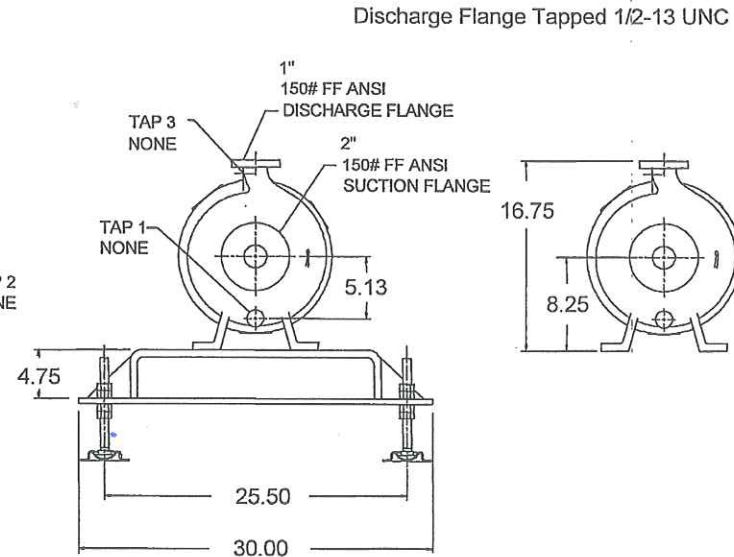
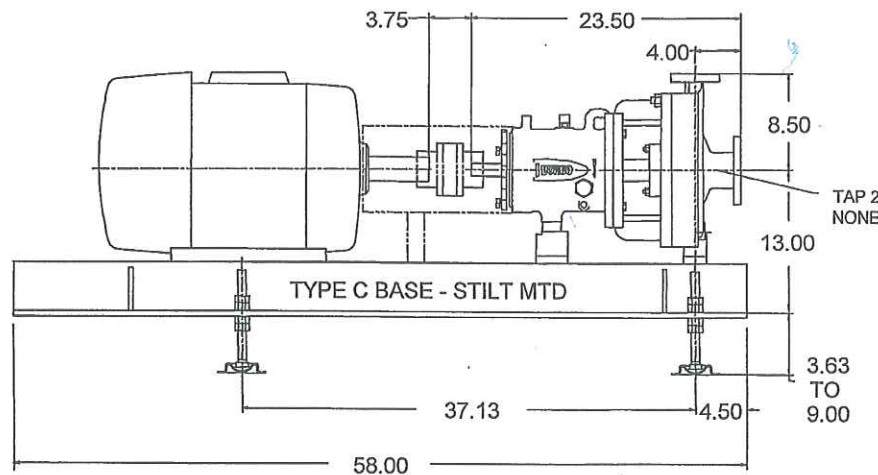


Dimensions certified for construction when properly endorsed below. Refer to factory for any "****" dimensions. DO NOT SCALE DRAWING

NOTES:

1. Consult pump I.O.M. before installing the pump.
2. Installation dimensions are +/- .13" (3mm), unless otherwise noted.
3. Foundation bolts and piping should not be set rigidly before receipt of equipment.
4. Allow a minimum of .75" (19mm) under baseplate for adjustment and grouting.
5. All holes in flanges are offset from centerlines.

6. Piping, foundations, and systems are the responsibility of others. Flowserve Pump Division data and comments are offered as an aid, but Flowserve Pump Division cannot assume responsibility for the system design or operation. It is recommended that a specialist skilled in this area be consulted to ensure a successful installation.
7. Dimension shown from bottom of base to centerline of pump includes any blocks under pump, as necessary.



All dimensions are in inches unless otherwise specified

DUPONT DANISCO
CELLULOSE ETHANOL
CUSTOMER PO: DDCE110098
TAG NO.: P1301
SERVICE: FRESH NH4OH TANK PUMP
PUMP MODEL: MK3 2K2X1LF-10OP
PUMP SERIAL NO: 0709-7792
FLOWSERVE ORDER: 034-01430-16

Pump size & type : 2K2x1LF-10 M3 LF
Pump speed / Stages : 3560 rpm / 1
Flow / Head : 12.0 USgpm / 439.00 ft
Driver power / Frame : 25.0 hp / 18.6 kW / 284TS
Volts / Phase / Hz : - 460 / 3 / 60

Drawing number :
Date : July 22, 2009
Certified by / Date : *Jain*
Seal type :
Seal flush plan : Plan 53

