

**No.SMPK /KDS/CIV/T/2535/223****Date: 17.02.2021****CORRIGENDUM-III****Ref. Tender Notice No.:** SMPK/KDS/CIV/T/2535/67

dt. 18.01.2021

Corrigendum I vide Notice No. SMPK/KDS/CIV/T/2535/116 Date: 19.01.2021

Corrigendum II vide Notice No. SMPK/KDS/CIV/T/2535/132 Date: 25.01.2021

Name of Work :- E-tendering for "REPAIRING & RESTORATION WORKS OF VARIOUS STRUCTURES FOR PORT & IWT TERMINAL AT SITTWE AND PALETWA UNDER KALADAN MULTI MODAL TRANSIT TRANSPORT PROJECT, MYANMAR"

**In reference to the above NIT and Corrigendum I & II following Corrigendum III is being issued and the required drawing is also being uploaded.**

Sl.No.	Ref. of Tender Document	Requirement by the bidder.	Drawing being uploaded
<b>PART-A</b>			
1.	Steel buoys including all accessories as per the specification and drawings contained in the contract complete in all respect in the access channel and harbour channel at Sittwe. (BOQ Item No. 1,Part-A)	<b>Detailed</b> specification and drawings of Steel Buoys and other accessories <b>Detailed</b> specification and drawings of Steel Buoys and other accessories	Drawings and Specification of Steel,FRP buoys and shore markers are being <b>uploaded</b>
2.	FRP Buoys including all accessories as per the specification and drawings contained in the contract complete in all respect in the channel between Sittwe and Kyauktaw. (BOQ Item No. 3,Part-A)		
3.	Shore Markers including all accessories as per the specification and drawings contained in the contract complete in all respect in the channel between Kyauktaw and Paletwa. (BOQ Item No. 5,Part-A)		
4.	Fuel Storage and handling system(BOQ Item No. 7,Part-A)	<b>Detailed</b> Specification and capacity of storage system	Drawing nos i) 3505-H000-83000-0003-0204-0001 ii) 3505-ENG-PJWO-GNAGN-FSP-DED-0001 iii) 3505-H000-Z83560-0008-0805-0001 Rev.-1 <b>are being uploaded</b>
5.	Construction of Cover Shed for Fuel Dispenser Unit at Sittwe .The construction will be executed as per approved drawings, technical specifications and as directed by Engineer-in-charge. (BOQ Item No. 9,Part-A)	<b>Detailed</b> TECHNICAL Specification and drawings of Cover Shed for Fuel Dispenser Unit at Sittwe	Drawing nos. 1.3505-H000-A00000-0008-0804-0031-01 2. 3505-H000-Z83560-0008-0800-0001- Rev.1 <b>are being uploaded</b>

6.	Rectification of Collapsed Armour layer - in between +2.20 to +5.05 M near the Sittwe Port Jetty uneven stones between two jetty approaches and filling 500 KG stones & to rectify and maintain slope profile as per approved drawings (BOQ Item No. 13(Part A))	<b>Detailed drawings and Specification</b>	Drawing no. 3505-H000-A07130-0024-2429-0001(Rev5) <b>is being uploaded</b>
7.	Rectification of Fenders frontal frame and fascia pad (Model no. SCK500H-E2.8) at IWT Jetty, Sittwe. (BOQ Item No. 15(PartA))	<b>Detailed drawings &amp; Technical Specification</b>	Drawings IND450-3M05 IND450-3P01 IND450-3T01 IND450-3T02 <b>are being uploaded.</b>
8.	MCC panel for supply of EB connection from Sittwe electricity department. (BOQ Item No. 17(Part-A))	<b>Detailed Technical Specification</b>	Single Line Diagram of LV Switch Gear(MCC-1&2) Drg. No. 3505-H000-Z00000-0009-0928-0004(Rev. 1) <b>is being uploaded</b>
9.	Repair of some fittings and painting of HLL Crane. (BOQ Item No.19,Part-A)	<b>Detailed Technical Specification</b>	A detail brochure of HLL Crane is being uploaded.
<b>PART-B</b>			
1	Fuel bunkering pump house and vehicle repairing shop equipments(BOQ Item No. 3)	<b>Detailed list of equipments including TECHNICAL Specification</b>	Drawing nos. 1.1.3539-ENG-PJWO-GBIRPS-CIV-ARC/001 2.1. 3539-ENG-PJHO-GIFGEN-CIV-FOU-002-Rev.-4 3. 1.3505-H000-Z66000-0002-0332-0008-02 4. 1. 3539-ENG-PJWO-GNAGEN-VAM-LIS-0001-01 5. 1. 3539-ENG-PJWO-GNAGEN-VAM-TSP-0006-01 6. 1. 3539-ENG-PJWO-GIFGEN-CIV-FOU-0006 Rev.-1 7. 1. 3539-ENG-PJWO-GNAGEN-FSP-PID-0001 Rev.-3 8.. 3539-ENG-PJWO-GNAGEN-FSP-PFD-0001 Rev.2. 9.. 3539-ENG-PJWO- GNAGEN-FSP-PGD-0001Rev.-2. <b>are being uploaded.</b>
2	Construction of Cover Shed for Fuel Dispenser Unit at Paletwa. The construction will be executed as per approved drawings, technical specifications and as directed by Engineer-in-charge. .( BOQ Item No. 5)	<b>Detailed TECHNICAL Specification and drawings of Cover Shed for Fuel Dispenser Unit at Paletwa</b>	1.3505-H000-Z66000-0002-0332-0008-02 <b>is being uploaded.</b>

<b>3.</b>	Construction of PCC "V" Drain along slope protection area in River Side at Paletwa as per specification and drawings contained in the contract . . (BOQ Item No. 7)	<b>Detailed Specification and Drawings of PCC "V" Drain .</b>	Drawing nos. 1.5.3539-ENG-PJWO-GIFGEN-CIV-SPD-0008 Rev.-1 2.1.3 TYPICAL DETAILS OF HORIZONTAL DRAIN <b>are being uploaded.</b>
<b>4</b>	Construction of RCC Storm Water Drain at Paletwa as per specification and drawings contained in the contract . (BOQ Item No. 9)	<b>Detailed Specification and Drawings of RCC Storm Water Drain.</b>	i) 3539-ENG-PJWO-GIFGEN-CIV-SPD-0013 Rev.-1- ii) 3539-ENG-PJWO-GIFGEN-CIV-GAD-0002- <b>Rev.-2 is being uploaded</b>

**All other terms & conditions and Clauses will remain same as per original**

Sd/-

**Superintending Engineer(Contract)**

**For मु<sup>TM</sup>य अभियंता/ Chief Engineer**

Figure 10-10  
Drawing 10-10

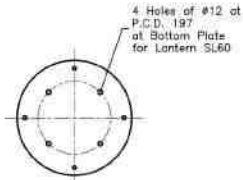
Figure 10-11  
Drawing 10-11

Figure 10-12  
Drawing 10-12

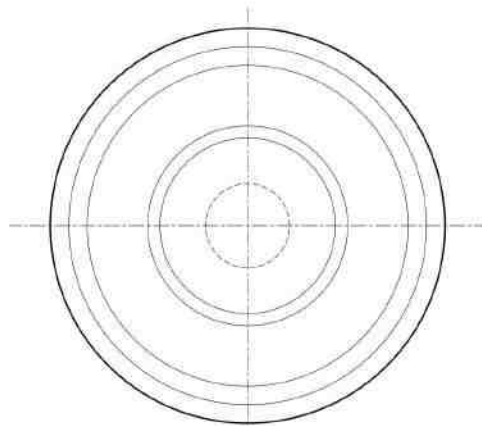
Figure 10-13  
Drawing 10-13

## 1.1 Drawing

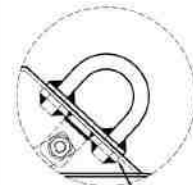
# Ø1.3mtr CAN OR CONE TYPE FRP BUOY ASSEMBLY.



SECTION - 'BB'

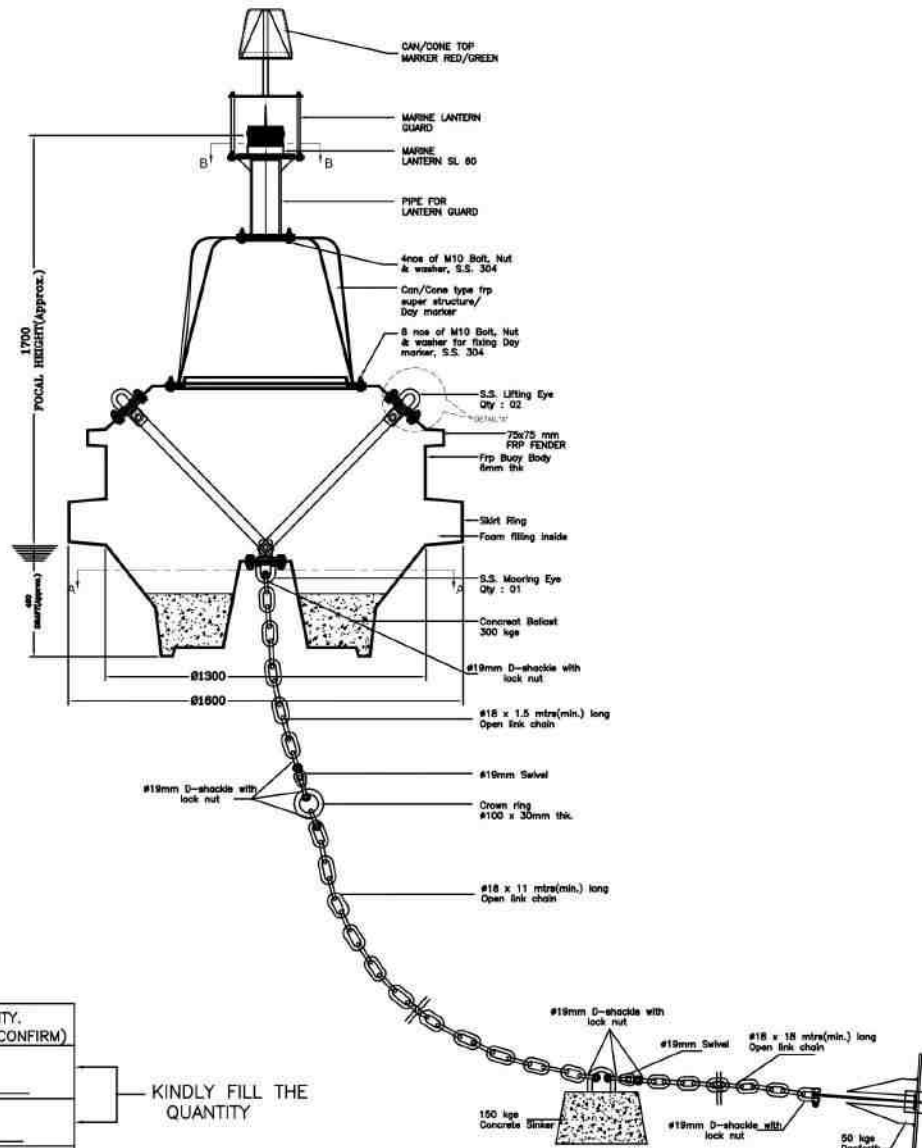


SECTION - 'AA'



12MM THK. +  
6MM M.S. INSERT

DETAIL "A"

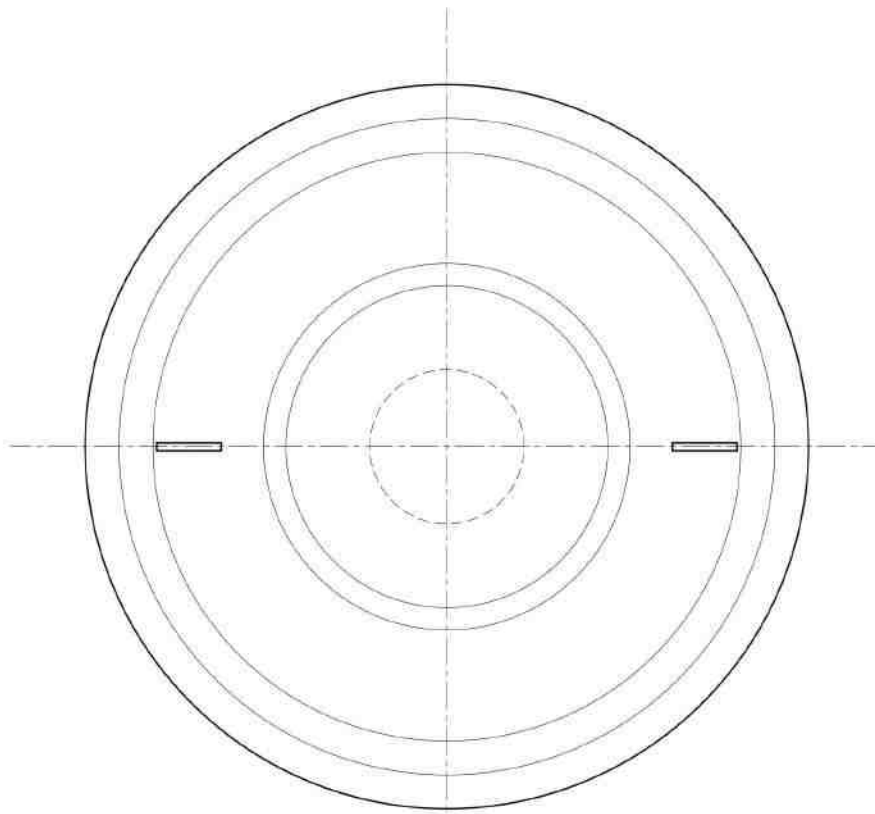


SR.NO	COLOUR	QUANTITY, (CLIAINT TO CONFIRM)
1	RED	
2	GREEN	
TOTAL QUANTITY		10 NOS

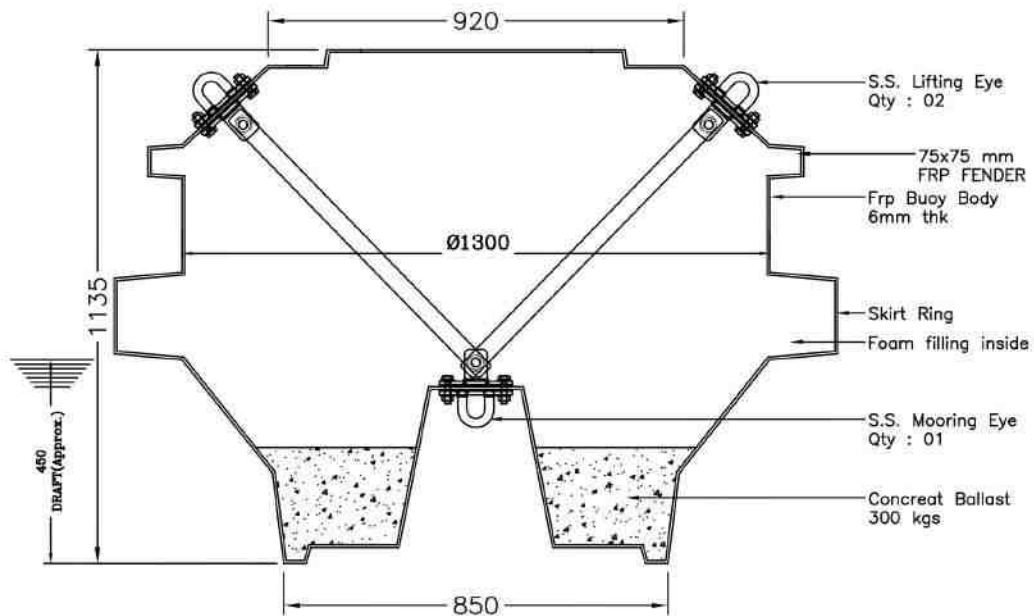
KINDLY FILL THE  
QUANTITY

NOTE:-  
\* PART NAME :- Dia. 1.3m FRP CAN OR CONE TYPE BUOY ASSEMBLY  
\* TOTAL QTY :- 10 nos.  
\* MATERIAL :- AS PER SPECIFICATION.  
\* STANDARD TOLERANCES OF ± 3 % SHALL APPLY, OTHERWISE AS SPECIFIED.  
\* ALL DIMENSION ARE IN mm OTHERWISE AS SPECIFIED.

DRG. NO. / REV. NO.		TITLE		STATUS CODE: 1-PRELIMINARY 2-FOR APPROVAL 3-TENDER 4-GOOD FOR PRODUCTION 5-INSPECTION REPORT		CLIENT :	
22.07.13		2		FOR APPROVAL		PROJECT : IWAI-MYANMAR	
REV. NO.		DATE		STATUS		TITLE : Dia. 1.3m FRP CAN OR CONE TYPE BUOY ASSEMBLY	
DRG. NO.		REV. NO.		REVISION		DRG. NO. : HEL / ORD /13-26/ DWG/01 / R0/130723	
REFERENCE DRAWING		SCALE		N.T.S.		SCALE	

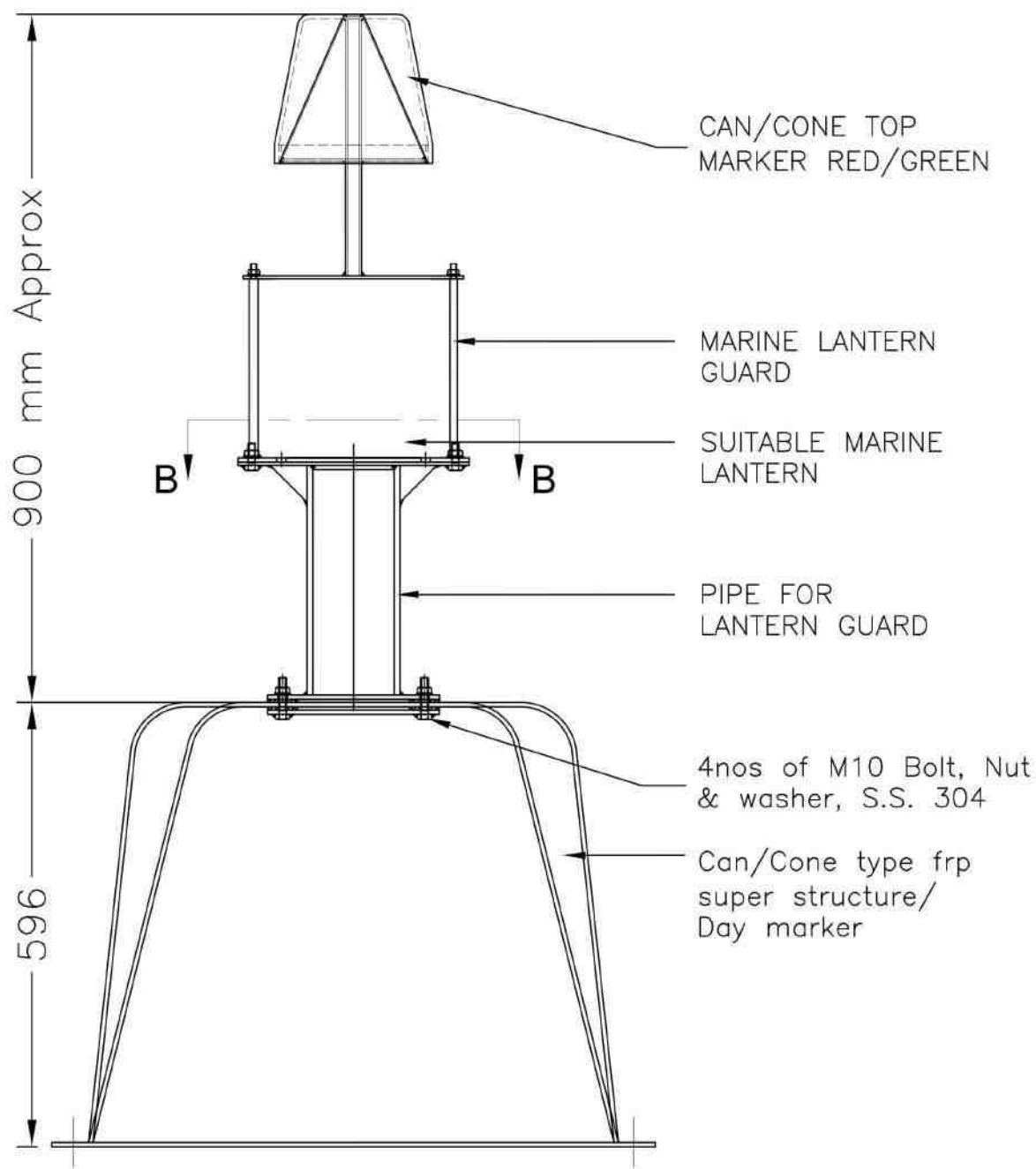


PLAN



NOTE :-  
 \* PART NAME :- Dia. 1.3m FRP CAN OR CONE TYPE BUOY ASSEMBLY  
 \* TOTAL QTY :- 10 nos.  
 \* MATERIAL :- AS PER SPECIFICATION  
 \* STANDARD TOLERANCES OF  $\pm 3\%$  SHALL APPLY, OTHERWISE AS SPECIFIED.  
 \* ALL DIMENSION ARE IN mm OTHERWISE AS SPECIFIED.

DRG. NO. / REV. NO.		TITLE		STATUS		FOR APPROVAL		CLIENT :	
0		20.07.13		0		FOR APPROVAL		PROJECT : IWAI-MYANMAR	
REV. NO.		DATE		STATUS		DESCRIPTION		TITLE : Dia. 1.3m FRP BUOY BODY	
						DRAWN BY : CH. BY. APPR. BY.		DRG. NO. : HEL / ORD /13-26/ DWG/01-02 / R0/130723	
REFERENCE DRAWING		STATUS CODE : 1-PRELIMINARY 2-FOR APPROVAL 3-DESIGN 4-GOOD FOR PRODUCTION 5-FINISHED/REPORT						SCALE : N.T.S.	
								Rev No. : 0	



NOTE :-  
 \* PART NAME :- Dia. 1.3m FRP CAN OR CONE TYPE BUOY ASSEMBLY  
 \* TOTAL QTY :- 10 nos.  
 \* MATERIAL :- AS PER SPECIFICATION.  
 \* STANDARD TOLERANCES OF  $\pm 3\%$  SHALL APPLY, OTHERWISE AS SPECIFIED.  
 \* ALL DIMENSION ARE IN mm OTHERWISE AS SPECIFIED.

REV. NO.	DATE	STATUS	DESCRIPTION	DRAWN BY	CHECKED	APPROVED
1	23.07.13	2	FOR APPROVAL			
REVISION						
STATUS CODE :- 1 PRELIMINARY 2 FOR APPROVAL 3 TENDER 4 EXCEED FOR PRODUCTION 5 INSPECTION REPORT						

CLIENT :	
PROJECT :	IWAI-MYANMAR
TITLE :	SUPER STRUCTURE FOR Dia. 1.3m FRP BUOY.
DRG. NO. :	HEL / ORD / 13-20/ DWG/01-03 / R0/130723
SCALE :	Rm. No.
N.T.S.	B

## 1.2 Material Specification

### 1.2.1 Technical Specification:

Construction	:	Material will be Fiber reinforced Plastic (FRP), fully filled with polyurethane foam.
Material	:	reinforced Plastic (FRP)
Buoy Diameter	:	Minimum 1.3 m along with skirting, day marker.
Focal height	:	+1700mm (approx).
Draft	:	approximately 450mm.
Shape	:	As specify in the drawing
Nuts & Bolts	:	All fixing bolts & nuts are to be made of stainless steel.
Superstructure	:	CAN/CONE type F.R.P. super Structure.
Lifting Eyes	:	02 Nos.
Mooring Eyes	:	01 Nos.
Fender	:	HAT type FRP construction with polyurethane core.

### 1.2.2 Painting Specification:

The Buoy body will have the natural colour of FRP. Green colour shall be impregnated during the manufacture of CONE day mark and Red colour shall be impregnated for the Cylindrical Cover (Cylindrical Day mark). The CONE marks / CAN marks (Green / Red) are to be provided with retro reflective tapes of same colour for easy location in night. Such tape shall cover 50% of the surface and shall be all around.

### 1.2.3 Lighting equipment:

Solar LED lantern SL 60.

### 1.2.4 Mooring System: Each set of mooring and sinker is to consist of the following complying with I.S.4484 & I.S.6132 or equivalent as applicable.

#### Mooring Gear:-

- a) The chain size will be based on the maximum expected mooring load.
- b) The minimum chain of nominal size for mooring the buoy will be 18mm U2 Grade or equivalent.
- c) One no. of pendent chain of 18mm dia. Of 11m length and one no. of 18mm dia. Of 18m length chain between Sinker and Anchor and 1.5m long open link pendant chain of 18mm dia. Two nos.

#### Sinker: -

One concrete Sinker of at least weighing 150Kgs will be provided per Buoy with a mild steel Lug of a nominal diameter not less than that of the chain and also have such dimensions that it can easily accommodate two 'D' shackles with nominal dia. Equivalent to the chain chosen.



**.Anchor: -**

One danforth anchor of 50Kg (Dry weight) will be provided per buoy. Each of the anchor will be provided with an anchor ring, shackle suitable for the anchor shank and having the same grade of material and the nominal size as the chain.

**Shackle: -**

'D' type end shackles 10 nos. (2 extra) 19mm nominal dia. D shackle with lock nut U2 grade will be provided. An extra two lose shackles will be provided on the bridle ring in order to shorten the pendent chain during water level recess. The locking pin used for shackles will be of stainless steel or non corrosive material.

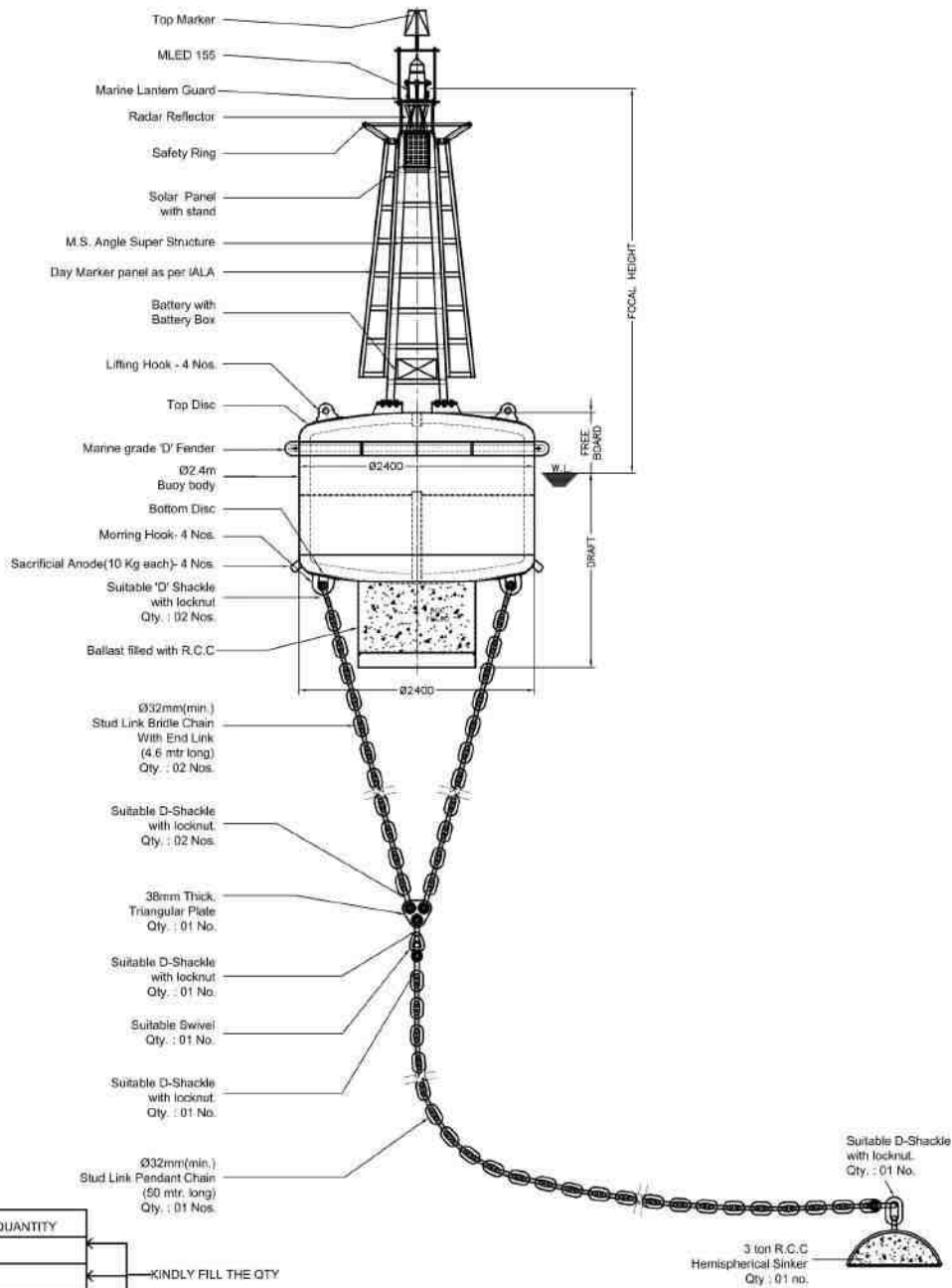
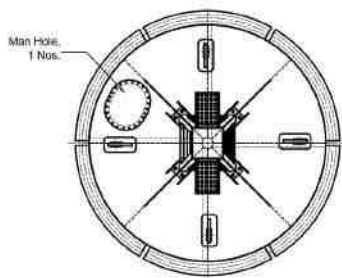
**Bridle Ring: -**

The nominal dia. Of bridle ring will be at least min. 1.8 times the dia. Of the chain chosen and it can be accommodate at least 5 'D' type shackles of the same size.

**Swivel: -**

One open swivel set complete with end joining links and with 19mm dia. size swivel piece with end links U2 Grade suitable to that of the chain chosen will be provided between bridle ring and sinker (pendent Line) as well as between sinker and anchor (Ground line) per Buoy.

## 2.1 Drawing



SR.NO	COLOUR	QUANTITY
1	RED	
2	GREEN	
3	WHITE-RED	
TOTAL QUANTITY		5 nos

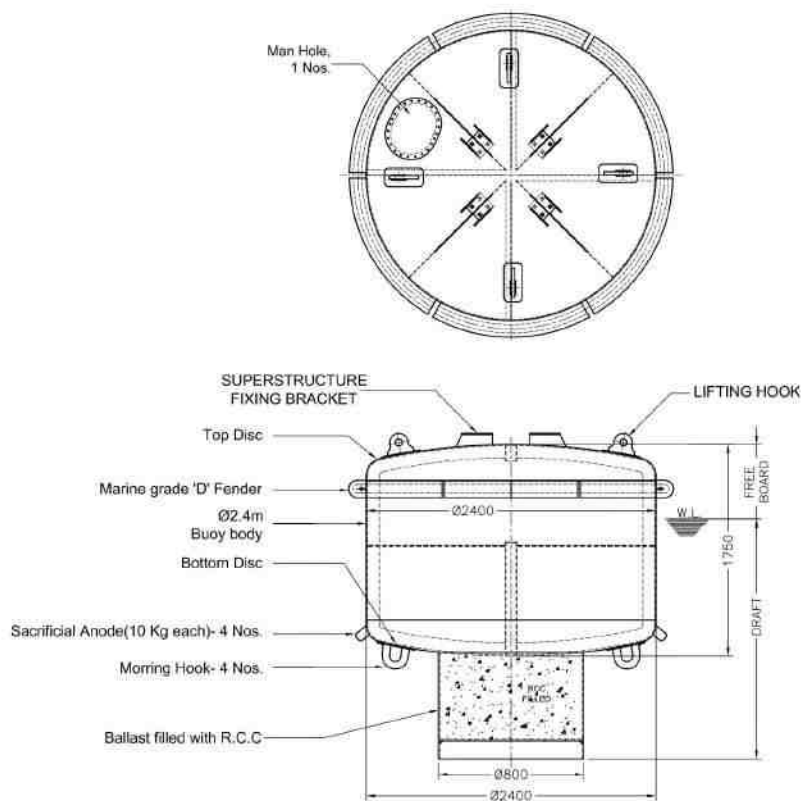
KINDLY FILL THE QTY

NOTE:-  
 \* PART NAME : Ø2.4m M.S. CHANNEL MARKER BUOY.  
 \* TOTAL QTY : 05 nos.  
 \* MATERIAL : AS PER SPECIFICATION.  
 \* STANDARD TOLERANCES OF ±3 % SHALL APPLY. OTHERWISE AS SPECIFIED.  
 \* ALL DIMENSION ARE IN mm OTHERWISE AS SPECIFIED.

