APPENDIX A

CITY SUPPLIED PUMP / MOTOR SYSTEM INFORMATION

Photo 1 – Pumps in City Storage

Photo 2 – Pump

Photo 3 – Pumps

Photo 4 – Pump / Motor Shafts

Photo 5 – Motor Bases

Photo 6 – Motor

POWER & MINE SUPPLY CO. LTD.

an **APPLIED ENGINEERING** company

Installation, Operation and Maintenance Manual

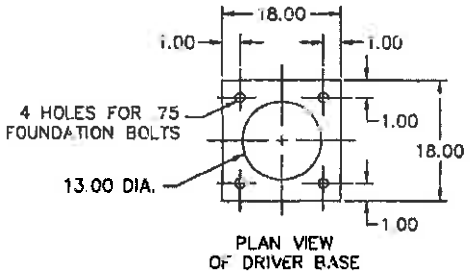
End User:	City of Winnipeg
Order Reference:	52-2006
Pumping Station:	Aubrey Street
Equipment Model:	Flowserve 10MFV-16A
Serial number(s):	0607MS004090-1/2
Power and Mine Supply reference:	ORD35580

Tuesday, September 19, 2006

Head Office: 4 – 75 Meridian Drive, Winnipeg, MB R2R 2V9 • **Phone** (204) 694-9300 • **Fax** (204) 694-7876

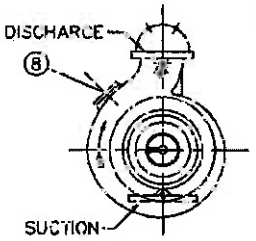
Saskatoon: 901 First Avenue, Saskatoon, SK S7K 1Y4 • **Phone** (306) 244-7274 • **Fax** (306) 244-9911

Ontario: 675 Harold Crescent, Thunder Bay, ON P7C 5H6 • **Phone** (807) 622-4044 • **Fax** (807) 622-3235



PLAN VIEW
OF DRIVER BASE

C.W. ROTATION VIEWED FROM COUPLING END
DISCHARGE NOZZLE POSITION IS
REFERENCED FROM SUCTION FLANGE



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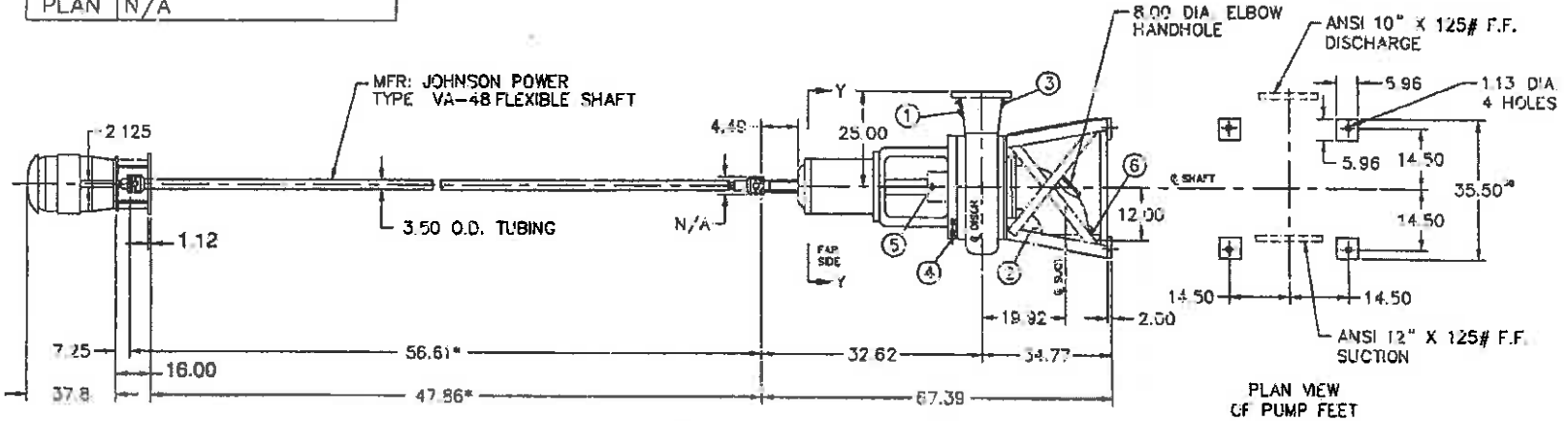
APPROXIMATE WEIGHTS
PUMP = 1560 LB
MOTOR STAND = 120 LB
MOTOR = 1435 LB

PUMP MAXIMUM PASSING
PARTICLE SIZE = 4.5"