109661

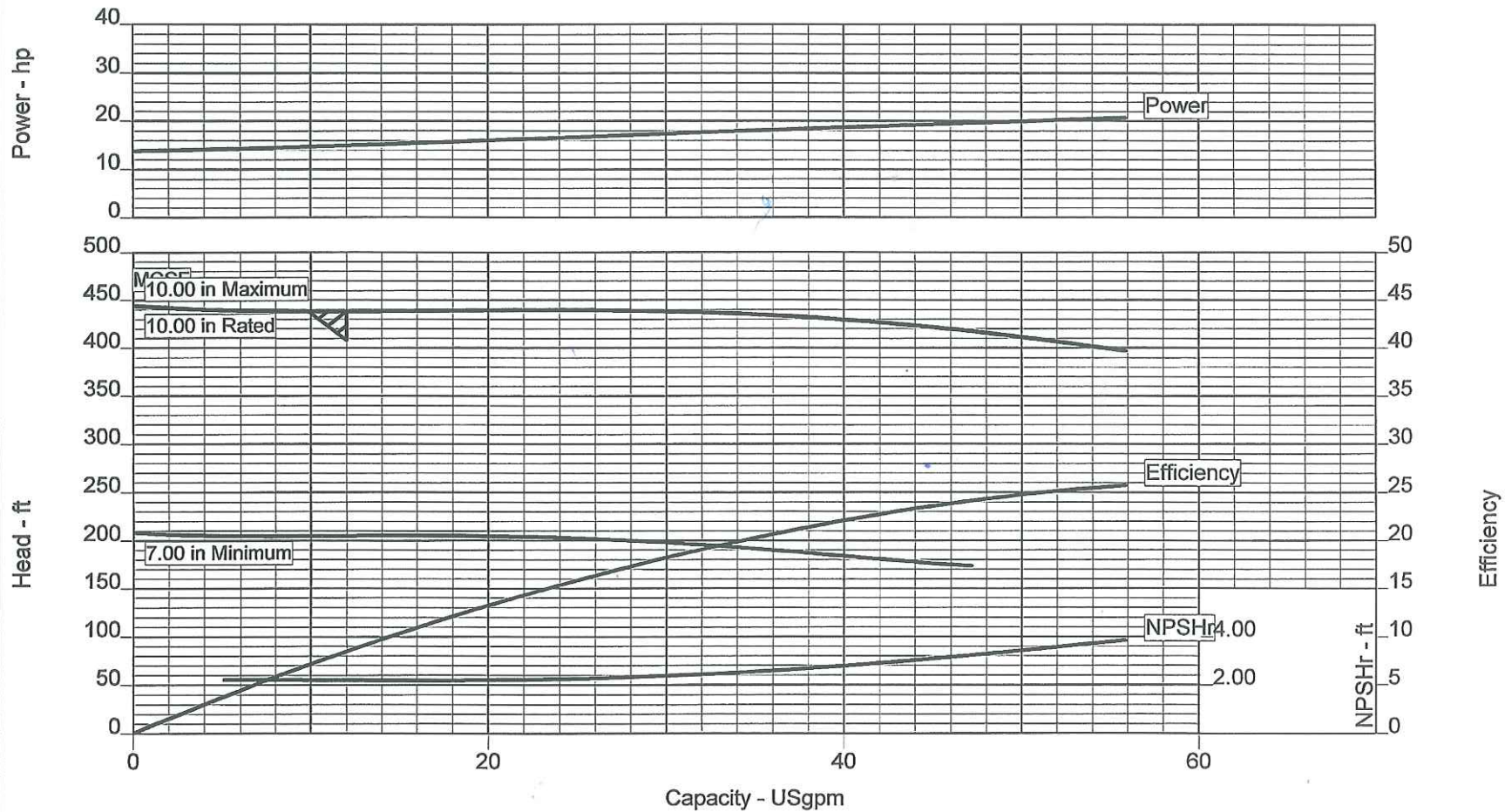
DUPONT DANISCO
 CELLULOSIC ETHANOL
 CUSTOMER PO: DDCE110098
 TAG NO. : P1301
 SERVICE : FRESH NH4OH TANK PUMP
 PUMP MODEL: MK3 2K2X1LF-10OP
 PUMP SERIAL NO: 0709-7792
 FLOWSERVE ORDER: 034-01430-16



