

**daedong**

# 3A165



Type	Rated RPM	Ratings (kW/HP)	
		Gross Engine Output	Net Engine Output
LWS1	2600	25.5 / 34.2	24.8 / 33.2

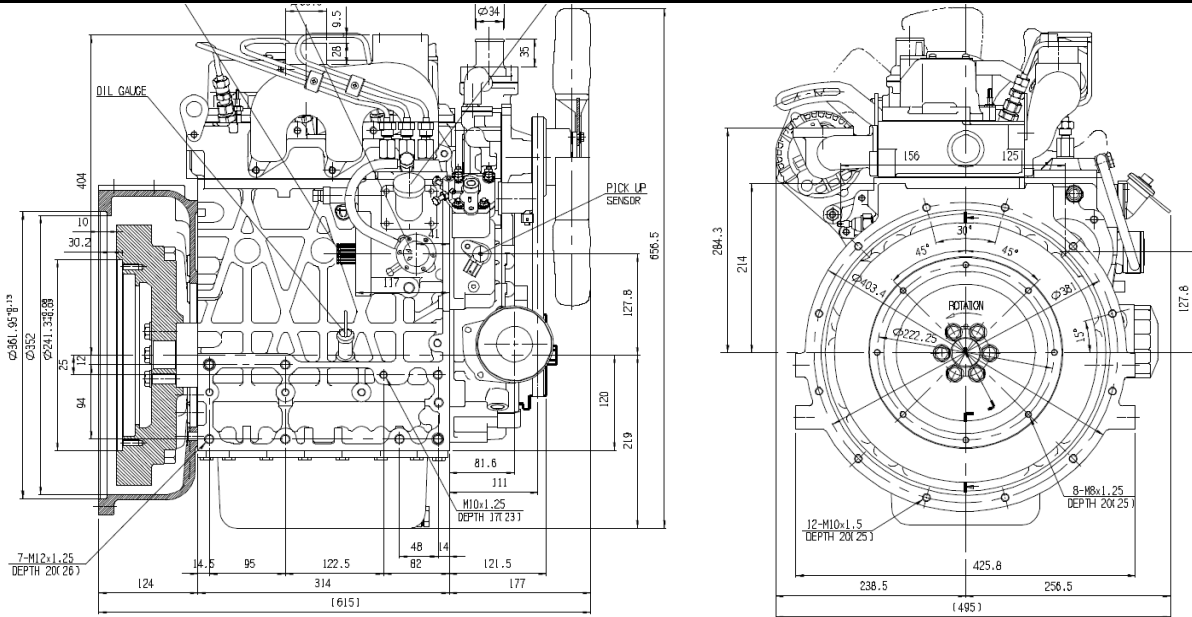
## ◎ GENERAL ENGINE DATA

▶ Emission Level	EEC : Stage3A, EPA : Tier3, Korea : Tier3
▶ Engine Type	3-Cylinder, 4-Cycle, In-line, Diesel, Water cooled, N/A
▶ Bore x Stroke	Ø87 x 92.4 mm
▶ Displacement	1.647 liters
▶ Compression Ratio	21.7 : 1
▶ Combustor Type	In-Direct Injection(Swirl Chamber)
▶ Rotation	Counter clockwise viewed from Flywheel
▶ Dimension (L x W x H)	615 x 495 x 656 mm
▶ Dry Weight	175kg (with Fan)
▶ High Idle Rpm	2800±100
▶ Low Idle Rpm	1000±100
▶ Max. Torque [N·m(kgf·m)/rpm]	97(9.89)/1700±100
▶ Aspiration	N/A
▶ Governor Type	Mechanical Centrifugal
▶ Injection timing	18° BTDC
▶ Alternator Capacity	12V-75A
▶ Firing order	1-2-3
▶ Flywheel housing	SAE No.4
▶ Flywheel	Clutch No.7-1/2
▶ Fuel Consumption Rate(at rated power)	Below 268g/kWh(200g/HPh)