MECHANICAL SEAL DATA	
MFR	FLOWSERVE
TYPE	RO
MAT	E75EFV-V
PLAN	N/A



PLAN VIEW
OF PUMP FEET

MOTOR DATA					
MFR	Teco			APPROX WT LBS	1435
TYPE	TEFC	FURN'D BY			PMS
FRAME	405HP	HP	75	RPM	1200
PHASE	3	HZ	60	VOLTS	575

LINE SHAFTING ANGULAR OFFSET IS TO BE LESS THAN 1° PER PLANE (LESS THAN 0.2" PER FOOT OF LENGTH)

1. 75 NPT-CASING VENT-PLUGGED
2. .25 NPT-SUCTION GAGE-PLUGGED
3. .75 NPT-DISCHARGE GAGE-PLUGGED
4. 75 NPT-STUFFING BOX DRAIN
5. .25 NPT-STUFFING BOX SEAL-PLUGGED
6. .50 NPT-SUCTION ELBOW DRAIN-PLUGGED
7. 1560 LBS. APPROX. WEIGHT OF PUMP ONLY
8. 5.00 DIA. CASING HANDHOLE

* NOTE: Distances measured from on site visit:
Pump pad ht = 0.75, Motor pad ht= 14
Floor-Floor ht = 94, Motor floor thick = 8