REV NO	DATE	STATUS	DESCRIPTION	DRN BY	CHEK BY	APPR BY
0	02.08.13	2	FOR APPROVAL			
REVISION						
STATUS CODE: 1-PRELIMINARY 2-FOR APPROVAL 3-DESIGN 4-GOOD FOR PRODUCTION 5-INSPECTION REPORT						

CLIENT :  
 PROJECT : IWAI-MYANMAR  
 TITLE : Ø2.4m STEEL LIGHT BUOY  
 DRG. NO. : HEL / ORD / 13-26 / DWG/02 / 130802

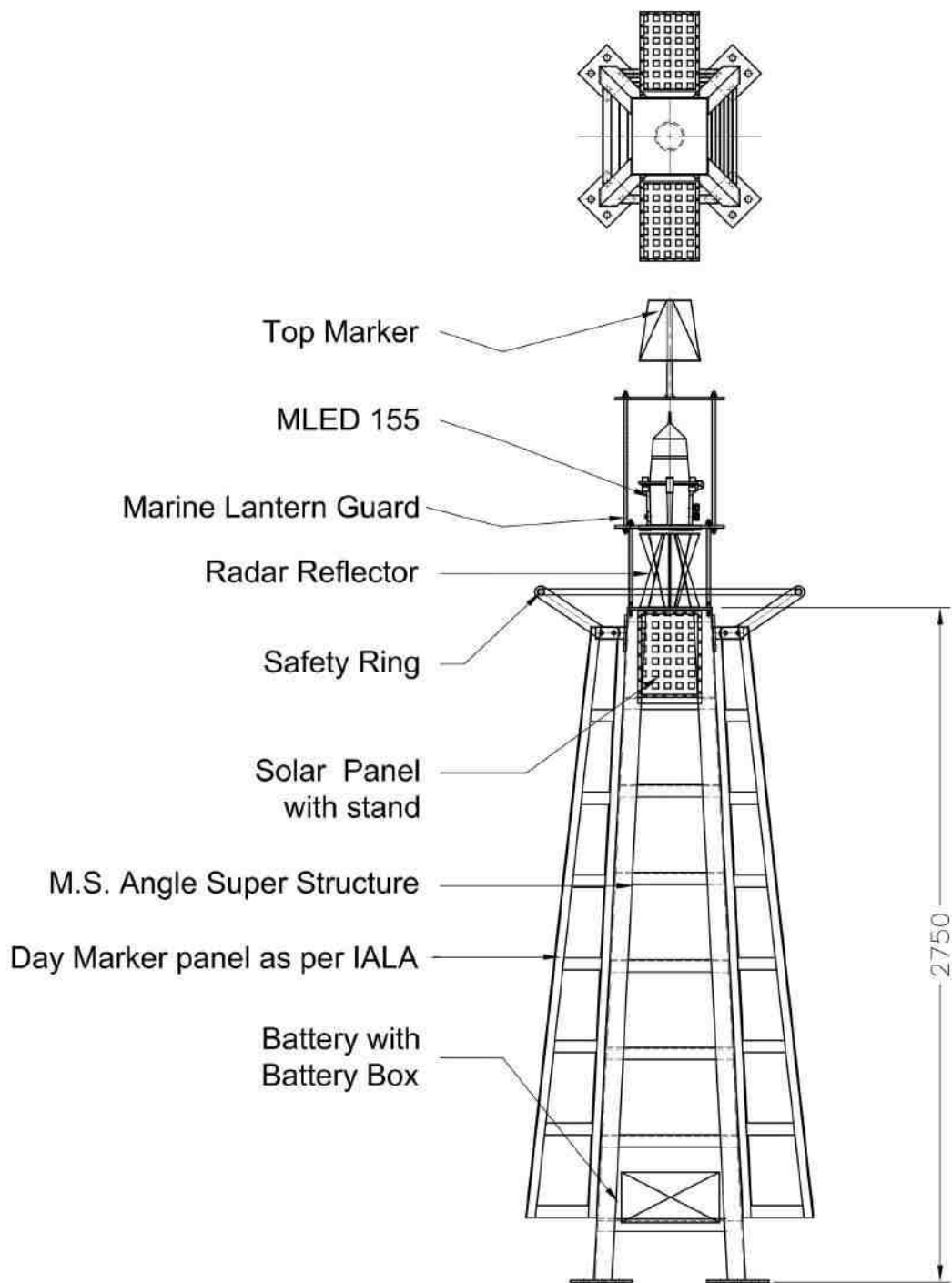
SCALE: Rev No  
 N.T.S. 0



# NOTE :-

- \* PART NAME :- Ø2.4m M.S. CHANNEL MARKER BUOY.
- \* TOTAL QTY :- 05 nos.
- \* MATERIAL :- AS PER SPECIFICATION.
- \* STANDARD TOLERANCES OF  $\pm 3\%$  SHALL APPLY, OTHERWISE AS SPECIFIED.
- \* ALL DIMENSION ARE IN mm OTHERWISE AS SPECIFIED.

DRG. NO. / REV. NO.		TITLE		STATUS/DATE		DESCRIPTION		DRN. BY		CHK. BY		APP. BY		CLIENT		PROJECT		TITLE		DRG. NO.		SCALE		Rev. No.	
REFERENCE DRAWING				1		FOR APPROVAL								IWAI-MYANMAR				Ø2.4m STEEL LIGHT BUOY		: HEL / ORD / 13-26 / DWG/02-01 / 130802		N.T.S.		0	



NOTE :-  
 \* PURPOSE - FOR BID PURPOSE ONLY.  
 \* PART NAME - Ø2.4m M.S. CHANNEL MARKER BUOY.  
 \* TOTAL QTY - 05 nos.  
 \* MATERIAL - AS PER SPECIFICATION  
 \* STANDARD TOLERANCES OF ± 3% SHALL APPLY, OTHERWISE AS SPECIFIED.  
 \* ALL DIMENSION ARE IN mm OTHERWISE AS SPECIFIED.

0	02.08.13	2	FOR APPROVAL						
REV.NO	DATE	STATUS	REVISION	DRN BY	CHK BY	APR BY			
(PAPER CODE : 1.PRELIMINARY 2.FOR APPROVAL 3.TENDER 4.GOOD FOR PRODUCTION 5.DISPOSITION REPORT)									

CLIENT :	
PROJECT :	IWAI-MYANMAR
TITLE :	SUPER STRUCTURE OF Ø2.4m STEEL LIGHT BUOY
DRG. NO. :	HEL /ORD / 13-26/ DWG/02-G2 /130802
SCALE	Rev.No
N.T.S.	0

## **2.2 MATERIAL SPECIFICATION**

### **2.2.1 Technical Specification:**

Construction	:	The main body top and bottom dish end shall be fabricated from M.S. plate, it will be fitted with steel reinforced ballast, two (2) steel mooring eyes, four (4) lifting eyes and fittings for Super Structure and marine "D" type fender.
Material & Thickness	:	M.S.as per I.S.2062 GR. B or equivalent & 8 mm minimum.
Buoy Diameter	:	Minimum 2.4 m.
Focal height	:	+4.0 m (approx).
Power system	:	solar panel / battery
Shape	:	As specify in the drawing
Colour	:	Red & White for the safe water buoy (Fairway Buoy), Green for Conical Shape and Red for Can Shape.
Nuts & Bolts	:	All fixing bolts & nuts are to be made of stainless steel.
Day Marker	:	CAN/CONE type.
Superstructure	:	M.S. super Structure as per I.S.2062 GR.B or equivalent.
Top Mark	:	Spherical, CONE / CAN as per IALA Zone "A".
Lifting Eyes	:	04 Nos.
Mooring Eyes	:	02 Nos.
Fender	:	Standard Marine Grade fenders.

- 2.2.2 **Painting Specification:** Where MS material used in Structure it will blasted to SA 2.5 & Painting to be carried out. After blasted to SA 2.5 standard and subsequent coating to be carried out without delay.

The colour of finishing coat is Red & White for the safe water buoy (Fairway Buoy), Green for Conical Shape and Red for Can Shape.

#### **1) PAINTING System:-**

##### **1.1 Hull Outside:-**

Description	Colour	Thickness (micron)
1 coat primer	Red	30 mu
1 coat coal tar epoxy	Black	125 mu
1 coat coal tar epoxy	Chocolate	125 mu
1 coat enamel	White/Red/Green	12 mu
1 coat antifouling (below water line)	Red/Green	30 mu

**a. Super Structure:-**

Description	Colour	Thickness (micron)
2 coat red lead primer	Red	50 mu
1 coat synthetic under coat	Light Gray	30 mu
2 coat enamel	White/Red/Green	25 mu

**1.1 Hull Components:-**

Description	Colour	Thickness (micron)
2 coat red oxide primer	Red	50 mu
2 coat aluminum hold paint	Aluminum	25 mu

Hull compartments without manhole shall be furnished with anti corrosive Vaparol.

**2.2.3 Lighting equipment:**

Suitable Marine lantern range 3-4Nm from Tide land as per broacher attached.

1 (one) no. Battery with capacity of 200AH and 2 (two) nos. solar module of 12V 20W.

**2.2.4 Mooring System:** Each set of mooring and sinker is to consist of the following complying with I.S.4484 & I.S.6132 or equivalent as applicable.

**Mooring Gear:-**

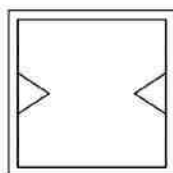
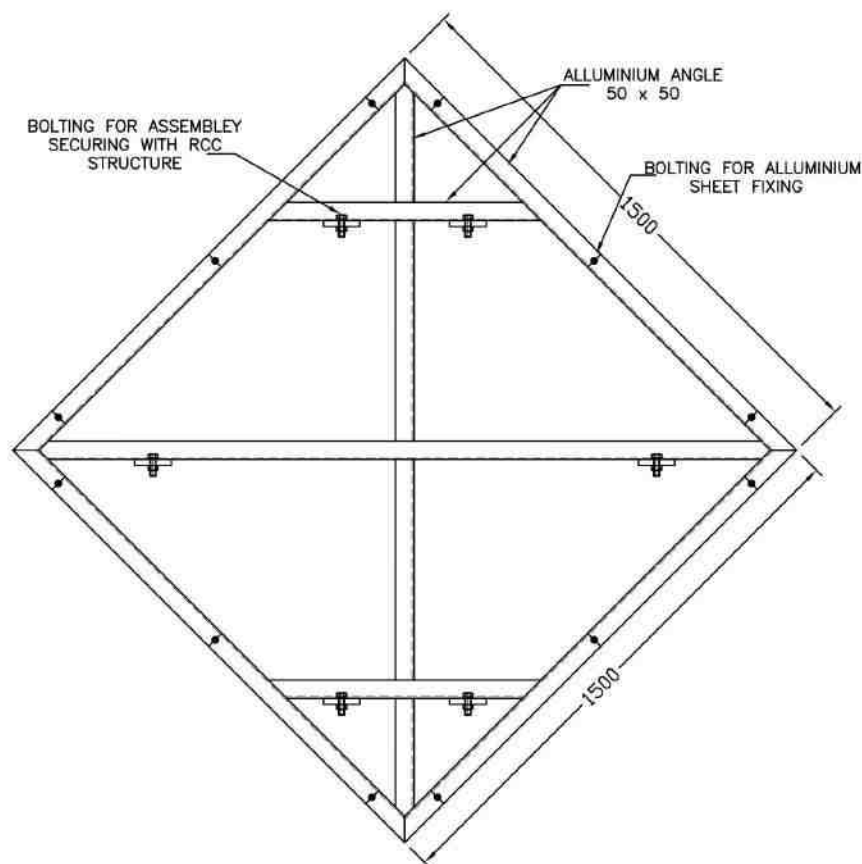
- d)** 2 x 4.6 m bridle using 32mm stud link type chain with 'D' type shackles with lock Nut. and tapered pin 6 (six), D' type shackles with lock nut and tapered pin 2 (two) with 38mm thick triangular plate.( monkey plate).
- e)** Swivel for 32mm stud link chain.
- f)** 50.0 m 32mm stud link pendent chain complete with "D' type shackles with lock Nut. at both ends.
- g)** Chain and bridles shall be made of Carbon Steel of uniform quality. The chemical composition and the strength of steel shall be confirmed to values of Lloyds Grade U2 or equivalent.
- h)** All mooring equipment shall be painted with coal tar Epoxy paint.

**Sinker: -**

- a)** The buoy sinker shall be made from RCC.
- b)** The buoy Sinker shall be RCC hemispherical shape made of cement, river send, 20mm downgraded stone chips mix (1:2:4) and M.S. reinforcement with steel lifting hook. The lifting hook shall have a minimum radius not less than 100mm.
- c)** The weight of RCC Sinker shall be 3.0 Tons.

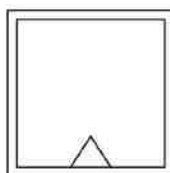


### 3.1 Drawing



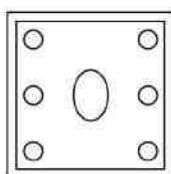
WIDTH OF CHANNEL LIMITED

QTY-\_\_\_\_\_



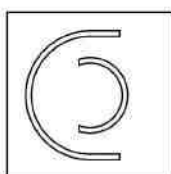
DEPTH OF WATER LIMITED

QTY-\_\_\_\_\_



RESTRICTION ON NAVIGATION

QTY-\_\_\_\_\_



TURNING AREA

QTY-\_\_\_\_\_

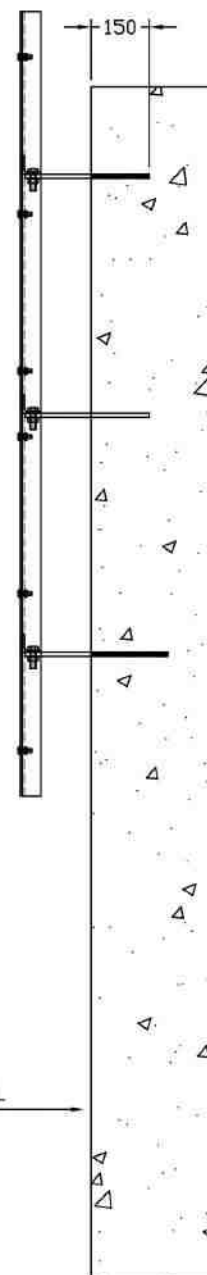


REDUCE SPEED MAX. SPEED PERMITTED

QTY-\_\_\_\_\_

NOT IN HEL SCOPE

RCC FOOTING



**SIDE VIEW**

**SELECTED SIGNALS AS PER SIGN**

\* QTY. OF VARIOUS SIGN CONFIRMED BY CLIAIT FILL THE QTY ABOVE

NOTE:

\* TOTAL QTY : 26 Nos

\* STANDARD TOLERANCES OF ±1mm SHALL APPLY, OTHERWISE AS SPECIFIED.

\* ALL DIMENSIONS ARE IN mm OTHERWISE AS SPECIFIED.

\* ALL ITEM PURCHASE WITH T.C.

DRG. NO. / REV. NO.

TITLE

REFERENCE DRAWING

REV. NO.

DATE

STATUS

DESCRIPTION

REVISION

DRNBY

CHKBY

APRBY

STATUS CODE: 1 PRELIMINARY 2 FOR APPROVAL 3 TENDER 4 GOOD FOR PRODUCTION 5 INSPECTION REPORT

CLIENT :-

PROJECT :-

TITLE :-

DRG. NO. : HEL/PRD/13-26/01/130731

SCALE

Rev No

N.T.S.

Q

## **3.2 MATERIAL SPECIFICATION**

### **3.3.1 Material Specification:**

1. ALUMINIUM SHEET : AS PER IS : 736 –MATER DESIGNATION 24345  
OR 1990 OR EQUIVALENT
2. BOLTS,NUT & WASHER : AS PER IS : 1364 OR EQUIVALENT.
4. HIGH INTENSITY GR. RETRO REFLECTIVE SHEET : AS PER DG<sup>3</sup> OR EQUIVALENT.

### **3.3.2 PAINING SPECIFICATIONS OF FIXED SHORE MARKS :-**

#### **3.3.3 Painting Specification :**

Retroreflective sign boards shall be made with base colour green and lettering white or other colour as approved by the Engineer .

# **OPERATION & MAINTENANCE MANUAL FOR ELL WHARF CRANE**



## **ANUPAM INDUSTRIES LTD.**

138, G.I.D.C. V. U. NAGAR - 388 121.

VIA - ANAND, GUJARAT.

PHONE: (02692) 236118, 236211, 235210

FAX: (02692) 236324

E-mail: [ganesh.jalvi@anupamgroup.com](mailto:ganesh.jalvi@anupamgroup.com), [anupam@anupamgroup.com](mailto:anupam@anupamgroup.com)



# OPERATION MANUAL

Contents:

**A. INTRODUCTION**

**B. GENERAL DESCRIPTION**

**C. SAFE HOISTING PRACTICES (DURING REGULAR OPERATION)**

## **A. INTRODUCTION**

ANUPAM is one of the most prominent crane manufacturers since last 35 years based in western part of India, engaged in Turnkey work of Design, Manufacturing, Supply and Erection-Commissioning of EOT, Goliath/Gantry, Steel Mill Duty, Special Purposes and Grabbing Cranes.

Our **ANUPAM** Cranes and Equipments are supplied to industrial core sectors such as Power Plants, Steel, Cement, Construction, Shipbuilding & Port, Petrochemical, Metallurgical and Heavy/General Engineering Sectors.

We are registered with all leading Project Consultants and have supplied cranes to all major industrial houses and core sectors of the country.

We have the largest manufacturing infrastructure in crane industry in India. We manufacture and supply cranes ranging up to 500MT capacity. Today we are fully equipped and have established name for itself for taking up Turnkey projects and successfully executing them in time, at highly competitive prices. We are proud of our vast pool of design and manufacturing expertise which made us leader in the area of technology and innovation.

We are also backed up by international collaborations to strengthen our capacity to design and manufacture various equipments.

**Unique Number for the subject Crane is 2740 which is called work order.**

## **B. GENERAL DESCRIPTION**

### **B.1. Crane operation**

#### **B.1.1 Hoist Motion:**

The Hoist motion requires high attention during the lifting of the loads. Hoisting mechanism hoists or lowers the hook.

This mechanism consists of motor, gearbox, couplings, brake, rope drum, wire rope bottom block, hook etc.

The rope drum is manufactured from seamless pipe with respect to the wire rope selection based on IS:2266, that is supported by gear box on one end, and the another end is supported on the pedestal assembly. The one end of the main motor's output is connected with gearbox with flexible full geared coupling. The brake drum is keyed with the horizontal helical gearbox's input shaft. The output shaft of the helical gearbox is connected to the rope drum by means of suitable keys/geared drum couplings. All these items such as motors, brakes and gearboxes are seated on separate fabricated stools welded with the top of the crab frame.

Depending on the safe working load, the number of falls is decided which helps to finalize the number of pulleys and the size of the equalizer pulley also.

In main hoist, when the load is supported by more than one fall of rope, then the rope system is equalized by using Equalizer pulleys. The rotary limit switch is installed at the end of the pedestal assembly, while the gravity type limit switch is near to the equalizer pulley to control the rotation of the drum and the height of the lift respectively. The auxiliary hoist is also designed in the same manner as of the main hoist.

When the power is in "OFF" position, the brake shoes hold the brake drum tightly and when the power lever is in "ON" position, the brake drum is released and the motor rotates the gearbox input shaft. The desired rpm of the drum is obtained from the output shaft of the helical gearbox. The connection from the motor to the rope drum is made reverse during lowering the hoist.

Care should be taken on the strength of the wire rope before operating the main hoist/auxiliary hoist. Replace the wire rope immediately, if it is found with any physical damage.

#### **Important Note:**

**RECEIVE THE SIGNALS FROM AUTHORISED PERSON ONLY FOR DOING THE HOIST AS WELL AS ALL MOTIONS.**

#### **B.1.2 Long Travelling Motion :**

The long travel mechanism of the crane consists of an electric motor, brake, gear box, two drive wheels and two driven wheels mounted on end carriage, which run over along the rails fixed on the gantry girder. The long travel mechanism moves the crane along the bay. The LT drive unit is installed at end of span on the bridge platform.

The movement of L.T. Wheels is obtained from the output shafts of the horizontal gearbox. The motor for long travel is seated on a fabricated stool & the same is welded on the platform. The output shaft of gearbox is connected to wheel assembly through shaft. The limit switch, which is fixed on end carriage, restricts the movement of the crane and the



striker plates are fixed at each end of the gantry girder. To avoid collision of the crane with the building structure, suitable buffers are provided on the end carriage.

### **B1.3Slewing drive**

The drive from vertically flanged on electric motors to be arranged through combined flexible couplings and double shoe brakes to the compact gearboxes. The slewing motion to be transferred to the rotating superstructure by forged steel slew pinions at the lower end of the vertical output shafts of the gearboxes and meshing with the internal spur ring integral with the fixed part of the slewing assembly.

The gearboxes are placed and bolted into the steel structure of the slewing frame.

The service braking will be electrically operated. Mechanical brakes are provided in the arrangement and serve as holding brakes only.

### **B1.4Luffing drive( Screw-Nut arrangement)**

The luffing of the jib system is driven by luff scew and nut system. The Screw end is linked to the compression member of the jib. In the A-frame there is the hinge point to the luffing drive. The drive comprise of the Gear box with inbuilt nut, Screw, Motor and brake.

Maintenance provisions are provided enabling change of all moving items without disassembling the whole unit.

<b>Following Major Safety Devices will be provided on ELL Cranes:</b>
a)Mechanical locking of Slew Motion
b)Audio Visual warning during Travel Motion
c)Provision of Jib locking and Drop anchoring during Storm conditions
d)Load Cum Radius indicator with Audio Visual Signal for Hoist
e)Anemometer for indication of Wind Speed
f)Two Brakes on Input shaft for Hoist/Luff/Slew
g)Emergency STOP button near Balancer/Operator's Cabin/Machinery house.
h)PA system for communication between Cabin/Machinery house from ground
I)Interlocking contacts in neutral OFF position
j)Manual Rail Clamp during Operation and Out of Service Condition at Bogie
k) Anti-derailment Guard below bogie.

### **B.3 DOCUMENTS :**

- B.3.1 General Arrangement Drawing.(Approved/Latest GAD)
- B.3.2 Drive arrangement like Hoist, Slew,Long Travel and Luffing
- B.3.3 Cable Reel system
- B.3.4 Slipping arrangement
- B.3.5 Bill of Material (Electrical)
- B.3.6 G. A. Drawing of Control Panel
- B.3.7 Main Power & Control Panel
- B.3.8 Main Hoist Power & Control CKT.
- B.3.9 Luff Power & Control CKT.
- B.3.10 Slew Power & Control CKT.
- B.3.11 Long Travel Power & Control CKT.

### **CARE DURING STORAGE & HANDLING AT SITE**

Crane parts after shop assembly/inspection are dismantled for transportation purpose.

- Large bulky components such as bogies,Portal leg,Portal beam,Machinery frame,Jib system are dispatched in Loose Condition. It is recommended to storage these parts near erection site to avoid more handling with proper supports.
- Expensive electrical items such as Panels, Cables, Master controllers etc. should be stored in protected area to avoid pilferage. Protection must be there from climatic conditions/rain.

## **G. SAFE HOISTING PRACTICES (DURING REGULAR OPERATION)**

1. DO's and DON'T's
2. Crane Drivers
3. Floorman's Standard Hand Signals
4. Crane Parking
5. Crane Attendants or Slingers
6. Procedures to start the crane
7. Procedures to stop the crane

### **1. Do's and don'ts**

- **Do Not load beyond the rated capacity:** The immediate danger is the possible failure of some load carrying parts. Over loading might also start a defect which could leads to some failure even at less than rated capacity.

### **DO NOT USE ANY OVERHEAD MATERIAL HANDLING EQUIPMENT FOR HANDLING PERSONNEL.**

- **Conduct a periodic visual inspection for signs of damage or wear :** Particular attention should be paid ot the wire rope and hook. If the hook is distorted or opened out, bring it in to the attention of the safety engineers before loading the hoist.
- **Do not use hoisting ropes or chains as a substitute for slings:** Use the slings only. Cable or chain slings should be of the proper size and type for load handling. Never use slings physical damage of any extent.
- **Whenever the hoist is lowered in such a manager as to take the load off the wire rope:** The operator should determine before making a lift again, whether the wire rope is properly reeved on the drum.
- **Stand clear of all loads:** If you must travel a load over the heads of other personnel, give ample warning of your intention before you move.
- **Always "inch" the hoist into the load:** Running into the load at full hoisting speed imposes an excessive overload on the hoisting mechanisms and could result in the failure of parts and/or the supporting structure. This is particularly true with high hoisting speeds. The same principle applies to the travelling motion also, which would otherwise cause a swinging of the load leading to unforeseen damages.
- **Limit switches are for emergency use only:** Limit switch should not be tripped during normal operation. If it is necessary to travel to the limit, use extreme caution and approach the limit in slow speed or by "inching". Do not leave the hook block in contact with the limit switch at the end of the operation. A phase reversal with the block in this position will probably result in damage to the hoist if the 'down' button or control lever is operated.
- **Be sure that the hoist raises and lowers properly when the corresponding push button or control lever is operated.** A reversal of direction indicates a phase reversal in the current conductor, or an interchange of wires on the push button-any of which would cause the limit switch to be inoperative. do not under any circumstances, operate the equipment until the fault has been found and corrected.

- centre the hoist over the load before lifting : Do not side-pull or end-pull. When the centre of gravity is difficult to ascertain, the load must be raised a little at a time to see that each part leaves the ground at the same time. The use of many ropes would be meaningless if the load is not supported evenly.
- Use padding on the edge of load if it is sharp and angular to prevent damage to the rope. Contact of the wire rope with a sharp angular edge of the load is unsafe. The wire rope can be cut very easily when it is twisted. Remember that twisting and pulling is the method employed when it is necessary to cut the wire rope.
- When the straddle angle of the rope slings is large, a larger load than commonly supposed, works on the wire ropes. The limit for this angle should be kept within 90°.
- wire ropes for load handling should not be placed on the portion of the load which may cause them to move or slip off.
- Reversing the position of an object or load is among the most dangerous types of operations. This operation should be done very slowly taking care that the rope do not become loose. The next thing to expect is a sudden reversal of the object position which will cause a very heavy strain on the ropes and possibly make them snap.
- Do not drag the load. It is dangerous to assume that a load which has been safely tied can be dragged. Because dragging the load creates higher stress in the wire rope than when suspending it.
- know the hand signals for hoisting, cross travel and long travel if working with cabin operated cranes. Operators should accept the signals of only those persons authorised to give them. Do not operate when signals are not clear.
- do not leave the load suspended in the air and unattended.
- do not jog controls unnecessarily. Hoist motors are generally of a high torque, high slip type. Each start causes an inrush of current greater than the running current and lead to overheating and heat failure or burnout of continued to excess.
- Be sure to operate all the motions without load first, when the crane is operated after a long time disuse.

## **2. Crane Drivers**

- Only trained, competent and properly authorised crane drivers are permitted to operate overhead travelling cranes. A CRANE driver SHALL HAVE WRITTEN KNOWLEDGE OF ENGLISH.
- Crane drivers must be physically fit and have good hearing and eyesight. The crane drivers should not operate the crane if not physically fit, but shall report any disability to the medical officer or other appropriate person at once.
- Crane drivers shall be alert at all times. Sleeping on the job, throwing pipe ashes or cigarette butts or spitting from the control cabin or bridge structure are not permitted under any circumstances.
- They shall keep their hands free when going up or down access ladders.
- They shall familiarize themselves fully with all cranes safely operating instructions, the crane mechanism and its proper care.
- Extreme care shall at all times be exercised by crane drivers and attendants, and all other personnel working or present on premises where cranes are located, to avoid

contact with the crane collector wires and/or any other power cables, whether covered or bare.

- Rail trucks, cars or other transport vehicles shall be towed by any crane.
- The crane driver must ensure that the fire extinguisher is kept in serviceable condition.
- The communication between the crane/driver and crane attendant (slinger) shall be through mutually agreed code of hand signals. This shall be displayed prominently inside the cabin. Verbal instructions can be given only if they are rendered audible.
- The operator shall respond only to signals from the person who is directing the lift. When a signal person is not required as part of the crane operation, the operator is then responsible for the lift. However the operator shall obey a STOP signal at all times, no matter who gives it.
- The crane driver is at all times responsible for the safe operation of his crane.
- He shall not leave the controls while a load is suspended from the crane.
- Where and when any crane fails to correctly respond to control, the crane driver shall immediately stop operation and open the power switch, then notify his supervisor. No attempt shall be made to get out of difficulty by repeated operations of the controls.
- In case of power failure, the crane driver shall move all controllers to the OFF positions, report the matter and await instructions.
- He shall not rely on LIMIT SWITCHES in ordinary working, they are for emergency only.
- The crane driver shall not tamper with circuit breakers, limit switches and / or other safety devices.
- Before closing main switches, make sure that all controllers are in the "OFF" position.
- All crane movements whilst loads are being handled, or maintenance or repair work done, shall be governed absolutely by the standard operating signals as given to the crane driver by the person authorized.
- Under no conditions shall any crane driver move a load unless he has clearly seen and understood the given signal.
- Bumping into runway stoppers shall be avoided.
- All load movements shall be done smoothly, without jerking or sudden stops.
- Under no circumstances shall the crane driver attempt to travel any load until that load has been hoisted clear of all obstruction.
- When handling loads approaching to maximum rated capacity, the crane driver shall test the hoist brakes after the first load has been lifted a few cms. Clear of the floor, by placing the controller in the OFF position. If the brakes do not hold, the brakes should be adjusted immediately.
- While the crane is in motion, crane drivers shall keep their hands on the controls at all times.

### **3. Floor man's standard hand signals**

The determination of a system of operating signals side by side with a strict adherence thereto is strongly recommended from the stand of operating efficiency and accident elimination. Suitable examples are given below for the operator's information.

- For hoisting: Hold forearm horizontally, palm up and move forearm upward.
- For lowering: Hold forearm horizontally, palm down and move forearm downward.
- For travelling: Hold upper arm horizontally at the side of the body, raise forearm vertically with palm facing the direction of movement and move forearm in the direction of movement.

- Degree: When degree of extent is to be indicated, the motion of the forearm is reduced (or repeated in small movements) for a slight movement or increased when a greater movement is desired.
- Stop lowering: The previous position of the forearm is maintained, but the palm is turned over as in the case of stop lowering.
- Stop travelling: The position of the forearm is same as that for travelling, but the palm is turned over as in the case of stop lowering.
- Emergency stop: Hold forearm horizontally in front of the body and swing rapidly to left and right.
- Operation: The completion of work is shown by raising both arms horizontally and Lowering both at the same time. If the travelling distance or lift is so much that the above signals are difficult to distinguish, then the entire arm may be moved instead of the forearm. The use of a whistle together with the above signals will help in making them clearly understood.

When the whistle is used, with the signals, the following notes are sounded before the hand signals are made.

- Short Movement
- Continuous Movement
- Stop

It is essential that only one man be assigned to do the work of signaling. Operation according to signals received from two or more men is extremely dangerous. The operation of the crane should also be performed by one man chosen for this purpose.

#### **4. Crane parking**

Before leaving his control position, the driver shall at all times ensure that:

- The Crane is spotted at the location designed for leaving the crane.
- There is no load suspended from the hook.
- The hook is raised clear of all observation.
- All controllers are placed in the OFF position.
- Subject to more specific local instructions, the main power switch in the crane is locked in the OFF position.
- When the cranes are exposed to wind, the travel brakes are locked and the hook in its maximum position.

