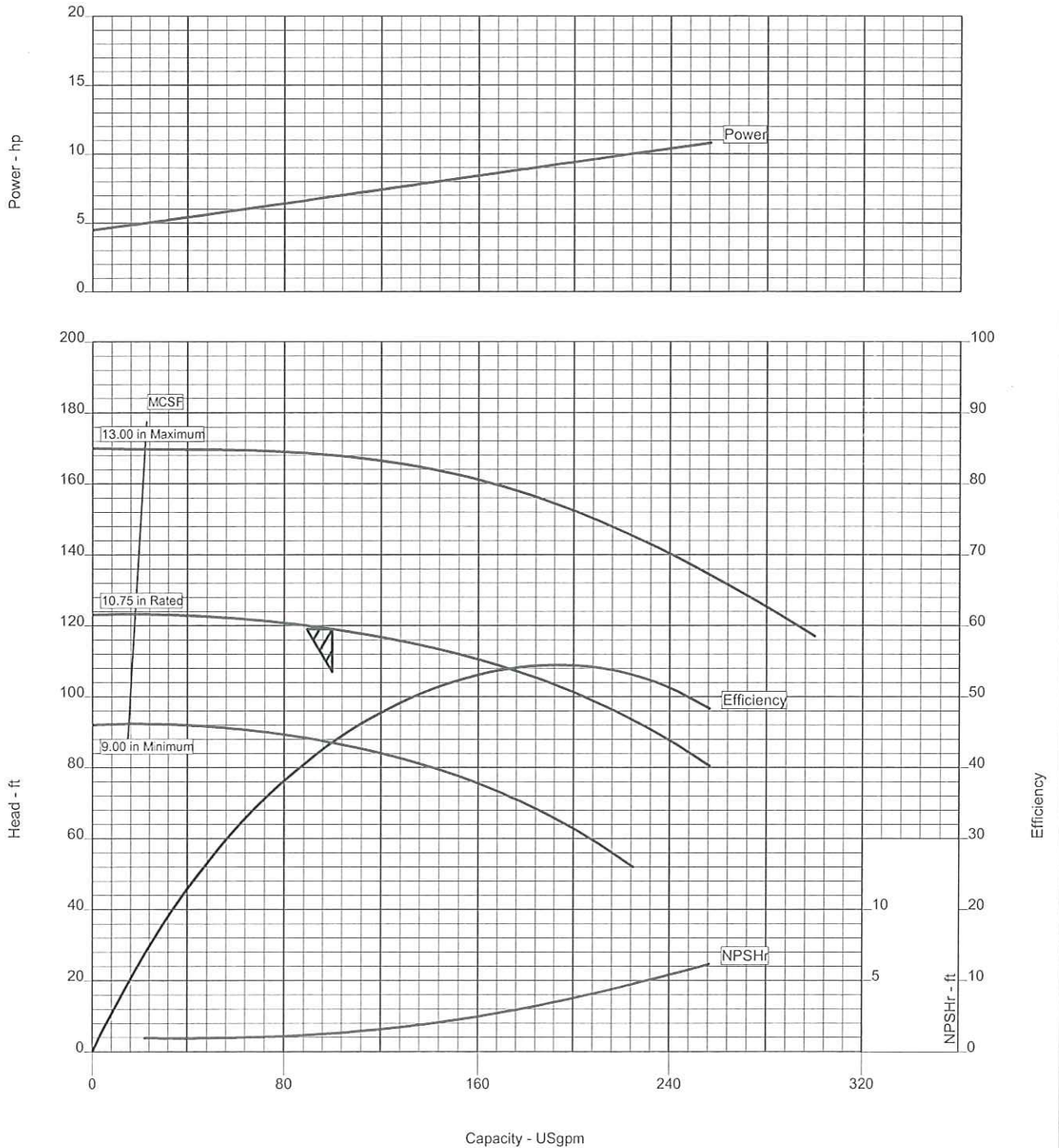


#108663

		Pump size & type	: 2K3x1.5-13RV M3 ST
		Based on curve no.	: MIII7300DV
		Number of stages	: 1
Customer	: FBD, LLC	Capacity	: 100.0 USgpm
Item number	: PC-9501	Head	: 119.0 ft
Service	: Process Water Pump	Specific gravity	: 1.000
Vendor reference	: 5477-00008	Pump speed	: 1750 rpm
Date	: March 4, 2011		