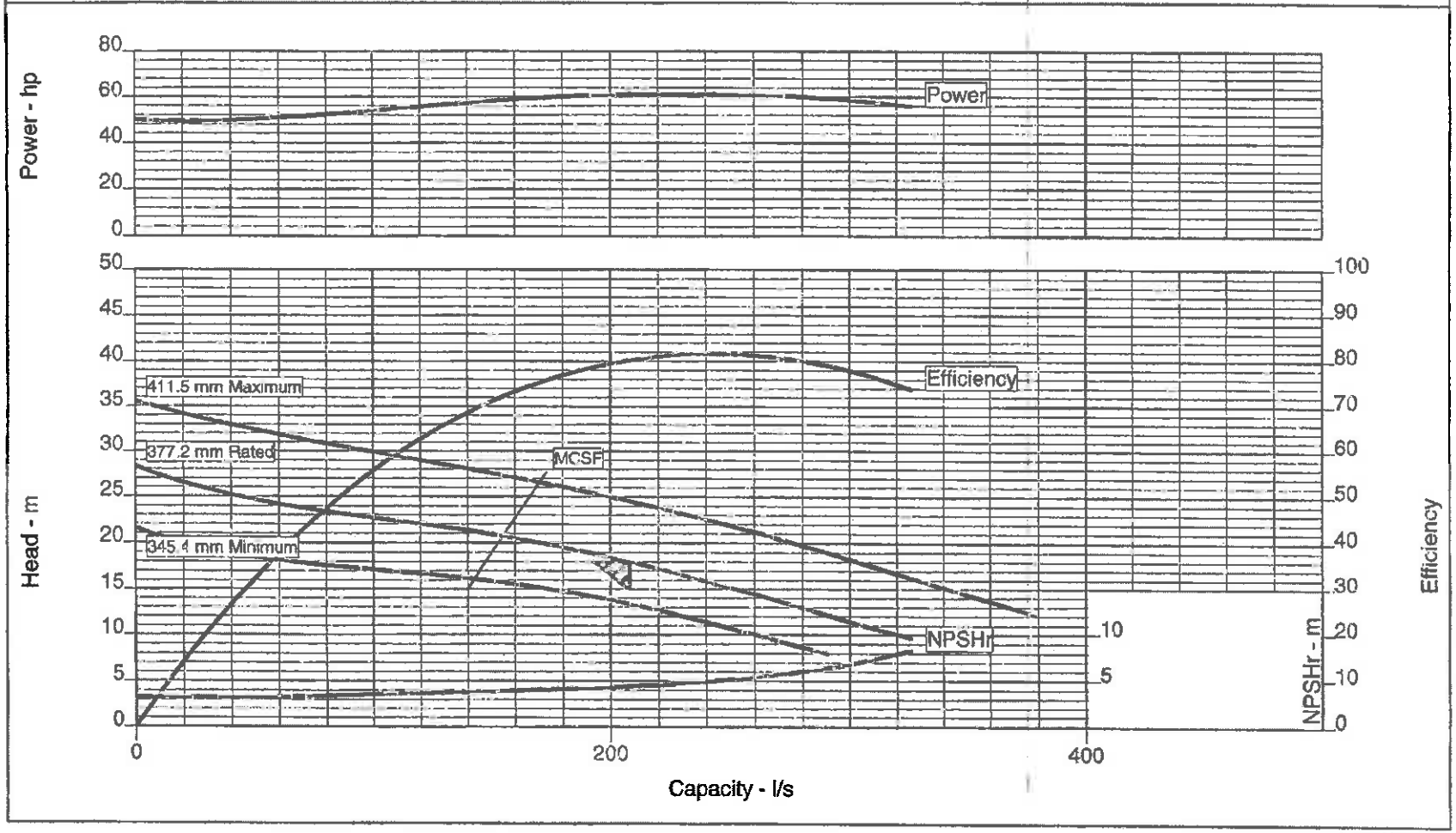
Power & Mine

POWER & MINE SUPPLY CO. LTD.
4 - 75 MERIDIAN DRIVE
WINNIPEG, MB R2R 2V9

DATE	APRIL 26, 2006
WORTHINGTON 10MFV-16 PUMP ELEVATION FRAME 6A	
CUSTOMER	CITY OF WINNIPEG
TAG	AUBREY PUMPING STATION
P.O. #	52-2006
DWG NO.	10MFV16A-6T-405HFa
ORDER #	OR035580
UNITS	INCHES
SCALE	NONE
CERTIFIED BY	S. KENYON

Customer	: City of Winnipeg	FLOWSERVE Pump Division			Pump size & type : 10MF16A FR6A
Item number	: Aubrey				Based on curve no. : 89116719
Service	: Aubrey Station				Number of stages : 1
Vendor reference	: 1833-10084	Capacity	: 208.0 l/s	Specific gravity	: 1.000
Date	: September 18, 2006	Head	: 18.00 m	Pump speed	: 1175 rpm

CURVES ARE APPROXIMATE, PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS, CAPACITY, HEAD, AND EFFICIENCY



FLOWSERVE Pump Division

Hydraulic Datasheet

Customer	: City of Winnipeg	Pump / Stages	: 10MF1SA FR6A	/ 1
Customer reference	: Pumping Station	Based on curve no	: 89116719	
Item number	: Aubrey	Vendor reference	: 1833-10084	
Service	: Aubrey Station	Date	: September 18, 2006	

Operating Conditions

Capacity	: 208.0 l/s
Water capacity (CQ=1.00)	: -
Normal capacity	: -
Total Developed Head	: 18.00 m
Water head (CH=1.00)	: -
NPSH available (NPSHa)	: 7.6 m
NPSHa less NPSH margin	: -
Maximum suction pressure	: 0.0 kPa.g

Liquid

Liquid type	: Sewage
Temperature / SG	: 30 °C / 1.000
Solids diameter	: -
Viscosity / Vapor pressure	: 1.0 cP / -

Materials / Specification

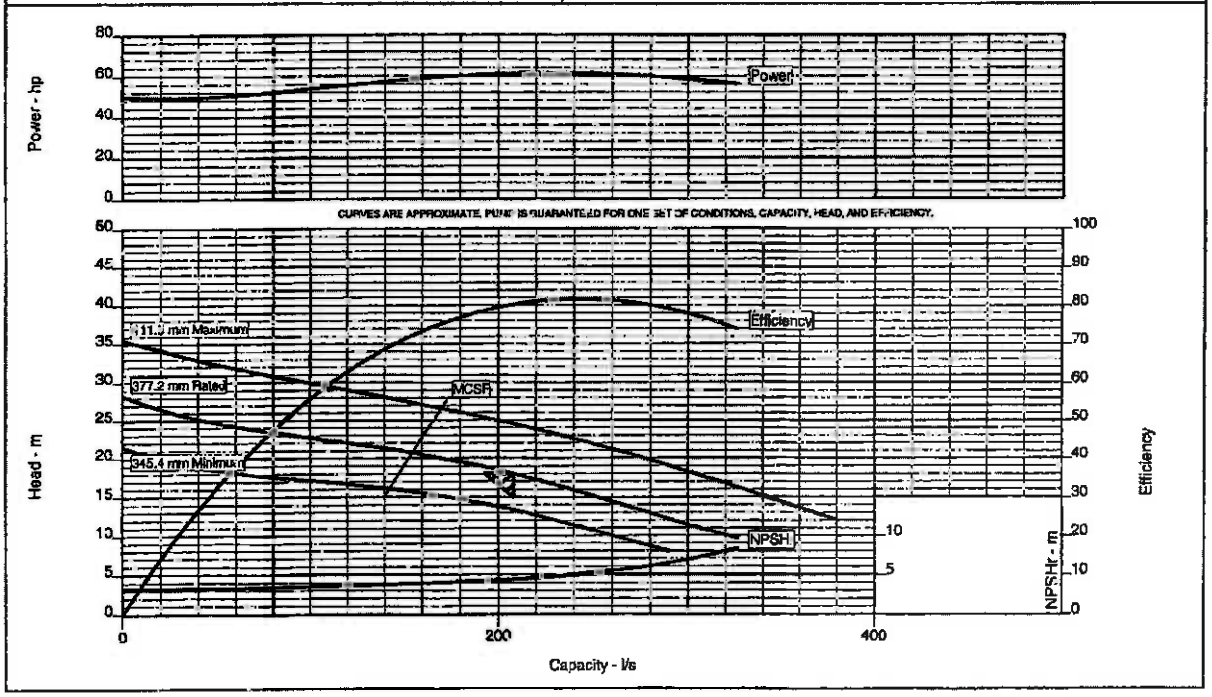
Material column code	: CI
Pump specification	:

Other Requirements

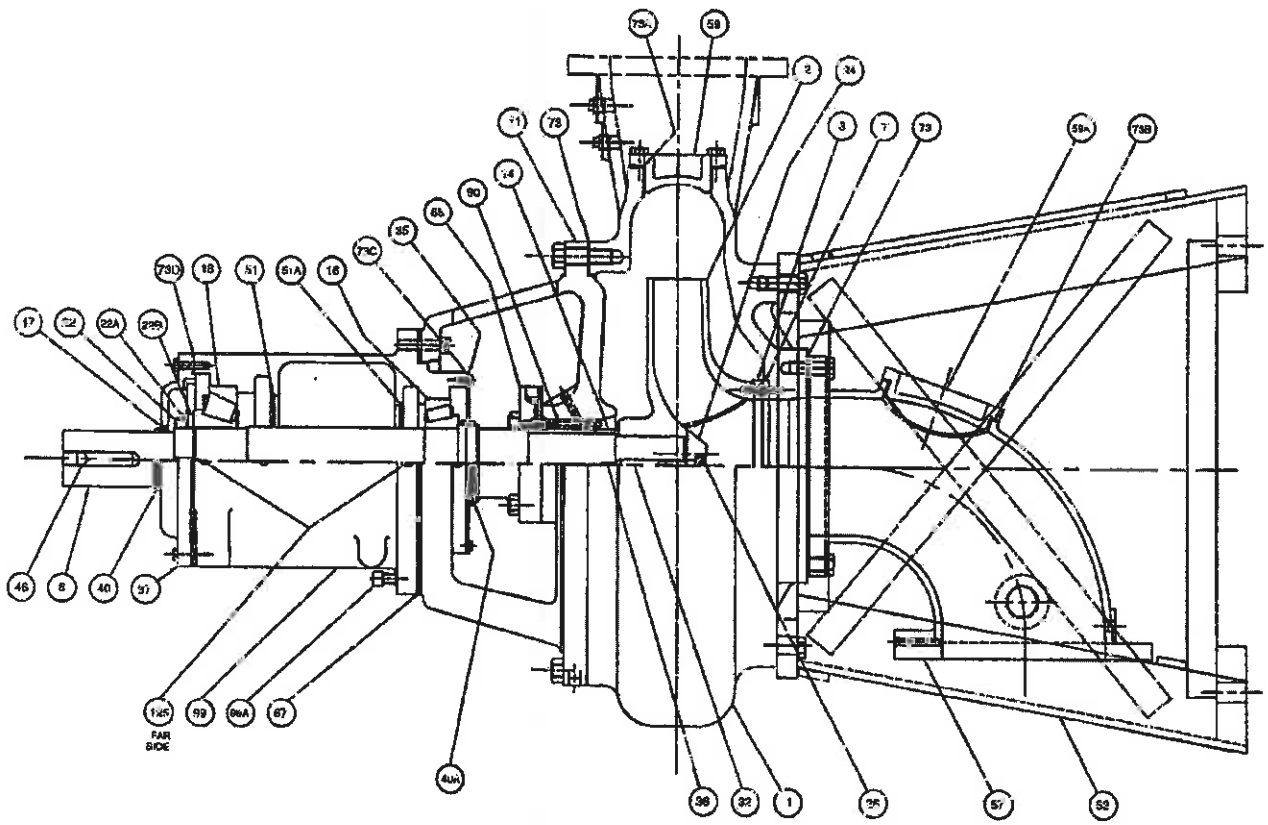
Hydraulic selection : No specification
Construction : No specification
Test tolerance : Hydraulic Institute Level A
Driver Sizing : Max Power(MCSF to EOC)with SF

