETTLE IRON WEIGSE EDGE RESIDET VARIUSH 12-15 MILS.
0	TEN:	
U.	EA C	Buma-N

NOTE: TO VALVE IS IN FULL COMPLIANCE WITH AWWA C524-80

4" FIG.504 The 110 - 168 208 262 198(558 Jies Reveale

				4	
TERISTICS ANSI Y14,5	INTERNATION	AL DISTRIBUTION	NEXT C	WO/ASSY	PREVIOUS DNG/ASSY
. D	TOLERANCES		EI /7		MUVE - U.S.M.
is	VUNLESS OTHERWISE		R/	DESCRIPTION	INTERNATIONAL
Y. 0	FRACTIONAL±1/64		DWN.		4 150 °CLASS
IRITY L	DEC1MAL±.005"		CHK D		YATOR & OVERRIDE
2	ANOULAR±1/2° 7 - 125 BMS	NO ECN BY CHKDATE MF REVISIONS	ENGR		471/200 2 40 CANTES
. <u>on ⊕</u> .⊤y ©	SURFACE FINISH REMOVE BURRS	(4) Insubation Reach is of a propalation united to be used in the propagation of the propagation in the propagation of the propagation of the propagation of the propagation in the propagation of the propagation of the propagation of the propagation in the propagation of the p	SCALE	SIZE PART NO.	
	BREAK SHARP EDGES	ינאדם עות 9 סופורזא פורום עומון באפערס פאבארי			

. .

.

<u> </u>	1			
	1910	7	7	
		4	V	7
			1000	
			「開発」	

VO3222

STANDARD PRODUCT

UNIDRIVE CYLINDER ACTUATOR

HYDRAULIC FIG. 785 - PNEUMATIC - DOUBLE ACTING

(1) SUB-ASSEMBLY	(2) ADAPTABLE	CYLINDER SIZE	MOUNTING NO., SIZE BOLT	DR. SHAFT BORE		IAL OUTPUT LBS.) '
NO.	TO	(BORE)	DIA. B, C	(IN.)	@ 60 PSI	@ 40 PSI
830-020-785-105	BAB, BAC, BAD	4	4-3% on 31/4	3/4 x 1/2	850/675*	575 (220)
830-020-785-155	BAB, BAC, BAD	5	4-3% on 31/4	3/4 x 1/2	1450/1175*	
830-080-785-205	CAD, CAE, CAF	6	4-1/2 on 5	11/8	2,775	
830-120-785-300	CAD, CAE, CAF	8	4-1/2 on 5	11/8	4,900	
830-140-785-300	CAG	8	4-1/2 on 5	13%	4,900	3,300 (1,750)
830-140-785-350	CAG	10	4-1/2 on 5	13%	7,700	12"
830-160-785-350	САН	10	4-1/2 on 5	15%	7,700	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
830-180-785-400	DAJ	10	4-3/4 on 61/2	1%	11,600	7,775 (3,200)
830-180-785-450	DAJ	12	4-3/4 on 61/2	1%	16,600	1.3.10 (0)2007
830-300-785-450	DAK, GAL	12	4-3/4 on 61/2	21⁄4	16,600	11,125 (4,800)
an a						
			A States and States			A Share to a
Alato to		State of the state	San Carlos Carlos	a the second		

LOWER TORQUE RATINGS ARE FOR NON-STD. PARALLEL MOUNTING POSITION.

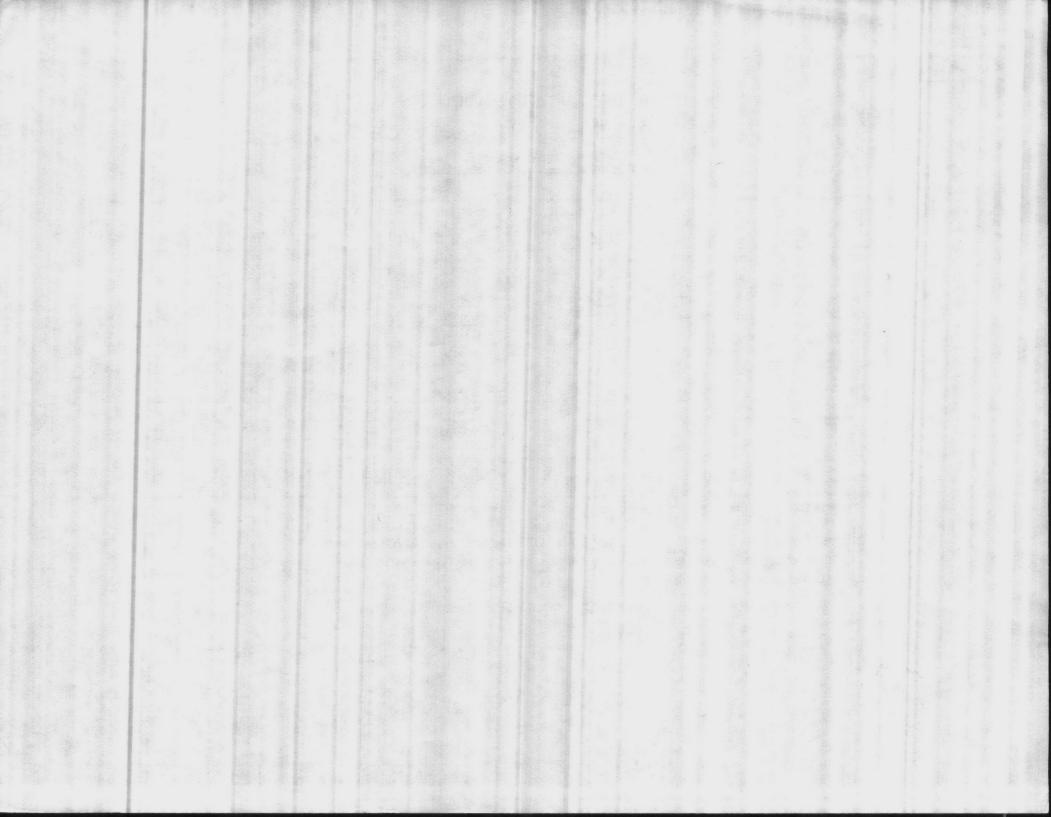
NOTES: 1. SUB-ASSEMBLY NUMBER SHOWN COVERS THE COMPLETE OPERATOR ASSEMBLY INCLUDING MOUNTING BOLTS, NUTS, WASHERS. IT DOES NOT INCLUDE STEM ADAPTER OR MOUNTING PLATE WHERE NEEDED. SEE SM0037, AND PRICE SHEETS.

2. FOR TABULATION OF ADAPTABILITY CODE LETTER, SYMBOLS, SEE SM0001 & SM0036.

1 ...

Roberts Filter Manufacturing Co. - Navy Darby, PA 19023 P.O. 35351-2093 KV-P2766

1	11/23/7	C.B.		DATE: 11/4/76	CH: RC	SM0322
NO.	DATE:	BY:	REVISION	DR: C.B .	APPD:	SIVIUSZZ





STATEMENT OF COMPLIANCE

AWWA C504

STANDARD FOR RUBBER-SEATED BUTTERFLY VALVES (3" - 72")

Keystone Model F. 504 (3" - 24") and Keystone Model F. 47 (30" - 72")

are designed in FULL COMPLIANCE with AWWA C504 (latest revision) NO EXCEPTIONS, DEVIATIONS OR CLARIFICATIONS. These valves meet or exceed all required safety factors called out in the AWWA - C504.

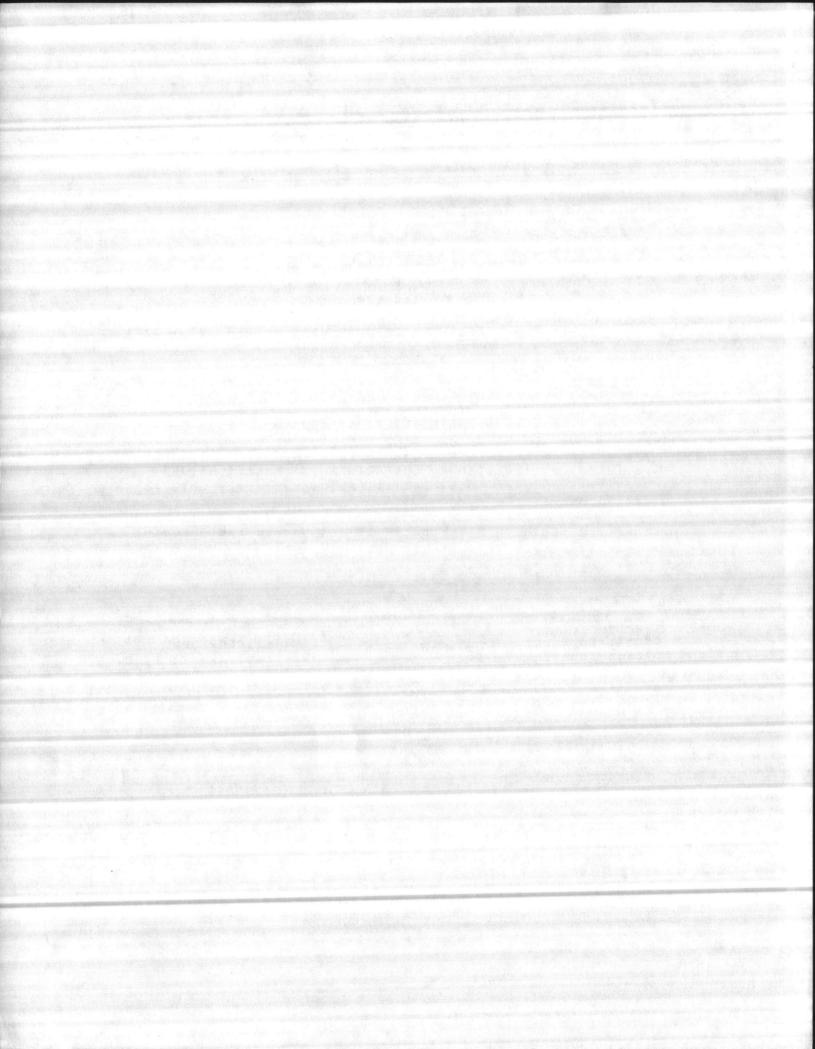
These values have been tested to and passed the "proofof-design" test of this standard.

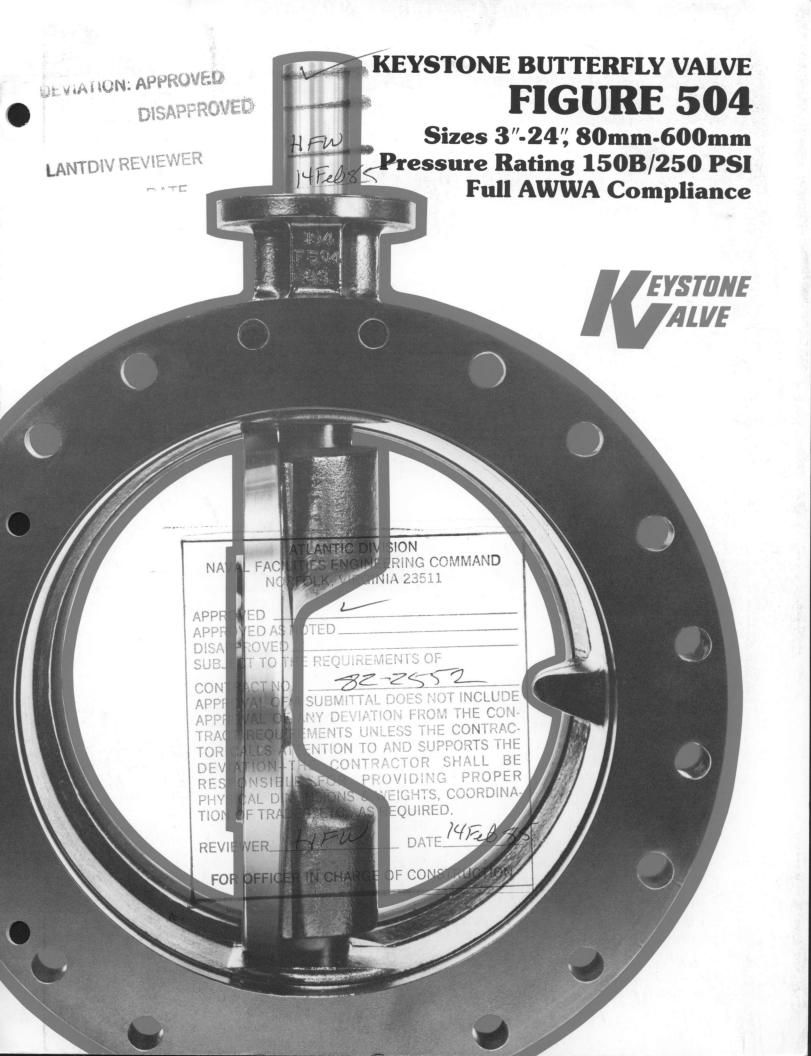
·····

Chief Engineer Steve Johnson, P. E.

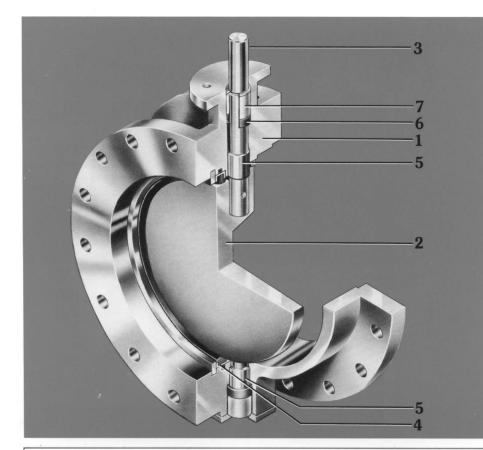
Project Engineer William Coskey, P. E.







The Keystone Figure 504 is a heavy-duty rubber seated Butterfly Valve in full compliance with AWWA C-504 specifications for use in municipal water treatment, power generation and industrial applications.



Mate	rials of Construction	
Standa	ard Materials	Options
Body:	Cast Iron ASTM A-126 Class B	Carbon Steel ASTM A-216 WCB Ductile Iron ASTM A-536
Shaft:	Stainless Steel 18-8 Type 304	Stainless Steel 18-8 Type 316 Stainless Steel 17-4 PH, Forged Nickel Aluminum Bronze ASTM B-150-C630 Monel 400 & K-500
Disc:	Ductile Iron ASTM A-536 w/Stainless edge Aluminum Bronze ASTM B-148 952	Carbon Steel ASTM A-216 WCB w/Stainless Edge Stainless Steel 18-8 Type 316 Nickel Aluminum Bronze ASTM B-148 958
Seat:	EPDM or Buna-N	Viton

Bearings: Teflon **Bushing:** Acetal **Packing:** Self-adjusting Chevron type Other materials of construction are available on request.

Available End Connections: Flanged (ANSI 150, ANSI 250), wafer, mechanical joint

Other design standards available: I.S.O., J.I.S., B.S., D.I.N.

For AWWA-Style valves, 30" and larger, Keystone manufactures the Fig. 47 product line. Check your local distributor for details and availability.

1. Body — The rugged cast body meets or exceeds all design and testing requirements of the AWWA standards. An internal travel stop provides a positive positioning feature not available in most other AWWA style valves.

2. Disc — The Keystone Equalinear[™] disc design provides maximum flow area, high capacity and desirable flow characteristics.

3. Shaft — The 2-piece shaft meets or exceeds the requirements of AWWA C-504 for Class 150 B.

4. Seat — Mechanically retained, *field-replaceable* elastomer seat provides continuous 360° seating, and is designed for reliable, long term service.
5. Bearing — Self lubricating upper and lower inboard bearings provide strength and low friction for easy operation and life time service.

6. Packing — Bi-directional packing is self-adjusting and suitable for pressure or vacuum service.

7. Bushing — Upper shaft bushing provides additional support for absorbing side thrust loads.

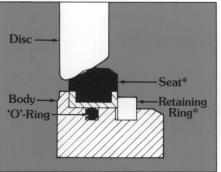
AWWA Compliance

The Figure 504 is one of the most advanced AWWA style butterfly valves available.

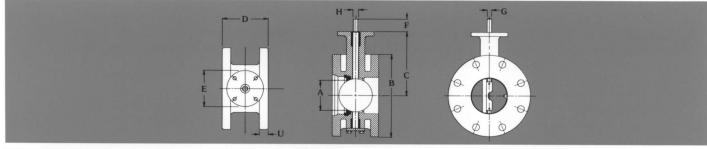
Using the stringent design requirements of ANSI B31.1 and B16.34 in conjunction with AWWA C-504, Keystone has developed a *full compliance* AWWA valve with capabilities extending beyond any other AWWA butterfly valve.

The design of this valve is the product of over 30 years experience by the world's largest manufacturer of butterfly valves, combined with the latest, most advanced technology known.

Seat Detail

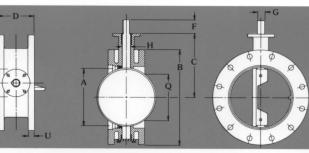


*Stainless steel backing and retainer.

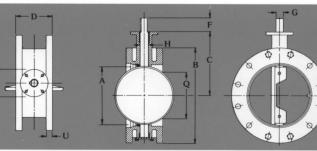


VALVE DIMENSIONS - Note: Dimensions shown are for Class 150B valve. Consult factory for 250#, MJ, and wafer style.

											Flang	e Drilling		Top Plate Drilling		
Size	Α	В	С	D	E	F	G*	H*	U	Bolt Circle	No. Holes	Tap Thread	Thru Hole Dia .	Bolt Circle	No. Holes	Hole Size
3	21/2	7½	6¼	5	4	11/4	3⁄8	9⁄16	3/4	6	4	—	3⁄4	3¼	4	7/16
4	33/8	9	7	5	4	11/4	7/16	5⁄8	15/16	71⁄2	8	—	3⁄4	3¼	4	7/16



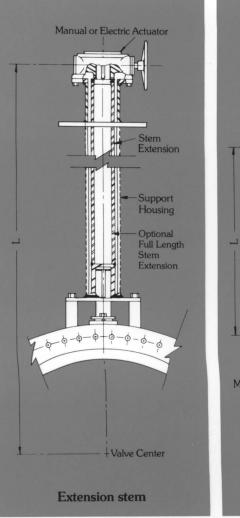
						14						Flang	e Drilling		Top Plate Drilling		
Size	Α	В	С	D	Q	E	F	G*	H*	U	Bolt Circle	No. Holes	Tap Thread	Thru Hole Dia.	Bolt Circle	No. Holes	Hole Size
6	51/4	11	8	5	21/4	6	2	11/8	11/8	1	91/2	8	_	7/8	5	4	9/16
8	75/16	131/2	91/2	6	41/2	6	2	11/8	11/8	11/8	113⁄4	8	—	7/8	5	4	9⁄16
10	97/16	16	103⁄4	8	53/8	6	3	13/8	13/8	13/16	141/4	12		1	5	4	9⁄16
12	111/8	19	121/4	8	8	6	3	13/8	11/2	11/4	17	12		1	5	4	9/16
14	123/4	21	14	8	101/8	6	3	15⁄8	13⁄4	13/8	183⁄4	12	_	11/8	5	4	9/16
16	151/16	231/2	15	8	13	8	41/4	17⁄8	2	17/16	211/4	16	—	11/8	61/2	4	13/16

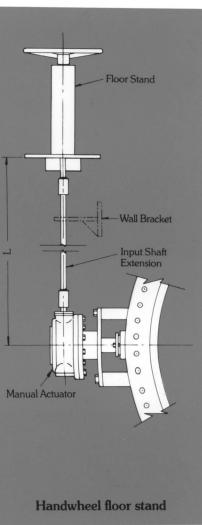


			5								Flange Drilling				Top Plate Drilling		
Size	Α	В	С	D	Q	E	F	G*	H*	U	Bolt Circle	No. Holes	Tap Thread	Thru Hole Dia .	Bolt Circle	No. Holes	Hole Size
18	17	25	16½	8	151/8	8	41⁄4	21/4	21/4	1%16	223/4	16	11/8 7UNC	11/4	6½	4	13/16
20	18¾	271/2	18	8	171⁄8	8	41⁄4	21/4	21/2	111/16	25	20	11/8 7UNC	11/4	6½	4	13/16
24	225/16	32	221/2	8	21	8	51⁄2	27/8	3	17⁄8	291/2	20	1¼ 7UNC	13/8	61⁄2	4	13/16

*Dimension (H) = shaft diameter (150B-full compliance); dimension (G) = actuator connection

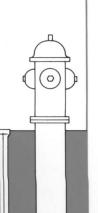
KEYSTONE BUTTERFLY VALVE FIGURE 504 Size 3"-24", 80mm-600mm





Buried Service

The Figure 504 as standard, is designed for either above ground or buried applications. With the proper actuator selection, this valve can provide long service life in buried or submerged applications. Shaft extensions, soil pipe, ground level position indicators, valve boxes, and tee-wrenches are available as optional accessories.



0

Often actuators are required to be located remotely from the valves they control.

To eliminate costly field problems, the following items should always be considered:

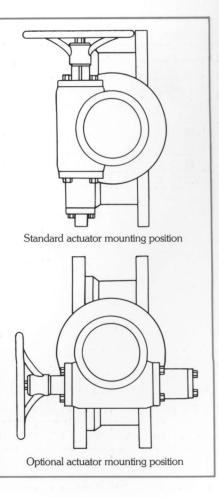
- 1. Length of extension (L)
- 2. Placement of actuator (on valve or floorstand)
- 3. Need for stem or shaft supports

4. Media exposed to the floorstand and/or extension.

After reviewing and defining the points above, the necessary extension options may be selected.

All dimensions for extensions must use standard reference points, e.g. centerline of valve to centerline of handwheel.

Should there be any questions regarding the extension options available, contact your nearest Keystone distributor.



Suggested Specifications: Service conditions

AWWA style butterfly valves are designed for the following service conditions as defined in AWWA C-504, latest revision, Sections 1.1:

"For fresh water, have a pH greater than 6, and temperatures generally less than 125°F (52°C)" General

All valves 3" to 24" inclusive shall be of the tight-closing rubber-seated type, conforming to the design standards of AWWA C-504, latest revision. Valves shall be bubble-tight at the rated pressure in either direction, and shall be suitable for throttling service and/or operation after long periods of inactivity.

Body

All valve bodies shall be constructed of cast iron ASTM A-126, Class B with ANSI B16.1 flange drilling. An internal cast-in travel stop shall provide positive disc location. **Disc**

All valve discs shall be constructed of either aluminum-bronze B-148 952, or ductile iron ASTM A-536, Grade 65-45-12 with a 18-8 Type stainless steel disc edge. **Shafts**

All shafts shall be solid 18-8 Type stainless steel, corresponding to the design requirements of AWWA C-504, latest revision.

Seat

All seats shall be EPDM or Buna-N, and mechanically retained in the valve body. The seat shall be *field replaceable*. Seats which are permanently attached or vulcanized are not acceptable.

Bearings

All shaft bearings shall be of the self-lubricating, corrosion resistant, sleeve type. Bearings shall be designed for horizontal and/or vertical shaft loading.

Packing

All valves shall have bi-directional and self-adjusting packing suitable for pressure and vacuum service. **Bushing**

All valves shall be provided with a heavy-duty top bushing to absorb any side thrust loads.

Testing

All valves shall be hydrostatically and leak tested in accordance with AWWA C-504, latest revision.

Proper Valve Selection

AWWA C-504 specifically defines rubber-seated, tight-closure butterfly valves, 3"-72" in size, with a maximum shut-off pressure of 150 PSI for Fresh Water having a pH greater than 6 and temperature generally less than $125^{\circ}F(52^{\circ}C)$.

This standard was not designed to cover systems handling air, gas, salt

water or brine solutions, chemically corrosive media, abrasive slurries, HVAC, or control applications.

The majority of valve failures occur when the *wrong valve* is selected and used in an application for which it was not designed. No valve style is designed to fit all applications. Keystone recognizes this fact and as a result, produces the widest range of butterfly valves in the world to cover all required applications.

Consult your local Keystone Valve Representative for specific details and recommended specifications with regard to your applications.



Keystone engineers their products using Computer-Assisted Design (CAD) Equipment to achieve maximum design integrity.



All valves are machined on precision Computer Numerical Controlled (CNC) equipment.



Value components are computer quality-checked and tested on coordinate measuring devices to ensure consistent high quality.

Like all Keystone butterfly valves, the Figure 504 is designed for direct mounting with all Keystone actuators.

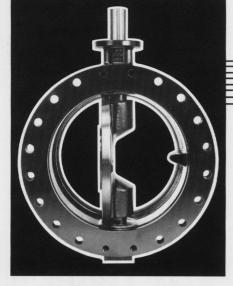
Keystone has engineered a complete line of valve actuators that are specifically designed for direct mounting to any Keystone butterfly valve. This eliminates the need for costly brackets and adapters, and associated problems such as reduced torque and misalignment.

The Keystone butterfly valve mounting flange is designed to allow complete interchangeability with the entire Keystone actuator line. This means the end user can initially specify a manually operated valve, and later convert to power actuation by simply switching out the manual actuator for a Keystone pneumatic or electric unit.

To complement the actuator line, Keystone also manufactures a full range of actuator accessories (positioners, solenoids, limit switches, etc). These accessories are designed to mount directly to Keystone actuators utilizing a modular design concept.

Your local Keystone representative stocks a wide variety of valve component materials and actuators to satisfy any flow control requirement.









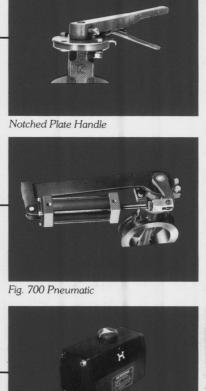
A Division of Keystone International, Inc.

9700 West Gulf Bank Drive • P.O. Box 40010, Houston, Texas 77040 Telephone: (713) 466-1176 • Telex 775-265

The data presented in this bulletin is for general information. Consult your Keystone representative for specific performance data and proper materials selection for your particular applications

Patents and Patents Pending in U.S. and foreign countries. Copyright 1984 Keystone International, Inc.

Bulletin No. 504B-684





DYNAMATE Fig. 790 Pneumatic



Printed in U.S.A. WL-20M

Fig. 790/positioner/switchbox

KE 7 I) Keystone KEYSTO 0 1) KEYDYNE

13

13

1

1

)

Figure 785 Cylinder Actuator

EVSTONE KEYDYNE KEYSTONE KEYDYNE KEYSTONE KEYD KEYDYNE KEYSTONE KEYDYNE KEYSTONE KEYDYNE KE EYSTONE KEYDYNE KEYSTONE KEYDYNE KEYSTONE KEYDYNE NE KEYDYNE KEYSTONE KEYDYNE KEYSTONE KEYDYNE K EYSTONE KEYDYNE KEYSTONE KEYDYNE KEYSTONE KEYD

Features of the Fig. 785 Actuator

Unidrive Cylinder I & II

The piston seals by means of an interference fit whereby the twin-lipped piston edge is always compressed against the cylinder wall.

Heavy duty actuator housing and cylinder end caps of cast iron for rugged service.

External, closedposition adjustment screw.

Unidrive

Cylinder II

Positive disc position indication.

One-piece driver/ lever-arm provides high torque transmission and positive connection to the valve stem.

Cylinder is of a fiberglass reinforced, epoxy-resin material providing high corrosion resistance, self lubrication, and temperature flexibility.

All external fasteners are cadmium plated for corrosion resistance.

Stainless steel piston rod and brass guide bushing provide permanent lubricity and wear resistance.

Gasket between housing & valve top plate prevents contamination of internal parts from exterior.

The Keystone Figure 785 cylinder actuator is a heavy duty, totally enclosed, weatherproof unit designed for maintenance-free operation in a variety of demanding applications. The Figure 785 is the cylinder actuated version of the heavy duty Unidrive actuator family. Models I & II incorporate a single piston driving a simple crank lever via an intermediate link. For reliable sealing, especially at low pressure differentials and for use after long periods of idleness, the piston and cylinder operate using an interference fit. The intermediate

link provides a positive connection between the piston rod and lever arms to optimize torque characteristics for butterfly valve operation. The position indicator is fastened directly to the drive shaft lever-arm assembly for positive disc position indication. The Unidrive Cylinder actuator is a compact, totally enclosed package with no external moving parts and mounts directly to any appropriately sized Keystone valve for complete interchangeability of actuators.

Engineering Data

Materials of Construction: Cylinder barrel of Black-Amalgon tubing which is a fiberglassreinforced, epoxy resin with homogeneous dispersion of low friction additives; end caps of cadmium plated cast iron; rubber piston with doubleedged seal; polished stainless steel piston rod with brass guide bushing; rugged cast iron housing; all external fasteners cadmium plated.

OPERATION: Standard 0° – 90° reversible for air, water, or hydraulic oil.

SUPPLY PRESSURE: 20 PSIG minimum to 120 PSIG maximum.

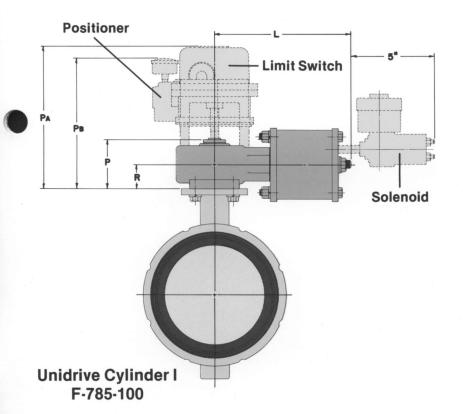
TEMPERATURE RANGE: -40° F. to + 200° F.

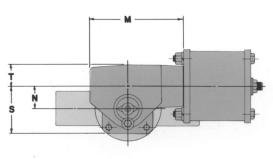
LUBRICATION: Factory lubricated.

ORIENTATION: Cylinder axis perpendicular to piping; parallel mounting is possible with reduced torque capability in some sizes.

MOUNTING: Bolts directly to valve top plate.

AVAILABLE ACCESSORIES: Solenoid with integral speed controls, limit switch, & positioner.





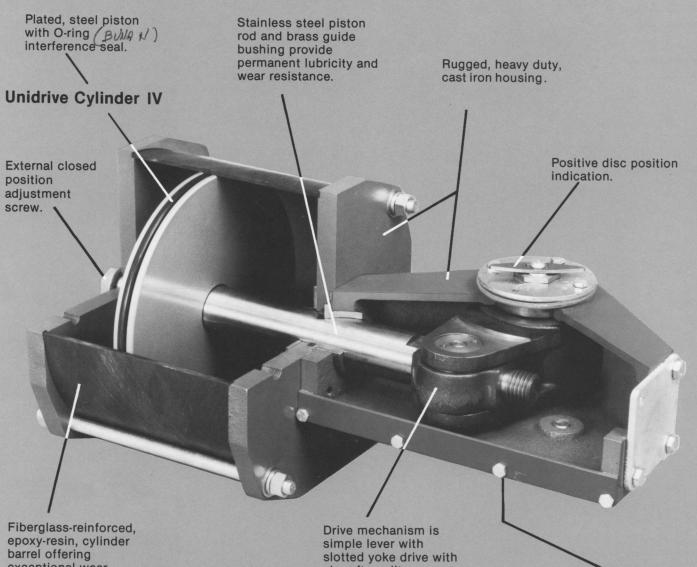
Notes

1. Standard actuator mounting as shown 2.90° operation provided

		ACTUA	ATOR	DIM	ENSI	ONS					and the	
ASSEMBLY	MOD.	VALVE	L	M	N	P	R	PA	PB	S	T	WEIGHT
UNIDRIVE-I 4" CYL.	100	2-6	8 16	54	$ \frac{7}{16} $	3	$ \frac{1}{2} $	834	8	3	138	14#
UNIDRIVE-I 5" CYL.	150	2-6"	$8\frac{5}{16}$	$5\frac{3}{4}$	$ \frac{7}{16} $	3	11/2	$8\frac{3}{4}$	8	3	$ \frac{3}{8} $	20#
UNIDRIVE-II 6" CYL.	200	8″-12″	124	$7\frac{3}{8}$	216	3	1 16	8 1/2	81/4	$4\frac{7}{16}$	$ \frac{1}{2} $	29#

Features of the Fig. 785 Actuator

Unidrive Cylinder III & IV



barrel offering exceptional wear resistance and self lubrication. simple lever with slotted yoke drive with aircraft quality camfollowing bearings in contact with casehardened ways in the yoke.

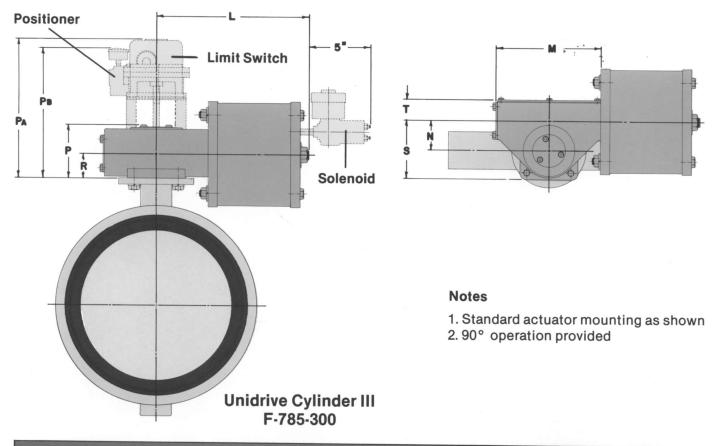
Gasket between housing and valve top plate.

The Unidrive Cylinder III & IV are a continuation of the family of pneumatic cylinder actuators discussed on page 2. The Models III & IV are designed for large diameter valves where obvious requirements of high torque capability are essential. The drive assembly and housing are similar to others in the Unidrive family which lend ruggedness and reliability as well as a more compact package than comparable pneumatic cylinder actuators. Again, there are no external moving parts, thus affording safety and protection from possible corrosion and weathering.

The main design variation of the III & IV from the two smaller models is that the transmission of piston force to the crank arms utilizes a slotted yoke drive with case-hardened ways. The contact point between the cam roller and the yoke way never falls outside the diameter of the piston rod so that thrust loads are always compressive or tensile on the rod. This, plus the fact that the piston rod is guided by an extremely long pilot bushing which completely eliminates the need for externally cumbersome pilot bearings.

Engineering Data

The actuator specifications for Models III & IV of the Fig. 785 are the same as those of models I & II on page 3.



ACTUATOR DIMENSIONS												
ASSEMBLY	MOD	VALVE SIZE	L	M	N	P	R	Pa	Рв	S	T	WEIGHT
UNIDRIVE-III 8" CYL.	300	12"-14"	124	81/4	$2\frac{3}{8}$	$4\frac{5}{16}$	2	10 ⁵ /16		$4\frac{3}{4}$		54*
UNIDRIVE-III 10"CYL.	350	14″-16″	15	11 =	$2\frac{3}{8}$	$4\frac{5}{16}$		5	1018	$4\frac{3}{4}$		72*
UNIDRIVE-IV 10"CYL.	400	18″-30″	16		37/16	$5\frac{3}{8}$	24	$ \frac{3}{8} $	11 =	$6\frac{1}{2}$	$2\frac{3}{8}$	92#
UNIDRIVE-IV 12"CYL.	450	18-30	16 <u>1</u>	$ \frac{ }{ 6 }$	$3\frac{7}{16}$	$5\frac{3}{8}$	$2\frac{1}{4}$	$ \frac{3}{8}$	$ \frac{1}{8} $	61/2	$2\frac{3}{8}$	124#

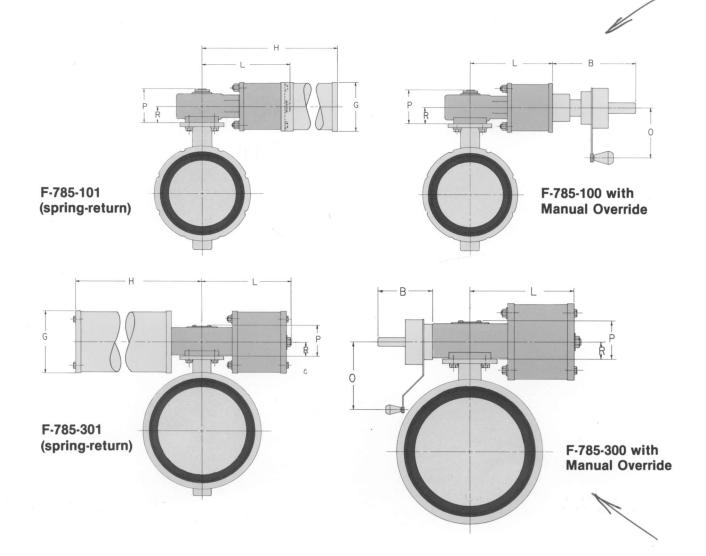
Air-to-air or spring-return actuator selection for 80 PSIG supply pressure by valve size and stream differential.

ASSEMBLY	MODEL	O PSIG ΔP	50 PSIG AP	IOO PSIG ΔP	150 PSIG ΔP	200 PSIG A P
UDI, 4 BR. CYL.	100	2-6	2-6	2-6	2-5	2-5
U.D.I, 5"BR. CYL.	150	-	8-10	-	6	6
U.D.II,6BR. CYL.	200	8,10 \$12	8-10	8-10	8-10	8
U.D.III,8BR. CYL.	300	14	14	14	12	12
U.D. III, IOBR. CYL.	350	16	16	16	14-16	14-16
U.D. IV, IOBR.CYL.	400	18-20	18-20	18-20	18	18
U.D. IV., IZBR.CYL.	450		-	-	20	20

Valve torque requirements based on wet service, Category II conditions (SMO 019).

Springreturn actuator torque may vary depending on conditions. Consult sales manual for actual selection.

Accessories



	ACTUATOR	DIMEN	SIONS				MAN	UAL	SPR	ING URN
	ASSEMBLY	MOD#	VALVE	L	Ρ	R	B	0	H	G
->	UNIDRIVE-I 4"CYL.	100	2"-6"	85	3	$ \frac{1}{2} $	$7\frac{1}{4}$	41/2	21 4	$4\frac{1}{2}$
	UNIDRIVE-I 5"CYL.	150	2"-6"	$8\frac{5}{16}$	3	$ \frac{1}{2} $	74	$4\frac{1}{2}$	21 3	51/2
	UNIDRIVE-II6" CYL.	200	8″-12″	124	3	1916	74	41/2	33 <u></u>	$6\frac{1}{2}$
->	UNIDRIVE-III 8"CYL.	300	12'-14"	124	$4\frac{5}{16}$	2	$5\frac{1}{2}$	$7\frac{1}{2}$	30	8 <u>1</u>
	UNIDRIVE-III 10"CYL.	350	14"-16"	15	$4\frac{5}{16}$	2	$5\frac{1}{2}$	$7\frac{1}{2}$	$29\frac{1}{4}$	$10\frac{1}{2}$
->	UNIDRIVE-IV 10"CYL.	400	18"-30"	16	$5\frac{3}{8}$	24	71/2	$7\frac{1}{2}$	354	$10\frac{1}{2}$
->	UNIDRIVE-IV 12"CYL.	450	18-30	164	$5\frac{3}{8}$	24	71/2	$7\frac{1}{2}$	40	125

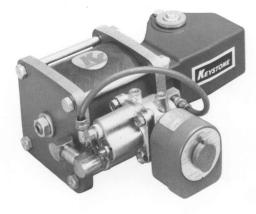
The manual override unit provides positive engage/disengage capability for actuation without supply air pressure or electrical control power.



The limit switch has two SPDT camoperated switches which are adjustable throughout the 90° travel range. The limit switch meets NEMA 4 or NEMA 7 design requirements and is rated at 10A for 120V/240V service. The limit switch can be mounted directly on air-to-air or springreturn models.

F-785-100 with Positioner.

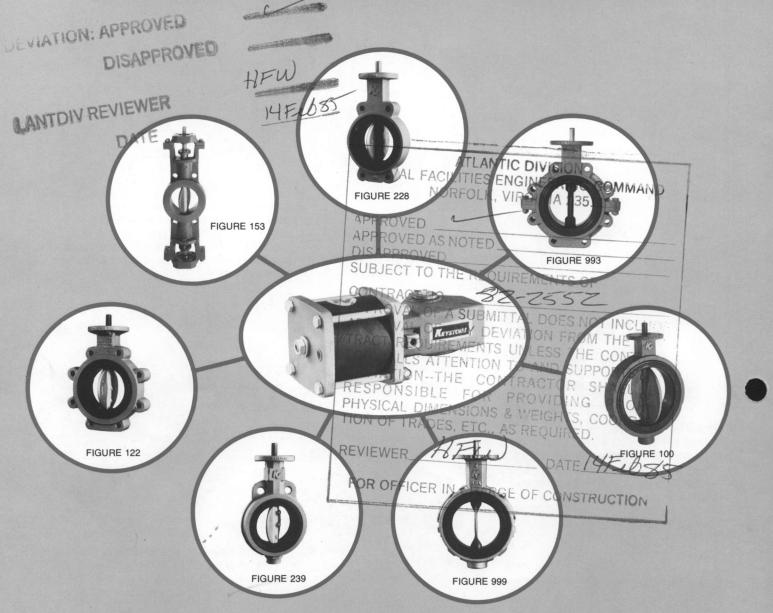
The top-mounted, rotary type positioner requires a 3-15 PSIG signal and is furnished with gauges. The internal spiral spring converts the rotary motion of the actuator to a feedback force directly recognized by the positioner. This eliminates inherent friction and reliability problems associated with other approaches.



The solenoid valve incorporates integral speed controls and operates at 120V AC, 60 Hz with a NEMA 1 or NEMA 4 & 7 rating. It can be supplied for alternate voltages.

The spring-return model incorporates a single compact spring module and can be supplied with a limit switch, positioner, or a combination of both. The spring module utilizes an integral booster piston that works in conjunction with the actuator piston to compress the spring. This arrangement allows the spring-return models to provide essentially the same output torque as the air-to-air units. The springs are self-contained in the spring modules allowing safe and convenient disassembly. Both 60 PSIG and 80 PSIG spring-return models are available.

COMPLETE INTERCHANGEABILITY BETWEEN VALVES AND ACTUATORS



Keystone engineering and research have developed a complete line of unitized valve actuators that are specifically designed to actuate the Keystone line of butterfly valves. The valve itself is designed to allow complete interchangeability between actuators. This means the application engineer can specify the Keystone Valve and Actuator for future generation use — you can start with a manual actuator and plan for eventual use of an electric or pneumatic actuator with easy changeover.



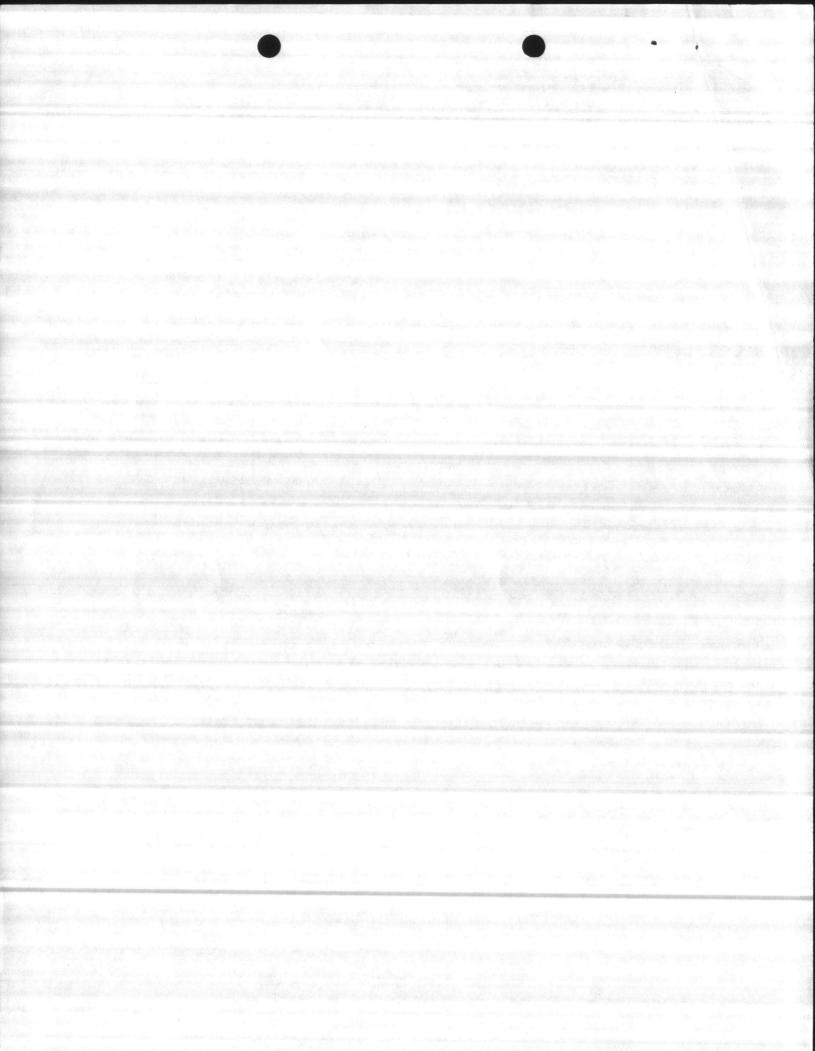
Keystone Valve Division of Keystone International, Inc. P.O. Box 40010, 9700 West Gulf Bank Drive, Houston, Texas 77040, (713) 466-1176

A	NTDIV NORFOLK 4-43	JBMITTAL TRANSMITTAL	CONTRACT NO	TRANSM	TTAL NO	DATE		
		5003 (Hev. 11-80)	×62473-32-8	-2532 2	2)	2/14/85		
	M CONTRACTOR		PROJECT TITLE AND L	OCATION				
0	zer HILIER	MANUFACTURING COMPANY	1. 2. 2. 2					
0	LT. M.	I. KIMBALL ROICC	REPLACE EC	UIPKENT - F	100L - B	102. 2515		
		CONTRACTOR USE ONLY	1		REVIE	WER USE ONLY		
-	L Contractor Approved	*List only one specification division ist only one of the following categories on ea and indicate which is being subr OICC Approval	nch transmittal form, mitted	tion/Substitution	A-Appro D-Disap AN-App RA-Reco	proved roved as noted aipt acknowledged.		
_	and the second second			OICC Approval	C-Comr R-Result			
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIF (Type, size, modei na., h brochure nu	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE			
	15440	FLOAT CONTROLL	ELOAT CONTROLLED VALVE					
_	Cat. Cut	Pratt Cylinder Operator	Cylinder Operator 3					
,	Cat Cut	Cla-Val Float Control	al Float Control 3					
4	5050-3	Partial Piping Layout	ial Piping Layout 3					
-		Deviation Request	in anglashar t	3				
	RACTOR'S COMMENTS	Certificat of compliance	e.	3	Y			
PY	OF TRANSMITTAL AND SUE		CONTRACTOR REPRES	ENTATIVE (Signature)				
	RECEIVED BY REVIEWER	FROM (Reviewer)	- Jick	TO A	A			
TE	3 25/85	LANTDIV	and the second	ROBERTS	FILTE	n /Rol		
1	Submittale are returned	with action indicated. Approval of an item doe	es not include approval of an	y deviation from the	contract requ	irements unless the c		

RESUBMITTAL IS APPROVED AT NO CHANGE IN COST OR TIME. CONTRACTOR TO PROVIDE UNIT COMPLETE WITH WATER PIPING. SUBMITTED AND APPRAVED AT NO ADDITIONAL COIT PER TELEPHONE BETWEEN MA. BARRY on 3/21/85 AND MR. THOMPSON 3/25/85. CUNVERSATTON

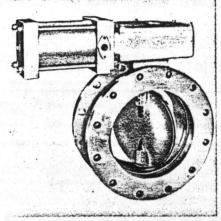
125%

COPIES TO



CYLINDER OPERATORS CONT N 62470-82-B-2552

Dura-Cyl[®] Non-Metallic Power Cylinders



Pratt Dura-Cyl cylinder operators have been developed to use water, primarily, as an operating medium*. Using the latest technology of nonmetallic material strength and durability, Dura-cyl cylinder is built to withstand the corrosive effects of water it has undergone extensive testing in the Pratt laboratory. Field installations have further proved its ruggedness and reliability.

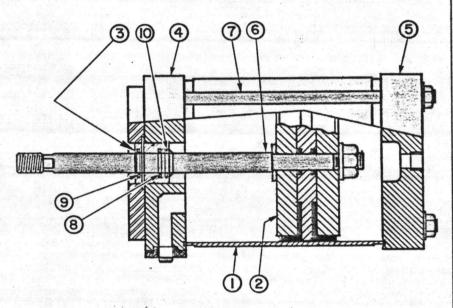
Because the cylinder is non-metallic, the problems of galvanic corrosion of vital cylinder parts (caused by the proximity of bronze to ferrous metals in a conductive solution) are eliminated. Thus, the life expectancy and operational dependability of the operator are increased.

The unit is amazingly durable, with flexural strength, modulus of elasticity, water resistance and frictional coefficients of the specially selected materials ideally suited for longer life in water service. These materials are mechanically equal or superior to their metallic counterparts in similar applications. The only metallic component exposed to water is the chrome plated stainless steel piston rod which is highly abrasion resistant. It is continually cleaned during operation by a new Pratt innovation . . . an internal wiper that removes any water deposited material from the rod, thereby preventing rod seal damage.

*Dura-Cyl cylinders are also suitable for air or oil operation.

Components

- Body glass fiber reinforced epoxy resin with low-friction additives emulsified throughout. Greater impact resistance and higher strength/ weight ratio than bronze alloy or all-bronze cylinders
- 2. Piston-non-metallic material designed with enlarged bearing area to minimize wear induced by side loading
- Rod Gland low friction acetal copolymer with extra long bearing area
- 4-5. Head and Cap high flexural strength phenolic laminate



- Piston Rod—ground and polished stainless steel, hard chrome plated to provide greater abrasion resistance.
- 7. Tie Rccs high tensile cold rolled steel
- 8. Seal Pressure energized, non-adjustable type Buna N molded rubber
- 9-10. Rod Wipers External: molded Buna N type removes any foreign materials on the exterior rod surfaces per AWWA C504

Internal: a Pratt innovation . . . removes any water deposited material from the rod before any rod seal damage can occur.

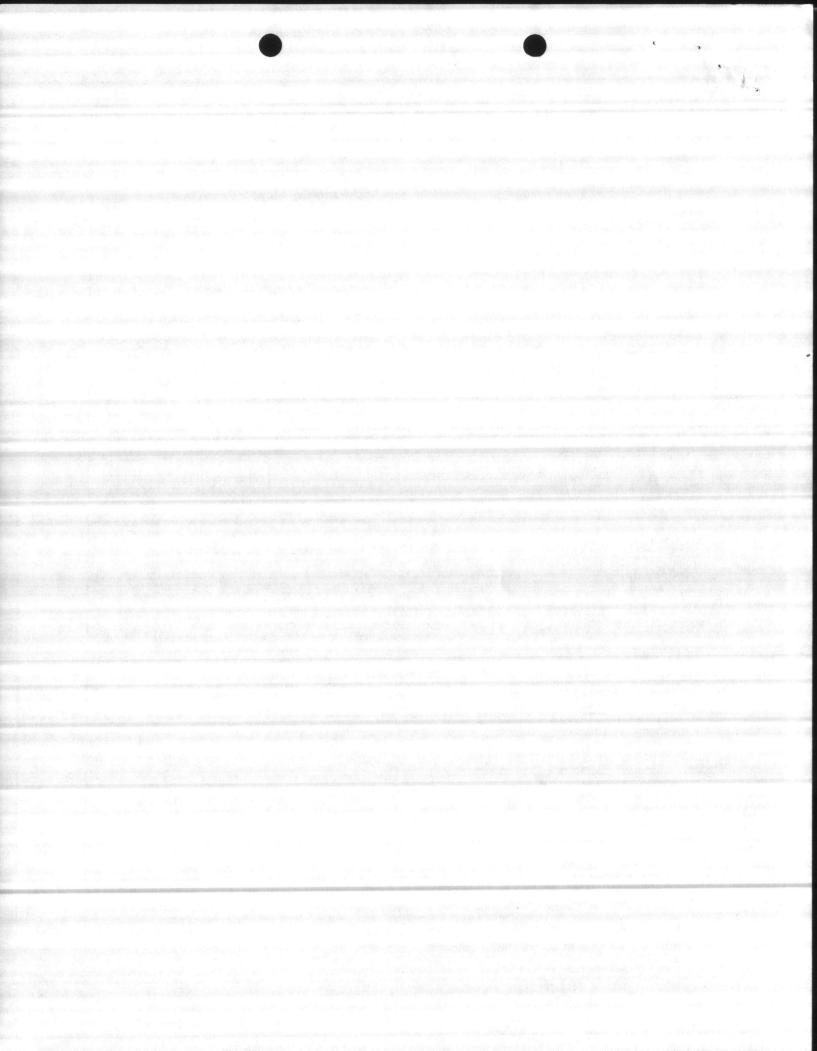
Technical Data

- Action—double acting
- Operating pressure 150 psig (maximum)
- Sizes—range of 15 bore/stroke combinations to match application requirements.
- Mounting designed for Pratt MDT operator
- Connections threaded NPT; size varies with bore

UBBER-SEAT

BUTTERFLY VALVES, 3⁴-20

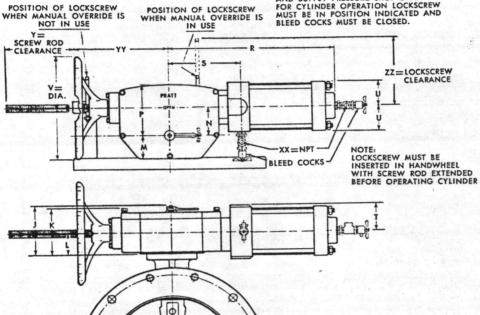
 Controls Available (Optional) directional valves, speed control valves, positioners, transmitters, limit switches, handjacks



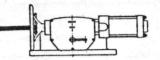
CYLINDER OPERATORS

Cylinder actuated MDT operators are fully enclosed units. They are available with up to 10 different bore/stroke cylinder sizes (as shown in the table below) to suit most application requirements. The units are also available with an extra-cost manual override (hand-jack) accessory for manually operating the valve in event of power failure. Other accessories available are described and illustrated on the pages that follow.

FOR MANUAL OPERATION LOCKSCREW MUST BE IN POSITION INDICATED, BLEED COCKS MUST BE OPENED AND SUPPLY PRESSURE SHUT OFF. FOR CYLINDER OPERATION LOCKSCREW MUST BE IN POSITION INDICATED AND BLEED COCKS MUST BE CLOSED.



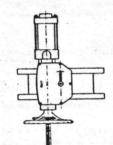
POSITION OF LOCKSCREW



0

0

Standard Position



Alternate Position

DIMENSIONS

AI RUBBER-SEAT BUTTERFLY VALVES, 3"20"

1

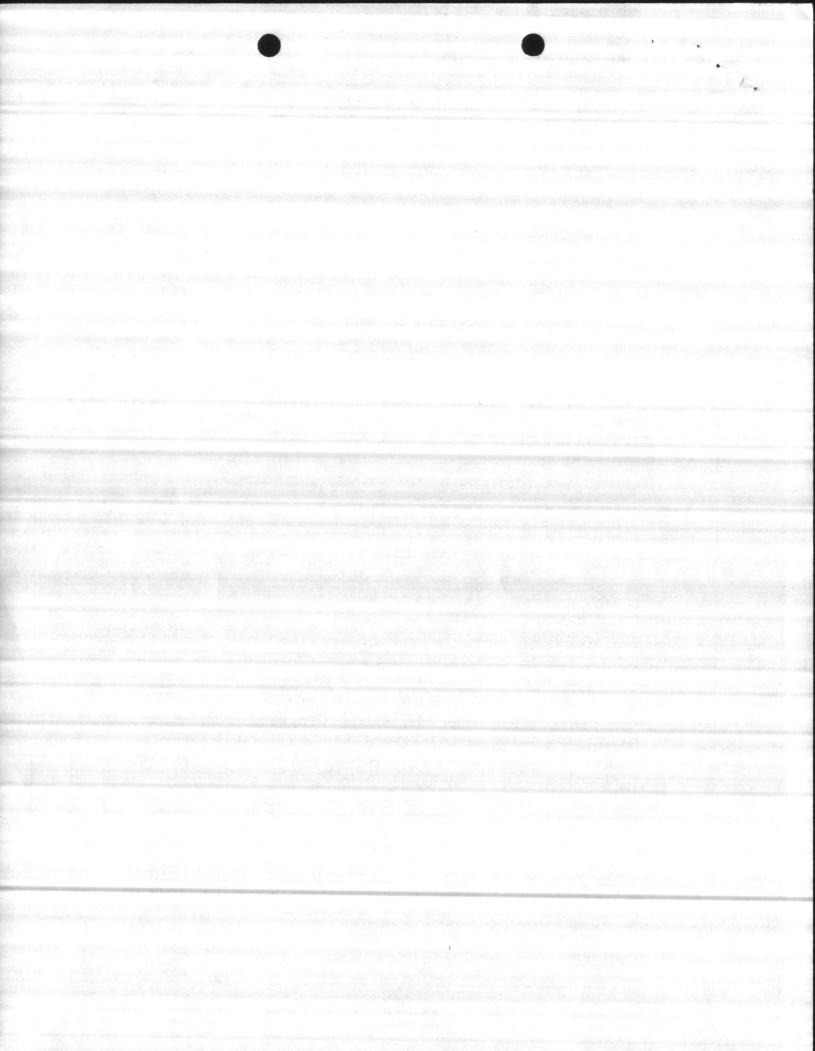
なたからい、アームななどの

1 i i

> 1

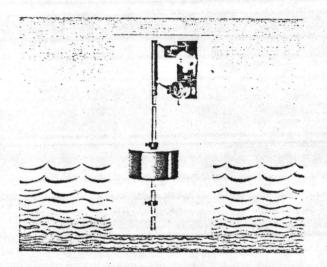
		1		N					R OPP	DE	R													
NOM.	010.	CYLIN	CYLINDER SIZE		CYLINDER SIZE		CYLINDER SIZE		CYLINDER SIZE		-		M	N		PR	s	т	u	v	xx	Y	YY	ZZ
SIZE		BORE	STROKE												-									
3"	MDT-2	21/2	4	41/8	43/8	2	21/8	2	41/2	13	53/16	2	11/8	8	1/4	51/4	71/4	61/4						
THRU	MDT-2	4	4	41/8	43/8	2	21/8	2	41/2	131/4	51/4	23/8	23/8	8	1/4	51/4	71/4	61/4						
12"	MDT-2	5	4	41/8	43/8	2	21/8	2	41/2	131/4	51/4	31/16	21/8	8	1/4	51/4	71/4	61/4						
14"	MDT-3	5	55/8	51/2	55/16	21/16	31/4	35/32	55/8	175/8	71/2	31/16	21/8	12	1/4	71/2	91/4	8						
AND	MDT-3	8	5%	51/2	75/16	21/16	31/4	35/32	53/8	185/16	715/16	4%	43/8	12	1/4	71/2	91/4	8						
16"	MDT-3	10	55%	51/2	55/16	21/16	31/4	35/32	5%	191/4	81/16	5%	53/8	12	1/4	71/2	91/4	8						
	MDT-4	5	8	63/8	6	21/8	33/8	4	75/16	21	81/2	31/16	21/8	12	1/4	81/4	10%	101/4						
18"	MDT-4	8	8	63/8	6	21/8	33/8	4	75/16	213/4	815/16	45/8	43/8	12	1/4	81/4	10%	101/4						
AND	MDT-4	10	8	63/8	6	21/8	33/8	4	75/16	223/4	91/16	5%	53/8	12	1/4	81/4	105/8	101/4						
20"	MDT-4	12	8	63/8	6	21/8	33/8	4	75/16	255/8	101/2	63%	63/8	12	1/2	81/4	101/8	101/4						

NOTE: All dimensions shown in inches



MP LE JEUNE NC CONT. N62470-82. B- 2552

Model CFI FLOAT CONTROL



Specifications

PIPING CONNECTIONS PRESSURE RATING TEMPERATURE RATING MATERIALS

1/8" NPT equipped with 1/4" SAE 45° flare type tube fittings 0-300 psi to 180°F. Max. In contact with operating fluid -Brass, stainless steel, monel, with Buna-N seals Float linkage and float rod - Brass and PVC

Base plate - enameled steel Float - Polypropylene

Other materials available -Stainless steel float Stainless steel rod and stops.

Brass.rods

Clean liquids or gases compatible

with specified materials.

1" min. 19" max. Float-rod extensions available ... in 12" or 24" increments to extend level differential-

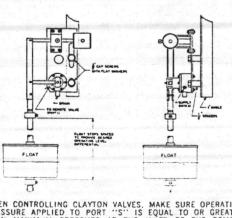
LEVEL DIFFERENTIAL

OPERATING FLUIDS

SHIPPING WEIGHT

12 lbs.





WHEN CONTROLLING CLAYTON VALVES, MAKE SURE OPERATING PRESSURE APPLIED TO PORT "S" IS EQUAL TO OR GREATER THAN MAXIMUM PRESSURE AT THE INLET OF THE REMOTE CLAYTON VALVE STRAINER, SHUT OFF VALVE, AND MOUNTING HARDWARE NOT SUPPLIED WITH FLOAT CONTROL.

OPEN TANK TYPE

Clayton CF1 Float Controls are float actuated multiport pilot valves which provide non-modulating, two-position, on-off operation. They are used primarily to operate remotely located Clayton Valves or other devices requiring three-way or four-way pilot valve operation. Designed for use in open tanks, these controls operate on a minimum level change of approximately 1". Maximum level change for the standard control is 19". This can be extended to 111/2 feet by adding float rod extensions.

The float moves freely on the float rod. On rising liquid level, the float contacts the upper stop and lifts the float linkage to the "UP" position. As the liquid level lowers, the control stays in the "UP" position until the float con-tacts the lower stop. The control then shifts to the "DOWN" position.

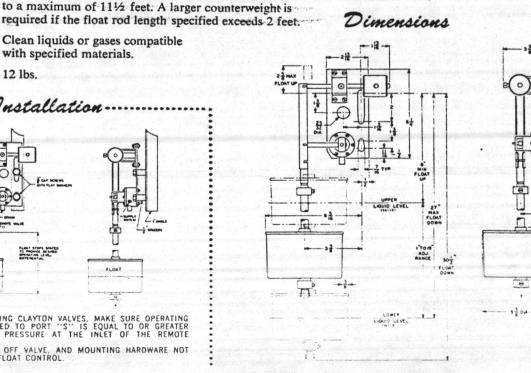
Note: A stilling well must be provided around the float if the liquid surface is subject to turbulence, ripples or wind.

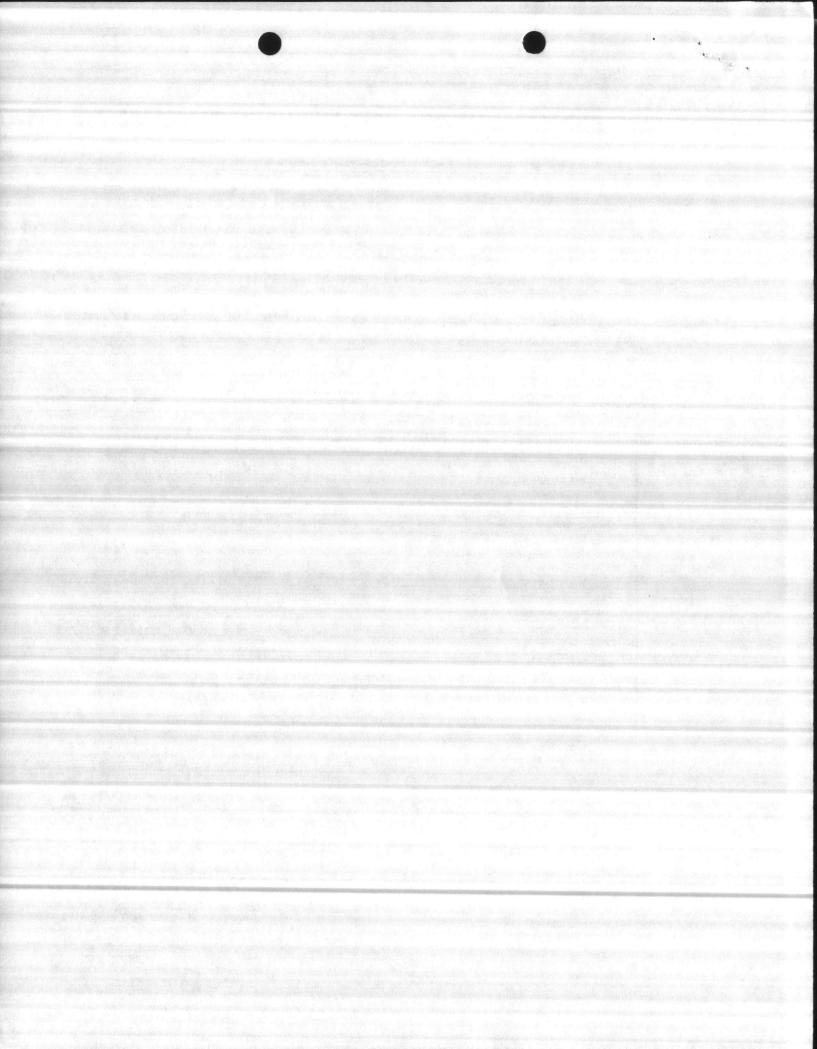
Features Accurate liquid level control.

- Operation is fully hydraulic.
- Simplified design . . . easy maintenance.
- No lubrication necessary.
- No gears . . . no mechanical linkage between valve and control.

WHEN ORDERING PLEASE SPECIFY:

- 1. Catalog number.
- 2. Size and type of Clayton Valve to be controlled.
- 3. Materials if different from standard.
- 4. Float-rod-length if longer than 2 ft.





CFI CATALOG NUMBER CF1-C1 TYPICAL INSTALLATION Clayton CF1 Float Control and Piping Diagrams Clayton 100-01 Hytrol Valve. STILLING FOR CONTROLLING CLAYTON 100-01 HYTROL VALVE FLOAT UP CLOSES VALVE When float rises, operating pressure is applied to valve cover chamber and valve closes. INSTALLATION DATA The float control is mounted above the high water level in the tank. The valve is installed FLOAT DOWN CLOSES VALVE: in the line leading to the tank and is con-CATALOG NUMBER CF1-C1 nected to the float control pilot by tubing. When line pressure is used to operate the valve, tubing connections are made from the float control pilot to the valve cover, and also to the inlet side of the valve. The control may be installed at any elevation above the valve, providing that the flowing line pressure in P.S.I. is equal to or greater than the vertical distance in feet between the valve and the float control. An independent source of either air or water may be used to operate the valve. The pres-FOR CONTROLLING FOR CONTROLLING CLAYTON 100-02 sure from this independent source must at all POWERTROL VALVE (Normally Closed) CLAYTON 100-01 HYTROL VALVE times be equal to or greater than pressure at With float down, operating pressure When float is "down" valve is closed. the valve inlet. The independent source is conis applied to close valve. When float rises, operating pressure is nected to the float control pilot in place of When float rises, pressure is released transmitted to valve power chamber the line running from the inlet side of the from valve cover chamber. and valve opens. valve. CATALOG NUMBER CF1-C1 FOR CONTROLLING CLAYTON 100-02 POWERTROL VALVE FLOAT UP FLOAT UP OPENS VALVE ... CLOSES VALVE BUTTERFLY VALUE 'n UA BR CATALOG NUMBER CF1-C1

> FOR CONTROLLING TWO VALVES ALTERNATELY

> > OPERATION

UP

DOWN

VALVE 1

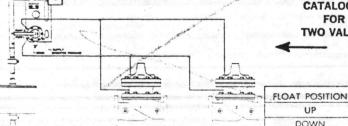
CLOSED

OPEN

VALVE 2

OPEN

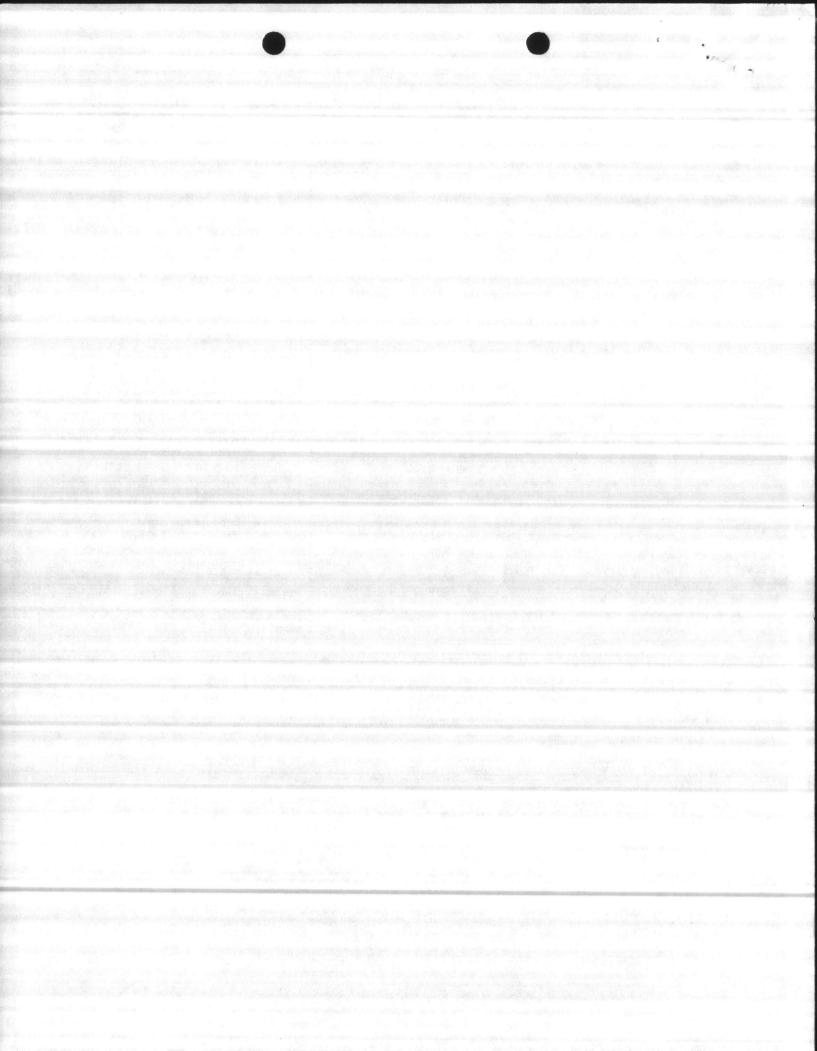
CLOSED



Clayton 100-02 POWERTROL VALVES

Clayton 100-01 HYTROL VALVES

17



M

oberta

CABLE: WATERFILT PHILA. TELEX: 753-447

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

DEVIATION REQUEST

SECTION 15440

PARAGRAPH 2.3.2.2

We propose to furnish a Cla-Val Float Control Unit in connection with a Pratt Monoflange Valve with a hydraulic cylinder in liew of the integral float with lever arm operator suggested in the specification.

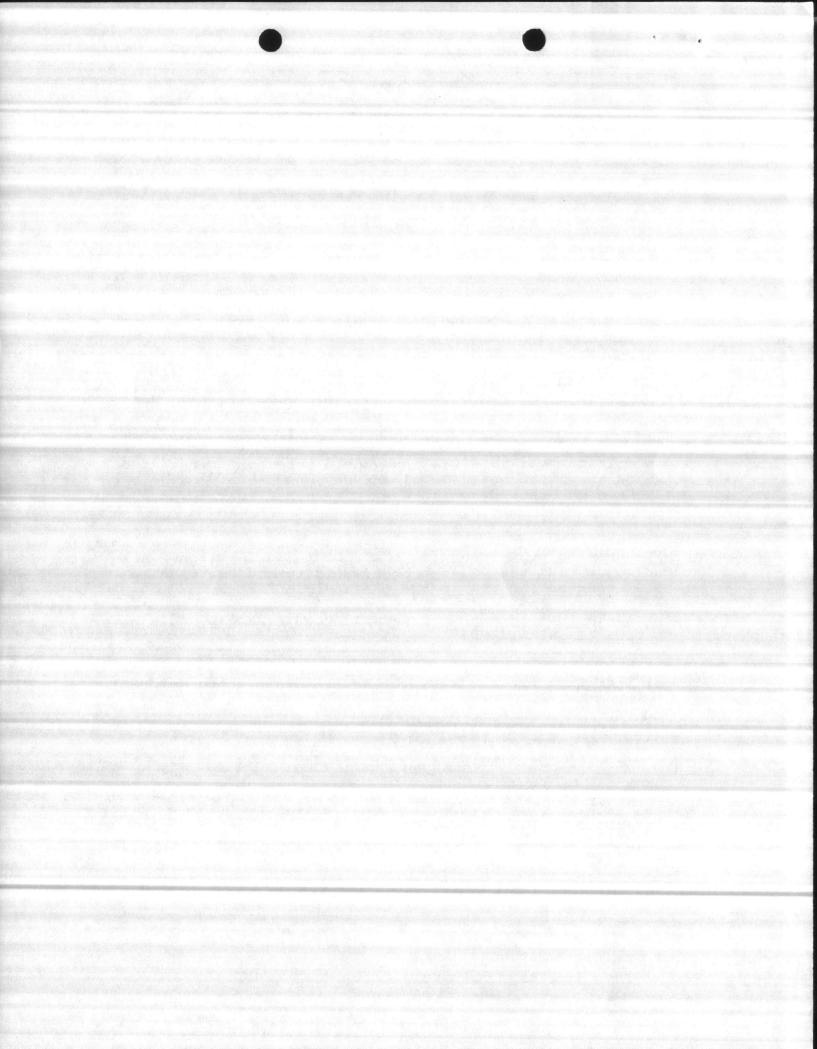
It is our opinion that this will provide a more positive shut-off of the valve on increased water level preventing possible overflowing of the pit. From our past experience we can advise that lever arm float operated valves can be erratic.

Catalog cuts of the proposed valve operator and float control unit, along with drawing 6950-8 showing their proposed locations, are attached. Note that the valve proper would be the Pratt Valve previously approved for use in the pools.

In order to use this arrangement we will require access to a water supply having 40 psi minimum or more.

The additional cost for furnishing the above equipment would be \$1,260.41 (see attached estimate for change order dated 2-15-85).

ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511	
APPROVED APPROVED AS NOT	(担)
Signature C. Heamplon	Date5_
COLUMNAL OR BODERTS Filter Mfg. Co.	
IDLE CALLER VIEW CONTRACT DE RESPUNS- CIULIS & VERTING CONTRACT DIMEN- CIULIS STATUS	
1	
FOR OFFICER PLOT PLACE OF CONSTRUCTION	ATER TREATMENT SYSTEMS SINCE 1897



oberta

CABLE: WATERFILT PHILA TELEX: 753-447

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-C-2552

PROJECT SPECIFICATION SECTION 15440

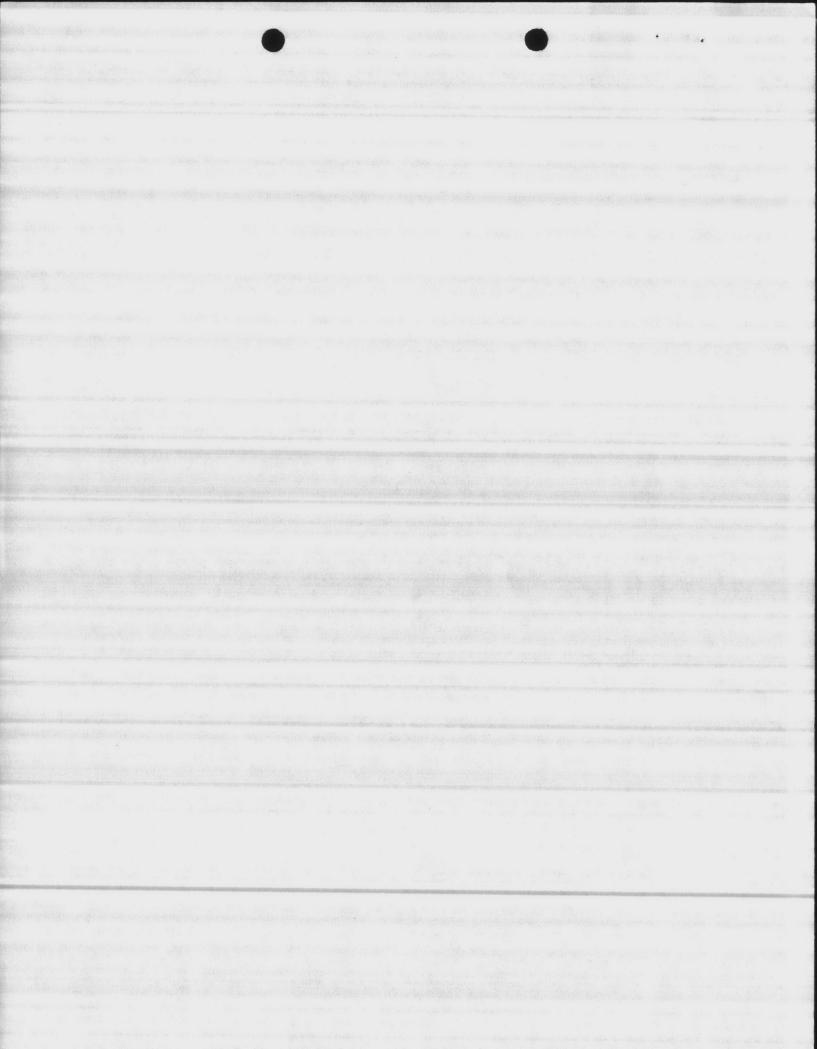
PARAGRAPH 2.3.2.2

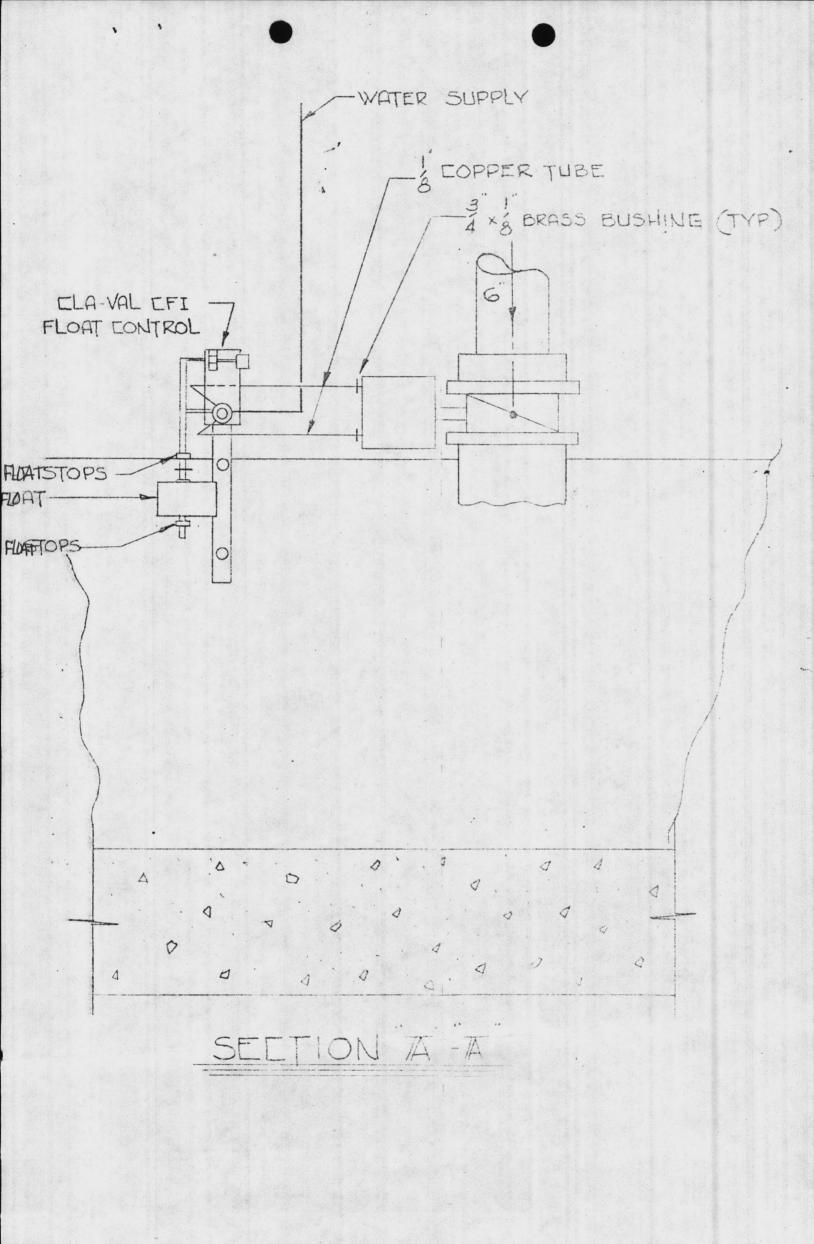
It is hereby certified that the equipment and material shown in this submittal is that proposed to be incorporated into Contract Number N62470-82-C-2552 and is in accordance with the contract drawings and specifications, except as noted in the attached deviation request.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

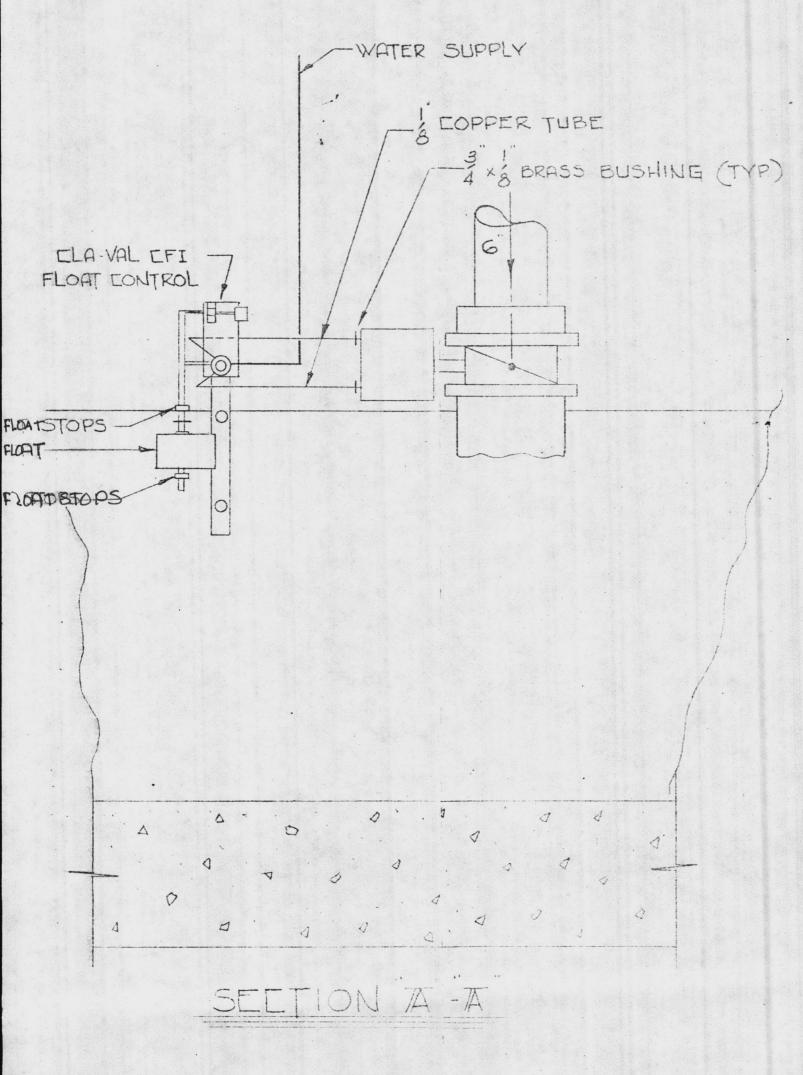
Certified By C. Kompton Robert Filter Mfg. Co.

Date 2.15-85

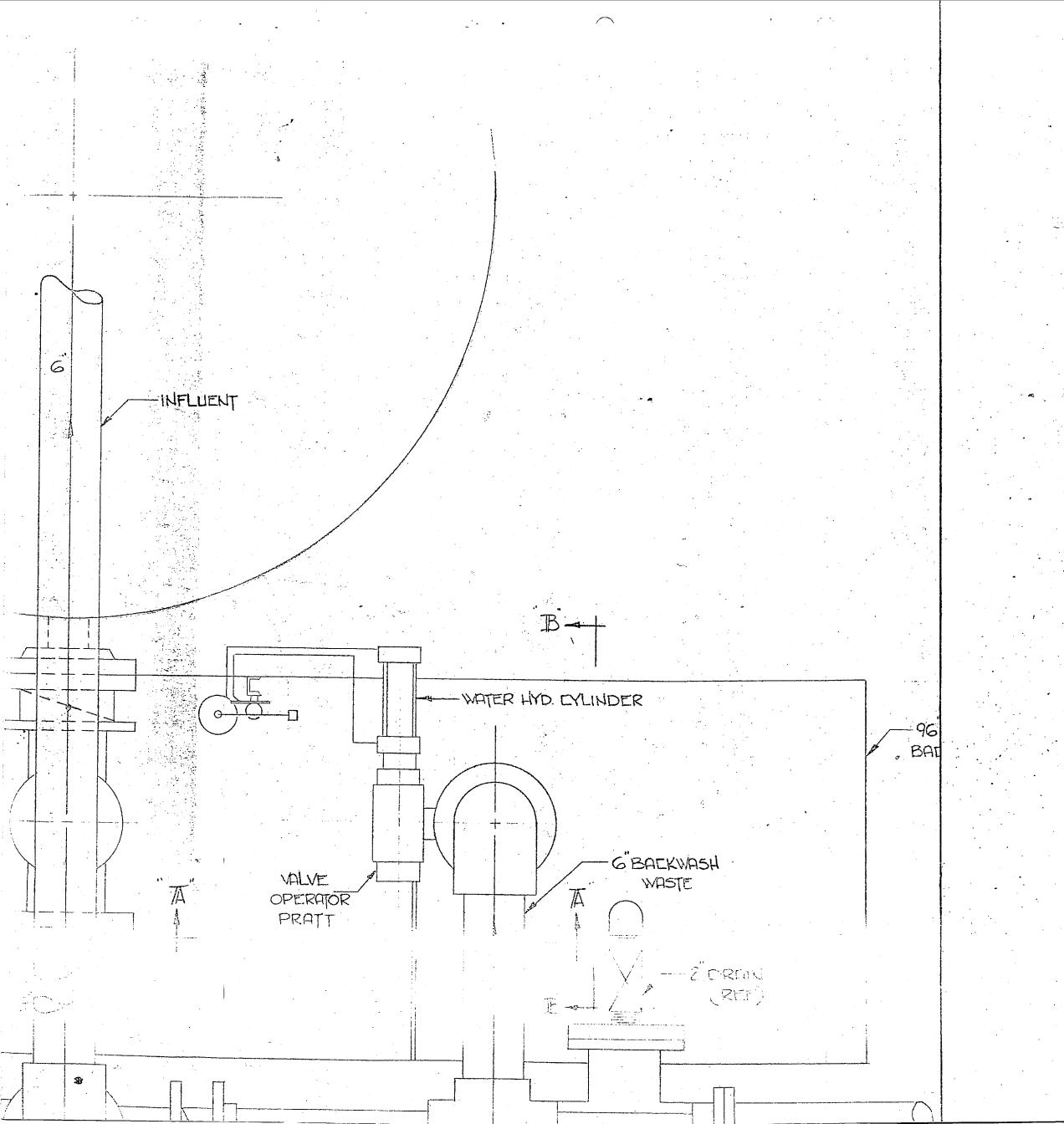












· · ·

Roberts

CABLE: WATERFILT PHILA. TELEX: 753-447

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-C-2552

PROJECT SPECIFICATION SECTION 15440

PARAGRAPH 2.3.2.4

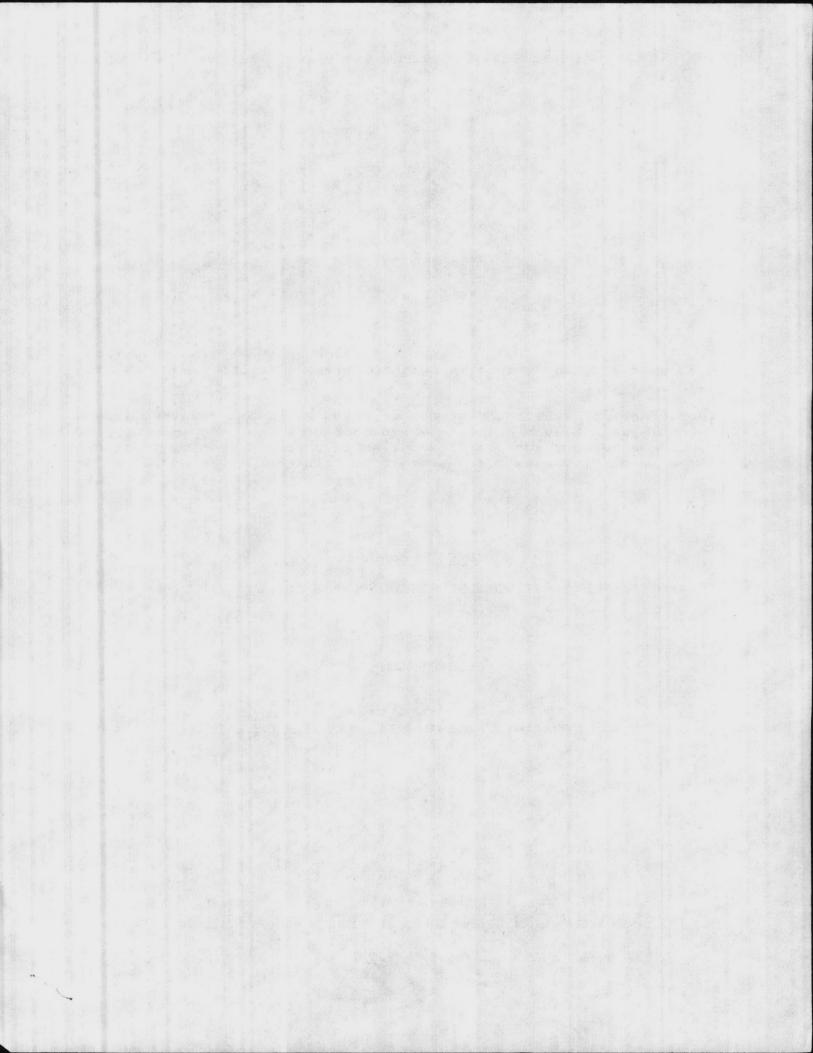
It is hereby certified that the equipment and material shown in this submittal is that proposed to be incorporated into Contract Number N62470-82-C-2552 and is in accordance with the contract drawings and specifications, except as noted on the attached sheet of deviations.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

Certified By J. C. Hampeon

Date 2.13-85

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897.



Loberts

CABLE: WATERFILT PHILA. TELEX: 753-447

FILTER MANUFACTURING COMPANY P.O., BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

COMMENTS

At your recuest of 2/4/85 we are resubmitting the various components for the effluent flow control system including the schematic wiring. It is our understanding that the transmitter and Venturi meter have been approved.

Note that the Fischer & Porter controller performs the functions of a controller, an indicator and a rate set station. This was mentioned in our deviation request of 12/6/84 (copies attached).

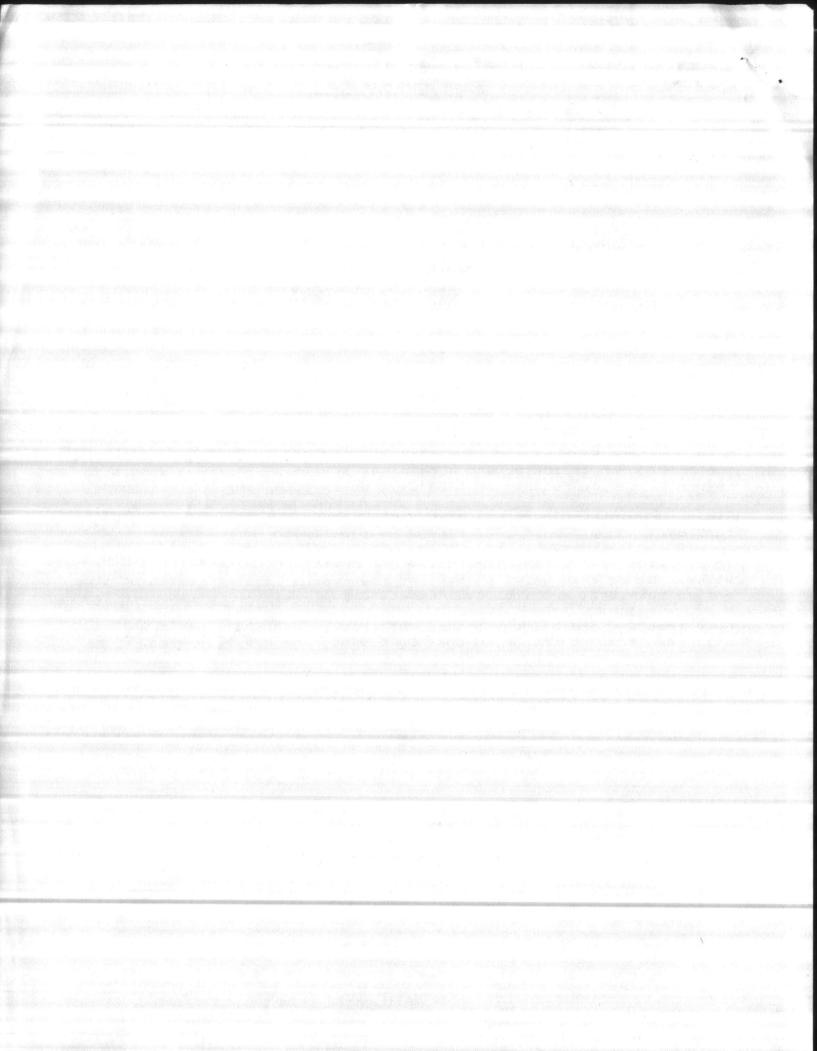
Piping grawing A-8784-6 was also discussed in our deviation request of 12/6/84.

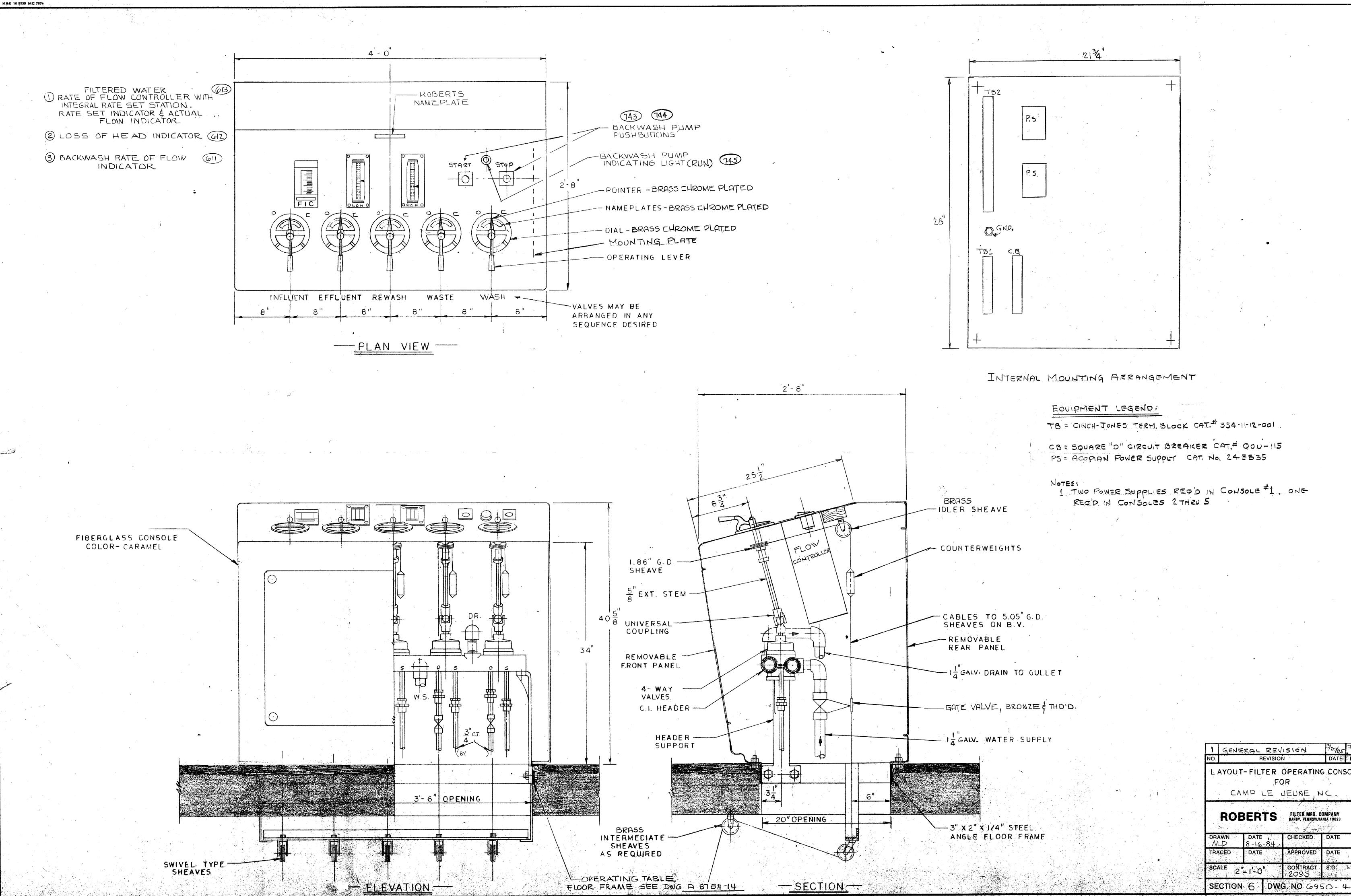
In addition Transmittal 12-C covered a deviation request for the Pratt valve. Since this valve is part of the control system copies of this entire submittal are included herewith.

Note that any and all deviations referred to currently and previously will result in no change in cost or time to the Naval Command.

Signature A.C. Thompson Date 2-13-85

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897.





	• · · · · · · · · · · · · · · · · · · ·		
IGEN	ERAL RE	VISION	3/20/85 JET
NO.	REVISIO	DŇ	DATE
	T-FUTER	OPERATIN	G CONSOL
LAIUU		OR	
• . • .	. ୮	UR	
C/	AMP LE	JEUNE N	
· · · · · · · · · · · · · · · · · · ·		te l	
RO	BERTS	FILTER MFG. C DARBY, PENNSYLV	
DRAWN	DATE	CHECKED	DATE
M_P.	8-16-84		at a fair An thair
TRACED	DATE	APPROVED	DATE
SCALE	"=1-0"	GONTRACT	S.O.
<u> </u>	= I - U	2093	
SECTIOI			

. .

.

ананда Аланда Аланда · · · · ·

,

.

÷

.

.

.

.

· · ·

· . .

.

•

.

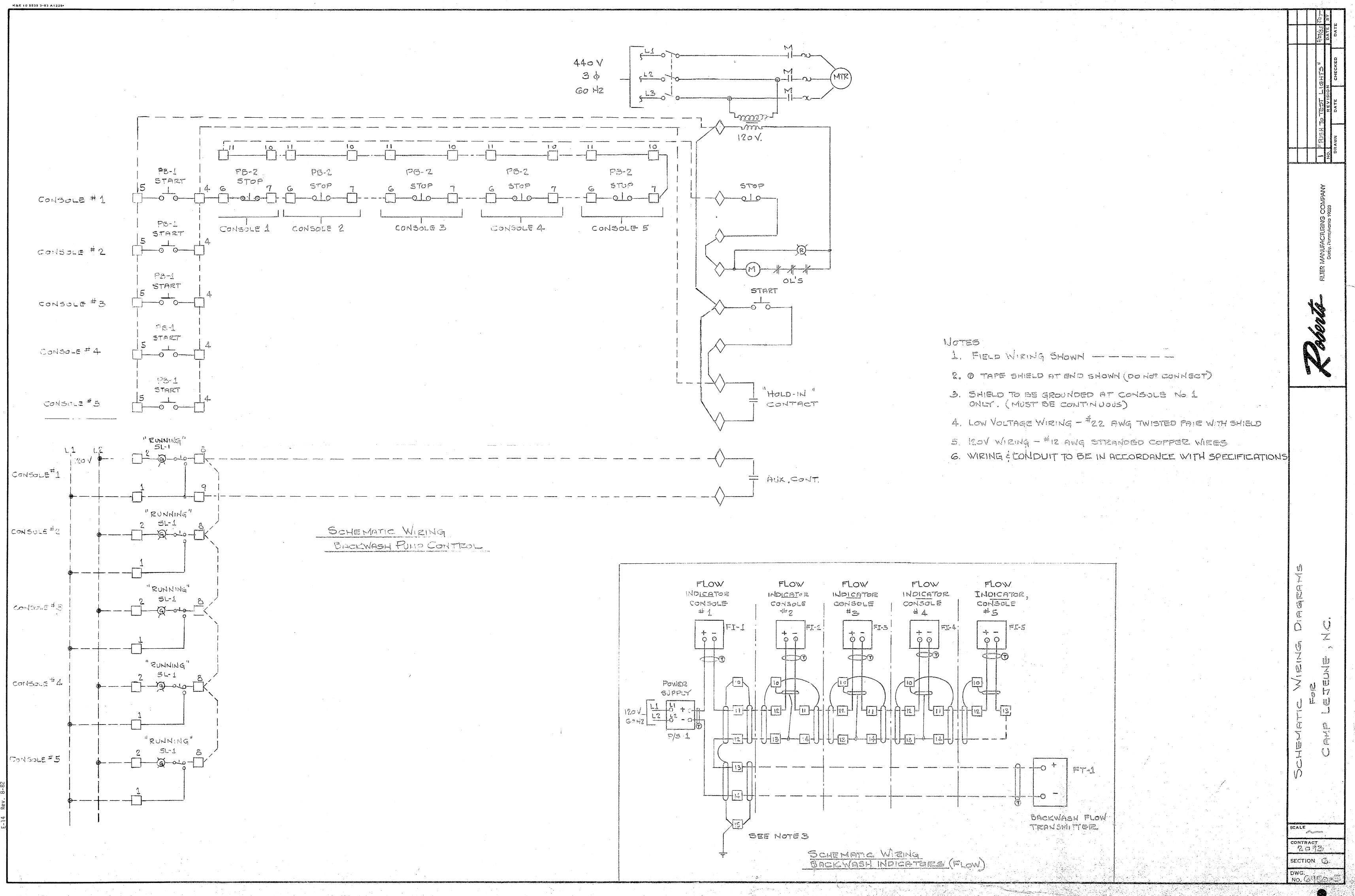
,

- ""

.

:

· · · · •



•

• i d t

; .

4 ,

_

.

-

.

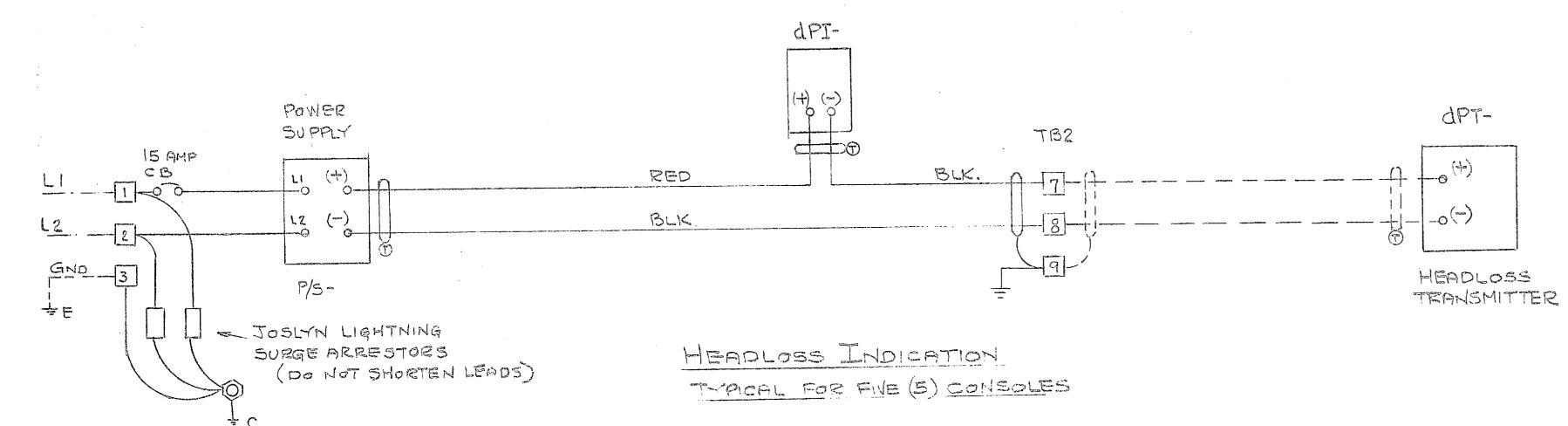
. .

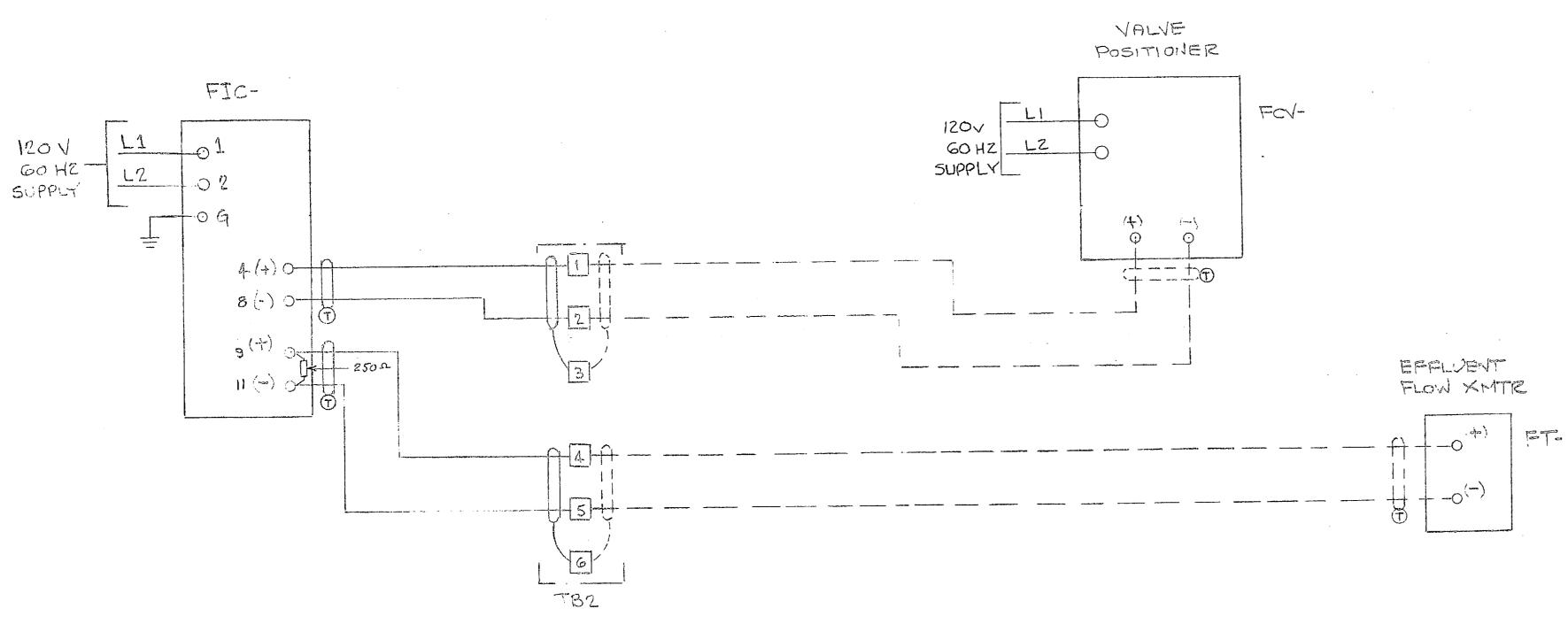
. :

7

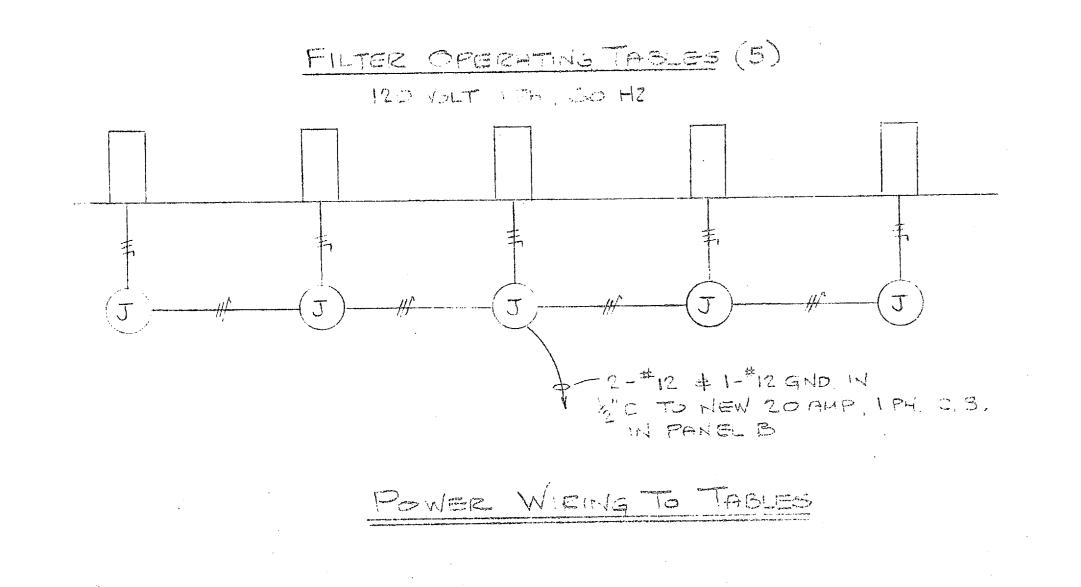
· ·

. 9





TYPICAL FOR FIVE (5) CONSOLES

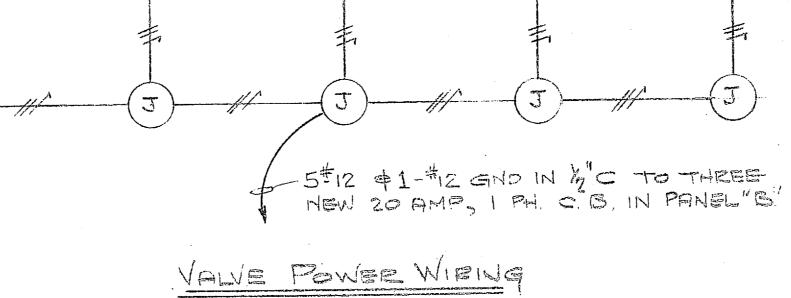


K&E 10 5535 3-83 A1225.

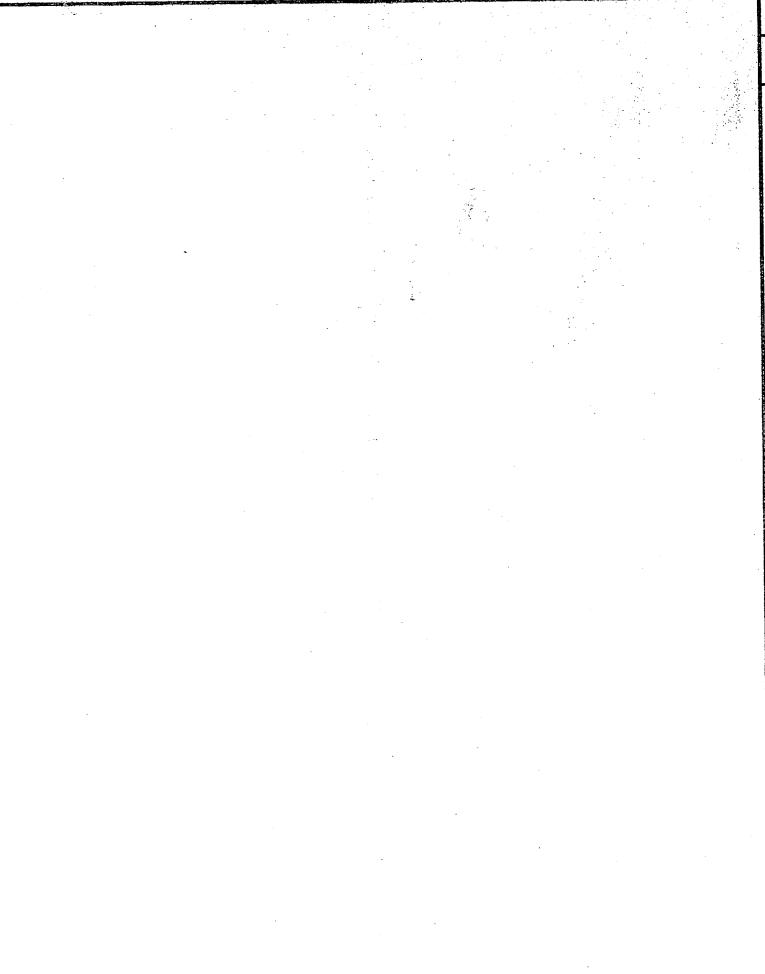
·----

EFFLUENT FLOW CONTROL

VALVE VALVE VALVE



VALVE



≩

IURING CON

MANUFACI Datby, Penn

TER

Bookt

Ċ

6]

0

N.B.T

SCALE

CONTRACT

SECTION

DWG. NO.

0

2

0 V U

()

NOTE -

SEE DRAWING	6950-5	FOR	WIEING	
NOTES				
			•	

VANE

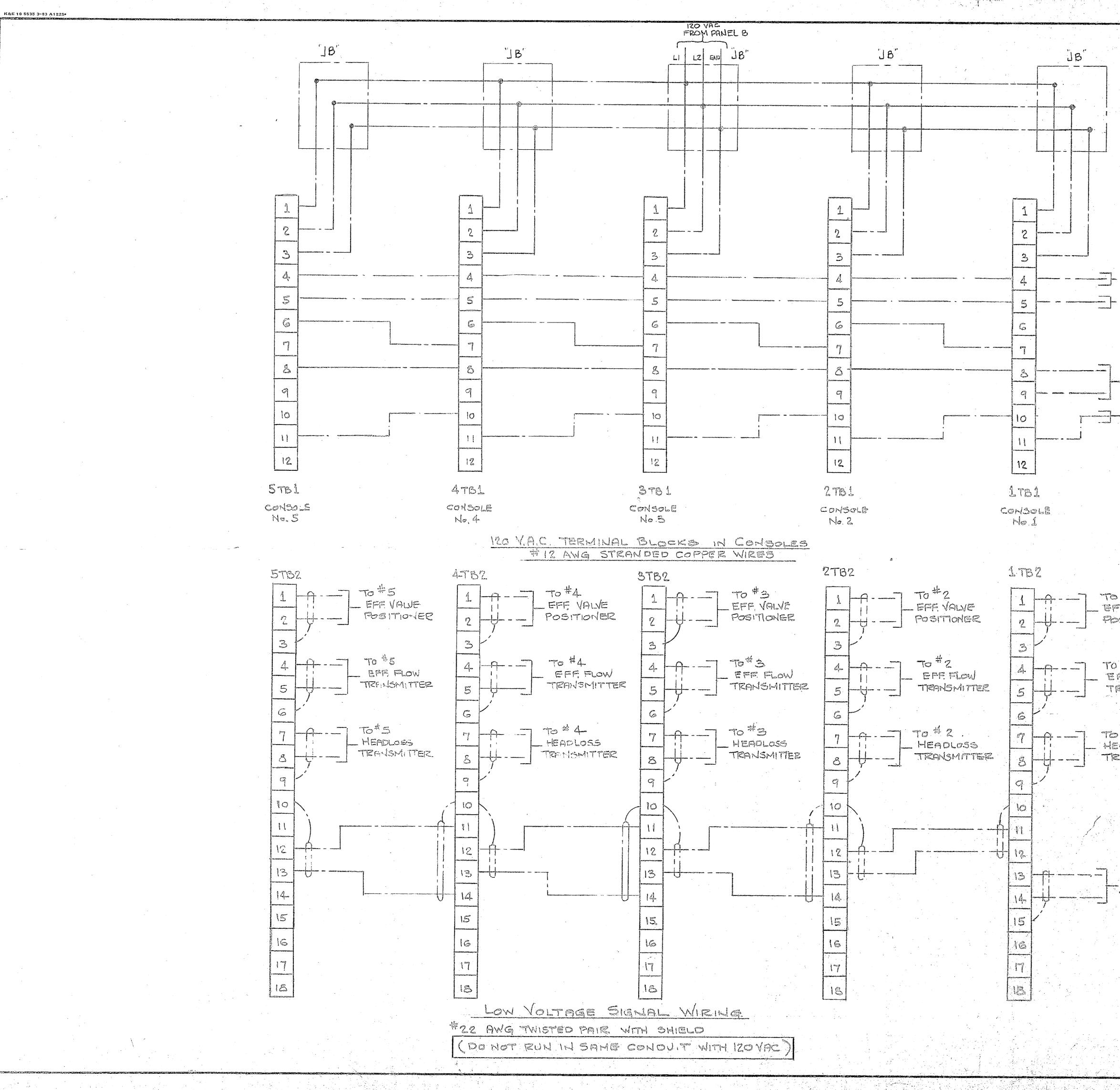
y y 1 ٦ `

•.

.

. . ·

.



---- FROM "HOLD-IN" CONTRET

FROM LI SIDE OF XFME IN BW. PUMP MOTOR STARTER ENCLOSURE

FROM ALLY CONTACT IN BACKWASHPUMP MOTOR STARTER

BW. PUMP MOTOR STARTER ENGLOSURE

to #1 - EFF. Value Positionee

TO #1 EFF FLOW

TRANSMITTER

To #1 HEROLOSS

TEANSMITTEE

FROM BRCKWASH TRANSMITTER

NOTE. SEE DWG. 6950-5 FOR WIRING NOTES

쉢 Û <u>II</u> 1 Parts 3

BOOLER

SCALE CONTRACT

SECTION DWG NO

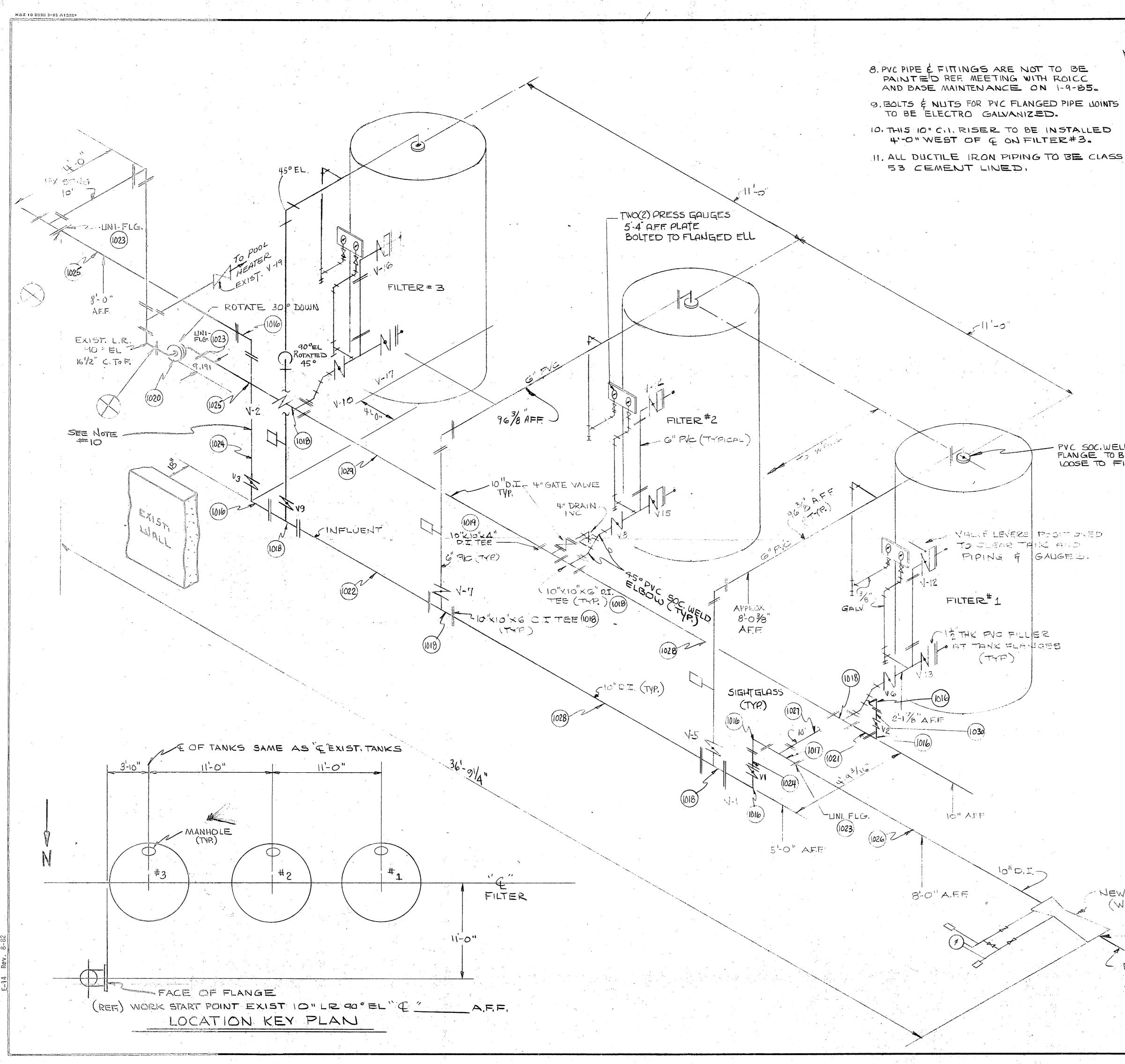
y y 1 ٦ `

•.

.

. . ·

.



NOTES: 1. ALL BUTTERFLY VALVES TO BE WAPER TYPE. VALVE MOVEMENT TO BE CHECKED PRIDE TO FINAL SECUREMENT TO FLANGED FITTINGS EFFLUENT LINE LOWERED AND MADE CLOSER TO TANKS BY ROTATING THE 45" ELBOWS BO". ADJUST JACKLEGS ON TANK TO SUIT ADJUST TANK JACK LEGS TO INSURE Q OF 4" FLANGED NOZZLES (11"O.D. X 4" RED. FLG.) IS 25%" A.F.F. 4. WORK START 5. THIS DRAWING TO BE USED FOR LAYOUT IN BLDG M-236 SYMBOL FOR CAST IRON / DUCTILE IRON PIPE & FTG'S. 61 7. ALL PIPING TO BE FIELD SUPPORTED TO COMPLY W/CONTRACT REQUIREMENTS THE ID" C.I. PIPE (10"AFF.) TO BE SUPPORTED W/ FIELD POLRED CONCRETE PADS TO FIT CONTOUR OF PIPE. BALANCE OF C.I. PIPE TO BE SUPPORTED W/ HANGERS FROM CEILING OR FLOOR AS READ. 9'-0" A.F.F. I'PIPE TO FLOOR (APYZOX) South - PVC SOC.WELD SLIP-ON FLANGE TO BE FURNISHED LOOSE TO FIELD (TYP.) NOTE#3 PIPE AIR/VAEUUM VALVE TO G ABOVE FLOOR U In _0 初止止 ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 11-11 13 \mathcal{O} APPROVED APPROVED AS NOTED DISAPPROVED SUBJECT TO THE REQUIREMENTS OF CONTRACT NO. 92-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRACTOR CALLS ATTENTION TO AND SUPPORTS THE DEVIA-TION - THE CONTRACTOR SHALL BE RESPONSI-BLE FOR PROVIDING PROPER PHYSICAL DIMEN-SIONS & WEIGHTS, COORDINATION OF TRADES, ETC., AS REQUIRED. - NEW VENTURI (WITH GAUGE' REVIEWER ... BDC . DATE 2/11/85 FOR OFFICER IN CHARGE OF CONSTRUCTION EXISTING 10"C.I (POOL RECIRCULATION) SCALE as all the same in the rate of THIS DRAWING REPRESENTS THE DESIGN AND ENGINEERING EFFORTS OF ROBERTS FILTER CONTRACT MFG. CO. THIS DRAWING AND ASSOCIATED DOCUMENTS MAY NOT BE REPRODUCED. 2093 LOANED. COPIED OR USED FOR ANY PURPOSE SECTION WITHOUT THE EXPRESS WRITTEN AUTHORIZATION OF ROBERTS FILTER MFG CO. DWG. NO 5350-12

. .

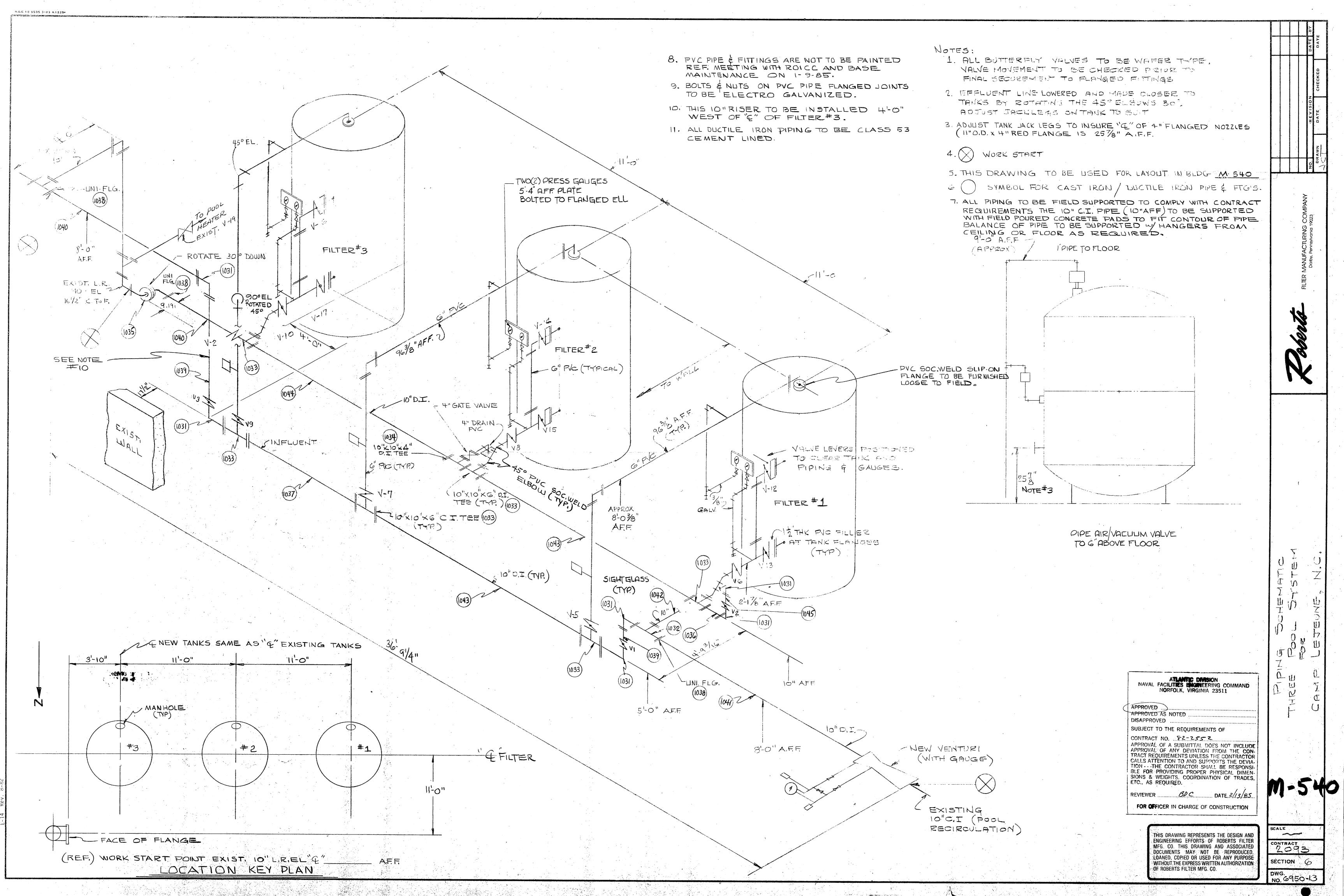
.

•

.

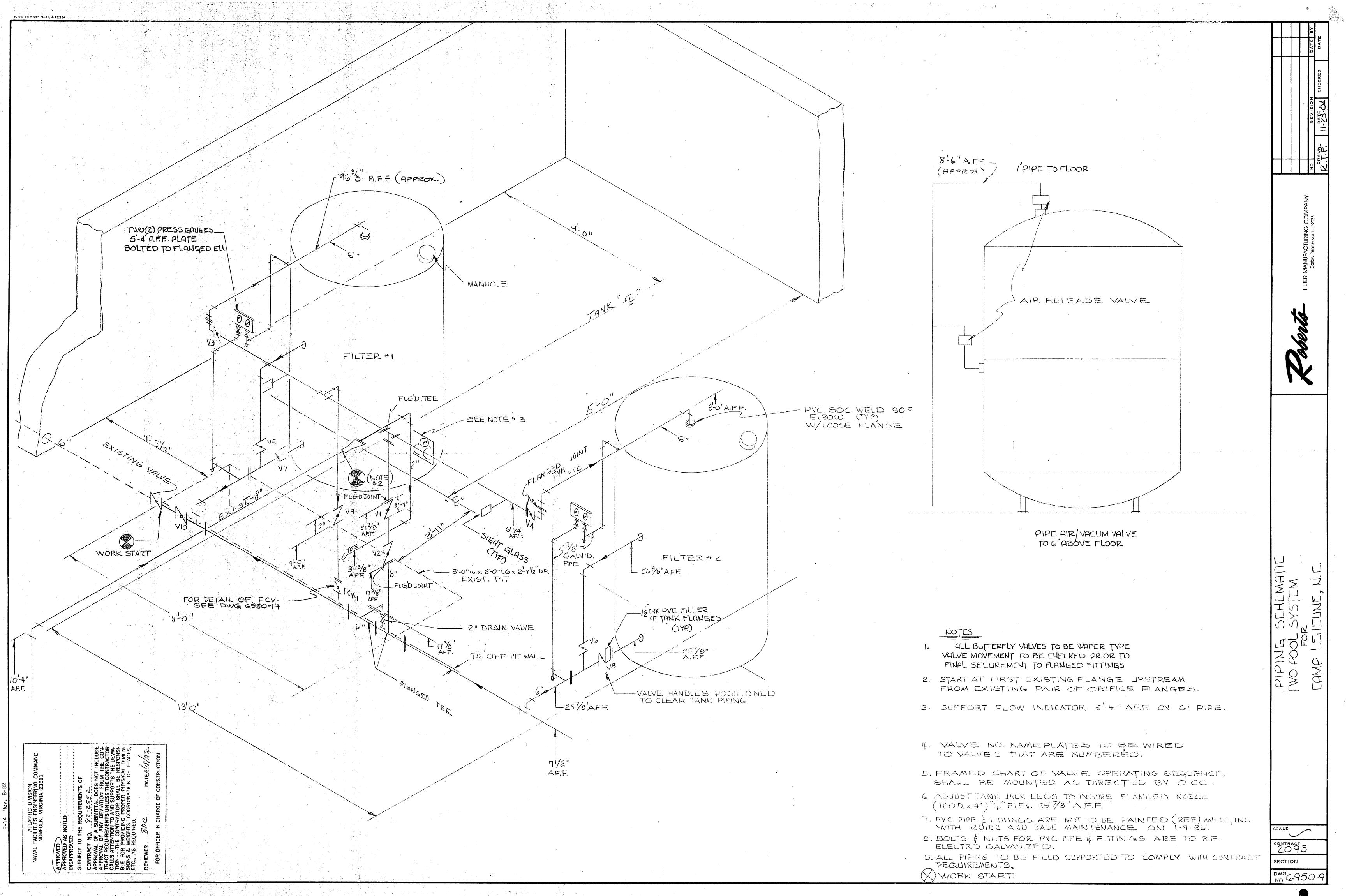
2 • · ·

.....



n to grade give to the test of test of the test of test of

3



:		-		4	
			-		
		:			
•	1. j.			89 A	
•					
				•	
				L j	
		ê e G			•
		4. W. S.			
		і. •			
:		2		· ·	і. - т
•	•				1.1
	т <u>а</u>				

··· · <u>-</u> ·

.

• .

.

•

· . • .

.

• .

t

. ,

. }

.

.

. .

i• •

H • .

.

•

•

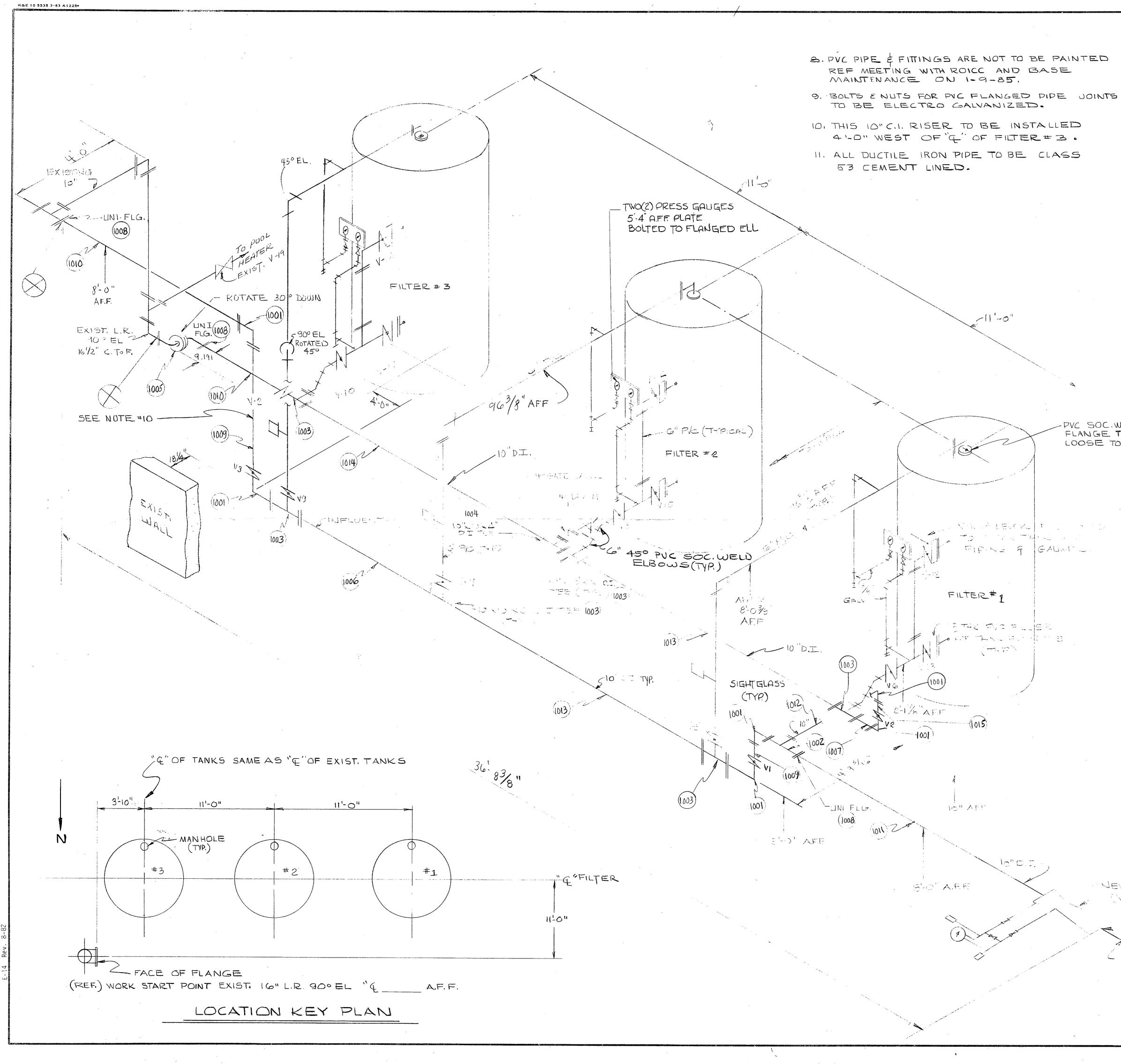
•

•

.

4 ,

•



NOTES: 1. ALL BUTTERELY VALVES TO BE WATER TYPE. VALVE MOVEMENT TO BE CHECKED PRIDE TO FINAL SECOREMENT TO FLANGED FITTINGS 2. EFFLUENT LINE LOWERED AND MADE CLOSER TO TANKS BY ROTATING THE 45" ELBOWS BOT, 3. ADJUST TANK JACK LEGS TO INSURE & OF 4" FLANGED NOZZLE (11"O.D. X 4" RED. FLANGE IS 25% A.F.F. 4. WORK START 5. THIS DRAWING TO BE USED FOR LAYOUT IN BLDG M-139 SYMBOL FOR CAST IRON / DUCTILE IRON PIPE & FTG'S. 6. 7. ALL PIPING TO BE FIELD SUPPORTED TO COMPLY WITH CONTRACT REQUIREMENTS, THE 10" C.I. PIPE (10" AFF.) TO BE SUPPORTED WITH FIELD POURED CONCRETE PADS TO FIT CONTOUR OF PIPE BALANCE OF C.I. PIPE TO BE SUPPORTED W/ HANGERS FROM CEILING OR FLOOR AS REQUIRED. 9'-0" A.F.F --I PIPE TO FLOOR (SPPROV 2 BORK FLANGE TO BE FURNISED LOOSE TO FIELD (TYP.) n5 1 NOTE#3 -----PIPE AIR/VAEUUM VALVE TO G'ABOVE FLOOR • () * TIN UI :M ATLANTIC DIVISION - UI NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED AS NOTED DISAPPROVED SUBJECT TO THE REQUIREMENTS OF CONTRACT NO. 82-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-NEW /MATINE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRACTOR CALLS ATTENTION TO AND SUPPORTS THE DEVIA-TION - - - THE CONTRACTOR SHALL BE RESPONSI-BLE FOR PROVIDING PROPER PHYSICAL DIMEN-SIONS & WEIGHTS, COORDINATION OF TRADES, ETC., AS REQUIRED. WITH GAUGE DATE 2/13/85 REVIEWER BDC EXISTING 10"C.I (Pool EEC ROULDT.ON) FOR OFFICER IN CHARGE OF CONSTRUCTION \mathbf{V} SCALE THIS DRAWING REPRESENTS THE DESIGN AND ENGINEERING EFFORTS OF ROBERTS FILTER MFG CO THIS DRAWING AND ASSOCIATED DOCUMENTS MAY NOT BE REPRODUCED. الازماد معرب مستعرير CONTRACT 2093 LOANED COPIED OR USED FOR ANY PURPOSE WITHOUT THE EXPRESS WRITTEN AUTHORIZATION SECTION OF ROBERTS FILTER MFG CO DWG. NO. 6950-11

, .

• • • ·· · · ·

· · · · · ·

`

.

.

•

.

•

		BMITTAL TRANSMITTAL	CONTRACT NO	TRANSMI	TTAL NO	DATE
LA	NTDIV NORFOLK 4-435	5/3 (Rev. 11-80)	N62470-82-B-2552	in It	12-D	2/12/85
RO	MCONTRACTOR	F	PROJECT TITLE AND LOCATION			1
	OBERTS FILTER	MANUFACTURING COMPANY	FILTER EFFLUEN	T CON	001 100	P - BLOG 2
.0 N	AVAL FACILITIE	S ENGINEERING COMMAND	1 2 to 1 to 1 to 1 to U to 1	1 0011		
		CONTRACTOR USE ONLY			REVIE	WER USE ONLY
	Lis	*List only one specification division t only one of the following categories on ea and indicate which is being subn OICC Approval	ch transmittal form,	1110-2010	A-Appro D-Disap AN-App	proved roved as noted eipt acknowledged. ments
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIF (Type, size, model no., M brochure nu	Mfg. name, dwg. or	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
	15440 Para.2.10.2	FILTER EFFLUENT	CONTROL			
	Para.2.10.2.1	Badger Venturi Meter		7	C	NFW 144 ZOFeb 8
>	2.10. 2 .3 throu 2.10.2.5	gh Fischer & Porter Contr	oller	7	A	1
3	2.10.2.2	Rosemount Flow Transmi	tter	7	A	
-	6950-6	Wiring Diagram - Efflu	ent Flow	7	RA	404 1 3/1/8.
1	A-8784-6	Proposed Piping Arrang	amant	7	C	V

N. A.

Hunt

COPY OF TRANSMITTAL AND SUBMITTALS TO ROICC		CONTRACTO	R REPRESENT TIVE (Signature)	
Lt. M. I. Kimball		7.0	. Mompson	
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	V	PROTOCI R	COBERTS

Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor calls attention to and supports the deviation.

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

enter 1

APPROVED. SEVERAL HEMS WERE PREVIOUSLY APPROVED BUT SUBMITTED HERE FOR INFORMATION ONLY. DATE SIGNATURE JUNE COPIES TO ROICC (2) LANTDIV (1) A-E (1) -1 MAR 1985 A U.S. GOP: 1983 - 739-003/2122 Region 3-11

27 MAR 1985 12-41

8000

ant**s**a Santa an Santa ang ang la se de ser s

5- 6

	NTRACTOR'S SUI	BMITTAL TRANSMITTAL	CONTRACT NO	TRANSM	ITTAL NO	DATE
	and the second s	5/3 (Hev. 11-80)	N62470-82-8-2552		-D	2/11/85
FROM	CONTRACTOR	and a second	PROJECT TITLE AND LOCATION			and the second second
	BERTS FILTER M	ANUFACTURING COMPANY	the second sector to the			
TO NA	VAL FACILTIES	ENGINEERING COMMAND	FILTER EFFLUENT	CONTI	ROL LOOP	- BLDG. 20
1		CONTRACTOR USE ONLY			REVIE	WER USE ONLY
	Lis Contractor Approved	*List only one specification division p t only one of the following categories on eac and indicate which is being submi OICC Approval	h transmittal form,	proval	A-Appro D-Disap AN-App	oproved proved as noted eipt acknowledged. ments
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFIC (Type, size, model no., Mi brochure nun	lg. name, dwg. or	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATI
6		Deviation Request of 12	/6/84	7	RA	Hrwige 20Febs
7		RFMCo Compliance		7	RA	1.4
8		Resubmittal of Transmit	tal 12-C	7	C	J
		(Pratt Valve)	and a second		a de cal	V
					1	S. 1996 1995
				198		1.2
CON	TRACTOR'S COMMENTS			12		

See attached sheet.

COPY OF TRANSMITTAL AND SUBMITTALS	STO ROICC	CONTRACTOR	REPRESENTATIVE (Signature)	~
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	0	то	
Submittals are returned with an tractor calls attention to and s	ction indicated. Approval of an item supports the deviation.	n does not include appre	oval of any deviation from the cont	ract requirements unless the con-
Submittals are forwarded to LA transmittal form.	ANTDIV with A-E recommendation	s indicated in REVIEWE	R USE ONLY Section and in comm	nents below on ONE COPY of the
REVIEWER'S COMMENTS		1.1.1.1.1.1.1.1.1		19 6
				1.1
		1000		
SEVERAL	ITEMS W	ERC	PREVIOUSCY	APPROLED
BUT SUB	MITTED -1 4	NE State 15	For INFOR	MATTON ONLY
COPIES TO ROICC (2) LANTDIV (1) A-E (1)	DATE	SIGNATURE	N N	

★ U.S. GOP: 1983 - 739-003/2122 Region 3-11

E7 MAR 1985 12 41



KEYSTONE VALVE — USA A Division of Keystone International. Inc.

F-504/507 INSTALLATION AND MAINTENANCE INSTRUCTIONS 3" - 24" (80 mm - 600 mm) (all classes) RUBBER-SEATED BUTTERFLY VALVE WITH FLANGED BODY

Flange Requirements

The F-504 valve is designed for installation between ANSI B16.1 class 125 flat faced flange (iron valves). The F-507 valve is designed for installation between ANSI B16.1 class 250 flat faced flange (iron valves). Full face flange gaskets are required. Any pipe with an inside diameter at the flange face greater than dimension "Q" may be used.

Installation Instructions

The valve may be lifted only by slings attached to the mounting plate or the flange holes; never by the actuator or valve body opening. Adjacent piping must be positioned so that minimal piping stresses are transmitted to the valve flanges during and after installation. NOTE: THE VALVE DISC MUST BE IN THE CLOSED, OR NEARLY CLOSED, POSITION BEFORE INSTALLATION OF THE VALVE IN THE LINE, TO PROTECT THE DISC SEATING EDGE.

The valve may be installed with the flow in either direction; however, seat replacement is facilitated when the disc flat is positioned downstream.

The valve shaft axis may be either vertical or horizontal. The valve shaft axis should be perpendicular to the plane of flow produced by a pump or fitting closer than the recommended six pipe diameters upstream of the valve to avoid unbalanced torque.

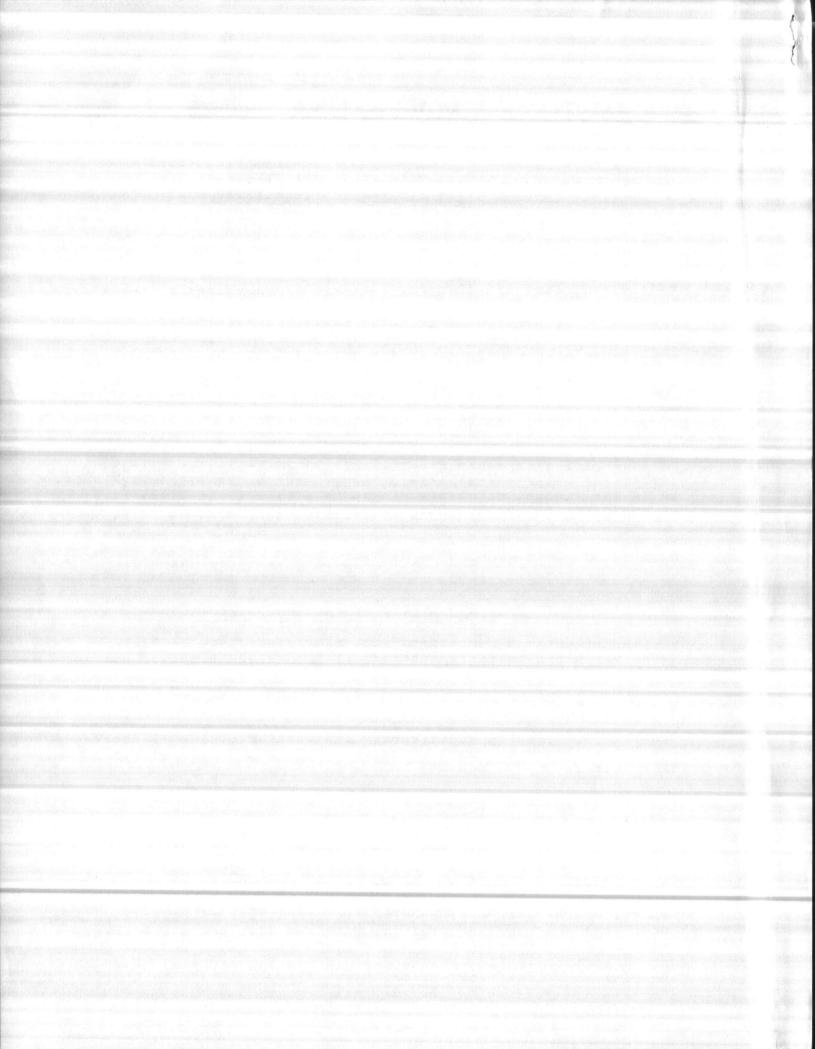
Disassembly

Complete disassembly and assembly instructions, plus illustrated parts lists, are available from your KEYSTONE VALVE exclusive distributor.

Seat Replacement

The Figure 504/507 seat is field replaceable with standard tools. The seat consists of three components: (1) seat in stainless backing, (2) stainless seat retaining ring, and (3) 0-ring.

Removal of the seat will require two standard screwdrivers. Locate the ends of the retaining ring and with one screwdriver, start to lift the ring from the slot in the body. Use the second screwdriver to advance the lifting process while holding the ring with the first screwdriver. After the ring is completely removed, apply force to the back side of the seat and pull from body.





In installing new seat, first place O-ring in proper groove. Lightly press fit seat into body, making sure proper level is toward the inside. The retainer ring is then slowly snapped back into the body.

Packing

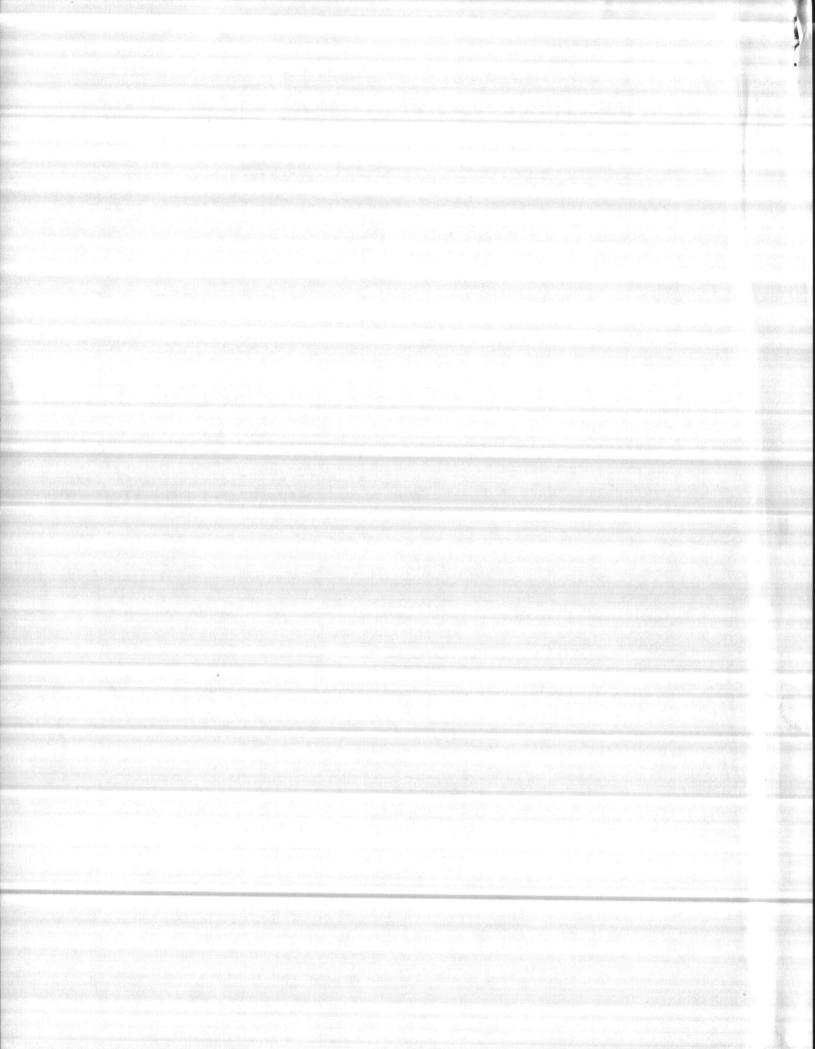
Packing utilized is self-adjustable and should be usable for the life of the valve.

Storage

Prior to installation, the F-504/507 valve should be stored in a clean, dry area. Prolonged exposure to temperature extremes may degrade the seat life. Power driven actuators should be protected per their storage instructions.