#### **5. Crane attendants or slingers**

- The crane attendants shall have adequate knowledge of the safety methods.
- The sling man shall have knowledge of knotting, slinging, strength of ropes, chains and other items used in hoist motion.
- He shall be all times responsible for safe slinging and handling of the load.
- He shall notify his supervisor whenever and prior to any unusual or special lifts are to be made.

The crane attendant is responsible for ensuring that,

- Any lifting equipment is not overloaded. If there is any doubt about the capacity of the equipment or the weight of the load, this should be immediately ascertained.
- All loads are securely slung, and that all signs etc., used are of the correct size and quality.
- All loads are moved in such a manner as to clear all obstructions and are not carried over personnel on shop floor.

- The slack is carefully removed from all slings prior to the load being lifted and during such process special care shall be taken when it is necessary to steady the slings by hand.
- Chains, cables and ropes shall be kept free from knots, twists and links.

## **6. Procedure to start the crane:**

Before starting the crane operation observed the following :

Check crane and craneway for any obstructions.

Release all locking devices.

Check that parts needing lubrication have required quantity of lubricants.

Ensure that no item is lying loose on the crane and the trolley.

Check for neutral position of all control gears.

Switch on the crane protective gear.

Check signal and wiring devices.

Check brakes and limit switches for their proper functioning.

**NOW THE CRANE IS READY FOR OPERATION.**

## **7. Procedure to stop the crane**

The following procedure should be observed while leaving the operator's cabin and the crane.

Run empty hook and the trolley to the specified resting position.

Run crane to the access point.

Set the master controllers in neutral position.

Switch off lights.

Press the OFF push button provided in the cabin / pendant.

Switch off the isolating switches.

Actuate locking devices if any.

Lock operator's cabin.

**NOW THE CRANE IS OUT OF OPERATION.**



## **MAINTENANCE MANUAL**

### **A. Measures to maintain reliability of operations**

- A.1 Lubrication
- A.2 Worm (or) deformed parts (or) broken parts
- A.3 Loosening of Fastened parts
- A.4 Contacting parts

### **B. Instruction for maintenance**

#### **B.1 Maintenance - Electrical Parts**

- Switch Fuse
- HRC Fuse
- Thermal / Magnetic Relays
- Limit Switches
- Contactors
- Motors
- Master Controllers / Cam Controller
- Electro Hydraulic Thrustor Brakes

#### **B.2 Maintenance - Mechanical Parts**

- Reduction gear unit
- Bearing
- List of Bearings used
- Wire Rope
- Wire rope details
- Travelling wheels
- Flexible gear coupling

#### **B.3 Trouble Shooting Chart**

### **C. SCHEDULE OF ROUTINE MAINTENANCE (WHILE IN OPERATION)**

### **D. SAFETY RULES**

### **E. CATALOGUES FOR BOUGHT OUT COMPONENTS**



## A. MEASURES TO MAINTAIN RELIABILITY OPERATIONS

Needless to say, daily maintenance and inspection are not only important for safe operation, but also govern the efficiency, service and life of the crane.

There are many points requiring attention for maintenance of the overhead crane, but the most important items may be roughly classified as following.

- Lubrication
- Inspection and replacement of wearing parts & deforming parts, and deletion of broken parts.
- Inspection of loosened fastening parts.
- Inspection of contacting parts.

**A.1 Lubrication:** Lubrication, which is as important to a crane as breathing is for a man, must never be forgotten. Apply proper amount of oil or grease at proper intervals. The lubrication chart for cranes is also given in the following pages.

**A.2 Worm or deformed parts and broken parts:** If the wear or deformation is within a certain limit, the part can still be used. Every wear limit mentioned in the wear table is the usable wear limit.

At each periodic inspection, consider the amount of expected wear before the next inspection and repair or replace the part if necessary. Since this wear limit is specified as a percentage of the initial dimensions and the wear conditions to facilitate inspection.

**A.3 Loosening of fastened parts:** Loose nuts etc., may result in serious trouble. Inspect all fastened parts (nuts, etc.) with special care.

**A.4 Contacting Parts:** This mainly concerns electrical parts. Always perform hoisting, travelling and traversing operation with no load to check the operating conditions before starting actual operation with load. At the same time, check the contact of the electrical equipment.

## B. INSTRUCTION FOR MAINTENANCE

### B.1 MAINTENANCE - ELECTRICAL PARTS

The proper maintenance of the following equipments will help to increase the life of the crane and its trouble free operation.

**B.1.1 Switch Fuse:** The fuses are to be checked regularly and replaced when they are worn out. Replacements of fuses are necessary when they emit burnt smell or gets overheat. Care should be taken to select the correct size of fuses.

**B.1.2 HRC Fuses:** It is advisable to keep one set of spare and all sizes of fuse links. The spare links should be used only after rectifying the defect that caused the fuse to blow out. Fuse wires may be used during repair work.

**B.1.3 Thermal relays / Magnetic relays:** The relays are supplied manual reset execution. They can be easily converted from manual reset mode to automatic reset mode from the front. So it is necessary to check / reset the button when it trips off due to over load. Also current setting in the recessed dial must be taken care of. Magnetic oil dash pot type relay, regularly fill up the lubrication / Oil for proper functioning.

**B.1.4 Limit switches:** Attention should be given for checking the tightness of springs in order to avoid any loose contact in the limit switch.

**B.1.5 Contactors:** All the moving and fixed contactors are to be inspected periodically for proper end contacts and the contact tips are to be cleared with thin emery paper.

**B.1.6 Motors:** Cleaning of Motors: Motors should be blown out at regular intervals to keep its ventilating passage clear particularly when operating in Dusty atmosphere. Moisture, Oil, Dirt, Grease and Carbon or Metallic Dust are the principle causes of break down. The motor should therefore be kept clean and dry. The stator and rotor windings must be kept free from oil and grease, damp and dirt. Periodic cleaning with dry compressed air bellows or a brush is very necessary.

The motor requires examining and dismantling from time to time and the frequency of successive cleanings will depend upon the conditions under which the motor operates. During periodic cleanings, care shall be taken to clean air passages in the stator and rotor for any accumulated dirt.

Terminals and screw connections shall be kept clean and tight. If they become dirty or corroded, they shall be disconnected and all contact surfaces made clean and smooth. Poor contact leads to sparking and ultimate break down.

**B.1.7 Master Controller / Cam Controller (In case of cabin operated crane):** Isolate the main switch before opening the controller. A thin film of acid - free oil is to be provided at the pivot points of the roller every six months by means of a thin brush. The cam shaft ends must be provided with the same lubrication at the same interval by joystick.

**B.1.8 Contacts:** The contact surface will become dark and rough due to arching. But this does not affect the functioning and contacts are not to be cleaned. Only if the silver contact facing is burnt down, should the contact stud and replace with new silver tipped contact stud.

**B.1.9 Electro hydraulic Thrustor Brake:** The improved design of these leverage system and the linkage makes it possible to utilize only a portion (70-75%) of the thrustor stroke initially (at the time of commissioning of the brake) when the brake lining is new. This enables a reverse for lining wear.

As the lining wears out the thruster brake adjusts itself automatically (by increasing) and the wear of the lining has no effect on the braking torque until the full thruster stroke is utilized. It is only after this stage that the brake has to be readjusted to the original setting.

It is only necessary to tighten the tie rod nuts to restore the thruster to its original position. This also restores automatically the spring setting / brake torque to the original value.

The angle of the brake shoe, being 70°, makes the replacement and Maintenance of the brake shoes quite easy.

The springs are vertically mounted and the setting has been so adjusted that even an appreciable wear of the lining, does not have a marked effect on the braking torque. If the lining wear is excessive, the braking torque undergoes a slight reduction and it can be compensated by resetting the spring to original value by means of the adjusting nut which are readily accessible.

## **B.2 Maintenance of - Mechanical Parts**

**B.2.1 Reduction Gear Unit:** Satisfactory performance of gears require lubricating oil be kept clean and free from dust, dirt and moisture and sludge.

Depending upon operating conditions, the oil eventually becomes contaminated and should be drained periodically. When first put into operation, the oil in a new gear unit becomes contaminated with grit and from tooth surfaces during running.

After one week of first operation, the new gear unit should be drained, filled with suitable flushing compound run for two hours at no load and immediately drained. Where the unit cannot be operated without load, use a mixture of 10% petroleum solvent and 90% new gear oil. After draining this flushing compound, the gear case should be filled with the recommended gear oil.

During operation, the oil level should be periodically checked. Too high oil level results in loss of power and oil leakage. Too low oil level results in friction in bearings and on gear causing over heating.

**B.2.2 Bearings:** Like all important mating components, ball bearing must occasionally be cleaned and examined. How often this should be done depends chiefly on the working condition. Where the load is heavy, it is advisable to clean the bearing thoroughly and examine rings, cages and rolling elements once a year. A check should also be made to ensure that all nuts and taper sleeves are secure and any necessary adjustments should be made. In many cases it is permissible to let the bearings run for considerably longer than a year before carrying out an inspection, especially if the condition of the temperature or noting the colour of the lubricant.

The spirit, good quality paraffin, petrol or benzene may be recommended as suitable for cleaning rolling bearings. Petrol and benzene must of course be handled with great care since they are highly inflammable.

Bearings should not be allowed to stand dry for any lengths of time after they have been cleaned, but should be oiled or greased immediately. When this is done the bearings should be rotated several times so that the oil or grease can reach all vital parts and thereby protect the bearings from dust. This is of special importance for bearings used in machines, which are liable to stand idle for long periods before being used again. For sheaves oiling the bearings at frequent intervals and checking that they rotate freely must be done. A sized up salve may ruin a rope very speedily. Care should be taken to see that the rope does not foul or flap against any obstacle in its way.

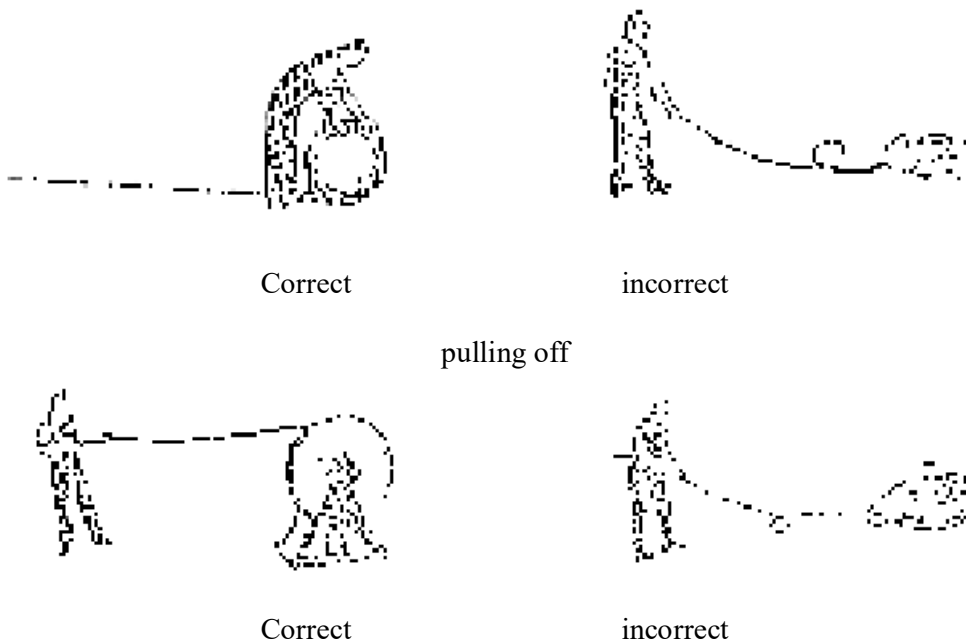
**B.2.3 Wire Ropes:** Frequent inspection of the entire length of rope is necessary, particularly in those sections, which may prove to be deteriorating. Cutting off a few feet or so of rope, changes the place of all most deterioration over sheaves and pulleys. Prudence lies in starting with a slightly longer length of rope than necessary to allow for cutting. This is found valuable particularly where the spliced end of the rope has to work over sheaves.

Watch constantly for broken wires, excessive wear and lubrication. See that the no. of broken wire does not exceed as laid down in different regulations.

Prompt attention must be given to a broken wire in a rope, otherwise damage to other wires and serious accident may result.

Nipping of the broken wire is most common method but not the best one. It would be much better to simply bend the wire backwards and forwards the fingers until it breaks, or in case of a short end, use the marlinespike or a piece of wood. The break inside instead of outside the rope, and the end is left tucked away between the strands, where it can not harm to the other wires or machinery of personnel.

### UNCOILING AND UNREALING OF WIRE ROPES



Wire rope is a machine component with moving parts. During the process of manufacture, the fiber core which is the essential support on which the strands rest, is thoroughly impregnated with lubricant. the strands as well as the completed ropes are likewise lubricated.

For many short-term services, factory lubrication is found to be sufficient. For others lubrication during service is a must. Cleaning wire rope with a brush or compressed air and giving is a light coating of special wire rope dressing is essential. This lubrication puts a protective film on each individual wire, repels water and stops corrosion. Before begin coiled or reeled for storage, cleaning and lubricating the rope is necessary.

It is essential not to allow kinks to form when uncoiling or unreeling a steel wire rope. It should be treated as a hose pipe. A light coil of rope may be unrolled along the ground but turn table, or it may be mounted on stands and supported by a bar or tube through the hole in its center. A coil or reel should never be laid on the ground and the end taken over.

Loops, if formed should be thrown out, they should never be pulled out as that cause kinks. Once a kink is formed the rope is damaged at that place.

**B.2.4 Travelling wheels:** The travelling wheels should not have cracks, blow holes, worn and any other disability which leads to insufficient quality. The rolling surfaces of the wheels should be out of dirt. Necessary lubrication is to be provided at the appropriate place and time in the wheel assembly.

**B.2.5 Flexible gear coupling:** Any coupling if properly installed and maintained will last for many years with trouble free operation. Maintenance procedure includes periodical inspection, cleaning, lubrication and realignment of the connected shafts. Longer coupling life can be expected if actual misalignment is kept to a minimum. It should be recognized that shaft misalignment normally increases with time due to shifting of foundations, bearing wear, thermal expansion and dynamic deflection of the connected equipment.

Maintenance procedure for floating shaft coupling is similar to that required for the standard couplings, but alignment is more difficult because of greater shaft operations. Special dial indicator arrangement to span the gap between the shaft ends of optical equipment is used. Due to greater offset capacity, shaft alignment is not as critical as any close connected coupling, permitting a greater initial alignment error.

The following instructions must be strictly followed while installing gear couplings.

- Un bolt and separate the two halves of the couplings.
- Force each hub with its sleeve mounted, on the shaft and key. a good press fit is essential. End of hub should come flush with end shaft.
- It is necessary to leave sufficient gap between fixed hub faces for efficient operation and long life of the couplings. This allows proper float without binding. this is very very important !!!!!
- Push casings apart and use a straight edge across the aligning surfaces of hubs to indicate parallel alignment as shown alongside. Take this measurement at every 90°.
- To indicate an angular alignment, use a thickness gauge on inside face of hub so that they come parallel with each other. Take this measurement at every 90°.
- Wipe off coupling flanges, clean interior and make it free from dist and grit. Apply adhesive cement to two faces and firmly bolt the flanges together with oil plugs at 180° and fill it with oil. this is very-very important !!!!!

### B.3 TROUBLE SHOOTING CHART

PROBLEM	CAUSE	REMEDY
<b>A. MOTORS</b>		
1. By hearing mechanical noise	May be due to, 1. Foreign matter in air Gap. 2. Bearing damaged.	1. Contact motor manufacturer. 1. Check with a listening stick, if confirmed, try to rotate the upper face of bearing by 180° f still, unsatisfactory, fit new bearing.
	3. Coupling out of line.	1. Check coupling gap & realign.
2. Pulsating electrical hum.	May be due to, 1. Defective rotor.	1. Check speed at full load. If it is low & if there is a periodic swing of current hen running & running defective rotor is indicated, the matter should be referred to the manufacturer.
	2. Defective wound rotor, loose connection, partial short circuit etc.	1. On a wound rotor machine check should be made of rotor resistance & open circuit voltage between slip rings
3. Steady electrical hum.	May be due to, 1. Running single phase.	1. Check that all supply lines are alive with balanced voltage.
	2. Excessive load.	1. Compare line current with that mentioned on motor name plate.
	3. Reversed phase.	1. Check connection in turn & correct the phase order.
	4. Uneven air gap.	1. Check with feelers. If due to worn bearings, fit new one.
By sight : 4. No rotation	May be due to, 1. Supply failure either complete or single phase	1. Disconnect motor immediately with a single phase fault. Serious overloading & burn out may rapidly occur.
	2. Reversed phase.	1. Ensure that correct supply is restored to motor terminals. 2. Check connections in turn & correct the phase order.
By touch : 5. Bearing Heating	May be due to, 1. Too much grease. 2. Too little grease.	1. Remove surplus grease. 1. Wash bearings & replenish

		with grease.
	3. Incorrect assembly.	1. Ensure bearing assembled squarely on shaft.
	4. Bearing overloaded	1. This may be due to misalignment of the drive, excessive & thrust imposed on motor or too great belt tension. Take appropriate steps to reduce the load on the bearings.
6. Brushes Heating	May be due to, 1. Excessive load	1. Compare line current with that mentioned on motor name plates.
	2. Brushes not bedding or sticking in holders	1. Carefully re-bed or clean brushes & adjust pressure.
<b>B. CONTACTORS</b>		
1. Excessive pitting and welding of contacts.	1. Chattering of contactors.	1. Tighten the Terminals. 2. Check & prevent over voltage.
2. Frequent Burning	1. Excessive over voltage 2. Under voltage and associated 3. Any obstruction in operation.	1. Check & prevent over Voltage. 1. Check and correct the incoming supply voltage. 1. Check contactor & remove the obstruction.
<b>C. BRAKES</b>		
1. Brake failure	1. Leakage of hydraulic oil. 2. Wear & tear of brake lining.	1. Check for the leakage, replace the damaged oil seals/O rings & replenish the oil. 1. The brake is to be readjusted to the original setting by tightening the screws. 2. Replace the liner.
<b>D. GENERAL</b>		
1. Over hoisting (or) over travelling.	1. Failure of limit switch.	1. Check for the spring action, if necessary replace it. 2. Check for the contact, if damaged replace with a new one.
<b>E. POWER CIRCUIT</b>		
1. Failure of power and control supply at the outgoing terminals of main contactor ICO.		1. Check the power fuses in the switch fuse unit. 2. Check the primary and secondary fuses of control transformer. 3. Check the status of gravity limit switch 2LS2 &

<p>2. Motor is not Starting.</p> <p>3. Motor is not picking up the full speed.</p>		<p>3LS2.</p> <p>4. Check the portion of the stator contactor (open/close)</p> <p>5. Check whether all the master controllers are in the neutral position.</p> <p>1. Check whether the brake is released.</p> <p>2. Check whether MCB is switched ON.</p> <p>3. Check the status of over load relay.</p> <p>4. Check the loose contacts of connections, improper contact of master controller / push button contacts.</p> <p>5. Check the coil voltage of the contactors.</p> <p>1. Check the resistance is opened / closed.</p> <p>2. Check the rotor contactor is energized or not.</p> <p>3. Check the timers for its operation.</p>
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### **C. SCHEDULE OF ROUTINE MAINTENANCE (WHILE IN OPERATION)**

#### **C.1 SCHEDULE OF MAINTENANCE OF MECHANICAL ITEMS**

Sr. No.	Frequency	Type of Check
1.	Weekly/Fortnight	Lubrication of all bearings
2.	Monthly	<ul style="list-style-type: none"><li>- Check oil level &amp; quality in gear box.</li><li>- Check thruster oil level &amp; quality.</li><li>- Check brake liner condition.</li><li>- Check brake drum condition.</li><li>- Check proper tightening of fasteners.</li><li>- Check wire rope condition.</li></ul>
3.	Six monthly	<ul style="list-style-type: none"><li>- Check track wheel condition.</li><li>- Check alignment of each drive mechanism.</li><li>- Check all gears &amp; pinions for wear &amp; tear.</li></ul>

#### **C. 2 SCHEDULE OF MAINTENANCE OF ELECTRICAL ITEMS**

Sr. No.	Frequency	Type of Check
1.	Weekly/Fortnight	<ul style="list-style-type: none"><li>- All electric connection in control panel for lightness.</li><li>- Fuse are to be checked &amp; replaced when they are worn out.</li><li>- Check the setting of relay.</li><li>- Check the proper functioning of contactor &amp; if contactor is not functioning then remove the contract kit &amp; also check the merging coil of contactor.</li><li>- Proper setting of brake.</li></ul>
2.	Six monthly or yearly	<ul style="list-style-type: none"><li>- Check the tightness of springs in order to avoid any loose contact in limit switch.</li><li>- Check the liner of brake.</li><li>- Check the proper functioning of the thruster.</li></ul>

### C.3 LUBRICATION

#### C.3.1 LUBRICATION & GUIDE LINE

Description of parts	Lubrication	Lubricant	Frequency
Hoist Gear Box	Inspection Cover	Servomesh SP320	Check oil level once in a week & top up, if necessary.
Slew gear box	Inspection cover	Servomesh SP320	Check oil level once in a week & top up, if necessary.
LT gear box	Inspection cover	Servomesh SP320	Check oil level once in a week & top up if necessary.
Plummer blocks	Grease nipple	Servogrease MP	Re-pack once in 6 Months
Wheel assembly	Grease nipple	Servogrease MP	Re-pack once in 6 Months
Top Block assly. & Bottom Block assly.	Grease nipple	Servogrease MP	Re-pack once in 6 Months
	Grease nipple	Servogrease MP	Re-pack once in 6 Months
Couplings Motors	Grease nipple	Servogrease MP	Re-pack once in 6 Months
Brake pin joints	Grease nipple	Servogrease MP	Re-pack once in 6 Months
Wire ropes	Oil Plug	Servogrease MP	Re-pack once in 6 Months
Thrustors	Greasing by hand	Servogrease MP	Re-pack once in 6 Months
	Greasing by	Servocoat 120	Re-pack once in 6 Months
	Oil plug	BS 148, Grade B30 (transformer oil) (3.5 ltrs.)	Re-pack once in 6 Months

### C.3.2 LUBRICANTS & ITS EQUIVALENTS

Lubricant	Lubricant	Lubricant	Lubricant
Servogem 2 or 3 (OR)	Shell Multi- Purpose Grease - 3	HP Multi-Purpose Grease - H	Marfax 3 HD
Servogrease MP	Servogrease MP	Servogrease MP	Servogrease MP
Servocoat 120	Cardium Compound	Hytak F30	Cretex 2x
Servomesh SP 320	Macoma oil 71	Gervil EP 3	Meropa 220

## **E. SAFETY RULES**

### **E.1 GENERAL**

The following rules if observed will help to reduce number of avoidable crane accident to which frequent reference has been made by the inspectorates.

- Only regular crane operators shall operate the crane. Authorized substitutes, who have at least two weeks experience and training under the supervision of a competent operation, crane repairman, or inspector, no one else should enter a crane cage.
- The operator shall familiarize himself fully with all crane rules and with the mechanism and its proper care. If adjustments and repairs are necessary, he shall report the same at once to the proper authority.
- The operator should not eat, smoke, or read while on duty, nor operate the crane when he is physically unfit.
- The operator or someone specially designated shall lubricate all working parts of the crane.
- The crane shall be examined daily for loose parts or defects.
- Crane shall be kept clean.
- Operators shall avoid, as far as possible, carrying loads over workmen, this must be absolutely avoided when carrying molten metal or when using a magnet.
- The operator should not reverse a motor until it has become to a full stop, to avoid accidents.
- The operator shall pay special attention to the block when long hitches are made, to avoid tripping of the limit switch or running the block upon the drum.
- The operator shall not make side pull with the crane except when specially instructed by the proper authority.
- When handling maximum loads, the operator shall rest the hoist brakes after the load has been lifted a few inches, if the brakes do not hold, the load should be lowered at once and the brakes adjusted or repaired.
- Bumping into runway steps or other crane parts shall be avoided. When the operator is ordered to engage or mesh other cranes, he shall do so with special care for the safety of persons and cranes.
- When lowering a load, the operator shall proceed carefully and make sure that he has the load under safe control.
- No person shall be permitted to operate the crane whose hearing or eye sight is defective, or who is suffering from heart disease or other ailments that might suddenly incapacitate him. A physical examination is required at least once a year.

If the crane is located out doors, the operators shall also lock the crane in a secure position to prevent it being blown off or along the track by a severe wind.

### **E.2 WEEKLY CHECK FOR CRANES**

Check periodically for the tightness of the following bolts.

- Fixing bolts of hoisting motors.
- Fixing bolts of brakes.
- Fixing bolts of bearing body.
- Fixing bolts of locker plate of drum shaft.
- Fixing bolts of drum gear.
- Slip rings and carbon brushes of each motor.

- Electrical panels.
- Condition of contact points in contactors & controllers.
- Wire ropes.
- Pilot lamp.
- Carbon collectors.
- Oil level in gearboxes.
- Lubrication.

It is advisable to inspect the keys in the couplings for its current position once in every 6 months. Wire rope end is fixed over the winding drum by means of clamps. The bolts of these clamps are to be checked for its tightness periodically.

It is needless to mention here the importance of periodical painting of the crane as part of preventive maintenance.

### **E.3 RULES FOR REPAIR MAN**

The rules apply to all those engaged in maintenance work on a crane.

- Repair man should have knowledge of operating the crane, so that he can take the crane to the location, where the repair work will be done.
- Repair man shall immediately place warning signals or OUT OF ORDER signs on a crane to be repaired and also on the floor beneath. If other cranes are operated on the same runway, they should place rail stops at a safe distance or make safe provision.
- When repairing the runway, repairman shall place rail stops and warning signs so as to protect both ends of the sections to be repaired.
- Repairman shall take care of preventing loose parts from falling or being thrown upon the floor beneath.
- Repairs shall not be considered complete until all guards and safety devices have been put in place and the block and tackle and other loose material have been removed.

### **E.4 RULES FOR FLOORMAN**

The six rules to be observed by floor men enable to include extra heavy lifts and operation of two crane conjunction.

- Floor man shall give all signals to the operation. Signals preferably manual should conform to the illustrated code of manual signals for crane operation enclosed.
- Floor man shall be responsible for the condition and selection of all hoisting accessories and for all inches and slings.
- Before the operator moves a crane upon which an empty chain sling is hanging, floor man should hook both ends of sling to the block.
- Floor man, where necessary should walk ahead of a moving load and warn people to keep a side of it. He should see that the load is carried high enough to clear all obstructions. Permanent high obstructions should be distinctively painted or otherwise marked.
- Floor man shall notify the foreman in advance when an unusual heavy load is to be handled.
- Floor man shall not ride or allow others to ride on the bracket or load.

## E.5 CODE OF MANUAL SIGNALS

### INSTRUCTION FOR HAND SIGNALS

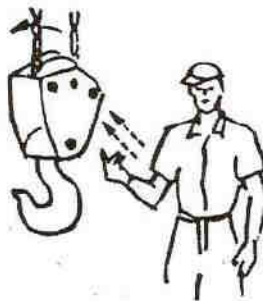
TO REDUCE TO THE ABSOLUTE MINIMUM THE NO. OF ACCIDENTS DUE TO FAULTY AND MISUNDERSTOOD SIGNALS WHEN HANDLING LOADS WITH CRANES, IT IS DEEMED NECESSARY TO USE STANDARD SIGNALS. THE SIGNALS SHOULD BE THOROUGHLY UNDERSTOOD BY THE SIGNALMAN AND THE CRANE OPERATOR, IT MAY BE DESIRABLE TO PASTE A COPY OF THIS SIGNAL CODE IN THE CRANE CABIN AND ANOTHER COPY WHERE THE SIGNAL MAN CAN OCCASIONALLY REFER TO IT.

THE CRANE OPERATOR SHOULD TAKE SIGNALS FROM NO ONE BUT THE AUTHORISED SIGNAL MAN AND SHOULD ADHERE STRICTLY TO THE RECOMMENDATIONS GIVEN BELOW :



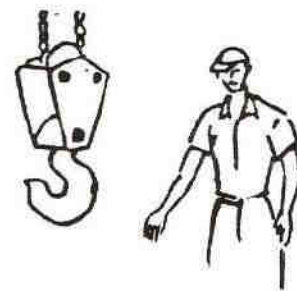
HOIST :-

MAKE SMALL HORIZONTAL CIRCLES WITH THE HAND, HOLDING FOREARM IN A VERTICAL POSITION AND FORCE FINGER EXTENDED.



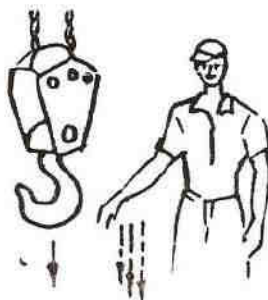
RACK :-

JERK HAND IN DIRECTION OF RACKING, WITH ARM EXTENDED, HAND JUST ABOVE HIP, FINGERS CLOSED, THUMB EXTENDED HORIZONTALLY.



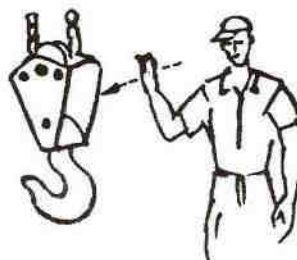
STOP :-

HOLD POSITION RIGID WITH ARM EXTENDED AND HAND LEVEL WITH THE HIP.



LOWER :-

WAVE FOREARM DOWNWARD WITH ARM EXTENDED HAND BELOW THE HIP AND PALM DOWNWARD.



TRAVEL :-

WITH FOREARM VERTICAL AND HAND OPEN WITH PALM IN DIRECTION OF TRAVEL WAVE FOREARM IN DIRECTION OF TRAVEL.



EMERGENCY STOP :-

MOVE HAND QUICKLY TO RIGHT AND LEFT WITH ARM EXTENDED, HAND LEVEL WITH THE HIP.













Portal Beam erection on Bogies of 10T ELL Crane  
for Port Jetty, Siltwe





# Limit Switches



**Rotary Geared  
Limit Switches**



**Worm Drive-FG:**



**Lever Operated**



**Weight Operated**

 **Speed-o-control Pvt. Ltd.**





## Rotary Geared Limit Switches (MODEL GRLS)

### INTRODUCTION :

Rotary Geared Limit Switch GRLS is used to trip motor supply when the moving loads reach the extreme end positions of working zone.

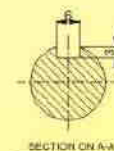
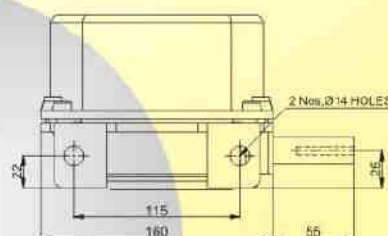
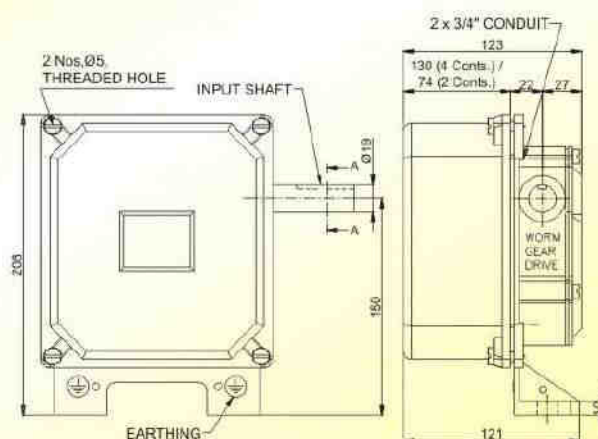
### OPERATION :

A tow ( or more ) contact elements are operated by respective rotating cams, suitably adjusted on a cam shaft which rotates with fixed speed ratio of the drive motor shaft. The cams can be stelessly positioned so that they trip motor supply and stop the motion at the set point of travel.

The GRLS Limit Switches with IP-55 degree of protection are available in desired NO/NC contacts combinations and specified gear ration.

### APPLICATION :

A Rotary Geared Limit Switches are suitable for use on reversing drives such as Hoists, Winches, Rolling Mills and various other mechanisms used in steel plants such as Cock Oven, Feeding Machinery etc.