**daedong KIOTI**

**ENGINE DIMENSION**

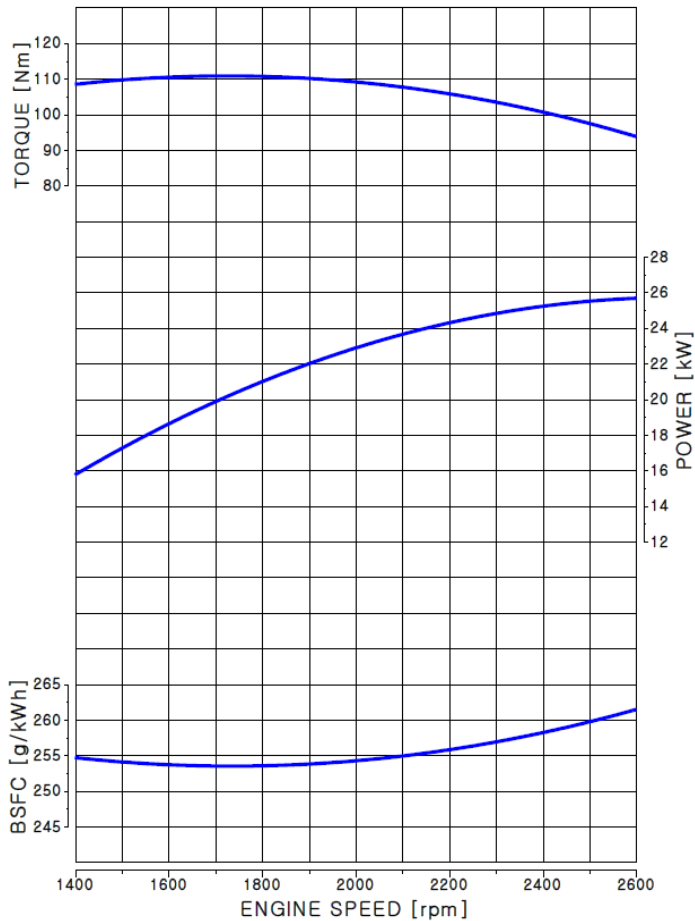


Designation	Length(L)	Width(W)	Height(H)	Dry weight
Value	615	495	656	175

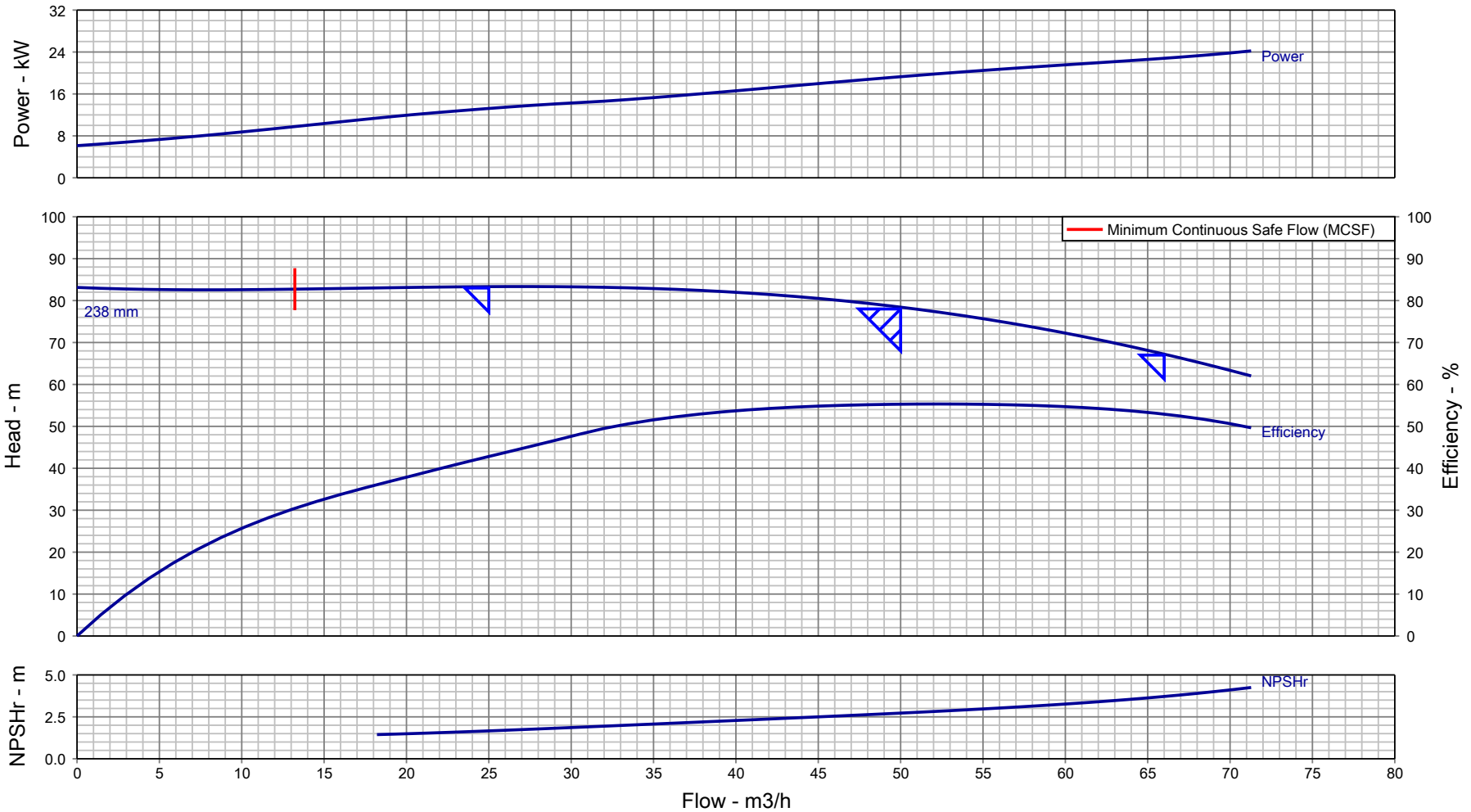
**Performance Curve**

3A165LWS FULL LOAD

SAE J1995



## Pump Performance Curve



Customer :	Pump Size/ Stages : DB 50/26/ 1	Flow, rated : 50.00 m <sup>3</sup> /h
Customer enquiry :	Speed, rated : 2950 rpm	Differential Head : 78.00 m
Project : Default	Based on curve number : HD10212A0 Rev 0	Fluid density rated : 0.998 kg/dm <sup>3</sup>
Quote number : 312657	Viscosity : 1.00 cSt	Efficiency : 55.28 %
Item number : 001	Cq/Ch/Ce/Cn [HI2010] : 1.00 / 1.00 / 1.00 / 1.00	Power, rated : 19.29 kW
Quantity : 1	Minimum recommended driver rating : 30.00 kW / 40.23 hp	NPSH required : 2.72 m
Date last saved : 08 Dec 2020 8:29 AM	Performance testing standard : ISO 9906 / ANSI-HI 14.6 Gr 2B	Liquid Type/ Application : Water

Notes: 1. Performance at shut off condition is approximate. 2. Rated impeller diameter is approximate. 3. Only duty point is guaranteed as per testing standard.

## Customer Price Sheet

Customer		Pump Size / Stages	DB 50/26 / 1
Item number	001	Pump speed	2950 rpm
Customer enquiry		Quote number	312657