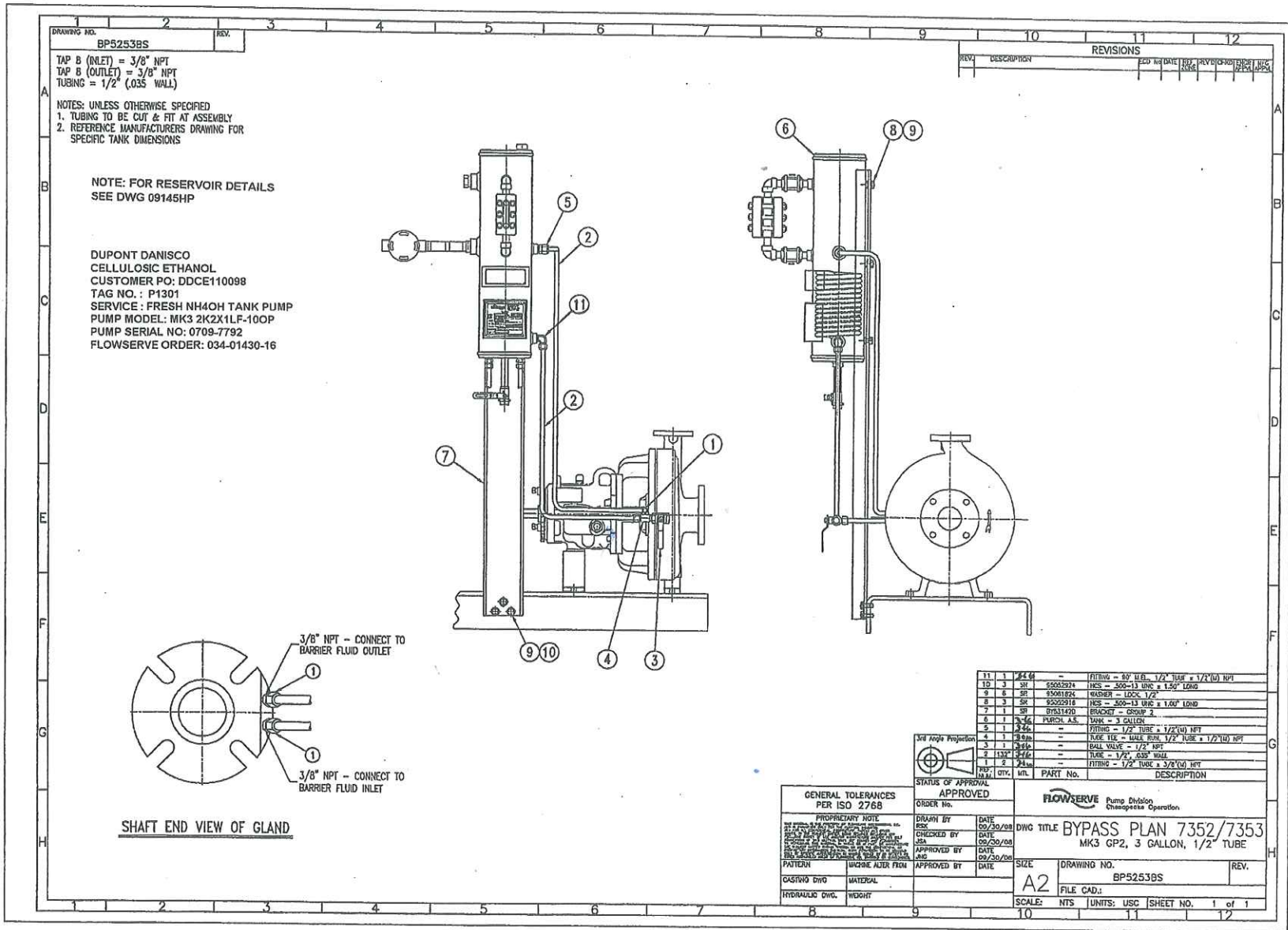
Pump size & type : 2K2x1LF-10 M3 LF
 Based on curve no. : MIII7760V
 Number of stages : 1

Capacity : 12.0 USgpm Specific gravity : 0.950
 Head : 438.00 ft Pump speed : 3054 rpm

CURVES ARE APPROXIMATE, PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS, CAPACITY, HEAD, AND EFFICIENCY.
 MGSF PROVIDES MECHANICAL PROTECTION ONLY. MINIMUM THERMAL FLOW MUST BE CALCULATED FOR THE SPECIFIC FLUID AND OPERATING CONDITIONS.



BP5253BS SHT 1 REV 0 PPD ENG JBERNING AUG-27-2009 14:16:32



DRAWING NO. **BP5253BS** REV.

TAP B (INLET) = 3/8" NPT
 TAP B (OUTLET) = 3/8" NPT
 TUBING = 1/2" (.035 WALL)

NOTES: UNLESS OTHERWISE SPECIFIED
 1. TUBING TO BE CUT & FIT AT ASSEMBLY
 2. REFERENCE MANUFACTURERS DRAWING FOR SPECIFIC TANK DIMENSIONS

NOTE: FOR RESERVOIR DETAILS SEE DWG 09145HP

DUPONT DANISCO
 CELLULOSIC ETHANOL
 CUSTOMER PO: DDCE110098
 TAG NO.: P1301
 SERVICE: FRESH NH4OH TANK PUMP
 PUMP MODEL: MK3 2K2X1LF-10CP
 PUMP SERIAL NO: 0709-7792
 FLOWSERVE ORDER: 034-01430-16

REV.		DESCRIPTION		ED	DR	DATE	REV	BY	DATE	REV	BY	DATE
1												

11	1	1/2" x 1/2"	-	FITTING - 90 DEG. 1/2" TUBE x 1/2" (U) NPT
10	3	3/8"	92005924	NES - 300-13 UNC x 1.50" LONG
9	6	3/8"	93001824	WASHER - LDCX 1/2"
8	3	3/8"	93002916	NES - 300-13 UNC x 1.00" LONG
7	1	3/8"	07091470	FLANGE - 2" DIA
6	1	3/4"	MURCH, A.S.	TANK - 3 GALLON
5	1	3/4"	-	FITTING - 1/2" TUBE x 1/2" (U) NPT
4	1	3/4"	-	TUBE FIT - 1/2" TUBE x 1/2" (U) NPT
3	1	3/4"	-	BALL VALVE - 1/2" NPT
2	1	3/4"	-	TUBE - 1/2" .035" WALL
1	1	2"	-	FITTING - 1/2" TUBE x 3/2" (U) NPT
REV.	QTY.	INTL.	PART No.	DESCRIPTION