### Technical Data

BODY MATERIAL	ALUMINIUM DIE CAST		
PROTECTION DEGREE	IP-55 CONFIRMING TO IS-13947(PART)-1)1993		
GEAR RATIO	48 : 1	60 : 1	96 : 1
DRIVE	WORM DRIVE		
CABLE ENTRIES	2 x 3/4" CONDUIT		
CONTACT MATERIAL	SILVER CADMIUM		
RATED VOLTAGE INSULATION	500 V.A.C.		
THERMAL TEST CURRENT	10 Amps. / 40 Amps.		
NO. OF CONTACTS	2 NC OR 4 NC		
CAM SETTING	ADJUSTABLE		

### Mechanical Data

Ratios	Effective Rotations	Useful Rotations	2 Contacts Model	4 Contacts Model
48:1	42	40	GRLS/48/2SH	GRLS/48/4SH
60:1	52	50	GRLS/60/2SH	GRLS/60/4SH
96:1	84	80	GRLS/96/2SH	GRLS/96/4SH

# Limit Switches



Model SLS



Model LS



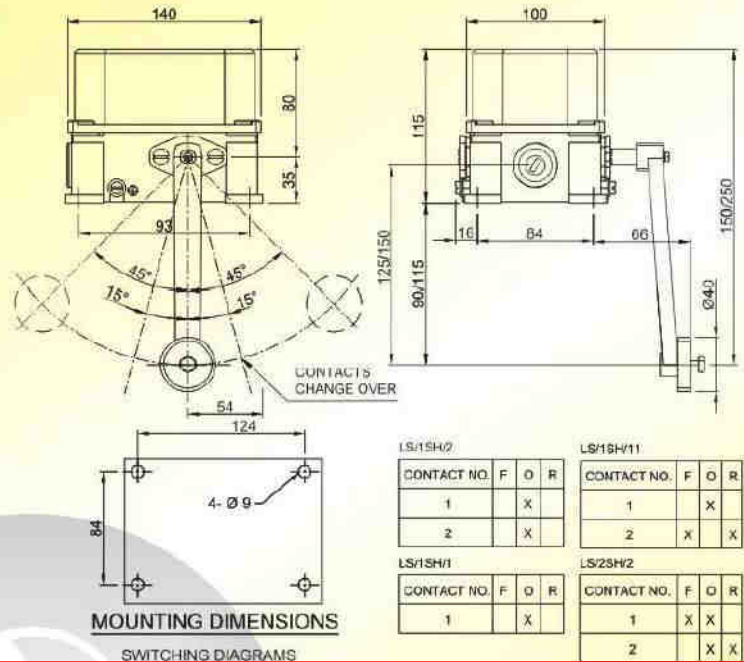
Model SW/LS



Model BLS

 **Speed-o-control Pvt. Ltd.**

## Lever Operated Limit Switches 40A Model LS

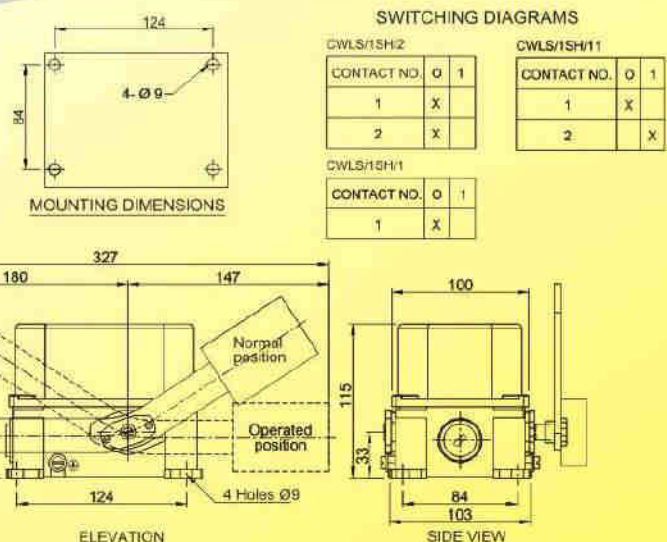


## Weight Operated Limit Switches 40A Model CWLS



### TECHNICAL DATA : LS

Body material	Powder coated, Aluminum Diecast
Degree of protection	IP-55 IS: 13947 part 1
Mounting position	floor mounting
Cable Entries	Twin, 3/4" BS conduit
No. of contact	2 / 4
Contact	Silver-cadmium
Wire connection	Screwed Terminals
Thermal Test Current	25 A
Rated Voltage	500 VAC



**Speed-o-control Pvt. Ltd.**

H. O. Unit -I : C-15/16, Nand Jyot Industrial Estate,  
Andheri - Kurla Road, Mumbai - 400072

Tel : (022) 42469700-30, (022) 28518512-3-4,

Fax : (022) 42469797/ 28518516, E-mail : speedcontrol@vsnl.net

Unit -II : Plot No. 4912, G. I. D. C., Phase IV,  
Vatva, Ahmedabad - 382445

Tel.: (079) 40083201/2/3/4, Fax : (079) 25841056

E-mail : socamd@gmail.com, socamd@in.com

Visit us at : [www.speedocontrols.com](http://www.speedocontrols.com)



# Limit Switches



**Rotary Geared  
Limit Switches**



**Worm Drive-FG:**



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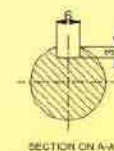
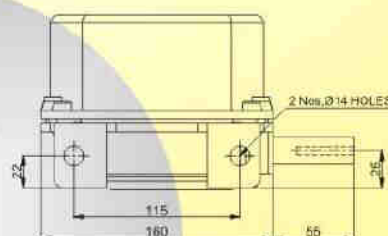
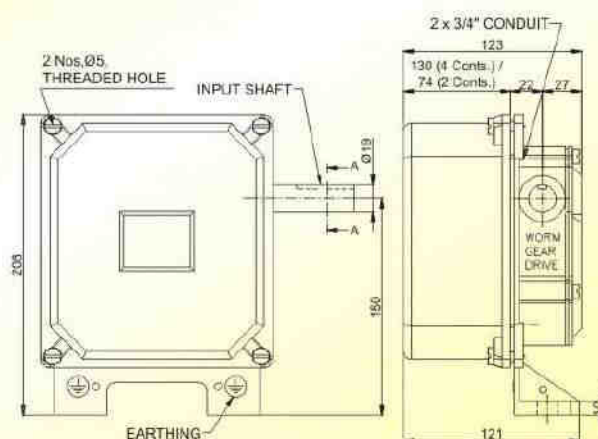
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# Limit Switches



Model SLS



Model LS



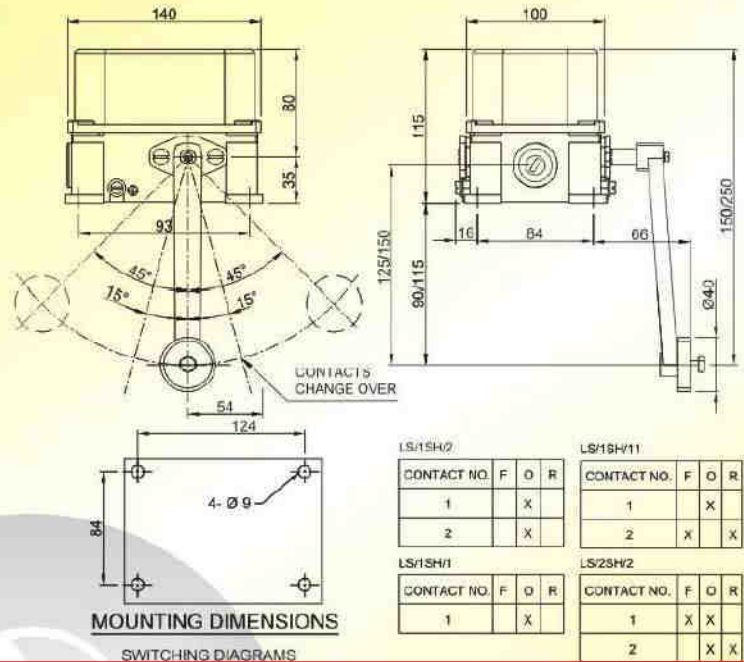
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Model BLS

 **Speed-o-control Pvt. Ltd.**

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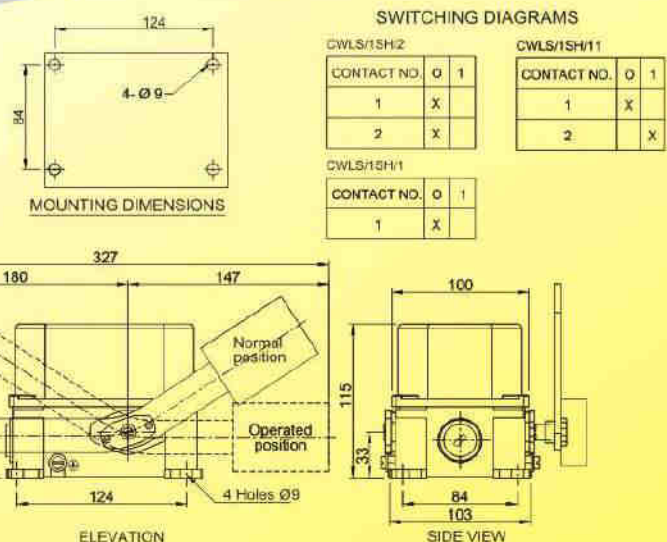


## Weight Operated Limit Switches 40A Model CWLS



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# SIEMENS



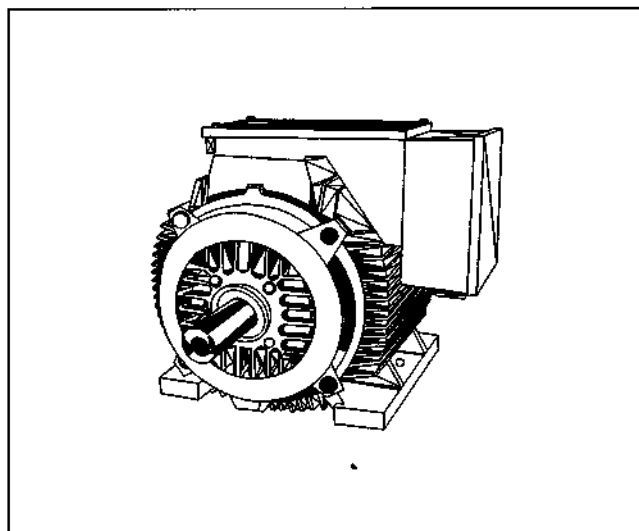
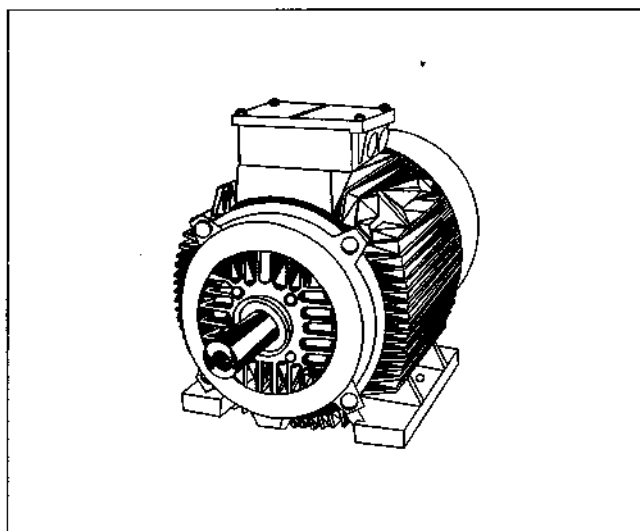
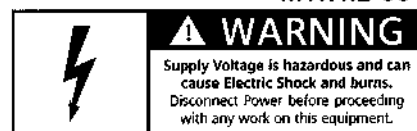
## Champion Series Motors

Type - 1LA0/1SE0 MOTORS

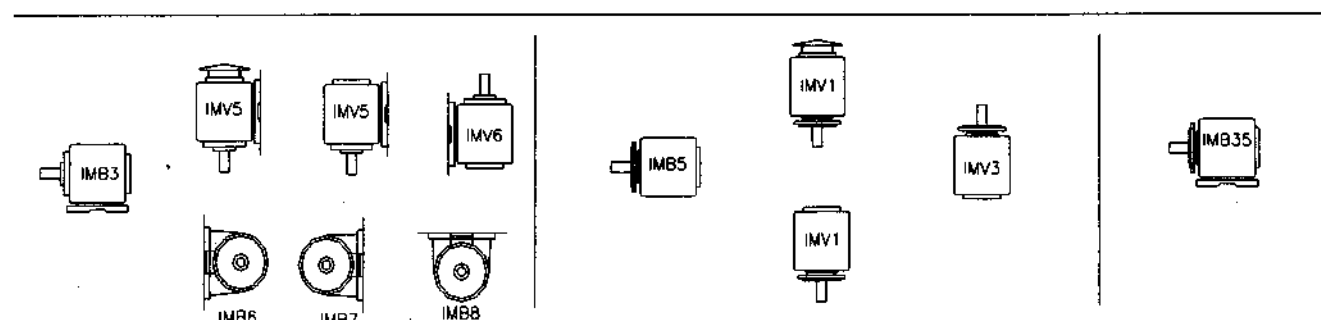
FRAME SIZES 160M TO 355L

Installation . Operation .  
Maintenance Instructions

MTR4.2-001



### Types of Construction:



# Three-phase induction motor Type 1LA0 / 1SE0

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## ENVIRONMENTAL PROTECTION

(To be read along with the Installation, Operation & Maintenance manual.)



Caution (Environmental Protection)

### UNPACKING:

Disposal of packing material: On unpacking the motors, the packing material shall be disposed as per the Local / Statutory requirements. Special attention should be given to Polythene bags, thermocole packing and nylon straps etc., which are not biodegradable.

### MAINTENANCE:

The disposal of waste generated during operation & maintenance of the motor should be done as per the applicable local environmental legislations.

Waste Copper windings during repair and maintenance - to be collected as segregated waste and sent to registered recyclers approved by the Central Pollution Control Board.

Waste grease & Greased cloth - to be collected as hazardous waste and sent to hazardous waste disposal facility for incineration.

Waste insulation material is a hazardous waste and it should only be incinerated at an authorized agency and not disposed by any other means.

The bearing to be discarded must be thoroughly cleaned from grease and should be intentionally damaged (using weld marks or cutters etc) to avoid reuse. The removed grease is a hazardous waste and is harmful to environment. It should only be incinerated at an authorized agency and not disposed by any other means.

### Disposal of the product at the end of its life:

When it is decided that the product cannot be repaired and is to be disposed off, care should be taken to adhere to Local / Statutory environmental requirements. It should be noted that the product contains grease, copper windings, insulation materials that are not biodegradable and are hazardous to the environment.

## 1 Safety information

### 1.1 Definitions, warning information

#### General Note



#### Warning

The data and recommendations specified in all the instructions supplied, and in all other related instructions, must always be observed in order to avoid **hazardous situations** and the **risk** of possible injury or damage.

Furthermore, the **pertinent national, local and plant-specific regulations and requirements** should be kept in mind!

**Special designs and other versions** may vary in technical details! If in doubt, be sure to contact the manufacturer, quoting the **type designation** and **serial number**, or have maintenance work done by one of SIEMENS Service Centers.



#### Warning

The waste generated during operation & maintenance of the motor should be done as per the applicable local environmental legislations.

- Waste grease & Greased cloth to be collected as hazardous waste and sent to hazardous waste disposal facility for incineration.
- Waste copper windings to be collected as hazardous waste and sent to registered recyclers approved by the respective State Pollution Control Board.

#### Qualified persons

Only qualified persons who have carefully read and understood the content of this documentation should be entrusted with the commissioning and operation of machines, equipment or systems. Qualified persons as far as the safety instructions given in this documentation are concerned are those who have the necessary authorization to commission, earth and identify equipment, systems and circuits in accordance with the relevant safety standards.

#### Safety guidelines

This documentation contains instructions, which must be followed closely in order to ensure personal safety and avoid damage to the equipment and machines.

Personal safety instructions are highlighted in the manual by a warning triangle, while damage avoidance instructions are not. They are marked as follows depending on the level of danger:



#### Danger

Danger means that death or grievous injury will occur if the appropriate precautions are not taken.



#### Warning

Warning means that death or grievous injury may occur if the appropriate precautions are not taken.



#### Caution

Caution with a warning triangle means that minor personal injury may occur if the appropriate precautions are not taken.

#### Caution

Caution without a warning triangle means that damage to property may occur if the appropriate precautions are not taken.

#### Notice

Notice means that an undesirable result or state might occur if the relevant instructions are not followed.

#### Note

Note draws particular attention to an important item of information about the product, its use or the corresponding section of the documentation, which could be useful to the user or operator.



## Proper usage

Please pay close attention to the following:



### Warning

The electrical equipment contains components that are at a dangerous voltage. Before any work is carried out, it must be ensured that the equipment is isolated from the supply.

Only qualified persons may work with this equipment.

These persons must be familiar with all instructions and precautions to be taken / specified in this documentation that are relevant for safety.

Safe and satisfactory operation of this motor presumes satisfactory transport, proper storage, installation and assembly and careful subsequent operation and maintenance.

This motor may only be used for the applications specified in the catalog and the technical description, and only in conjunction with third-party devices and components recommended and/or approved by SIEMENS.

**Failing to adhere to these instructions may result in severe injury and/or damage to property.**

National safety regulations must be closely observed.

## 1.2 Safety and application information

### The safe use of electrical machines



### Danger

These electrical machines are designed for use in industrial power systems.

Rotating or live and uninsulated parts pose a danger.

There is consequently a risk of fatal or severe personal injury or substantial damage to property if the necessary covers are removed without authorization or if the equipment is handled improperly, operated incorrectly or maintained inadequately.

If the motors are used outside industrial areas, the installation site must be safeguarded against unauthorized access by means of suitable protection facilities (e.g. fencing) and appropriate warning signs.

The persons responsible for the safety of the system are under an obligation to ensure that:

- The basic planning work for the system and all work relating to transportation, assembly, installation, commissioning, maintenance and repairs are carried out by qualified persons and checked by responsible, suitably skilled persons.
- These instructions and the motor documentation are made available at all times while work is in progress.
- The technical data and specifications relating to the permissible installation, connection, ambient and operating conditions are taken into account at all times.
- The system-specific erection and safety regulations are observed and personal protective gear is used.
- Work on these machines, or in the vicinity of these machines, by unqualified persons is prohibited.

These instructions therefore only contain the information, which is necessary for the motors to be used by qualified persons in accordance with their intended purpose.

### Note

We recommend engaging the support and services of your local SIEMENS service center for all planning, installation, commissioning and maintenance work.

## 2 Description

### 2.1 General

The Champion series motors are three phase cage induction motors; totally enclosed fan cooled (TEFC) type for low voltage supply. General-purpose motors type 1LA0/1SE0 conform to IS: 325. The motors comply with the type of protection IP55 in accordance with IS 4691. The degree of protection of the motor is specified on the rating plate.

IMB3 is the standard mode of construction. All other constructions are given on customer request.

Unless otherwise specified, the rated outputs apply to continuous duty (S1) at a frequency of 50 Hz, an ambient temperature of 50° centigrade and site altitude not exceeding 1000m above mean sea level.

### 2.2 Terminal box

The terminal box conforms to type of protection IP55 in accordance with IS: 4691.

For foot-mounted motors, the terminal box is provided on the top with cable entry from RHS (as seen from DriveEnd) as a standard feature. If specifically ordered, terminal box position on the right or the left-hand side (when viewed from the drive end) can be supplied.

In order to provide for different directions for cable entry, the orientation of the terminal box can be altered in steps of 90°. The larger terminal boxes are normally provided with detachable inclined cable gland plate that also can be rotated in steps of 180°.

### 3 Operation



#### Warning

Before starting any work on the machine, be sure to isolate it from the power supply.



#### Warning

All covers which are designed to prevent active or rotating parts from being touched, or which are necessary to ensure correct air guidance and thus effective cooling, must not be opened during operation.

All deviations from normal operation (higher power consumption, temperature or vibration level, unusual noises or odours, tripped monitoring devices, etc.) are indications that the motor is no longer functioning correctly. In this case, the maintenance technician must be immediately notified in order to prevent disturbances that could either directly or indirectly lead to severe personal injury or substantial material damage. If in doubt, power-down the motor immediately in conformance with the system-specific safety requirements!



#### Caution

The surfaces of the machines can reach high temperatures, which can lead to burns in case of contact. That is why appropriate measures to avoid accidental contact must be taken.

#### 3.1 Inspection, Storage & Transport



#### Warning

The motors may only be transported and hoisted in a position corresponding to their type of construction (i.e. horizontal construction types in horizontal position and vertical construction types in vertical position). The motors may only be hoisted using the lifting eyebolt(s) provided on the stator housing. Use appropriate rope guidance or spreading equipment (for weight see rating plate or technical data).



#### Warning

For lifting assembled machine sets (such as built-on gearboxes, fan units), always use the lifting eyebolt(s) or lifting pegs provided on both the units! Machine sets should not be lifted by suspending the individual machines! Check the lifting capacity of the hoist!



#### Warning

Only the intended openings, eyebolts and lifting pin on the base plates may be used for transporting motor sets. Always pay attention to the carrying capacity of the lifting device. Motor sets must not be lifted by attachment to the individual motors.

For lifting assembled machine sets (such as built-on gearboxes, fan units), always use the lifting eyebolt(s) or lifting pegs provided on both the units! Machine sets should not be lifted by suspending the individual machines! Check the lifting capacity of the hoist!

**NOTE:** The motors should not be lifted using the centre holes on the shaft DE and NDE, because the weight of the motor shall harm the bearing and reduce its performance and operational life.

The bearings should be regreased, if the motors are stored for more than 18 months prior to commissioning under favorable conditions (kept in a dry place free from dust and vibration). Under unfavorable conditions, this period is considerably shorter than above.

Check the packing of the motor on arrival and in case any damage is observed, please report to the nearest Siemens office.

Make sure that the right type of motor as ordered has arrived. The motor nameplate provides relevant information.

If the motor is not installed immediately, it should be stored in a dry and vibration free room.

The rotor of the motor with cylindrical roller bearing or angular contact ball bearings is axially locked in position with the help of sheet steel rotor locator at the shaft extension. This is to prevent damage to the bearing due to standstill vibrations during transport. Do not remove this rotor locator until the motor is being coupled to the driven equipment. In special cases where the motor is to be transported after the fitting of the transmission elements like coupling/pulley, other suitable arrangements to secure the rotor must be made.

Motors of vertical type of construction with angular contact ball bearing (2 pole motors of frame 315 and

above) should be transported in vertical conditions only. If horizontal transportation is a must, lock the rotor axially in position with the help of the rotor locator.

If the motors are kept in stock (for more than 3 months) prior to commissioning, rotate the rotor for 10 to 15 revolutions every fortnight. For those motors supplied with rotor locator, remove the locator, do the above operation and reassemble the rotor locator in its place.



## Caution

(Environmental Protection)

Disposal of packing material: On unpacking the motors, the packing material shall be disposed as per the Local / Statutory requirements.

Special attention should be given to Polythene bags, thermocole packing and nylon straps etc., which are not biodegradable.

### 3.2 Mounting

All standard motors upto frame size 315M (except 2 pole motors of frame 315M) are suitable for horizontal as well as vertical mounting. i.e. Standard foot mounted motors can be used in IM-B3, B6, B7, B8, V5, V6 constructions or flange-mounted motor can be used in IM-B5, V1, and V3 constructions. All motors which have a shaft extension pointing upwards (V6 construction) must have a means (provided by the user) of preventing the ingress of dust and of liquids along the shaft.

Whenever the foot mounted motors have facility for mounting with alternative fixing distances corresponding to S&M or M&L frame designations, two holes are provided on the mounting feet at the non-drive end. Corresponding letters S, M, L are indicated near the fixing holes on the mounting feet.

### 3.3 Installation

After installation, **screwed-in lifting eyebolt(s)** should either be removed or tightened down.

Remove rotor locator (when provided) from shaft extension. Check the free running of the rotor by rotating the shaft by hand.

The shaft extension of the motor is coated with an anticorrosion agent. To remove this coating use kerosene / thinner. Do not use sandpaper or scraper.

Before mounting the motor, see that the motor feet are properly cleaned.

As a standard practice, the transmission elements to be fitted to the motor should be dynamically balanced. Please note that the rotors of the motors are dynamically balanced with half key inserted in the shaft extension of the motor. Transmission elements must be fitted and removed only by means of suitable tool. Refer fig.2.



## Caution

The keys are only secured against falling-out during transport. If the motor has two shaft ends, and a power take-off element is only fitted to one end, steps must be taken to prevent the key at the other end from being slung out.

Install the motor in such a manner that the cooling air has free access and can escape unobstructed. Discharged air or hot air from neighboring equipment, must not be sucked in again. Clean the entire path of air over the motor (between ribs and air inlet in fan cowl) at regular intervals to remove any foreign deposits, preferably by means of compressed air.

Motors are provided with plugged drain-holes, located at **lowermost point** on both the endshields for drainage of condensate water. Please ensure that these holes are the lowest point of the motor. If necessary rotate the end shield.

For foot mounted motors to be fixed on the wall a support should be provided for the mounting feet from below.

In the case of motors with shaft end facing upwards or downwards, measures must be taken (by the user) to ensure that no water or dust can penetrate into the upper bearing. (Refer 2.2)

Initial lubrication of the bearings is carried out in works.

If the belt drive is used, install the machine in such a manner that it can be shifted on its base (e.g. on slide rails) to obtain correct belt tension. Excessive belt tension may result in damage to the bearing and /or shaft. For permissible radial loads on shaft extension and recommended pulley sizes refer the Siemens catalog or contact our office.



## Caution

Excessive belt tension may result in damage to the shaft bearings; for permissible values, see catalog or enquire.

Due attention should be given to the measures necessary to prevent accidental touching of rotating parts (couplings, pulleys, etc.)

### Quiet running

Stable foundations or mounting conditions, exact alignment of the motors and a well-balanced transmission element are essential for quiet vibration-free running. If necessary, shims should be inserted under the motor feet to prevent strain.

### 3.4 Electrical connection

Examine the rating plate data and ensure that it matches with the power circuit to which the motor is to be connected. Check to see that system voltage and frequency agree with the data given on the rating plate. Select the size of supply cables as required for the particular current rating. Connect the supply cables in accordance with the connection diagram shown inside the terminal box cover.



#### Danger

All work on the motor must only be performed by qualified personnel, with the motor in a stationary state. The supply should be secured so that it cannot be switched back on again. Check that no voltage is present before commencing work.

Connection and arrangement of the terminal links must agree with the diagram provided in the terminal box.

Refer Fig. 3 to Fig. 6 for various Terminal box arrangements.

Please refer to the table below for tightening torques for terminal bolts and nuts (except for terminal strips).

Thread-ø	Nm	M4	M5	M6	M8	M10	M12	M16
Tightening Torque(Nm)	Min	0.8	1.8	2.7	5.5	9	14	27
	Max	1.2	2.5	4	8	13	20	40

Ensure that the direction of rotation of the motor is as required. For induction motors, the direction of rotation can be reversed by interchanging two supply phase connections in the terminal box. All motors of type 1LA0 / 1SE0 are suitable for bi-directional rotation.

Before closing the terminal box ensure that:

- Interior of the terminal box is clean and free of cable residue.
- All terminal screws and bolts are firmly tightened.
- Minimum air-clearance (>10mm upto 500V. >14mm upto 1000V) is maintained.
- Unused cable entries are sealed off with the plugging elements firmly screwed in.
- All sealing surfaces have adequate contact.

When the motors are provided with anti-condensation heaters, ensure that the supply to heaters is switched off before switching on the motor.

Before starting and during operation, make sure that all the relevant safety and statutory regulations pertaining to the area of operation is complied with.

### 3.4.1 Earthing

Connect the earthing conductor to the terminal with the earth marking in the Terminal box as well as on the Stator housing.

Clean the area underneath the earthing terminal and smear it with petroleum jelly before making earthing connections.

### 3.5 Checking the insulation resistance

The insulation resistance of the windings must be measured prior to initial startup of the machine, and after long periods of storage or standstill (approximately 6 months).



#### Warning

While the measurement is being taken and immediately afterwards, some of the terminals carry dangerous voltages and must not be touched.

### Measurement

The insulation resistance of the windings to ground is measured with 500V DC. The winding temperature should be 30°C±15°C.

### Checking

Minimum insulation resistance value (at 40°C) as specified in IS: 4722 is  $R_m = kV + 1$ , where kV is the rated voltage of the machine. Thus, for 415V rated voltage the insulation resistance of the winding should not be less than 1.42 MOhm.

If less the winding must be suitably dried as per IS: 900

### 3.6 Bearing and lubrication

All motors, as a standard feature, are provided with floating bearing at drive end and fixed bearing at non-drive end. Motors are provided with regreasing arrangement (grease nipples).

It is recommended that the greasing instructions and type of grease used as mentioned on the lubrication data plate should be followed. (Standard type of grease used is UNIREX N3 of ExxonMobil).

Mixing greases of different thickeners and basic oils reduce the quality and should therefore be avoided.

Only in special cases should deviations be made from the usual greasing data. The regreasing intervals should be shortened for instance, if the motors are operated at ambient air temperatures higher than originally allowed for, or if corrosive vapours occur or extremely heavy contamination is present.

While regreasing, clean grease nipples and press in the grease stipulated on the lubrication data plate using grease gun. At the same time, the shaft should be rotating in order that the new grease is distributed

uniformly in the bearing. After regreasing, the bearing temperature will rise by a few degrees and drop to its normal value when the grease reaches its normal service viscosity and the excess grease has been forced out of the bearing.

The old grease from several greasing operations gathers in the space inside the outer bearing cover/ endshields. Remove the old grease while overhauling the machine.

### 3.7 Balancing, transmission elements

A suitable device should always be used for fitting and removing the transmission elements (coupling halves, pulleys, pinions).

As standard, the rotors are dynamically balanced with the half key inserted.

When fitting the transmission element, keep the type of balance in mind! Balance with half key.



#### Warning

The usual measures should be taken to guard transmission elements from touch. If a motor is started up without transmission element attached, the key should be secured to prevent it being thrown out.

### 3.8 Commissioning

**NOTE:** Where the torque is very uneven (the drive of a reciprocating type compressor, for example), the inevitable result is a non-sinusoidal motor current, whose harmonics can lead to excessive system perturbation or excessive electromagnetic interference.

In case of converter-fed motors, high-frequency current or voltage harmonics in the motor cables can give rise to electromagnetic interference. This is why the use of shielded cables is recommended.



#### Warning

Only expert persons should be entrusted with work on power installations. All covers which are designed to prevent active or rotating parts from being touched, or which are necessary to ensure correct air guidance and thus effective cooling, must be installed prior to commissioning.

**Before commissioning, check that:**

- The minimum insulation resistances are adhered to.
- The rotor turns freely without rubbing.
- The motor is properly assembled and aligned.

- The transmission elements are correctly adjusted (e.g. belt tension) and the transmission element is suitable for the given operating conditions.
- All electrical connections, mounting screws and connecting elements are properly fitted and tightened.
- All protective conductors are properly installed.
- Any auxiliaries that may be fitted (brakes, speedometer, separate fan) are in working order.
- Touch protection guards are installed around moving and live parts.
- The maximum speed  $n_{max}$  is not exceeded, especially for motors with variable speed drive.

**NOTE:** The maximum speed  $n_{max}$  is the highest operating speed permitted for short periods. It should be kept in mind that motor noise and vibration are worse at this speed, and bearing life is reduced. (For details refer catalogue or contact nearest Siemens office).



#### Caution

After motor installation, the brake, if fitted, should be checked for proper functioning.

It is not possible to formulate a complete checklist for all operations and applications. Other checks may also be necessary!

## 4. Electromagnetic Compatibility

When used for their intended purpose and operated on electrical supply systems with features specified (in EN 50160), the machines satisfy the requirements of the EU Directive on Electromagnetic Compatibility 89/336/EEU, and IEC 60034-1 Clause 13.

### Electromagnetic interference emission:

**Note:** Very uneven torque (such as with reciprocating compressor drives) forces a non sinusoidal motor current, the harmonics of which, can cause both impermissible reaction on the system and impermissible strong electromagnetic interference emission.