Operation-Exercise

Valve life will be prolonged if periodic exercising is performed. Keystone recommends the valves be operated for one full cycle at least once a year.





CABLE: WATERFILT PHILA. TELEX: 753-447

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

February 8, 1985

DEVIATION REQUEST

WITH

RFMCo COMMENTS

We refer to the discussions at the Naval Facilities on January 8, 1985 concerning the Keystone Valves as originally submitted by our transmittal No. 14. those present were Mr. Herb White and Mr. Jerry Haste of the Naval Command, Mr. George Gavlick of Keystone Valve and Mr. Gene Barry representing Roberts Filter Company.

It was suggested that we resubmit with special drawings, a torque chart, catalogs and compliance certificates. They are attached.

As also suggested, a sample actuator has been sent to Mr. J. Haste by Mr. Gavlik.

The deviations in actuator materials are as follows:

Cylinder Body - Fiberglass reinforced Cylinder Head - Steel Piston (8" valve & above) - Steel with rubber coating Piston (10" valve & above) - Steel plated Bearing Material - Bronze, permanent lubricity Tie Rod Matrial - Cadmium plated carbon steel

Note that the adjustable stops have been provided to assure that the valve can be positioned fully open or fully closed.

The above listed deviations would result in no change in cost or time to the Naval Command.

Signed J. C. Thompson Date 2-8-83

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897.

Loberts

CABLE: WATERFILT PHILA. TELEX: 753-447

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-8-2552

PROJECT SPECIFICATION SECTION 15440

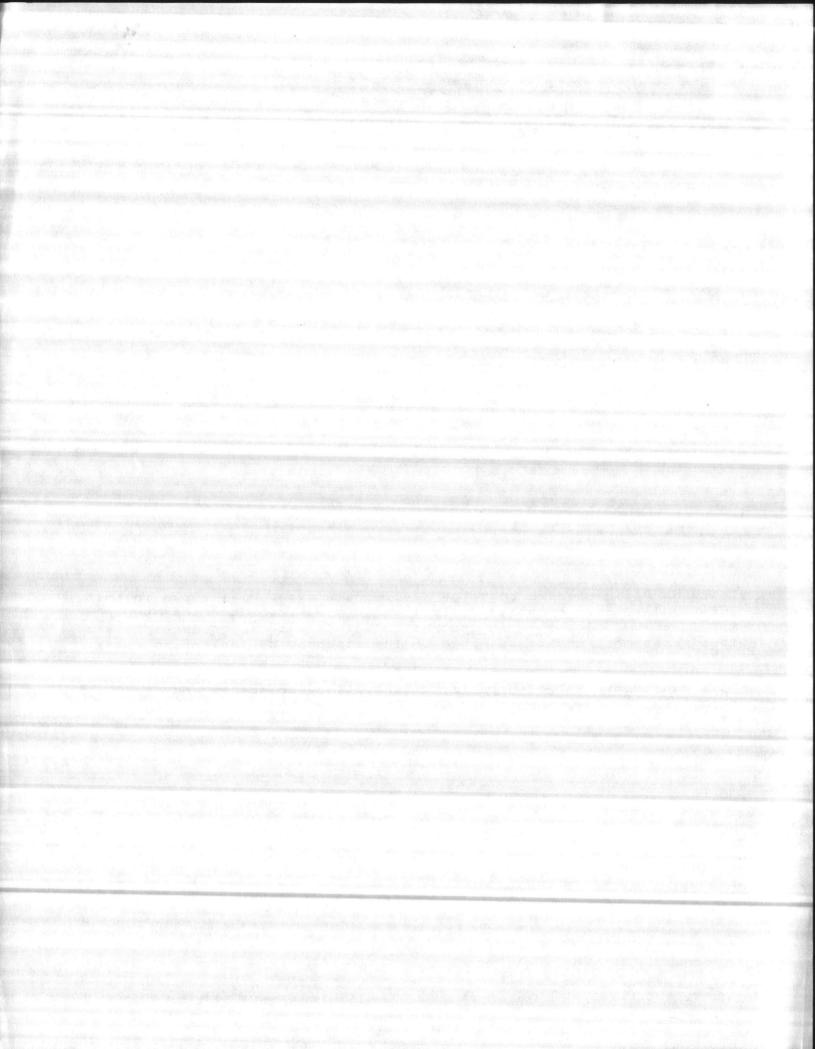
PARAGRAPH 2.3.2.4

It is hereby certified that the equipment and material shown in this submittal is that proposed to be incorporated into Contract Number N62470-82-B-2552 and is in accordance with the contract drawings and specifications, except as noted on the attached deviation request and letter.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

Certified By J.C. Kompson Date 2-8-85

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897 .



70 mz	
- 100	CONTRACT NO

2

CONTRACTOR'S SUBMITTAL TRANSMITTAL

NAVAL CALIFILS ENGINEERING COMMAND

LANTDIV NORFOLK 4-4355/3 (Rev. 11-80)

FROM CONTRACTOR

ROBERTS FIL

TO

462470-02-8-255 PROJECT TITLE AND LOCATION ER MANUFACTURING COMPANY

TRANSMITTAL NO

DATE

REPLACE EQUERIMENT - SUILDING 20

-	and the second second	REVI	EWER USE ONLY		
	L Contractor Approved	A-Appr D-Disa AN-App	pproved proved as noted ceipt acknowledged. ments		
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICATION (Type, size, model no., Mfg. name, dwg. or brochure number)	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
	Para. 2. 0. 2. 4	KEYSTORE GUTTERFLY HALVES			and the second
1	CA-027440	4° Valve with F-765 Actuator	7	A	HFW1406 14 Feb 85
2	04-27450	10" to 18" Valve with F-785 Actuator	7	A	T
3	510322	Actuator Torsional Output	7	RA	
	talog	Fig. 785 Cylinder Actuator	7	A	
	Catalog	Fig. 504 APMA Butterfly Valve	7	A	V

CONTRACTOR'S COMMENTS

COPY OF TRANSMITTAL AND SUBMITTALS TO ROICC		CONTRACTOR REPRESENTATIVE (Signalure)			
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	.0	то	11 / Robrass	

No CHANGE IN G.

OF THIRE .

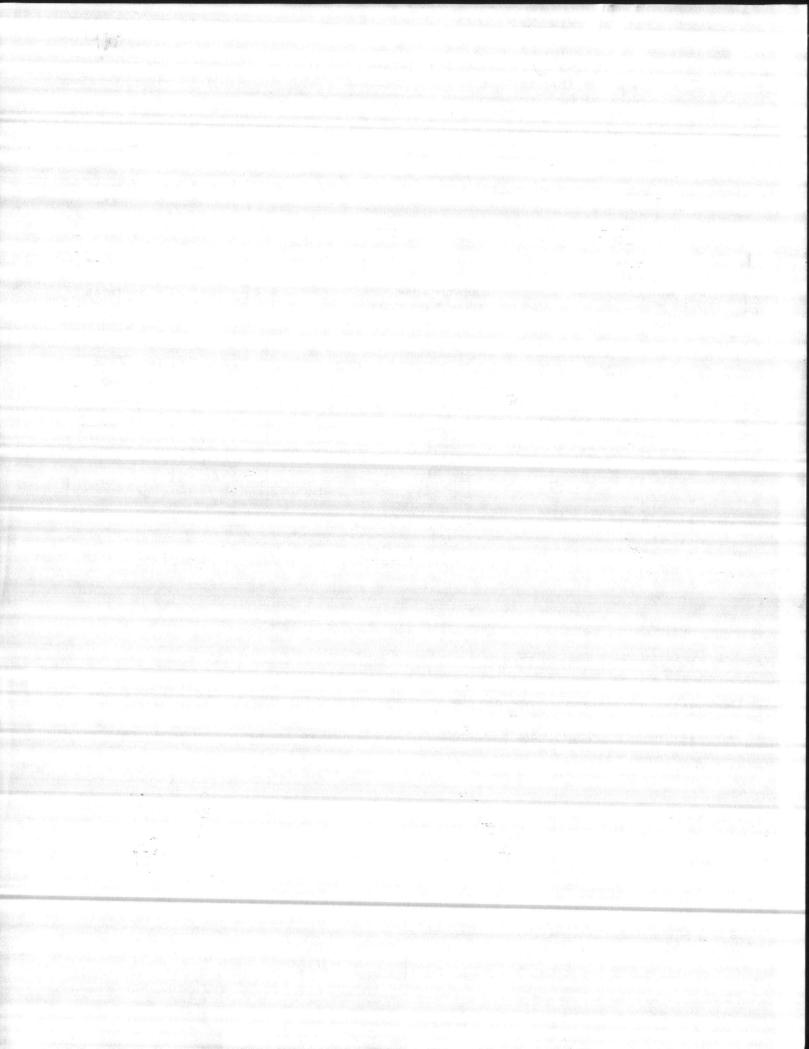
APPRINCO

Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the con-tractor calls attention to and supports the deviation.

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

COPIES TO	DATE	SIGNATURE
ROICC (2) LANTDIV (1)	114115	1 1 h ha the
A-E (1)	61110-	V 11 ving A



CONTRACTOR'S SUBMITTAL TRANSMITTAL		CONTRACT NO	TRANSMI	TTAL NO	DATE
TDIV NORFOLK 4-43	55/3 (Rev. 11-80)	No2470-62-5-205	1 1	4-A	2/8/85
CONTRACTOR	an and a star and a second	PROJECT TITLE AND LOCATION	11 - Here -	and a start of the second s	
SERTS FILTER M	MANUFACTURING COMPANY				MC 90
		REPLACE EQU.	[PHLM1]	- BUILD.	ING 20
VAL FACILITIES				REVIE	WER USE ONLY
Li Contractor Approved	*List only one specification division p st only one of the following categories on eac	th transmittal form, itted	Approval	A-Appro D-Disap AN-App RA-Rec C-Comr	proved roved as noted eipt acknowledged. nents
PROJ. SPEC. SECT.	(Type, size, model no., M	ifg. name, dwg. or	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
Letter	Keystone Valve Compliance	ce	7	RA	HEN1406 14 Feb 8
	Deviation Request		7	RA	
W 12 to	RFMCo Compliance	RFNCo Compliance 7			
Bulletin	Installation, Maintenance Instructions		7	RA	V
				and and the set	and the second second
the second second second			1000		
	TDIV NORFOLK 4-43	ITDIV NORFOLK 4-4355/3 (Rev. 11-80)	ITDIV NORFOLK 4-4355/3 (Rev. 11-80) Incontractor Incontractor PROJECT TITLE AND LOCATION SERTS FILTER MANUFACTURING COMPANY REPLACE EQUI IAL FACILITIES ENGINEERING COMMAND REPLACE EQUI CONTRACTOR USE ONLY "List only one specification division per form. List only one of the following categories on each transmittal form, and indicate which is being submitted Contractor Approved OICC Approval Image: Deviation/Sule PROJ. SPEC. SECT. ITEM IDENTIFICATION & PROJ. SPEC. SECT. ITEM IDENTIFICATION & PROJ. DWG. NO.* Keystone Valve Compliance Deviation Request RFHCo Compliance	ITDIV NORFOLK 4-4355/3 (Rev. 11-80) MC2470-6-1-253 I ICONTRACTOR PROJECT TITLE AND LOCATION SERTS FILTER MANUFACTURING COMPANY REPLACE EQUIPMENT IAL FACILITIES ENGINEERING COMMAND REPLACE EQUIPMENT CONTRACTOR USE ONLY List only one specification division per form. List only one of the following categories on each transmittal form, and indicate which is being submitted Contractor Approved OICC Approval Deviation/Substitution For OICC Approval PROJ. SPEC. SECT. ITEM IDENTIFICATION (Type, size, model no., Mig. name, dwg. or brochure number) 50 20 0 I.etter Keystone Valve Compliance 7 Deviation Request 7 RFHCo Compliance 7	ITDIV NORFOLK 4-4355/3 (Rev. 11-80) Item 12470-1-053 14-A ICONTRACTOR PROJECT TITLE AND LOCATION SERTS FILTER MANUFACTURING COMPANY REPLACE EQUIPMENT - DUILDI IAA REVIE IAA REVIE IAA Review IAAA Review IAAA Review IAAA Review IAAA Review IAAA Review IAAA Review IAAAA Review IAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

COPY OF TRANSMITTAL AND SUBMITTALS	TO ROICC	CONTRACTOR	REPRESENTATIVE (Signaluro)	
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	0	Ronalk.	117 73

Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor calls attention to and supports the deviation.

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

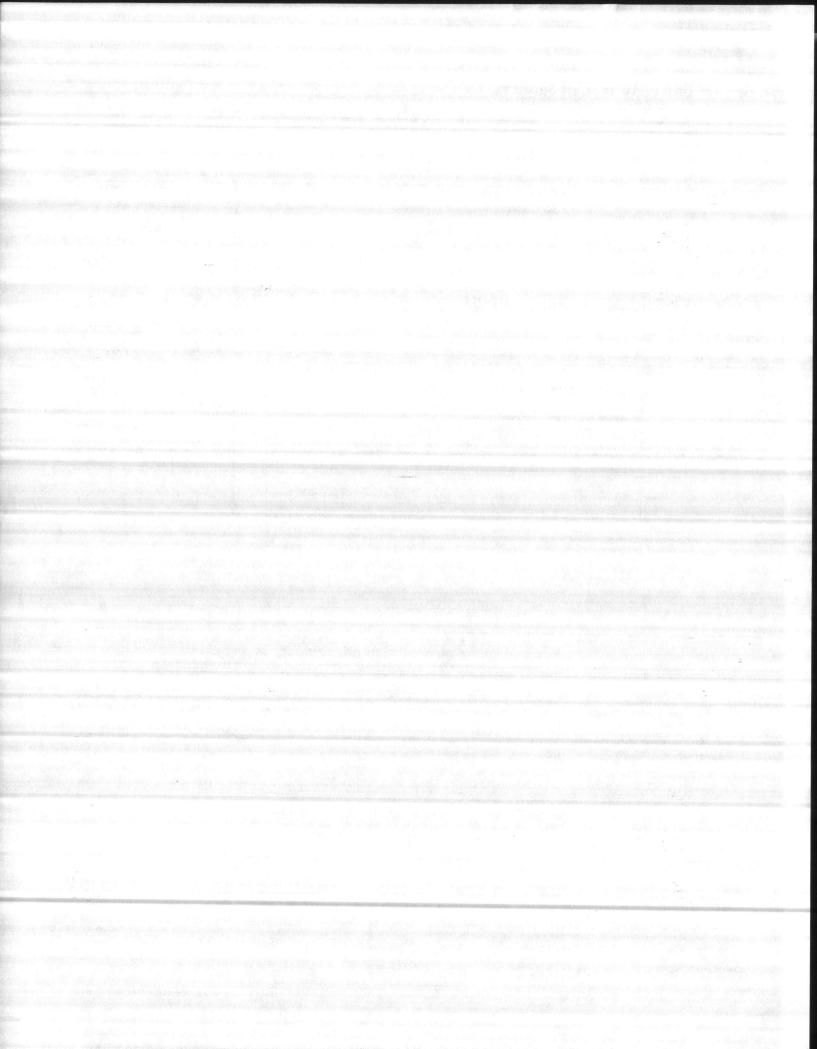
No CHANGE IN G.T.

APPRO-00"

REVIEWER'S COMMENTS

V

OPIES TO:	DATE	SIGNATURE	
ROICC (2) LANTDIV (1)	mid.		1 bata at 1
A-E (1)	1.1.11	92 V	11 transity -



1		70				
	NTRACTOR'S SUNTEDIV NORFOLK 4-43	IBMITTAL TRANSMITTAL 55/3 (Rev. 11-80)	CONTRACT NO N62470-82-8-255		ITTAL NO	DATE 2/8/85
FROM CONTRACTOR ROBERTS FILTER MANUFACTURING COMPANY			PROJECT TITLE AND LOCATION REPLACE EQUIPMEN			
	VAL FACILITIES	S ENGINEERING COMMAND	INTERNOL SOUDITIES		2 Q J. La D. A. 1997	10
		CONTRACTOR USE ONLY		2	REVIE	WER USE ONLY
	Li Contractor Approved	*List only one specification division p st only one of the following categories on eac. and indicate which is being submi OICC Approval	h transmittal form,		A-Appro D-Disap AN-App	proved roved as noted eipt acknowledged. nents
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFIC (Type, size, model no., Mi brochure nun	ig. name, dwg. or	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
1	15440 Para.2.3.2.4	KEYSTONE BUTTERFLY V	ALVES			
	CA-027440	4" Valve with F-785 Actu	ator	7		
	CA-27450	10" to 18" Valve with F-785 Actuator 7				
5	SM0322	Actuator Torsional Outpu	t	7		
ł	Catalog	Fig. 785 Cylinder Actuat	or	7		
5	Catalog	Fig. 504 AWWA Butterfly	Valve	7		

CONTRACTOR'S COMMENTS

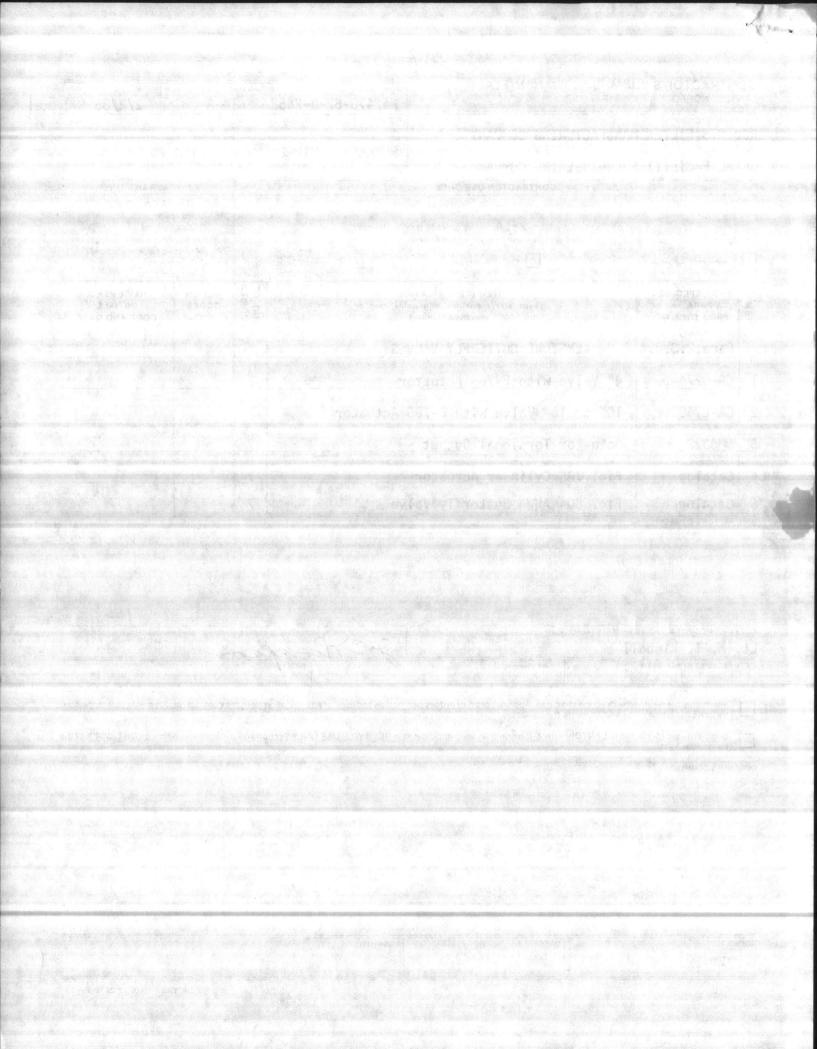
COPY OF TRANSMITTAL AND SUBMITTALS TO ROICC		CONTRACTOR REPRESENTATIVE (Signature)			
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	0	TO		
	1				

Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor calls attention to and supports the deviation.

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

COPIES TO	DATE	SIGNATURE		
ROICC (2) LANTDIV (1) A-E (1)	a series of the second	et e l'anna anna ann an Anna an An		



4-A 2/8/8
- BUILDING 20
- BUILDING 20
REVIEWER USE ONLY
A-Approved D-Disapproved AN-Approved as noted RA-Receipt acknowledg C-Comments R-Resubmit
ACTION REVIEWER CODES INITIALS CODE AND I
13 6

CONTRACTOR'S COMMENTS

COPY OF TRANSMITTAL AND SUBMITTALS TO ROICC		CONTRACTOR REPRÉSENTATIVE (Signalure)			
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	0	10		

Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor calls attention to and supports the deviation.

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

RECKI ED ROICC JAXNCA

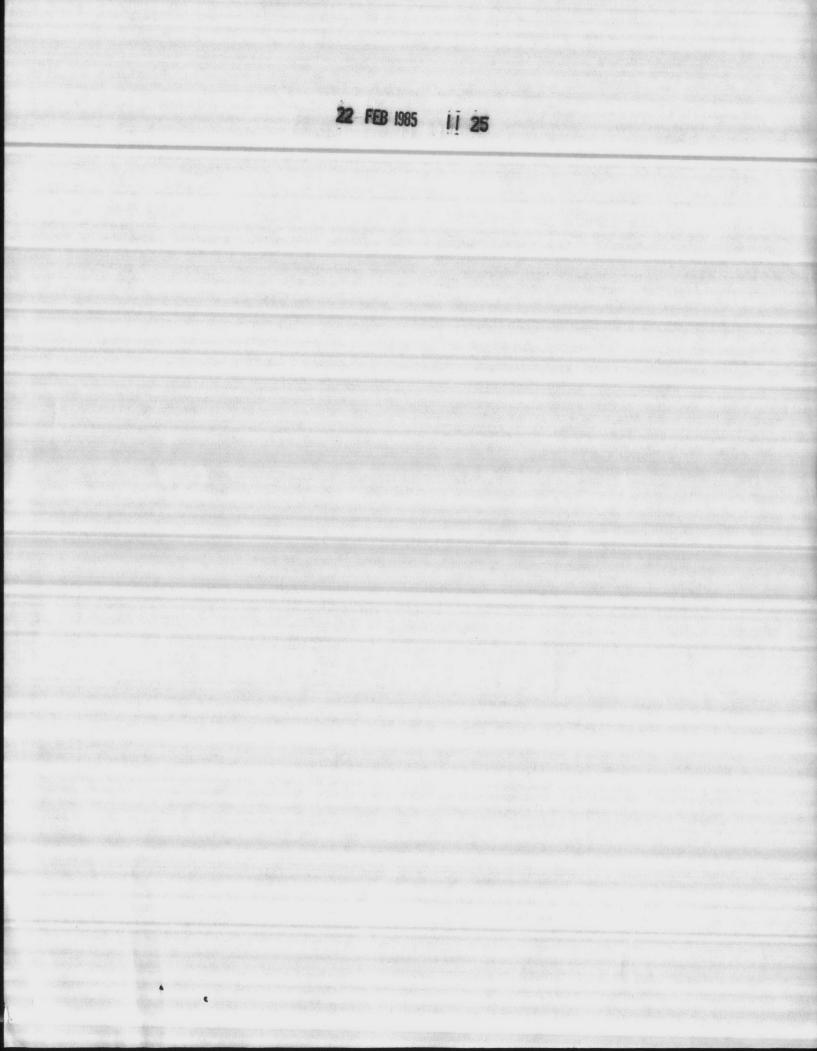
FEB 11 10 38 PM 85

COPIES TO	DATE	SIGNATURE	
ROICC (2) LANTDIV (1) A-E (1)	ante esta de la facta de la companya de la company Ante esta de la companya de la company		
R-E (1)	Party and the second second second	and the second second second second second	

FEB 11 10 38 PM '85 RECEIVED ROICC JAXNCA

	NTRACTOR'S SI	UBMITTAL TRANSMITTAL	CONTRACT NO		MITTAL NO	DATE
	A CONTRACTOR		N62470-82-B-2	and the second sec	12-0	2/6/85
	and the second	R MANUFACTURING CO.	REPLACE EQU			NG 20
N	VAVAL FACTLIT	IES ENGINEERING COMMAND	CAMP LE JEUI		- DUILDI	Nu 20
-	VITIL TRULLI	CONTRACTOR USE ONLY				EWER USE ONLY
		*List only one specification division pe	OLL	01/11	A-App	
	Ĺ	ist only one of the following categories on each and indicate which is being submit		EWEN	AN-AP	pproved proved as noted
]	Contractor Approved	OICC Approval	Deviation/S For OIC	Substitution C Approval	C-Com R-Resu	
	PROJ. SPEC. SECT. & PARA. and/or	ITEM IDENTIFIC	ATION TE LAN	TDIVE	ACTION	REVIEWER'S
	PROJ. DWG. NO. *	(Type, size, model no., Mf brochure num	iber)	E 058 5	W.	INITIALS CODE AND DATE
	15440 Para. 2.3.2.	B ELECTRICALLY OPERATI	ED VALVE	FILE	Y	
	"	Statement of the second second second		7	AN/	HFW1406
		Pratt Electric Operator ·	- burrecini 182		RA	19 FEB 85
1		Pratt Letter of 2/1/85		7	RA	
		Deviation Request and Cor	mments	7	RA	
	II	RFMCo Compliance		7	RA	V
15	TRACTOR'S COMMENTS					
N	TRACTOR'S COMMENTS					
PY	OF TRANSMITTAL AND SU	IBMITTALS TO ROICC	CONTRACTOR REPRESENTAT	TIVE (Signature)		
PY		IBMITTALS TO ROICC	CONTRACTOR REPRESENTAT	TIVE (Signature)		<u> </u>
	OF TRANSMITTAL AND SU M. I. Kimba	IBMITTALS TO ROICC	J.C. The	TIVE (Signature)	m CC/	ROBERTS F.
	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER 2/12- Submittals are returned	IBMITTALS TO ROICC	9.C. The 10 10	Rol	m CC/	Roberts A
	M. I. Kimba M. I. Kimba RECEIVED BY REVIEWER 2/12 Submittals are returned tractor calls attention	IBMITTALS TO ROICC 11 FROM (Reviewar) FROM (Reviewar) AMMAN	s not include approval of any dev	Rol (AN CC/ the contract re	
PPY	M. I. Kimba RECEIVED BY REVIEWER 2/12 Submittals are returned tractor calls attention Submittals are forware transmittal form.	IBMITTALS TO ROICC 11 FROM (Reviewar) FROM (Reviewar) Marcon indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi	s not include approval of any der	Roll Roll viation from	the contract re	below on ONE COPY of the
	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER 2/12 Submittals are returned tractor calls attention Submittals are forwar transmittal form. EWER'S COMMENTS ONE TRAT	BMITTALS TO ROICC 11 FROM (Reviewar) AMAMMU ad with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi OR IS APPROVED	a not include approval of any der cated in REVIEWER USE ONLY	Roll Roll viation from Section and D _e	the contract re in comments	E AUXILLAN
	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER 2/12 Submittals are returned tractor calls attention Submittals are forwar transmittal form. EWER'S COMMENTS ONE TRAT	IBMITTALS TO ROICC 11 FROM (Reviewar) FROM (Reviewar) Marcon indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi	a not include approval of any der cated in REVIEWER USE ONLY	Roll Roll viation from Section and D _e	the contract re in comments	E AUXILLAN
	OF TRANSMITTAL AND SU M. I. Kimba PRECEIVED BY REVIEWER 2/12 Submittals are returned tractor calls attention Submittals are forware transmittal form. Submittals are forware transmittal form. Submittals are forware transmittal form.	IBMITTALS TO ROICC 11 FROM (Reviews) FROM (Reviews) AMADIV ad with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi add to LANTDIV with A-E recommendations indi	A NOTEX DECATORS	NAS	$\frac{\delta \mathcal{N}}{CC/}$ the contract re in comments $\frac{\delta \mathcal{P} \mathcal{E}}{\mathcal{S} \mathcal{P} \mathcal{E}}$	E AUXILLAN
	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER 2/12 Submittals are returned tractor calls attention Submittals are forwar transmittal form. EWER'S COMMENTS OPERAT MAN VAL E 2 VAL	BEMITTALS TO ROICC 11 FROM (Reviewar) AMMBIN ad with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi OR IS APPROVED AMMOWHEEL NE DIMENSION	$\frac{1}{10}, \frac{1}{10}, \frac{1}{10}$ To To To To To To To To To To	$rac{mps}{Roll}$ viation from $rac{mps}{rac{s}}$ Section and $rac{s}{rac{s}}$ $rac{s}{rac{s}}$ $rac{s}{rac{s}}$	$\frac{M}{CC/}$ the contract re in comments $\frac{DRSVID}{SPE}$	E AUXICLAN ECIFIEDE ATTON HASI
	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER 2/12 Submittals are returned tractor calls attention Submittals are forwar transmittal form. WER'S COMMENTS OPERAT MANUAL E 2 VAL EN SUBM	IBMITTALS TO ROICC 11 FROM (Reviewar) AMMBIN ad with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi add to LANTDIV add to LANTDIV add to LANTDIV	$\frac{\int C \cdot f_{KB}}{\int}$ To To To To To To To To To To	$rac{mps}{Roll}$ viation from $rac{mps}{rac{s}}$ Section and $rac{s}{rac{s}}$ $rac{s}{rac{s}}$ $rac{s}{rac{s}}$	$\frac{M}{CC/}$ the contract re in comments $\frac{DRSVID}{SPE}$	E AUXICLAN ECIFIEDE ATTON HASI
	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER 2/12 Submittals are returned tractor calls attention Submittals are forwar transmittal form. WER'S COMMENTS OPERAT MANUAL E 2 VAL EN SUBM	IBMITTALS TO ROICC 11 FROM (Reviewar) AMMBIN ad with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi add to LANTDIV add to LANTDIV add to LANTDIV	$\frac{\int C \cdot f_{KB}}{\int}$ To To To To To To To To To To	$\frac{mps}{Roll}$ viation from r Section and D_{e} p As As as as bs h	DEVII DEVII	E AUXILLAN ECIFIEDS ATTON HASI VOTED AS L
	OF TRANSMITTAL AND SU M. I. Kimba RECEIVED BY REVIEWER 2/12 Submittals are returned tractor calls attention Submittals are forwar transmittal form. WER'S COMMENTS OPERAT MANUAL E 2 VAL EN SUBM	BEMITTALS TO ROICC 11 FROM (Reviewar) AMMBIN ad with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi OR IS APPROVED AMMOWHEEL NE DIMENSION	$\frac{\int C \cdot f_{KB}}{\int}$ To To To To To To To To To To	$\frac{mps}{Roll}$ viation from r Section and D_{e} p As As as as bs h	DEVII DEVII	E AUXICLAN ECIFIEDE ATTON HASI

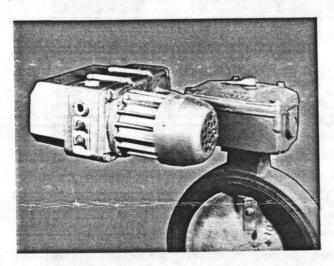
an in ST



			40-05		(-05
		•	$()^{\prime}$	-	· Antipa di	Connie
	NTRACTOR'S SU ITDIV NORFOLK 4-43	JBMITTAL TRANSMITTAL			TTAL NO	DATE
	CONTRACTOR		PROJECT TITLE AND LOCATION		12-C	2/6/85
-		R MANUFACTURING CO.		-		NO 00
)			REPLACE EQUIPMI		- BOILDI	NG 20
N	NAVAL FACILIT	LES ENGINEERING COMMAND				EWER USE ONLY
		*List only one specification division per	form.	-		CTION CODES
٦	L Contractor Approved	ist only one of the following categories on each to and indicate which is being submitte OICC Approval	ansmittal form	D	AN-AP	pproved proved as noted ceipt acknowledged.
-	Contractor Approved	OICC Approval	For OICC Apr	989 proval	E C-Com R-Resu	
	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICA (Type, size, model no., Mfg. brochure numbe	name, dwg. or CODE O		ODES	REVIEWER'S INITIALS CODE AND DATE
	15440 Para. 2.3.2.	3 ELECTRICALLY OPERATED	VALVE STITUT	E	Y	
	"	Pratt Electric Operator -		7	AN	HFW/406 19FEB 85
	a se u	Pratt Letter of 2/1/85		7	RA	in the second second
			anta	7	RA	
		Deviation Request and Comm			0.	
_	U	RFMCo Compliance		7	KA	W
	OF TRANSMITTAL AND SU		CONTRACTOR REPRESENTATIVE (S	ignature)	,	
	M. I. Kimba	and the second secon	J.C. Thom	pe	m	
	2-112:	ISS FROM (Beviewar)	To R	010	CC/	ROBERT FI
K	Submittals are returned	d with action indicated. Approval of an item does n	ot include approval of any deviation	n from	the contract re	
4	tractor calls attention	to and supports the deviation.				
]	Submittals are forward transmittal form.	ded to LANTDIV with A-E recommendations indica	ted in REVIEWER USE ONLY Secti	on and	in comments I	below on ONE COPY of the
VIE	EWER'S COMMENTS		A Alaton		2	1
	OPERAT	or is APPROVED	TO IVVIED.	P	ROVIDO	= HUXICLAR
	MALIAI	GAT HANDWHEEL C	PERATORS 1	As	SPE	CIFIEDS
				in the second second		
07	E: VAL	VE DIMENSION	(10" To 8")	DEVI	ATTON HASN
Be	EEN SUBA	NITTED AS SUCH				
2	EVIATION	1				OICE CAMIL
DPI	ES TO	DATE	KED IT -	16	K	orce (Amile
L	OICC (2) ANTDIV (1) -E (1)	2/19/85	Masto			
			/		TUS GOP	1983 - 739-003/2122 Region 3-11

22 FEB 1985 11 25

POSITRON[®] 'MOTOR-ACTUATED MDT **ELECTRIC OPERATORS**



The Pratt Positron electric motor operator affords maximum flexibility in controlling valve function and position. The unit is specifically designed for reliable valve operation encountered in water/air service.

The Positron unit mounts directly to the Pratt MDT operator. It is available in five model series, each designed to match individual application requirements. The five series designations are: 100, 200, B200, 300 and B300.

FOR VALVE APPLICATIONS **REQUIRING REMOTE OR** AUTOMATED CONTROL USING ELECTRIC MOTORS

Features

- Weather-Tight Housing—Heavy cast aluminum, fully gasketed for dependable service under conditions of high moisture and humidity environments.
- Heavy-Duty Motors-single and 3-phase units to suit 115VAC, 230VAC and 460VAC inputs, with thermal overload protection and limit switches to prevent valve overtravel . . . smaller sizes rated for continuous duty operation.
- Internal Heaters—built into all units to prevent condensation damage within the controls compartment.
- Manual Override-all units have wrench flats on drive 57 shaft for manual operation in event of power failure.
- Fully Assembled-each motor/operator is shipped completely assembled with motor and controls mounted to the applicable Pratt MDT unit.

Note: Pratt Positron/MDT operators are available only with Pratt butterfly valves.

Drive Train

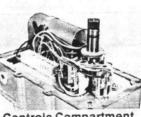
Drive train consists of an integral triple reduction helical gear reducer available with three or four ratios, depending on the model series. On the Positron Series 100, 200 and B200 units, up to three speeds of operation are available: 60, 120 or 180 seconds. On the Series 300 and B300 units, up to four operation speeds are available: 40, 60, 90 and 120 seconds. The minimum and maximum speeds obtainable with any particular gear train will vary with size of valve, line pressure and flow velocity. Helical gears and shafts are made of alloy steel and heat-treated for hardness with all shafts mounted in bearings. The gear box is completely sealed and weatherproof, conforming to NEMA IV specifications, and is grease filled for permanent lubrication.

Controls

A separate compartment is provided for all electrical controls, including four travel-limit switches, an anti-condensation hea-

ter element, a self-resetting thermal cutout switch for motor overload and a multi-contact terminal block for all external connections. Two of the limit switches are pre-wired into the motor control circuit and the other two are available for external signal circuits. The compartment is fully gasketed and completely weatherproof, provided the electrical conduit connection ports are sealed.

1 1 Gear Box



Controls Compartment

Positron Series	MDT Model	Valve Size	Electrical Characteristics	Current I Running	Rating (Amps) Locked Rotor	Thermal Overload Protection	Heater(s)	Limit Switches	Manual Override
- 100	2.3&4	3"—20"	115V AC, 60 Hz, 1 PH	1.9	3.7	Yes	Yes-2	Yes-4†	Yes
200	2.3&4	3"—20"	230V AC, 60 Hz, 3 PH	1.0	1.8	Yes	Yes—1	Yes-4	Yes
B200	2.3&4	3"—20"	460V AC, 60 Hz, 3 PH	0.5	1.0	Yes	Yes—1	Yes-4	Yes
300	5	24" and up	230V AC, 60 Hz 3 PH	4.0	12.2	Yes	Yes—1	Yes-4	Yes
B300	5	24" and up	460V AC, 60 Hz, 3 PH	2.0	6.1	Yes	Yes—1	Yes-4	Yes

*The application of Positron and MDT operators to a specific valve size depends upon line pressure and velocity as well as speed of operation. Your Pratt Sales Engineer can furnish you with precise information to suit your particular needs. Two switches included in units equipped with Positac positioning system.

PERSON MOTOR-ACTUATED MDT ELECTRIC OPERATORS Bulletin 182

Operator Selector Chart*

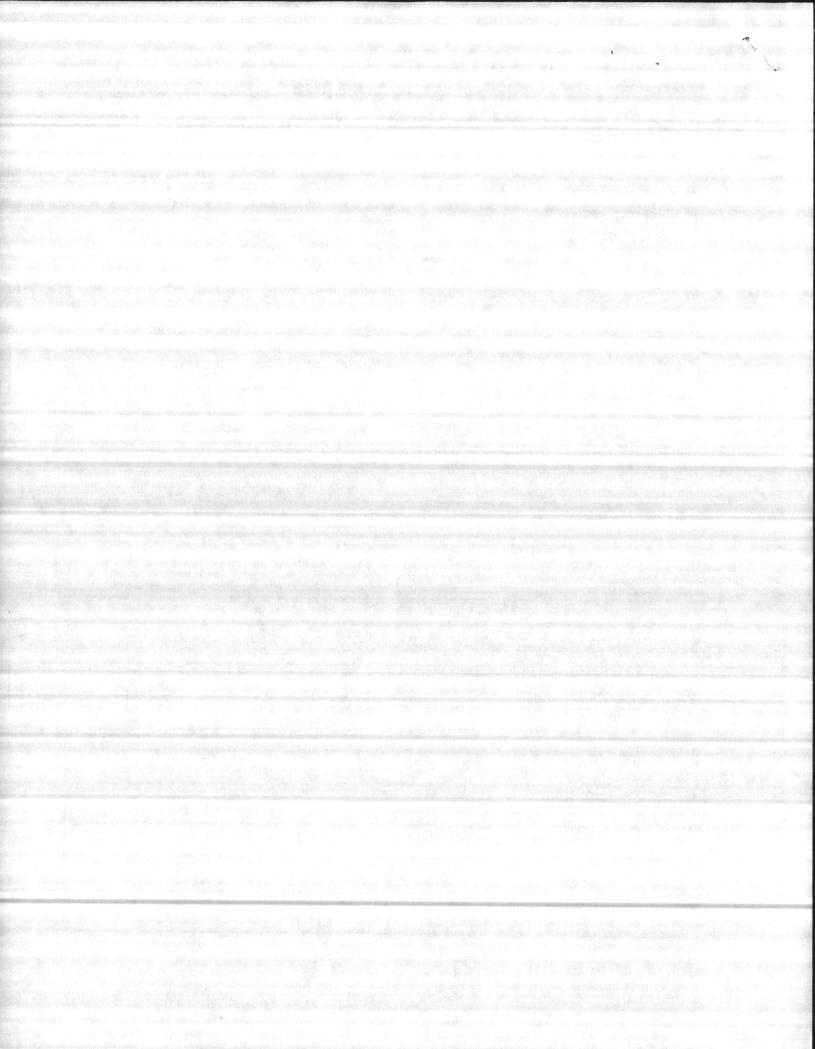
Bulletin 182

PRATT

HENRY PRATT COMPANY

401 South Highland Avenue Aurora, Illinois 60507

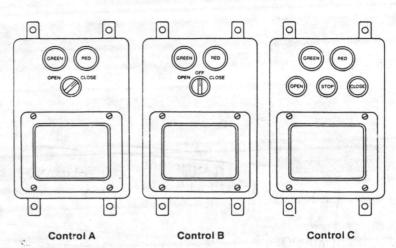
Creative engineering for fluid systems



Control Stations

Three types are available . . . all are NEMA IV enclosures and are pre-wired and number coded to the Positron multi-contact terminal block. All units have open/close indicating lights, and are furnished with holding relays, reversing starters and control transformers where required.

- Control A (Positron 100 series only) One button, 2 position (Open-close) Indication — 2 lights (red, green)
- Control B (Positron 100 series only) One button, 3 position (Open-off-close) Indication — 2 lights (red, green)
- Control C (All Positron series) Three pushbuttons (Open-stop-close) Indication — 2 lights (red, green)



Extensions & Accessories

Accessories available include three pre-wired control stations with indicating lights (described above). A valve position transmitter and feedback potentiometer, which mounts directly to the MDT operator housing, is available for remote indication of valve disc position. Also available is Pratt Positac proportional servo-amplifier for use with the Positron 100 motor operator. Pratt extensions include floorstands, extension bonnets or external packing bonnets.

POSITAC[®] Positioning System

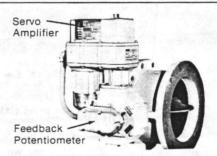
The Positac System is a solid-state device designed for use with the Positron 100 Series motor operator, to permit motorized valve throttling control in conjunction with automated process control systems.

The unit consists of a proportional-position servo-amplifier installed within the standard Positron control compartment, plus a valve-position feedback potentiometer mounted on the cover of the Pratt MDT operator. It is furnished complete and requires no accessories or other components. (If required by customer, externally mounted limit switches are available as an extra-cost accessory.)

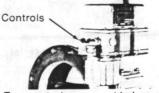
The system, in effect, enables the DC milliampere command signal from most standard process controllers to drive the valve operator's AC motor. It balances the command signal against the feedback signal from the valve-position potentiometer. Sensing the magnitude and direction of the error between these two signals, it actuates the Positron motor in the proper direction and as long as necessary to reduce the signal error to zero.

Positac is factory calibrated to the specified range of input signal. Normally this input signal is 4 to 20 MADC (standard) although other input signal ranges are available. Only two connections are required for Positac to be fully operational: the 115VAC (nominal) power line and the input signal line. Once connected, the system is activated and automatic control is accomplished by the process controller. When required, the unit can be controlled by an electrical switch on the Positron unit. In addition, wrench flats are provided for manual operation.

Another safety feature has been incorporated which maintains the valve disc in the "as-is" position upon loss of input signal independent of whether power is maintained to the motor.



Positron controls compartment housing cut away to illustrate mounting of servoamplifier within unit. Note feedback potentiometer mounted to side of MDT operator housing.



Two controls are provided on gear box of Positron 100 with Positac. MANUAL/AUTO switch has two positions and selects desired mode of operation. The OPEN/STOP/ CLOSE switch is activated when the mode selector switch is in the MANUAL position.

All information contained herein was correct at time of publication. Illustrations in this bulletin are typical. Equipment supplied may vary slightly from that shown. Henry Pratt Company reserves the right to make changes in specifications shown herein or add improvements at any time without obligation or notice.



HENRY PRATT COMPANY, 401 South Highland Avenue, Aurora, Illinois 60507 Creative engineering for fluid systems.

	LANTIC DIVISION IES ENGINEERING COMMAND OLK, VIRGINIA 23511
CONTRACT NO. APPROVAL OF A APPROVAL OF TRACT REQUIR TOR CALLS AT DEVIATION-T RESPONSIBL PHYSICAL DIM TION OF TRAD	E REQUIREMENTS OF <u>82-2552</u> A SUBMITTAL DOES NOT INCLUDE ANY DEVIATION FROM THE CON- REMENTS UNLESS THE CONTRAC- TENTION TO AND SUPPORTS THE THE CONTRACTOR SHALL BE THE CONTRACTOR SHALL BE THE FOR PROVIDING PROPER MENSIONS & WEIGHTS, COORDINA DES, ETC., AS REQUIRED.

DEVIATION: APPROVED ~ Noted 1

DISADDODOVICT

HFW 19Filde

*

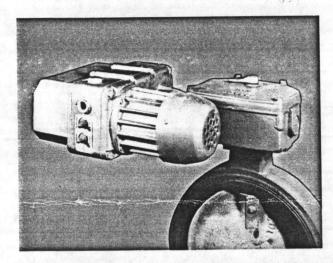
LANTDIV REVIEWER DATE

POSITRON[®] MOTOR-ACTUATED MDT ELECTRIC OPERATORS

Bulletin 182

PRATT

HENRY PRATT COMPANY 401 South Highland Avenue Aurora, Illinois 60507 Creative engineering for fluid systems



The Pratt Positron electric motor operator affords maximum flexibility in controlling valve function and position. The unit is specifically designed for reliable valve operation encountered in water/air service.

The Positron unit mounts directly to the Pratt MDT operator. It is available in five model series, each designed to match individual application requirements. The five series designations are: 100, 200, B200, 300 and B300.

FOR VALVE APPLICATIONS **REQUIRING REMOTE OR** AUTOMATED CONTROL USING ELECTRIC MOTORS

Features . . .

- Weather-Tight Housing—Heavy cast aluminum, fully gasketed for dependable service under conditions of high moisture and humidity environments.
- Heavy-Duty Motors-single and 3-phase units to suit 115VAC, 230VAC and 460VAC inputs, with thermal overload protection and limit switches to prevent valve overtravel ... smaller sizes rated for continuous duty operation.
- Internal Heaters-built into all units to prevent conden-sation damage within the controls compartment.
- Manual Override-all units have wrench flats on drive μ. shaft for manual operation in event of power failure.
- Fully Assembled-each motor/operator is shipped completely assembled with motor and controls mounted to the applicable Pratt MDT unit.

Note: Pratt Positron/MDT operators are available only with Pratt butterfly valves.

Drive Train

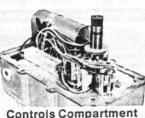
Drive train consists of an integral triple reduction helical gear reducer available with three or four ratios, depending on the model series. On the Positron Series 100, 200 and B200 units, up to three speeds of operation are available: 60, 120 or 180 seconds. On the Series 300 and B300 units, up to four operation speeds are available: 40, 60, 90 and 120 seconds. The minimum and maximum speeds obtainable with any particular gear train will vary with size of valve, line pressure and flow velocity. Helical gears and shafts are made of alloy steel and heat-treated for hardness with all shafts mounted in bearings. The gear box is completely sealed and weatherproof, conforming to NEMA IV specifications, and is grease filled for permanent lubrication.

Controls

A separate compartment is provided for all electrical controls, including four travel-limit switches, an anti-condensation hea-

ter element, a self-resetting thermal cutout switch for motor overload and a multi-contact terminal block for all external connections. Two of the limit switches are pre-wired into the motor control circuit and the other two are available for external signal circuits. The compartment is fully gasketed and completely weatherproof, provided the electrical conduit connection ports are sealed.

1 1 Gear Box

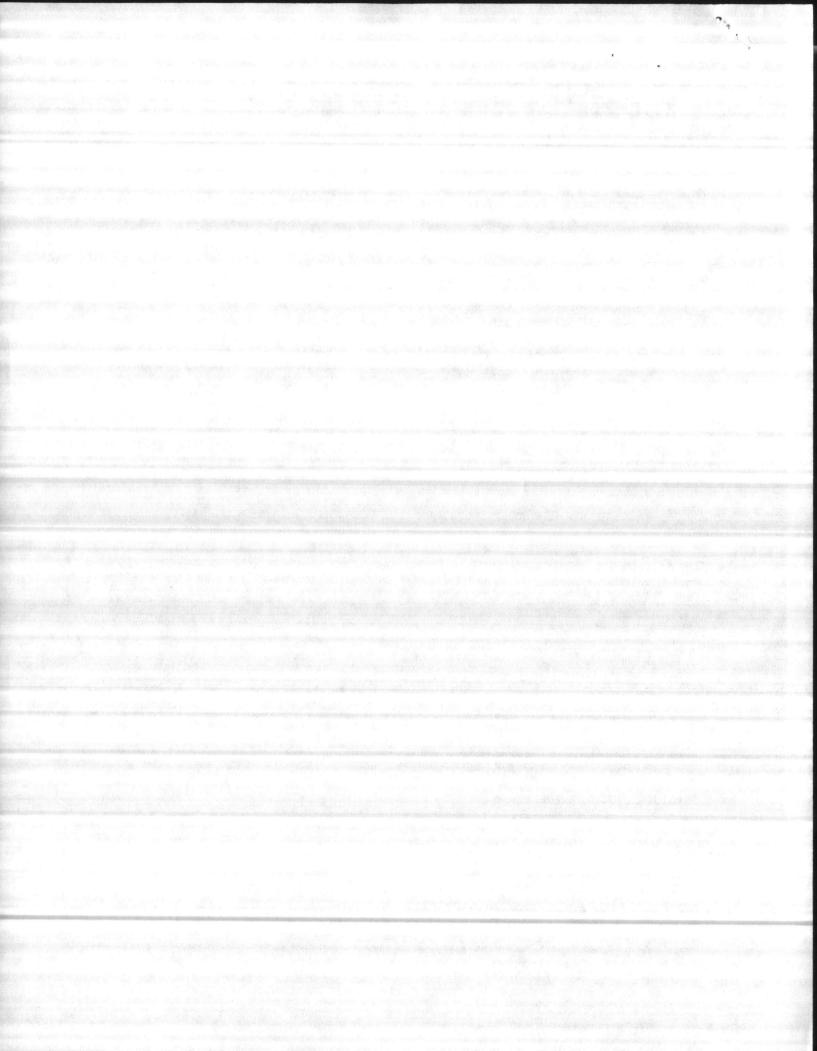


Limit Manual Override Current Rating (Amps) Running | Locked Rotor Thermal Overload Protection Electrical Characteristics Positron Series MDT Valve Heater(s) Switches Yes-41 Yes Yes Yes-2 3.7 2,3&4 3"-20" 115V AC, 60 Hz, 1 PH 1.9 100 Yes Yes-4 Yes Yes-1 1.0 1.8 3"-20" 230V AC, 60 Hz, 3 PH 200 2.3&4 Yes-1 Yes-4 Yes 1.0 Yes 0.5 460V AC, 60 Hz, 3 PH B200 2.3&4 3"-20" Yes Yes--1 230V AC, 60 Hz 3 PH 4.0 12.2 Yes Yes-1 300 5 24" and up Yes-4 Yes 6.1 Yes Yes-1 2.0 460V AC, 60 Hz, 3 PH 5 24" and up B300

*The application of Positron and MDT operators to a specific valve size depends upon line pressure and velocity as well as speed of operation. Your Pratt Sales Engineer can furnish you with precise information to suit your particular needs.

†Two switches included in units equipped with Positac positioning system.

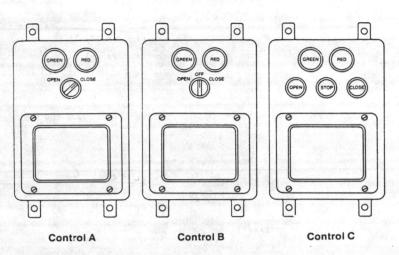
Operator Selector Chart*



Control Stations

Three types are available . . . all are NEMA IV enclosures and are pre-wired and number coded to the Positron multi-contact terminal block. All units have open/close indicating lights, and are furnished with holding relays, reversing starters and control transformers where required.

- Control A (Positron 100 series only) One button, 2 position (Open-close) Indication — 2 lights (red, green)
- Control B (Positron 100 series only) One button, 3 position (Open-off-close) Indication — 2 lights (red, green)
- Control C (All Positron series) Three pushbuttons (Open-stop-close) Indication — 2 lights (red, green)



Extensions & Accessories

Accessories available include three pre-wired control stations with indicating lights (described above). A valve position transmitter and feedback potentiometer, which mounts directly to the MDT operator housing, is available for remote indication of valve disc position. Also available is Pratt Positac proportional servo-amplifier for use with the Positron 100 motor operator. Pratt extensions include floorstands, extension bonnets or external packing bonnets.

POSITAC® Positioning System

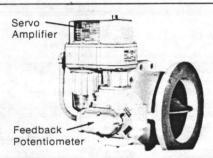
The Positac System is a solid-state device designed for use with the Positron 100 Series motor operator, to permit motorized valve throttling control in conjunction with automated process control systems.

The unit consists of a proportional-position servo-amplifier installed within the standard Positron control compartment, plus a valve-position feedback potentiometer mounted on the cover of the Pratt MDT operator. It is furnished complete and requires no accessories or other components. (If required by customer, externally mounted limit switches are available as an extra-cost accessory.)

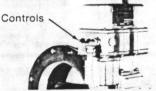
The system, in effect, enables the DC milliampere command signal from most standard process controllers to drive the valve operator's AC motor. It balances the command signal against the feedback signal from the valve-position potentiometer. Sensing the magnitude and direction of the error between these two signals, it actuates the Positron motor in the proper direction and as long as necessary to reduce the signal error to zero.

Positac is factory calibrated to the specified range of input signal. Normally this input signal is 4 to 20 MADC (standard) although other input signal ranges are available. Only two connections are required for Positac to be fully operational: the 115VAC (nominal) power line and the input signal line. Once connected, the system is activated and automatic control is accomplished by the process controller. When required, the unit can be controlled by an electrical switch on the Positron unit. In addition, wrench flats are provided for manual operation.

Another safety feature has been incorporated which maintains the valve disc in the "as-is" position upon loss of input signal independent of whether power is maintained to the motor.



Positron controls compartment housing cut away to illustrate mounting of servoamplifier within unit. Note feedback potentiometer mounted to side of MDT operator housing.



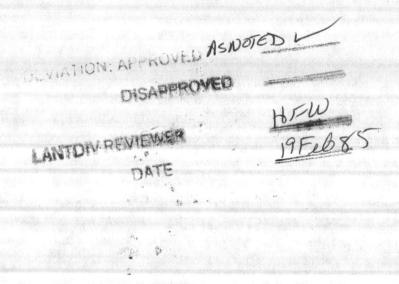
Two controls are provided on gear box of Positron 100 with Positac. MANUAL/AUTO switch has two positions and selects desired mode of operation. The OPEN/STOP/ CLOSE switch is activated when the mode selector switch is in the MANUAL position.

All information contained herein was correct at time of publication. Illustrations in this bulletin are typical. Equipment supplied may vary slightly from that shown. Henry Pratt Company reserves the right to make changes in specifications shown herein or add improvements at any time without obligation or notice.



HENRY PRATT COMPANY, 401 South Highland Avenue, Aurora, Illinois 60507 Creative engineering for fluid systems.

ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED _ APPROVED AS NOTED DISAPPROVED_ SUBJECT TO THE REQUIREMENTS OF CONTRACT NO. SZ-255Z APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRAC-TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION .- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA-TION OF TRADES, ETC., AS REQUIRED. DATE 19Feb 85 REVIEWER HFW FOR OFFICER IN CHARGE OF CONSTRUCTION



Loberta

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-8-2552

PROJECT SPECIFICATION SECTION 15440

PARAGRAPH 2.3.2.3

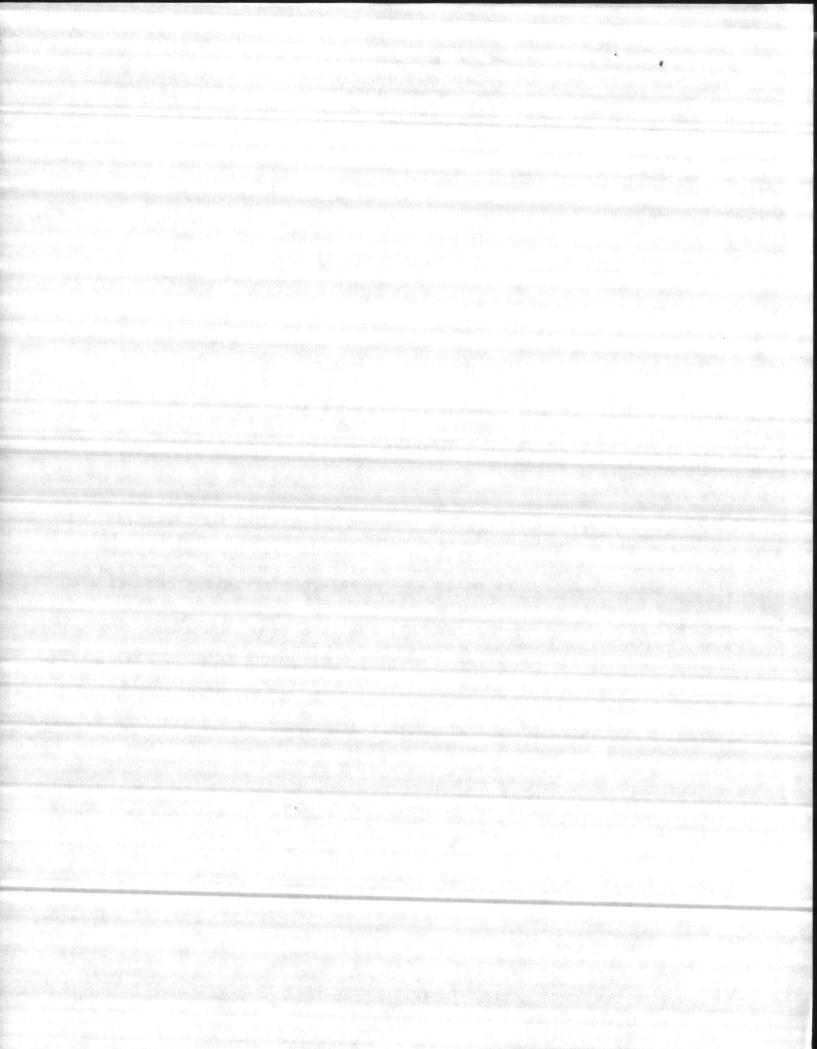
It is hereby certified that the equipment and material shown in this submittal is that proposed to be incorporated into Contract Number N62470-82-B-2552 and is in accordance with the contract drawings and specifications, except as noted on the attached deviation request and letter.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

Certified By J. C. Hampkon

Date 2-6-85

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEM'S SINCE 1897



Roberts

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-8-2552

PROJECT SPECIFICATION SECTION 15440

PARAGRAPH 2.3.2.3

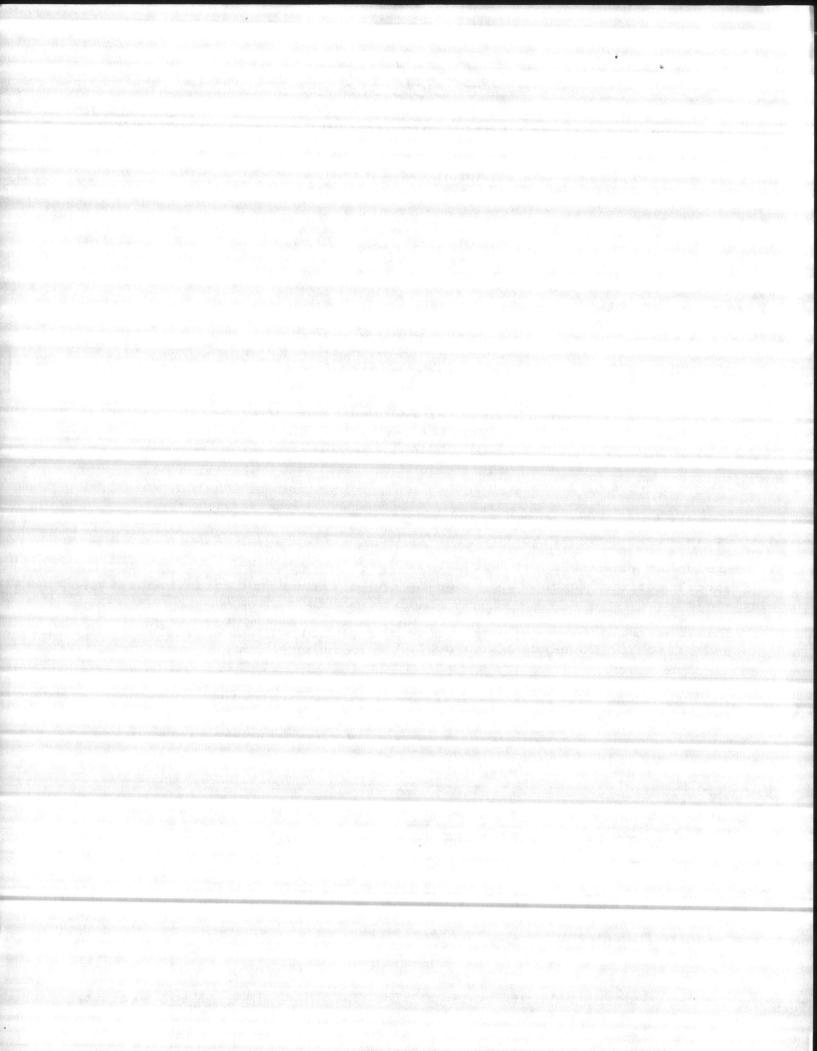
It is hereby certified that the equipment and material shown in this submittal is that proposed to be incorporated into Contract Number N62470-82-B-2552 and is in accordance with the contract drawings and specifications, except as noted on the attached deviation request and letter.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

Certified By J. C. Kompson

Date_ 2-6-85

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897



Poberta

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

February 6, 1985

DEVIATION REQUEST

WITH

RFMCo COMMENTS

We refer to the Naval Command's comments of January 7, 1985 concerning Items 11 and 13 of our original transmittal No. 12 which pertained to the Pratt Valve Electric Operator.

The job specifications (Section 15440, Paragraph 2.3.2.3) reflect the features of the B.I.F. Series 663 operator. Special attention should be given to the fact that B.I.F. no longer manufactures this product. Note also that we have been unable to find an alternative supplier that could comply with the specifications.

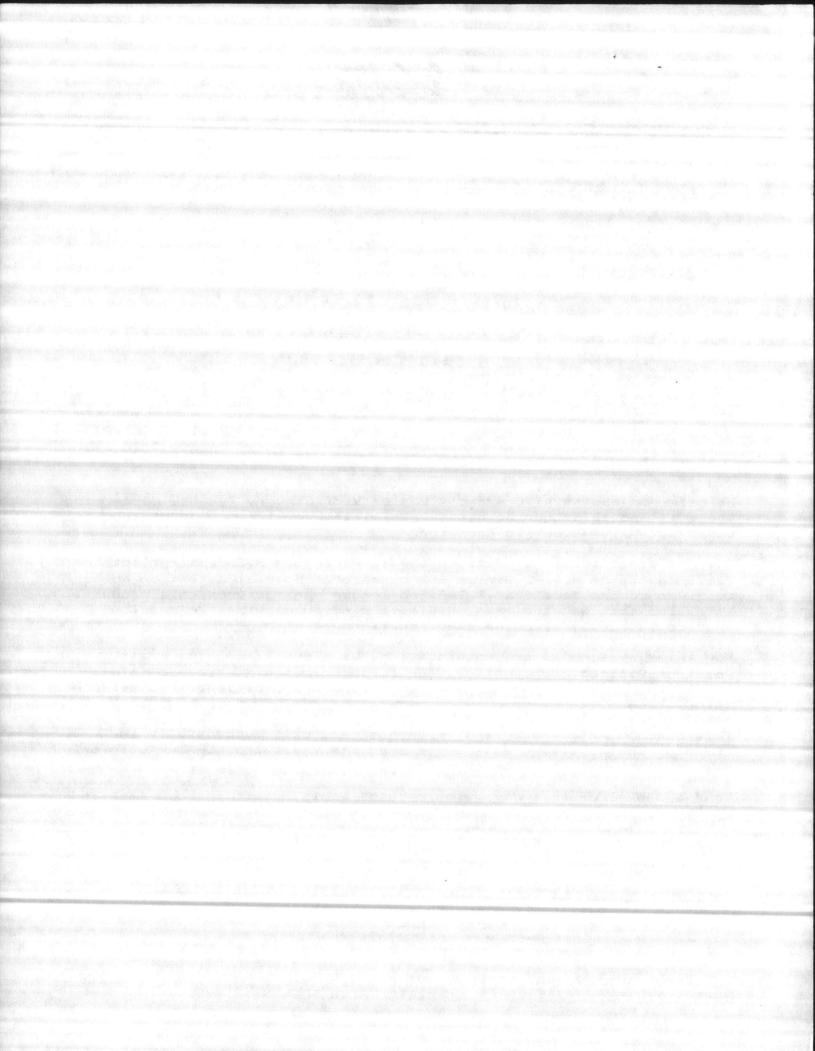
For these reasons we are resubmitting, as a deviation, the Pratt Positron-Positac operator for your further review. Attached is a letter from Henry Pratt Company addressing the additional requested information.

This particular operator and valve has been used successfully in numerous installations by Roberts over the years and, in our opinion, will perform well in this instance.

Your approval of this deviation request would result in no change in cost or time to the Government.

J. C. Hompson Date 2-6-85 Signed_

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897



Poberto

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

February 6, 1985

DEVIATION REQUEST

WITH

RFMCo COMMENTS

We refer to the Naval Command's comments of January 7, 1985 concerning Items 11 and 13 of our original transmittal No. 12 which pertained to the Pratt Valve Electric Operator.

The job specifications (Section 15440, Paragraph 2.3.2.3) reflect the features of the B.I.F. Series 663 operator. Special attention should be given to the fact that B.I.F. no longer manufactures this product. Note also that we have been unable to find an alternative supplier that could comply with the specifications.

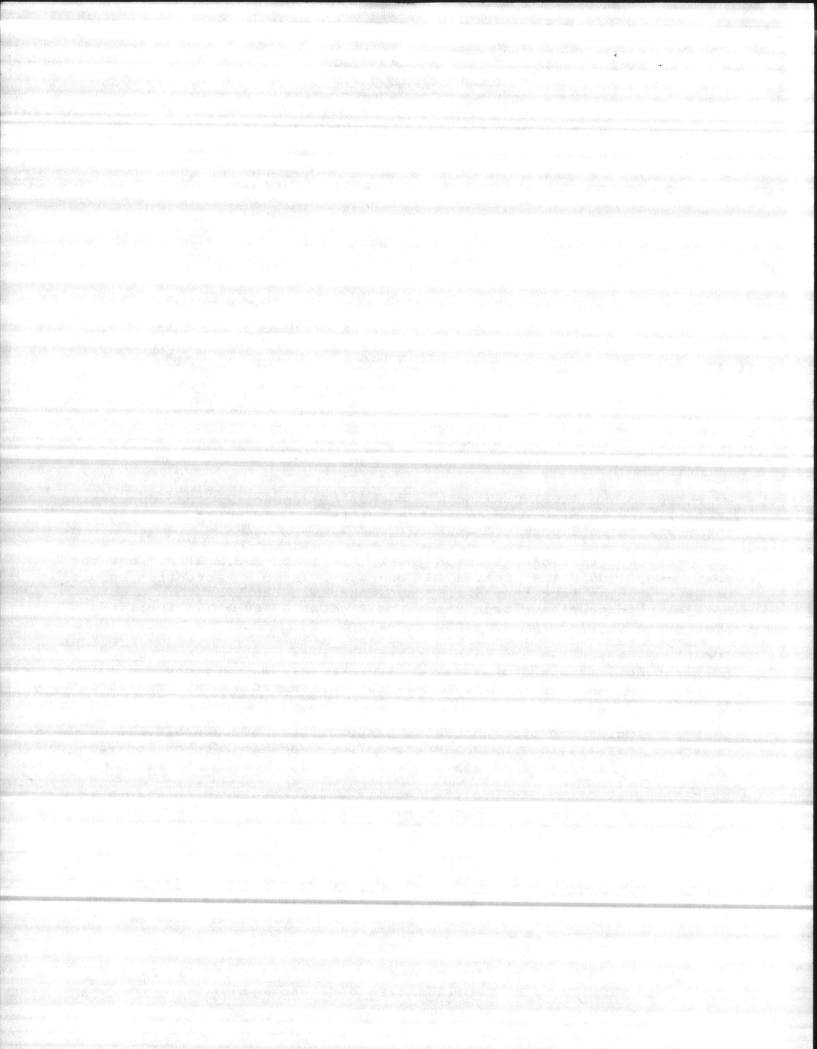
For these reasons we are resubmitting, as a deviation, the Pratt Positron-Positac operator for your further review. Attached is a letter from Henry Pratt Company addressing the additional requested information.

This particular operator and valve has been used successfully in numerous installations by Roberts over the years and, in our opinion, will perform well in this instance.

Your approval of this deviation request would result in no change in cost or time to the Government.

Signed J. C. Hompson Date 2-6-85

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897





HENRY PRATT COMPANY

creative engineering for fluid systems 401 SOUTH HIGHLAND AVENUE · AURORA, ILLINOIS 60507

February 1, 1985

RECEIVED

FEB 5 1985

ROBERTS FILTER

Roberts Filter Manufacturing Company 6th Street and Columbia Avenue Darby, Pennsylvania 19023

Attention: Mr. Gene Barry

Subject: Roberts Filter Purchase Order 35578-2093 Marine Corps Base - Camp Lejeune, NC Pratt Shop Order 54265

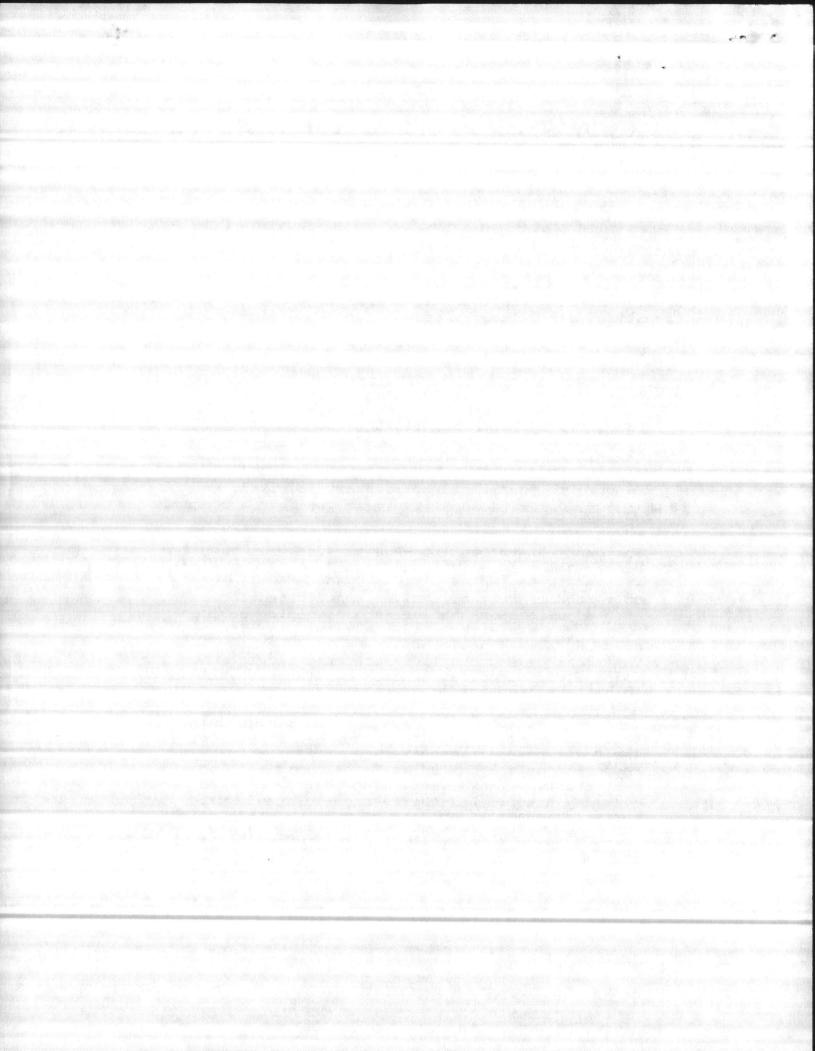
Gentlemen:

h: my

In response to your letter of January 25, 1985, we submit the following in response to the Navy's comments on our submittal.

- 1. The Henry Pratt Positron-Positac does not have mechanical stop adjustment from 0 to 90 degrees as the BIF Series 663. AWWA C-504 specifications only require that all valves shall be equipped with adjustable mechanical stop-limiting devices to prevent over-travel of the valve disc in the open and closed positions. The Henry Pratt Positron-Positac complies with that requirement using a thrust collar at each end that is shimed to get the disc dead center in the seat.
- 2. The MDT operator is a traveling nut design using cold drawn steel shaft and ductile iron slider. The Positron-Positac gear reducer is a triple reduction unit. The helical gears are made of a heat treated alloy steel. The shafts are also made of alloy steel. All shafts ride in needle type thrust bearings except the main drive shaft which is fitted with a sintered bronze, permanently lubricated sleeve bearing. The gear box assembly contains 1.5 pounds of grease and is completely sealed. No lubrication is necessary for the life of the unit.

.... Amsted





Roberts Filter Manufacturing Company Page 2 February 1, 1985

- 3. The Positron-Positac is a 115 volt, 60 cycle, single phase AC, 1700 rpm, permanent split capacitor type reversible motor, rated at .125 horsepower.
- Unlike BIF who uses one size motor operator for all 4. valves 3" thru 24", Henry Pratt as well as most other electric motor operator manufacturers (Auma, EIM, Limitorque, Rotork, Raymond Controls, etc.) size the operator to the valve torque. The Pratt 8" 2FII at maximum pressure of 150 psi has a seating and bearing torque of 2100 inch-pounds. Therefore, we use the MDT-2 traveling nut operator with a Positron-Positac CD106, which has a maximum torque rating of 4200 inch-pounds. We have an electric motor operator rated for 20,000 inch-pounds that is used on 18" thru 36" valves, where the valve seating and bearing or dynamic torque is 10,000 inch-pounds or higher, but we do not mount it on the 8" valve. The motor is the same for both the 8" valve or a 20" valve, but it is thru the gearing that the operator develops the 10,000 or 20,000 inch pound rating, and the operating time increases from 60 seconds to 180 or 300 seconds depending on the gears used.

If we can be of any further assistance, please feel free to contact us.

Very truly yours,

HENRY PRATT COMPANY

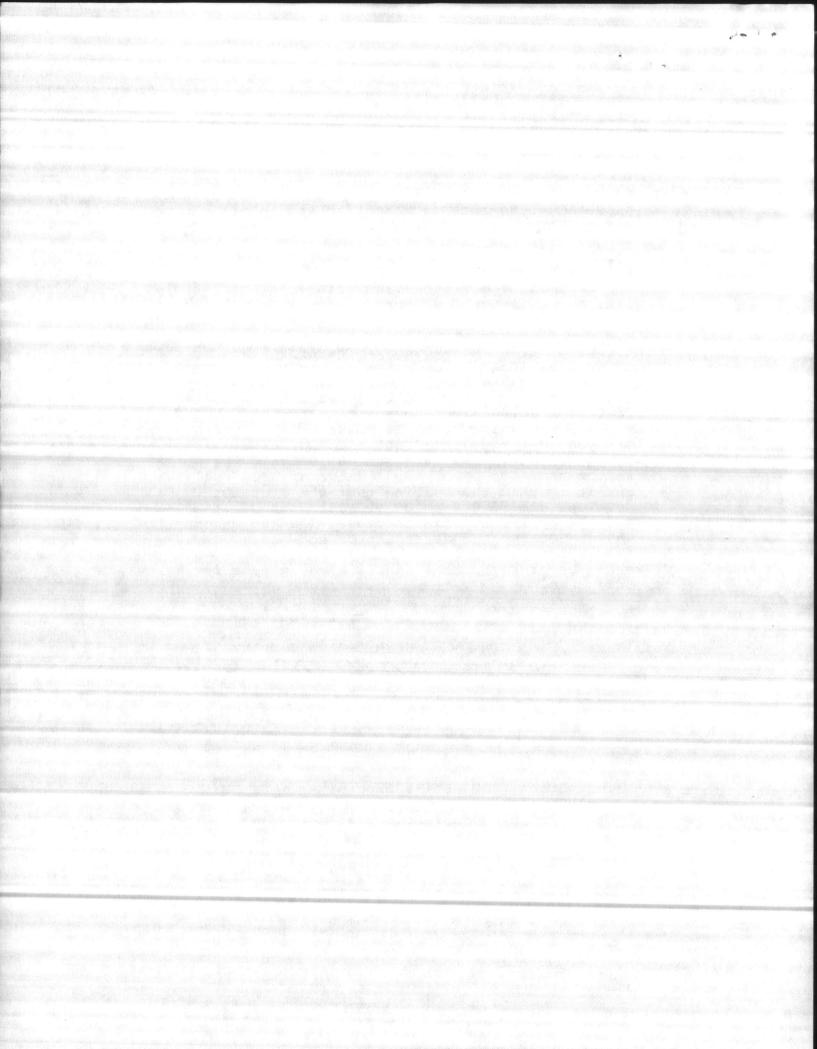
Richard A. Johnson

Richard A. Johnson Senior Application Engineer

RAJ/sp

- -

cc: W. R. Erber, HPCO-Philadelphia Robert L. Carlson Inc. Engineered Systems & Products Inc.





HENRY PRATT COMPANY

creative engineering for fluid systems 401 SOUTH HIGHLAND AVENUE · AURORA, ILLINOIS 60507

February 1, 1985

RECEIVED

FEB 5 1985

ROBERTS EILTER

Roberts Filter Manufacturing Company 6th Street and Columbia Avenue Darby, Pennsylvania 19023

Attention: Mr. Gene Barry

Subject: Roberts Filter Purchase Order 35578-2093 Marine Corps Base - Camp Lejeune, NC Pratt Shop Order 54265

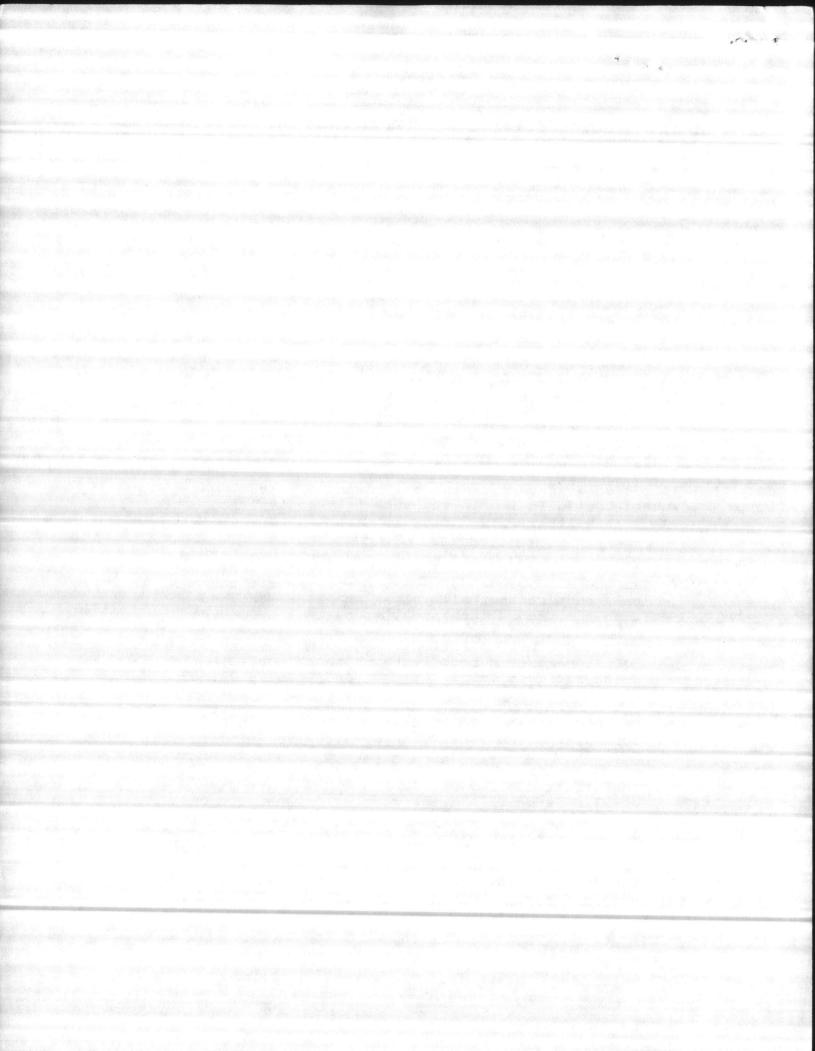
Gentlemen:

1 4 · P. M.

In response to your letter of January 25, 1985, we submit the following in response to the Navy's comments on our submittal.

- 1. The Henry Pratt Positron-Positac does not have mechanical stop adjustment from 0 to 90 degrees as the BIF Series 663. AWWA C-504 specifications only require that all valves shall be equipped with adjustable mechanical stop-limiting devices to prevent over-travel of the valve disc in the open and closed positions. The Henry Pratt Positron-Positac complies with that requirement using a thrust collar at each end that is shimed to get the disc dead center in the seat.
- 2. The MDT operator is a traveling nut design using cold drawn steel shaft and ductile iron slider. The Positron-Positac gear reducer is a triple reduction unit. The helical gears are made of a heat treated alloy steel. The shafts are also made of alloy steel. All shafts ride in needle type thrust bearings except the main drive shaft which is fitted with a sintered bronze, permanently lubricated sleeve bearing. The gear box assembly contains 1.5 pounds of grease and is completely sealed. No lubrication is necessary for the life of the unit.

.... Amsted



PRATT

Roberts Filter Manufacturing Company Page 2 February 1, 1985

- 3. The Positron-Positac is a 115 volt, 60 cycle, single phase AC, 1700 rpm, permanent split capacitor type reversible motor, rated at .125 horsepower.
- 4. Unlike BIF who uses one size motor operator for all valves 3" thru 24", Henry Pratt as well as most other electric motor operator manufacturers (Auma, EIM, Limitorque, Rotork, Raymond Controls, etc.) size the operator to the valve torque. The Pratt 8" 2FII at maximum pressure of 150 psi has a seating and bearing torque of 2100 inch-pounds. Therefore, we use the MDT-2 traveling nut operator with a Positron-Positac CD106, which has a maximum torque rating of 4200 inch-pounds. We have an electric motor operator rated for 20,000 inch-pounds that is used on 18" thru 36" valves, where the valve seating and bearing or dynamic torque is 10,000 inch-pounds or higher, but we do not mount it on the 8" valve. The motor is the same for both the 8" valve or a 20" valve, but it is thru the gearing that the operator develops the 10,000 or 20,000 inch pound rating, and the operating time increases from 60 seconds to 180 or 300 seconds depending on the gears used.

If we can be of any further assistance, please feel free to contact us.

..... Amsted

Very truly yours,

HENRY PRATT COMPANY

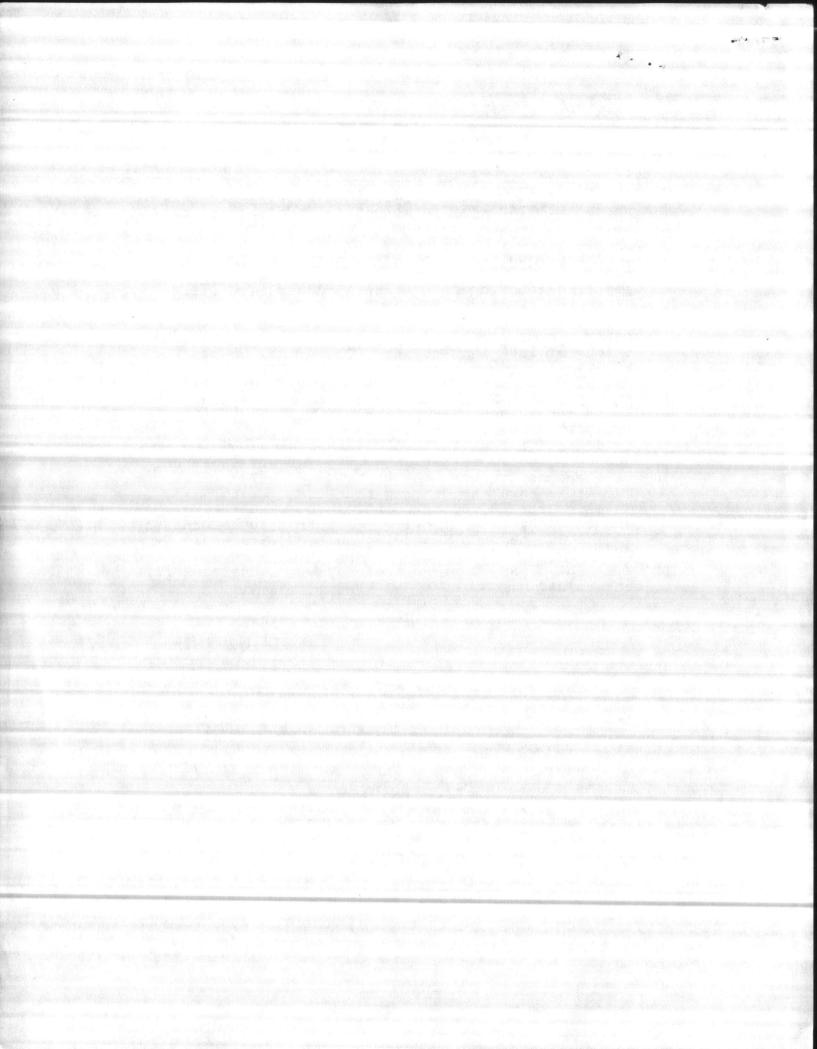
Richard A. Johnson

Richard A. Johnson Senior Application Engineer

RAJ/sp

. . . .

cc: W. R. Erber, HPCO-Philadelphia Robert L. Carlson Inc. Engineered Systems & Products Inc.







FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

Transmittal No. 19 January 23, 1985 RFMCo Contract 2093

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-C-2552

PROJECT SPECIFICATION SECTION 15440

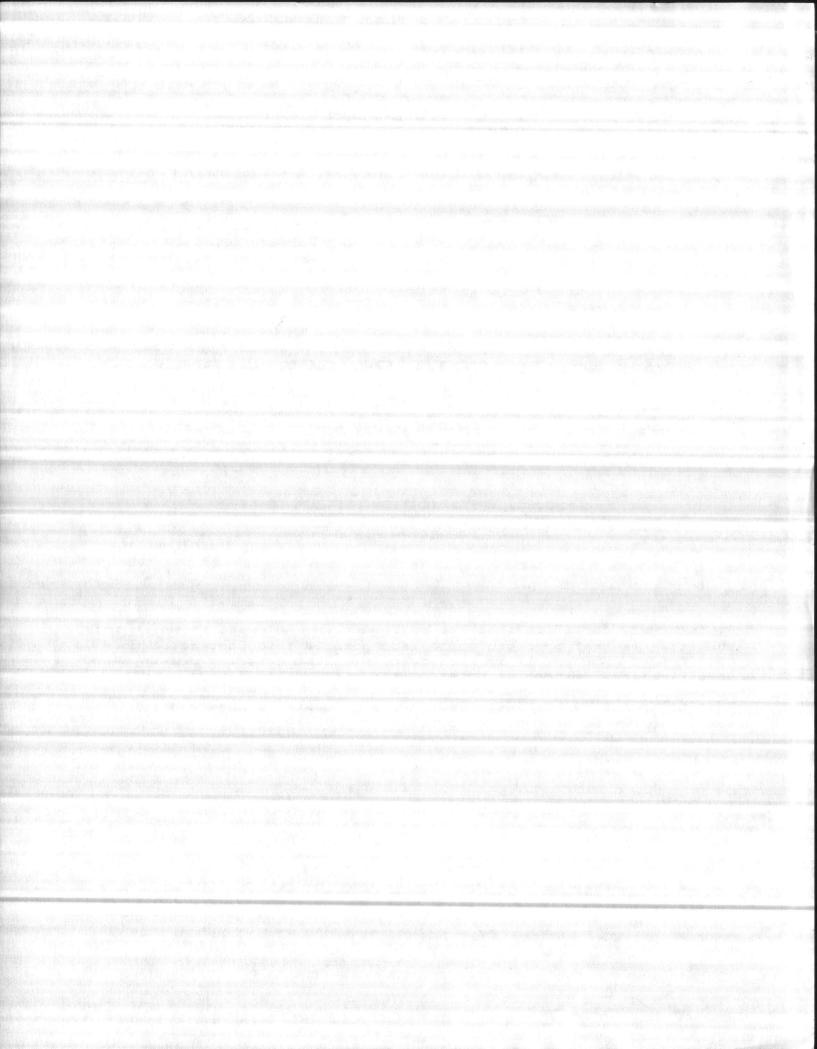
PARACRAPH 2.2.3

It is hereby certified that the equipment and material shown in this submittal is that proposed to be incorporated into Contract Number N62470-82-B-2552 and is in accordance with the contract drawings and specifications, except as noted on the attached deviation request.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

Certified By J.C. Thompson

Date 2-4-85



Poberta

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

DEVIATION REQUEST

CONTRACT NO. N62470-82-8-2552

SECTION 15440

As discussed by our Gene Barry on a visit to your office on January 8, 1985 the following suggested minor changes in piping installation are shown for the following purposes:

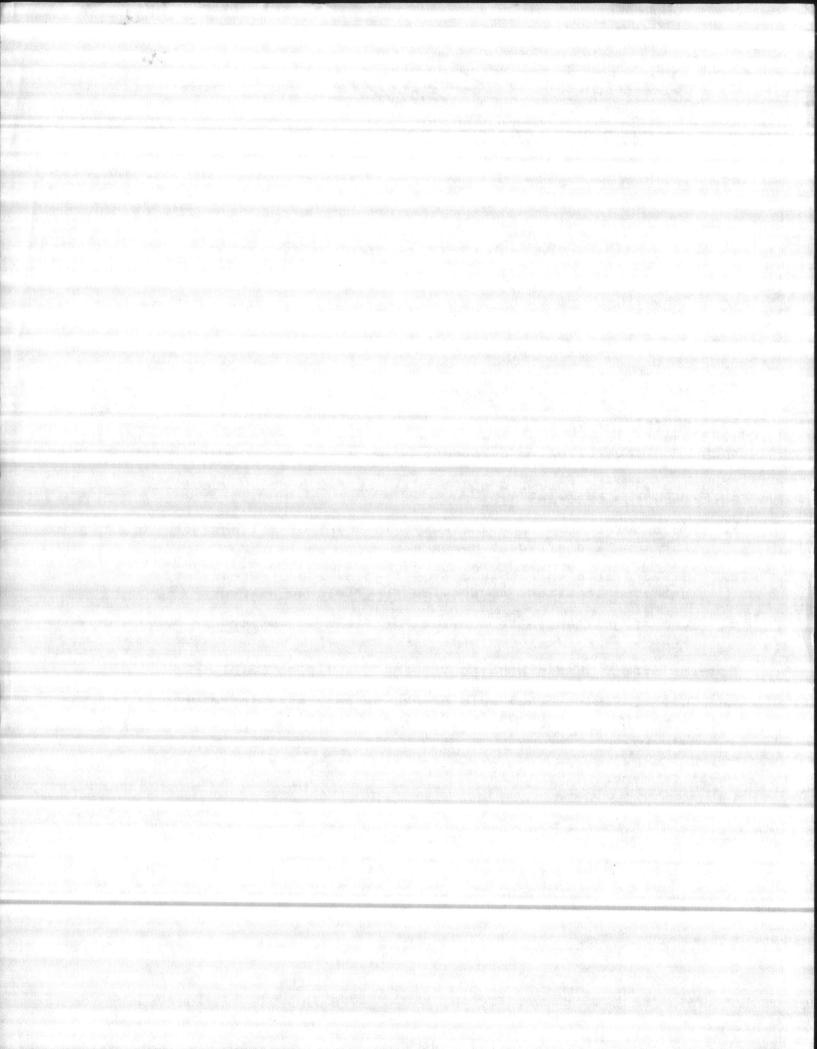
Drawings 6950-11, 6950-12 and 6950-13 (Field Working Drawings Buildings 139, 236 and 540)

- a. To provide more room (walkway) in front of filters between 10" influent and effluent headers.
- b. Use of field socket weld 6" PVC 45 deg. and 90 deg. ells in selected locations to provide for field adjustment.
- c. Use of uniflanges to provide for field adjustment in the ductile iron pipe runs (three places).

Drawing 6950-9 (Field Working Drawing - Building 2615)

d. Use of field socket weld 6" PVC 90 deg. ells in selected locations to provide for field adjustment.

The above deviations would result in no change in cost or time to the Naval Command.



	NTRACTOR'S SU			CONTRACT NO N62470-82-B	problem and the little sectors and	AITTAL NO	2/1/85
	CONTRACTOR	MANUEAC		PROJECT TITLE AND LOG	CATION		
TO	ROBERTS FILTER			REPLACE	EQUIPMENT gs 139, 23	IN POOL 36 and 5	S 40)
r	NAVAL FACILITI	ES ENGIN	EERING COMMAND			d	IEWER USE ONLY
	a concentration and a concentration	*List c	only one specification division p	er form.			ACTION CODES
	Lis		the following categories on each d indicate which is being submi			1	roved approved aproved as noted
ב	Contractor Approved		OICC Approval	X Deviation	on/Substitution OICC Approval	RA-Re	ceipt acknowledged.
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *		ITEM IDENTIFIC (Type, size, model no., Mi brochure num	CATION g. name, dwg. or	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
1	15440 2.2.3	UNI-F	lange		7	A	HFW1406 IZFEB8
2				alian and a second	7	1. 1.	
2	1		tion Request ficate of Compliar	nce	7	RA	HFW1406 12 FEB 85
4	6950-11		Piping - Building	have the second	7	A	BDC/403 2/13/85
5	6950-12	Poo1	Pool Piping - Building 236 7				BDG1403 2/13/85
	6050 12				Sector States		BDC/403
6	6950-13	<u>Pool</u>	<u> Piping - Building</u>	540	7	<u>A</u>	2/13/85
TNOS				CONTRACTOR REPRESER			2/13/85
OPY	OF TRANSMITTAL AND SUB	MITTALS TO ROI	cc	CONTRACTOR REPRESEN	NTATIVE (Signature)		2/13/85
OPY	PRACTOR'S COMMENTS	MITTALS TO ROI		CONTRACTOR REPRESEN			Ilislas Ficter JR
	OF TRANSMITTAL AND SUB M. I. Kimba RECEIVED BY REVIEWER 2 /6/84 Submittals are returned tractor calls attention t Submittals are forwarde transmittal form.	MITTALS TO ROI	CC FROM (Reviewer ZAMMDIV dicated. Approval of an item does s the deviation. / with A-E recommendations indi	CONTRACTOR REPRESEN	NTATIVE (Signature) TO ROBED y deviation from t	CTS /	FICTER /Re equirements unless the con-
	OF TRANSMITTAL AND SUB . M. I. Kimba RECEIVED BY REVIEWER 2 /6/85 Submittals are returned tractor calls attention t Submittals are forward transmittal form. WER'S COMMENTS MARK	MITTALS TO ROU 11 D with action in o and support ed to LANTDIN PROVES	CC FROM (Reviewer WTD) / dicated. Approval of an item does s the deviation. / with A-E recommendations indi O. No C. AppropriveD.	CONTRACTOR REPRESEN	NTATIVE (Signature) TO POBED y deviation from t NLY Section and	CTS / he contract re in comments	FICTER JRC Equirements unless the con- below on ONE COPY of the Himters
	PRACTOR'S COMMENTS OF TRANSMITTAL AND SUB M. I. Kimba RECEIVED BY REVIEWER 2 /6/82 Submittals are returned tractor calls attention t Submittals are forward transmittal form. WER'S COMMENTS UNI - FLAN FIELD SOC, LOCATED	MITTALS TO ROU 11 Solution in o and support ed to LANTDIN PROVES GE KET IS	CC FROM (Reviewer WTD) / ZAMTD) / dicated. Approval of an item does s the deviation. / with A-E recommendations indi	CONTRACTOR REPRESEN	NTATIVE (Signature) TO POBED y deviation from t NLY Section and	CTS / he contract re in comments	FICTER JRC Equirements unless the con- below on ONE COPY of the Himters

22 FEB 1985 11 25

	NTDIV NORFOLK 4-435	BMITTAL TRANSMITTAL 5/3 (Rev. 11-80)	CONTRACT NO N62470-82	2_B_255	TRANSMI	pg. 2	2/1/85
RO	M CONTRACTOR		PROJECT TITLE AND	DLOCATION	1	py. 2	
RC	BERTS FILTER M	ANUFACTURING CO.	REPLACE (Buildin	EQUIPME	NT II	POOLS	
NA	VAL FACILITIES	ENGINEERING COMMAND	(buildi	iys 139	, 230	anu 540)
		CONTRACTOR USE ONLY				REVI	EWER USE ONLY
		*List only one specification division p				A-Appi	
	LIS	t only one of the following categories on eac and indicate which is being subm					pproved proved as noted
	Contractor Approved	OICC Approval		viation/Subst		RA-Ree C-Com R-Resu	
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFIC (Type, size, model no., Mi brochure nun	CATION g. name, dwg. or		NO. OF COPIES	ACTION	REVIEWER'S INITIALS CODE AND DAT
&	6950-9	Pool Piping - Building	2615		7	A	BDC/483 2/13/85
		and the second second					
	a second and						E.
OP	OF TRANSMITTAL AND SUBN		-		1.0		
Lt	M T Vimbal		CONTRACTOR REPR	RESENTATIVE	ignature)	1	
	RECEIVED BY REVIEWER	FROM (Reviewer)	109	то	J	An	
	tractor calls attention to	with action indicated. Approval of an item doe o and supports the deviation.	I have been a second of				
	Submittals are forwarde transmittal form.	d to LANTDIV with A-E recommendations ind	cated in REVIEWER US	E ONLY Sect	ion and ii	n comments l	below on ONE COPY of
REVI	EWER'S COMMENTS		and a second subjection of	general second	a a cara a c	ala parte de la compañía	en eren far er er seren sig ger
		22 FEB	1002 11 52				
108	ES TO	DATE 55 LEO					

Ser.

- - 1

.

1

22 FEB 1985 11 25

A٨	TDIV NORFOLK 4-435	5/3 (Rev. 11-80)	CONTRACT NO	TRANSMI	TTAL NO	DATE 1/18/
O	CONTRACTOR		PROJECT TITLE AND LOCATIO			17:10/
21		MAMUFACTURING CO.	REPLACE EQUIP CAMP DE JEUNE			
-	teric ritercerec	CONTRACTOR USE ONLY			REVI	EWER USE ONLY
כ	Lis	*List only one specification division per t only one of the following categories on each and indicate which is being submit OICC Approval	transmittal form, red Deviation/St	ubstitution Approval	A-Appi D-Disa AN-Ap	pproved proved as noted ceipt acknowledged. aments
	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFIC/ (Type, size, model no., Mig brochure numt	. name, dwg. or	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
100	15440 Para 2.3.1.2	2" VALVE - BLDG. 20	- SUGFACE HASH	•		
1	Ľ	Valworth Fig. 8726		7	A	C.CS 405 1/2.
-	u	RELCo Deviation Kannest		7	A	1
1		SENCe Corpliance Stateler			RA	
		and the second		7	RA	V

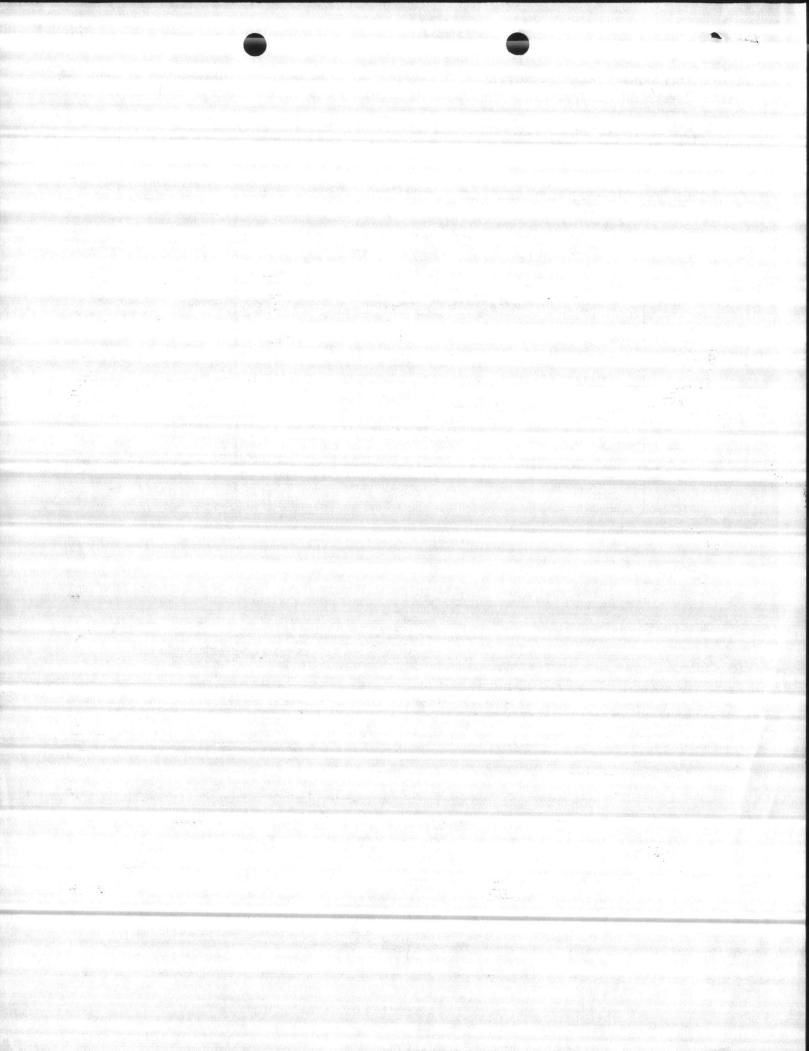
LL. L. Minsell		140	Hank	can
DATE RECEIVED BY REVIEWER	OM (Reviewer)	0	то	na 12

Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor calls attention to and supports the deviation.

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

COPIES TO ROICC (2)	DATE	SIGNATURE	and a state and state of the second state of the second state of the
LANTDIV (1) A-E (1)	1/30/05	LiHaste	an a
and the second second second second	and the second	*	J.S. GOP: 1983 - 739-003/2122 Region 3-11



IRON BODY WEDGE GATE CLASS 125

FIGURES: 8726 (2"-4"), 8726F (2"-12")

DESIGN DESCRIPTION:

Bolted Bonnet Outside Screw and Yoke Solid Wedge

Bronze Mounted e Threaded Ends (Fig. 8726) Flanged Ends (Fig. 8726F)

PARTS AND MATERIAL LIST:

DESCRIPTION	MATERIAL	ASTM SPEC.
body	cast iron	A126 CL B
bonnet*	cast iron	A126 CL B
wedge**	cast iron	A126 CL B
wedge face ring**	cast bronze	B62 AL836
seat ring	cast bronze	B62 AL836
body gasket	asbestos composition	commercial
stem	silicon bronze	B371 CDA-694
wedge pin (2" to 8")	brass	B140
(10" to 12")	silicon bronze	B371 CDA-694
 stem collar	silicon bronze	B371 CDA-694
body bolt	steel	commercial
body nut	steel	commercial
backseat bushing	cast bronze	B62 AL836
gland follower packing gland	cast iron cad. plated powdered iron or brass	A126 CL B B310-58T P.M. B16 AL360
packing	graphite imp. asbestos	commercial
gland follower bolt	steel	commercial
gland follower nut	bronze	commercial
bonnet cap	cast iron	A126 CL B
yoke bushing	cast bronze	B62 AL836
bonnet cap bolt	steel	commercial
bonnet cap nut	steel	commercial
handwheel	cast iron	A126 CL B
handwheel nut	cast bronze	B62 AL836
I.D. plate	aluminum	commercial

*Sizes through 8" made with yoke integral with bonnet. 10" and 12" sizes made with separate yoke bolted to bonnet.
*Sizes 2" thru 31/2" are all bronze wedges. Sizes 4" through 12" made with cast iron wedge with bronze wedge face rings.

DIMENSIONS IN INCHES:

SIZE	2	21/2	3	4	5	6	8	10	12	
a 1	55/8	57/8	61/8	61/2		_				
a (F)	7	71/2	8	9	10	101/2	111/2	13	14	
b	15	161/8	183/4	231/2	271/8	301/8	401/8	481/4	567/8	
С	7	8	8	10	10	12	14	16	18	
d	6	7	71/2	9	10	11	131/2	16	19	
е	5/8	11/16	3/4	15/16	15/16	1	11/8	1 3/16	11/4	

WEIGHTS IN POUNDS:

(8726)	27	41	48	72	and the second	19 <u>19 1</u> 9 19	19 <u>00-</u> 19	<u> </u>	Charles of the	
(8726F)	34	52	63	101	137	170	298	465	679	

2" VALUE FOR SURF. WASH SYSTEM BLOG, 20

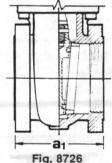
12



TEMPERATURE RATINGS PRESSU 125 psi wsp 450F 200 psi woq -20 to 150F Fig. 8726 Fig. 8726F threaded ends flanged ends 23 24 22 19 20 18 21 13 open 17 14 16 15 12 2 10 6 11 9 8 4 d 5

3

1



Sizes 2" to 4"

APPLICABLE STANDARDS:

Fed. Spec. WW-V-58B, Type I, Clas	s I, OSY
Face-to-Face	
End Flanges CL125	ANSI B16.1
Tapered Pipe Threads	. ANSI B2.1

For engineering specifications and data, see index page E1 of Engineering Section in back of Catalog.

	ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK. VIRGINIA 23511
in the second	APPROVED APPROVED AS NOTED DISAPPROVED SUBJECT TO THE NEQUIREMENTS OF
	CONTRACT NO. 05-82-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON- TRACT REQUIREMENTS UNLESS THE CONTRAC- TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION-THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS. CO-ORDINA- TION OF TRADES. ETC., AS REQUIRED
	REVIEWER CCS DAT 2 5 JAN 1985 FOR OFFICER IN CHARGE OF CONSTRUCTION



FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

2 1

CONTRACT NUMBER

N62470-82-C-2552

PROJECT SPECIFICATION SECTION 15440

PARAGRAPH 2.3.1.2

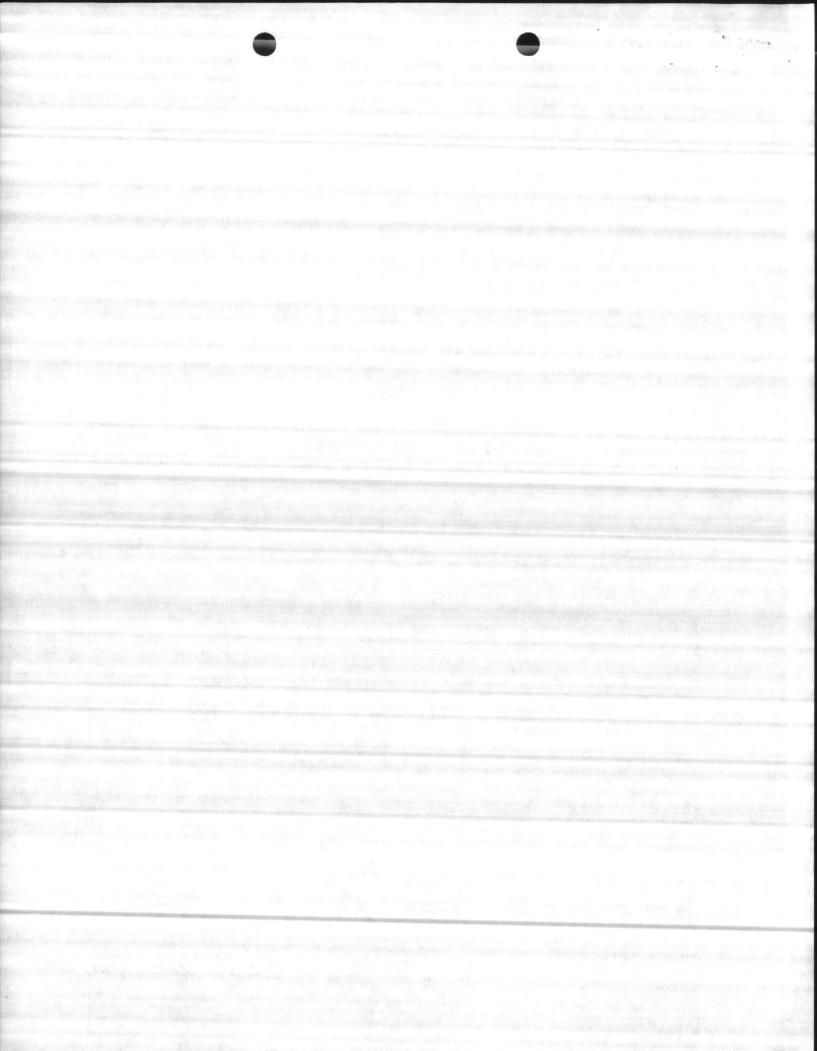
It is hereby certified that the (equipment/material) shown and marked in this submittal is that proposed to be incorporated into Contract No. N62470-82-B-2552 and is in compliance with the contract drawings and specifications except as noted in the attached deviation request.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

Certified By J.C. Hompson Date 1-17-85

CCS 405 1/25/85

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897





FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

DEVIATION REQUEST

The 2" OS&Y valve proposed herein for use with the surface wash piping in Building 20 complies with Federal Spec. WW-V-58.

An extension stem with floor stand is not applicable.

We have contacted manufacturers including Walworth, Crane, Dresser, Kennedy and others, however, none can supply the valve with a double disc. For this reason we are proposing to supply the 2" Walworth valve with a solid wedge as a deviation from the contract specifications.

signed J. C. Hompson

Date /-17-85

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897

ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511	
PPROVED	
UBJECT TO THE REQUIREMENTS OF 2552	md .
PPROVAL OF A SUBMITTAL COLOR THE COM- PPROVAL OF ANY DEVIATION FROM THE CON- RACT REQUIREMENTS UNLESS THE CONTRAC- OR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION-THE CONTRACTOR SHALL BE DEVIATION-THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, CO-PRDINA- PHYSICAL DIMENSIONS & WEIGHTS, CO-PRDINA- TION OF TRADES. ETC. AS REQUIRE 5 JAN 1985	
REVIEWER CCS DATE	
FOR OFFICER IN CHARGE OF CONSTRUCTION	

CONTRACTOR'S SUBMITTAL TRANSMITTAL LANTDIV NORFOLK 4-4355/3 (Rev. 11-80)		CONTRACT NO		ITTAL NO	DATE	
		33/3 (Nev. 11-00)	N62470-82-B-2552	1	3-A	1/28/85
	M CONTRACTOR		PROJECT TITLE AND LOCATION			and the second
	OBERTS FILTER	MANUFACTURING COMPANY				
in N	AVAL FACILITI	ES ENGINEERING COMMAND	REPLACE EQUIPA CAMP LE VEUNE	AENT	- POOLS	2
	and the second	CONTRACTOR USE ONLY	0	V		EWER USE ONLY
	Li Contractor Approved	*List only one specification division per f ist only one of the following categories on each tr and indicate which is being submitted OICC Approval	ansmittal 60m. 31 JAN 15	985 V	A-Appr D-Disaj	oproved proved as noted eipt acknowledged. ments
TEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICAT (Type, size, model no., Mfg. i brochure numbe	name, dwg. or	NO. OF	ACTION	REVIEWER'S INITIALS CODE AND DATE
	15540 Para. 2.9	DIRECT READING FLOW	I INDICATORS			
A	Catalog Cuts	ITT Barton 226 Indicator		7	A.	HFW/406 4Feb 84
A	II	Air Eliminator		7	A	
A_	u	1/2" Valve		7	A	
A	A-8784-12	Piping for Indicator		7	A	
A	Letter	RFMCo Compliance		7	RA	V

Hunt

Resubmitted per comments re transmittal No. 13

CONTRACTOR REPRESENTATIVE (Signature) COPY OF TRANSMITTAL AND SUBMITTALS TO ROICC Kimball Lt. M. Ι DATE RECEIV FROM (Review TCL TO

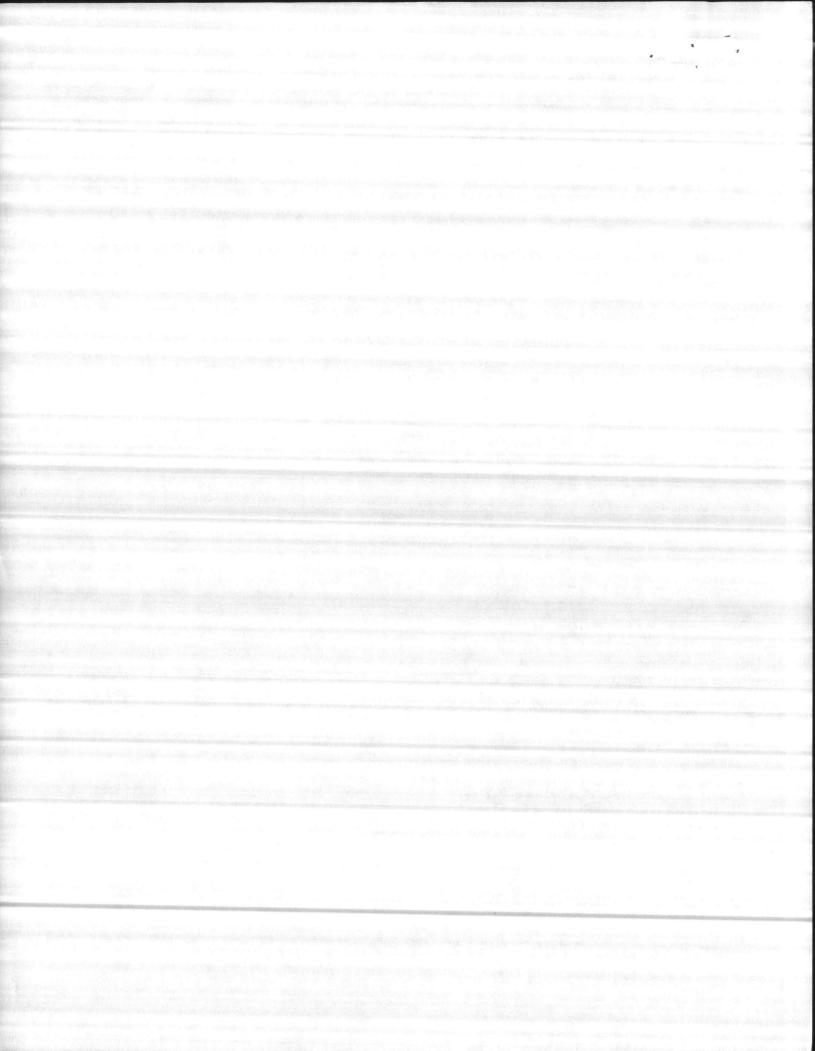
Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor calls attention to and supports the deviation.

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

APPROVED

COPIES TO ROICC (2) LANTDIV (1) A-E (1)	2/4/85	SIGNATURE	fast
		- 100	✿ U.S. GOP: 1983 - 739-003/2122 Region 3-11





FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-B-2552

PROJECT SPECIFICATION SECTION 15440

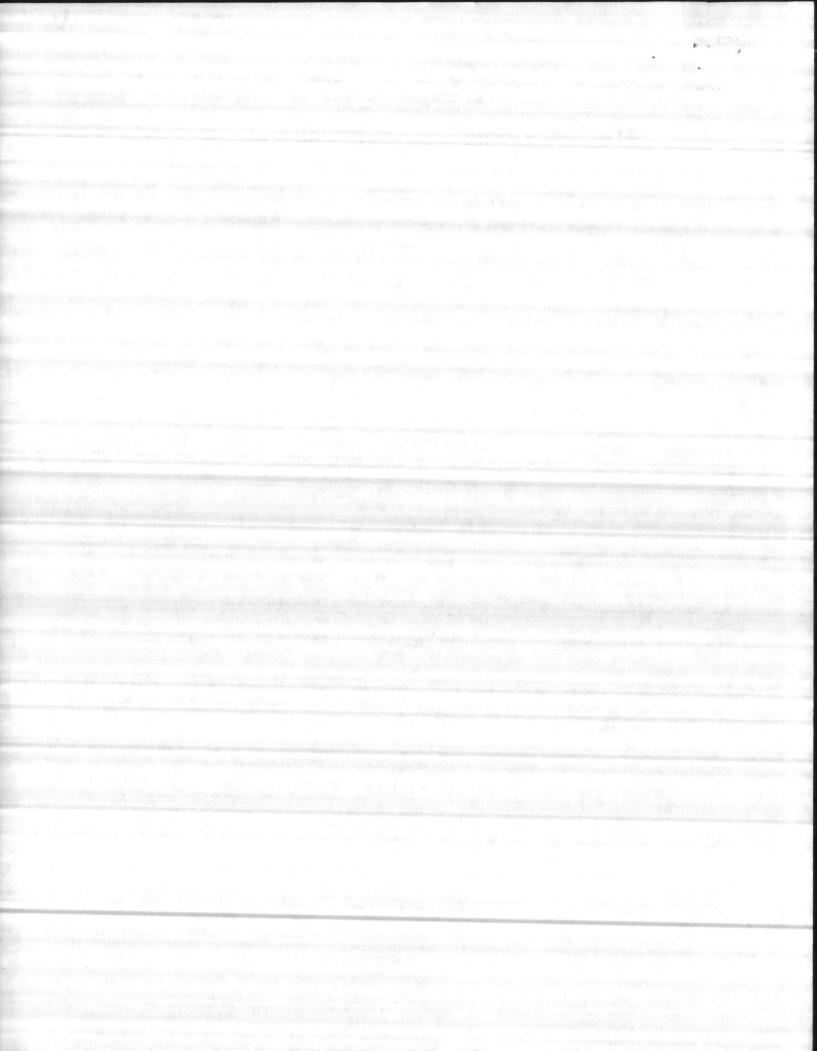
PARAGRAPH 2.9

It is hereby certified that the (equipment/material) shown and marked in this submittal is that proposed to be incorporated into Contract No. N62470-82-B-2552 and is in compliance with the contract drawings and specifications.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

Certified By J. C. Hompson Date 1-29-85

.



PRODUCT/BULLETIN 226-10



Model 226 Indicator

And a second second

LIQUID LEVEL-DIFFERENTIAL PRESSURE-FLOW RATE

PRODUCT DESCRIPTION

The Model 226 is a differential pressure indicator equipped with a three-inch dial and is actuated by a Model 224 Rupture-proof Differential Pressure Unit.

This indicator is a compact, lightweight, rugged instrument, specifically engineered for the measurement of flow, differential pressure or liquid level where weight and space are at a premium. The indicating pointer traverses a 270° arc. Scales are provided for direct reading of flow, differential pressure or liquid level. The Model 226 is widely used in jet engine and missile testing programs, aircraft ground support equipment, water treatment processes and air conditioning systems. It is specified by many of the producers and distributors of liquefied gases for liquid level indication of materials such as CO₂, LOX, nitrogen, helium, hydrogen, and argon.

THE ACTUATING UNIT

The indicator is actuated by dual, rupture-proof bellows with integral temperature compensation. The bellows are liquid-filled and will withstand repeated overranges equal to the working pressure of the instrument housing without causing a calibration change. Motion transmission is by a hermetically sealed torque tube; thus eliminating friction, leakage, and the need for lubrication.

CASE

The 3" case is fabricated from die-cast aluminum and comes with a special baked enamel black finish. It is sealed by a cover glass placed on a cork ring and held in place by a spanning ring. This insures a moisture, fume and dust-free atmosphere for the indicating mechanism.

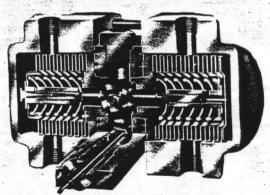
INDICATING MECHANISM

The indicating mechanism of the Model 226 consists of a precision-made, jewelled, rotary movement. It multiplies rotation of the torque tube through a gear and pinion to the indicating pointer. The indicating pointer traverses a 270° arc, providing excellent readability. The movement has micrometer screws for convenient zero and range adjustments. Zero and range adjustments may be made without removing the scale plate or the pointer. The rotary movement and the pointer are fully protected from overrange in either direction.

OW INDICATOR FOR POOLS



Model 226 Indicator

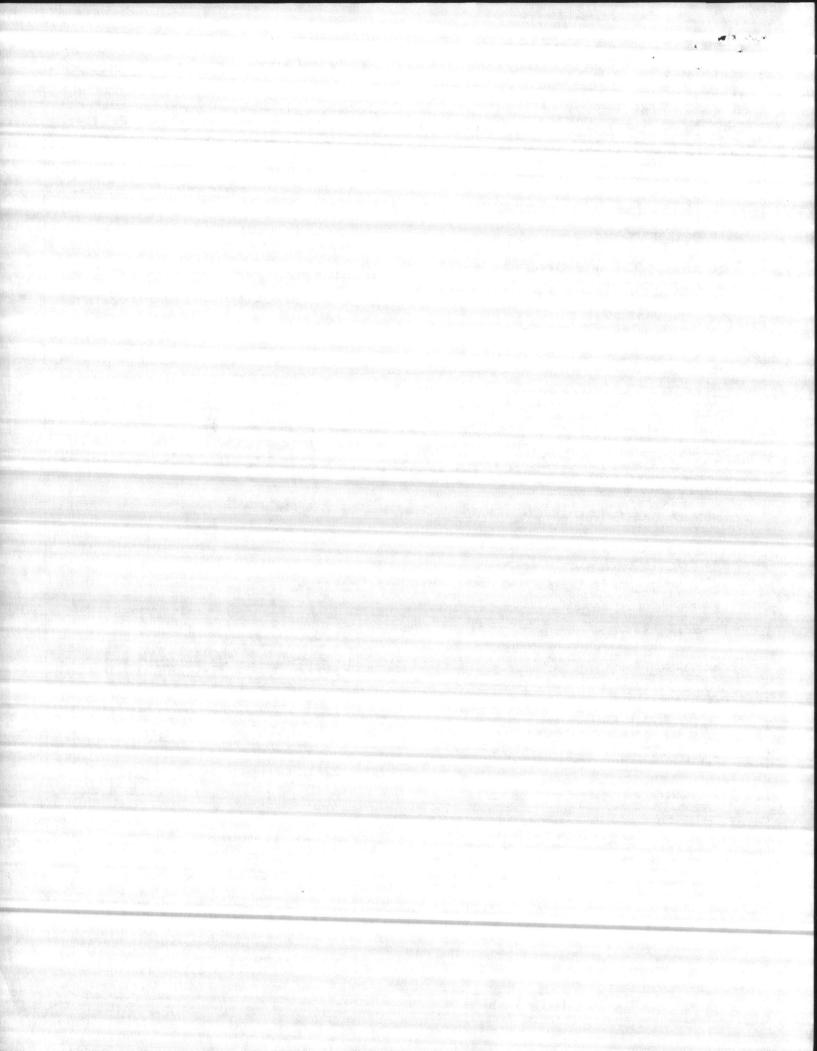


Model 224 Differential Pressure Unit Cutaway

SCALES

The indicating scale is graduated uniformly for measurement of differential pressure or liquid level. Square root scales are available for direct reading of flow rate and special scales can be furnished for indicating the quantity of liquid in tanks. For complete information on the differential pressure unit, request Bulletin 224. Installation data and technical assistance for standard or special applications available upon request.

C Copyright 1978, International Telephone and Telegraph Corporation



GENERAL SPECIFICATIONS

		Availa	able Differen	tial Pressure Ra	inges		
	Meter Body	Stainless St	eel Bellows	Beryllium Cop	oper Bellows	Pressure Co	nnections
SWP-psi	Housing Material	1-5/8" O.D.	3/4" O.D.	1-5/8" O.D.	3/4" O.D.	Тор	Bottom
500	Forged Brass (ASTM-B124 #2)			0-30" w.c. to 0-24.5 psi	0-25 psi to 0-400 psi	1/4" NPT	1/4" NPT
500	Stainless Steel (316)	0-30" w.c. to 0-55 psi	0-60 psi to 0-500 psi	0-30" w.c. to 0-24.5 psi	0-25 psi to 0-400 psi	1/4" NPT	1/4" NPT
1,000	Brass (Fed. Spec. QQ-B-637 Comp. 2)	12 Mar 1997		0-60" w.c. to 0-24.5 psi	0-25 psi to 0-400 psi	1/8" NPT 1/4" NPT	1/8" NPT 1/4" NPT
1,000	Copper Nickel (70-30) MIL-C-15726			0-60" w.c. to 0-24.5 psi	0-25 psi to 0-400 psi	MS16142-4	MS16142-
1,500	Cold Rolled Steel (C1018) Stainless Steel (316)	0-60" w.c. to 0-55 psi	0-60 psi to 0-600 psi	0-60" w.c. to 0-24.5 psi	0-25 psi to 0-400 psi	1/4" NPT	1/4" NPT
3,000	Cold Rolled Steel (C10.18) Stainless Steel (316)	0-60" w.c. to 0-55 psi	0-60 psi to 0-600 psi	0-60" w.c. to 0-24.5 psi	0-25 psi to 0-400 psi	1/2" NPT	1/4" NPT
6,000	Cold Rolled Steel (C1018) Stainless Steel (316)	0-70" w.c. to 0-55 psi	0-60 psi to 0-600 psi	0-70" w.c. to 0-24.5 psi	0-25 psi to 0-400 psi	1/2" NPT 9/16"- 18UNF-2B	1/4" NPT 9/16"- 18UNF-28
10,000	Alloy Steel (4140)	0-100" w.c. to 0-55 psi	0-60 psi to 0-600 psi	0-100" w.c. to 0-24.5 psi	0-25 psi to 0-400 psi	9/16"- 18UNF-2B	9/16"- 18UNF-28
Net	L.P. Head	1.66	2.51	1.66	2.51	2 der Service	1.75 A.C
Volume in cu. in.	H.P. Head	41.55	2.42	1.55	- 2.42		e sienze si
Displaceme	ent in cu. in. for full-scale travel	.14	.03	.14	.03	l'alien land-in	and and and and a

NOTES: Zero center or split ranges are available on special order. For example, a 0-60" w.c. range may be ordered 30-0-30" w.c. of 15-0-45" w.c. Absolute pressure ranges are available from 100" w.c. to 600 psi.

Other sizes and types of connections (welding stubs, MS, A.N.D., etc.) are available upon request.

Special bellows and housing materials can be made available, such as Monel, Inconel 625 and Hastelloy-B, upon request. Outline dimensional drawings are available upon request.

PERFORMANCE SPECIFICATIONS

Temperature Limits

Accuracy: Ranges from 0-30" w.c. to 0-200 psi ±1/2% of full scale differential pressure Ranges from 0-200 psi to 0-400 psi ±3/4% of full scale differential pressure .. -60°F to +200°F

ORDERING INFORMATION

Housing Pressure Rating (SWP) Housing Material **Bellows Material**

Material Contacting Bellows Differential Pressure Range Mounting (pipe, wall, flush panel)

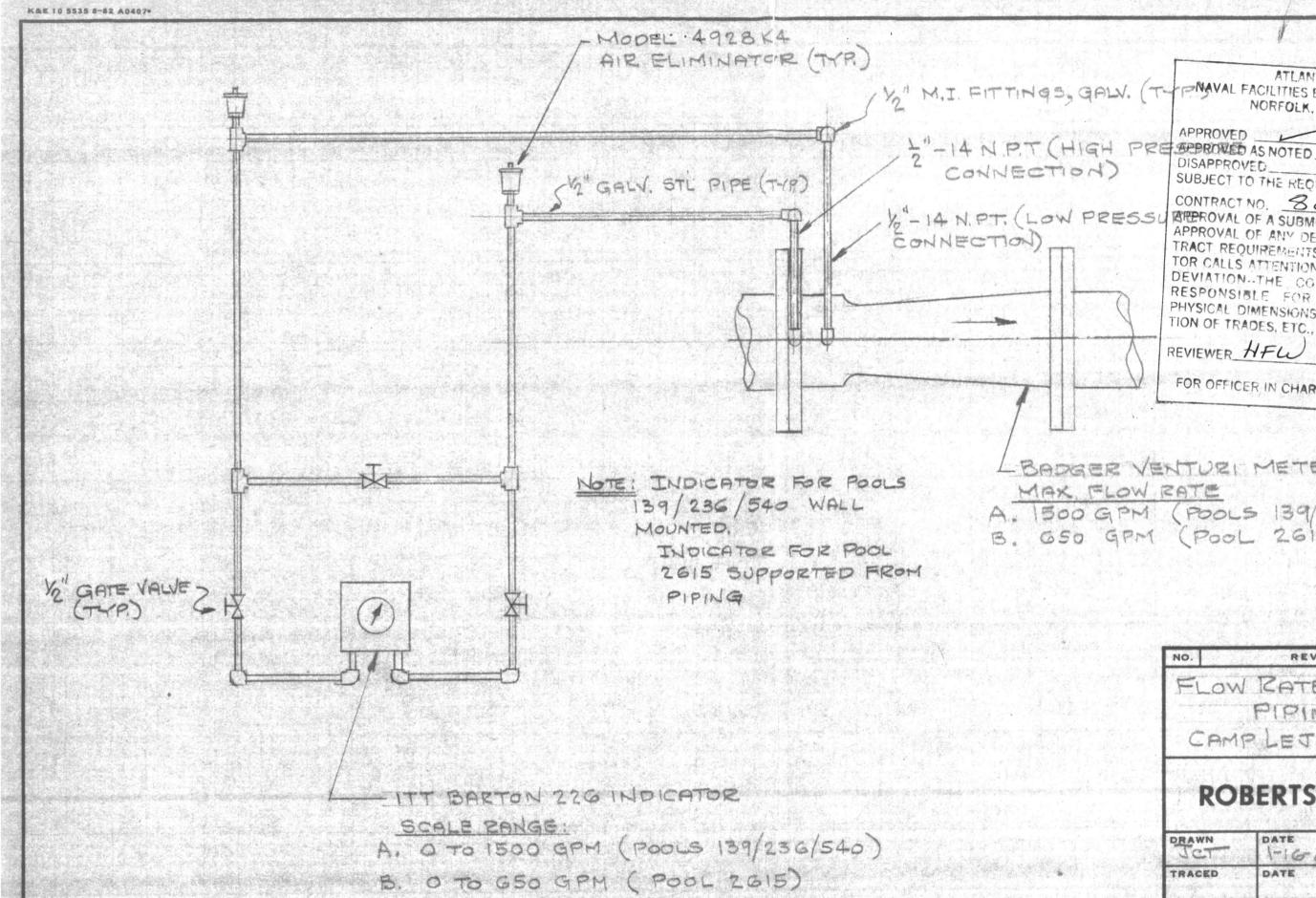
Type of Scale (square root, uniform) Scale Graduations 0-1500 GPM-3 POOLS 0-650 GM - 1000L (261

YOUR LOCAL REPRESENTATIVE

PROCESS INSTRUMENTS AND CONTROLS 900 S. Turnbull Canyon Road, P.O. Box 1882 City of Industry, California 91749 Telephone (213) 961-2547 Telex: 67-7475

HC15M Printed in U.S.A.

ATLANTIG DI NAVAL FACILITIES ENGIN NORFOLK, VIRGI	EERING COMMAND
APPROVED	
APPROVED AS NOTED	
DICADDONIED	
SUBJECT TO THE REQUIRE	VIENTS OF
CONTRACT NO. <u>BZ-Z</u> APPROVAL OF A SUBMITTA APPROVAL OF ANY DEVIAL TRACT REQUIREMENTS UN TOR CALLS ATTENTION TO DEVIATION-THE CONTI RESPONSIBLE FOR PU PHYSICAL DIMENSIONS & TION OF TRADES, ETC., AS	TON FROM THE CON- ILESS THE CONTRAC- AND SUPPORTS THE RACTOR SHALL BE ROVIDING PROPER WEIGHTS, COORDINA- REQUIRED.
REVIEWER HFW	DATE 4Feb 85
FOR OFFICER IN CHARGE	E OF CONSTRUCTION

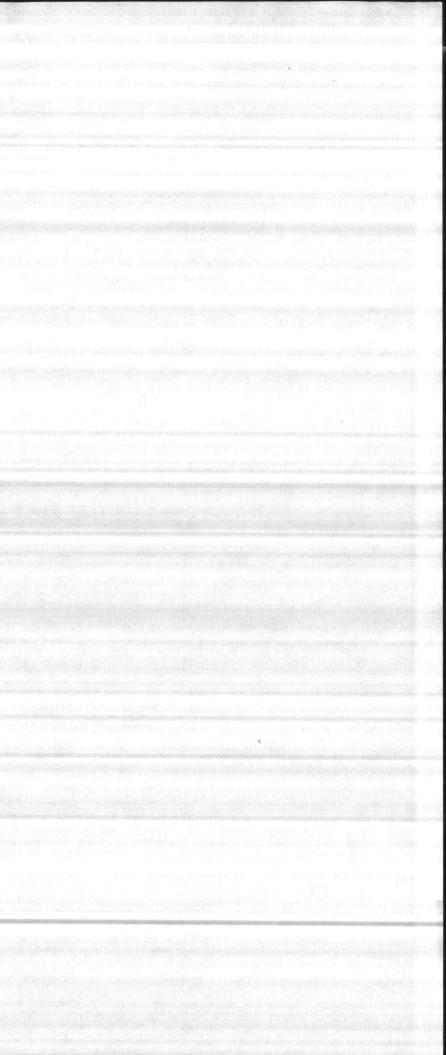


ATLANTIC DIVISION 1/ M.I. FITTINGS, GALV. (T-PNAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED DISAPPROVED. SUBJECT TO THE REQUIREMENTS OF CONTRACT NO. 82-2552 ARPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRAC-TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION .. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA-TION OF TRADES, ETC., AS REQUIRED. REVIEWER HFW DATE 4Febra FOR OFFICER IN CHARGE OF CONSTRUCTION LBADGER VENTURI METER A. 1500 G.PM (POOLS 139/236/540 B. 650 GPM (POOL 2615) REVISION DATE BY NO. FLOW RATE INDICATOR PIPING FOR POOLS CAMP LEJEUNE, N.C ROBERTS FILTER MFG. COMPANY DARBY, PENNSYLVANIA 19023 DRAWN DATE CHECKED DATE 1-16-85 DATE APPROVED DATE TRACED SCALE CONTRACT 5.0. 2093 DWG. NO. 8784-12 SECTION A

TUNN POP

a de la seconda de la contra construir de la seconda de la construir de la construir de la construir de la cons Auguna de la construir de la con Auguna de la construir de la con

and the second second



Liquid Level Controls & Air Vents

Liquid Proportioning Level Controls Both models furnished with 8 ft. of poly-vinyl supply hose, stainless steel foot valve

Maintains a desired level of proportioned chemical concentrate to water mixture in drum, tank or barrel. Float on adjustable chain opens valve when level goes down. Feeds mixture under the surface to avoid foaming. Vacuum breaker prevents siphon-ing action. Proportion of concentrate to water is adjusted by concealed screw. Cor-rosion resistant construction.

4903K51. Ready to install on a garden hose. Remove adapter and a 1/2" FPT con-nection is available. Mounting bracket. 4803K52. Has 34" FPT connection.

and container protec	tor disc.
MAXIMUM	FLOW RATES
Viscosity	Fluid Oz./Gallon
in Centipoise	4803K51 4803K52
Light (1 cp)	10
Medium (75 cp)	3 5.4
Heavy (300 cp)	1 1.5
Water Flow at 40 psi	4 gpm 16 gpm
No.	NET EACH
4803K51	\$129.64
4803K52	193.50

Pump Controls and Low Water Cutoffs A For Submersible and Self-Priming Pumps

For automatic pump starting, high water level alarm, low level cutoff switch or electric clutch operation. Automatic operation—switch turns on at 2%", off at 7%". Mercury capsule switch is molded into poly-urethane float. This assures safe, sparkproof operation with positive action every time. Switch is constructed of inert materials not subject to

corrosion or electrolysis. Tough acetal plastic housing protects switch from objects adrift.

Must be mounted horizontally. Has 3 foot connection leads—make connections above water level. Contact rating: 15 amps from 6 to 32 VDC; 5 amps at 115 VAC.



ſ

ST

F

35791145225

Siz 1/2 3/4 1** 11/4

3/4

11/4

car ma

D clos R

ope

For Any Size Boiler - U.L. Listed

 For Any Size Bo

 Maximum Boiler Pressure: 150 psi.

 Float actuated electrical switches control

 boiler feed pumps from the boiler water level.

 Keeps the boiler water level within the close

 limits recommended for maximum steaming et

 icincy and fuel economy.

 These controls also include a second switch

 with circuits for stopping the automatic burner

 and sounding an alarm, the final sateguard for

 emergency conditions such as current interrup

 for to the pump or failure of make-up water

 supply.

 Gar. also be used on storage tanks and

 pressure vessels to start or stop pumps, or

 and/or low level.

 For any size boiler. Mercury tube type

 switches. Fully enclosed junction, boxes.

 AMP RATING AT FULL LOAD

 AMP RATING AT FULL LOAD

 Amp RATING AT FULL LOAD

 115
12

CONTROL WITHOUT WATER COLUMN. For boilers with separate water column. Pack-less construction utilizing extra heavy sylphon bellows. Float chamber 1" NPT tapped top and bottom for installation on equalizing pipe. Available with automatic or manual reset cut-off switch. NET EACH No.

C CONTROL WITH INTEGRAL WATER COL-UMN. Has integral water column type of float chamber tapped for gauge glass and tri-cocks. Float chamber is 1° NPT tapped top and bottom for installation on equalizing pipe. Tapped ½° NPT for gauge glass and tri-cocks. Available with automatic or manual re-set cutoff switch. set cutoff switch.



1070

For removing air from steam or liquid lines. A vac-uum check seals system against entrance of air from outside when system pressure drops. Brass construc-tion. Combination 34" MPT and 34" FPT connection.

LOW PRESSURE. For pressures up to 15 psi. Use at the end of steam mains, tops of risers and other similar locations on vapor and one pipe vacuum systems. For applications where venting does not exceed one cubic foot per minute at 5 psi.

Operates on float and thermostatic principle which automatically eliminates air from the system and closes-immediately in the presence of steam or water. No. 4926K21 NET EACH \$38.31



Air Eliminators

Air Vents

For hot water heating systems, chilled water cooling systems and other applications where water or liquids are used for heating or cooling. Install on mains, pipe lines, tanks, unit heaters, chillers, radiant panels, convectors or coils.

Automatically vents air to eliminate air pockets or traps that retard free circulation of the water or liquid and reduce the efficiency of the system.

Brass construction. The valve has monel metal spring and neoprene valve seat that are unaffected by high temperatures, oil or antifreeze.

C

MEDIUM PRESSURE—FLOAT AND THERMOSTATIC CONSTRUCTION. For pressures to 125 psi. For use on steam pressure vessels or systems. Float and thermo-static principle expels air rapidly and automatically, and closes immediately in presence of steam or water. No. 4925K11NET EACH \$87.78

 No. 4928k2
 NET EACH \$14.52

 Ya" female bottom connection. Max. pressure: 150 psi.
 NET EACH \$14.20

 Ya" female and 'Xa" male combination bottom connection. Max. pressure: 150 psi.
 NET EACH \$17.84

 No. 4928K4
 NET EACH \$17.84

McMASTER-CARR

ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED L APPROVED AS NOTED SUBJECT TO THE REQUIREMENTS OF DISAPPROVED. CONTRACT NO. 82-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRAC-TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION .. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA-TION OF TRADES, ETC., AS REQUIRED. REVIEWER HFW DATE 4 Feb 85 FOR OFFICER IN CHARGE OF CONSTRUCTION

h.

, he is sites

PRESSURE-TEMPERATURE RATINGS	Sec. Sec. Ast
threaded 150 psi wsp (1/4" to 2") 450F	
threaded 125 psi wsp (21/2" to 4") 450F	L. Ash
flanged 125 psi wsp (1" to 4") 450F	1.00
threaded 225 wog (1/4" to 2") -20 to 150F	
threaded 175 wog (21/2" to 4") -20 to 150F	. Marine
flanged 200 wog (1" to 2") -20 to 150F	1. 1. 1
flanged 175 wog (21/2" to 4") -20 to 150F	
Tanged 175 wog (272 to 4) - 20 to 1501	an a
	1 Section 2
	and an in
	AREAM .
	7.1
	1000
	1.1.1.1
	General Anna Province
wadhucath	- second second second
	-
	1. 199
	1
	WITCH
Figs. 709, 711 Figs. 709F, 711F	HAT' AND
Threaded Ends Flanged Ends	um n di
	その見ている。ほう
	11212
C 38	s s merus Cacas - 19
Trans	a determine
10000-1	2300.00
	11
9	increased and and a
10- 000 000 40	的研究
	in voreiteren
b DI D Fuld	
open A Fig 7005	
2 Fig. 709F Sizes 1" to 4	,
8	
	7
	3
	den sendera
	4
and the second	e national a seg
UINAUXION III	1
6	
Fig. 709	
Sizes 1⁄4" to 4"	

(=)

IRON BODY WEDGE GATE CLASS 150

FIGURES: 709 (1/4"-4"), 709F (1"-4"), 711 (1/4"-4"), 711F (1"-4")

DESIGN DESCRIPTION:

Solid Wedge Saddle Style Inside Thread Bronze Mounted (Figs. 709, 709F)

All Iron (Figs. 711, 711F) Threaded Ends (Figs. 709, 711) Flanged Ends (Figs. 709F, 711F)

	DESCRIPTION	MATERIAL	ASTM SPEC.
1	body	hi-strength cast iron	A126 CL B
2	bonnet	hi-strength cast iron	A126 CL B
3	wedge (709)	bronze	B61 AL922
	wedge (711)	malleable iron	A197
4	seat rings (709)	brass	B16 AL360
4 B	seat rings (711)	steel	A108 GR 1213
5	stem (709)	brass	B16 AL360
47	stem (711) 🦻 🖡	steel (ni-plated)	A108 GR1117
6	saddle bolt	steel	A108 GR1018
7	bonnet gasket	asbestos	commercial
8	bonnet bushing (709)	valve bronze	B61AL922
231	saddle bolt nut*	steel	_
9	stuffing nut	steel	A108 GR1018
10	gland (709)	brassy	B16 AL360
	gland (711)	steel	A108 GR1018
11	packing	asbestos	commercial
12	handwheel	aluminum	B85 AL S12A
······································	handwheel nut (709, 709F)*	brass	commercial
	handwheel nut (711, 711F)*	steel	commercial
	lockwasher*	steel	commercial

DIMENSIONS IN INCHES:

SIZE	1/4	3/8	1/2	3/4	1	11⁄4	11/2	2	21/2	3	4
a 1	23/16	23/16	219/32	211/16	33/16	33/8	315/32	41/2	51/4	51/2	61/4
a (F)							6				9
b	6 ³ /16	63/16	63/16	75/8	811/16	93/4	113/8	141/8	163/4	191/8	241/2
c	21/2	21/2	21/2	3	3	3	33/4	41/4	51/4	53/4	61/2
d					41/4	45/8	5	6	7	71/2	9
е	1 <u>-</u>			41 <u>-</u>	7/16	1/2	9/16	5/8	11/16	3/4	15/16

WEIGHTS IN POUNDS:

(709, 711)	1.9	1.8	2	3.2	4.5	6.1	8.1	13.2	22	31.5	64
(709F, 711F)	-	<u> </u>	—	2 <u>21</u>	6.8	9.7	13.8	21.5	33	45	83

APPLICABLE STANDARDS:

Face-to-Face 2" to 4"ANSI B16.10 End Flanges.....CL 125....ANSI B16.1 Tapered Pipe Threads ANSI B2.1

For engineering specifications and data, see index page E1 of Engineering Section in back of Catalog.