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



Customer	: FBD, LLC	Pump / Stages	: 2K3x1.5-13RV M3 ST	/ 1
Customer reference	: Biorefinery Pilot	Based on curve no.	: MIII7300DV	
Item number	: PC-9501	Vendor reference	: 5477-00008	
Service	: Process Water Pump	Date	: March 4, 2011	
Operating Conditions		Materials / Specification		
Capacity	: 100.0 USgpm	Material column code	: D/C	
Water Capacity (CQ=1.00)	: -	Pump specification	: ANSI B73.1	
Normal capacity	: -	Other Requirements		
Total Developed Head	: 119.00 ft	Hydraulic selection : No specification		
Water head (CH=1.00)	: -	Construction : No specification		
NPSH available (NPSHa)	: 32.8 ft	Test tolerance : Hydraulic Institute Level B		
NPSHa less NPSH margin	: -	Driver Sizing : Max Power (SO to EOC) w/o SF		
Maximum suction pressure	: 0.0 psig	Seal configuration : Single Seal		
Liquid				
Liquid type	: Chemical			
Temperature / SG	: 120 °F / 1.000			
Solid Size - Actual / Limit	: - / 0.00 in			
Viscosity / Vapor pressure	: 1.0 cSt / 1.00 psia			
Performance				
Hydraulic power	: 3.01 hp	Impeller diameter		
Pump speed	: 1750 rpm	Rated	: 10.75 in	
Efficiency (CE=1.00)	: 43.6 %	Maximum	: 13.00 in	
		Minimum	: 9.00 in	
NPSH required (NPSHr)	: 1.3 ft	Suction specific speed	: 8490 US units	
Rated power	: 6.90 hp	Minimum continuous flow	: 18.1 USgpm	
Maximum power	: 10.79 hp	Maximum head @ rated dia	: 123.0 ft	
Driver power	: 15.00 hp / 11.19 kW	Flow at BEP	: 193.3 USgpm	
Casing working pressure	: 53.3 psig	Flow as % of BEP	: 51.7 %	
(based on shut off @ cut dia)		Efficiency at normal flow	: -	
Maximum allowable	: 247.0 psig	Impeller dia ratio (rated/max)	: 82.7 %	
Hydrostatic test pressure	: 375.0 psig	Head rise to shut off	: 3.4 %	
Est. rated seal chamb. press.	: -	Total head ratio (rated/max)	: 70.8 %	

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Customer : FBD, LLC		Pump / Stages : 2K3x1.5-13RV M3 ST / 1	
Customer reference : Biorefinery Pilot		Based on curve no. : MIII7300DV	
Item number : PC-9501		Vendor reference : 5477-00008	
Service : Process Water Pump		Date : March 4, 2011	