Performance

Hydraulic power	: 49.2 hp	Impeller diameter	
Pump speed	: 1175 rpm	Rated	: 377.2 mm
Efficiency (CE=1.00)	: 80.2 %	Maximum	: 411.5 mm
		Minimum	: 345.4 mm
NPSH required (NPSHr)	: 4.4 m	Suction specific speed	: 9180 US units
Rated power	: 61.3 hp	Minimum continuous flow	: 156.0 l/s
Maximum power	: 61.5 hp	Maximum head @ rated dia	: 28.3 m
Driver power	: 75.0 hp / 55.9 kW	Flow at BEP	: 243.0 l/s
Casing working pressure	: 277.0 kPa.g	Flow as % of BEP	: 85.6 %
(based on shut off @ cut dia)		Efficiency at normal flow	: -
Maximum allowable	: 413.7 kPa.g	Impeller dia ratio (rated/max)	: 91.7 %
Hydrostatic test pressure	: 689.5 kPa.g	Head rise to shut off	: 57.2 %
Est. rated seal chamb. press	: -	Total head ratio (rated/max)	: 73.4 %



CS 5T/6A



ROTATING PARTS		
REF. NO.	NO REQD	DESCRIPTION
2	1	IMPELLER
6	1	PUMP SHAFT
8	1	IMPELLER WEARING RING
14	1	SHAFT SLEEVE
18	1	LINE BEARING
19	1	THRUST BEARING
22	1	BEARING LOCKNUT
22A	1	BEARING LOCKWASHER
22B	1	BEARING WASHER
24	1	IMPELLER COVER PLATE
28	1	IMPELLER SCREW
32	1	IMPELLER KEY
36	1	SHAFT SLEEVE KEY
40	1	SEAL RING (OUTBOARD)
40A	2	SEAL RING (INBOARD)
46	1	COUPLING KEY
80	1	MECHANICAL SEAL ROTATING ELEMENT

STATIONARY PARTS		
REF NO.	NO REQD	DESCRIPTION
1	1	CASING
7	1	CASING WEARING RING
11	1	STUFFING BOX HEAD
35	1	LINE BEARING COVER
37	1	THRUST BEARING COVER
17	1	GREASE SEAL (OUTBOARD)
51	1	GREASE RETAINER (OUTBOARD)
51A	1	GREASE RETAINER (INBOARD)
53	1	PUMP BASE
57	1	SUCTION ELBOW
59	1	CASING HANDHOLE COVER
59A	1	SUCTION ELBOW HANDHOLE COVER
65	1	MECHANICAL SEAL STATIONARY ELEMENT
67	SET	ADJUSTING SHIMS
73	1	CASING GASKET
73A	1	CASING HANDHOLE COVER GASKET
73B	1	SUCTION ELBOW HANDHOLE COVER GASKET
73C	1	LINE COVER GASKET
73D	1	THRUST COVER GASKET
99	1	BEARING FRAME
99A	2	ADJUSTING BOLT
125	2	GREASE FITTING