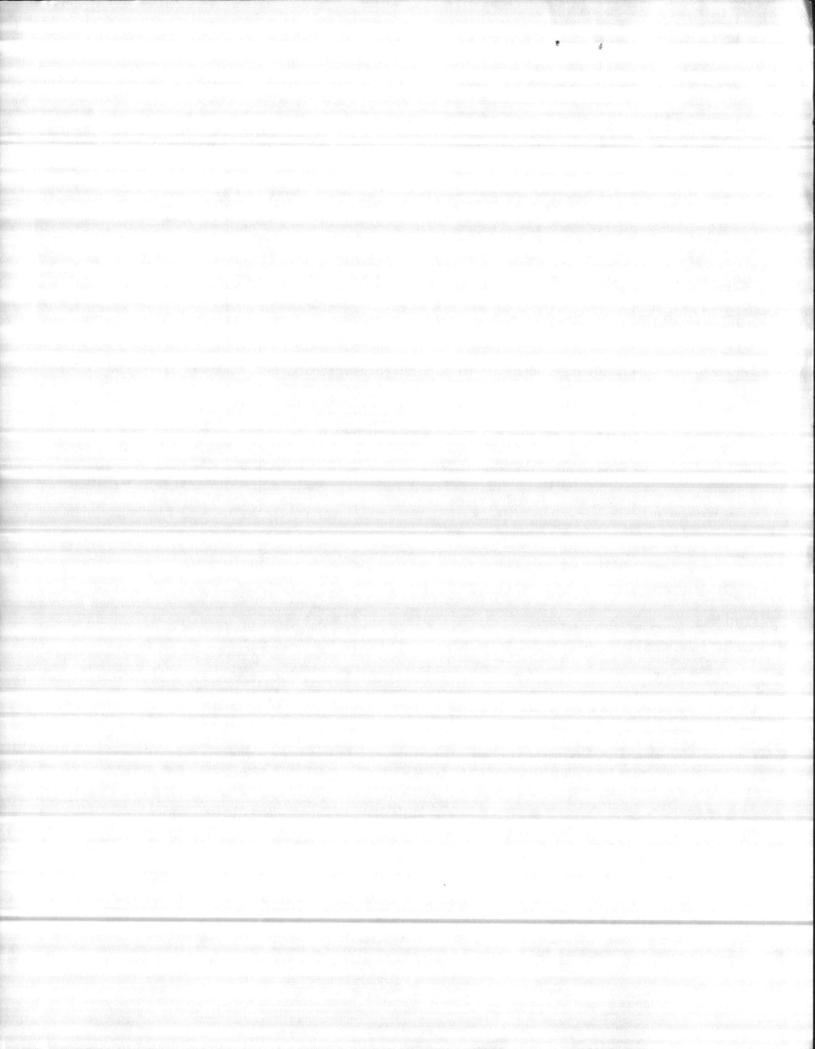
	ATLANTIC DIVISION
	NAVAL FACILITIES ENGINEERING COMMAND
	NORFOLK, VIRGINIA 23511
	APPROVED
	APPROVED AS NOTED
	DISAPPROVED
	SUBJECT TO THE REQUIREMENTS OF
	CONTRACT NO. 82-2552
	APPROVAL OF A SUBMITTAL DOES NOT INCLUDE
1	APPROVAL OF ANY DEVIATION FROM THE CON-
1	TRACT REQUIREMENTS UNLESS THE CONTRAC-
1	TOR CALLS ATTENTION TO AND SUPPORTS THE
1	DEVIATION THE CONTRACTOR SHALL BE
	RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA-
	TION OF TRADES, ETC., AS REQUIRED.
1	
1	REVIEWER_HFW DATE 4Feb 85
1	FOR OFFICER IN CHARGE OF CONSTRUCTION
L	

	ITDIV NORFOLK 4-43	JBMITTAL TRANSMITTAL	CONTRACT NO	TRANSM	TTAL NO	DATE
	A CONTRACTOR	355/3 (Hev. 11-80)	N62470-82-B-2552	12-1	A pg. 1	1/28/85
		MANUFACTURING COMPANY	PROJECT TITLE AND LOCATION			
0	DENIS FILIER	MANUFACTURING COMPANY	REPLACE EQUIPM	FNT -	- BUTI TN	G 20
NA	VAL FACILITIE	S ENGINEERING COMMAND	T.U.T.	<u> </u>	DOILIN	
	and the second se	CONTRACTOR USE ONLY	John Martin	3X	REVI	EWER USE ONLY
	L Contractor Approved	ist only one of the following categories on each tr and indicate which is being submitted OICC Approval	C LAN IS	itution proval C	S AN-APP	oproved proved as noted seipt acknowledged. ments
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICAT (Type, size, model no., Mfg. r brochure number	name, dwg. or	NO. OF COPLES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
	15440 Para. 2.10	INSTRUMENTS AND CONTRO	OLS - BLDG. 20			
5A	A-8784-4	Headloss Indicator with Man	ufacturing Data	7	A	HFW/406 4 Feb 8.4
5A	A-8784-5	Backwash Flow Indicator wit	h Mfg. Data	7	A.	9
1A	Catalog Pages	Fischer and Porter Controll		7	R	
		Rosemount Flow Transmitter	1	7	A	
<u>5A</u>	and the second se	Rosemount Headloss Transmit	tor	7	A	V

**

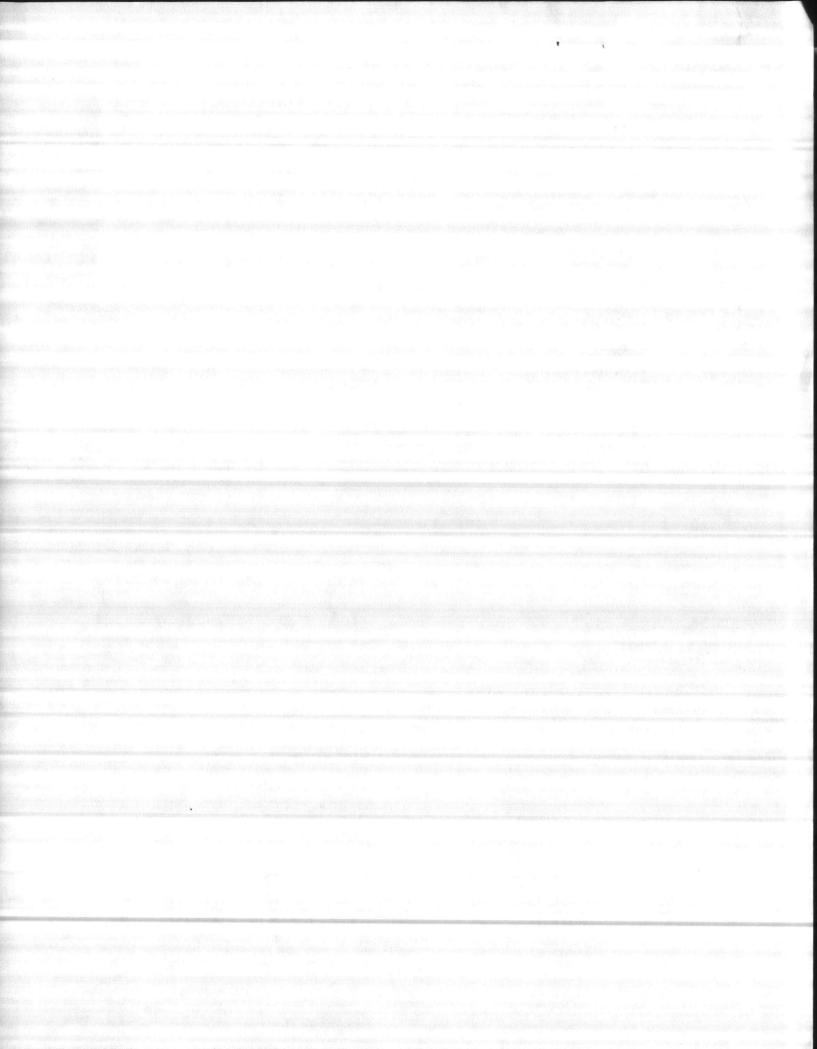
•

t. M. I. Kimball	AITTALS TO ROICC		SENTATIVE (Signature)	
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	0	TO ROBERTS FILTE	a/ROICC
Submittals are returned tractor calls attention to	with action indicated. Approval of an item doe o and supports the deviation.	s not include approval of a	any deviation from the contract re	equirements unless the con-
Submittals are forwards transmittal form.	d to LANTDIV with A-E recommendations ind	icated in REVIEWER USE	ONLY Section and in comments	below on ONE COPY of the
	Contracen: ENTIN SHOULD BE RESUB			
(INCUDE	VENTURI, PRESSURE	DIFFERENTIA	N FLOW TRAN	ism ITTER,
RATE OF	FLOW INDICATOR)	ELECTEON	ic RATE SET	TING STATION
ALL	OTHERS APPRON	EN.		an an an san an a
COPIES TO ROICC (2) LANTDIV (1) A-E (1)	2/4/85	SIGNATURE 14	aste	
		0	AU.S. GOP:	1983 - 739-003/2122 Region 3-11



	NTRACTOR'S S				0550			DATE
	M CONTRACTOR			PROJECT TITLE AND L		12-1	A Pg. 2	1/28/8
RO	BERTS FILTER	MANUFACT	URING COMPANY					ILDING 20
Sec. 1977	VAL FACILITIE	S ENGINE	ERING COMMAND	KEFEA	CE EQU	IFRE	11 - DU	
			CONTRACTOR USE ONLY		and a second		REVI	EWER USE ONLY
	1	List only one of	only one specification division , the following categories on ea of indicate which is being sub-	h transmittal form,			A-Appi D-Disa	pproved
	and indicate which is being submitted			Devia	Deviation/Substitution For OICC Approval		AN-Approved as noted RA-Receipt acknowledged. C-Comments R-Resubmit	
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *		ITEM IDENTIFICATION (Type, size, model no., Mfg. name, dwg. or brochure number)			NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DAT
	Catalog Pages	G.F. Inc	dicating Light (T)	7	A	HFW1406 4Feb8
23A			ompliance	anoronner iype	·	7	RA	N
-34	Letter							V
	in the second					1		
							5 G 1. 1 G 4	
		and the second second	·					
CONT	TRACTOR'S COMMENTS							
	TRACTOR'S COMMENTS	JBMITTALS TO RO	201	CONTRACTOR REPRES	SENTATIVE (S	Signature)		
COPT				CONTRACTOR REPRES	1,0		l	
	Y OF TRANSMITTAL AND SU <u> t. M. I. Kimb</u> E RECEIVED BY REVIEWER		ICC FROM (Reviewer)	CONTRACTOR REPRES	tho	mp		- TRUIC
	Y OF TRANSMITTAL AND SU t. M. I. Kimb E RECEIVED BY REVIEWER 1/31/85	ed with action in	FROM (Reviewer)	<u>J.C.</u>	To e	mp Bik	13 FILTE	CZ / KCM rquirements unless the
	TOF TRANSMITTAL AND SU t. M. I. Kimb E RECEIVED BY REVIEWER 1/3//X Submittals are return tractor calls attention	ed with action in to and support	FROM (Reviewer)	es not include approval of a	To Co	mf Bick.	73 FICTO ne contract re	quirements unless the
	Y OF TRANSMITTAL AND SU t. M. I. Kimb E RECEIVED BY REVIEWER 1/3//KS Submittals are return tractor calls attention Submittals are forwar transmittal form. EWER'S COMMENTS Trace 4 Mil	ed with action in to and support rded to LANTDIN	FROM (Reviewer) dicated. Approval of an item do is the deviation. I with A-E recommendations in with A-E recommendations in Mailen Emm	es not include approval of a licated in REVIEWER USE	To en iny deviation	mf BLR. on from the ion and i	TS TILTO ne contract re in comments	below on ONE COPY
	Y OF TRANSMITTAL AND SU t. M. I. Kimb E RECEIVED BY REVIEWER 1/31/KS Submittals are returned tractor calls attention Submittals are forware transmittal form. EWER'S COMMENTS TEM # 1411 SYSTEM	ed with action in to and support rded to LANTDIN G Contro SNOUL	FROM (Reviewer) idicated. Approval of an item do to the deviation. // with A-E recommendations in // actent: Entrol // BACER: Entrol // BACER: Entrol	es not include approval of a licated in REVIEWER USE REC FICTER SMITTED A	To en ny deviation	mf oBLR. on from the lion and i FFLL Care	PS FILTE	Province of the second
	Y OF TRANSMITTAL AND SU t. M. I. Kimb E RECEIVED BY REVIEWER 1/31/KS Submittals are returned tractor calls attention Submittals are forware transmittal form. EWER'S COMMENTS TEM # 1411 SYSTEM	ed with action in to and support rded to LANTDIN G Contro SNOUL	FROM (Reviewer) idicated. Approval of an item do to the deviation. // with A-E recommendations in // actent: Entrol // BACER: Entrol // BACER: Entrol	es not include approval of a licated in REVIEWER USE REC FICTER SMITTED A	To en ny deviation	mf oBLR. on from the lion and i FFLL Care	PS FILTE	Province of the second
	Y OF TRANSMITTAL AND SU t. M. I. Kimb E RECEIVED BY REVIEWER 1/31/KS Submittals are return tractor calls attention Submittals are forwar transmittal form. EWER'S COMMENTS TEM # 141 SYSTEM INCLOSE ELECTRE	ed with action in to and support rded to LANTDIN G. Contr SNOULI VENT	FROM (Reviewer) dicated. Approval of an item do to the deviation. With A-E recommendations in Railen: Entr) 36 2550 White Super- Content TR OLL OFF	DIFFCRENCE	Yho To ei iny deviatio ONLY Sect	mf Bille ion from the ion and i FFCU Card	TS TILTE	equirements unless the below on ONE COPY of Contractor An class process Sum and Copy
	Y OF TRANSMITTAL AND SU t. M. I. Kimb E RECEIVED BY REVIEWER 1/31/KS Submittals are return tractor calls attention Submittals are forwar transmittal form. EWER'S COMMENTS TEM # 141 SYSTEM INCLOSE ELECTRE	ed with action in to and support rded to LANTDIN G. Contr SNOULI VENT	FROM (Reviewer) idicated. Approval of an item do to the deviation. // with A-E recommendations in // actent: Entrol // BACER: Entrol // BACER: Entrol	DIFFCRENCE	Yho To ei iny deviatio ONLY Sect	mf Bille ion from the ion and i FFCU Card	TS TILTE	equirements unless the below on ONE COPY of Contractor An class process Sum and Copy
	Y OF TRANSMITTAL AND SU t. M. I. Kimb E RECEIVED BY REVIEWER 1/3)/KS Submittals are return tractor calls attention Submittals are forwar transmittal form. EWER'S COMMENTS TEM # 141 SYSTEM INFLOE ELE CITE IMPLOE	ed with action in to and support rded to LANTDIN G. Contr SNOULI VENT	FROM (Reviewer) dicated. Approval of an item do to the deviation. With A-E recommendations in Radient: Entry Radient: Entry) 36 20502 White Super- Const TR OLL ON OW MAILARY	ELLCTROA	Yho To ei iny deviatio ONLY Sect	mf Bille ion from the ion and i FFCU Card	TS TILTE	equirements unless the below on ONE COPY of Contractor An class process Sum and Copy

srid,



Roberts

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-C-2552

PROJECT SPECIFICATION SECTION 15440

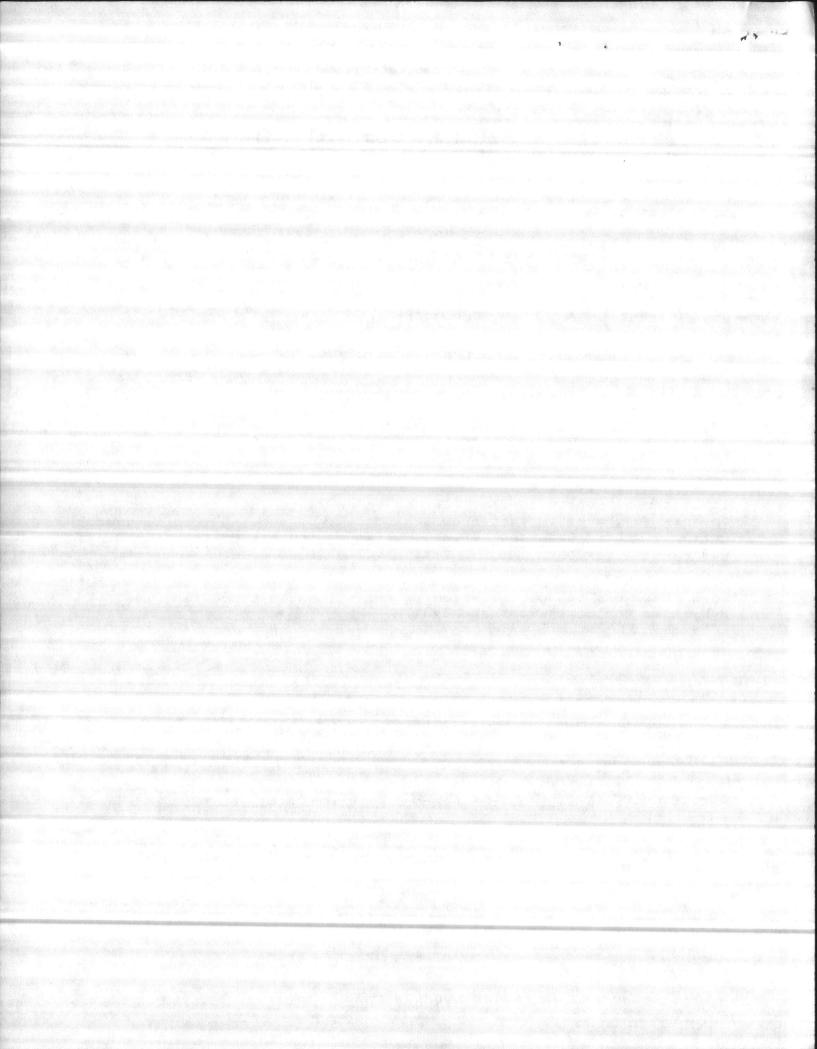
PARAGRAPH 2.10

It is hereby certified that the (equipment/material) shown and marked in this submittal is that proposed to be incorporated into Contract No. N62470-82-8-2552 and is in compliance with the contract drawings and specifications.

This equipment can be installed in the allocated spaces and is submitted for Government approval.

Certified By J. C. Hompson Date 1-28-85

MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897



- --



CABLE: WATERFILT PHILA. TELEX: 753-447

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

January 28, 1985

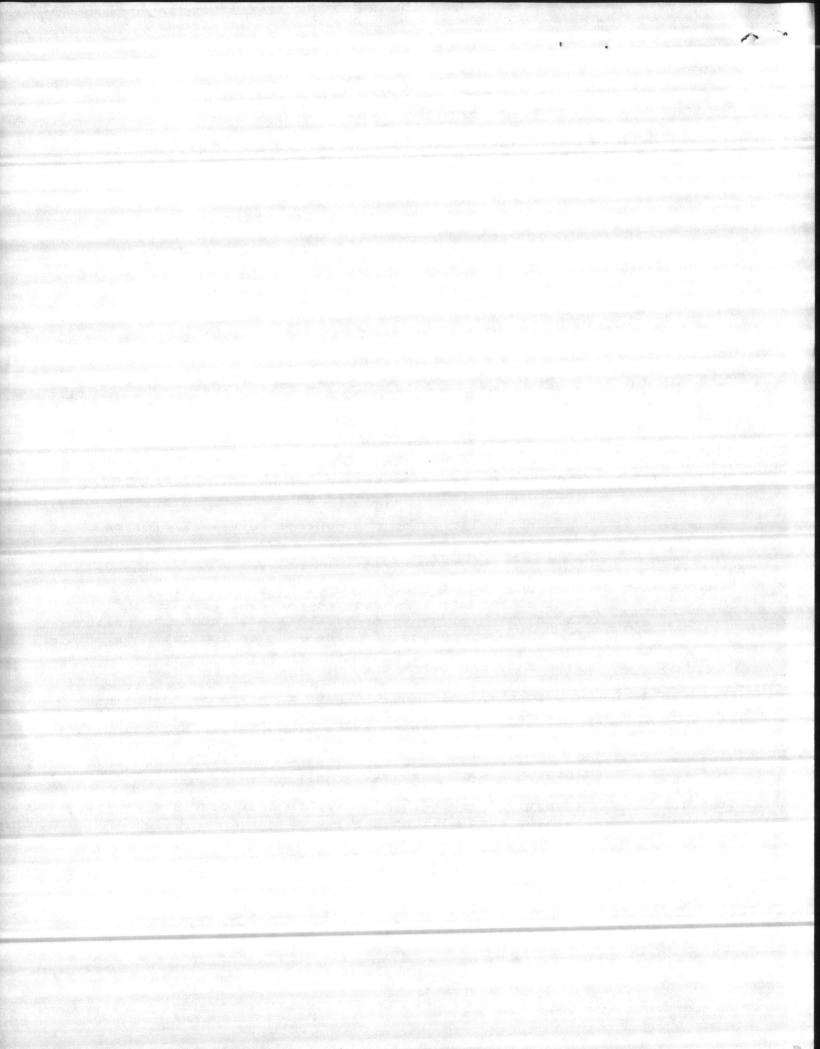
RESPONSE TO REVIEW COMMENTS

OF 1/7/85 - SUBMITTAL NO. 12

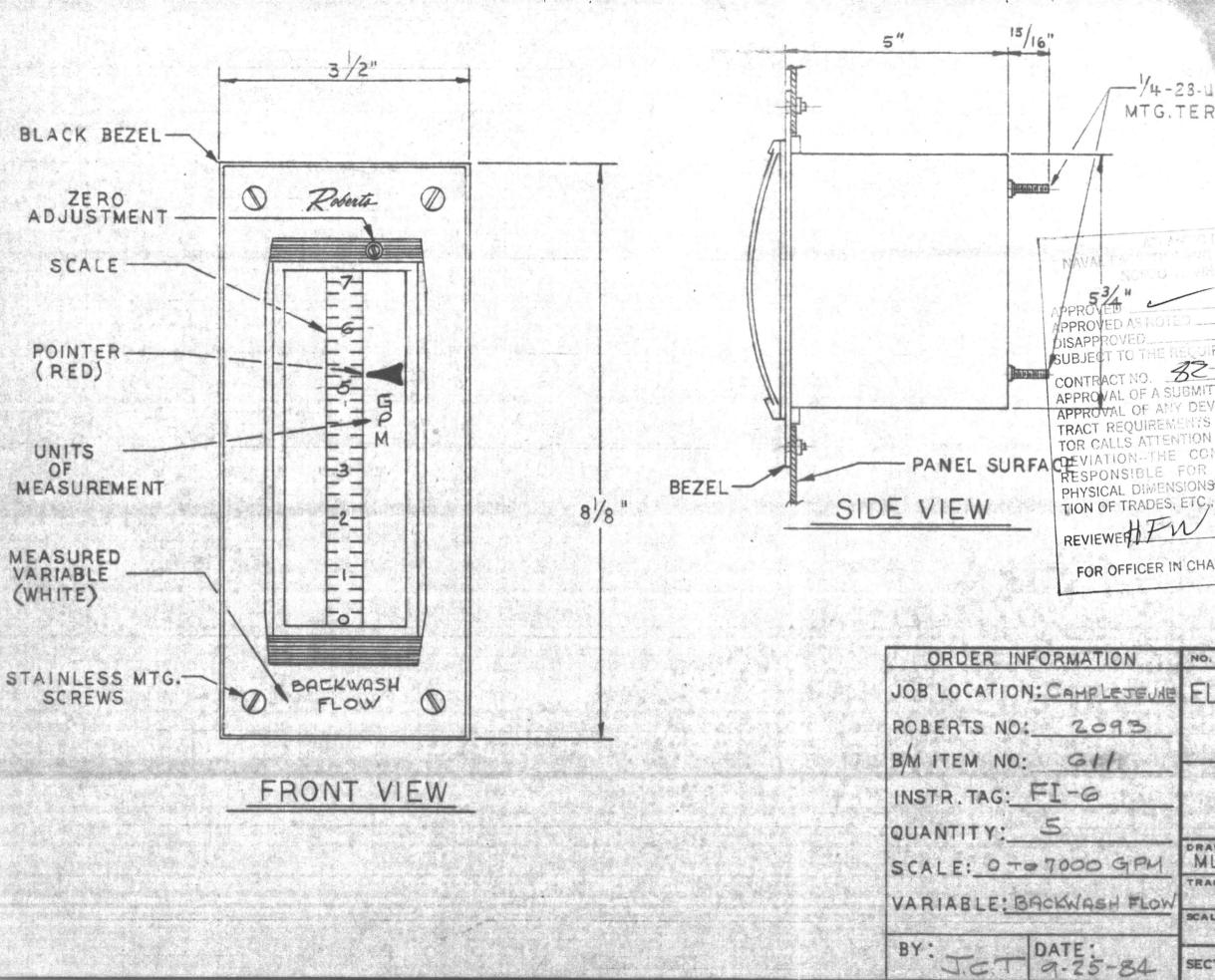
- Items 5 & 6 The loss of head and backwash flow indicators now include manufacturers data, material and accuracy.
- Items 11 & 13 Comments relative to the control valve will follow separately.
- Item 14 The function of the Fischer & Porter Controller is to control the effluent flow to the desired rate (which is adjustable) by transmitting a 4 to 20 MA to position the valve accordingly. Note that an indicator is an integral part of the controller which can be readily viewed by the operator.
- Items 15 & 16 The loss of head and backwash flow transmitter literature now reflects the ranges. Each transmitter will be calibrated to agree with the Venturi characteristics.

Note that each transmitter will provide local indication.

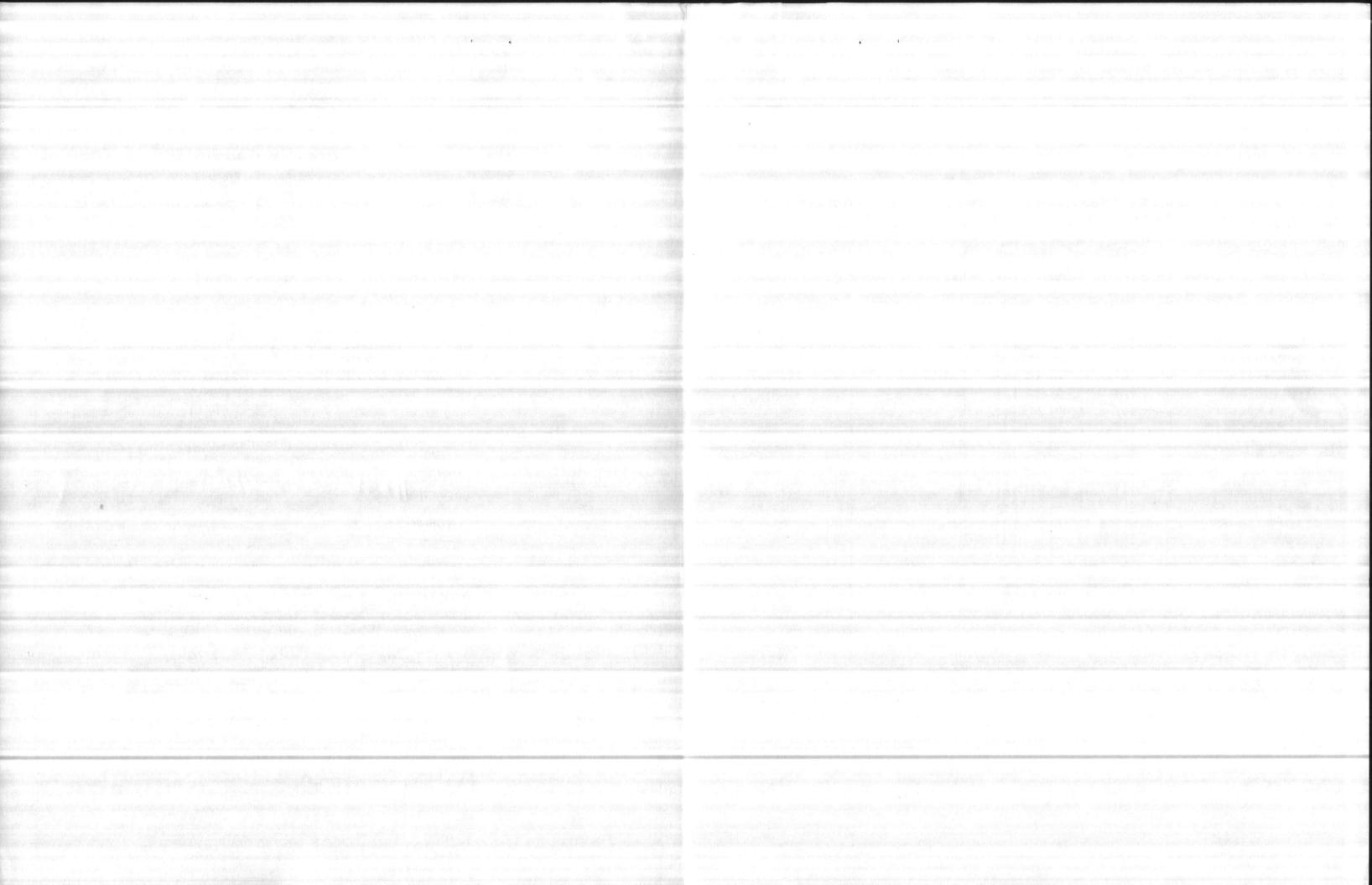
Item 19 - Transformer type lights will be provided as specified, catalog cuts will be provided.

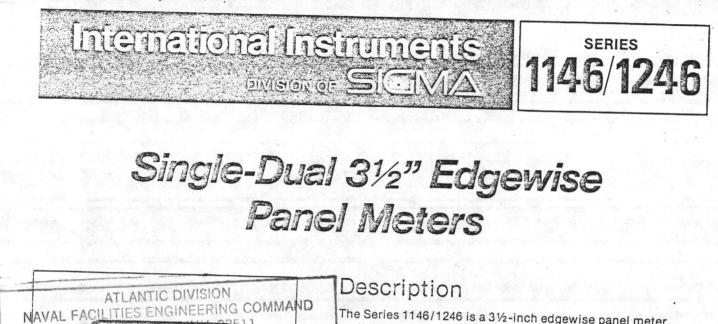






17/8 "Q" -/4-28-UNF MTG.TERM, DIA. HOLE 7" 33/4" HE REQUIREMENTS OF DOES NOT INCLUDE DEVIATION FROM THE CON-SUMPORTS THE 4" MINT TO AND: CTOR SHALG BE TYPIC ACROPER TOU TION OF TRADES, ETC., AS REOPREPANELS IN FACE REVIEWER FW DATE FAUSS FOR OFFICER IN CHARGE OF CONSTRUCTION REVISION NO. DATE BY ELECTRONIC INDICATOR MODEL E-6V-I SINGLE VARIABLE FILTER MEG. COMPANY ROBERTS MLP 9 - 10 - 84 CHECKED DATE TRACED DATE APPROVED DATE SCALE CONTRACT 5.0. N.T.S. 2093 DWG. NO. 8784-5 SECTION A





The Series 1146/1246 is a 3½-inch edgewise panel meter available as a single scale meter (the 1146) or a dual scale meter (the 1246) with independent dual inputs.

Horizontal or vertical meters are available. Both can be stacked n unlimited quantities without special mounting hardware or ools.

Appearance is similar to International Instruments' Series 1151/1251 6-inch edgewise meter, providing design compati-LUDE bility when installed on the same panel.

M THE CON-E CONTRAC-The instrument utilizes a patented flat meter movement with PPORTS THE exclusive cantilevered coil construction. The jeweled D'Arsonval SHALL BE four times greater than conventional movement of equivalent IG PROPERsize — assuring long, stable life.

COORDINA-Anti-parallax, bi-level scales reduce reading errors on both Series 1146 and Series 1246.

VSTRUCTION Features

Independent Dual Instruments

Two independent meters can be included in one 3½" instrument. Thus, related functions from a single source can be displayed in a single unit; e.g., specific gravity and temperature, tank level and density, speed and R.P.M. etc.

Additionally, you save three ways with the Series 1246 through: Lower Initial Cost per Meter

Reduced Panel Space

Less panel fabrication and assembly labor time

Hi-visibility Pointers

The bright cerise (red) pointers, supplied as standard, combined with the bi-level anti-parallax scales make this a most easily read instrument, even in high density panels with many meters stacked side by side.

 Front mounted zero adjust on both the 1146 single or 1246 dual.

Series 1246 — Dual Vertically mounted instrument with two independent inputs

0=

FMTS C

EPRO

-746 88

ΞO

C?

TIN

APPROVE

APPROVE

DISAPPR

APPROV編

APPROVA

TRACT R

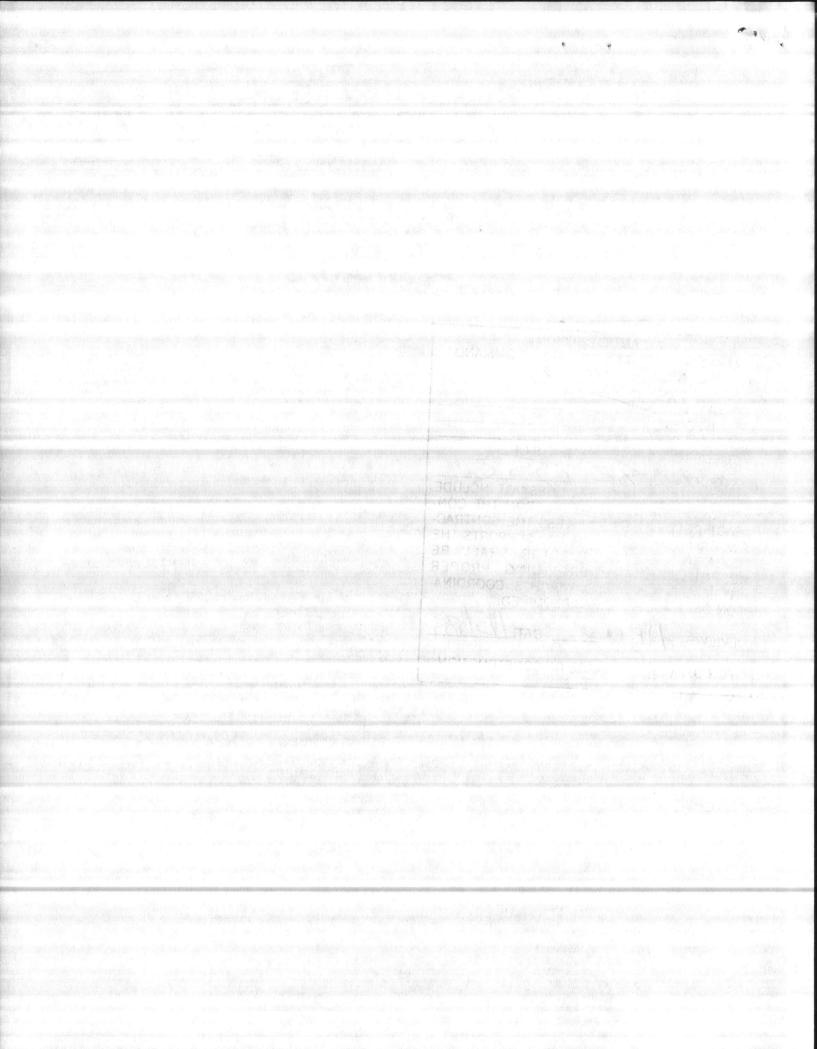
EVIAT

ION OF

FOR

RESPO

BAEKWASH FLOW 0707000 GPM SEALE 4 TO 20 MA INPUT



SERIES TO AD APAG EDGE MISCH DANGE MIDNERS

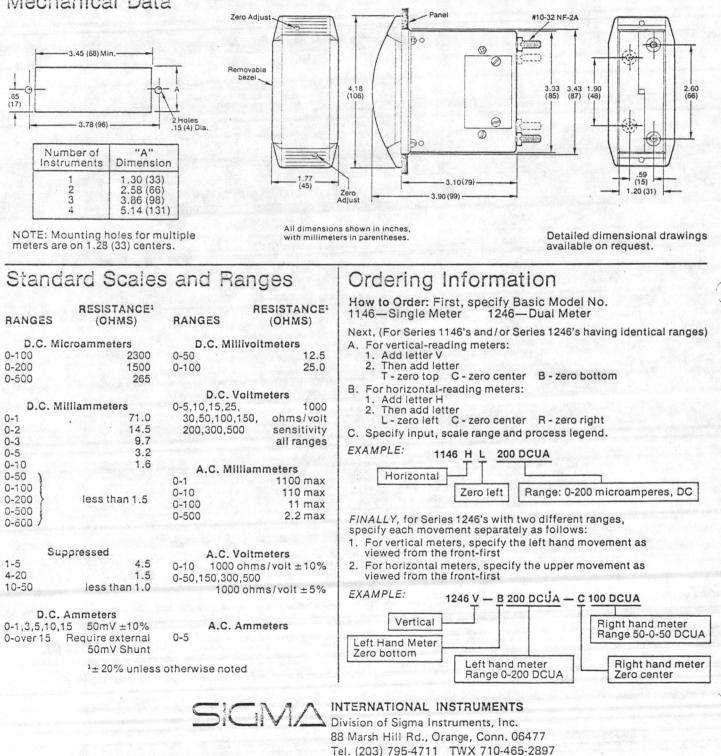
Specifications

Accuracy: 2% F.S. Value for DC Ranges 3% F.S. Value for AC Ranges Repeatability: ±2% F.S. Overload: Sustained-120% for 8 hours Momentary-10 times rated current **Response Time:** 3 Secs. Max. Overshoot: 40% maximum

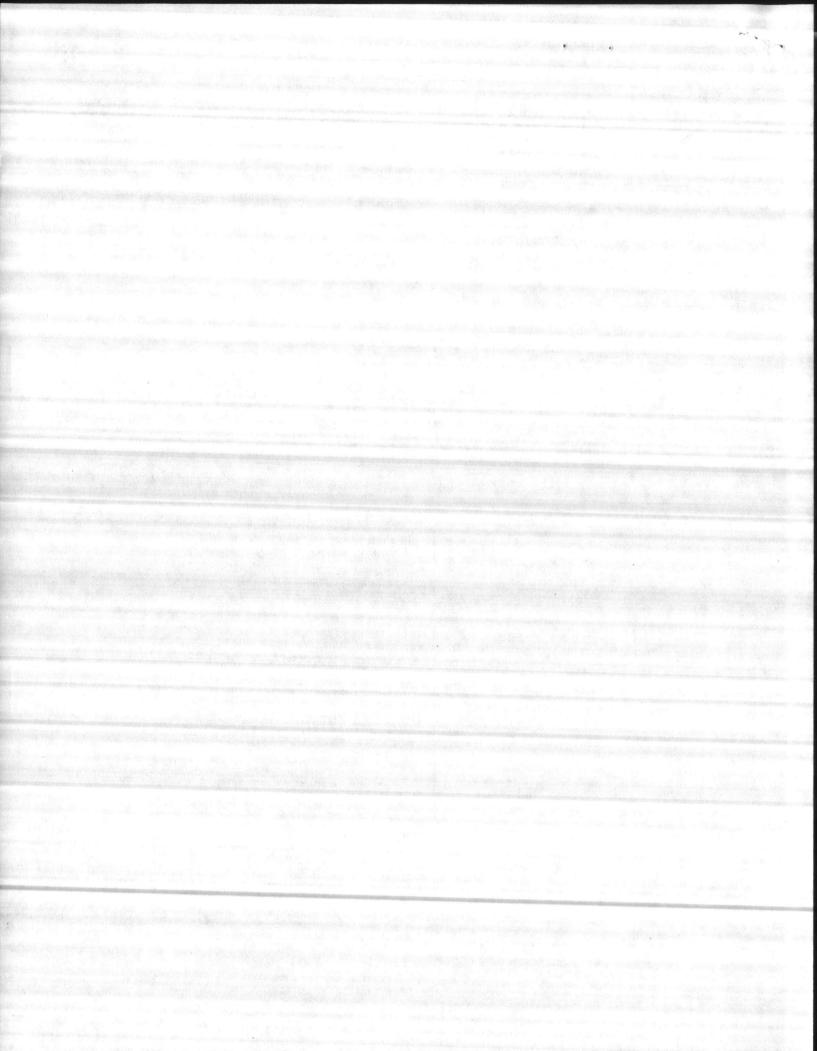
Mechanical Data

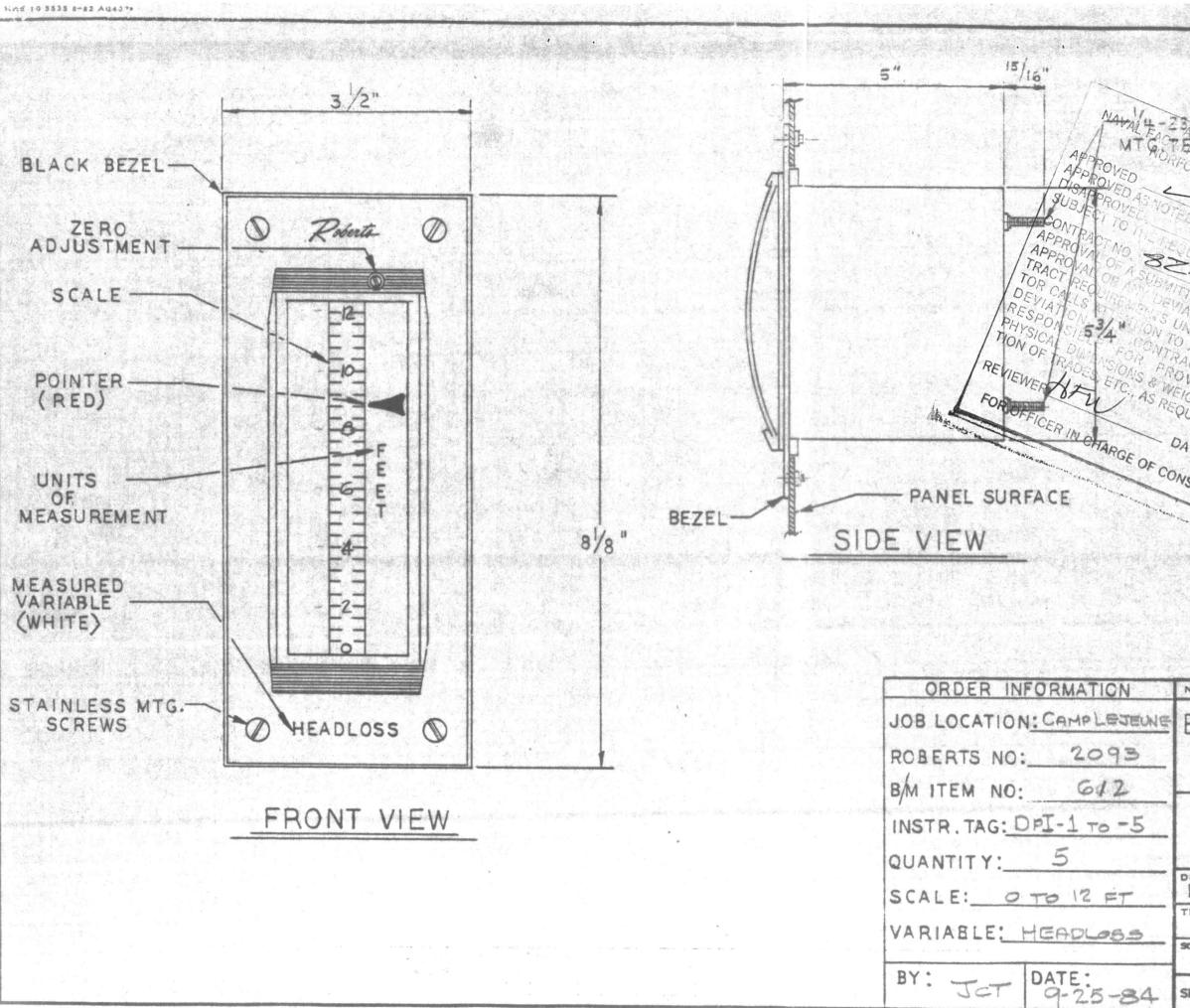
Hi-Pot: 2600 Volts RMS terminal to case for 1 minute Temperature (Operating): -20 to 50°C Shock: 50 G's Pointer: Triangular type, color-cerise red Length-2.7 inches Scale. Marking-black lettering on white background.

Standard Movement: Zero left on horizontal or zero bottom on vertical (Zero center, right or top optional) Mounting: Two 6-32 round head screws, with lock washers and nuts. 10-32 stud terminals Terminals: Materials of Construction: Case and crystal-self-extinguishing plastic Black case Finish: Single Scale Model-8 oz. Weight: Dual Scale Model-10 oz.

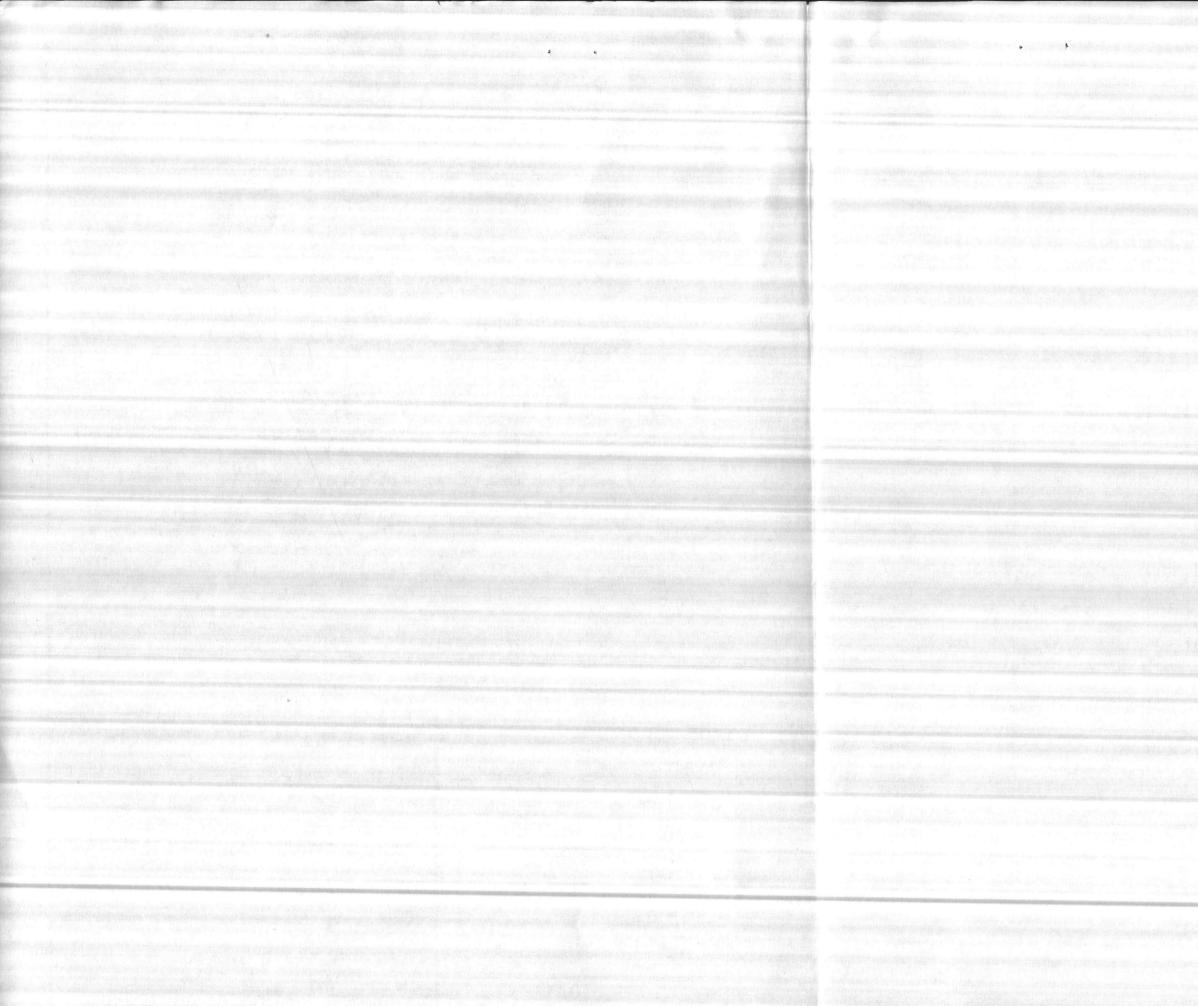


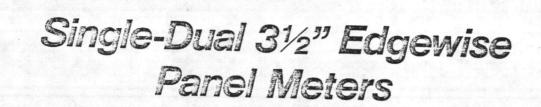
CANADA: Sigma Instruments (Canada) Ltd. • 55 Six Point Road • Toronto, Ont. M8Z 2X3 • Tel: (416) 239-8161





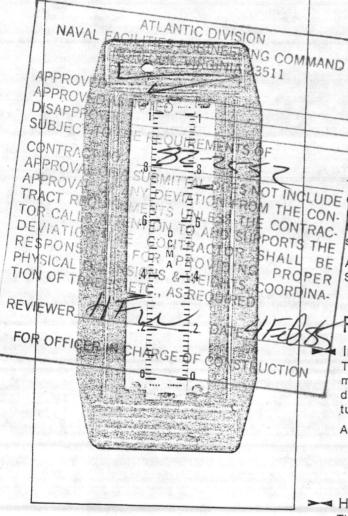
		Condition of	alle agent to
	17/8		British H
ERMINE DIN FOLKENGING	+"c"	~ 3/1	" DIA. HOLE
ED VIRGINI	VEING COMMAN	071	
TTAL DOES NO	H N	<u>*</u> €"	7"
AND SUPPO	THE THE		
AND SUPPO RACTOR SUPPO OVIDING SHA EIGHTS, COORL OUIRED. DATE	OBE	.	
WSTRUCTON	PICAL	CUTOU	MIN: *E"
an tak film	R PANEL	SURFACE	
NO.	REVISIO) N	DATE BY
)	RONIC	-6V-I	Contractor and the second
		ILTER MFG.	
MLP	9-10-84	CHECKED	DATE * *
TRACED	DATE .	APPROVED	DATE
SCALE	T.S.	CONTRACT	5.0.
SECTION A	DWG.	NO. 87	84-4





DIMISTOR OF SOMA

Internetional Instruments



Series 1246 — Dual Vertically mounted instrument with two independent inputs

TO 7000 GPM SEALE

BAEKWASH FLOW

4 TO 20 MA. INPUT

Description

The Series 1146/1246 is a 3½-inch edgewise panel meter available as a single scale meter (the 1146) or a dual scale meter (the 1246) with independent dual inputs.

SERIES

1146/1246

Horizontal or vertical meters are available. Both can be stacked in unlimited quantities without special mounting hardware or topls.

Appearance is similar to International Instruments' Series 1151/1251 6-inch edgewise meter, providing design compatibility when installed on the same panel.

The instrument utilizes a patented flat meter movement with exclusive cantilevered coil construction. The jeweled D'Arsonval movement produces torque-to-weight ratios (meter efficiency) four times greater than conventional movement of equivalent size — assuring long, stable life.

Anti-parallax, bi-level scales reduce reading errors on both Series 1146 and Series 1246.

Features

Independent Dual Instruments

Two independent meters can be included in one 3½" instrument. Thus, related functions from a single source can be displayed in a single unit; e.g., specific gravity and temperature, tank level and density, speed and R.P.M. etc.

Additionally, you save three ways with the Series 1246 through: Lower Initial Cost per Meter

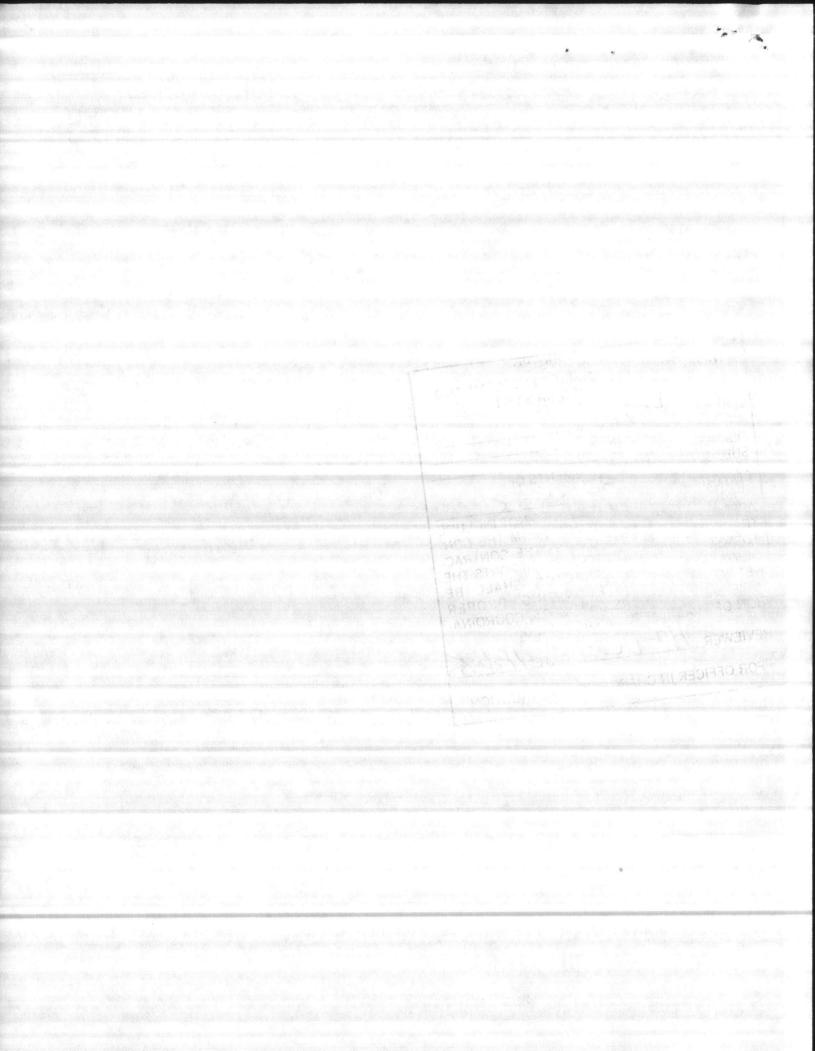
Reduced Panel Space

Less panel fabrication and assembly labor time

Hi-visibility Pointers

The bright cerise (red) pointers, supplied as standard, combined with the bi-level anti-parallax scales make this a most easily read instrument, even in high density panels with many meters stacked side by side.

Front mounted zero adjust on both the 1146 single or 1246 dual.



Specifications

: . Si=:1=

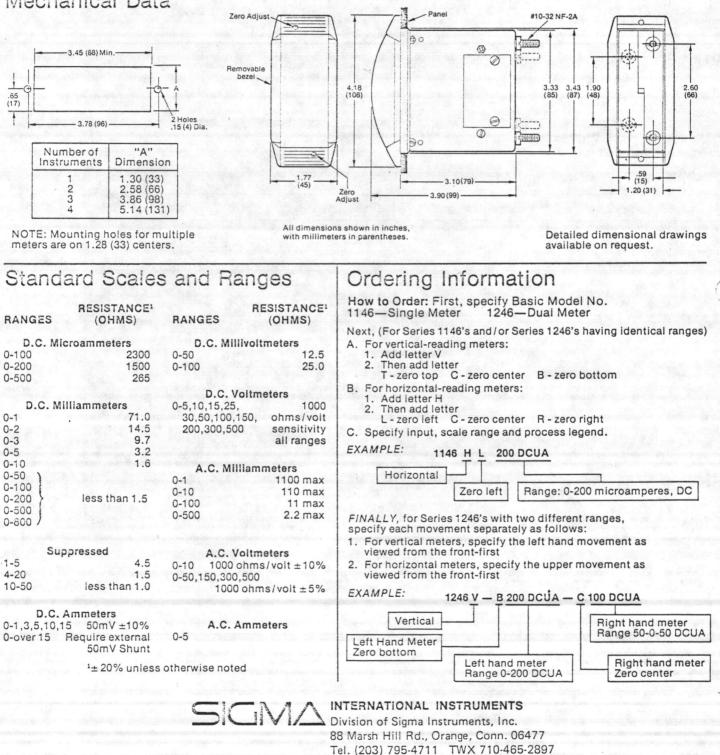
Accuracy: 2% F.S. Value for DC Ranges 3% F.S. Value for AC Ranges ±2% F.S. Repeatability: Overload: Sustained-120% for 8 hours Momentary-10 times rated current **Response Time:** 3 Secs. Max. Overshoot: 40% maximum

TALLARIC RECEMBER 1240 R. MEMERS

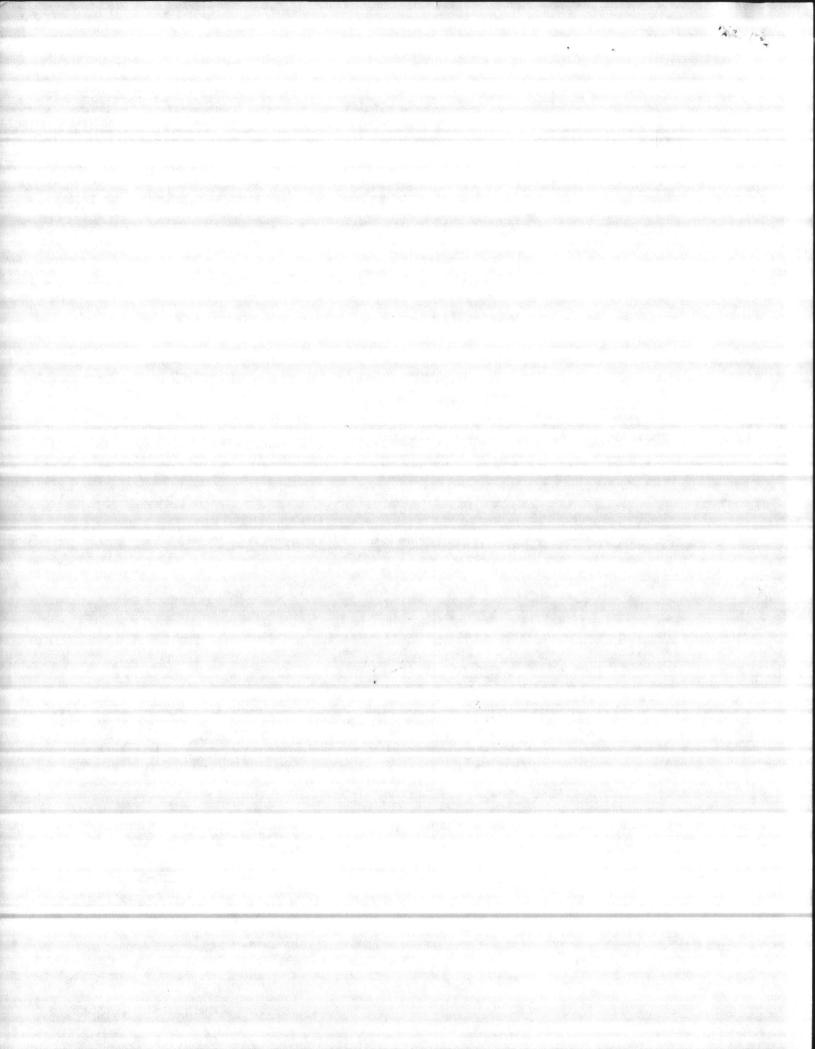
Mechanical Data

Hi-Pot: 2600 Volts RMS terminal to case for 1 minute Temperature (Operating): -20 to 50°C Shock: 50 G's Pointer: Triangular type, color-cerise red Length-2.7 inches Scale. Marking-black lettering on white background.

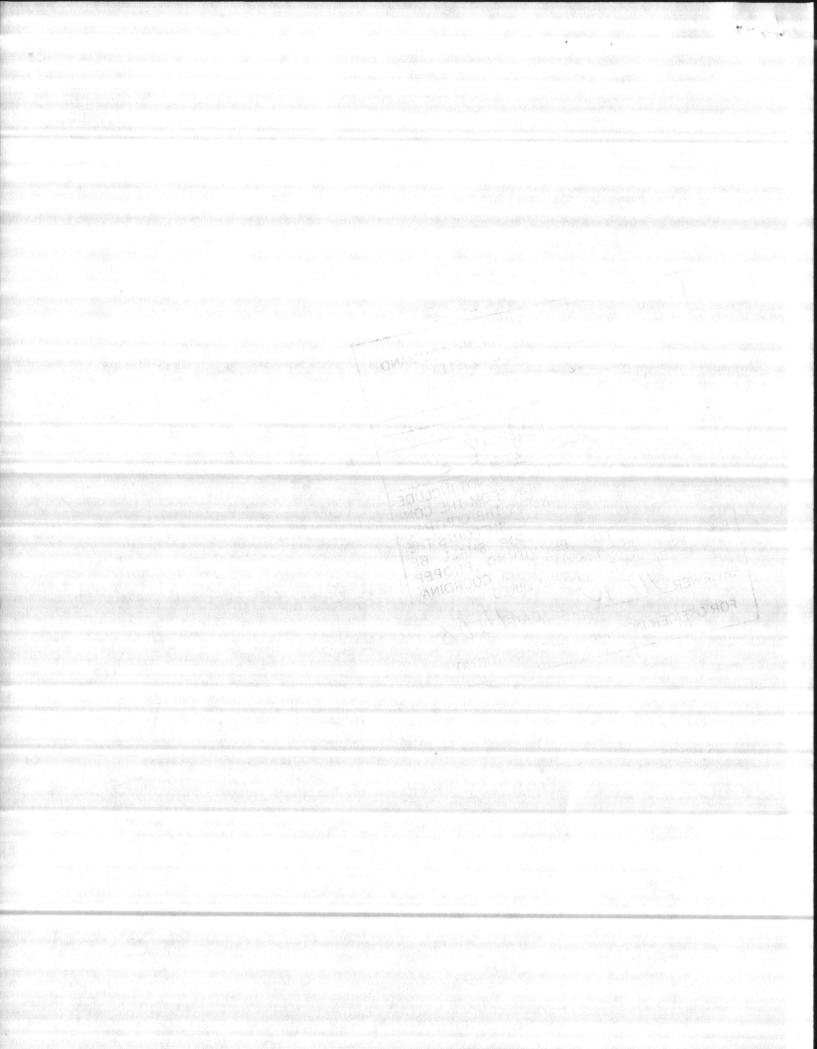
Standard Movement: Zero left on horizontal or zero bottom on vertical (Zero center, right or top optional) Mounting: Two 6-32 round head screws, with lock washers and nuts. Terminals: 10-32 stud terminals Materials of Construction: Case and crystal-self-extinguishing plastic Black case Finish: Single Scale Model-8 oz. Weight: Dual Scale Model-10 oz.



CANADA: Sigma Instruments (Canada) Ltd. • 55 Six Point Road • Toronto, Ont. M8Z 2X3 • Tel: (416) 239-8161



Internetional Instruments SERIES 1146/1246 Single-Dual 31/2" Edgewise Panel Meters NAVAL FACH ATLANTIC DIVISION AGILITIES ENGINEERING COMPAGINES 146/1246 is a 3½-inch edgewise panel meter NORFOLK, VIRGINIA 23511 available as a single scale meter (the 1146) or a dual scale meter available with independent dual inputs. PROVE Horizontal or vertical meters are available. Both can be stacked in unlimited quantities without special mounting hardware or MENTS OF tools. Appearance is similar to International Instruments' Series 1151/1251 6-inch edgewise meter, providing design compati-OES NOT INCELLUE FROM THE UDE FROM THE ONINSTRUMENT utilizes a patented flat meter movement with S THE CONTexclusive cantilevered coil construction. The jeweled D'Arsonval ONSIBL PHYSICAL DINGS AND SUP ORTS revealsive cantilevered coil construction. The jeweled D Alsonia COR ORTS revealed produces torque-to-weight ratios (meter efficiency) VIDING SHALL four times greater than conventional movement of equivalent GHTS, COOPDITIES assuring long, stable life. TION OF TRADES, ETG GHTS, COORDIMATI parallax, bi-level scales reduce reading errors on both REVIEWER T REQUIRED. FOR OFFICER TW-CHARGE OF CONSTRUCTION Independent Dual Instruments Two independent meters can be included in one 31/2" instrument. Thus, related functions from a single source can be displayed in a single unit; e.g., specific gravity and temperature, tank level and density, speed and R.P.M. etc. Additionally, you save three ways with the Series 1246 through: Lower Initial Cost per Meter Reduced Panel Space Less panel fabrication and assembly labor time Hi-visibility Pointers The bright cerise (red) pointers, supplied as standard, com-Series 1246 - Dual bined with the bi-level anti-parallax scales make this a most Vertically mounted instrument easily read instrument, even in high density panels with many with two independent inputs meters stacked side by side. Front mounted zero adjust on both the 1146 single or HEAD 095 OF 1246 dual. SCALE RANGE 4 TO ZO MA IN PUT RANGE

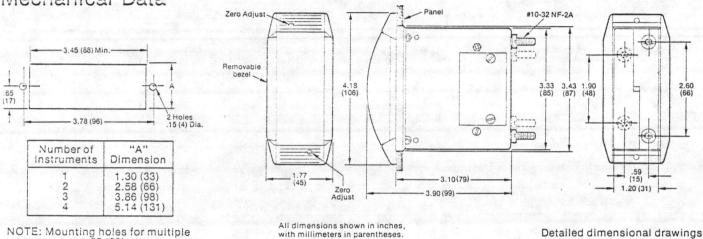


SI=1:11= THE ARE BEREINSE MANUAL MORNERS

Specifications

Accuracy: 2% F.S. Value for DC Ranges 3% F.S. Value for AC Ranges Repeatability: ±2% F.S. Overload: Sustained-120% for 8 hours Momentary-10 times rated current Response Time: 3 Secs. Max. Overshoot: 40% maximum

Mechanical Data



Hi-Pot: 2600 Volts RMS terminal to case

Temperature (Operating):

Shock:

Pointer:

Scale:

for 1 minute

-20 to 50°C

Triangular type,

color—cerise red Length—2.7 inches

white background.

Marking-black lettering on

50 G's

Ordering Information

NOTE: Mounting holes for multiple meters are on 1.28 (33) centers.

Standard Scales and Ranges

0-100 0-200 0-500 0-1 0-2 0-3 0-5 0-10 0-50 0-100 0-500 0-500 0-500	C. Microammeters 2300 1500 265 C. Milliammeters 71.0 14.5 9.7 3.2 1.6	RESISTANCE* (OHMS)D.C. Millivoltmeters0-5012.5 0-100D.C. Voltmeters0-5,10,15,25, 30,50,100,150, 200,300,5001000 ohms/volt sensitivity all rangesA.C. Milliammeters 0-10-1	 How to Order: First, specify Basic Model No. 1146—Single Meter 1246—Dual Meter Next, (For Series 1146's and/or Series 1246's having identical ranges) A. For vertical-reading meters: Add letter V Then add letter T-zero top C-zero center B-zero bottom B. For horizontal-reading meters: Add letter H Then add letter Zero left C-zero center R-zero right C. Specify input, scale range and process legend.
0-100 0-200 0-500 0-1 0-2 0-3 0-5 0-10 0-50 0-100 0-200 0-500 0-500	2. Microammeters 2300 1500 265 C. Milliammeters 71.0 14.5 9.7 3.2 1.6	D.C. Millivoltmeters 0-50 12.5 0-100 25.0 D.C. Voltmeters 0-5,10,15,25, 1000 30,50,100,150, ohms/volt 200,300,500 sensitivity all ranges A.C. Milliammeters 0-1 1100 max	 A. For vertical-reading meters: Add letter V Then add letter T-zero top C-zero center B-zero bottom B. For horizontal-reading meters: Add letter H Then add letter Zero left C-zero center R-zero right C. Specify input, scale range and process legend. EXAMPLE: 1146 H L 200 DCUA
0-200 0-500 0-1 0-2 0-3 0-5 0-10 0-50 0-100 0-200 0-500	1500 265 C. Milliammeters 71.0 14.5 9.7 3.2 1.6	0-100 25.0 D.C. Voltmeters 0-5,10,15,25, 1000 30,50,100,150, ohms/volt 200,300,500 sensitivity all ranges A.C. Milliammeters 0-1 1100 max	 2. Then add letter T - zero top C - zero center B - zero bottom B. For horizontal-reading meters: Add letter H Then add letter L - zero left C - zero center R - zero right C. Specify input, scale range and process legend. EXAMPLE: 1146 H L 200 DCUA
D.C 0-1 0-2 0-3 0-5 0-10 0-50 0-100 0-200 0-500	. 71.0 14.5 9.7 3.2 1.6	0-5,10,15,25, 1000 30,50,100,150, ohms/volt 200,300,500 sensitivity all ranges A.C. Milliammeters 0-1 1100 max	1. Add letter H 2. Then add letter L - zero left C - zero center R - zero right C. Specify input, scale range and process legend. EXAMPLE: 1146 H L 200 DCUA
0-10 0-50 0-100 0-200 0-500	1.6	0-1 1100 max	
0-100 0-200 0-500		0-1 1100 max	
0-800 /	less than 1.5	0-10 110 max 0-100 11 max 0-500 2.2 max	Zero left Range: 0-200 microamperes, DC FINALLY, for Series 1246's with two different ranges, specify each movement separately as follows:
1-5 4-20 10-50	Suppressed 4.5 1.5 less than 1.0	A.C. Voltmeters 0-10 1000 chms/volt ±10% 0-50,150,300,500 1000 chms/volt ±5%	 For vertical meters, specify the left hand movement as viewed from the front-first For horizontal meters, specify the upper movement as viewed from the front-first EXAMPLE: 1246 V — B 200 DCUA — C 100 DCUA
D 0-1,3,5, 0-over 1		A.C. Ammeters 0-5	Vertical Right hand meter Range 50-0-50 DCUA
	1±20% unless	otherwise noted	Left hand meter Range 0-200 DCUA Zero center

CANADA: Sigma instruments (Canada) Ltd. • 55 Six Point Road • Toronto, Ont. M8Z 2X3 • Tel: (416) 239-8161

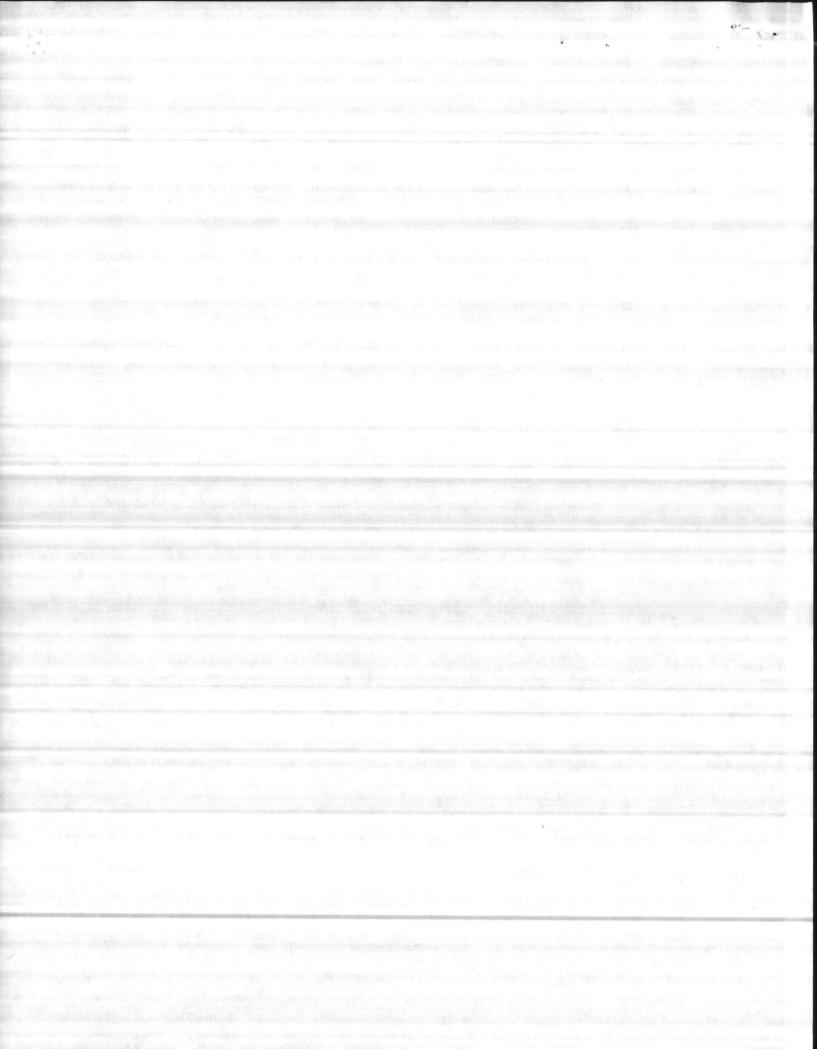
Standard Movement: Zero left on horizontal or zero bottom on vertical (Zero center, right or top optional) Mounting: Two 6-32 round head screws, with lock washers and nuts. 10-32 stud terminals Case and crystal-self-extinguishing plastic Black case

Single Scale Model-8 oz.

Terminals: Materials of Construction: Finish: Weight:

available on request.

Dual Scale Model-10 oz.



with lenses.

Heavy-Duty, Oiltight Push Buttons

600 VOLTS MAX. AC/DC 10 AMPERES CONTINUOUS

CR104P PUSH BUTTONS

PRICING INFORMATION

light

light

-

ŋ

Standard and Push-to-test Indicating Light Units

Push-to-test Unit Standard Unit List Price, G0-10G Operating Color of List Price, Catalog Number CR104P Catalog Number CR104P Voltage Lens G0-10G 28.00 TRANSFORMER TYPE WITH 6-VOLT SECONDARY, NO. 755 LAMP Red LG32R LT32R A. States - 3 Green LT32G LT32M LG326 LG32M LG32L LG32W Amber 120V NAL \$42.80 LT32L \$54.80 (60/50 Hz) White LT32W Yellow LG32E LT32E Clear LG32C LT32C Less Lens @ LG32 40.00 LT32 52.00 LG33R LG33G LG33M LG33L LG33W LG33E Red Green OIS LT33R LT33G LT33M SUB Amber 240V LT33L LT33L LT33E LT33C LT33C Blue 42.80 54.80 CO z. (60/50 Hz) White Yellow 40 Standard RA ST Clear LG33C indicating Less Lens LT33-LT34R LT34R LT34M LT34M LT34W LT34W 'T34E LG33 40.00 52.00 RAC LG34R Red Green Amber Blue White Yellow LG34M 480V 1 G341 42.80 54.80 (60/50 Hz) LG34W LG34E Clear LG34C 10 Less Lens@ LG34 40.00 LT34 52.00 REVIE Red LG35R LT35R O, LT35G LG35G Amber Blue White LG35M 600¥ (607 50 Hz) 42.80 LT35L LT35W LG351 54.80 LG35W Yellow LG35E LT35E Or C LG35C I T35C Less Lengo LG35 40.00 LT35 52.00 Co FULL VOLTAGE TYPE S LTIGR C LTIGG RAC P Red 1G168 Green HARGE LG16G HE 6 Volt (#755 Amber LG16M \$34,80 LT16L LT16W LG16L \$46.80 ROIN LG16W LG16E LG16C Lamp) White A 3 Yellow LT16E Clear **Push-to-test** indicating Less Lens® 32.00 LG16 LT16 44.00 Red LG17R LT17R 1 LG17G LG17M LG17L LG17L Green LT17G 34.80 LT17M LT17L LT17W Amber 12 Volts (#756 46 80 White Lamp) LG17E LT17E LT17C Yellow 2.1 1 Clear LG17C Less Lens 32.00 LG17 44.00 LT17 Red LG18R LT18R Green LG18G LT18G LT18G LT18M LT18L LT18W LT18E LT18C 100 Amber Blue LG18M 24 Volts 34.80 (#1819 46.80 LG18W White 115 - 18 A.R Lamp) Yellow 5 Clear LG18C Less Lens® LG18 32.00 LT18 44.00 Red LG22R LT22R 14- 1295 Green LG22G -LT22G the Mar Amber LG22M LG22L LT22M 120 Volts Blue 34.80 46.80 (#120PSB White LG22W LT22W 12/2/2 Lamo) Yellow LT22E LT22C 1.5 Clear LG22C Less Lens LG22 32.00 LT22 ----

Units are supplied factory assembled when ordered

NOTE: Catalog Number and price do not include nameplate. All nameplates must be ordered as a separate item from pages E22 and E23.

O Select required lens from page E20 and order as a separate item.

REFERENCE:

Descriptive bulletin GEA-10877

Nameplate Selection pages E21, E22 **Drilling Plan and** Dimensions... pages E18, E26

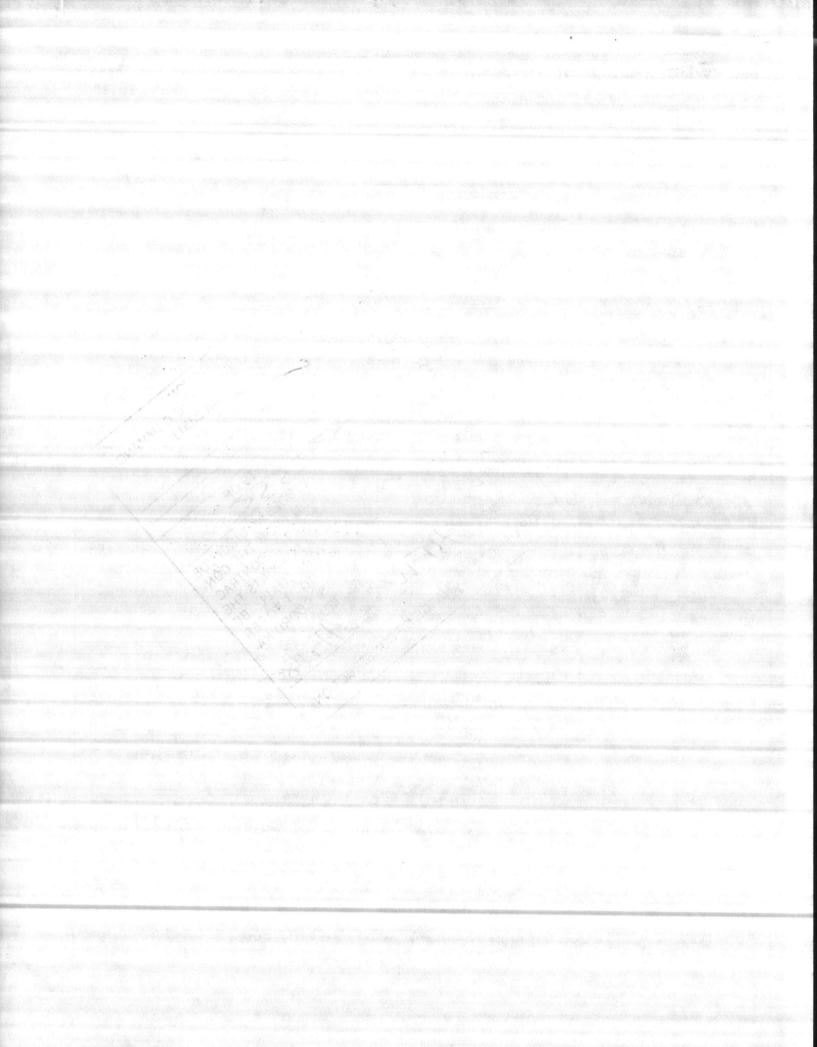
Lamp Ordering																	
Information	•	•	•	•	•	•	•	•	•	•	•	•	•	•	. page	E20	

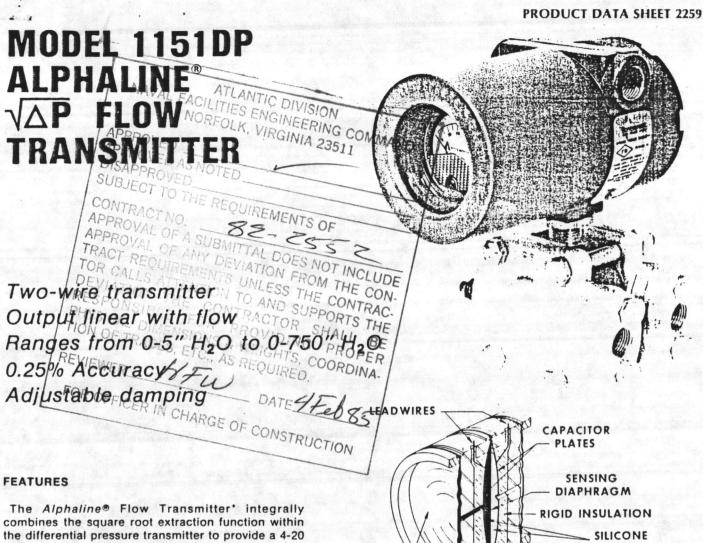
Prices and data subject to change without notice.

E

5 12

表





combines the square root extraction function within the differential pressure transmitter to provide a 4-20 mADC signal directly proportional to flow. No additional power supplies, wiring or additional "black boxes" are required with this two-wire electronic flow transmitter.

A solid, stable-zero flow signal is achieved by electronically switching from a square root to a linear function at 20% of flow (4% of differential input pressure). This eliminates zero instability problems inherent in designs attemping to extract the square root of signals approaching zero.

Installation, calibration and commissioning are simplified by compact design, external span and zero adjustments, and explosion-proof, weather-proof construction with separate compartments for electronics and wiring connections. Volumetric displacement of less than 0.01 cubic inch prevents pumping of the process fluid and eliminates the need for condensate chambers and level pots. Tantalum, *Hastelloy C-276* and *Monel* are available for corrosive service. Modular construction and plug-in printed circuit boards aid in troubleshooting and reduce parts stocking.

OPERATION

ISOLATING

DIAPHRAGM

Process pressure is transmitted through isolating diaphragms and silicone oil fill fluid to a sensing diaphragm in the center of the δ -CELL^{**}. The sensing diaphragm is a stretched spring element which deflects in response to differential pressure across it. The displacement of the sensing diaphragm, a maximum motion of 0.004 inches, is proportional to the differential pressure. The position of the sensing diaphragm is detected by capacitor plates on both sides of the sensing diaphragm. The differential capacitance between the sensing diaphragm and the capacitor plates is converted electronically to a twowire 4-20 mADC signal proportional to the square root of the differential pressure.

OIL

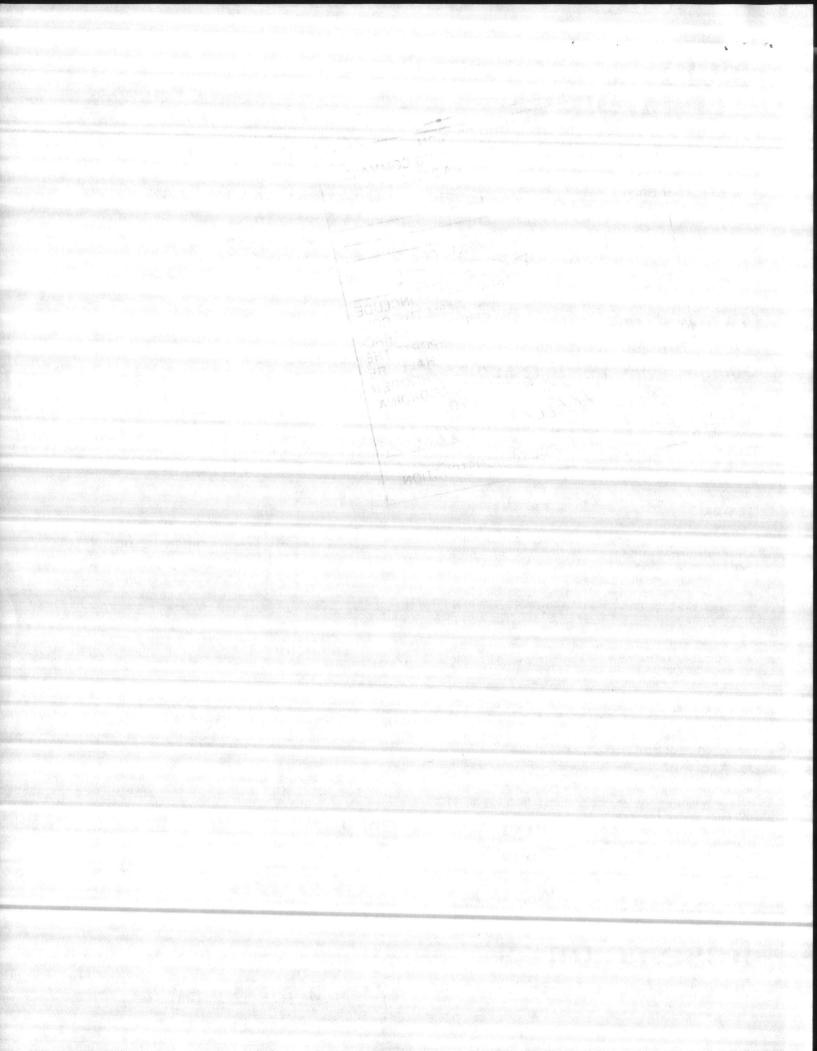
THE .S-CELL

WELDED SEALS

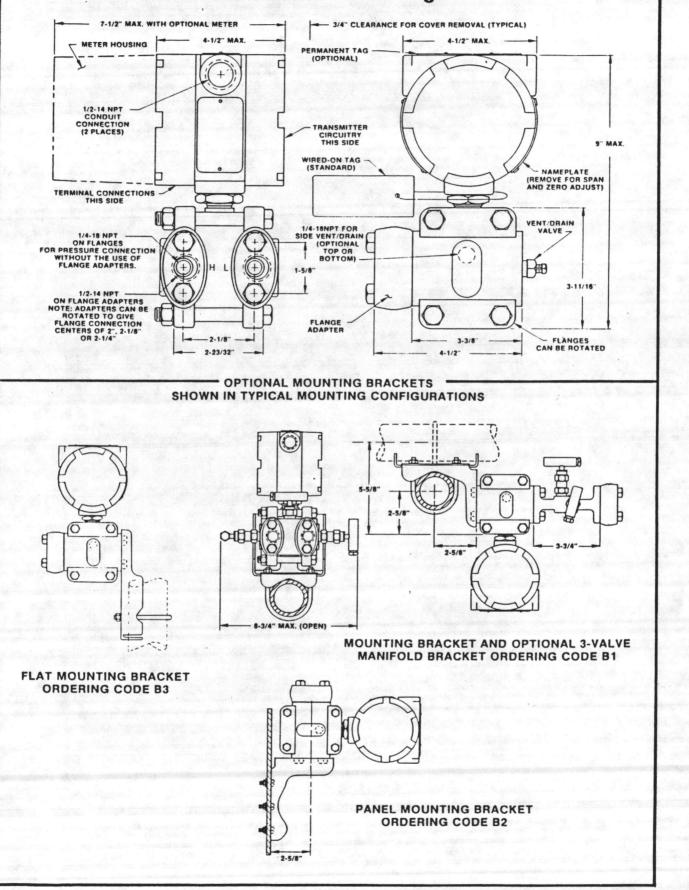


BACKWASH FLOW

 Rosemount Inc., 1971, 1975, 1976.
 *Protected by one or more of the following U.S. Patents: No. 3, 195,028; 3,271,669; 3,318,153; 3,618,390; 3,646,538; 3,793,885; 3,800,413; 3,854,039; 3,859,594; and 3,975,719.
 Canada Patented 1968, 1974, 1975, 1976, 1977, 1979.
 Mexico Patentado Nos 118892, 136497. Other U.S. and Foreign Patents issued or pending.

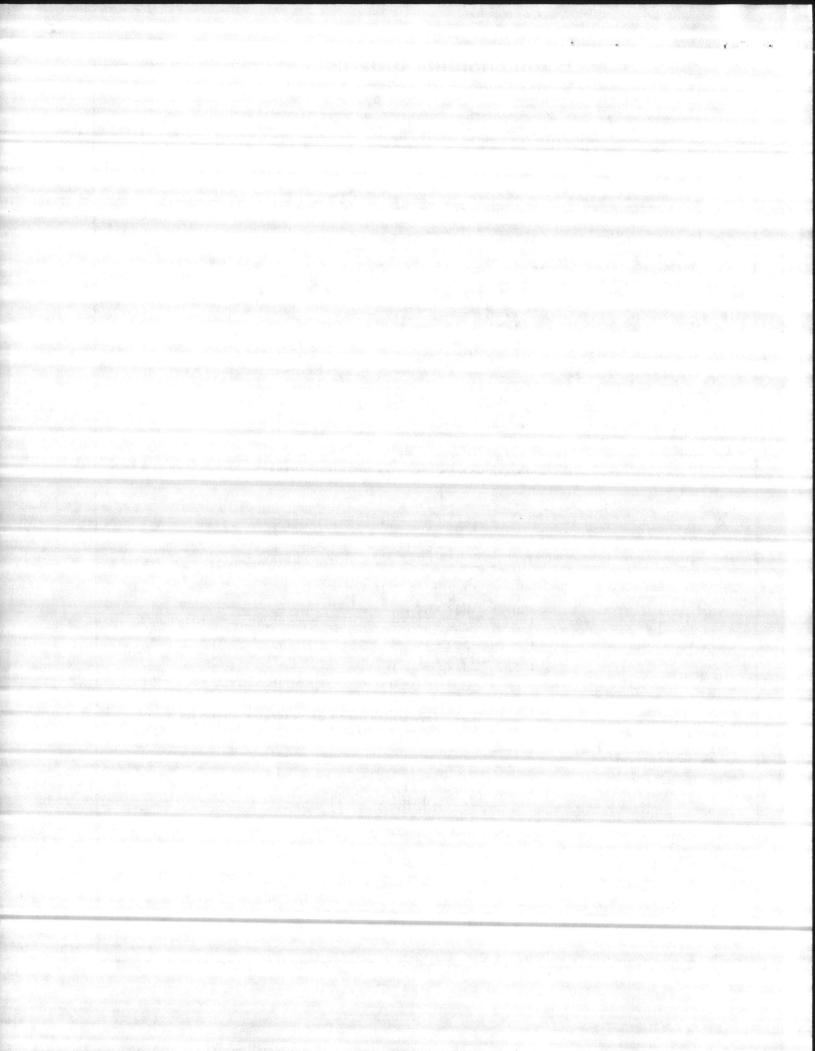


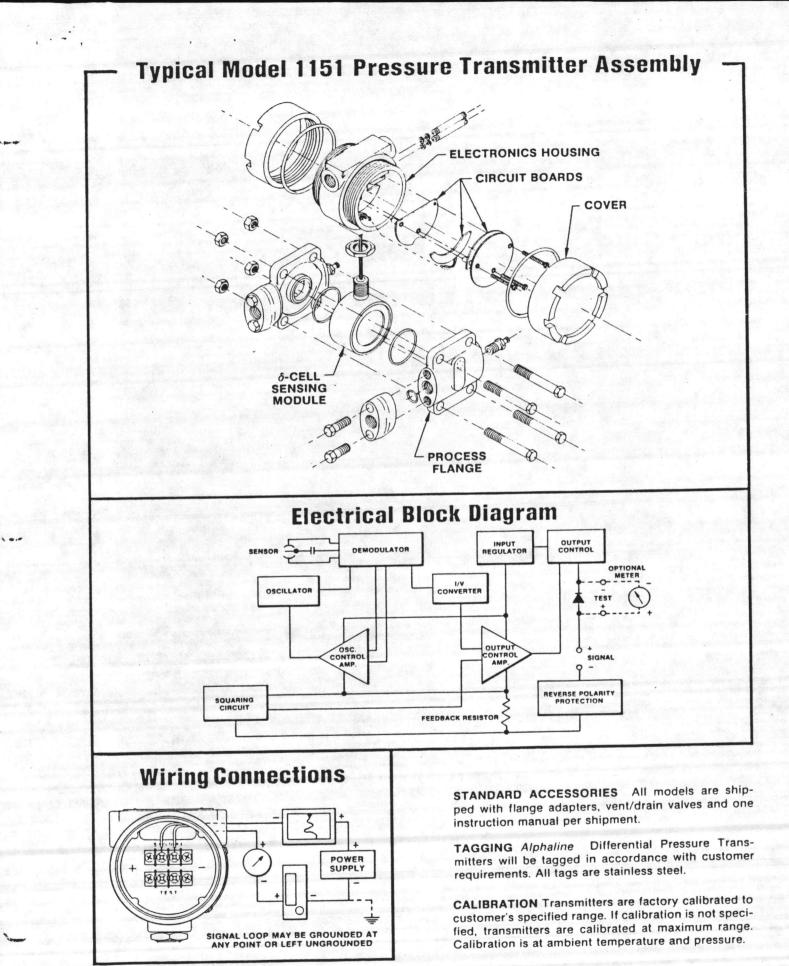
Dimensional Drawings



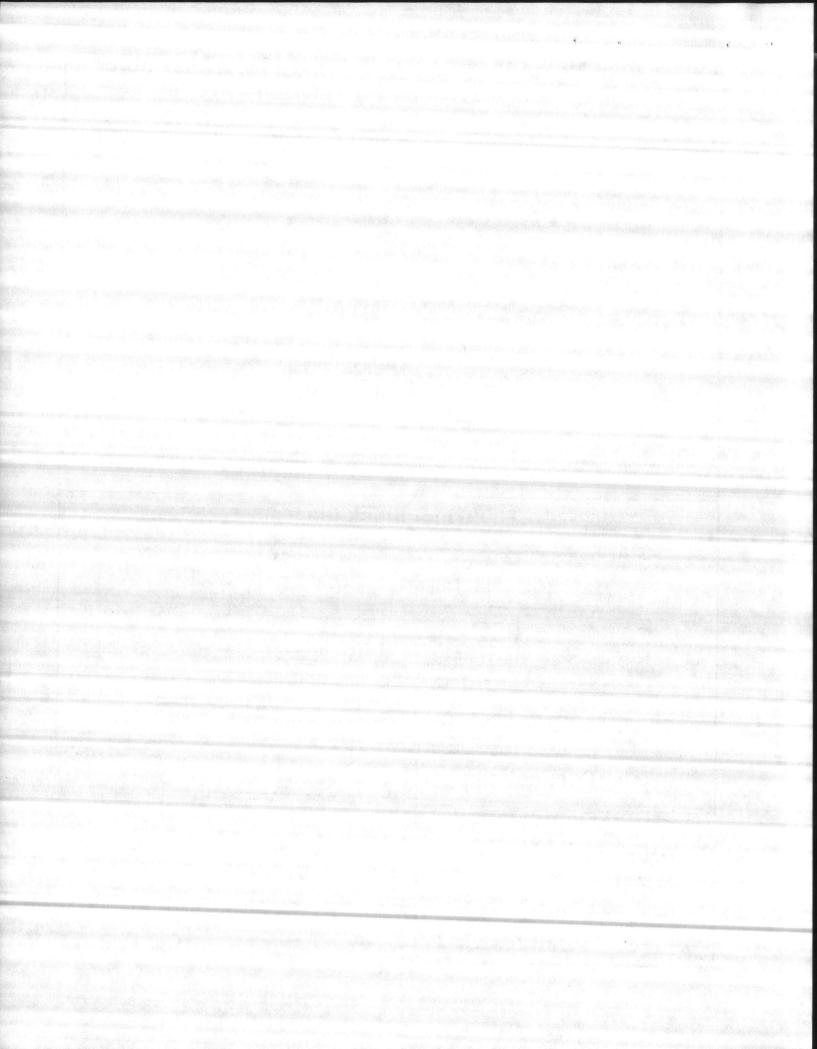
··· ,

.





Rosemount 5



Functional Specifications

Liquid, gas or vapor.

Ranges

Service

0-5/30 inches H₂O 0-25/150 inches H₂O 0-125/750 inches H₂O

Outputs

4-20 mADC, square root of differential input pressure between 4% and 100% of input. Linear with differential input pressure between 0% and 4% of input.

Power Supply

External power supply required. Up to 55 VDC. Transmitter operates on 12 to 45 VDC with no load.

Load Limitations

See Figure 1.

Indication

Optional meter with 1-3/4" linear scale, 0-100%. Indication accuracy is $\pm 2\%$ of span.

Hazardous Locations

Explosion proof: Approved by Factory Mutual (FM) for Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; and Class III, Division 1. Certification by Canadian Standards Association (CSA) for Class I, Division 2, Groups A and B; Class I, Division 1, Groups C and D; Class II, Division 1, Groups E, F and G; Class III (Encl. IV).

Intrinsically safe: FM or CSA certification optional for Class I, Division 1, Groups A, B, C and D when used with approved barrier systems.

FM explosion proof tag standard. Appropriate tag will be substituted if optional certification selected.

Span and Zero

Continuously adjustable externally, non-interacting.

Zero Elevation and Suppression

Zero elevation or zero suppression adjustable up to 10% of calibrated flow span.

Temperature Limits

-20° to +150°F Amplifier operating. -40° to +220°F Sensing element operating with silicone fill.

+32° to +160°F Sensing element operating with Fluorolube fill.

-60° to +180°F Storage.

Static Pressure and Overpressure Limits

0 psia to 2000 psig on either side without damage to the transmitter. Operates within specifications between static line pressures of 1/2 psia and 2000 psig, for silicone oil transmitters, and between atmospheric and 2000 psig for *Fluorolube* transmitters, 10,000 psig proof pressure on the flanges.

Humidity Limits

0 to 100% RH.

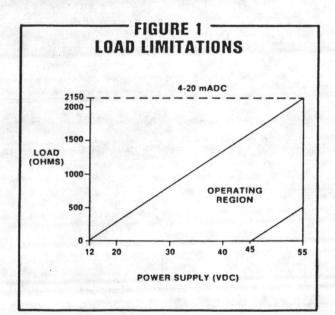
Volumetric Displacement Less than 0.01 cubic inches.

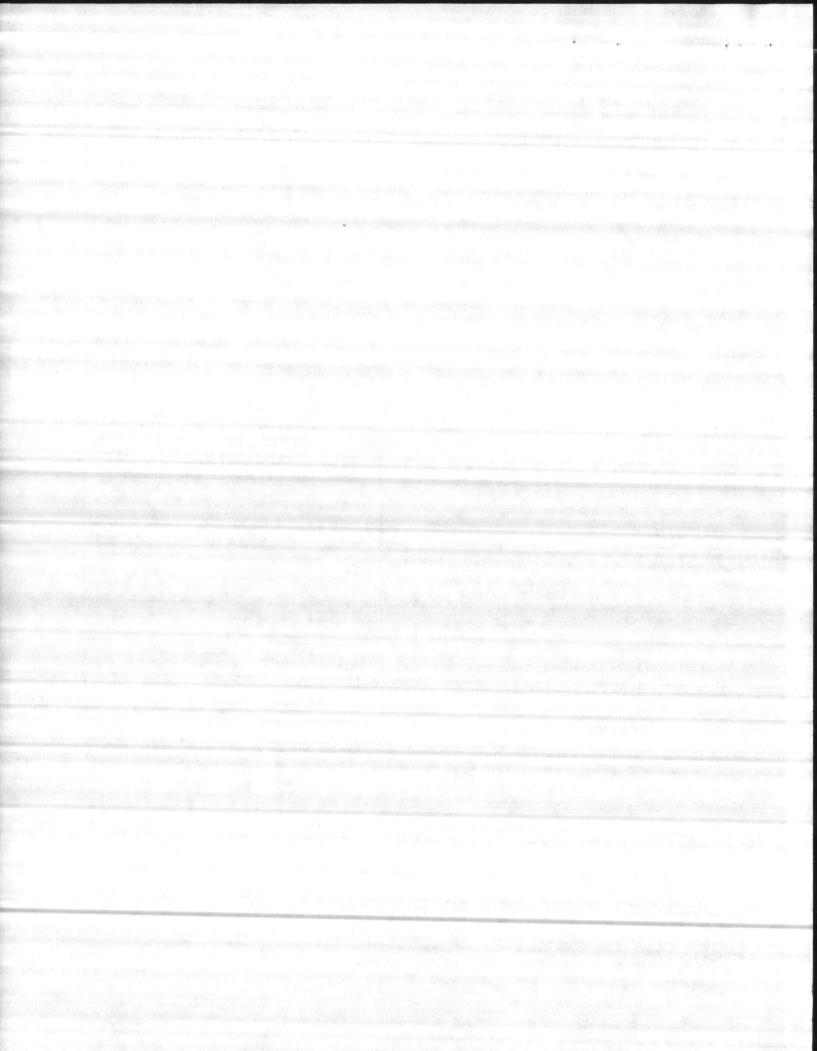
Damping

Time constant continuously adjustable between 0.2 and 1.0 seonds. *Fluorolube* fill: higher time constant.

Turn-on Time

2 seconds. No warmup required.





Performance Specifications

(ZERO BASED SPANS, REFERENCE CONDITIONS, 316SS ISOLATING DIAPHRAGMS, SILICONE OIL FILL. APPLIES FROM 20% TO 100% FLOW)

Accuracy

 $\pm 0.25\%$ of calibrated span for a range of 20% to 100% of flow (4% to 100% of input pressure). Includes combined effects of hysteresis, repeatability and conformity of the square root function. Output linear with input pressure for the range of 0% to 20% of flow (0% to 4% of input pressure).

Dead Band

None

Stability

±0.25% of upper range limit for six months.

Temperature Effect

The total output effect, whether at zero or full scale, including zero and span errors: $\pm 1.5\%$ of upper range limit per 100°F. ($\pm 2.5\%$ for range 3).

Static Pressure Effect

Zero Error: $\pm 0.25\%$ of differential pressure upper range limit for 2000 psi ($\pm 0.5\%$ for range 3).

Span Error: $-0.5\pm0.1\%$ of reading per 1000 psi $(-0.75\pm0.1\%$ for range 3).

This is a systematic error which can be calibrated out for a particular pressure before installation.

Vibration Effect

±0.05% of upper range limit per g to 200 Hz in any axis.

Power Supply Effect

Less than 0.005% of output span per volt.

Load Effect

No load effect other than the change in power supplied to the transmitter.

Mounting Position Effect

Zero shift of up to 1" H_2O which can be calibrated out. Range 3 transmitters should be installed with diaphragm in vertical plane. No span effect. No effect in plane of diaphragm.

Physical Specifications

Material of Construction†

Isolating Diaphragms: 316SS, Hastelloy C-276, Monel, or Tantalum.

Drain/Vent Valves: 316SS, Hastelloy C, or Monel.

Process Flanges and Adapters: Cadmium Plated Carbon Steel, 316SS, Hastelloy C or Monel.

Wetted O-Rings: Viton.

Fill Fluid: Silicone Oil or Fluorolube Oil.

Bolts: Cadmium Plated Carbon Steel.

Electronics Housing: Low-copper aluminum (NEMA4).

Paint: Epoxy-Polyester.

Process Connections

1/4 NPT on 2-1/8" centers on flanges. 1/2 NPT on 2", 2-1/8" or 2-1/4" centers with adapters.

Electrical Connections

1/2-inch conduit with screw terminals and integral test jacks compatible with miniature banana plugs (*Pomona* 2944, 3690 or equal).

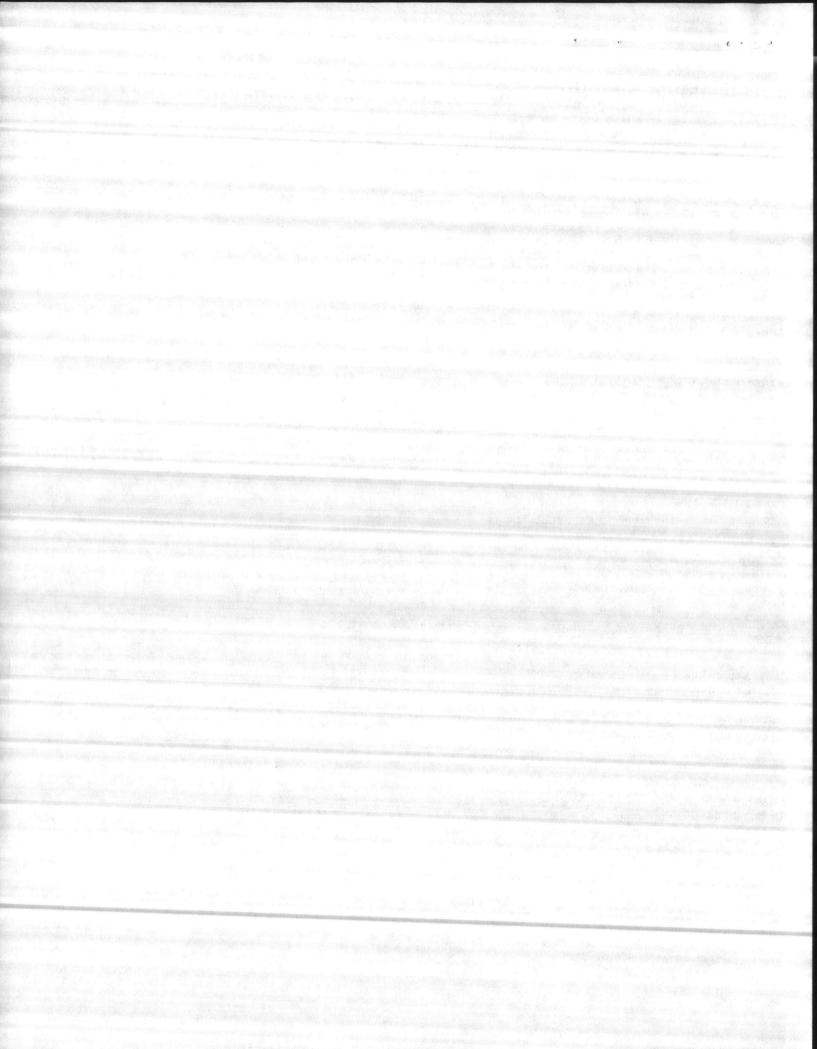
Weight

12 pounds excluding options.

†Monel is a trademark of International Nickel Co. Hastellov is a trademark of the Cabot Corp.

Viton is a DuPont trademark.

Fluorolube is a trademark of the Hooker Chemical Co. Terminology per SAMA Standard PMC20. 1-1973.



Ordering Information

CC	DE	RANGE	S		Start Start		Constant Sectors	States and the					
	3 4 5	0-25 to	5 to 0-30 inches H_2O (0-127 to 0-762 mm H_2O) 25 to 0-150 inches H_2O (0-635 to 0-3810 mm H_2O) 125 to 0-750 inches H_2O (0-3175 to 0-19050 mm H_2O) 125 to 0-750 inches H_2O (0-3175 to 0-19050 mm H_2O)										
		CODE	OUTPU	DUTPUT									
		J	4-20 mA	ADC, square root of input with adjustable damping									
RATTE	D.	D	D					MATERIALS OF	CONSTRUCTION				
SUIT TURI			CODE	FLAN		DRAIN/VENT VALVES	ISOLATING DIAPHRAGMS	FILL FLUID					
2 21		No.	12	Cadmi	um Plated C.S.	31655	316SS	and the second second second					
inter and		1. 22.13	13	Cadmi	um Plated C.S.	Hastelloy C	Hastelloy C-276						
		Lang Part	14	Cadmi	um Plated C.S.	Monel	Monel						
			15	Cadmi	um Plated C.S.	316SS	Tantalum	A starting of					
		1.4	22	316SS		316SS	31655						
Sec. Sec.		1997 B	23	316SS		316SS	Hastelloy C-276	SILICONE					
			24	316SS		31655	Monel						
1.000			25	316SS		316SS	Tantalum	and the state and					
1.		1.14	33	Hastel	lov C	Hastelloy C	Hastelloy C-276	and a strange in 1983					
10000			35	Hastel		Hastelloy C	Tantalum	/					
			44	Monel	and the second second	Monel	Monel						
		1A		and the second second	um Plated C.S.	316SS 316SS	316SS 316SS	·) :					
10.000	2A 1B 2B 3B 1D 2D 3D			316SS	Distant C.C.			a start and a start of the					
				Contraction of the Contraction of the	um Plated C.S.	Hastelloy C	Hastelloy C-276	The second second					
				31655		316SS	Hastelloy C-276	(
1.1.1			and a second state of the	Hastell		Hastelloy C	Hastelloy C-276	FLUOROLUBE					
le an Star					um Plated C.S.	316SS	Tantalum	Karley Participation					
				316SS Hastell	oy C	316SS Hastelloy C	Tantalum Tantalum						
0.00				CODE	OPTIONS (See	Product Data Sheet 23	60 for Additional Options	6					
				M1	Linear Meter, 0-	and the second	ion for Additional Optiono,						
		New York	1.1	B1		et for Mounting to 2"	Pipe						
			18	B2	A CONTRACT OF A CARL STORE OF A CARL STORE AND A CARL STORE	et for Panel Mounting							
Sec. Sec.		See Serve		B3		racket for Mounting to	2" Pipe						
			199	D1	Side Vent/Drain								
			Sec. 1	D2	Side Vent/Drain	the second s							
			1.1	E6			or Class I, Division 2, Grou Division 1, Groups E, Fand						
		Seland.		15	FM Intrinsic Saf	ety Approval with Fox	boro, Taylor, Westinghous Technology, Stahl and Fis	e. Leeds &					
	1		oved barriers ≤30V and ≥12										
			2. 18		Spec 200 Con	verters. See PDS 2360	for Models. Temperature priate Option Codes to sp	erature Code T2D.					
		general anti-tal in encomposition	igence offens and a start			tions described in Pro							
1	2	+	1.1										

ADDITIONAL OPTIONS

All Series 1151 Transmitter Options are described in Product Data Sheet 2360. These include optional materials, outputs, tests, etc. Any appropriate Option Code can be added to the basic 1151 Transmitter Model Number.

ACCESSORY 3-VALVE MANIFOLD (Packaged separately)

Part No. 1151-150-1:

3-Valve Manifold, Carbon Steel (Anderson, Greenwood & Co., M4AVC). Part No. 1151-150-2:

3-Valve Manifold, 316SS (Anderson, Greenwood & Co., M4AVS).

Other Series 1151 Pressure Transmitter Product Data Sheet:

 PDS2255:
 1151DP & 1151GP Remote Seals

 PDS2256:
 1151DP Differential Pressure

 PDS2257:
 1151DP High Differential Pressure

 PDS2258:
 1151HP High Line Pressure Differential

 PDS2260:
 1151GP Gage Pressure

 PDS2261:
 1151P Absolute Pressure

 PDS2262:
 1151LT Liquid Level

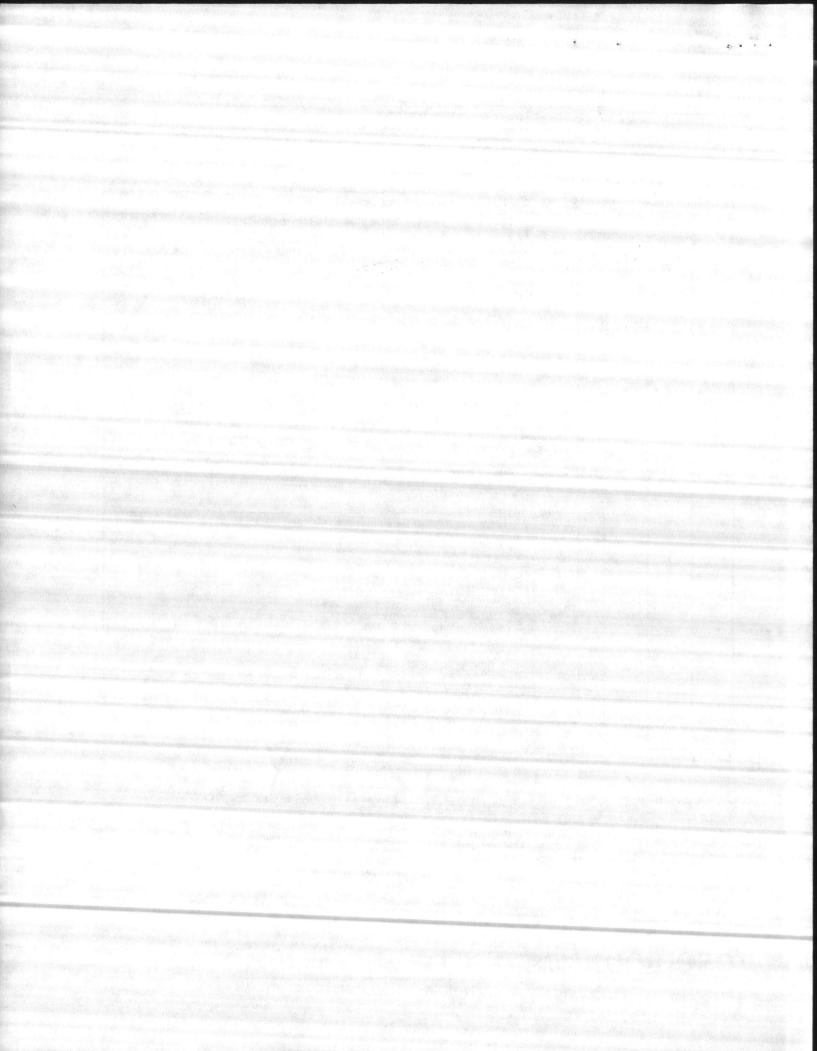
 PDS2264:
 1151DR Draft Range Differential Pressure

 PDS2260:
 1151 Pressure Transmitter Options

Rosemount Inc.

POST OFFICE BOX 35129 MINNEAPOLIS, MINNESOTA 55435

PHONE: (612) 941-5560 TWX: 910-576-3103 TELEX: 29-0183 CABLE: ROSEMOUNT



CAPACITOR PLATES

THE S-CELL

WELDED SEALS

SENSING

DIAPHRAGM

RIGID INSULATION

- OIL FILL

MODEL 1151DP ALPHALINE DIFFERENTIAL PRESSURE TRANSMITTER ATLANTIC DIVISION

Ranges from 0,5% H2O to 0-750 H2O239 Compatible with any 2-wire system, Solid state, plug-in circuit boards Compact, rugged, impervious to vibration Compact, External span approval of any Deviation FROM THE CON-0.2% accuracy act REQUIREMENTS UNLESS THE CONTRAC-On 4-20 mA OUTOULS ATTENTION TO AND SUPPORTS THE

Up to 600% elevation or contractor supports the 500% support sion encloses and supports the 500% support sion encloses a weights, coording and the contractor shall be adjustable damping, etc., as required.
 Adjustable damping HFu

FOR OFFICER IN CHARGE OF CONSTRUCTION

HEW

FEATURES

The Alphaline® Differential Pressure Transmitter* brings true precision to the measurement of flow, level, low gage pressure, vacuum, and specific gravity. Direct electronic sensing with the completely sealed δ -CELL^{**} capacitance sensing element allows significant improvement in differential pressure measurement. Because mechanical force transfer is eliminated, performance is dramatically improved and problems with shock and vibration are drastically reduced. Welded stress isolation clamping in the sensor housing prevents introduction of errors due to stresses and torques on the process flanges and minimizes effects of line pressure and overpressure to 2000 psi.

Installation, calibration, and commissioning are simplified by compact design, external span and zero adjustments, and explosion-proof, weather-proof construction with separate compartments for electronics and wiring connections. Volumetric displacement of less than 0.01 cubic inch prevents pumping of the process fluid and eliminates the need for condensate chambers and level pots. Tantalum, Hastelloy C-276 and Monel are available for corrosive service. Modular construction and plug-in printed circuit boards aid in trouble shooting and reduce parts stocking.



OPERATION

ISOLATING

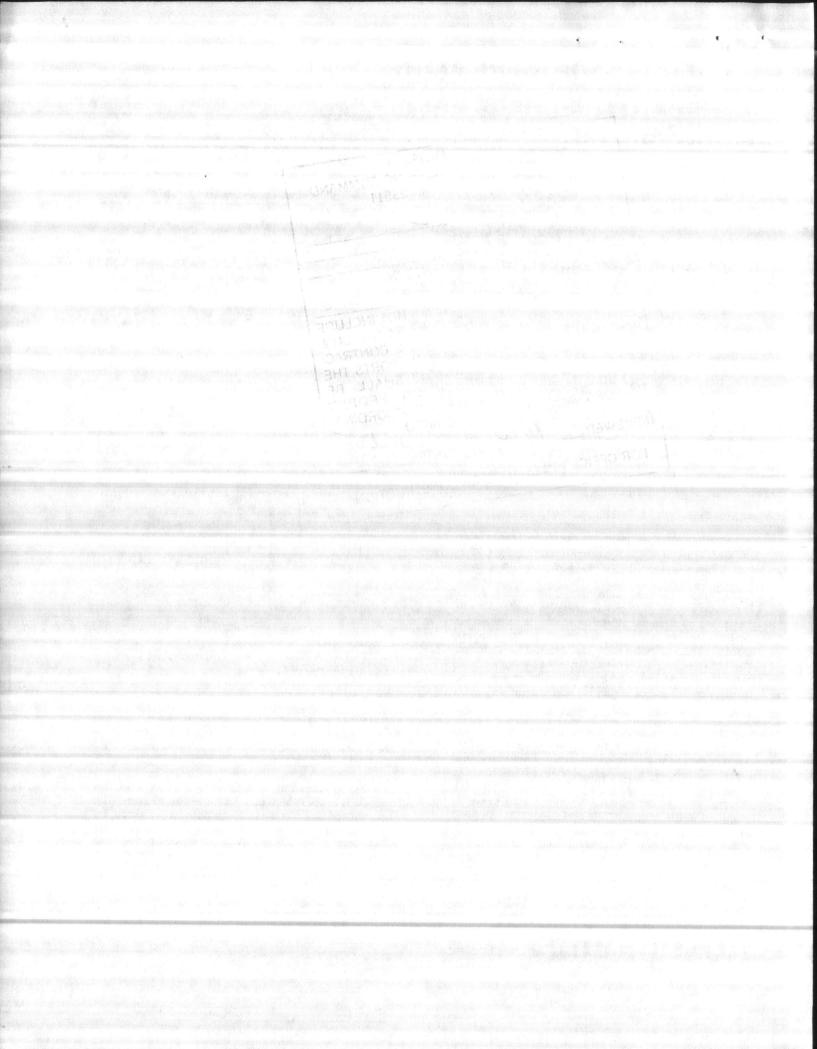
DIAPHRAGM

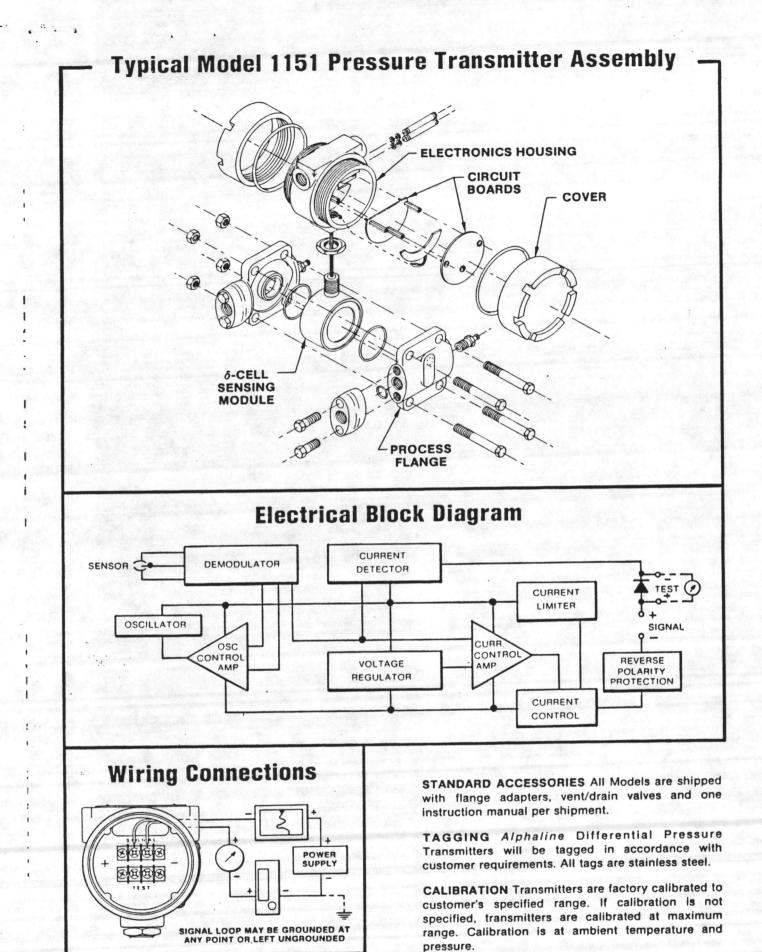
JF2085

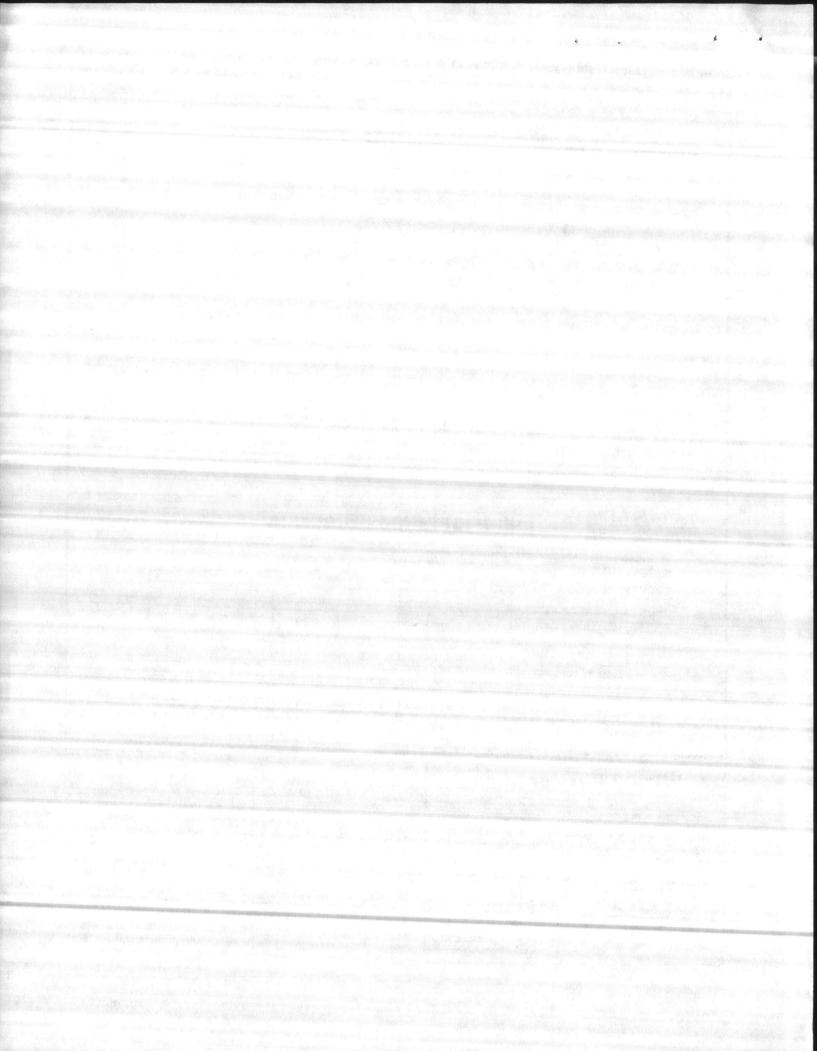
LEADWIRES

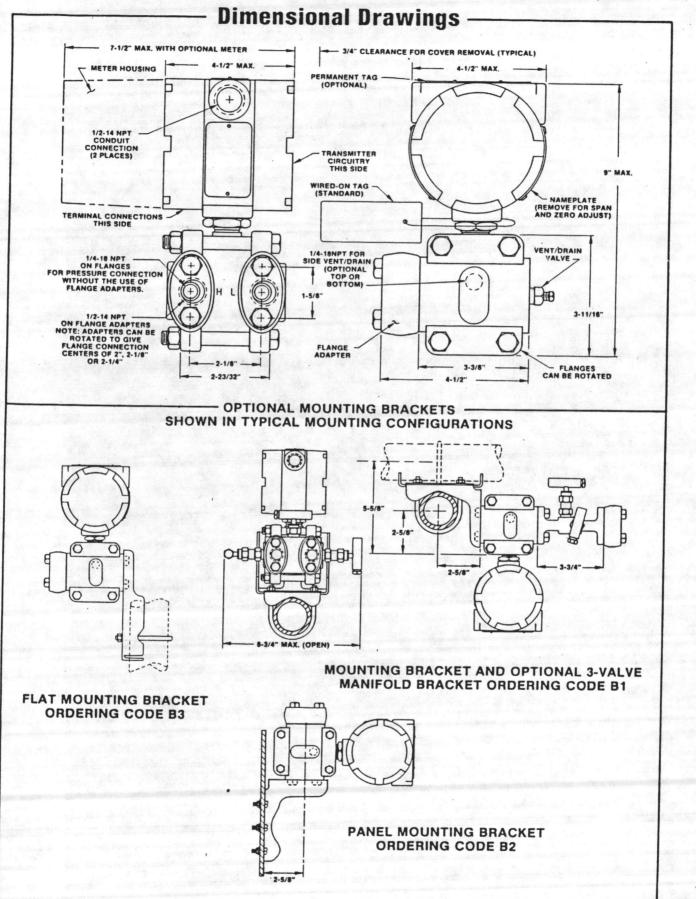
Process pressure is transmitted through isolating diaphragms and oil fill fluid to a sensing diaphragm in the center of the δ -CELL. The sensing diaphragm is a stretched spring element which deflects in response to differential pressure across it. The displacement of the sensing diaphragm, a maximum motion of 0.004 inches, is proportional to the differential pressure. The position of the sensing diaphragm is detected by capacitor plates on both sides of the sensing diaphragm. The differential capacitance between the sensing diaphragm and the capacitor plates is converted electronically to a 2-wire, 4-20 mADC or 10-50 mADC signal.

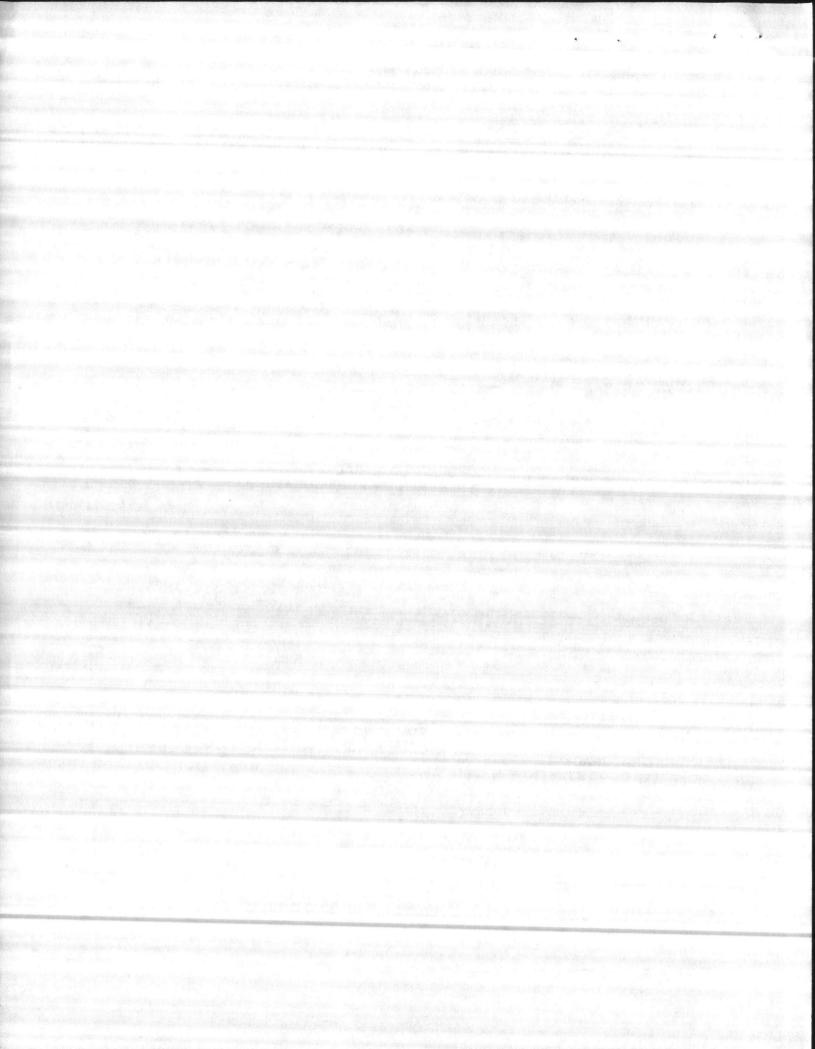
eRosemount Inc., 1971, 1975, 1976. *Protected by one or more of the following U.S. Patents: No. 3, 195,028; 3,271,669; 3,318,153; 3,618,390; 3,646,538; 3,793,885; 3,800,413; 3,854,039; 3,859,594; and 3,975,719. Canada Patented 1968, 1974, 1975, 1976, 1977, 1979. Mexico Patentado Nos 118892, 136497. Other U.S. and Foreign Patents issued or pending.











Performance Specifications

(ZERO BASED SPANS, REFERENCE CONDITIONS. SILICONE OIL FILL, 316SS ISOLATING DIAPHRAGMS)

Accuracy

 $\pm 0.2\%$ of calibrated span. Includes combined effects of linearity, hysteresis and repeatability.

Linearity

±0.1% of calibrated span.

Hysteresis

0.05% of calibrated span (0.1% for range 5 or range 3 with Fluorolube).

Repeatability

0.05% of calibrated span (0.1% for range 3 with Fluorolube).

Dead Band

None

Stability

±0.2% of upper range limit for 6 months.

Temperature Effect

At Maximum Span (e.g. 0-150" H₂O for 0-25/150" H₂O range)

Zero Error: $\pm 0.5\%$ of span per 100° F. Total effect including span and zero errors: $\pm 1.0\%$ of span per 100° F.

Note: Double the specified effect for range 3.

At Minimum Span (e.g. 0-25" H_2O for 0-25/150" H_2O range)

Zero Error: $\pm 3.0\%$ of span per 100°F. Total effect including span and zero errors: $\pm 3.5\%$ of span per 100°F.

Note: Double the specified effect for range code 3.

Statio, Pressure Effect

Zero Error: $\pm 0.25\%$ of upper range limit for 2000 psi ($\pm 0.5\%$ for range 3).

Span Error: For transmitters with silicone oil $-1\pm0.25\%$ of reading per 1000 psi ($-1.5\pm0.25\%$ for range 3). For transmitters with *Fluorolube* oil $-1\pm0.5\%$ of reading per 1000 psi ($-1.5\pm0.5\%$ for range 3). This is a systematic error which can be calibrated out for a particular pressure before installation.

Vibration Effect

±0.05% of upper range limit per g to 200 Hz in any axis.

Power Supply Effect

Less than 0.005% of output span per volt.

Load Effect

No load effect other than the change in power supplied to the transmitter.

Mounting Position Effect

Zero shift of up to 1" H₂O which can be calibrated out. No span effect. No effect in plane of diaphragm.

Physical Specifications

Materials of Construction†

Isolating Diaphragms: 316SS, Hastelloy C-276, Monel or tantalum.

Drain/Vent Valves: 316SS, Hastelloy C, or Monel.

Process Flanges and Adapters: Cadmium Plated Carbon Steel, 316SS, Hastelloy C or Monel.

Wetted O-Rings: Viton.

Fill Fluid: Silicone Oil or Fluorolube Oil.

Bolts: Cadmium Plated Carbon Steel

Electronics Housing: Low-copper aluminum (NEMA4)

Paint:

Epoxy-Polyester.

Process Connections

1/4-NPT on 2-1/8" centers on flanges. 1/2-NPT on 2", 2-1/8" or 2-1/4" centers with adapters.

Electrical Connections

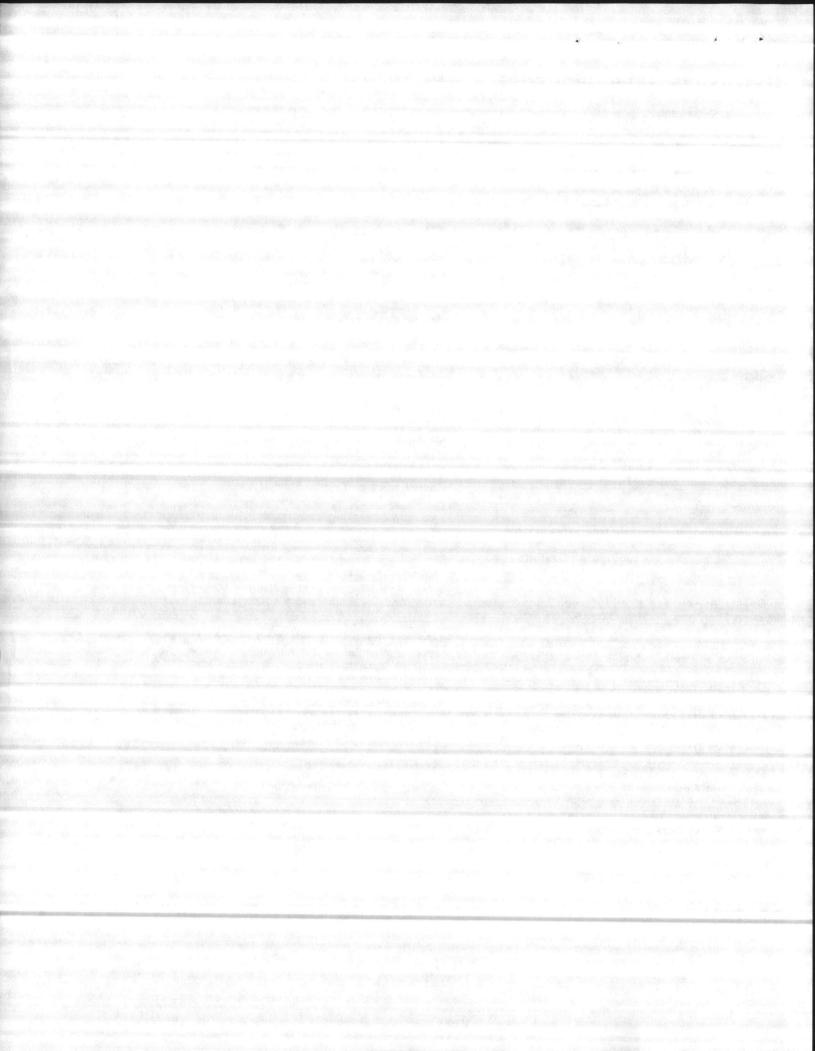
1/2-inch conduit with screw terminals and integral test jacks compatible with miniature banana plugs (Pomona 2944, 3690 or equal).

Weight

12 pounds excluding options.

†Monel is a trademark of International Nickel Co. Hastelloy is a trademark of the Cabot Corp. Viton is a DuPont trademark.

Fluorolube is a trademark of the Hooker Chemical Co. Terminology per SAMA Standard PMC20. 1-1973



Functional Specifications

Service

·. .

Liquid, gas or vapor.

Ranges

0-5/30 inches H₂O 0-25/150 inches H₂O 0-125/750 inches H₂O

Outputs

4-20 mADC or 10-50 mADC

Power Supply

External power supply required. 4-20 mADC:

Transmitter operates on 12 to 45 VDC with no load. 10-50 mADC:

Transmitter operates on 30 to 85 VDC with no load.

Load Limitations

See Figure 1.

Indication

Optional meter with 1-3/4" scale. Indication accuracy is $\pm 2\%$.

Hazardous Locations

Explosion proof: Approved by Factory Mutual (FM) for Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; and Class III, Division 1. Certification by Canadian Standards Association (CSA) for Class I, Division 2, Groups A and B; Class I, Division 1, Groups C and D; Class II, Division 1, Groups E, F and G; Class III (Encl. IV).

Intrinsically safe: FM or CSA certification optional for Class I, Division 1, Groups A, B, C and D when used with approved barrier systems.

FM Explosion Proof tag standard. Appropriate tag will be substituted if optional certification selected.

Span and Zero

Continuously adjustable externally.

Zero Elevation and Suppression

Regardless of output specified, zero elevation and suppression must be such that neither the span nor the upper or lower range value exceed 100% of the upper range limit.

4-20 mADC Maximum zero elevation: 600% of calibrated span. Maximum zero suppression: 500% of calibrate span.

10-50 mADC Maximum zero elevation or suppression: 150% of calibrated span.

Temperature Limits

-20° F to +200° F Amplifier operating.

-40°F to +220°F Sensing element operating with Silicone fill.

+32°F to +160°F Sensing element operating with Fluorolube fill.

-60° F to +250° F Storage.

Static Pressure and Overpressure Limits

0 psia to 2000 psig on either side without damage to the transmitter. Operates within specifications between static line pressures of 1/2 psia and 2000 psig for silicone oil transmitters and between atmospheric and 2000 psig for *Fluorolube* transmitters. 10,000 psig proof pressure on the flanges.

Humidity Limits

0-100% RH.

Volumetric Displacement

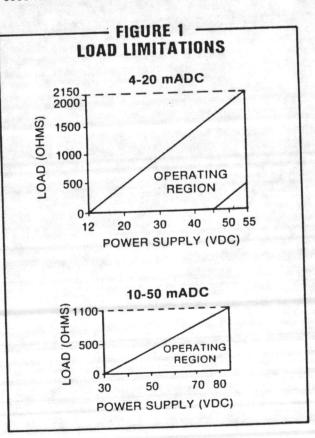
Less than 0.01 cubic inches.

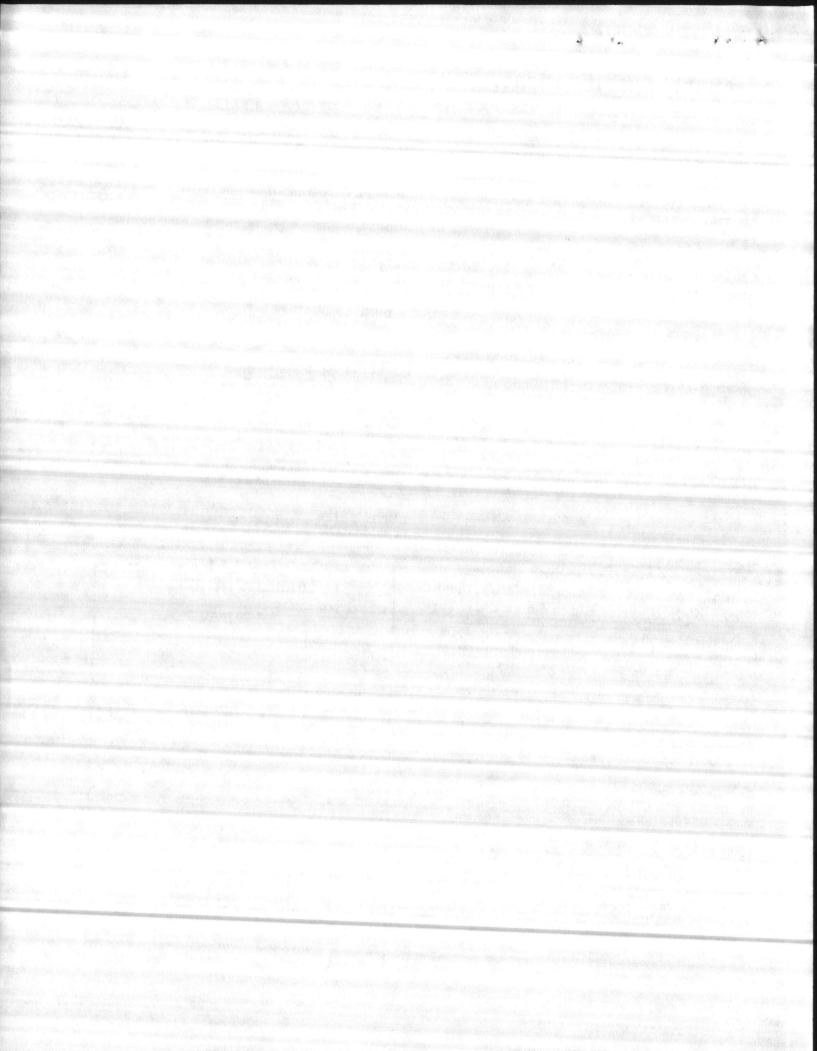
Damping

4-20 mADC: Time constant continuously adjustable between 0.2 and 1.67 seconds with silicone fill. 10-50 mADC: Time constant fixed at 0.2 second (0.4 second for range 3) with silicone fill. *Fluorolube* fill: Higher time constant.

Turn-On Time

2 seconds. No warmup required.





Ordering Information

	CODE	RANGES		de la come	a the state						
	3				7 to 0-762 mm H ₂ O 635 to 0-3810 mm I						
	5				-3175 to 0-19050 m						
19 1 25	Ļ		1			The second s		No. Service			
	Self Mar	CODE	OUTPUT	-	:		the second s				
	B		the strategy of the state of the		idjustable damping fixed damping						
10.1						MATERIALS O	MATERIALS OF CONSTRUCTION				
			CODE	FLANG		DRAIN/VENT VALVES	ISOLATING DIAPHRAGMS	FILL FLUID			
Sec. 2	100	1.1.1	12	Cadmin	m Plated C.S.	316SS	316SS				
		100	13	and the second second	m Plated C.S.	Hastelloy C	Hastelloy C-276				
1		in the second	14		Im Plated C.S.	Monel	Monel)			
the second	and the second	and the second	15		m Plated C.S.	316SS	Tantalum				
Lane	all and more	S. Carlos	22	31655	Contract States and	31655	316SS	1. 1. 1927			
		1. 18 C	23	31655		31655	Hastelloy C-276	Silicone			
1	Sec. Chatter	March Cont	24	31655		31655	Monel				
			25	31655		31655	Tantalum	and the second second			
1.00		D. Taki	33	Hastell	av C	Hastelloy C	Hastelloy C-276				
1.1		Networks		Hastell		Hastelloy C	Tantalum	1			
	12	201	35	Monel	0,0	Monel	Monel				
-	and the second	Sec. Sec.	1A		um Plated C.S.	316SS	316SS	1			
	100	1.1.1	2A	31655		31655	31655				
- 10. X .:			18		um Plated C.S.	Hastelloy C	Hastelloy C-276	and the second			
		dantha a ta	and the second second	316SS Hastelloy C Cadmium Plated C.S.		316SS	Hastelloy C-276	Elucrolub			
1.000			28			Hastelloy C	Hastelloy C-276	Fluorolut			
1	1.1	1.00	38				Tantalum				
No.		Same and	10	316SS	um Plated C.S.	316SS					
	TA AS	1.1				316SS	Tantalum)			
1	-Gale - A	Sec. Phil	3D	Hastell		Hastelloy C	Tantalum				
			1.00	CODE	OPTIONS (See P	roduct Data Sheet 236) for Additional Options)				
1000	Sec. and	an a	Section of the	· M1	Linear Meter, 0-10	00% Scale					
1000	Care alea	State and		M2	Square Root Mete	er, 0-10 Scale					
		1991	All Sie	B1	Mounting Bracket	for Mounting to 2" Pi	pe				
	100			B2		for Panel Mounting					
				B3		cket for Mounting to 2	" Pipe				
Sec. al	2.6.		Contraction and	D1	Side Vent/Drain,						
1000				D2	Side Vent/Drain, I						
	Divison		Divison 1, Group	SA Explosion Proof Certification for Class I, Division 2, Groups A and B; Class I, Divison 1, Groups C and D; Class II, Division 1, Groups E, F and G; Class III (Encl. IV) M Intrinsic Safety Approval with Foxboro, Taylor, Westinghouse. Leeds & Northrup.							
		S. 18	1	15	Honeywell, Measu	rement Technology, S	tahl and Fisher Controls. See	eds & Northrup. PDS 2360 for			
	10	en North		16	CSA Intrinsic Safe	odels. (Use with Output Code E, only). nsic Safety Approval for approved barriers ≤30V and ≥120Ω. Also <i>Foxboro Spe</i> erters. See PDS 2360 for Models. Temperature Code T2D. (Use with Output					
				-	Code E, only).		ite Option Codes to specify an				
1		18	See as	1.350		in Product Data Shee		an a			

ADDITIONAL OPTIONS

All Series 1151 Transmitter Options are described in Product Data Sheet 2360. These include optional materials, outputs, tests, etc. Any appropriate Option Code can be added to the basic 1151 Transmitter Model Number.

ACCESSORY 3-VALVE MANIFOLD (Packaged Separately)

- Part No. 1151-150-1: 3-Valve Manifold, Carbon Steel (Anderson, Greenwood & Co., M4AVC).
- Part No. 1151-150-2: 3-Valve Manifold, 316SS (Anderson, Greenwood & Co., M4AVS).

Rosemount Inc.

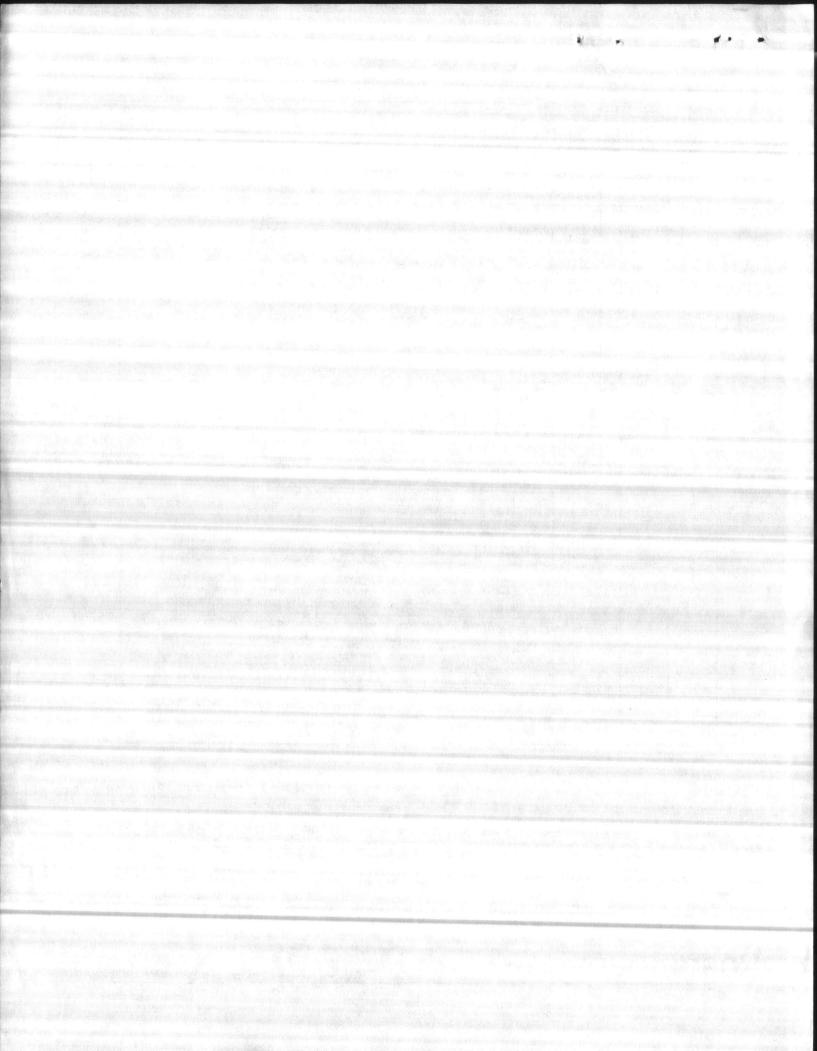
Other Series 1151 Pressure Transmitter Product Data Sheets:

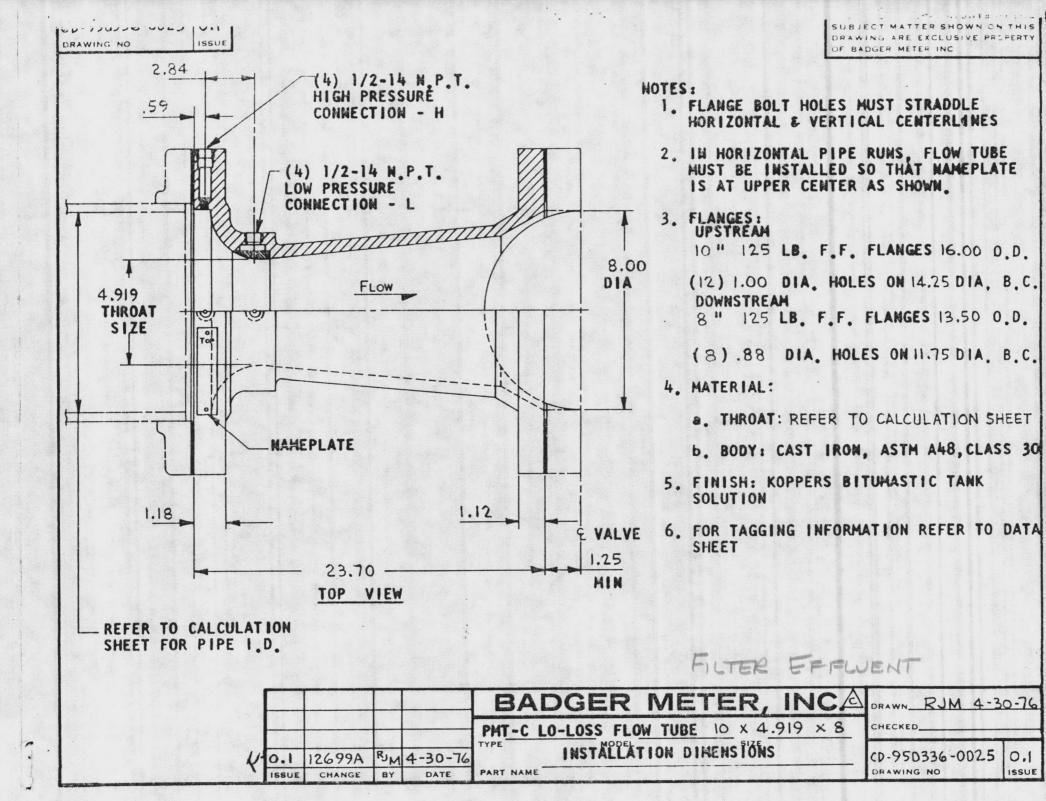
PDS2255: 1151DP & 1151GP Remote Seals PDS2257: 1151DP High Differential Pressure PDS2258: 1151HP High Line Pressure Differential PDS2259: 1151DP Square Root Differential Flow PDS2260: 1151GP Gage Pressure PDS2261: 1151AP Absolute Pressure PDS2262: 1151LLT Liquid Level PDS2294: 1151DR Draft Range Differential Pressure PDS2360: 1151 Pressure Transmitter Options.

POST OFFICE BOX 35129 MINNEAPOLIS, MINNESOTA 55435

PHONE: (612) 941-5560 TWX: 910-576-3103 TELEX: 29-0183 CABLE: ROSEMOUNT

Revised 9/80

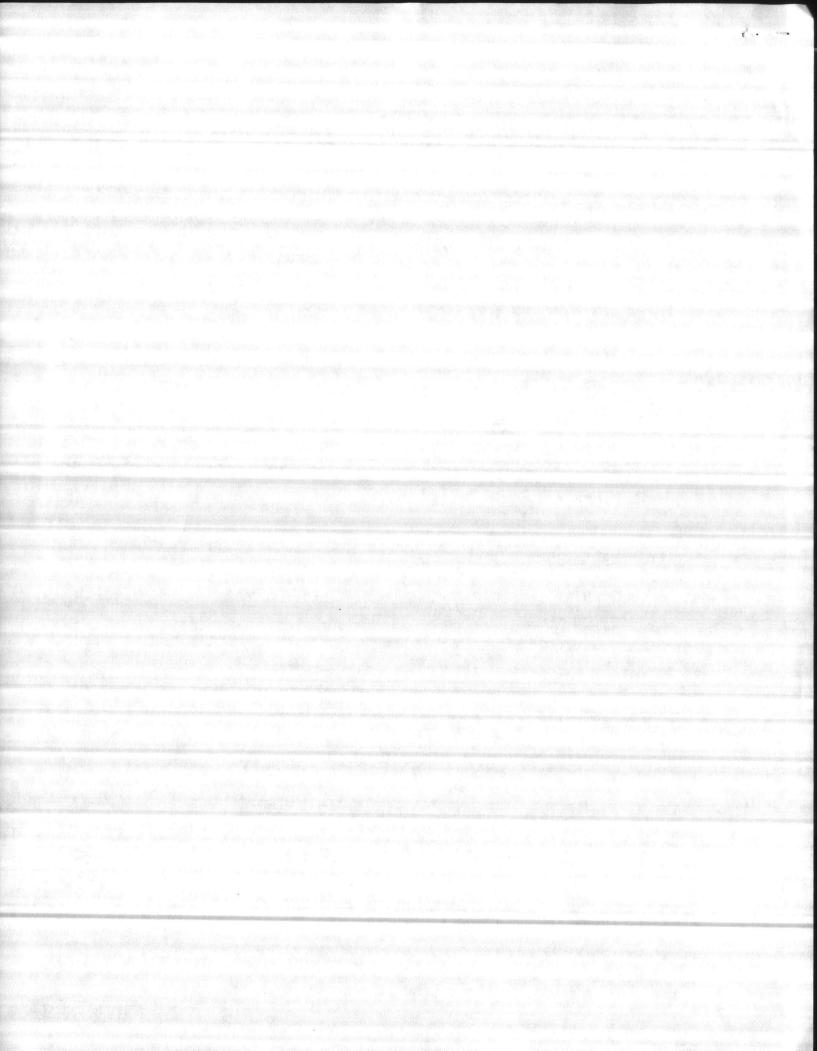






P.O. BOX 581390 6116 EAST 15th STREET TULSA, OKLAHOMA 74158-1009 (918) 836-8411 • TELEX: RCA 203605		DIFFERENTIAL PRIMARY DATA/CALCU WATER CALCULATION - VO	LATION SHEET
USER	5.0.NO. R R F.O.NO.	265EP84 901896 ROBERTS FILTER MANUF. CO. 35520-2093 CAMP LEJEUNE, NC	
LO-LOSSDATA: LO-LOSS STYLE NOMINAL SIZE THROAT DIA (IN.) BETA RATIO TAP SIZE TAP LOCATION	PMT-C 10 4,919 ,498 1/2 INTEGRAL	SERIAL NO. TAG BODY MATERIAL THROAT MATERIAL FLANGE MATERIAL	901896 DEFGH FILTER EFFLUENT CAST-IRON BRONZE CAST-IRON
DIFFERENTIAL PRESS PERMANENT PRESSURE PERMANENT PRESSURE	LOSS IS	177.53 INCHES WATER AT 4.44 % OF DIFFERENTIAL 7.88 INCHES OF WATER A	•
FLUID DATA FLUID DPER.PRES.(PSIA) OPER.TEMP.(F) SAGE TEMP.(F)	WATER 64,7 50 60	OPER.SP.GR. BASE SP.GR. OPER.VISC.(CP)	1.00016 1.00016 1.119
FLOW DATA MAX.FLOW (SPM) NORM.FLOW (GPM)	1600 1120	PIPE REYNOLDS NO. PIPE REYNOLDS NO.	448835 314184
CUSTOMER PIPELINE & 1 NGM.PIPE SIZE PIPE SCHED/CLASS FLANGE TYPE	FLANGE DATA 10 CI CL.24 ANSI	PIPE MATERIAL	CAST IRON 10,06 125
APPLICABLE DOCUMENTS INSTALLATION/		PRODUCTIO	N
• · · • • • • • • • • • • • • • • • • •	• • • • • • • • •	• • • • • • • • • • • • • • • • • • •	· · · · · ·
HEFERENCE: FLOW ME	TER ENGINEE	RING HANDBOOK, C.F.CUSICK	, 3RD ED., 1961
CERTIFIED CORRECT 1	BY:	, DATE:	

REPARED BY :RV



Badger Meter.Inc.

P.O. BOX 581390 6116 EAST 15th STREET TULSA, OKLAHOMA 74158-1009 (918) 836-8411 • TELEX: RCA 203605

DIFFERENTIAL ELEMENT SUPPLEMENTARY DATA SHEET WATER CALCULATION - VOLUMETRIC FLOW



26SEP84 DATE BADGER 3.0.ND. 901396 CUSTOMER CUSTOMER P. 0. ND. 35520-2093 USER CONSULTING ENGR.

ROBERTS FILTER MANUF, CO. CAMP LEJEUNE, NC

LO-LOSSDATA: LO-LOSS STYLE

WOMENAL SIZE

PMT-C 10

SERIAL NO. TAG

901896 DEFGH FILTER EFFLUENT

WORKING EQUATION FOR LIQUID FLOW GAL/HR AT BASE TEMPERATURE

QGH=340.11(S)(FA)(D2)(FHM)(FGB)(FGF), (EQ 15, PG 95)

QGH = 96000S = ,20937 FA = .99983 D2 = 101,2036

FHM = 13.32427FGB = .99983FGF = 1.00008

REYNOLDS NO. EQUATION FOR LIQUID FLOW GAL/HR AT BASE TEMPERATURE

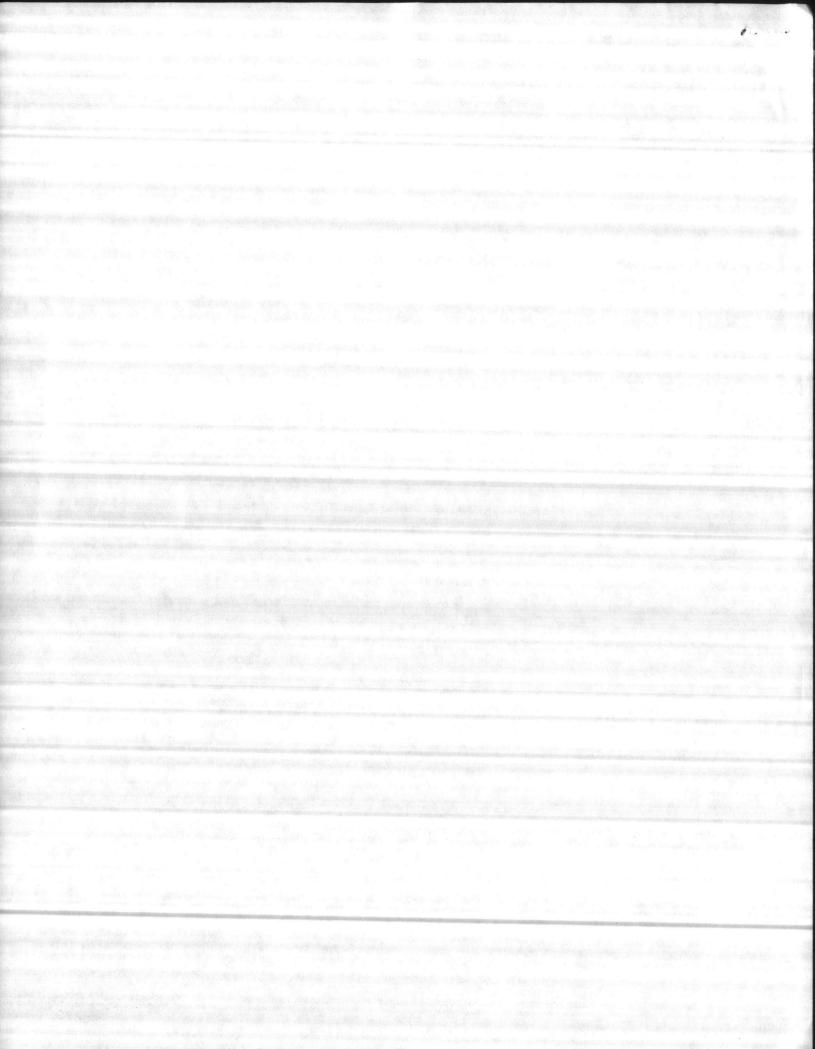
RD=52.654(QGHA)(GB)/(D)(U), (EQ 20, PG 97)

1. -

QGHA = 67200GB = 1.00016

D = 10.06U = 1.11965

DISCHARGE COEFFICIENT =,85031



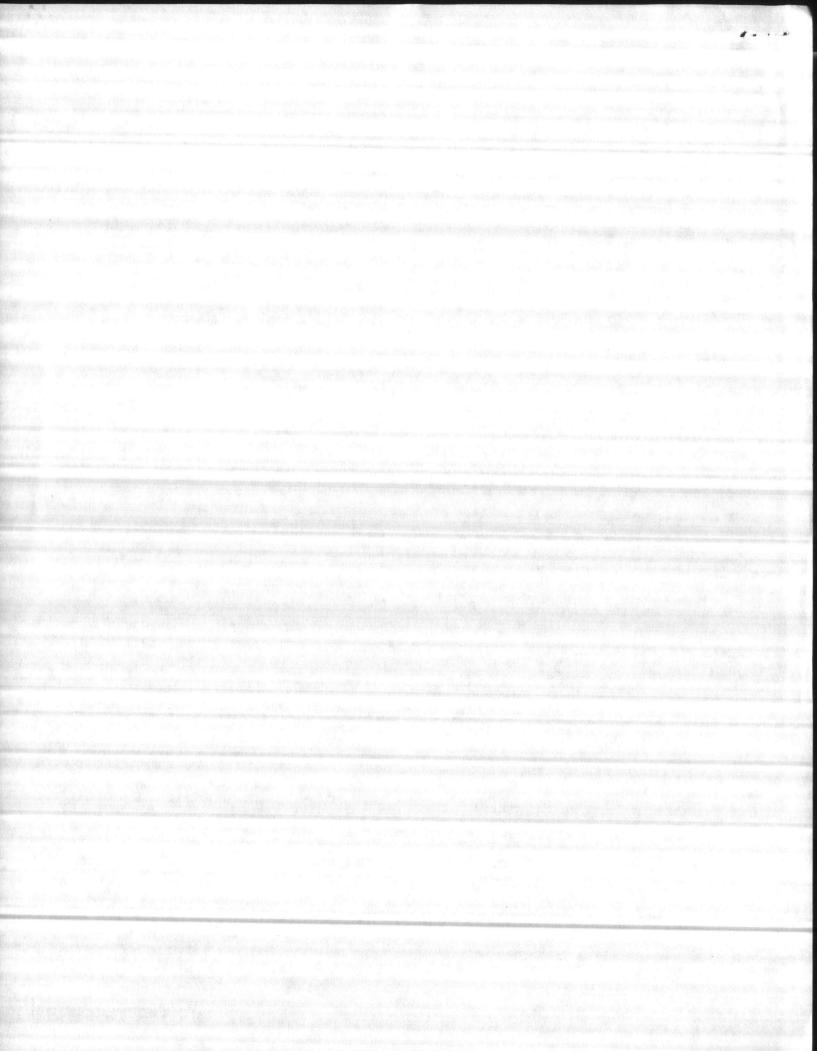
Badger Meter, Inc.