**Note:** In the case of converter fed machines, high frequency harmonic currents in the motor supply leads can give rise to electromagnetic interference emission, the magnitude of which depends upon the converter design (type, interference suppression measures, manufacturer). That is why the use of shielded supply cables is recommended. In order to avoid exceeding the limit values specified in EN 50081 with a converter / motor drive system, the EMC data provided by the converter manufacturer should always be followed. If they recommend the use of shielded supply cables, the shielding is most effective if it is connected over a large area right up to the motor terminal box (with a metal cable gland). In the case of motors with built in

detectors (e.g. PTC thermistors), interference voltages can occur in the detector cables due to converter related reasons.

#### **Electromagnetic interference immunity:**

The requirements of immunity to interference to EN 50082 are in principle, satisfied by the motors. In the case of motors with built in detectors (e.g. PTC thermistors), the operator himself must provide immunity to interference by selecting a suitable detector signaling cables with shielding (similar to the main motor leads)

## **5. Maintenance**

### **Safety Precautions**



## **Warning**

Before starting any work on the motor or other equipment, particularly before opening covers over live or moving parts, the motor must be properly isolated from the power supply. Besides the main circuits, any additional or auxiliary circuits that may be present must also be isolated.

The "5 Safety rules" to be followed are:

- Isolate the equipment
- Take effective measures to prevent reconnection
- Verify equipment is dead
- Ensure proper earthing connections
- Cover or fence off adjacent live parts

The precautions listed above should remain in force until all maintenance work is finished and the motor has been fully assembled.

Certain parts of the motor may reach temperatures above 50°C.

When cleaning the motor with compressed air, ensure that suitable exhaustion measures are used and you use personal protective gear (goggles, face mask/filter or similar)!

If chemical cleaning agents are used, observe the instructions and any warnings.

Chemical agents must be compatible with the motor's components/parts, especially when it involves plastics.

**NOTE:** Where motors are fitted with plugged drain holes, these should be opened from time to time to allow any accumulated condense water to be drained away.

Condense water openings should always be at the lowest point of the motor!



## **Caution**

(Environmental Protection)

The disposal of waste generated during operation & maintenance of the motor should be done as per the applicable local environmental legislations.



## **Caution**

(Environmental Protection)

Waste Copper windings during repair and maintenance - to be collected as segregated waste and sent to registered recyclers approved by the respective State Pollution Control Board.

### **5.1 General**

Periodic overhauling of the motor is recommended to ensure long trouble free service.

Before starting the maintenance work, make sure that the supply is disconnected. These motors are provided closely pitched ribs for effective cooling of the motor. These ribs should be cleaned at regular intervals either by oil free compressed air, or by scraping, depending on the level of contamination.

The inside of the motor should be cleaned using dry compressed air during normal overhauling of the motor. Special care should be taken while cleaning the windings to remove loose dust, moisture etc.

### **5.2 Dismantling**

#### **5.2.1 Pressing on and pulling off drive elements**

Use the tapped hole provided in the end of the shaft for fitting drive components such as couplings, gearwheels, belt pulleys etc. and, if possible, heat the components as necessary. Use a suitable puller tool for removing the components. Do not strike the components, e.g. with a hammer or similar tool, when fitting or removing them and do not exert more than the maximum value of radial or axial force - according to the catalog - transmitted to the motor bearings through the shaft extension.

#### **5.2.2 Fans**

##### **Plastic fan**

Thermo plastic fans have two cast-on tabs that snap into the ring groove on the shaft to prevent axial movement. Before the fan is pulled off the shaft, the two tabs must be disengaged (lifted up) and held temporarily in that position, e.g. by inserting packing.

Thermoplastic fans have two openings for the insertion of the puller arms so that the pulling force can directly act on the fan hub. On delivery, a film of plastic may cover these openings and later on they should be punched.

A suitable device (puller) should be used for pulling the fan off and pressing it back on. Hammer blows must be avoided to protect the fan and bearings.

### Cast Iron fan

Cast iron fans are axial locked with separate circlip. Cast iron fans are best removed by engaging the puller arms on the outer rim of the fan. In case of larger fans, the puller holes provided on the hub can be used.

### 5.2.3 Removal of Bearings

For removing bearings use proper pullers. Reusable bearings, which are non-separable (e.g. Deep groove ball bearing), should be withdrawn by attaching puller arms to the inner ring of the bearing. If it is a must to apply puller arms on the outer ring of the bearing, the bearing should be rotated during withdrawal to avoid damage to the bearing.



### Caution

(Environmental Protection)

Waste grease & Greased cloth - to be collected as hazardous waste and sent to hazardous waste disposal facility for incineration.

Removal of bearings or inner rings which are not to be used is facilitated by heating them with gas or welding torch.

### 5.3 Re-assembly

The motor must be assembled in a dust free, dry and clean location.

As the motor conforms to the type of protection IP55, all machined mating surfaces are provided with a thin even coat of bearing grease. Provide a fresh coat of this grease at the time of re-assembly.

Unmatched surfaces are provided with rubber gaskets. At the time of re-assembly, ensure that the gaskets are in good condition. Place the gaskets carefully to achieve the correct sealing. Replace the gaskets with the new ones if the same are damaged.

All fasteners that are used on the exterior of the motor are provided with a coat of bearing grease to prevent ingress of water and dust through tapped holes. Ensure that the same is provided at the time of re-assembly.

Do not interchange location (DE & NDE) of bearing covers, as the spigot dimensions may be different.

A bearing must be replaced if it is damaged. Damage to bearing is often difficult to recognize; in doubtful cases, replace the bearing. Bearings, which have been removed, should be reused only if they show no trace of damage and provided they are thoroughly cleaned beforehand.

For cleaning bearings use proper cleaning agent e.g. White spirit. Wear gloves.



### Caution

The cleaned bearing must be free of foreign bodies (fibres from cleaning rags, hair from brushes, etc.)

It is recommended that the new rolling bearings be installed as follows:



### Caution

(Environmental Protection)

The bearing to be discarded must be thoroughly cleaned from grease and should be intentionally damaged (using weld marks or cutters etc) to avoid reuse.

The removed grease is a hazardous waste and is harmful to environment causing soil pollution and water pollution. It should only be incinerated at an authorized agency and not disposed by any other means.

Heat the deep groove ball bearing or the inner race of the separable bearing. (Roller/Angular contact ball bearing) in oil or air to a temperature of approximately 80-100°C and slip them into the shaft. Heavy blows may damage the bearing and must be avoided. When installing single angular contact ball bearing, make sure that the broad shoulder of the inner race is with operating position pointing upwards i.e. in a direction opposite to that of the axial force.

After fitting, the bearing must be filled with sufficient quantity of grease.



### Caution

(Environmental Protection)

Waste Copper windings during repair and maintenance - to be collected as segregated waste and sent to registered recyclers approved by the respective State Pollution Control Board.

Waste insulation material is a hazardous waste and it should only be incinerated at an authorized agency and not disposed by any other means.

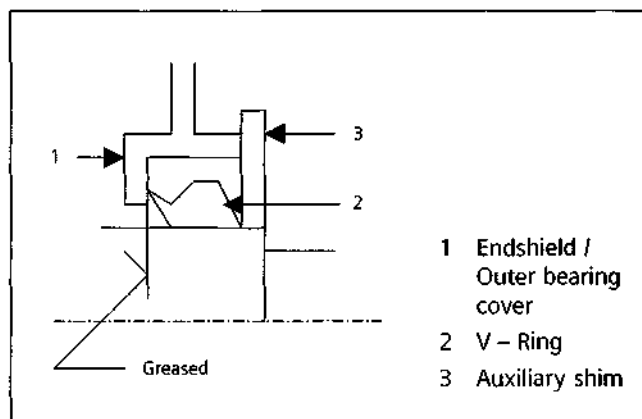
### 5.4 Initial fill of grease

Grease is to be filled in the bearing spaces completely, in-between the gaps of the rolling elements and in one-third open space, near the bearing, inside the inner bearing cover.

Pack the bearing cavities flush with grease! The cover plate or endshield is kept free of grease to prevent over greasing.

In case of regreaseable bearings, also fill the grease ducts in the endshield and the inner bearing cover.

When assembling the shaft sealing rings, ensure that they are fitted properly.



Ensure that the V rings are in the proper axial position. This is ensured with the help of auxiliary shim such that the bearing cover face / Endshield face and outer edge of the V-ring are flush.

Any worn sealing elements (such as shaft sealing ring, etc.) should also be renewed.

Whenever labyrinth seal is used, the gap between the labyrinth and Outer bearing cover should be filled with bearing grease.

#### NOTE:

- a) Motors provided with cylindrical roller bearings on the drive end sides have very high dynamic capacity. As per bearing manufacturers, the roller bearing performs satisfactorily only when it is radially loaded to approximately 2% of its dynamic capacity. In view of this, the roller bearing may not run smooth when the motor is run uncoupled or with low radial load (e.g. In direct flexible couplings.)
- b) **Type of grease for standard machines:**  
Grease lifetime and lubrication intervals specified are valid for UNIREX N3 type of grease only.  
Special greases are indicated on the lubricating data plate.
- c) **Avoid mixing different types of grease!**

### 5.5 Joint sealing

When reassembling machines with degree of protection IP56 (see rating plate), the joint between the motor frame and the endshields are sealed with rubber 'O' rings. It should be ensured that these are not damaged.

## 6. Spare Parts

When ordering spare parts, please indicate the correct Motor Type, Serial Number (as shown on the rating plate) and also the correct part description. This will ensure speedy and correct delivery of spare parts. Please refer to the exploded view of the motor (Fig.1).



### Caution

(Environmental Protection)

Disposal of the product at the end of its life: When it is decided that the product cannot be repaired and is to be disposed off, care should be taken to adhere to Local / Statutory environmental requirements. It should be noted that the product contains grease, copper windings, insulation materials that are not biodegradable and are hazardous to the environment.

#### NOTE:

In addition to the above information, it is recommended that the user refer to IS: 900 – "Code of practice for installation and maintenance of Induction Motors".

#### Applicable Standards

The motors comply with the following standards:

- IS: 325: Specification for three phase induction motors
- IS: 900: Code of practice for installation and maintenance of induction motors.
- IS: 4691: Degree of protection provided by enclosure for rotating electrical machinery
- IS: 7816: Guide for testing insulation resistance of rotating machines.
- IS: 9628: Specification for Three phase induction motors with type of protection 'n'.
- IS: 6381: Specification for construction and testing of apparatus with type of protection 'e'.
- IS: 12065: Permissible limits of noise level for rotating electrical machines.
- IS: 12075: Mechanical vibration of rotating electrical machines with shaft heights 56mm and higher – Measurement, Evaluation and Limits of Vibration severity.
- IEC: 60034-1: Rotating electrical machines – Part 1: Rating and Performance.
- IEC: 60034-5: Degree of protection for rotating electrical machines.
- EN: 60204: Safety of machinery –Electrical equipment of machines.



Fig. 1

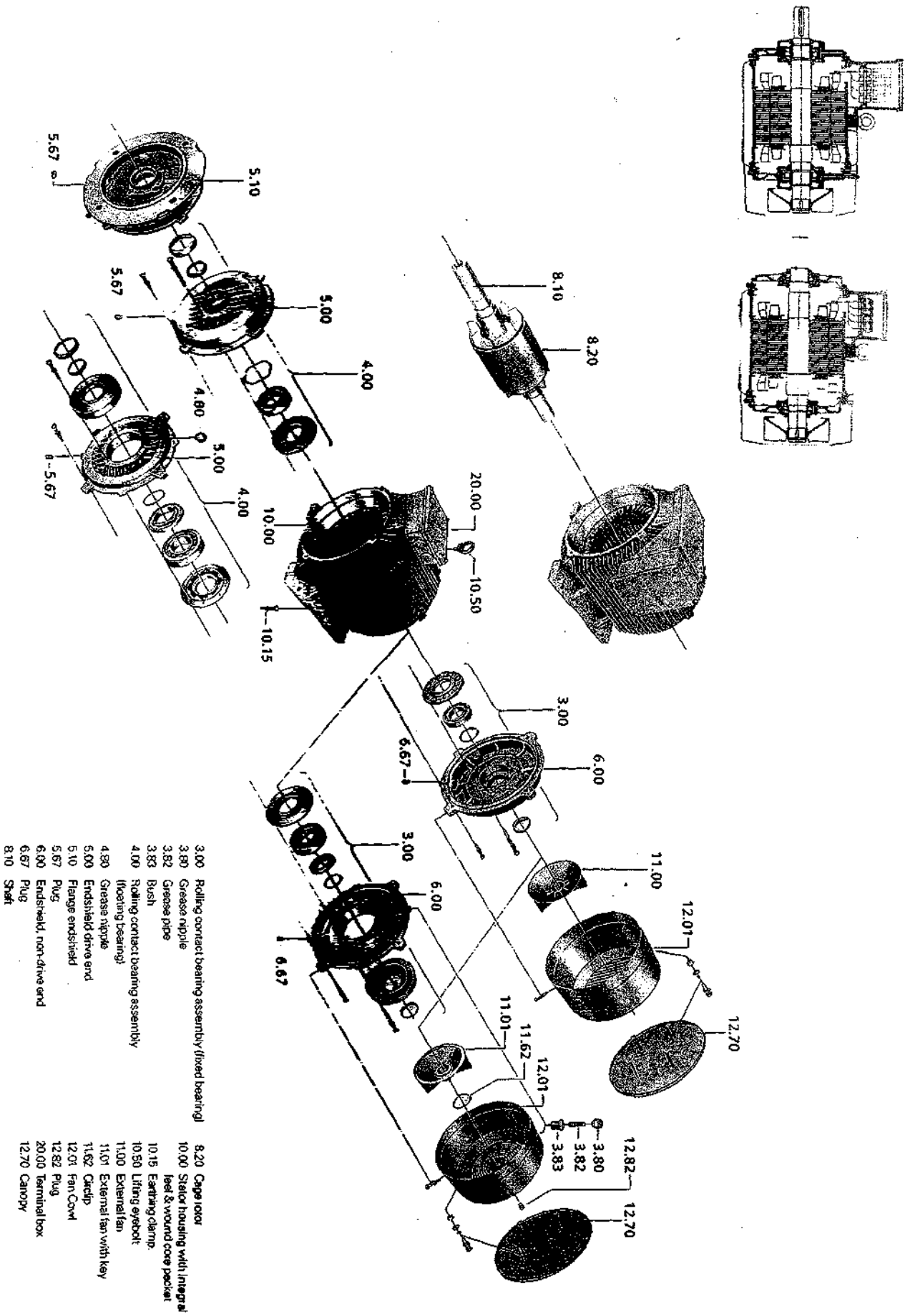
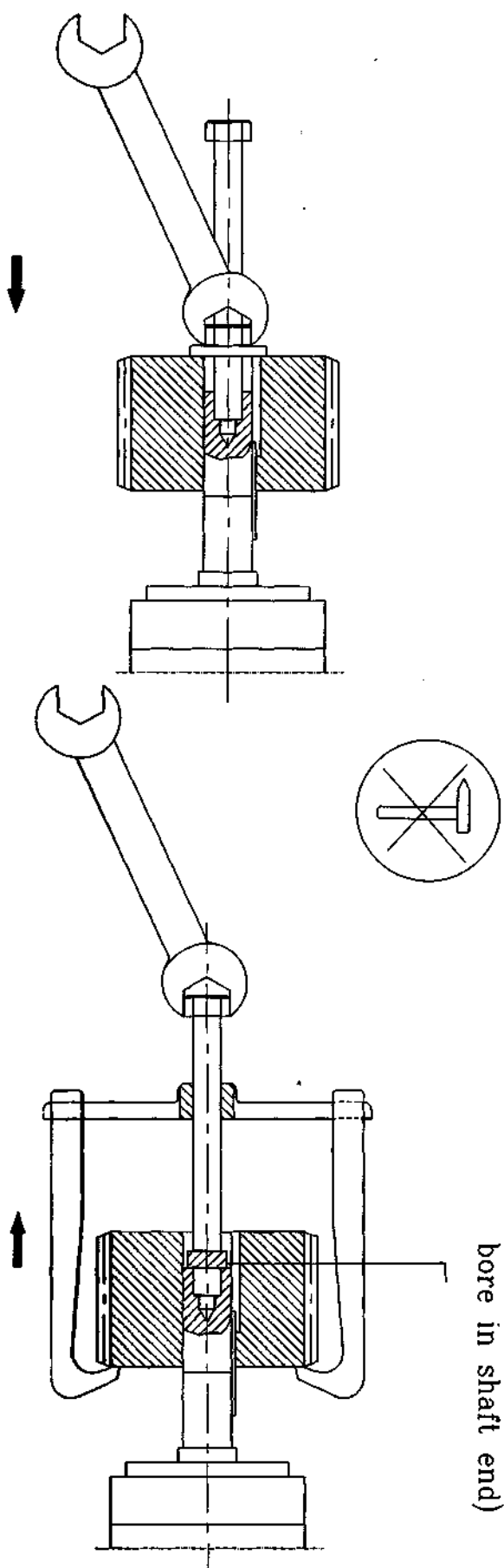
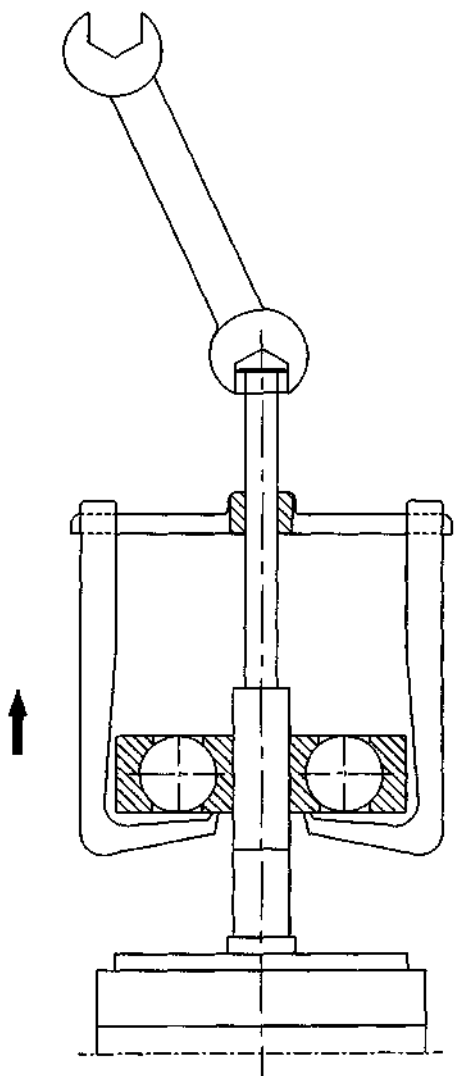


Fig. 2

Pressing on and pulling off drive elements



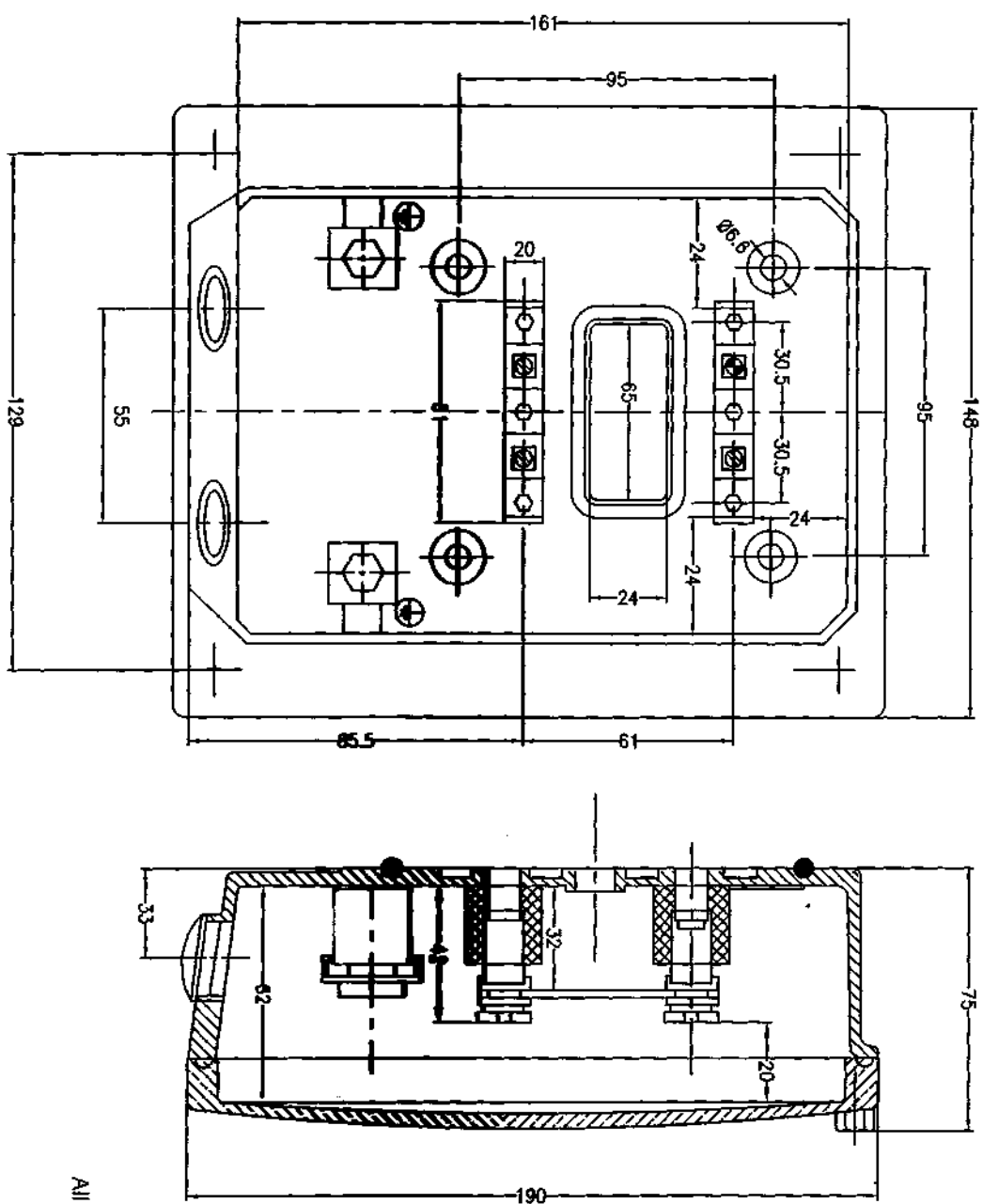
Changing bearings



All dimensions in mm.

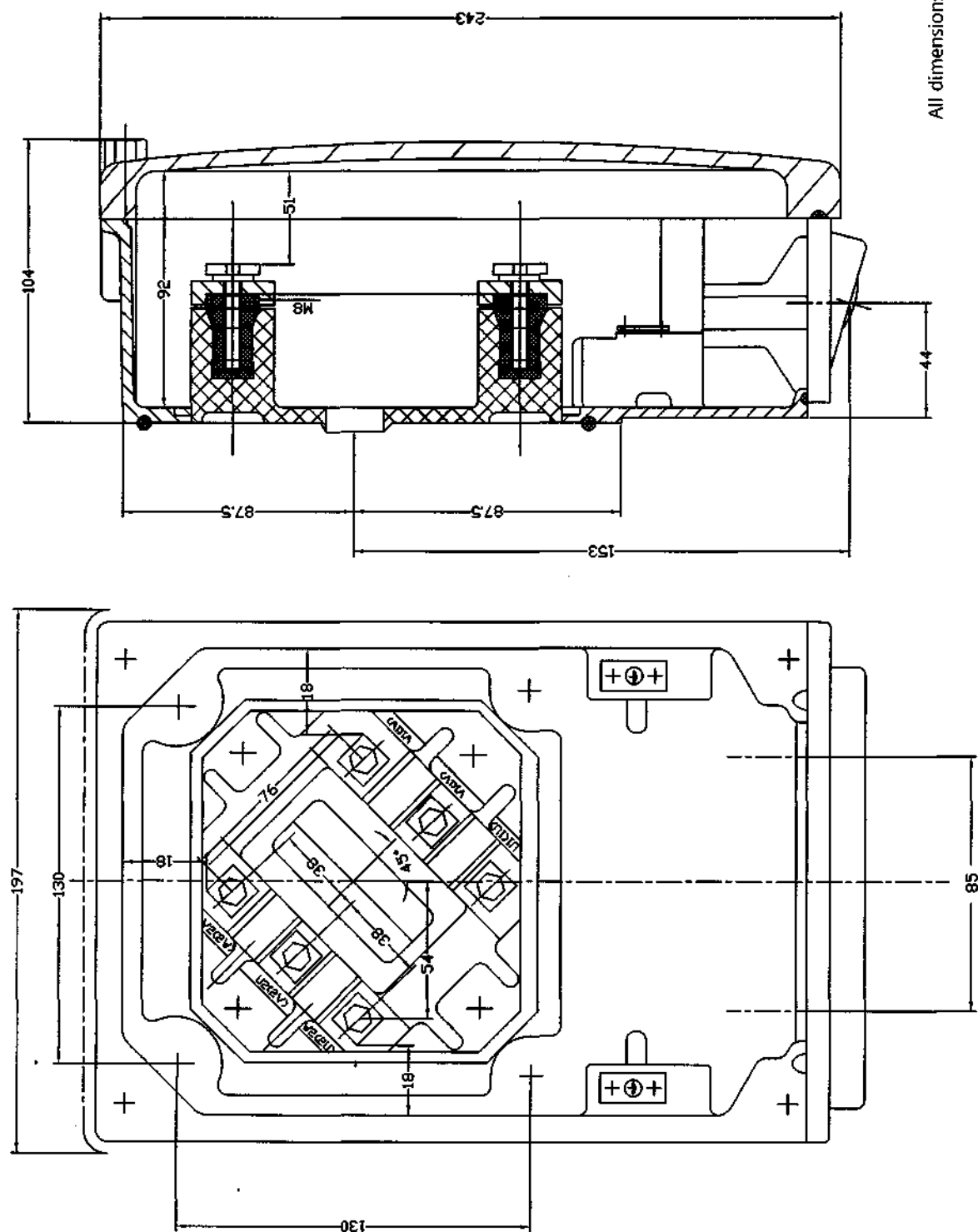
Fig. 3

## Terminal Box 1XB1 223



All dimensions in mm.

# Terminal Box 1XB7 322

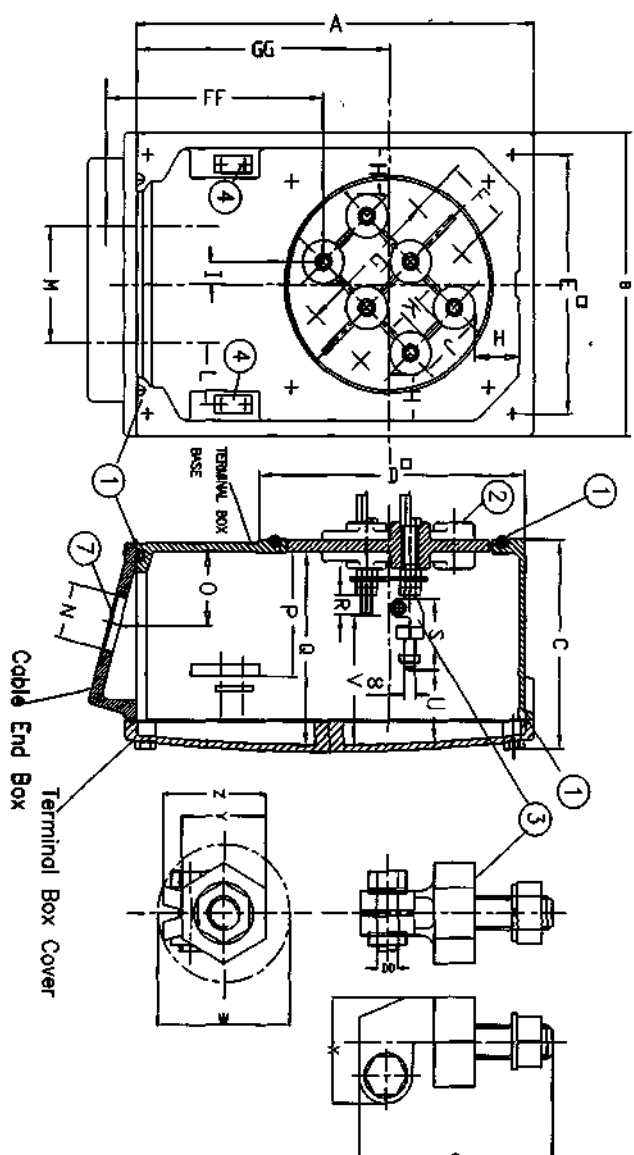


All dimensions in mm.

Fig. 4

Fig. 5

## Terminal Box Dimensions



Terminal box type	Terminal size	Conductor Cross Section (mm <sup>2</sup> )	
1XB7		Solderless type cable connection	Compression type cable connection
422	M10	6...240 mm <sup>2</sup>	6...185 mm <sup>2</sup>
522	M12	10...240 mm <sup>2</sup>	25...240 mm <sup>2</sup>
622	M16	25...240 mm <sup>2</sup>	50...300 mm <sup>2</sup>

Terminal Box	A	B	C	D	E	F	G	H	I	J	K	L	M	O	P	Q	R	S	U	V	W	X	Y	Z	CC	DD	FF	GG	
1XB7 422	294	228	155	208	156	56	126	21	20	56	24	45.5	85	48.5	97	138	18	59	42	78	41	29.5	24	29.5	M10	M6	120	132	180
1XB7 522	356	260	180	240	180	66	150	21.5	23	66	27	50.5	100	50	120	161	23	70	47.5	89.5	51	37	30	37	M12	M8	240	171	226
1XB7 622	422	324	229	306	240	84	196	29	30	84	30	60.5	135	87	156	206	25	91	63.5	116	62	48	41	48	M16	M10	300	187	260

- ① Rubber gasket  
 ② Terminal block  
 ③ Terminal connection assembly  
 ④ Earthing clamp  
 ⑤ Distance from center of conduit entry hole  
 ⑥ Max. permissible size of conductor  
 ⑦ 2 Nos. Conduit Entry M72x2.

All dimensions in mm.

Fig 6

# ARRANGMENT FOR AUXILIARY TERMINAL BOX

MAIN TERMINAL BLOCK

Details of Anti Condensation heater , leads and aux term box for the same.

MAIN TERMINAL BOX

ACH Heating  
Element cable  
leads

CLAMP

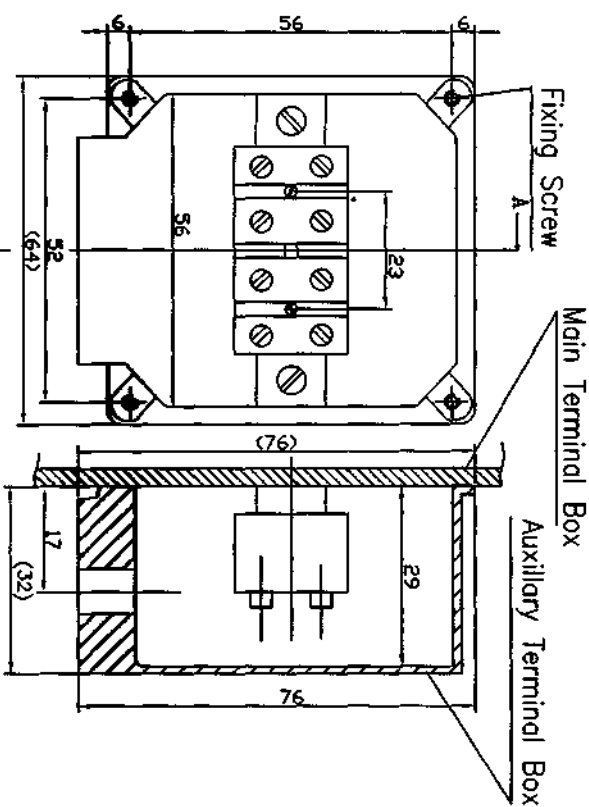
GASKET

RUBBER GROMMET

AUXILIARY TERMINAL BOX FOR ACH/PTC

STRIP CONNECTOR FOR ACH

EARTHING PLATE



All dimensions in mm.