NOTE 1. IMPELLER & CASING RINGS ALONG WITH SUCTION REDUCER AND RELATED PARTS ARE OPTIONAL

34 40

CAD DWG -NC MANUAL CHANGES PERMITTED

WORTHINGTON PUMP SECTIONAL
SECTIONAL ASSEMBLY FR-5T, 6A

INGERSOLL — DRESSER PUMP COMPANY
WAREHAM, MASSACHUSETTS

XXX	XXX	XXX	CS 5T/6A	A

ALT. BASES

A B C D E F G H J K

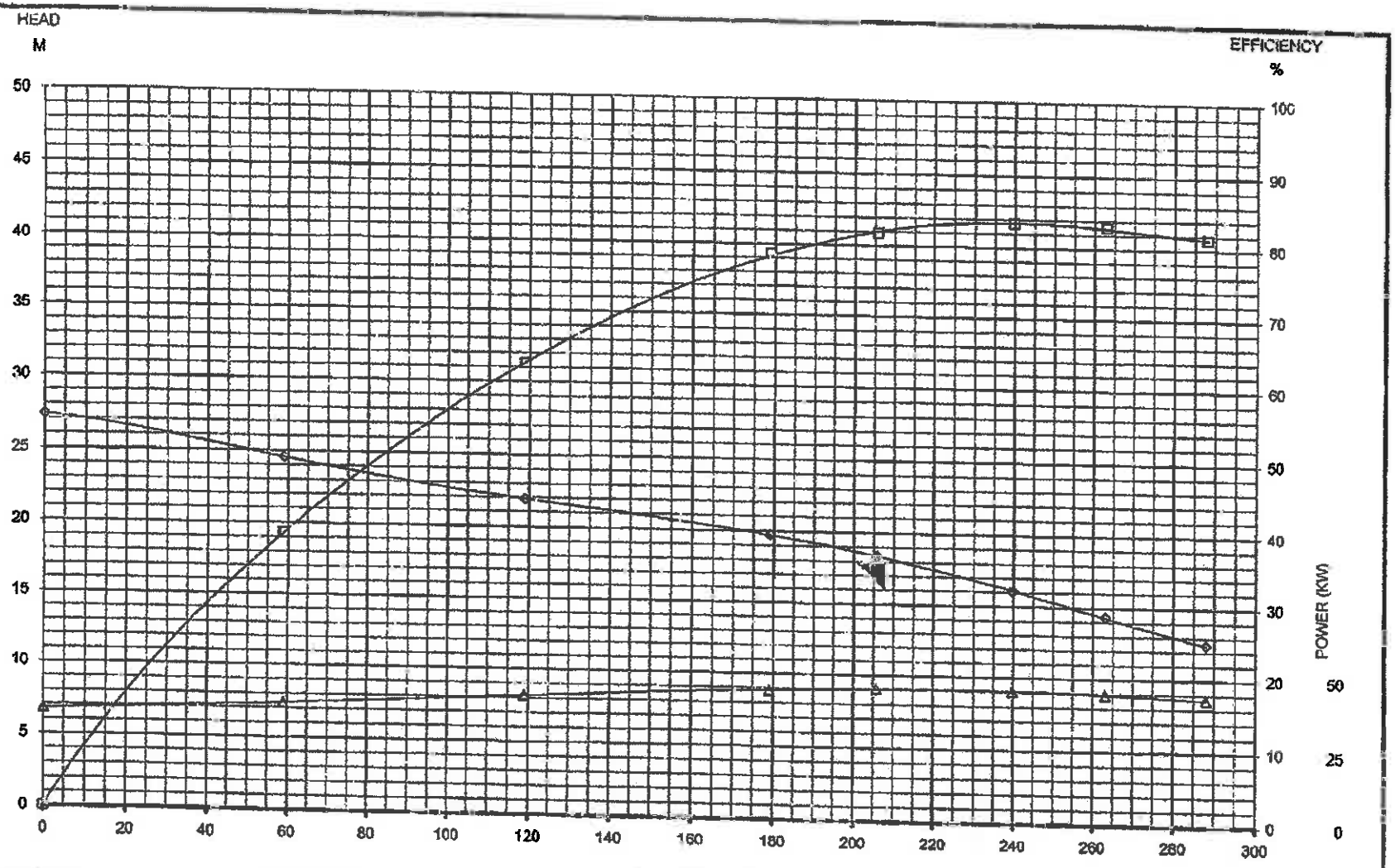
Material List

FLOWSERVE

Cross Sectional Drawing: CS004088

Ref. No.	No. of Pieces	Name of Part	Material
		STATIONARY PARTS	
1	1	Casing	CAST IRON ASTM A-278 CL. 30
7	1	Casing Wearing Ring	STN. STL. (17%CHR.) AISI 440A (450-500 BHN) **NOTE 1**
11	1	Stuffing Box Head	CAST IRON ASTM A-278 CL. 30
35	1	Line Brg. Cover	STEEL
37	1	Thrust Brg. Cover	CAST IRON ASTM A-278 CL. 30
47	1	Grease Seal (Outboard)	NEOPRENE / STEEL CASE
51	1	Grease Retainer (Outboard)	NEOPRENE
51A	1	Grease Retainer (Inboard)	NEOPRENE
53	1	Pump Base	STEEL
57	1	Suction Elbow	CAST IRON ASTM A-278 CL. 30
59	1	Handhole Cover	CAST IRON ASTM A-278 CL. 30
59A	1	Handhole Cover	CAST IRON ASTM A-278 CL. 30
65	1	Mechanical Seal	CARBON
67	1 Set	Adjusting Shims	PLASTIC
73	1	Seal Ring	NEOPRENE
73A	1	Gasket	PAPER
73B	1	Gasket	TEFLON
73C	1	Gasket	ARAMID FIBER
73D	1	Gasket	RUBBER
99	1	Bearing Frame	CAST IRON ASTM A-278 CL. 30
99A	2	Adjusting Bolts	STEEL
125	2	Alemite Grease Ftgs.	STEEL
		ROTATING PARTS	
2	1	Impeller	CAST IRON ASTM A-278 CL. 30 W/3% NICKEL
6	1	Shaft w/ Keys	CARBON STEEL / ASTM A-434 GR. 4140
8	1	Impeller Wearing Ring	STN. STL. / ASTM A-743 GR. CA-15 (325-375 BHN) **NOTE 1**
14	1	Shaft Sleeve	STN. STL. / ASTM A-479 TYPE 316 **NOTE 2**
16	1	Line Bearing	STEEL
18	1	Thrust Bearing	STEEL
22	1	Bearing Locknut	STEEL
22A	1	Bearing Lockwasher	STEEL
22B	1	Bearing Washer	STEEL
24	1	Impeller Cover Plate	STN. STL. / ASTM A-276 TYPE 410
26	1	Impeller Screw	STN. STL. / ASTM A-276 TYPE 410
32	1	Impeller Key	CARBON STEEL / ASTM A-434 GR. 4140
36	1	Shaft Sleeve Key	CARBON STEEL / ASTM A-434 GR. 4140
40	1	Seal Ring (Outboard)	NEOPRENE
40A	2	Seal Ring (Inboard)	NEOPRENE
46	1	Coupling Key	CARBON STEEL / ASTM A-434 GR. 4140
80	1	Mechanical Seal	CERAMIC