P.O. BOX 581390 6116 EAST 15th STREET TULSA, OKLAHOMA 74158-1009	nya sama na mataka kanan Senang Kabupatén Senang Senang Kabupatén Senang Kabupatén Senang Kabupatén Senang Kabupatén Senang Kabupatén Se		DIFFE	RENTIAL	METER	al a sur a sur A sur a s
(918) 836-8411 • TELEX: RCA 203605		F	LOW VS DIFF	ERENTIAL	. CALCULATIO	NS
BADGER S DATE CUSTOMEP ELEMENT SERIAL N TAG INFO	2 7 F 1 10(S) 9					
FLUID DPER,TEMP,(F) DPER,PRES,(PSIA	WATER 60.000		THROAT I. PIPE I.D.		4,91900 10,06000	
RESOLUTION DIFF.UNITS		PERCENT O				
FLOW DIFF (GPM) (IN)	FLOW (GPM)	DIFF (IN)	FLOW (GPM)	DIFF (IN)	FLOW (GPM)	DIFF (IN)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1584 1520 1455 1392 1328 1264 1200 1136 1072 1008 944.0 880.0 816.0 752.0 688.0 524.0 560.0	174.0 160.2 147.0 134.3 122.3 110.8 99.86 89.49 79.69 70.46 61.79 53.69 46.17 39.21 32.81 26.99 21.74	1568 1504 1440 1376 1312 1248 1184 1120 1056 992.0 928.0 864.0 800.0 736.0 672.0 608.0 544.0	170.5 156.8 143.8 131.3 119.3 108.0 97.22 86.99 77.33 68.24 59.71 51.76 44.37 37.55 31.30 25.62 20.51	1552 1488 1424 1360 1296 1232 1168 1104 1040 976.0 912.0 848.0 784.0 720.0 656.0 592.0 528.0	167.0 153.5 140.6 128.2 116.4 105.2 94.61 84.52 75.00 66.05 57.67 49.86 42.61 35.94 29.83 24.29 19.32
512.0 18.17 448.0 13.91 384.0 10.21 320.0 7.095 256.0 4.540 192.0 2.552	496.0 432.0 368.0 304.0 240.0 176.0	17.05 12.93 9.385 6.403 3.990 2.144	480.0 414.0 352.0 288.0 224.0 160.0	15.97 11.99 8.586 5.746 3.475 1.772	454.0 400.0 336.0 272.0 208.0	14.92 11.08 7.823 5.125 2.996

THIS CALIBRATION DATA MAY DIFFER FROM THE NORMAL SQUARE ROOT RELATION BETWEEN FLOW AND DIFFERENTIAL PRESSURE DUE TO THE EFFECTS OF DISCHARGE COEFFICIENT VS REYNOLDS NUMBER VARIATION AND/OR (IN COMPRESSIBLE FLOWS) ADIABATIC EXPANSION. FOTHER OR BOTH OF THE EFFECTS ARE INCORPORATED INTO THIS DATA AS APPROPRIATE.

ALL PROPRIETARY RIGHTS IN THE SUBJECT MATTER SHOWN ARE EXCLUSIVE PROPERTY OF BADGER METER, INC.

1.



$\begin{array}{c} \textbf{MODEL 1151DP} \\ \textbf{ALPHALINE}^{\$} \\ \sqrt{\bigtriangleup P} \quad \textbf{FLOW} \\ \textbf{TRANSMITTER} \end{array} \end{array}$

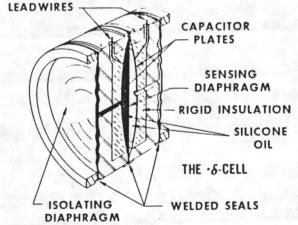
Two-wire transmitter Output linear with flow Ranges from 0-5" H₂O to 0-750" H₂O 0.25% Accuracy Adjustable damping

FEATURES

The Alphaline® Flow Transmitter* integrally combines the square root extraction function within the differential pressure transmitter to provide a 4-20 mADC signal directly proportional to flow. No additional power supplies, wiring or additional "black boxes" are required with this two-wire electronic flow transmitter.

A solid, stable-zero flow signal is achieved by electronically switching from a square root to a linear function at 20% of flow (4% of differential input pressure). This eliminates zero instability problems inherent in designs attemping to extract the square root of signals approaching zero.

Installation, calibration and commissioning are simplified by compact design, external span and zero adjustments, and explosion-proof, weather-proof construction with separate compartments for electronics and wiring connections. Volumetric displacement of less than 0.01 cubic inch prevents pumping of the process fluid and eliminates the need for condensate chambers and level pots. Tantalum, *Hastelloy C-276* and *Monel* are available for corrosive service. Modular construction and plug-in printed circuit boards aid in troubleshooting and reduce parts stocking.



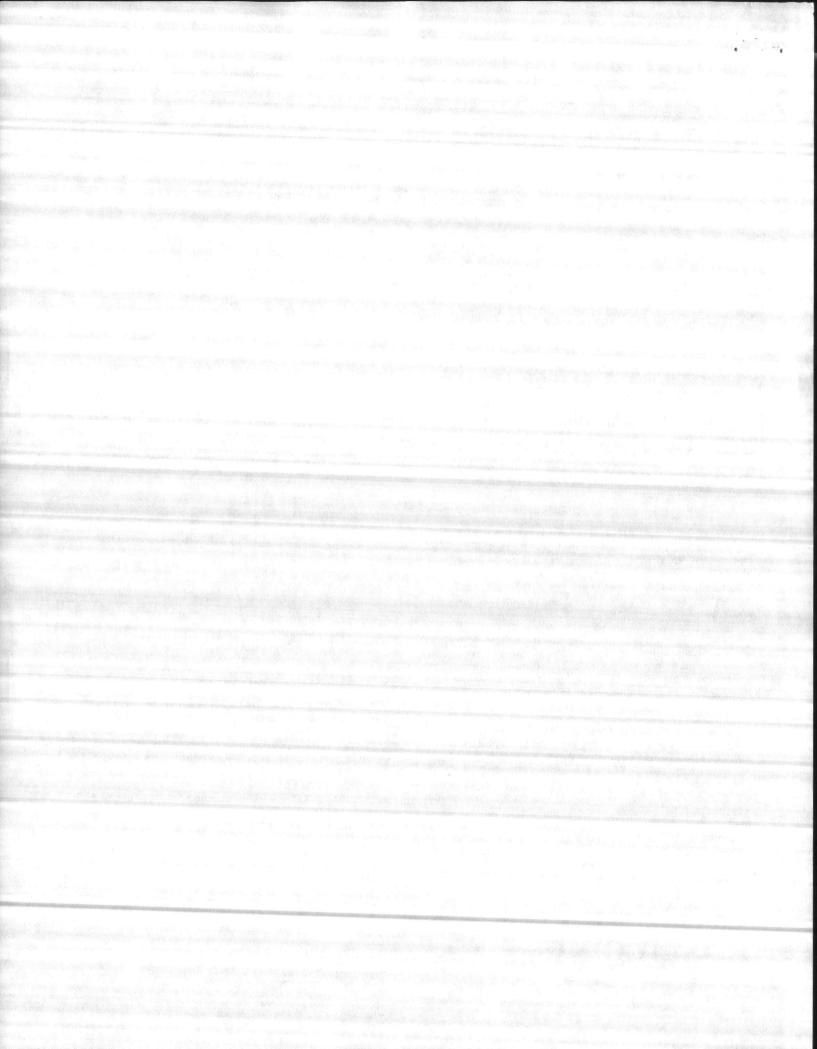
OPERATION

Process pressure is transmitted through isolating diaphragms and silicone oil fill fluid to a sensing diaphragm in the center of the δ -CELL^T. The sensing diaphragm is a stretched spring element which deflects in response to differential pressure across it. The displacement of the sensing diaphragm, a maximum motion of 0.004 inches, is proportional to the differential pressure. The position of the sensing diaphragm is detected by capacitor plates on both sides of the sensing diaphragm. The differential capacitance between the sensing diaphragm and the capacitor plates is converted electronically to a twowire 4-20 mADC signal proportional to the square root of the differential pressure.

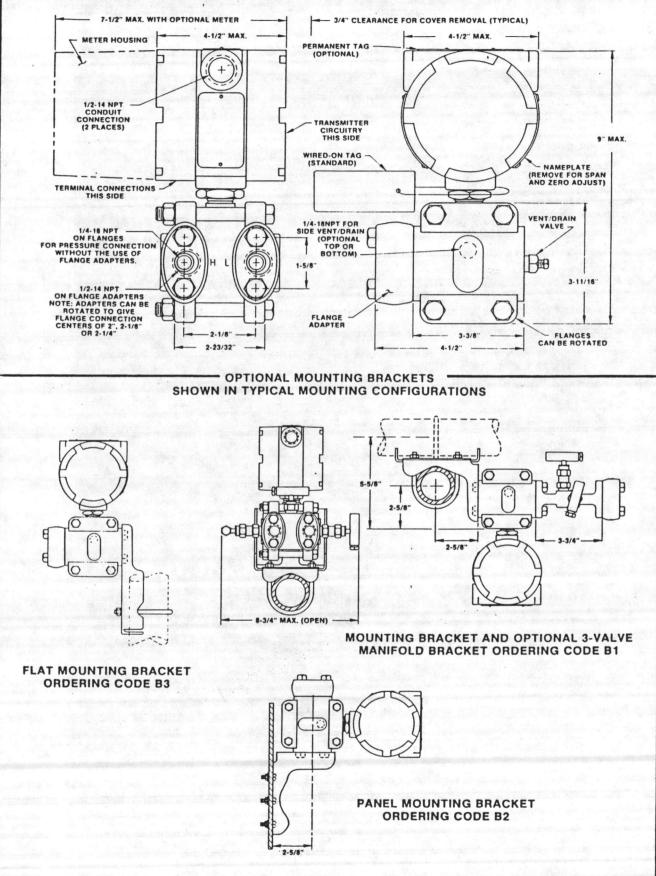


FILTER EFFLUENT

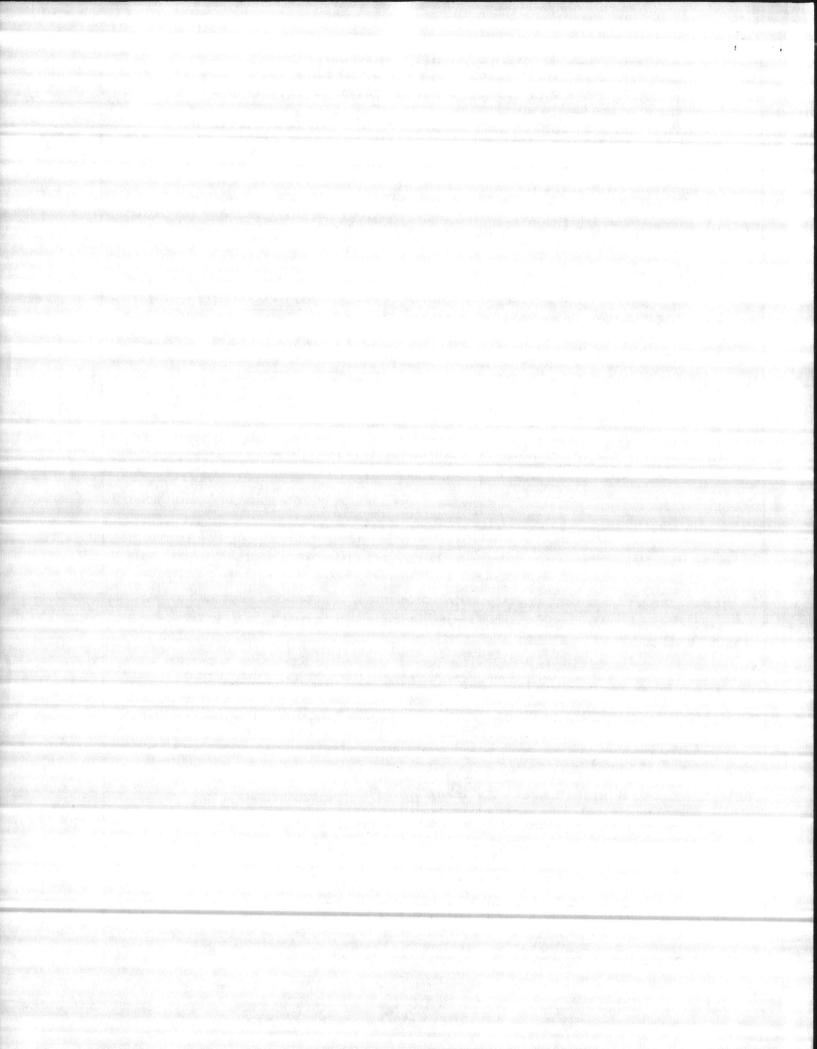
 Rosemount Inc., 1971, 1975, 1976.
 *Protected by one or more of the following U.S. Patents: No. 3, 195,028; 3, 271,669; 3, 318, 153; 3, 618,390; 3, 646,538; 3,793,885; 3,800,413; 3,854,039; 3,859,594; and 3,975,719.
 Canada Patented 1968, 1974, 1975, 1976, 1977, 1979.
 Mexico Patentado Nos 118892, 136497. Other U.S. and Foreign Patents issued or pending.

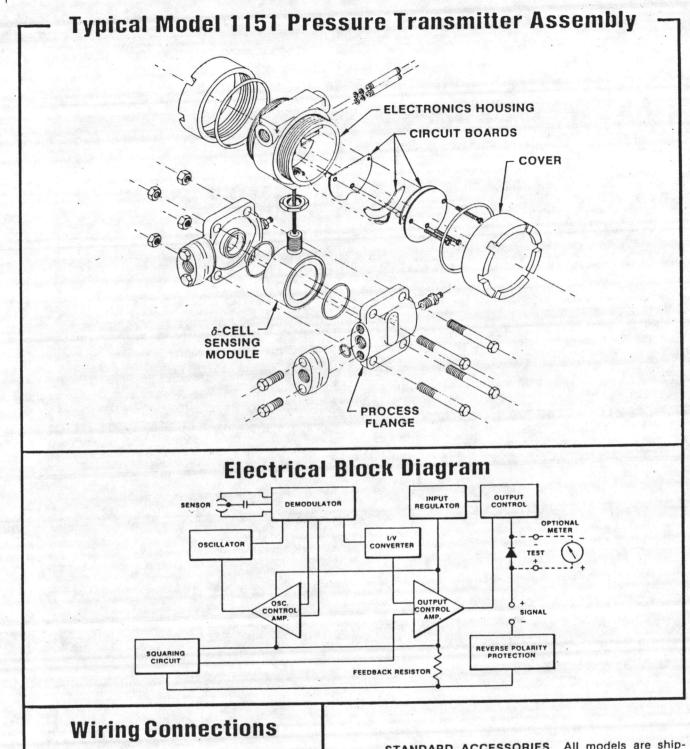


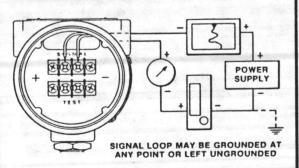
Dimensional Drawings



· • ,



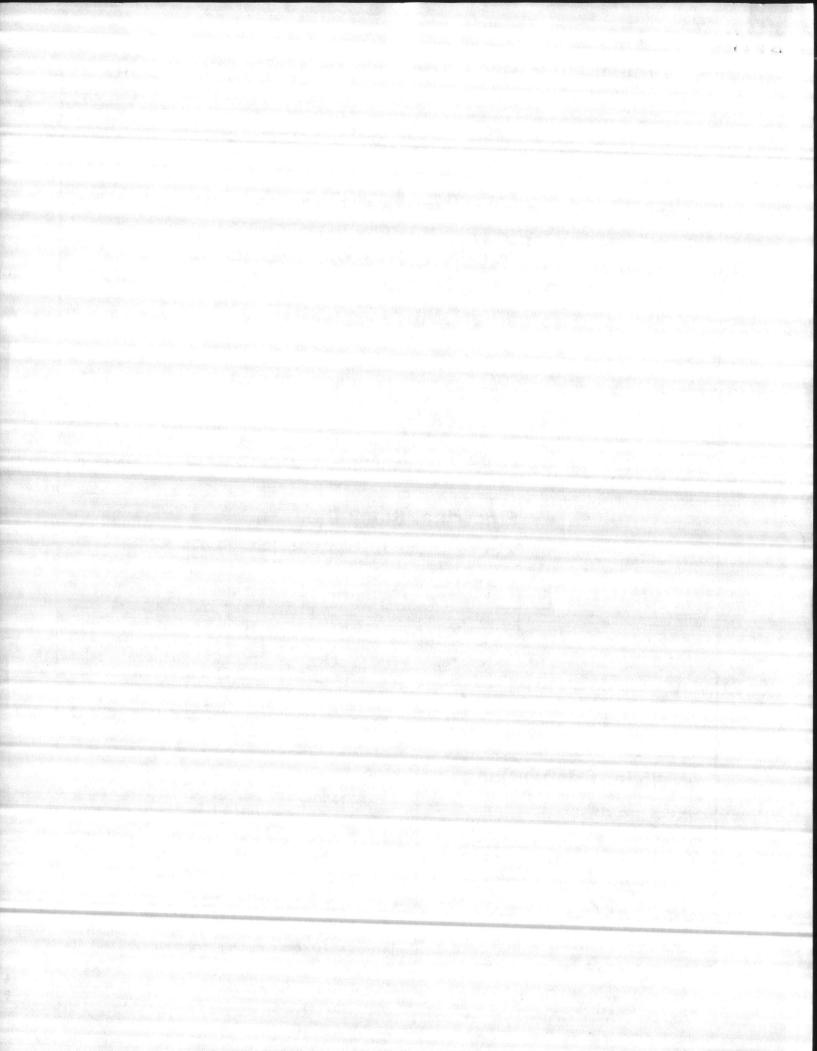




STANDARD ACCESSORIES All models are shipped with flange adapters, vent/drain valves and one instruction manual per shipment.

TAGGING Alphaline Differential Pressure Transmitters will be tagged in accordance with customer requirements. All tags are stainless steel.

CALIBRATION Transmitters are factory calibrated to customer's specified range. If calibration is not specified, transmitters are calibrated at maximum range. Calibration is at ambient temperature and pressure.



Functional Specifications

Service

Liquid, gas or vapor.

Ranges

0-5/30 inches H₂O 0-25/150 inches H₂O 0-125/750 inches H₂O

Outputs

4-20 mADC, square root of differential input pressure between 4% and 100% of input. Linear with differential input pressure between 0% and 4% of input.

Power Supply

External power supply required. Up to 55 VDC. Transmitter operates on 12 to 45 VDC with no load.

Load Limitations

See Figure 1.

Indication

Optional meter with 1-3/4" linear scale, 0-100%. Indication accuracy is $\pm 2\%$ of span.

Hazardous Locations

Explosion proof: Approved by Factory Mutual (FM) for Class I, Division 1, Groups B, C and D; Class II, Division 1, Groups E, F and G; and Class III, Division 1. Certification by Canadian Standards Association (CSA) for Class I, Division 2, Groups A and B; Class I, Division 1, Groups C and D; Class II, Division 1, Groups E, F and G; Class III (Encl. IV).

Intrinsically safe: FM or CSA certification optional for Class I, Division 1, Groups A, B, C and D when used with approved barrier systems.

FM explosion proof tag standard. Appropriate tag will be substituted if optional certification selected.

Span and Zero

Continuously adjustable externally, non-interacting.

Zero Elevation and Suppression

Zero elevation or zero suppression adjustable up to 10% of calibrated flow span.

Temperature Limits

-20° to +150°F Amplifier operating. -40° to +220°F Sensing element operating with silicone fill.

+32° to +160°F Sensing element operating with Fluorolube fill.

-60° to +180°F Storage.

Static Pressure and Overpressure Limits

0 psia to 2000 psig on either side without damage to the transmitter. Operates within specifications between static line pressures of 1/2 psia and 2000 psig, for silicone oil transmitters, and between atmospheric and 2000 psig for *Fluorolube* transmitters, 10,000 psig proof pressure on the flanges.

Humidity Limits

0 to 100% RH.

Volumetric Displacement

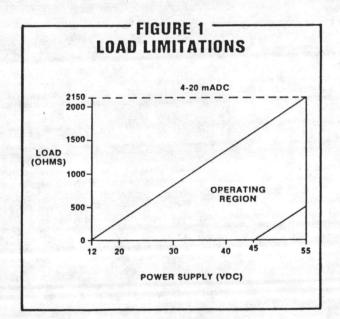
Less than 0.01 cubic inches.

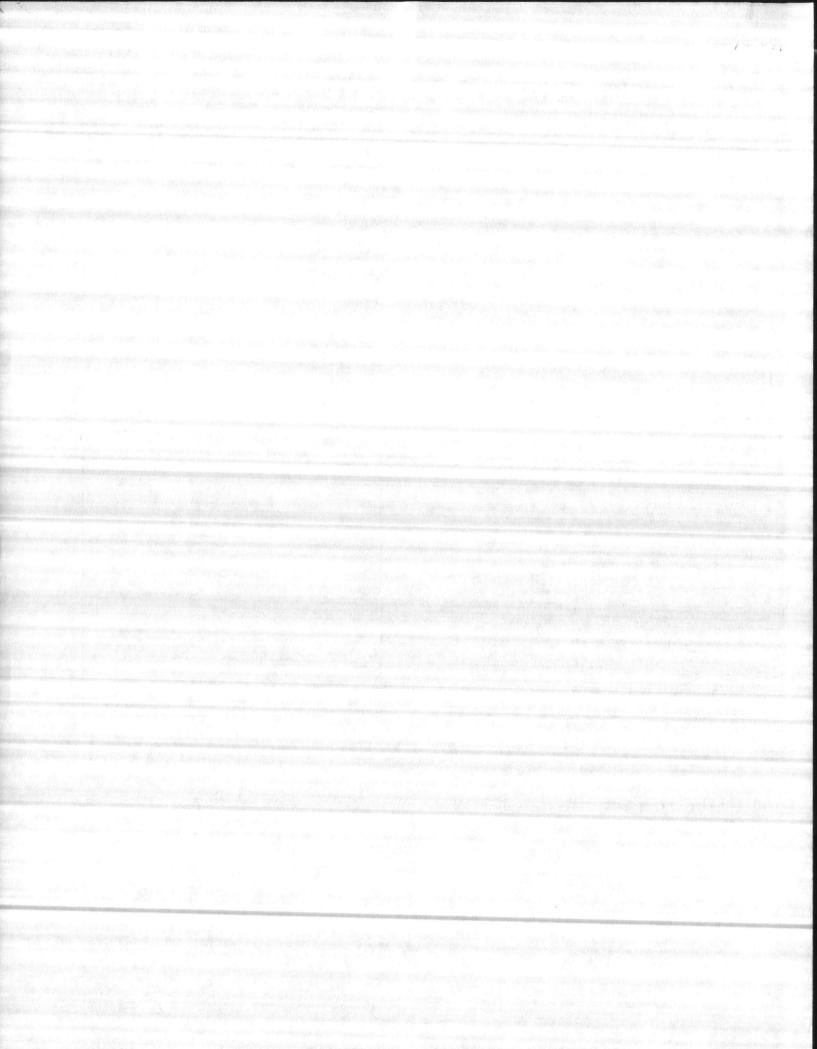
Damping

Time constant continuously adjustable between 0.2 and 1.0 seonds. Fluorolube fill: higher time constant.

Turn-on Time

2 seconds. No warmup required.





Performance Specifications

(ZERO BASED SPANS, REFERENCE CONDITIONS, 316SS ISOLATING DIAPHRAGMS, SILICONE OIL FILL, APPLIES FROM 20% TO 100% FLOW)

Accuracy

 $\pm 0.25\%$ of calibrated span for a range of 20% to 100% of flow (4% to 100% of input pressure). Includes combined effects of hysteresis, repeatability and conformity of the square root function. Output linear with input pressure for the range of 0% to 20% of flow (0% to 4% of input pressure).

Dead Band

None

Stability

±0.25% of upper range limit for six months.

Temperature Effect

The total output effect, whether at zero or full scale, including zero and span errors: $\pm 1.5\%$ of upper range limit per 100° F. ($\pm 2.5\%$ for range 3).

Static Pressure Effect

Zero Error: $\pm 0.25\%$ of differential pressure upper range limit for 2000 psi ($\pm 0.5\%$ for range 3).

Span Error: $-0.5\pm0.1\%$ of reading per 1000 psi $(-0.75\pm0.1\%$ for range 3).

This is a systematic error which can be calibrated out for a particular pressure before installation.

Vibration Effect

±0.05% of upper range limit per g to 200 Hz in any axis.

Power Supply Effect

Less than 0.005% of output span per volt.

Load Effect

No load effect other than the change in power supplied to the transmitter.

Mounting Position Effect

Zero shift of up to 1" H_2O which can be calibrated out. Range 3 transmitters should be installed with diaphragm in vertical plane. No span effect. No effect in plane of diaphragm.

Physical Specifications

Material of Construction†

Isolating Diaphragms: 316SS, Hastelloy C-276, Monel, or Tantalum.

Drain/Vent Valves: 316SS, Hastelloy C, or Monel.

Process Flanges and Adapters: Cadmium Plated Carbon Steel, 316SS, Hastelloy C or Monel.

Wetted O-Rings: Viton.

Fill Fluid: Silicone Oil or Fluorolube Oil.

Bolts: Cadmium Plated Carbon Steel.

Electronics Housing: Low-copper aluminum (NEMA4).

Paint: Epoxy-Polyester.

Process Connections

1/4 NPT on 2-1/8" centers on flanges. 1/2 NPT on 2", 2-1/8" or 2-1/4" centers with adapters.

Electrical Connections

1/2-inch conduit with screw terminals and integral test jacks compatible with miniature banana plugs (*Pomona* 2944, 3690 or equal).

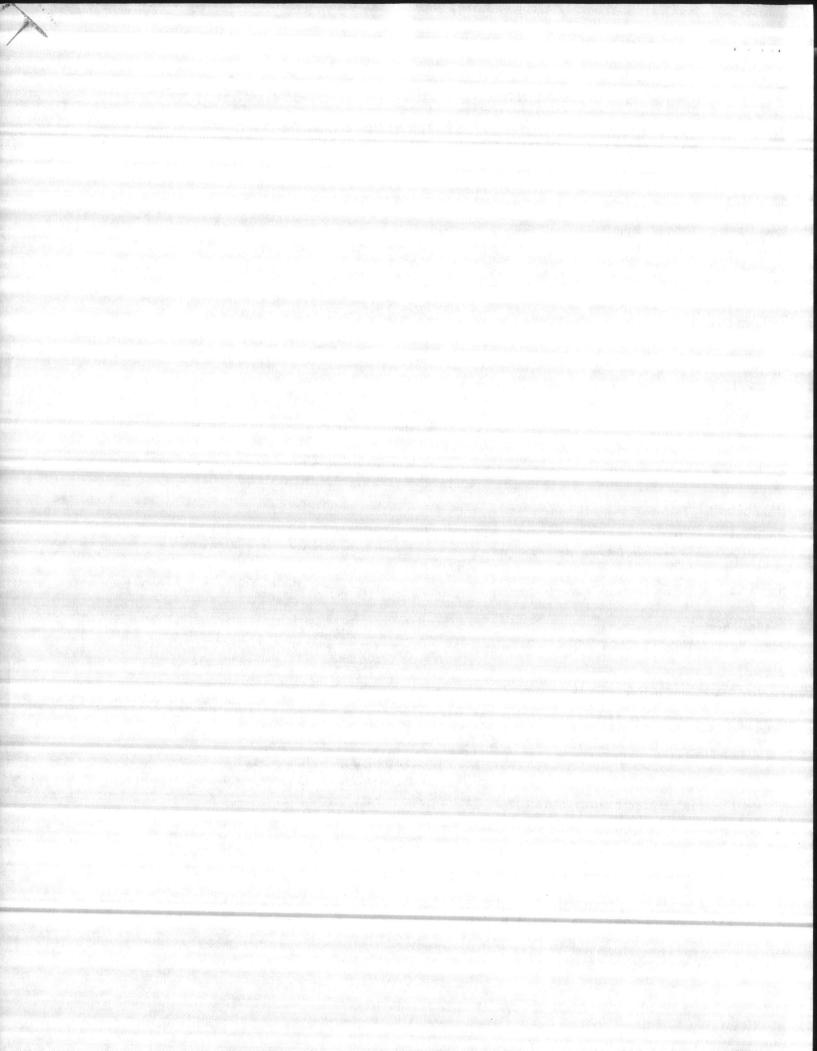
Weight

12 pounds excluding options.

†Monel is a trademark of International Nickel Co. Hastelloy is a trademark of the Cabot Corp.

Viton is a DuPont trademark.

Fluorolube is a trademark of the Hooker Chemical Co. Terminology per SAMA Standard PMC20. 1-1973.



Ordering Information

	CODE	RANGE	S			and a subscription of	Salar and the second second	and the second for						
-	3 4 5	0-5 to 0 0-25 to	-30 inches 0-150 inch	es H ₂ O (127 to 0-762 mm 0-635 to 0-3810 r (0-3175 to 0-190	mm H ₂ O) NOTE:	Consult Factory for squa for line pressure to 4,500							
		T				CODE	OUTPUT							
2 ATEI							J			re root of input v	with adjustable dampir	ng		
TRI						MATERIALS OF	CONSTRUCTION							
			CODE	FLANC		DRAIN/VENT VALVES	ISOLATING DIAPHRAGMS	FILL FLUID						
~		12 34	12	Cadmi	um Plated C.S.	31655	316SS							
	a la com	Same Land	13	Cadmi	um Plated C.S.	Hastelloy C	Hastelloy C-276	>						
	and the second	1.1.1	14	A CONTRACTOR OF A	um Plated C.S.	Monel	Monel							
	6 6 14	is a ditte	15		um Plated C.S.	316SS	Tantalum							
	1 23.8	1000	22	316SS		316SS	316SS	SILICONE						
		The second	23	316SS		316SS	Hastelloy C-276	SILICONE						
	in the	125 10 10 10	24	316SS		316SS	<i>Monel</i> Tantalum							
	1.25	Sec.	25	316SS		316SS	Hastelloy C-276							
	i star	No. On Carl	33	Hastell		Hastelloy C	Tantalum)						
	te parte		35	Hastell Monel	oyc	Hastelloy C Monel	Monel							
		100	1A	Cadmin	um Plated C.S.	316SS	316SS	· 、 :						
	1.18		2A	316SS		316SS	316SS							
	1		1B	Cadmin	um Plated C.S.	Hastelloy C	Hastelloy C-276							
	in Star		2B	316SS		316SS	Hastelloy C-276							
	1. 2.65		3B	Hastell	oy C	Hastelloy C	Hastelloy C-276	> FLUOROLUBE						
4		21 1.33	1D	Cadmi	um Plated C.S.	316SS	Tantalum	a stand the second second						
			2D	316SS		316SS	Tantalum							
			3D	Hastell	oy C	Hastelloy C	Tantalum)						
		a la la con	- an all a	CODE	OPTIONS (See	Product Data Sheet 2	360 for Additional Options)						
			100	M1	Linear Meter, 0									
	1	1.00		B1	Mounting Brack	ket for Mounting to 2"	Pipe							
	Sal and	1.1	23 S.	B2	Mounting Brack	ket for Panel Mounting								
	1. 1. 200		1	B3		Bracket for Mounting t	o 2" Pipe							
			in the second	D1	Side Vent/Drain									
	100	1.0	Sec. Part	D2	Side Vent/Drain		or Class I, Division 2, Gro	ups A and B. Class I						
	1			E6	Division 1, Gro	oups C and D; Class II.	, Division 1, Groups E, Fan	d G; Class III (Encl. IV						
			i eser	15	Northrup, Ho	fety Approval with For neywell, Measurement Barrier Models.	xboro, Taylor, Westinghou Technology, Stahl and Fis	se, Leeds & sher Controls. See						
				16	CSA Intrinsic S Spec 200 Cor	afety Approval for app overters. See PDS 2360	roved barriers ≤30V and ≥13 0 for Models. Temperature	Code T2D.						
La la la					Other Options.	Note: Insert the appr	opriate Option Codes to s oduct Data Sheet 2360.	pecify any of the						
					Other Options.	Note: Insert the appr	opriate Option Codes to s	pecify any of t						

ADDITIONAL OPTIONS

All Series 1151 Transmitter Options are described in Product Data Sheet 2360. These include optional materials, outputs, tests, etc. Any appropriate Option Code can be added to the basic 1151 Transmitter Model Number.

ACCESSORY 3-VALVE MANIFOLD (Packaged separately)

Part No. 1151-150-1:

3-Valve Manifold, Carbon Steel (Anderson, Greenwood & Co., M4AVC). Part No. 1151-150-2:

3-Valve Manifold, 316SS (Anderson, Greenwood & Co., M4AVS).

Rosemount Inc.

Other Series 1151 Pressure Transmitter Product Data Sheet:

 PDS2255:
 1151DP & 1151GP Remote Seals

 PDS2256:
 1151DP Differential Pressure

 PDS2257:
 1151DP High Differential Pressure

 PDS2258:
 1151HP High Line Pressure Differential

 PDS2260:
 1151GP Gage Pressure

 PDS2261:
 1151P Absolute Pressure

 PDS2262:
 1151LLT Liquid Level

 PDS2264:
 1151DR Draft Range Differential Pressure

 PDS2260:
 1151 Pressure Transmitter Options

POST OFFICE BOX 35129 MINNEAPOLIS, MINNESOTA 55435

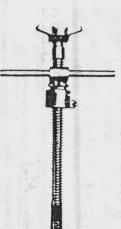
PHONE: (612) 941-5560 TWX: 910-576-3103 TELEX: 29-0183 CABLE: ROSEMOUNT

Revised 9/80

DEVIATION: APPROVED L DISAPPROVED LANTDIV REVIEWER In succession of the local division of the l HFW ZOF-1685 DATE

AT1
NAVAL FACILITIES DIVISION
NORFOLK, VINGINIA 2001
I APPROVED
APPROVED ACTION
SUBJECT TO THE REQUIREMENTS OF
CONTRACT NO. 82-2552
I APPROVAL OF CODIVITIAL DOC
APPROVAL OF A SUBMITTAL DOES OF INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON- TRACT REQUIREMENTS UNLESS THE CONTRAC- TOR CALLS ATTENTION TO AND SUPPOPERAC-
TOR CALLS OMENENTS UNLESS THE CON-
DEVIATION-THE CONTRACTOR SUPPORTS THE RESPONSIBLE FOR PROVIDING SHALL BE
RESPONSIBLE FOR PROVIDING PROPER
PHYSICAL DIMENSIONS & FECHTS, COORDINA-
I WILL A SALE A SALE A SALE AND A SALE AND A SALE A
FUR OFFICER IN CHARGE OF COM
FOR OFFICER IN CHARGE OF CONSTRUCTION

Jack



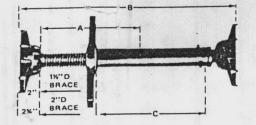
1470000

(without pipe)

Eight ton capacity with $1\frac{1}{2}$ " screw diameter for use with 2" standard round pipe. To attach drill pipe 1" from end with $\frac{1}{32}$ " drill. Maximum travel 15", weight 27 pounds. Also available with wing nut handle.

menues

WITH PIPE

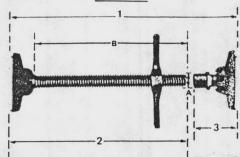


Specifications Complete With Pipe

Catalog No.	Pupe & Screw Dia. In.	A Longth Scrow, In,	B Longth Closed In.	B Longth Open, In,	C Longth Pipe In.	Sale Exten- sion In.	W1., Lbs.
T-1-11-22	11/2	14	21	30	13%	9	18
T-1-11-23	11/2	14	24	33	16%	9	19
T-1-13-26	1%	18	36	47	28%	12	23
T-1-13-27	1%	18	42	53	34%	12	24
T-1-13-28	1%	18	48	58	40%	12	25
T-2-14-31	2	18	36	46	26	12	43
T-2-14-32	2	18	42	52	32	12	44
T-2-14-33	2	18	48	58	38	12	46
T-2-14-34	2	18	54	64	44	12	49
T-2-14-35	2	18	60	70	50	12	50

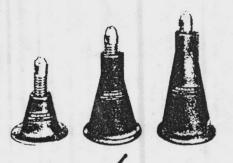
Fittings

W/O PIPE



Catalog No.	A Pipe & Screw Dia. in.	B Length Screw in.	Safe Extension in.	Weight Lbs.
1 T	RENCH B	RACE FI	TTINGS	
T-1-11	1½	14	9	15
T-1-13	11/2	18	11	17
T-2-14	2	18	12	35
2 TREN	CH BRAC	ESCREW	ENDO	NLY
T-11	11/2	14	9	12
T-13	11/2	18	11	14
T-14	2	18	12	27
3 TREN	CH BRAC	EBUTTE	NDS ON	ILY
T-1	11/2			3
T-2	2		Sec.	8

Tank Jacks



Milwaukee Tank Jacks can be used for leveling horizontal or versial tanks.

Cat. No.	TJ-2*	тј-3•	TJ-4*	TJ-5*	TJ-6*
Stand Height	4"	6"	8"	10"	12"
Height Open	8"	10"	12"	14"	16"
Height Closed	6"	8"	10"	12"	14"
Screw Length	6"	6"	6"	6"	6"
Screw 11/2" Dia.		1%"	1%"	1½"	1%"
Lifting Cap. 12 12 Tons		12	12	12	12

*Available with 1400900 Tank Jack Saddle

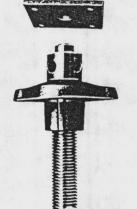
Milwaukee Hydraulic Jacks



Cat. No.	H-1½	н-з	H-5	н-8	H-10	H-12	H-20
Cap. Tons(*)	1%	3	5	8	10	12	20
Wt., Lbs.(**)	8%	14%	16¾	19%	23	24	38½
Power Lift	4½"	6%"	6%"	6%"	6%"	6"	7 1/16
Screw Extension	3"	3%"	4%"	4%"	4%"	4%"	2%"
Closed Height	6¾"	9%"	8¾"	9"	9"	9"	111/8"
Extended Height	14%"	19"	19%"	19¾"	19%"	19%"	211/16
Oil Cap. Pts.	%	1/4	1/3	J/8	5. ₈	5/8	1 1/2

(*) 2240 lb. ton. (**) Includes handles.

Steel House Raising Screws

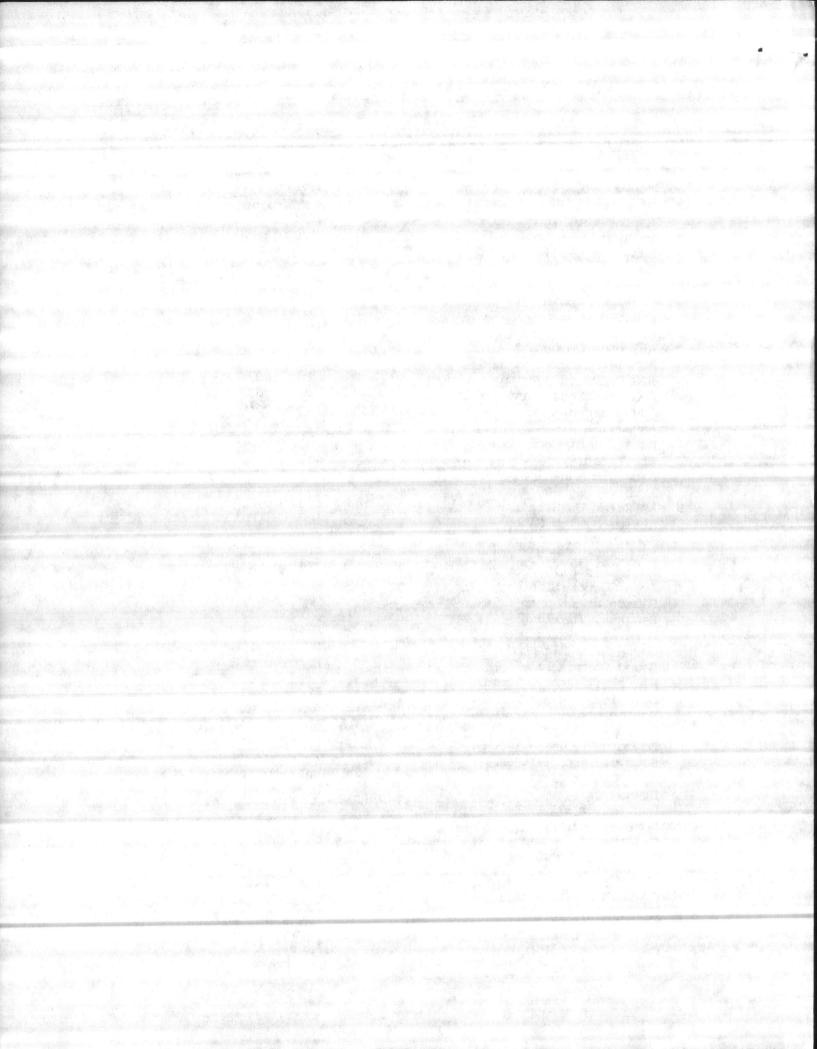


Cat. No.	Screw	Height Overall	Sust. Cap. Tons	Wgt. Lbs.
SHR-1	2×8	12	25	21
SHR-2	2 x 10	14	25	24
SHR-3	2 x 12	16	25	27
SHR-4	2 x 14	18	25	28
SHR-5	21/2 × 8	12	35	29
SHR-6	2½ × 10	14	35	34
SHR-7	21/2 x 12	16	35	38
SHR-8	21/2 × 14	18	35	40
SHR-9	21/2 x 16	20	35	42
SHR-10	2½ x 18	22	35	59
SHR-15	6 x 6 For	ged Steel	Cap on	ly 6

privite and the ist a real ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMM NORFOLK, VIRGINIA 23511 APPROVED _ APPROVED AS NOTED_ DISAPPROVED SUBJECT TO THE REQUIREMENTS OF CONTRACT NO. 05-82-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON TRACT REQUIREMENTS UNLESS THE CONTRAC TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION-THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA TION OF TRADES, ETC., AS REQUISED TO 1984 REVIEWERJMJ DATE FOR OFFICER IN CHARGE OF CONSTRUCTION

NEPTUNE FILTER INSTALLATIONS

FILTER TYPE	JOB NAME	÷.	LOCATION
10			
MC	Emory University		Atlanta, GA
	Lido Beach	i s leged	Hempstead, NY
	Manchester High School	1	Manchester, CT
	Pulaski Park Pool		Holyoke, MA
	Sahm Park Pool		Indianapolis, IN
	Southeastern MA University		North Dartmouth, MA
RF	Soucheascern FR University		a the second
and the second	American Chain & Cable		York, PA
	American Chain & Cable		York, PA
	Anaconda Brass Company		Waterbury, CT
	Anaconda Company		Ansonia, CT
	APS Technical Services		England
	APS Technical Services Ltd.		England
	APS Technical Services Ltd.		England
			Greensboro, NC
	Aqua Gardens		San Juan, PR Puerto Rico
Par painter a	Aquadilla		W. Yarmouth, MA
	Aquarium of Cape Code	1. 1. 1. 1.	Rye, NY
William Williams. The	Arbors at Rye Town		Archbold, OH
	Archbold Municipal Pool		Boston, MA
	Archives Museum for		그는 감독하는 것은 것들은 것은 것은 것을 가 없다. 것은 것을 가 물었다. 것은 것은 것을 가지 않는 것이 없는 것이 같아요. 이 것을 것을 것을 했다.
	As-Salam Hospital		Cairo U.A.R.
	Atrium Health Club	a milita	Boston, MA
	Auburn YMCA-WEIU		Auburn, NY
	Aurora YMCA		Aurora, IL
	Automatic Filter Systems Inc.		Totowa, NJ
	Avon Corporation		Maspeth, NY
	Babson Recreation Center		Wellesley, MA
	Bangkok, Thailand		Thailand
	Barclay Chemical Co.		Watertown, MA
	Barre Swimming Pool		Barre, VT
	Beach Point Club		Mamoroneck, NY
	Bearcroft Swim & Tennis Club		Attleboro, MA
	Beth Israel Medical Center		Newark, NJ
	Boston Athletic Club		Boston, MA
	Boston College		Chestnut Hill, MA
	Bowdoin College		Brunswick, ME
	Boys Club of Waltham		Waltham, MA
	Boys Club of Watertown	4	Watertown, MA
	Brunswick Naval Base		Brunswick, ME
	Burlington YMCA		Burlington, VT
	Burr School		Hartford, CT
	Callaway Ed. Foundation		Manchester, GA
		ono the secolo	Camden, NJ
	Camden City YMCA		Batavia, OH
	Camp Allen		Point Judith, RI
	Camp Jori		Vernon, NJ
	Camp Louenna		Canajoharie, NY
	Canajoharie School		Canisteo, NY
a a state of the second st	Caniesteo High School		Ames, IA
	Carr's Pool		
	Charlestown Boys Club		Boston, MA



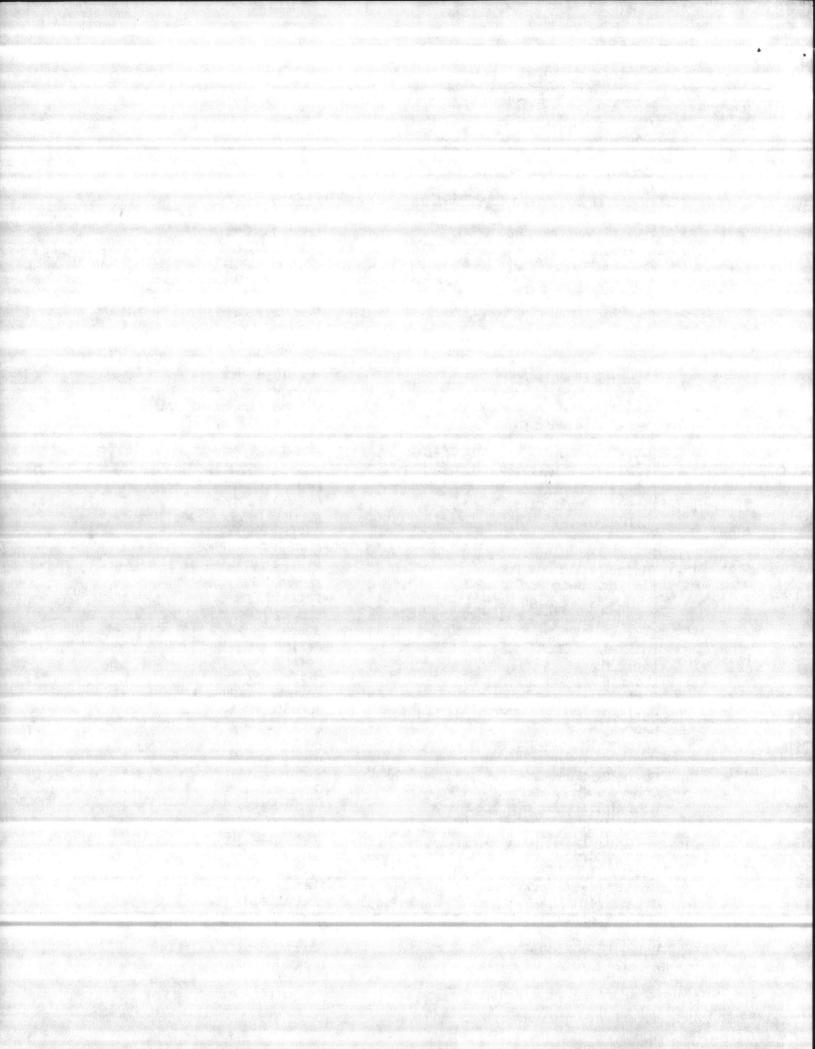
FILTER TYPE

JOB NAME

Closter Swim Club Combined Field Army Comm. Building Connellsville Area H.S. Connellsville High School Cordelia Park Pool Corrick International Coudersport Recreation Crestwood Country Club Cummins Engine Company Danbury Regional YMCA Danbury YMCA Danbury YMCA Darien Community YMCA Darien YMCA Davenport Club Deen Morita Plumbing Deepwater Operating Co. Deer Lakes High School Denver Athletic Club Donley Center Dorchester House Double Oaks Park Pool Douglas Country Club Drumlins Golf Club E. Millinocket Swimming Pool Ebster Park Eisenhower Center Elmira Municipal Pool Elmridge Swim Pool Enrico Fermi High School Essex Community College Everett YMCA Fall River YMCA Field House Foran High School Fort Monmouth Galliker Dairy company Gateway Pool Gateway Sr. High School Gayle S. Mann Jr & Co. Gayle S. Mann Jr & Co. Geneva Family YMCA Geo. Jr. Republic School Givaudan Corporation Gordon's Plumbing Grand Hotel Greater Lowell Reg. School Green Street Park Greenfield YMCA GIE Corporation Hamden-North Haven YMCA Harrisburg Middle School Hartford YMCA

LOCATION

Closter, NJ Uijongbu Korea New Haven, CT Connellsville, PA Connellsville, PA Charlotte, NC S. Kearney , NJ Coudersport, PA Rehoboth, MS Columbus, IN Danbury, CT Danbury, CT Danbury, CT Darien, CT Darien, CT Pompano Beach, FL Honolulu, HA Pennsville, NY W. Deer Township, PA Denver, CO Providence, RI Dorchester, MA Charlotte, NC Douglas, GA Syracuse, NY E. Millinocket, ME Decatur, GA Bridgeport, CT Elmira, NY Rocky Hill, CT Enfield, CT Essex, MD Everett, WA Fall River, MA Fort Monmouth, NJ Milford, CT Fort Monmouth, NJ Johnstown, PA Ames, IA Monroeville, PA Richmond, VA Richmond, VA Geneva, NY Grove City, PA Clifton, NJ Las Vegas, NV Cairo Egypt Tyngsboro, MA Woburn, MA Greenfield, MA Norwalk, CT Hamden, CT Harrisburg, PA Hartford, CT



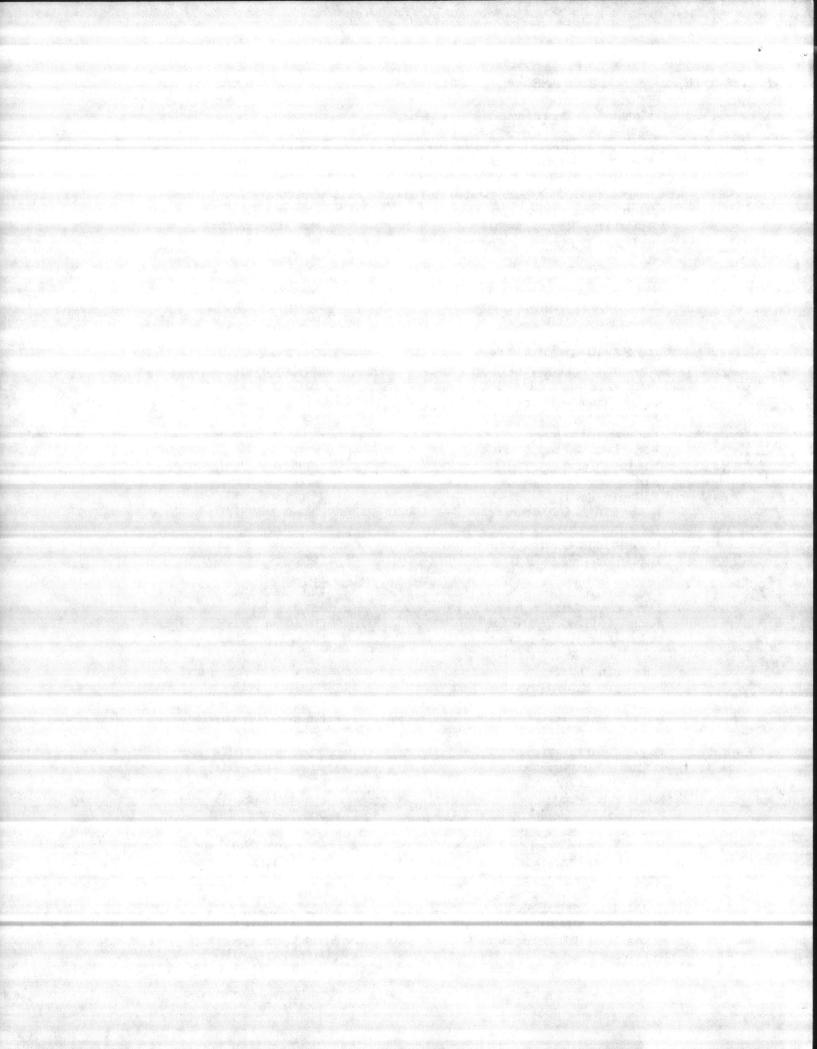
F.	IL	TE	RJ	TY	PE

Harvard University Hayden Recreation Center Hayes Jones Comm. Center Hazleton Campus Hemlocks Outdoor Rec. Center Hemocks Outdoor Ed. Center High Plains School Hillhouse High School Hillkroft School & Camp Hirshhorn Museum Hospital Houma Terrebonne YMCA Huntington High School Hvde Park YMCA Intercontinental Hotel Jack Daniels Distillery Jewish Community Center Jordan Amman Plaza Hotel Kate Gleason Memorial Pool Keene State University Keesler AFB Kennebec Valley YMCA Killens Pond Kings College Kiwanis Pool Kuwait Banking Company LaMesa Municipal Pool Larenbaugh Camp & Rec. Launcher Lab Building Lewiston YMCA Lycoming College Lynn Boys Club Magnolia Park Makah Air Force Base Manhattan Comm. College Mansuring Club Marlboro High School Marley Special School Martin Park Pool Marywood College May V. Carrigan School McCaskey High School MDC - Magazine Beach Park MDC Latta Pool MDC Pool - Franklin Field MDC Pool - Melrose MDC Stoneham Pool Memorial Blvd. School Mexico Job Miami Cargo Service Middletown YMCA Mifflinburg Municipal Pool Mikes Pool Plumbing Millwood Pond

Boston, MA Lexington, MA Pontiac, MI Luzerne, PA Amston, CT Amston, CT Orange, CT New Haven, CT Huntington, NY Washington, DC Saudi Arabia Saudi Arabia Houma, LA Syracuse, NY Hyde Park, Boston, MA Saipan Lynchburg, TN New Orleans, LA Jordan Saudi Arabia E. Rochester, NY Keene, NH , MS Augusta, ME Cockeysville, MD Wilkes Barre, PA Portland, ME Kuwait LaMesa, CA Corning, NY Newport, RI Lewiston, PA Williamsport, PA Lynn , MA Meridian, MS Neah Bay, WA New York, NY Rye, NY Marlboro, NY Anne Arundel County, MD East Hartford, CT Scranton, PA West Haven, CT Lancaster, PA

Somerville, MA Dorchester, MA Melrose, MA Stoneham, MA Bristol, CT

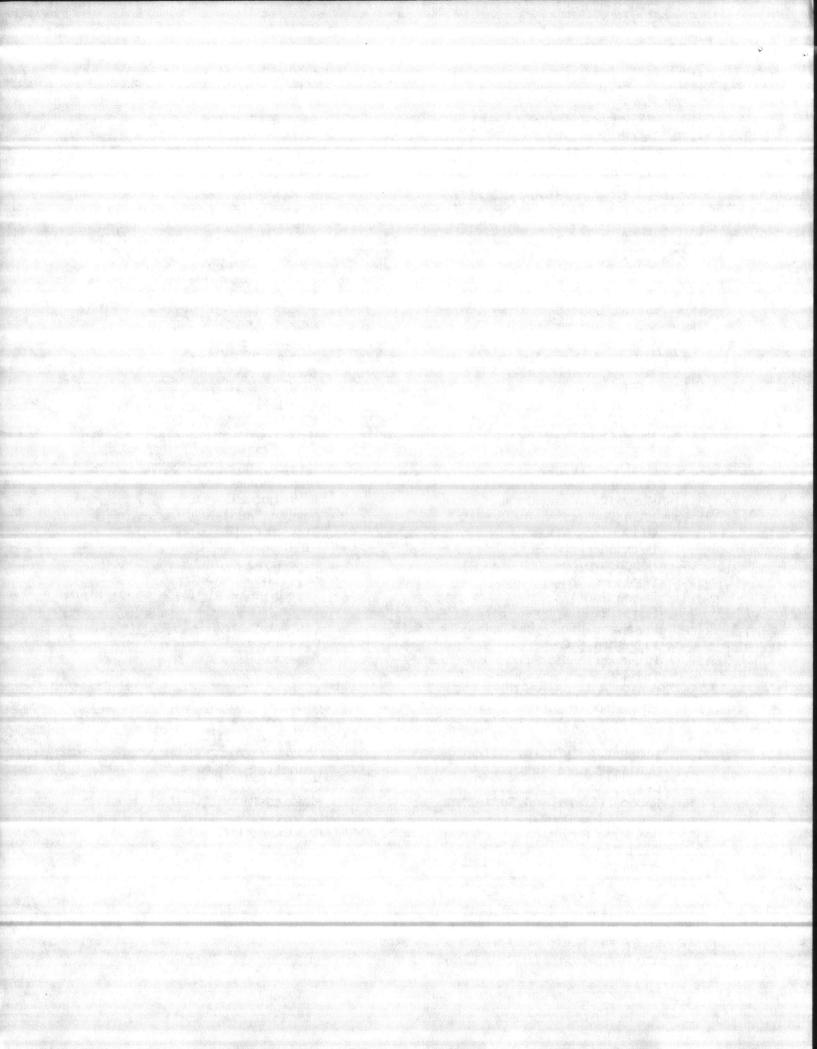
Miami, FL Middletown, CT Mifflinburg, PA Las Vegas, NV Wethersfield, CT



FILTER TYPE

Modernage Photographic Service Montibello Hospital Moores Park Pool Morial Gym Moylan High School Muckelshoot Fish Hatchery Municipal Pool/Bethlehem Municipal Swimming Pool Municipal Swimming Pool Nautilus Swim Pool Co. Nautilus Swim Pool Co. Nautlius Swim Pool Co. Naval Education Trng Center NCO Swimming Pool New Hampshire Youth Division New York Aquarium Nichols College Noble Inn Nome/Beltz North Brunswick Twp H.S. North End Complex North Street Swimming Pool North Suburban YMCA Northern Berkshire YMCA Norwalk Jewish Comm. Center NRIA Project Old Colony YMCA Palisade Pool Project Patchoque Oil Term. Corp. Payne Jr. High School Peace Sun III Program Pecos High School Pheasant Run Swim Club Pittston YMCA Plainville High School Polychrome Corporation Polychrome Corporation Pomperaug Regional High School Pool & Christmas Village, Inc. Porta High School Poughkeepsie Water Slide Public School 45 Quincy YMCA Raocoa Plumbing & Sprinkler Recreation Dept. Red Wing Municipal Swim Pool Reed Pool Ringwood, City of River Processing, Inc. Riverwood Gunite Pools Robert Brown State Park Robin Hood Park Roger Williams Park Zoo ROICCPAC Code 83/NAS/Oakland

New York, NY Baltimore, MD Lansing, MI Macon, GA Hartford, CT Auburn, WA Bethlehem, NH Elmira, NY Rutland, MA Park Ridge, NJ Park Ridge, NJ Park Ridge, NJ Newport, RI Jeddah, SA Manchester, NH Bronx, NY Dudley, MA Atlanta, GA Nome, AK North Brunswick, NJ Waterbury, CT Waterville, ME Woburn, MA North Adams, MA East Norwalk, CT Damman Saudi Arabia Brockton, MA Village of Palisade, NE Brooklyn, NY No. Tonowanda, NY Riyadh RSAF Air Base Saudi Arabia Pecos, TX Cinnamonson, NJ Pittston, PA Plainville, CT Yonkers, NY Yoners, NY Middlebury, CT Swansea, MA Petersburg, IL Poughkeepsie, NY Manhattan, NY Quincy, MA Puerto Rico Barre, VT Red Wing, MN Ware, MA , NJ Hazard, KY Denver, CO Elberton, GA Keene, NH Providence, RI Oakland, CA



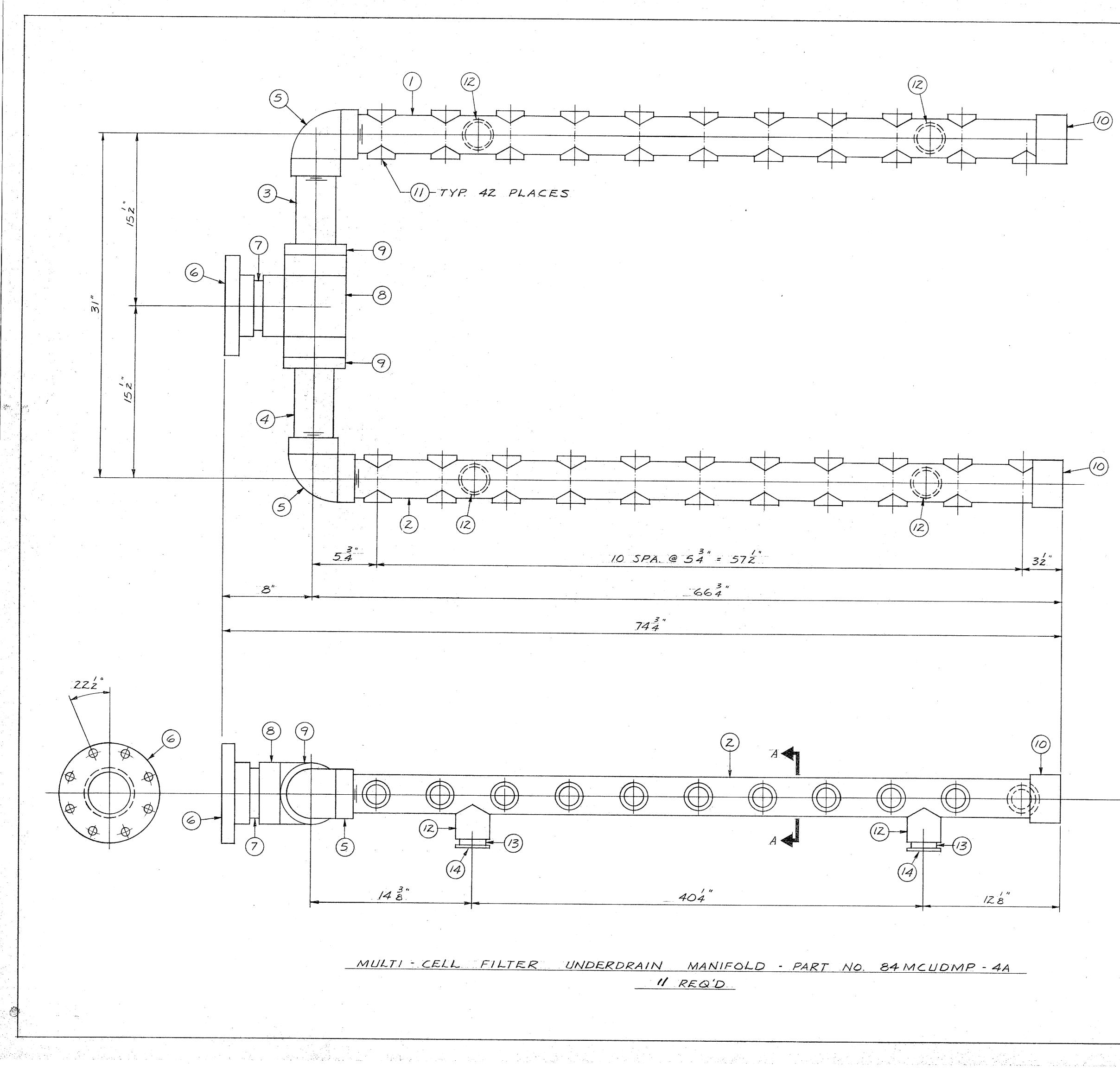
FILTER TYPE

Rutland Plastics Sachem High School Sagamore Children's Hospital Saginaw High School Sandwich Jr.Sr. High School Saudi Arabia Fertilizer Co. Saudi Arabia Fertilizer Co. Smithfield YMCA So. Providence Rec. Center Southeast Branch YMCA Southern High School #70 Spring Brook Park Springfield YMCA St. George's School St. Johns Recreation Center St. Mary's Country Club Star Pools, Inc. Stauffer Chemical Co. Stauffer Chemical Co. Stonewall Pool Suffern Sr. High School Sun Valley Swim Club Syracuse Boys Club Technicolor, Inc. Thompson's Point Thornburg Holding Co. Twin Falls YFCA U.S. Merchant Marine Academy U.S. Naval Sub Base University of Hartford Upper Dublin Township Pool USN Diving & Salvage Valley Pool VASA Organization Verplanck Pool Vets Memorial Park Walbrook Sr. High School Ward 6 Pool Wassaic Development Center Wayland Swim Club West Haven High School West Haven High School West Point Military Academy West Roxbury YMCA Westport YMCA Wheeling Park H.S. Wilbur Cross High School Wildwood Apartments Willimantic YMCA Winsted YMCA Woodbridge Club Worcester YMCA WR Grace company Wykagyll Country Club

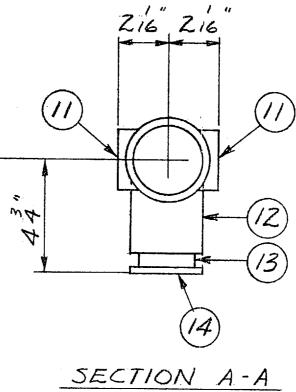
Pineville, SC Lake Ronkonkoma, NY Melville, NY Saginaw, MI E. Sandwich, MA Damman Saudi Arabia Damman Saudi Arabia Greenville, RI Providence, RI Atlanta, GA Baltimore, MD Bedford, MA Springfield, IL Newport, RI Brookly, NY St. Mary's , PA Wrentham, MA Chicago Heights, IL Axis, AL Manassas, VA Suffern, NY Florham Park, NJ Syracuse, NY New York, NY Portlane, ME Thornburg, VA Twin Falls, ID New York, NY New London, CT Hartford, CT North Hills, PA Panama City, FL Syracuse, NY Budd Lake, NJ Manchester, CT South Windsor, CT Baltimore, MD Holyoke, MA Wassaic, NY Wayland, MA West Haven, CT West Haven, CT West Point, NY West Roxbury, MA Westport, CT Wheeling, WV New Haven, CT Fairfield, OH Willimantic, CT Winsted, CT Woodbridge, CT Worcester, MA Nashua, NH New Rochelle, NY

			F	ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND
				APPROVED AS NOTED
				CONTRACT NO. 05-82-2552 CONTRACT NO. 05-82-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON- TRACT REQUIREMENTS UNLESS THE CONTRAC- TRACT REQUIREMENTS UNLESS THE CONTRAC-
				TOR CALLS ATTENTION THE CONTRACTOR SHALL BE DEVIATION-THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA- PHYSICAL DIMENSIONS & WEIGHTS, COORDINA- TION OF TRADES, ETC., AS REQUIRED.
				REVIEWER JMJ DATE 1984

.



BILL	OF		MATERIAL
PART NO.	MARK	NO. PCS	DESCRIPTION
84MCUDMP - 4A	1	1	3" SCH. 80 TYPE I
	······································		PVC PIPE TO.E.
	· · · · ·		en e
	Z.,	7	3" SCH. 80 TYPE 1
	· · · · ·		PVC PIPE T.O.E.
	.3	1	3" SCH. 80 TYPE I
	· · · · · · · · · · · ·		PVC PIPE T.O.E.
	· · · · · · ·		
	4	1	3" SCH. 80 TYPE 1
			PVC PIPE T.O.E.
	5	Z	3" SCH. 80 TYPE 1
			PVC 90° EL TXT
		,	4" SCH. 80 TYPE 1
· · ·			PVC SOCKET FLG
	·····	- 	TVC JUCKET FLG,
	~	· · · · · · · ·	A" SATT ON THE
			4" SCH. 80 TYPE I PVC PIPE
		· · · · · · · ·	PVC PIPE
		· · · · · · · · · · · · · · · · · · ·	
	8		4" 5CH. 80 TYPE 1
			PVC SOCKET TEE
			n na sa manana na sa sa manana na sa manana na sa
\mathbf{X}_{i} , where \mathbf{x}_{i} is the set of	9	2	4" × 3" SCH. 80 TYPE 1
			PVC RED. BUSHING
	······································		an an ann an an an an ann an ann ann an
	10	Z	3" SCH 80 TYPE I
	· · · · · · · · · · · · · · · · · · ·		PVC SOCKET CAP
	· · · · · · · · · · · · · · · · · · ·		
	11	4Z	SCH. 80 TYPE 1
		· · · · · · · · · · ·	PVC RED. BUSHING
	·······		$Z"S \times I_Z"F.P.T.$
	· · · · · · · · · · · · · · · · · · ·		
an a	12	4	2"SCH. BO TYPE I
	· · · · · · · · · · · · · · · · · ·	··· ·	PVC COUPLING
	13	4	Z" SCH. 80 TYPE I
	······		PVC PIPE
	14	4	PVC SHEET
			3" DIA. × 4" THK.
	· · · · · · · · · · · · · · · · · · ·		



APPROVED NSF *5033 NEPTUNE FILTER COMPANY DIV. WEST WARWICK, R. I., U. S. A. FABRICATION DETAILS OF UNDERDRAIN MANIFOLD FOR 84" MULTI-CELL FILTER PART NO. 84 MCUDMP-4A DATE 10-12-84 JOB ORDER NO. - 4984 G

DEWG. NO. UM-1 PART NO. -

.

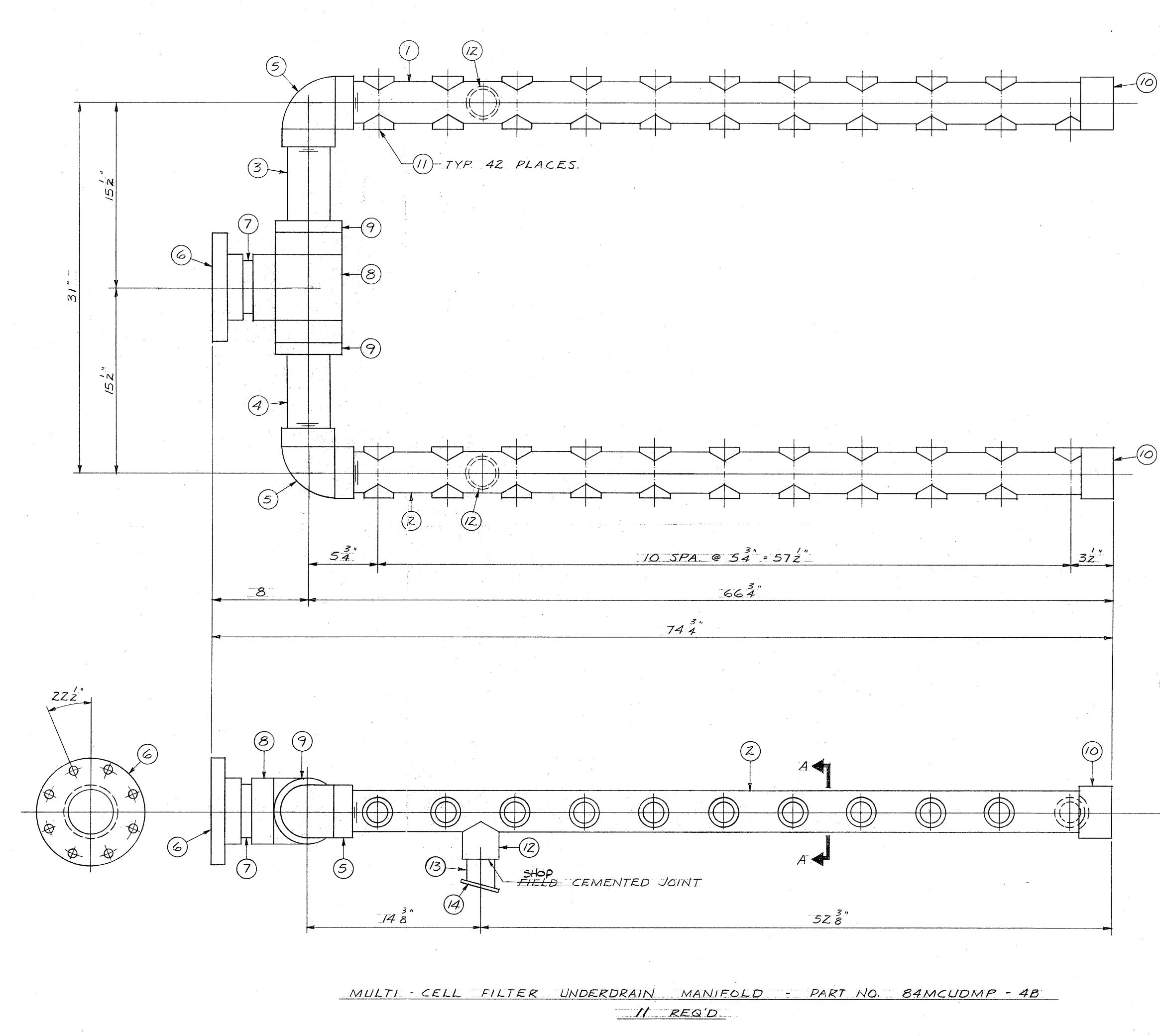
. .

ATLANTIC DIVISION
MAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA 23511
APPROVED
APPROVED AS NOTED
DISAPPROVED
SUBJECT TO THE REQUIREMENTS OF
CONTRACT NO. 05-82-2552
APPROVAL OF A SUBMITTAL DOES NOT INCLUDE
APPROVAL OF ANY DEVIATION FROM THE CON-
TRACT REQUREMENTS UNLESS THE CONTRAC-
TOR CALLS ATTENTION TO AND SUPPORTS THE
DEVIATION-THE CONTRACTOR SHALL BE
RESPONSIBLE FOR PROVIDING PROPER
PMYSICAL DIMENSIONS & WEIGHTS, COORDINA
TION OF TRADES, ETC., AS REQUIRED.
REVIEWER JMJ DATE
FOR OFFICER IN CHARGE OF CONSTRUCTION

.

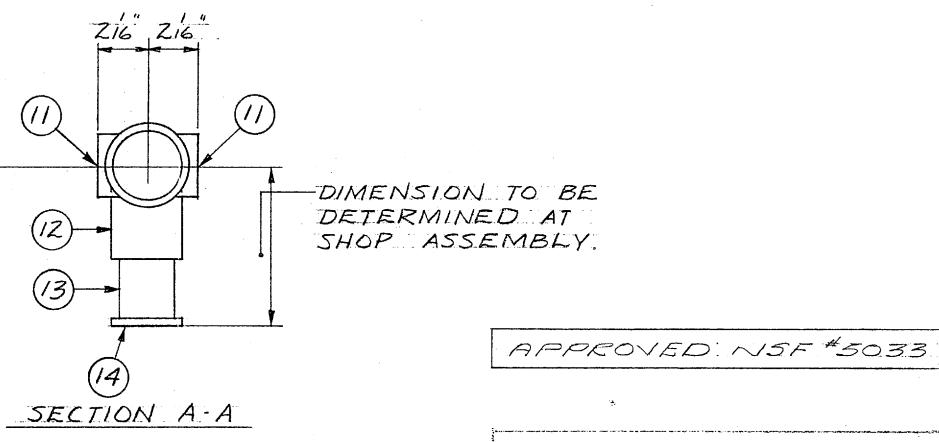
1

i



at an in the first star

PART NO.	MARK	No. Dre	DESCRIPTION
84 MCUDMP - 48		1	3" SCH. 80 TYPE 1
	• • • • • • •	-	PVC PIPE T.O.E.
	· · · · · · · · · · · · · · · · · · ·		
	7	· · · · · · · · · · · · · · · · · · ·	2# 5/11 97 TVDE 1
		. <i>1</i>	3" SCH. 80 TYPE I
			PVC PIPE T.O.E.
	3	1	3" SCH. 80 TYPE 1
	······································		PVC PIPE T.O.E.
	· · · · · · · · · · · · · · · · · · ·		na na na kana ana ana kana kana kana ka
	4		3" SCH 80 TYPE I
			PVC PIPE T.O.E.
		· · · · ·	
	5	Ζ	3" SCH. 80 TYPE I
			PVC 90°EL TXT
	-6		4" SCH 80 TYPE 1
			PVC SOCKET FLG.
	7		4" SCH. 80 TYPE 1
	······		PVC PIPE
		<u>-</u>	лин
	8		4" SCH. BO TYPE I
			PVC SOCKET TEE
		Z	4"×3" SCH. 80 TYPE 1
	· · · · · · · · · · · · · · · · · · ·		PVC RED. BUSHING
	· · · · · · · · · · · · · · · · · · ·		
		Z	3" SCH BO TYPE I
	an a		PVC SOCKET CAP
	- 11	4Z	SCH. 80 TYPE 1
· · ·			PVC RED. BUSHING
	······································		2"5 × 12" F.P.T.
	·····		
	12	7	Z" SCH. 80 TYPE 1
			PVC COUPLING
		· · · · · · · · · · · · ·	an ar an an an an ann an ann an ann an ann an a
	12		2" SCH. 80 TYPE I
	13		
			PVC PIPE
	14	Z	PVC SHEET
			3" DIA. × 4" THK.
	· · · · · · · · · · · · · · · · · · ·	· · · · ·	
-	MATE	RI	AL BILLED FOR ONE UNIT
	, <u> </u>		



NEPTUNE FILTER COMPANY DIV. WEST WARWICK, R. I., U. S. A. FABRICATION DETAILS OF UNDERDRAIN MANIFOLD FOR 84" MULTI-CELL FILTER PART NO. 84 MCUDMP-48 DATE 10-12-84 JOB ORDER NO. - 49846 VOR. BY 5. P. V. DRWG. NG. UM-Z PART NO. -

-----. · ·

· •

•

.

	ATLANTIC DIVISION
	MAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511
().	
	IPPROVED
	APPROVED AS NOTED
	DISAPPROVED
	SUBJECT TO THE DESUIRE SECTS OF 2552
	CONTRACT NO
	APPROVAL OF A SUBMITTAL DOLLS NOT THE CON-
	TRACT REQUIREMENTS UNLESS THE CONTRAC-
	TOR CALLS ATTENTION TO AND SUPPORTS THE
	DEVIATION THE CONTRACTOR SHALL BE
	RESPONSIBLE FOR PROVIDING PROPER
	PHYSICAL DIMENSIONS & WEIGHTS, COORDINA
	PHYSICAL DIMENSIONS & HEIGHTS, COUNTRING
	TION OF TRADES, ETC., AS REQUIRED.
	REVIEWER INS DATE 1984
ł	KEAIEMER JENO
	FOR OFFICER IN CHARGE OF CONSTRUCTION
1	
L,	and the second

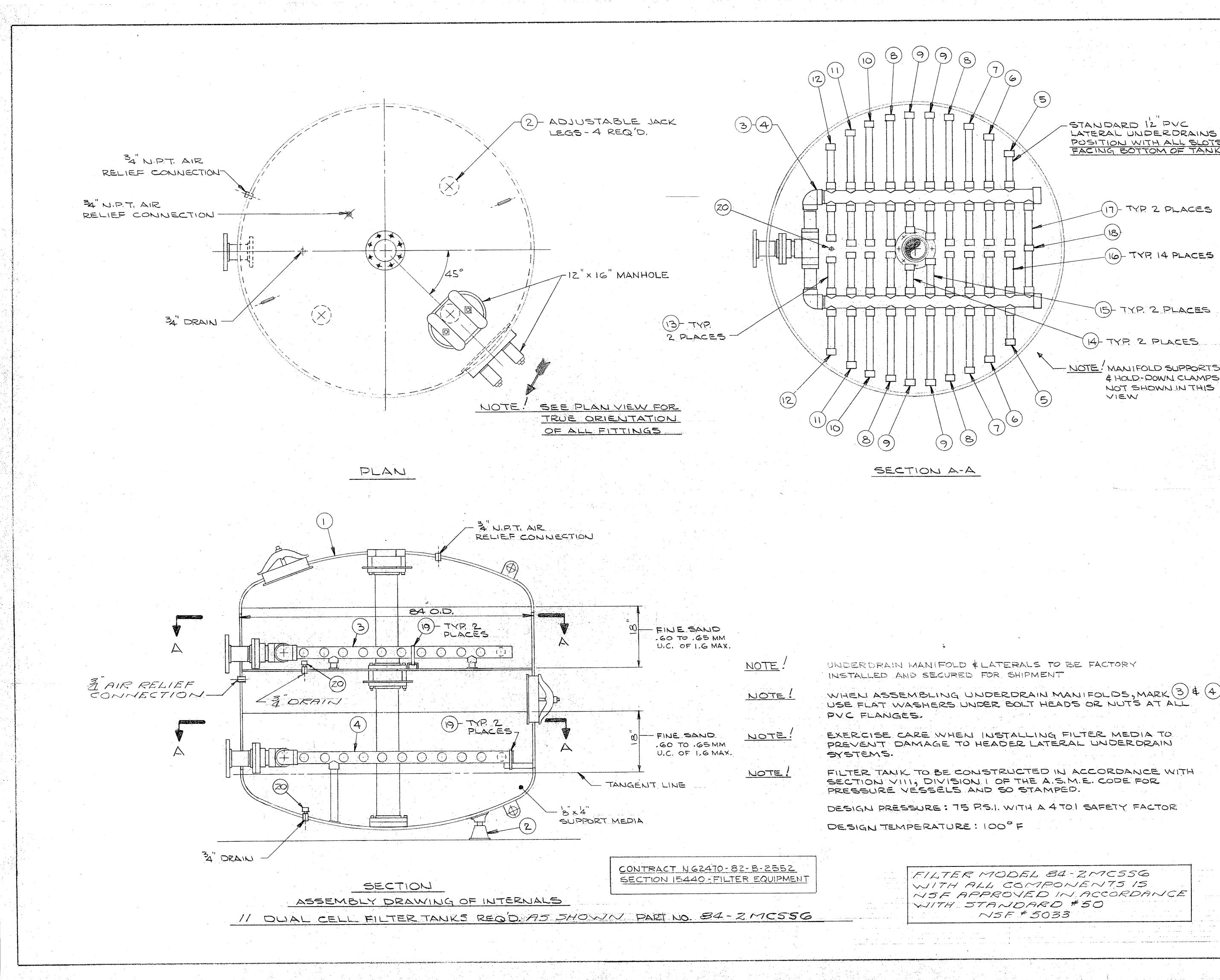
.

ι,

,

.

.



(5) -STANDARD 12 PVC LATERAL UNDERDRAINS POSITION WITH ALL SLOTS FACING BOTTOM OF TANK 17- TYP 2 PLACES (18) - 16- TYP 14 PLACES (15)- TYP. 2 PLACES 14- TYP 2 PLACES NOTE MANIFOLD SUPPORTS

& HOLD-DOWN CLAMPS NOT SHOWN IN THIS

VIEW

(5)

FILTER MODEL 84-ZMC556 WITH ALL COMPONENTS 15 NJE APPROVED IN ACCORDANCE

1 1 DUAL CELL FILTER TANK PART NUMBER BART NUMBER JACK 3 1 UNDERDRAIN MANIFOLD PART NUMBER BAMCUOMP-4A 4 INDERDRAIN MANIFOLD PART NUMBER B4 MCUOMP-4A 4 INDERDRAIN MANIFOLD PART NUMBER B4 MCUOMP-4A 4 INDERDRAIN MANIFOLD PART NUMBER B4 MCUOMP-4A A IND IZ UDLP-10 C4 LATERAL - PART NO. IZ UDLP-182 8 LATERAL - PART NO. IZ UDLP-182 10 4 LATERAL - PART NO. IZ UDLP-192 11 4 LATERAL - PART NO. IZ UDLP-13 13 4 LATERAL - PART NO. IZ UDLP-102 14 LATERAL - PART	AADIS	NO	OF MATERIAL	DENANDI
FILTER TANK PART NUMBER B4 - Z MC 55G 2 A* TJ-2. MILWAUKEE JACK 3 I UNDERDRAIN MANIFOLD PART NUMBER B4 MCUDMP-4A 4 I UNDERDRAIN MANIFOLD PART NUMBER B4 MCUDMP-4A 4 I UNDERDRAIN MANIFOLD PART NUMBER B4 MCUDMP-4B 5 A LATERAL - PART NO. 12 UDLP-11 G 4 LATERAL - PART NO. 12 UDLP-152 8 B LATERAL - PART NO. 12 UDLP-162 9 8 LATERAL - PART NO. 12 UDLP-17 12 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-102	NAKK			REMARK
PART NUMBER 84 - Z ~7C 55G 2 JACK 3 JACK A JACK BAMBUDRAIN MANIFOLD PART NUMBER BAMCUDMP-4A A JUNDERDRAIN MANIFOLD PART NUMBER BAMCUDMP-4B 5 4 LATERAL - PART NO. 12 UDLP-11 6 4 LATERAL - PART NO. 12 UDLP-12 10 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART	1	1	DUAL CELL	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			FILTER TANK	
2 4 * TJ-2. MILWAUKEE JACK 3 1. UNDERDRAIN 3 1. UNDERDRAIN MANIFOLD PART NUMBER B4 MCUDMP-4A 4 1. UNDERDRAIN MANIFOLD PART NUMBER B4 MCUDMP-4A 4 1. UNDERDRAIN MANIFOLD PART NUMBER B4 MCUDMP-4B 5 4. LATERAL - PART NO. 1'2 UDLP-11 6 4. LATERAL - PART NO. 1'2 UDLP-15 7 4. LATERAL - PART NO. 1'2 UDLP-18'2 8 BATERAL - PART NO. 1'2 UDLP-22 10 4. LATERAL - PART NO. 1'2 UDLP-19'2 11 4. LATERAL - PART NO. 1'2 UDLP-19'2 11 4. LATERAL - PART NO. 1'2 UDLP-13 13 4. LATERAL - PART NO. 1'2 UDLP-10'1 14 4. LATERAL - PART NO. 1'2 UDLP-10'1 15 4. LATERAL - PART NO. 1'2 UDLP-10 16 2. BAND SEAL CPLG. </td <td></td> <td></td> <td>PART NUMBER</td> <td></td>			PART NUMBER	
2 4 # TJ-2. MILWAUKEE 3 I. UNDERDRAIN MANIFOLD PART NUMBER 84 MCUDMP-4A 4 I. UNDERDRAIN MANIFOLD PART NUMBER 84 MCUDMP-4A 4 I. UNDERDRAIN MANIFOLD PART NUMBER 84 MCUDMP-4B 5 4 LATERAL - PART NO. 12 UDLP-15 7 4 LATERAL - PART NO. 12 UDLP-15 7 4 LATERAL - PART NO. 12 UDLP-15 8 LATERAL - PART NO. 12 UDLP-15 9 8 LATERAL - PART NO. 12 UDLP-192 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-10 14 LATERAL - PART NO. 12 UDLP-102 14 LATERAL - PART NO. 12 UDLP-1010 16 2 BAND BEAL CPLG	• • • • • • • •		84-2MC556	
JACK 3 I UNDERDRAIN MANIFOLD PART NUMBER B4 MCUDMP-4A 4 I UNDERDRAIN MANIFOLD PART NUMBER B4 MCUDMP-4A 4 MANIFOLD PART NUMBER B4 MCUDMP-4B 5 4 ATERAL - PART NO. 12 NO. 12 NO. 12 MATERAL - PART NO. 12 NO. 12 NO. 12 NO. 12 NO. 12 NO. 12 MO. 12 NO. 12	·		*TI-2 MILWAUKEE	
3 I UNDERDRAIN MANIFOLD PART NUMBER 84 MCUDMP-4A 4 I UNDERDRAIN MANIFOLD PART NUMBER 84 MCUDMP-4A 4 I UNDERDRAIN MANIFOLD PART NUMBER 84 MCUDMP-4B 5 5 4 LATERAL - PART NO. I'Z UDLP-IS 7 7 4 LATERAL - PART NO. I'Z UDLP-IS'Z 8 8 LATERAL - PART NO. I'Z UDLP-22 10 9 8 LATERAL - PART NO. I'Z UDLP-19'Z 11 11 4 LATERAL - PART NO. I'Z UDLP-19'Z 11 12 4 LATERAL - PART NO. I'Z UDLP-19'Z 11 14 LATERAL - PART NO. I'Z UDLP-10'Z 11 14 LATERAL - PART NO. I'Z UDLP-10'Z 14 4 LATERAL - PART NO. I'Z UDLP-10'Z 14 4 LATERAL - PART NO. I'Z UDLP-10'Z				· · · · · · · · · · · · · · · · · · ·
MANIFOLD PART NUMBER 84 MCUDMP-4A 4 IUNDERDRAIN MANIFOLD PART NUMBER 84 MCUDMP-4B 5 4 NO. 12 UDLP-11 6 4 NO. 12 UDLP-11 6 4 NO. 12 UDLP-15 7 4 LATERAL - PART NO. 12 UDLP-152 8 LATERAL - PART NO. 12 UDLP-21 9 8 LATERAL - PART NO. 12 UDLP-192 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-192 14 LATERAL - PART NO. 12 UDLP-102 14 LATERAL - PART NO. 12 UDLP-102 14 <	· .			
PART NUMBER 84 MCUDMP-4A 4 I UNDERDRAIN MANIFOLD PART NUMBER 84 MCUDMP-4B 5 4 LATERAL - PART NO. 1'2 UDLP-11 6 4 LATERAL - PART NO. 1'2 UDLP-15 7 4 LATERAL - PART NO. 1'2 UDLP-18'2 8 B LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-22 10 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-10'2 14 4 LATERAL - PART NO. 1'2 UDLP-10'2 14 LATERAL - PART NO. 1'2 UDLP-10'2 16 2 BAND SEAL - PART NO. 1'2 UDLP-12'-M 18 2 BAND SEAL CPLG 19 4 S.S.CLAMP 20 2 PVC 5 TR	3	<u> </u>	UNDERDRAIN	
84 MCUDMP-4A 4 I UNDERDRAIN MANIFOLD PART NUMBER 84 MCUDMP-4B 5 4 LATERAL - PART NO. 1'2 UDLP-11 6 4 LATERAL - PART NO. 1'2 UDLP-15 7 4 LATERAL - PART NO. 1'2 UDLP-15 7 4 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-19'2 10 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-10'2 14 LATERAL - PART NO. 1'2 UDLP-10'2 14 LATERAL - PART NO. 1'2 UDLP-10'2 14 LATERAL - PART NO. 1'2 UDLP-10'10 16 28 LATERAL - PART NO. 1'2 UDLP-10'10 16 2 BAND SEAL CPLG. * CP-150 19 19 4 S.S.CLAMP 20 Z			MANIFOLD	
4 I UNDERDRAIN MANIFOLD PART NUMBER 24 MCUDMP-4B 5 4 LATERAL - PART NO. 1'2 UDLP-11 6 4 LATERAL - PART NO. 1'2 UDLP-15 7 4 LATERAL - PART NO. 1'2 UDLP-18'2 8 B LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-22 10 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-13 13 4 LATERAL - PART NO. 1'2 UDLP-10'2 14 LATERAL - PART NO. 1'2 UDLP-10'2 14 LATERAL - PART NO. 1'2 UDLP-10'2 16 28 LATERAL - PART NO. 1'2 UDLP-10'10'10 16 <td< td=""><td>· · · · · · · · · · · · · · · · · · ·</td><td>n an Tar Maria Tar Maria</td><td>PART NUMBER</td><td></td></td<>	· · · · · · · · · · · · · · · · · · ·	n an Tar Maria Tar Maria	PART NUMBER	
MANIFOLD PART NUMBER 84 MCUOMP-4B 5 4 LATERAL - PART NO. 1'2 UDLP-11 6 4 LATERAL - PART NO. 1'2 UDLP-15 7 4 LATERAL - PART NO. 1'2 UDLP-15'2 8 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-22 10 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-13 13 4 LATERAL - PART NO. 1'2 UDLP-102 14 LATERAL - PART NO. 1'2 UDLP-102 14 LATERAL - PART NO. 1'2 UDLP-10 16 28 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-10 16 28 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-12			84 MCUDMP-4A	
MANIFOLD PART NUMBER 84 MCUOMP-4B 5 4 LATERAL - PART NO. 1'2 UDLP-11 6 4 LATERAL - PART NO. 1'2 UDLP-15 7 4 LATERAL - PART NO. 1'2 UDLP-15'2 8 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-22 10 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-13 13 4 LATERAL - PART NO. 1'2 UDLP-102 14 LATERAL - PART NO. 1'2 UDLP-102 14 LATERAL - PART NO. 1'2 UDLP-10 16 28 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-10 16 28 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-12	4	1.	UNDERDRAIN	
PART NUMBER 84 MCUOMP-4B 5 4 LATERAL - PART NO. 1'2 UDLP-11 6 4 LATERAL - PART NO. 1'2 UDLP-15 7 4 LATERAL - PART NO. 1'2 UDLP-15'2 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-22 10 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-10 12 4 LATERAL - PART NO. 1'2 UDLP-10'2 14 4 LATERAL - PART NO. 1'2 UDLP-10 16 28 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-12 17 <				·
84 MCLUDMP-4B 5 4 LATERAL - PART NO. 1'2 UDLP-11 6 4 LATERAL - PART NO. 1'2 UDLP-15 7 4 LATERAL - PART NO. 1'2 UDLP-15'2 8 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 LATERAL - PART NO. 1'2 UDLP-22 10 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-10'2 14 LATERAL - PART NO. 1'2 UDLP-10'2 14 LATERAL - PART NO. 1'2 UDLP-10 16 28 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART				
5 4 LATERAL - PART NO. 1'2 UDLP-11 6 4 LATERAL - PART NO. 1'2 UDLP-15 7 4 LATERAL - PART NO. 1'2 UDLP-15'2 8 LATERAL - PART NO. 1'2 UDLP-21 9 8 1 ATERAL - PART NO. 1'2 UDLP-21 9 8 1 NO. 1'2 UDLP-21 9 8 1 ATERAL - PART NO. 1'2 UDLP-19'2 11 4 1 ATERAL - PART NO. 1'2 UDLP-19'2 11 4 1 ATERAL - PART NO. 1'2 UDLP-19'2 11 4 1 ATERAL - PART NO. 1'2 UDLP-10'2 14 LATERAL - PART NO. 1'2 UDLP-10 16 28 17 4 NO. 1'2 UDLP-10 16 28 17 4 NO. 1'2 UDLP-12'2-M 18 2 2 AND SEAL CPLG <td></td> <td></td> <td></td> <td></td>				
NO. 12 UDLP-11 G 4 LATERAL - PART NO. 12 UDLP-15 7 4 LATERAL - PART NO. 12 UDLP-182 8 LATERAL - PART NO. 12 UDLP-21 9 8 LATERAL - PART NO. 12 UDLP-21 9 8 LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-10 12 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 U				
6 4 LATERAL - PART. NO. 12 UDLP-15 7 4 LATERAL - PART NO. 12 UDLP-18 ¹ 2 8 8 LATERAL - PART NO. 12 UDLP-21 9 8 LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-19 ¹ 2 11 4 LATERAL - PART NO. 12 UDLP-19 ¹ 2 11 4 LATERAL - PART NO. 12 UDLP-17 12 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-10 ¹ 2 14 4 LATERAL - PART NO. 12 UDLP-10 ¹ 2 14 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-12 17 5 5 7 8 AUX 2 BAND SEAL CPLG. 18 2 BAND SEAL CPLG. 19 4 5.5 CLAMP 20 2 PVC 5 7 8 AUX 2 DLATED BOLT 4 NUT 22 16 8 PLATED 5 HOW FLAT WASHER	5	4	LATERAL - PART	
NO. 12 UDLP-15 7 4 LATERAL - PART NO. 12 UDLP-182 8 LATERAL - PART NO. 12 UDLP-21 9 8 LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-17 12 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-10 15 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-12 17 5 2 BAND SEAL CPLG # CP-150 19 4 5.5 CLAMP ZO Z PVC 57RAINER ZI 16 8 PLATED BOLT 4 NUT ZZ 16 8 PLATED NOT	· · · · · · · · · · · · · · · · · · ·		NO. 12 UDLP-11	
7 4 LATERAL - PART NO. 12 UDLP-182 8 8 LATERAL - PART NO. 12 UDLP-21 9 8 LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-197 12 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-12 19 4 S.S.CLAMP 20 2 PVC 5 TRAINER 21 16 8 × 34 PLATED BOLT 4 NUT 22 16 8 PLATED NOT	6	4	LATERAL - PART	
7 4 LATERAL - PART NO. 12 UDLP-182 8 8 LATERAL - PART NO. 12 UDLP-21 9 8 LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-197 12 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-12 19 4 S.S.CLAMP 20 2 PVC 5 TRAINER 21 16 8 × 34 PLATED BOLT 4 NUT 22 16 8 PLATED NOT			NO. 12 UDLP- 15	
NO. 12 UDLP-182 8 LATERAL - PART NO. 12 UDLP-21 9 8 LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-10 16 28 17 4 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-10 16 2 17 4 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PAR	7	4		
8 B LATERAL - PART NO. 12 UDLP-21 9 B LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-17 12 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-10 17 4 LATERAL - PART NO. 12 UDLP-12 17 5 MON 18 2 BAND SEAL CPLG. # CP-150 19 4 5.5 CLAMP ZO Z PVC 5 TRAINSER ZI 16 8 PLATED BOLT 4 NIUT ZZ 16 8 PLATED SHOW FLAT WASHER	<u>، و معار میں م</u> رد :			
NO. 12. UDLP-21 9 8 LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-17 12 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-10 17 4 LATERAL - PART NO. 12 UDLP-12 17 50 19 4 5.5 CLAMP ZO Z PVC 5 TRAINER ZI 16 8 Y 34 PLATED BOLT 4 NIUT ZZ 16 8 PLATED SHOW FLAT WASHER		~		
9 8 LATERAL - PART NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-17 12 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-8 15 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-12 17 5 HON 18 2 BAND SEAL CPLG. # CP-150 19 4 5.5 CLAMP 20 2 PVC 5 TRAINER 21 16 8 x 34 PLATED BOLT 4 NIUT 22 16 8 PLATED SHOW FLAT WASHER	ð			
NO. 12 UDLP-22 10 4 LATERAL - PART NO. 12 UDLP-192 11 4 LATERAL - PART NO. 12 UDLP-17 12 4 LATERAL - PART NO. 12 UDLP-13 13 4 LATERAL - PART NO. 12 UDLP-13 14 4 LATERAL - PART NO. 12 UDLP-102 14 4 LATERAL - PART NO. 12 UDLP-1012 14 4 LATERAL - PART NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-12 18 2 BAND SEAL CPLG. # CP-150 19 19 4 S.S. CLAMP 20 2 PVC STRAINER 21 16 3 x 34 PLATED 32 BOLT 4 NUT 34 PLATED 54 PLATED			NO. 12 UDLP-21	
10 4 LATERAL - PART NO. 1'2 UDLP-19'2 11 4 LATERAL - PART NO. 1'2 UDLP-17 12 4 LATERAL - PART NO. 1'2 UDLP-13 13 4 LATERAL - PART NO. 1'2 UDLP-10'2 14 4 LATERAL - PART NO. 1'2 UDLP-8 15 4 LATERAL - PART NO. 1'2 UDLP-10 16 28 LATERAL - PART NO. 1'2 UDLP-12 17 4 LATERAL - PART NO. 1'2 UDLP-12 17 5 5 5 7 7 7 10 / 5 R 2 BAND SEAL CPLG. # CP-150 19 4 S.S. CLAMP 20 2 PVC 5 7 7 7 10 / 5 R 2 BOLT 4 NUT 2 16 8 Y 3'4 PLATED BOLT 4 NUT 2 16 8 PLATED HOT MASHER	9	8	LATERAL - PART	
NO. 1^{\prime} UDLP-19 ^{\prime} 11 4 LATERAL - PART NO. 1^{\prime} UDLP-17 12 4 LATERAL- PART NO. 1^{\prime} UDLP-13 13 4 LATERAL - PART NO. 1^{\prime} UDLP-10 ^{\prime} 14 4 LATERAL - PART NO. 1^{\prime} UDLP-8 15 4 LATERAL - PART NO. 1^{\prime} UDLP-10 16 28 LATERAL - PART NO. 1^{\prime} UDLP-12 17 4 LATERAL - PART NO. 1^{\prime} UDLP-12 17 5 18 2 BAND SEAL CPLG. $= \frac{1}{2}$ CP-150 19 4 5.5 CLAMP 20 2 PVC 5 TRAINER 21 16 8 × 34 PLATED BOLT 4 NUT 22 16 8 PLATED FORMULT	· · · · · · · · · · · · · · · · · · ·		NO. 12 UDLP-22	an a
NO. $12 UDLP - 19^{2}$ 11 4 LATERAL - PART NO. $12 UDLP - 17$ 12 4 LATERAL - PART NO. $12 UDLP - 13$ 13 4 LATERAL - PART NO. $12 UDLP - 10^{2}$ 14 4 LATERAL - PART NO. $12 UDLP - 8$ 15 4 LATERAL - PART NO. $12 UDLP - 10$ 16 28 LATERAL - PART NO. $12 UDLP - 12$ 17 4 LATERAL - PART NO. $12 UDLP - 12$ 17 5 0 12 0 12 0 12 0 12 0 12 0 12 0 12 0	10	4	LATERAL - PART	
114LATERAL - PARTNO. 1'2 UDLP-17124LATERAL - PARTNO. 1'2 UDLP-13134LATERAL - PARTNO. 1'2 UDLP-10'2144LATERAL - PARTNO. 1'2 UDLP-8154LATERAL - PARTNO. 1'2 UDLP-101628LATERAL - PARTNO. 1'2 UDLP-101628LATERAL - PARTNO. 1'2 UDLP-12174LATERAL - PARTNO. 1'2 UDLP-12'2-M182BAND SEAL CPLG.# CP-150194S.S. CLAMP202PVC STRAINER2116BOLT 4 NUT22163PLATEDFLAT WASHER				
NO. $1^{1}2$ UDLP-17 12. 4 LATERAL - PART NO. $1^{1}2$ UDLP-13 13 4 LATERAL - PART NO. $1^{1}2$ UDLP-10 ¹ 2 14 4 LATERAL - PART NO. $1^{1}2$ UDLP-8 15 4 LATERAL - PART NO. $1^{1}2$ UDLP-10 16 28 LATERAL - PART NO. $1^{1}2$ UDLP-10 16 28 LATERAL - PART NO. $1^{1}2$ UDLP-12 17 4 LATERAL - PART NO. $1^{1}2$ UDLP-12 17 4 LATERAL - PART NO. $1^{1}2$ UDLP-12 17 4 LATERAL - PART NO. $1^{1}2$ UDLP-12 18 2 BAND SEAL CPLG. # CP-150 19 4 2 2 2 2 3 4 4 5 5 4 6 5 7 7	· · · ·			
124LATERAL- PARTNO1'2UDLP-13134LATERAL - PARTNO1'2UDLP-10'2144LATERAL - PARTNO1'2UDLP-8154LATERAL - PARTNO1'2UDLP-101628LATERAL - PARTNO1'2UDLP-101628LATERAL - PARTNO1'2UDLP-12174LATERAL - PARTNO1'2UDLP-12174LATERAL - PARTNO1'2UDLP-12'2-M182BANID2BANIDSEAL CPLG.#CP-150194202PVC5TRAINER202PVC5TRAINER21165" x 3'4"PLATEDSHOWFLATWASHER	<u></u>			
$\frac{13}{13} \frac{4}{4} \frac{1}{4} $	· · · · · · · · · · · · · · · · · · ·			
134LATERAL - PARTNO. 1^{1} UDLP-1012144LATERAL - PARTNO. 1^{1} UDLP-8154LATERAL - PARTNO. 1^{1} UDLP-101628LATERAL - PARTNO. 1^{1} UDLP-12174LATERAL - PARTNO. 1^{1} UDLP-12174LATERAL - PARTNO. 1^{1} UDLP-12174LATERAL - PARTNO. 1^{1} UDLP-12182BAND SEAL CPLG.# CP-150194202PVC STRAINER202PVC STRAINER21163 × 34PLATEDBOLT & NUT22168PLATEDFLAT WASHER	12	4	LATERAL- PART	-
$\frac{14}{14} = \frac{12}{4} = \frac{12}{4}$		 	NO 1'2 UDLP-13	
144LATERAL - PARTNO. 1'2 UDLP-8154NO. 1'2 UDLP-10NO. 1'2 UDLP-101628LATERAL - PARTNO. 1'2 UDLP-12174LATERAL - PARTNO. 1'2 UDLP-12'2-M182BAND SEAL CPLG. $# CP-150$ 194202PVC STRAINER202PVC STRAINER21168X 3'4PLATED5HowFLAT WASHER	13	4	LATERAL - PART	
144LATERAL - PARTNO. 1'2 UDLP-8154LATERAL - PARTNO. 1'2 UDLP-101628LATERAL - PARTNO. 1'2 UDLP-12174LATERAL - PARTNO. 1'2 UDLP-12'2-M182BAND SEAL CPLG. $# CP-150$ 194202PVC 57202PVC 5721168X34PLATEDBOLT & NUT22168PLATEDFLAT. WASHER	; ;		NO. 12 UDLP-102	
NO. $12 UDLP-8$ 15 4 LATERAL - PART NO. $12 UDLP-10$ 16 28 LATERAL - PART NO. $12 UDLP-12$ 17 4 LATERAL - PART NO. $12 UDLP-12$ -M 18 2 BAND SEAL CPLG. # CP-150 19 4 S.S. CLAMP ZO Z PVC STRAINER Z1 16 3 × 34 PLATED BOLT & NUT Z2 16 8 PLATED SHOW	N	Δ		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	·			
NO. 12 UDLP-10 16 28 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-12 18 2 BAND SEAL CPLG. #CP-150 19 4 S.S.CLAMP 20 2 PVC STRAINER 21 16 8 2 PVC STRAINER 22 16 8 PLATED 5 PLATED 5 FLAT. WASHER			· · · · · · · · · · · · · · · · · · ·	
16 28 LATERAL - PART NO. 1'2 UDLP-12 17 4 17 4 18 2 18 2 BAND SEAL CPLG. #CP-150 19 4 20 2 PVC STRAINER 20 2 21 16 3"x 3'4" PLATED BOLT & NUT ZZ 16	15	4		
NO. 12 UDLP-12 17 4 LATERAL - PART NO. 12 UDLP-122-M 18 2 BAND SEAL CPLG. # CP-150 19 4 5.5 CLAMP 20 2 PVC 5TRAINER Z1 16 $\frac{5}{8}$ x $\frac{3}{4}$ PLATED BOLT 4 NUT Z2 16 $\frac{5}{8}$ PLATED SHOW FLAT WASHER		·		
17 4 LATERAL - PART NO. 12 UDLP-122-M 18 2 BAND SEAL CPLG. # CP-150 19 4 S.S.CLAMP 20 2 PVC STRAINER Z1 16 3 × 34 PLATED BOLT & NUT Z2 16 3 PLATED (SHOW) FLAT WASHER	16	28	LATERAL - PART	
17 4 LATERAL - PART NO. 12 UDLP-122-M 18 2 BAND SEAL CPLG. #CP-150 19 4 S.S.CLAMP 20 2 PVC STRAINER Z1 16 3 × 34 PLATED BOLT & NUT Z2 16 3 PLATED (SHOW) FLAT WASHER			NO. 12 UDLP-12	
$18 2 BAND SEAL CPLG.$ $18 2 BAND SEAL CPLG.$ $19 4 5.5 CLAMP$ $20 2 PVC 5TRAINER$ $21 16 3 \times 34 PLATED$ $BOLT 4 NUT$ $22 16 3 PLATED SHOWN$ $FLAT WASHER$	17	4		
18 2 BAND SEAL CPLG. #CP-150 19 4 S.S. CLAMP 20 2 PVC STRAINER 21 16 3 × 34 PLATED BOLT & NUT 22 16 3 PLATED SHOW FLAT WASHER			the second s	
19 4 5.5.CLAMP 20 2 PVC 57RAINIER 21 16 3×34" PLATED BOLT & NUT BOLT & NUT 22 16 3 FLAT WASHER FLAT				-
19 A SECLAMP 20 Z PVC STRAINER ZI 16 3×34" PLATED BOLT & NUT ZZ 16 3" PLATED SHOW FLAT WASHER	10	4		
ZO Z PVC STRAINER ZI 16 3×34 PLATED BOLT 4 NUT ZZ 16 3 PLATED SHOW FLAT WASHER				
ZI 16 3 × 34" PLATED BOLT & NUT ZZ 16 3 PLATED / MOT FLAT WASHER	19			
ZZ 16 8 PLATED SHOW	ZO	2	PVC STRAINER	
ZZ 16 8 PLATED SHOW			n na santa sa guna na santa sa santa sa	
ZZ 16 8 PLATED SHOW				
ZZ 16 8 PLATED SHOW	المربع المربع معه والارماني المربع المربع المربع المربع المربع المربع المربع المربع المربع المربع المربع المربع			
ZZ 16 8 PLATED SHOW	71	 i/	5", 21,"	
ZZ 16 8 PLATED SHOW	~1			
ELAT WASHER	· · · · · · · · · · · · · · · · · · ·	1	the second s	LINT
	22	16	PLATED	SHOW
23 2 A" FLG. GASKET	· · · · · · · · · · · · · · · · · · ·		FLAT WASHER	
	23	2	A" FLG GASKET	
				· · · · · · · · · · · · · · · · · · ·
		+	· • •	

ONE FILTER TANK WITH INTERNALS. IL FILTER TANKS WITH INTERNALS RED'D.

	ILTER COMPANY DIV. RWICK, R. I., U. S. A.
	DRAWING OF
· · · · · · · · · · · · · · · · · · ·	FILTER TANK
DATE 9/14/84	JOB ORDER NO 49846
DOWO. NO. FA-1	PART NO

,

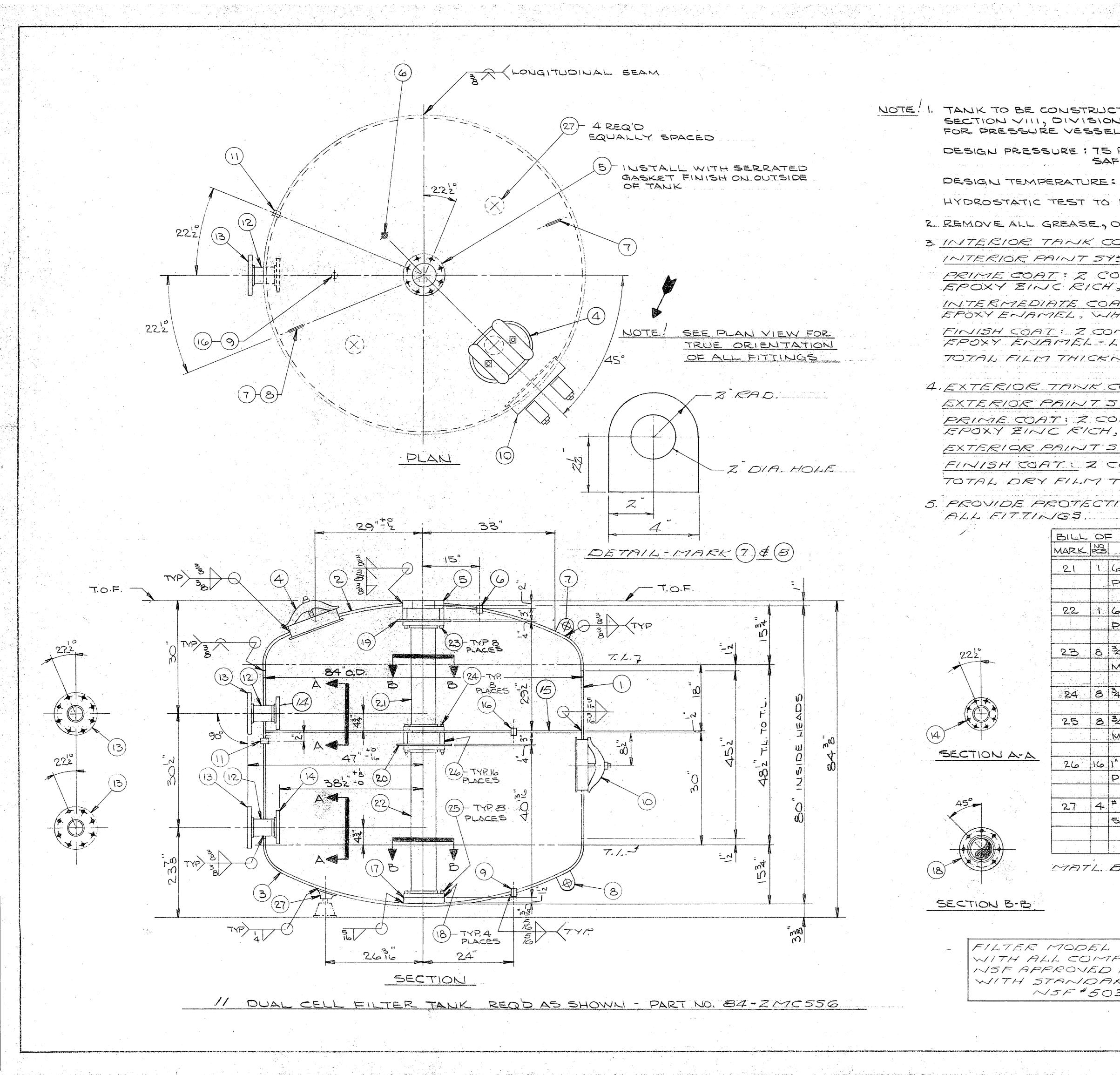
.

· ·

	÷				
·					
		:			
			•		
• ·					
<u>ية</u> م	৾৾ড়৾ড়৸ড়ড়৸ য় ৾৻ঽড়ৼড়৻ঢ়ৗ৾৽৻য়ঀ৸ৗ৾৽৸ৼ৾ঀড়৻ঀ৾ড়৾৾য়৾ঀয়ঢ়৽৽ৼৼ৾৽৸য়	لولغان شکار کرکرد اور محمد پرور و باری کرکر اور محمد و و و و و و و و و و و و و و و و و و و			
·	ATLANTIC DIVIS MAVAL FACILITIES ENGINEE NORFOLK, VIRGINI	RING COMMAND			
	APPROVED AS NOTED				
	SUBJECT TO THE REQUIREMENT CONTRACT NO. $05-82$ Approval of a submittal d	CES NOT INCLUDE	1	· .	
	APPROVAL OF ANY DEVIATION TRACT REQUIREMENTS UNLE TOR CALLS ATTENTION TO AN DEVIATION-THE CONTRAC	SS THE CONTRAC- ND SUPPORTS THE			
	RESPONSIBLE FOR PROM PHYSICAL DIMENSIONS & WEI TION OF TRADES, ETC., AS RE	IDING PROPER IGHTS, COORDINA OVIRED.	:		
	REVIEWER JMJ FOR OFFICER IN CHARGE OF	5 DEC 1984 DATE CONSTRUCTION			
	Branner with the office of the second s				

.

• · .



DESIGN TEMPERATURE: HYDROSTATIC TEST TO 2 REMOVE ALL GREASE, O 3. INTERIOR TANK CO INTERIOR PAINT SY PRIME COAT: Z CON EPOXY ZINIC RICH, INTERMEDIATE COA EPOXY ENAMEL, WH FINISH COAT : Z CON EPOXY ENIAMEL-L TOTAL FILM THICKA 4. EXTERIOR TANK C EXTERIOR PRINTS PRIME COAT: 2 CO EPOXY ZINIC RICH,

SECTION B-B

		<u>BILL</u>			MATERIAL	<u>]</u> .
	PART NO.	1		Y	DESCRIPTION	MAT
	84-2170556		<u></u>	1	R 45'z" x 38" x 266"	5A-2 GR. (
			2	<u></u>	A.5.M.E. F&D HEAD 84" O.D. x 38" NOM. GA.	· · · · · · · · · · · · · · · · · · ·
FANK TO BE CONSTRUCTED IN SECTION VIII, DIVISION 1 OF					78" 1.D.R., 62" 1.C.R.	
OR PRESSURE VESSELS AND	50 STAMPED.		• • • • • • • •		12 STRAIGHT FLG.	54-51 GR 70
DESIGN PRESSURE : 75 PS.I. W	ITH A 4 TO I			<u></u>		
SAFETY FA			З	. \	A.S.M.E. FED HEAD	-
ESIGN TEMPERATURE: 100°F					84" O.D. x 38" NOM. GA.	<u>.</u>
	e e per la construcción de la const		· ·	х. 	78" 1.D.R., 62" 1.C.R.	••••••••••••••••••••••••••••••••••••••
YDROSTATIC TEST TO 113 P.S	(1)			• 1.	1'2" STRAIGHT FLG	5A-5
EMOVE ALL GREASE, OIL & WE	ELD SPATTER.					
NTERIOR TANK COATIN			4		12"x 16"x 34" x 3" - 300#	
			···		MANHOLE - COMPLETE	يورنيه بروسيسي بينونغ فسؤب
NTERIOR PAINT SYSTEM					WITH RUBBER GASKET	SA-G GR.T
POXY ZINC RICH, LIGT					rb $i'' = '' = - ''$	
the second s			U U		PL 11" O.D. x2" x 6" 1.D.	5A-3
NTERMEDIATE COAT: 2 POXY ENAMEL, WHITE	COMPONENT	-		1.	3,"	
(a) a second constraint of the second const			6		4-3000# FORGED	A-109 GR.11
FROXY ENAMEL-LIGHT		· · · · · · · · · · · ·			STEEL FULL CPLG.	GR.II
OTAL FILM THICKNESS:	· · · · · · · · · · · · · · · · · · ·			0	STD. LIFTING LUG.	117
			1 (-			H.R.
XTERIOR TANK COATIN	16.		8	1	STD. LIFTING LUG	H.R.
XTERIOR PRINT SYSTEM	the second se	~ +				
دور از آسان الحراب الذات المراجع بالمراجع المعادير بمعه المراجع معرف موجع محمد المراجع المراجع المراجع مع موجع مراجع المراجع المراجع المراجع المحمد المراجع المعادير بمعه المراجع معرف محمد المراجع محمد المراجع المراجع المراج			9	1	34"-3000# FORGED	
PRIME COAT: Z COMPON					STEEL FULL CPLG.	A-105 GR. 11
SXTERIOR PAINT SYSTEM	and the second					
			10	1	12"×16"×34"×3"-300#	
FINISH COATE Z COATS	an a				MANHOLE-COMPLETE	
OTAL DRY FILM THICKA	1E55 G M1125,				WITH RUBBER GASKET	SA-G
PROVIDE PROTECTIVE CO	VERS FOR		1			
ALL FITTINGS.			11	<u>}</u>	34"-3000# FORGED	
TRUL OF NAATED	AL CONTINUED				STEEL FULL CPLG,	A-105 GR.11
MARK RS DESC	and the second sec					
			12	2	4" SCH 80 STEEL	SA- 53
	BO STEEL				PIPE X 71% TO.E.	GR B
PIPE X	20B	-			4"x 11"-150# REDUCING	
22 1 6" SCH E	O STEEL		13	6	SLIP-ON ELANGE	A-181 GR.1
PIPE X					JUIT TWA THANGE	GRI
			14	2	4"-125# STD C.1.	
222° 23 8 34-10 UN	C HEX, HD				COMPANION FLG.	
	E SCREW X 5"					
			15	1	R 83400 x'z"x 6"10	H.R.
24 8 34-7" 80	LT & NUT					1
			16	<u>]</u>	34-3000# FORGED	4
25 8 31-10 UNI	C HEX. HD.				STEEL FULL CPLG.	A-105 GR.11
	SCREWX 134"					
ECTION A-A			.\7	1	R 11" DIA. x 12"	HIR.
26 16 1" 504 40						
PIPE × 3			18	4	6-150# STEEL	
					SLIP-ON FLANGE	A-181 GR.1
	D MILWAUKEE					
SADDLE			19	1	P. 143, 0.0 x 4 x 6"1.0.	H.R.
	t 1					
					n an	
			20	1	R 1434" DIA. X4"	HIRS

CONTRACT NG2470-82-8-2552 SECTION 15440 - FILTER EQUIPMENT

NEPTUNE FILTER COMPANY DIV. WEST WARWICK, R. I., U. S. A.

FABRICATION DETAILS OF 84" DUAL CELL FILTER TANKS PART NO. 84-2MC556

MATE 9-13-84 JOS ORDER NO. - 49846 DRWG. NO. FT-I PART NO. -

FILTER MODEL 84-ZMC556 WITH ALL COMPONENTS 15 NSF APPROVED IN ACCORDANCE

WITH STANDARD #50 NJF * 5033

r • i) . , .

المسيسة المالية المالية المالية المالية المالية المالية المسالية المسالية المسالية المسالية المالية المسالية ال

		• • •				
					r	
				,		
		• •				
			1 2 1 1 1			
			į			
			:			
	ATLANTIC DIVIS	ION RING COMMAND				
APPROVER APPROVER DISAPPRO SUBJECT CONTRACT APPROVAL APPROVAL TRACT RE TOR CALL DEVIATIO RESPONS PHYSICAL	NORFOLK, VIRGINIA DAS NOTED VED TO THE REQUIREME TO THE REQUIREME TO THE REQUIREMENT OF A SUBMITTAL D OF A SUBMITTAL D OF ANY DEVIATION OF A SUBMITTAL D OF A S	A 23511 NTS OF 2 - 2 5 5 OES NOT INCLUE N FROM THE CON SS THE CONTRAM ID SUPPORTS THE TOR SHALL E VIDING PROPE IGHTS, COORDIN QUIRED.	Z Z E N C G E R A			
REVIEWER		5 DEC 1984	-			

NEPTUNE UP BENSON

Re: Contract N62470-82-B-2552 Section 15440 - Filter Equipment

TO WHOM IT MAY CONCERN:

This is to certify that the filters to be provided on the above mentioned project are standard manufactured catalog items. All filters with internal components are NSF tested, approved and listed for Model 84-2MCSS6 in accordance with standard #50 NSF #5033.

All filter tanks to be constructed in accordance with Section VIII, Division 1 of the A.S.M.E. Code for pressure vessels and so stamped and labelled.

Junius Gertz, P.E. Vice President

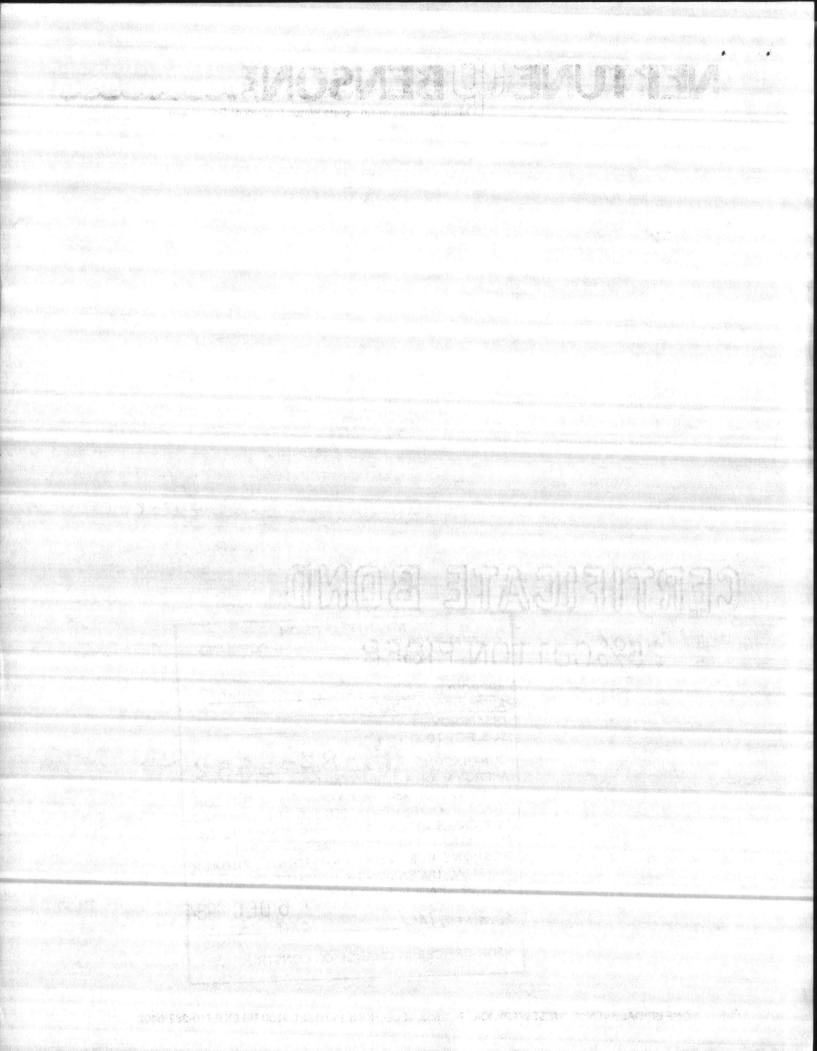
1450

Dated 11/17/84

NAVAL FACILITIES	TIC DIVISION ENGINEERING COMMAND VIRGINIA 23511
APPROVED	and the second second second second
APPROVED AS NOTED	2
DISAPPROVED	
SUBJECT TO THE REQ	WIREMENTS OF
CONTRACT NO. 05	-82-2552
A JUBAL OF A JUBA	ILLAL DOFT MAT ININI UNE
PARTICIPAL OF ANY DI	EVIATION EDOM THE ADD
I MALI ACUUINEMENT	S LINI ESS THE CONTRACT
I UN LALLO AL EN ION	N TO AMO SUDOOMEN THE
	NTRACTOD CUAL
ACOTONOIDLE FOR	PROVIDING BOARS
I JUNE DIMENSION	S & WEIGHTE MODONIUS
NON OF TRADES, ETC.	AS REOLIDEO
REVIEWER JMJ	5 DEC 1984
IL TICHER JIM	DATE
FOR OFFICED IN MIL	
· VI VITUCK IN CHA	RGE OF CONSTRUCTION

ONE BRIDAL AVENUE, WEST WARWICK, RI 02893, TELEPHONE (401) 821-2200 TELEX II 710-382-6402

Lisa



NEPTUNE UU BENSONZ

MANUFACTURERS CERTIFICATE OF CONFORMANCE

TO WHOM IT MAY CONCERN:

This is to certify that the following equipment to be supplied by Neptune-Benson, Inc. will meet the specification for Project #05-82-2552; Replace Filters in Pools, Marine Corps Base, Camp LeJeune, North Carolina

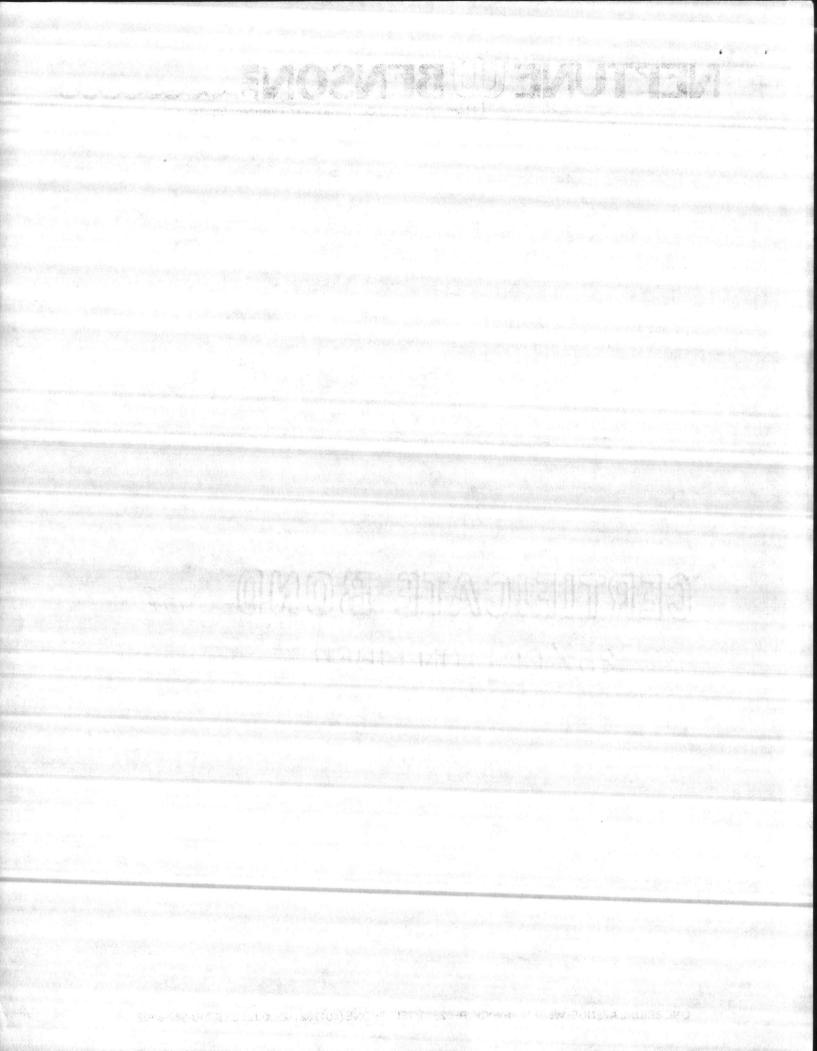
Section 15440; Part 2 - Products 2.1 Filter Equipment 2.1.1 Filters two cell all sand Pressure type Paragraphs a thru k

Exception: Paragraph i portion "ASTM 316 stainless steel sand retainers protecting underdrain inlets to prevent any pass of sand filter media."

Documentation per attached Page 2.

Junius Gertz, P.E. Vice President

Dated 11/17/84



NEPTUNE UP BENSON

Manufacturers of Complete Water Treatment Equipment

Page 2

CAMP LEJEUNE PROJECT 05-82-2552

This reference is the standard specification of another manufacturer who fabricates his laterals using drilled holes, thereby necessitating the use of some type of screen or retainer to prevent the passage of sand.

If you refer to our calculations you will find that Neptune's lateral underdrains are provided with machined openings already sized to prevent the passage of media through the system without the use of an additional screen.

We have selected this type of underdrain for a number of reasons:

- 1. Our machined openings are spaced much closer than any drilled openings.
- 2. The open area of these single direction machined openings is much greater than the openings resulting from the crisscrossed mesh of stainless steel screening.
- 3. Precipitated minerals that can accumulate in this type of equipment tend to adhere more readily to a metallic mesh formation as compared to single direction machined opening in smooth PVC material.
- 4. The stainless steel mesh over a period of time can bloom or expand due to the changes in direction of flow and pressure drops with the possibility of changing the openings in the mesh.
- 5. The stainless steel mesh is usually secured to the PVC laterals by a heat seal method. Heat sealing in this fashion can reduce the cross sectional area of the lateral pipe itself thus reducing the strength of the pipe.
- 6. An imperfect heat seal could allow the passage of media through the drilled opening.

ADDITIONAL COMMENTS

The Neptune type of lateral has been in continuous use and production for over fifteen years. Such laterals are used in both our rapid flow filters (RF) and multi-cell (MC) units. These installations are located world wide and include some of the most prestigious and widely used pools in this country. The new U. S. Naval Academy pool in Annapolis uses Neptune-s Multi-Cell filters and is experiencing extended filter cycles. The Indiana State University pool in Indianapolis, where U. S. Olympic trials were held, claims outstanding success in water clarity using Neptune Multi-Cell Filters.

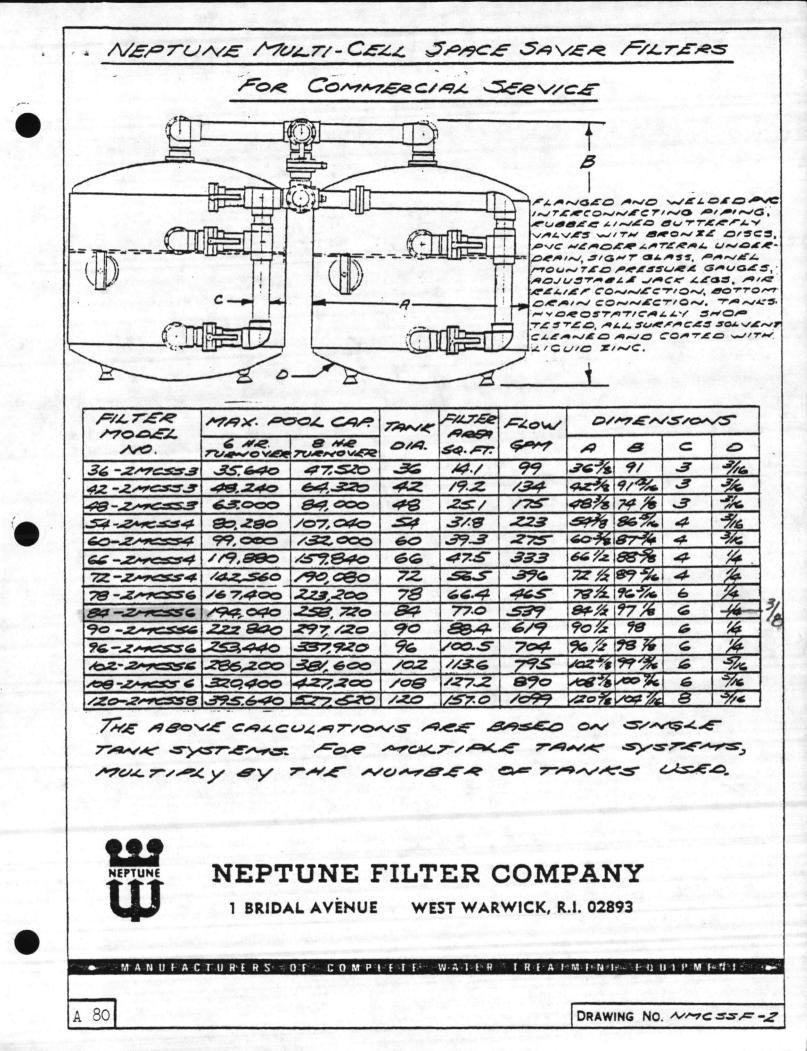
Replacement laterals are very seldom required and have <u>never</u> been replaced because of wear or passage of filter sand.

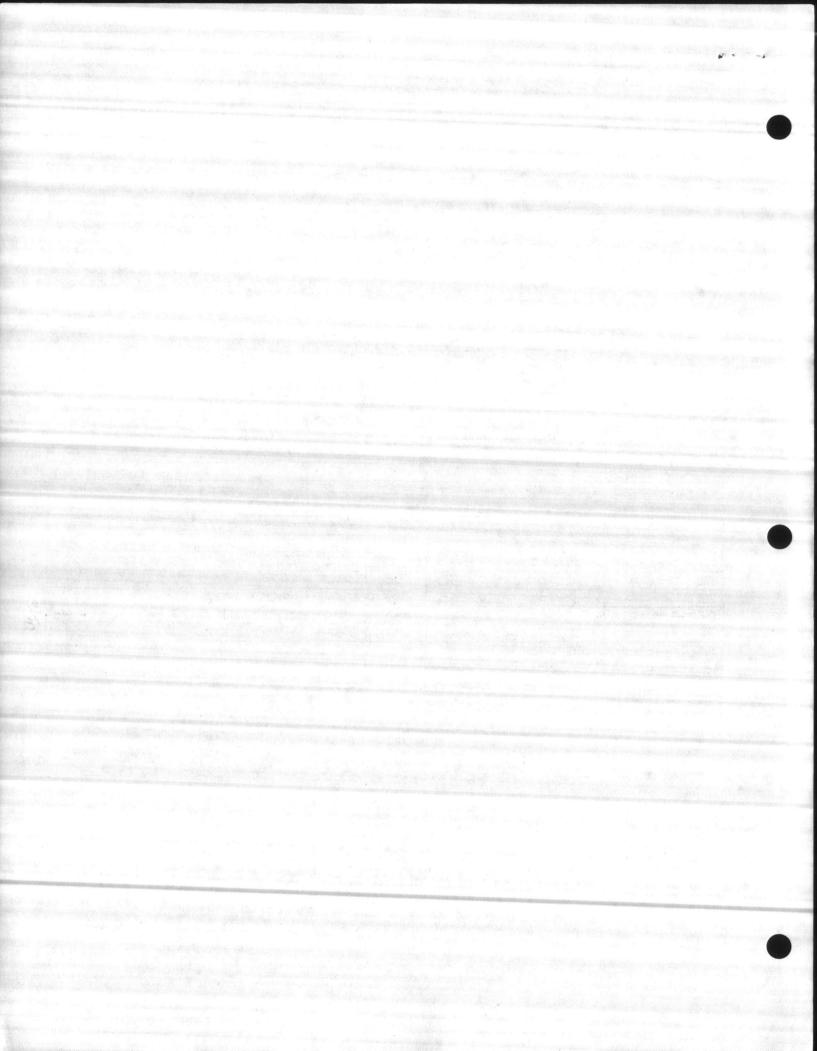
NETUNE UNENSON:

Wainforther of Complete Water Transet Equilate

CONTRACTOR DE LA CIENCIA

IS NO FIGS



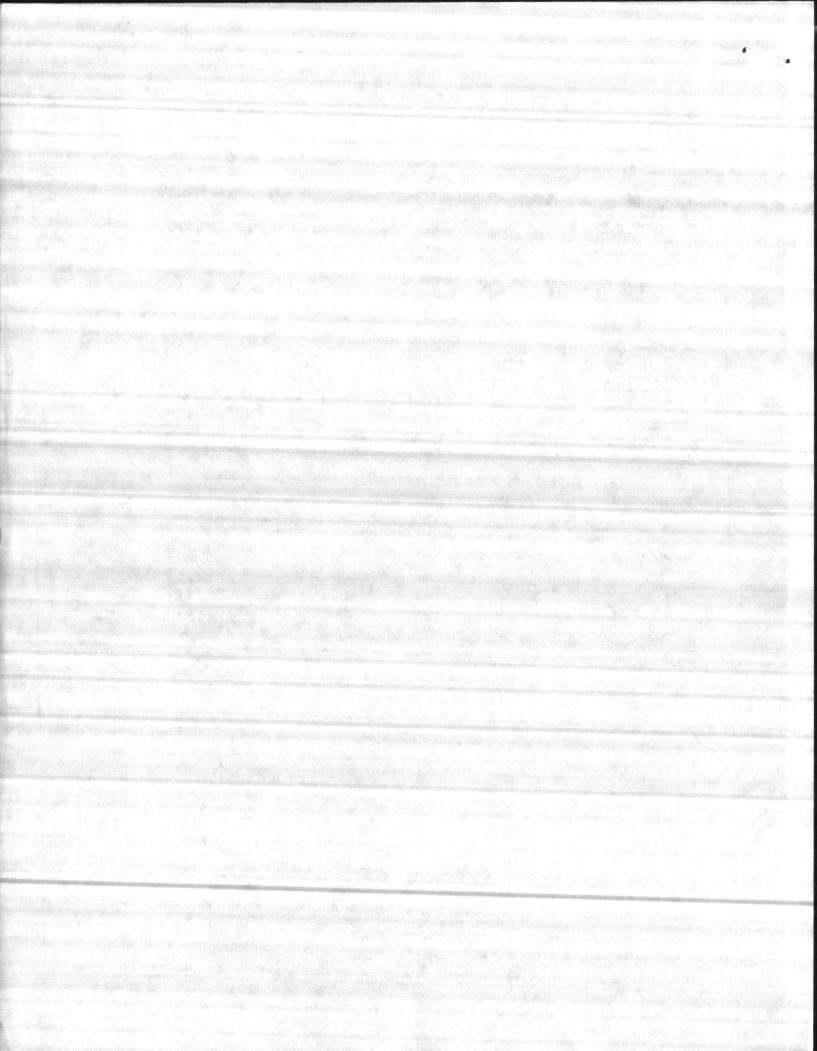


NEPTUNE-BENSON, INC. JOBNO. 49846 CUSTOMER - ROBERTS FILTER MFG. CO. PROJECT - CAMP LEJEUNE, N.C. CALCULATIONS BY F.C. Bud

TANK CONSTRUCTED IN ACCORDANCE WITH SECTION VIII, DIVISION I OF THE ASME CODE FOR PRESSURE NESSELS AND SO STAMPED

84 DIA. × 45% SHELL FILTER TANK DESIGN PRESSURE - 75 P.S.I. DESIGN TEMPERATURE - 100°F CORROSION ALLOWANCE - 0 NO RADIOGRAPHY

HEAD - FLANGED AND DISHED ASME - CODE TYPE MATL - 5A-516 GR. 70 P = 75 P. 5.1. 5 = 80% OF 17,500 = 14,000 E=1.0 L= 78" r = 6.5 $\frac{L}{r} = \frac{78}{6.5} = 12$ M = 1.6Z $t = \frac{PLM}{Z5E - 0.2P}$ $t = \frac{(75)(78)(1.62)}{(2)(14,000)(1.0) - (0.2)(75)} = \frac{9477}{27,985} = .339$ REQUIRED THICKNESS t = .339 CORROSION ALLOWANCE * . 339 USE 3

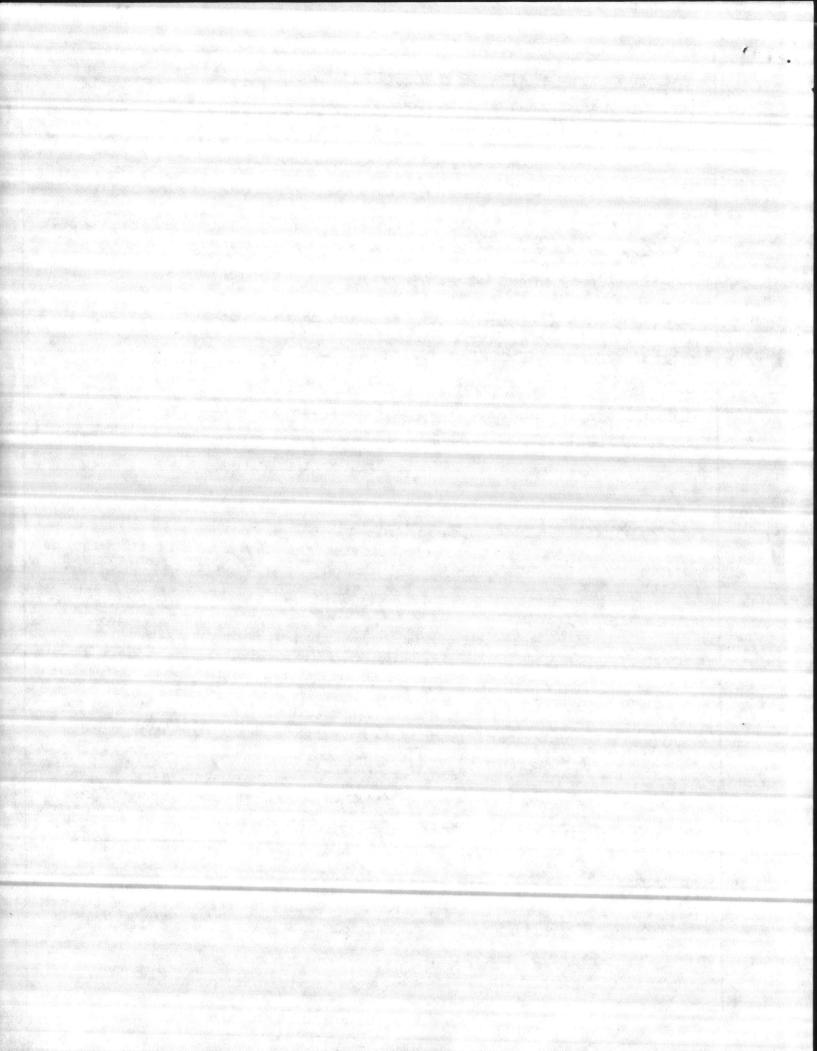


NEPTUNE - BENJON, INC. JOB NO. 49846 CUSTOMER - ROBERTS FILTER MFG. CO. PROJECT - CAMP LEJEUNE, N.C. CALCULATIONS BY J.C. Bud

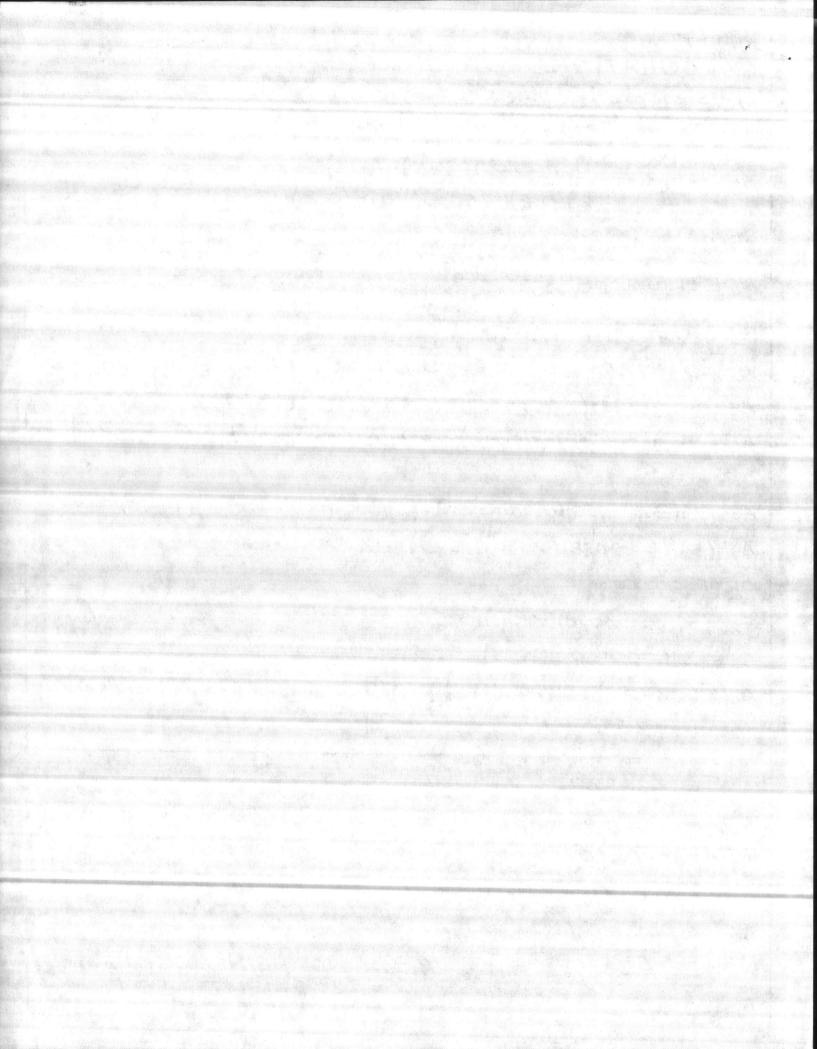
TANK CONSTRUCTED IN ACCORDANCE WITH SECTION VIII, DIVISION I OF THE ASME CODE FOR PRESSURE VESSELS AND 50 STAMPED

84 DIA. × 452 SHELL FILTER TANK. DESIGN PRESSURE - 75 P.S.I. DESIGN TEMPERATURE - 100°F CORROSION ALLOWANCE - 0 NO RADIOGRAPHY

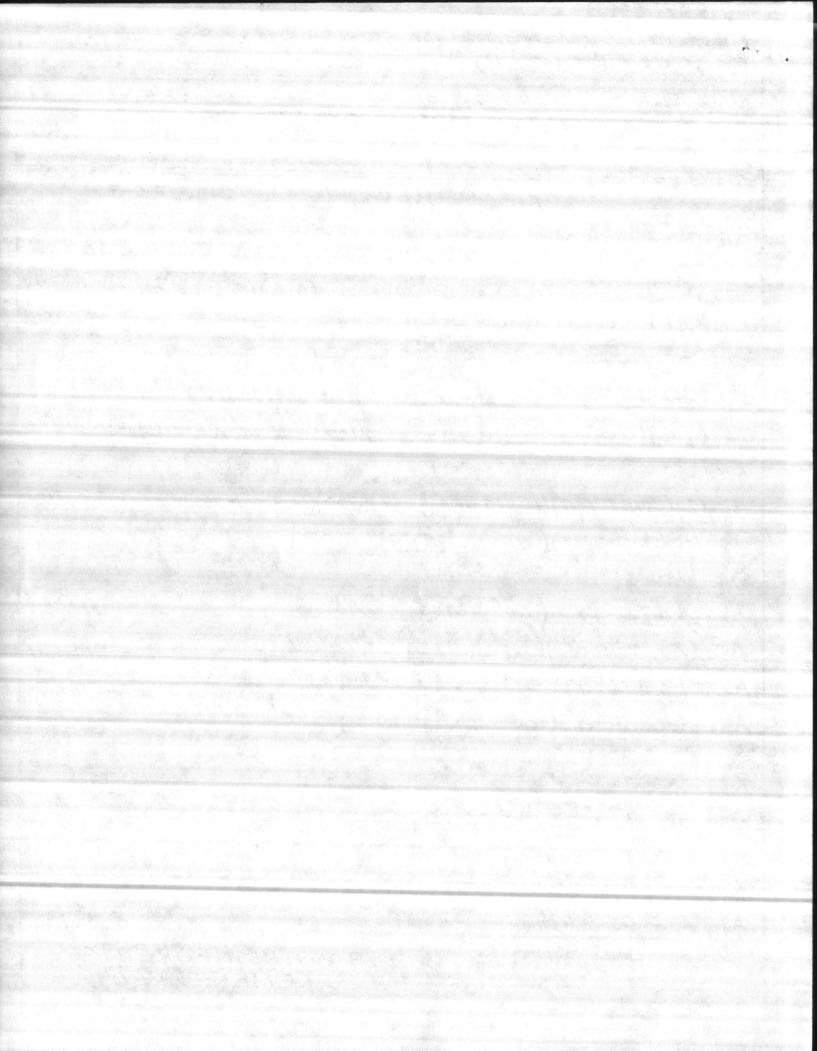
SHELL MAT'L - 5A - 285 GR C P= 75 P.S.I. Ro = 42 5 = 13,800 E = .70 $t = \frac{PR_0}{5E+0.4P}$ $t = \frac{(75)(42)}{(13,800)(.70) + (0.4)(75)} = \frac{3150}{9690}$ 3150 = 325 REQUIRED THICKNESS L = .325 CORROSION ALLOWANCE = USE :3



ad entry



NOZZLE - 12 × 16 × 2 MATL J	F.C. Bud * 3 MANHOLE IN SHELL A-675 GR. 70
	5) (<u>4Z</u>) <u>3150</u> 00)(1.0) + (0.4)(75) 11,070 ⁼ .285
SHELL t = . 375	76 \ 1 7 \ 675
NOZZLE trn = ((0.8)(17,	$\frac{75}{500}(1.0) - (0.6)(75) \frac{525}{13,955} = .038$
NOZZLE In = . 750	
WELD SIZE =	3 DOUBLE FILLET
A = (14)(.285)(1.0) + (2	(.750)(.750)(.785)(1-1.0) = 3,99
A,=(14)(1x.375-1x.285)-(2	2)(.750)(1×.375-1×.285)(1-1.0) = [1.26]
OR	(3)(3)(3)(3)(3)(3)(3)(3)(3)(3)(3)(3)(3)(
$A_1 = (2)(.375 + .750)(1 \times .375 - 1)$	×. 203) - (2)(.750)(1×.375-1×.285)(1-1.0) = 0.203
Az=(5)(.750038)(1.0)(.	375) = [1.302]
OR	
Az=(5)(.750038)(1.0)(.	
$A_3 = (Z)(.750-0)(1.0)(.$	
$A_{41} = (.375)^2 (1.0) =$	
$A_{43} = (.375)^2 (1.0)$	= 0.141
$A_1 = 1.260$	
$A_z = 1.335$	
$A_3 = 1.407$	
ng /.	
1 - 0141	
$A_{41} = 0.141$ $A_{43} = 0.141$	



A spanning and	ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511
AP	PROVED
	PROVED AS NOTED
DI	SAPPROVED
C	PROVAL OF A SUBMITTAL DOES NOT MODUCE
At	PROVAL OF A SUDMITTAL DOLLAR THE CON-
TS	PACT REOLAREMENTS UNLESS THE CONTRAC-
TC	OR CALLS ATTENTION TO AND SUPPORTS THE
0	EVIATION THE CONTRACTOR SHALL BE
H	HYSICAL DIMENSIONS & WEIGHTS, COORDINA
TI	ON OF TRADES, ETC., AS REQUIRED.
	1 6 DEC 109/
R	EVIEWER MA DATE
	FOR OFFICER IN CHARGE OF CONSTRUCTION
	LOU OLLIGER III OLLIGE CLEAR COL

1

CALCULATIONS FOR NEPTUNE LATERAL TYPE UNDERDRAINS

84"OD CHAMBER - U.S.M.C. BASE, CAMP LEJUENE

Machined Openings:.017" wide x 1.5" longSq.In./Opening:.0255"Openings per Inch:5.8Open Area/Inch of
Lateral Pipe:.1479"Open Area per Chamber:81.63 Sq.In.Open Area of 4" Manifold:12.56 sq.in.Lateral Open Area
Manifold Open Area6.5

RECOMMENDED FILTER MEDIA PARTICLE SIZE

RANGE : .5 to .8 mm

.5 mm = .01977"

Smallest dimension of filter media particle of .0197" is greater than slot opening of .017"

NSF



and the set of the second se ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED APPROVED AS NOTED ____ DISAPPROVED_ SUBJECT TO THE REQUIREMENTS OF CONTRACT NO. 05-82 54 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRAC-TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA TION OF TRADES, ETC., AS REQUIRED. 5 DEC 1984 REVIEWERJMd DATE FOR OFFICER IN CHARGE OF CONSTRUCTION فمتحفظ فليله وتدويت ومراجع والمعالية والمالية والمالية والمتدومة والمعاد والمتعاد والمالية والمعالية

NEPTUNE-BENSON, INC. ONE BRIDAL AVENUE WEST WARWICK, RHODE ISLAND 02893

Rapid Flow	Filter System	s for Comm	ercial Service	• - Models:	
36SRF**	54SRF**	72SRF**	90SRF*	102SRF**	
42SRF*	60SRF**	78SRF**	96SRF**	108SRF**	
48SRF**	66SRF**	84SRF**		120SRF**	
36DRF	54DRF**	72DRF**	90DRF**	102DRF**	
42DRF**	60DRF**	78DRF**	96DRF**	108DRF**	
48DRE**	66D8F**	84DRF**		120DRF**	

*Listed for 17 gpm/sq.ft.