### Totals

Grand Total	RFQ	Lead Time Total	N/A
Pumpset	RFQ		

### Pumpset

Qty	Description	Average Unit Price	Extended Price
1	<b>DB 50/26</b> <b>Order Type</b> <b>Order Details</b> Order For: Pumpset Accessories (Other than Driver / Baseplate / Coupling): Not required Spares applicability: Not required <b>Pump (102121611AA11111)</b> <b>Materials of Construction</b> Material Grade standard to be displayed on Sectional Drawing: As per KBL standard Pump casing material: CI IS210:FG260 (012) Impeller material: CI IS210:FG260 (012) Shaft material: ST ST ASTM A276-410 ANLD (253) Shaft sleeve material: ST ST ASTMA276-410(210/250BHN)-ANLD (565) Casing ring material: CI IS210:FG260 (012) Material Code: 16 MOC -CI260(012) / CI260(012) / SS410(253) Bareshaft Pump Price: TP strategy Delivery Alert: This model attracts longer lead time please contact to SNOP, KOV. <b>Construction Options</b> Flange drilling: BS EN1092 PN16 FF Gland Packing / Mechanical Seal: Mechanical seal Stuffing box sealing / flushing: API Plan 01 External Material Group: DB-BR - ALL DB 32/13 TO 150/40 & ILS SMALL Distribution Channel: 01 - Dealer <b>Painting, Packing, QAP, Special Features</b> Painting selection: Standard Painting Packing selection: Standard QAP applicability: Not Required Special Requirements in Bare pumps (CE mark, Spl fasteners, Hardness etc.): None <b>Spl.Requirement Notes (Auto Generated)</b> No special QAP requirements AND Painting:-Standard Painting AND Packing:-Standard <b>Driver (A01KBQAHFAABVEBCAA)</b> <b>Driver Type</b> Driver Selection: Electric Motor Motor Type ( LT/HT - IEC/NEMA): LT motor (IEC solid shaft motors) Motor insulation and cooling: Class F TEFC (Totally Enclosed Fan Cooled) Motor Efficiency Class / Mounting / Starting: IE2 Horizontal motor with DOL starting (STD) Area Classification: Safe area (Non Flame proof) (Standard ) Area- Zone and Gas Group: Safe Zone Area Classification Details: Safe Area SAF Motor poles: 2 pole	RFQ	RFQ

# Pumpset

Qty	Description	Average Unit Price	Extended Price
	<p>           Voltage with Variation: 415 ± 10 % Volts            Frequency With Variation: 50 Hz ± 5% -- Standard            Ambient Temp. / Temp. Rise / Protection Class: 50° Ambient/Temp Rise Limited to Class B/ IP55            Motor Make Choice: Unique Motor make Selection            Motor manufacturer: KBL            Required Accessories: None            Motor Special Requirements of testings, approvals, canopy, paint etc.: None            Motor: KBL IE2 SAF 30KW,2P,B3 200L 415V 50Hz            Motor Price: TP Strategy. (Motor Price newly added. Pl. cross check with Purchase before quoting.)            Spares of Motor required: No  <b>Coupling (A2414050409)</b>  <b>Coupling details</b>            Coupling selection: Catalogue            Coupling make: Rathi            Coupling type: STD            Coupling Service Factor: 1            Coupling: COUP-RATHI-L190 P24M55  <b>Baseplate, Design and Type (K0102Y2201405411)</b>  <b>Baseplate Type</b>            Baseplate Design: Standard Base plate            Coupling guard: MS            Baseplate: BASEASLY-10204UAL20+102Y2+200L+MSGRD         </p>		



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## PUMP TEST WRITE UP

### QUOTE DETAILS

Customer	:	Quote number	: 312657
Customer Enquiry No.	:	Pump model	: DB 50/26
Project	: Default	Stages	: 1
End user	: -	Based on curve number	: HD10212A0 Rev 0
Tag number	: 001	Date last updated	: 08 Dec 2020 8:29 AM
Service	: -	Quantity of pumps	: 1

### DUTY POINT

Head, rated (requested)	: 78.00 m
Flow, rated	: 50.00 m <sup>3</sup> /h
Efficiency at duty point	: 55.28 %
NPSH required / margin required	: 2.72 m / 0.50 m
Power, rated	: 19.29 kW
Pump speed, rated	: 2950 rpm
Specific gravity, rated / max	: 0.998 / 0.998 kg/dm <sup>3</sup>
Viscosity, Rated / Max.	: 1.00 cSt / -

### NOTES :

PERFORMANCE TESTING WILL BE CARRIED OUT ACCORDING TO ISO 9906 / ANSI-HI 14.6 Gr 2B WITH TOLERANCES MENTIONED THEREIN.



## **PUMP TESTING PROCEDURE**

### **1. INTRODUCTION**

This procedure is applicable to acceptance of performance testing of the pump at P. T. Lab of Kirloskar Brothers Limited, Kirloskarwadi. The procedure described is to be employed for testing the pump individually without reference to the final installation conditions.