Sr. No. | Description

All motors are Totally Enclosed Fan Cooled (TEFC) with Squirrel Cage Rotor

1	11A0 CHAMPION Series 250 - 355 frame (2 Pole 0.18 - 45kW, 4 Pole 0.12 - 15kW)	EFF2
2	11A0 CHAMPION Series 250 - 355 frame (6 Pole 0.18 - 30kW, 8 Pole 0.12 - 22kW)	EFF3
3	15E0 CHAMPION Series 250 - 355 frame (2 Pole 55 - 315kW, 4 Pole 55 - 315kW, 6 Pole 55 - 200kW)	EFF1
4	15E0 CHAMPION Series 2 Pole 9.3 - 19.5kW	EFF1
5	Consultant Series Motor 11A0 (2 Pole 37 - 160kW, 4 Pole 18.5 - 160kW, 6 Pole 11 - 90kW)	
6	Dual Speed Motors 11A0 2 Speed 4/2 Pole (160L - 315W)	
7	11A0 Super Energy Efficient Motors (2 Pole 0.18 - 7.5kW, 4 Pole 0.12 - 7.5kW & 5.5kW)	EFF4
8	11A0 Super Energy Efficient Motors (2 Pole 22 - 200kW, 4 Pole 18.5 - 200kW & 6 Pole 11 - 160kW)	EFF4
9	11A0 Transform Series (2 Pole 250 - 500kW, 4 Pole 250 - 1250kW, 6 Pole 160 - 790kW)	
10	1P00 (2 Pole 11 - 315kW, 4 Pole 11 - 315kW, 6 Pole 7.5 - 200kW)	
11	1A08 (2 Pole 250-500kW, 4 Pole 250 - 1180kW, 6 Pole 160 - 750kW)	
12	1P10 Motors for Textile Mill & some applications (2 Pole 37 - 55 kW)	
13	11A0 Motor for Textile Mill & some applications	

# Totally Enclosed (TE) Motor without cooling Fan

For Technical details, Please refer catalogues or contact our nearest sales office (details on back cover).



A brand new series of  
super performers

## Motors - Champion Series

### Benefits

- Full range **EFF1** and **EFF2** class motors
- **EFF1** class as standard in frames  $\geq 250$
- Energy saving, therefore lowest "Life Cycle Cost"
- Robust design for highest reliability and uptime
- Range: 0.12 kW - 315 kW

Now there's even more to a Siemens motor than just horse power

**SIEMENS**



## Your partners

### Sales offices:

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4th Floor, Secretariat Road  
Opp. Secretariat, Saifabad  
☎ : +91 40 23482500 (10 Lines)  
Fax: +91 40 23243145 / 23243146
- **Kolkata** - 700042  
43 Shanti Palli, R B Connector  
Eastern Metropolitan Bypass  
☎ : +91 33 24449000, 24428641-47  
Fax: +91 33 24449010 / 13
- **Lucknow** - 226001  
28/45, Ashok Marg  
Opposite Indira Bhawan  
☎ : +91 522 4031022, 4031000  
Fax: +91 522 4031019
- **Mumbai** - 400018  
130, Pandurang Budhkar Marg, Worli  
☎ : +91 22 24987000-02  
Fax: +91 22 24987312
- **Nagpur** - 440010  
5th Floor, Landmark Building  
Ramdas Peth  
☎ : +91 712 6633000  
Fax: +91 712 6633111
- **New Delhi** - 110002  
4A, Ring Road, I.P. Estate  
☎ : +91 11 42995000-09  
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- **Pune** - 411016  
Tower B / 701 - 705, ICC Trade Tower  
403A, Senapati Bapat Road  
☎ : +91 20 2570 6000  
Fax: +91 20 2570 6060

### Disposal

Siemens Products are environment friendly, which predominantly consist of recyclable materials.

For disposal we recommend disassembling and separation into following materials:

**METALS** : Segregate into Ferrous & Non Ferrous types for recycling through authorised dealer.

**PLASTICS** : Segregate as per material type for recycling through authorised dealer.

Because of the long lifetime of Siemens products the disposal guidelines may be replaced by other national regulations when taking the product out of service.

The local customer care service is available at any time to answer disposal-related questions

**Siemens Ltd.**

**Automation & Drives - Motors**

Thane Belapur Road

Thane 400601

Fax: +91 22 27623727

E-mail: [motors.in@siemens.com](mailto:motors.in@siemens.com)

Customer care Toll free no. 1800 220 987. Email: [adscs.india@siemens.com](mailto:adscs.india@siemens.com)

**Siemens Ltd.**

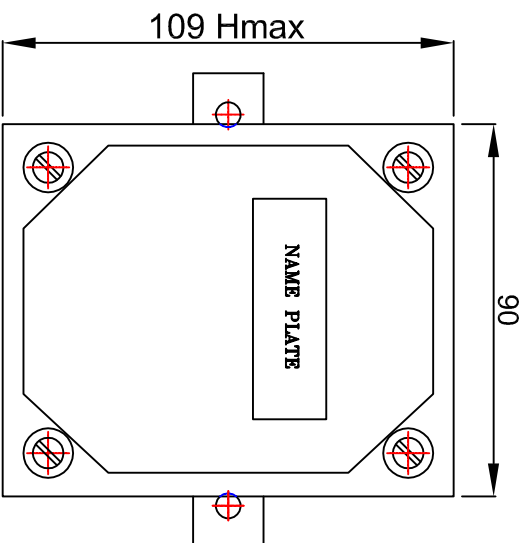
MOT-02-120-048

Product development is a continuous process. Consequently the data indicated in this booklet is subject to change without prior notice.

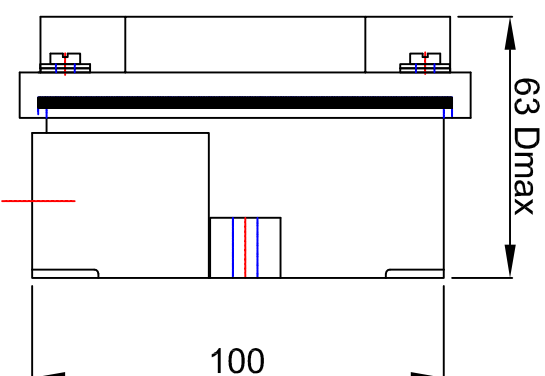
Expert



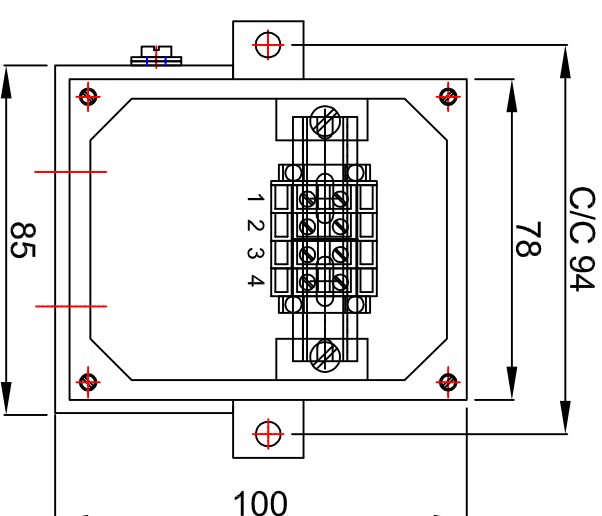
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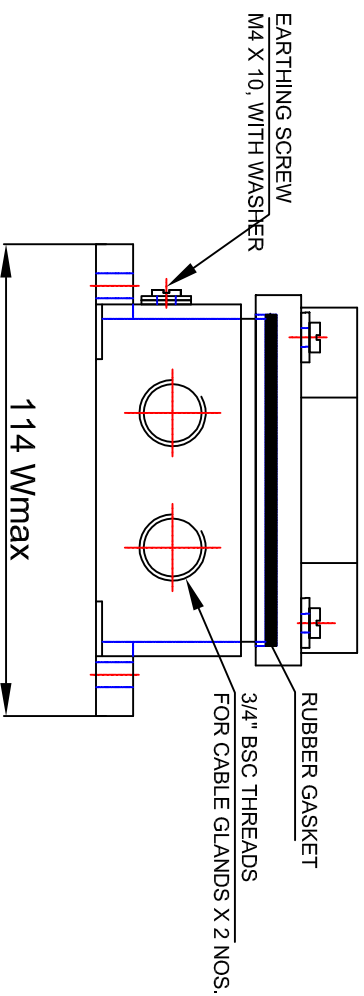
### FRONT VIEW WITH COVER




## SIDE VIEW



## FRONT VIEW WITHOUT COVER

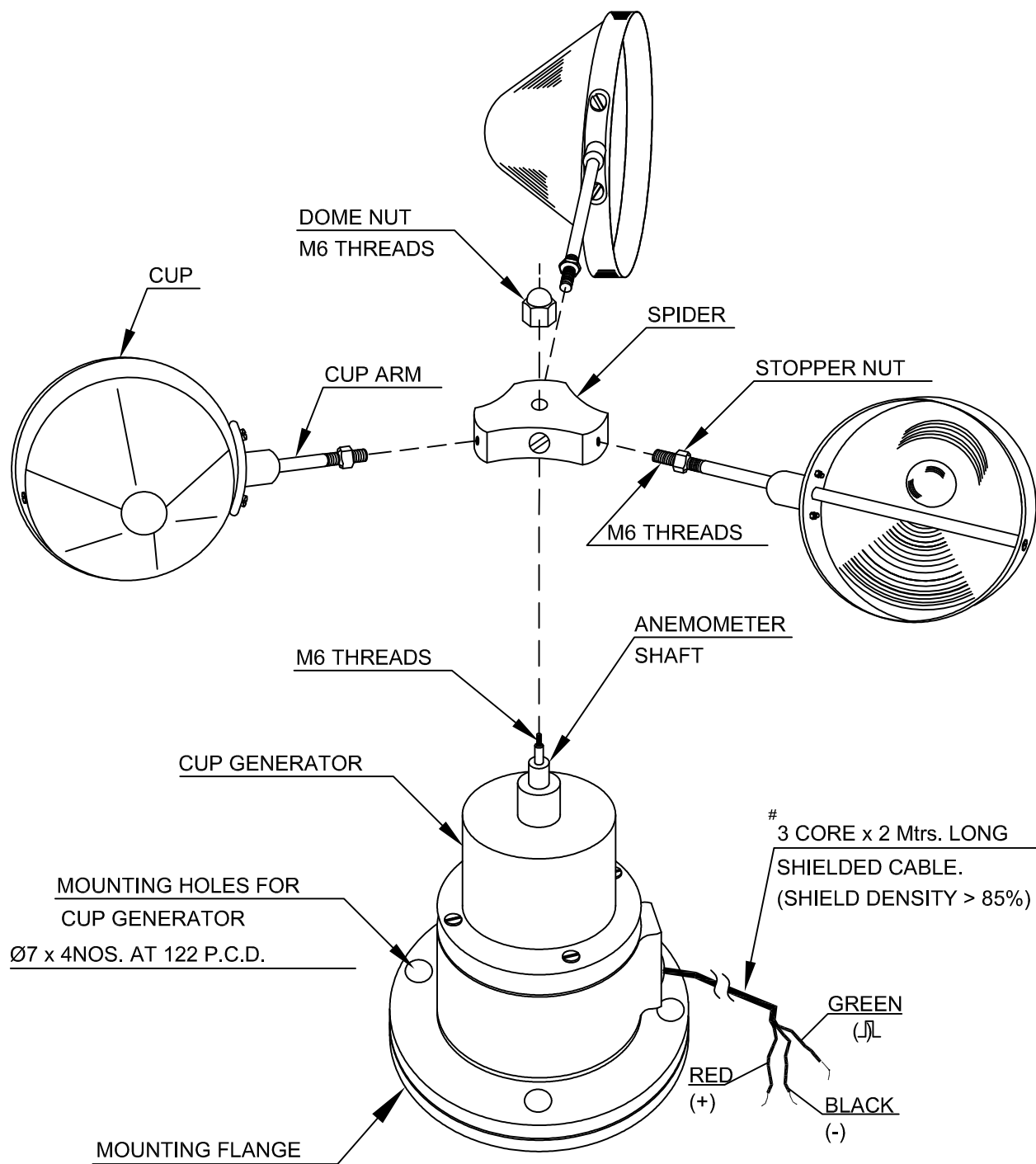


## BOTTOM VIEW

CLIENT : Anupam Industries Ltd.				PROJECT : ESSAR-2740		<div></div> <b>KANA ELECTROMECHS</b> 17/1B, KOTHRUD INDL. ESTATE, PUNE - 411 038.	
REV. 00	DRN. BY	A.C.D	25.04.2013	<b>DIMENSIONAL DETAILS OF</b>  <b>CAST AL. JUNCTION BOX ( SMALL )</b>			
	CHK. BY	A.R.N	25.04.2013				
SHEET 2 OF 3	APP. BY	A.R.N	25.04.2013				

### SPECIFICATIONS :-

TYPE	: JB 101-04
ENCL. MATERIAL	: CAST ALUMINIUM
FINISH	: POWDER COATED
COLOUR	: SIEMENS GREY
PROTECTION	: IP 65
OVERALL DIM	: 114(W) X 109(H) x 63(D)
DIM TOLERANCE	: ± 5 ON OVER ALL DIM.
	± 1 ON MTG. DIM.



# FOR CUP GENERATORS MOUNTED ON STAND & DULY  
WIRED UPTO CONTROLLER UNIT, THE CABLE LENGTH  
IS SHORT AND JUST SUFFICIENT.

**CAUTION : REFER MOUNTING INSTRUCTIONS BEFORE MOUNTING.**  
(INSTRUCTIONS ARE ENCLOSED ALONGWITH THE MATERIAL DURING PACKING)

NOTE : FOR CONVENIENCE OF PACKING THE CUP ASSEMBLY WITH CUPS ATTACHED TO THE SPIDER,  
IS DETACHED FROM THE CUP GENERATOR BODY AND IS SEPARATELY PACKED IT REQUIRES  
REASSEMBLY AT SITE AS SHOWN IN THE XPLODED VIEW.

**EXPLODED VIEW OF  
CUP GENERATOR UNIT**



**KANA ELECTROMECHS**  
17/1B KOTHRUD IND. ESTATE  
PUNE - 411 029

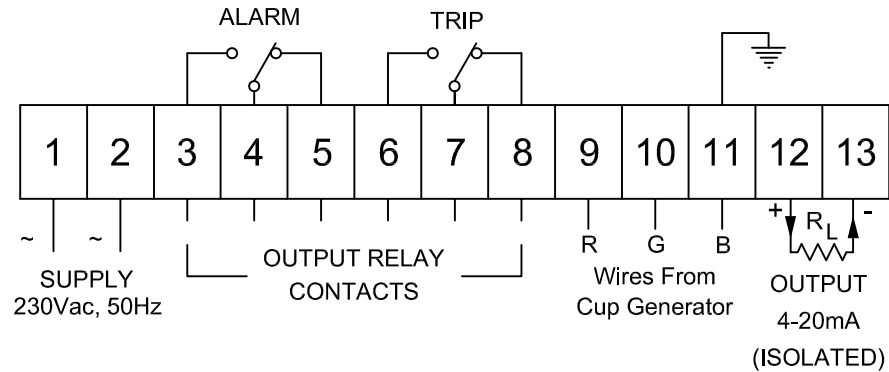
DRG. NO. : CUP GEN-EXPLODED VIEW

SCALE : N.T.S.

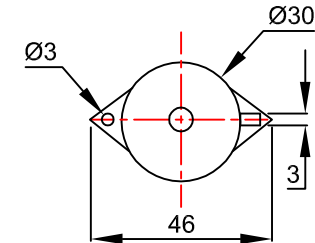
ALL DIMENSIONS IN MM

REV. 00	DRN. BY	N.P.K.	13.05.10
SHEET 3 OF 3	CHK. BY	A.R.N.	13.05.10
	APP. BY	A.R.N.	13.05.10

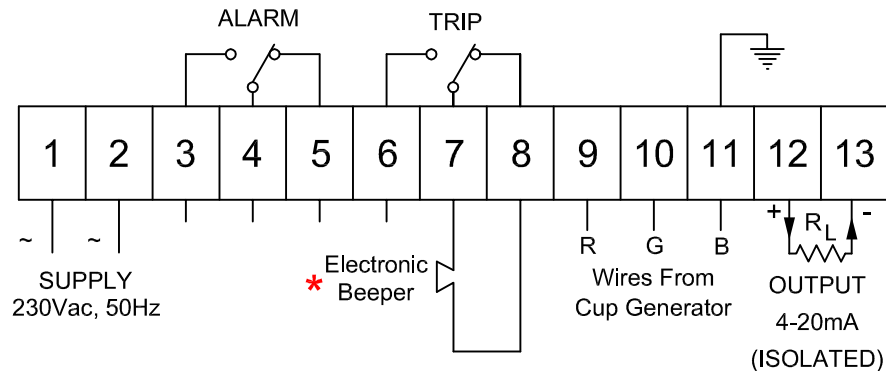
## ELECTRICAL CONNECTIONS



## ELECTRONIC BEEPER DIMENSIONAL DRAWING



## ELECTRICAL CONNECTIONS WITH BEEPER



### \* NOTE:

- 1) Electronic Beeper can be connected to either Alarm or Trip Contact.  
*You have to specify where to connect.*
- 2) DC Supply for Beeper will be taken from Anemometer Circuit and hence the Beeper output contact can not be connected to any External Circuit.
- 3) Beeper to be affixed / pasted on the panel door or on the Anemometer body by Double Adhesive Sticker.

CLIENT : Anupam Industries Ltd.			
REV. 00	DRN. BY	N.A.K.	12.11.2013
SHEET 1 OF 1	CHK. BY	D.R.N.	12.11.2013
	APP. BY	D.R.N.	12.11.2013

PROJECTS : 1) NAVAL-2486-87 2) ESSAR-2740

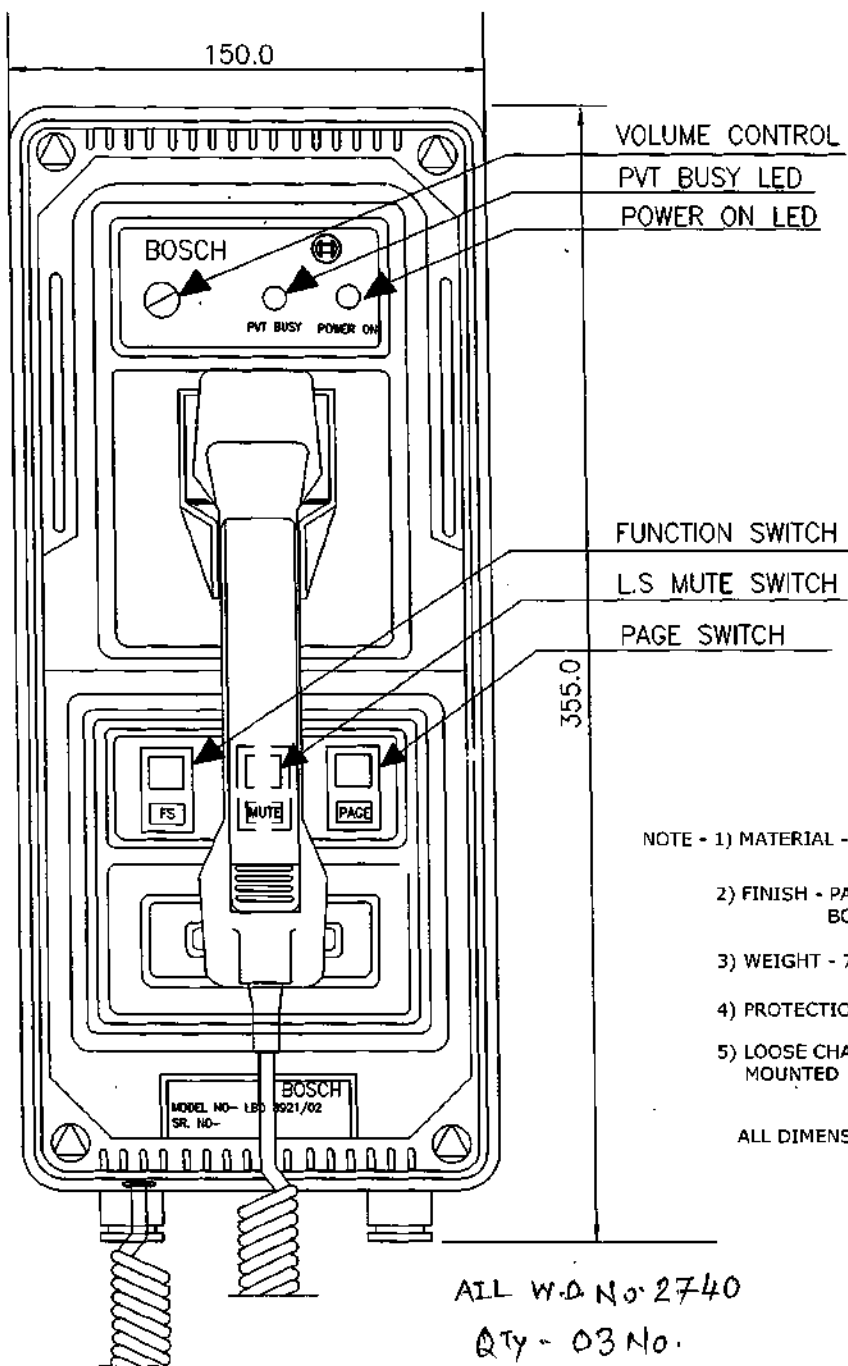
### ANEMOMETER ELECTRICAL CONNECTIONS WITH ELECTRONIC BEEPER



**KANA ELECTROMECHS**  
17/1B KOTHRUD IND. ESTATE  
PUNE - 411 038

FILE NO. : D:\WINANEMO\AILA-16902-16903-EC

DRG. NO. : AILA-EC-BEEPER



NOTE - 1) MATERIAL - CAST ALUMINIUM ALLOY LM-6.

2) FINISH - PAINTED STOV.ENAMEL STIPPLE FINISH  
BOX - BEIGE, COVER - BROWN

3) WEIGHT - 7.0 KG.APPROX

4) PROTECTION - IP 55

5) LOOSE CHANNELS SUPPLIED WITH STATION TO BE  
MOUNTED FIRST THEN STATION TO BE SCREWED.

ALL DIMENSIONS ARE IN MM

Approved



ALL W.D No. 2740

Qty - 03 No.

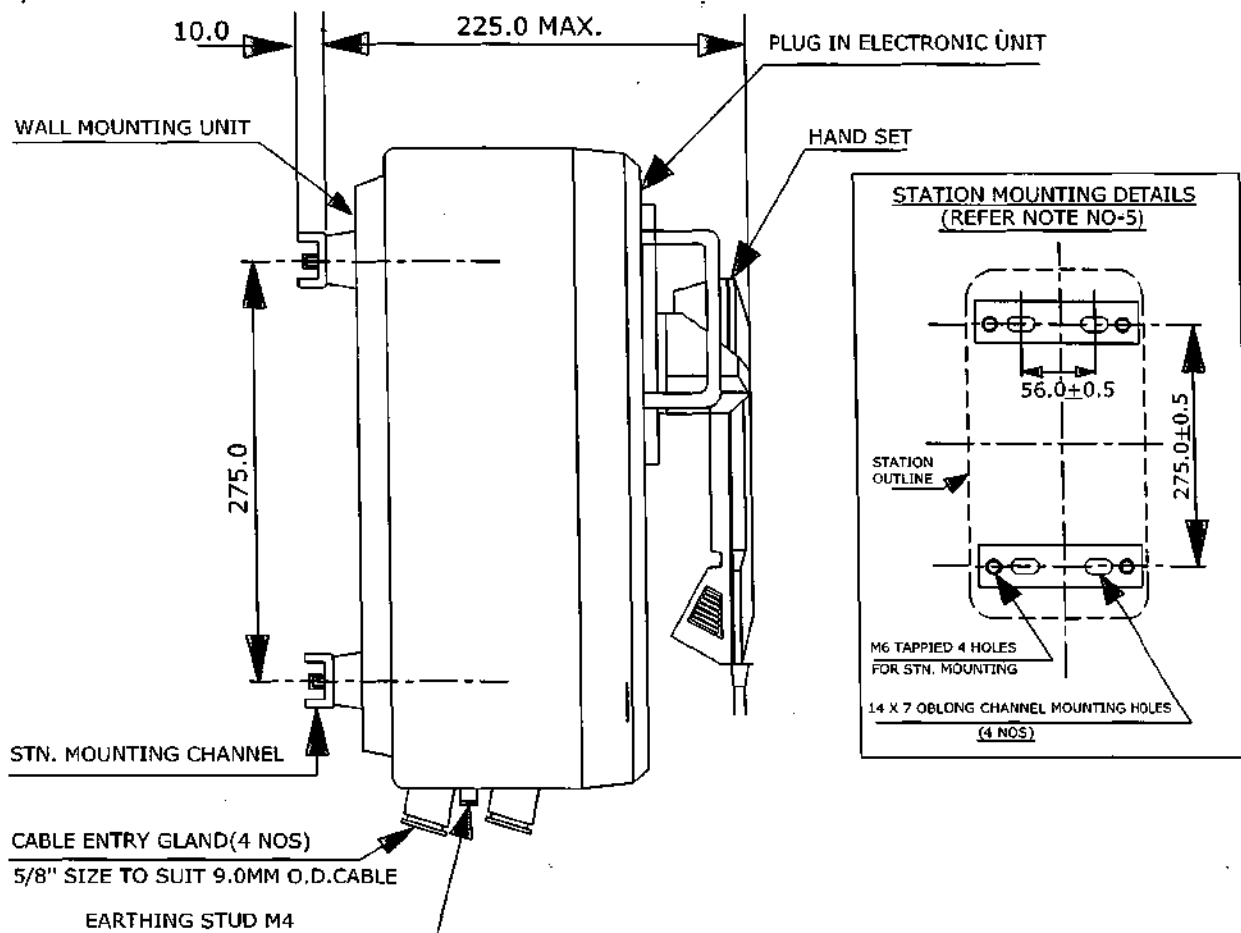
CLASS NO.	WALL MOUNTING HAND SET STATION			
	LBD 8921/02			
NAME YASIN	1 SH	10	SH 110 - 1	
PROPERTY OF TOYO TECHNICAL SERVICES			CHECK	

# WALL MOUNTING STATION

(HAND SET)

LBD 8921/02

## GENERAL ARRANGEMENT DRAWING

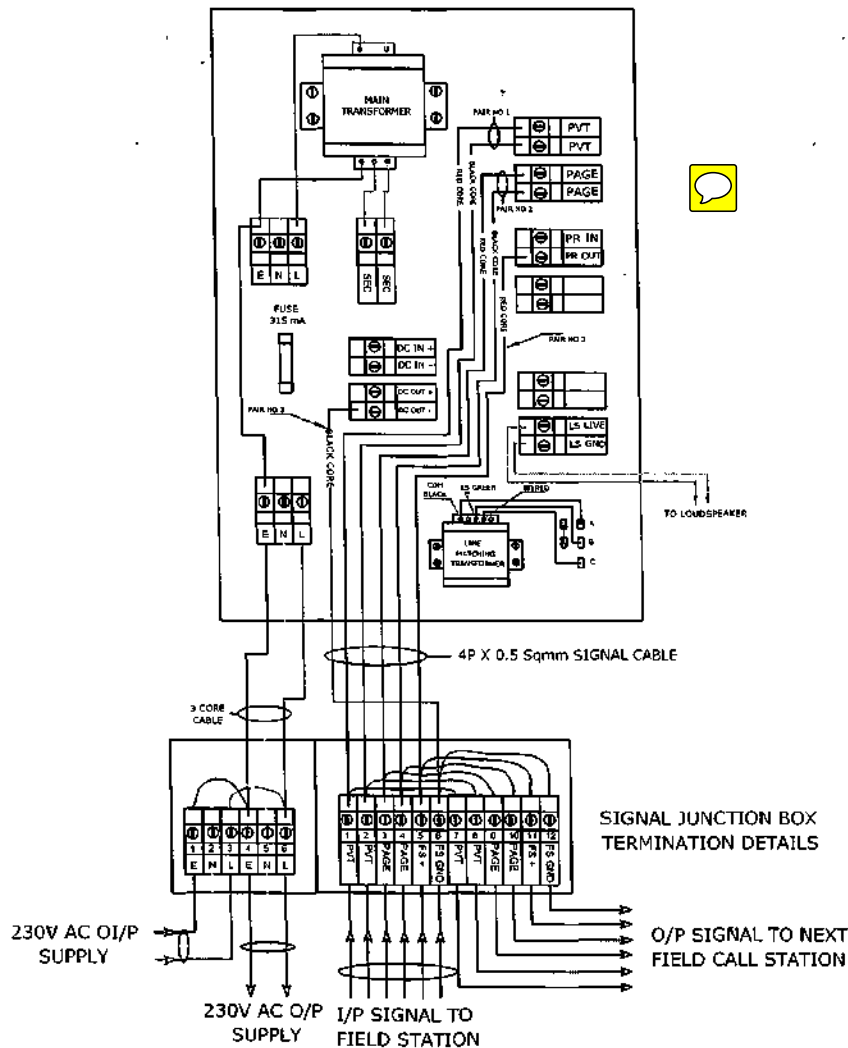


ALL DIMENSIONS ARE IN MM



TITLE :- G.A AND MOUNTING DETAILS OF LBD 8921/02		
CLASS NO.	PROJECT :-	
DRAWN BY:YASIN	CHECK BY:	APPROVED BY:-
APPROVED BY:	PROPERTY OF: TOYO TECHNICAL SERVICES	

# BASE PCB TERMINATION DETAILS OF LBD 8921/02



TITLE :- BASE PCB TERMINATION DETAIL OF LBD 8921/02		
CLASS NO.	PROJECT :-	
DRAWN BY: YASIN		
CHECK BY:		APPROVED BY:-
APPROVED BY:		PROPERTY OF: TOYO TECHNICAL SERVICES





**BOSCH DATASHEET**  
TOYO TECHNICAL SERVICES, BARODA

**HANDSET TYPE FIELD CALL STATION 15 WATT RMS BUILT IN AMPLIFIER**  
**MODEL NO: LBD8921/02 MAKE : BOSCH**

SR. NO.	DESCRIPTION	SPECIFICATION
1	TYPE OF MOUNTING ARRANGEMENT	WALL/COLUMN MOUNTING HANDSET TYPE
2	TYPE OF AMPLIFIER	BUILT IN 15WATT RMS POWER AMPLIFIER
3	INDICATION	LED INDICATION, POWER ON AND PVT BUSY.
4	CONTROLS ON FRONT PANEL	FS,MUTE,PAGE
5	VOLUME CONTROL EXTERNAL SPEAKER	PROVIDED PORT METER ON FRONT PANEL
6	MICROPHONE (TRANSMITTER)	DYNAMIC NOISE CENCELING TYPE, 230E +/- 15%
7	EAPPIECE (RECEIVER)	DYNAMIC ,230 E +/- 15%
	<b>LINE AMPLIFIER</b>	
8	INPUT SENSITIVITY	2V
9	Microphone Input	5MV ADJUSTABLE BY PRESET
10	LOAD IMPEDANCE	240 OMHS RESISTIVE
11	RESIDUAL NOISE LEVEL	- 50 DB W.R.T OUTPUT
12	FREQUENCY RESPONSE	200 HZ TO 12 KHZ (+1 & -3 DB )
13	GONG TONE FREQUENCY	600HZ +/- 100 HZ
14	GONG TONE DURATION	800 Ms +/- 100ms
	<b>POWER AMPLIFIER</b>	
15	INPUT SENSITIVITY	2V
16	INPUT IMPEDANCE	25K OMS
17	OUTPUT POWER	15 WATT RMS ACROSS 8/16 OHMS
18	PROTECTION	SHORT CIRCUIT ON OUTPUT
19	POWER SUPPLY	110VAC/220VAC/240VAC /24VDC
20	CURRANT CONSUMPTION	180MA
21	PERMISSIBLE TEMP.	Operate -20 c TO +55 c ,Storage- -40c to +70C
22	PROTECTION	IP52 WITH CANOPY IP55
23	DIAMENSSION (H XW XD)	355MM X 150MM X225MM
24	WEIGHT	7KG WITHOUT PACKING
25	MATERIALS	CAST ALLUMINIUM ALLOY LM-6
26	PAINT	DARK BROWN AND BEIGE
27	CABLE ENTRY	BOTTOM 3/ 4 " x 4 NOS .