**With or without one of the following suffixes: SLA (automatically operated) or SLM (manual single lever linkage; and one of the following numerals: 3, 4, 6, 8, 10

Multi-Cell Rapid Flow Filter Systems for

Commercial Ser	vice *** - Mod	els:	
36-2MCSS3	60-2MCSS4	84-2MCSS6	102-2MCSS6
42-2MCSS3	66-2MCSS4	90-2MCSS6	108-2MCSS6
48-2MCSS3	72-2MCSS4	96-2MCSS6	120-2MCSS6
54-2MCSS4	78-2MCSS6		
48-3MCSS4	66-2MCSS6	84-3MCSS6	102-3MCSS8
54-3MCSS4	72-3MCSS6	90-3MCSS6	108-3MCSS8
60-3MCSS4	78-3MCSS6	96-3MCSS8	120-3MCSS8

*** Listed for 7 gpm/sq.ft.



3475 Plymouth Road P.O. Box 1468 Ann Arbor, Michigan 41806 U.S.A. Telephone: 313-769-8010

National Sanitation Foundation

OFFICIAL LISTING



DRAWING NO.

-------ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED APPROVED AS NOTED. DISAPPROVED. SUBJECT TO THE REQUIREMENTS OF 552 ð CONTRACT NO. APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRAC-TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION-THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA-TION OF TRADES, ETC., AS REQUIRED. 5 DEC 1984 DATE REVIEWER FOR OFFICER IN CHARGE OF CONSTRUCTION Linkowegan and a mapped to a data between the set of a a - m



Poberto

CABLE: WATERFILT PHILA. TELEX: 753-447

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CONTRACT N62470-82-8-2552

SECTION 15440

PARA. 2.10 INSTRUMENTATION AND CONTROLS FOR

WATER TREATMENT PLANT (BUILDING 20)

DEVIATION REQUESTS

IN-LINE CONTROLS (FILTER EFFLUENT)

#23

We submit for your approval drawing No. A-8784-6 illustrating a modified arrangement of the effluent piping, Venturi meter, control valve and isolation valve for the five (5) filters in building #20.

Our experience in other similar applications has shown that an isolation valve, when mounted before the Venturi, creates significant turbulancein the flow of water causing oscillating Venturi sensing resulting in excessive "hunting" of the controller and control valve resulting in premature wear.

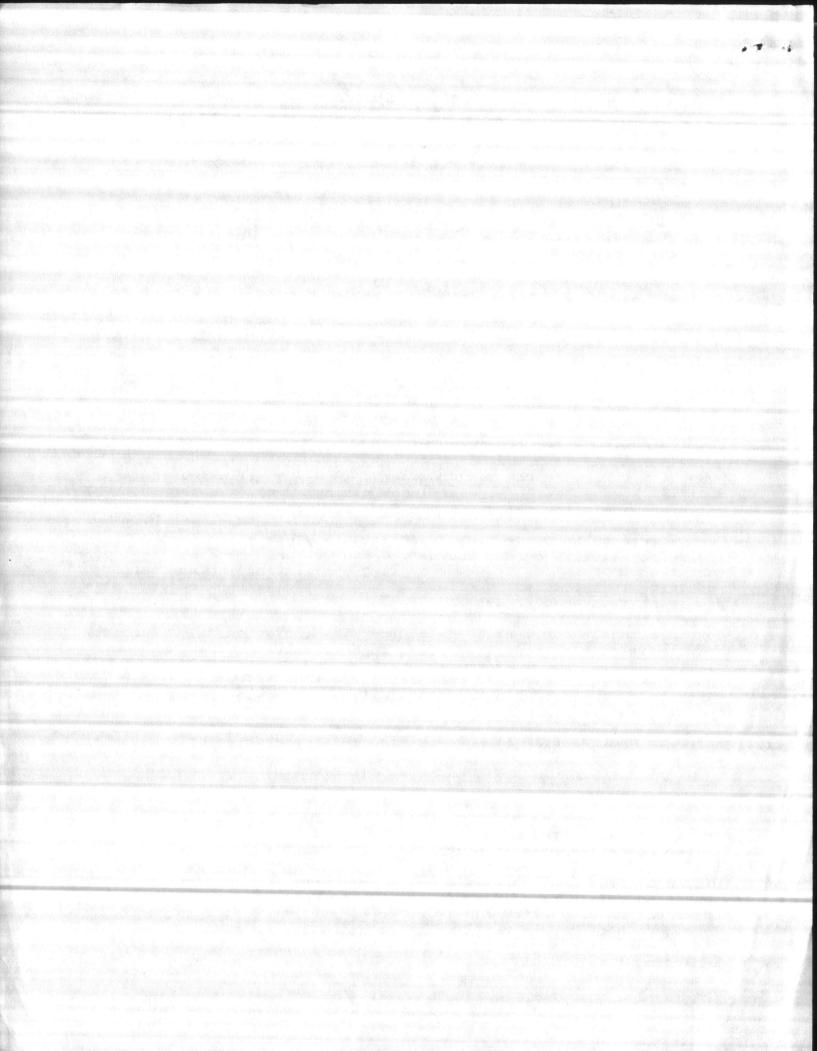
0K for this reason our sketch now depicts the isolation value located 0K downstream of the Venturi tube and control value.

The control value size has been decreased from 10" to 8" as our ok experience has indicated that this will also provide better control characteristics.

Refer to Pratt letter of November 13, 1984 discussing valve submittal and deviations.

FILTER CONSOLE

OK In addition we offer drawing No. 6950-4 illustrating the proposed filter operating console which will be constructed of fiberglass instead of steel as mentioned in the specifications. Note that this will provide superior resistance to moisture. We have successfully installed this type of Fischer and Porter Console (catalog cuts attached) in many water plants. The construction of this console (although a different model) is substantially the same as the fiberglass consoles we installed at the Camp LeJeune Water Plant (Holcomb Blvd.) in 1971.



Potente FILTER MANUFACTURING COMPANY

Contract N62470-82-B-2552, Section 15440 Para. 2.10 Instrumentation & Controls (Building 20) Deviation Requests Continued

Resubmit Drawings No. A-8784-4 and A-8784-5 are enclosed to illustrate the indicators for backwash flow and headloss. They are of our own manufacture.

The specifications call for a separate indicator and controller for each of the five (5) effluent control systems. We propose to utilize a combination unit (Flow Indicating Controller) because of space limitations on the Console.

OK We propose to provide a means of stopping and starting the wash water pump at each console as well as providing local control.

OK Backwash Flow Rate Indicators have been shown on each console in lieu of one (1) 24" circular dial indicator wall mounted. This is consistent with our usual practice and will be beneficial to the operator.

As was discussed by our Mr. Walter Trapnell and Your Mr. H. F. White III this past summer we have substituted, in lieu of BIF equipment, various manufacturer's instruments as listed below.

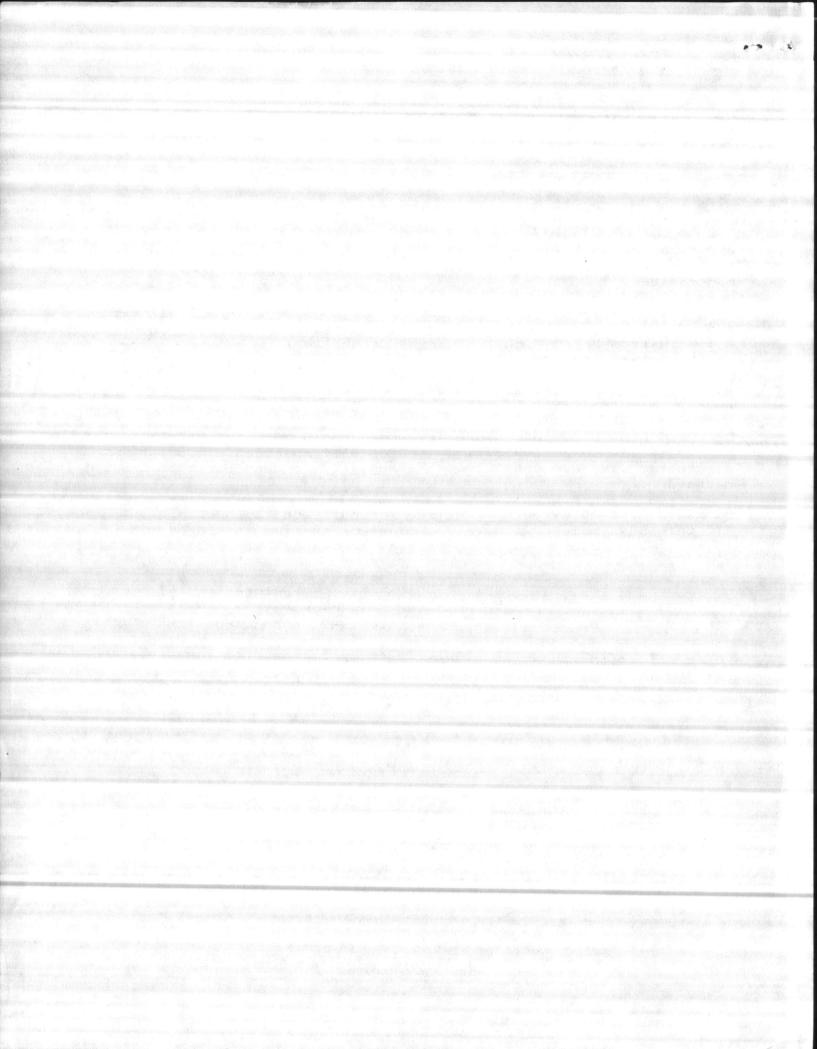
- A. Controller Fischer and Porter
- B. Indicator Roberts Filter Mfg. Co.
- C. FLow Transmitter Rosemount
- D. Headloss Transmitter Rosemount

The above deviations will result in no cost change to the Naval Command.

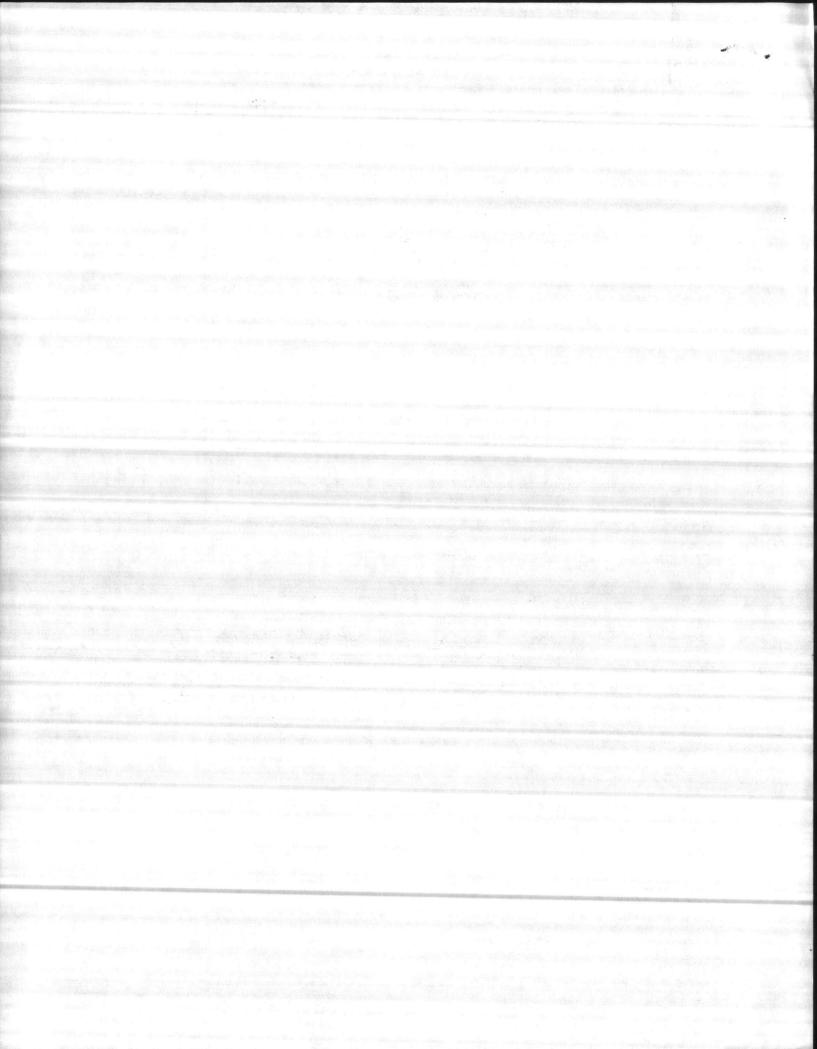
We respectively request your approval of the above.

Signature Roberts Filter Mfg.

Date 12.6.84



LA	NTDIV NORFOLK 4-43	JBMITTAL TRANSMITTAL 55/3 (Rev. 11-80)	CONTRACT NO	many supervised participants and the supervised of the supervised sectors and the supervised sectors a	16			
FRO	M CONTRACTOR		PROJECT TITLE AND LO		10	11/14		
1.11.12	BERTS FILTER I	AMULACTURINE CO.	replace (- Pools			
TO	WAL FACTUATIE	S ENGINEEPINE COMMAND			- Building 20			
		CONTRACTOR USE ONLY			REVI	EWER USE ONLY		
	Li Contractor Approved	*List only one specification division pe ist only one of the following categories on each and indicate which is being submi	transmittal form, tted	ion/Substitution	A-Appi D-Disa AN-Ap	pproved proved as noted ceipt acknowledge		
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO.*	ITEM IDENTIFIC (Type, size, model no., Mf brochure num	ATION g. name, dwg. or	OICC Approval	ACTION CODES	REVIEWER INITIALS		
-	Porra, 2-1	Backwach Sight Glass (Po	ols)	7	A	17 Is		
					15	115 611-44		
	15420 Fora. 1.1.1	2' Cate Valve (Surface W	ash - Bldc. 20)) 7	J	t Dece		
					1	-1/		
		Calles Camplianum		RA	1.17	191		
	A CONTRACT OF A CONTRACT OF A CONTRACT OF	· KAMUD COMPLIANCE				the second se		
COM	NTRACTOR'S COMMENTS	- KFMCo Compliance						
COF	NTRACTOR'S COMMENTS	BMITTALS TO ROICC	CONTRACTOR REPRESE					
	NTRACTOR'S COMMENTS	BMITTALS TO ROICC	001	ENTAZIWE (Signature)	The second se			
	NTRACTOR'S COMMENTS	BMITTALS TO ROICC	001	, 11	The second se) 2567275		
	TRACTOR'S COMMENTS	BMITTALS TO BOICC	J.C.4	to Reich	c/ ke			
	PY OF TRANSMITTAL AND SUI IS I GI. H. C. GI TE RECEIVED BY REVIEWER Submittals are returne tractor calls attention	BMITTALS TO ROICC	s not include approval of an	TO ROLL	C / HCC	quirements unless		
	PY OF TRANSMITTAL AND SUI IS IGI. J. G. G. TE RECEIVED BY REVIEWER Submittals are returne tractor calls attention	BMITTALS TO ROICC	s not include approval of an	TO R CI (ne contract re	quirements unless below on ONE CO		
	PY OF TRANSMITTAL AND SUI IS IGI. J. G. G. TE RECEIVED BY REVIEWER Submittals are returne tractor calls attention	BMITTALS TO ROICC	s not include approval of an	TO R CI (ne contract re	quirements unless		
	TRACTOR'S COMMENTS	BMITTALS TO ROICC PROM (Reviewer) DIV d with action indicated. Approval of an item does to and supports the deviation. Hed to LANTDIV with A-E recommendations indi DUCS NOT COMP WITTL FLOOR	s not include approval of an icated in REVIEWER USE O	TO R CI (ne contract re	quirements unless		
	TRACTOR'S COMMENTS	BMITTALS TO ROICC PROM (Reviewer) DIV d with action indicated. Approval of an item does to and supports the deviation. Hed to LANTDIV with A-E recommendations indi DUCS NOT COMP WITTL FLOOR	s not include approval of an icated in REVIEWER USE O	TO R CI (ne contract re	quirements unless below on ONE CO		
	VTRACTOR'S COMMENTS	BMITTALS TO BOICC 13 FROM (Reviewer) DIV d with action indicated. Approval of an item does to and supports the deviation. Sed to LANTDIV with A-E recommendations indi RECS NOT COMP A MITTAL FLOCK MITTAL FLOCK A GE WASH ARE	P.C.Y s not include approval of an icated in REVIEWER USE C MCH STANDS REQUIRED	TO ROLL	in comments I	quirements unless below on ONE COI		
	VTRACTOR'S COMMENTS PY OF TRANSMITTAL AND SUL ISIGII W. C. GY TE RECEIVED BY REVIEWER Submittals are returne tractor calls attention Submittals are forward transmittal form. TEWER'S COMMENTS TE MICHE DISC DSS CAL SUMFI SUBMIT	BMITTALS TO ROICC 13 FROM (Reviewer): DIV d with action indicated. Approval of an item does to and supports the deviation. Hed to LANTDIV with A-E recommendations indi DICS NOT COMP ACE WASH ARE CEPTIFICATE OF	P.C.Y s not include approval of an icated in REVIEWER USE C M.H. STANDS REQUIRED Comput	hrmp TO RCIC ny deviation from th DNLY Section and in SPECH , 2000 AACE	E J Ke in contract re Contract re Contract Post J FRam	quirements unless below on ONE CO GATE THE		
	VTRACTOR'S COMMENTS PY OF TRANSMITTAL AND SUL ISIGII W. C. GY TE RECEIVED BY REVIEWER Submittals are returne tractor calls attention Submittals are forward transmittal form. TEWER'S COMMENTS TE MICHE DISC DSS CAL SUMFI SUBMIT	BMITTALS TO BOICC 13 FROM (Reviewer) DIV d with action indicated. Approval of an item does to and supports the deviation. Sed to LANTDIV with A-E recommendations indi RECS NOT COMP A MITTAL FLOCK MITTAL FLOCK A GE WASH ARE	P.C.Y s not include approval of an icated in REVIEWER USE C M.H. STANDS REQUIRED Comput	hrmp TO RCIC ny deviation from th DNLY Section and in SPECH , 2000 AACE	E J Ke in contract re Contract re Contract Post J FRam	quirements unless below on ONE CO GATE THE		



Loberto

CABLE: WATERFILT PHILA. TELEX: 831-439

FILTER MANUFACTURING COMPANY P.O. BOX 167 • DARBY, PENNSYLVANIA 19023 • (215) 583-3131

CERTIFICATE OF COMPLIANCE

CONTRACT NUMBER

N62470-82-C-2552

PROJECT SPECIFICATION SECTION 15440

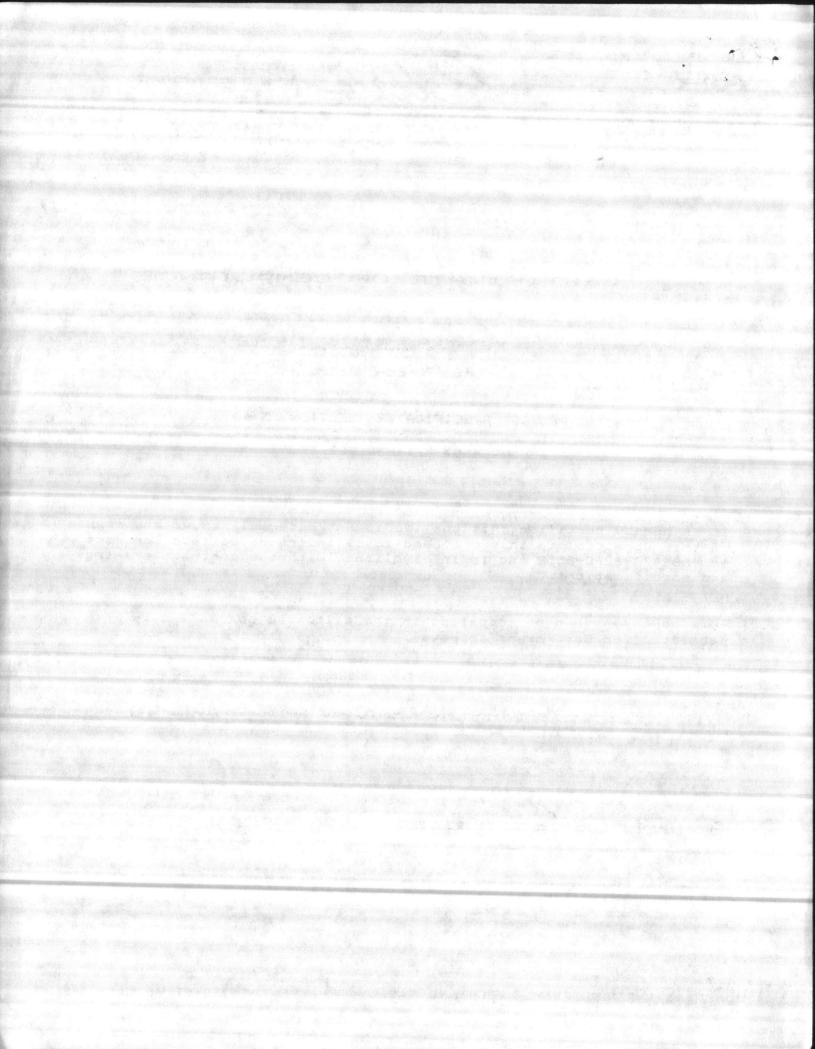
PARAGRAPHS 2.1 AND 1.1.1

It is hereby certified that the (equipment/material) shown and marked in this submittal is that proposed to be incorporated into Contract No. N62470-82-C-2552 and is in compliance with the contract drawings and specifications.

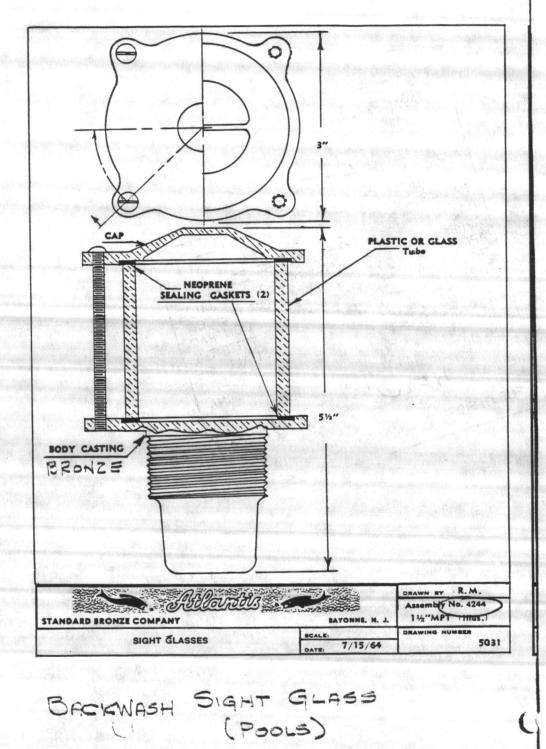
This equipment can be installed in the allocated spaces and is submitted for Government approval.

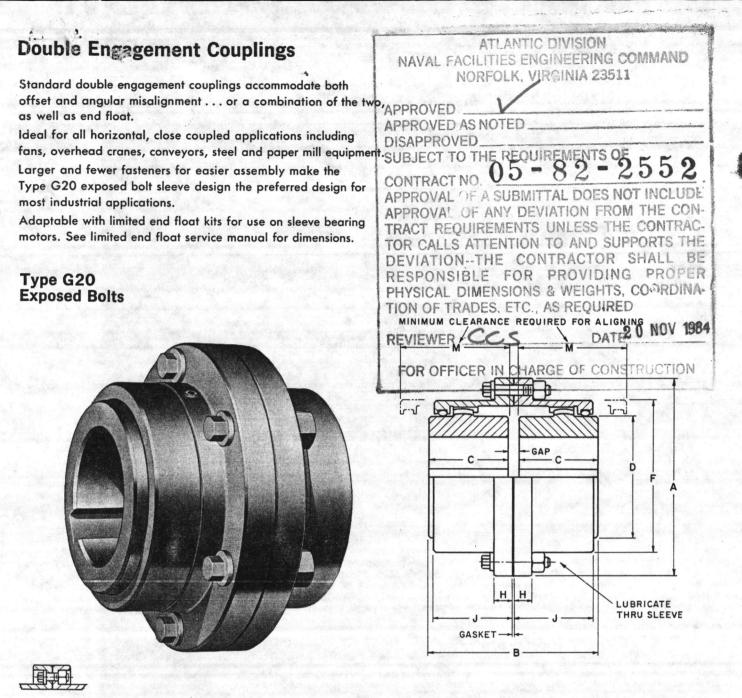
Certified By A.C. Hompson Date 12-12-84

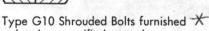
MUNICIPAL AND INDUSTRIAL WATER AND WASTEWATER TREATMENT SYSTEMS SINCE 1897



NAVAL FACILITIES ENGINEERING COMMAND APPROVED APPROVED APPROVED AS NOTED DISAPPROVED SUBJECT TO THE REQUIREMENTS OF CONTRACT NO. 82-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF A SUBMITTAL DOES NOT INCLUDE TRACT REQUIREMENTS UNLESS THE CONTRACT TOP CALLS ATTENTION TO AND SUBMITTAL DOES NOT INCLUDE TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION THE CONTRACTOR SUPPORTS THE TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION. THE CONTRACTOR SUPPORTS THE RESPONSIBLE FOR PROVIDING SHALL BE PHYSICAL DIMENSIONS & WEIGHTS, COORDINAL BE TION OF TRADES FTC AS REOLIDED COORDINA. TION OF TRADES, ETC., AS REQUIRED. REVIEWER HEW FOR OFFICER IN CHARGE OF CONSTRUCTION DATE 19 Dec 84







only	when	specified	on order	r		

SIZ		per 00	Max * Speed	Max • Bore	Min	Cpig W No Bor		Lube Wt	and the second			DIMEN	sions —	INCHES				SIZE
1		m	rpm	(Sq Key)	Bore	G10	G20	lb.	A	B	c	D	F	H	J	M	GAP	*
101 101 102 102	5G 0G	12 27 50 90	8000 6500 5600 5000	1.875 2.375 2.875 3.625	.50 .75 1.00 1.25	9 17 30 55	10 20 35 65	.09 .16 .25 .50	4.56 6.00 7.00 8.38	3.50 4.00 5.00 6.25	1.69 1.94 2.44 3.03	2.70 3.40 4.14 5.14	3.30 4.14 4.98 6.10	.55 .75 .75 .86	1.53 1.88 2.34 2.82	2.00 2.40 3.00 3.60	.125 .125 .125 .125 .188	1010G 1015G 1020G 1025G
103 103 104 104	5G 2 0G 3	50 30 50 80	4400 3900 3600 3200	4.125 4.875 5.750 6.500	1.50 2.00 2.50 3.00	85 135 195 280	95 150 215 300	.80 1.20 2.00 2.30	9.44 11.00 12.50 13.62	7.37 8.63 9.75 10.93	3.59 4.19 4.75 5.31	6.00 7.00 8.25 9.25	7.10 8.32 9.66 10.79	.86 1.12 1.12 1.12	3.30 3.84 4.38 4.84	4.20 5.10 5.70 6.50	.188 .250 .250 .312	1030G 1035G 1040G 1045G
105 105 106 107	5G 8 0G 11	50 50 00 00	2900 2650 2450 2150	7.000 7.750 8.750 10.000	3.50 4.00 4.50 5.00	390 525	420 550 675 1070	3.90 4.90 7.00 9.60	15.31 16.75 18.00 20.75	12.37 13.56 15.12 17.75	6.03 6.62 7.41 8.69	10.00 11.00 12.00 14.00	12.04 13.16 14.41 16.73	1.50 1.50 1.00 1.12	5.54 6.22 6.66 7.70	7.20 8.00 9.00 10.50	.312 .312 .312 .312 .375	1050G 1055G 1060G 1070G

★ All sizes will be furnished as Type G20 unless otherwise specified on order. Sizes 1060 and 1070G available only as Type G20.

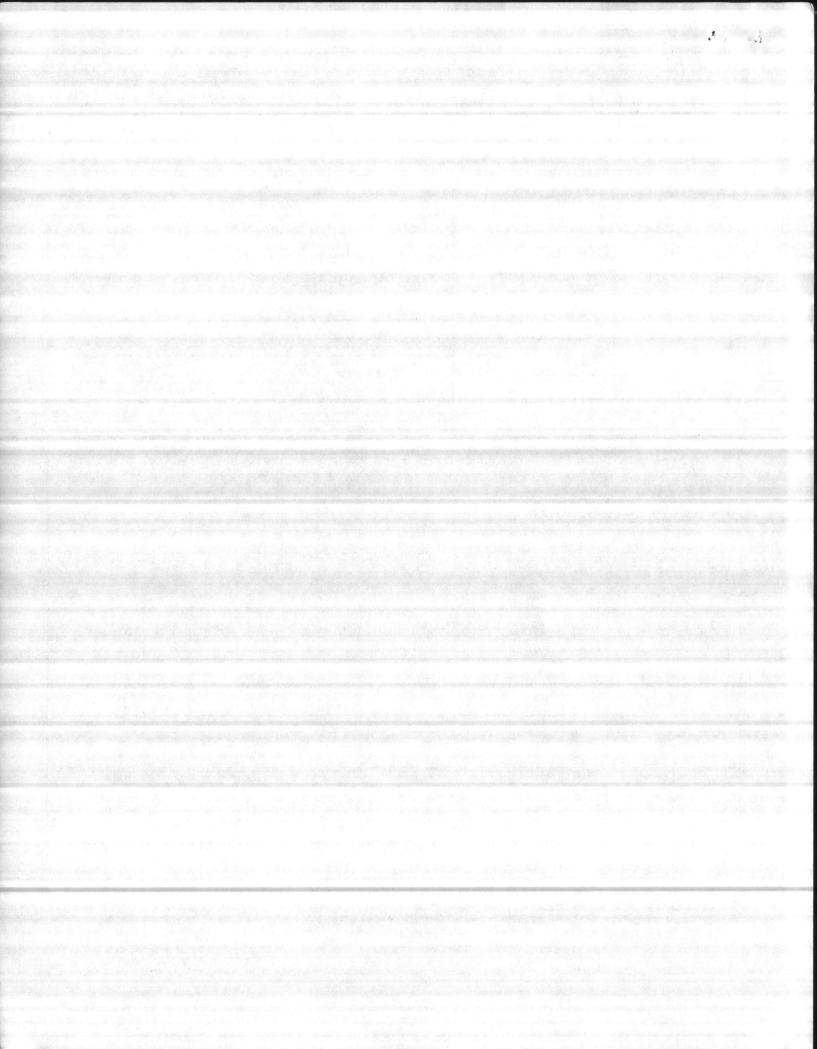
* Consult Factory for higher speeds.

 Couplings are normally furnished with an average interference fit of .0005" per inch of shaft diameter, unless otherwise specified.

Dimensions are for reference only and are subject to change without notice unless certified.

× _	6 <u>↓</u>		ACC	SLEEVE SEAL RING	THRU I- OVER H1/2" TO OVER 3" TO OVER 4" TO OVER 5" TO	/2" NOM 0 3" NOM 4" NOM 5" NOM 6" NOM	TERFERENCE FIT . SHAFT DIA00 . SHAFT DIA00 . SHAFT DIA00 . SHAFT DIA00 . SHAFT DIA00	01/0005 02/001 03/0015 035/002	
E			1	HUB	MIN. BO MAX BO				
4	1111	11/1/			CON	MON	PARTS		
-	-3/32-	-31/32-		PART	DWG. NO		NO	TES	ange Ange
	-	-3		ACCESS- ORIES	A00343A #	9 0	(I) SET P	ER UNI	т
	and all and a second		83	SLEEVE	A00343A #	68 ®	(2) REQ'D	PER U	NIT
્પ	•		- 6		A00343A#	67 3	(2) REQ'D	PER U	NIT
J			1	HUB	SEE BELO		(2) REQ'D		
1	-7				OPTION		ASSEMBLY	•	
-	-77	EARANCE REQ	10		END FLOAT	, LIMI	TED TO 416		
	NOMINAL			98 CPLG.	END FLOAT, L	IMITE	0 TO 3/32*(P.	HENOLIC	DI
NO.	SHAFT DIA.	KEYWAY	NO.	SHAFT DIA.	KEYWAY	NO.	SHAFT DIA	KEY	WA
01	2.250	1/2 × 1/4	17			33			
02	3.625	7/8 × 7/16	18			34			
03	3.375	7/8×7/16	19		- 1 / 1 Mar - 1	35	8		- 12
04	1.9375	1/2 × 1/4	20			36	MF		-
05	3.000	3/4 × 3/8	21			37	22 TER		
06	3.125	3/4 x 3/8	22	Augurtus	and the second	38			di se
07	2.750	5/8 × 5/16	23	and the second second		39	27384 2093	BMD	
08	2.562	5/8 x 5/16	24			40	003	HSH	
09	2.438	5/8 × 5/16	25			41	DS SER. N OMER F	ACKWASH	
10	3.125	3/4 × 1/4	26		5 - 100 - 2.	42	DS S DME	NO.	
11	SEE #189	ante en ser en en settemente Antes en ser en settemente e	27		an ann an thairte an th	43	Include 1.0	ERVI	·
12	2.875	3/4×3/8	28.			44	004	E S	
16	2.375	5/8 × 5/16	29			45			
13		Sec. Sec. Sec. 12	30	1 . Second		46	er september i de	14	t.
	1		31			47			
13							Sugar manager		1999 1999 1999
13 14 15 16			32	estilo en de la constant Sette		48	B. B. Barris and Street Street		-
13 14 15 16 8	DED LIMITED	END FLOAT E.W. L.4.79	32	050#13 REV	ISED BORE	48			
13 14 15 16 8 0 1	DED LIMITED TION CHART. WAS FOOL, @WA 03 DA DDED #03 -7-77 EVE	5 -002, @ WAS	32 10 0.5	050 #13 REV 6.30.81 SPE C.30.81 SPE EV DOGD # 04 0050 # 04 0050 A 06+ m.P. 2-8-78	E 8-31-81 FAZ	11	DD. #08 \$ #	#09 4/	5/

-



GOULDS PUMPS, INC.

QUALITY CONTROL PROCEDURE

OCP NO. 530 REV. NO. 1

PAGE 1 OF 1

TITLE: STANDARD PAINTING PROCEDURE

PURPOSE: This procedure describes the standard steps taken in the preparation for and painting of pumps.

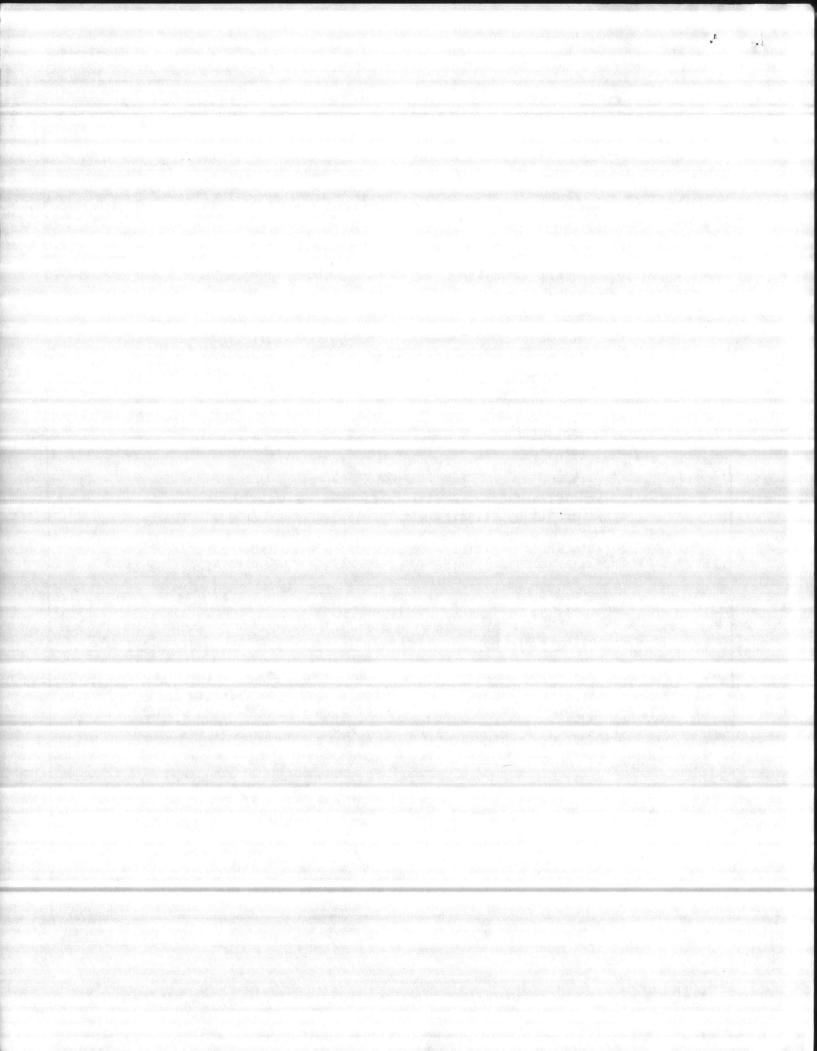
SCOPE: This procedure is applicable for E.P.D. pumps.

PROCESS:

A. Surface Preparation

- Hand and Power Tool Cleaning Remove all loose rust, scale, weld splatter and other foreign material by one or more of the following methods:
 - a. Power Tools
 - b. Hand Chipping
 - c. Scraping
 - d. Sanding
 - e. Wire Burshing
- Solvent Cleaning Remove all oil, grease, dirt, soil and other contaminants by cleaning with Varsol, Acetone or equivalent.
- Surface Irregularities Small surface pits and surface irregularities are smoothed using Martin Senour #6375 Red Oxide Lacquer Glazing Putty or equivalent.
- B. Paint Application
 - 1. Paint shall be applied with clean standard spraying equipment or clean brush as necessary.
 - Unless otherwise specified on the Factory Order, all surfaces to be painted receive a minimum of 1.0 mils of Goulds standard A.D. enamel (Voplex #450-13537, End Suction pumps or Voplex #450-21170, Double Suction pumps).

DATE OF ORIGINAL ISSUE May 9, 1977 Mfg. Theflin Eng. (Will	1
	1 111.1
DATE OF REVISION 9/27/83 Markt. Meet Mfg. Serv.	
Form No. 9609-QC Mat'l W.S. Hetelian Prep. By	ten



GOULDS PUMPS, INC. SENECA FALLS, NEW YORK 13148

Certificate of Conformance

		Manufacturing	 Street of the second	-
Serial No	3B632	Size	14x16-18	

Customer's Pump Description _____ Backwash Pump

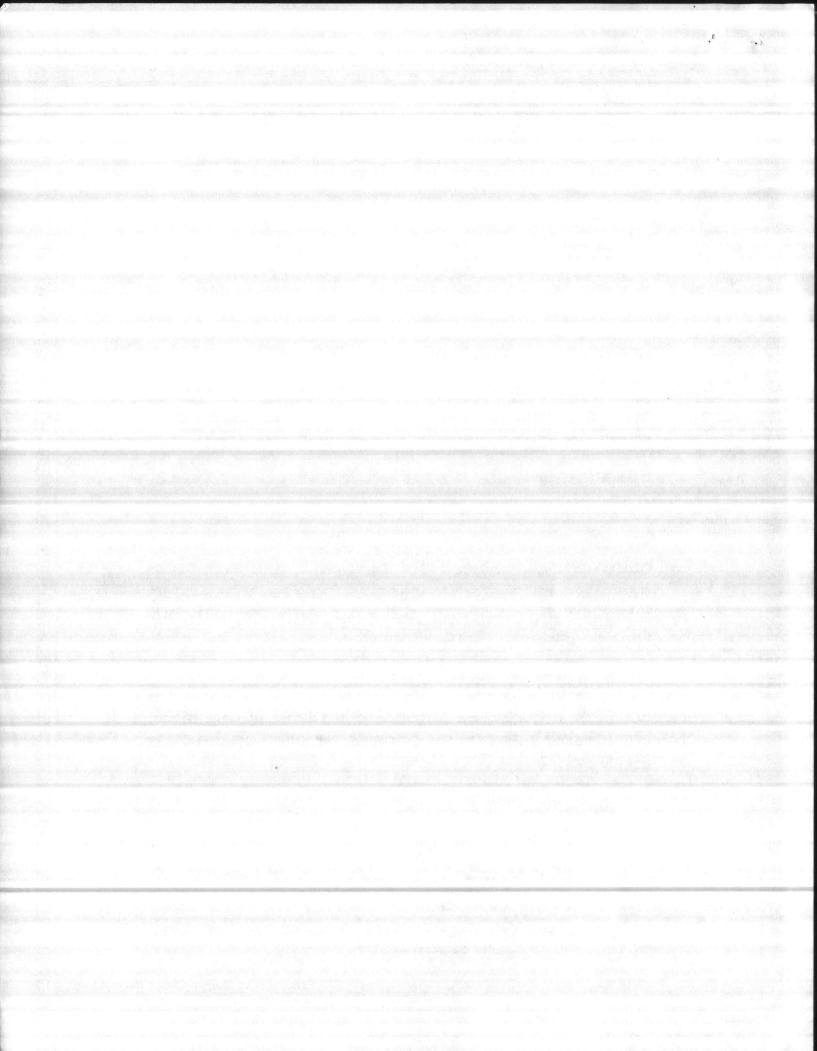
Cust.	P.0	. No.	35366-2093	Model	No.	3415 S	

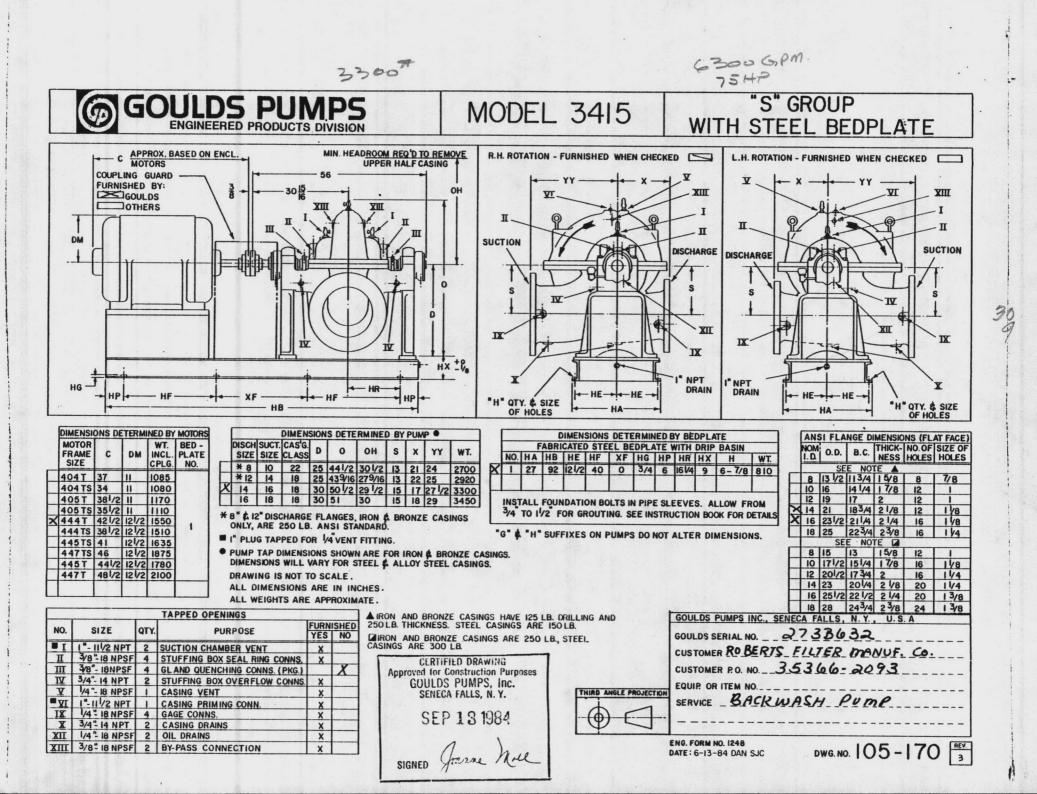
Specification _

We certify that the customer's Purchase Order requirements have been complied with and the materials used in the construction of the above described pump(s) and/or part(s) are in accordance with the specifications.

Applicable for repair parts: We certify that repair parts are new and unused and are equivalent and/or interchangeable with original parts as supplied on the original Pump Order.

Quality Assurance Department



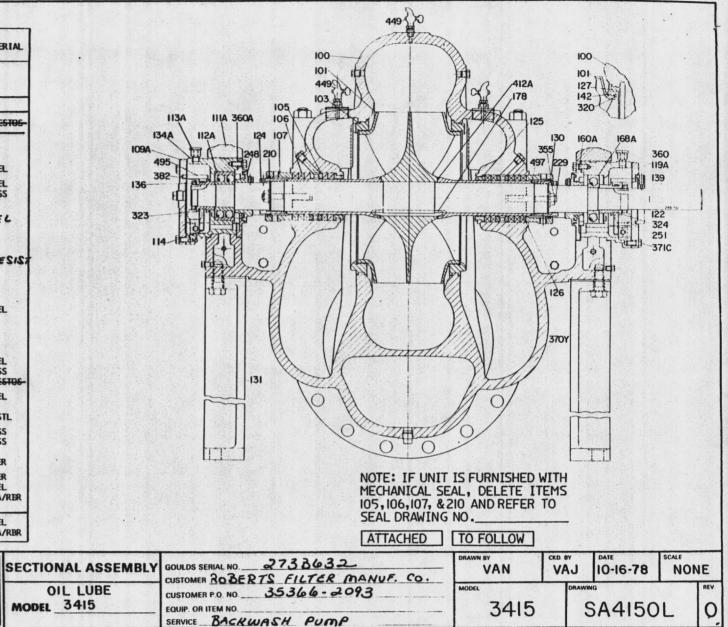


• 2

		BILL OF MATERIAL	
I TEM ND	QTY PER PUMP	PART NAME	MATERIAL
100 101 103	1 1 2	CASING IMPELLER 	C1 C1
105	2-	-LANTERN-RING	
106 107	-1SET		ASDESTOS
109A 111A 112A	1 2 1	BRG END COV - CPLG BEARING CAP BALL BEARING - THRUST	CI CI STEEL
113A 114 119A	2 2 1	Breather Oil Ring End Cover - CPLG	STEEL BRASS CI
122 124 125	1 1 2	, SHAFT SLEEVE NUT STUFFING BOX BUSHING	STEEL CI CI
126 127 130	2 2	SHAFT SLEEVE CASE WRG RG-IMP WR RGS SLEEVE NUT	CI NI. RESIS
131 134 136	2 2 2 2	PEDESTAL BEARING HOUSING BEARING LOCKNUT	CI CI STEEL
139 142 160A	1-3 2 2	DUST COVER IMPELLER RING BRG END COVER	
168A 178 210	1 1 2	BALL BEARING - CPLG IMPELLER KEY 	STEEL 303SS
229 248 251	4 2 2	SWING BOLT (NOT SHOWN) OIL THROWER SIGHT OILER	STEEL CI GL/STL
320 355	6 4	Set Screw-IMP WRG RG Hex NUT-SWING BOLT (NOT SHOWN)	303SS 316SS
360	2	GASKET END COVER	PAPER
360A 382 412A	2 1 2	GASKET-BRG HSG COV BEARING LOCKNUT O-RING IMPELLER	PAPER STEEL BUNA/RBR
449 495 497	2 2	VENT-COCK RTNG RING - DIL RING D-RING SLV NUT	STEEL. BUNA/RBR

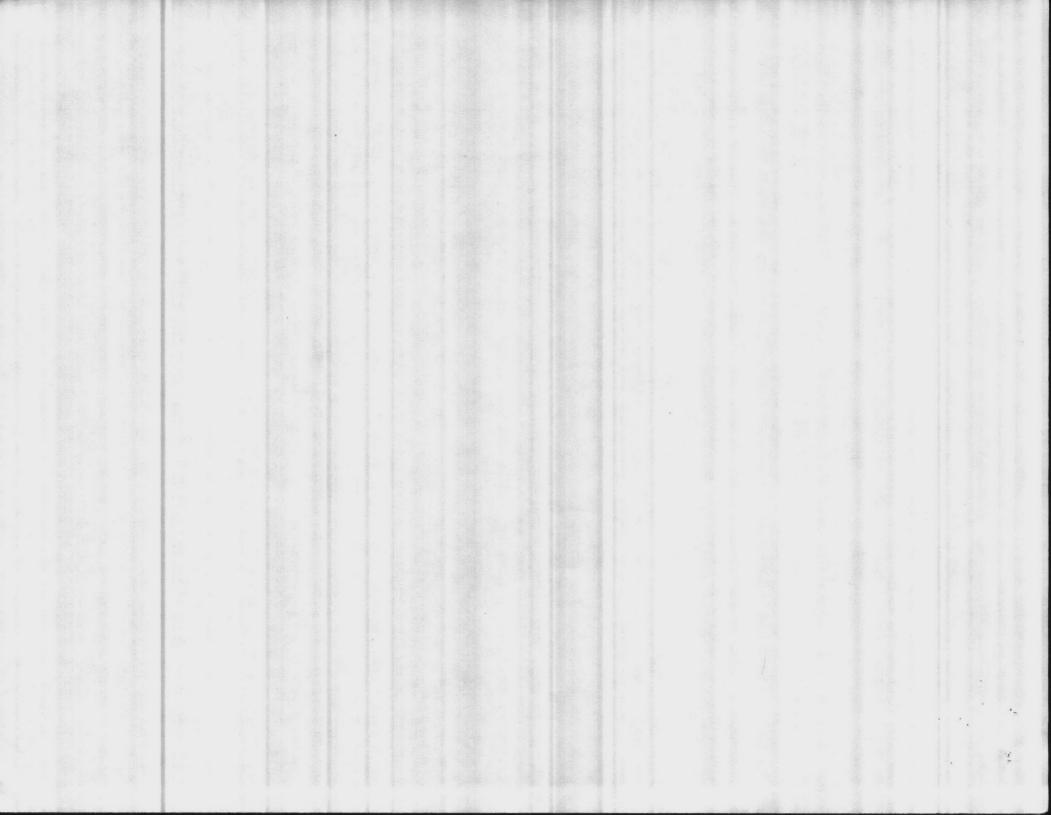
GOULDS PUMPS, INC. ENGINEERED PRODUCTS DIVISION

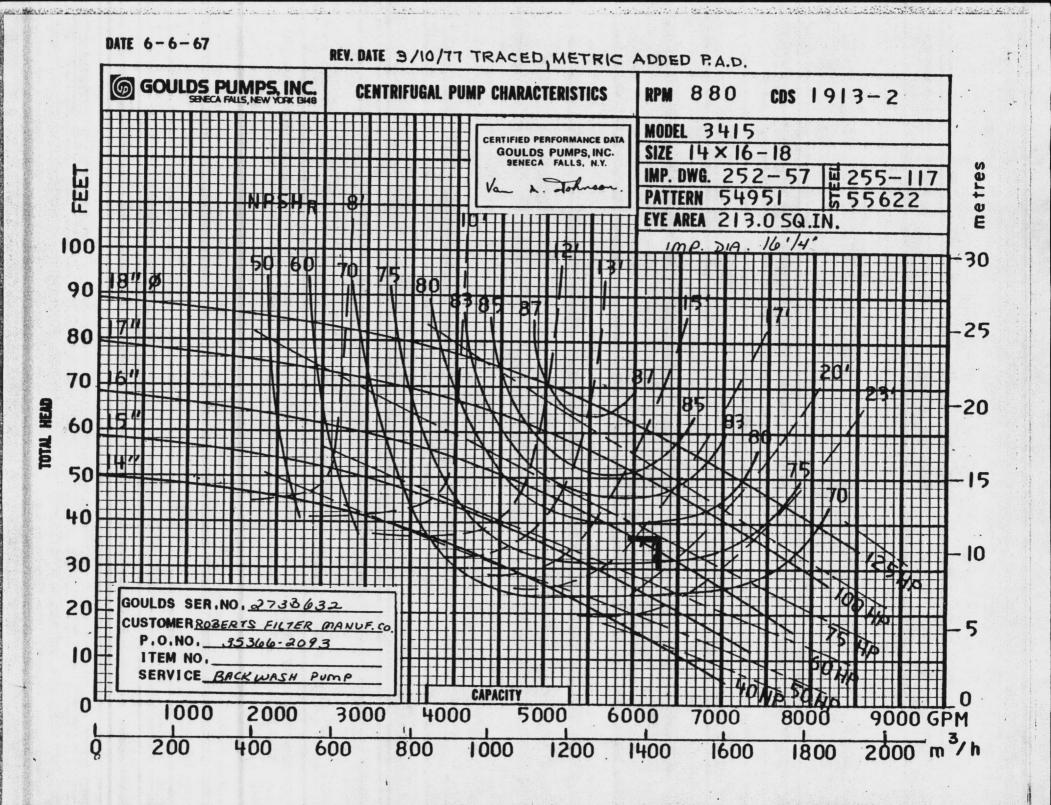
SENECA FALLS NEW YORK 13148

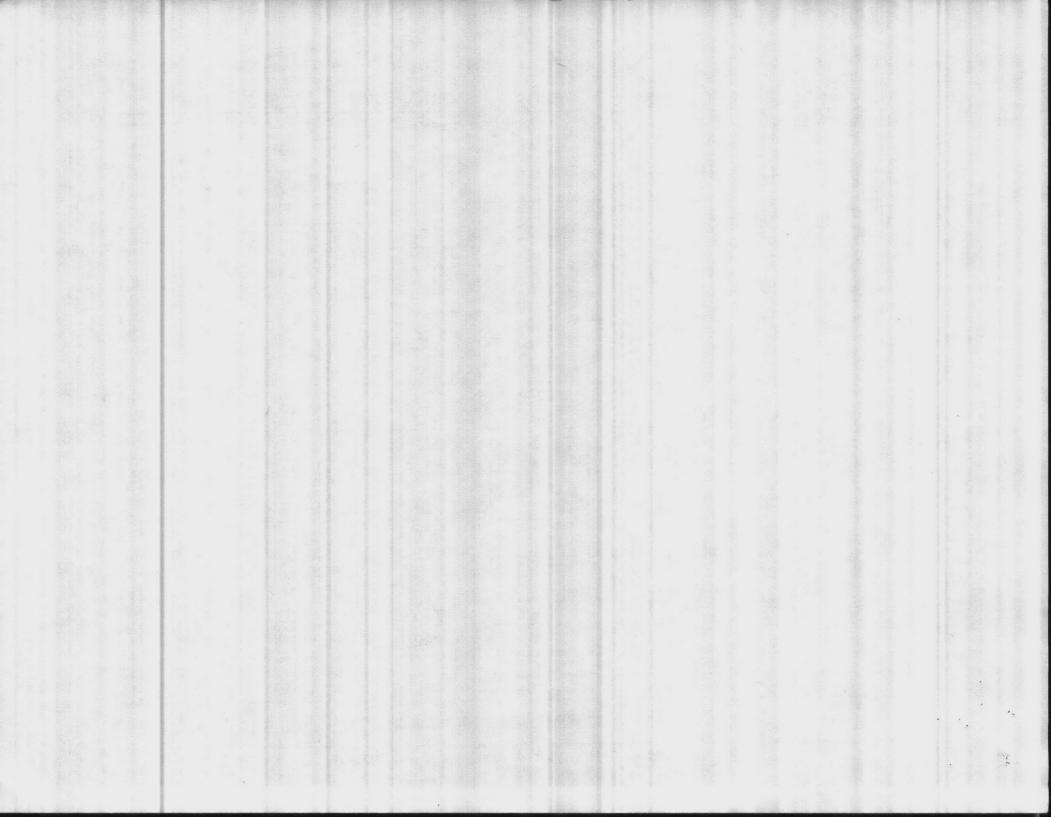


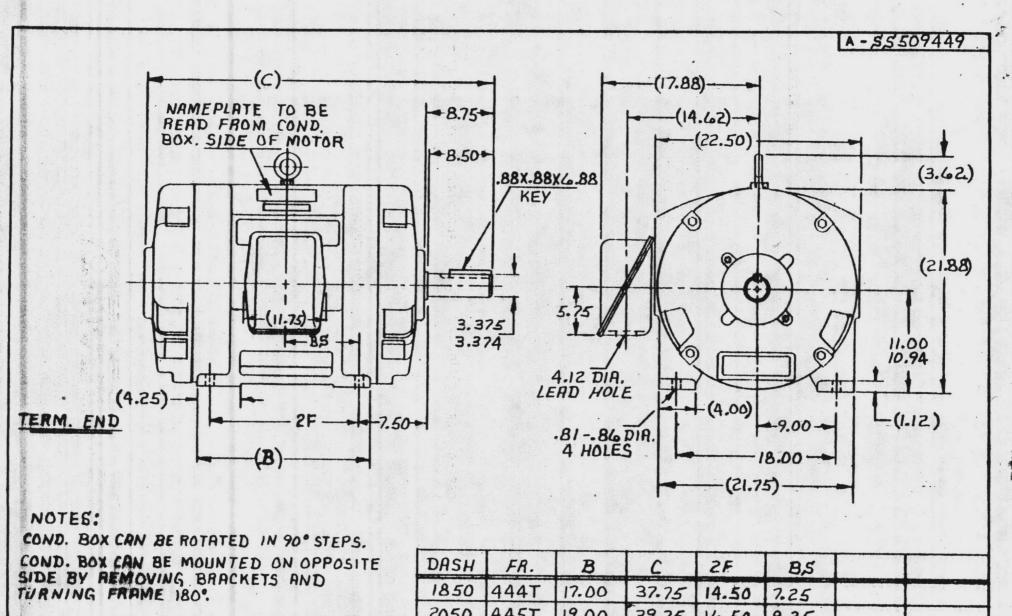
OIL LUBE

MODEL 3415

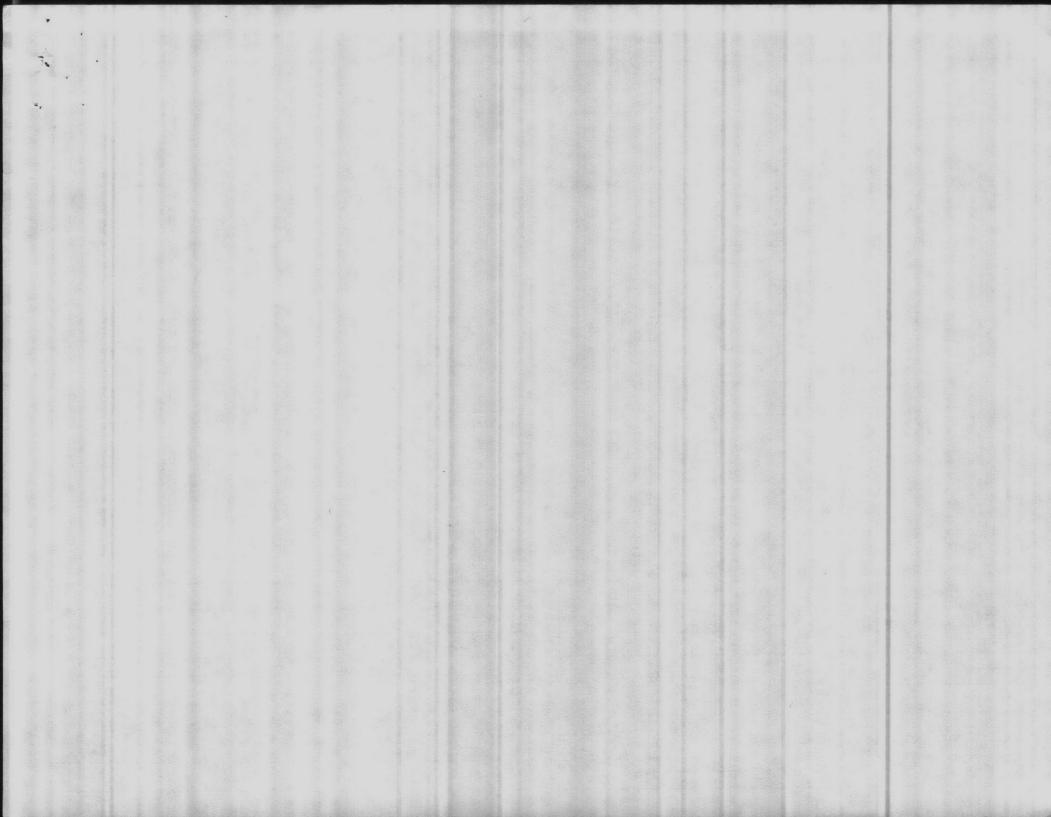








		2050	445T	19.00	39.75	16.50	8.25	1 S. 10 S. 17 S. 18	
GOULDS SER. NO. 273 R 632 CUSTOMER RODGETS FATRE MAN P.O. NO. 25366-2093 ITEM NO. SERVICE BACKULACH PUMP	The state in the second state in the second	FMF	RIC DRAWING # nunout true positin nound true positin true positin	SYMBOLS: CONCENTAIC Dr - SYMMETRICAL PROFILE OF A PROFILE OF A	UNLESS OTHEF TOL ON XX ± MATL SPEC FINISH	ARA	DIMENSIONS ARE ± 005 X		ANGLES 17'30" AFACE UGHNESS UNLESS HERWISE NOTED 11.17.81 11-18-81 11-20-81
AND UPDATED	NAME	PART NAME O	R DR	. PR	STD.		Dwg	S\$ 509	





CERTIFICATION DATA

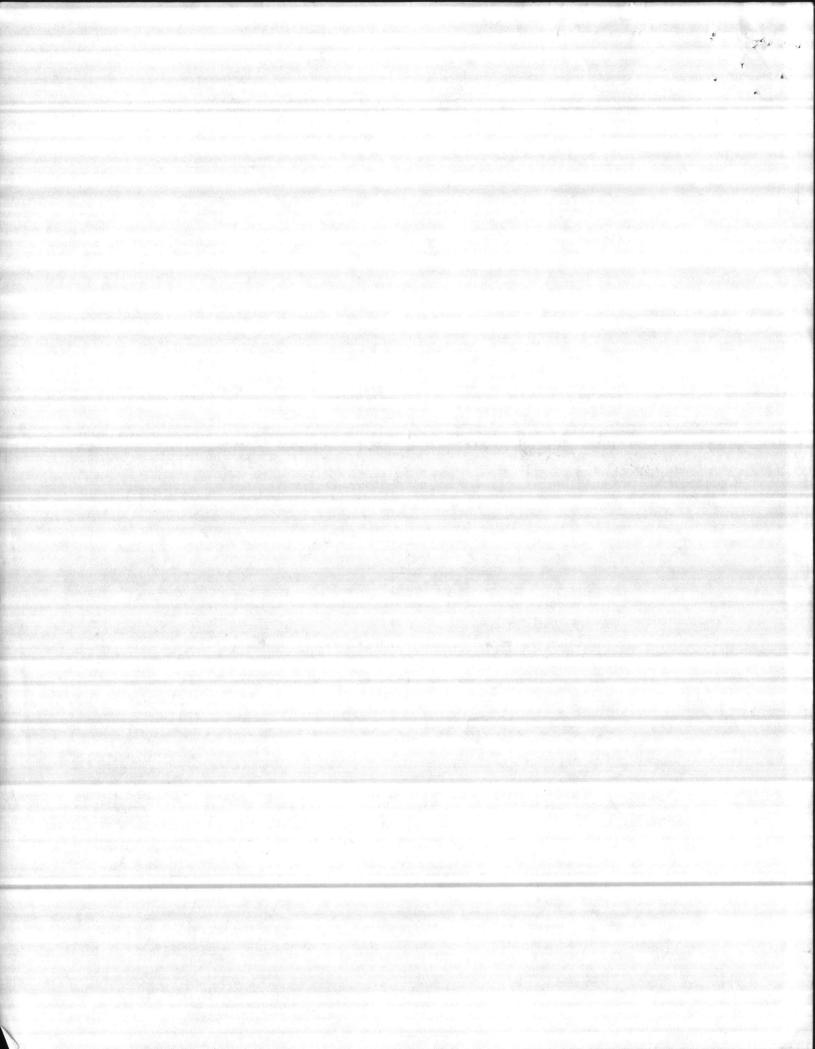
CUSTOMER Goulds Pur	nps, Inc.		
CUSTOMER ORDER NO.	M26710 F.O.27363	2	
M.E. ORDER NO. 3162	2756 MODE	L NO. 444TTDS7404AN	
TYPE TDS	FRAME 444T	HP/KW 75 HP	RPM 900
C¥C 60	PH 3 VOLT	S 460	CL. OF INSUL. F
DUTY Continuous	AMB 40°C	ENCL DP	BRG Ball

SUPPLEMENTAL INFORMATION: Outline Drawing A-SS509449-1850

272 8122	
GOULDS SER NO. 273 B632 CUSTOMER LOBERTS FILTER MA	WEACTURING CO .
P.O. NO. 3.5366-2093	_
ITEM NO.	
SERVICE BACKWASH PUMP.	_

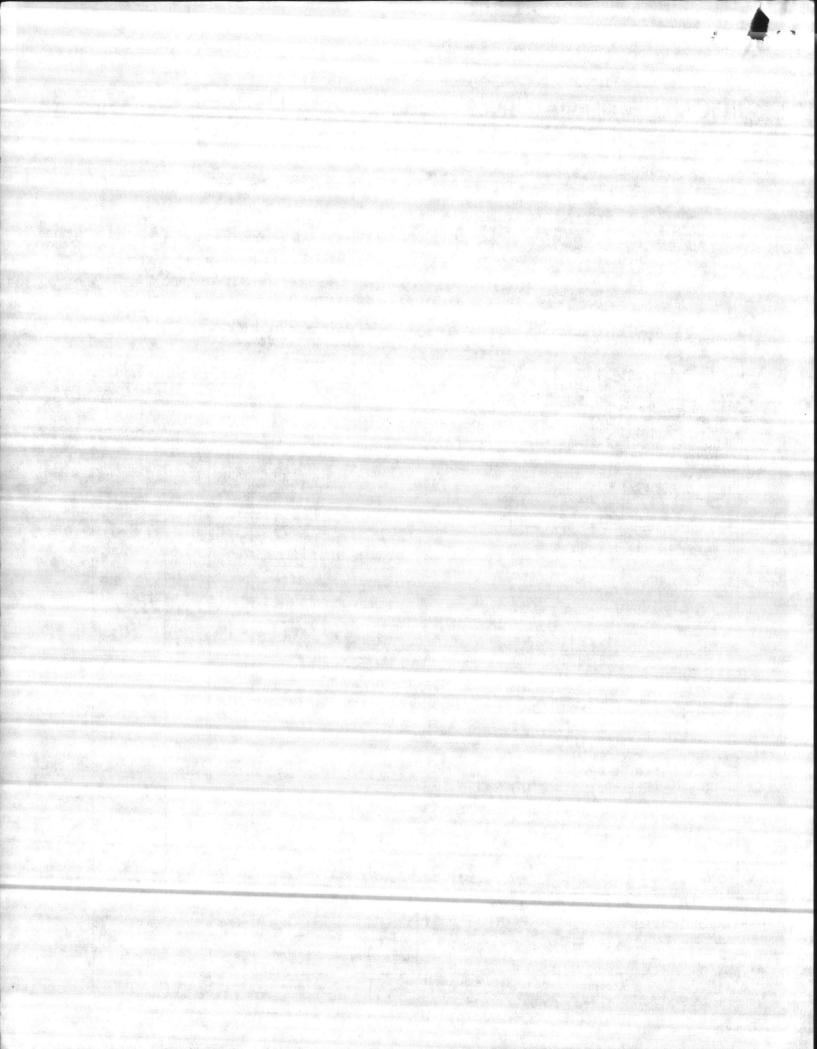
CERTIFIED BY Bruce Aho

DATE September 12, 1984

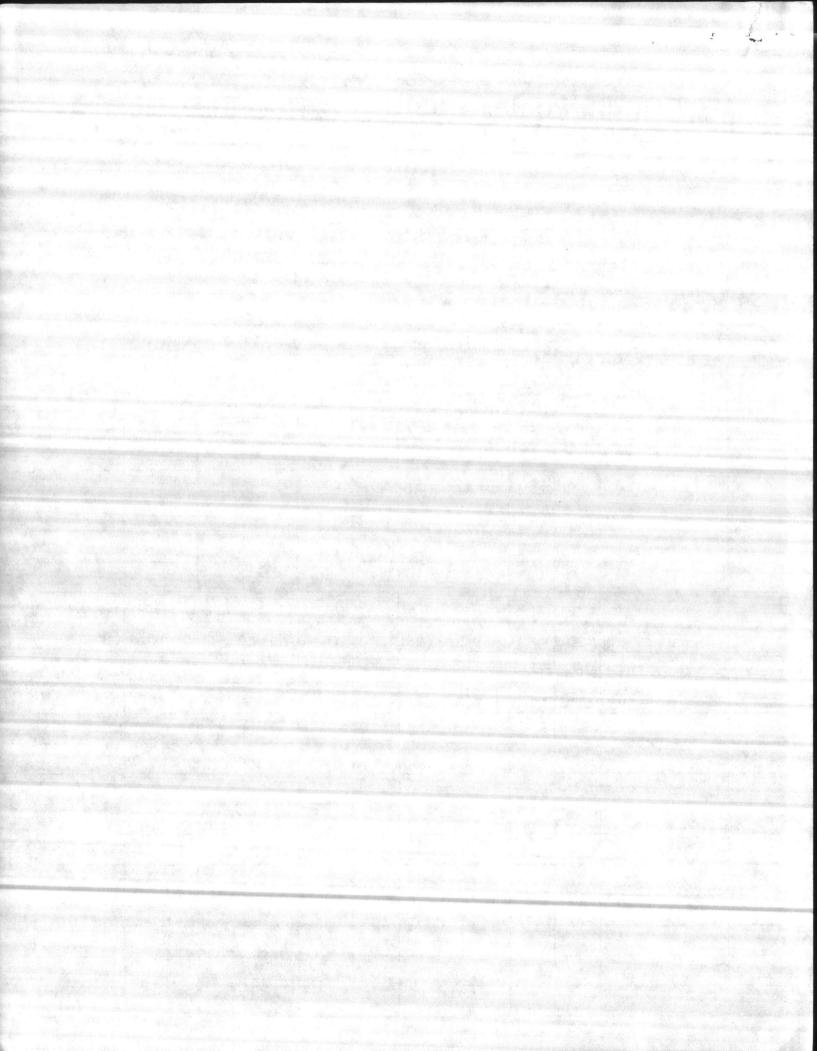


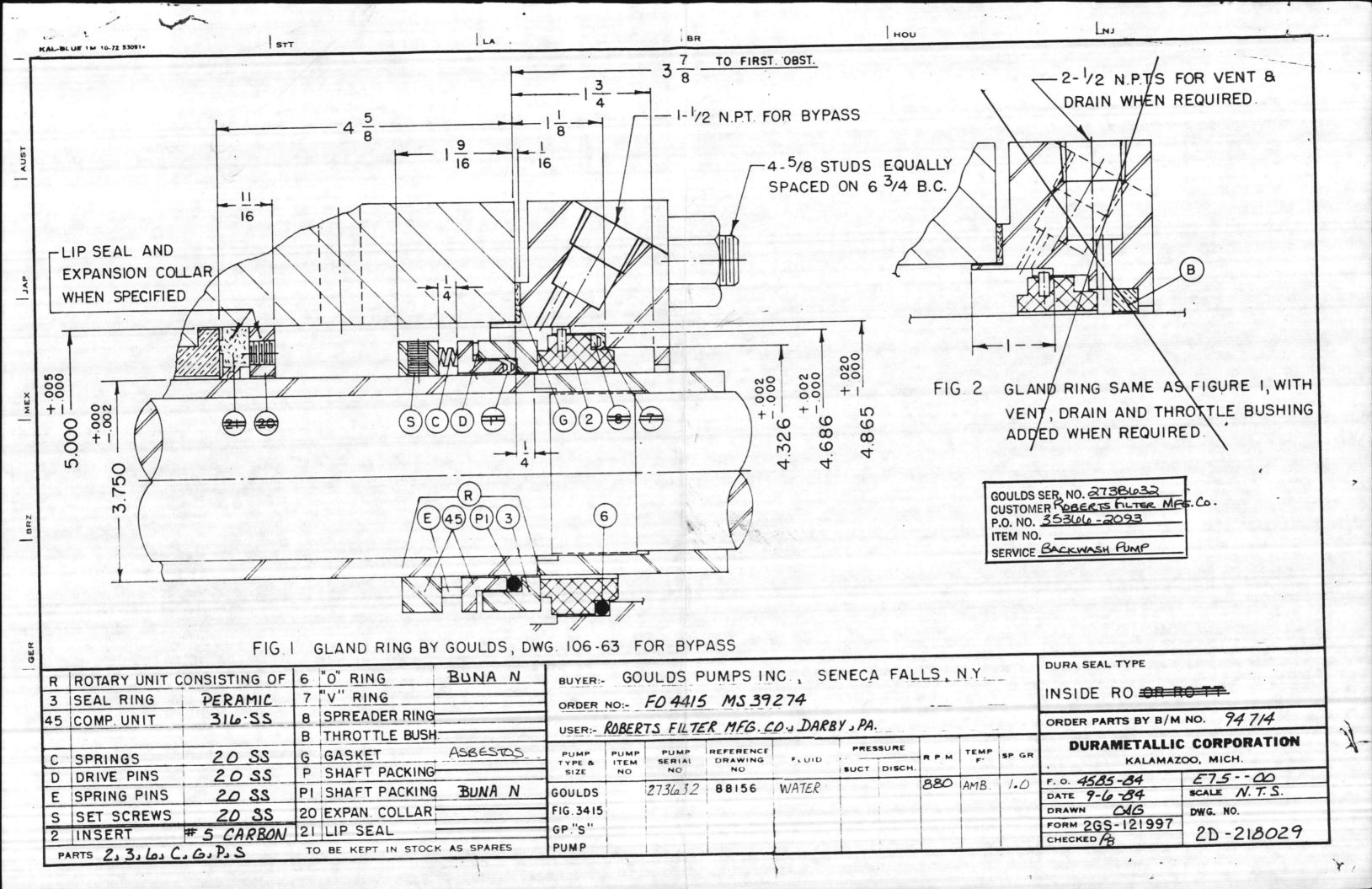
Te					NC		1997) 1997) 1997)	LOAD	6	ALLO	CATION	PAGE		Service -	3632
G	GOL	SENE	CA FALLS	NEW YORK	(13148	DUNS	222-5100	START		COMP	LETE	1 0	-	INVOICE N	Contractor de la contraction d
CUSTO		366-209		G. P. ORDER					DATE	SHIPPE	ID .	-			
AND D	ATE 8-	15-84 J	L	NUMBER	27363	2 🧃		PAR	T B/M	- all		TE	RRITOR	IY	
٦.	RC		ILTER M	ANUFACTUR					P. B/M	4					
				UMBIA AVE NIA 1902		÷.		COM				TERMS:	NET 30	DAYS	
F				4) 4)	n en 1977 Synasteria	per terretari antidati ang		ON AS	SEMBLY	S	S UBJ. T	FOR LA	TEPAY	MENT	
				Sugar 1	Na se sas			T		ale in	an de la		Sec.	Meret 4	tin (gilar)
	ro DE	STINATI	ON & RO	UTING LAT	ER			-	O.B. SEN	And the second	LLS, NLY. #	2 SHOP			
						- (Fr - 10) - (Fr - 10)									
MA		366-209	5					SHIP W	тн	nin en Nordel			1	APPROX, S	
		PREP	and the second second	D. IN ORDER DEF	There							•		MIPPING	UATE
	H ORDER NO.	UATE	8-27-8			3-29-84	•	N	PARTI	AL (IF C	HECKED)			D.	.o.A.
OTY.	P.O. ITEM NO	Station and the					AL NO. 738632		1963	de la	QTY.	UNIT		OTAL	NE
UND.	SERVICE [RO	T. CONST.		, ,00,2	SE	P 1	5	SHIFFED	FRICE			
1	3415		14X16-		and the second second	.1.				1					1.
	<u>с.р.м.</u> 6300	T.N.H. 37	14	LIQU	ID	94	TEMP.	SP. GF	the state of the s	79 x		an in			
	0500	(1							NPSI 18	HR	and the				1.2.1.1
	IMPELLER	PELLER 164" DIA DRAWING 252-57 PATT. 5495								RESS					
	IMPELLER	1708	DIA. DRAWING PATT.							etter en t Start	sec. S	a ng kab	12.2		
	M	TOR	н.р. 75	880	ASE CYCLES		460		FRAME	Т		n an an Carl at a			
	0.D.	P. 1.1	S CLARKER SHITTERS IF	NCLOSURE			DWG		COL	DE	dig- And	alexa e			
	FACTOR		WILLNO		M26	5710	DA		LEXBI						1.1.1.1.1.
	FACTOR			ADDITIONS, MO	1				CC.DI		44				
	1.		BEDPLAT		1 14	Aller .	Augh-			a internet			作りた		
に影	2.3.		GUARD	3		and and							18		
	4. 5.			RING RING EAL ON PA											in the second
		ka majera s	in an air an												- 9. N
時代に								•			ester	Rent of a			
er en fils	*DWG 40	91748 A		•	1998 - 19	and the second second				i Sont	n Lange des		- pro-		
PURNIEH ONLY WHEN CHECKED	PERFOR	and the second	IT. NON- WIT.			a la la	and the second	DARD ENGR	DATA		Aline				
CHECKED	NPSH				bioteco de ser dego					PRINTS	Ka				
10000 260	NOISE	01			n an		SECTIONALE			REPRO	gengessters oprå se		opticies optication		
	VIBRATI									5 10 10 1					and the second second second second

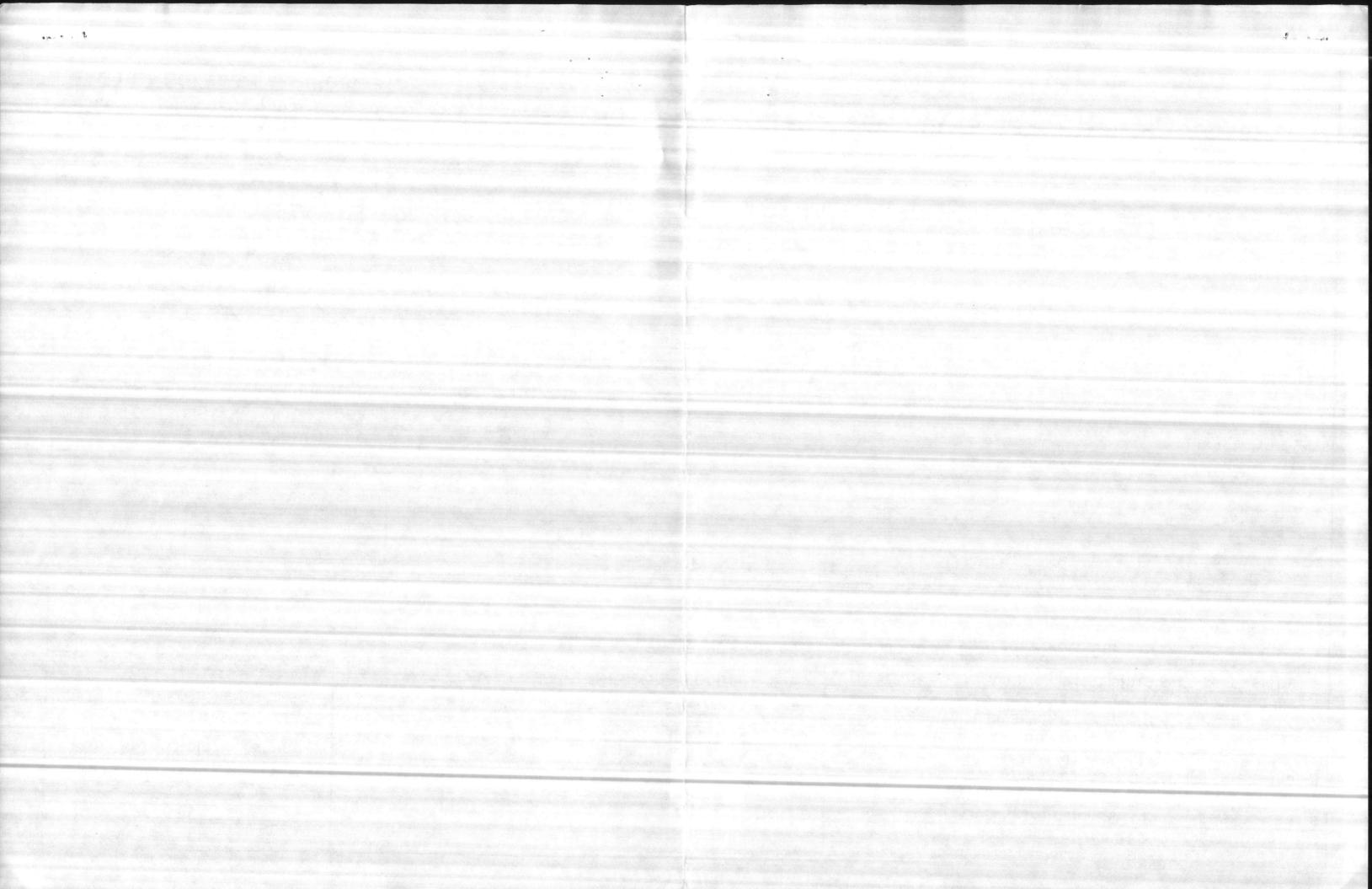
E.



	GOULDS PUMPS, INC. SENECA FALLS, NEW YORK 13148							MECHANICAL SEAL CONT. SHEET					
	AGE 2 OF	3	ROBERT	S FILTER MF	=G. CO.		FACTORY O	RDER N	10.	273632			
UANTITY	seal mfgr. DURA		RO	соре Е7500	size 3-3/4	MFGR. RE 2GS-12	1997	El constantion Second	STUFFING BOX DWG.				
		"O" RING	MOUNTED	DETAILS		art fra	20 -	2180	29				
July -		ST		STATIONARY SE	EAT			SEAL	INSTALLATION				
			PLAIN			OTHER		<u> </u>		SLAND MATERIAL			
and the second s		AL BY PASS	WITH BUSHING)			
	MS 39274 UP SEAL YES AMFGR.	NO 🗌		MAL	EXPANSION MATERIAL	COLLAR	1	D. AND	O.D.	P.O. NO. (UP SEAL)			
	DESCRIPTION	MDL NO	. SIZE		R CLASS.	ITEM	UNIT LIST PRICE	QUAN.		NET AMOUNT			
i ja Mina	and the second secon		1. 2.5										
	FURNISH W/10	007 NI-	RESIST	CASING WEA	ARING RIN	s			ng ang taong ta Taong taong taong Taong taong				
		A.		No					an an Aliana An Anna An Aliana				
t a Mart	ALUMIMUM SU	FACES	SHALL	NOT BE PAIN	NTED.	1 1 1	1.00	2.00					
- 1960,975 		1 Sugar	and the second										
	THIS ORDER	IS CER	IFIED	FOR NATION	AL DEFENSI	USE UN	DER DMS	REG.	1, PRIOR	NITY DOC-2.			
	YOU ARE REQU	IRED	TO FOLL	OW THE PROV	VISIONS O	DMS RE	G. 1 & D	F ALL	OTHER A	PPLICABLE			
	REGULATIONS	& ORDE	RS OF	BDSA IN OBT	TAINING CO	NTROLLE	D MATERI	ALS &	OTHER F	RODUCTS			
an could the	& MATERIALS	NEEDE	TO FI	LL THIS OR	DER.	1			in hydro	is provide the			
i san Tan								AN. No.					
- (Ø.)		4.5	1. N. 1	and Constants		1		en e	y lan Area an	e Mersen and			
		and the											
		1.	1000			and a second sec		tra napri	a na sana ang taong ta	na analas analas			
						1	50 A		ne de la composition de la composition La composition de la c				
and the second						and and a second		23. 1911 - 1911 -					
1999 (1999) - 1999 (1999)		100 800 100 800 90 100 80	1			-			an an sin sin sin sin sin sin sin sin sin si	ger Berner des artes des services			
		1.12 (1.14) (1.14)	n an			122 - 14 - 14 - 14 - 14	i de la companya de		an a				
ander og det der Gesenen stange		i gani n		in Samerika			ung (67) Langer (86)		ng Ward Right Talend Ng Kabupatén Karana Talah Kabupatén Karana				
A CONTRACTOR OF A CONTRACTOR	and the second	1			- por deserve and the	and the second second second	The state of the	100		The and the second second second			



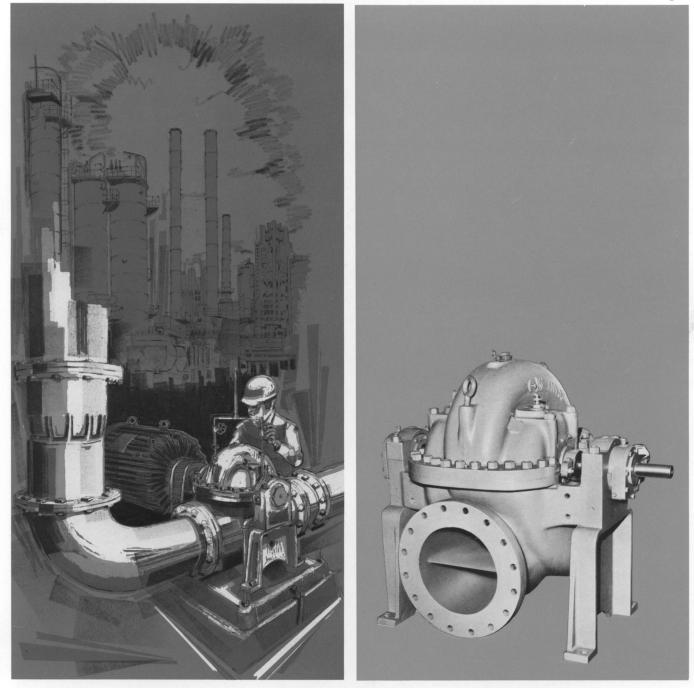


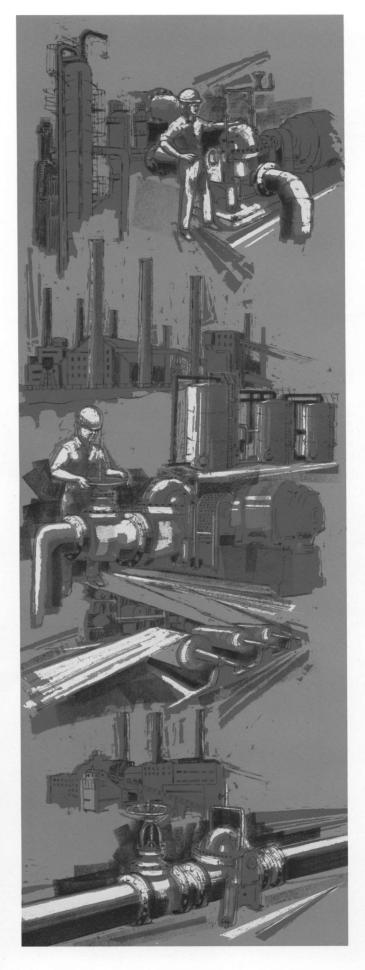


BULLETIN 721.7 May 1978

• GOULDS PUMPS

Goulds Model 3415-DV Single Stage, Double Suction, Dual Volute Pumps





Goulds Model 3415-DV

Double Suction Pumps Designed for Wide Range of Services

- Capacities to 19,000 GPM (4270 m³/h)
- Heads to 570 feet TDH (174 m)
- Temperatures to 275° F (135° C)
- Pressures to 275 PSIG (19.3 kg/cm²)

Design Features

Horizontally Split Casing Suction & Discharge Nozzles in Lower Casing Ease Inspection and Repair.

Double Suction/Dual Volute Design Assures Axial & Radial Balance; Long Life—Low Maintenance.

Enclosed Impellers Hand Finished & Dynamically Balanced.

Wear Rings Easily Replaced, Protect Against Casing Wear. Hooked Design for High Efficiency and Low NPSH.

Maximum Parts Interchangeability Reduces Inventory Requirements.

Suction & Discharge Common Centerlines Simplify Plant Design.

Services

Process Quench Water, Stripper Bottoms, Reboiler Circulation, Cooling Tower

Pulp & Paper Primary and Secondary Cleaner, Filtrate, Mill Water Supply, Fan Pump, Headbox Supply

Primary Metals Cooling Water, Quench, Lubricating Systems for Rolling Mills, Leaching

Municipal High Lift, Low Lift, Filter Wash Water, Waste Water, Raw Water

Utilities Cooling Tower, Component Cooling, Service Water, Recycle Water, Chemical Cleaning

Marine Bilge and Ballast, Cargo, Cooling Service, Fire Pump

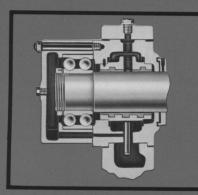


Model 3415-DV Double Suction — Dual V

Heavy Duty Design Features for Wide Range of Industry Se



OPTIONAL IMPELLER WEARING RINGS Can be mounted on impeller without additional machining of impeller. Locked on impeller hub with stainless steel set screws.



OPTIONAL RING OILED SLEEVE BEARING WITH BALL THRUST BEARING

HIGH THRUST CAPABILITY — With double row thrust bearings and shaft lock nut.

HEAVY DUTY SHAFT Designed for toughest services. Renewable shaft sleeves fully protect shaft from pumpage.

STUFFING BOX BUSHING

Protects casing from wear; are easily replaceable. Double lock. RENEWABLE CASE WEARING RINGS

Permits easy maintenance of proper running clearances. Double lock in ____ lower half casing to prevent rotation. Hooked (shrouded) configuration to guide flow into impeller eye and decrease recirculation; reduces NPSH required and improves efficiency.

DOUBLE SUCTION IMPELLER

LE

Minimizes axial thrust, assures smooth, vibration-free performance. Staggered vanes and center shroud available on most sizes.

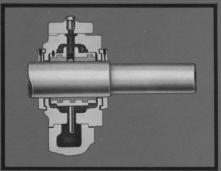
olute Pumps

THE THE

UPPER HALF CASING

Permits inspection, maintenance or removal of complete rotating element without disturbing piping or alignment.

LABYRINTH SEALING OF — BEARING HOUSINGS Prevents contaminants from entering oil and bearings.

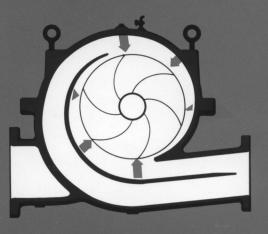


OPTIONAL RING OILED SLEEVE BEARING COUPLING END

OIL LUBRICATION STANDARD Oil level maintained by constant level oilers.

Balanced Design

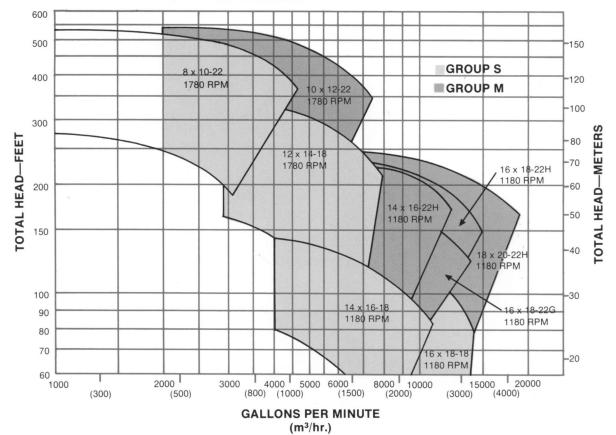
Goulds Model 3415-DV dual volute casing design is ideal where pumps must periodically operate at capacities above or below design capacity or at uninterrupted high head. Essentially, this design equalizes radial forces and lessens radial reaction on shaft and bearings. This equalization or balancing of radial forces is accomplished by dividing the liquid discharged by the impeller into two half-capacity volutes with two cut-waters set 180° apart. Radial forces on the shaft and bearings are equally opposed. This principle is shown in the illustration below. Combined with a double suction impeller for axial balance, the 3415-DV provides long life/low maintenance.



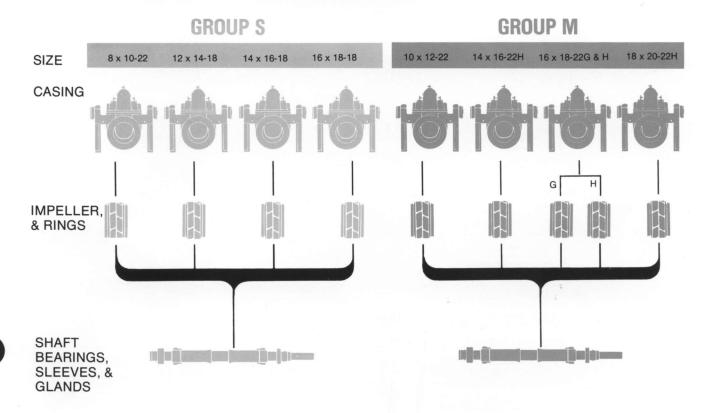
DUAL VOLUTE DESIGN balances radial forces—assures smooth, vibration-free performance.

POSITIVE LIQUID SEALING Buna-O-ring in controlled compression protects threaded area against corrosion.

Maximum Performance



Maximum Interchangeability



			1	Material							
ltem No.	No. Req'd per Pump	Part Name	Bronze Fitted	All Iron	All Bronze	All 316SS	All Iro 316SS Rot. E				
100	1 Upper 1 Lower	Casing	1003	1003	1103	316	1003				
101	1	Impeller	1103	1000	1103	3	16				
103	2	Wearing Ring—Case	1102	1000	1102	3	16				
105	2	Lantern Ring	1102	1000	1102	3	16				
106	1 Set	Stuffing Box Packing			Asbestos	A Startes					
107	2	Quench Gland	1102	1000	1102	3	16				
109A	1	End Cover—(Thrust End)			1000						
111A	2	Bearing Cap, Ball Bearing			1000						
111B	2	Bearing Cap, Sleeve Bearing (Not Illustrated)			1000						
112A	1	Ball Bearing—(Thrust End)	1.25		Steel						
113A	2	Breather			Steel		2000				
114	2	Oil Ring, Ball Bearing			Brass						
114A	2	Oil Ring, Sleeve Bearing (Not Illustrated)		7	Brass						
115	1	Bearing Shell, Upper (Thrust) (Not Illustrated)		(Diass		-				
116	1	Bearing Shell, Lower (Thrust) (Not Illustrated)									
119A	1	End Cover (Coupling End)			1000						
120	1				1000						
121	1	Bearing Shell, Upper (Coupling) (Not Illustrated)									
		Bearing Shell, Lower (Coupling) (Not Illustrated)	0.15	10.10		010					
122	1	Shaft	SAE			316					
124	1	Sleeve Nut (Right Hand)	1102	1000	1102	-	16				
125	2	Stuffing Box Bushing	1102	1000	1102		16				
126	2	Shaft Sleeve	11104	1000	¹ 1104	-	16				
127	2	Case Wrg Ring (For Imp. w/Imp. Rings) (Not Illustrated)	1102	1000	1102		16				
130	1	Sleeve Nut (Left Hand)	1102	1000	1102 316						
131	2	Pedestal			1000		100				
134A	2	Bearing Housing			1000		N. Contraction				
136	2	Bearing Lock Nut (Ball Thrust Bearing)			Steel		1				
139	1	Dust Cover, Otr.			1000						
142	2	Impeller Ring (Not Illustrated)	1102	1000	1102	3	16				
159	1	Dust Cover, In. (Coupling)			1000						
160A	2	Bearing Cover (Inboard)			1000						
168A	1	Ball Bearing—(Coupling End)			Steel						
178	1	Impeller Key			AISI 303						
210	2	Gland Packing		Lubr	ricated Ast	pestos					
229	4	Swing Bolt (Not Illustrated)	Ste	eel		AISI 316					
248	2	Oil Thrower			1000						
251	2	Sight Oiler (Not Illustrated)		5	Steel & Gla	SS					
320	6	Set Screw-Impeller Wearing Rings			316						
323	1	Sleeve, Oil Ring (Thrust)			1000		14. 31. 44. 44. 44. 44. 44. 44. 44. 44. 44. 4				
324	1	Sleeve, Oil Ring (Coupling End)			1000						
351	2	Gasket, Case (Not Illustrated)			Asbestos						
355	4	Hex Nut—Swing Bolt (Not Illustrated)	-		316		1				
360	2	Gasket, End Cover			.0045 Pape	ar					
360A	2	Gasket, Bearing Housing Cover			.0045 Pape						
382	1	Bearing Lock Nut (For Ball Bearing Coupling End)				51	-				
412A	2	O-Ring—Impeller			Steel	or	-				
412A	3		Drass	1	Buna Rubb	1					
449		Vent Cock Retaining Pin (Oil Ring)	Brass	2	Brass	316	2				
495	2				Steel						

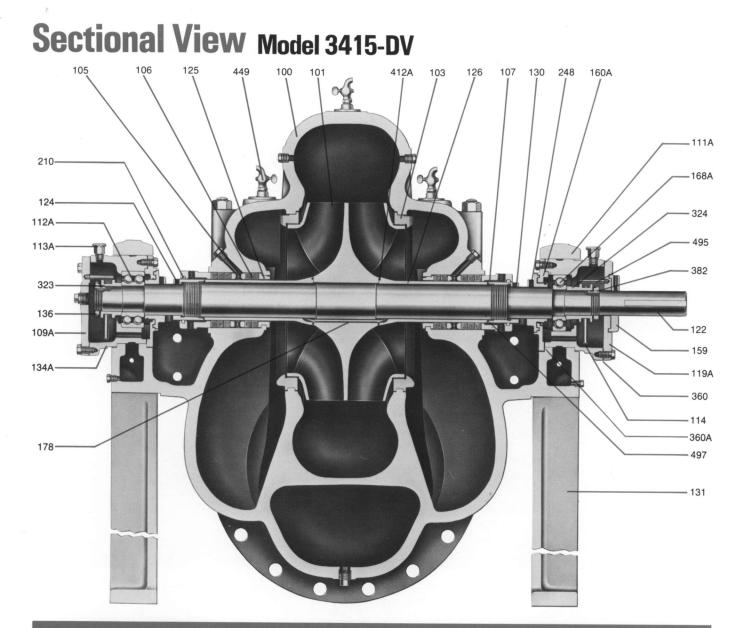
¹S group 1104, M group 1102. ²Vent cock not furnished.

Materials of Construction

Code	Material and Specification	
1000	Cast Iron ASTM A48 Class 25	
1003	Cast Iron ASTM A48 Class 30	
316	Cast Stainless ASTM A296 Gr. CF-8M Wrought Stainless ASTM A276 Type 316	
303	AISI Type 303 Stainless Steel	

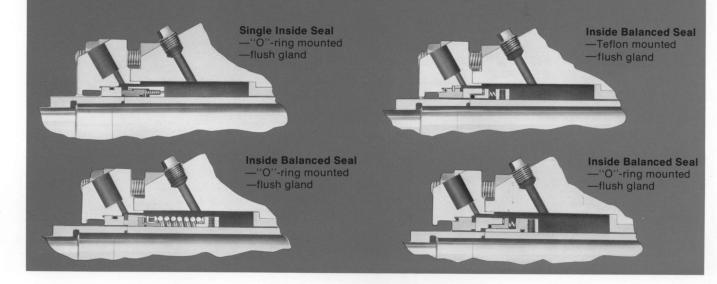
Material	Cu %	Sn %	Pb %	Zn %	Ni %	P %
1102	84-86	4-6	4-6	4-6	_	_
1103	87	6	4.5	1.75	0.75	_
1104	81-85	6.3- 7.5	6.0- 8.0	2.0- 4.0	.5 Max.	.15 Max.





Mechanical Seals

A variety of mechanical seals are available. Conversion can be made from packed box to mechanical seals in the field without machining.



Custom Built Pumps/Standard Parts

Specifications

Casing Horizontally split with upper and lower half dowelled and bolted together. Flanged suction and discharge connections and integrally cast bearing housing seats are located in lower half of casing. Removal of upper half casing permits inspection maintenance and removal of complete rotating element without disturbing piping or driver.

All locks for internal renewable and bearing housing seats are bored in one machine set-up. Assures permanent positive alignment. Dual volute design balances radial load and minimizes deflection. Casing supplied with vent valves, drain plugs, gauge connections and lifting eye bolts.

Impeller Enclosed, double-suction, with staggered vanes. Cast in one piece. All exterior surfaces machined. Interior surfaces or water ways are hand finished. Dynamically balanced and keyed to shaft.

Wearing Rings All pumps fitted with renewable casing wearing rings. Rings permit easy maintenance of proper running clearances, to minimize leakage between suction and discharge chambers of casing. Hooked or shrouded design assists in guiding flow into impeller inlet. This results in improved efficiency and quiet performance.

Casing rings held laterally by double tongue and groove lock in lower half casing; rotation prevented by single tongue and groove in upper half casing. Renewable impeller wearing rings are supplied when ordered. Rings mounted on impeller without additional machining of impeller; locked on impeller hub with stainless steel set screws.

Shaft & Shaft Sleeves Shaft sleeves fully protect shaft from wear. Sleeves are held by a nut threaded to the shaft which is accessible from the outside of the stuffing box. Nuts tighten against rotation and are further secured by set screws. An "O" ring seal at each end of sleeve keeps the shaft dry and prevents

shaft failure due to corrosion. Shaft sleeves are positively driven by the same key that drives the impeller. Keyways at impeller and coupling fits have radius fillets to reduce concentration of torsional stresses. Threaded portions of shaft are maintained outboard of impeller and stuffing box to eliminate failures due to stress concentrations.

Stuffing Box Provided with square packing rings, removable lantern ring, and positively locked renewable stuffing box throat bushing. Tapped opening for water sealing either from pump casing or outside sources, or for use of a lubricator. Mechanical seals can be provided. Split, cowl type gland suitable for use with quenching liquids. Halves bolted together. Provided with packing ring to prevent liquid spraying and travelling along shaft outside gland. Tapped top and bottom connections furnished for quenching.

Bearings Ring oil lubricated ball bearings standard. Double row outboard thrust bearing locked in bearing housing, takes radial and any unbalanced thrust load. Inboard bearing is single row, free to float axially in bearing housing, takes radial load only. Both bearings pressed on shaft and held with lock nuts. Constant level bottle oiler maintains proper oil level in oil reservoir. Labyrinth oil throwers prevent entrance of moisture and dirt.

Pumps can also be supplied with ring oil lubricated sleeve bearings. Where sleeve bearings are used, thrust bearing can be double row ball bearing or Kingsbury Bearing.

Rotation All pumps furnished right hand construction unless otherwise ordered.

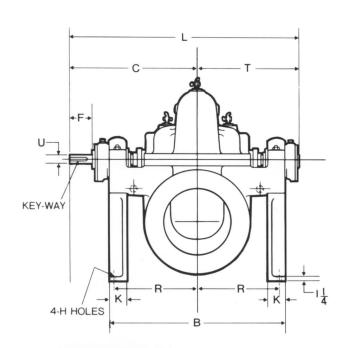
Materials Regularly available in bronze-fitted, all-iron, allbronze, iron with 316 stainless trim, or all 316 stainless steel. See Parts List for details.

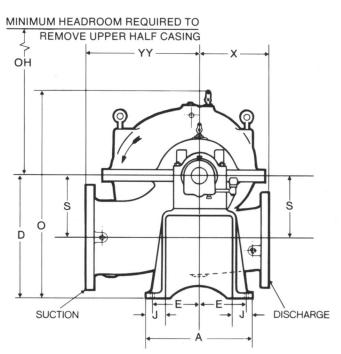
Construction Details

			GRO	UPS		GROUP M				
		8 x 10-22	12 x 14-18	14 x 16-18	16 x 18-18	10 x 12-22	14 x 16-22H	16x18-22G&H	18 x 20-22H	
Weight—Bronze Fitted Bare Pump	lb. (kg)	2700 (1225)	2920 (1325)	3300 (1497)	3450 (1565)	3400 (1542)	4600 (2087)	4900 (2223)	5400 (2449)	
Casing Thickness—Volute	in. (mm)	13/16 (21)	3⁄4 (19)	15/16 (24)	1 (25)	1 (25)	11/8 (29)	11/8 (29)	1¾6 (30)	
Casing Thickness—Sidewall	in. (mm)	13/16 (21)	3⁄4 (19)	15/16 (24)	1 (25)	1 (25)	11/8 (29)	11/8 (29)	13/16 (30)	
Maximum Diameter Spherical Solids	in. (mm)	7/8 (22)	13⁄8 (35)	11/8 (29)	7⁄8 (22)	11/8 (29)	13⁄4 (44)	21⁄4 (57)	211/16 (68)	
Casing Capacity—Gallons	(I)	36 (137)	50 (190)	69 (262)	100 (380)	45 (171)	89 (338)	108 (410)	135 (513)	
Stuffing Box Bore	in. (mm)			5 (127)				55% (143)		
Stuffing Box Depth to Bushing	in. (mm)			45% (117)		45/8 (117)				
Stuffing Box Packing—Size	in. (mm)		5% x 5% (16 x 16)			5% x 5% (16 x 16)				
Stuffing Box-No. of Rings				5 (127)		5 (127)				
Width of Lantern Ring	in. (mm)			11⁄4 (32)		11⁄4 (32)				
Shaft Diameter at Impeller	in. (mm)			31⁄4 (83)		3¾ (95)				
Shaft Diameter at Sleeve	in. (mm)	31⁄4 (83)				3¾ (95)				
Shaft Diameter at Coupling	in. (mm)	21/4 (57)				2¾ (70)				
Outside Diameter of Sleeve	in. (mm)			3¾ (95)	4	43⁄8 (111)				
Ball Bearing—Coupling End	The second second second			MRC-312S		MRC-315S				
Ball Bearing—Thrust End				MRC-5312		MRC-5315				
Maximum Total Working Pressure	PSI (kPa)		See Pressure-Temperature Char				rt Supplemental Engineering Data			
Maximum Test Pressure	PSI (kPa)		150% of Working							
Bearing Centers	in. (mm)	39 (1)				44 (1.12)				
Maximum Shaft HP per 100 RPM	HP (Kw)			46.5 (34.7)		89.0 (66.4)				
Maximum Liquid Temperature w/o Qu	ench °F (°C)			180 (82)		180 (82)				
Maximum Liquid Temperature w/Quer	nch °F (°C)			275 (135)				275 (135)		

1 Π DIS Model 3415-DV PI

Dimensions in inches and (mm). Not to be used for construction.





	DIMENSIONS DETERMINED BY PUMP																				
Group	Pump Size	A	в	с	D	E	F	н	J	к	L	0	он	R	s	т	Key-Way	U	x	YY	Pump Weight
	g., 10.00t											44½ (1130)	30½ (775)						21 (533)	24 (610)	2700 (1225)
S	8 x 10-22† 12 x 14-18†	26	423/4	3015/16	25 (635)	111/2	61/8	11/8	41/2	41/4	56	43 [%] ₁₆ (1106)	27% ₁₆ (700)	201/8	13 (330)	251/16	1/2 × 1/4	21/4	22 (559)	25 (635)	2920 (1325)
0	14 x 16-18 16 x 18-18	(660)	(1086)		30 (762)	(292)	(156)	(29)	(114)) (108)	(1422)	50½ (1283)	29½ (749)	(511)	15 (381)	(637)	(13 x 6)	(57)	17 (432)	27½ (699)	3300 (1497)
									51 (1295)	30 (762)						18 (457)	29 (737)	3450 (1565)			
	10 - 10 001		30 48¼ (762) (1226) 35½6 (891)		34			1¼ (32)	4½ (114)		63½ (1602)	54¼ (1378)	31¼ (794)				5% x 5% (16 x 8)	2¾ (70)	25 (635)	26 (660)	3400 (1542)
	10 x 12-22† 14 x 16-22H	30				13) 71⁄4 (184)					571/8 (1451)	341/8 (867)	22 ⁷ / ₈ (581)) 28 (711)			25 (635)	30 (762)	4600 (2087)
м	16 x 18-22G&H 18 x 20-22H				(864)	(330)						573/4	34 ³ / ₄ (883)						27 (686)	32 (813)	4900 (2223)
	10 X 20-22H			581/8 (1476)	35½ (892)	1	18 (457)	1			29	34 (864)	5400 (2449)								

†8", 10", and 12" discharge flanges (iron and bronze casings only) are 250 lb. ANSI standard. ▲M Group dimension for ring oil lubricated sleeve bearing is 32½". Note: Coupling Guard is pump mounted (Guard is Optional.)

ANSI FLANGE DIMENSIONS											
Nominal		ANS	61 125 Lb. I	Drilling	ANSI 250 Lb. Drilling						
I.D.	O.D.	B.C.	Thickness*	No. of Holes	Hole Size	O.D.	B.C.	Thickness	No. of Holes	Hole Size	
8 (203)	13½ (343)	11¾ (298)	15⁄8 (41)	8	⁷ / ₈ (22)	15 (381)	13 (330)	15⁄8 (41)	12	1 (25)	
10 (254)	16 (406)	14¼ (362)	17⁄8 (48)	12	1 (25)	17½ (445)	15¼ (387)	17⁄8 (48)	16	1 ½ (29)	
12 (305)	19 (483)	17 (432)	2 (51)	12	1 (25)	20½ (521)	173⁄4 (451)	2 (51)	16	1¼ (32)	
14 (356)	21 (533)	18¾ (476)	21⁄8 (54)	12	11⁄8 (29)	23 (584)	20¼ (514)	21/8 (54)	20	1¼ (32)	
16 (406)	23½ (597)	21¼ (540)	2¼ (57)	16	11⁄8 (29)	25½ (648)	22½ (572)	2¼ (57)	20	1 ³ / ₈ (35)	
18 (457)	25 (635)	22¾ (578)	23⁄8 (60)	16	11⁄4 (32)	28 (711)	24¾ (629)	23⁄8 (60)	24	1 ³ / ₈ (35)	
20 (508)	27½ (699)	25 (635)	2½ (64)	20	11⁄4 (32)	30½ (775)	27 (686)	2½ (64)	24	1 ³ / ₈ (35)	

*Thicknesses are 250 lb. Flange Ratings.

Purpose	No. of Taps	Tap Size
Suction Chamber Vent	2	1"‡ (25)
Stuffing Box Seal Ring Conns.	4	³ /8″ (10)
Gland Quenching Conns.	4	³ /8″ (10)
Stuffing Box Overflow Conns.	2	^{3/4"} (19)
Casing Vent	1	1⁄4″ (6)
Casing Priming Conn.	1	1"‡ (25)
Gage Conns.	4	1⁄4" (6)
Casing Drains	2	³ ⁄4″ (19)
Oil Drains	2	1⁄4″ (6)
Seal Pipe Conns. Casing	2	³ /8" (10)

‡1" plug tapped for 1/4 vent fitting.



GOULDS PUMPS

Branch Sales Offices

Branch Sales Offices
Allanta—Atlanta. GA (404) 455-4800
Batlimora—Hunt Valley, MD (301) 686-7900
Batlimora—Baton Rouge. Al (504) 927-387.
Beaumont—Beaumont. TX (713) 832-387.
Beaumont—Beaumont. TX (713) 832-387.
Beaumont—Berningham. AL (205) 939-0533
Boston—Wellesey Hills, MA (617) 235-385.
Buffala—Cheektowaga, NY (716) 843-3114
Charleston—St. Abans, WY (716) 843-3114
Charleston—St. Abans, WY (716) 843-3114
Charleston—All (207) 439-7241
Charleston—St. Abans, WY (716) 843-7870
Cleveland—Parma. OH (216) 842-7870
Dallas—Rchardson, TX (713) 789-7867
Dallas—Rchardson, TX (713) 789-7867
Dallas—Rchardson, TX (713) 789-7867
Dallas—Rchardson, TX (713) 789-7867
Dallas—Rchardson, TX (713) 787-7807
Dallas—Rchardson, TX (713) 787-7807
Dallas—Rchardson, TX (713) 987-2906
Memphia—Mobile, AL (205) 342-0868
Namos—Monre, LA (318) 987-0853
Kansa City—Rainsa City, MO (816) 942-4450
Los Angeles—Covina, CA (213) 967-2906
Memphia—Mobile, AL (205) 342-0868
Namos—Monre, LA (713) 87-7867
Pathemphis, TN (901) 767-2380
Differemdone, LA (318) 37-6864
Namos—Monre, LA (318) 37-6864
Namos—Monre, LA (318) 37-6865
Namos—Monre, LA (318) 987-6935
Stente—Lynnwood, WA (600) 741-1258
Stente—Lynnwood, WA (600) 741-1258
Stente—Covina, CA (213) 967-5085
Stata—Chardson, Van (714) 822-9001
Minitopa—Results, DE (302) 737-8708
Dallas Francisco, Van (131) 987-9087
Nama—Lytz, FL (813) 961-5085
Tata=City, CA (511) 961-5085
Stata=City, CA (51

International Sales Offices

International Sales Offices Goulds Pumps, Inc.-Headyduarters, Saneca Falls, NY (315) 568-2811 (TLX 93-7280) Goulds Pumps Southeast Asia Office – Singapore, Republic of Singapore 235-5715 (TLX 26126) Goulds Pumps European Office – The Hague, Netherlai (300) 46-38-42 (TLX 154141) Goulds Pumps – Middle East Office – Arbens, Greece (30-1) 725-506 (TLX 21864) Goulds Pumps Lain American Office – Coral Gables, Florida (305) 446-1607 (TLX 803266) Damman, Saudi Arabia–383-2978 (TLX 803266) Netherlands

Manufacturing Plants

Engineered Product Division—Seneca Falls, NY (315) 568-2811 (TLX 93-7290) Vertical Pump Division—City of Industry, California (213) 692-0211 (TLX 67-0458) Texas Division—Lubbock, Texas (806) 763-2361
 Texas Division—Lubbock, Texas (866) (783-2361 (TLX 74411)

 Goyne Pump Division—Ashland, Pennsylvaria (TL) 875-8660

 Bombas Goulds de Mexico, S.A. de C.V.—Mexico City. Mexico 593-6730

 Goulds Bombas e Equipamentos ITDA—Salto, S.P. Brazi (11) 251-1035 (TLX 113953)

 Goulds Pumps (Phil.) Inc.—Mania, Philippines 88-74-71 (TLX 636861 (C02)
 Brazil

Goulds Pumps Europe AG—Zofingen, Switzerland (062) 52-19-91 (TLX 68246)

Manufacturing Licensees

Manutacturing Licensees Beloit Canada LieeAt.d. – Goulds Pumps Division – Pointe Claire, Ouebec, Ganada (514) 665-6520 (TLX 05-621528) Goulds D-P, Drakos Polemis Pumps Manutacturers Inc.,– Krissia, Greece (30-1) 60-34-11 (TLX 216929) Cettic Engineering Co. Ltd.–Dublin, Ireland (353-17) (47-091) (TLX 4315) Miguel Schmitt & Cla, S.R.L.–Buenos Aires, Argentina 67-7319 (TLX 17107)

(TLX.17107)

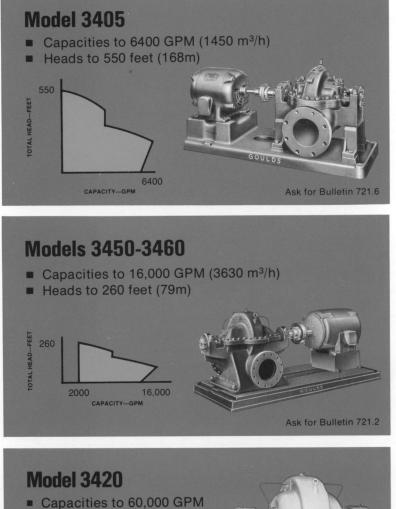
Pump Rebuild and Overhaul Shops

New Jersey PRO Shop—Fairfield, NJ (201) 575-6400 (TLX 138655) Baton Rouge PRO Shop—Denham Springs, LA (504) 665-3726 Houston PRO Shop—Houston, TX (713) 433-0055 Corporate Headquarters

Goulds Pumps, Inc.-Seneca Falls, NY (315) 568-2811 (TLX 93-7290)



Goulds Double Suction Pumps for Industry

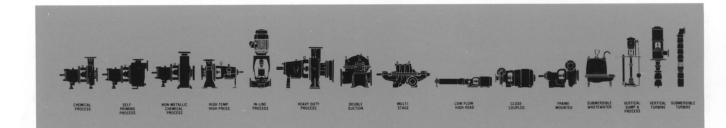


60,000

 $(13,630m^{3}/h)$

Heads to 400 feet (122m)

CAPACITY-GPM

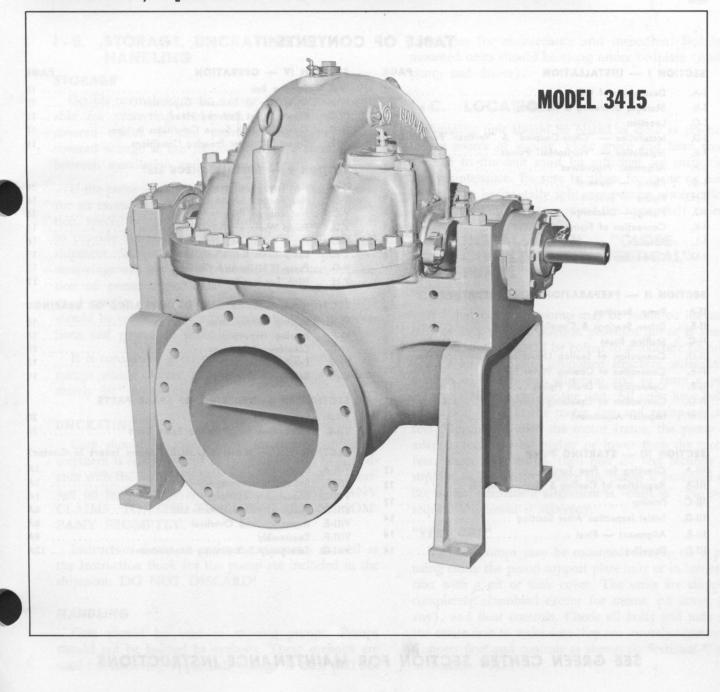


400

Ask for Bulletin 721.10



Installation, Operation and Maintenance Instructions



FOREWORD

The design, material, and workmanship incorporated in the construction of Goulds Pumps makes them capable of giving long, trouble-free service. The life and satisfactory service of any mechanical unit, however, is enhanced and extended by correct application, proper installation, periodic inspection and careful maintenance. This instruction manual was prepared to assist operators in understanding the construction and the correct methods of installing, operating and maintaining these pumps.

Study thoroughly Sections I, II, III and IV and carefully follow the instructions for installation and operation. Sections V and VI are answers to trouble and maintenance questions. Keep this instruction manual handy for reference. Further information can be obtained by contacting the Engineering Application Division, Goulds Pumps, Inc., Seneca Falls, New York or your local branch office.

WARNING: Goulds Pumps, Inc. will not be liable for any damages or delay caused by failure to comply with the provisions of this instruction manual.

TABLE OF CONTENTS

PAGE

SECTION I - INSTALLATION

I-A.	Description of Units	1
I-B.	Storage, Uncrating & Handling	1
I-C.	Location	1
I-D.	Installation — "Close-Coupled" & "Vertical" Pumps	1
I-E.	Installation — "Horizontal" Pumps	2
I-F.	Alignment Procedures	3
I-G.	Piping — General	5
I-H.	Piping — Suction	6
I-J.	Piping — Discharge	8
I-K.	Connection of Piping	8
I-L.	Rotation	8
I-M.	Connection of Coupling	8

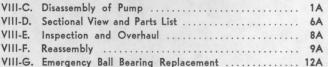
SECTION II - PREPARATION FOR OPERATION

II-A.	Pump Bearings	9
11-B.	Driver Bearings & Coupling	9
II-C.	Stuffing Boxes	9
II-D.	Connection of Sealing Liquid or Grease Lubricator	10
II-E.	Connection of Cooling Water Piping	11
II-F.	Connection of Drain Piping	11
II-G.	Connection of Equalizing Piping	11
II-H.	Impeller Adjustment	11

SECTION III - STARTING PUMP

III-A.	Checking for Free Turning	
III-B.	Regulation of Cooling & Flushing Liquids 12	
III-C.	Priming 12	
III-D.	Initial Inspection After Starting	
III-E.	Alignment — Final 14	
III-F.	Doweling	

SECTION IV - OPERATION PAGE IV-A. Stuffing Box 15 IV-B. Operating at Reduced Capacities 15 IV-C. Operating at Reduced Head 15 IV-D. Operating with Surge Conditions in Line 15 IV-E. Operating under Freezing Conditions 15 SECTION V - TROUBLE CHECK LIST V-A. No Liquid Delivered 16 Not Enough Liquid Delivered 16 V-B. V-C. Not Enough Pressure 16 V-D. V-F Pump Takes Too Much Power 16 V.F Pump Leaks Excessively at Stuffing Box 17 V-G. Pump is Noisy and Vibrates 17 V-H. High Bearing Temperature 17 SECTION VI - CARE AND MAINTENANCE OF BEARINGS VI-A. Bearing Temperatures 18 VI-B. Bearing Inspection 18 VI-C. Cleaning of Bearings 18 VI-D. Bearing Removal 18 VI-E. Ball Bearing Installation 19 SECTION VII - ORDERING OF SPARE PARTS SECTION VIII - MAINTENANCE (Green Insert in Center) VIII-B. Impeller Clearance Adjustment 1A

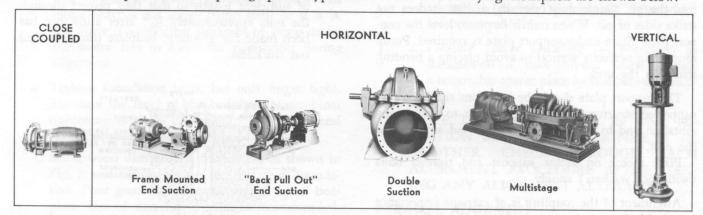


SEE GREEN CENTER SECTION FOR MAINTENANCE INSTRUCTIONS

SECTION I — INSTALLATION

I - A. DESCRIPTION OF UNITS

Reference is made to several different types of pumps in the following text. To enable the reader to associate these terms to his particular unit, photographs of typical units with an identifying description are shown below.



I-B. STORAGE, UNCRATING & HANDLING

STORAGE

Goulds normal domestic storage preparation is suitable for protecting the pump during shipment in covered trucks. It also provides protection during covered storage at the jobsite, and for a short period between installation and start-up.

If the pump is to be idle and exposed to the elements for an extended period, either before or after installation, special precautions are required. One approach is to provide special preservatives and wrapping before shipment. However, after installation, the protective wrappings will have been removed. Therefore, application of preservatives after installation is considered good practice. The driver and coupling manufacturers should be contacted for recommendations on preservations and protection procedures.

It is considered good practice to rotate the shaft on pumps which contain ball or roller bearings approximately 30° every few weeks.

UNCRATING

Care should be taken when uncrating pumps. If shipment is not delivered in good order and in accordance with the Bill-of-Lading, note the damage or shortage on both receipt and freight bill. MAKE ANY CLAIMS TO THE TRANSPORTATION COM-PANY PROMPTLY.

Instruction sheets on various components as well as the Instruction Book for the pump are included in the shipment. DO NOT DISCARD!

HANDLING

Care should be used in moving pumps. Pumps should not be hoisted by eyebolts. These eyebolts are used for removing upper half casings or back pull out assemblies for maintenance and inspection. Bedplate mounted units should be slung under bedplate (under pump and driver).

I-C. LOCATION

Pumping unit should be placed as close as practical to the source of supply. Floor space and head room allotted to the unit must be sufficient for inspection and maintenance. Be sure to allow for crane or hoist service. On horizontally split case pumps, always allow sufficient head room to remove the upper half casing.

I - D. INSTALLATION — "CLOSE-COUPLED" AND "VERTICAL" PUMPS

"CLOSE-COUPLED"

A "close-coupled" pump may be mounted horizontally or in a vertical position provided motor is above pump. The unit should be bolted to a concrete foundation or an adequately supported structure, substantial enough to absorb any vibration and to form a permanent rigid support for the unit. All units have holddown bolt holes in the motor feet and pump/adapter feet. Depending upon the motor frame, the pump or adapter feet may be higher or lower than the motor feet. Shim as required, then bolt all feet securely to support or foundation. Since the pump is mounted on the motor, permanent alignment is "built in". No subsequent alignment is necessary.

"VERTICAL"

Vertical pumps may be mounted directly on a pit, using either the pump support plate only or in conjunction with a pit or tank cover. The units are shipped completely assembled except for motor, pit cover (if any), and float controls. Check all bolts and nuts on the entire unit to make sure they are securely tightened. Connect float and controls as shown on Sectional View in Section VIII-D.

1

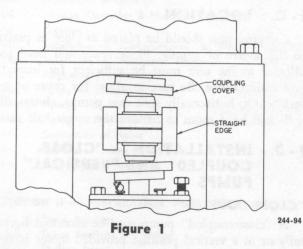
Installation must be done with care to avoid damage and insure proper operation. It is recommended that a man be stationed inside the pit, whenever possible, to assist in the initial installation.

Lower the assembled pump (less motor) carefully into the pit. Guide unit carefully so that it does not strike sides of pit. When unit is in place, level the support plate. Shim under support plate as required. Pump must hang perfectly vertical to avoid placing a bending stress on the unit.

The support plate should be bolted to an adequately supported structure, substantial enough to absorb any vibration and to form a permanent, rigid support for the unit.

Place motor on motor support and tighten bolts (with lock washers) snugly.

Alignment of the coupling is of extreme importance for trouble-free mechanical operation. Check for alignment by laying a straight edge across coupling hubs at four points 90° apart. See Fig. 1. When the straight edge rests evenly at all four points, the coupling is aligned.



The machined faces of the motor support and motor will provide angular alignment. However, any foreign material or burrs on the surface will destroy this alignment. Make sure surfaces are clean and smooth.

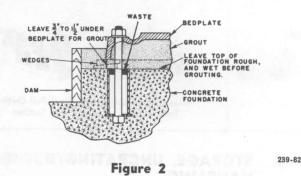
I - E. INSTALLATION — "HORIZONTAL" PUMPS

Bedplate mounted units are normally mounted on a concrete foundation of liberal thickness poured on a solid footing, using a one-three-five mix. The foundation should be substantial in order to absorb any vibration and to form a permanent, rigid support for the pumping unit.

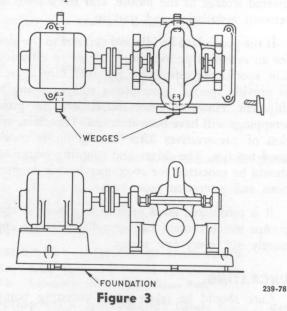
- 1. The location and size of foundation bolts are shown on the outline assembly drawing supplied for the unit.
- 2. When unit is mounted on a concrete foundation, each foundation bolt should be installed with a pipe sleeve around it to allow for adjustment.

The I. D. of the sleeve should be $2\frac{1}{2}$ -3 times the bolt diameter. Place a washer between the bolt head and sleeve to hold bolts. See Fig. 2.

Stuff waste around bolts to prevent concrete from entering between bolt and sleeve. Bolts should be of sufficient length so that they project through the nuts approximately $\frac{1}{4}$ " after allowance has been made for grouting, bedplate thickness, and nut thickness.



3. Put the unit in place on wedges. THE WEDGES SHOULD BE PLACED AT FOUR POINTS AS SHOWN IN FIG. 3. Some long installations may require additional wedges near the middle of the bedplate.



 Disconnect coupling between pump and driver. Note: "Spider-Insert" couplings, as shown in Fig. 4, need not be disconnected.





- 5. By adjustment of wedges, bring the bedplate to an approximate level and provide the proper distance above the foundation for grouting (3/4") to 11/2"). Level or plumb the suction and discharge flanges. Bring pump and motor shafts into reasonable alignment making *absolutely certain* that motor shaft is not above pump shaft or if it is, that there is a sufficient thickness of shims under the motor feet to allow for adjustment during alignment.
- 6. Tighten foundation bolts, but only finger tight. Maintain the level of the bedplate. *Note*: Final tightening is done after pump is grouted and grout has set at least 48 hours.
- 7. Build wood dam around foundation as shown in Fig. 2, and thoroughly wet top surface of foundation. Pour grout in hole provided in top of bedplate. Use of non-shrink grout is recommended. Grout should be thin enough to flow out under the bedplate but not so wet that sand and cement will separate. Grout should be puddled continuously as it is poured to expel the air and completely fill the space under the bedplate to the level of the grout hole. Strike along top of dam with trowel to give a neat finished appearance. Allow grout to harden at least 48 hours.
- 8. Tighten foundation bolts.
- 9. Tighten pump hold-down bolts.

I - F. ALIGNMENT PROCEDURES GENERAL

Alignment of the pump and driver is of extreme importance for trouble-free mechanical operation. The following are suggested steps to establish the initial alignment of the unit.

NOTE:

THIS IS AN INITIAL ALIGNMENT. The final alignment is done after the unit has been run under actual operating conditions. The final alignment procedure is outlined in Section III-E and must be followed. Make sure motor starting switch is "locked out" to prevent accidental rotation.

Any coupling manufacturer's instruction sheets, sent with the pump, should be studied and used when installing, aligning, or servicing coupling. Note that coupling hubs are not necessarily mounted flush with the shaft ends. If instructions are not available, the following procedure may be used. The procedure is given for two basic coupling types:

- Flexible Coupling Normally furnished on all units except "back pull-out". Normally not assembled (except "spider-insert" type which are preassembled).
- 2. Flexible Spacer Coupling Furnished as standard on all "back pull-out" units. Contains a removable spacer piece located between coupling hubs.

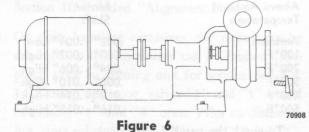
NOTE THAT ALIGNMENT IN ONE DI-RECTION MAY ALTER ALIGNMENT IN ANOTHER. CHECK THROUGH EACH ALIGNMENT PROCEDURE AFTER MAK-ING ANY ALIGNMENT ALTERATION.

PARALLEL ALIGNMENT

Unit is in parallel misalignment when the shaft axes are parallel but not concentric. Shift driver as required.

In order to obtain vertical parallel alignment under actual operating conditions, the driver shaft may have to be set higher or lower (using thin shim stock) than the pump shaft due to differences in expansion rates. Pump expansion rates vary with pump design. The following is a suggested cold setting for motor driven units:

Frame Mounted Units



Pumpage Temperature	Set
Above Ambient	Motor
Temperature	Shaft
Ambient	.004"006" Low
100°F	.002"004" Low
200°F	.000"002" Low
300°F	.000"002" Higl

Pedestal Mounted Units

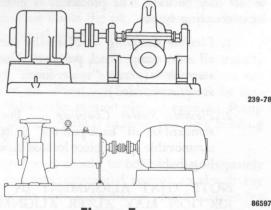


Figure 7

Set motor shaft .002" - .004" low regardless of pumpage temperature.

Casing Mounted Units

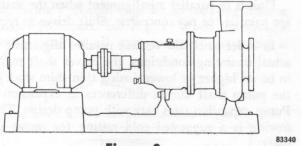


Figure 8

Pumpage Temperature Set Above Ambient Motor Temperature Shaft .002" - .004" Low Ambient 100°F .000" - .002" High 200°F .004" - .006" High 300°F .008" - .010" High 400°F .012" - .014" High 500°F .016" - .018" High

To check the parallel alignment:

1. Flexible Couplings

Place a straight edge across both coupling hubs at four points 90° apart. The unit will be in parallel alignment when the straight edge rests evenly on both halves. See Fig. 9.

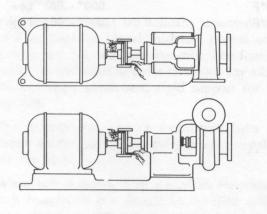


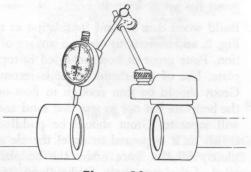
Figure 9

2. "Spider-Insert" Couplings

Place a straight edge across both coupling hubs at four points 90° apart. The unit will be in parallel alignment when the straight edge rests evenly on both halves. See Fig. 9.

3. Flexible Spacer Couplings

Place a dial indicator on one hub and rotate that hub 360° while taking readings on the outside diameter of the other hub. When indicator does not deflect more than .002" total, parallel alignment is achieved. See Fig. 10.





ANGULAR ALIGNMENT

Unit is in angular misalignment when the shaft axes are concentric, but not parallel. Shim unit as required.

1. Flexible Couplings

The normal "gap" (distance between coupling halves) is approximately $\frac{1}{8}$ ". However, the coupling manufacturer's instructions should be followed. Insert a "feeler" or taper gauge at 90° intervals on the circumference of the hubs. When the "gap" is identical within .002", the unit is in angular alignment. See Fig. 11.

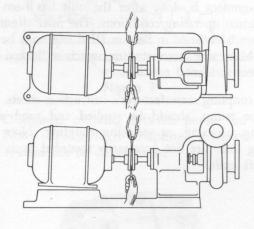


Figure 11



70910

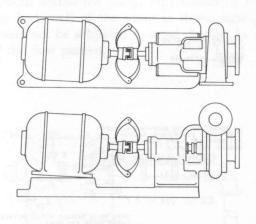
2. "Spider-Insert" Couplings

The normal "gap" (distance between hub and insert) is approximately 1/16". However, the

4

70909

coupling manufacturer's instructions should be followed. Check alignment by using calipers at 90° intervals on the circumference on the outer end of hubs. When caliper measurements are identical, the unit is in angular alignment. See Fig. 12.





3. Flexible Spacer Couplings

Place a dial indicator on one shaft hub and rotate that hub 360°. Take readings from the face of the other hub. Alignment is achieved when indicator does not deflect more than .002". See Fig. 13.

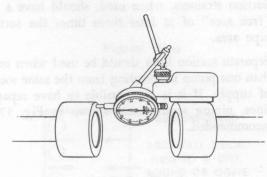


Figure 13

I-G. PIPING - GENERAL

1. All piping must be supported indepedently of the pump. The piping should always "line-up" naturally with the pump flanges. NEVER DRAW THE PIPING INTO PLACE BY USE OF FORCE AT THE FLANGED SUCTION AND DISCHARGE CONNECTIONS OF THE PUMP, AS THIS MAY IMPOSE DANGER-OUS STRAINS ON THE UNIT AND CAUSE MISALIGNMENT BETWEEN PUMP AND DRIVER.

- 2. The piping, both suction and discharge, should be as short and direct as possible. Avoid all unnecessary elbows, bends, and fittings, as they increase the friction losses in the piping. The size of pipe and fittings should be carefully selected and of sufficient size to keep the friction losses as low as practical.
- 3. Piping must not be connected to the pump until the grout has thoroughly hardened and the foundation bolts, as well as driver and pump hold down bolts have been tightened.
- 4. When handling liquids at elevated temperatures, it is suggested that expansion loops or joints be properly installed in suction and/or discharge lines so that linear expansion of the piping will not draw the pump out of alignment.

If such expansion loops or joints are not used, the forces and moments, due to thermal expansion of the piping system, that can act upon the pump inlet and discharge flanges must be determined and must not exceed the limits permissible for the specific pump in question.

Such installations require extremely careful and precise attention to hot alignment procedures. See Section III-E, titled "Alignment-Final."

5. On units handling corrosives, the piping can be arranged so that corrosives can be flushed from pump prior to opening unit for service. See Fig. 14. During operation, valves "1" and "3" would be closed, "2" and "4" open. Prior to dismantling, close valves "2" and "4", open "1" and "3". Introducing water at valve "3" will allow water to flush pump and drain at valve "1".

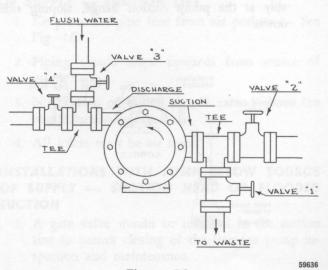


Figure 14

70923

I-H. PIPING - SUCTION

GENERAL

Properly installed suction piping is of extreme importance for trouble-free centrifugal pump operation.

1. Use of elbows close to the pump suction flange should be avoided. Where used, elbows should be long radius.

On double suction pumps, if an elbow must be used at the pump suction flange, it must be in a vertical position only. If an elbow must be used in other than a vertical position, it is permissible only providing there is a minimum of two diameters of straight pipe between the elbow and pump suction flange.

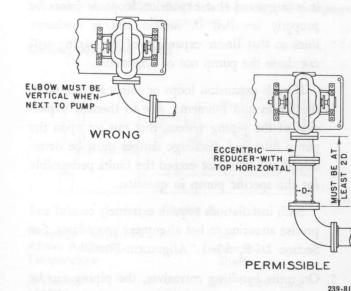
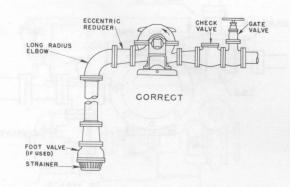
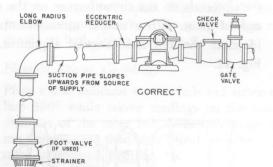


Figure 15



- 2. The suction pipe should never be of smaller diameter than the pump suction. Use of suction pipe one or two sizes larger than the pump suction, with a reducer at the pump suction flange, is desirable.
- 3. Reducers, if used, should be ecentric and preferably at the pump suction flange, sloping side down.





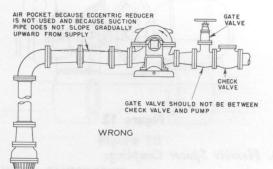


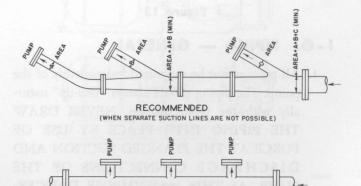
Figure 16

239-81

239-95

4. A CENTRIFUGAL PUMP SHOULD NEVER BE THROTTLED ON THE SUCTION SIDE.

- 5. Suction strainers, when used, should have a net "free area" of at least three times the suction pipe area.
- 6. Separate suction lines should be used when more than one pump is operating from the same source of supply. If it is not possible to have separate lines, piping arrangement shown in Fig. 17 is recommended.



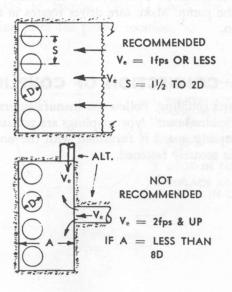


WRONG

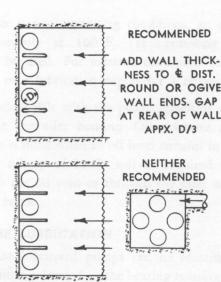
SUCTION PIPING DESIGN FOR LARGE PUMPS

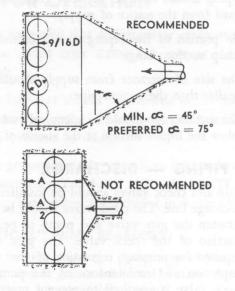
Large units taking their suction supply from sumps require special attention. A properly designed sump is a must. The larger the unit, the more important these considerations become. A 3000 GPM pump should be considered a large unit.

The following sketches will show the preferred pipe arrangement within the sump. Pipe should be located near the back wall of the sump as shown in Fig. 18 and should not be subjected to rapid changes in direction of the flow pattern.











The velocity of the water approaching the pump suction pipe should be kept to a maximum of one foot per second to avoid air being drawn into the pump. Pump suction inlet velocities and submergence (the height of the water above the pump inlet) are two additional factors that must be considered. These factors vary so greatly with the size and capacities of the individual pumps and systems that past experience, or a good reference, should be relied upon in arriving at these values.

The suction pipe should be sized to obtain a flow velocity of 4 to 7 feet per second. Changes in flow direction should be avoided wherever possible, especially near the pump suction. A reducer at the pump suction flange to smoothly accelerate and stabilize flow into the pump is desirable.

Refer to the nearest Goulds representative for further information.

INSTALLATIONS WITH PUMP ABOVE SOURCE OF SUPPLY — SUCTION LIFT

- 1. Keep suction pipe free from air pockets See Fig. 16.
- 2. Piping should slope upwards from source of supply.
- 3. No portion of piping should extend above the pump suction nozzle.
- 4. All joints must be air tight.

INSTALLATIONS WITH PUMP BELOW SOURCE OF SUPPLY — SUCTION HEAD OR FLOODED SUCTION

- 1. A gate valve should be installed in the suction line to permit closing of the line for pump inspection and maintenance.
- 2. Keep suction pipe free from air pockets.

- 3. Piping should be level or slope gradually downward from the source of supply.
- 4. No portion of the piping should extend below pump suction flange.
- 5. The size of entrance from supply should be no smaller than the suction pipe.
- 6. The suction pipe should be adequately submerged below the liquid surface at the source of supply.

I-J. PIPING - DISCHARGE

- 1. Gate and check valves should be installed in the discharge line. The check valve should be located between the gate valve and pump to permit inspection of the check valve. The gate valve is required for priming, regulation of flow and for inspection and maintenance of the pump. The check valve is required to prevent reverse flow through the pump when the driver is turned off.
- 2. Increasers, if used in discharge line, should be placed between the pump and check valves.
- 3. If quick-closing valves are installed in the system, cushioning devices should be used to protect the pump from surges and water hammer.

I-K. CONNECTION OF PIPING

Connect suction and discharge piping to the pump. Rotate pump shaft several times by hand to be sure there is no binding and that all parts are free. Recheck alignment. NOTE: On non-metallic pumps, use gaskets which are suitable for the flanges. Teflon envelope style is recommended.

I-L. ROTATION

SERIOUS DAMAGE MAY RESULT IF PUMP IS RUN IN WRONG DIRECTION. BEFORE COUP-LING IS CONNECTED, THE MOTOR SHOULD BE WIRED AND THE DIRECTION OF ROTA-TION CHECKED. The direction of rotation is marked on the pump. Make sure driver rotates in the same direction.

I-M. CONNECTION OF COUPLING

Connect coupling. Follow the manufacturers instructions. "Spider-Insert" type couplings are pre-assembled. If a coupling guard is furnished with the unit, make sure it is securely fastened.

SECTION II - PREPARATION FOR OPERATION

II-A. PUMP BEARINGS

OIL LUBRICATION

Oil lubricated pumps are not lubricated at the factory. A high quality turbine type oil, with rust and oxidation inhibitors, should be used. Constant level oilers are supplied with most oil lubricated pumps. They are included in the box of fittings which accompanies the pump. The oiler was adjusted to maintain proper oil level before leaving the factory. The adjustment should be checked in case this setting was disturbed. See Figure 19. Correct dimensions for A and B are giving in Section VIII-A. Check the assembly dimension print for proper location.

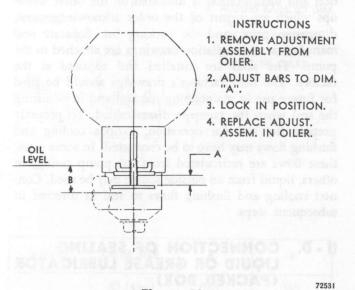


Figure 19

Under normal operating conditions, an oil of 300 SSU viscosity at 100°F. (approximately SAE-20) should be used. For extreme conditions refer to the factory or a lubrication expert for a recommendation.

Fill the bottle with the proper grade of oil and replace in the oiler housing. Oil reservoir in bearing housing is filled when an oil level remains in the bottle. Several fillings of bottle will be required. Never fill through the oil vent or through the oiler without use of the bottle.

GREASE LUBRICATION

Grease lubricated pumps can be identified by the grease fittings located on the bearing housing. Sufficient lubricant is inserted at the factory for 2,000 hours of operation. DO NOT GREASE AT TOO FREQUENT INTERVALS.

It is suggested that additional or replacement lubricant be added after 2,000 hours or at three-month intervals.

The lubricant should be renewed in the housings at least once annually. This should be done when the annual overhaul is made.

The grease should be of sodium lithium base, NGLI #2 consistency. DO NOT USE GRAPHITE. Further greasing instructions are included in Section VIII-A.

"VERTICAL" PUMP BEARINGS

The bearing above the pump support plate is a ball bearing and is grease lubricated. Follow the previous instructions for grease lubrication.

The pump steady bearings (below the pump support plate) are sleeve type and made of various materials depending upon the application of the pump. See Section VIII-A for specific details.

"CLOSE-COUPLED" PUMPS

"Close-coupled" pumps contain no pump bearings. The only bearings in the unit are contained within the motor. Make sure that the motor bearings are properly lubricated. Refer to the motor manufacturer for instructions.

II - B. DRIVER BEARINGS AND COUPLING

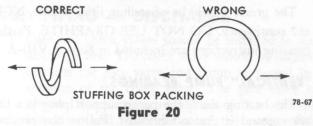
Check to be sure that driver bearings are properly lubricated. Contact the motor manufacturer for lubrication instructions. Refer to coupling instructions supplied separately for coupling lubrication.

II - C. STUFFING BOXES

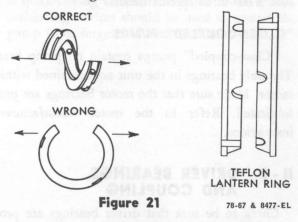
PACKING

Before packing the stuffing box, make sure box is clean and contains no foreign material. If unit has a metal lantern ring, assembled with the pump, make sure ring is outside the stuffing box.

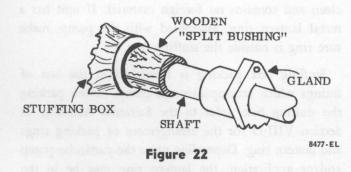
Stuffing box packing is furnished in the box of fittings which accompanies the pump. When packing the stuffing box, refer to the Sectional Assembly in Section VIII-D for the arrangement of packing rings and lantern ring. Depending upon the particular pump and/or application, the lantern ring may be in the middle or bottom of the stuffing box, incorporated in another part or not used at all. Some packing rings are die-formed and special care must be taken during installation. To install, twist the ring sideways just enough to get it around the shaft or sleeve. DO NOT ATTEMPT TO PULL RINGS STRAIGHT OUT. See Fig. 20. Another form of packing ring is the bulk-type packing which is cut to the proper length. Each piece should be placed around the shaft or sleeve and the ends of the packing should just meet to form a smooth, perfect ring. If necessary, the ends should be trimmed to obtain this fit.