### **2. PURPOSE OF THE TEST**

2.1 The performance test will be conducted for verifying Head, Discharge, power absorbed & efficiency. Noise level & vibration level of the pump shall be recorded during performance test.

2.2 Range of the performance test-

2.2.1 Readings of Head, Power, Discharge will be taken at five points.

- One point as near as possible to rated capacity and head (duty Head.)
- Two points above rated head in the operating range
- One point below rated head
- One point near to shut off.

2.2.2 Lab motor will be employed to test the pump. If contractually agreed job motor can also be employed to test the pump.

2.2.3 Water at ambient temperature (45 Deg. Max.) shall be used for performance testing.

2.2.4 The duration of test shall be sufficient to attain accurate and consistent test results. Approx. duration will be one hour.

2.2.5 Tolerance at duty point – As mentioned in relevant testing standard.

### **3. TESTING APPARATUS**

Calibration certificates for measuring instruments like Wattmeter, Pressure Gauge, Ammeters, Voltmeters and tachometer will be furnished at the time of test and along with the Test Report.



## PUMP TESTING PROCEDURE

- 3.1 Speed of test – The actual speed of rotation will be as obtained at the prevailing voltage, frequency and load. Actual speed shall be measured at each reading.
- 3.2 The test condition will be obtained by throttling a valve in the delivery pipe.

### 4. PROCEDURE FOR MEASUREMENT OF DISCHARGE, HEAD, POWER INPUT AND SPEED OF ROTATION

- 4.1 Discharge Measurement –The discharge will be measured either by electronic flow meter or 'V' notch / Rectangular weir or other device depending upon discharge at full open flow of the pump.
- 4.2 Head Measurement –Delivery head will be measured by suitable Bourdon type pressure gauge. The gauge will be calibrated on dead weight gauge tester before actual testing of the pump. Suction lift will be measured by manometer.
- 4.3 Measurement of Power Input –The power input will be determined from measurement of the electrical power input to the motor of tested efficiency coupled to the pump. The electrical power input to the motor will be measured by Two Wattmeter Method. Motor output will be computed by using graph of motor efficiency.
- 4.4 Speed Measurement - The speed will be measured by a digital tachometer.
- 4.5 The readings shall be recorded in stabilized condition simultaneously and only after verifying that the readings taken are logical.

### 5. INSTRUMENTS EMPLOYED AND ACCURACY OF MEASUREMENT

Quantity	Instrument	Overall Accuracy (within)
Discharge	Rectangular Weir / V Notch/ Flowmeter	± 1.5%
Head	Bourdon type Pressure Gauge	± 1% of full scale deflection
Power	Wattmeter, Voltmeter, Ammeter.	± 0.5% of full scale deflection
Speed	Digital Tachometer	± 1 rpm

### 6. ANALYSIS OF TESTS

Test data obtained at the speed of rotation in deviation from the specified speed of rotation will be translated to the specified speed of rotation by using the following formulae –



**PUMP TESTING PROCEDURE**

Discharge	$Q_{sp} = Q (N_{sp}/N)$
Total Head	$H_{sp} = H (N_{sp}/N)^2$
Pump Input Power	$P_{sp} = P (N_{sp}/N)^3$
Pump efficiency	$\% \text{efficiency}_{sp} = \% \text{efficiency}$

Where,

suffix 'sp' implies specified.

Q – Discharge in l/sec or m<sup>3</sup>/hr

H - Total Head In m

P - Pump Input in Kw

N - Speed in rpm

Pump efficiency will remain unchanged.