TITLE :-		MODEL:- LBD 8347+LBD 8308, MAKE:- BOSCH	
CLASS NO.	PROJECT :-		
DRAWN BY:YASIN		CHECK BY:	APPROVED BY:-
APPROVED BY:		PROPERTY OF: TOYO TECHNICAL SERVICES	



SR. NO.	DESCRIPTION	SPECIFICATION
1	Make	Philips /Bosch
2	Type	LBD 8347
3	Materials	Die cast Aluminium Alloy LM6
4	Colour	Synthetic stoving enamel Light grey 631 of IS- 5
5	Mounting	Bracket mounting M.S. sheet 3mm thick
6	Cable gland and cable entry	Supplied with Brass 5/8" single compression gland
7	Dimension in mm	250(H) X 255(W) X 255(D) MM
8	Weight	3.1Kg
9	Protection	IP55
	Driver unit LBD8308M	
10	Rated /max power	15Watt RMS / 30 Watt Max
11	Voice coil impedance	16 Ohms
12	SPL 1w/1m	109d +3 dB to -2dB at 1 KHZ
13	Maximum out put SPL	120 dB at 1 KHZ
14	Dimension in mm	Q105D X 134 D
15	Input voltage (RMS)	LBD 8308 - 15.5 V, LBD 8308/T - 100V
16	Input tapping	100V with (T) or 16 Ohms direct
17	Certificate	None
18	Weight	LBD 8308 - 1.3 KG, LBD 8308/T - 1.6 KG

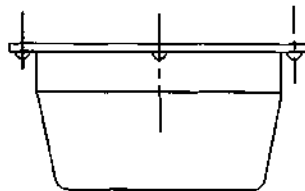
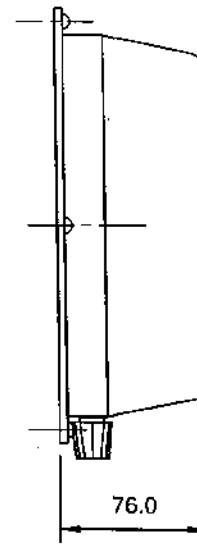
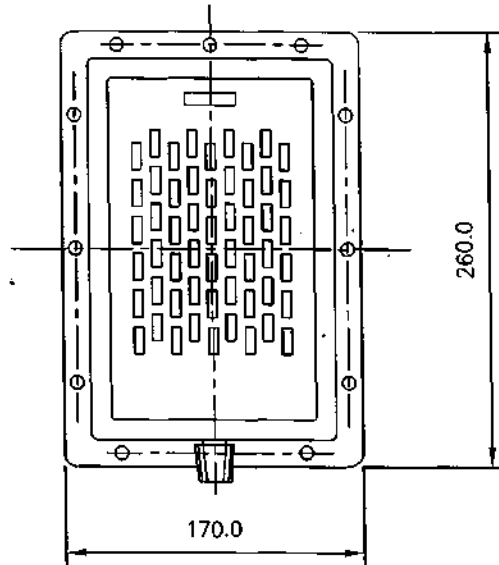
# OUTDOOR HORN LOUDSPEAKER LBD8347 +LBD8308M DRIVER UNIT ,BOSCH MAKE



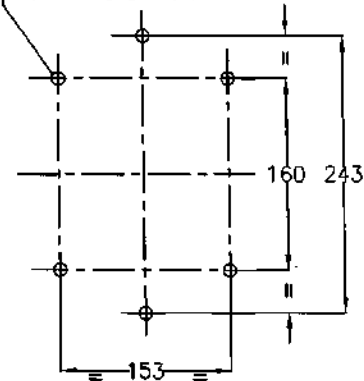
TOYO TECHNICAL SERVICES

# GENERAL ARRANGEMENT DRAWING

## LBD 8363MR



6 NOS #4.5 HOLES PROVIDED ON  
MOUNTING PLATE AS SHOWN



MOUNTING DETAILS

### TECHNICAL DATA :-

#### ENCLOSURE :-

MATERIAL - M.S. SHT 1.2 MM THICK

PAINTED - STOV.ENAMEL LIGHT GREY (SEMIGLOSSY) SHADE 631 OF IS-5.

#### SPEAKER :-

MAKE -

BOSCH

SIZE -

150 X 100 MM

IMPEDANCE -

8 OHMS

RATED POWER O/P -

4 WATTS

FREQUENCY RANGE -

100 - 15000 Hz.

INPUT VOLTAGE -

8/18 OHMS OR 70,100V

WEIGHT OF UNIT APPROX. - 1.3 KG



Approved

ALL W.D No-2740

Qty = 02 Nos.



TITLE :- MODEL:- LBD 8363 MR, MAKE:- BOSCH		
CLASS NO.	PROJECT :-	
DRAWN BY: YASIN		
CHECK BY:		APPROVED BY:-
APPROVED BY:		PROPERTY OF: TOYO TECHNICAL SERVICES



## TOYO TECHNICAL SERVICES

### '6' WATT RMS INDOOR BOX TYPE SPEAKER LBD8363MR,BOSCH MAKE

SR. NO.	DESCRIPTION	SPECIFICATION
	Horn loudspeaker LBD8347	
1	Make	Philips /Bosch
2	Type	LBD 8363MR
3	Materials	M.S Sheet 1.2 MM thick
4	Colour	Stove Enamel Light grey ,Shade 631 of IS-5
5	Mounting	Wall mounting
6	Cable entry	Bottom
7	Dimension in mm	76(H) X 170(W) X 260MM (L) MM
8	Weight	1.3Kg
9	Rated /max power	4Watt RMS / 6 Watt Max
10	Voice coil impedance	4 Omhs
11	Freq. Response	100Hz - 15 KHZ
12	Nominal Voltage	11V AC Peak to peak
13	Maximum out put SPL	84 dB (Typical )

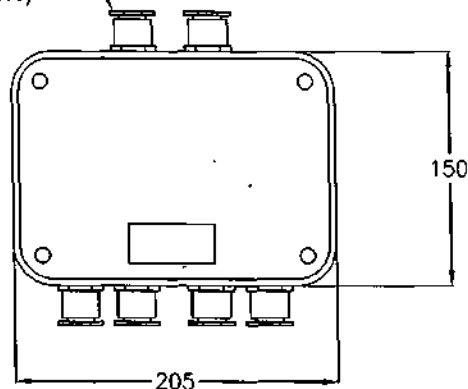


# GENERAL ARRANGEMENT DRAWING

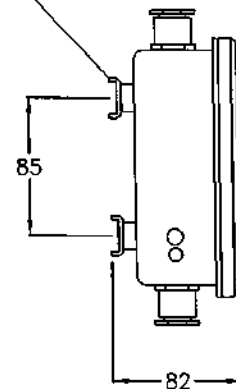
SHEET 17 OF 18

## CONNECTION BOX FOR ANNOUNCEMENT CONSOLE

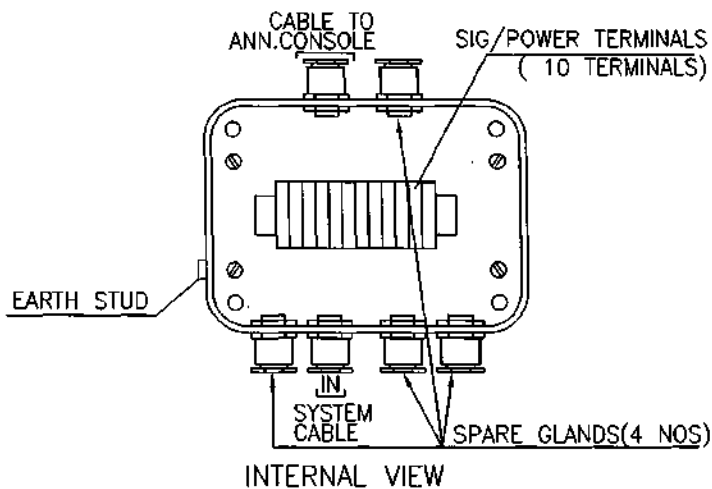
GLAND 3/4" SIZE TO SUIT  
19.0 MM.O.D.CABLE (6 Nos)



MOUNTING CHANNEL (2X)

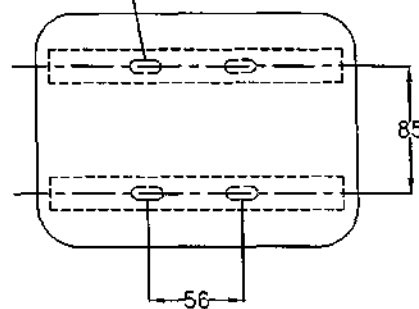


DIMENSIONAL DRAWING



INTERNAL VIEW

14 X 7 OBLONG MTG. HOLES (4X)  
ON CHANNEL



MOUNTING DETAILS

### TECHNICAL DATA

- 1) MATERIAL OF BODY - PRESSURE DIE CASTING AL. ALLOY LM 6
- 2) MATERIAL OF GLAND - BRASS
- 3) FINISH - PAINTED STOVING ENAMEL STIPPLE, BOX-BEIGE, COVER-BROWN
- 4) INSULATION RESISTANCE - 500 M OHMS  
BET. TERMINAL & BODY
- 5) H.V. TEST - 1)MAINS CONNECTOR : 2 KV FOR 1 MIN  
- 2)SIGNAL CONNECTOR : 1.5 KV FOR 1 MIN
- 6) PROTECTION - AS PER IP 55

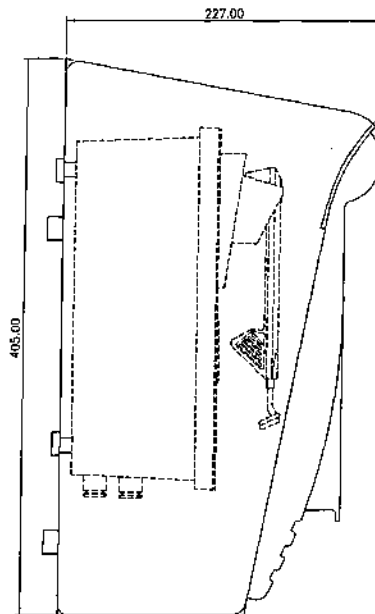
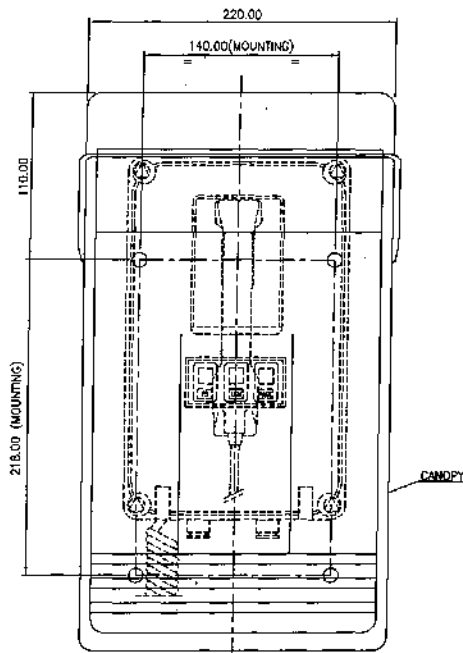
ALL H.O No. 2740  
QTY = 03 NOS.



TITLE :- G.A OF STATION JUNCTION BOX LBD 8930		
CLASS NO.	PROJECT :-	
DRAWN BY:YASIN		
CHECK BY:	APPROVED BY:-	
APPROVED BY:	PROPERTY OF: TOYO TECHNICAL SERVICES	

# GENERAL ARRANGEMENT DRAWING

## LDD 8901/11 CANOPY



### NOTE:-

- 1) MATERIAL-FIBRE RE INFORCED PLASTIC 3 MM THK.  
USING MB BOLTS (4x), THEN STATION TO BE SCREWED
- 2) COLOUR- LIGHT GREY.  
FINISH-GLOSS
- 3) WEIGHT - 8.0 KG.APPROX.
- 4) PROTECTION - IP 55
- 5) CANOPY TO BE MOUNTED ON THE WALL BY  
IN THE CANOPY.
- 6) STATION IS SHOWN IN DOTTED LINES.(FOR IDEA) Approved,
- 7) CANOPY IS SUITABLE FOR MOUNTING  
LDD 8921/20, LDD 8922/20  
(FIG.SHOWS LDD 8921/20 ONLY)

ALL W.D.N02740  
QTY 01 NO.

GENERAL TOL.±2.0 MM. UNLESS SPECIFIED.  
ALL DIMENSIONS ARE IN MM

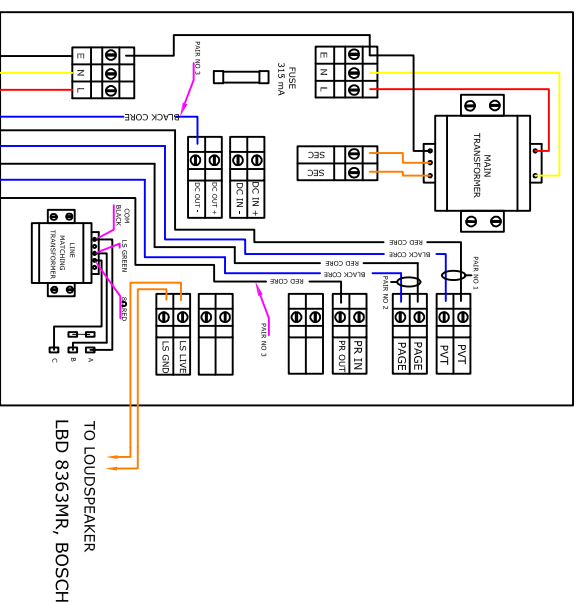


CLASS NO.	WEATHER PROOF COVER(CANOPY)			
	LDD 8901/11			
	INDUSTRIAL P.SYSTEM			
NAME YASIN	1 SH	10	SH	
BQ	PROPERTY OF	TOYO TECHNICAL SERVICES	CHECK	FORM A3

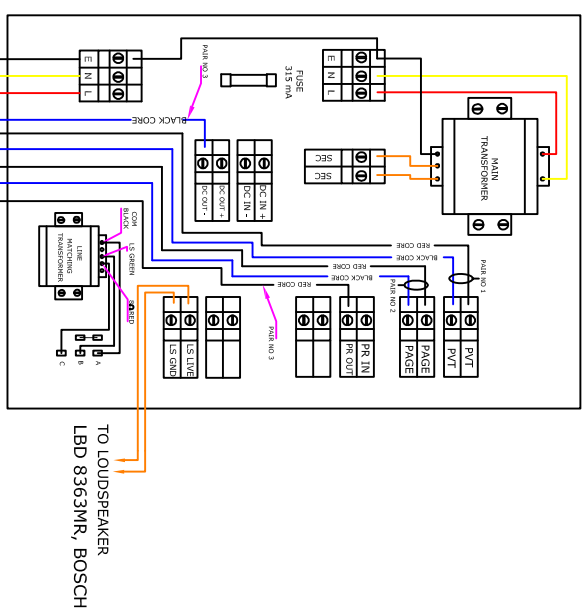


# BASE PCB TERMINATION DETAILS OF LBD 8921/02

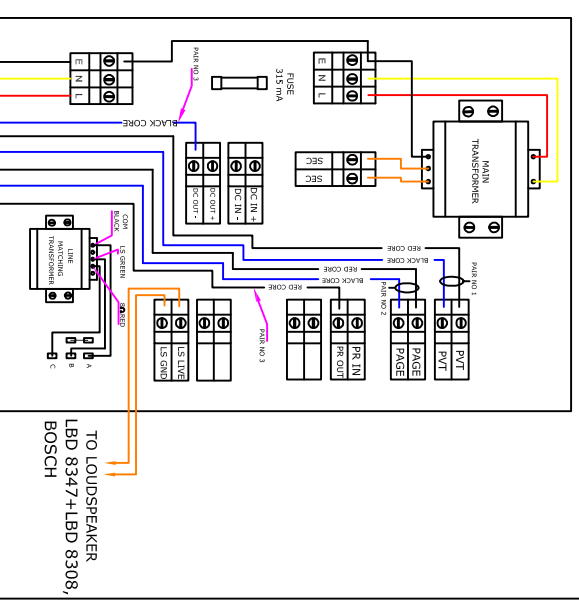
BASE TERMINATION OF FIELD CALL STATION-1  
MODEL: LBD 8921/02, MAKE: BOSCH



BASE TERMINATION OF FIELD CALL STATION-2  
MODEL: LBD 8921/02, MAKE: BOSCH



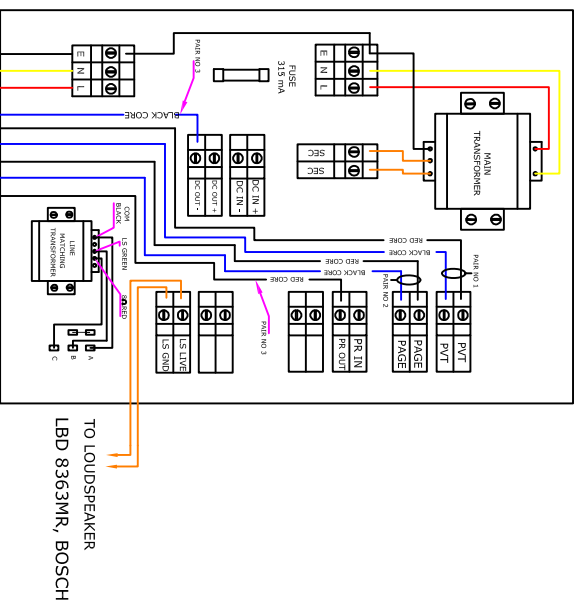
BASE TERMINATION OF FIELD CALL STATION-3  
MODEL: LBD 8921/02, MAKE: BOSCH



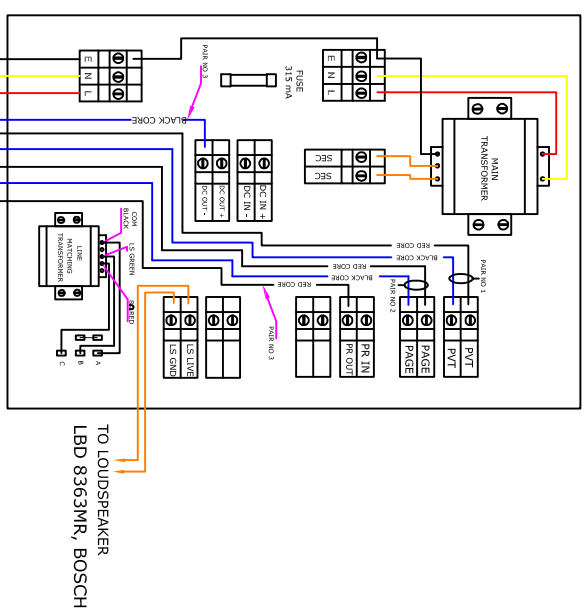


# BASE PCB TERMINATION DETAILS OF LBD 8921/02

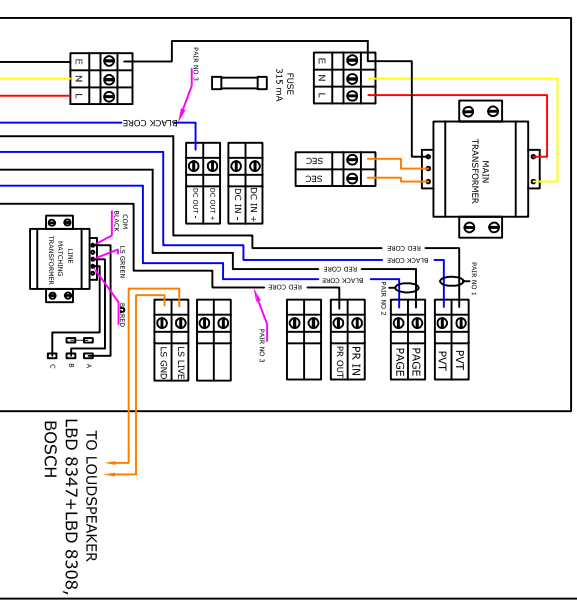
BASE TERMINATION OF FIELD CALL STATION-1  
MODEL: LBD 8921/02, MAKE: BOSCH



BASE TERMINATION OF FIELD CALL STATION-2  
MODEL: LBD 8921/02, MAKE: BOSCH

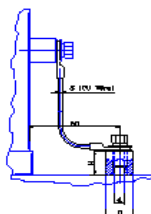


BASE TERMINATION OF FIELD CALL STATION-3  
MODEL: LBD 8921/02, MAKE: BOSCH



## EARTHING SCHEDULE

Sr. No.	From	To	Type of Earthing Flexible Wire	Size of Earthing Flexible Wire	Quantity in Meters
<b>On Portal Leg</b>					
1	LT Motor-1	LT Boggie	Flexible Wire(Green)	4 Sq.mm	2+2
2	LT Motor-2	LT Boggie	Flexible Wire(Green)	4 Sq.mm	2+2
3	LT Motor-3	LT Boggie	Flexible Wire(Green)	4 Sq.mm	2+2
4	LT Motor-4	LT Boggie	Flexible Wire(Green)	4 Sq.mm	2+2
5	LT Motor-5	LT Boggie	Flexible Wire(Green)	4 Sq.mm	2+2
6	LT Motor-6	LT Boggie	Flexible Wire(Green)	4 Sq.mm	2+2
7	LT Motor-7	LT Boggie	Flexible Wire(Green)	4 Sq.mm	2+2
8	LT Motor-8	LT Boggie	Flexible Wire(Green)	4 Sq.mm	2+2
On portal Leg : Flexible wire connection at LT Boggie done through Bush. (as per below picture)					
<b>In Portal Room</b>					
1	MIS Panel	Portal Girder GI Flat	Flexible Wire(Green)	35 Sq.mm	2+2
2	Protective Panel-1	Portal Girder GI Flat	Flexible Wire(Green)	35 Sq.mm	2+2
3	LT Panel-1	Portal Girder GI Flat	Flexible Wire(Green)	16 Sq.mm	2+2
4	LT Panel-2	Portal Girder GI Flat	Flexible Wire(Green)	16 Sq.mm	2+2
5	LT DBR-1	Portal Girder GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
6	LT DBR-2	Portal Girder GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
7	Lighting X'mer	Portal Girder GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
8	CRD Panel	Portal Girder GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
9	CRD Resistance Box	Portal Girder GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
10	MIS Panel	Power Slipping Assembly	Flexible Wire(Green)	35 Sq.mm	30
11	Power Slipping Assembly	Protective Panel-2	Flexible Wire(Green)	35 Sq.mm	15
In Portal Room : Consider throughout GI Flat (50 x 6 mm) in Portal room for earthing of above Electrical Equipment					
<b>In Machine Room</b>					
1	Protective Panel-2	Machine Room GI Flat	Flexible Wire(Green)	35 Sq.mm	2+2
2	MH Panel	Machine Room GI Flat	Flexible Wire(Green)	35 Sq.mm	2+2
3	Slew Panel	Machine Room GI Flat	Flexible Wire(Green)	16 Sq.mm	2+2
4	Luff Panel	Machine Room GI Flat	Flexible Wire(Green)	16 Sq.mm	2+2
5	MH DBR	Machine Room GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
6	Slew DBR	Machine Room GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
7	Luff DBR	Machine Room GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
8	MH Motor	Machine Room GI Flat	Flexible Wire(Green)	35 Sq.mm	2+2
9	MH Brake-1	Machine Room GI Flat	Flexible Wire(Green)	4 Sq.mm	2
10	MH Brake-2	Machine Room GI Flat	Flexible Wire(Green)	4 Sq.mm	2
11	Slew Motor	Machine Room GI Flat	Flexible Wire(Green)	16 Sq.mm	2+2
12	Slew Brake-1	Machine Room GI Flat	Flexible Wire(Green)	4 Sq.mm	2
13	Slew Brake-2	Machine Room GI Flat	Flexible Wire(Green)	4 Sq.mm	2
14	Protective Panel-2	Cabin Remote I/O Panel	Flexible Wire(Green)	4 Sq.mm	2+2
In Machine Room : Consider throughout GI Flat (50 x 6 mm) alongwith Cable tray in Machine room for earthing of above Electrical Equipment					
<b>In Machine Room</b>					
1	Exhaust Fan-1	Machine Room	Flexible Wire(Green)	4 Sq.mm	2
2	Exhaust Fan-2	Machine Room	Flexible Wire(Green)	4 Sq.mm	2
3	Exhaust Fan-3	Machine Room	Flexible Wire(Green)	4 Sq.mm	2
4	Exhaust Fan-4	Machine Room	Flexible Wire(Green)	4 Sq.mm	2
5	Exhaust Fan-5	Machine Room	Flexible Wire(Green)	4 Sq.mm	2
6	Exhaust Fan-6	Machine Room	Flexible Wire(Green)	4 Sq.mm	2
In Machine Room : Flexible wire connection at Exhaust Fan done through Bush. (as per below picture)					
<b>Earthing in the Cabin</b>					
1	Cabin Remote I/O Panel	Cabin Misc Electrical Equip.	Flexible Wire(Green)	4 Sq.mm	20
<b>Earthing on Jib</b>					
1	Luff Motor	Luff Platform	Flexible Wire(Green)	16 Sq.mm	2+2
2	Luff Brake-1	Luff Platform	Flexible Wire(Green)	4 Sq.mm	2
3	Luff Brake-2	Luff Platform	Flexible Wire(Green)	4 Sq.mm	2
On Jib : Flexible wire connection at Luff Platform done through Bush.					



EARTHING SCHEDULE					
1	CABLE CURRENT (A)	2	SIZE OF BOLT (d)	3	4
305	20	MS	25	120	
62	20	MS	25	16	
46	20	MS	25	10	
27	16	MS	20	4	

EARTHING ARRANGEMENT FOR ELECTRICAL EQUIPMENT

We have consider 2 Point earthing for all Electricals on crane.

We have consider Motor Body Earthing

Prepared By :Jigar Mistry

Sign:

Date : 18.01.14

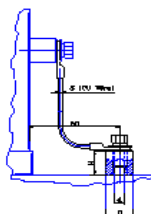
Checked By:Chirag Patel

Sign:

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4	LT Panel-2	Portal Girder GI Flat	Flexible Wire(Green)	16 Sq.mm	2+2
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4	Luff Panel	Machine Room GI Flat	Flexible Wire(Green)	16 Sq.mm	2+2
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6	Slew DBR	Machine Room GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
7	Luff DBR	Machine Room GI Flat	Flexible Wire(Green)	4 Sq.mm	2+2
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3	Exhaust Fan-3	Machine Room	Flexible Wire(Green)	4 Sq.mm	2
4	Exhaust Fan-4	Machine Room	Flexible Wire(Green)	4 Sq.mm	2
5	Exhaust Fan-5	Machine Room	Flexible Wire(Green)	4 Sq.mm	2
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We have consider Motor Body Earthing

Prepared By :Jigar Mistry

Sign:

Date : 18.01.14

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Sign:

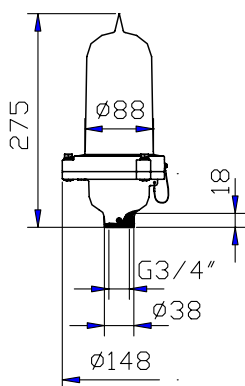
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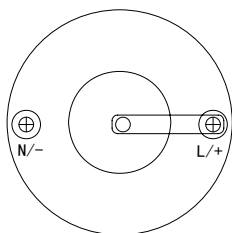
Patent No. 200920068564.3



Installation dimension ( mm )



Connect diagram



Application



#### Application

ABC-7L Single Aviation Obstruction Light for marking towers(Telecom, GSM), Cranes, Hoists, Smokestacks, Buildings, Wind generator and any other potentially hazardous obstructions to air traffic.

#### Main Functions & Features

- Base is made of die casting aluminum alloy, with light weight and corrosion resistance.
- ABC-7A(LED) bulb uses super brightness LED, and its life time more than 100,000hrs.
- PC cover is used for ABC-7A(LED) bulb, providing good intensity, thermal stability and good finishing surface.
- The lamp housing and upper lamp holder are sealed with structural glue, to ensure the good watertight of the product.
- A bird spike is provided on the top to avoid the drop of the bird.
- Built-in photocell, can switch ON/OFF the light at dawn and night automatically.(optional)

#### Specifications

International standard	ICAO(Aerodromes Annex 14) Low intensity ; FAA-L810	Vertical degree	≥10°
Light source	LED	Horizontal degree	360°
Light color	Red, Amber, Green, Blue, White(Optional)	Work way	Steady burning or flash ( optional )
Operating voltage	AC110V~AC240V/DC12V/DC24V/DC40V~DC60V(other voltage can be customized)	Visible distance	> 3.5KM(AT=0.85)
Power consumption	5W	LED life	≥100,000hrs
Intensity	>10cd		
Ambient temperature	-30°C ~ +70°C	IP Protection	IP65
Humidity	10% ~ 95% (No coagulation )	Weight	1.25kg
Material	Base : Aluminum alloy Housing : PC		

#### Installation and operation

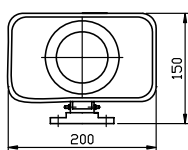
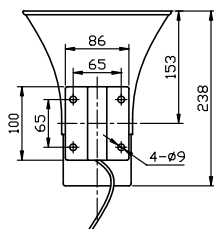
- Check whether the supply voltage does comply with the rated voltage of the lamp(Pay attention to the polarity in case of DC voltage)
- Insert the power cable through the bottom of lamp holder, and connect them to the terminals in the base respectively.
- Connect the earth wire to the corresponding earth terminals.
- Tighten the screws between lamp housing and base.
- Screw the lamp on the G3/4" (G1" ) threaded pipe, which should be fixed on a smooth surface with enough mechanical strength.
- Verify whether the power cables are well connected before power on.

#### Models

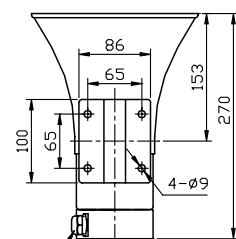
Model	Function & Characteristic	
	Characteristic	Remark
ABC-7L	Steady burning	
ABC-7LP	ABC-7L with photocell	Controlled illumination of light-operated switch : 70/100lux
ABC-7LQ	ABC-7L with photocell and flash type	Controlled illumination of light-operated switch : 70/100lux Flash frequency : 30~40times/min
ABC-7LS	Flash type	Flash frequency : 30~40times/min



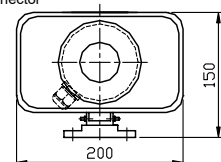
Mounting dimension ( mm )



BC-3A



PG13.5  
Waterproof  
Connector



BC-3A with junction box

#### Application



#### Application

Apply to construction machinery(travelling cranes, crawler crane, gantry cranes etc.), harbor machinery(overhead cranes, bridge cranes, )etc hoist device.