GENERAL TOLERANCES PER ISO 2768		APPROVED	
CASTING DWG	MATERIAL	DRAWN BY	DATE
HYDRAULIC DWG	WEIGHT	CHECKED BY	DATE
		APPROVED BY	DATE
		APPROVED BY	DATE

FLOWSERVE Pump Division Chattanooga Operation	
DWG TITLE BYPASS PLAN 7352/7353 MK3 GP2, 3 GALLON, 1/2" TUBE	
SIZE A2	DRAWING NO. BP5253BS
FILE CAD:	REV.
SCALE: NTS	UNITS: USC
SHEET NO. 1	of 1

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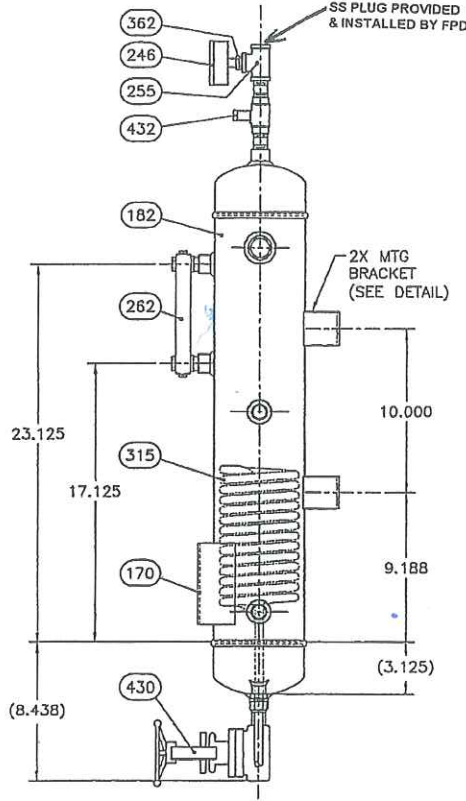
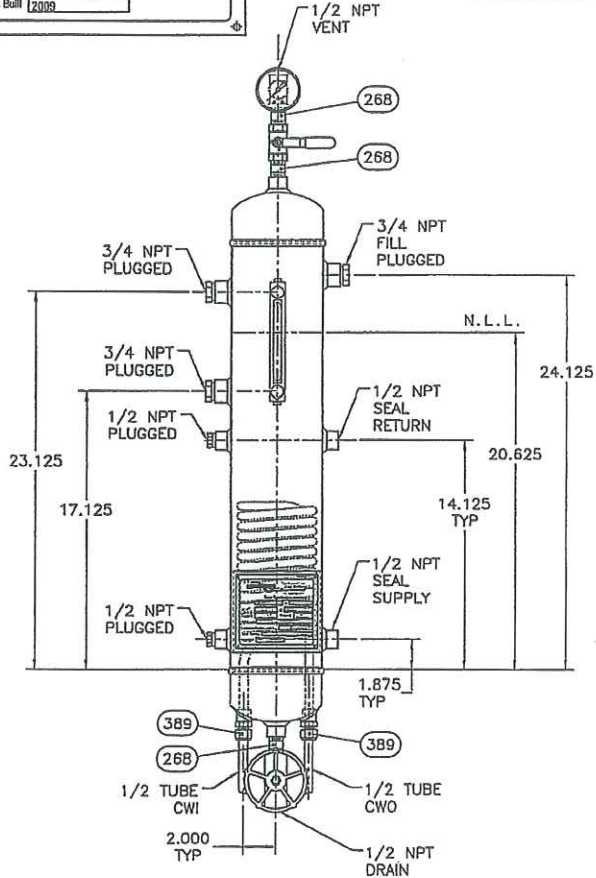
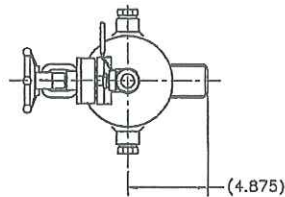
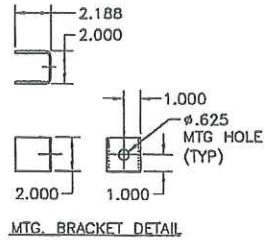
09145HP 1 (IN) REV: P2 KAL ENG DPUZIN AUG-05-2009 09:28:02

NO: 09145HP REV: P2

Flowserve Flow Solutions Division
Tulsa, OK USA
Phone: (918) 582-6953
Fax: (918) 583-1071

Seal Reservoir

MAWP 160 PSI at 160°F
MDMT 20°F at 160 PSI
Capacity 3 GALLONS Hydro at 240 PSI
Part Code _____
Flowserve Factory Order No. 09145HP
Serial Number _____
Date Built 2009