**7. TOTAL HEAD CALCULATIONS**

Total Head (H) =	Delivery gauge reading (H <sub>d</sub> ) ± Suction Manometer reading (H <sub>s</sub> ) + Gauge position correction (α) + Velocity head correction (V <sup>2</sup> /2g)
(V <sup>2</sup> /2g) =	$[V_d^2 - V_s^2] / 2g$

Where,

$g = 9.81 \text{ m/sec}^2$

V<sub>d</sub> = Velocity in delivery Pipe

V<sub>s</sub> = Velocity in suction pipe

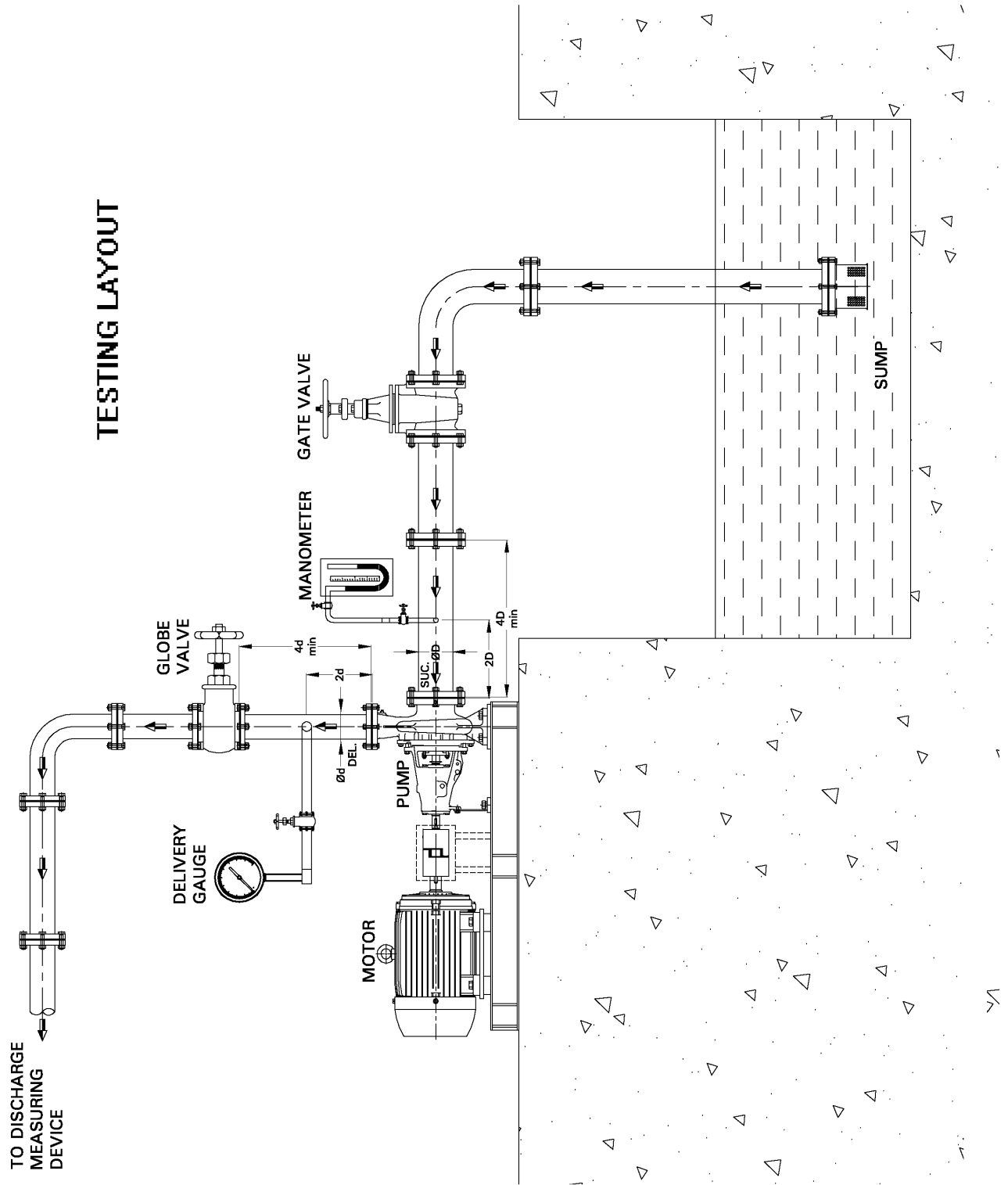