There are two basic types of lantern rings — Teflon and metal. Two-piece Teflon lantern rings are supplied in most units. Install as shown in Fig. 21. Note: 2 pieces make one ring. Notches must face one another but need not be aligned.



To pack the stuffing box, install the packing and lantern ring in the proper sequence. Each ring should be installed separately. Firmly seat each ring. Use of a wooden split bushing is recommended. See Fig. 22. Use gland to jack the bushing and ring into the box. Stagger joints in each ring 90°. Make sure center of lantern ring lines up with flush tap in the stuffing box. Any extra rings are spares.



Tighten the gland nuts evenly but not tight. Follow adjustment procedure outlined in Section III-D.

REMOVAL OF PACKING

To remove packing from the stuffing box, the following steps should be followed:

- 1. Remove gland assembly.
- 2. Remove packing with a "packing hook."
- 3. Remove lantern ring by inserting a wire hook into the ring on the outer edge.
- 4. Clean the stuffing box.
- 5. On horizontally split case pumps, an alternate method of removing packing is to remove the upper half casing. See Section VIII-C. Remove packing and lantern ring and inspect sleeves. If deeply grooved, sleeves should be replaced.

MECHANICAL SEALS

When mechanical seals are furnished, the description and identification is indicated on the order writeups which are a part of the order acknowledgement, dimension print, and the packing list. Separate seal manufacturers' installation drawings are attached to the pump. The seals are installed and adjusted at the factory. The manufacturer's drawings should be filed for future use in maintaining the seal and in adjusting the seal when the pump is disassembled. To properly prepare the seal for operation, various cooling and flushing flows may have to be connected. In some cases, these flows are recirculated from the pump casing; in others, liquid from an outside source may be used. Connect cooling and flushing flows to seal as directed in subsequent steps.

II - D. CONNECTION OF SEALING LIQUID OR GREASE LUBRICATOR (PACKED BOX)

If the stuffing box pressure is above atmospheric pressure, and the pumpage is clean, normal gland leakage of 40 to 60 drops per minute is usually sufficient to lubricate and cool the packing and sealing liquid is not required.

Sealing liquid or grease lubricator is required when:

1. Abrasive particles in the pumpage could score the shaft or sleeve.

2. Stuffing box pressure may be below atmospheric pressure due to pump running with suction lift, or when suction source is under vacuum. Under these conditions, the packing will not be cooled and lubricated and air will be drawn into the pump.

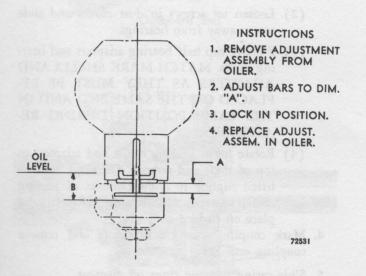
SEALING LIQUID

Sealing liquid may be supplied by recirculation of pumpage through a line from the casing to the stuffing box. If the pumpage is abrasive, an outside source of clean compatible liquid must be used at a pressure of 30 to 50 PSI above suction pressure.

MODEL 3415 SECTION VIII — MAINTENANCE

VIII - A. LUBRICATION

1. Oil Lubrication — (Refer to Section II-A for oil specifications.) Ring oil lubricated ball bearings are standard on all Model 3415 units. THE BEARINGS ARE NOT LUBRICATED AT THE FACTORY.



GROUP	OILER SIZE	A	В
S	#3 (4 oz.)	19/32"	1/2"
м	#5 (8 oz.)	9/16"	1/2"

See Construction Details (VIII-D) for Size-Group Designation.

Figure 1A

Oil lubricated pumps are supplied with oilers which maintain a constant oil level in the bearing housing. See Figure 2-A for oiler location.

(a) Before installing the oiler on the bearing housing, check the oiler adjustment.

(b) Install oilers.

(c) Fill each oiler bottle with oil and replace in the oiler housing. Oil reservoir in bearing housing is filled when oil remains visible in the bottle. Several fillings of the bottle will be required. Never fill through the oil vent or the oiler without use of the bottle. Sleeve bearings with a ball thrust bearing are optional on the Model 3415. They also utilize constant level oilers and use the same setting dimensions given above.

2. Grease Lubrication — (Refer to Section II-A for grease specifications.) Grease lubricated ball bearings are optional on the Model 3415. These units can be identified by the grease fittings located on the bearing housing end covers. GREASE LUBRICATED BEARINGS ARE LUBRICATED AT THE FACTORY. DO NOT GREASE AT TOO FREQUENT INTERVALS. To grease bearings:

(a) Remove relief plugs on bearing end covers. See Figure 5A.

(b) Insert grease through fittings, while shaft is rotating, until grease appears through the relief plug holes.

(c) Operate unit for approximately $\frac{1}{2}$ hour with relief holes open to prevent overgreasing. After $\frac{1}{2}$ hour, replace relief plugs.

VIII - B. IMPELLER CLEARANCE ADJUSTMENT

There is no external impeller adjustment on the Model 3415.

VIII - C. DISASSEMBLY OF PUMP

To prepare the pump for disassembly, proceed as follows:

(a) Shut off all valves controlling flow to and from pump.

(b) Drain liquid from pump. Casing drain plugs are located on bottom of casing.

(c) Disconnect all auxiliary tubing and piping.

(d) Disconnect coupling.

(e) If the unit is oil lubricated, remove oil drain plugs from bottom of bearing housings and drain oil. Replace plugs after draining.

(f) Remove glands from casing. If unit has packed stuffing boxes, unbolt and remove gland halves. If equipped with mechanical seals, slide glands toward bearings. Protect lapped stationary seat faces from damage.



The numbers located on the following figures refer to the procedure steps. For example, number 1 on Figure 2A refers to Step 1.

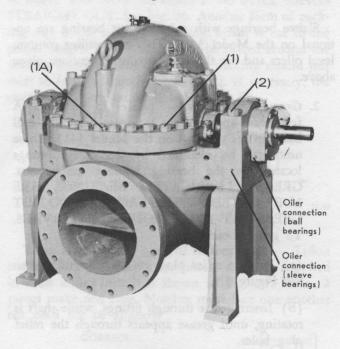
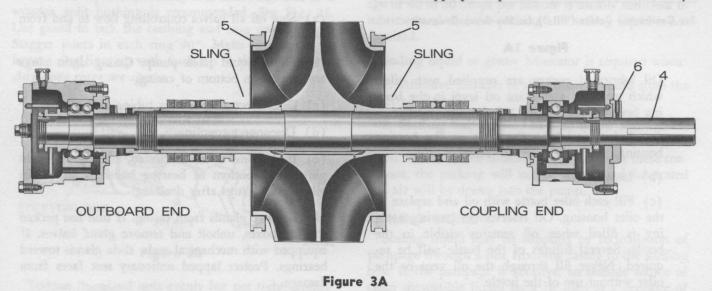


Figure 2A

- Remove the casing parting nuts. Remove dowel pins (1A). Loosen top half casing by inserting four 1/2"-13 NC bolts into parting flange. Remove top half casing using the eye bolts. DO NOT USE EYE BOLTS TO LIFT ENTIRE PUMP. Exercise care to prevent the gasket from tearing.
- 2. Remove bearing caps. MATCH-MARK EACH BEARING CAP. THEY MUST BE REPLACED ON THE SAME END AND IN THE SAME POSITION ON PUMP DURING REASSEMBLY.

- 3. Place sling in position (see Figure 3A) and take weight off element. Make sure all stationary parts of rotating element are loose before rotating element is removed. It is desirable to rotate casing wearing rings, stuffing box bushings and bearing housings 180° to disengage tongue and groove locks.
 - A. On units with ball bearings, remove element and place on padded supports.
 - B. On units with sleeve bearings, refer to Figure $\overline{6A}$.
 - (1) Unbolt and remove bearing end cover on outboard end of pump. Preserve gasket.
 - (2) Loosen set screws in dust covers and slide covers away from bearings.
 - (3) Remove top half bearing adapters and bearing shells. MATCH-MARK SHELLS AND ADAPTERS AS THEY MUST BE RE-PLACED ON THE SAME END AND IN THE SAME POSITION DURING RE-ASSEMBLY.
 - (4) Rotate lower bearing shells and adapters to top of shaft and remove. Oil rings must be lifted slightly to allow removal of bearing shells and adapter. Remove element and place on padded supports.
- 4. Mark coupling position on shaft and remove coupling and key.
- 5. Slide casing wearing rings off element.
- 6. Loosen set screw and remove dust cover (or deflector) from coupling end of shaft.
- 7. The standard bearings are ring oil lubricated ball bearings. However, grease lubrication and sleeve bearings are optional. Specific bearing disassembly procedures for each type are given below. Select the appropriate procedure and follow it carefully:



2A

- A. Ring Oil Lubricated Ball Bearings:
- (1) Outboard End

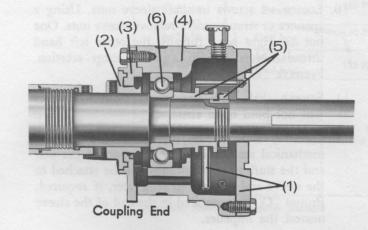
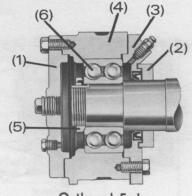


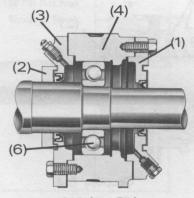
Figure 4A

- (a-1) Remove bearing end covers and oil rings from each end of shaft.
- (a-2) Loosen set screws in oil throwers and slide them toward shaft sleeves.
- (a-3) Unbolt inboard bearing end covers and slide them toward shaft sleeves.
- (a-4) Slide bearing housings off shaft. Preserve gaskets.
- (a-5) Straighten "tangs" in lock washers and remove both bearing lock nuts and washers. Slide oil ring sleeves off shaft.
- (a-6) Remove ball bearings using a bearing puller as shown in Section VI-D, Figure 30. Care must be taken to prevent damage to bearings. NEVER USE A HAMMER TO DRIVE SHAFT THROUGH BEARINGS. Protect bearings from contamination.
- (a-7) Go to step 8.

B. Grease Lubricated Ball Bearings:



Outboard End

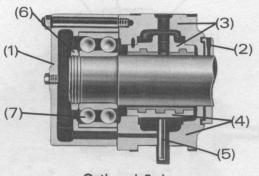


Coupling End

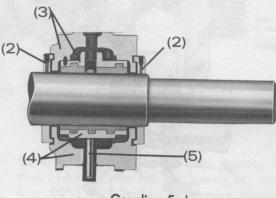
Figure 5A

- (b-1) Remove bearing end covers. Preserve gaskets.
- (b-2) Slide deflectors toward shaft sleeves.
- (b-3) Unbolt inboard bearing end covers and slide toward shaft sleeves.
- (b-4) Slide bearing housings off shaft. Preserve gaskets.
- (b-5) Straighten "tang" in lock washer and remove outboard end bearing lock nut and washer.
- (b-6) Remove ball bearings using a bearing puller as shown in Section VI-D, Figure 30. Care must be taken to prevent damage to bearings. NEVER USE A HAMMER TO DRIVE SHAFT THROUGH BEARINGS. Protect bearings from contamination.
- (b-7) Go to step 8.

C. Ring Oil Lubricated Sleeve Bearings:



Outboard End



Coupling End Figure 6A

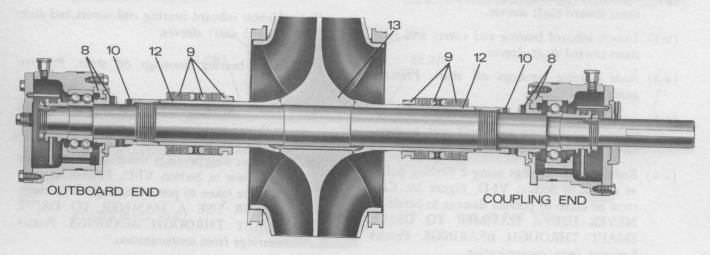
The first four steps in the disassembly procedure of sleeve bearings are outlined in Step 3.

- (c-5) Lift oil rings off shaft.
- (c-6) Straighten "tang" in lock washer and remove outboard end bearing lock nut and washer.

(c-7) Remove ball bearing using a bearing puller as shown in Section VI-D, Figure 30. Care must be used to prevent damage to bearing. NEVER USE A HAMMER TO DRIVE SHAFT THROUGH BEARINGS. Protect bearings from contamination.

(c-8) Go to step 8.

- Slide inboard bearing end covers, oil throwers, dust covers, and deflectors (if any) off shaft. Protect grease seals on grease lubricated pumps.
- 9. If unit has mechanical seals, slide glands, with stationary seat in place, off shaft. Use care to prevent damage to lapped seal faces. Rotary portion of seal and stuffing box bushing can be left on sleeve until sleeve is removed. If unit has packed stuffing boxes, remove packing, lantern rings and stuffing box bushings.
- Loosen set screws in shaft sleeve nuts. Using a spanner or strap wrench, remove sleeve nuts. One nut has right hand threads, the other left hand threads. Nuts tighten against pump rotation. Preserve "O" rings.
- 11. Smooth shaft with fine emery cloth so sleeves will not bind upon removal.
- 12. Carefully slide sleeves off shaft. If pump has mechanical seals, then rotary portion of the seal and the stuffing box bushings will be attached to the sleeve and can be removed later, if required. Protect "O"-rings located in the end of the sleeve nearest the impeller.
- 13. Lightly scribe a line on the shaft near the impeller hub. This will determine the proper position of the impeller on the shaft. Drive or press impeller off shaft. DO NOT DAMAGE IMPEL-LER HUB SURFACE WHICH IS SEALED BY SLEEVE "O"-RING. Remove key.



PRESSURE - TEMPERATURE CAPABILITY

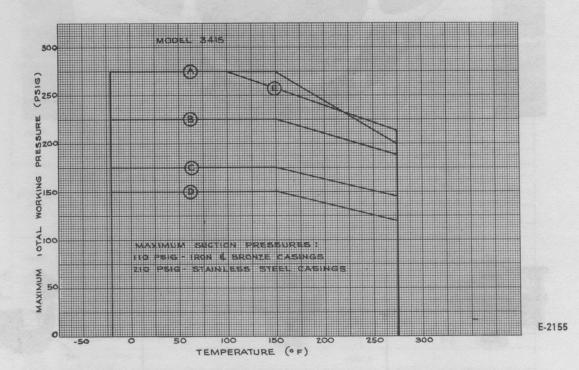
The maximum pressure rating of the pump, including the connection of pump and pipe flanges, can be determined from the chart and table shown below. The maximum working pressure is dependent upon both the casing limits and the mating flanges.

The table below references the combination of pump size, material and mating pipe flanges to the pressuretemperature chart. To determine the maximum working pressure:

- (1) Select the proper code designation for the pump size, material and mating pipe flanges from the table.
- (2) Follow the coded curve on the chart to the desired pumping temperature.
- (3) The pressure value shown at that temperature is the maximum working pressure of the pump and mating pipe flange combination.

Pump	Pump Casing		Acceptable ating Flanges	Code
Size	Material	Discharge	Suction	
8 x 10-22 10 x 12-22 12 x 14-18	Cast Iron or Bronze	250 PSI Flat Face Cast Iron ør 300 PSI Flat Face Bronze or Steel	125 PSI Cast Iron	"A"
14 x 16-18 14 x 16-22 16 x 18-18	Bronze	150 PSI Flat Face Steel	150 PSI Flat Face	"B"
	Cast Iron	150 PSI Flat Face Steel	- Bronze or Steel	"C"
16 x 18-22H 18 x 20-22	Bronze or Cast Iron	125 PSI Cast Iron		"D"
8 x 10-22 10 x 12-22		N. P. J		
12 x 14-18 14 x 16-18		150 PSI	150 PSI Flat	"F"
14 x 16-22	31655	Flat Face Steel	Face Steel	E.,
16 x 18-18				
16 x 18-22H 18 x 20-22				

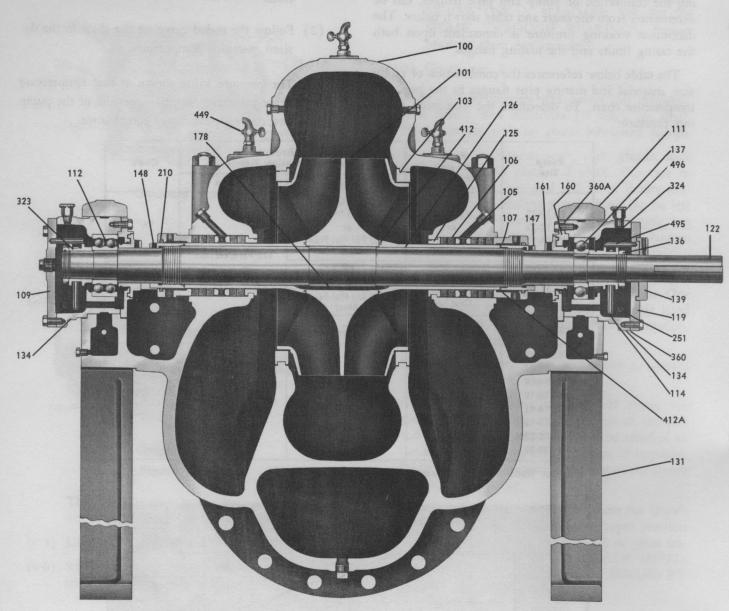
* American National Standards Institute



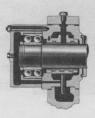
Note: For pressure requirements above those shown, optional casing material, flanges and bolting are available. Contact the nearest Goulds representative for details.

VIII - D. SECTIONAL VIEW AND PARTS LIST

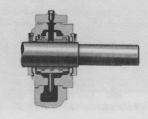
standard construction with ring oiled ball bearings



252-42



ring oiled sleeve bearing with ball thrust bearing



ring oiled sleeve bearing coupling end



impeller with impeller wearing ring

PARTS LIST AND MATERIALS OF CONSTRUCTION

tem	No. Req.						Material		
No.	per Pump	in state she	Part Name		B.F.	A.I.	A.B.	316 SS	Al/316 R.E.
100	1 Upper 1 Lower	Casing			1003	1003	1103	316	1003
101	1	Impeller	and a strend to be		1103	1000	1103	316	316
103	2	Wearing Ring -	Casing		1106	1000	1106	316	316
105	2	Lantern Ring	Liter Propiet		1102	1000	1102	316	316
106	1 Set	Stuffing Box Pack	ing				Asbestos		
107	2	Stuffing Box Split	and the second se		1106	1000	1106	316	316
109	1	Brg. End Cover -			-	an and the second	1000		201120.00
111	2	Bearing Cap					1000		
112	1	Ball Bearing - T	hrust End		The second		Steel	Lite In an	
114	2	Oil Ring	and the second of the				Brass	and in the	+ The second
119	1	Brg. End Cover -	- Cola, End				1000		
122	1	Shaft			SAE 4340	SAE 4340	316	316	316
125	2	Stuffing Box Bush	ing		1102	1000	1102	316	316
126	2	Shaft Sleeve			1106	1000	1106	316	316
127	2		Casing (with Imp. '	Wrg. Ring)	1106	1000	1106	316	316
131	2	Pedestal			1000		1000		
134	2	Bearing Housing				1.2.2	1000		
136	2		t and Lockwasher		Contraction of the local division of the loc		Steel		
137	1	Ball Bearing - C			1 1 2 22.0	C.M. Starter	Steel		
139	1	Dust Cover	-prigr and				1000		
142	2	Wearing Ring -	Impeller		1103	1000	1103	316	316
147	1	Shaft Sleeve Nut			1106	1000	1106	316	316
148	1	Shaft Sleeve Nut			1106	1000	1106	316	316
160	2	Bearing End Cov					1000	STREET.	
161	2	Oil Thrower	un moouru		and the second s	A the fail of	1000		
178	1	Impeller Key	CONTRACTOR OF			11111111	AISI 303		
210	2	Gland Packing				Lu	bricated Asbe	stos	
229	4	Swing Bolt (not	illue)		Si	teel		AISI 303	
251	2	Constant Level					hite Metal & G	Blass	1000
320	6		peller Wrg. Ring				316		1.23.20
323	1	Oil Ring Sleeve	the second s				1000	Contra la la	
323	1	Oil Ring Sleeve			15.00	11. 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1000	11 12 14 19 19	
351	2		ig Flg. (not illus.)				Asbestos	Stand State	9
355	4	Swing Bolt Nut					316	A CONTRACTOR	12000
360	2	Gasket — Brg.					.0045 Paper		
	2		Hsg. Cover — Inboa	ard	1000		.0045 Paper		
360A 412	2	O-Ring — Imp.					Buna Rubber		AN ALL ALL
412 412A	2	O-Ring — Sleev					Buna Rubber		S. Longe
412A 449	3	Air Cock			Brass	Steel	Brass	316	Stee
495	2	Retainer Pin (O	il Ring)				Steel		
495	2	Breather	in King)			-	Steel		
	No.	Cu. %	Sn. %	Pb. %		Zn. %	P. %		Ni. %
1	102	84-86	4-6	4-6		4-6			-
	103	87	6	4.5		1.75	.051	5	0.75
	106	84	8	8		_	.101	5	-

Symbol 1000—Cast Iron—Corresponds to ASTM A278 Class 25 1003—Cast Iron—Corresponds to ASTM A278 Class 30 316—Corresponds to AISI Type 316 (Wrought) or ASTM A296 CF-8M (Cast)

CONSTRUCTION DETAILS

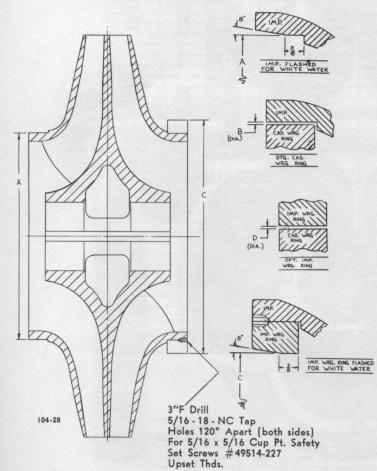
			GROU	JP "S"			GROU	IP "M"		
	internation paint	8 x 10-22	12 x 14-18	14 x 16-18	16 x 18-18	10 x 12-22	14 x 16-22	16 x 18-22H	18 x 20-22	
	Weight — Bronze Fitted Bare Pump	2700	2920	3300	3450	3400	4600	4900	5400	
PUMP	Minimum Casing Thickness — Cast Iron and Bronze	13/16"	3/4"	13/16"	7/8"	7/8″	11/8″	11/8″	1 3/16"	
	Casing Capacity — Gallons	35	50	70	100	45	90	110	135	
	Stuffing Box Bore			5"			5	5/8"		
	Stuffing Box Depth (to Stuff. Box Bush.)		4	5/8			45%8			
STUFFING	Stuffing Box Packing (Size)	10000	5/8	x 5/8		12.	5/8	x 5/8		
BOA	Stuffing Box — No. of Packing Rings			5	11.00	5				
	Width of Lantern Ring		1	1/4			1	1/4		
	Shaft Dia. at Impeller		3	/4"			3	3/4"		
SHAFT	Shaft Dia. in Shaft Sleeve		3	1/4"			3	3/4"		
SHAFI	Shaft Dia. at Coupling End		2	1/4"			2	3/4"		
	Outside Dia. of Shaft Sleeve		3	3/4"			4	3/8"		
19.225	Ball Brg Coupling End	1.000	MRC	C-3125			MR	C-315S		
	Ball Bearing - Thrust End		MRC	C-5312			MR	C-5315		
	Max. Total Working Pressure			See Pressu	re — Tempe	rature Chart	on Page 5A	۱.	The second	
GENERAL	Max. Test Pressure			150%	6 of Working	Pressure at	100°F.			
	Bearing Centers		3	39"				44"		
	Max. Shaft H.P. per 100 R.P.M.		4	6.5			8	9.0		
TEMP.	Max. Liquid Temp. without Quenching				18	0° F				
LIMITS	Max. Liquid Temp. with Quenching				27	'5° F				





VIII - E. INSPECTION AND OVERHAUL

- 1. "O"-Rings Inspect "O"-rings and replace if damaged. Position them in sleeves and sleeve nuts.
- 2. Wearing Rings The original radial clearance between the impeller and the casing wearing rings is shown on Chart #1A. Clearance between casing wearing rings and optional impeller wearing rings is also shown. When hydraulic performance is reduced substantially, the casing rings should be replaced.



3. Impeller Wearing Rings — If the unit has impeller wearing rings and it is necessary to replace the rings:

(a) Remove old rings by removing the three set screws and pulling ring off hub.

(b) Clean hub and press on new ring.

(c) Drill and tap three holes 120° apart with an "F" drill and a 5/16'' - 18NC tap on each ring. Use $5/16'' \ge 5/16''$ cup point safety set screws. Tighten screws and lightly "upset" threads. See Chart #1A.

(d) Replacement impeller rings are supplied .020-.030" oversize and must be turned to size *after* mounting on impeller. See Chart #1A for dimensions.

- 4. Gasket Inspect flange gasket. If torn or otherwise damaged, cut a new gasket of 1/64" asbestos conforming to ASTM D-1170 specifications, Grade P-1242-D (Armstrong AN 890 or equal). Use the upper half casing as a template. Strike the sheet with a ball peen hammer. This will cut the gasket against the edge of the casing. The gasket must cover the entire surface of the parting flange, especially around the wearing ring locks, or internal leakage from high to low pressure zones in the pump will occur.
- 5. Shaft Check shaft for runout to see that it is not bent. Straighten if required. Bearing seats *must* be in perfect condition. Replace if necessary. Check keyways for burrs or foreign matter.
- 6. Impeller Check impeller and replace if there is:

(a) Excessive erosion, especially on the inlet vanes.

CL		DT	11.9	
CH	A	KI	#	A

Material	Dimension				PUMP	SIZE			
material	Dimension	8 x 10-22	12 x 14-18	14 x 16-18	16 x 18-18	10 x 12-22	14 x 16-22	16 x 18-22H	18 x 20-22
	A	8.989″ 8.987	10.753″ 10.751	12.236″ 12.233	13.986″ 13.983	10.238″ 10.236	12.986" 12.983	14.234″ 14.231	15.359" 15.356
Iron & Bronze	В	.020 .024	.022 .026	.023 .029	.023 .029	.022 .026	.023 .029	.023 .029	.023 .029
ITON & DIONZO	с	9.854 9.852	12.477 12.474	13.102 13.099	14.852 14.849	11.102 11.100	14.477 14.474	15.602 15.599	16.477 16.474
	D	.021 .025	.023 .029	.023 .029	.023 .029	.023 .027	.023 .029	.023 .029	.023 .029
	A	8.989 8.987	10.753 10.751	12.236 12.233	13.982 13.979	10.238 10.236	12.982 12.979	14.234 14.231	15.355 15.352
Steel	В	.020 .024	.022 .026	.023 .029	.023 .029	.022 .026	.023 .029	.023 .029	.023 .029
51661	с	9.854 9.852	12.477 12.474	13.102 13.099	14.852 14.849	11.102 11.100	14.477 14.474	15.602 15.599	16.477 16.474
S. Caperto	D	.021 .025	.023 .029	.023 .029	.023 .029	.023 .027	.023 .029	.023 .029	.023 .029

(b) Excessive wear on wearing surfaces. If the impeller diameter has to be cut, it should be dynamically balanced. Imbalance can be corrected by grinding on the outside of the shrouds near the periphery.

7. Shaft Sleeve — The sleeve surface in the stuffing box area must be smooth and free of grooves. If grooved, replace. "O"-ring groove in end of sleeve must be in good condition.

The original diametric clearance between the shaft sleeve and the stuffing box bushing is .030"-.034". If this clearance has increased to more than .050-.060" the sleeve, and at times, the stuffing box bushing should be replaced.

- 8. Bearings Replace ball bearings if worn, loose, rough, or noisy when rotated. See Section VI-B.
- 9. General All parts should be clean before assembly. This is especially important at "O"-ring grooves, threads and bearing areas.

VIII - F. REASSEMBLY

- 1. Determine the correct positioning of impeller on shaft. Facing the coupling end of shaft, determine proper rotation of unit (clockwise or counterclockwise). Figure 8A shows proper relationship between rotation and impeller vane curvature for counter-clockwise rotation.
- 2. Slide impeller on shaft with key in place. Drive or press shaft into impeller. DO NOT DAMAGE END OF SHAFT. Line up impeller hub with scribe mark made on shaft during disassembly.
- 3. Place "O"-rings in grooves in end of shaft sleeves. Slide sleeves on shaft.

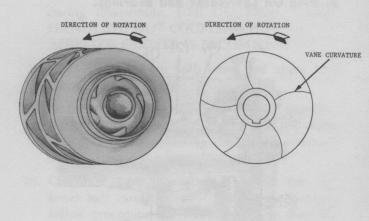


Figure 8A

- 4. Place "O"-rings under outer end of sleeves. Tighten shaft sleeve nuts against sleeves using a spanner or strap wrench. Tighten set screws in sleeve nuts.
- 5. Slide stuffing box bushings over sleeves. Position as shown in Figure 9A so that continuous "lock" is facing towards packing. If unit is equipped with mechanical seals, carefully slide the rotary portion on the sleeve and fasten securely. Check seal manufacturer's drawing for proper position. Carefully slide mechanical seal glands, with stationary seats and gaskets in place, on shaft. If unit has packing, slide the lantern rings on sleeves.
- 6. This step contains instructions for the installation of bearings. Select the appropriate procedure as you did previously in the Disassembly instructions and follow it carefully.

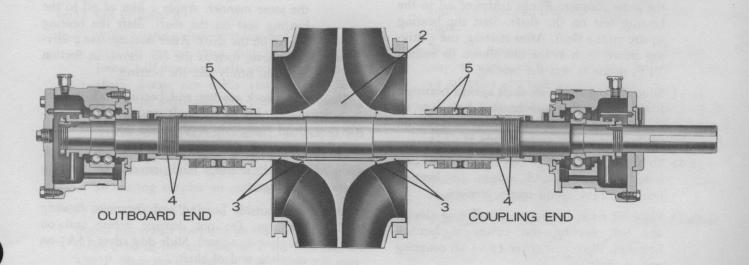


Figure 9A

A. Ring Oil Lubricated Ball Bearings:

B. Grease Lubricated Ball Bearings:

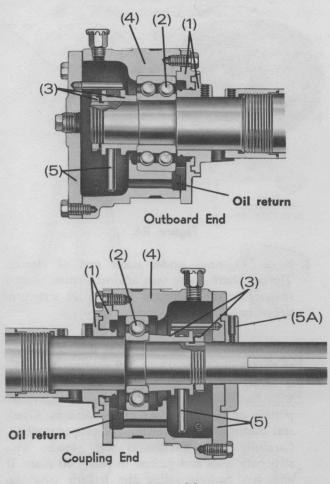
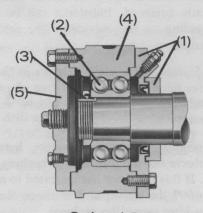


Figure 10A

- (a-1) Slide oil throwers and inboard bearing end covers on shaft.
- (a-2) Install the bearings. Coupling end bearing is single row and the outboard bearing is double row. Although different, they are installed in the same manner. Apply a film of oil to the bearing seat on the shaft. Start the bearing square on the shaft. After starting, use a driving sleeve, such as the one shown in Section VI-E, to firmly seat the bearing.
- (a-3) Slide oil ring sleeve on shaft against bearings. Place lock washer and bearing lock nuts on shaft and firmly tighten. Bend "tangs" on washers into slots in lock nuts.
- (a-4) Slide bearing housings over bearings and bolt inboard bearing end covers to bearing housings. Line up oil return grooves.
- (a-5) Place oil rings in groove on oil ring sleeves and bolt bearing end covers to bearing housings. Place dust cover (5A) on coupling end of shaft.
- (a-6) Go to Step 7.



Outboard End

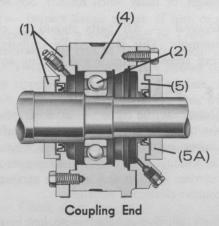
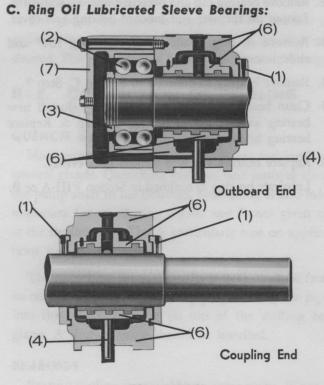


Figure 11A

- (b-1) Slide deflectors and inboard bearing end covers on shaft. Do not damage grease seals.
- (b-2) Install the bearings. Coupling end bearing is single row and the outboard bearing is double row. Although different, they are installed in the same manner. Apply a film of oil to the bearing seat on the shaft. Start the bearing square on the shaft. After starting, use a driving sleeve, such as the one shown in Section VI-E, to firmly seat the bearing.
- (b-3) Place lock washer and bearing lock nut on outboard end of shaft and firmly tighten. Bend "tang" on washer into slot in lock nut.
- (b-4) Slide bearing housings over bearings and bolt inboard bearing end covers to bearing housings.
- (b-5) Bolt outside bearing end covers to bearing housings. Do not damage grease seal on coupling end cover. Slide dust cover (5A) on coupling end of shaft.
- (b-6) Go to Step 7.





- (c-1) Slide dust covers on shaft.
- (c-2) Install ball bearing on outboard end of shaft. Apply a film of oil to the bearing seat on shaft. Start the bearing square on the shaft. After starting, use a driving sleeve, such as shown in Section VI-E, to firmly seat the bearing.
- (c-3) Place lock washer and bearing lock nut on outboard end of shaft and firmly tighten. Bend "tang" on lock washer into slot in lock nut.
- (c-4) Place oil rings on shaft.
- (c-5) Go to Step 7.
- (c-6) After rotating element is lowered into the casing, lift the oil rings slightly and place the lower half bearing shells and adapter on the shaft. Rotate the shells and adapters 180° under the shaft and into position. Following the procedure, place top half shells and adapters in position on top of shaft. MAKE SURE MATCH-MARKS LINE UP.
- (c-7) Bolt bearing end cover with gasket in place to bearing adapter on outboard end of shaft.
- (c-8) Go to Step 10.
- 7. Install pump half coupling on shaft. Heat the hub in an oven or hot oil bath until the hub reaches 300°F. Slide the hub on the shaft until it is positioned in the same location as it was originally. It should line up with the mark scribed on shaft

during disassembly. USE CAUTION WHEN HANDLING HOT COUPLING HUB. USE OF ASBESTOS GLOVES IS RECOMMENDED.

- 8. Clean all "seats" in both lower and upper half casing.
- 9. Slide the casing wearing rings onto the impeller. Make sure that the continuous lock on the upper half of the rings is facing toward the center of the impeller.
- 10. Carefully lower the rotating element into the lower half casing. If pump has sleeve bearings, follow procedures (6) through (8) in Step 6C. Make sure that "double locks" on wearing rings, bearing housings and stuffing box bushings are facing up. The unit should settle easily into place. After the element has been properly seated, rotate the rings, bearing housings, and stuffing box bushings 180° so that "double locks" are located in lower half casing. Check to be sure impeller is centered in casing. If it is not, loosen sleeve nuts and shift sleeves and impeller as required. Check for free turning by rotating the shaft by hand.
- 11. Replace the bearing caps and tighten the nuts evenly. Make sure that the caps are replaced on the same end from which they were removed and the match-marks "line up". Check for free turning.
- 12. Place the parting gasket in position on the lower half casing. Make sure edge of gasket is flush with stuffing box bores and tight against the wearing rings and stuffing box bushings.
- 13. Carefully lower the upper half casing which should settle into place without resistance. Replace dowel pins. Check for free turning. If no binding is apparent, tighten parting nuts alternately on each side of pump starting from the center. Check for free turning after all nuts are tight.
- 14. Slide oil throwers, dust covers and deflectors, if any, to within 1/32'' of the bearing end covers or adapters and tighten set screws.
- 15. If unit has packing, repack stuffing boxes and replace gland assemblies as outlined in Section II-C. If unit has mechanical seals, bolt glands to stuffing box and firmly tighten.
- 16. Follow alignment procedures as outlined in Section I-F. Connect coupling.
- 17. Lubricate pump bearings as described in Section VIII-A.
- 18. Connect all auxiliary piping.
- 19. Follow directions in Section III for starting and operating procedures.

VIII - G. EMERGENCY BALL BEARING REPLACEMENT

If the outboard end ball bearing needs replacement and it is not desirable to overhaul the entire pump, the bearing can be replaced as follows: NOTE: Coupling end bearing cannot be replaced in this manner unless:

- (a) Pump or driver is removed from bedplate or
- (b) Spacer coupling is used.
- 1. Remove oiler and drain oil from housing.

- 2. Remove bearing cap and outboard bearing end cover. Loosen oil thrower and inboard bearing end cover.
- 3. Remove oil ring, rotate bearing housing 180° and slide housing off shaft.
- 4. Remove bearing as outlined in Section C, Step 7.
- 5. Clean bearing housing and end covers. Install new bearing as outlined in Section F, Step 6. Replace bearing housing and end cover.
- 6. Replace bearing cap and tighten nuts evenly.
- 7. Lubricate bearing as outlined in Section VIII-A or B.

GREASE LUBRICATOR

The grease lubricator is supplied when the use of recirculating pumpage or outside sealing liquid is not desired. The grease should be insoluble in the pumpage.

II - E. CONNECTION OF COOLING WATER PIPING

QUENCH GLAND

Most pumps which contain stuffing box packing have quench glands. Quenching prevents heat transfer along the pump shaft to the bearings. Quenching is also most important for smothering vapors and fumes given off at the stuffing box. This is particularly true on applications such as hot water.

The quenching liquid (usually water) must be from an outside source. It should be piped, with flexible pipe, into the tapped opening on top of the stuffing box gland. A shut-off valve should be installed.

BEARINGS

Bearing cooling is available on some units. When it is available, cooling water must be connected to the jacket when pumping hot liquids. See the temperature limits listed under "Construction Details" in Section VIII-D. Valves should be installed in the coolant supply lines to regulate the flow.

STUFFING BOXES

Some units are equipped with cooling jackets around the stuffing box as standard. It is optional on various other models. Coolant lines are connected in the same manner as the bearing cooling lines.

CASING PEDESTALS

On some models, water cooled pedestals are available. Connection of coolant lines is made in the same manner as above.

MECHANICAL SEALS

Seal materials (carbon, ceramic, teflon, etc.) are suitable for use at temperatures to 500°F. (212° to 250°F. if seal has rubber parts). However, for satisfactory operation, there must be a liquid film between the seal faces to lubricate them. If the liquid flashes to vapor, the faces will run dry and be damaged. To prevent this, the liquid must be cool. In general, this requires that the liquid be cooled so that the vapor pressure is well below the stuffing box pressure. Doubtful cases should be referred to Goulds for a recommendation. Refer to seal manufacturer's drawing for location of taps. Some methods which may be used to cool the seal are:

1. Dead Ended Seal Chamber

No liquid is circulated through the stuffing box. The isolated or "dead ended" liquid around the seal is cooled by circulating water in the stuffing box jacket, if any.

2. Cool Liquid Flushing — External Source

A clean, cool compatible liquid is injected from an outside source directly into the seal chamber. The flushing liquid must be at a pressure 20 to 40 PSI greater than the pressure in the stuffing box. Onehalf to two GPM should be injected. A control valve and rotometer placed in the inlet line permits accurate regulation. Cooling water can be circulated through the stuffing box water jacket (if any) in addition to the external flush.

3. Cool Liquid Flushing — Product Cooling

In this arrangement, pumped liquid is piped from the pump casing, cooled in an external heat exchanger, then injected into the seal chamber. A control valve together with a rotometer and/or a dial thermometer should be installed in a line from the exchanger to the seal chamber. One-half to two GPM should be circulated. Cooling water, one to three GPM, should be circulated through the stuffing box jacket, if any.

II-F. CONNECTION OF DRAIN PIPING

All units contain tapped openings around the stuffing box for draining leakage. On corrosion resistant units, a drain pan is supplied with a tapped opening. Check the assembly dimension print for size and location.

II-G. CONNECTION OF EQUALIZING PIPING

Some multi-stage pumps have equalizing piping to equalize pressure on the stuffing boxes (see Sectional View in Section VIII-D). This piping is in the box of fittings which accompanies the pump. The ends of the piping must be connected to the openings in each stuffing box.

II - H. IMPELLER ADJUSTMENT

Some end suction pumps, in addition to vertical pumps, have means of adjusting impeller clearance within the casing. The clearance was set at the factory, but in transit, the clearance may have been lost. Proper clearance must be attained before a pump is operated or SERIOUS DAMAGE MAY OCCUR. Check and reset impeller clearance by method described in Section VIII-B.

11

SECTION III — STARTING PUMP

III - A. CHECKING FOR FREE TURNING

Rotate shaft by hand to be sure rotating element is free. If element rubs or binds:

- 1. Check alignment
- 2. Pipe loads should be removed
- 3. Check impeller clearance (if external adjustment is possible) as outlined in Section VIII-B.
- 4. If unit is equipped with leveling bolts on frame or casing foot, check to be sure that bolts are not overtightened.

III - B. REGULATION OF COOLING AND FLUSHING LIQUIDS

The supply of liquid to any cooling jackets, quench glands, or mechanical seals should be regulated by valves in the supply line. *Approximate* flow rates are as follows:

Quench Glands — $\frac{1}{2}$ to 1 GPM

Cooling Jackets — 1 to 3 GPM

Mechanical Seals $-\frac{1}{2}$ to 2 GPM

The cooling lines should be checked periodically to see that they have not become clogged.

III - C. PRIMING

The pump must always be fully primed and the suction pipe full of liquid before pump is started.

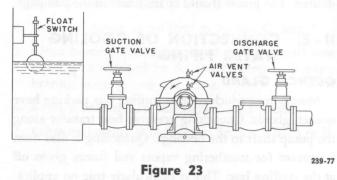
If pump is run dry, the rotating parts within the pump may seize to the stationary parts since they depend upon the liquid being pumped for lubrication.

Several different methods of priming can be used, depending upon the type of installation and service involved.

Vertical sump pumps, when submerged, need not be primed since the pump is filled with liquid.

NOTE: ON GLASS-LINED PUMPS, THE THERMAL SHOCK LIMIT OF THE GLASS VAR-IES WITH THE CONDITIONS OF OPERATION. DO NOT INTRODUCE LIQUID TO PUMP IF TEMPERATURE DIFFERENCE BETWEEN LIQ-UID AND PUMP IS OVER 100°F. GRADUALLY HEAT PUMP BEFORE INTRODUCING HOT LIQUIDS.

SUCTION SUPPLY ABOVE PUMP



When pump is installed as shown in Fig. 23, pump will prime itself. Open gate valve on suction and close discharge gate valve. Open air vent valves until all air is expelled and water flows through openings. Close air vent valves, start pump and open discharge gate valve. Pump will continue to be primed for any future starting.

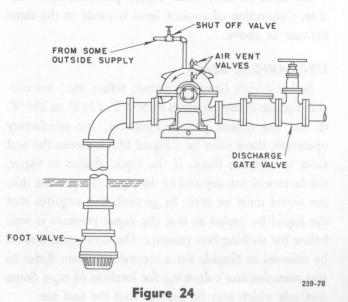
This method is the simplest and, particularly for automatic operation, the safest. A float switch in the suction reservoir can be arranged to stop pump, should there be failure of liquid supply.

PRIMING WITH FOOT VALVE

With pump installed on suction lift, with foot valve at end of suction line, priming can be done any of the following three ways:

1. Outside Supply

Close discharge gate valve, open air vent valves and open valve in priming supply line until all air is expelled and water issues from vent openings. Close air vent valves, close valve in priming supply line, and start pump; then open discharge gate valve.



2. By Separate Hand, or Manually Controlled, Priming Pump

Close discharge gate valve (keep air vent valves closed) and open valve in line to priming pump. Exhaust air from pump and suction piping until water flows from priming pump. With priming pump running, close valve in priming line, start pump and open discharge gate valve.

An alternate method is to reverse connections on priming pump and extending priming pump suction to source of liquid supply. The pump may be primed by pumping liquid into casing until liquid comes out of the open air vent valves.

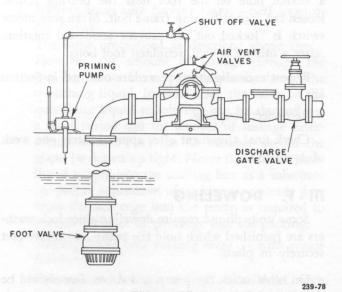
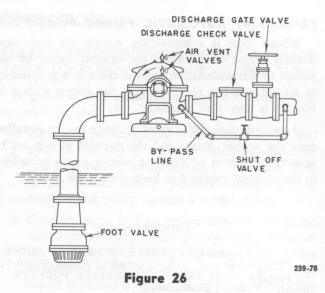


Figure 25

In either of these methods (1) and (2), the pump will remain primed, provided foot value is tight. Any failure, however, of foot value when pump is standing idle, will permit the pump to lose its prime. During long idle periods, the pump can also lose its prime through leakage from stuffing boxes.

3. Bypassing Around Discharge Check Valve

This method can be used only when there is liquid under some pressure in the discharge line. The original prime must be effected from some outside source. After subsequent idle periods, open air vent valves and open valve in bypass line around discharge check and gate valves until liquid flows from air vent openings. Close air vent valves and bypass valve, start pump and open discharge gate valve.

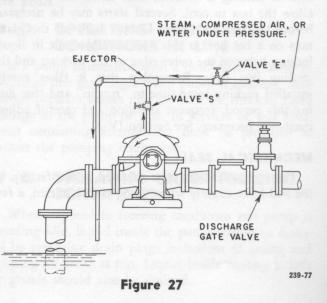


The valve in bypass can be left open, in which event, during idle periods, loss through foot valve is constantly replenished from discharge line. This system is used for automatic operation where idle periods are of short duration and there is no danger of exhausting all liquid from discharge line, due to a leaky foot valve. The foot valve must be capable of withstanding static head pressure of the system.

PRIMING BY EJECTION

On suction lift installation, an ejector, operated by steam, compressed air, or water under pressure, and connected to tapped opening in top of casing can be used to remove air from casing and suction line, thus priming the pump. See Fig. 27.

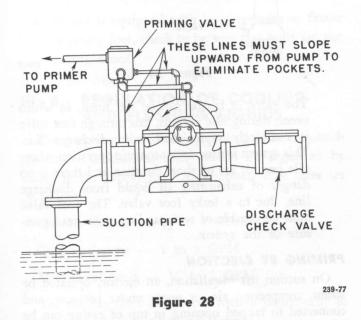
Close discharge gate valve, open valve "E" in steam, air or water pressure supply line. Open valve "S" in suction pipe of ejector connected to pump casing. Air will be evacuated and liquid will be drawn up into suction pipe and pump casing. When all air is evacuated, start pump, close valve "S" and valve "E", and open discharge gate valve.



PRIMING BY AUTOMATIC PRIMER PUMP

Where there is a fluctuating suction lift that occasionally might drop below the normal limits of the pump, or for installations where there is any quantity of air entrained in the pumpage, the system shown in Fig. 28 is very well adapted.

A vacuum tank and a vacuum gauge can be installed near the primer pump and the vacuum switch set to automatically start or stop the primer pump according to the vacuum required to keep the system primed.



III - D. INITIAL INSPECTION AFTER STARTING

PACKED BOX

With pump running at rated speed, the stuffing box gland can be adjusted. Draw gland nuts up evenly and only 1/6 of a turn at a time, allowing sufficient time between adjustments for the packing to adjust itself and the effect on the leakage to be observed. If any sign of heating is evident, shut down the pump and allow the box to cool. Several starts may be necessary before the box runs cool. Do not back off the gland nuts on a hot box as this will usually result in liquid leaking between the outer edge of the packing and the stuffing box bore. Remember that it takes newlyinstalled packing some time to "run in" and that during this period, frequent attention and careful adjustments are necessary. See Section IV-A.

MECHANICAL SEAL

The mechanical seal was adjusted at the factory. If the seal leaks slightly when pump is first started, a few hours run-in will allow seal to adjust itself. NEVER RUN SEAL DRY. MAKE SURE COOLING FLOW LINES, IF ANY, ARE OPERATING PROPERLY.

III - E. ALIGNMENT - FINAL

Final adjustment can only be accomplished after the unit has been run under actual operating conditions for a sufficient length of time to bring the unit up to operating temperature.

After this warm-up period has elapsed, stop the unit and IMMEDIATELY DISCONNECT THE COUP-LING AND CHECK THE ALIGNMENT. On "Back-Pull Out" end suction units, the frame foot should be loosened to relieve any strain due to thermal expansion. On units which have jacking bolts on the foot, loosen the hold-down bolts. On units which have a slotted hole on the foot near the bearing frame, loosen the foot-to-bearing frame bolt. Make sure motor switch is "locked out" to prevent accidental rotation. After a minute or two, retighten foot bolts.

Repeat each alignment procedure outlined in Section IF.

Reconnect coupling.

Check final alignment after approximately one week of operation.

III - F. DOWELING

Some units do not require doweling since lock washers are furnished which hold the pump and driver feet securely in place.

On other units, the pump and driver feet should be doweled after installation is completed, and the unit is in correct final alignment. Taper dowel pins, included in the box of fittings, are furnished for these units.

NOTE: ON ALL MULTI-STAGE UNITS, DOWEL PINS (IF SUPPLIED) SHOULD BE USED ON THE COUPLING END OF PUMP ONLY. DO NOT DOWEL FEET ON OUTBOARD END OF PUMP.

On units to be doweled (except those noted above), drill through two diagonally opposite feet of the pump into the bedplate. Use a reamer with a $\frac{1}{4}$ " per foot taper. The dowels should extend well into the bedplate but project above the pump feet. Drivers should also be doweled but the driver manufacturer should be contacted for instructions.

IV - A. STUFFING BOX

1. Stuffing boxes with packing rings — less quenching liquid or grease lubricator:

Periodically inspect stuffing box to see that there is sufficient leakage to lubricate the packing and maintain a cool box. Never draw up packing so that the stuffing box heats, as this will cause damage to both packing and sleeve. Draw up gland nuts slowly and evenly and only when pump is running.

After pump has been in operation for some time and the packing has been completely run in, at least 40 to 60 drops per minute of the liquid should be allowed to trickle from the stuffing box at all times for cooling and lubricating the packing and shaft sleeve.

2. Stuffing boxes with packing rings — with quenching liquid:

The same precautions as described above apply. However, the amount of leakage through the packing cannot be easily determined, due to the quenching liquid. In most cases, the valve on the quenching liquid supply line can be shut off for a short period and the amount of leakage determined as in IV-A1. In no instance should the gland be drawn up tight. Never throttle the clean liquid supply into the stuffing box as a substitute for proper adjustment of packing — a steady flow from the seal cage into the pump is required to prevent entrance of pumpage into the packing.

3. Stuffing boxes with packing rings — with grease lubricator:

Operation is the same as directed in IV-A1, with the addition that the handle on the lubricator should be given a turn or two about every 100 hours of operation.

4. Stuffing boxes with mechanical seal:

This type of box requires no attention other than to make sure that the circulating lines do not become clogged.

IV - B. OPERATING AT REDUCED CAPACITIES

DO NOT operate a centrifugal pump at greatly reduced capacities or with discharge gate valve closed, because the energy required to drive the pump is converted into heat. The temperature of the liquid in the pump may increase until the boiling point is reached. If this occurs, the rotating parts are exposed to vapor with no lubrication and they may score or even seize to the stationary parts. WARNING: IF RUNNING CLEARANCES HAVE ENLARGED DUE TO WEAR, SEIZURE MAY NOT TAKE PLACE AND CONTINUED OPERATION UNDER THESE CONDITIONS MAY CREATE AN EXPLOSIVE

HAZARD DUE TO THE CONFINED VAPOR UNDER HIGH PRESSURE AND TEMPERATURE.

To guard against possible damage, protective devices are available, such as:

- 1. Liquid temperature relay or thermostat which will shut off the unit if the liquid temperature in the pump exceeds a predetermined maximum. This device guards against possible damage due to running the pump against a closed valve.
- 2. Constant open by-pass orifice between the pump discharge and any check or regulating valve in the discharge line. The liquid through the orifice is returned to the suction source. The amount of liquid bypassed is a function of input horsepower and the allowable temperature rise. This device also is insurance against damage due to running the pump against a closed discharge valve or very low flow conditions.
- 3. Bearing temperature relay which will shut the unit down if the bearing temperature exceeds a predetermined maximum.
- 4. Low suction pressure control which will shut off the unit should the suction pressure drop below a pre-established minimum. A CENTRIFUGAL PUMP SHOULD NEVER BE THROTTLED FOR CAPACITY ADJUSTMENT ON THE SUCTION SIDE.

IV-C. OPERATING AT REDUCED HEAD

On motor driven pumps, when discharge head or pressure is allowed to drop considerably below the rated point for any length of time, the motor should be watched for heating because the pump capacity increases with reduced head, as does horsepower consumption. If this condition is likely to persist, arrangements should be made either to manually or automatically throttle the discharge valve to build up head to a safe point.

IV - D. OPERATING WITH SURGE CONDITIONS IN LINE

If a pump is installed with a quick closing valve in discharge line that closes when pump is running, dangerous pressure surges may be built up that can cause damage to the pump or line. In services of this kind, some cushioning arrangement must be provided to protect the pumping equipment.

IV - E. OPERATING UNDER FREEZING CONDITIONS

When exposed to freezing conditions and pump is standing idle, liquid inside the pump should be drained by removing drain plugs in bottom of casing and opening air cocks at top. Liquid inside cooling jackets or glands should also be drained.

SECTION V — TROUBLE CHECK LIST

V - A. NO LIQUID DELIVERED

- 1. Pump not primed casing and suction pipe not completely filled with liquid.
- *2. Speed too low.
- 3. Discharge head too high. Check system head (particularly friction loss).
- Suction lift too high (suction pipe may be too small or long, causing excessive friction loss).
 Check with vacuum or compound gauge.
- 5. Impeller or suction pipe or opening completely plugged.
- 6. Wrong direction of rotation or impeller installed backwards.
- 7. Air pocket in suction line.
- Stuffing box packing worn or liquid seal plugged — allowing leakage of air into pump casing.
- 9. Air leak in suction line.
- 10. Not enough suction head for hot or volatile liquids. Check carefully as this is a frequent cause of trouble on such service.

V - B. NOT ENOUGH LIQUID DELIVERED

- Pump not primed casing and suction pipe not completely filled with liquid.
- *2. Speed too low.
- 3. Discharge head higher than anticipated. Check system head (particularly friction loss.)
- 4. Suction lift too high (suction pipe may be too small or long, causing excessive friction loss.) Check with vacuum or compound gauge.
- 5. Impeller or suction pipe or opening partially plugged.
- 6. Wrong direction of rotation or impeller installed backwards.
- 7. Air pocket in suction line.
- Stuffing box packing worn or liquid seal plugged — allowing leakage of air into pump casing.
- 9. Air leak in suction line.
- 10. Not enough suction head for hot or volatile liquids. Check carefully as this is a frequent cause of trouble on such service.

- 11. Foot valve too small.
- 12. Foot valve or suction pipe not immersed deeply enough.
- 13. Mechanical defects: Impeller clearance too great Impeller damage

V - C. NOT ENOUGH PRESSURE

- *1. Speed too low.
 - 2. Air or gases in liquid.
 - 3. Impeller diameter may be too small.
 - 4. Mechanical defects: Impeller clearance too great Impeller damaged
 - 5. Wrong direction of rotation or impeller installed backwards.
 - 6. Be sure pressure gauge is in correct place on discharge nozzle or discharge pipe.

V - D. PUMP WORKS A WHILE AND THEN QUITS

- 1. Leaky suction line.
- Stuffing box packing worn or liquid seal plugged — allowing leakage of air into pump casing.
- 3. Air pocket in suction line.
- 4. Not enough suction head for hot or volatile liquids. Check carefully as this is a frequent cause of trouble on such service.
- 5. Air or gases in liquid.
- 6. Suction lift too high (suction pipe may be too small or long, causing excessive friction loss). Check with vacuum or compound gauge.
- 7. Impeller plugged.
- 8. Obstruction in suction or discharge line.
- 9. Casing gaskets damaged.

V - E. PUMP TAKES TOO MUCH POWER

- 1. Speed too high.
- 2. Head lower than rating, pumps too much liquid.
- 3. Liquid heavier than anticipated. Check viscosity and specific gravity.
- * When directly connected to electric motors, check whether motor wiring is correct and receives full voltage. When directly connected to steam turbines, make sure that turbine receives full steam pressure.

4. Mechanical defects: Shaft bent

Rotating element binds

Stuffing box too tight

Impeller clearance too great

5. Wrong direction of rotation, or impeller installed backwards.

V - F. PUMP LEAKS EXCESSIVELY AT STUFFING BOX

- 1. Packing is worn or not properly lubricated.
- 2. Packing is incorrectly inserted or not properly run in.
- 3. Packing is not correct for liquid handled.
- 4. Shaft sleeve scored.
- 5. Insufficient packing.
- 6. Damaged mechanical seal.

V - G. PUMP IS NOISY OR VIBRATES

- 1. Hydraulic noise cavitation, suction lift too high. Check with vacuum or compound gauge.
- Mechanical defects: Shaft bent Rotating parts bind, are loose or broken Bearings worn out. Coupling misaligned.

V - H. HIGH BEARING TEMPERATURE See Section VI-A

- 1. Pump and driver misalignment.
- 2. Pump capacity too low.
- 3. Improper lubrication.
- 4. Excessive vibration.
- 5. Bent shaft.
- 6. Rotating element binds.

but and addressings can be checked for visibut and addressings can be checked for visior ease by douby manage the races and watching a site or viora areas on the balls, caller or tworaces. The bestings can also be inspected by helding the lance race and spinning the easter operating or asping noises are strated or the botting do not. It should be replaced if any view of the races is apprende replaced if any view of

Shere I. 'as should be imported to determine inter deep stratches or pouges i star then oil montes) are passen. The balances waters heald also be trat of high or low spote United track also be trat of high or low spote United track also he trat of high or low spote United tracks are completely stratch, they should

When the of a breaking can be done, allo redened of a more a lit even a small an out of their to dist. - I bench, and a specific all for dists in as - I bench, and place a possible all fools, as well - to the food'd be loop the di

SECTION VI - CARE AND MAINTENANCE OF BEARINGS

VI - A. BEARING TEMPERATURES

All bearings operate at some temperature above that of the surrounding atmosphere, unless cooled. Heat is generated within the bearing due to rolling friction, churning of oil and the "drag" of the race.

Do not use the human hand as a thermometer. A temperature which feels "hot" varies from 120°F. - 130°F. depending upon the individual. Above this temperature, the human hand is worthless in estimating temperature.

Bearing temperatures up to 180°F are normal. Determine the temperature accurately by placing a contact type thermometer against the bearing housing. It should be recorded in a convenient location for reference. THE STABILITY OF THE TEMPERATURE, RATHER THAN THE NUMBER OF DEGREES, IS THE BEST INDICATION OF NORMAL OPERA-TION. A sudden increase in temperature is an indication of danger and a signal to investigate. The unit should be checked for abnormal hydraulic operation and unnecessary loads, such as coupling misalignment, etc.

VI-B. BEARING INSPECTION

1. Ball and Roller Bearings

Ball and roller bearings can be checked for visible wear by slowly turning the races and watching for pits or worn areas on the balls, rollers or raceways. The bearings can also be inspected by holding the inner race and spinning the outer race. If any rasping noises are emitted or the bearing "catches", it should be replaced. If any wear on the races is apparent, replacement is suggested.

2. Sleeve Bearings

Sleeve bearings should be inspected to determine if any deep scratches or gouges (other than oil grooves) are present. The babbitted surfaces should also be free of high or low spots. Unless these surfaces are completely smooth, they should be replaced if they cannot be "scraped in."

VI - C. CLEANING OF BEARINGS

The life of a bearing can be drastically reduced if contaminated with even a small amount of dust or dirt. All bearing assembly operations should be done in as dust-free an atmosphere as possible. All tools, as well as the hands, should be kept clean. If new bearings are to be installed, they should not be unwrapped until ready for installation and should not be cleaned or washed.

If old bearings are dirty, they should be replaced. Washing the bearings does not guarantee cleanliness and is risky at best. If new bearings are not readily available, and immediate reassembly is necessary, dirty bearings can be cleaned as follows:

Pour one or two quarts of CLEAN, WATER-FREE kerosene into a CLEAN pail. Dip the bearings into the kerosene and agitate slowly. Repeat until bearing is completely clean. Blow dry with CLEAN FILTERED compressed air. With ball bearings, hold the two races together, but allow the inner race to rotate a few turns now and then to dislodge the kerosene from the retainer pockets. When the bearing has been blown dry, oil it immediately with a good grade of clean machine oil to prevent corrosion or rust.

If there is any question as to the condition of bearings, it is always best to replace them. This may prevent an unplanned shutdown.

VI - D. BEARING REMOVAL

1. Ball Bearings

A puller such as the one shown in Fig. 29 should be used. The puller bar must be "square" with the end of the shaft at all times in order to keep even pressure on the outer circumference of the bearing. The puller screw should be tightened steadily to enable the bearing to slide smoothly off the shaft. Do not damage the end of the shaft.

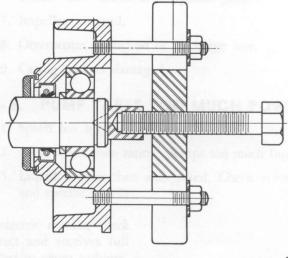
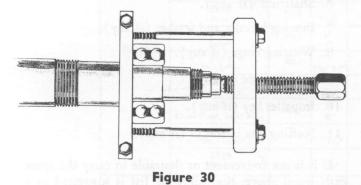


Figure 29

244-95

On some units, the bearing housings slide off the bearings and the puller such as the one shown in Fig. 30 should be used. This type of puller pulls directly against the bearing itself. The puller bar must be "square" with the end of the shaft at all times and the puller screw should be tightened steadily to enable the bearings to slide smoothly off the shaft. Do not damage the end of the shaft.



2. Sleeve Bearings

After the bearing shells have been removed, a bearing puller, such as shown in Fig. 30 should be used to remove the ball bearing. The puller bar must be "square" with the end of the shaft at all times and the puller screw should be tightened steadily to enable the bearing to slide smoothly off the shaft. Do not damage the end of the shaft. After the bearings have been removed, they should be wrapped in clean paper or cloth to prevent contamination. Other parts which surround the bearings, such as bearing housings, should be kept clean in the same manner.

VI - E. BALL BEARING INSTALLATION

A film of clean machine oil should be applied to the bearing seat on the shaft. The bearing should be started on the shaft by tapping the inner race with a hammer or mallet. Do not use a lead mall. The bearing must be kept "square" at all times. Once the bearing is located on the shaft, a driving sleeve, such as the one shown in Fig. 31 should be used. The sleeve should contact the inner race of the bearing only. The bearing should be pressed or driven until it contacts shoulder "x".

Duplex thrust bearings must be mounted in the proper position as described in Section VIII-F.

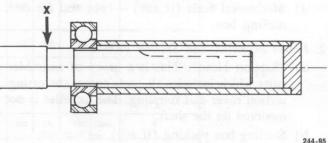


Figure 31

SECTION VII — ORDERING OF SPARE PARTS

VII - A. SPARE PARTS

To insure against possible long and costly "downtime" periods, especially on critical services, it is advisable to have spare parts on hand.

The most desirable parts to have on hand are the following:

1. Horizontally Split Case Pumps

- a) "Rotating element". This is a group of assembled parts, including bearings, bearing housings, shaft, impeller(s), wearing rings, stuffing box bushings, and all rotating parts except the coupling.
- b) Stuffing box packing (if any) one set for each stuffing box.
- c) Stuffing box gland packing (if any) one set for each gland.
- d) Mechanical Seals (if any) one seal for each stuffing box.
- 2. Frame Mounted End Suction Pumps
 - a) "Support Head". This is a group of assembled parts which includes all parts except the casing, suction cover and coupling. The impeller is not mounted on the shaft.
 - b) Stuffing box packing (if any) one set.
 - c) Stuffing box gland packing (if any) one set.
 - d) Mechanical seal (if any) one.
- 3. "Back Pull-Out" End Suction Pumps
 - a) "Back Pull-Out assembly". This is a group of assembled parts which includes all parts except the casing and the coupling.
 - b) Stuffing box packing (if any) one set.
 - c) Stuffing box gland packing (if any) one set.
 - d) Mechanical seal (if any) one.

With these parts on hand, pump can be easily and quickly reconditioned by replacing the worn parts.

An alternate, though not as desirable as that stated above, is to have on hand parts that are most likely to wear and which can be used as needed.

Following is a list of these suggested parts:

 Stuffing box packing (if any) — one set for each stuffing box.

- 2. Stuffing box gland packing (if any) one set.
- 3. Mechanical seal (if any).
- 4. Shaft sleeve (if any).
- 5. Ball bearings one of each.
- 6. Shaft nut (if any).
- 7. Bearing locknut and washer (if any).
- 8. Wearing rings (if any).
- 9. Shaft one required.
- 10. Impeller key (if any).
- 11. Stuffing box bushings (if any).

If it is not convenient or desirable to carry the spare parts listed above, the following list is suggested as a minimum for servicing the pump under ordinary conditions of wear:

- Stuffing box packing (if any) one set for each stuffing box.
- 2. Stuffing box gland packing (if any) one set.
- 3. Shaft sleeve (if any).
- 4. Ball bearings one of each.
- 5. Shaft nut (if any).
- 6. Bearing locknut and washer (if any)

VII - B. INSTRUCTIONS FOR ORDERING SPARE PARTS

Repair orders will be handled with the minimum of delay if the following directions are followed:

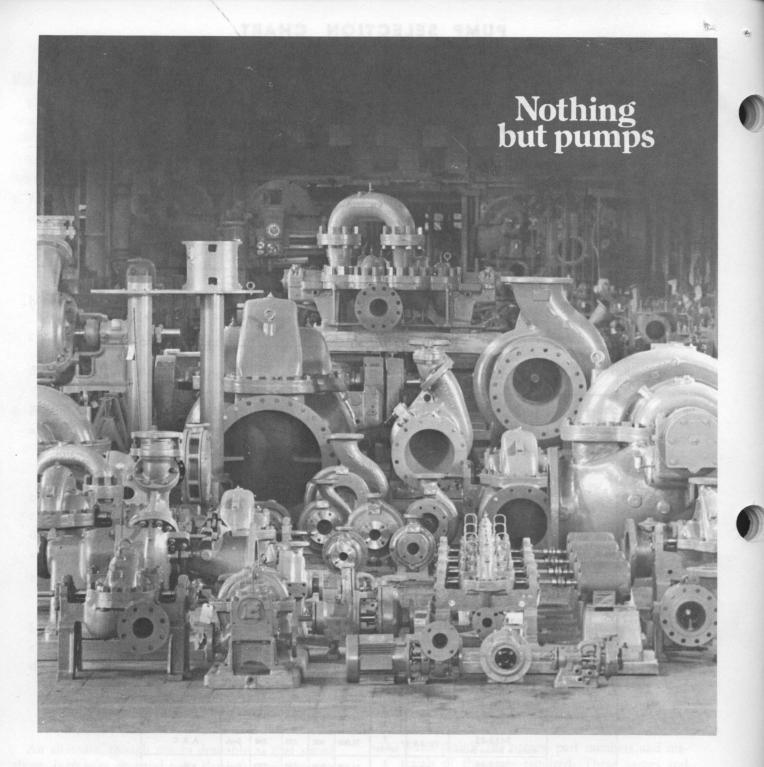
- 1. Give Model No., size of the pump and serial number. These can all be obtained from the nameplate.
- 2. Write plainly the names, part numbers and materials of the parts required. These names and numbers should agree with those on the Sectional View in Section VIII-D.
- 3. Give the number of parts required.
- 4. Give complete shipping instructions.

PUMP SELECTION CHART

						1.000		1. N	
	Model Number and Pump Type	Described in Bulletin	No. of Sizes & Range	Max. Capacity G.P.M.	Max. Head Feet	Max. Temp. °F	Max. Work'g Press.	Type of Im- peller	Class of Construction
	3196-STD AVS Chemical	725.1	18 1″-4″	1600	750	500	375	Open	A, B, C, F
	3196-XL 3196-HT	725.1XL	5 6" & 8"	4250	230	500 700	375	Open	A, B, C, F A, B, C
	3706 Small Glassed	725.2	1 1″	100	115	350	150	Open	D
	3708 Glassed	725.2	4 1"-3"	700	150	350	150	Semi- Open	D
Process	3107 Teflon	725.3	1 1″	70	110	300	150	Open	E
Frocess	3198 AVS Teflon	725.3	2 1 ¹ / ₂ " & 3"	800	410	300	225	Open	E
	2520 Liquid Ring	725.6	1 1½″	60	85	212	75	Strgt. Blade	1 & 8
	3604 Close-Cupid. Small Alloy	725.7	1 3⁄4"	16	28	220	75	Semi- Open	8
	3199 Single Stg., Direct Con.	725.8	3 1"-11/2"	220	150	350	150	Open	A, B, C
	3716 Cer-Vit		1 1½″	140	140	350	100	Open	Cer-Vit
High Temp. Process	3735-HPI Centerline Mounted 3736-HPI Foot Mounted	724.2	21 1"-6"	1900	900	800 500	600	Encl.	с
	3135 Diagonally Split Casing	723.1	12 3″-8″	4000	300	200	150	Open	A, B, C
Stock	3175 Back Pull Out	723.4	17 3"-18"	12,500	320	450	275	Open	A, B, C
	3655 Single Stg., Close-Cupld.	710.1	25 11⁄4"-8"	3800	400	250	150	Encl.	A
	3755 Single Stg., Direct Con.	715.1	25 1¼4″-8″	3800	400	350	150	Encl.	A
General Service	3345 Two Stg., Direct Con.	718.2	1 1″	120	500	350	250	Encl.	A
	3320 Two Stg., Close-CupId.	713.1	1 1″	120	500	250	250	Encl.	A
	3189 Single Stg., Direct Con.	720.4	2 6" & 8"	3200	155	350	150	Open	A
	3316 Two Stage	722.6	10 1″-8″	3000	1000	400	500	Encl.	A & B in all sizes C in most sizes
Multi Stage	3330 Medium Pressure	722.1	21 3″-8″	2100	1000	350	370	Encl.	A & B
	3360-65 High Pressure	722.4	11 3"-8"	2600	3400	350	1200	Encl.	A & B
	3405	721.6	39 2"-12"	6400	550	350	250	Encl.	A & B in all sizes C in 4" thru 12"
	3404 Vertically Mtd.	721.15	39 2"-12"	6400	525	350	250	Encl.	A & B in all sizes C in 4" thru 12"
Double Suction	3415DV	721.7	8 8"-18"	15,000	550	275	275	Encl.	A, B, C
	3420-23 Horiz. & Bottom Suction	721.8 & .9	7 16"-36"	75,000	400	275	200	Encl.	A, B, C
	3450-60 Horiz. & Bottom Suction	721.2	3 14"-16"	16,000	200	250	250	Encl.	A
Vertical	3171 Vertical Centrifugal	726.1	21 1"-8"	3180	290	450	150	Open	A & C
Verticui	VIT Vertical Turbine	3A.1	18 4"-36"	20,000	3000	250	-	Open	1, 3, 5, 8
	and the second		-		MA	TERIA	LS OF C	ONSTR	UCTION
		Ļ	Class						
-3.53 -3.53			Class	2. B	ll iron. ronze fi	tted.			
The table a	t right shows a code for	con-		2. B 3. A	ronze fi II bronz	tted. e. See	A278). Bulletin STM A39		c.
struction ma	t right shows a code for aterials. They are listed i	in the		2. B 3. A 4. D 5. N	ronze fi II bronz uctile i i-Resist	tted. e. See ron (AS t (Type	Bulletin STM A39 2). (AS	5). TM A4	36).
struction ma last column	aterials. They are listed i of the INDEX AND SI	in the -	A	2. B 3. A 4. D 5. N 6. C	ronze fi II bronz uctile i i-Resist arbon s	tted. ce. See ron (AS t (Type teel (A	Bulletin STM A39 2). (AS	5). TM A4 16 Grade	36). e WCA & WCB).
struction ma last column TION chart	aterials. They are listed i of the INDEX AND SI above. Materials liste	in the ELEC- d in-	A	2. B 3. A 4. D 5. N 6. C 7. 11 8. 31	ronze fi II bronz uctile i i-Resist arbon s -13% c 6 stain	tted. ce. See ron (AS t (Type teel (A hrome : less (A)	Bulletin STM A39 2). (AS STM A2 stainless CI CF8M	5). TM A4 16 Grade (ACI ().	36). e WCA & WCB). CA15).
struction ma last column TION chart clude both	aterials. They are listed i of the INDEX AND SI above. Materials liste normal inventory alloy:	in the ELEC- d in- s and	AB	2. B 3. A 4. D 5. N 6. C 7. 11 8. 31 9. G	ronze fi II bronz uctile i i-Resist arbon s -13% c 6 stain ould-A-	tted. con (AS t (Type teel (A hrome : less (A Loy 20	Bulletin STM A39 2). (AS STM A2 stainless CI CF8M (ACI CI	5). TM A4 16 Grade (ACI (). N 7 MC	36). e WCA & WCB). CA15). U).
struction ma last column TION chart clude both some others	aterials. They are listed i of the INDEX AND SI above. Materials liste normal inventory alloy: built only to order. For	in the ELEC- d in- and spe-	AB	2. B 3. A 4. D 5. N 6. C 7. 11 8. 31 9. G 10. O 10. O 10. (3	ronze fi II bronz uctile i i-Resist arbon s -13% c 6 stain ould-A- ther sp w, med 347) 316	tted. te. See ron (AS t (Type teel (A hrome : less (A Loy 20 ecial sa ium an ELC, :	Bulletin STM A39 2). (AS STM A2 stainless CI CF8M (ACI CI	5). TM A4 16 Grade (ACI (). N 7 MC	36). e WCA & WCB). CA15). U).
struction ma last column TION chart clude both some others	aterials. They are listed if of the INDEX AND SI above. Materials liste normal inventory alloys built only to order. For ation on delivery consult	in the ELEC- d in- and spe-	A B C	2. B 3. A 4. D 5. N 6. C 7. 11 8. 31 9. G 10. O 10. (3 11. IS	ronze fi II bronz uctile i i-Resist arbon s -13% c 6 stain ould-A- ther sp w, med 347) 316 50 B ar	tted. te. See ron (AS t (Type teel (Ai hrome: less (Al Loy 20 ecial sa ium an ELC, i nd C.	Bulletin A39 2). (AS STM A2 stainless CI CF8M (ACI CI and cast d high c S17 ELC	5). TM A4 16 Grade (ACI (). N 7 MC	36). e WCA & WCB). CA15). U).
struction ma last column TION chart clude both some others cific informa	aterials. They are listed if of the INDEX AND SI above. Materials liste normal inventory alloys built only to order. For ation on delivery consult	in the ELEC- d in- and spe-	AB	2. B 3. A 4. D 5. N 6. C 7. 11 8. 31 9. G 10. O 10. O 11. IS 12. A	ronze fi Il bronz uctile i i-Resisti arbon s -13% c 6 stain ould-A- ther sp w, med 447) 316 60 B ar Il iron,	tted. te. See ron (AS t (Type teel (A hrome : less (Al Loy 20 ecial sa ium an ELC, : nd C. glassed	Bulletin A39 2). (AS STM A2 stainless CI CF8M (ACI CI and cast d high c S17 ELC	5). TM A43 16 Gradu (ACI ()). N 7 MC machin arbon st , monel,	36). e WCA & WCB). CA15). U). eable alloys such as eels, ACI CF 8C nickel.









GOULDS PUMPS, INC. Main Plant and Headquarters, Seneca Falls, N.Y. 13148

FROM		JBMITTAL TRANSMITTAL 55/3 (Rev. 11-80)	CONTRACT NO		TTAL NO	DATE
	CONTRACTOR		N62470-82-C-2552	5,	Pg. 1	11/13/84
NU		MANUFACTURING CO.	· · · · · · · · · · · · · · · · · · ·		DUTI DTNC	
ro		ENGINEERING COMMAND	REPLACE EQUIPMEN CAMP LE JEUNE, i	NI – NORTH	CAROLIN	i 20 IA
		CONTRACTOR USE ONLY			REVIE	WER USE ONLY
_	L. Contractor Approved	*List only one specification division per fo ist only one of the following categories on each tra and indicate which is being submitted OICC Approval	ansmittal form,	Tation FRAF	A-Appro D-Disap AN-App	pproved proved as noted eipt acknowledged. ments
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICATI (Type, size, model no., Mfg. n brochure number	ame, dwg. or ELAN	- O DO	CODES	REVIEWER'S INITIALS CODE AND DATE
	15440 Para 27	WASH WATER PUMP	, COD	E <u>05</u>	E.	
1	105-170	Model 3415 Backwash Pump	191	1701	A	CCS 405 11-21
2	SA4150L	Model 3415 Sectional Assemb	bly	7	7	
3		Data Sheets - Pump		7		
-	2D-218029	Gland Ring		7		
5	FRACTOR'S COMMENTS	Pump Characteristics		7	Ý	. V
COPY	OF TRANSMITTAL AND SU	BMITTALS TO BOICC	CONTRACTOR REPRESENTATIVE (Signature		19/10 122552
	ign W. G. Gri		9. C. Han		1 1-1	
	RECEIVED BY REVIEWER	FROM (Reviewer)	TO TO	0		E lasir

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

APPROVED PROVIDE CONTRACTOR

CERTIFICATION !

COPIES TO ROICC (2) LANTDIV (1) A-E (1)	DATE 11/26/84	SIGNATURE Hast	11/2/
NOTE : PLEASE TNIS	Form. PROVIDE	MAKE GARES	* U.S. GOP: 1983 - 739-003/2122 Region 3-11 OF 7 DE OR16INALS.

Nov 30 11 32 AM '84 RECEIVED ROICC JAXNCA

-

	NTRACTOR'S SU	JBMITTAL TRANSMITTAL 155/3 (Rev. 11-80)	CONTRACT NO N62470-82-C-2552	5, 1	Pg. 2	DATE 11/13/84
	ERTS FILTER N	ANUFACTURING CO.	PROJECT TITLE AND LOCATION REPLACE EQUIPMEN	Г – ВI	UILDING	20
	AL FACILITIES	ENGINEERING COMMAND	CAMP LE JEUNE, NO	ORTH (CAROLINA	l
		CONTRACTOR USE ONLY			REVIE	EWER USE ONLY
Ø	L Contractor Approved	*List only one specification division po- ist only one of the following categories on each and indicate which is being submi	transmittal form,		A-Appro D-Disap AN-App	oproved proved as noted reipt acknowledged. ments
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFIC (Type, size, model no., Mf brochure num	g. name, dwg. or	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
6	A0034A	Falk Coupling		7		
7	Bulletin 451-110	Instructions - Coupling		7	A	CC3 405 11-21-
8	2 Pages	F. O. Write-up		7	1	
9		Certificate of Conformanc	e	7	Same and the second	
10	QCP-530	Painting Procedure		7		
11	A-SS509449	Motor Drawing and Certifi	cation	7	¥	Y

COPT OF TRANSMITTAL AND SUBMIT			D (D Signalure)	
Ensign W. G. Grip	in a water and the second states of the	2.0	. Hompson	에 다르르카 한테이 다루는 한 한 한 만 같이
DATE RECEIVED BY REVIEWER	FROM (Reviewer)	0	ROBORTS	FILTER/RO.
Submittals are returned wi tractor calls attention to a	ith action indicated. Approval of an item does i and supports the deviation.	not include approva	l of any deviation from the contract	requirements unless the con-
Submittals are forwarded t transmittal form.	to LANTDIV with A-E recommendations indic	ated in REVIEWER U	JSE ONLY Section and in comment	s below on ONE COPY of the
REVIEWER'S COMMENTS		an digen in a state of the second		
	A August			
1	OPPOVED			
AT	opporte			
2	a glandine ta chine increase a substance and the	0	CERTIFICA	TTCALL
PROVIDE	CONTRACTOR	5	CLEINICH	1
an e an a tha				
		lan da sais		
COPIES TO ROICC (2)	DATE / /	SIGNATURE	11	
LANTDIV (1) A-E (1)	11/26/84	(1)	Hast	
		10.		

TOANCAUTTAL

WOTE : PETRISE DO NOT - MART GUESTAUS OPENOUS/2122 Region 3-11 THIS FORM PRODUCTS SOF ADDEL SATURG ORIGINALS. Nov 30 11 32 AM '84 RECEIVED ROICC JAXNCA

	NTRACTOR'S SI	UBMITTAL TRANSMITTAL 355/3 (Rev. 11-80)			ITTAL NO	DATE
	CONTRACTOR		N62470-82-C-2552	1-	B, Pg.#	1 11/9/84
RC	BERTS FILTER	MANUFACTURING CO.	REPLACE EQUIF	MENT	- BUIL	DING 20
0			CAMP LE JEUNE			
NA	VAL FACILITI	ES ENGINEERING COMMAND			PEV	EWER USE ONLY
	······	*List only one specification division per for	911101 m			ACTION CODES
	L	ist only one of the following categories on each the and indicate which is being submitted	nittal ATECEIVED		AN-Ap	pproved proved as noted
	Contractor Approved	OICC Approval	LANT For DICC Ap		C-Com R-Resu	
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICATE (Type, size, model no., Mlg. re brochure number)		NO. OF	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
-	15440 Para. 2.6	P	1 IVI IE	<u> </u>		
1	A-8784-1	Type W-20 Rotosweeps	9.1%	7	AN	HFW1406 15 NOV 84
2	A-8784-2	Surface Wash Supports	1, 1/2	7	AN	45 NOU 84
3	A-8784-3	Details of Surface Wash Supp	ports	7	AN	HFW1466 15 NOV 84
	Tech. Std.					HEALLONG
. 1	A CONTRACT AND A DESCRIPTION OF A DES		1		RA	111 001 906
4	3003.1.2	I.O. & M Instructions - Rot	tosweeps	7	RA	1520084
	A CONTRACT AND A DESCRIPTION OF A DES	I.O. & M Instructions - Rot Type "W" Rotosweeps RESUBMITTED AS REQUESTED	tosweeps	7	RA AN	1570084 HFW1406 15-NOV80
ON	3003.1.2 Bulletin 501.1	Type "W" Rotosweeps RESUBMITTED AS REQUESTED		7.	RA AN	15-NOUSY HFW1406 15-NOUSY
OPT	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF	Type "W" Rotosweeps RESUBMITTED AS REQUESTED	-604	ignature)	RA AN	ISTNOUSY HEWI406 ISTNOUSY
CONT	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS	Type "W" Rotosweeps RESUBMITTED AS REQUESTED	-604	Ignature)	RA AN	ISTNOUSY HEWIYOG ISTNOUSY X DAICO
OPT	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWER 11 13 8	Type "W" Rotosweeps RESUBMITTED AS REQUESTED BMITTALS TO ROICC RIP FROM (Reviewer) AMANTOL C	CONTRACTOR REPRESENTATIVE IS 9. C. Los To	Ro	RA AN BERT.	HEWIGO
OPT	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWER 1113	Type "W" Rotosweeps RESUBMITTED AS REQUESTED	CONTRACTOR REPRESENTATIVE IS 9. C. Los To	Ro	RA AN BERT becontract re	HFW1406 15-NOV84 S IROUS4 S IROUS4 S IROUS4 Autor
COPT EN	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWER 11 13 Submittals are returned tractor, calls attention	Type "W" Rotosweeps RESUBMITTED AS REQUESTED IBMITTALS TO ROICC IP M FROM (Reviewer) FROM (Reviewer) FROM (Reviewer) FROM (Reviewer) FROM (Reviewer) <td>CONTRACTOR REPRESENTATIVO (S </td> <td>Ro</td> <td></td> <td></td>	CONTRACTOR REPRESENTATIVO (S 	Ro		
	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWED UNDITTALS are returned tractor, calls attention Submittals are forwar transmittal form. WER'S COMMENTS	Type "W" Rotosweeps RESUBMITTED AS REQUESTED IBMITTALS TO ROICC RIP P	CONTRACTOR REPRESENTATIVO (S 	Ro		
	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWER 1112 Submittals are returned tractor, calls attention Submittals are forwar transmittal form.	Type "W" Rotosweeps RESUBMITTED AS REQUESTED IBMITTALS TO ROICC IP M FROM (Reviewer) M FROM (Reviewer) M FROM (Reviewer) M FROM (Reviewer) M ID M ID M ID M ID M ID	CONTRACTOR REPRESENTATIVE (S TO include approval of any deviation d in REVIEWER USE ONLY Section	Ro Ro on and	in comments I	below on ONE COPY of the
	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWER 1112 Submittals are returned tractor, calls attention Submittals are forwar transmittal form.	Type "W" Rotosweeps RESUBMITTED AS REQUESTED IBMITTALS TO ROICC IP M FROM (Reviewer) M FROM (Reviewer) M FROM (Reviewer) M FROM (Reviewer) M ID M ID M ID M ID M ID	CONTRACTOR REPRESENTATIVE (S TO include approval of any deviation d in REVIEWER USE ONLY Section	Ro Ro on and	in comments I	below on ONE COPY of the
	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWER 1113 Submittals are returned tractor, calls attention Submittals are forwar transmittal form. WER'S COMMENTS APPROV DRAWING	Type "W" Rotosweeps RESUBMITTED AS REQUESTED IBMITTALS TO ROICC M FROM (Reviewer) M A M FROM (Reviewer) M M FROM (Reviewer) M M A M A M FROM (Reviewer) M M A M A A A A A A NOTED S S A A B B B B B B B B B B <td>CONTRACTOR REPRESENTATIVE (S TO include approval of any deviation d in REVIEWER USE ONLY Section</td> <td>Ro Ro on and</td> <td>in comments I</td> <td>below on ONE COPY of the</td>	CONTRACTOR REPRESENTATIVE (S TO include approval of any deviation d in REVIEWER USE ONLY Section	Ro Ro on and	in comments I	below on ONE COPY of the
	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWER 1113 Submittals are returned tractor, calls attention Submittals are forwar transmittal form. WER'S COMMENTS APPROV DRAWING	Type "W" Rotosweeps RESUBMITTED AS REQUESTED IBMITTALS TO ROICC RIP P	CONTRACTOR REPRESENTATIVE (S TO include approval of any deviation d in REVIEWER USE ONLY Section SALALL BO	Ro n from the on and	EOP	DLD AS SHOW
	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWER 11 Submittals are returned tractor calls attention Submittals are forwar transmittal form. WER'S COMMENTS APPROV DRAWING ON CA SURFACE	Type "W" Rotosweeps RESUBMITTED AS REQUESTED BEMITTALS TO ROICC RIP M FROM (Reviewer) M FROM (Reviewer) M M FROM (Reviewer) M M M M M M M M M M M M M	CONTRACTOR REPRESENTATIVE (S TO include approval of any deviation d in REVIEWER USE ONLY Section	Ro n from the on and	EOP	DLD AS SHOW
	3003.1.2 Bulletin 501.1 RACTOR'S COMMENTS OF TRANSMITTAL AND SU SIGN W. G. GF RECEIVED BY REVIEWER 11 Submittals are returned tractor calls attention Submittals are forwar transmittal form. WER'S COMMENTS APPROV DRAWING ON CA SURFACE	Type "W" Rotosweeps RESUBMITTED AS REQUESTED BMITTALS TO ROICC RIP M FROM (Reviewer) M FROM (Reviewer) M ACANTDIV ACANTDIV with A-E recommendations indicated RED AS NOTED. S 8784-1 : NOZZLES ATALOG GT.	CONTRACTOR REPRESENTATIVE (S TO include approval of any deviation d in REVIEWER USE ONLY Section SALALL BO	Ro n from the on and	EOP	DLD AS SHOW

and the second of the second of the second of the

weile.

のの日本で

DEC 3 12 42 PH '84 RECEIVED ROICC JAXNCA

Ĩ

.

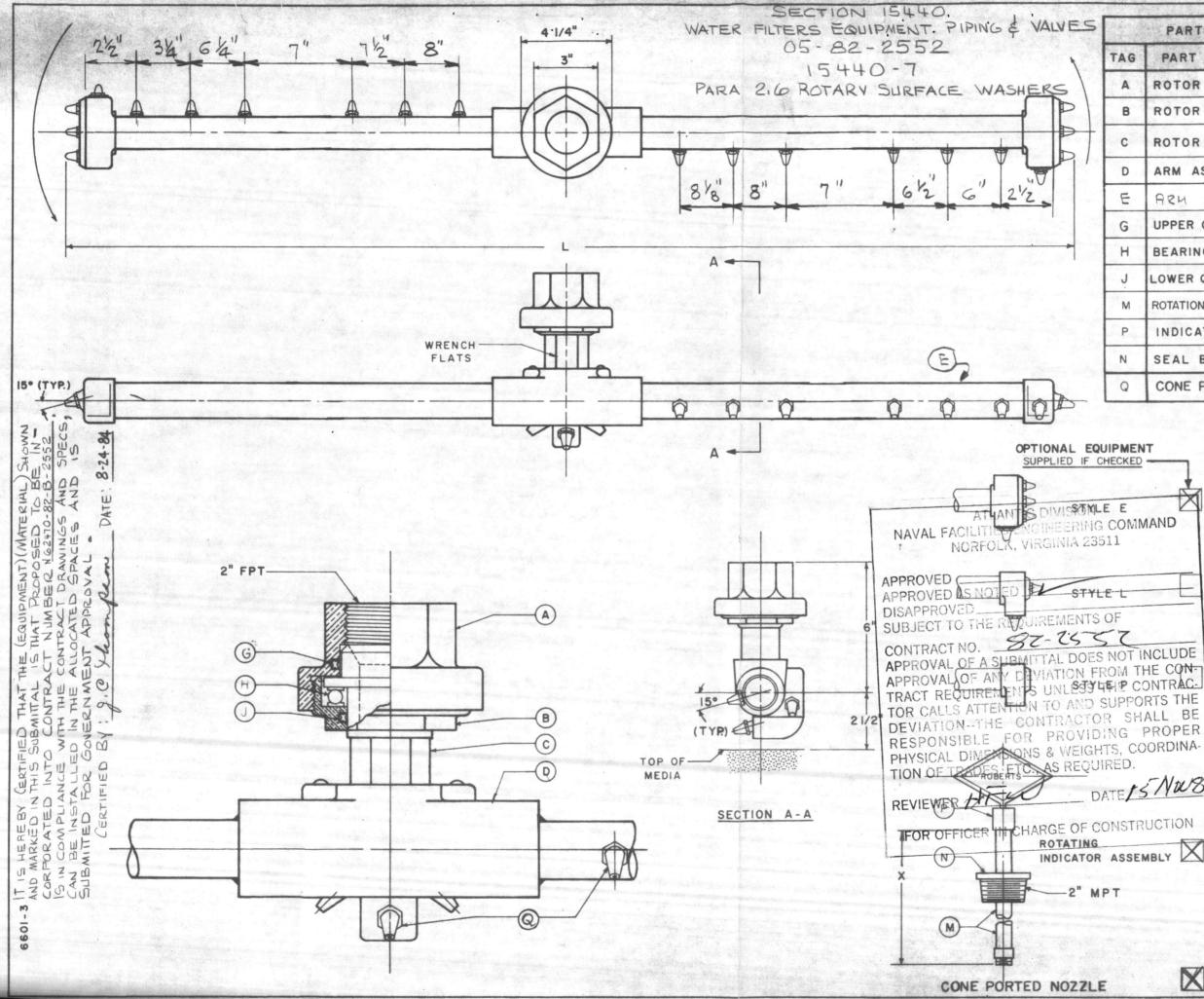
	CONTRACTOR		N62470-82-C-255	1	, Pg. #	2 11/9/84
	REDIC ETITED		and the second			al an and start the
	SERIS FILIER	MANUFACTURING CO.	REPLACE EQUIPMI			
NA	VAL FACILITIE	S ENGINEERING COMMAND	CAM LE OLONE,	nontin	ONNOLI	
		CONTRACTOR USE ONLY			REVI	EWER USE ONLY
		*List only one specification division per	form.		A-Appr	CTION CODES
	L	ist only one of the following categories on each and indicate which is being submitt			D-Disa	pproved proved as noted
	Contractor Approved	OICC Approval	Deviation/Sub For OICC A	and the second		ceipt acknowledged. ments
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICA (Type, size, model no., M/g. brochure numb	name, dwg. or	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DAT
	15440 Para. 2.6		1		Consel-1	
6	1414. 2.0	Detail of Rotosweep Nozzle		7	A	HFW1406 15 Aby 84
7		Comp. Cert Steel Pipe	Nº Nº	7	RA	HFW/406 15 NOV 8
8		Comp. Cert Fittings		7	RA	HFW140
9		Page of Comments		7	RA	HFW 416 15 NOV
Sal		and a second				
COPY	OF TRANSMITTAL AND SU	BMITTALS TO ROICC	CONTRACTOR REPRESENTATIVE	(Signature)		
ENS	SIGN W. G. GR	RIPP CV	A.C. Hen	~ 11		
Statement of the local division of the local	RECEIVED BY REVIEWER	H FROM (Reviewer)	То	Ko	BERT	STRIKE
D'	Submittals are returne	ed with action indicated. Approval of an item does to and supports the deviation.	not include approval of any deviat	tion from th	ne contract re	quirements unless th
	Carl Charles -	ded to LANTDIV with A-E recommendations indic	ated in REVIEWER USE ONLY Se	ction and i	n comments	below on ONE COPY
Ц	transmittal form.					
REVIEW	WER'S COMMENTS	A. NOTE	2			
	APPRO	VED AS NOTE			<i>,</i> .	1-
		G 8784.1 : NOZZI	LE SHALL E	56 1	LEOR	old as i
1)	DRAWIN	9 8107 1 10-022	an and a start in the second			
	ON C:	ATALOG GUT:				
2)	SURFAC.	E WAS H SUPPORTS	Accompac	it	500	ulut 19
	WAAR	ANTY RECUBED.	~ / .			11-11-
COPIE	S TO NCC (2) NTDIV (1)	DATE 111-9/84		internation	C	

- 2

the set of section of the again of the section of parts

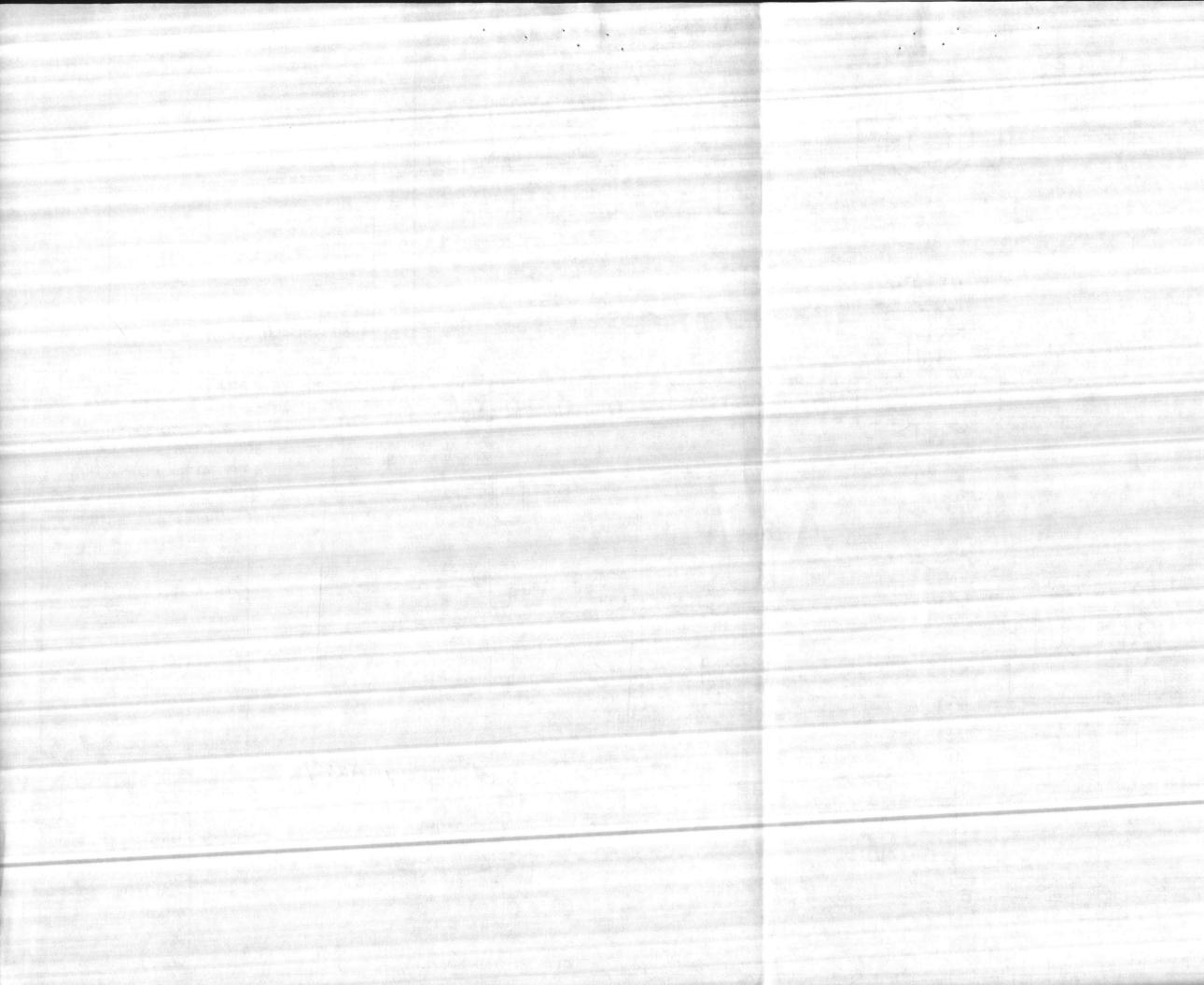
DEC 3 12 43 PM '84 RECEIVED ROICC JAXNCA

ींने क्रांड्य

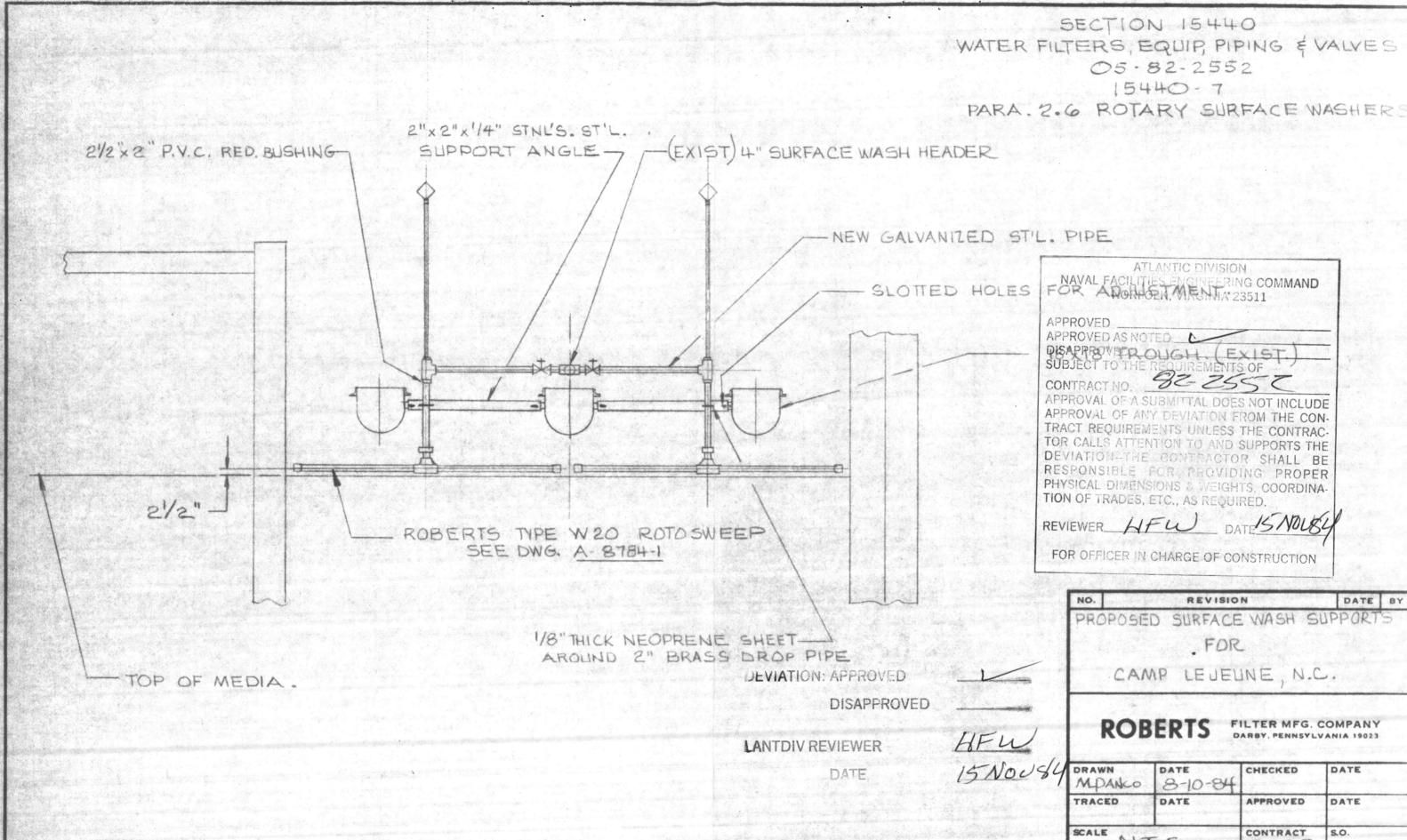


	PARTS LIST	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	1 set a sta
TAG	PART NAME	MATERIAL	
Α	ROTOR CAP	CAST BRASS	
в	ROTOR RETAINER	CAST BRASS	
с	ROTOR	CAST BRASS	
D	ARM ASSEMBLY	CAST BRASS	
E	ARM	BRASS PIPE]
G	UPPER QUAD RING SEAL	BUNA-N	
н	BEARING/RACE ASS'Y	STN STEEL	
J	LOWER QUAD RING SEAL	BUNA-N	
М	ROTATION TUBE	COPPER	
Ρ	INDICATOR ASSY	BRASS	
N	SEAL BUSHING	PVC	
Q	CONE PORTED NOZZLE	NYLON	SEG CAT. CUT

SEE TECH STD 3003.1 OR 3003.3 FOR INSTALLATION & OPERATING INSTRUCTIONS. (150 PSI MAX. PRESS EERING COMMAND ORDER INFORMATION CAMP LE JEUNE JOB LOCATION :. 2093 RFM CO NO .: 20 QUANTITY: B/M ITEM: __ 8'-0" x=8'-0" WATER REQUIRED: 55 _G.P.M. EACH AT 50 PSIG 9-84 9 83 DATE SNOUS 5 REVISED 4 REVISED 3 IND MATL 6158 GENERAL GENERAL INDICATOR ASSEMBLY PARTS ASSEMBLY DRAWING FOR TYPE W-20 ROTOSWEEP 3' TO 14' DIA. ROBERTS PILTER MPG. COMPANY MD X NTS SECTION A DWG. NO.8784 -Q7 OH





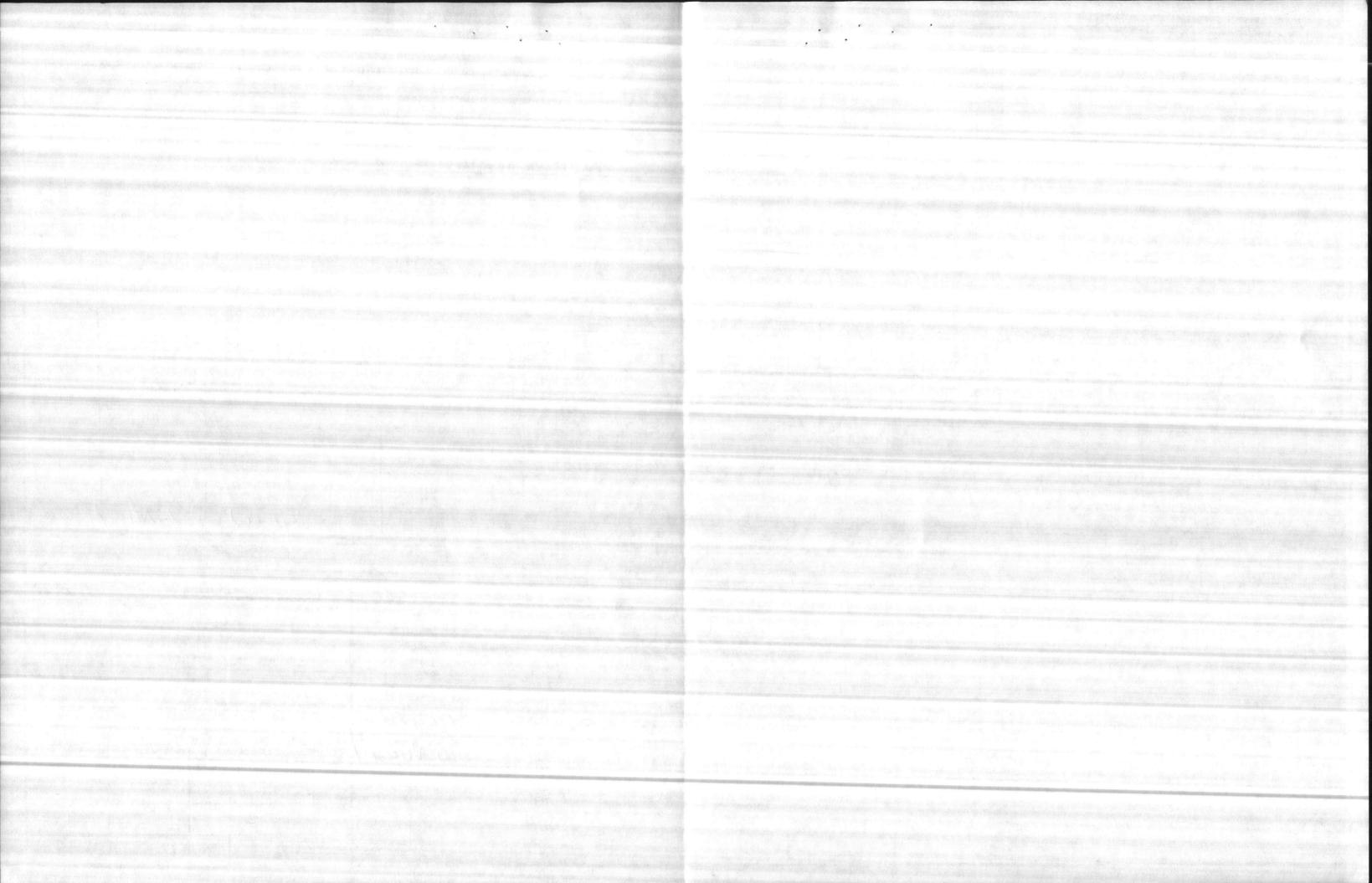


KAE 10 3335 8-82 A0407.

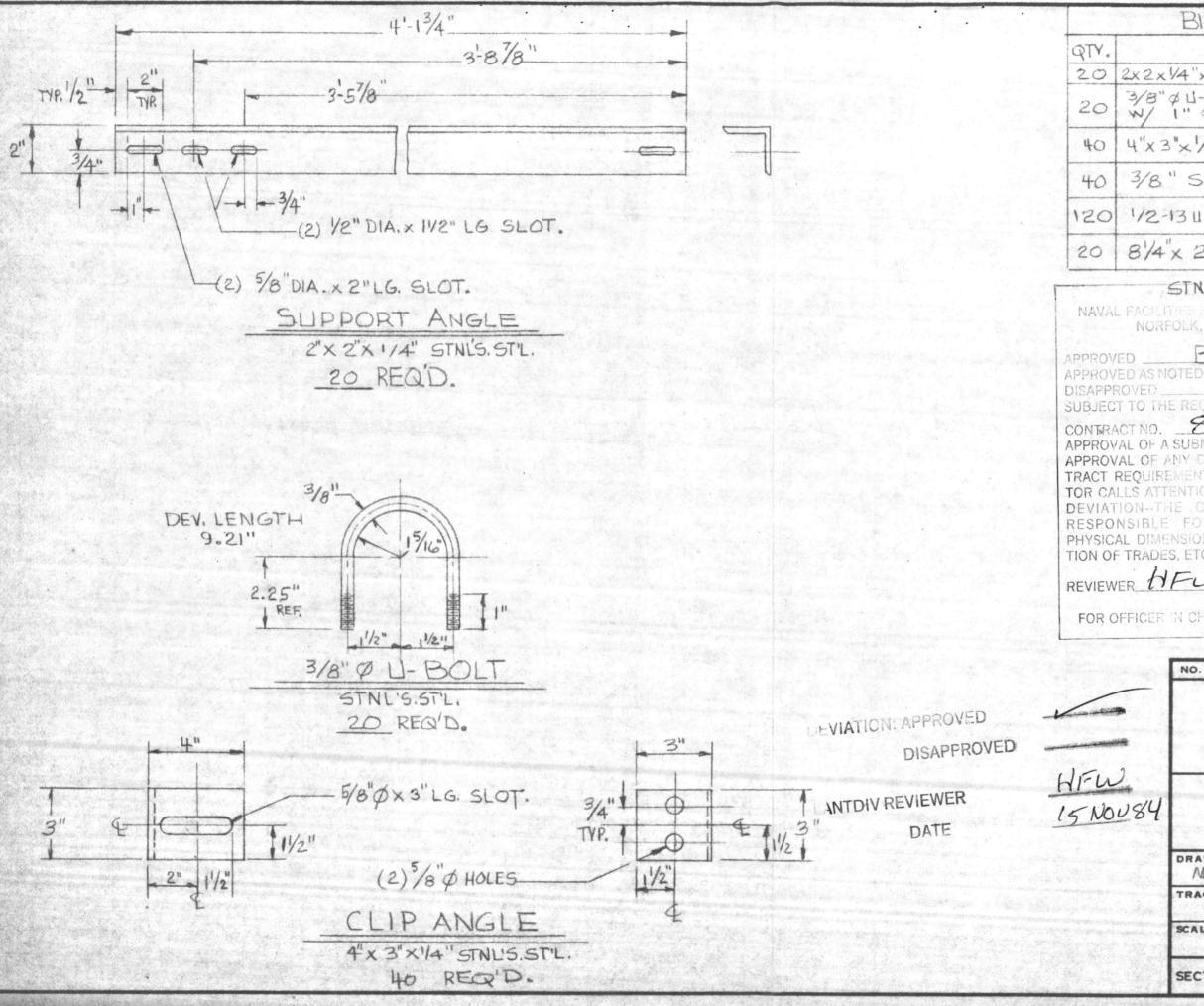
				and the second			
PIPE							
NAVAL FACI	ATLAN	ITIC C		N NG COMMAI 23511	ND]	
PROVED	1997) 					-	
APPROVED BJECT TO T	ROL HE RE	GH	(E EMENT				
NTRACT NO PROVAL OF PROVAL OF	ASUB	MITTA	L DOE	S NOT INCL	UDE		
ACT REQUIE R CALLS AT	REMEN	TS UI DN TC	NLESS) AND	THE CONTI SUPPORTS	RAC-		
VIATION1	HE C	ONT	NACTO	R SHALL	RE		
SPONSIBL	E FO	17 17	U.V.IL	ING PRU	PER		
SPONSIBL (SICAL DIM N OF TRADI	ENSIOI ES, ET(NS & C., AS	WEIGH REQU	ITS, COORD	INA-		
SPONSIBL (SICAL DIM N OF TRADI	ENSIOI ES, ET(NS & C., AS	WEIGH REQU	ITS COORD	INA-		
SPONSIBL (SICAL DIM N OF TRAD	ENSIDI ES, ETC LE	$\frac{1}{2}$	WEIGH REQU	ITS, COORD	INA-		
SPONSIBL (SICAL DIM N OF TRAD (IEWER OR OFFICER	ENSIDI ES, ETC 447	NS & C., AS W ARGE	WEIGH REQU D, OF C(ITS, COORD IRED. ATE	INA-		
SPONSIBL (SICAL DIM N OF TRAD) (IEWER OR OFFICER	ENSIDI ES, ETC 447	NS & C., AS W ARGE	VEIGH REQU OF CO	ITS, COORD IRED. ATE SNOL ONSTRUCTION E WASH	INA-		
NOF TRAD	ENSIDI ES, ETC 4F IN CH	ARGE		ITS, COORD IRED. ATE SNOL ONSTRUCTION WASH	INA-	PPO	
NOF TRAD	ENSIDI ES, ETC 4F IN CH	ARGE		ITS, COORD IRED. ATE SNOL ONSTRUCTION E WASH	INA-	PPO	
SPONSIBL (SICAL DIM N OF TRAD) (IEWER DR OFFICER PROPO	ENSIDI ES, ETC 4F IN CH	ARGE		ITS, COORD IRED. ATE SNOL ONSTRUCTION WASH	INA- INA- INA- INA- INA- INA- INA- INA-		RTS
SPONSIBL (SICAL DIM N OF TRADI (IEWER) PROPO PROPO C RC		ARGE		ITS, COORD IRED. ATE SNOL ONSTRUCTION E WASH	INA- INA- INA- INA- INA- INA- INA- INA-		RTS
SPONSIBL (SICAL DIM N OF TRAD (IEWER) PROPO PROPO		ARGE		ITS, COORD IRED. ATE SNOL ONSTRUCTION E WASH INE, N	INA- INA- DN SU		RTS
SPONSIBL (SICAL DIM N OF TRADI (IEWER) OR OFFICER PROPO C DRAWN M_DAN TRACED SCALE		ARGE ARGE SUR LE RT: ATE		ITS, COORD IRED. ATE SNOL ONSTRUCTION WASH UNE, N UNE, N UNE, N CHECKED	SU .C	DATE	RTS

SECTION 15440

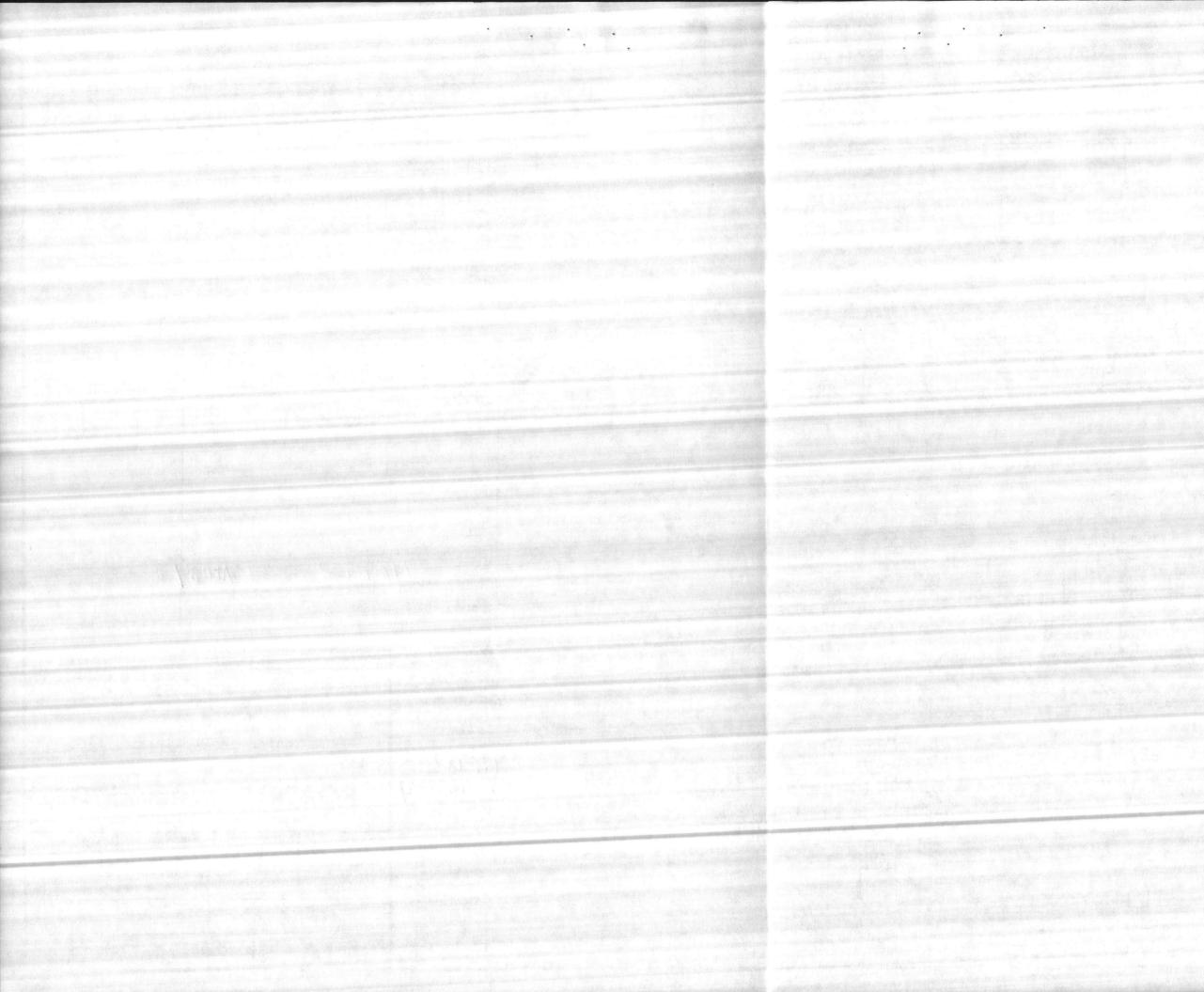
05-82-2552 15440 - 7

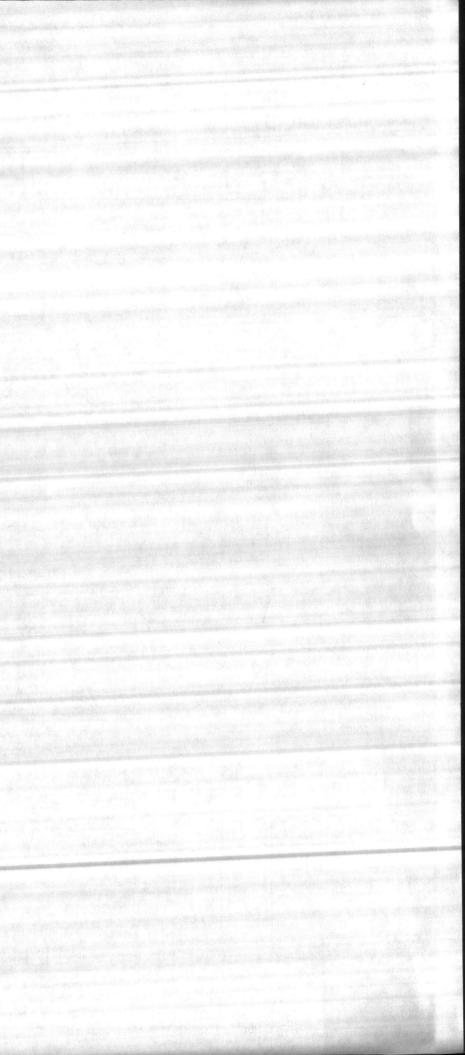


K&E 10 5535 8-82 A0407*



OF MATERIAL BILL DESCRIDTION 20 2x2x1/4"x4-13/4"LG.STNL'S,STL.ANGLE. 3/8" & U-BOLT, DEV. LGTH = 9.21" STNL'S. ST'L. W/ 1" OF THD. EA. END. 4"x 3"x 1/4" x 3" LG. STNL'S. ST'L. ANGLE 3/8" S.S. HEX NUTS & WASHERS. 1/2-13 UNC X 11/4"LG.S.S. HEX BOLTS 81/4"x 2"x 1/8" THICK NEOPRENE RUBBER STNUS STIL. TO BE BOH NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 B/M JTEN SUBJECT TO THE REOUIREMENTS OF 82-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRAC-TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION -- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA-TION OF TRADES, ETC., AS REQUIRED. REVIEWER HELL DATE 15NOU 84 FOR OFFICER IN CHARGE OF CONSTRUCTION NO. REVISION DATE BY DROP SUPPORTS PIPE FOR CAMP LEJEUNE, NC ROBERTS FILTER MFG. COMPANY DARBY, PENNSYLVANIA 19023 DRAWN CHECKED DATE DATE 8-14-84 ALPANCO TRACED DATE APPROVED DATE CONTRACT SCALE 5.0. NTS. 2093 DWG. NO. 8784-3 SECTION A





Poberta FILTER MFG. COMPANY Darby, Pennsylvania 19023

TECHNICAL STANDARD

3003.1.2

Date of Issue: November 10, 1983 Page 1 of 6

CONTRACT No. N 62470-82-C-2552 SECT 15440 PARA. 2.6 PARA 1.8 SECT 15011 INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS

FOR TYPES AW-20 (W-20) AND IW-20 ROTOSWEEPS WITH INDICATORS

Reference Dwgs. B-8462-1 and your specific project drawings (if applicable)

PREPARATION A.

23

ш

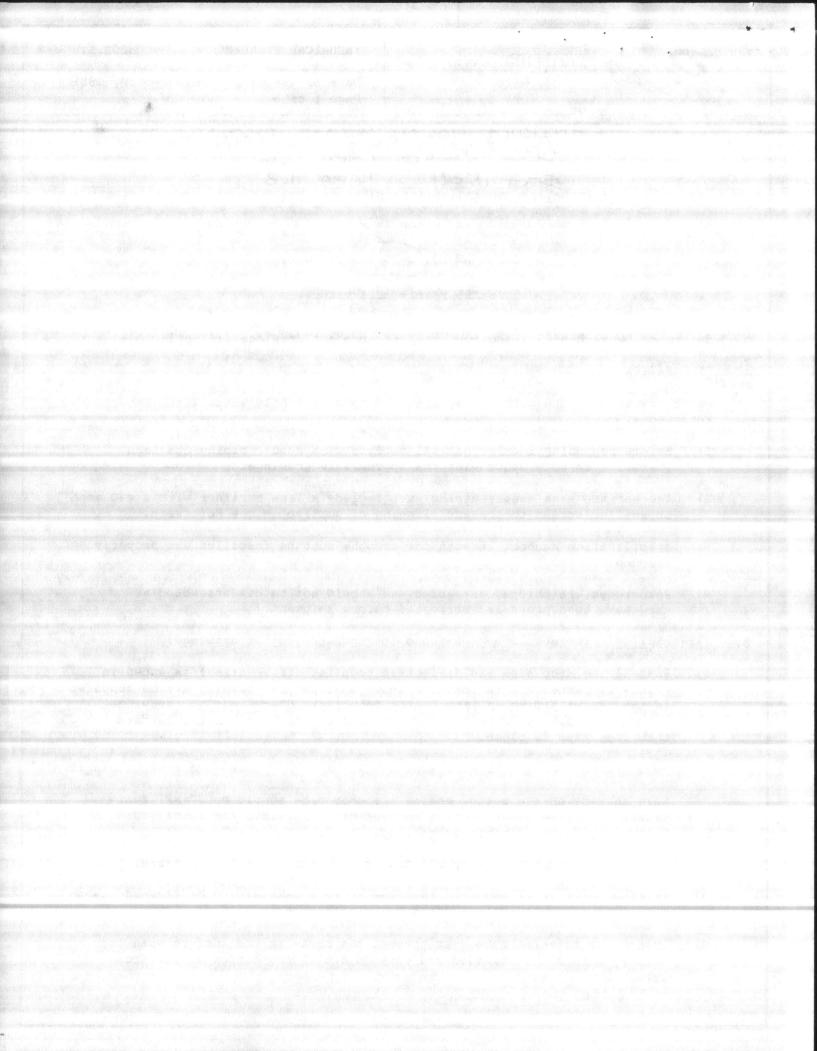
Prior preparation and planning is required to efficiently install the Roberts Rotosweeps.

- 1) Before beginning insure that all surface wash header piping has been installed in accordance with the appropriate drawings.
- The surface wash supply piping must include a line strainer with a #40 mesh 2) or smaller screen to prevent clogging of nozzles in the Rotosweep.
- Stabilization support between the troughs must be installed and properly 3) aligned.
- Rotosweeps are shipped assembled and should not be dis-assembled as 4) they have been properly lubricated before shipment.
- (Reference B-8462-1 and appropriate project drawings) Β. INSTALLATION
 - Install the drop pipe and dielectric coupling (if required) as shown in 1) Figure 1. Note that in some instances a dielectric bushing may be supplied in the header piping in lieu of the coupling. Check your job drawings. Secure drop pipe to stabilizer cross-member with U-bolt being certain that drop pipe is plumb.

Note that bottom end of drop pipe should be 7-3/4" above the final media level.

Male threads on the bottom end of the drop pipe should be 2" NPT full profile to allow proper thread engagement (3/4") into the rotor cap Remove any chips to minimize galling.

- In a similar manner install all drop pipes within the filter basin. 2)
- At this point it is required that the surface wash piping be flushed clean 3) of any construction debris using clean, clear water.
- Insert the rotation tube down through the cross in the surface wash 4) header so that the threaded end extends out of the bottom of the drop pipe.



TECHNICAL STANDARD

3003.1.2



FILTER MFG. COMPANY Darby, Pennsylvania 19023

Date of Issue Page 2 of 6 November 10, 1983

5) Remove the plastic thread protector from the rotary joint. Hold or block the Rotosweep assembly in position below the drop pipe and screw the rotation tube (M) into the threads provided in the arm assembly tee. (Fig.2)

CAUTION: Use care when installing the rotation tube so as not to crush this thin walled tube.

6) Lift the entire assembly upward and acrew the rotor cap onto the drop pipe.

Pipe thread compound may be used providing it is suitable for potable water and does not get into the rotary joint. Alternately teflon tape may be used. (Fig. 3)

7) Remove any burrs on the upper end of the rotation tube. Apply a small amount of white petroleum jelly (Vaseline) to the O-rings in the seal bushing.

Slide the seal bushing down over the rotation tube and screw into the cross on the surface wash header. Do not over-tighten (Fig. 4)

- 8) Install the indicator assembly on the top of the rotation tube. Tighten set screw to secure but do not over-tighten and crush rotation tube.
- Rotosweep nozzles are often shipped with tape over the holes to insure cleanliness during transit. Remove all pieces of tape.

C. OPERATION

23

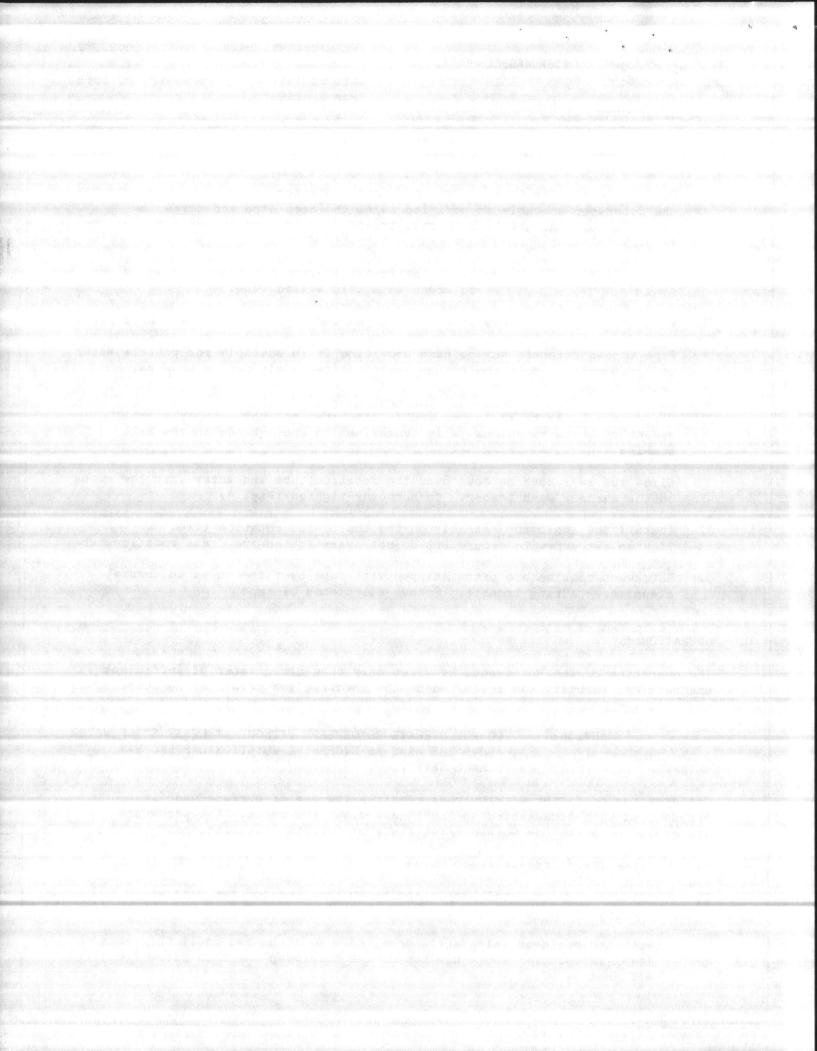
ш

The operation of the Rotosweeps requires only that clean water of sufficient pressure and quantity (as indicated on the specific job drawings) be supplied to the units.

CAUTION: DO NOT OPERATE ROTOSWEEPS WITHOUT AT LEAST 6" OF WATER ABOVE THE ARMS AS EXCESSIVE ROTATIONAL SPEED MAY DAMAGE UNITS.

Optimization of filter service runs requires the use of surface wash in conjunction with backwashing to thoroughly clean the media. The procedure listed below has worked effectively on Roberts installations.

- 1. Close the filter influent valve.
- 2. After the water level has fallen below the level of the wash water troughs, open the waste valve.
- 3. With the effluent valve still open, draw down the bed until the water level is about 6" above the top of the Rotosweep and then close the effluent valve.





TECHNICAL STANDARD

3003.1.2

Date of Issue: Page 3 of 6

November 10, 1983

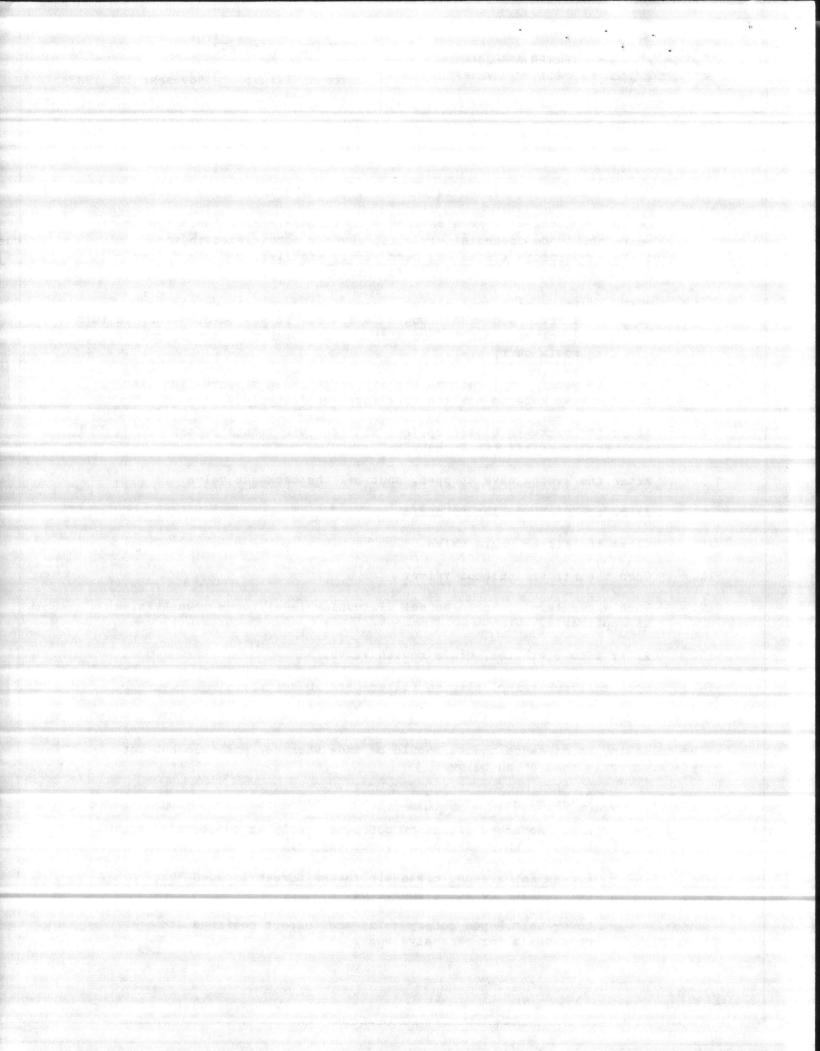
- Turn on the Rotosweep media washers by opening the supply valve. 4.
- After the Rotosweeps have reached a continuous speed, the backwash 5. valve should be opened slowly until any air accumulated in the filter underdrain system has been safely expelled, and the filter bed is expanded to a state of fluidity.
 - In certain applications where freeboard between the media NOTE: surface and wash troughs is minimal it may be necessary to turn Rotosweeps off before starting backwash in order to prevent media carry-over.
- When the water level reaches the lip of the wash troughs, increase 6. the backwash rate to maximum rate for that filter.
- After the backwash clears up, but at least one minute before 7. backwash, shut off the Rotosweeps.
- 8. After the sweeps have stopped, shut off the backwash valve.
- Allow the waste gullet to drain. 9.
- 10. Close the filter waste valve.
- 11. Open the filter influent valve.
- When water level reaches normal filtration level, open rewash valve 12. if applicable.
- 13. After 1 to 3 minutes, close rewash valve.
- 14. Open effluent valve, placing filter back in service.

D. MAINTENANCE

23 ш The following maintenance checks should be made whenever possible but not less frequently than shown below.

Monthly - Clean strainer basket in surface wash supply.

- Apply moderate amount of petroleum jelly at juncture of rotation tube (M) and seal bushing (N).
- For AW Rotosweeps, clean air intake screen located just below white rotating indicator.
- Annually Lower unit, open rotary joint and inspect bearings and quad seals for excessive wear.





3003.1.2

Date of Issue: Page 4 of 6 November 10, 1983

- Replace above as necessary. Apply a moderate amount of white petroleum jelly to ball bearings.
- Check nozzles for plugging and clean or replace as necessary.
- Re-tighten all support hardware.

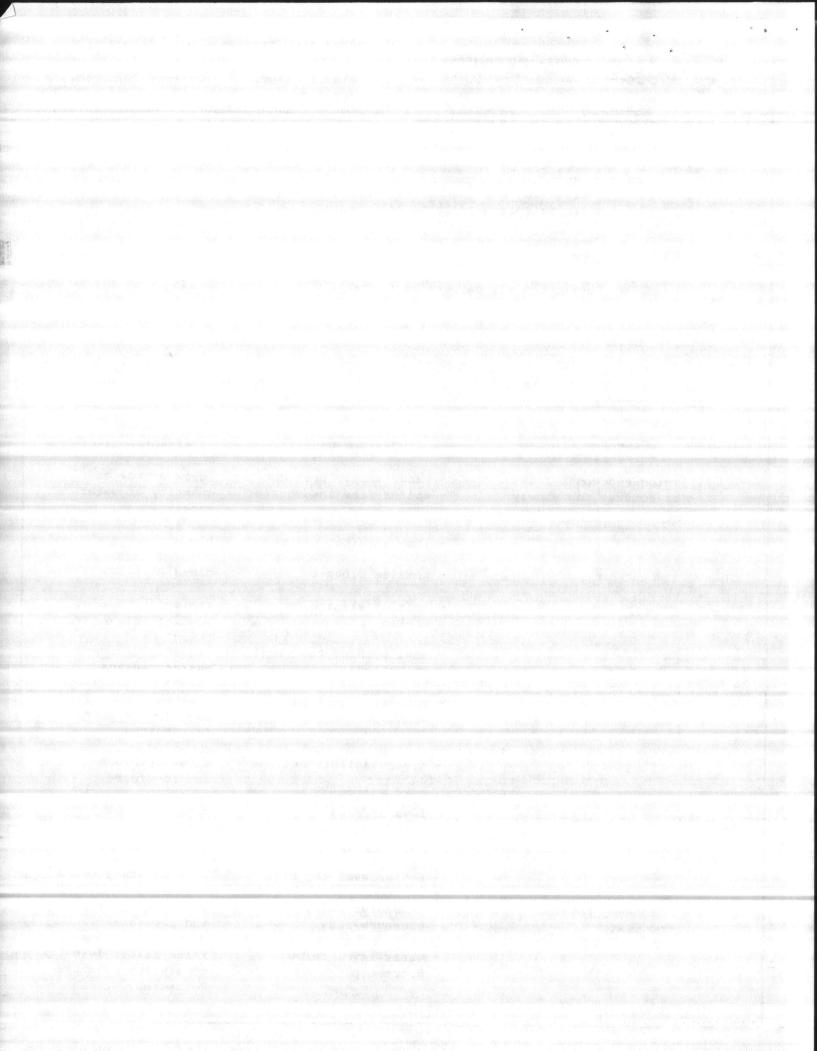
E. TROUBLE SHOOTING

In the unlikely event that the Rotosweeps cease to function properly it is suggested that the items listed below be checked before calling for factory service.

SYMPTON	POSSIBLE CAUSE	RENEDY
 Rotosweep won't rotate or rotates too slowly 	 water supply pressure and/or flow inadequate 	check source and quantity of water supply
	- line strainer clogged	clean
	- nozzles clogged	clean
	- nozzles missing or broken	replace
	- seal bushing too tight or galled	loosen, lubricate and/or replace
	- excessive bearing friction	inspect, lubricate and replace bearings as required
	- grease solidification	clean bearings and re-grease
	- loss of plumb	re-plumb down pipe and retighten hardware
	- media level too high	remove excess media
2) Rotosweep rotates too fast	- excessive water pressure/flow	reduce water flow and pressure
	- water level below	raise filter level

Rotosweep

raise filter level to minimum 6" above Rotosweep.





FILTER MFG. COMPANY Darby, Pennsylvania 19023

TECHNICAL STANDARD

3003.1.2

Date of Issue: Page 5 of 6 November 10, 1983

3) Excessive vibration when Rotosweep runs

- loss of plumb

- loose support hardware

- air in water supply

- water hammer

replumb & tighten support hardware

tighten

nozzles

bushing

clean

parts

replace seal

provide means for purging trapped air

provide surge dampeners or slow down valve speed

inspect and clean

- randomly plugged nozzle

 Excess flow of water at seal bushing

5) No air from nozzles (Type AW only) - worn O-rings

- intake acreen plugged

- damaged air chamber, rotation tube or distribution tube

- damaged neoprene nozzle gaskets

- plugged air orifices

- no water flow

6) Water spurting from air intake (AW only)

- punctured rotation

- plugged nozzles

replace damaged parts

replace damaged

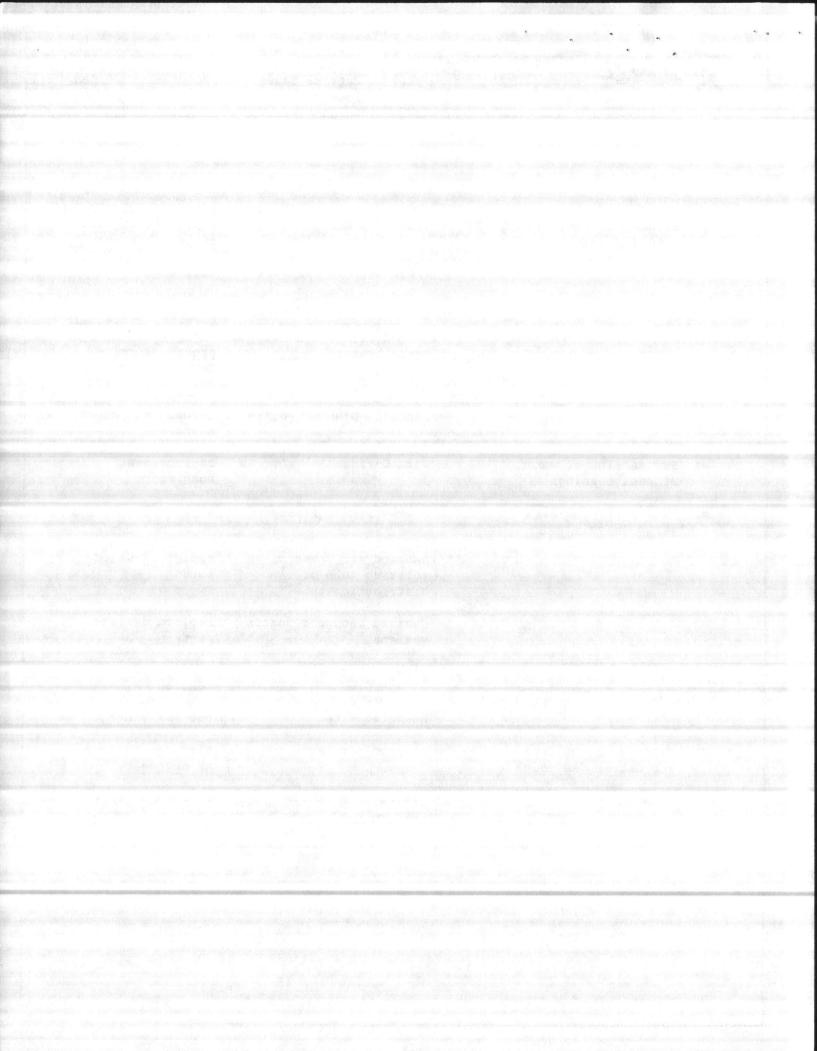
replace eductor nozzles

see (1) above

clean or replace as necessary

replace or repair

tube



Roberts

3003.1.2

November 10, 1983

F. SPARE PARTS AND SERVICE

T

While spare parts are usually immediately available from stock at our Darby plant we suggest that the following items be maintained in the filter plant inventory for each Rotosweep.

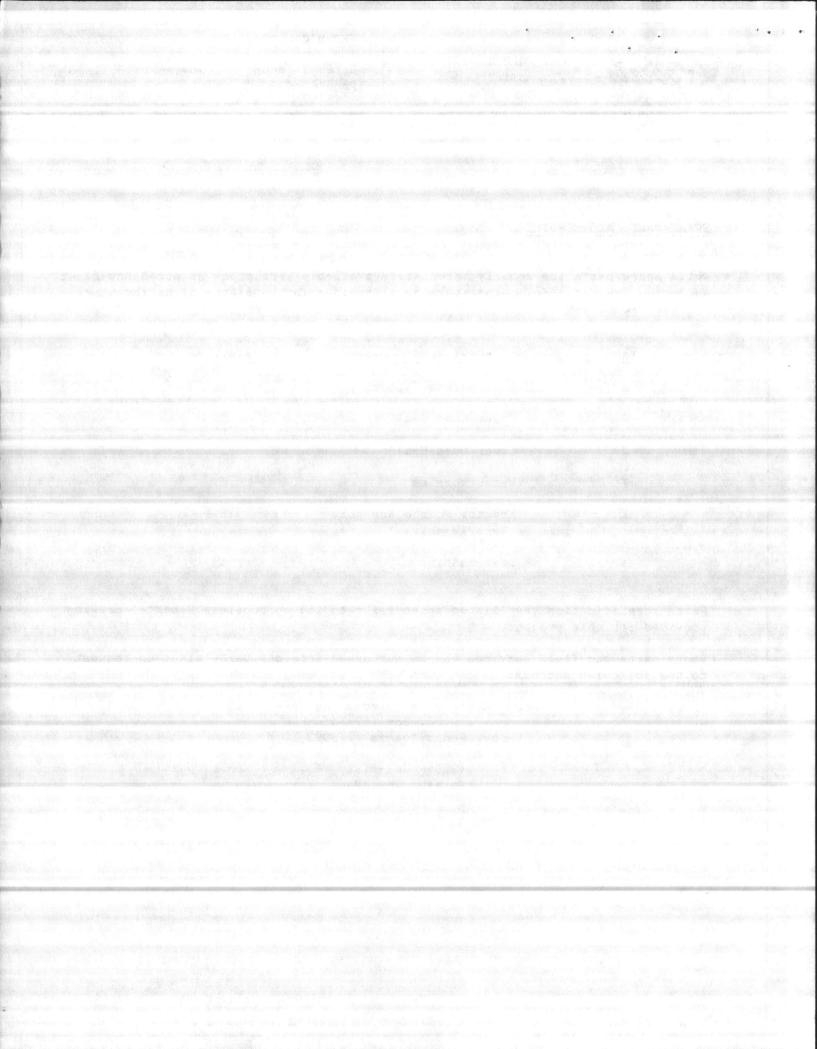
TAG	PART NAME	QUANTITY
H	Bearing/Race Assembly	1
G	Upper Quad Seal	2
J	Lower Quad Seal	2
F	Water Nozzles	6
E	Eductor Nozzle Assembly (Type AW only)	3
N	Seal Bushing	1

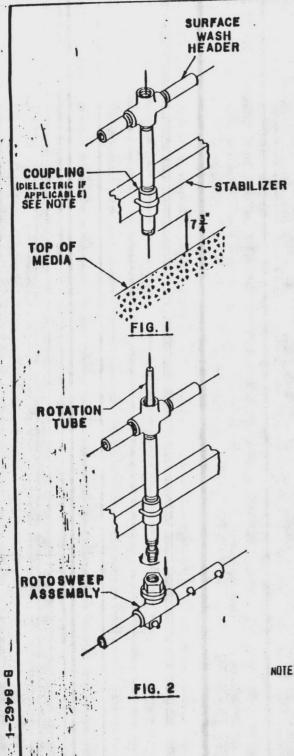
Parts identification tags listed above refer to the appropriate Roberts' drawing provided for this project.

Spare parts and field services may be purchased from our Darby plant on request to the following address:

Roberts Filter Manufacturing Co. P. O. Box 167 Darby, Pennsylvania 19023

> (215) 583-3131 Telex 753447





.

STEP 1

INSTALL THE DROP PIPE AND DIELECTRIC COUPLING (IF REQUIRED) AS SHOWN IN FIGURE 1. SECURE DROP PIPE TO STABILIZER CROSS-MEMBER WITH U-BOLT BEING CERTAIN THAT DROP PIPE IS PLUMB.

NOTE THAT BOTTOM END OF DROP PIPE SHOULD BE 7-3/4 ABOVE THE FINAL MEDIA LEVEL.

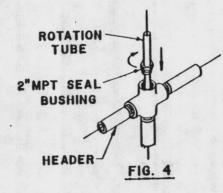
IALE THREADS ON THE BOTTOM END OF THE DROP PIPE SHOULD BE 2" NPT FULL PROFILE TO ALLOW PROPER THREAD ENGAGEMENT (3/4") INIO THE ROTOR CAP (PART A). REMOVE ANY CHIPS TO MINIMIZE GALLING.

SIEP 2

IN A SIMILAR MANNER INSTALL ALL DROP PIPES WITHIN THE FILTER BASIN.

STEP 3

AT THIS POINT IT IS REQUIRED THAT THE SURFACE WASH PIPING BE FLUSHED CLEAN OF ANY CONSTRUCTION DEBRIS USING CLEAN, CLEAR MATER.



DROP PIPE

STEP 4

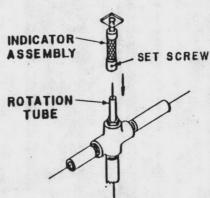
INSERT THE ROTATION TUBE (M) DOWN THROUGH THE CROSS IN THE SURFACE WASH HEADER SO THAT THE THREADED END EXTENDS OUT OF THE BOTTOM OF THE DROP PIPE.

STEP 5

REMOVE THE PLASTIC THREAD PROTECTOR FROM THE ROTARY JOINT. HOLD OR BLOCK THE ROTO-SWEEP ASSEMBLY IN POSITION BELOW THE DROP PIPE AND SCREW THE ROTATION TUBE (M) INTO THE THREADS PROVIDED IN THE ARM ASSEMBLY THEE. (FIG. 2)

CANTION: USE CARE WHEN INSTALLING THE ROTATION TUBE SO AS NOT TO CRUSH THIS THIN WALLED TUBE.

NOTE: IN LIEU OF A DIELECTRIC COUPLING SOME INSTALLATIONS USE A DIELECTRIC BUSHING AT THE HEADER. CHECK PROJECT DRAWINGS.



STEP 9

ROTOSWEEP NOZZLES ARE OFTEN SHIPPED WITH TAPE OVER THE HOLES TO INSURE CLEANLINESS DURING TRANSIT. REMOVE ALL PIECES OF TAPE.

FIG. 5

SEE TECHNICAL STANDARD 3003.1 FOR OPERATING AND MAINTENANCE INSTRUCTIONS.

SIEP 6

0

FIG. 3

LIFT THE ENTIRE ASSEMBLY UPWARD AND SCREW THE ROTOR CAP ONTO THE DROP PIPE.

PIPE THREAD COMPOUND MAY BE USED PROVIDING IT IS SUITABLE FOR POTABLE WATER AND DOES NOT GET INTO THE ROTARY JOINT. ALTERNATELY TEFLON TAPE MAY BE USED. (FIG. 3)

STEP Z

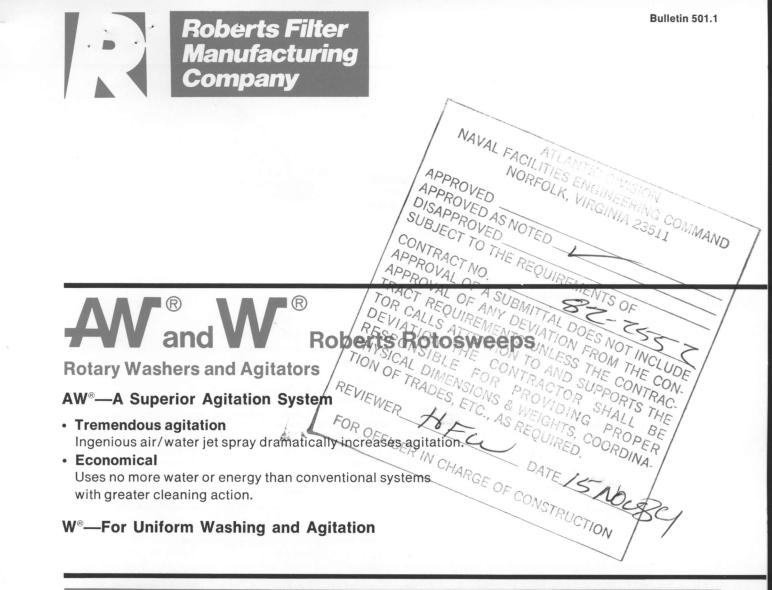
REMOVE ANY BURRS ON THE UPPER END OF THE Rotation tube (M). Apply a small amount of white petroleum jelly (vasel NE) to the o-rings in the seal bushing (N).

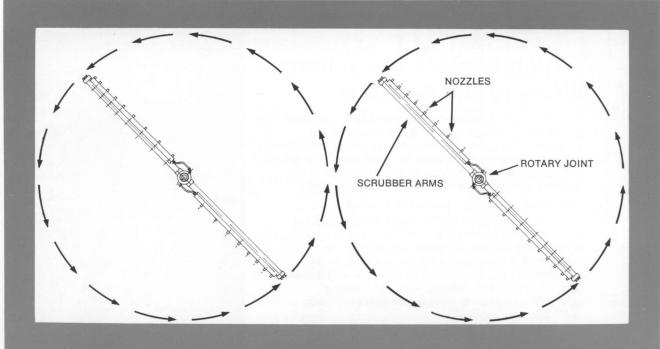
SLIDE THE SEAL BUSHING DOWN OVER THE ROTATION TUBE AND SCREW INTO THE CROSS ON THE SURFACE WASH HEADER. DO NOT OVER-TIGHTEM. [FIG. 4]

STEP 8

INSTALL THE INDICATOR ASSEMBLY (P) ON THE TOP OF THE ROTATION TUBE (M).