BILL OF MATERIAL NO: 09145HP				1 SUGGESTED SPARE PARTS 2 CODE/ASC(X)/OFF. STD(Y)		
NO	PARTCODE	QTY	DESCRIPTION	MATERIAL	1	2
182	W8034Y0000	1	RESERVOIR 5" PIPE SCH 10 (SHELL 26" LG)	304 SS		
170	U3DPU22A209	1	NAMEPLATE FOR RESERVOIR	STAINLESS STEEL		
262	U3DPU17A285	1	LIQUID LEVEL INDICATOR 1/2" NPT, TUBULAR, 6 C-C LUBE DEVICES: 6607-06-A-1-4	ALUMINUM		
315	4R98173X958	1	COOLING COIL 1/2" X .065 WALL X 20' LG. FOR 5" PIPE	SA-249 Gr. 316 / 316L WELDED		
389	U3DPU011985	2	TUBE FITTING (M) CONN. 1/2" TUBE x 1/2" (M)PIPE, BORE THROUGH	316		
246	U3DPU15A791	1	PRESSURE INDICATOR 2.5" DIAL, 0-160 PSI ASHCROFT: 25-1005-02B-160	BRASS		
255	0055004815	1	TEE FITTING 1/2" NPT SCD #150	304/304L SS		
268	3B04004925	3	PIPE NIPPLE 1/2" X 2" S/ 40S SMLS TBE	SA-312 Gr. 304 / 304L SMLS		
362	3765004850	1	PIPE FITTING 1/2" X 1/4" HEX BUSHING	SA-182 Gr. F304 / 304L		
430	U3DPU23G600	1	GATE VALVE 1/2" NPT CL800 CONVENTIONAL PORT	316 SS		
432	U3DPU23G900	1	BALL VALVE 1/2" NPT 1-PC CL. 800 WOG	316		

- NOTES:
- MFG PER FLOWSERVE SPEC 1T-8107.
 - ALL DIMENSIONS ARE ±.250 UNLESS OTHERWISE NOTED.
 - ALL DIMENSIONS IN () ARE REFERENCE.
 - MAWP 160 PSI @ -20° TO 150° F.
 - VESSEL HYDRO @ 1.5 x MAWP (160 PSI) = 240 PSI.
 - FOR LEVEL GAUGE (NO. 262) O-RING KIT, USE PART CODE U3DPU17A286.
 - CRN 0H0843.3 & 0H11516.52671. DUPONT DANISCO CELLULOSIC ETHANOL CUSTOMER PO: DDCE110098 TAG NO.: P1301 SERVICE: FRESH NH4OH TANK PUMP PUMP MODEL: MK3 2K2X1L-100P PUMP SERIAL NO: 0709-7792 FLOWSERVE ORDER: 034-01430-16

CUSTOMER: FLOWSERVE PUMP DIVISION
ADDRESS: CHESAPEAKE, VA
API PLAN: 53A
PROJECT NO.: 70443
FPD JOB#

THIS SEAL IS DESIGNED TO OPERATE WITHIN SPECIFIC OPERATING CONDITIONS. REFER TO THE PUBLISHED APPLICATION INFORMATION AVAILABLE FROM YOUR FLOWSERVE SALES REPRESENTATIVE.

AUXILIARY TYPE: RESERVOIR 3 GALLON ANSI PLAN 53A
AUX CODE: PLAN 53A

REF PART CODE:	SCALE: TO SCALE	SEAL REF:
	DRAWN: AORTEGA	PARTS LIST NO:
	DATE:	REF DWG:
	CHKD:	FORM DWG:
	APPVD:	DRAWING NO: SHEET: 1 of 1 REV:
	JOB NO: 09145HP	09145HP P2

REVISION: P2 DATE: 28-JUL-2009 BY: AORTEGA ICHR: KHICKWAN ECN NO:
REVISION NOTE: BALL VALVE FOR DRAIN REPLACED BY GATE VALVE. RELEASE FOR CUSTOMER APPROVAL