**8. EFFICIENCY CALCULATIONS**

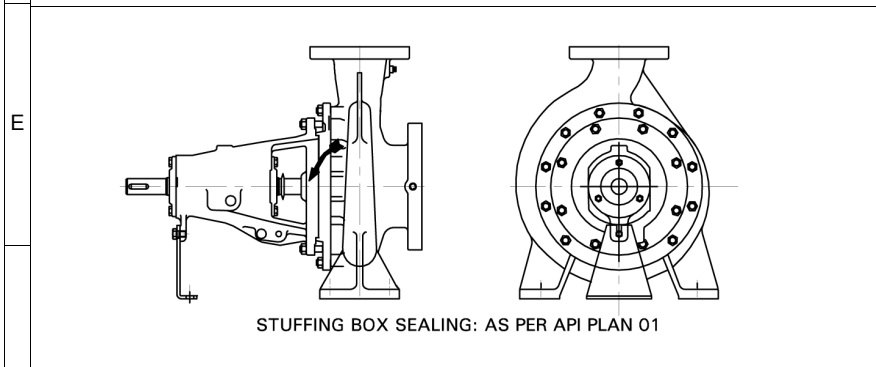
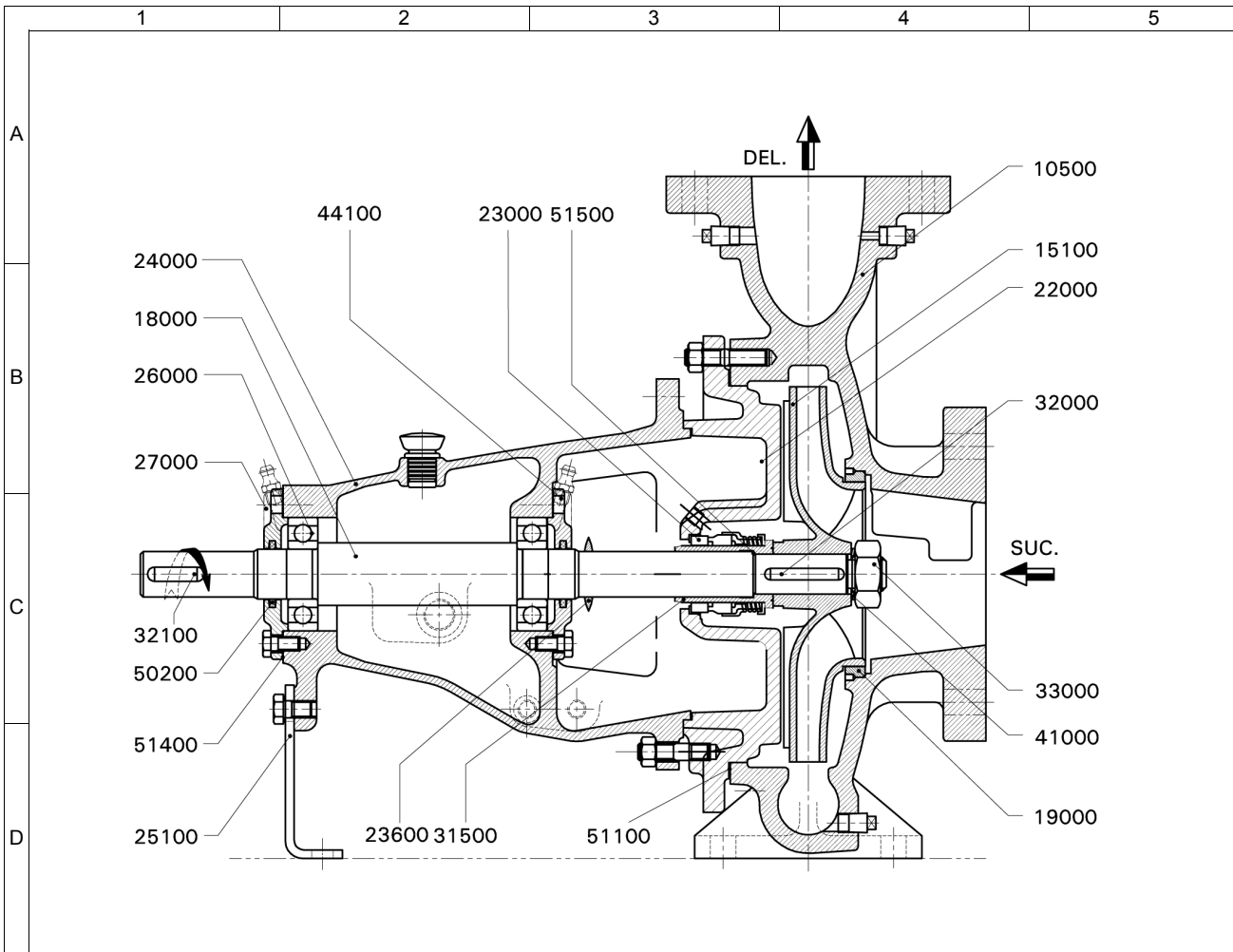
Motor Input (kW) =	Sum of wattmeter reading x Wattmeter Constant
Motor Output(kW) =	Motor Input x Motor Efficiency
Pump Input (kW) =	Motor Output (kW)
Pump Output (kW) =	$\frac{\text{Total Head "H" (m) x Discharge "Q" (lps) x Sp.gravity}}{102}$
Pump efficiency (%) =	$\frac{\text{Pump output x 100}}{\text{Pump input}}$