1. **Mounted w/ 18-8 S. S. Screws Retained w/ Loctite 271 Adhesive at Assembly.**
2. **Loctite Type RC-680 Retaining Compound Applied Between Sleeve and Shaft at Assembly.**
3. **Locked in Place w/ an 18-8 S.S. Set Screw at Assembly.**



0607MS004090-1 SERIAL NO.	S4090 ORDER NO.	10MFV16 MODEL	1 STAGES	MN TEST LOOP	PUMP TYPE OF TEST	Horizontal 100hp @ 1200rpm TEST MOTOR	12 MAG FLOW METER	07/26/06 DATE TESTED	1A CURVE NO

CASING DATA	IMPELLER DATA		CONDITIONS OF SERVICE		
CAST IRON MATERIAL	2.5-3% NI-CI MATERIAL	1A FINISH	208 L/S FLOW	18 M HEAD	I CERTIFY THAT WITHIN THE ACCUPACY OF THE TEST INSTRUMENTATION, THIS TEST REPRESENTS THE PERFORMANCE OF 0607MS004090-1
1A FINISH	14.84 DIAMETER		1 SG	1180 RPM SPEED	
N/A TONGUE	DEBURR TIP			90 TEMP. (F)	

FLOWSERVE

FLOWSERVE

FLOWSERVE PUMP DIVISION
Taneytown

PERFORMANCE TEST RESULTS

ORDER NUMBER:	S4090
SERIAL NUMBER:	0607MS004090-1
MODEL:	10MFV16 -1
TEST DATE:	07/26/06

DATA CORRECTED TO 1180 RPM AND 1 S.G.

FLOW L/S	HEAD M	POWER KW	EFFICIENCY %	NPSHA M
0.0	27.30	33.82	0.00	15.76
59.0	24.56	36.81	35.61	14.40
119.0	21.91	40.87	62.55	14.07
179.0	19.75	44.11	78.61	13.41
205.8	18.39	45.42	81.74	13.04
239.8	16.07	45.28	83.46	12.46
263.1	14.36	44.60	83.07	12.01
288.1	12.48	43.28	81.49	11.49