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DIM'S ARE REF UNLESS SPECIFIED OTHERWISE.
DIM'S IN: INCHES

C/A2 JULY 2009

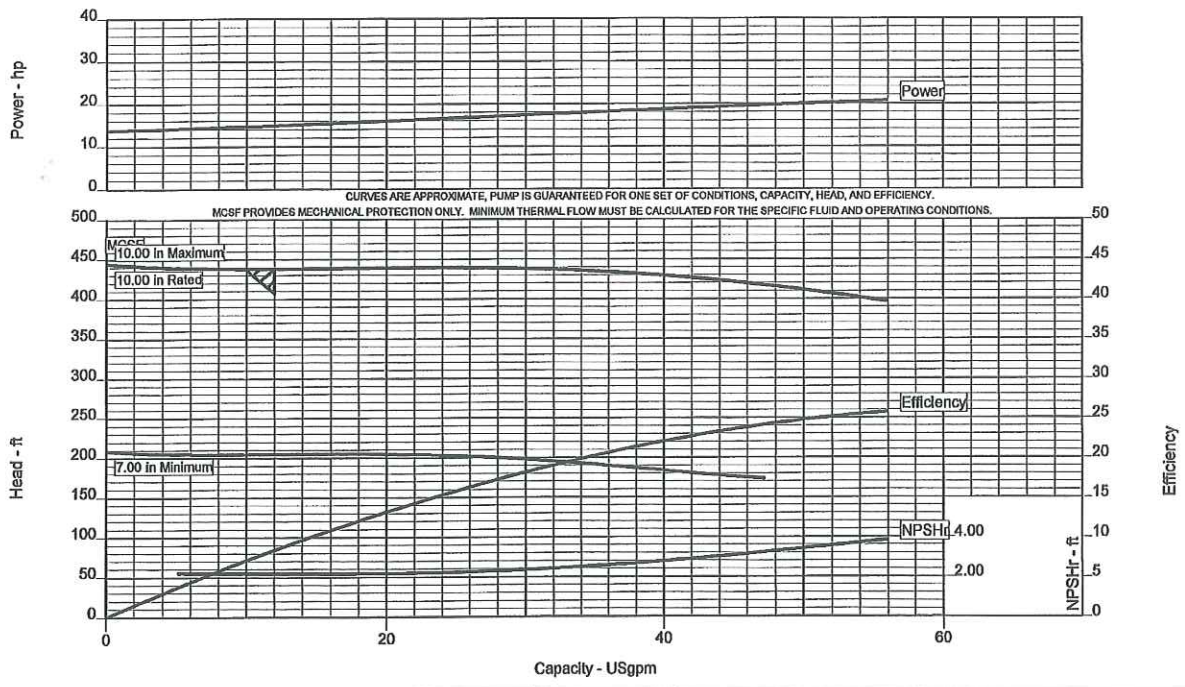
PROPOSAL DRAWING FOR CUSTOMER REVIEW



DUPONT DANISCO
 CELLULOSIC ETHANOL
 CUSTOMER PO: DDCE110098
 TAG NO.: P1301
 SERVICE: FRESH NH4OH TANK PUMP
 PUMP MODEL: MK3 2K2X1LF-10OP
 PUMP SERIAL NO: 0709-7792
 FLOWERVE ORDER: 034-01430-16

Pump / Stages : 2K2x1LF-10 M3 LF / 1
 Based on curve no. : MIII7760V
 Vendor reference : 3820-80670
 Date : August 27, 2009

Operating Conditions		Materials / Specification	
Capacity	: 12.0 USgpm	Material column code	: CD4
Water Capacity (CQ=1.00)	: -	Pump specification	: ANSI B73.1
Normal capacity	: -	Other Requirements	
Total Developed Head	: 438.00 ft	Hydraulic selection : No specification	
Water head (CH=1.00)	: -	Construction : No specification	
NPSH available (NPSHa)	: 6.0 ft	Test tolerance : Hydraulic Institute Level B	
NPSHa less NPSH margin	: -	Speed Set : 3054 rpm	
Maximum suction pressure	: 35.0 psig	Driver Sizing : Max Power(MCSF to EOC) w/o SF	
Liquid		Seal configuration : Double Seal	
Liquid type	: Other		
Temperature / SG	: 212 °F / 0.950		
Solid Size - Actual / Limit	: - / 0.00 in		
Viscosity / Vapor pressure	: 1.0 cSt / -		
Performance			
Hydraulic power	: 1.26 hp	Impeller diameter	
Pump speed	: 3054 rpm	Rated	: 10.00 in
Efficiency (CE=1.00)	: 8.5 %	Maximum	: 10.00 in
		Minimum	: 7.00 in
NPSH required (NPSHr)	: 2.2 ft	Suction specific speed	: 8310 US units
Rated power	: 14.92 hp	Minimum continuous flow	: 0.0 USgpm
Maximum power	: 20.7 hp	Maximum head @ rated dia	: 444.4 ft
Driver power	: 25.0 hp / 18.6 kW	Flow at BEP	: 75.4 USgpm
Casing working pressure	: 217.2 psig	Flow as % of BEP	: 15.9 %
(based on shut off @ cut dia)		Efficiency at normal flow	: -
Maximum allowable	: 0.0 psig	Impeller dia ratio (rated/max)	: 100.0 %
Hydrostatic test pressure	: 0.0 psig	Head rise to shut off	: 1.2 %
Est. rated seal chamb. press.	: -	Total head ratio (rated/max)	: 99.9 %



** denotes rejection criteria

DUPONT DANISCO
 CELLULOSIC ETHANOL
 CUSTOMER PO: DDCE110098
 TAG NO.: P1301
 SERVICE: FRESH NH4OH TANK PUMP
 PUMP MODEL: MK3 2K2X1LF-10OP
 PUMP SERIAL NO: 0709-7792
 FLOWERVE ORDER: 034-01430-16

Pump / Stages	: 2K2x1LF-10 M3 LF	/ 1
Based on curve no.	: MIII7760V	
Vendor reference	: 3820-80670	
Date	: August 27, 2009	