If specific gravity of the liquid to be pumped is different than water i.e.1.0, then pump input in kw for liquid shall be obtained by multiplying specific gravity of the liquid to the pump input of water.

# PUMP TESTING PROCEDURE

## TESTING LAYOUT





**NOTES:**

- " \* " INDICATES RECOMMENDED SPARES.
- FASTENERS IN LIQUID CONTACT ARE IN CS

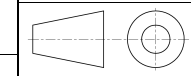
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PART NO.	PART DESCRIPTION	MAT. CODE	MOC DESCRIPTION
10500	PUMP CASING	012	CI IS210:FG260
15100*	IMPELLER	012	CI IS210:FG260
18000*	PUMP SHAFT	253	ST ST ASTM A276-410 ANLD
19000*	WEAR RING - SUCTION SIDE	012	CI IS210:FG260
22000	CASING COVER	012	CI IS210:FG260
23000*	MECHANICAL SEAL	998	DIN SEAL
23600*	LIQUID DEFELCTOR	370	NATURAL RUB ASTM D2000AA-70SHORE/7MPa
24000	BEARING HOUSING	012	CI IS210:FG260
25100	SUPPORT FOOT	042	MS IS:5986-Fe410WA (OLD-IS:1079)
26000*	DEEP GROOVE BALL BEARING	000	STEEL
27000	BEARING COVER DE & NDE	012	CI IS 210-FG 260
31500*	SHAFT SLEEVE - MECHANICALSEAL	565	ST ST ASTMA276-410(210/250BHN)-ANLD
32000*	KEY FOR IMPELLER	253	ST ST ASTM A276-410 ANLD
32100	KEY FOR COUPLING	053	CS IS1570:40C8 HOT RLD
33000*	IMPELLER NUT	664	AUS ST ASTMA194/194M-8M-UNS S31600 (NUT)
41000*	LOCK WASHER-IMPELLER NUT	054	SPRING ST IS:4072-80C6
44100	GREASE NIPPLE	444	CS IS:1367 Part3 CL4.6 CDP
50200*	FELT RING	375	FELT
51100*	GASKET-CASING COVER	702	NON ASBESTOS FERROLITE NAM37 OR EQ
51400*	GASKET-BEARING COVER	702	NON ASBESTOS FERROLITE NAM37 OR EQ
51500*	GASKET-SHAFT SLEEVE	702	NON ASBESTOS FERROLITE NAM37 OR EQ

PUMP	DB 50/26	MOC	16
ENQUIRY NO./DATE	/	QUANTITY	1
PO. NO./DATE	-	TAG NO.	001
QUOTATION NO.	0	DATE.	-
O/A. NO.	-	MISI.	-
CUSTOMER	-		
END USER	-		
PROJECT	Default		
CONSULTANT	-		
SERVICE	-		



**Kirloskar Brothers Limited**  
KIRLOSKARVADI - 416308, DIST.- SANGLI (INDIA)

CROSS SECTIONAL DRAWING

DRAWING NO.	TC02-1
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