FLOWSERVE

FLOWSERVE PUMP DIVISION
Taneytown

TEST DATA

ORDER NUMBER:	S4090
SERIAL NUMBER:	0607MS004090-1
MODEL:	10MFV16 -1
TEST DATE:	07/26/06

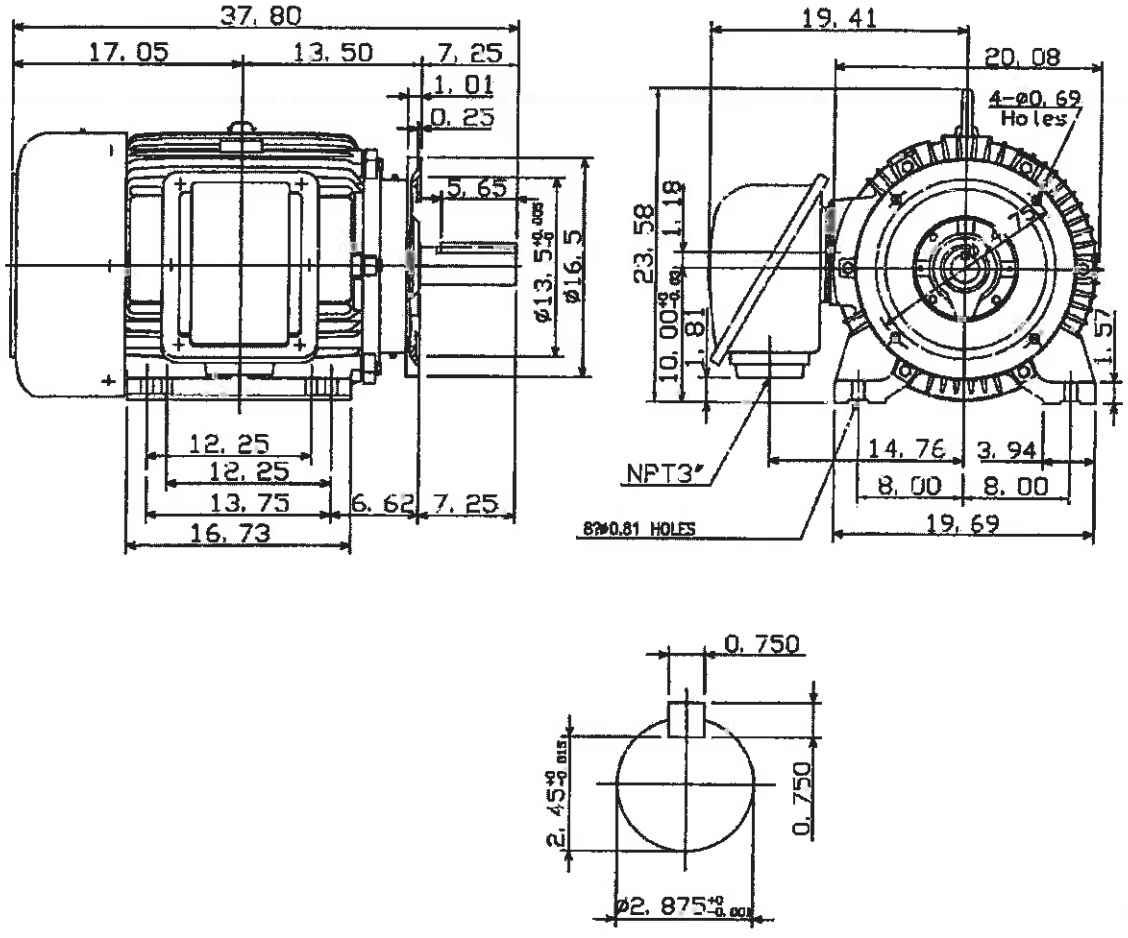
FLOW GPM	POWER KW	Discharge Pressure PSI	Suction Pressure PSI	Speed RPM
0	38.41	45.93	6.41	1188.55
941.5	41.54	39.90	4.34	1188
1896.1	45.66	35.15	3.50	1186.17
2849.1	48.94	30.52	2.01	1184.89
3275.8	50.33	27.75	1.19	1184.89
3816.9	50.21	23.20	-0.06	1185.07
4189.2	49.51	19.81	-1.02	1185.25
4587.9	48.15	16.01	-2.15	1185.62

TECO	OUTLINE DIMENSIONS	MOTOR TYPE: AEHEUW-PB*
DATE	3-PHASE INDUCTION MOTOR	FRAME NO. 405LPZ

Pole	HP	kW	Hz	VOLT	r/min(rpm)
6	75	55	60	575	1200

Ins	Rating	Dimension in	Approx Weight	Bearings
F	CONT.	inches		DE: 6317 NDE: 6313

Totally Enclosed Fan Cooled Type, Squirrel-cage Rotor.



WE6842-1

DWN.	K. L. KUO	05-05-06	東元電機股份有限公司 TECO Electric & Machinery Co., Ltd. TAIWAN	DWG NO.	31057H373580
CHKD.	K. L. KUO	05-05-06			
APPD.	M. C. TSAI	05-05-06			

TECO–Westinghouse

MOTORS (CANADA) INC.

OPTIM™ HE PLUS

HIGH / PREMIUM EFFICIENCY TEFC SEVERE DUTY

NEMA Standard 3-Phase Motors
60Hz, 230V/460V (Usable on 208V) or 575V
NEMA Design B or C, Continuous Duty
Class F Insulation, 40¡C Ambient, 1.15 S.F.
1-300HP CSA Certified for Division 2 Locations (up to 449T Frame)
CSA Certified for Inverter Duty Operation (up to 449T Frame)
HPE® Wire

HP	FULL LOAD RPM	FRAME SIZE	EFFICIENCY (%)		
			FULL LOAD	3/4 LOAD	1/2 LOAD
75	1180	405T	94.1	94.5	94.1

POWER FACTOR (%)			230V CURRENT (A)	
FULL LOAD	3/4 LOAD	1/2 LOAD	FULL LOAD	LOCKED ROTOR
89	87	83.5	-	-

460V CURRENT (A)		575V CURRENT (A)	
FULL LOAD	LOCKED ROTOR	FULL LOAD	LOCKED ROTOR
-	-	67.6	434

TORQUE			
FULL LOAD lb-ft	LOCKED ROTOR %FLT	PULL UP %FLT	BREAKDOWN %FLT
333.4	220	180	250

ROTOR WK² lb-ft²	NEMA CODE LETTER	SERVICE FACTOR
36.239	G	1.15

NOTE: 1. The above are typical values based on test according to ANSI IEEE standard 112 Method B.

2. Breakdown & locked rotor torques are shown as average expected values.
3. Efficiency, power factor, speed and torque are the same for other voltages. Current values vary inversely with voltage.
4. Tolerance According to NEMA MG1-12 & IEC 34-1.
5. Data subject to change without notice.