Construction					Driver Information	
Nozzles	Size	Rating	Face	Pos'n	Manufacturer	: Reliance
Suction	2.00	150#	FF	End	Power	: 25.0 hp / 18.6 kW
Discharge	1.00	150#	FF	Top	Service factor (req'st / act)	: 1.15 / 1.15
Casing mounting					Speed	: 3600 rpm
Casing split					Orientation / Mounting	: Horizontal / Foot
Impeller type					Driver Type	: NEMA
Bearing type (radial)					Frame-size / material	: 284TS / Cast Iron
Bearing number (radial)					Enclosure	: TEFC-841
Bearing type (thrust)					Hazardous area class	: -
Bearing number (thrust)					Explosion 'T' rating	: -
Bearing lubrication					Volts / Phase / Hz	: - 460 / 3 / 60
Rotation (view from cplg)					Amps-full load/locked rotor	: 28.00 / 181.00
Rotation (view from cplg)					Motor starting	: Direct on line (DOL)
Materials					Insulation	: F
Casing					Temperature rise	: -
Impeller					Bearings	: Ball
Seal chamber					Lubrication	: Grease
Shaft					Motor mounted by	: Flowserve
Sleeve					Sound Pressure (dBA @ 1.0 m)	
Baseplate, Coupling and Guard					Driver, expected	: 71.0
Baseplate type					Pump & driver, estimated	: -
Baseplate material					Seal Information	
Baseplate size					Arrangement	: -
Coupling manufacturer					Size	: 1.875
Coupling size					Manufacturer / Type	: Flowserve / -
Coupling / Shaft guard					Material code (Man't/API)	: - / -
Shaft / seal guard					Internal neck bushing	: Not Available
Weights (Approx.)					Gland	
Bareshaft pump(net)					Gland material	: -
Baseplate(net)					Flush	: .375" NPT (inlet)
Driver(net)					Vent	: -
Shipping gross weight/vol.					Drain	: .375" NPT (outlet)
Testing					Auxiliary seal device	: -
Hydrostatic test					Piping	
Performance test					Seal flush plan	: Plan 53
NPSH test					Seal flush construction	: -
Paint and Package					Seal flush material	: -
Pump paint					Aux seal flush plan	: None
Base grout surface prep					Aux seal flush construction	: -
Shipment type					Aux seal flush material	: -
Notes						
ANSI 3A w/site, magnetic drain plug						

DUTY MASTER ALTERNATING CURRENT MOTORS

SQUIRREL-CAGE INDUCTION
CAST IRON CONSTRUCTION

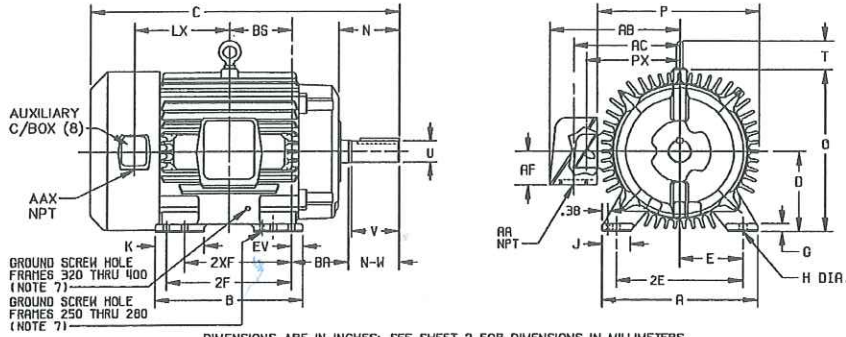
ENCLOSURE: TOTALLY ENCLOSED

COOLING: FAN COOLED

MOUNTING: FOOT

FRAMES 250T THRU 440TS

RCP 422



DIMENSIONS ARE IN INCHES: SEE SHEET 2 FOR DIMENSIONS IN MILLIMETERS

FRAME	A	D(2)	E	G	H	J	K	O	P	T	CAST IRON TERMINAL BOX				BA	FV	AUXILIARY C/BOX (8)		
											AA	AB	AC	AF			AA	LX	PX
254T-256T	12.50	6.25	5.00	.75	.56	2.50	---	13.25	13.25	2.44	1-1/2	11.75	9.31	3.00	4.25	1.00	3/4	6.31	9.31
284T-286TS	13.75	7.00	5.50	.75	.56	2.50	---	14.75	14.88	2.44	1-1/2	12.75	10.00	3.19	4.75	1.00	3/4	6.88	10.50
324T-326TS	15.50	8.00	6.25	.88	.69	2.75	4.50	16.69	17.00	2.44	3	16.75	12.57	4.12	5.25	1.38	3/4	8.00	10.50
364T-365TS	17.00	9.00	7.00	.88	.69	2.75	3.88	18.50	19.50	2.94	4	19.25	14.50	6.00	5.88	1.38	3/4	8.38	11.62
404T-405TS	19.00	10.00	8.00	1.12	.81	3.25	4.62	21.31	22.50	2.94	4	20.50	15.50	6.00	6.62	1.13	3/4	9.62	14.44
444T-445TS	21.00	11.00	9.00	1.12	.81	3.25	5.25	23.38	25.25	3.25	4	23.44	18.19	7.00	7.50	1.25	3/4	11.12	15.25