2	GE	NERAL		9.83 D
T	TI	TLE	1	9-81AW
NO		REVISI	ON	DATE BY
	IYP	YPES A	W-20, W	DICATOR
	RO	BERTS		TRASMO
DRA	WN	DATE	CHECKIN	DATE
	WH	BERTS	CHECKIN	DATE DATE
4	WM .W.	DATE	CHECKIN	DATE DATE DATE 1-78





Typical arrangement in a rectangular configuration having a ratio of 2:1.

Until Now

The continuing demand for more efficient filtration systems has led to the development of various devices and systems to extend the time required between backwash cycles.

A proliferation of methods to improve the overall effectiveness of filter backwashing have been attempted with varying degrees of success. Most, however, have been lacking either in overall cleaning efficiency, or cost effectiveness, or both.

Some of the earlier significant innovations for agitating and cleaning the filter bed surface included mechanical devices such as rotating raking systems, and water streams directed towards the surface by means of stationary nozzles.

Although both of these innovations represented significant improvements, they had limitations. While the rotating rake system proved relatively effective for circular tanks, the mechanical complexities of this system precluded its economical application for rectangular tanks. The fixed nozzle water spray systems represented a relatively passive system insofar as affording uniform agitation and cleaning action. They simply did not do the cleaning job frequently required.

Rotary Agitators – A Major Breakthrough

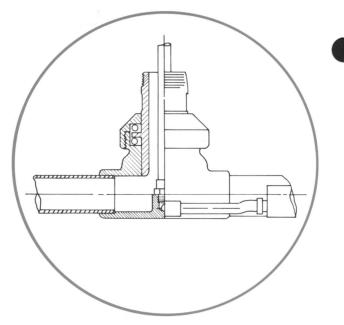
By literally sweeping the entire surface of the filter media, laterally rotating agitators produce a washing action that is vastly superior to the passive agitation produced by fixed nozzle sprays. Roberts Filter Manufacturing Company, a pioneer in the development of better filtration systems, has two superior models available.

W[®]Rotosweep — For Uniform Washing and Agitation

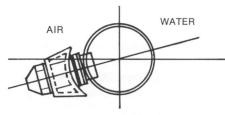
Roberts Model W[®] is a highly efficient rotating water jet agitator. Through extensive research and stringent testing procedures, we have designed a hydraulic system with nozzles so ingeniously spaced and positioned, they provide virtually uniform washing and agitation throughout the entire filter bed.

The W[®] Model's three major components comprise the supporting member, or stator, the lateral headers to which the nozzles are attached, and the rotary joint which is the heart of the system. And, as all our products are, it's backed by Roberts' well-known reputation for workmanship, care in selecting compatible materials, and over 80 years experience in filtration technology.

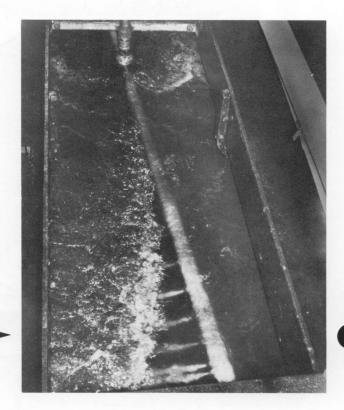
The AW[®] in action. Photograph was taken with the sweep arms submerging as the backwash expands the filter bed. Arms and jet sprays are unretouched to show actual effect of the dynamic air/water action.



Sectioned drawing of the rotary joint, showing stainless steel ball bearings, seals, control port for the end spray and the air suction connections.



Cross section of scrubber arm showing air and water conduits interconnected by nozzles.



AW[®] Rotosweep – Superior System

The AW® Rotosweep represents a major breakthrough in rotating agitator design. It incorporates all the features of the W® Model. But what makes our AW® Model totally unique is its dramatically increased agitation effectiveness achieved by combining air and water rather than using water alone.

Our patented system produces air/water jet sprays with far greater energy levels and at no higher operating costs. In spite of its vastly improved washing efficiency, it uses no more water or energy than a conventional system. The inducted air makes the difference.

Air and water are directed to the individual discharge nozzles through separate conduits. The nozzles induct atmospheric air which assures just the right air/water mixture. This not only results in a turbulent high energy level jet effect that washes and agitates the filter bed with unparalleled efficiency, but also provides the propelling force for rotating the agitator.

Roberts AW[®] Model is well suited for a variety of applications. With more stringent effluent requirements, the use of gravity filters for tertiary treatment of biologically or chemically treated wastewaters is becoming quite common. The AW[®] Model was originally developed for this use, but its advantages are equally apparent on water treatment applications.

The effluent from secondary treatment plants normally imposes a considerably higher suspended solids loading on filter beds. The solid particles usually have adhering properties that make it difficult to break the bond between these sludge particles and the filter media. Conventional rotating water agitators would require vast quantities of water at very high pressures to break this bond, and still the results may not be entirely satisfactory. On the other hand, our AW® Model can provide this greater scouring action with virtually no increase in energy or water consumption.

A serendipitous advantage of this system may be derived by continuously, or intermittantly operating the AW[®] Model during the filtration cycle. The dissolved oxygen level of the applied water may thus be enhanced with consequent higher BOD removals.

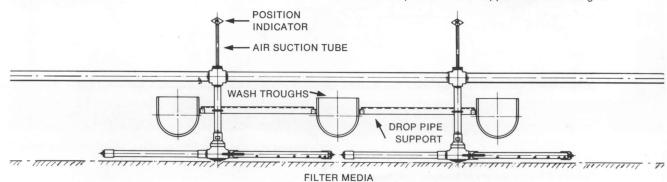
Regardless of its applications, the AW[®] has features so superior it has rendered conventional designs virtually obsolete.

TABLE 1—WATER REQUIREMENTS AW FLOW DATA

METRIC EQUIVALENTS IN BLUE

	ATOR IA.	60 F (minin		100	PSI
FT IN.	METERS	USGPM*	LIT/SEC*	USGPM*	LIT/SEC
5'-9"	1.75	39.8	2.51	51.3	3.24
6'-0"	1.83	41.6	2.62	53.7	3.39
6'-3"	1.91	43.5	2.74	56.1	3.54
6'-6"	1.98	45.5	2.87	58.7	3.70
6'-9"	2.06	47.5	3.00	61.3	3.87
7'-0"	2.13	49.6	3.13	64.0	4.04
7'-3"	2.21	51.8	3.27	66.8	4.22
7'-6"	2.29	54.0	3.41	69.7	4.40
7'-9"	2.36	56.3	3.55	72.6	4.58
8'-0"	2.44	58.9	3.72	76.0	4.79
8'-3"	2.51	61.2	3.86	78.9	4.98
8'-6"	2.59	63.8	4.03	82.3	5.19
8'-9"	2.67	66.4	4.19	85.7	5.40
9'-0"	2.74	69.0	4.35	89.0	5.62
9'-3"	2.82	71.8	4.53	92.6	5.84
9'-6"	2.90	74.6	4.71	96.2	6.07
9'-9"	2.97	77.5	4.89	100.	6.31
10'-0"	3.05	80.5	5.08	104.	6.55
10'-3"	3.12	83.6	5.28	108.	6.80
10'-6"	3.20	86.8	5.48	112.	7.06
10'-9"	3.28	89.9	5.67	116.	7.32
11'-0"	3.35	93.1	5.87	120.	7.58
11'-3"	3.43	96.5	6.01	125.	7.86
11'-6"	3.51	100.	6.31	129.	8.14
11'-9"	3.58	104.	6.53	134.	8.42
12'-0"	3.66	107.	6.76	138.	8.72
12'-3"	3.73	111.	6.98	143.	9.01
12'-6"	3.81	114.	7.22	148.	9.31
12'-9"	3.89	118.	7.46	152.	9.62
13'-0"	3.96	119.	7.50	153.	9.64
13'-3"	4.04	120.	7.56	155.	9.77
13'-6"	4.11	122.	7.68	157.	9.89
13'-9"	4.19	124.	7.82	160.	10.1
14'-0"	4.27	126.	7.94	163.	10.3
14'-3"	4.34	128.	8.06	166.	10.5
14'-6"	4.42	130.	8.19	169.	10.7
14'-9"	4.50	132.	8.31	171.	10.8
15'-0"	4.57	134.	8.44	173.	10.9
15'-3"	4.65	136.	8.56	175.	11.0
15'-6"	4.72	138.	8.70	178.	11.2
15'-9"	4.80	140.	8.82	181.	11.4
16'-0"	4.88	142.	8.95	183.	11.5
16'-3"	4.95	144.	9.06	186.	11.7
16'-6"	5.03	146.	9.20	188.	11.9
16'-9"	5.11	147.	9.26	190.	12.0
17'-0"	5.18	148.	9.32	192.	12.1
17'-3"	5.26	150.	9.45	194.	12.2
17'-6"	5.33	152.	9.57	197.	12.4
17'-9"	5.41	155.	9.77	200.	12.6
18'-0"	5.49	158.	9.96	204.	12.9
18'-3"	5.56	161.	10.1	208.	13.1
18'-6"	5.64	164.	10.3	212.	13.3
18'-9"	5.72	167.	10.5	216.	13.6
19'-0"	5.79	170.	10.7	220.	13.9
19'-3"	5.87	173.	10.9	224.	14.1
19'-6"	5.94	177.	11.2	228.	14.4
19'-9"	6.02	181.	11.4	234.	14.7

*Water consumption—approximate maximum with end sprays in operation. Actual average consumption slightly less. Metric conversions are provided for the engineers convenience only.

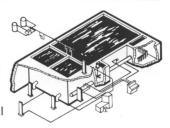


Elevation Drawing of a typical installation showing relationship of the stator supports to wash troughs.

Products and Services

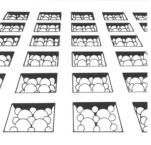
High Flow-Rate Filter Systems

Roberts Manhattan Process (RMP), an advanced water treatment system for potable and industrial water. Higher flow rates minimize capital and operating costs.



Filter Underdrain Systems

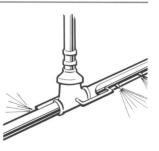
Reliable and widely accepted Wheeler Bottoms assure even distribution of backwash, with minimum head loss.



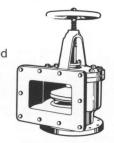
Operating Controls Quality control centers with operating consoles utilizing hydraulic, electric, pneumatic or a combination of controls as requirements dictate.



Media Washers The AW and W are the most advanced and efficient air/water and water agitators available.



Valves and Accessories Roberts Filter Manufacturing Company is wellknown for valves designed specifically for filter plants. A complete line of wall castings is available.



Pressure Filters Roberts Pressure Filters are applicable to municipal and industrial

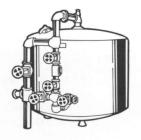
water and waste-water

with a wide range of

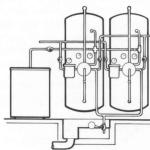
media.

rates.

service and are available

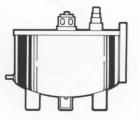


Ion Exchange Equipment The Roberts Line includes Softeners, Iron and Manganese removal systems and two, three or mixed-bed Demineralizers; in materials and with accessories to specifications.



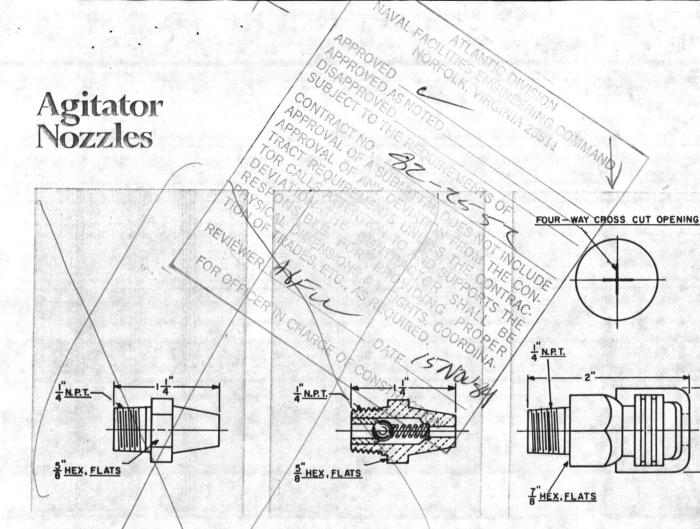
Chemical Feeders Wet-type chemical feeders and slurry tanks are designed to handle a wide

range of materials and



Roberts Filter Manufacturing Company

6th and Columbia Avenue • Darby, Pennsylvania 19023 (215) 583-3131 Roberts Filter Company of Canada Ltd., Toronto Roberts Filter Company of Quebec Ltd., Montreal



Specifications for Leopold Molded Nylon Agitator Nozzles*

(Furnished as standard on all Leopold and Palmer Agitators)

Agitator nozzles shall be of molded nylon pigmented bronze. The internal nozzle configuration shall be designed to produce the most efficient jet and the nozzle orifice size selection shall be made on the basis of the required discharge capacity of the agitator unit.

Nozzles shall be provided with 5/8" hexagonal wrench flats and shall be 11/4" overall length provided with a 1/4" male pipe thread end.

"Molded Nylon Agitator Nozzles" shall be as manufactured by the F. B. Leopold Company, Inc., Zelienople, Pennsylvania.

*Tellurium copper nozzles of same configuration available at additional cost.

Specifications for Leopold Molded Nylon "Shur-Seal" Agitator Nozzles

(Available as an extra on all Agitator Models)

Agitator nozzles shall be of molded nylon pigmented bronze.

Agitator nozzles shall incorporate an internal spring loaded ball check to prevent backflow. Check valve seat shall be molded nylon with stainless steel ball and spring. An agitator supply pressure of 5 psi shall be required to unseat the ball check.

"Shur-Seal" nozzle external configuration shall be identical to the standard molded nylon agitator nozzle normally furnished on all Leopold and Palmer Agitator models.

Molded Nylon "Shur-Seal Agitator Nozzles" shall be as manufactured by the F. B. Leopold Company, Inc., Zelienople, Pennsylvania.

Specifications for Leopold-Stuart Molded Nylon "Flexi-Jet" Agitator Nozzles*

(Furnished as standard on Leopold-Stuart "30A" Agitator—Available as an extra on Leopold and Palmer

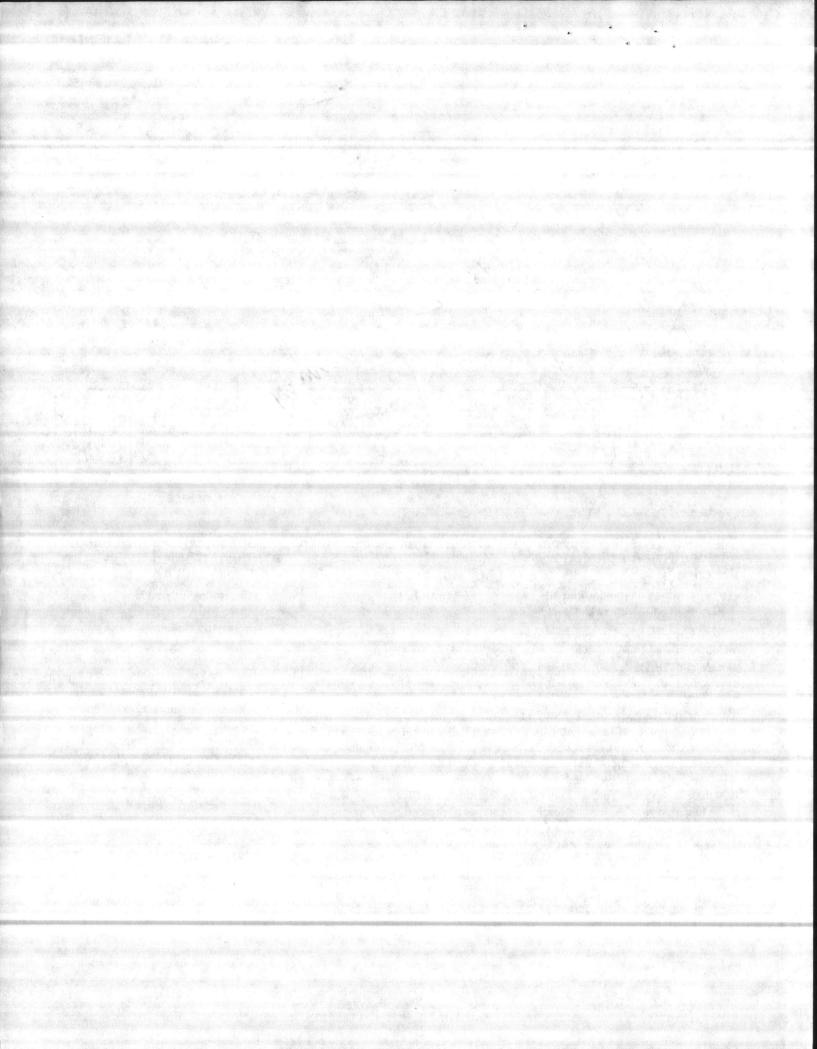
Agitators).

Agitator nozzles shall be of molded nylon, 2" overall length with $\frac{7}{8}$ " hexagonal wrench flat provided with a $\frac{1}{4}$ " male pipe thread end.

Nozzles shall be designed to accommodate and retain a snap-on flexible rubber cap provided with a four-way cross cut opening which shall open under pressure and close automatically when pressure is turned off to prevent backflow.

Flexible rubber cap shall be 1" external diameter and shall be provided with an internal shoulder to snap into a matching groove in nozzle to retain cap in position on nozzle under all operating conditions.

"Molded Nylon" "Flexi-Jet Agitator Nozzles" shall be as manufactured by the F. B. Leopold Company, Inc., Zelienople, Pennsylvania.





JOHN HACK COMPANY INC. JOHN MACH COLLES for Every Service Contests steel Piping Materials for Every Service Contests steel MILL DISTRIBUTORS-CARBON STEEL COPPER & BRASS · POLYVINYL CHLORIDE CONTESTS STEEL THOROFARE, NEW JERSEY 08086 NUV 5

ROBERTS FILTER

CERTIFICATE OF COMPLIANCE

Manufacturer STOCKHAM VALVES & FITTINGS

Pu	rch	aser	ROBERTS FILTER MFG.	co.
P.	ο.	No.	ALL PURCHASES	
s.	0.	No.		

P. O. No.

The undersigned certifies that the material (s) shipped on the above reference order number conform to Specification as follows:

Specifications

SEE BELOW

Item No.

Quantity

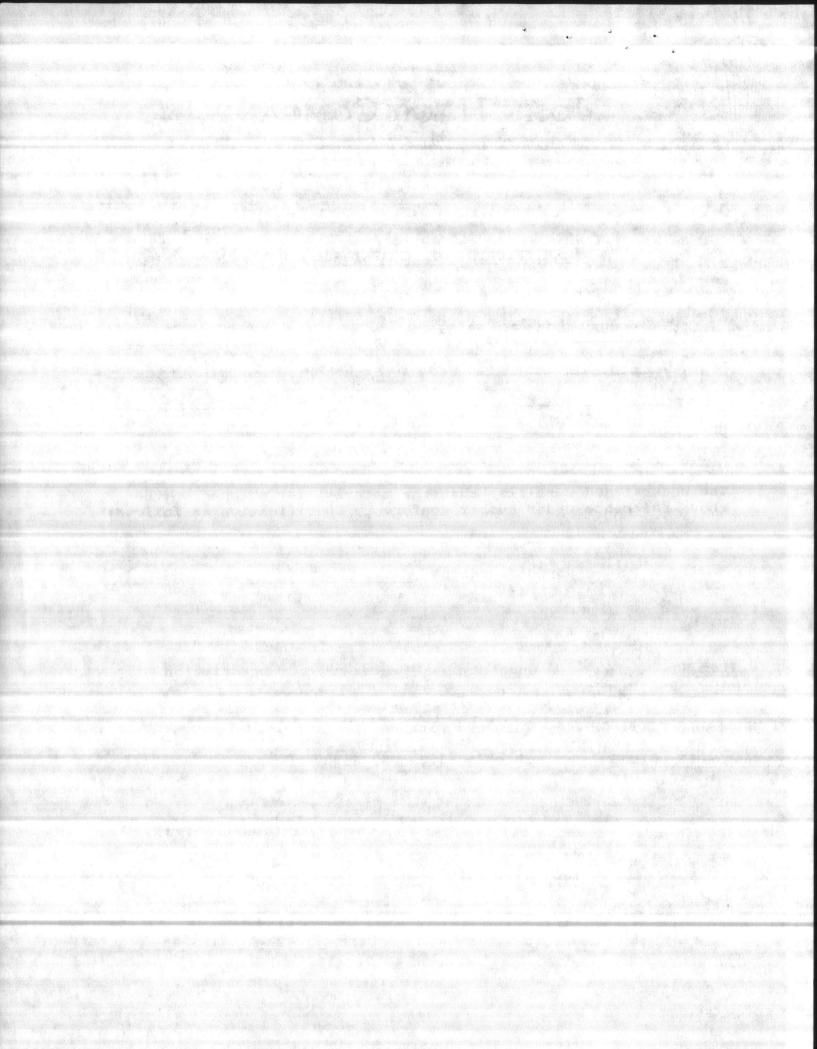
Description

MALLEABLE FITTINGS Threaded Fittings B 16.3-77

MALLEABLE UNIONS Threaded 150, 250 & 300# Class B 16.39-77

Company Representative

Russell Farrow November 2, 1984 Date





JOHN HACK COMPANY INC. Piping Materials for Every Service

MILL DISTRIBUTORS- CARBON STEEL COPPER & BRASS + POLYVINYL CHLORIDE + STAINLESS STEEL THOROFARE, NEW JERSEY 08086

CERTIFICATE OF COMPLIANCE

Manufacturer

UNITED STATES STEEL CORP.

Pu	rch	aser	ROBI	ERTS	FIL	FER	MFG.	co
P.	ο.	No.	ALL	PUR	CHASI	ES		
s.	0.	No.			ing and a second		an a	

Description

P. O. No.

The undersigned certifies that the material (s) shipped on the above reference order number conform to Specification as follows:

Specifications

SEE BELOW

Item No.

Quantity

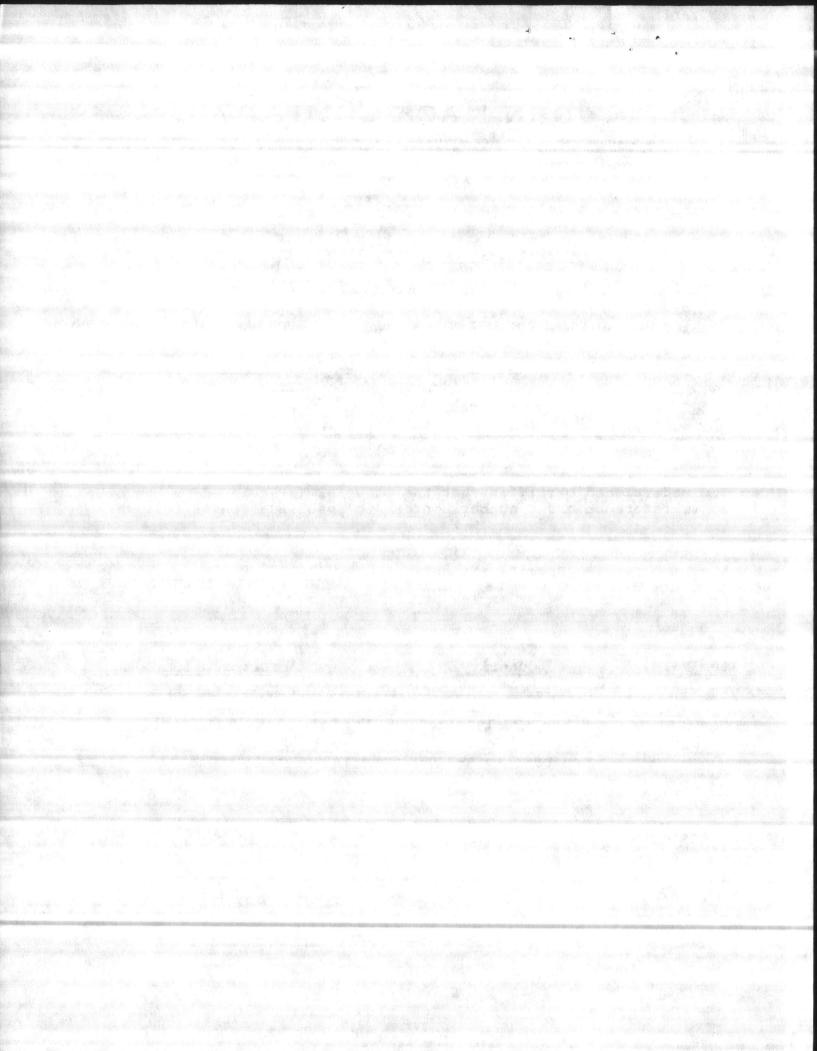
STEEL PIPE

Black & Galvanized - Welded & Seamless

Conforms to A-120-81 and is up-graded to A-53

Company Representative

Russell Farrow Date November 2, 1984



Polenta FILTER MANUFACTURING COMPANY

CONTRACT N62470-82-C-2552

SUBMITTAL NO. 1-B

COMMENTS

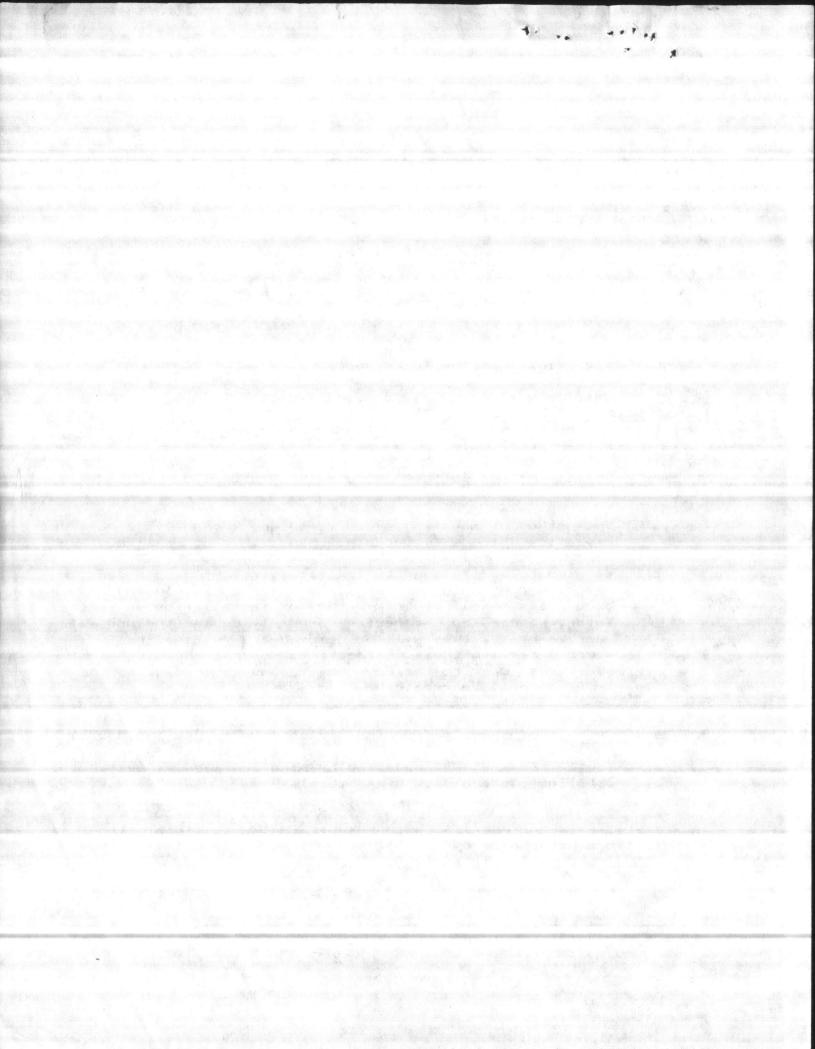
1.	a)	We will supply nylon nozzles (detail attached) as per specifications for Rotosweeps.
100	ь)	Nozzles will have 1/8" dia. orifices
	с)	We certify that the rotary surface washer will deliver 55 GPM at 50 PSIG.
	d)	Spacing of nozzle shown on drawing A-8784-1.

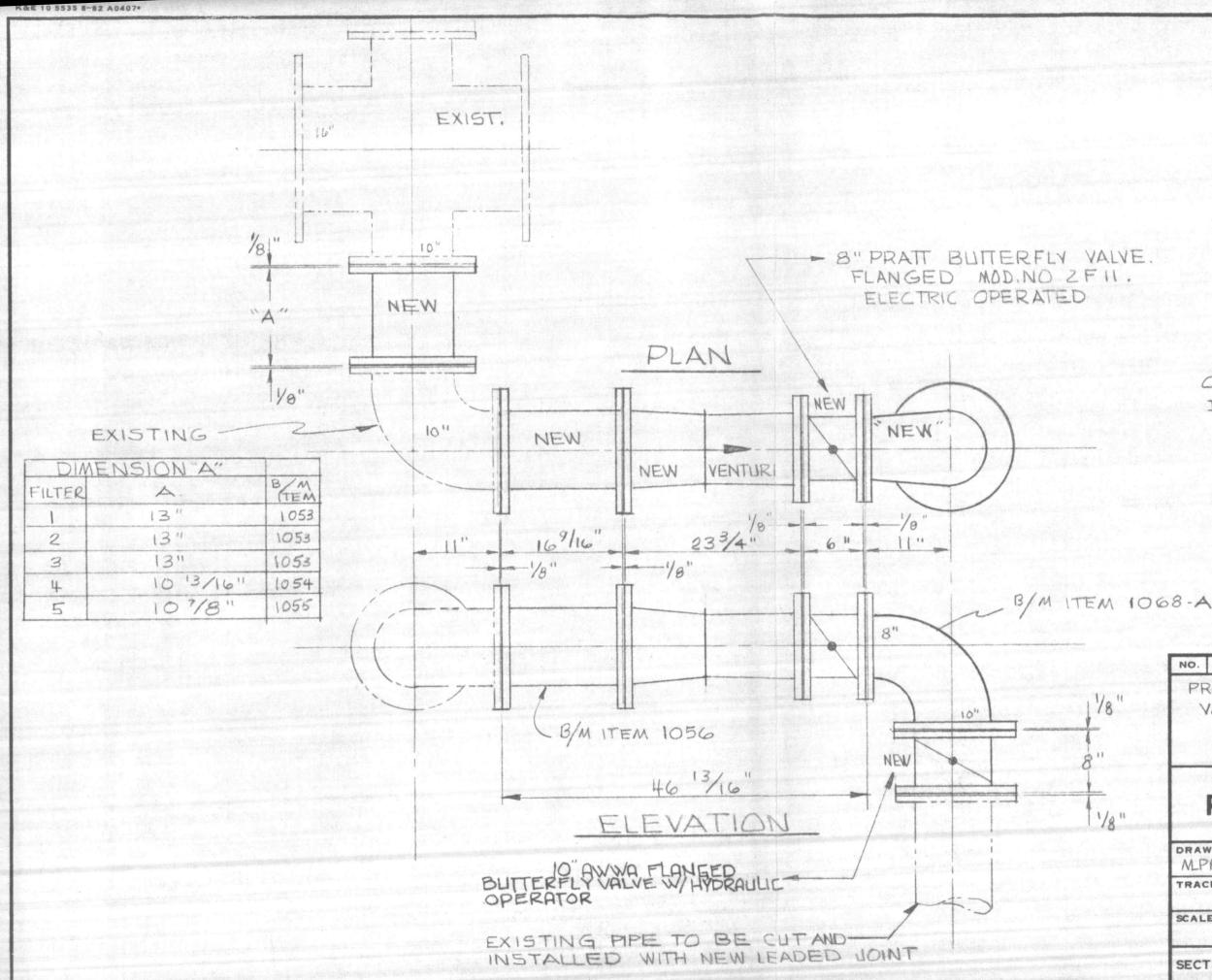
- 2. a) The method of mounting supports to the troughs is a contract deviation which will incur no change in cost or time.
 - b) We wish to verify that the existing troughs can support the weight and dynamic action of the sweeps. Should any damage occur as a result of this method of installation or if the rotary washers do not perform properly during the one (1) year warranty, they will be removed and reinstalled in accordance with the specifications/contract drawing at no additional cost to the Government, and any damage to the troughs shall be repaired.
- 3. a) Details of the supports and angle shown on drawing A-8784-3.
 - b) The 2-1/2" x 2" PVC reducing bushing provides a dielectric coupling between dissimilar metals
- 4. Certificates of compliance for steel pipe and malleable iron fittings attached.

ROBERTS FILTER MANUFACTURING CO.

SIGNED J. C. Humpton

DATED NOVEMBER 9, 1984

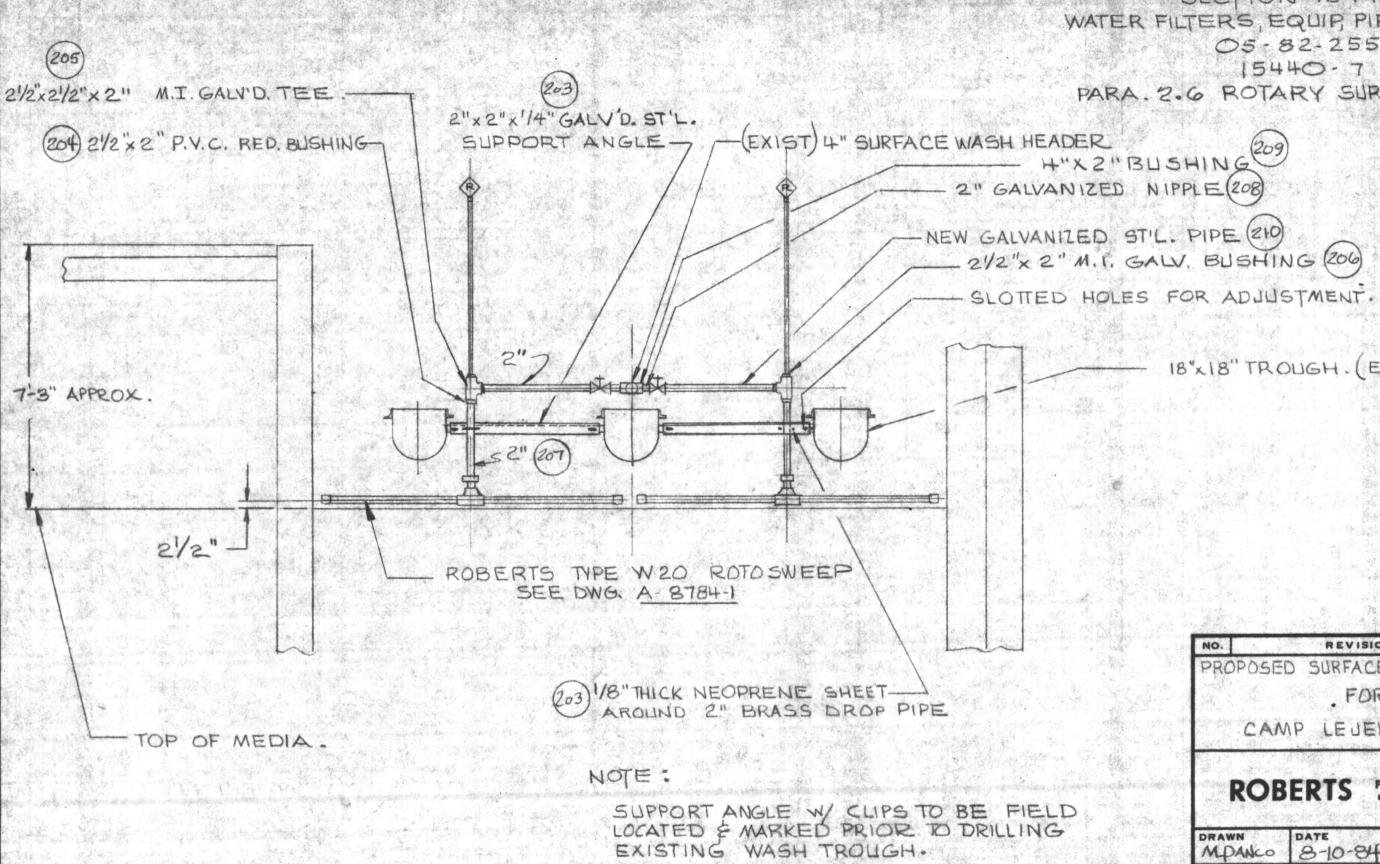




NO.	REVISI	ON	DATE BY
VALVE	SED ARR S FOR EF FOR CAMP LE	FLUENT C	ONTROL
RO	BERTS	FILTER MFG. DARBY, PENNSYL	
RO DRAWN MLPANCO	DATE 11-9-84		
DRAWN	DATE	CHECKED	VANIA 19023
DRAWN MLPANCO TRACED	DATE 11-9-84	CHECKED	DATE

CONTRACT IFB NG2470-82-8-2552 SPECIFICATION NO. 05-82-2552



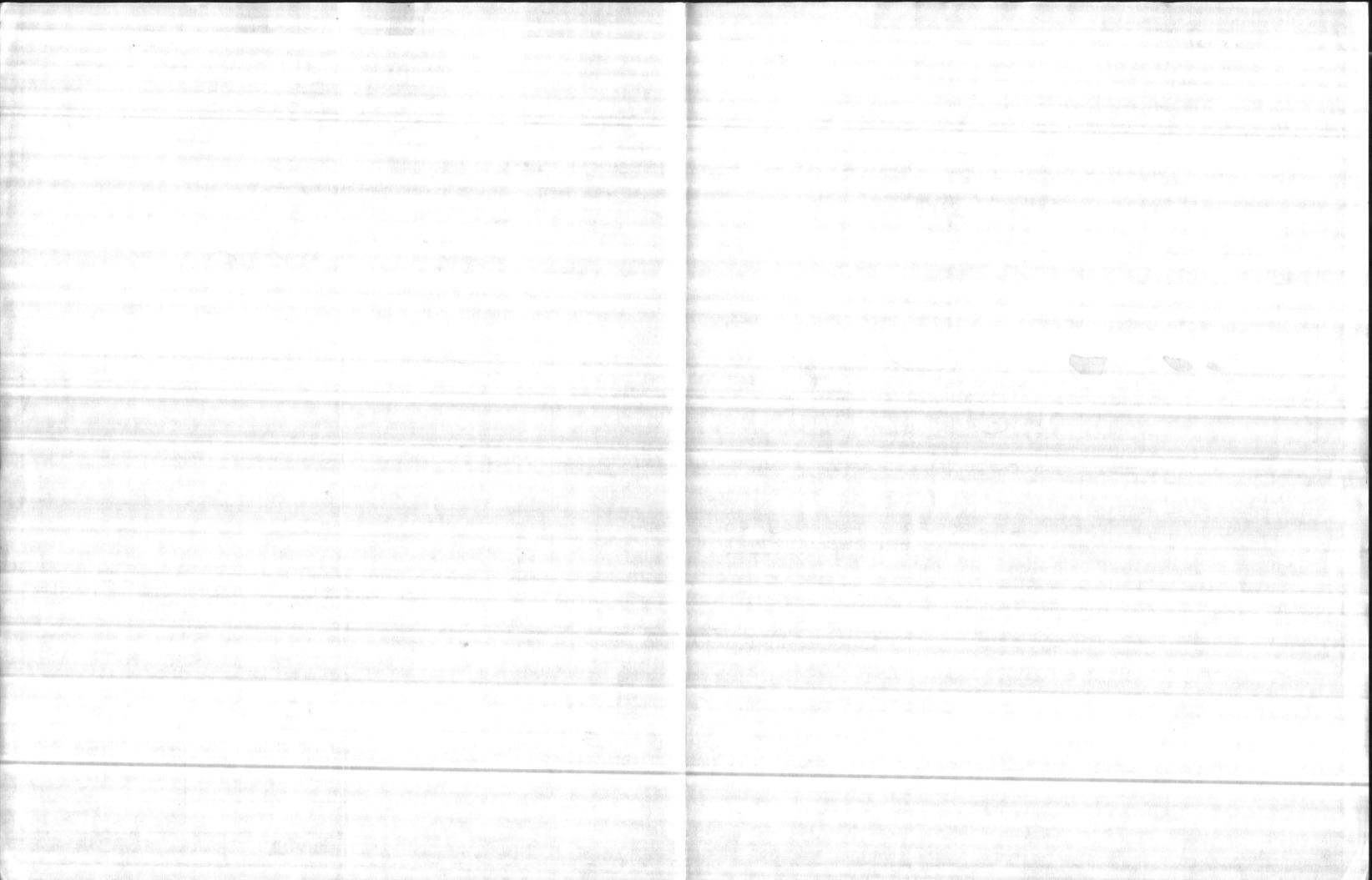


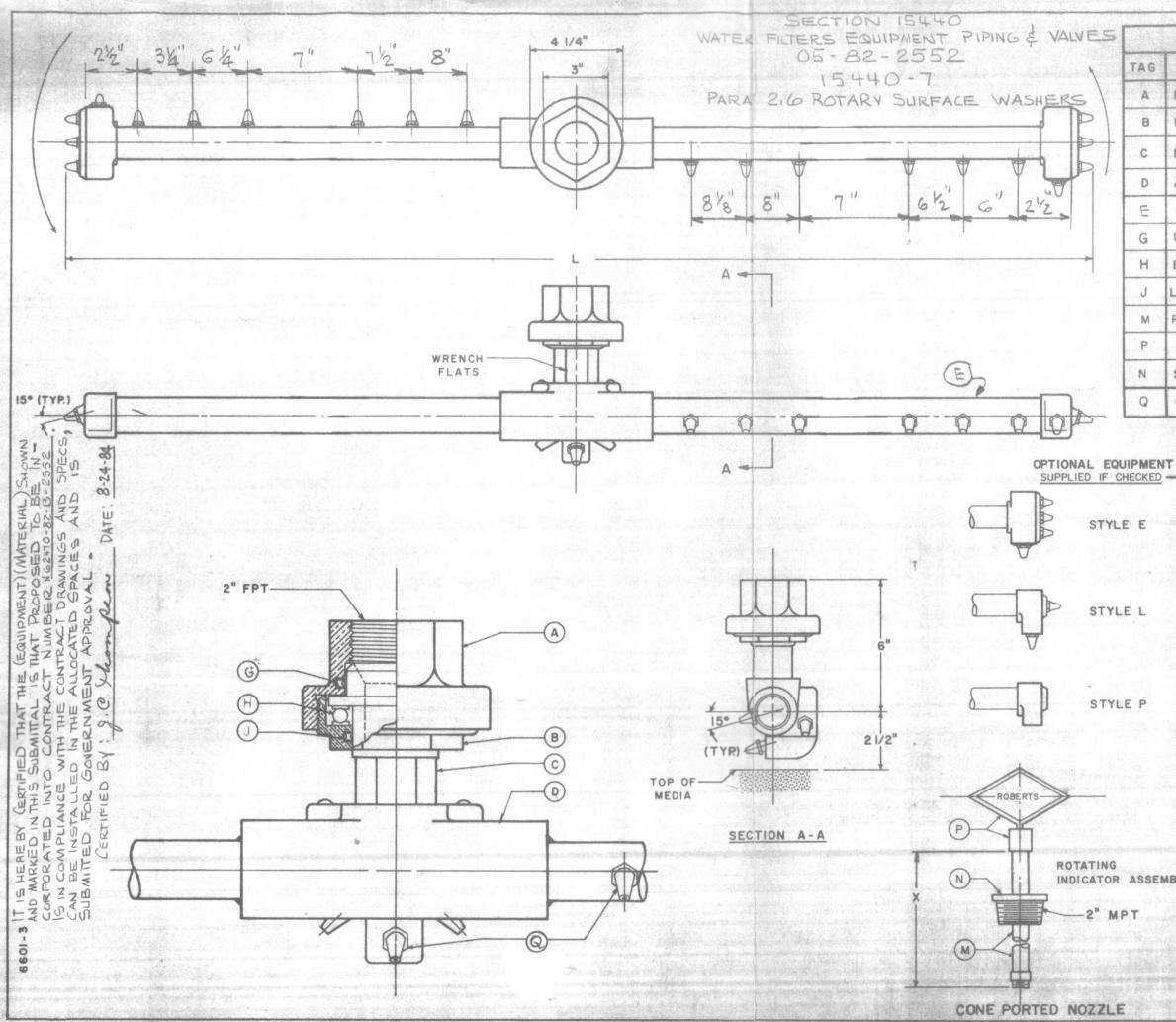
SECTION 15440 WATER FILTERS, EQUIP, PIPING & VALVES 05-82-2552 15440 - 7

PARA. 2.6 ROTARY SURFACE WASHERS

18"x18" TROUGH . (EXIST.)

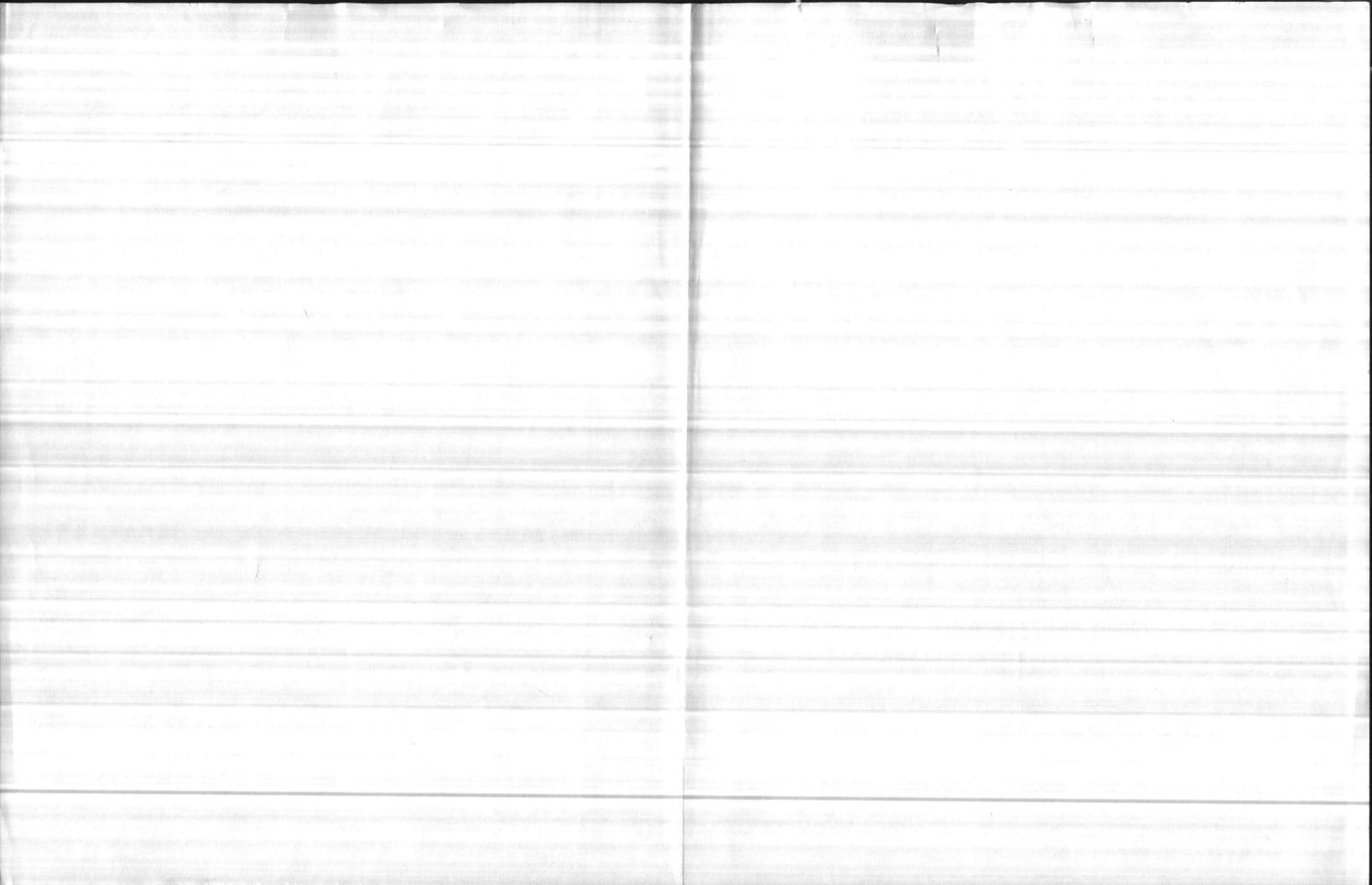
Alter St		Att Assessment of	State Barris
NO.	REVISIO	N	DATE BY
PROPOS	ED SURFACE	WASH S	UPPORTS
	FOR		
CA	MP LEJEL	JNE, N.C	5.
RO		ILTER MFG. 1 DARBY, PENNSYL	
MDANCO	8-10-84	CHECKED	DATE
TRACED	DATE	APPROVED	DATE
SCALE N	T. S.	CONTRACT	s.o.
SECTION	DWG.	NO. 87	84-2





	PARTS LIST		
TAG	PART NAME	MATERIAL	hereine
Α	ROTOR CAP	CAST BRASS	and the second second
в	ROTOR RETAINER	CAST BRASS	
с	ROTOR	CAST BRASS	
D	ARM ASSEMBLY	CAST BRASS	
E	ARM	BRASS PIPE	4
G	UPPER QUAD RING SEAL	BUNA-N	
н	BEARING/RACE ASS'Y	STN STEEL	
J	LOWER QUAD RING SEAL	BUNA-N	
M	ROTATION TUBE	COPPER	
Р	INDICATOR ASSY	BRASS	
N	SEAL BUSHING	PVC	L. Contraction
Q	CONE PORTED NOZZLE	NYLON	SEE CAT. CUT

SEE TECH STD 3003.1 OR 3003.3 FOR INSTALLATION & OPERATING INSTRUCTIONS 150 PSI MAX. PRESS X ORDER INFORMATION JOB CAMP LE JEUNE 2093 RFM CO NO .:-20 QUANTITY : _ B/M ITEM: 201 1= 8'-0" x=8'-0" WATER REQUIRED: 55 GPM. EACH AT 50 PSIG 5 REVISED 10/19/2 4 REVISED 9-84 3 IND MATL 983 2 GENERAL GENERAL ROTATING INDICATOR ASSEMBLY REVIS PARTS ASSEMBLY DRAWING FOR TYPE W-20 ROTOSWEEP 3' TO 14' DIA. ROBERTS PARTY PENTYLVANIA 190 MD X NTS SECTION A DWG. NO.8784 .



CONTRACTOR'S SUBMITTAL TRANSMITTAL LANTDIV NORFOLK 4-4355/3 (Rev. 11-80)	N62470-82-B-2552	TRANSMITTA #3-A		DATE 11/21/84
FROM CONTRACTOP ROBERTS FILTER MANUFACTURING COMPANY TO NAVAL FACILITIES ENGINEERING COMMAND	REPLACE EQUI	PMENT -	- POOLS	
NAVAL TAGILITILS ENGINEERING COMMAN			REVIE	WER USE ONLY

X	L Contractor Approved	List only one specification division per form. ist only one of the following categories on each transmittal form. and indicate which is being submitted OICC Approval For OICC Ap		A-Appr D-Disar AN-App	oproved proved as noted reipt acknowledged. ments
TEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICATION (Type, size, model no., Mfg. name, dwg. or brochure number)	NO. OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
12	a na da	Tank Adjustable Legs	7	$\tilde{E}_{1}r_{1}^{i}$	+C
13		NSF Pressure Drop Standards	7	1. 7.0	1 stated
14		Underdrain Lateral Calculations	7	£H.	a securities
-				and the second s	1
,				<u>/k.//</u> 7. E	14.
cor	TRACTOR'S COMMENTS			t E	1 0 0

COPY OF TRANSMITTAL AND SUBMITTALS	TO ROICC	CONTRACTOR REPR	ESENTATIVE (Signature)	/
Ensign W. G. Grip	FROM (Reviewer)	<u> </u>	To Kiscis	V Jack Jack
			f any deviation from the contract	t requirements unless the co

Submittals are returned with action indicated. Approval of an item does not include approval of an tractor calls attention to and supports the deviation.

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS MARY MER DE NTIN DUT AC Privace CARRED The

COPIES TO BOICC (2)	DATE	SIGNATURE
LANTDIV (1)	2	

★ U.S. GOP: 1983 - 739-003/2122 Region 3-11

DEC 10 12 41 PM '84 RECEIVED ROICC JAXNCA

		UBMITTAL TRANSMITTAL	CONTRACT NO	TRANSA	AITTAL NO	DATE .
	NTDIV NORFOLK 4-4	355/3 (Hev. 11-80)	N62470-82-B-2552	#3-	A Pg.	2 11/21/84
	ON CONTRACTOR		PROJECT TITLE AND LOCATION			
TO	JBERIS FILLER	MANUFACTURING COMPANY			i saling ka pilo	Marcal addited by source of
-	AVAL FACILITIE	ES ENGINEERING COMMAND	REPLACE EQUI	PMENT	- P00L	S
	a service a service ser	CONTRACTOR USE ONLY	1		REV	EWER USE ONLY
X	Contractor Approved	List only one specification division per factors only one of the following categories on each triand indicate which is being submitted OICC Approval	ansmittal form.		A-App D-Disa AN-Ap	pproved proved as noted ceipt acknowledged. aments
ITEM NO.	PROJ. SPEC. SECT. & PARÁ. and/or PROJ. DWG. NO.*	ITEM IDENTIFICAT (Type, size, model no., Mfg. r brochure number	ame, dwg. or	NO. OF COPIES	ACTION	REVIEWER'S INITIALS CODE AND DATE
6		NSF and ASME Certification		7	RA	HFW/406 3DEC 84
7	••	Certificate of Conformance	, Page 1	7	RA	HFa/406 3Dec 84
8		Certificate of Conformance.	, Page 2	7	RA	HFW/406 3Dec 84
9	NMC556	Standard Catalog Drawing		7	AN	JMJ 403 5 DEC 64
0		Neptune Filter Installation	List	7	RA	4 FW/406 3 Dec 84
í		NSF Official Listing	· Andrew - North	7	RA	HFW/406 3Dor 84
ON	IRACTOR'S COMMENTS				*	

Ensign W. G. Grip		CONTRACTOR REPI	RESENTATIVE (Signalure)	topologon in the second
DATE RECEIVED BY REVIEWER	FROM (Reviewer)		TO KOBORTS	pricies

tractor calls attention to and supports the deviation. Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the

transmittal form. REVIEWER'S COMMENTS

FILMENIS HANGE MIL Spra -71 . LESIGN OF THE SA DER DEN ATIN ISI AL A.C Lip Tank 1.10

COPIES TO ROICC (2)	DATE	SIGNATURE	
LANTDIV (1) A-E (1)	and the second	and the second state of the second states and	

* U.S. GOP: 1983 - 739-003/2122 Region 3-11

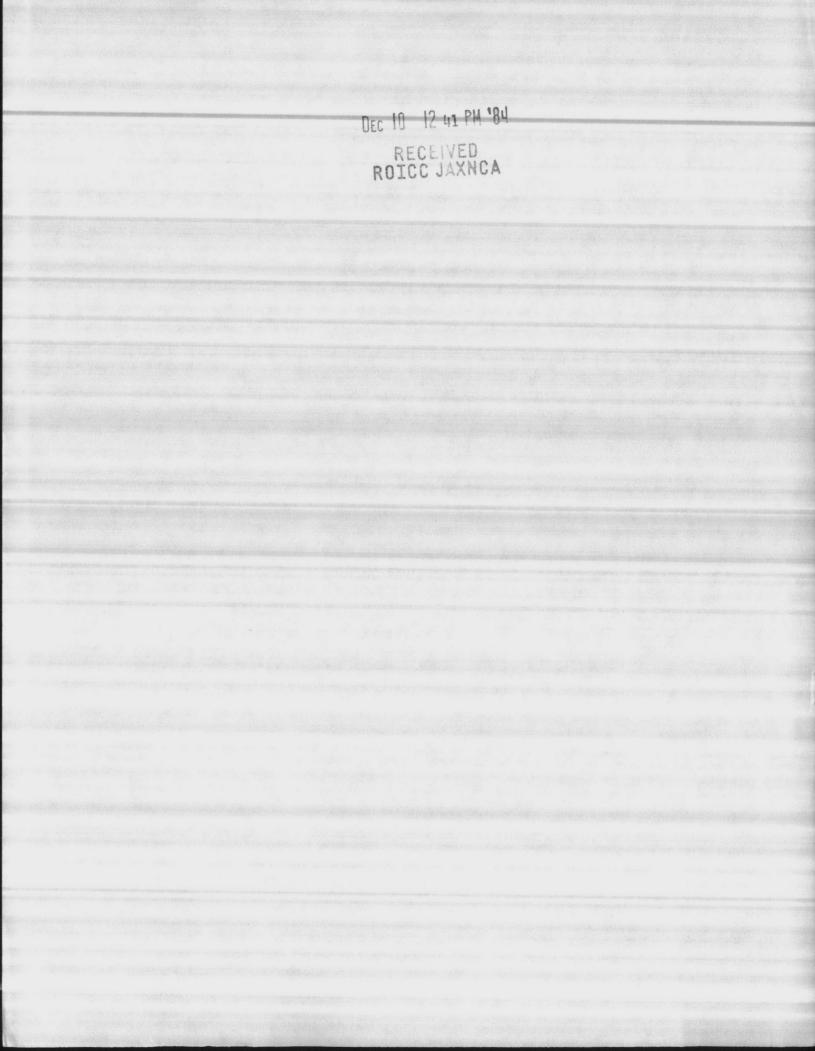
. .

DEC 10 12 41 PM '84 RECEIVED ROICC JAXNCA

CONTRACTOR BERTS FILTER MANUFACTURING CO. AL FACILITIES ENGINEERING COMMAND CONTRACTOR USE ONLY "List only one specification division per for	N62470-82-B-2552 PROJECT TITLE AND LOCATION REPLACE EC	#3-A		11/21/84
AL FACILITIES ENGINEERING COMMAND CONTRACTOR USE ONLY "List only one specification division per for	REPLACE EC	UTPMEN		
CONTRACTOR USE ONLY *List only one specification division per for	REPLACE EQ	UTPMENT		1000
CONTRACTOR USE ONLY *List only one specification division per for			- POC	DLS
*List only one specification division per for		1	BEVIEN	WER USE ONLY
the set of the	· m .			TION CODES
List only one of the following categories on each tran and indicate which is being submitted Contractor Approved OICC Approval	Devision	Pution 1		proved oved as noted ipt acknowledged eents
PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. * ITEM IDENTIFICATIO (Type, size, model no., Mfg. na brochure number)			CTION ODES	REVIEWER'S INITIALS CODE AND DATE
15440	OF CODE 05			•
Para 2.1 FILTER TANKS		X		
• FA-1 Assembly Drawing - Filter Ta	ank the	7	and the second se	IMJ 45 5 DEC EL
The sensity browing - inder it				Inis 423
FT-1 Fabrication Details - Filter	r Tank	7 1		5 DERE F.
UM-1 Fabrication Details - Underg	drain	7 1	Contraction of the second	5 DEZ 64
				1411 403
UM-2 Fabrication Details - Underg	drain	7 A	5	- DEC 64
Tank Construction Calculatio	Jac	7 4	Contract of the second s	5 DEZ 84
ACTOR'S COMMENTS	research the second second second			5.00001
DF TRANSMITTAL AND SUBMITTALS TO ROICC	CONTRACTOR REPRESENTATIVE (S	4		
RECEIVED BY REVIEWER FROM (Reviewer)	TO A	0.0-	- /	1 Percent
26 Nov 84 LANTDIU	10	BERI	5 /	Rojec
Submittals are returned with action indicated. Approval of an item does not i tractor calls attention to and supports the deviation.	include approval of any deviation	n from the co	ntract requ	irements unless the
Submittals are forwarded to LANTDIV with A-E recommendations indicated		on and in co	mments bel	IN ON ONE COPY O
transmittal form.			innents bei	
VER'S COMMENTS		1	٨	Λ
FILTER_ TANKS MEET THE S				
DESIGN OF THE UNDER DRA	IN STRAIN	ins	15	A
DEVIATION BUT IS ACCEP	TABLE D	ASIT		al al.
APPROVAL CARRED BY THE THE	- D	FUEN		~ /\/

BOICC (2)	DATE	SIGNATURE
LANTDIV (1) A-E (1)	6 DEZ 84	Ataste

* U.S. GOP: 1983 - 739-003/2122 Region 3-11



	TDIV NORFOLK 4-435	BMITTAL TRANSMITTAL	CONTRACT NO	Contraction Provide State	ITTAL NO	DATE
FROM	CONTRACTOR		N62470-8225	and the second sec	4	11/6/84
		Manufacturing Co.			DOOL	
TO		the second s	REPLACE FIL CAMP LE JEU		PUUL	
Na	val racificies	S Engineering Command CONTRACTOR USE ONLY			BEVI	EWER USE ONLY
		*List only one specification division pe	er form.			CTION CODES
	Lis	t only one of the following categories on each and indicate which is being submi				oved oproved proved as noted
	Contractor Approved	OICC Approval		/Substitution CC Approval	RA-Rec C-Com R-Resu	
ITEM NO.	PROJ. SPEC. SECT. & PARA, and/or PROJ. DWG. NO. *	ITEM IDENTIFIC (Type, size, model no., Mi brochure num	g. name, dwg. or	NO. OF COPIES	ACTION	REVIEWER'S INITIALS CODE AND DATE
-	15440 Para. 2.5					GODE AND DATE
1	Catalog Pages	Pressure Gauge BA14	G	7	A	406 M
			9 NOV 1984			
copy En	TRACTOR'S COMMENTS	A PARTY OF A	CODE CS. CONTRACTOR REPRESENT	omps	ers Fi	Tree 1/2
	Submittals are returned	PD FROM (Reviewer)	CONTRACTOR REPRESENT	Robert Robert		· Sector Charles

Nov 16 12 18 PM '84 RECEIVED ROICC JAXNCA



COMMON FEATURES



Regal Gauges are calibrated in accordance with ANSI B40.1-1974 Grade A (\pm 1%). See Page 16 of this catalog for further reference to ANSI B40.1. • 1% accuracy.

 White dial, black graduations and numerals, except: corresponding temperatures in red on ammonia and refrigerant gauges; 270° arc, except: 180° on bourdon type low pressure gauge to 5 psi, smaller arc on low pressure bellows gauges.

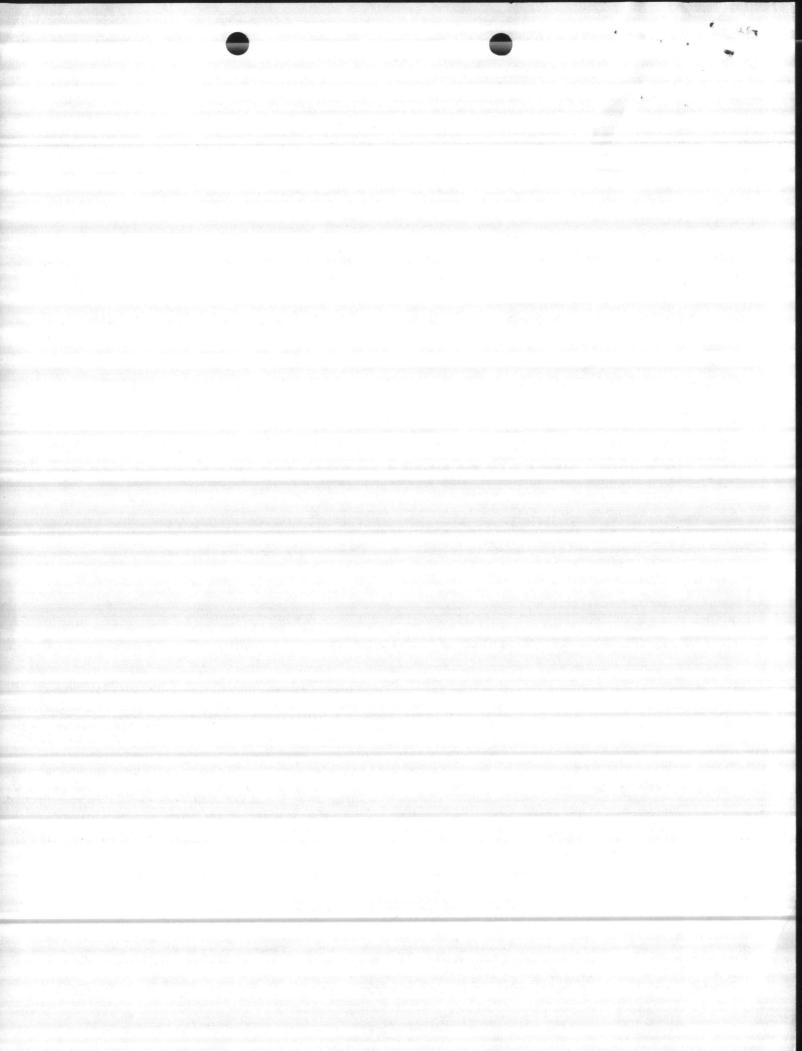
CATALOG NUMBER	SERVICE				
BA1	Vacuum, pressure, compound.				
BA3	/acuum, pressure, compound.				
BB1	Pressure, compound. Duplex gauge. Indicates two related pressures on same dial; top pointer orange, bottom black.				
BC1	Pressure. Differential gauge. Indicates difference between two independent pressure sources, with zero at top center; pointer at right would indicate right connection that much higher than left connection, and vice versa.				
BD1	Pressure. Differential gauge. Regular dial and range configuration; pressure must be applied to high pressure connection before low pressure is applied; remaining reading is the difference.				
BE1	Pressure. Retard gauge. Has expanded scale, advantageous where accurate measurement of small variations in pressure over a part of the range is required.				
BF1	Pressure, compound. Retard gauge. Has expanded scale, advantageous where accurate measurement of small variations in pressure over a part of the range is required.				
BM1	Pressure. Altitude gauge. Indicates height of water in reservoirs, etc. Red set hand.				
BN1	Pressure. Combination pressure and altitude gauge. Indicates both height of water and corresponding pressure in reservoirs, etc. Red set hand.				
ВК1	Vacuum, pressure, compound. Low pressure gauge.				
BL1	Vacuum, pressure, compound. Bellows actuated gauge for very low pressures.				
BL4	Vacuum, pressure, compound. Bellows actuated gauge for very low pressures. WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS, OUT DEPARTMENT STALLED IN THE ALLOCATED SPACES, AND IS SUBMITTED FOR GOVERNMENT APPROVAL.				
BP3	Compound. Ammonia gauge. Indicates corresponding temperatures Socket contains stainless steel throttle screw .020 Bore.				
BQ1	Pressure, compound. Refrigerant gauge. Refrigerants 12 and 22 standard; others available. Indicates corresponding temperatures. Socket contains brass throttle screw .008 Bore.				

FOR STANDARD REGAL RANGES, SEE PAGE 6



NG2470-82-3-2552 SECT 15440 PARA 2.5

WHEN ORDERING: Specify (1) Gauge Type i.e. BA1; (2) Dial (by symbol) i.e. 3 = 3%, 4 = 4%, 6 = 6%, 8 = 8% and 9 = 12% size. (3) To the resultant 4-digit number, refer to page 13 and add appropriate case style symbol. Example: "Type BA14P" denotes



- Slotted adjustable pointer (except BBI Duplex: balanced micrometer).
- Surface, direct (stem), semi-flush and flush mounting.

A

• ¼" NPT male connection; ½" NPT optional, or no charge over 1,000 psi.

	DIAL SIZES	RANGE TABLE See P. 6	RANGE LIMIT	MOVEMENT	BOURDON TUBE	SOCKET
	3½", 4½", 6", 8½", 12"	A	1,000 psi	Bronze rotary with nickel silver pinion gear; bronze sector gear; stainless steel link.	Phosphor bronze.	Forged brass.
in ter ender en selectere grande	3½", 4½", 6", 8½", 12"	А	20,000 psi	Bronze rotary with nickel silver pinion gear; bronze sector gear; stainless steel link.	Alloy steel 4130.	Alloy steel.
seren en e	4½", 6", 8½" 12"	A	1,000 psi	Bronze rotary with nickel silver pinion gear; bronze sector gears and stainless steel link.	Phosphor bronze; alloy steel, beryllium copper; stainless steel or monel optional, except 31/2" size.	Forged brass (st. st., alloy st. or monel).
	4½", 6", 8½", 12"	В	500 psi	Bronze.	Phosphor bronze; alloy steel, beryllium copper; stainless steel or monel optional.	Forged brass (st. st., alloy st. or monel).
	4½", 6"	с	1,000 psi	Bronze.	Phosphor bronze; alloy steel, beryllium copper; stainless steel or monel optional.	Forged brass (st. st., alloy st. or monel).
	4½", 6", 12"	D	30 psi	Bronze sector gear; stainless steel link. One retard mechanism.	Phosphor bronze.	Forged brass.
C	4½", 6", 12"	D	100 psi	Bronze sector gear; stainless steel link. Two retard mechanisms (ex- cept one on 30"0-100 psi).	Phosphor bronze.	Forged brass.
i de s	3½", 4½", 6", 8½"	E	1,000 feet of water	Bronze rotary with nickel silver pinion gear; bronze sector gear; stainless steel link.	Phosphor bronze.	Forged brass.
4	3½'', 4½'', 6'', 8½''	E	300 psi & 690 feet of water	Bronze rotary with nickel silver pinion gear; bronze sector gear; stainless steel link.	Phosphor bronze.	Forged brass.
ala A Artista Artista	4½", 6", 8½"	F	10 psi	Bronze rotary with nickel silver pinion gear; bronze sector gear; stainless steel link.	Phosphor bronze.	Forged brass.
n Arren der Arren der Stater Arren der Stater	4½", 6", 8½"	G	15 psi	Bronze rotary with nickel silver pinion gear; bronze sector gear; stainless steel link.	(BELLOWS) Phosphor bronze. Overrange stop.	Forged
	4½", 6", 8½"	G	15 psi	All stainless steel.	(BELLOWS) 316 stainless steel. Overrange stop.	316 stainless steel.
	3½", 4½", 6", 8½"	I	300 psi	All stainless steel.	Alloy steel 4130.	Alloy steel.
	3½", 4½", 6", 8½"	н	300 psi	All stainless steel	Phosphor bronze.	Forged brass.

FOR STANDARD REGAL RANGES, SEE PAGE 6

41/2" dial size Regal Gauge in black phenol case.

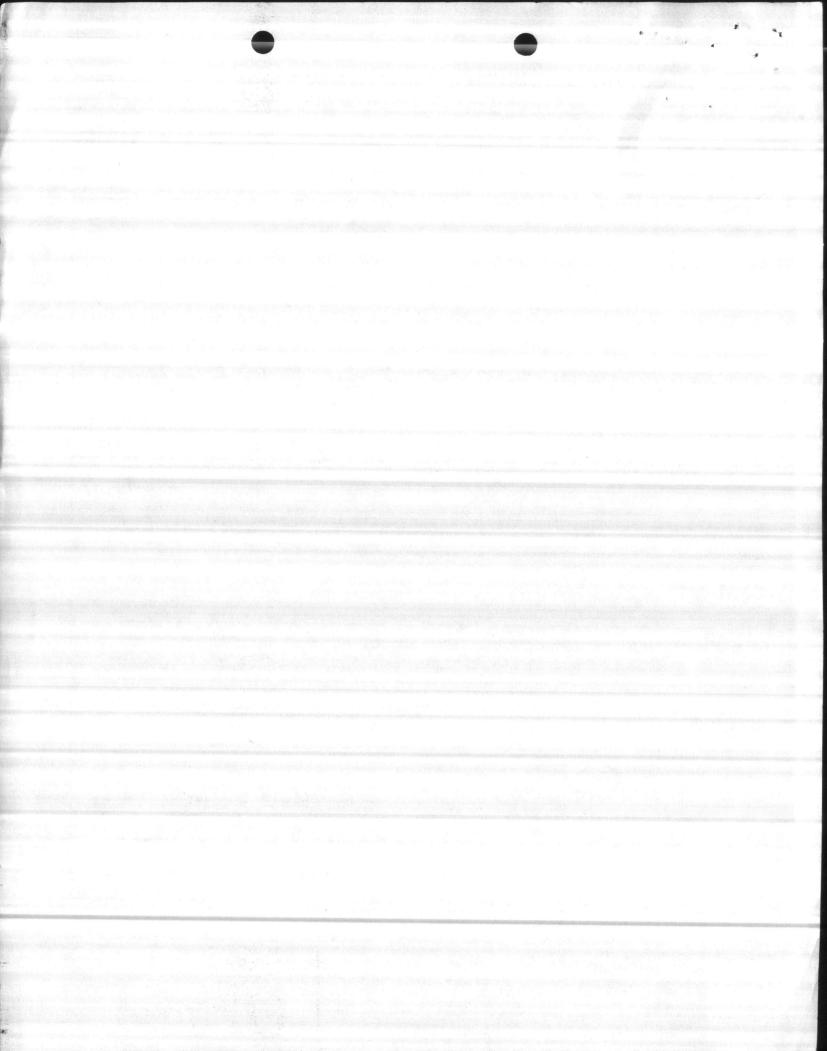
In addition to Gauge Type number . . . Specify Range; Connection (size and location); Dial (white or special).





WEKSLER

INSTRUMENTS





Standard REGAL Ranges

TABLE A GENERAL

DIAL BANGES ELCURE INTERVALA SMALLEST				
DIAL RANGES	FIGURE INTERVALS	GRADUATION		
0- 15 p.s.i.t	1 p.s.i.	¼ p.s.i.		
0- 30 p.s.i.	5 p.s.i.	1/2 p.s.i.		
0- 60 p.s.i.	10 p.s.i.t	1 p.s.i		
0- 100 p.s.i.	10 p.s.i.	1 p.s.i.		
0- 160 p.s.i.	20 p.s.i.	2 p.s.i.		
0- 200 p.s.i.	20 p.s.i.	2 p.s.i.		
0- 250 p.s.i.	25 p.s.i.	5 p.s.i.		
0- 300 p.s.i.	50 p.s.i.	5 p.s.i.		
0- 400 p.s.i.	50 p.s.i.	5 p.s.i.		
0- 500 p.s.i.	50 p.s.i.	5 p.s.i.		
0- 600 p.s.i.	100 p.s.i.tt	10 p.s.i.tt		
0- 700 p.s.i.	100 p.s.i.	10 p.s.i.		
0- 800 p.s.i.	100 p.s.i.	10 p.s.i.		
0- 1,000 p.s.i.	100 p.s.i.	10 p.s.i.		
0- 1,500 p.s.i.	300 p.s.i.	20 p.s.i.		
0- 2,000 p.s.i.	200 p.s.i.	20 p.s.i.		
0- 3,000 p.s.i.	500 p.s.i.	20 p.s.i.		
0- 5,000 p.s.i.	500 p.s.i.	50 p.s.i.		
0-10,000 p.s.i.	1,000 p.s.i.	100 p.s.i.		
0-20,000 p.s.i.*	2,000 p.s.i.	200 p.s.i.		
0-30" Hg. Vac.	5"	1/2''		
30''-0- 15 p.s.i.	5" & 3 p.s.i.	1" & 1 p.s.i.		
30"-0- 30 p.s.i.	10" & 5 p.s.i.	1" & 1 p.s.i.		
30''-0- 60 p.s.i.	10" & 10 p.s.i.	1" & 1 p.s.i.		
30"-0-100 p.s.i.	30" & 10 p.s.i.	2" & 1 p.s.i.		
30"-0-150 p.s.i.	30" & 25 p.s.i.	5" & 5 p.s.i.		
30''-0-200 p.s.i.	30" & 20 p.s.i.	5" & 5 p.s.i.		
30''-0-300 p.s.i.	30" & 50 p.s.i.	5" & 5 p.s.i.		
30''-0-400 p.s.i.	30" & 50 p.s.i.	10" & 5 p.s.i.		
30''-0-600 p.s.i.	30" & 100 p.s.i.	10" & 5 p.s.i.		

Metric dials, in ranges up to 160,000 kPa, and metric dials, in standard ranges up to 700 KG/CM², can be furnished. See page 2. t Not available in duplex.

TABLE B RANGES FOR TYPE BC1 DIFFERENTIAL GAUGE (Other Ranges Available)

DIAL RANGES	FIGURE INTERVALS	SMALLEST GRADUATION	STATIC PRESSURE LIMITS**
30-0- 30 p.s.i.	5 p.s.i.	1 p.s.i.	90 p.s.i.
50-0- 50 p.s.i.	10 p.s.i.	1 p.s.i.	150 p.s.i.
100-0-100 p.s.i.	20 p.s.i.	2 p.s.i.	300 p.s.i.
200-0-200 p.s.i.	50 p.s.i.	5 p.s.i.	600 p.s.i.
300-0-300 p.s.i.	100 p.s.i.	10 p.s.i.	700 p.s.i.
400-0-400 p.s.i.	100 p.s.i.	10 p.s.i.	950 p.s.i.
500-0-500 p.s.i.	100 p.s.i.	10 p.s.i.	1,200 p.s.i.

TABLE C

RANGES FOR TYPE BD1 DIFFERENTIAL GAUGE (Other Ranges Available)

DIAL RANGES	FIGURE INTERVALS	SMALLEST GRADUATION	STATIC PRESSURE LIMITS**
0- 30 p.s.i.	5 p.s.i.	½ p.s.i.	45 p.s.i.
0- 60 p.s.i.	10 p.s.i.t	1 p.s.i.	90 p.s.i.
0- 100 p.s.i.	10 p.s.i.	1 p.s.i.	150 p.s.i.
0- 160 p.s.i.	20 p.s.i.	2 p.s.i.	240 p.s.i.
0- 200 p.s.i.	20 p.s.i.	2 p.s.i.	300 p.s.i.
0- 300 p.s.i.	50 p.s.i.	5 p.s.i.	450 p.s.i.
0- 400 p.s.i.	50 p.s.i.	5 p.s.i.	600 p.s.i.
0- 500 p.s.i.	50 p.s.i.	5 p.s.i.	600 p.s.i.
0- 600 p.s.i.	100 p.s.i.tt	10 p.s.i.tt	700 p.s.i.
0- 800 p.s.i.	100 p.s.i.	10 p.s.i.	950 p.s.i.
0-1,000 p.s.i.	100 p.s.i.	10 p.s.i.	1,200 p.s.i.

TABLE D **RETARD RANGES**

TOTAL GRADUATION	FIGURE INTERVALS	SMALLEST GRADUATION
0 to 15 p.s.i. 0 to 30 p.s.i.	1 p.s.i. (0- 5); 5 p.s.i. (5-15) 1 p.s.i. (0-10); 10 p.s.i. (10-30)	1 oz. (0- 5); 1 p.s.i. (5-15) 1 oz. (0-10); 5 p.s.i. (10-30)
30''-0-30 p.s.i.	2" (0-10); 10" (10-30) 1 p.s.i. (0-5-; 10 p.s.i. (10-30)	½" (0-10); 5" (10-30) 1 oz. (0-5–; 5 p.s.i. (5-30)
30''-0-100 p.s.i.	10" (0-30); 10 p.s.i. (0-50) 25 p.s.i. (50-100)	1" (0-30); 1 p.s.i. (0-50) 5 p.s.i. (50-100)

NOTE: On compound range gauges the zero graduation is not to be used as a calibration reference point.

t Also available with figures at 5 p.s.i. intervals. tt Also available with 50 and 5 p.s.i. markings.

*403 st. st. bourdon

**Maximum pressure that can be admitted into the bourdon tubes.

TABLE E **ALTITUDE GAUGE RANGES**

TOTAL	FIGURE INTERVALS	SMALLEST GRADUATION
0- 30 ft.	5 ft.	½ ft.
0- 70 ft.	10 ft.	1 ft.
0- 100 ft.	10 ft.	1 ft.
0- 160 ft.	20 ft.	2 ft.
0- 200 ft.	20 ft.	2 ft.
0- 250 ft.	25 ft.	5 ft.
0- 300 ft.	50 ft.	5 ft.
Ø − 400 ft.	50 ft.	5 ft.
0- 500 ft.	50 ft.	5\ft.
0- 600 ft.	100 ft.	10 ft,
0- 700 ft.	100 ft.	10 ft.
0- 800 ft.	100 ft.	10 ft.
0-1,000 ft.	100 ft.	10 ft.
15 p.s.i. & 35 ft.	3 p.s.i. & 5 ft.	1/4 p.s.i. & 1/2 ft.
30 p.s.i. & 70 ft.	5 p.s.i. & 10 ft.	1 p.s.i. & 1 ft.
50 p.s.i. & 116 ft.	10 p.s.i. & 10 ft.	1 p.s.i. & 2 ft.
60 p.s.i. & 140 ft.	10 p.s.i. & 20 ft.	1 p.s.i. & 2 ft.
100 p.s.i. & 231 ft.	10 p.s.i. & 25 ft.	2 p.s.i. & 5 ft.
150 p.s.i. & 345 ft.	20 p.s.i. & 20 ft.	2 p.s.i. & 5 ft.
200 p.s.i. & 460 ft.	20 p.s.i. & 50 ft.	2 p.s.i. & 5 ft.
300 p.s.i. & 690 ft.	50 p.s.i. & 50 ft.	5 p.s.i. & 10 ft.

TABLE F - RANGES FOR BK1 GAUGE

DIAL RANGES	FIGURE	SMALLEST GRADUATION	DIAL ARC
0 to 5 p.s.i. 0 to 10 p.s.i.	1 p.s.i. 1 p.s.i.	2 oz. 2 oz.	180° 270°
0-10" Hg. Vac. 0-15" Hg. Vac.	2"	202. ¼" ½"	180° 180°

TABLE G - RANGES FOR BELLOWS GAUGES

	FIGURE	SMALLEST	BL1	BL4
DIAL RANGES	INTERVALS	GRADUA- TION	Dial Arc	Dial Arc
0 to 10" Water Press.	2"	1/4"	90°	
0 to 15" Water Press.	3"	1/2"	90°	
0 to 20" Water Press. & 12 oz.	2" & 1 oz.	1" & ¼ oz.	180°	
0 to 30" Water Press. & 18 oz.	5" & 1 oz.	1/2" & 1/2 OZ.	215°	
0 to 30" Water Press. & 18 oz.	10" & 1 oz.	1" & ½ oz.		90
0 to 40" Water Press. & 24 oz.	5" & 3 oz.	1" & ½ oz.	270°	90
0 to 60" Water Press. & 35 oz.	5" & 5 oz.	1" & 1 oz.	270°	180
0 to 80" Water Press. & 45 oz.	10" & 5 oz.	1" & 1 oz.	270°	-
0 to 100" Water Press. & 57 oz.	10" & 5 oz.	1" & 1 oz.	270°	270
0 to 5 p.s.i.	1 p.s.i.	1 oz.	270°	270
0 to 10 p.s.i.	1 p.s.i.	2 oz.	270°	270
0 to 15 p.s.i.	2 p.s.i.	.2 p.s.i.	270°	270
0 to 10" Water Vac.	2"	1/4"	90°	1_
0 to 15" Water Vac.	3"	1/2"	90°	1
0 to 40" Water Vac. & 75mm. Hg.	5" & 10mm	1" & 1 mm.	270°	90
0 to 5" Hg. Vac.	1"	.1"	270°	180
0 to 10'' Hg. Vac.	2"	1/4"	270°	270
10" Water Pressure & 10" Water Vacuum	2″	1/2"	180°	
40" Water Pressure & 20" Water Vacuum	10''	1"	270°	180
10" Hg. Vacuum & 5 p.s.i. Pressure	2" & 1 p.s.i.	.2" & .1 p.s.i.	270°	270

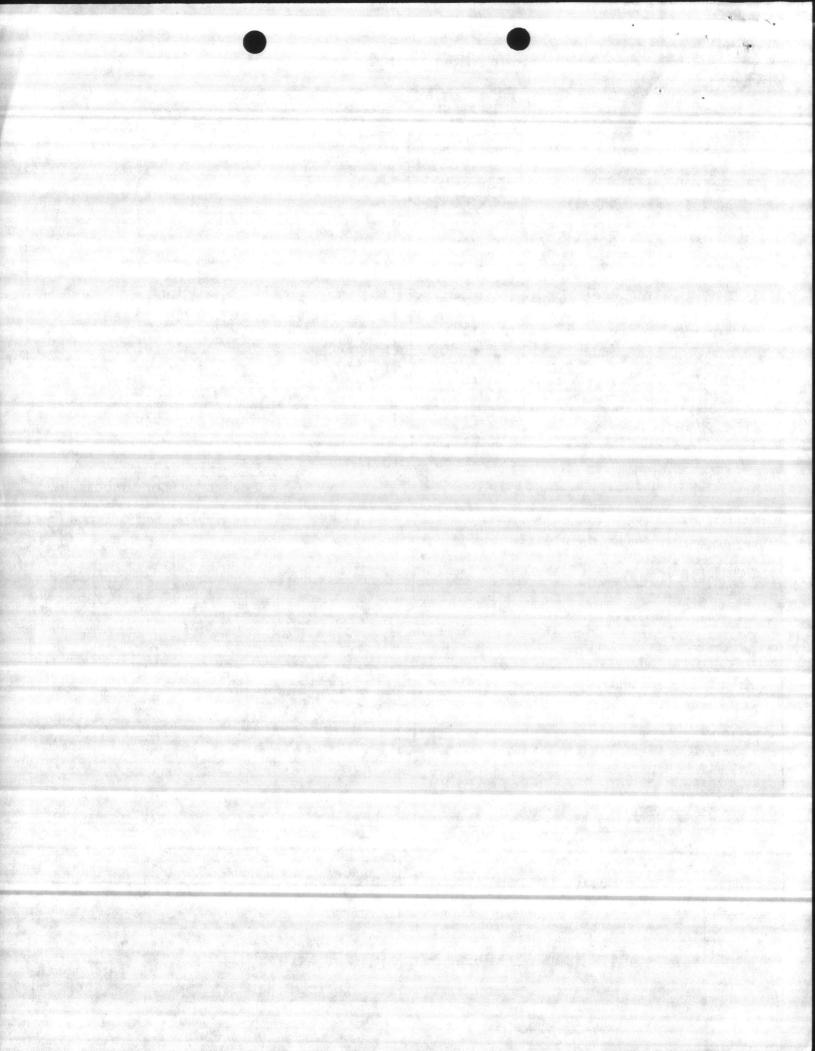
TABLE H - RANGES FOR REFRIGERANT 12 OR 22

DIAL RANGES	FIGURE INTERVALS	SMALLEST
30''-0-150 p.s.i. 30''-0-300 p.s.i.	30" & 25 p.s.i. 30" & 25 p.s.i.	5" & 5 p.s.i. 5" & 5 p.s.i.
0-300 p.s.i.	25 p.s.i.	5 p.s.i.

TABLE I - RANGES FOR AMMONIA

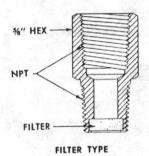
FIGURE INTERVALS	GRADUATION
30" & 25 p.s.i. 30" & 25 p.s.i.	5" & 5 p.s.i. 5" & 5 p.s.i.
	30" & 25 p.s.i.

NOTE: Any standard pressure or compound range, from 30 to 400#, can be furnished for ammonia use, without temperature equivalent, at no additional charge.





PISTON TYPE



PRESSURE SNUBBERS

PISTON TYPE: Shocks and pulsations are absorbed in the doughnut-shaped orifice "O" formed by the piston "P" in the tube. As the piston moves up and down with the pulsation, it automatically kicks out any sediment or pipe scale that would clog a simple orifice or needle valve.

Each snubber is furnished with three pistons. The snubbing may be changed to suit individual installations by changing pistons. By using the proper piston any of the listed snubbers can be made to operate satisfactorily from vacuum to its maximum rated pressure on any fluid compatible with the body material. These snubbers may be installed vertically, horizontally, inverted, or at any angle.

TYPE NUMBER	GAS OR LIQUID IN PIPE LINE	PRESSURE RANGE, LBS.	PIPE SIZE AND LENGTH	MATERIAL
RS1	Air, water steam, etc.	0- 3.000	April 1	Brass
RS2	Oil, fats, etc.	0- 3,000	'4" NPT	Diass
RS7	Thin corrosive liquids, gases	State Barting and Bar	A = 31/2"	St. St.
RS8	Thick corrosive liquids	0- 5,000		01.01.
RS6	Oil, water, etc., specify		½" NPT	Brass
RS9	Thin or thick corrosive, specify	0-10,000	A = 3-5/8"	St. St.

FILTER TYPE: Snubbing element consists of a 3/8" diameter x 1/8" thick MICRO METALLIC stainless steel filter. When placed in the line just before the pressure gauge, the gauge pointer moves across the scale at a rate which is proportional to the pressure differential across the snubber element. Overall length 1%".

TYPE NO.	GAS OR LIQUID	PRESSURE RANGE	CONNECTION	MATERIAL
BW 41	Air	1,500 PSI	14" NPT	Brass
BW 42	Water-Light Oil	1,500 PSI	1/4" NPT	Brass
BW 43	Heavy Oil	1,500 PSI	1/4" NPT	Brass
SW 41	Air	5,000 PSI	¼" NPT	St. Stl.
SW 42	Water-Light Oil	5,000 PSI	1/4" NPT	St. Stl.
SW 43	Heavy Oil	5,000 PSI	¼" NPT	St. Stl.
SW 44	Mercury	5,000 PSI	1/4" NPT	St. Stl.
A05	*	20,000 PSI	½" NPT	St. Stl.

*When ordering: add Suffix letter "D" for Heavy Oil (over 50 S.S.U.): "E" for Water or Hydraulic Oil; "G" for Air; "H" for Mercury Manometer.

OPTIONAL EXTRAS

MAXIMUM and MINIMUM POINTERS

Used to indicate highest and lowest pressures reached since last setting. Equipped with external reset knobs.

MAXIMUM or MINIMUM POINTER

Used to indicate highest or lowest pressure reached. Equipped with external reset knob.

SERVICE MARKINGS

Service and company nameplates can be attached to standard dials. Maximum, 20 letters per plate. Dials with blank nameplate can also be supplied.

PLASTIC LENS

Glass lens is standard on all gauges except Navy. Plastic lens, furnished at extra cost, is recommended whenever the danger of breakage is a possibility.

LAMINATED SHATTERPROOF LENS*

Can be furnished in place of plain glass lens, when specified. Also available separately.

THROTTLING ORIFICE

A device drilled with an orifice to minimize and dampen pulsation surges.

*All except 12" dial size.

SAFETY BLOW-OUT DISC

An optional safety feature, available on pressure gauges in all sizes, this synthetic rubber disc is designed to blow out if internal case pressure should exceed 5 psi. Where the gauge is to be surface mounted, it is advisable to use spacing washers (so the disc will have room to pop out).

RED SET HAND

The red set hand is used to indicate a specific operating or maximum pressure. It is attached to the dial with a grommet and can be reset manually.

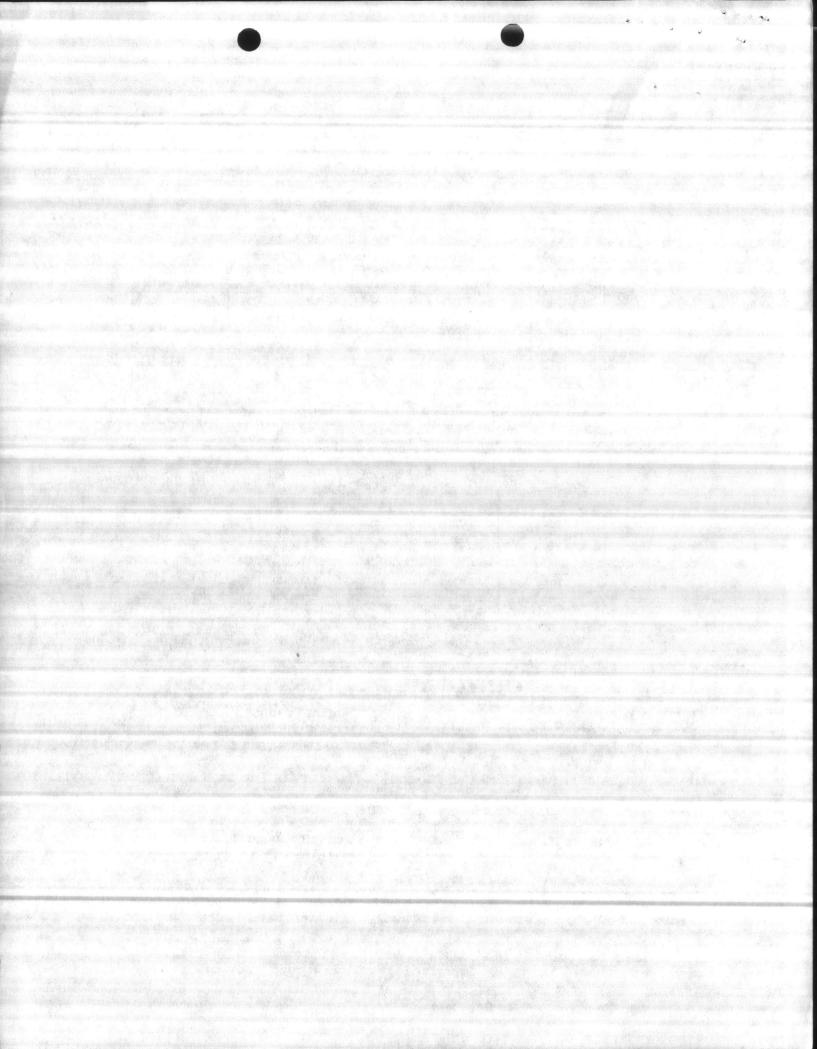
SPECIAL DIALS

Dials to customer specification can be supplied at additional cost. When ordering or making inquiry please advise quantity, and all details of layout desired.

NOTE: Dials designed to include colored numerals or arcs can also, be supplied. One or more colors may be specified.

OVERLOAD/UNDERLOAD STOPS

All gauges listed in this catalog can be supplied with underload stop – for protection from vacuum, or overload stop – for protection from overpressure.





CAPILLARY BLEEDER

Weksler gauges can be furnished with a bleeder system which operates through a flexible capillary in the bourdon tube. Ending at the highest point of fluid in the gauge, the bleeder tube provides for fast and complete removal of air or gases. The external bleed port is protected and sealed by a cap nut.

Especially useful in sealed systems such as solid-filled gauges or gauges equipped with diaphragm seal, the capillary bleeder feature is also recommended for applications where highest accuracy and sluggish free action is desired.

For type 316 stainless steel bleeder system (max. pressure 10,000 psi), specify Model SCB.

Refer to other pages in this catalog for gauge ordering information.

GAUGE ACCESSORIES BAR STOCK NEEDLE VALVES

These values are used primarily to closely regulate fine flow. However, they may be used as a throttling device on lines to pressure gauge where rapid and excessively pulsating pressures would tend to effect the gauge performance or mechanism.

TYPE NO.	SIZE	MATERIAL	PRESSURE & TEMP. RATING	WEIGHT
AV34	¼" NPT		500 I O 15005	8 oz.
AV32	1/2" NPT	Bronze: For oil, water, gas, etc.	500 psi @ 150°F	1 lb. 4 oz.
AV44	'/ NPT	Carbon Steel: Parkerized and	475 psi @ 1000°F 550 psi @ 900°F	9 oz.
AV42	½" NPT	Parcolaced, for resistance to corrosion.	600 psi @ 850°F 10,000 psi @ 150°F	1 lb. 6 oz.
AV54	%" NPT	12-14% Chrome Stainless Steel For cold nitric acid, crude oil and	10,000 psi @ 150°F	9 oz.
AV52	½" NPT	oil derivatives, alcohol, liquor, boric acid, alkaine solutions, etc.	10,000 psi @ 130 1	1 lb. 6 oz.
AV64	¼" NPT	Combination: 12-14% Chrome Stainless Steel and Carbon Steel	475 psi @ 1000°F 500 psi @ 900°F	9 oz.
AV62	½" NPT	offers highest resistance to gelling at high temperatures.	600 psi @ 750°F 4,000 psi @ 150°F	1 lb. 6 oz.
AV74	'4" NPT	316 Stainless Steel provides greatest overall resistance to	4,000 psi @ 150°F	9 oz.
AV72	½" NPT	corrosion; very good for sub-zero service.	4,000 pai @ 150 1	1 lb. 6 oz.

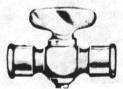
His Constitution



BAR STOCK NEEDLE VALVE



BAR STOCK NEEDLE VALVE (Brass)



TEE HANDLE COCK



TEE HANDLE COCK





SIPHON

BRASS BAR STOCK NEEDLE VALVES

TYPE BBV4 – Brass, ¼" NPT female connections only. Suitable for 600 psi at 300°F maximum; water, oil, or gas service.

GAUGE COCKS

TEE HANDLE COCKS – In polished brass (suitable for pressure to 125 psi hydraulic). Specify type A10 for $\frac{125}{100}$ size. For $\frac{125}{100}$ size except chrome plated, specify Type A10C. For pressures to 600 psi hydraulic, $\frac{125}{100}$ size only, with hex shoulders, specify Type A10E.

LEVER HANDLE COCK – ¼" male and female connections, suitable for pressures to 200 psi hydraulic. Specify Type A11 for brass, or Type A11C for chrome plated brass.

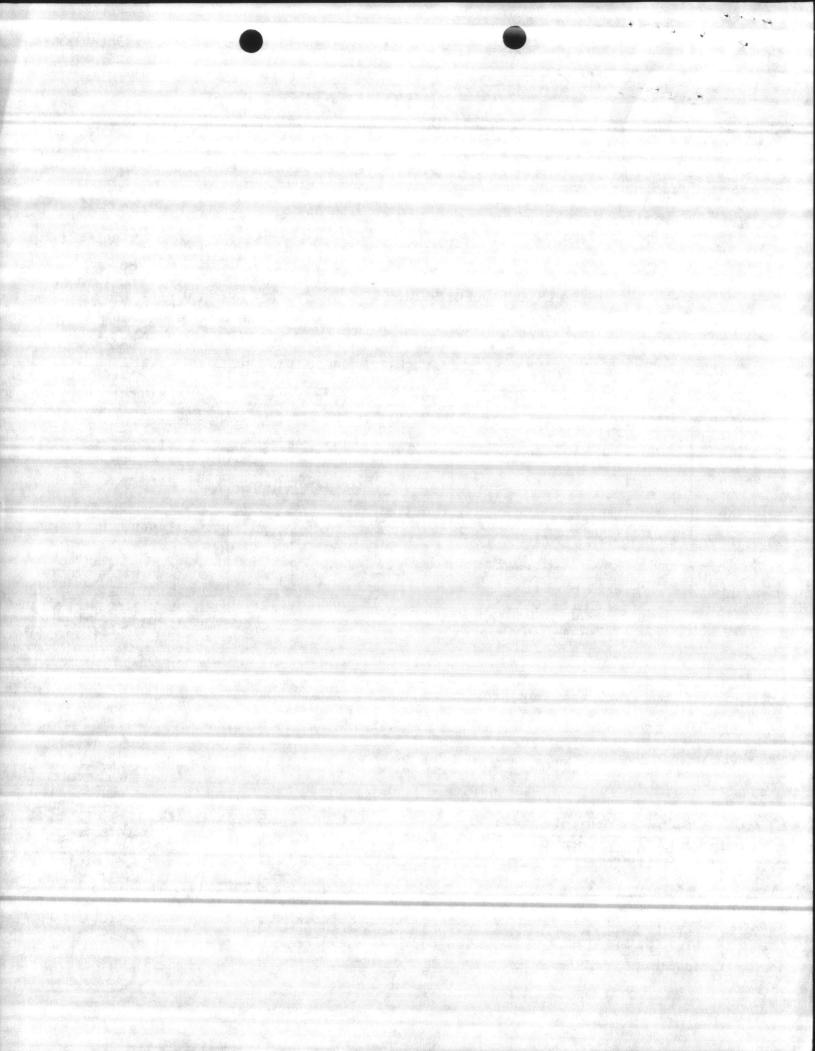
LEVER HANDLE COCK – ¼" female connections. Specify Type A12 for brass or Type A12C for chrome plated brass.

SIPHONS

When a gauge is to be used for steam pressures, a siphon filled with water is recommended between line and gauge to prevent steam from entering the tube.

SIZE	SIPHON MATERIAL	CAPACITY	TYPE NO
1	Iron (Schedule 40)	500 psi and 400°F	A031
	Brass	250 psi and 400°F	A03B
%" N.P.T.	Chrome Plated Brass	250 psi and 400°F	A03P
Service - Maria	Seamless Steel, extra heavy (Schedule 80)	1,000 psi and 850°F	CPS4
362.00	Seamless Stainless Steel XH (Schedule 80)	2,000 psi and 1000°F	CPSS4
and the second second	Seamless Steel, extra heavy (Schedule 80)	1,000 psi and 850°F	CPS2
½" N.P.T.	Seamless Stainless Steel XH (Schedule 80)	2,000 psi and 1000°F	CPSS2
	Seamless Steel (Schedule 40)	500 psi and 400°F	CPS5





CASE STYLES: 3½", 4½", 6", 8½" and 12" + Dial Sizes

Standard turret type Phenol case, for surface or direct mounting. Bottom connection standard, back connection available. (List prices are based on use of this case.) Case style PF (not illustrated) includes special ring assembly for flush mounting purposes. Case

Case style PF (not illustrated) includes special ring assembly for flush mounting purposes. Case style PF is standard with back connection; bottom connection available.

CA	SE	RING TYPE FINISH	CASE TYPES
MATERIAL	FINISH	RING I THE FINISH	CASE TTPE
Direct		Snap Ring, Black Finish	P .:
Phenol	Glossy Black	Steel Flush Ring, Black Finish	PF

Back flange permits surface or direct mounting. Bottom connection standard; back connection available.

	Directo Tanata d	Chrome-like Slip Ring	G
Aluminum	Black Textured Enamel	Aluminum Bayonet Lock Ring, Black Finish	A
Cast Brass	Satin	Brass Screw Ring, Satin Finish	J
Stainless Steel	Polished	Bayonet Lock Ring	X*

*41/2" dial size only.

For direct mounting only. Bottom connection standard; back connection available.

	Black Terrard	Chrome-like Slip Ring	1 1 Mar
Aluminum	Black Textured - Enamel	Aluminum Bayonet Lock Ring, Black Finish	Ċ.
Cast Brass	Satin	Brass Screw Ring, Satin Finish	L
Stainless Steel	Polished	Bayonet Lock Ring	Y*

*41/2" dial size only.

Cast aluminum surface mounting case with aluminum flush ring. Back connection standard; bottom connection available.

Aluminum	Black Textured Enamel	Threaded Aluminum Ring, Black Finish	AF
Cast Brass	Satin	Threaded Brass Ring, Satin Finish	JF

Front flanged case, for semi-flush surface mounting. Available with back connection only.

	Black Tauturad	Chrome-like Slip Ring	H
Aluminum	Black Textured Enamel	Aluminum Bayonet Lock Ring, Black Finish	В*
Cast Brass	Satin	Brass Screw Ring, Satin Finish	К

*Except 8½" dial size.

For flush mounting, with "U" clamp. Also available without "U" clamp for direct (stem) mounting; specify case style "O". Type "OF" case is furnished with back connection only. Bottom connection only for style "O" case.

Drawn Steel	Cadmium Plated	Press Fit, Chrome Plated Brass	OF*
		이네 그는 것을 하는 것 같아요. 이야지 않는 것 같아요. 이는 것 같아요. 이는 것 것 같아요. 이는 것 것 같아요. 이는 것 같아요. 이야지 않는	

*31/2" dial size only.

Cast aluminum case for flush mounting. Available with back connection only.

Aluminum	Black Textured Enamel	Hinged Steel Ring, Black Finish	W*
----------	--------------------------	---------------------------------	----

*41/2" and 6" dial sizes only.

SAFETY CASE TYPES

Specifically designed for severe or dangerous services, safety cases have a solid integral wall between the dial plate and operating parts, providing maximum protection. Should the bourdon tube rupture due to overpressure or other cause, rear plate permits full area release of pressure with maximum protection.

S	AFETY STYLES	DIAL SIZES	CASE TYPES
Phenol Case: Sir	nliar to style "P" except Safety	31/2, 41/2 & 81/2"	2+
Back Flanged Case:	Similar to style "A" except Safety	31/2,41/2,6 & 81/2"	4•
Hinged Front Case:	Similar to style "W" except Safety	4½ & 6"	6
Hi-Shock Navy Case Aluminum Case w/S	n Gnap Ring, Gray Finish	31/2, 41/2 & 81/2"	3

•Also available for flush mounting. To denote, add letter "F" i.e. 2F or 4F. tAF case only.





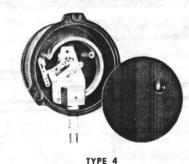














G

AF

н

OF

\A/

ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED APPROVED AS NOTED_ DISAPPROVED SUBJECT TO THE REQUIREMENTS OF CONTRACTNO. 82-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF A SUDMETTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLISS THE CONTRAC-TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION-THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA-TION OF TRADES, ETC., AS REQUIRED. REVIEWER HFW DATE 14NOV 84 FOR OFFICER IN CHARGE OF CONSTRUCTION

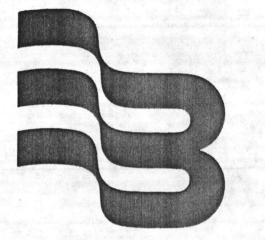
	NTRACTOR'S SU	UBMITTAL TRANSMITTAL	CONTRACT NO		TRANSM		DATE	
	CONTRACTOR		N62470-82-	and the second se		6	11/14/8	4
		MANUFACTURING CO.		and a start of the	CUT	CUTION	NO DOOL C	
то		1	CAMP LE				ING POOLS	
_N/	AVAL FACILITI	ES ENGINEERING COMMAND	J ON THE LE	oconic,				
_		*List only one specification division p	er form.	TIT	5		ACTION CODES	
	L	ist only one of the following categories on eac	transmillation Dr	A	3	A-App D-Disa	roved approved	
		and indicate which is being submi		IVED	3		proved as noted ceipt acknowledged.	
X	Contractor Approved	OICC Approval		ation Substi			nments	
NO.	PROJ. SPEC. SECT.	ITEM IDENTIFIC	ATION CONF	ON,		ACTION	REVIEWER'S	
ITEM	& PARA. and/or PROJ. DWG. NO. *	(Type, size, model no., Mi brochure nun	-	vol 1	NO OF	CODES	INITIALS CODE AND DATE	
	15440		TIE	TETTO	1	and the second		deni.)
-	Para. 2.9	VENTURI TUBE	5 4	<u> </u>				_
1	S-331-24	10" Venturi Tube with Ca	lculations		7	A	CCS 405 11	ho
2	S-331-66	8" Venturi Tube with Cal	sulations		7	A	1	
		o vencuri rube wrth can		<u></u>		01		
3	Letter	Certificate of Conforman	ce	<u> </u>	7	RA	¥	
		participation of the second second second second			- and	line and the		
CONT	TRACTOR'S COMMENTS	ROTAMETER SUBMITTAL LATE	{					
		Ú M		ESENTATIVE /				
COPY	TRACTOR'S COMMENTS	BMITTALS TO ROICC		ESENTATIVE (S	Signature)	2m	70.03	
COPY	OF TRANSMITTAL AND SU	BMITTALS TO ROICC		ESENTATIVE (S Hios TO	mp	em	_	
COPY	OF TRANSMITTAL AND SU	BMITTALS TO ROICC ip FROM (Reviewer) LIANTDIV	CONTRACTOR REPRE	10	Ro	Lon BERTS	FILTER	
COPY	OF TRANSMITTAL AND SU Sign W. G. Gri RECEIVED BY REVIEWER Submittals are returne	BMITTALS TO ROICC	CONTRACTOR REPRE	10	Ro		FILTER	
COPY	OF TRANSMITTAL AND SU Sign W. G. Gri RECEIVED BY REVIEWER Submittals are returned tractor calls attention	BMITTALS TO ROICC I D FROM (Reviewer) LADTDIV ed with action indicated. Approval of an item does	CONTRACTOR REPRE	To any deviatio	n from th	e contract re	FILTER	
	OF TRANSMITTAL AND SU ign W. G. Gri RECEIVED BY REVIEWER Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROICC I D FROM (Reviewer) LANDIV ed with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi	CONTRACTOR REPRE	To any deviatio	n from th	e contract re	FILTER	
	OF TRANSMITTAL AND SU ign W. G. Gri RECEIVED BY REVIEWER Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROICC I D FROM (Reviewer) LANDIV ed with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi	CONTRACTOR REPRE	To any deviatio	n from th	e contract re	FILTER	
	OF TRANSMITTAL AND SU ign W. G. Gri RECEIVED BY REVIEWER Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROICC I D FROM (Reviewer) LANDIV ed with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi	CONTRACTOR REPRE	To any deviatio	n from th	ne contract re	FILTER equirements unless the c below on ONE COPY of	on-
	OF TRANSMITTAL AND SU ign W. G. Gri RECEIVED BY REVIEWER Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROICC I D FROM (Reviewer) LANDIV ed with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi	CONTRACTOR REPRE	To any deviatio	n from th	ne contract re	FILTER equirements unless the c below on ONE COPY of	on-
	OF TRANSMITTAL AND SU ign W. G. Gri RECEIVED BY REVIEWER Submittals are returne tractor calls attention Submittals are forward transmittal form.	BMITTALS TO ROICC p FROM (Reviewer) LANDIV ed with action indicated. Approval of an item does to and supports the deviation.	CONTRACTOR REPRE	To any deviatio	n from th	ne contract re	FILTER equirements unless the c below on ONE COPY of	on-
	Submittals are returne tractor calls attention Submittals are forward transmittal form. Submittals are forward transmittal form. Submittals are forward transmittal form.	BMITTALS TO ROICC ID FROM (Reviewer) LANTDIV ed with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi OVED GAUTRACTOR	CONTRACTOR REPRE	To any deviatio	RG n from the	n comments i	FILTER_ equirements unless the c below on ONE COPY of C SUBMIT	on-
	Submittals are returne tractor calls attention Submittals are forward transmittal form. Submittals are forward transmittal form. Submittals are forward transmittal form.	BMITTALS TO ROICC ID FROM (Reviewer) LANTDIV ed with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi OVED GAUTRACTOR	CONTRACTOR REPRE	To any deviatio	RG n from the	n comments i	FILTER equirements unless the c below on ONE COPY of	on-
	Submittals are returne tractor calls attention Submittals are returne tractor calls attention Submittals are forward transmittal form. Submittals are forward transmittal form.	BMITTALS TO ROICC ID FROM (Reviewer) LANTDIV ed with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi OVED GAUTRACTOR	CONTRACTOR REPRE	To any deviatio	RG n from the	n comments i	FILTER_ equirements unless the c below on ONE COPY of C SUBMIT	on-
	Submittals are returne tractor calls attention Submittals are returne tractor calls attention Submittals are forward transmittal form. Submittals are forward transmittal form.	BMITTALS TO ROICC ID FROM (Reviewer) LANTDIV ed with action indicated. Approval of an item does to and supports the deviation. ded to LANTDIV with A-E recommendations indi EVED GOVED GOVER	CONTRACTOR REPRE 2, C. a not include approval of cated in REVIEWER USE CERTIFICA CORM, USE SIGNATURE	To any deviatio	RG n from the	n comments i	FILTER_ equirements unless the c below on ONE COPY of C SUBMIT	on-

Nov 30 11 32 AM '84 RECLIVED ROICC JAXNCA

.

Service Service

Badger Meter



NAVAL		DIVISION INEERING COMM/ COINIA 23511	ND
DISAPPRO	D		
SUBJECT	TO THE REQUI	REMENTS OF 82-255	9
APPROVA APPROVA TRACT FL TOR CALL DEVIATIO RESPON PHYSICAL	L OF A SUBMIT OF ANY DEVI EQUIREMENTS S ATTENTION ONTHE CON SIBLE FOR	TAL DOES NOT INC ATION FROM THE UNLESS THE CON TO AND SUPPORT TRACTOR SHAL PROVIDING PR & WEIGHTS, COMP AS REQUIRED	COM TRAC S THE L BE OPER RDINA-
	R CCS	DATE 2 0 NO	V 1984

SUBMITTAL DATA

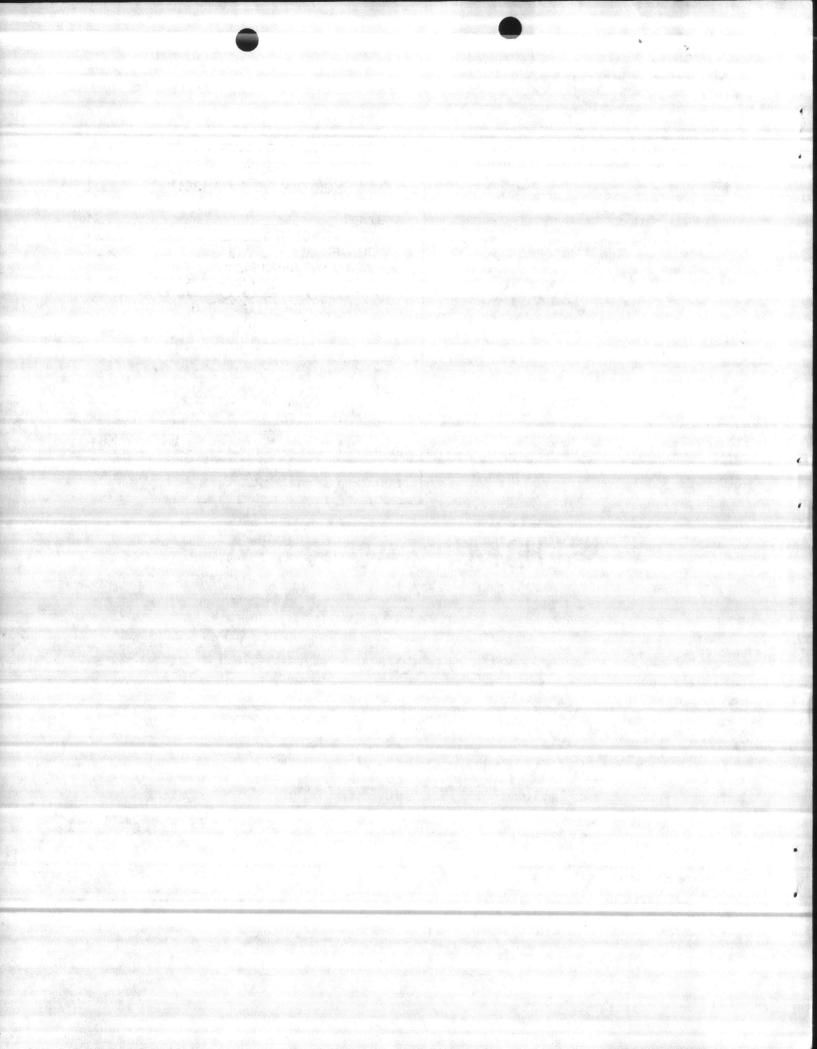
901896

Badger Meter, Inc. P.O. Drawer I Tulsa, Oklahoma 74158 (918) 836-8411 Telex: RCA 203605

POLS.

1

1.



NOV 9 1984

Badger Meter, Inc.

DRAWER I 6116 East 15th Street Tulsa, Oklahoma 74158 (918) 836-8411



November 6, 1984

Mr. Pat Adams James R. Stover P. O. Box 4 Quakertown, PA 18951

Subject: Roberts Filter Purchase Order 35520-2093

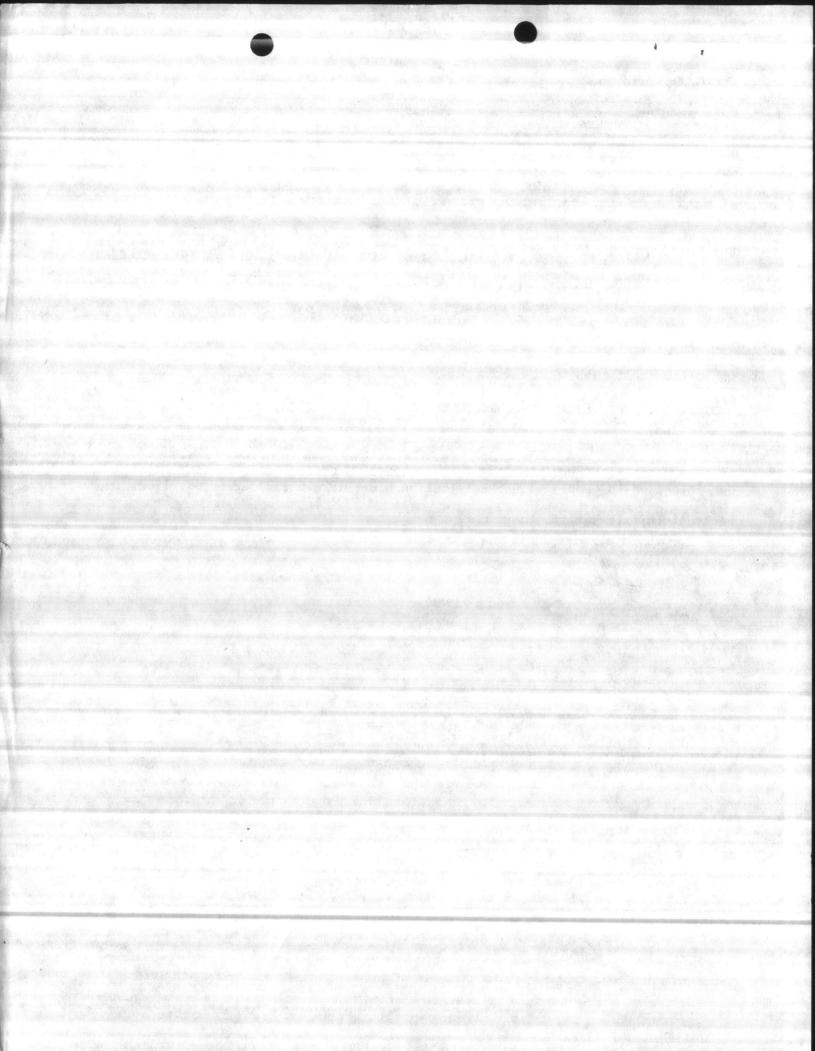
Gentlemen,

In accordance with requirements of the subject purchase order, we confirm our intention to comply with Specification MIL-M-18221C (YD) 22 August 1983.

We trust this is satisfactory.

ber RC

Rod Cumber RGC:th cc: S.O. 901896 RECEIVED NOV 1 2 1984 ROBERTS FILTER



Lo-Loss® Cast Iron Flow Element

Technical Brief

Closed Pipe File

Description

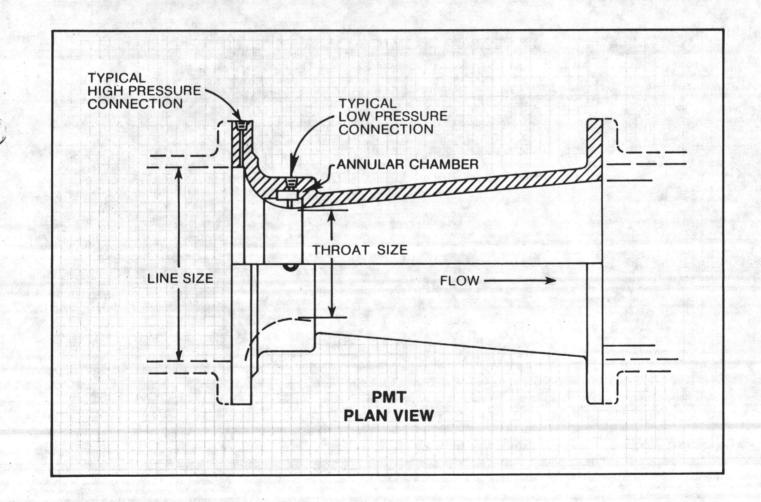
The cast iron series of the Badger Meter Lo-Loss® is a modified venturi flow element that provides increased rangeability at lower permanent pressure loss than any other differential producing primary device.

Applications

The cast iron Lo-Loss is designed to measure full pipe gases, water, wastewater and sludge or

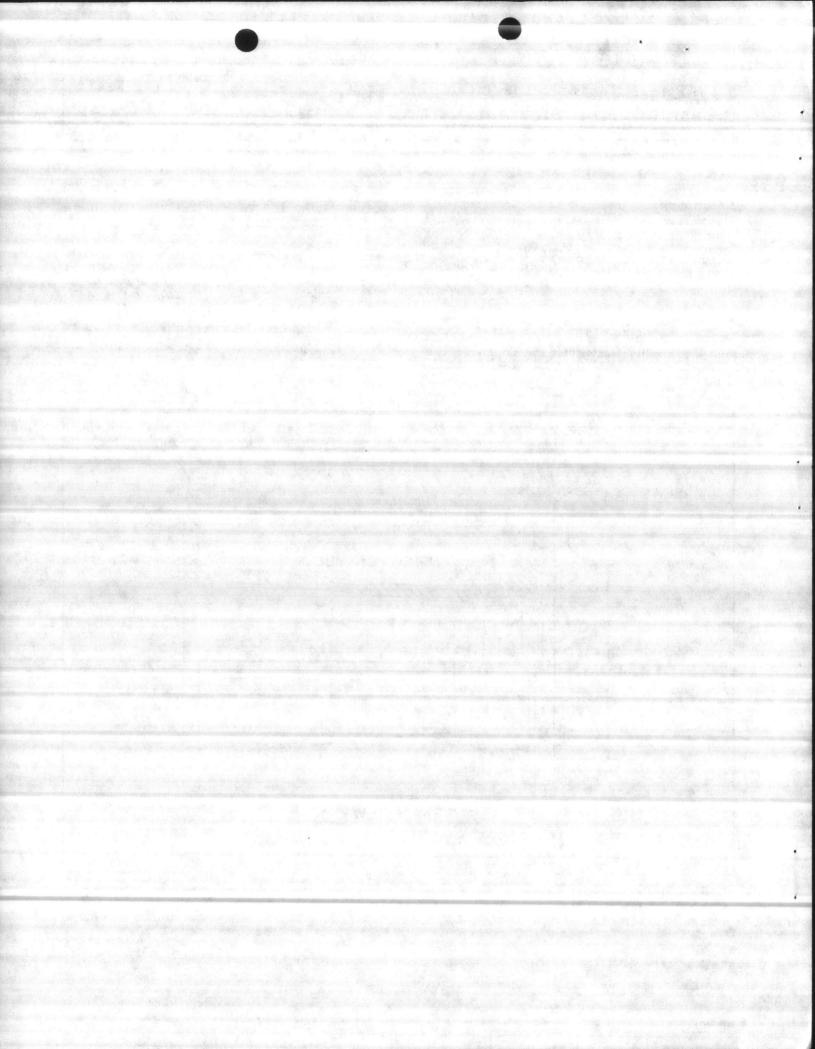
slurry flows. The cast iron Lo-Loss is furnished in four models depending on the application.

1. **PMT:** The PMT Lo-Loss is a full flanged cast iron flow element designed for water or gas service. The PMT has either a bronze or stainless steel throat, precisely machined with the body. An annular chamber located in the throat is provided to enhance a stable low pressure reading. The Lo-Loss can be supplied with either 125 or 250 lb. flanges.





P.O. Box 581390 Tulsa, Oklahoma 74158 (918) 836-8411 Telex: RCA 203605



CAST IRON SERIES LO-LOSS FLOW TUBE CAPACITIES (Water at 69°F.)

Pipe Size	Throat	% Head	Approx. Layin		APPROXIMATE CAPACITIES (Maximum Differential in Inches of Water) Million Gallons per Day Gallons per Minute					1214	
ches	Diameter		Length Inche Flanged			5.2. Ma	201.44				301.44
cnes	1 000	Loss		42.39	75.36	117.75	301.44	42.39	75.36	117.75	
	1.609	4.0	7 ¹ / ₄ 6 ¹ / ₂	.120	.160 .200	.200	.320	83.3 104.2	111.1 138.8	138.8 173.6	222.2
3	2.171	2.9	51/4	.150	.200	.250	.600	156.3	208.3	260.4	416.6
	2.434	2.5	51/4	.300	.400	.500	.800	208.3	277.7	347.2	555.5
4	2.203	4.0	91/4	.225	.300	.375	.600	156.3	208.3	260.4	416.6
4	2.814	3.0	7	375	.500	.625	1.000	260.4	347.2	434	694.4
	2.529	5.3	161/4	.300	.400	.500	.800	208.3	277.7	347.2	555.5
6	3.114	4.2	14	.450	.600	.750	1.200	312.5	416.6	520.8	833.3
U	4.000	3.3	93/4	.750	1.000	1.250	2.000	520.8	694.4	868	1389
4.428		2.8	91/4	.9375	1.250	1.5625	2.500	651	868	1085	1736
1. 11.	3.466	5.0	20 ⁷ /8 18 ⁷ /8	.562	.750	.937	1.500	390.3	520.8 694.4	650.7	1041
8	4.018	3.7	151/2	.750	1.500	1.250	2.000	520.8 781.3	1041	868	1389 2083
5.9	5.978	2.8	115/8	1.725	2.300	2.875	4.600	1198	1597	1996	3194
	3.991	5.7	27	.750	1.000	1.250	2.000	520.8	694.4	868	1389
	4.919	4.4	233/4	1.125	1.500	1.875	3.000	781.3	1041	1302	2083
10	6.343	3.5	17	1.875	2.500	3.125	5.000	1302	1736	2170	3472
	6.907	3.1	133/4	2.250	3.000	3.750	6.000	1563	2083	2604	4167
STERIO P	7.710	2.6	171/4	2.906	3.875	4.844	7.750	2018	2691	3364	5381
	4.892	5.7	32	1.125	1.500	1.875	3.000	781.3	1041	1302	2083
12	5.675	4.6	29 ¹ / ₄ 24 ¹ / ₄	1.500	2.000	2.500	4.000	1042	1389	1736	2778 4167
	6.966 8.000		181/4	2.250	3.000	3.750	6.000	1563	2083 2778	2604 3472	5556
ditter .	9.507	3.4	161/2	3.000 4.500	4.000	5.000 7.500	8.000	2083 3125	4167	5208	8333
Section Calif	4.9001	7.0	401/2	1.14	1.52	1.9	3.04	792	1056	1319	2111
	6.958	4.4	311/2	2.250	3.000	3.750	6.000	1563	2083	2604	4167
14	8.044	3.9	281/2	3.000	4.000	5.000	8.000	2083	2778	3472	5556
	9.757	3.1	2313/16	4.500	6.000	7.500	12.000	3125	4167	5208	8333
	10.328	2.8	193/4	5.250	7.000	8.750	14.000	3646	4861	6076	9722
16 8.036 9.838 11.255	6.932	5.1	401/1	2.250	3.000	3.750	6.000	1563	2083	2604	4167
		4.3	363/1	3.000	4.000	5.000	8.000	2083	2778	3472	5556
		3.6	257/8	4.500	6.000	7.500	12.000	3125	4167	5208	8333
	11.255	3.0	22 ⁷ /8 27	6.000	8.000	10.000	16.000 20.000	4167 5208	5556 6944	6944 8681	11111 13889
u u company	8.011	2.6	45	7.500 3.000	10.000	12.500 5.000	8.000	2083	2778	3472	5556
	8.984	4.3	411/2	3.750	5.000	6.250	10.000	2604	3472	4340	6944
18	9.849	3.9	381/2	4.500	6.000	7.500	12.000	3125	4167	5208	8333
	11.350	3.6	273/8	6.000	8.000	10.000	16.000	4167	5556	6944	11111
	12.592	3.0	321/2	7.500	10.000	12.500	20.000	5208	6944	8681	13889
	13.618	2.7	32	9.000	12.000	15.000	24.000	6250	8333	10417	16667
	7.00 ²	7.0	57	2.32	3.09	3.87	6.19	1612	2147	2689	4300
	8.959	4.8	493/4	3.750	5.000	6.250	10.000	2604	3472	4340	6944
20	9.839	4.4	46 ¹ / ₂ 41	4.500	6.000	7.500	12.000	3125 4167	4167	5208 6944	8333
20	11.377	3.9	311/2	6.000 9.000	8.000	10.000	24.000	6250	5556 8333	10417	16667
	15.602	2.5	25	12.000	16.000	20.000	32.000	8333	11111	13888	22222
	15.804	2.5	313/1	12.750	17.000	21.250	34.000	8854	11805	14757	23611
	9.783	5.7	63	4.500	6.000	7.500	12.000	3125	4167	5208	8333
	11.349	4.6	571/2	6.000	8.000	10.000	16.000	4167	5556	6944	11111
24	13.931	3.9	451/2	9.000	12.000	15.000	24.000	6250	8333	10417	16667
	16.000	3.3	331/2	12.000	16.000	20.000	32.000	8333	11111	13888	22222
	17.677	2.8	331/2	15.000	20.000	25.000	40.000	10417	13889	17361	27778
	19.014	2.5		18.000	24.000	30.000	48.000	12500	16667	20833	33333
	11.265	6.2	82 77	6.000 7.500	8.000	10.000	16.000 20.000	4167 5208	5556 6944	6944 8681	11111 13889
20	16.086	5.2	641/2	12.000	16.000	20.000	32.000	8333	11111	13888	22222
30	17.975	3.8	571/2	15.000	20.000	25.000	40.000	10417	13889	17361	27778
21.7	21.711	2.9		22.500	30.000	37.500	60.000	15625	20833	26042	41667
	24.341	2.5		30.000	40.000	50.000	80.000	20833	27778	34722	55556
13.80 16.02 19.70	13.806	6.0	97	9.000	12.000	15.000	24.000	6250	8333	10417	16667
	16.022	4.9		12.000	16.000	20.000	32.000	8333	11111	13889	22222
	19.705	4.0		18.000	24.000	30.000	48.000	12500	16667	20833	33333
36	22.004	3.7		22.500	30.000	37.500	60.000	15625	20833	26042	41667
	25.183	3.1	55	30.000	40.000	50.000	80.000	20833	27778	34722	55556 69444
and the second	27.687 29.636	2.6		37.500 45.000	50.000	62.500 75.000	100.000 120.000	26042 31250	34722 41667	43403 52083	83333

Design Notes

FOR LARGER SIZES OR SPECIALS CONSULT THE FACTORY.

1/2

Recalibration with New Flow or Differential Pressures

Maximum differential pressures listed under "Approximate Capacities" are for specific throat diameters for each flow tube. To determine different pressures or flow rates the following formulas can be used:

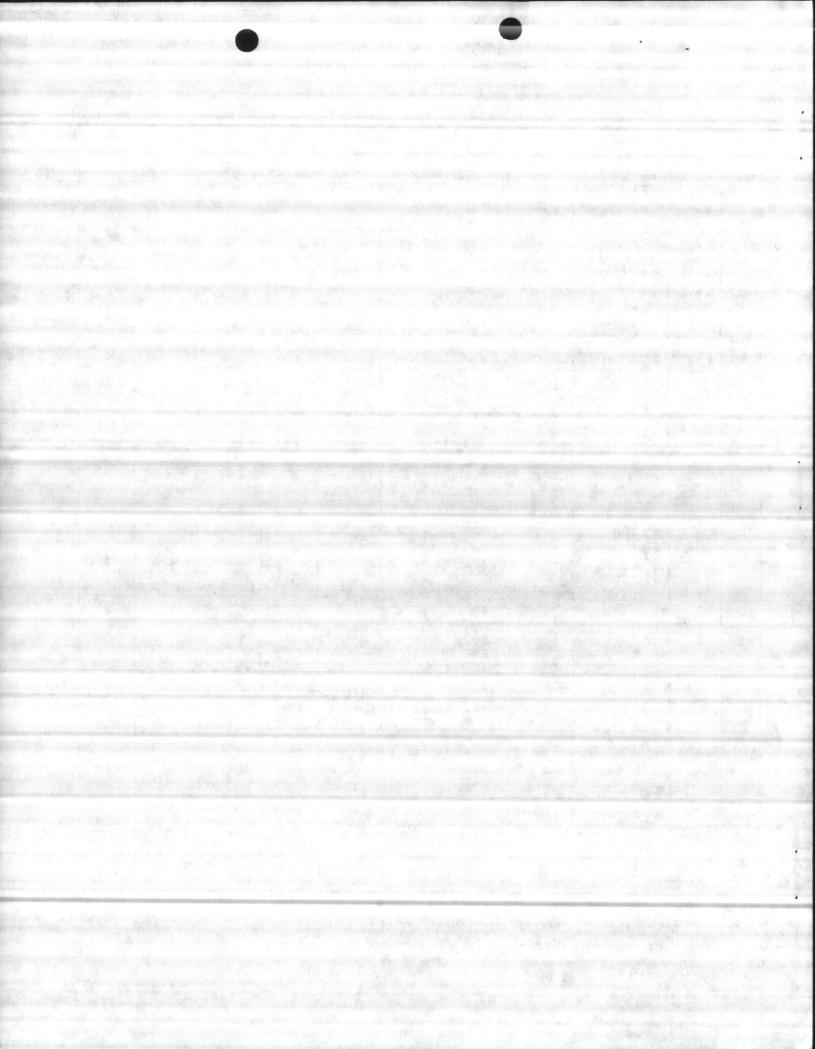
1. Differential Pressure

 $\left(\frac{\text{New Flow}}{\text{Known Flow}}\right)^2 \times \text{Known } \Delta P = \text{New } \Delta P$

2. Flow Rate

Known ΔP

x Known Flow = New Flow



Piping Requirements

The Lo-Loss flowmeters may be either horizontally or vertically mounted. A welldeveloped symmetrical velocity profile is required. General practice requires the pipe be maintained full and the upstream piping be sufficient to assure profile conditioning. Refer to ASME Fluid Meters, 6th Edition, Page 180, for general conditions. The Lo-Loss requires one pipe diameter less than the classical venturi.

General Specifications ACCURACY:

Within the specified flow range and piping configurations the Lo-Loss flowmeters produce accurate measurements of

±0.75% of value uncalibrated ±0.25% of value calibrated

PRESSURE LOSS:

The permanent pressure loss of the Lo-Loss expressed as a percentage of the differential produced is shown in Figure 1 and is the lowest of any differential-producing primary element.

BETA RATIO:

Badger Meter is the only manufacturer of differential pressure producing devices who can furnish beta ratios for the Lo-Loss from .35 to .85. By custom computer designing a Lo-Loss to the exact flow conditions with the proper beta ratio. Badger can guarantee the most accurate and reliable primary element with the lowest permanent pressure loss.

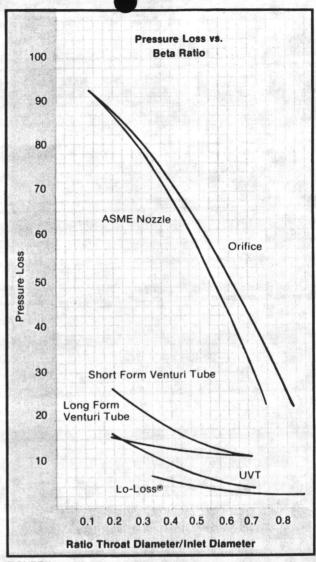
Operating Conditions The cast iron series can handle temperature ranges from -20°F to 400°F with pressure not to exceed 250 PSI up to and including 24 inches. For cast iron sizes, above 24 inches the pressures should not exceed 125 PSI.

Energy Concerns

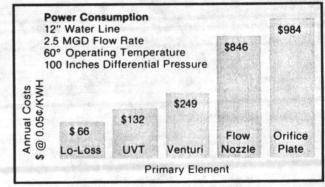
Figure 1 compares the Lo-Loss with other primary flow elements and Figure 2 displays the annual power costs of these devices in a typical example. The significant pressure recovery of the Lo-Loss means dollar savings in reduced pumping costs. The Lo-Loss will recover up to 97.5% of the differential produced at a 0.85 beta. This is 3 to 4 times better than a conventional venturi and twice as good as the modified venturi.

Cost Savings

Figure 2 shows comparative operating costs of several commonly used primary elements. The data clearly demonstrates that the Lo-Loss flow tube is at least 50% more economical than its nearest rival and 1500% more economical than the most commonly used device.

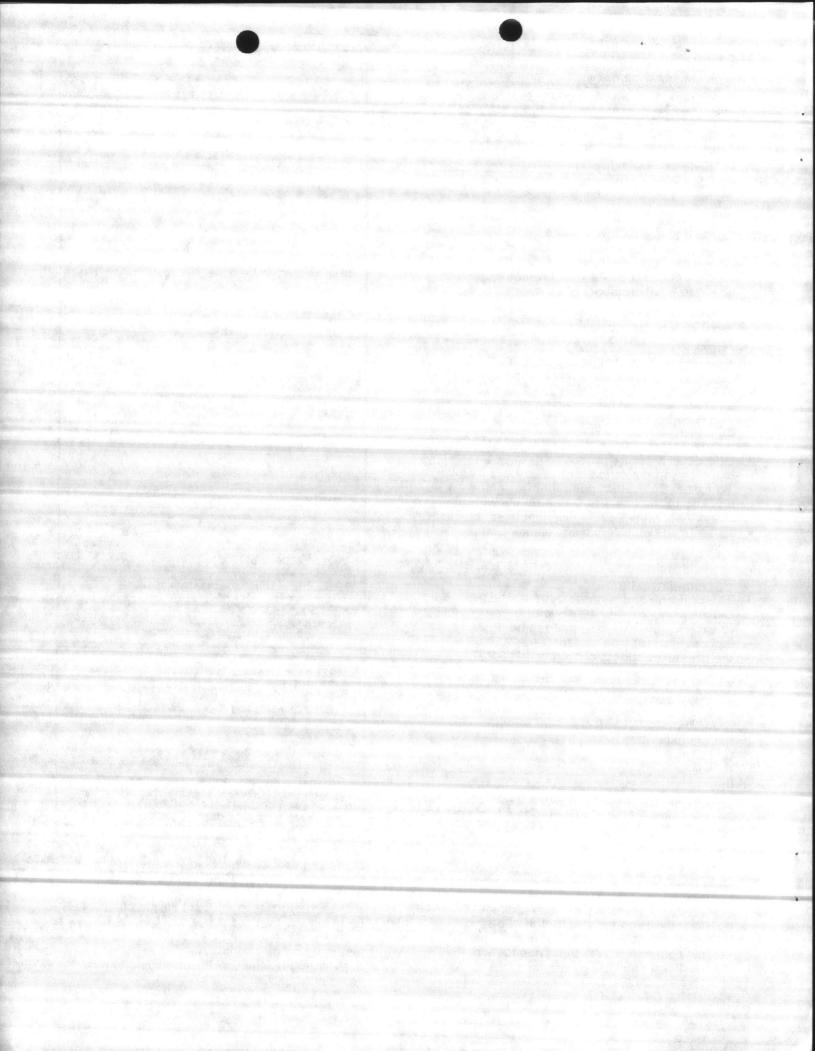




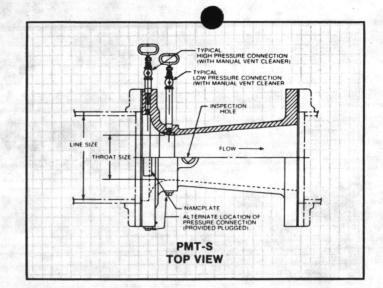




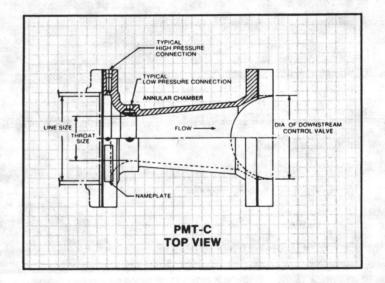
Many engineers have already realized the savings possible by using venturi tubes instead of orifice plates. The next logical step is to realize the further significant savings possible by using the Lo-Loss instead of the venturi tube. For 23 years many engineers have done just that and given their clients the benefits of maximum efficiency and accuracy.



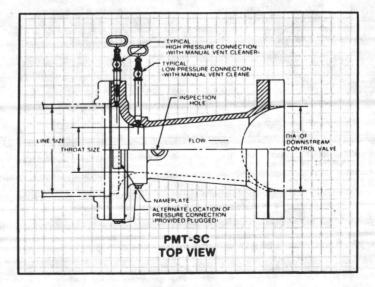
2. **PMT-S:** The PMT-S is a full flanged (125 or 250 lb.) primary element designed for wastewater, sludge, slurry or other fluids with suspended solids. A single low pressure tap design has been incorporated in the PMT-S to eliminate solids buildup from the fluid. Manual vent cleaners are standard, and hydraulic vent cleaners or a continuous water purge system are available options. Please consult the factory.

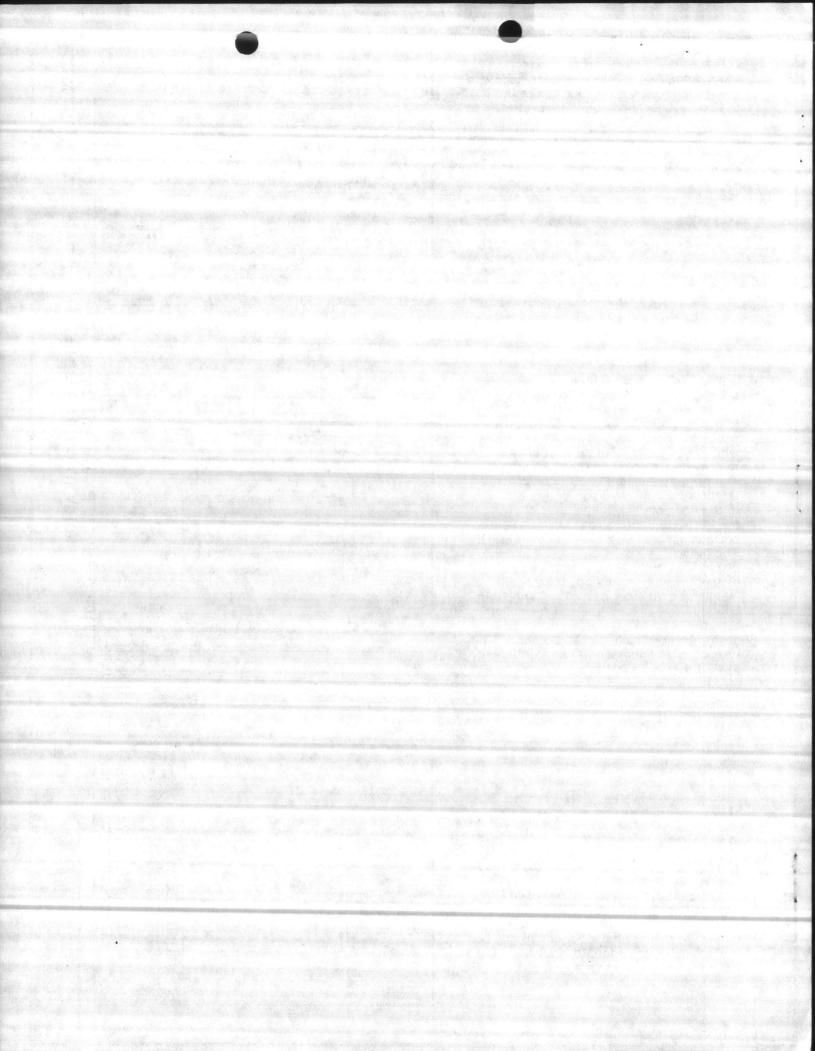


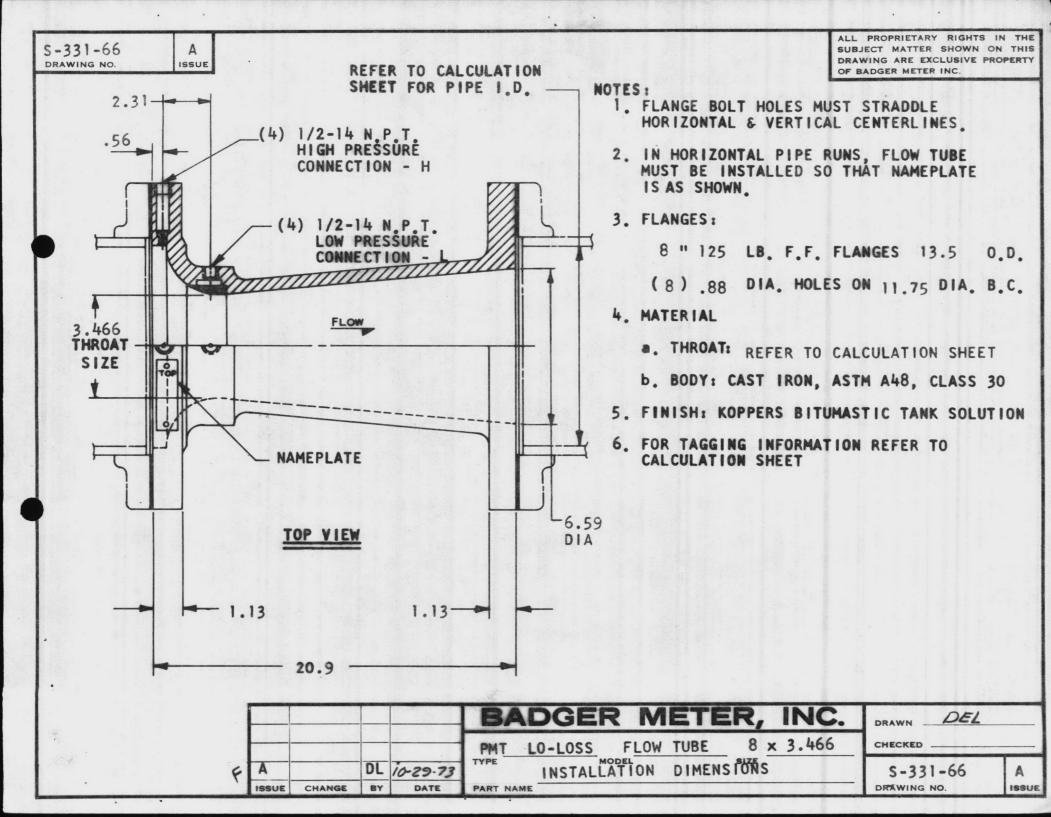
3. The PMT-C is a full flanged (125 or 150 lb.) primary element designed for water or gas service. The construction accommodates either a bronze or stainless steel throat, precisely machined with the body, with an annular chamber to provide a stable low pressure reading. The primary element is also constructed to accept a butterfly valve bolted directly to the downstream flange, thus allowing the PMT-C and the valve to become vital components in a rate-of-flow controller system. The butterfly valve in no way affects the discharge coefficient of the primary element, which means accuracy is maintained. In most cases the flange can be made one nominal pipe size smaller than the main pipe run, and in special cases larger reductions can be made. This type of valve engineering can significantly lower the project costs.



4. The **PMT-SC** is a full-flanged (125 or 250 lb.) primary element designed with no annular chamber and is intended to be used in applications where the fluid contains solids. The primary element will accept a butterfly valve or elbow bolted directly to the downstream flange, thus allowing the PMT-SC to be used in many applications where other venturi or flow tubes could not be used.









P.O. BOX 581390 6116 EAST 15th STREET TULSA, OKLAHOMA 74158-1009 (918) 836-8411 • TELEX: RCA 203605		DIFFERENTIAL PRIMARY DATA/CALCU WATER CALCULATION - VO	LATION SHEET
CUSTOME	S.O.NO. R R P.O.NO.	26SEP84 901896 ROBERTS FILTER MANUF. CO. 35520-2093 CAMP LEJEUNE, NC	a segura a s
	ING ENGR.	MATTIN DE ANI NA COMPANY TIME	
LO-LOSSDATA:			A Second
LO-LOSS STYLE NOMINAL SIZE THROAT DIA (IN.) BETA RATIO TAP SIZE TAP LOCATION	PMT 8 3.466 .428 1/2 INTEGRAL	SERIAL NO. TAG BODY MATERIAL THROAT MATERIAL FLANGE MATERIAL	901896 I POOL 2615 CAST-IRON BRONZE CAST-IRON
DIFFERENTIAL PRESS PERMANENT PRESSURE PERMANENT PRESSURE	LOSS IS	117.31 INCHES WATER AT 5.13 % OF DIFFERENTIAL 6.02 INCHES OF WATER A	To Kalendari
FLUID DATA	制制制品		a standard
FLUID	WATER	OPER. SP. GR.	1.00016
OPER.PRES.(PSIA) OPER.TEMP.(F) BASE TEMP.(F)	64.7 60 60	BASE SP.GR. OPER.VISC. (CP)	1.00016 1.119
TI OU DAMA			and section of the se
FLOW DATA MAX,FLOW (GPM) NORM,FLOW (GPM)	650 455	PIPE REYNOLDS NO. PIPE REYNOLDS NO.	226740 158718
CUSTOMER PIPELINE &	FLANGE DATA		
NOM. PIPE SIZE PIPE SCHED/CLASS FLANGE TYPE	8 CI CL.24 ANSI	PIPE MATERIAL PIPE 1.D. FLANGE RATING	CAST IRON 8.09 125
APPLICABLE DOCUMENTS	ala salari I a		
INSTALLATION/		PRODUCTIO	N
***********	*******		*****

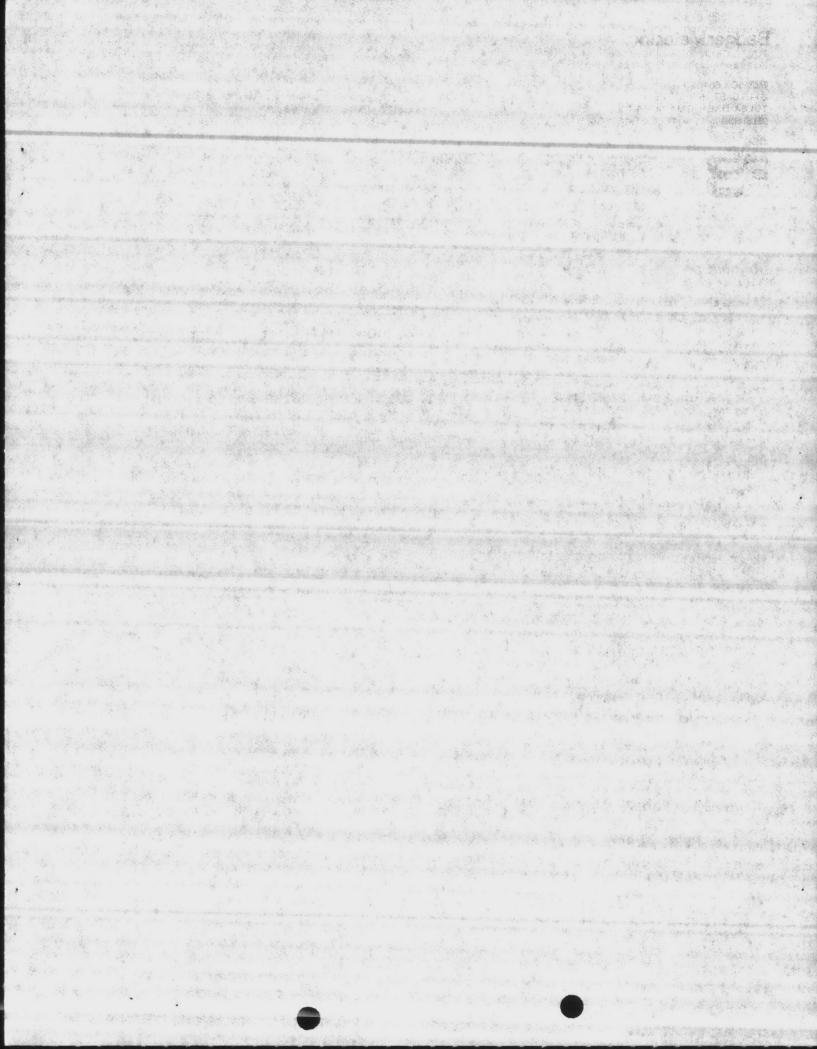
**********	*******	********	*****
REFERENCE: FLOW ME	TER ENGINE	RING HANDBOOK, C.F.CUSICK	, 3RD ED., 196

CERTIFIED CORRECT BY:

, DATE:

PREPARED BY IRV

1961



P.O. BOX 581390 6116 EAST 15th STREET TULSA, OKLAHOMA 74158-1009 (918) 836-8411 • TELEX: RCA 203605

DATE

USER

CUSTOMER

DIFFERENTIAL ELEMENT SUPPLEMENTARY DATA SHEET WATER CALCULATION - VOLUMETRIC FLOW



26SEP84 BADGER S.O.NO. 901896 ROBERTS FILTER MANUF. CO. CUSTOMER P.O.NO. 35520-2093 CAMP LEJEUNE, NC CONSULTING ENGR.