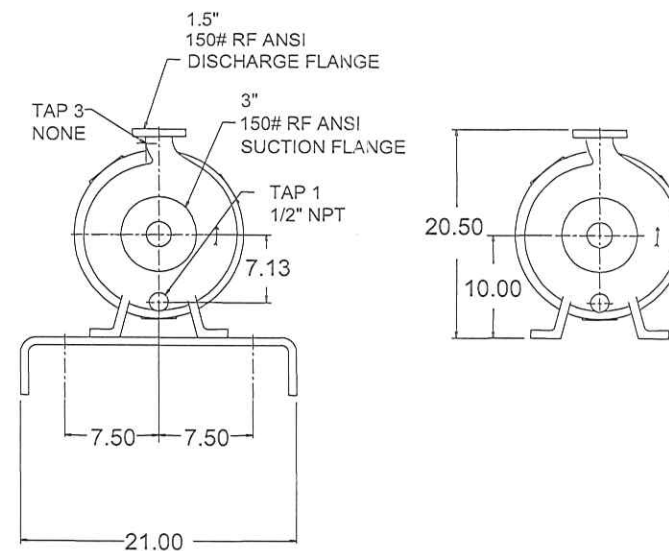
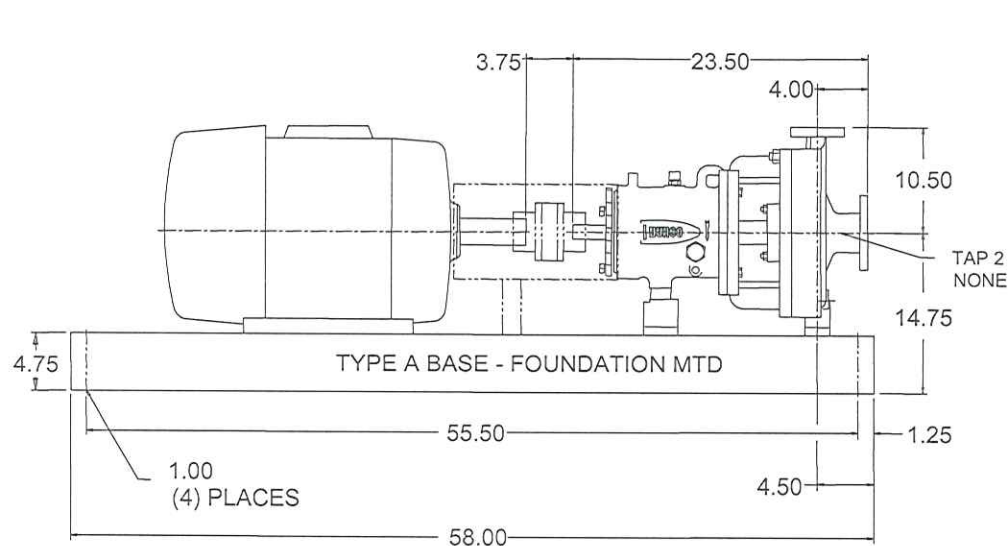
Construction					Driver Information	
Nozzles	Size	Rating	Face	Pos'n	Manufacturer	: Flowserve Choice
Suction	3.00	150#	RF	End	Power	: 15.00 hp / 11.19 kW
Discharge	1.50	150#	RF	Top	Service factor (req'st / act)	: 1.15 / 1.25
Casing mounting : Foot					Speed	: 1800 rpm
Casing split : Radial					Orientation / Mounting	: Horizontal / Foot
Impeller type : Reverse Vane					Driver Type	: NEMA
Bearing type (radial) : Sgl Row					Frame-size / material	: 254T / Aluminum
Bearing number (radial) : 6310-C3					Enclosure	: TEFC-PE
Bearing type (thrust) : Dbl Row					Hazardous area class	: -
Bearing number (thrust) : 5310-AHC3					Explosion 'T' rating	: -
Bearing lubrication : Flood					Volts / Phase / Hz	: 230/460 / 3 / 60
Rotation (view from cplg) : CW per Hyd. Institute					Amps-full load/locked rotor	: 18.40 / 111.00
Motor starting : Direct on line (DOL)					Insulation	: F
Materials					Temperature rise	: -
Casing : Duct.Cast Iron (DCI)					Bearings	: Ball
Impeller : CD4M/CD-4MCu					Lubrication	: Grease
Seal chamber : FML Box / (DCI)					Motor mounted by	: Flowserve
Shaft : BB 1144 Steel					Sound Pressure (dBA @ 1.0 m)	
Sleeve : No Sleeve					Driver, expected	: 66.6
Baseplate, Coupling and Guard					Pump & driver, estimated	: -
Baseplate type : Type A Founda					Seal Information	
Baseplate material : Steel					Arrangement	: Sgl Int O-Ring
Baseplate size : 258 Baseplate					Size	: 1.875
Coupling manufacturer : T.B. Woods					Manufacturer / Type	: Flowserve / ISC Pusher
Coupling size : Sureflex S					Material code (Man'f/API)	: CSCPX----ECXV- / BSTFN
Coupling / Shaft guard : Steel					Internal neck bushing	: Not Available
Shaft / seal guard : None Supplied					Gland	
Weights (Approx.)					Gland material	: 316SS
Bareshaft pump(nett) : 250.0 lb					Flush	: .375" NPT
Baseplate(nett) : 234.0 lb					Vent	: .375" NPT
Driver(nett) : 240.1 lb					Drain	: .375" NPT
Shipping gross weight/vol. : 832.7 lb / 19.58 cu.ft					Auxiliary seal device	: Carbon Bushing
Testing					Piping	
Hydrostatic test : Non witnessed					Seal flush plan	: None
Performance test : None					Seal flush construction	: -
NPSH test : None					Seal flush material	: -
Paint and Package					Aux seal flush plan	: None
Pump paint : Std.Polyurethane					Aux seal flush construction	: -
Base grout surface prep : Standard					Aux seal flush material	: -
Shipment type : Domestic					Notes	
Mark 3A w/Watchdog oiler						
Casing w/1/2" Plugged Drain (NPT)						

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

Customer	: FBD, LLC	Pump size & type	: 2K3x1.5-13RV M3 ST	Drawing number	
Item number	: PC-9501	Pump speed / Stages	: 1750 rpm / 1	Date	: March 4, 2011
Service	: Process Water Pump	Flow / Head	: 100.0 USgpm / 119.00 ft	Certified by / Date :	
Customer PO #	:	Driver power / Frame	: 15.00 hp / 11.19 kW / 254T	Seal type	: ISC Pusher
Vendor reference	: 5477-00008 Rev. A	Volts / Phase / Hz	: 230/460 / 3 / 60	Seal flush plan	: None