FRAME SIZE	C	BS	B	2F	(4) 2XF	N	SHAFT AND KEY			SQ.	LGTH.	WEIGHT LBS. (5)
							N-W(6)	U(3)	V			
254T	24.56	5.00	12.00	---	8.25	4.12	4.00	1.625	3.75	.375	2.88	335
256T	24.56	5.00	12.00	10.00	---	4.12	4.00	1.625	3.75	.375	2.88	345
284T	27.44	5.50	13.00	---	8.50	5.00	4.62	1.875	4.38	.500	3.25	475
284TS	26.06	5.50	13.00	---	8.50	3.62	3.25	1.625	3.00	.375	1.88	475
286T	27.44	5.50	13.00	11.00	---	5.00	4.62	1.875	4.38	.500	3.25	490
286TS	26.06	5.50	13.00	11.00	---	3.62	3.25	1.625	3.00	.375	1.88	490
324T	30.44	6.00	14.75	---	10.50	5.62	5.25	2.125	5.00	.500	3.88	590
324TS	28.94	6.00	14.75	---	10.50	4.12	3.75	1.875	3.50	.500	2.00	590
326T	30.44	6.00	14.75	12.00	---	5.62	5.25	2.125	5.00	.500	3.88	630
326TS	28.94	6.00	14.75	12.00	---	4.12	3.75	1.875	3.50	.500	2.00	630
364T	33.44	6.12	15.00	---	11.25	6.25	5.88	2.375	5.62	.625	4.25	865
364TS	31.31	6.12	15.00	---	11.25	4.12	3.75	1.875	3.50	.500	2.00	859
365T	33.44	6.12	15.00	12.25	---	6.25	5.88	2.375	5.62	.625	4.25	890
365TS	31.31	6.12	15.00	12.25	---	4.12	3.75	1.875	3.50	.500	2.00	884
404T	38.31	6.88	16.00	---	12.25	7.50	7.25	2.875	7.00	.750	5.62	1220
404TS	35.31	6.88	16.00	---	12.25	4.50	4.25	2.125	4.00	.500	2.75	1211
405T	38.31	6.88	16.00	13.75	---	7.50	7.25	2.875	7.00	.750	5.62	1260
405TS	35.31	6.88	16.00	13.75	---	4.50	4.25	2.125	4.00	.500	2.75	1251
444T	44.62	8.25	19.00	---	14.50	8.94	8.50	3.375	8.25	.875	6.88	1670
444TS	40.88	8.25	19.00	---	14.50	5.19	4.75	2.375	4.50	.625	3.00	1654
445T	44.62	8.25	19.00	16.50	---	8.94	8.50	3.375	8.25	.875	6.88	1860
445TS	40.88	8.25	19.00	16.50	---	5.19	4.75	2.375	4.50	.625	3.00	1844

- (1) SPECIAL DIMENSIONS APPLYING TO THIS ORDER ON THIS LINE.
- (2) "D" VARIES - 250T - 320T +.00, -.03.
360T - 440T +.00, -.06.
- (3) "U" VARIES - HP TO 1.625 DIA. +.0000, -.0005
1.625 AND LARGER +.000, -.001.
- (4) ALL FRAMES HAVE EIGHT MOUNTING HOLES FOR DUAL MOUNTING.
- (5) MOTOR WEIGHTS MAY VARY BY 15% DEPENDING UPON RATING.
- (6) "N-W" VARIES +.00, -.25.
- (7) GROUND SCREW HOLE, 3/8-16 TAP 1 TO 200HP, ABOVE 200HP 1/2-13 TAP.
- (8) OPTIONAL AUXILIARY CONDUIT BOX SUPPLIED ONLY WHEN SPECIFIED. AUXILIARY CONDUIT BOX LOCATED OPPOSITE SIDE, 250 FRAMES ONLY.

CONDUIT BOX LOCATED ON OPPOSITE SIDE WHEN F-2,W-1, W-4,W-5,W-7, OR C-1 MOUNTING IS SPECIFIED.

IF MOUNTING CLEARANCE DETAILS ARE REQUIRED, CONSULT FACTORY.

MAXIMUM PERMISSIBLE SHAFT RUNOUT WHEN MEASURED AT END OF STD. SHAFT EXTENSION IS .001 T.I.R. UP TO AND INCLUDING 1.625 DIA. AND .0015 T.I.R. BALL BEARINGS .002 T.I.R. ROLLER BEARINGS ABOVE 1.625 DIA. TO 5 INCH DIA.

FRAME- 284TS TYPE- --- CERTIFIED FOR- Flowsolve
 ORDER- --- ITEM- --- HP- 25 RPM- 3600 PH- 3 HZ 60 VOLTS 460
 SALES ORDER- --- APPROVED BY- MH DATE 7/31/09

DUPONT DANISCO
CELLULOSIC ETHANOL
CUSTOMER PO: DDCE110098
TAG NO.: P1301
SERVICE: FRESH NH4OH TANK PUMP
PUMP MODEL: MK3 2K2X1F-100P
PUMP SERIAL NO: 0709-7792
FLOWSERVE ORDER: 034-01430-16

CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT MOTOR PERFORMANCE IS SUITABLE IN THE APPLICATION.

REV. DESC. ASSIGNED TO BUSLOAD
REV. LTR. A
FILE: YRAG\00004\954
M/T: ---
 TDR: 000000450025
BY: RAGRKH
 DIM SH1 TFC 250-440TS SFCL GROUND XT RCP-422