LO-LOSSDATA: LO-LOSS STYLE NOMINAL SIZE

PMT 8

SERIAL NO. TAG

901896 I POOL 2615

WORKING EQUATION FOR LIQUID FLOW GAL/HR AT BASE TEMPERATURE

GGH=340.11(S)(FA)(D2)(FHM)(FGB)(FGF),

(Etc	1 1:	14	FG	43	11
		1000	250 (1995) / 10		

BCH	. 祥	39000
. 9	-	.1618
FA	100	. 99983
D2	-	65.4481

FHM = 10.83101FGB = .99983FGF = 1.00008

REYNOLDS NO. EQUATION FOR LIQUID FLOW GAL/HR AT BASE TEMPERATURE

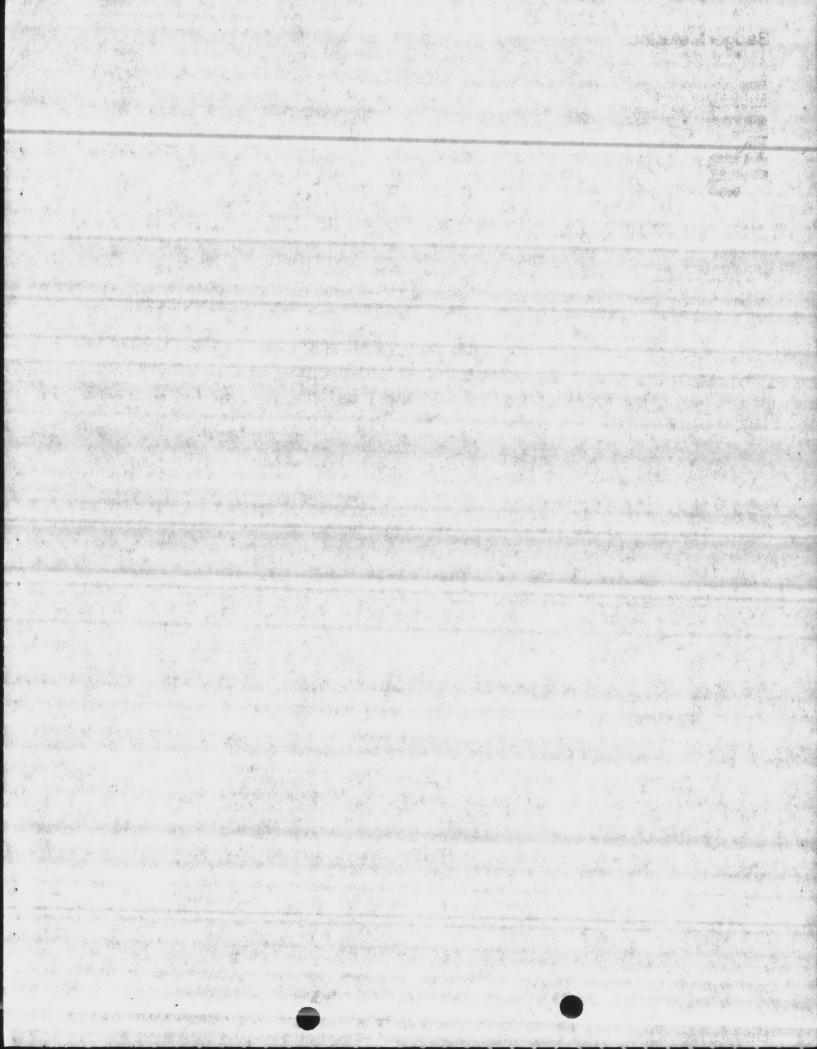
RD=52.654(GGHA)(GB)/(D)(U),

(EQ 20, PG 97)

QGHA = 27300 GB = 1.00016

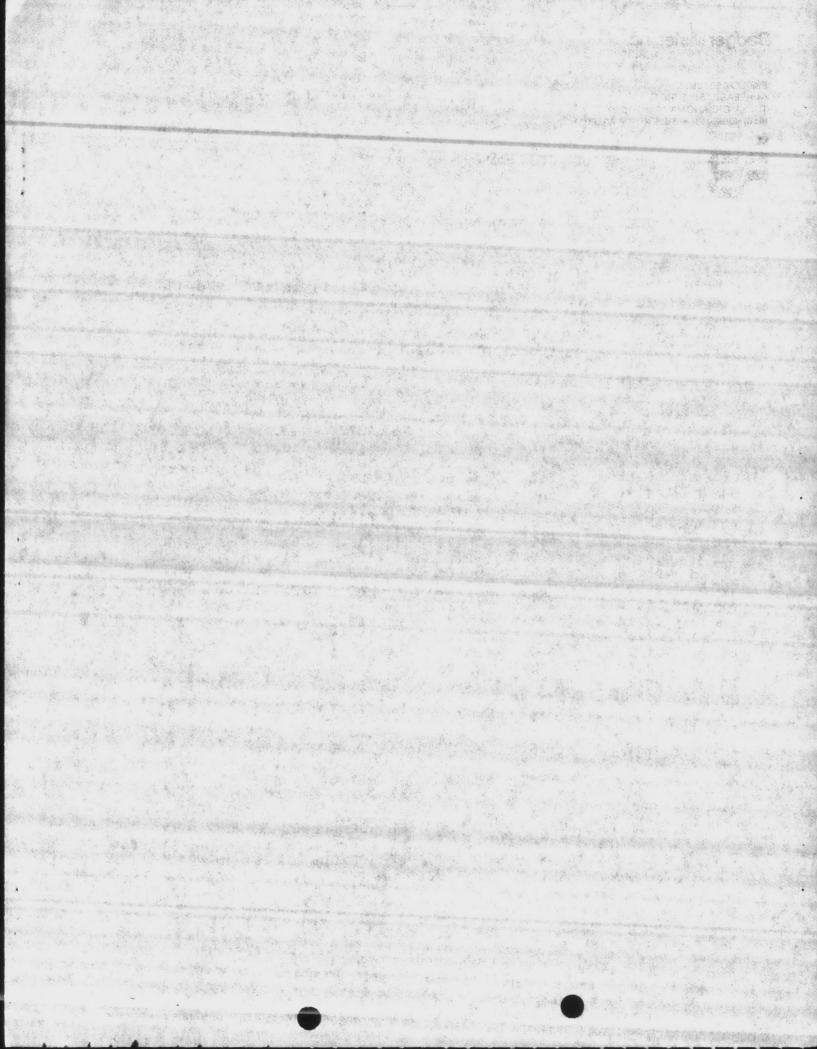
D = 8.09 U = 1.11965

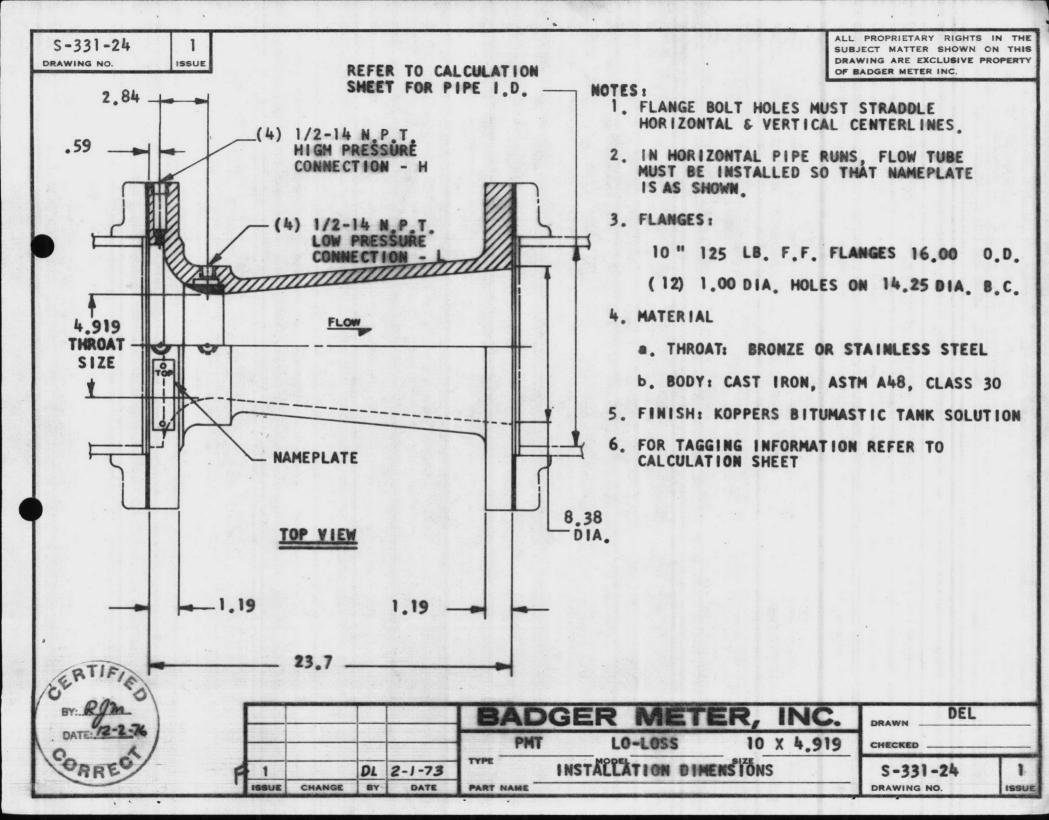
DISCHARGE COEFFICIENT =.86652



BOX 581390 EAST 15th S A. OKLAHOM	REET A 74158-1009			DIFFI	RENTIAL	1ETER	andre de la composition de la
	TELEX: RCA 203605	the factor of the		FLOW VS DIF	FERENTIAL	CALCULATI	ONS
3	BADGER S DATE CUSTOMER ELEMENT SERIAL N TAG INFO	26 RC 8, 0(S) 90	1896 SEP84 IBERTS 090 X 1896 I 00L 261	FILTER MANUF 3.466 LO-LOS 5			
) TEMP.(F) PRES.(PSIA)))	THROAT I. PIPE I.D.		3.46600 8.09000	
	UTION UNITS	1.000 F INCHES		OF MAXIMUM WATER			
FLOW (GPM)	DIFF (IN)	FLOW (GPM)	DIFF (IN)	FLOW (GPM)	DIFF (IN)	FLOW (GPM)	DIFF (IN)
650.0	117.3	648.5	114.9	637.0	112.6	630.5	110.3
624.0	108.1	617.5	105.8	611.0	103.6	604.5	101.4
598.0	99.30	591.5	97.15	585.0	95.03	578.5	92.93
572.0	90.85	565.5	88.80	559.0	86.77	552.5	84.76
546.0	82.78	539.5	80.82	533.0	78.88	526.5	76.97
520.0	75,08	513.5	73,21	507.0	71.37	500.5	69.55
494.0	67.76	487.5	65,98	481.0	64.24	474.5	62.51
468.0	60.81	461.5	59.13	455,0	\$7,48	448.5	55.85
442.0	54.24	435.5	52.65	429.0	51.09	422.5	49.56
416.0	48.04	409.5	46.55	403.0	45.09	396.5	43,64
390.0	42.22	383.5	40.83		39.45	370,5	38.11
364.0		357,5	35.48	351.0	34,20	344.5	32,94
338.0	31.71	331.5	30.50		29.32	318.5	28.14
286.0	27.02	305.5	25,90	299.0	24.81	292.5	23.74
260.0	18.76	253.5	17,83	247.0	20.68	266.5	19.71
234.0	15.19	227.5		221.0	13.55	240.5 214.5	
	12.00		11.26		10,55	188.5	9.859
Product of the second second second	9.191		8.546		7.924	162.5	7.320
156.0		149.5	6.200		5.672	136.5	5.168
130.0	4.687	123.5	4.230		3.796	110.5	
104.0	2.999	97.50	2.635	91.00	2.295	84.50	1,979
age state at the state							

THIS CALIBRATION DATA MAY DIFFER FROM THE NORMAL SQUARE ROOT RELATION BETWEEN FLOW AND DIFFERENTIAL PRESSURE DUE TO THE EFFECTS OF DISCHARGE COEFFICIENT VS REYNOLDS NUMBER VARIATION AND/OR (IN COMPRESSIBLE FLOWS) ADIABATIC EXPANSION. EITHER OR BOTH OF THE EFFECTS ARE INCORPORATED INTO THIS DATA AS APPROPRIATE.





der solgen 🚈 👘 👘 das solgen C. Legal and the second second .

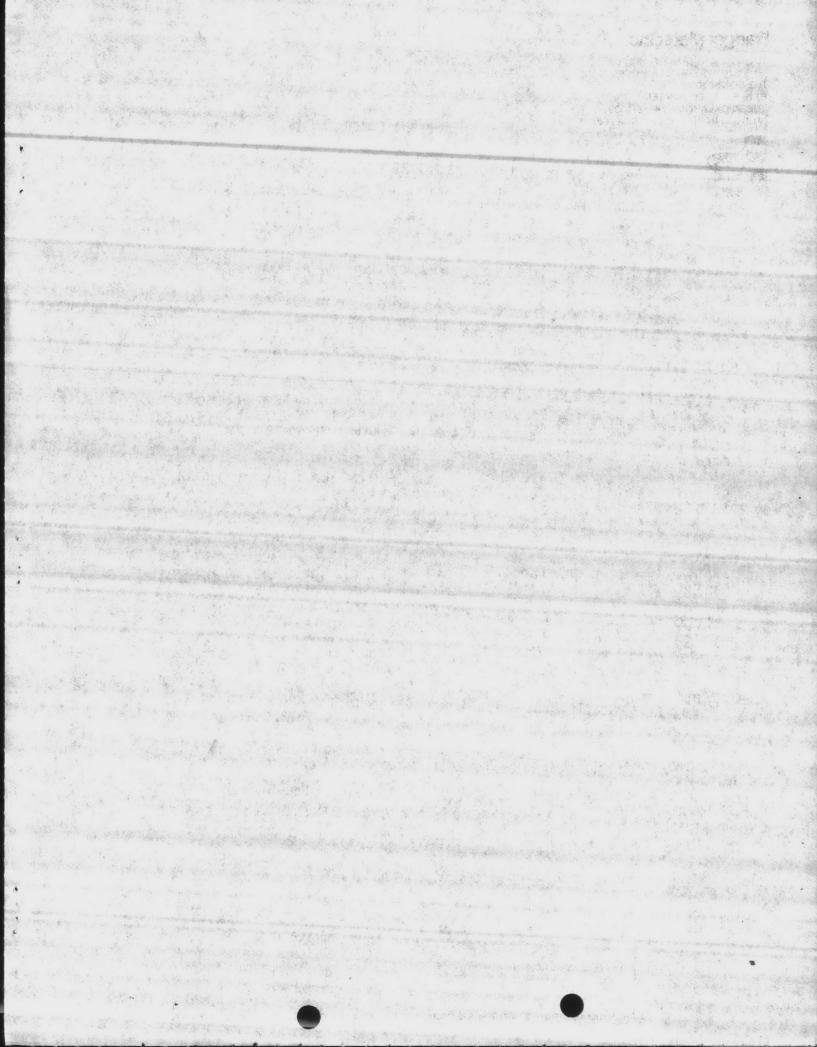
P.O. BOX 581390 6116 EAST 15th STREET TULSA, OKLAHOMA 74158-1009 (918) 836-8411 • TELEX: RCA 203605

DIFFERENTIAL ELEMENT PRIMARY DATA/CALCULATION SHEET WATER CALCULATION - VOLUMETRIC FLOW

			a ser all all the assessments
DATE	and the second	265EP84	
BADGER S	3.0.NO.	901896	entern with a trans.
		ROBERTS FILTER MANUF. CO.	· 영상 전 문화 관람이 있는 것
	R P. D. NO.	35520-2093	An and the second and the second of
	ING ENGR.	CAMP LEJEUNE, NC	a start by the start of the
and out That out Att 5 a	k i that day i that's ∖ ?		
LO-LOSSDATA:	and a stranger of the	A MARTINE MARTIN	
LO-LOSS STYLE	FMT	SERIAL NO.	901896 A,B,C
NOMINAL SIZE	10	TAG	POOL 139/236/540
THROAT DIA (IN.)	4.919	BODY MATERIAL	CAST-IRON
BETA RATIO	.488		
TAP SIZE	1/2	FLANGE MATERIAL	CAST-IRON
TAP LOCATION	INTEGRAL	States and the second second	
DIFFERENTIAL PRESSL	IRE IS	156.03 INCHES WATER AT	IROO COM
PERMANENT PRESSURE		4.44 % OF DIFFERENTIAL.	
PERMANENT PRESSURE	LOSS IS	6.93 INCHES OF WATER AT	
FLUID DATA			「「「ため」」
	WATER	OPER.SP.GR.	1.00016
OPER. PRES. (PSIA)	64.7	BASE SP. GR.	1.00016
OPER. TEMP. (F)	60	OPER, VISC, (CP)	1.119
BASE TEMP, (F)	60		*****
FLOW DATA		and the second second second	
MAX, FLOW (GPM)	1500	PIPE REYNOLDS NO.	420782
NORM. FLOW (GPM)	1050	PIPE REYNOLDS NO.	
CUSTOMER PIPELINE & F	LANGE DATA	and the second second	Roan Brief Barris
NOM PTOT CITE	10	DIDE MATEDIAL	CAST IRON
PIPE SCHED/CLASS	CI CL. 24	PIPE I.D.	10.06
FLANGE TYPE	ANSI	FLANGE RATING	125
APPLICABLE DOCUMENTS:	and the second second		
INSTALLATION/A		PRODUCTION	
**********	*******	***********	

REFERENCE: FLOW MET	TER ENGINEE	RING HANDBOOK, C.F.CUSICK,	, 3RD ED., 1961
CERTIFIED CORRECT E	3Y 2	, DATE:	
PREPARED BY BU			

PREPARED BY RV



P.O. BOX 581390 6116 EAST 15th STREET TULSA, OKLAHOMA 74158-1009 (918) 836-8411 • TELEX: RCA 203605

DIFFERENTIAL ELEMENT SUPPLEMENTARY DATA SHEET WATER CALCULATION - VOLUMETRIC FLOW



DATE BADGER S.O.NO. CUSTOMER CUSTOMER P.O.NO. USER CONSULTING ENGR.

26SEP84 901896 ROBERTS FILTER MANUF. CD. 35520-2093 CAMP LEJEUNE, NC

LO-LOSSDATA: LO-LOSS STYLE PMT

NOMINAL SIZE

FMT 10 SERIAL NO. TAG 901896 A,B,C POOL 139/236/540

WORKING EQUATION FOR LIQUID FLOW GAL/HR AT BASE TEMPERATURE

QGH=340.11(S)(FA)(D2)(FHM)(FGB)(FGF), (EQ 15, PG 95)

QGH	5 22	90000	FHM	32	12.49135
S	-	.20937	FGB	12	. 99983
FA	-	. 99983	FGF	-	1.00008
D2	100	101.2036	and be		

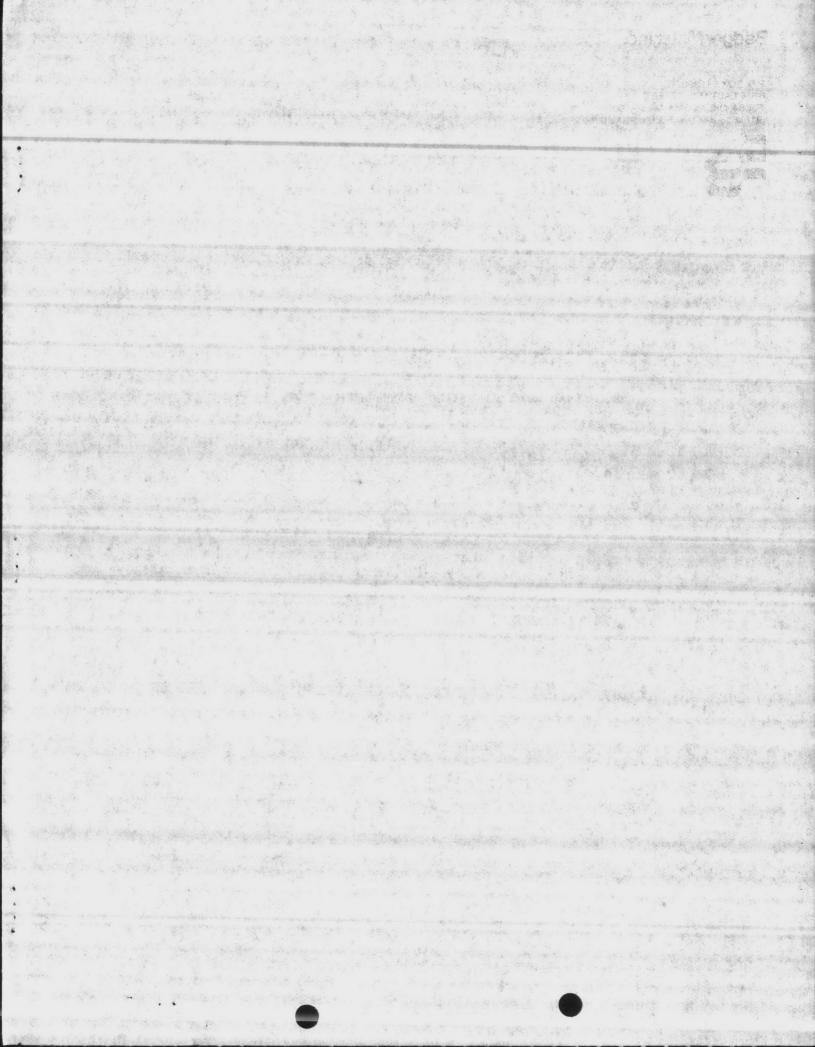
REYNOLDS NO. EQUATION FOR LIQUID FLOW GAL/HR AT BASE TEMPERATURE

RD=52,654(QGHA)(GB)/(D)(U),

(EQ 20, PG 97)

GGHA = 63000 GB = 1,00016 D = 10.06U = 1.11965

DISCHARGE COEFFICIENT =.85032



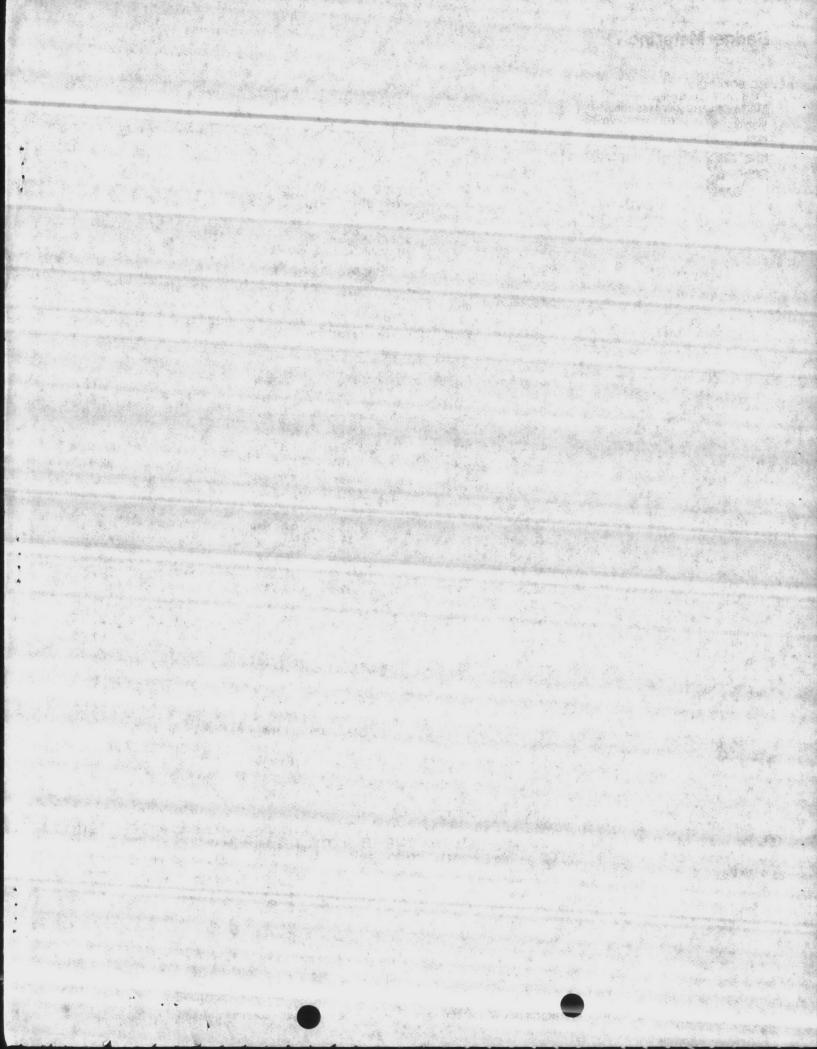
P.O. BOX 581390 6116 EAST 15th STREET TULSA, OKLAHOMA 74158-1009 (918) 836-8411 • TELEX: RCA 203605

DIFFERENTIAL METER

FLOW VS DIFFERENTIAL CALCULATIONS

	and the statement of	AL A CALL AND AND AND A CALL AND A CALL AND A CALL			and the second		and the second	
	3	BADGER S DATE CUSTOMER ELEMENT SERIAL N TAG INFO	0(S)					
		D TEMP.(F) PRES.(PSIA)	60.00	0	THROAT I PIPE I.D		4.91900 10.06000	
		LUTION UNITS	and the second second	PERCENT S OF 68F	OF MAXIMUM WATER			
	FLOW	DIFF	FLOW	DIFF	FLOW	DIFF	FLOW	DIFF
	(GPM)	(IN)	(GPM)	(IN)	(GPM)	(IN)	(GPM)	(IN)
		(1) (1) way (1) was (10) 191	an any unit also an	1 1990 1980 1996 3991 4995 4996 4996 4991	and the set of a set of a	10 min nor on on in in in		
		156.0	1485			149.8	1455	146.8
	1440		1425		1410		1395	
后。""哈 北下。"马	1380	132.0	1365		1350	126.3	1335	123.6
1.20	1320	120.8	1305		1290	115.4	1275	112.7
	1260	110.1	1245		1230	104.9	1215	102.3
	1200	99.86	1185		1170	94.93	1155	92.51
	1140	90.12	1125		1110	85.44	1095	83,15
	1020	80.88	1065				1035	74.28
	960.0	63,90	945.0		930.0	67.96	975.0	65.92
	900.0	56.16	885.0	See Street and the second s	870.0	52,48	915.0 855.0	58.05
	840.0	48,92	825.0		810.0	45.49	795.0	50.69
		42.18	765.0	A CALL AND A	750.0	39,00	735.0	43.82
		35,94	705.0		690.0	33.01	675.0	31.59
Sec.	660.0	30,20	645.0		630.0	27.51	615.0	
	600.0	24.95	585.0	the second se			555.0	21.35
	540.0	20.21	525.0	The second s	510.0		495.0	16.98
F. Cak	Sales and the second	15.97	465.0	Construction of the second	450.0		435.0	13.11
		12.22		11.36		10.54	375.0	9,745
	360.0	8.981	345.0		330.0		315.0	
	300.0	6.236	285.0	the second se		 A second s		4.504
	240.0	3,990		3.506			195.0	2.633
	180.0	2,243	165.0			1.557		war y see tell ber
	Martin Martin		10 B					

THIS CALIBRATION DATA MAY DIFFER FROM THE NORMAL SQUARE ROOT RELATION BETWEEN FLOW AND DIFFERENTIAL PRESSURE DUE TO THE EFFECTS OF DISCHARGE COEFFICIENT VS REYNOLDS NUMBER VARIATION AND/OR (IN COMPRESSIBLE FLOWS) ADIABATIC EXPANSION, EITHER OR BOTH OF THE EFFECTS ARE INCORPORATED INTO THIS DATA AS APPROPRIATE.



CO	NTRACTOR'S SU	BMITTAL TRANSMITTAL	CONTRACT NO	N. S. S. Lines	SMITTAL NO	DATE
-	M CONTRACTOR	(nev. 11-60)	N62470-82-B-		8.	11/19/84
		MANUFACTURING COMPANY	PHOJECT TITLE AND LOC	ATION		
TO	DENTO TILIENT		REPLAC	E EQUIPM	ENT IN	POOLS
NA	VAL FACILITIES	S ENGINEERING COMMAND		and a second		
		CONTRACTOR USE ONLY				VIEWER USE ONLY
		*List only one specification division p			A-Ap	ACTION CODES
	Lis	st only one of the following categories on eac and indicate Anich is being subm				sapproved pproved as noted
Ø	Contractor Approved	OICC Approval	and a second	on/Substitution DICC Approva	C-Co	leceipt acknowledged. mments submit
NO	PROJ. SPEC. SECT.	ITEM IDENTIFI		NO. OF	ACTION	
TEM	& PARA. and/or PROJ. DWG. NO. *	(Type, size, model no., M brochure nu		N N	CODES	INITIALS CODE AND DATE
	15440				A	HFWILLO
1	Para. 2.1	Crispin Model AlO, AV	lalve		A	300084
			R.	To	16.19	
-	and the second second		A. 4	AY		A Sugaration and
			N RECEIV	ER YON		
			23 NOV	1984 5		a and a star
			E LANTO	ME	1	A LEW MAN
10 1			The conso	N KI		a and a second
			1 ST STAR	A AN		
			Harris		a gebenningen	
CON	TRACTOR'S COMMENTS		E CONTINE	13		
CON	TRACTOR'S COMMENTS		Tot 16t	13		
CON	TRACTOR'S COMMENTS		I CONTINE	131		
CON	TRACTOR'S COMMENTS		Tot 16T	18		
CON	TRACTOR'S COMMENTS		Ton 181	3		
COP	Y OF TRANSMITTAL AND SUB	and the second	CONTRACTOB REPRESEN	V	-	
COP		FROM (Reviewer)	J.C.Y	hom	Reor	
COP	Y OF TRANSMITTAL AND SUB Ensign W. G. G	arip	J.C.Y	kom	Reor	L Gitter_
COP	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER ///23/84 Submittals are returned	FROM (Reviewer) LANTOIV d with action indicated. Approval of an item doe	<u>J.C. 7</u>	"Rong	REOR	La CTER
COP	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER ///23/84 Submittals are returned tractor calls attention t	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation.	es not include approval of any	TO ROBER	RLOU RTS .	
COP	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER ///23/84 Submittals are returned tractor calls attention t	FROM (Reviewer) LANTOIV d with action indicated. Approval of an item doe	es not include approval of any	TO ROBER	RLOU RTS .	
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER ///23/84 Submittals are returned tractor calls attention t Submittals are forward	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation.	es not include approval of any	TO ROBER	RLOU RTS .	
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER ///23/84 Submittals are returned tractor calls attention t Submittals are forward transmittal form.	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation. ed to LANTDIV with A-E recommendations inc	es not include approval of any	TO ROBER	RLOU RTS .	
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER ///23/84 Submittals are returned tractor calls attention t Submittals are forward transmittal form.	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation.	es not include approval of any	TO ROBER	RLOU RTS .	
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER ///23/84 Submittals are returned tractor calls attention t Submittals are forward transmittal form.	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation. ed to LANTDIV with A-E recommendations inc	es not include approval of any	TO ROBER	RLOU RTS .	
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER ///23/84 Submittals are returned tractor calls attention t Submittals are forward transmittal form.	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation. ed to LANTDIV with A-E recommendations inc	es not include approval of any	TO ROBER	RLOU RTS .	
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER 11/23/84 Submittals are returned tractor calls attention t Submittals are forward transmittal form. EWER'S COMMENTS	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation. ed to LANTDIV with A-E recommendations inc AMMOVED	es not include approval of any	TO ROBER r deviation from	RTS . n the contract	s below on ONE COPY of
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER 11/23/84 Submittals are returned tractor calls attention t Submittals are forward transmittal form. EWER'S COMMENTS	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation. ed to LANTDIV with A-E recommendations inc AMMOVED	es not include approval of any	TO ROBER r deviation from	RTS . n the contract	s below on ONE COPY of
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER 11/23/84 Submittals are returned tractor calls attention t Submittals are forward transmittal form. EWER'S COMMENTS	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation. ed to LANTDIV with A-E recommendations inc AMMOVED	es not include approval of any	TO ROBER r deviation from	RTS . n the contract	s below on ONE COPY of
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER 11/23/84 Submittals are returned tractor calls attention t Submittals are forward transmittal form. EWER'S COMMENTS	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation. ed to LANTDIV with A-E recommendations inc AMMOVED	es not include approval of any	TO ROBER r deviation from	RTS . n the contract	s below on ONE COPY of
	Y OF TRANSMITTAL AND SUB Ensign W. G. G E RECEIVED BY REVIEWER 11/23/84 Submittals are returned tractor calls attention t Submittals are forward transmittal form. EWER'S COMMENTS	FROM (Reviewer) LAWTOW d with action indicated. Approval of an item doe to and supports the deviation. ed to LANTDIV with A-E recommendations inc	es not include approval of any	TO ROBER r deviation from	RTS . n the contract	s below on ONE COPY of

DEC 5 11 48 AM '84 RECEIVED ROICC JAXNCA



FUNCTIONS OF THE AIR AND VACUUM VALVE

The Air and Vacuum Unit with its orifice the same diameter as the inlet allows large quantities of air to be vented from systems being filled with liquid and the same holds true in reverse for vacuum conditions when system is drained.

Its design is such that the velocity of air passing through the valve will not blow the float shut. It will not close until the arrival of liquid in the valve and will not open to vent accumulating air as long as the system is under pressure and in operation. The Air and Vacuum Valves on this page are available with either composition or stainless steel floats and either standard top or protectop.

PARTS LIST FOR AIR AND VACUUM VALVES 1/2" DIA, THROUGH 4" - DIA.

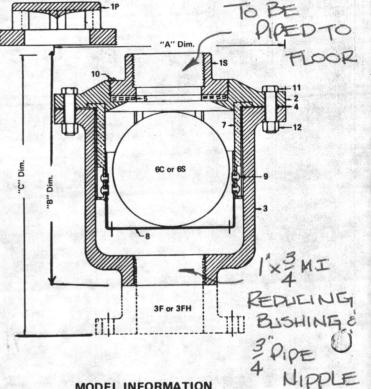
PART NO.	ITEM	MATERIAL
**1P	PROTECTOP	CAST IRON
**15	STD. TOP	CAST IRON
2	FLANGE	CAST IRON
**3	BODY, SCREW INLET	CAST IRON
**3F	BODY, 125 ASA FLANGED	CAST IRON
**3FH	BODY, 250 ASA FLANGED	CAST IRON
4	GASKET	ACCOPAC
5	SEAT	HY-CAR RUBBER
*6C	FLOAT	COMPOSITION
*65	FLOAT	STAINLESS STEEL
7	HANGER	BRASS
8	CUP	BRONZE
9	RIVET	COPPER
10	SCREW	STAINLESS STEEL
11	BOLT	STEEL
12	NUT	STEEL

(SUBJECT TO CHANGE WITHOUT NOTICE) **PART NO'S. 1P, 1S, 3, 3F AND 3FH ARE AT CUSTOMERS OPTION

*PART NO'S. 6C AND 6S ARE INTERCHANGEABLE AND ARE OPTIONAL AT CUSTOMERS REQUEST. NOTE: MATERIALS AND PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

DIMENSION & WEIGHT INFORMATION

Size of valve	1/2"	1''	2"	3"	4"	6"	8"	10"
A-Dim.	4 3/4"	6 1/4"	8 3/4"	11 1/2"	14"	15"	17 3/4"	21"
B-Dim. Connection	4 7/8"	6 1/8"	9 1/2"	11 5/8"	14 1/4"	ET IL		di tan
C-Dim. Connection	-		12"	15 3/4"	17 1/4"	1515/16"	18 1/4"	21 3/4"
Weight Scwd. Connection	7 lbs.	16 lbs.	42 lbs.	79 lbs.	145 lbs.		interface of the second se	and Contract Sectors
Weight Fldg. Connection			48 lbs.	93 lbs.	158 lbs.	189 lbs.	264 lbs.	320 lbs



AIR AND

VACUUM VALVES

MODEL INFORMATION

SIZE OF VALVE	1/2"	1″	2″	3″	4"	6″	8"	10"
Scwd. Inlet	A5	A10	A20	A30	A40	-	1	-
125 Figd. Inlet	-	- 100	A21	A31	A41	A61	A81	A101
250 Figd. Inlet	-	-A 8.5	A22	A32	A42	A62	A82	A102

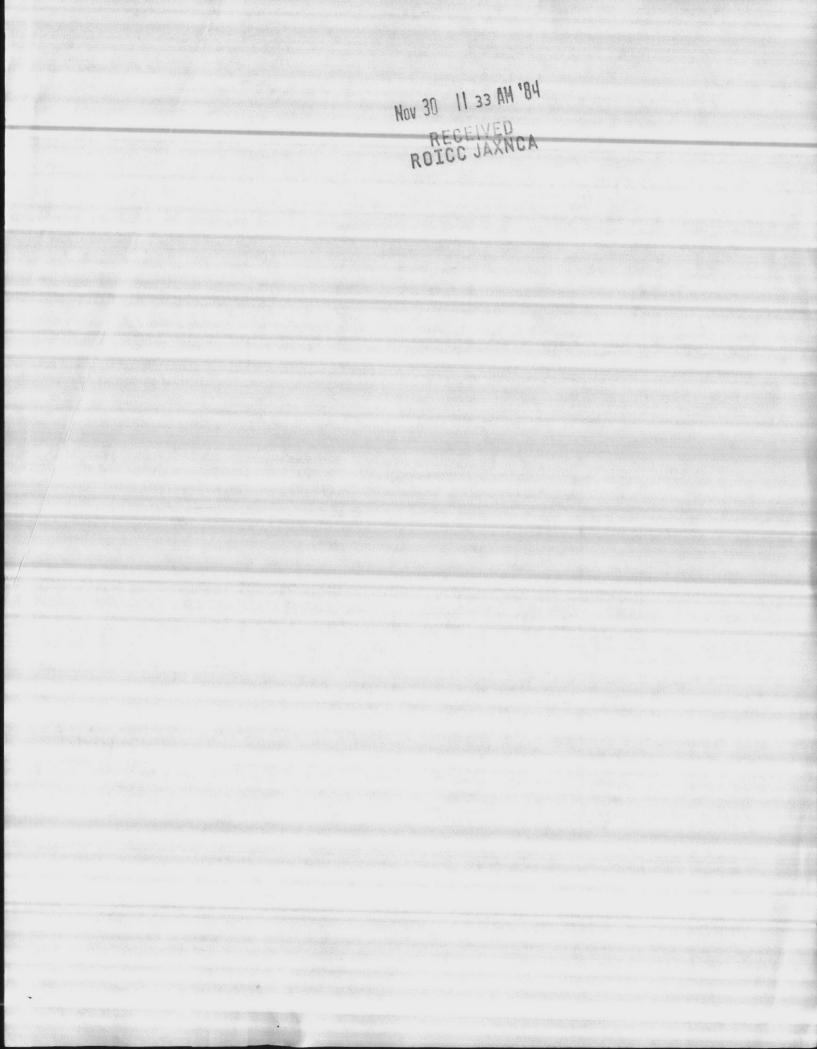
HAN BE ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED F APPROVED AS NOTED DISAPPROVED SUBJECT TO THE REQUIREMENTS OF CONTRACTINO. 82-2552 APPROVAL OF A SUBMITTAL DOES NOT INCLUDE APPROVAL OF ANY DEVIATION FROM THE CON-TRACT REQUIREMENTS UNLESS THE CONTRAC-TOR CALLS ATTENTION TO AND SUPPORTS THE DEVIATION THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STOR PROPER · 文字 新工业 PHYSICAL DIMENSIONS & THOMAS, COORDINA-TION OF TRADES, ETC., AS NEQUIRED. REVIEWER AFW DATE 3Dec 84 FOR OFFICER IN CHARGE OF CONSTRUCTION

-	constructions from a resource of the local sector of	BMITTAL TRANSMITTAL	CONTRACT NO	TRANSMI	TTAL NO	DATE
LAN	ITDIV NORFOLK 4-43	55/3 (Rev. 11-80)	N62470-82-B-2552	15 2	7	11/16/84
ROR	CONTRACTOR		PROJECT TITLE AND LOCATION			
RO	BERTS FILTER	MANUFACTURING CO.			DOOL C	
0	an to go the second		REPLACE EQUIPME			
NA	VAL FACILITIE	S ENGINEERING COMMAND	CAMP LE JEUNE,	NORTH	H CARULI	NA
	In the other waves and the second s second second secon	CONTRACTOR USE ONLY	SATTIN'L'		REVIE	WER USE ONLY
X	Li Contractor Approved	*List only one specification division points only one of the following categories on each and indicate which is being submit OICC Approval	transmittatiorm, RECEIVED		A-Appro D-Disar AN-App	oproved proved as noted eipt acknowledged. ments
ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFIC (Type, size, model no., Mf brochure num	g. name, dwg of	NO OF COPIES	ACTION CODES	REVIEWER'S INITIALS CODE AND DATE
	15440 2.3.2.1	Manually Operated Valves	(Pools			
1	C-6918	Monoflange Butterfly Val	ve	7	ANI	123/403/24. Hov. 8
2		Pratt Submittal (modifie	d compliance) Letter	7		
3		Pratt Catalog Sheet		7		egana - Palantina - Anta
						<u> </u>
ON	TRACTOR'S COMMENTS	and a subsection of the second se				
OP	the disc e is their s 2. A drawing OF TRANSMITTAL AND SU Ensign W. G.	Grip	tion as noted on dra lve will be forwarde	wing ed lat	C-6198.	This
TAC	20 Nov 84	FROM (Reviewer)	0 10	Paza	ERTS	FILTER /ROIC

Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

APPROVED SUBJECT TO RECEIPT OF CERTIFICATE OF COMPLIANCE AND CERTIFIED TEST REPORTS REQUIRED BY SPECIFICATION. SUBMIT AS SOON AS POSSIBLE AND PRIOR TO DELIVERY OF MATERIAL TO JOBSITE.

COPIES TO ROICC (2)	DATE	SI		All a	
LANTDIV (1) A-E (1)	27	Nov 89	4	Host	





HENRY PRATT COMPANY

creative engineering for fluid systems 401 SOUTH HIGHLAND AVENUE · AURORA, ILLINOIS 60507

November 13, 1984

NOV 1 5 1984 ROBERTS FILTER

Roberts Filter Manufacturing Company 6th Street and Columbia Avenue Darby, Pennsylvania 19023

Attention: Mr. Gene Barry

Subject: Roberts Filter Purchase Order 35578-2093 Marine Corps Base - Camp Lejeune, NC Pratt Shop Order 54265 Manual Valves Submittal

Gentlemen:

See the attached approval drawings for the above project.

The manually operated butterfly valves (Pratt Items 2 and 3) conform to the Navy Contract Specification No. 05-82-2552, paragraph 2.3.2.1. The valves are in complete conformance with AWWA C504-80 Class 150B and are a single flange (also called monoflange) wafer type with a lever operator, except as clarified in drawing C-6198.

The valves are painted in accordance with AWWA C504-80 with one modification in Fed. Spec. number as it will be incorporated in the next revision to AWWA C504 Standards and is as follows:

- Interior of Valve: Black Asphalt Varnish (Color Black) per Fed. Spec. TT-C-494A (formerly TT-V-51C).
- 2. Exterior of Valve and Operator: Zinc Chromate (Color Yellow) per Fed. Spec. TT-P-645.

The "Certified Test Reports" will be submitted after the valves are manufactured and tested, but prior to delivery. Since the certified test reports certify that the valves on a particular order have been tested, the reports cannot be submitted until the tests have been conducted. See the attached samples "A", "B", and "C" of the various reports specified in AWWA C504 (Leak and Hydro, Proof-of-Design, Affidavit of Compliance).



177730 HAR CHARTEN STAR FRANCE STAR ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VIRGINIA 23511 APPROVED APPROVED AS NOTED CONTRACT NO 05-82-2352 SUBJECT TO THE REQUISE WENTS OF APPROVAL OF ANY THE CON-TRACT REVIDREMEN S IN USS THE CONTRAC. TOR CALLS ATTEN WAY TO AND SUPPORTS THE DEVIATION THE CONTRACTOR SHALL BE RESPONSIBLE OF PROVIDING PROPER PHYSICAL DIMENSIONS & WEIGHTS, COORDINA TION OF TRADES. ETC. AS REQUIRED. 26 NOV 1984 JLB REVIEWER FOR OFFICER IN CHARGE OF CONSTRUCTION

Approve as noted, subject to Receipt of Certificate of Compliance and Certified Test Reports Require by Specification.

PRATT

Roberts Filter Manufacturing Company Page 2 November 13, 1984

According to paragraph 1.3.4 of the specifications, copies of test reports need not be submitted except as specifically requested by the Contracting Officer. Please specify what reports are to be submitted.

The "Certificate of Compliance" will be submitted after the drawings are returned and approved, as it will state that the valves were manufactured to material specifications as per the approved drawing (See sample "D" attached).

The instruction, operation and maintenance manuals as well as recommended spare parts will be submitted within eight weeks after receipt of approved drawings.

Pratt's warranty was submitted with our order acknowledgment. Any warranty work would be handled by us at Henry Pratt Company, 401 South Highland Avenue, Aurora, Illinois 60507. The phone number is (312) 844-4000.

The torque for the 6" valve that will be modified for float operation requires 64 foot pounds force to close the valve. The shaft and keyway information is per attached sketch.

If we can be of any further assistance, please feel free to contact us.

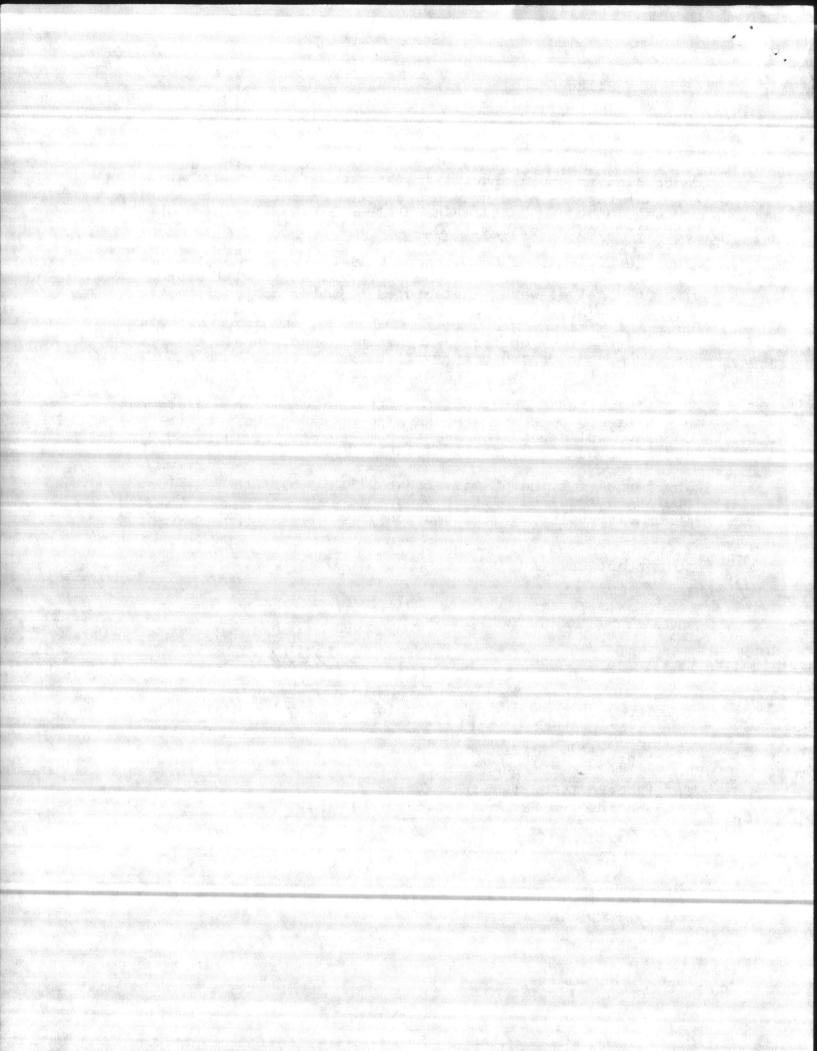
Very truly yours,

HENRY PRATT COMPANY

Kichard A Johnson

Richard A. Johnson Senior Application Engineer

RAJ/sp Enclosures cc: W. J. Stark, HPCO-Aurora Robert L. Carlson Inc. Engineered Systems & Products Inc.



Test Report AWWA Proof-of-Design Test of 16" - 150B 2FII Rubber Seat Butterfly Valve October 10, 1972

Test Objective:

This test was performed to prove the cycle life of a Pratt 16" - 150B 2FII rubber seat Butterfly valve conforming to Class 150B of the AWWA C504-70, Section 13 specifications.

Description of Valve:

The valve tested was a Pratt 16" Model 2FII Assembly No. 65321, rubber seat Butterfly valve. This assembly conformed to the 150B designation of the AWWA C504 specification. The valve body, disc, shaft, and bearings were manufactured in accordance with Pratt Drawing Nos. B-304, B-337, B-331, and A-173, respectively.

All pertinent dimensions were measured either before or after the test and were found to be in agreement with the listed drawings.

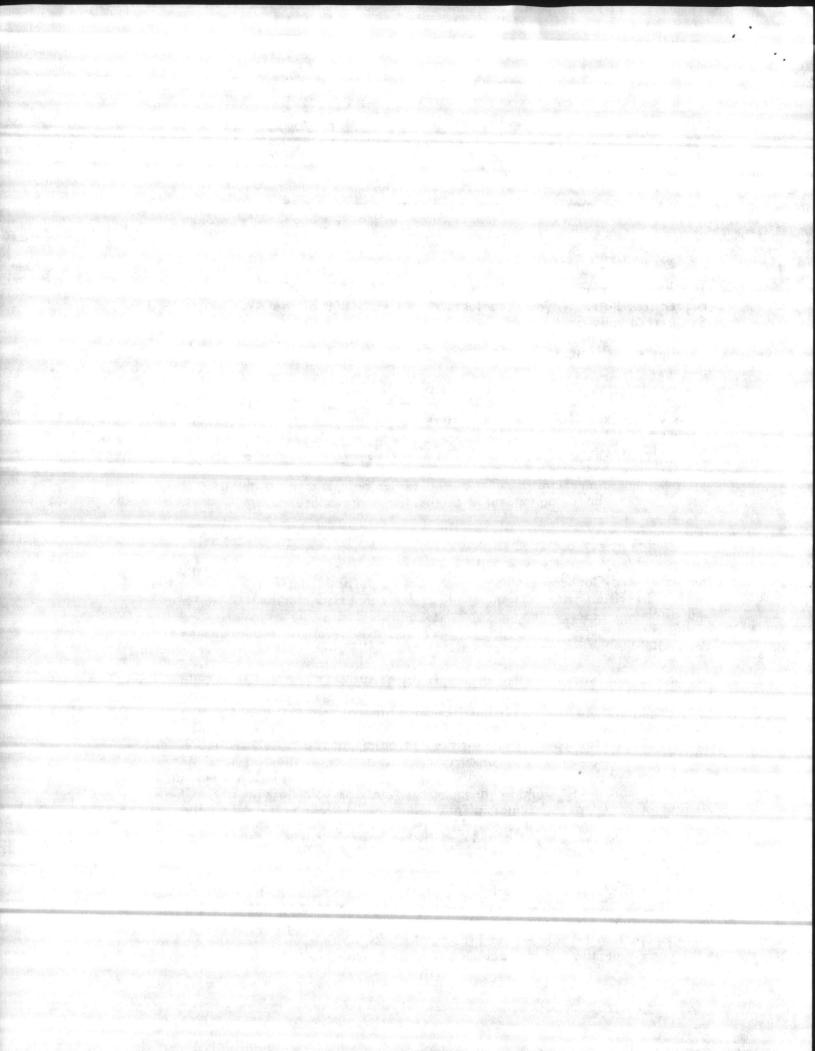
Test Apparatus:

An MDT-4 cylinder operator with operating cycle of 75 sec. was mounted on the valve and flanged test heads were bolted to both end flanges. Both test heads were fitted with flanged openings for connection to the 10" water supply and discharge pipes. The operator was adjusted to assure automatic cycling of the disc through a ninety-degree arc of travel from the closed position, perpendicular to the water-way axis, to the full-open position and vice versa.

All of the test was performed at the Henry Pratt R&D Test Laboratory in Aurora, Illinois, where the test assembly was bolted into the test-hydroloop. The testhydroloop included four centrifugal pumps with capacity of 2,000 gpm at a discharge pressure of 75 psi each. For the present test, a series parallel combination of the pumps were utilized to obtain a 150 psi shut-off pressure. With the test valve full-open, the rate of flow through the test loop was 3,750 gpm, as indicated by the flow meter. The discharge flow from the test valve was conducted back to the pump suction reservoir through approximately 20 feet of a 10" pipe having no intervening restrictions or throttle valves other than two ninety-degree elbows.

Test Method:

Before the cycle test was started, the test valve was bubble-tested and found to be bubble-tight at 150 psi air pressure. After the water pumps were started, the test valve was placed in cycling operation, then the pump discharge control valves were finally adjusted to produce 150 psi water pressure at the test valve inlet each time the valve reached full-closed position.



The valve was operated through 10,000 cycles, each cycle consisting of an opening operation while subjected to 150 psi inlet water pressure, travel to the full-open position, and back to full-closed position and full closure while subjected to 150 psi inlet water pressure.

Test Results:

After completion of 10,000 cycles imposed in the manner described under "Test Methods", the test valve was found to be bubble-tight at 150 psi air pressure. Inspection of the valve seat showed that it remained in excellent condition. The cycle test produced no noticable effects on any other part of the valve.

Conclusion:

- 1. The Pratt 16" Model 2FII rubber seat Butterfly valve conforming to Class 150B of the AWWA C504 specifications successfully met the requirements of Paragraph 13.4.2 under Section 13 of the AWWA C504 specification.
- 2. The successful performance of the present test automatically proves the conformance of 3" thru 20" sizes of the Pratt Model 2FII rubber seat Butterfly valves in all classes to Paragraph 13.4.2 of the AWWA C504 specifications.

tom Shury

I.S. Hukvari, P.E. Manager, Test Laboratory

R.C.Soar

R.P.Saar Vice President, Engineering

ISH:ib

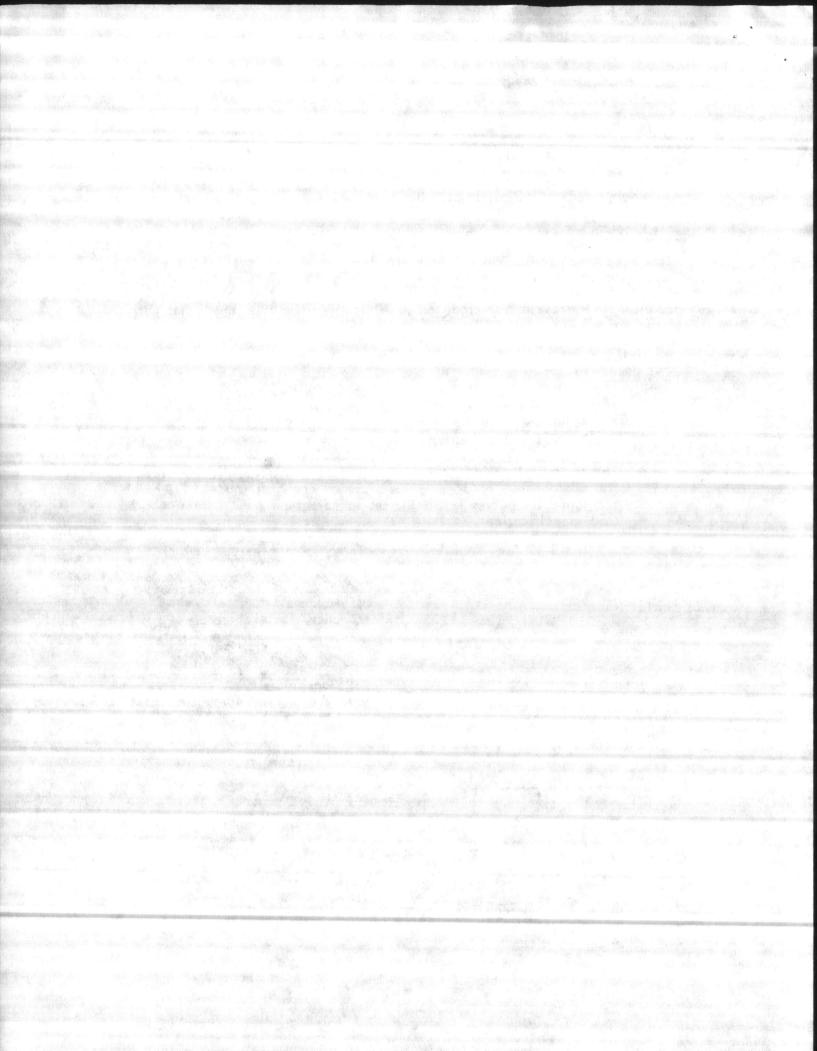
Illinois State of

County of Kane

On this 13 day of Octomon 1977. Notary Public Que The Color

hiy Commission Expires March 15, 1975

Page 2 of 2 October 10, 1972



AWWA Proof-of-Design Test Section 12, Paragraph 12.4.1 AWWA Standard C-504-74

Valve tested:	4" 2FII 150B w/Ni-Resist Disc	Date	5-28-76	
Assembly No.	and the second	n indi Alarah Manada		
Job No.	4-2464-1			0.000

The above value was tested hydrostatically with the disc in closed position. Twice the specified shut-off pressure 300 psi was applied to one side of the disc and zero on the other. This test was made in each direction across the disc.

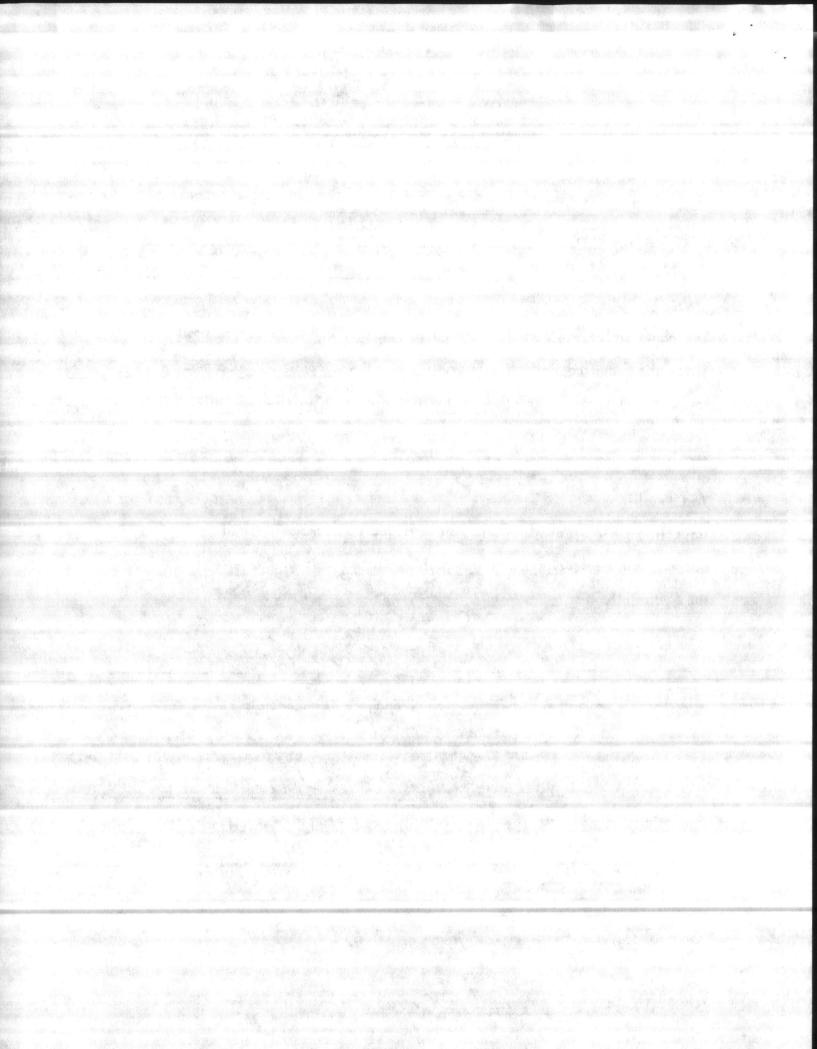
Test Result:

Inspection during the hydrostatic test revealed no leakage through the metal, and no permanent deformation was noticed on any part of the valve following the hydrostatic test.

1.S.Hukvari, P.E. Manager, Test Laboratory

R.P.Saar Vice President, Engineering

State of	Illinois	and the second	
County of	Kane		
On this 28	the day of	mach	, 19-7.6
	1		
Notary Public	lian	7: 12	lauring
	A		1



PRATT

HENRY PRATT COMPANY

ereative engineering for fluid systems . 401 SOUTH INGHIAND AVENUE - ACROIN, HIJNOIS 60507

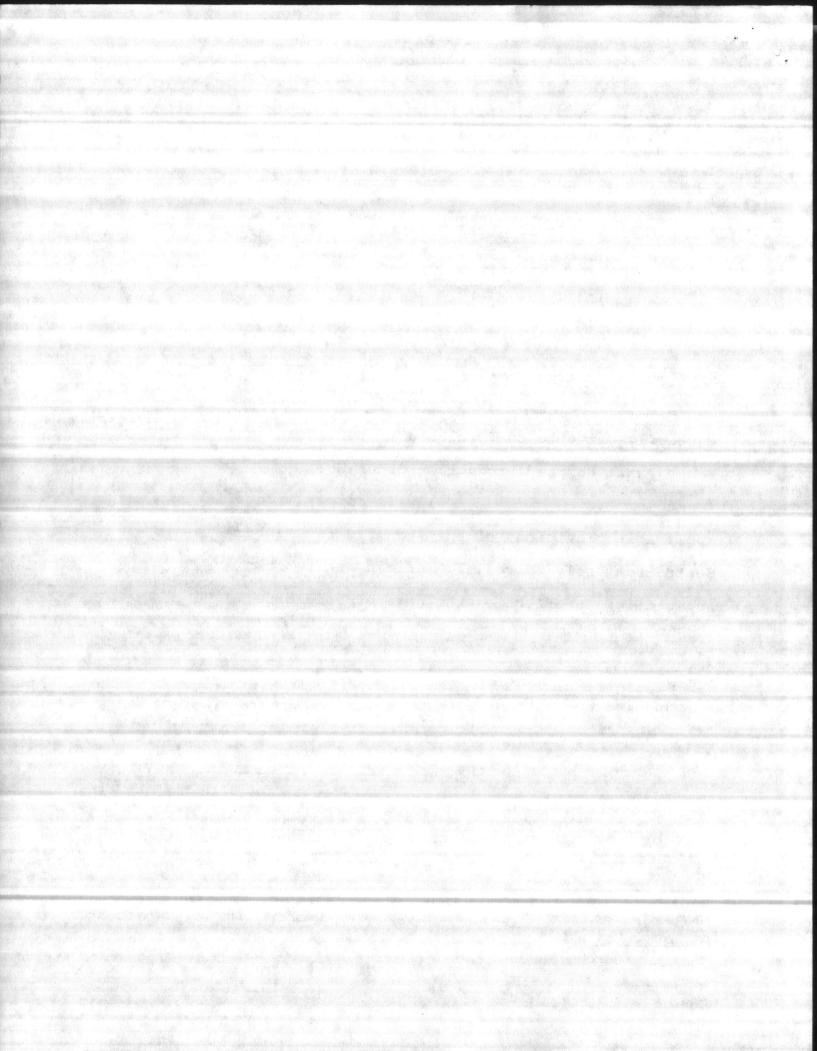
AFFIDAVIT OF COMPLIANCE WITH STANDARDS OF AMERICAN WATER WORKS ASSOCIATION FOR RUBBER-SEATED BUTTERFLY VALVES

HENRY PRATT COMPANY, by its authorized representative signing below, hereby certifies to

that each rubber-seated butterfly valve to be furnished to Purchaser under Henry Pratt Company Production Order No. (Customer P.O.) will comply with all applicable provisions of the Standard for Rubber Seated Butterfly Valves of American Water Works Association in effect on the date of said order.

Contract Administrator

Notary Public of Kane County, Illinois



HENRY PRATT. COMPANY

CUSTOMER: Sh	erman Machine & Iron Works
CUSTOMER P. O.	5860
PRATT ORDER NO.	014573
VALVE SIZE:	14"

We hereby certify that this valves was manufactured to material specifications as per approved Henry Pratt Print Number <u>C-5317 REV 1</u>.

Inspec

Ed Wolber

DATE: February 8, 1979

Subscribed and sworn to before me

this 8th day of February 19 79.

(Seal) Notary Public

My Commission Expires Nev. 30. 1982

PRATT ITEM NO: -014573-03

END PIECE: C. I. ASTM A-126 CL. B

CENTER PIECE: D. I. ASTM A-536 (65-45-12)

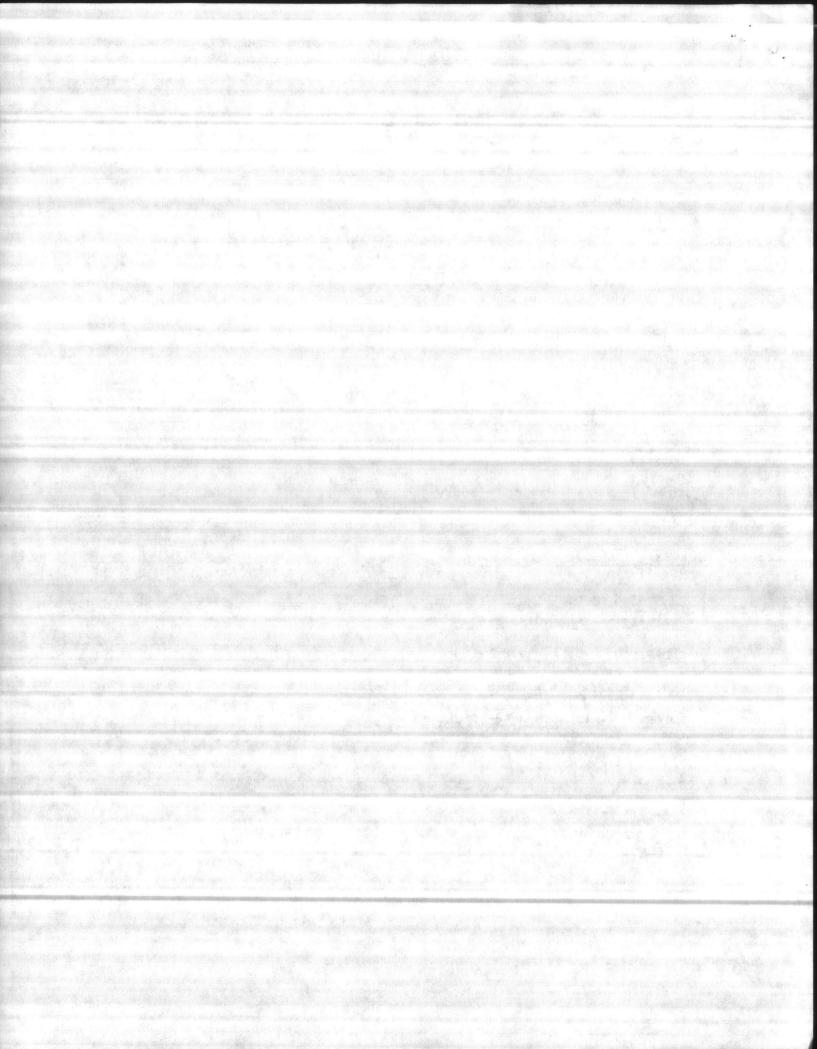
ROTOR: C. I. ASTM A-48-70 CL. 40

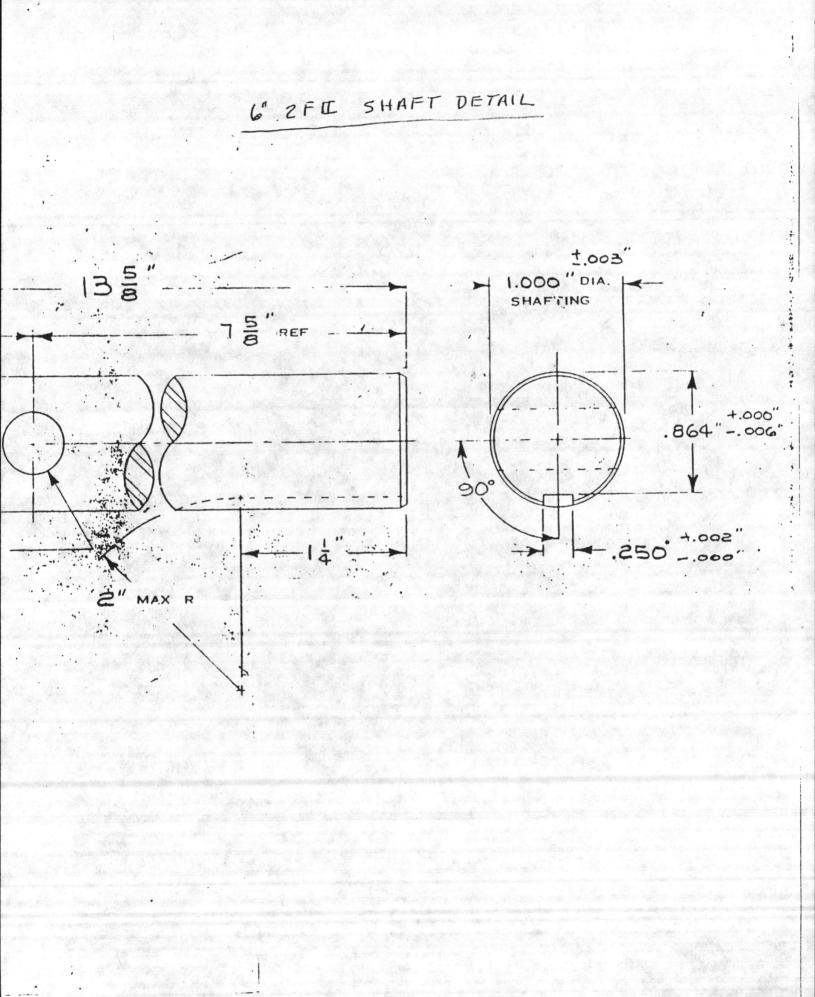
SHAFT: STN. STL. 18-8 T-304

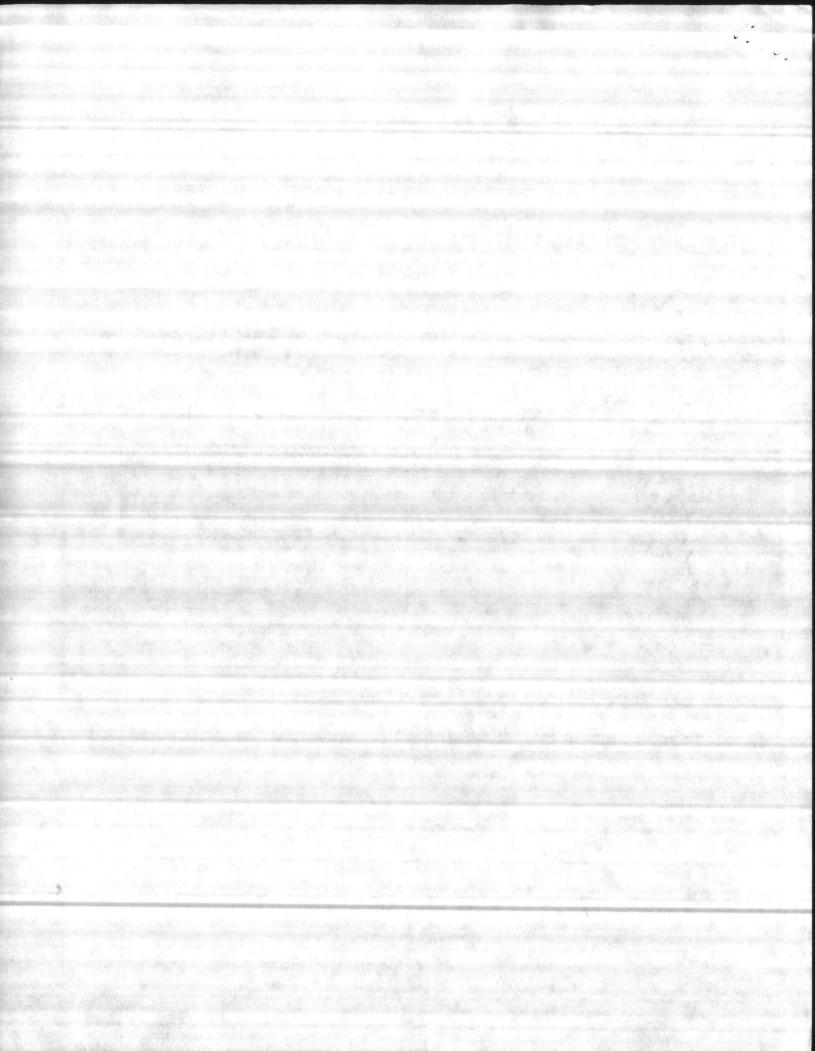
SEGMENTS:

SEAT: RESILOSEAL "L"

BEARINGS: TEFLON LINED, FIBERGLASS BACKED



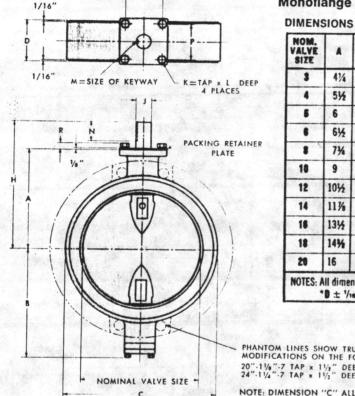




DIMENSIONS-PL, N STEM VALVES

The dimensions shown are for plain stem valves without operators and accessories. To obtain overall dimensions of valves with operators and accessories, combine the valve dimensions on this page with dimensions for the appropriate accessory equipment listed

and dimensioned on the following pages. Since these combined dimensions will be approximate, request certified drawings to obtain precise overall dimensions of the specific valve/accessory combination of interest to you.

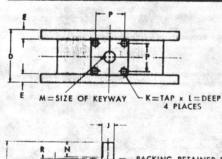


Monoflange MKII

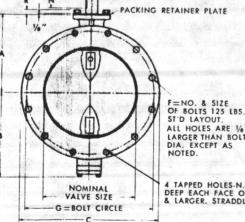
NOM. VALVE SIZE			c	D-	н	J	ĸ	L				
3	41/4	31/4	51/4	21/15	73%	4	3/1-16	%16	1/16×1/12	1%	21/2	4
4	51%	31/2	6¾	25/16	81/8	%	3-16	1/16	11ex 1/12	1%	254	H
5	6	43%	7%	2%16	811/1e	34	3/1-16	1/16	3/16 × 3/22	1%	24	4
6	61/2	51%	8%	215/16	93/16	1	%-16	16	14 x 14	1%	21/2	×
1	7%	61/2	10%	31/10	10%	11/8	34-16	1/16	%x%	114	214	4
10	9	9%	131/4	33/10	121/	1%	14-16	1/16	110×1/12	1%	21/2	H
12	101/2	11%	16	31/16	13%	11%	%-16	16	%x1/10	2	21/2	4
14	11%	125%	17%	311/16	15%	1%	14-13	%	1/18×1/12	214	41/4	4
18	131	141/2	201/	43/16	17%	2	1/2-13	13/16	12×14	234	4%	4
18	14%	15%	211/2	411/16	18%10	21/4	14-13	13/10	%x%is	21/4	41/4	94
20	16	17	231/4	53/10	19%	23/2	14-13	3/4	%x%	214	41/4	%

PHANTOM LINES SHOW TRUNNION MODIFICATIONS ON THE FOLLOWING VALVES: 20".116"-7 TAP x 11/2" DEEP — 4 PLACES EACH FACE 24".11/4"-7 TAP x 11/2" DEEP — 4 PLACES EACH FACE

NOTE: DIMENSION "C" ALLOWS CLEARANCE FOR 150 LB. OR 125 LB. ANSI BOLT LAYOUT



1

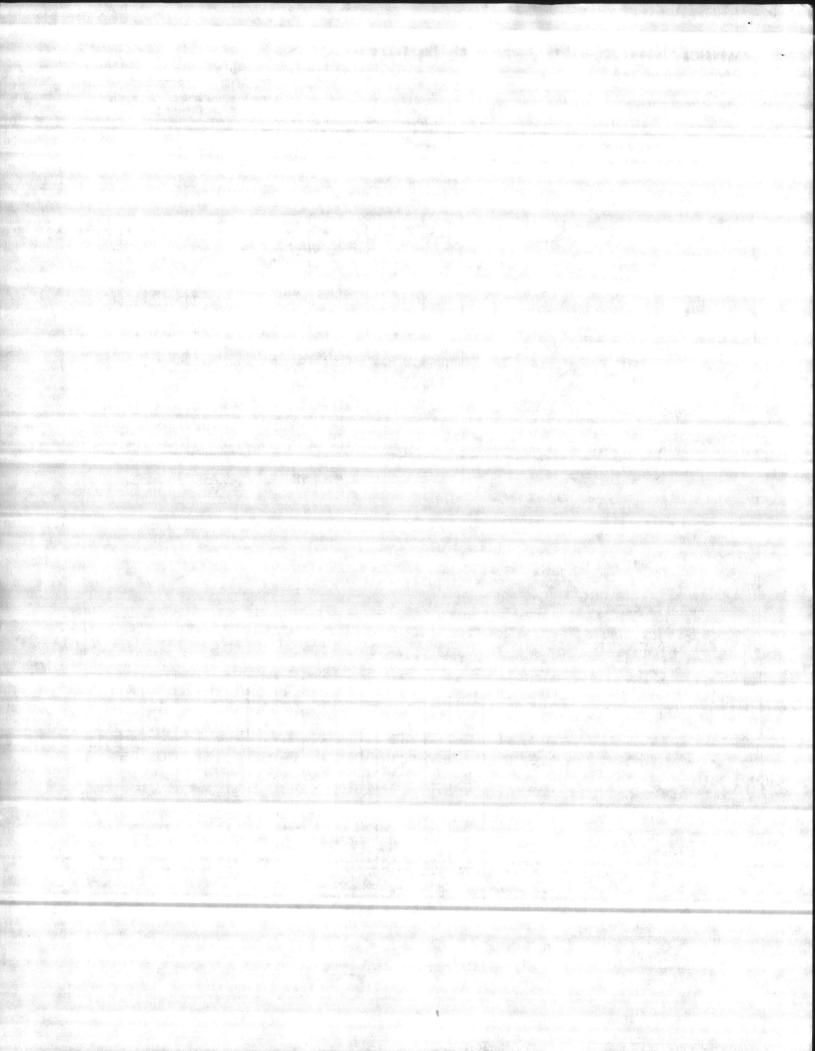


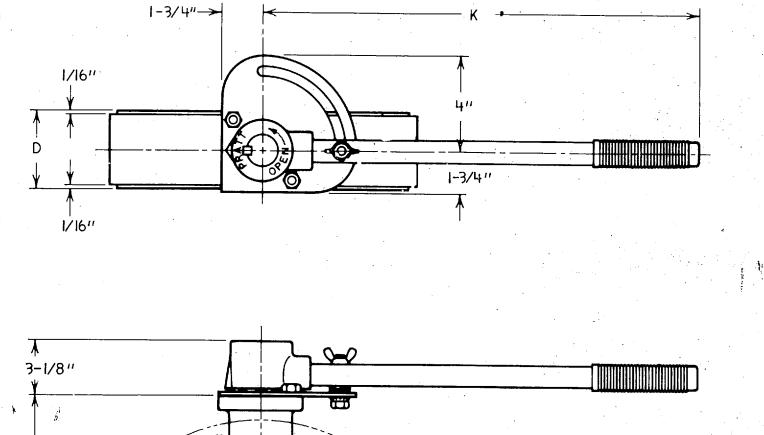
Model 2FII

DIMENSION

NOM. VALVE SIZE	•		C	D.	E	F	G	H	1	K	L			•	
1	43%	31/4	71/2	5	15/16	4-%	6	7%	14	\$.16	34	14×14	1%	21/2	1
4	51/2	31/2	9	5	15/16	8-%	71/2	81/2	1%	\$4.16	4	1/10 A 1/2	114	21/2	T,
6	61/2	51%	11	5	1	8-1/4	91/2	9%10	1	34-16	14	14114	1%	21/2	ļ
	73/4	61/2	1314	6	1%	8-3%	113/4	10%	11/8	%-16	14	14×16	1%	214	1
10	9	9%	16	8	11/16	12-1/1	141/4	121/	1%	%-16	%	1/16×1/32	1%	214	1
12	101%	113%	19	8	11/4	12-1/1	17	13%	11/2	1-16	1/16	%x1/16	2	21/2	Y
14	11%	12%	21	8	1%	12-1	18%	15%	1%	14-13	1/4	1/16x1/12	214	41/6	1
16	131/2	143%	231/2	8	11/16	16-1	211/4	17%	2	14-13	3/4	1/2 1/6	21/4	41/4	31
18	14%	15%	25	8	1%16	16-11/6	221/4	18%	21/4	14-13	. 1/4	14×15%	214	4%	¥
20	16	17	271/2	8	111/16	20-11/8	25	19%	21/2	14.13	34	%x3/10	21/	4%	Y

4 TAPPED HOLES N.C. (2) R.H. X E DEEP EACH FACE ON VALVES 18" & LARGER. STRADDLE CENTER LINE.





CUSTOMER P.O.: 35578-2093 PRATT ORDER NO.: 054265	
PROJECT: MARINE CORP BASE-CAMP LEJ	IEUNE
PRATT VALVE ITEM QUAN, SIZE	OPERATOR DESCRIPTION TAG
02 46 6"	L-12 HANDLEVER
03 12 10"	L-18 HANDLEVER

ROBERTS FILTER MFG. CO.

- i -

	 	THRU 10" & LARGER	
•		•	

VALVI	Λ	В	C	D
3	4-3/4	3-1/4	5-1/4	2-1/16
4	5-1/2	3-1/2	6-3/4	2-5/16
6	6-1/2	5-1/8	8-5/8	2-15/16
8	7-3/4	6-1/2	10-7/8	3-1/16
10	9	9-7/8	13-1/4	3-3/16

NOTE: ALL DIMENSIONS SHOWN IN INCHES.

نى<u>م</u>ىد

Ň

Z.

εŇ

7

1

Ĭ - i - .

i

~

,

-

) , ÷

20⁴⁴

lan a

.....

HANDLEVER	OPERATOR TABLE
OPERATOR MODEL	К
L-12	12-3/8
L- 18	18-3/8

NOTES	I. OPERATOR MOUNTED IN POSITION SHOWN.
PAINT	2. VALVES MANUFACTURED IN ACCORDANCE WITH AWWA SPECIFICATION C-504-80\CLASS I50B, EXCEPT DISC EDGES ARE 80% NICKEL AND 20% CHROME ALLOY OVERLAY APPLIED USING A NONTRANSFERRED PLASMA ARC PROCESS.
	INTERIOR OF VALVE (DISC ONLY): <u>BLACK VARNISH, FED. SPEC.</u> TT-C-494A TYPE II
	EXTERIOR OF VALVE AND OPERATOR: ZINC CHROMATE, FED. SPEC TT-C-494A TYPE II

	M , λ ,
	M , M ,
	M () and () and () and () are set of the set o
	NOTE : DIMENSION "C" ALLOWS
	CLEARANCE FOR 125 OR 150
	LB. A.S.A. BOLT LAYOUT.
	CD. ADA, BOLT LATOUT.
	이 같은 것 같은
; u·	
	PART MATERIAL
	BODY CAST IRON ASTM A-48 CLASS 40
Z Z	
	DISC CAST IRON ASTM A-126 CLASS B W/80% NICKEL, 20% CHROME EDGE
	- SHAFT STAINLESS STEEL ASTM A-276 TYPE 304
	📕 SFAT RUBBER
PRANT HENRY PRATT COMPANY AURORA, ILL.	
AURORA, IĻL.	BEARINGS <u>NYLATRON G.S.</u>
GENERAL ARRANGEMENT DRAWING MONOFLANGE MARKII BUTTERFLY VALVE	
GENERAL ARRANGEMENT DRAWING	
MONOFLANGE MARKII BUTTERFLY VALVE	
HANDLEVER OPERATOR	에 가지 않는 것 같은 것 같
	그는 그는 것 같아요. 이 같은 것 같아요. 그는 것 같아요. 이 것 같아요. 그는 것 같아요. 그는 것 같아요. 그는 것 같아요. 한 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
NONE IL COL	
SCALE NONE DATE 11-2-84	
DRAWN BYCHECKED BY	에 있는 것이 있 같이 있는 것이 있
ADDRAUGHT FM	
APPROVED FM	

CUSTOMER:

· · · ·

, . .

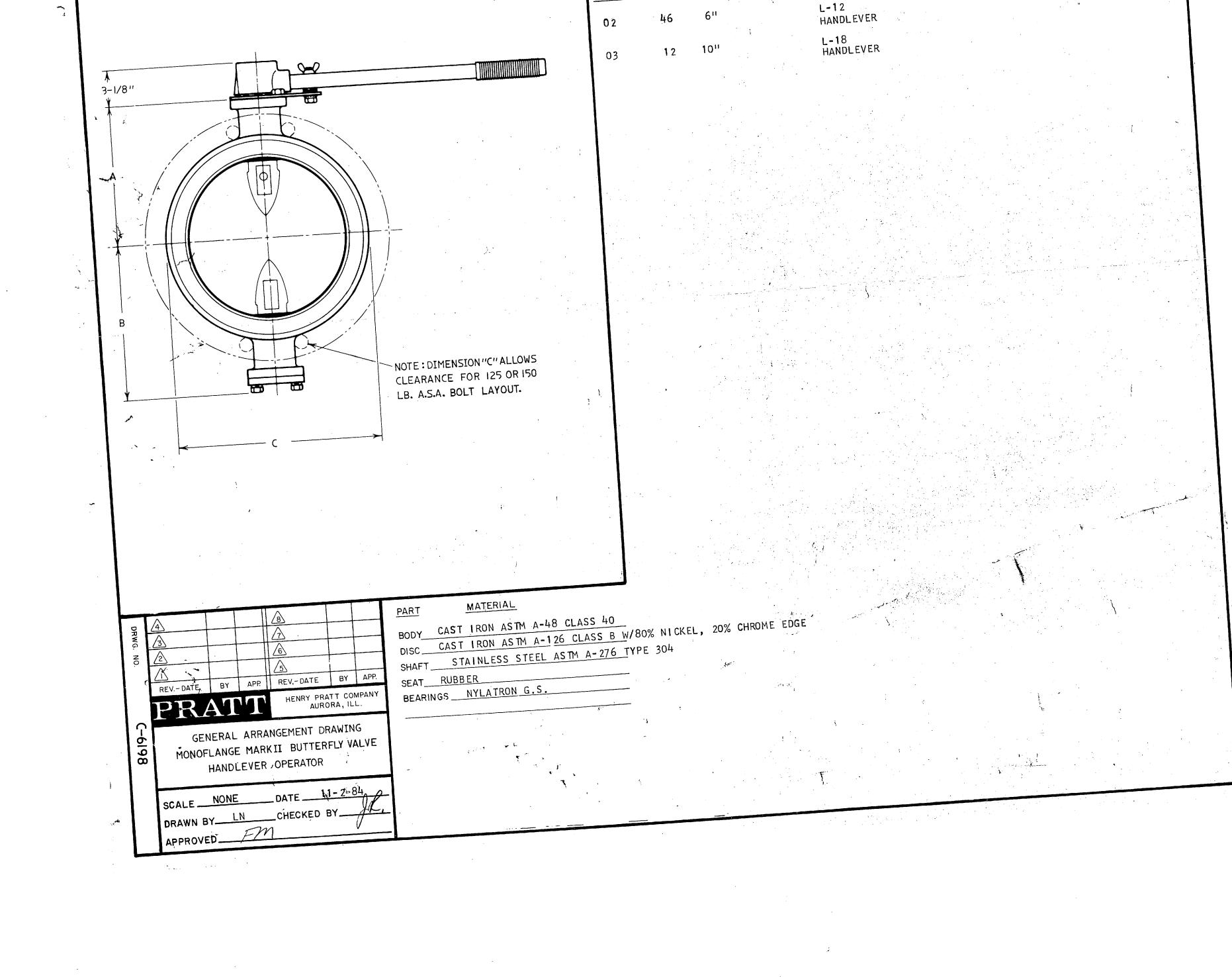
.

 \cdot .

·

			NOTES:	OPERATOR MOUNTED IN POSITION SHOWN.
4 5- 6 6- 8 7- 10 9 NOTE: ALL	B C D 3/4 3-1/4 5-1/4 2-1/16 3/2 3-1/2 6-3/4 2-5/16 3/4 6-1/2 10-7/8 3-1/16 9-7/8 13-1/4 3-3/16 9-7/8 13-1/4 3-3/16 9-7/8 '' THRU 10'' VALVES /8'' FOR 12'' & LARGER VALVES	HANDLEVER OPERATOR TABLE OPERATOR K MODEL L-12 12-3/8 L-18 18-3/8	2 - - PAINT:	VALVES MANUFACTURED IN ACCONDUCTORS 150B, AWWA SPECIFICATION C-504-80 CLASS 150B, EXCEPT DISC EDGES ARE 80% NICKEL AND 20% EXCEPT DISC EDGES ARE 80% NICKEL AND 20% CHROME ALLOY OVERLAY APPLIED USING A CHROME ALLOY OVERLAY APPLIED USING A NONTRANSFERRED PLASMA ARC PROCESS.
	e die Geboorden van die staar van Geboorden van die staar van			
	-3/4"->	- K →		
1/16"			CUSTOMER: ROBERTS FILTER MFG CUSTOMER P.O.: 35578-2093 PRATT ORDER NO.: 054265 PROJECT: MARINE CORP BASE-CA	

, ,



•

、 . . .

.

.

~ `

• - , .

.

•

NEPTUNE UU BENSON

April 5, 1980

TO WHOM IT MAY CONCERN:

This is to certify that all Neptune Sand Filters constructed in accordance with NSF standards meet the following requirements as listed and required by the National Sanitation Foundation:

Section 5 Filters, Pressure Para 5.0.5

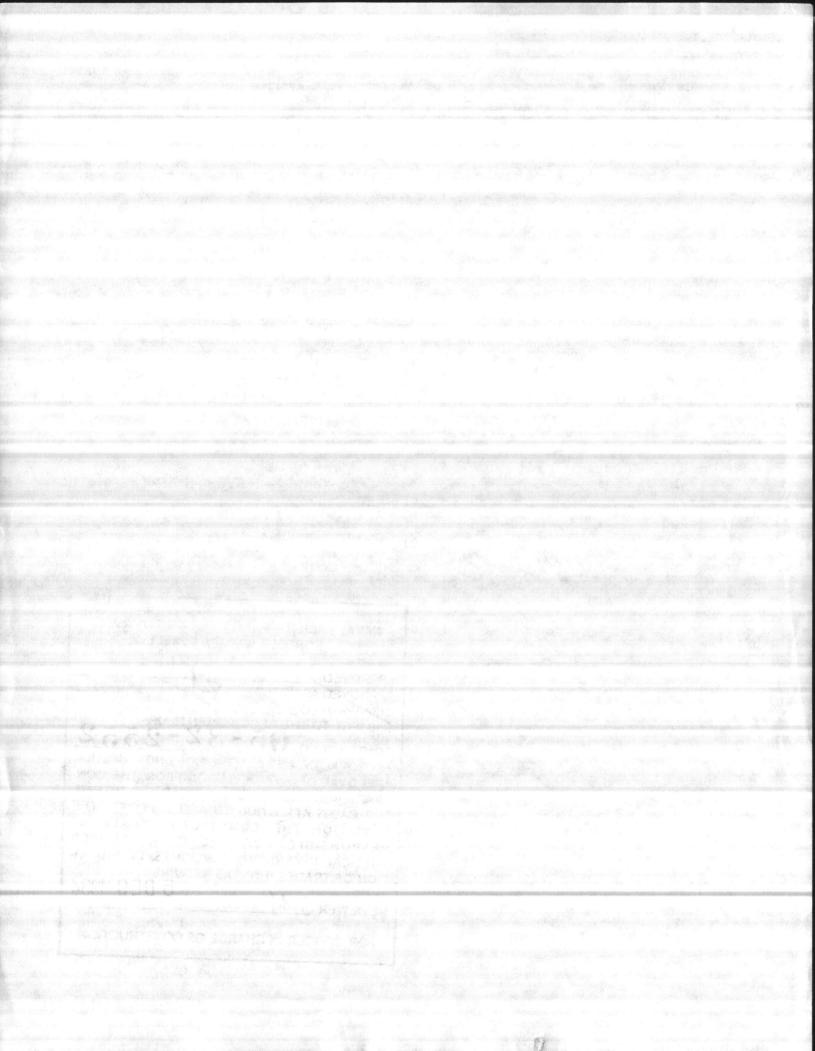
Initial Pressure Drop: The initial pressure drop through any filter operating at the design flow rate and measured from the filter housing inlet to the filter housing discharge shall not exceed 3 psi (20.7kPa).

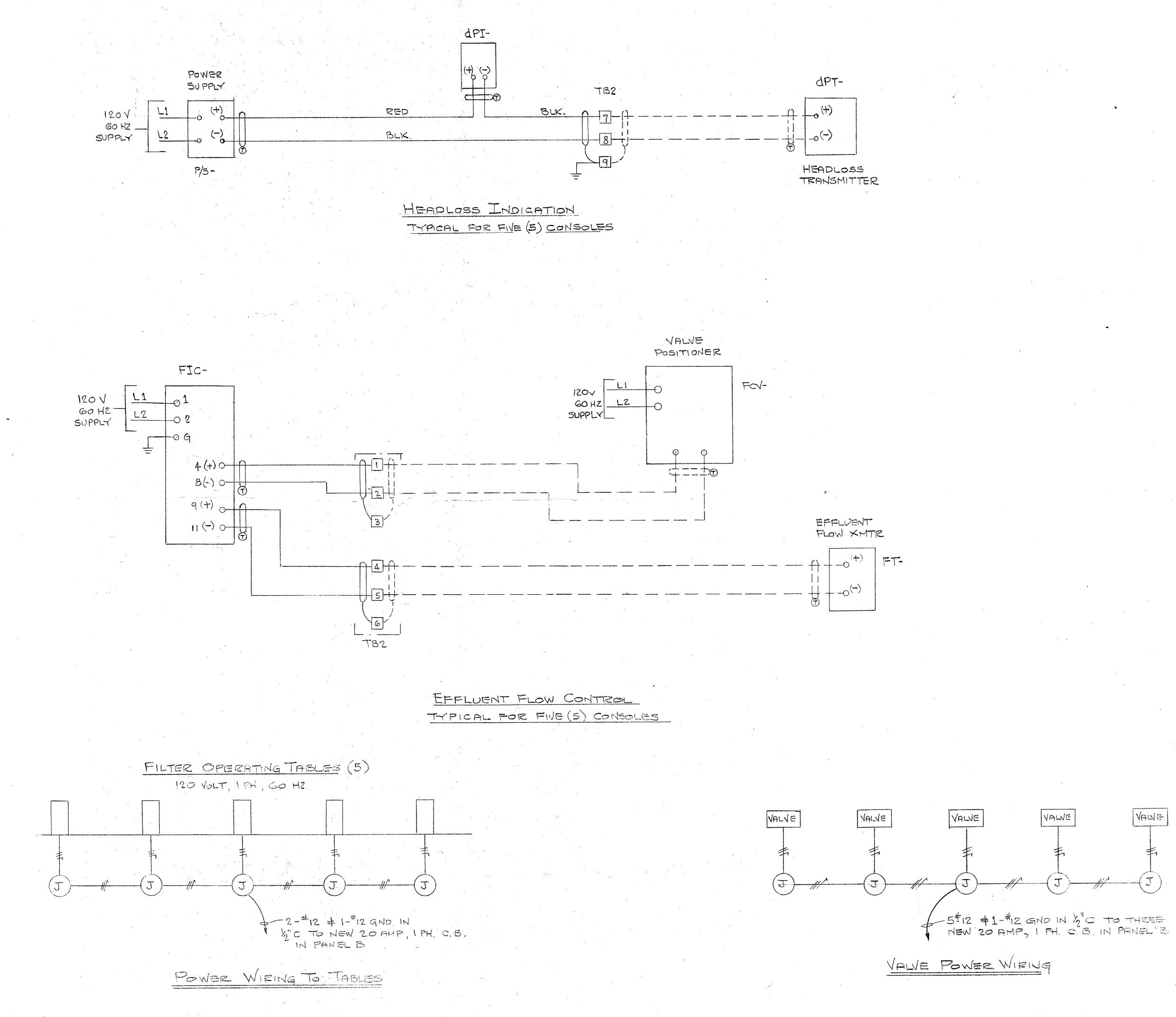
Very truly yours,

NEPTUNE-BENSON, INC. Junius Gertz, P.E. Vice President

JG:crs

ATLANTIC DIV NAVAL FACILITIES ENGINE NORFOLK, VIRGI	ERING COMMAND
APPROVED APPROVED AS NOTED DISAPPROVED SUBJECT TO THE REQUIRED	
SUBJECT TO THE REQUIRED CONTRACT NO. 05-8 APPROVAL OF A SUBMITTAL APPROVAL OF ANY DEVIAT TRACT REQUIREMENTS UN TOR CALLS ATTENTION TO DEVIATION-THE CONTR RESPONSIBLE FOR PE PHYSICAL DIMENSIONS & TION OF TRADES, ETC., AS REVIEWER JM	ION FROM THE CON- LESS THE CONTRAC- AND SUPPORTS THE LACTOR SHALL BE LOVIDING PROPER WEIGHTS, COORDINA-
FOR OFFICER IN CHARGE	OF CONSTRUCTION





. i 🖷 i

K&E 10 5535 3-83 A1225.

Nore-

VALVE

SEE DRANME BREAK FRANKERE

La Contra

SCALE CONTRACT ni dun dan kenyanan tala SECTION

EWG. NO.

ere ante este

· · · · · · · · · · · · · · · · ·

u .

•

.

.

· · ·

.

1 . .

· ·

. .

.

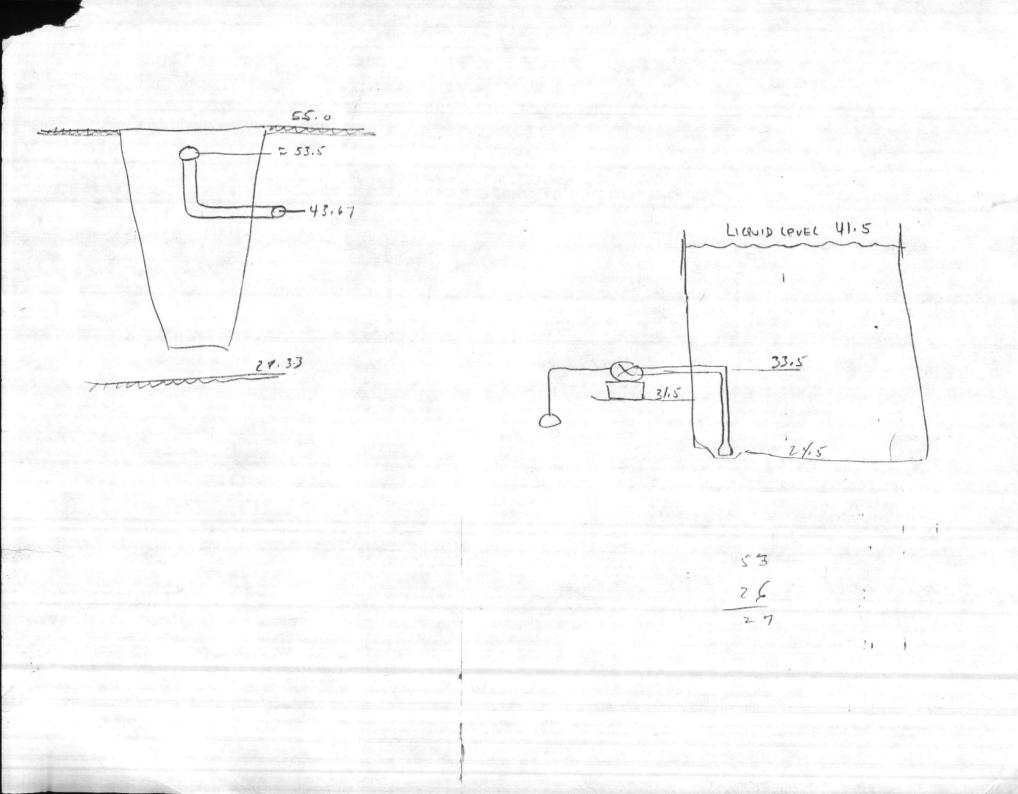
. .

jan -----

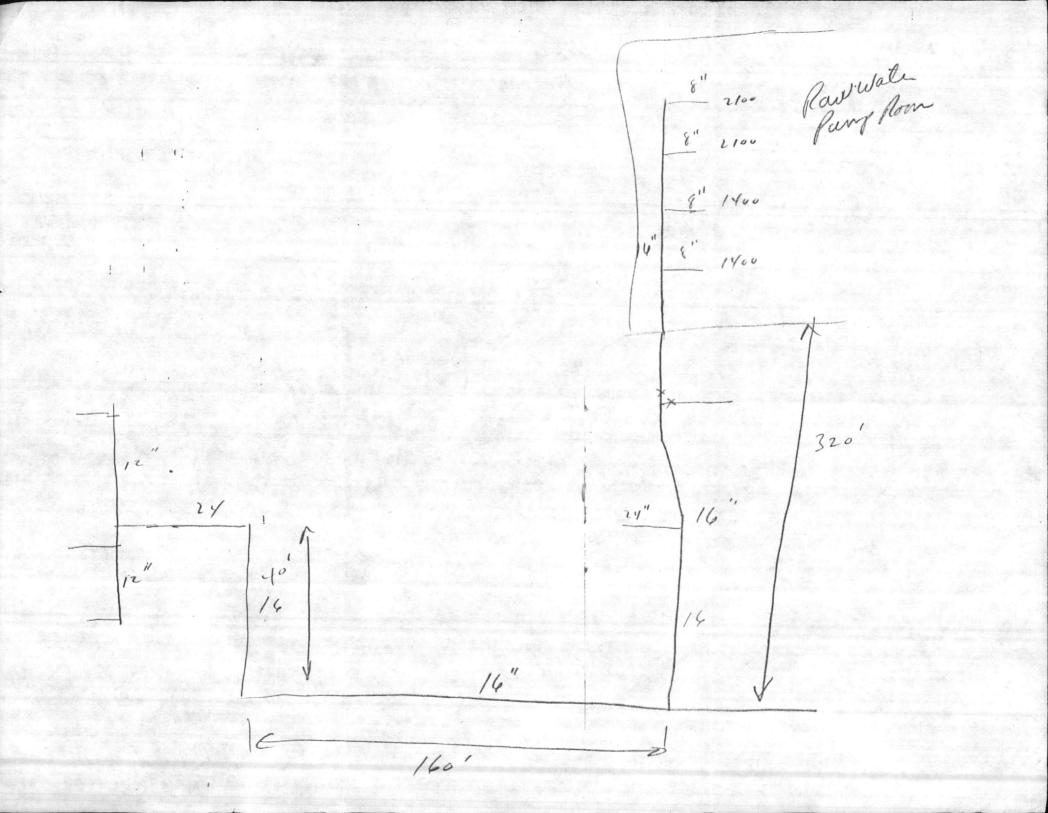
• .

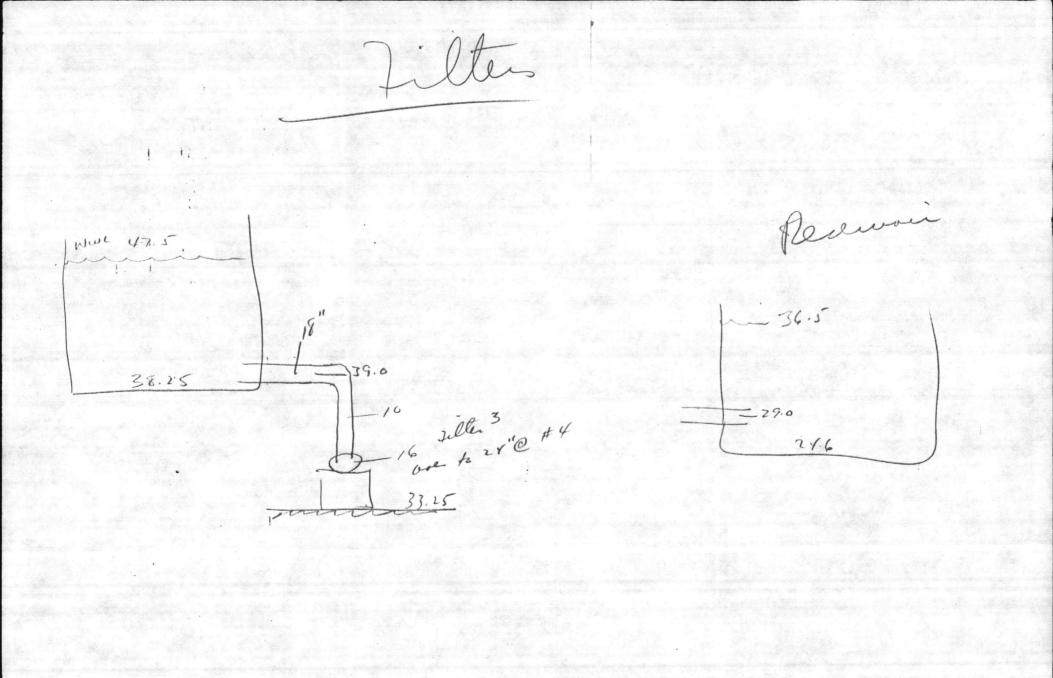
,

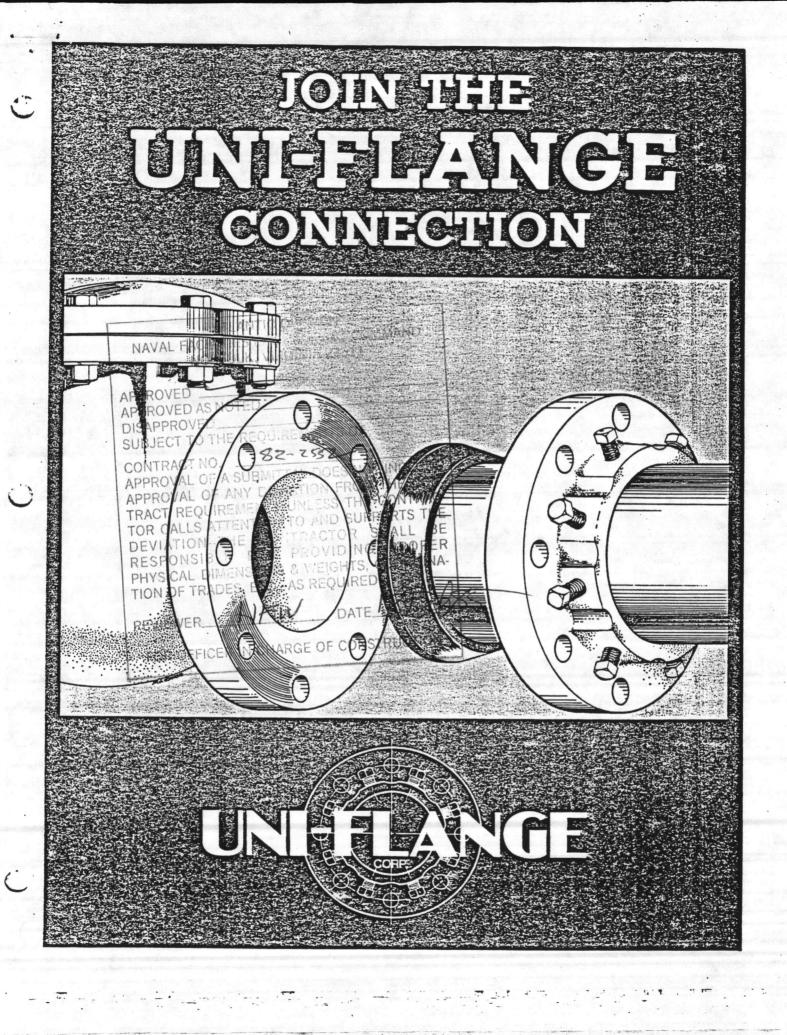
.

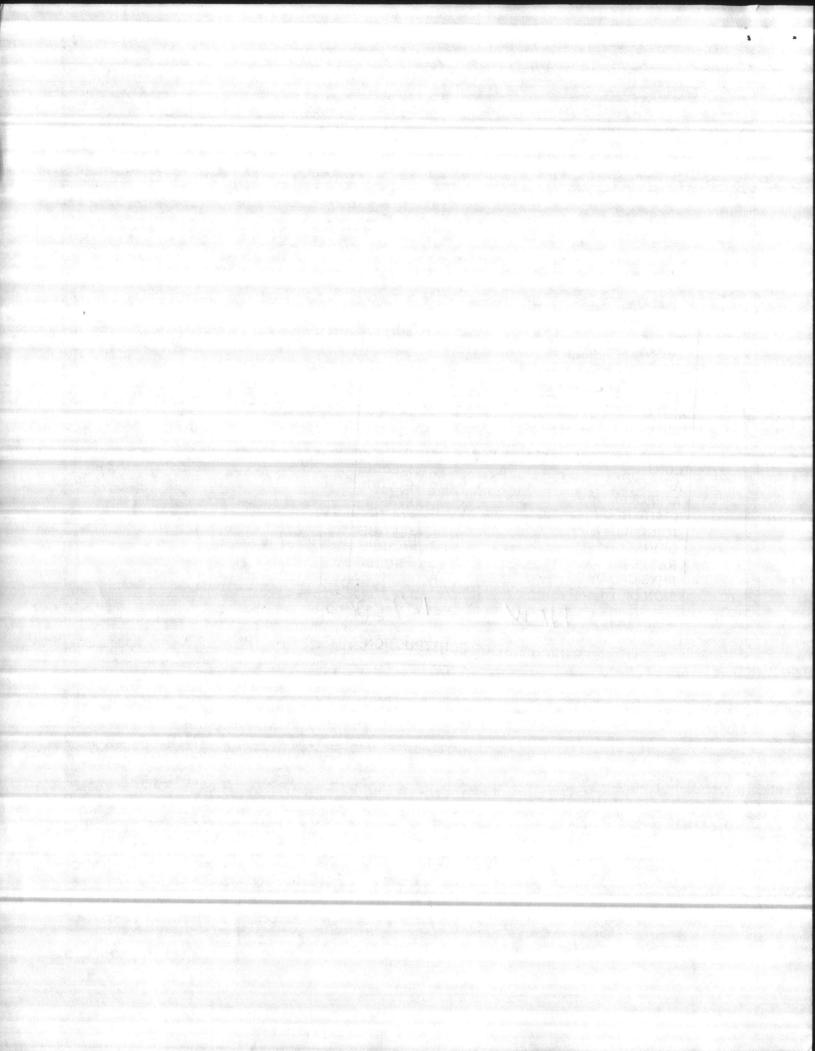












THE UNI-FLANGE METHOD

"Uni-Flange" is a method of joining valves, fittings and equipment with integral flanged ends to plain-ended pipe, with all the advantages of welded and screwed systems, but without the need for pipe end preparation.

HOW IT WORKS

Like all the best ideas, the working principle of Uni-Flange is a simple one. Slide the flange over plain-ended pipe and follow it with the standard mechanical joint type gasket. When the Uni-Flange is brought to mate against the existing flange, and the flange bolts are tightened, it creates a compression seal against the mating flange and down on to the pipe surface. No additional gasket is needed. End restraint is provided when the set

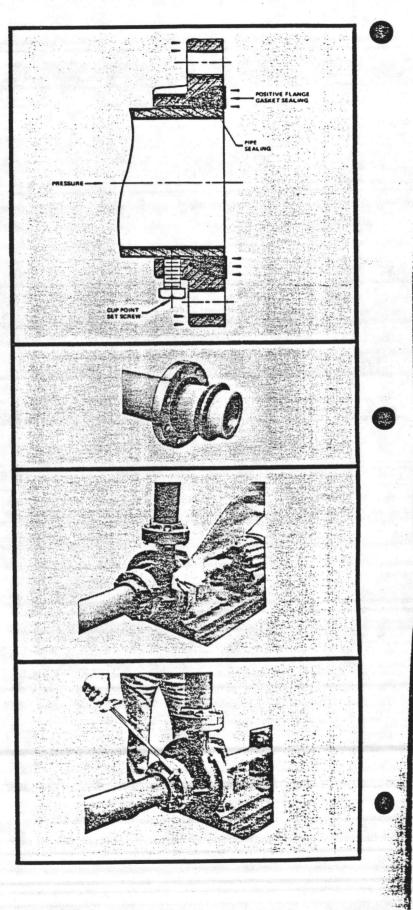
screws are tightened.

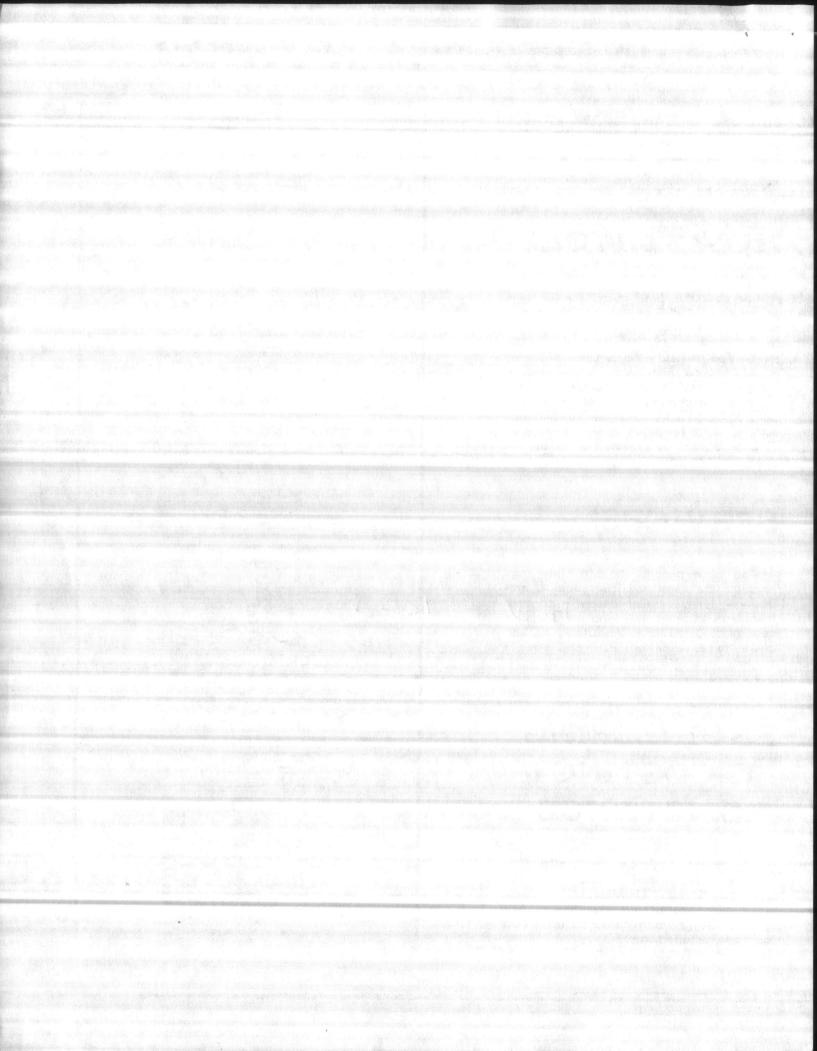
SERVICES

The same people who sell Uni-Flange products are eager to offer prompt, professional service. Our policy is to seek long term business relationships with our customers, based upon manufacturing and delivering superior products and services on time, every time. Your satisfaction is guaranteed.

ENGINEERING & COSTING ASSISTANCE

Uni-Flange engineers are available to help you design and cost-out your new projects using Uni-Flange products. Take advantage of our expertise to help you choose gasket materials to meet your particular requirements.





UNI-FLANGE ADVANTAGES

Job site fabrication, using plain end pipe.

Uni-Flange eliminates the problems of pre-engineered, prefabricated piping sytems. For a start, pipe sizing need not be so precise, because lengths can be cut and can be made up to suit site requirements. Mistakes in fabrication or drawings can be easily rectified on - site, instead of relying on off-site supplied, machinists and fabricators. DOWN TIME SAVINGS are

considerable.

Plain-end pipe is considerably cheaper than threaded or flanged pipe - Uni-Flange makes it easy to use (and use some cut offs too). Uni-Flange has built-in-end restraint. No tie - rods, no anchoring, no fixing (have you looked at the price of tie - rods lately?).

Uni-Flange allows a deflection flexibility setting, and an improved cutting - tolerance.

When installing the pipe, misalignment can often be allowed for by using the deflection setting incorporated in the design of Uni-Flange. There is an allowance of ¼" between pipe and mating flange, which allows for a lower degree of accuracy than would be necessary with rigid flanged systems. Uni-Flange needs no special plant or equipment for installation.

No threading or welding equipment, for instance.

Fast, easy installation without skilled labor.

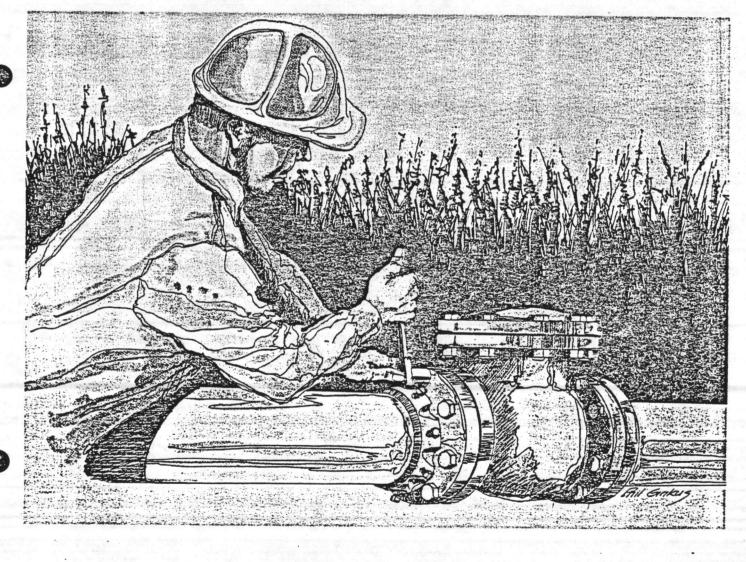
If you can use a wrench, you can use Uni-Flange.

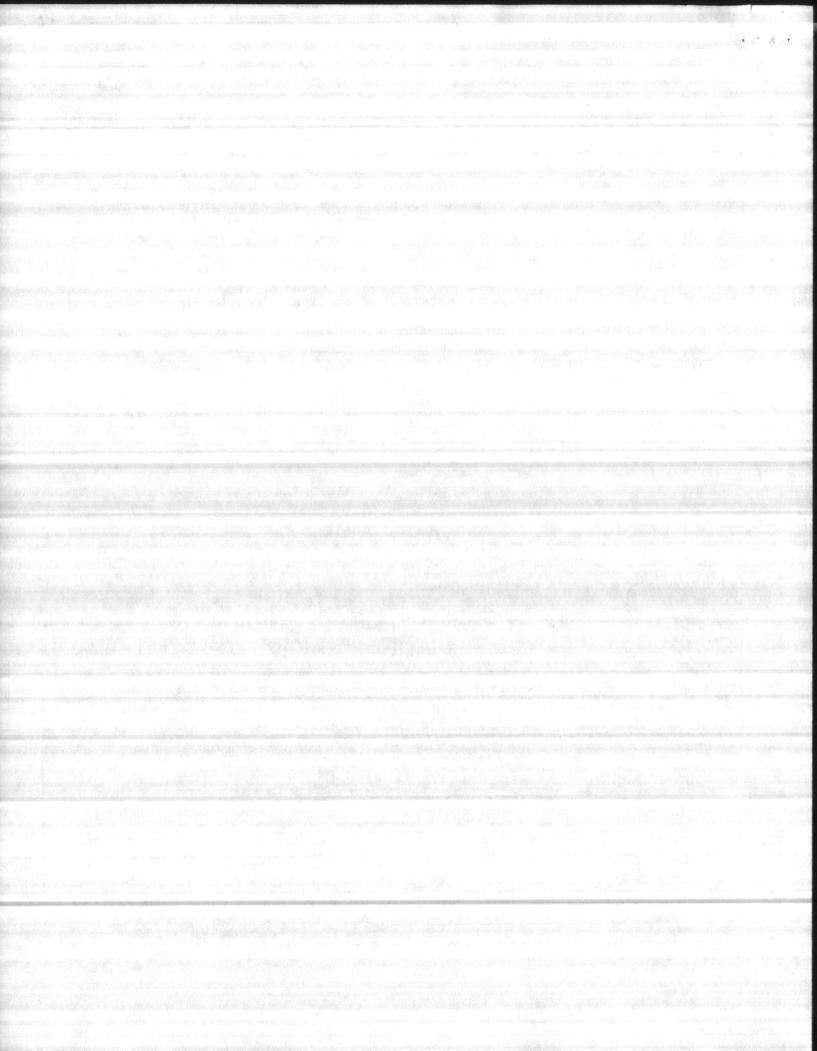
Eliminates bolt hole alignment problems.

Uni-Flange can be freely rotated before bolt tightening, enabling easy bolt hole alignment.

Eliminates additional restraining connections.

UNI-FLANGE MAKES LIFE EASIER ON SITE' WHERE IT MATTERS'





UNI-FLANGE IN ACTION

Will the set screws damage the pipe?

With ductile or steel pipe. which the SERIES 400 was designed for, there is no danger of pipe damage due to the high tensile strength of this material.

The set screws are cup point and divide the stress evenly around the o.d. of the pipe, minimizing the possibility of damage.

The principle of set screws for pipe restraint is not an entirely new idea having been developed nearly fifty years ago, and used in hundreds of thousands of mechanical type joint retainer glands, with totally satisfactory results throughout the world.

Will the set screws "back-out" or loosen with continual use?

When the set screw is originally tightened, it creates a "pocket" in the pipe. Even if the set screw loosens, it will remain inside this pocket and continue to restrain the flange.

ないとうことであることであるとう

Will the set screws hold on a high vibration connection like a pump?

In practice no problems have been reported under these conditions, but for added security we recommend either.

- a) Wiring of set screws to prevent loosening.
- b) Using lock-nuts, or a pro-'Loc-Tite'. duct like Will the Uni-Flange work on **PVC** pipe?

Yes, it will but it is not recommended. Over a period of time set screws can cause disfiguring of the pipe, affecting the seal. We recommend Uni-Flange Corporation's Series 900 Adapter Flange designed specifically for use on PVC pipe.

Can Uni-Flange be used underground and aboveground?

Yes, both. All materials are corrosion resistant.

How far off can the length of pipe be? How exact is the cutting tolerance?

The pipe should not exceed %" back from the mating flange thereby giving an improved cutting tolerance over rigid, screwed or welded flanges.

Can Uni-Flange be used face to face?

Yes, with a metal ring/spacer. Can Uni-Flange be used on steam or gas?

It is excellent for gas because of its superior seal. It is not recommended for prolonged use on steam.

Can Uni-Flange be used on temperature applications?

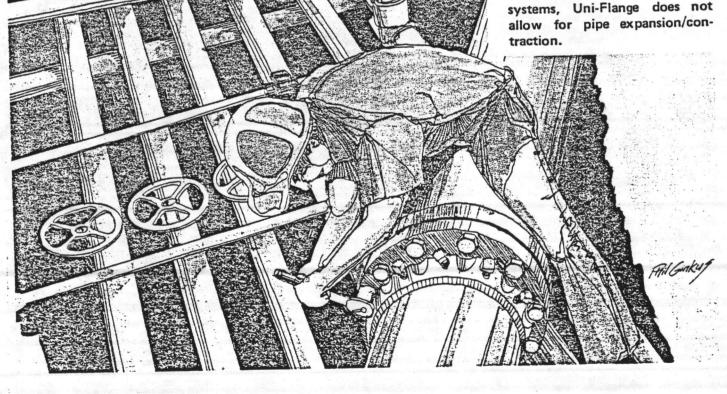
Yes, our various gaskets will handle most temperature ranges.

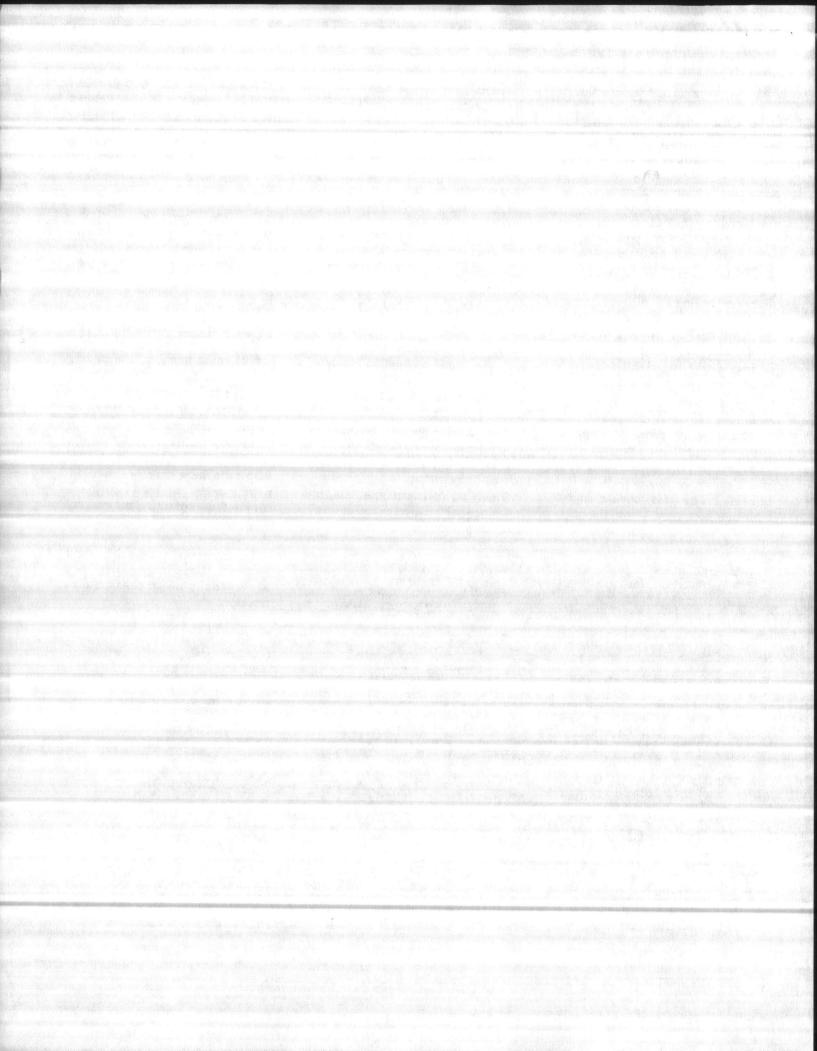
Can you put abrasive material through the Uni-Flange?

Yes, the flange itself is not in contact with the media. The gasket is synthetic rubber, which has good abrasion resistance. Also, the pipe may be installed with a metal to metal contact. completely protecting the gasket. about expansion/

What contraction?

In common with other rigid systems, Uni-Flange does not





TECHNICAL DATA AND AVAILABILITY

Flange Material

Manufactured from Ductile Iron ASTM A536 Grade 65-45-12 Drilling to ANSI B16.1 - Class 125 & 250 / ANSI B16.5 - Class 150 & 300.

Design

Uni-Flange has been designed to meet the test requirements of ANSI B16.1 -Class 125 and 250 / ANSI B16.5 -Class 150 and 300. Set Screw Material

AISI 4140 Steel. Tensile 190,000 psi minimum. Heat treated and zinc plated.

Gasket Availability

Standard Gasket supplied with the Uni-Flange is SBR (BUNA-S), suitable for water and wastewater, and most moderate chemicals. Temperature range 65°F to 212°F.

The following alternative gaskets are also available, and color coded as indicated:

EPDM (Ethylene Propylene)-green suitable for 65°F to 350°F. CR (Neoprene) - yellow suitable for 65°F to 212°F.

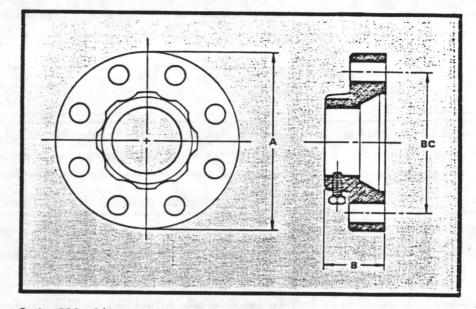
NBR (Buna - N, Nytril, Hycar) orange suitable for 65°F to FPM (Viton) - red suitable for 50°F to 450°F.

Hydrostatic Test Pressure Uni-Flanges are capable of with-

standing the following hydrostatic test without leakage.

SERIES 200 - Class 125/150 2 in. - 8 in. 600 psi 10 in. - 12 in. 525 psi SERIES 400 - Class 125/150 2 in. - 12 in. 750 psi 14 in. - 24 in. 300 psi 30 in. - 48 in. 150 psi SERIES 420 - Class 250/300 2 in. - 12 in. 800 psi Applications Uni-Flanges are designed to handle the following water working pressures at a temperature of- 20º F to 150º F. SERIES 200 - Class 125/150 2 in. - 8 in. 200 psi

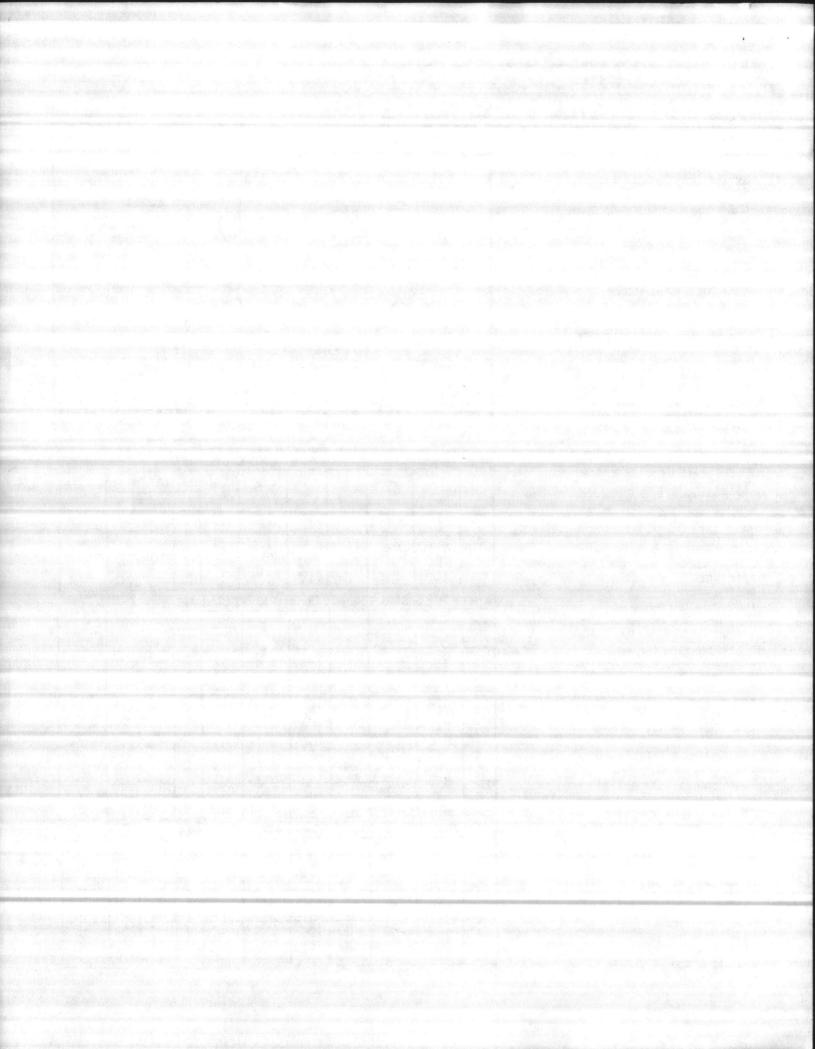
10 in. - 12 in. 175 psi SERIES 400 - Class 125/150 2 in. - 12 in. 250 psi 14 in. - 24 in. 150 psi 30 in. - 48 in. 100 psi SERIES 420 - Class 250/300 2 in. - 12 in. 400 psi



NOM.	STEEL	CAST IRON	2. S. S. Willage and	the second stall the	Marine galaria	BOLT		BOLT			WGT.	
PIPE	PIPE	PIPE	A	В	B.C.	HOLE	S	ET SCREWS	APPROX			
SIZE	0.D. 200-S	0.D. 200-C				DIA.	NO.	SIZE	(LBS.)			
2	2.375	2.50	6	1 13/16	4 3/4	3/4	2	1/2 x 1	3.5			
2%	2.875	*N/A	7	1 13/16	5 1/2	3/4	4	1/2 x 1	4.0			
3	3.500	3.96	7%	1 13/16	6	3/4	4	1/2 x 1	5.0			
4	4.500	4.80	9	1 7/8	7 1/2	3/4	4	1/2 x 1	7.7			
5	5.563	*N/A	10	1 7/8	8 1/2	7/8	.8	1/2 x 1	8.7			
6	6.625	6.90	11	1 7/8	9 1/2	7/8	8	1/2 x 1	10.0			
8	8.625	9.05	13%	2 1/4	11 3/4	7/8	8	5/8 x 1 1/4	16.5			
10 12	10.750 12.750	11.10	16	2 1/4	14 1/4	11	12	5/8 x 1 1/4	22.0			
		13.20	19	2 1/4	17	1	12	5/8 x 1 1/4	31.0			
eries	400 - 5	S/Class 1	50	Serie	s 400 - 0	C/Class	125	Dimen	ions in inch			
NOM.	STEEL	CAST IRON		ulupa Mente	New Mark	BOLT		T SCREWS	WGT.			
SIZE	PIPE O.D.	PIPE O.D.	A	B	B.C.	HOLE DIA.		LI SUNENS	APPROX			
in Scales	400-S	400-C				UIA	NO.	SIZE	(LBS.)			
2	2.375	2.50	6	2 1	4 3/4	3/4	4	1/2 x 1	5			
2%	2.875	*N/A	7	2 1/16	5 1/2	3/4	4	1/2 x 1	7			
3	3.500	3.96	7%	2 1/16	6	3/4	4	1/2 x 1	8			
3%	4.000	*N/A	8%	2 1/16	7	3/4	8	1/2 x 1	9			
4	4.500	4.80	9	2 1/16	71/2	3/4	8	1/2 x 1	11			
5	5.563	*N/A	10	2 1/8	8 1/2	7/8	8	5/8 x 1 1/4	13			
6	6.625 8.625	6.90	11	2 1/8	91/2	7/8	8	5/8 x 1 1/4	14			
10	10.750	9.05	13%	2 1/8	11 3/4	7/8	8	5/8 x 1 1/4	21			
12	12.750	13,20	16 19	23/16 2 1/4	14 1/4 17	1	12 12	5/8 x 1 1/4 5/8 x 1 1/4	38 56			
14	14.000	15.30	21	2 5/8	18 3/4	1 1/8	and the owner of the	States and a state of the state				
16	16.000	17.40	23%	2 11/16	21 1/4	1 1/8	12 16	5/8 x 1 1/4 5/8 x 1 1/4	70			
18	18.000	19.50	25	2 13/16	22 3/4	1 1/4	16	3/4 x 2	90			
20	20.000	21.60	27%	2 15/16	25	1 1/4	20	3/4 x 2	145			
24	24.000	25.80	32	3 1/8	29 1/2	1 3/8	20	3/4 x 2	175			
30	30.000	32.00	38%	4	36	13/8	28	1 x 2 1/4	270			
36	36.000	38.30	46	4 1/2	42 3/4	1 5/8	32	1 x 2 1/4	400			
42	42.000	44.50	53	4 3/4	49 1/2	1 5/8	36	1 x 2 1/4	495			
48	48.000	50.80	59%	4 7/8	56	1 5/8	44	1 x 2 1/4	660			
eries	420 - 5	Class 3	00	Series	: 420 - 0	C/Class	250	Dimen	uons in incl			
NOM.	STEEL	CAST IRON	17120	- 1-20.00	- States	BOLT	SET SCREWS		WGT.			
SIZE	PIPE O.D.	O.D.	A 34	B	B.C.	HOLE			APPROX			
SIZE	420-5	420-C		1. 10:22		DIA.	NO.	SIZE ST	(LBS.)			
2	2.375	2.50	6%	2 1/4	5	3/4	8	1/2 × 1	7			
2%	2.875	*N/A	7%	2 3/8	57/8	7/8	8	1/2 x 1	10			
3	3.500	3.96	8%	2 7/16	6 5/8	7/8	8	1/2 x 1	13			
3%	4.000	*N/A	9	27/16	7 1/4	7/8	8	1/2 x 1	16			
4	4.500	4.80	10	27/16	77/8	7/8	8	5/8 x 1 1/4	21			
5	5.563	*N/A	11	2 9/16	9 1/4	7/8	8	5/8 x 1 1/4	27			
6	6.625	6.90	12%	2 9/16	10 5/8	7/8	12	5/8 x 1 1/4	38			
8	8.625	9.05	15	2 5/8	13	1	12	5/8 x 1 1/4	57			
10 12	10.750	11.10	17%	27/8	15 1/4	1 1/8	16	5/8 x 1 1/4	74			
		13.20	20%	3	17 3/4	1 1/4	16	5/8 x 1 1/4	104			

*N/A - Cast Iron Pipe Not Manufactured in These Sizes

imensions in inches



DEFLECTION CHART THRUST RESTRAINT SERIES 200/400/420

DEFLECTION CHART

NOM. PIPE SIZE	CAST IRON PIPE O.D. (IN)	STEEL PIPE O.D. (IN)	MAXIMUM ANGLE DEFLECTION	DEFLECTION IN/18 FT. LGTH. (IN)	
2	2.50	2.375	40-2'	15.23	
21/2	*N/A	2.875	30 - 56'	14.85	
3	3.96	3.500	30 - 50'	14.47	
31/2	* N/A	4.000	30 - 47'	14.28	
4	4.80	4.500	30 - 44'	14.09	
5	*N/A	5.563	30 - 41'	13.91	
6	6.90	6.625	30 - 36'	13.59	
8	9.06	8.625	30 - 20'	12.58	
10	11.10	10.750	30 - 13'	12.14	
12	13.20	12.750	20 - 35'	9.12	
14	15.30	14.000	20 - 20'	8.80	
16	17.40	16.000	20 - 5 '	7.86	
18	19.50	18.000	20 - 0'	7.54	
20	21.60	20.000	1º - 56'	7.29	
24	25.80	24.000	10 - 37'	6.10	
30	32.00	30.000	10 - 35'	5.97	
36	38.30	36.000	10 - 23'	5.22	
42	44.50	42.000	10 - 11'	4.46	
42	50.80	48.000	10.2'	3.89	

THRUST

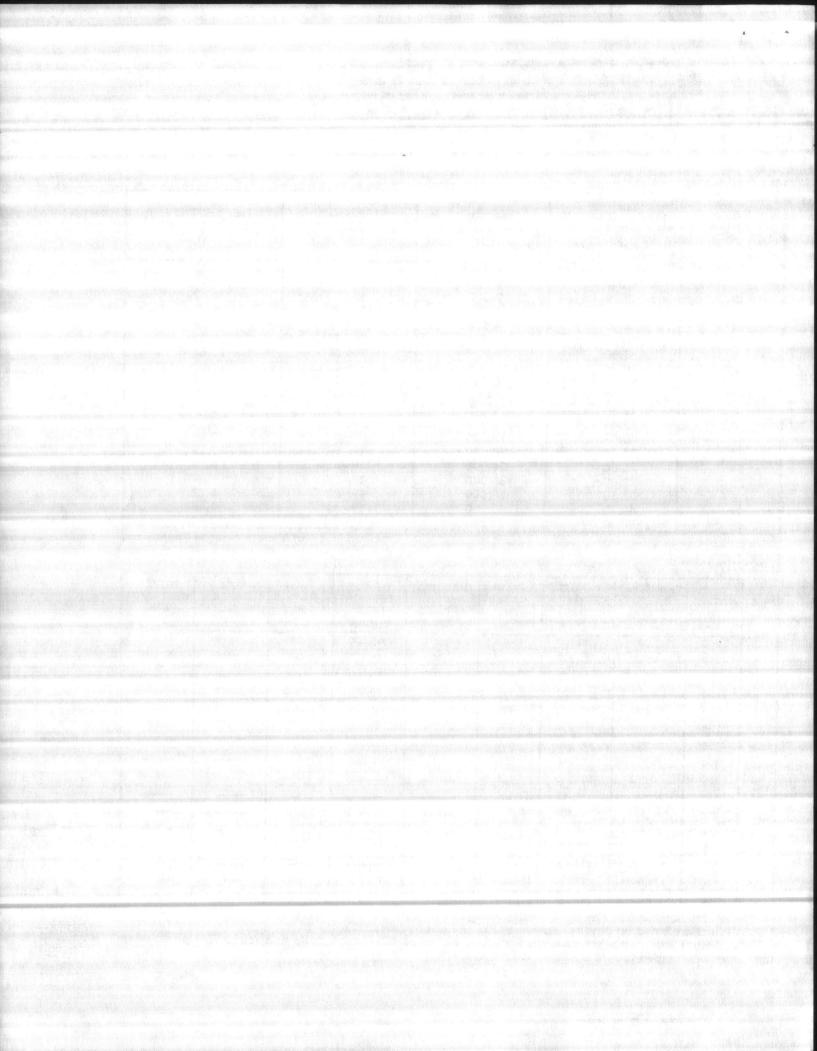
CEDIEC A20

SERIES 200

REST	RAIN	r	SERIES 400		and the second	SERIES 420			SERIES 200
NOM. PIPE SIZE	WWP RATING (PSI)	THRUST AT RATED PRESSURE -(LBS.)	THRUST RESTRAINT (LBS.)	WWP RATING (PSI)	THRUST AT RATED PRESSURE (LBS.)	THRUST RESTRAINT (LBS.)	WWP RATING (PSI)	THRUST AT RATED PRESSURE (LBS)	THRUST RESTRAINT (LBS.)
2	250	. 785	22,800	400	1,257	45,600	200	628	11,400
3	250	1,767	22,800	400	2,827	45,600	200	1,414	22,800
4	250	3,142	45,600	400	5,026	50,600	200	2,513	22,800
6	250	7,069	50,600	400	11,310	75,900	200	5,655	45,600
8	250	12,566	50,600	400	20,106	75,900	200	10,053	50,600
10.	250	19,635	75,900	400	31,416	101,200	175	13,744	75,900
12	250	28,274	75,900	400	45,239	101,200	175	19,792	75,900
14	150	23,091	75,900				-		
16	150	30,159	101,200				-		
18	150	38,170	110,400	-			-		
20	150	47,124	138,000	_			-		-
24	150	67,858	138,000	_	a tanti <u>ana ana an</u> a a	a tana <u>alam kana kan</u> atan		netare an an teap	Dala <mark>n er en bo</mark> le e
30	100	70,686	208,600	-			-		
36	100	101,790	238,400			·	-		
42	100	138,540	268,200	_			-		
48	100	180,956	327,800	- 1			-		

Above figures derived from results of independent testing by Worcester Polytechnic Institute in Worcester, MA. Results are based on physical restraint tests and not hydrostatic testing.

* These figures apply only for standard wall steel (schedule 40+) and ductile iron (class 52+) pipes, when the full recommended torque is applied to the set screw.



UNI-FLANGE ASSEMBLY INSTRUCTIONS

Clean plain end of pipe. Be sure that plain end pipe is cut square and free of burrs.

2 Thoroughly lubricate plain end of pipe and gasket with a soap based pipegasket lubricant. This allows gasket to slip easily into position, making sure it seats evenly.

3

Slide flange over plain end of pipe.

4 Slide lubricated gasket over, pipe end. No other gasket is necessary or should be used to seal flange faces. Slide flange forward until gasket is evenly seated in flange cavity. Hand tighten set screws against pipe surface.

Using conventional flange bolts, mate the Uni-Flange to the standard flange. Be sure to evenly tighten bolts alternately on opposite sides. Maintain approximately the same distance between the flange faces at all points around the joint. Tighten flange bolts to specified torque values.

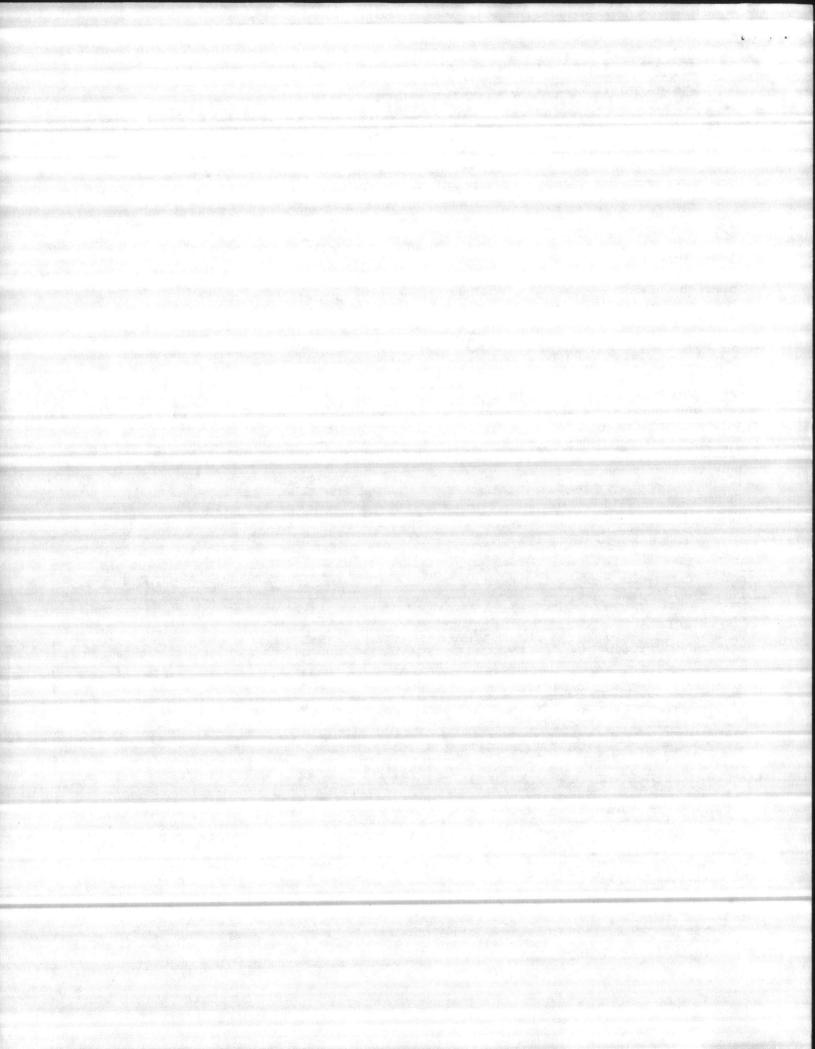
6 Snug down all set screws evenly. Tighten with wrench to torque values shown on instruction sheet provided with each flange.

NOTE:

These instructions apply to standard wall steel (schedule 40+) and ductile iron (class 52+) pipes only. For other piping materials and special pressure or media applications, please consult us.

NOTE:

The design and dimensions of products and/or component parts are subject to change without notice.



UNI-FLANGE WORKS

The Uni-Flange Adapter was developed out of what we considered necessity - the necessity to eliminate the problems inherent with prefabricated flanged piping. We felt there had to be a way to eliminate the numerous delays caused by inaccurate dimensional details and reliance on off-site suppliers.

The design of the Uni-Flange Adapter is really quite simple. We took the best features of three different products and combined them into one fitting.

The FLANGE is made of ductile iron, tougher and stronger than the conventional grey iron threaded flange; it won't break when bolts are over-tightened or from impact.

The GASKET is the standard American Water Works Association Mechanical Joint gasket. These have been in continuous service for over 40 years.

NO THREADING

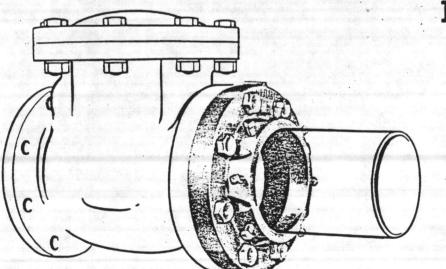
The RESTRAINT is provided by a set screw locking device, similar to that used in mechanical joint retainer glands. Thousands of these are installed throughout the world, in lieu of concrete thrust blocks and other restraining devices; the principal has been in use for over 40 years.

The Uni-Flange Adapter is one of the fastest growing new ideas in piping. As numerous field trials by engineers proved the product worked. but not only exceeded the capabilities of flanges. weld threaded flanges, and flanged coupling adapters, the Uni-Flange Adapter has been accepted by most major engineering firms, water, wastewater and municipal authorities. It is UNDERWRITERS LABOR-ATORY LISTED and FAC-TORY MUTUAL SYSTEM APPROVED.

The Series 200-C and 400-C are Factory Mutual System Approved for underground and aboveground use only on the first flanged connection at the base of a sprinkler riser. This is because that is the only acceptable aboveground use of iron pipe under Factory Mutual installation rules. The series 200-S flanges are not subject to this limitation. Flanges intended for aboveground use are approved with EPDM gaskets (color code green).

More and more engineering firms are designing total systems with the Uni-Flange Adapter. They've found that water, wastewater, fire protection, and process piping systems can be assembled with no delays.

There are over 350 stocking Uni-Flange distributors throughout the United States, Canada and the world. There is a convenient stock located near you. Call your local distributor and put the Uni-Flange to work for you.



Simply the best idea in piping since the flange.

NO WELDING ..

NO GROOVING

For further information and the location of the nearest stocking Distributor -- Contact:



UNI-FLANGE a division of NAPPCO INC.

77 MAIN STREET NORTHBOROUGH, MA 01532 TEL.: (617) 393-2527 / TELEX: 92-0475 FORM NO. 119-0184