#### Major function&features

- Multiple tones are available.
- Loud and clear alarm sound
- Easy of operation, and have a long lifetime
- Stability

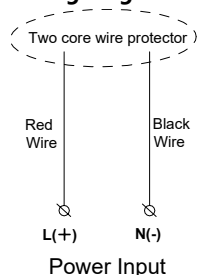
#### Major specification

Supply voltage	AC220V/DC24V (other voltage can be customized)	Power frequency	50Hz~60Hz
Tone	A/B/E/D/Speech ( special tone or speech can be customized )	Loudspeaker Power	10W
Loudspeaker resistance	8Ω/16Ω	Sound level	106dB
Operating temperature	-30°C ~ +70°C	IP protection	IP65
Humidity	10% ~ 95% (no condensing )	Material	Engineering plastics
Weight	1.6kg		

#### Installation and operation

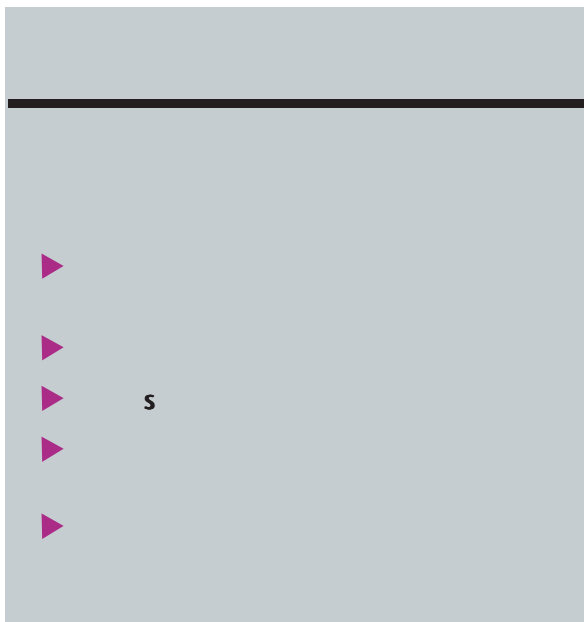
- Check the power supply voltage whether is the same with the siren.
- Use M8 screws to fasten to the mounting surface, the mounting surface should level-off and have enough mechanical strength.
- The speaker head must be downside in order to avoid any water accumulation.
- Connect the cable, and make sure the same power with the devise.
- Power on and operation.

#### Wiring diagram



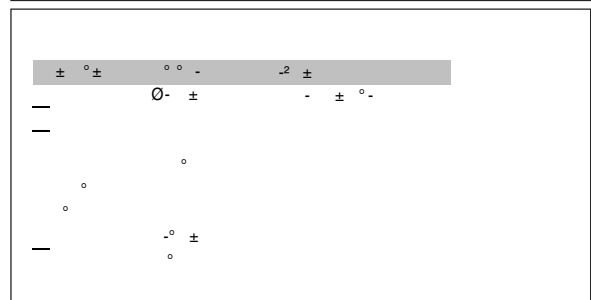
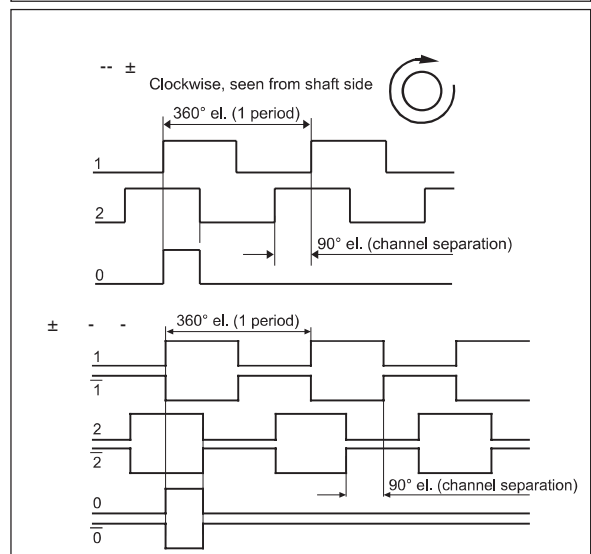
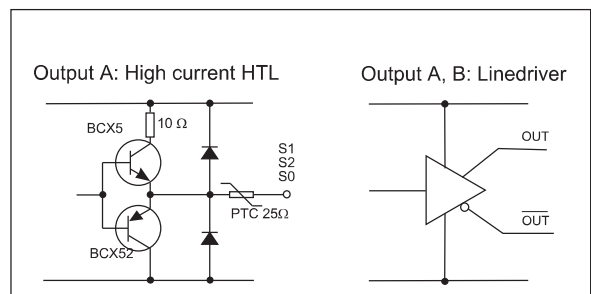
#### Notice

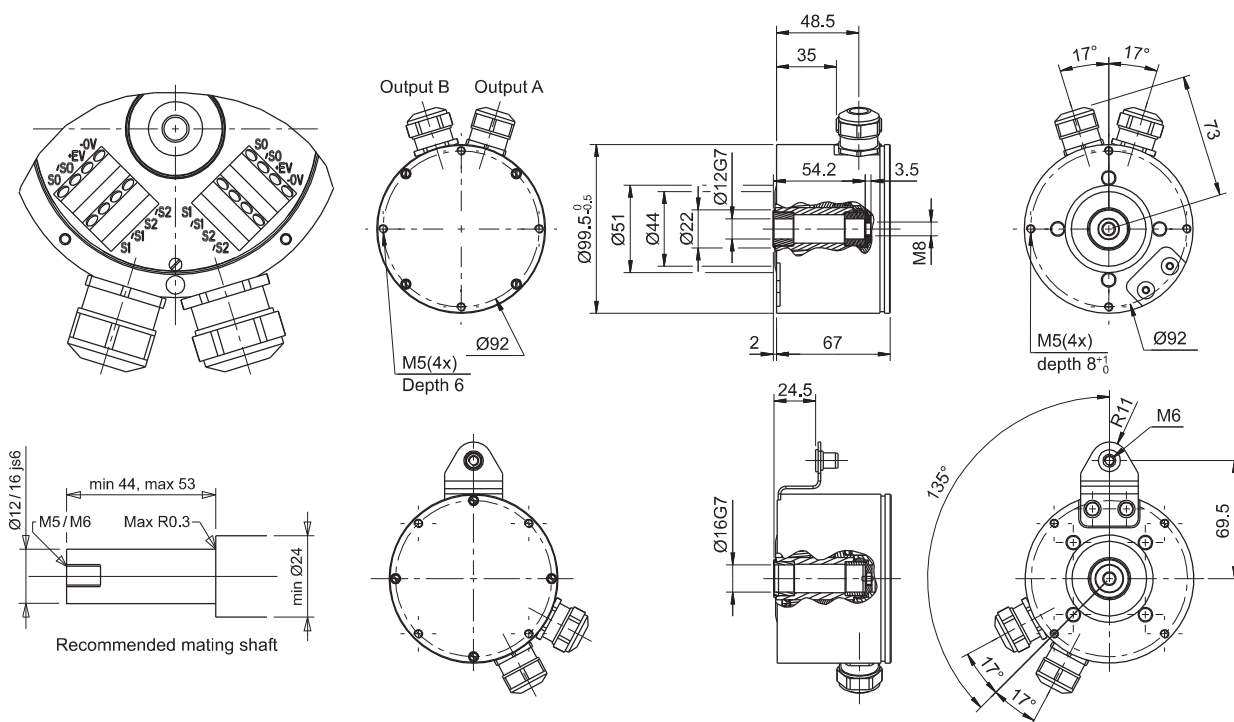
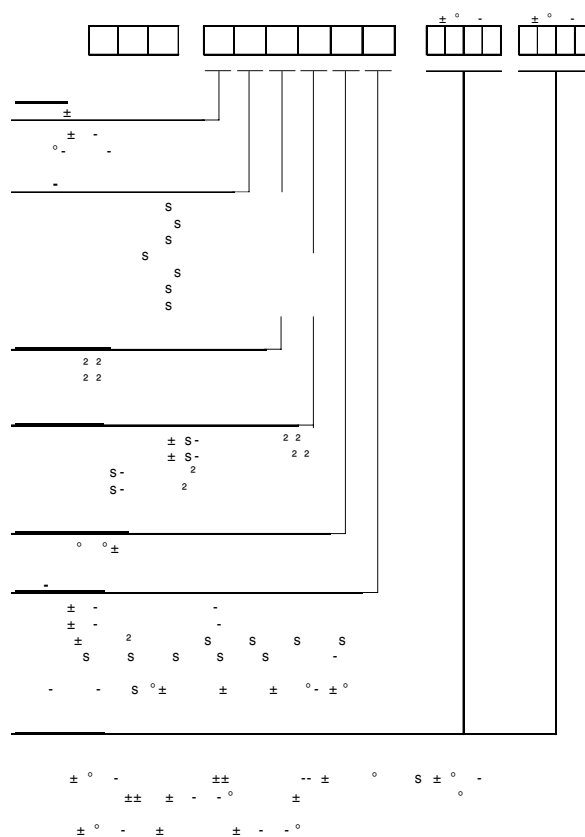
- Please read the instruction manual carefully before operation.
- Ensure that the power connection part is correct.
- If there are any questions when, please contact us.



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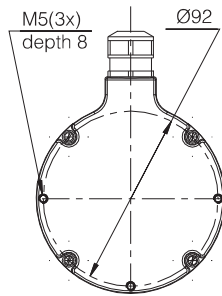
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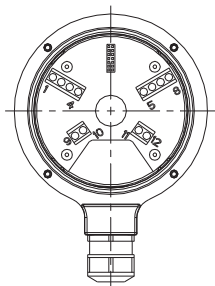
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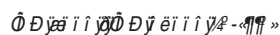
Recommended mating shaft



Inside cover with ADS  
861X1XXX

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# Master Controller

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Master Controller



Cam Controller



Dual Master Controller

## Master / Cam Controllers

### INTRODUCTION:

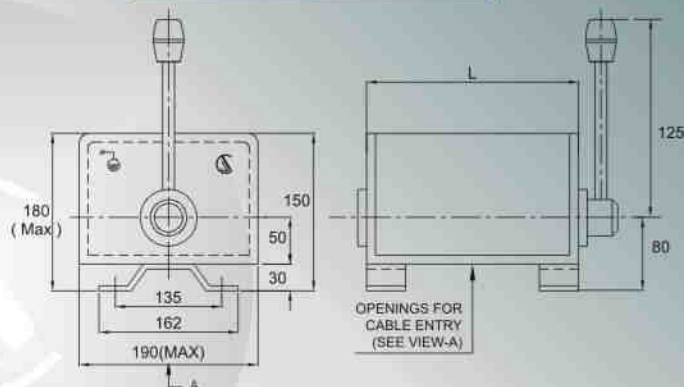
Master Controllers are used for remote operation of contractors equipment controlling E.O.T. Cranes & Rolling mills drives. The controllers are made in dust proof enclosure in IP-54 degree of protection, up to 6 notches either side with maximum 24 contacts as per desired sequence with spring return arrangement & Dead man's handle arrangement are available. And Master Controllers are compact suitable for Hoist -Grab, CT - LT maximum contacts 16 per motion with spring return arrangement.

### GENERAL:

Master Controllers are of cam type where in contacts are actuated by individual cams mounted on operated shaft. These controllers are used for remote operation of contractors equipment controlling heavy duty E. O. T. cranes & Rolling mill drives.

### CONSTRUCTION:

Master Controller is housed in enclosure and provided with an easily removable cover with ample area for maintenance. The cam shaft is mounted on bearing bushes on walls of housing. The cams are made of delrin material and fixed on square spindle switch is moved by handle. The cams are cut correspond to the switching program.



DIMENSIONS DETAILS					
TYPE	L	d	NO. OF CONTACTS	NO. OF CABLE ENTRIES DIA 20	DIA 26
1	135	105	8	2	2
2	195	165	12	2	4
3	245	215	18	2	4
4	305	265	24	2	6

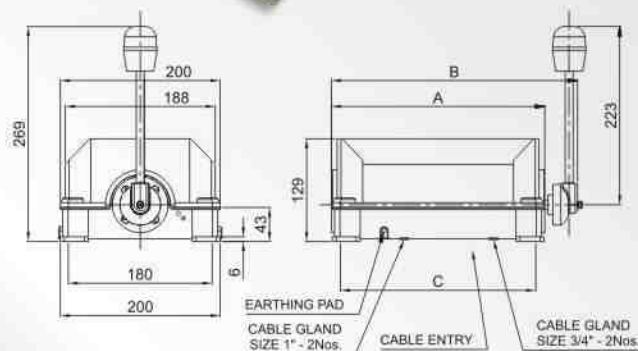
Sheet Steel enclosure ( IP 44 )

## Cam Controllers

### TECHNICAL DATA :

Body Material	-Sheet Steel / Aluminium Die cast
Protection Degree	-IP-44 / IP-54
Confirming to IS	-13947(Part-1)1993
Mounting position	-Horizontal / Vertical
Contact Material	-Silver Cadmium
Rated Voltage Insulation	-500 V. A. C.
Thermal Test Current	-10 Amps./ 40 amps.
Cable entries	-2X20Ø 2x26Ø standard conduit
Frequency of operation	-720 switching per hour
Contacts	-Single
No. of contacts	-24 maximum
No. of steps	-6-0-6 maximum
Optional	-Spring return / deadman's Handle arrangement

master controller



DIMENSIONS DETAILS						
TYPE	A	B	C	NO. OF CONTACTS	NO. OF CABLE ENTRIES	
					DIA 20	DIA 25
SMALL	170	220	90	8	1	1
MEDIUM	267	308	245	16	2	2
BIG	370	435	140	24	2	2



### 1) SYSTEM SPECIFICATIONS:

Parameter	Main Hoist
SWL	10 t
Min. Boom Radius	9 m
Max. Boom Radius	25 m
No. of Ropes	2
Rope Diameter	25 mm
Rope Tension / Fall	5 t
Max. Rope Tension (125% Overload)	6.25 t
Rope Diversion	8°
Max. Force on Load Cell	1.74 t
Load Cell Capacity	2 t
Diverter Pulley Thickness (Max.)	50 mm
Boom Length (L)	26500 mm
Offset from Crane Centre (c)	1675 mm

### 2) SYSTEM DISPLAYS FULL SCALES & RESOLUTIONS:

Main Hoist Full Scale	12.00 t
Main Hoist Resolution	00.02 t
Boom Radius Full Scale	25.00 m
Boom Radius Resolution	00.20 m

### 3) ALARM & TRIP CONDITIONS:

Load Alarm Value	09.50 t
Load Trip Value	10.50 t
Radius Alarm Value	22.50 m
Radius Trip Value	25.00 m

### 4) SYSTEM OPERATION:

This system continuously monitors, displays and controls the Main Hoist Actual Load & Boom Radius of a 10 t ELL Crane. A pin type load cell is mounted in a suitable diverter pulley (NOT in NRE scope), which produces a diversion angle of approximately 8°. An angle sensor is fixed on the boom at a suitable location. The working radius is relative to the boom angle, as shown above.

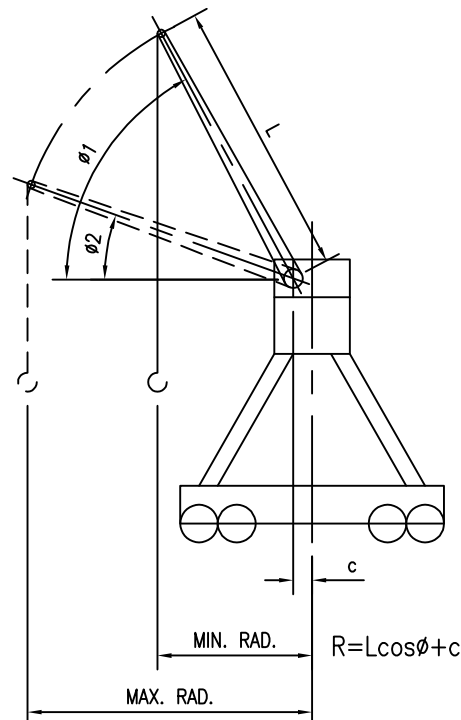
A supply panel provides stabilized and isolated 230 VAC power supply to the load controller. It has in-built MCB for safety. In addition, a relay is also activated when the supply panel is switched on. 2 NO/NC contacts of this relay are brought on the terminals. These contacts can be used for interlocking the luff and hoist motors so that the same can be operated only if the SLI system is put on!

When the supply panel is switched on, the load controller also gets on. After displaying an initial power-on sequence (which is a self diagnostic feature), the load controller starts displaying the Actual Load, Safe Load, Actual Radius and Safe Radius. In operation, when the actual load exceeds 95% of safe load, or when the actual boom radius exceeds 95% of max. radius (exact values as shown above), a buzzer starts ringing and an ALM lamp starts flashing. On pressing ACK push button, the buzzer stops ringing and the lamp remains on. The ALM lamp goes off only when the actual load or radius reduces below 85% of alarm values.

When the actual load exceeds 105% of safe load or when the actual boom radius exceeds 100% of max. radius (exact values as shown above), a TRIP lamp gets on and a TRIP relay is activated. Both the trip relays have 2 NO/NC contacts of 230 VAC/5 A rating. The TRIP lamp goes off and the relay is de-activated only when the actual load or actual radius reduces below the trip condition values.

When the <G> key on the display is pressed for more than 5 seconds, the display shows 'AtEST' and goes into annunciator test mode. In this mode, a buzzer starts ringing and the ALM lamp starts flashing. On pressing ACK push button, the buzzer stops ringing and the lamp becomes steady. On pressing <G> key again for more than 5 seconds, the display reverts back to run mode.

### 5) SYSTEM ACCURACY: ± 1 % of Full Scale



$$R = L \cos \theta + c$$

CLIENT : ANUPAM INDUSTRIES LTD., Anand				FILE : PE269101.DWG			
PROJECT : W/O 2740 (Essar Projects, Myanmar)				APPROVED		REV.5	
TOLERANCES – LINEAR: ±0.5 HOLES: H13				CHECKED	Shraddha	REV.4	
CH.: 0.5x45° U/C: 1.0x1.0 S.F.: ~				DRAWN	Rajesh	24.06.13	REV.3
MATERIAL : .				UNITS	mm	REV.2	
:				SCALE	–	REV.1	
TREATMENT/FINISH : .				Wt.	–	PE/269/101	
:				DOC	DWG		
N.R. ENTERPRISES: Tel: +91-20-2547 6057/81 [] Fax: 2547 0244 [] Email: nre@nre.co.in						SHEET NO. 1 OF 1	A4

SR #	DESCRIPTION	SIZE / SPECIFICATION	MAKE / MATL	REF CODE #	QTY	UOM
001	Load Cell	Pin Type, Ø30x89L, 2t	Alloy Steel/ENP	LC/39/0028	1	pc
002	Teflon Washers	D70 x d32 x 1.5 thick	PTFE	M54/0013/0	2	pc
003	Junction Box	82 x 80 x 56	ABS	P1/T11/100	1	pc
004	Junction Box	240 x 120 x 60	CRCA/Ptd	EWK/0054/0	1	pc
005	Cable for Load Cell	0.5 sq.mm x 6 Core Shielded	Cu/PVC		15	m
006	Supply Panel	400 x 200 x 120	CRCA/Ptd	EWK/0052/0	1	pc
007	Safe Load Indicator	400 x 200 x 120	CRCA/Ptd	EWK/0053/0	1	pc
008	System Documentation	Users Manuals	Paper	PE/201/000	6	set
	<b>TOTAL</b>				<b>28</b>	
	<b>M/s. ANUPAM SCOPE OF SUPPLY:</b>					
091	Diverter Pulley Assembly	Ø400	Mild Steel/Ptd	PE/269/290	1	pc
092	Dual System Encoder	1024 PPR HTL + 50 PPR TTL	Leine Linde	865-118494-1024-50	1	pc



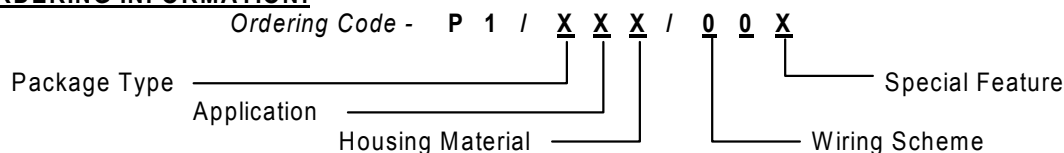
The JB Series Junction Boxes are compact and weatherproof instruments designed for any type of indoor or outdoor applications, to operate under any type of conditions. They are very simple to use and operate, and is very user friendly.

They can be used for all weighing applications such as weigh platforms, weigh bridges, tank weighing systems, etc. They have got features such as

**GENERAL TECHNICAL SPECIFICATIONS:**

Load cell drive capacity	2 nos. 350 $\Omega$ load cells (Optional up to 8 nos.)
Load cell connection	4 wire or 6 wire
Settings	Set Points, Digital Filter, Baud Rate and Current Output Settings by software through keyboard
Operating temperature range	0 °C to +50 °C
Storage temperature range	-10 °C to +70 °C

**ORDERING INFORMATION:**



**Package Type -**

- T : Terminals only
- S : Signal Trim PCB (Up to 4 load cells)
- E : Excitation Trim PCB (Up to 6 load cells)

**Application -**

- 1 : One Sensor
- 4 : Up to Four Sensors
- 6 : Up to Six Sensors

**Housing Material -**

- 0 : Stainless Steel
- 1 : ABS Plastic
- 2 : Cast Aluminium, Flameproof
- 7 : Mild Steel, Powder coated (default)

**Wiring Scheme - (For Terminals Package)**

- 0 : No wiring (Only plain terminals)
- 1 : Up to Four Load Cells (With S/E Trim PCB)
- 2 : Two Load Cells Parallel Connection
- 3 : Belt Weigher (2 Load Cells + 1 Encoder)
- 4 : Four Load Cells Parallel Connection

**Special Feature -**

- 0 : No Special Feature
- S : Any Special Feature, such as Different Wiring Scheme, Cable Glands, Painting, Colour Shade, etc.

For more details, contact us at -

**N.R. ENTERPRISES**

Flat #1, Pooja Enclave, Lane #1, Shahu Colony,  
Karvenagar, PUNE, 411052, INDIA

Tel. : +91-20-2547 6057, 2547 6081, 2547 8098

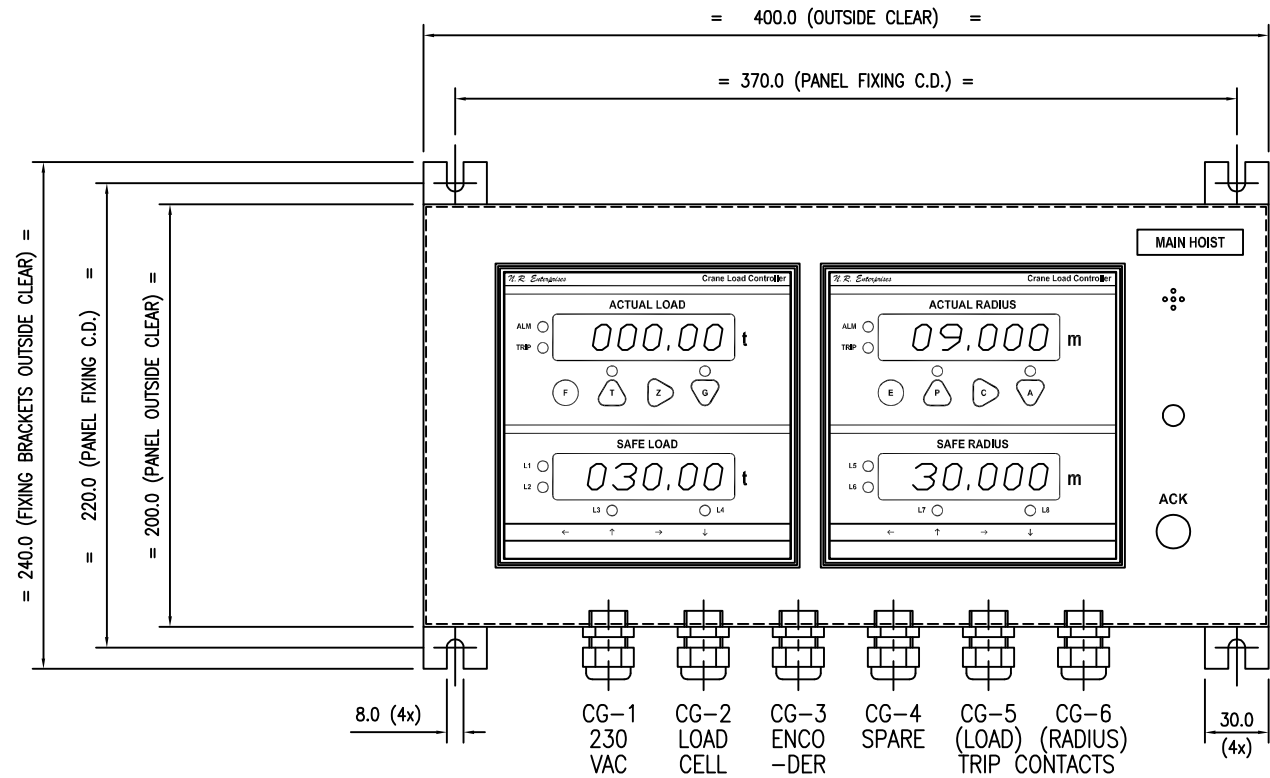
Fax : +91-20-2547 0244


E-mail : nre@nre.co.in

Website : www.nre.co.in

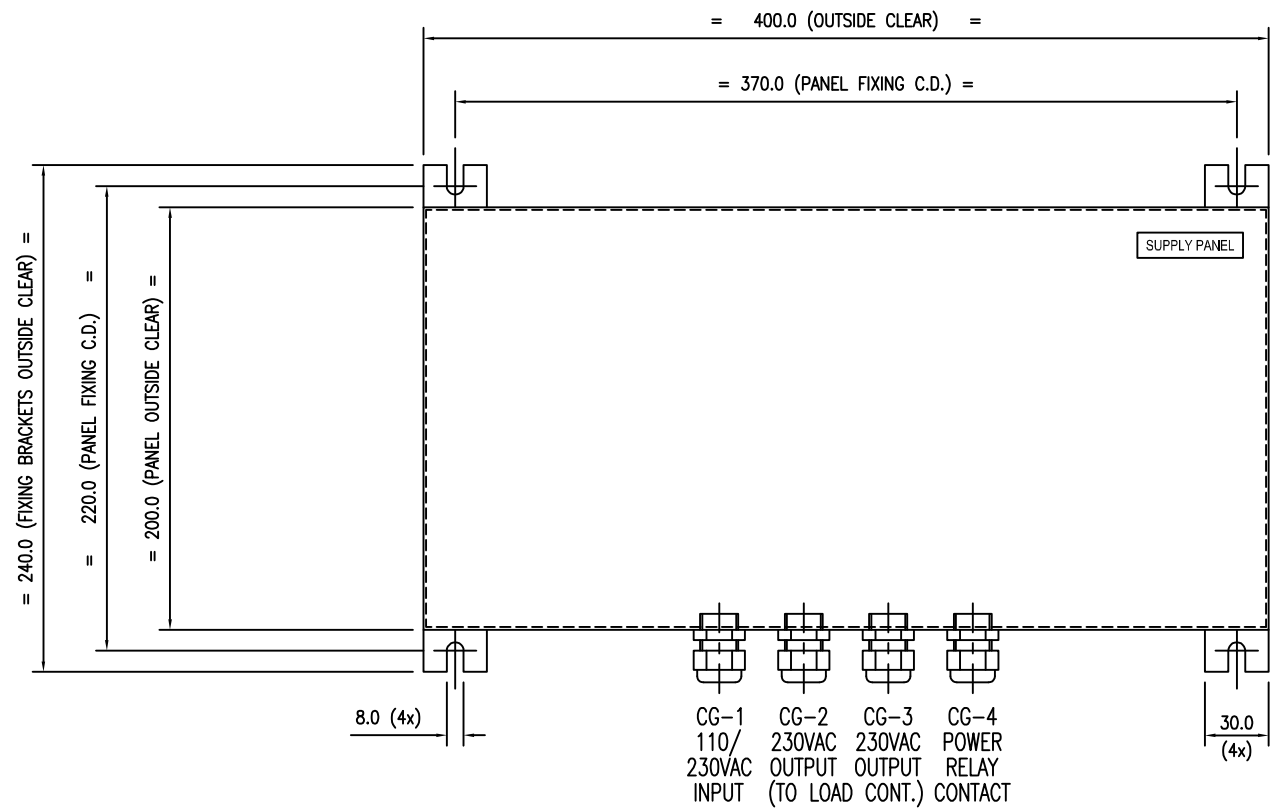



ISO 9001:2008 Cert.# Q194809



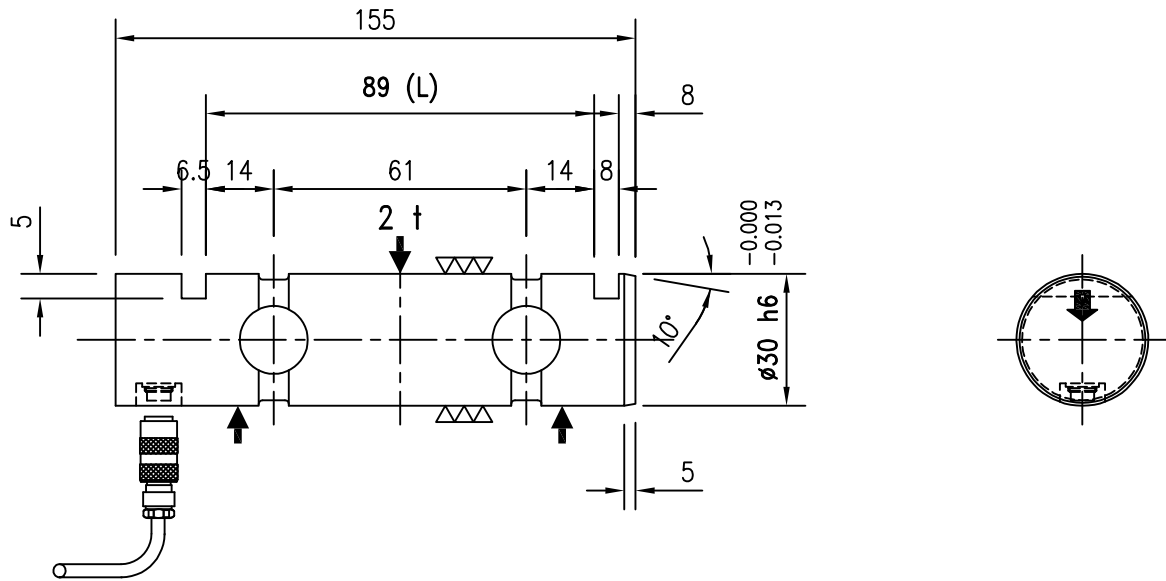
CLIENT : .						FILE : EWK00530.DWG		
PROJECT : .				APPROVED		REV.5		
TOLERANCES - LINEAR: $\pm 0.5$ HOLES: H13				CHECKED		REV.4		
CH.: 0.5x45° U/C: 1.0x1.0 S.F.: ~				DRAWN	S Joshi	29.09.05	REV.3	
MATERIAL : CRCA, 2 mm Thick			UNITS	<div>ELL CRANE SLI LOAD CONTROLLER G.A. DRAWING</div>		REV.2		
			SCALE			1:2.5	REV.1	17.09.06
TREATMENT/FINISH : Powder Coated, Shade No. 631, acc. to IS:5			Wt.			kg	<div>EWK/0053/0</div>	
			DOC			DWG		
N.R. ENTERPRISES: Tel: +91-20-2547 6057/81 ☐ Fax: 2547 0244 ☐ Email: nre@nre.co.in						SHEET NO. 1 OF 1 A3		





CLIENT : .					FILE : EWK00520.DWG				
PROJECT : .				APPROVED				REV.5	
TOLERANCES - LINEAR: $\pm 0.5$ HOLES: H13								REV.4	
CH.: 0.5x45" U/C: 1.0x1.0 S.F.: ~						DRAWN S Joshi 29.09.05		REV.3	
MATERIAL : CRCA, 2 mm Thick				UNITS mm		<div style="border: 1px solid black; padding: 5px; text-align: center;">             ELL CRANE SLI              SUPPLY PANEL              G.A. DRAWING           </div>		REV.2 15.02.09	
				SCALE 1:2.5				REV.1 15.12.08	
TREATMENT/FINISH : Powder Coated, Shade No. 631, acc. to IS:5				Wt. kg					
				DOC DWG					
N.R. ENTERPRISES: Tel: +91-20-2547 6057/81 ☐ Fax: 2547 0244 ☐ Email: nre@nre.co.in								SHEET NO. 1 OF 1 A3	





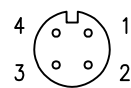
#### NOTES -

- 1) 2 NOS. LOCKING PLATES OF 6 mm THICKNESS TO BE USED.
- 2) DUMMY PIN TO BE USED FOR ERECTION..
- 3) LOCKING PLATES & DUMMY PIN BOTH NOT A PART OF LOAD PIN SUPPLY.

#### MAJOR SPECIFICATIONS -

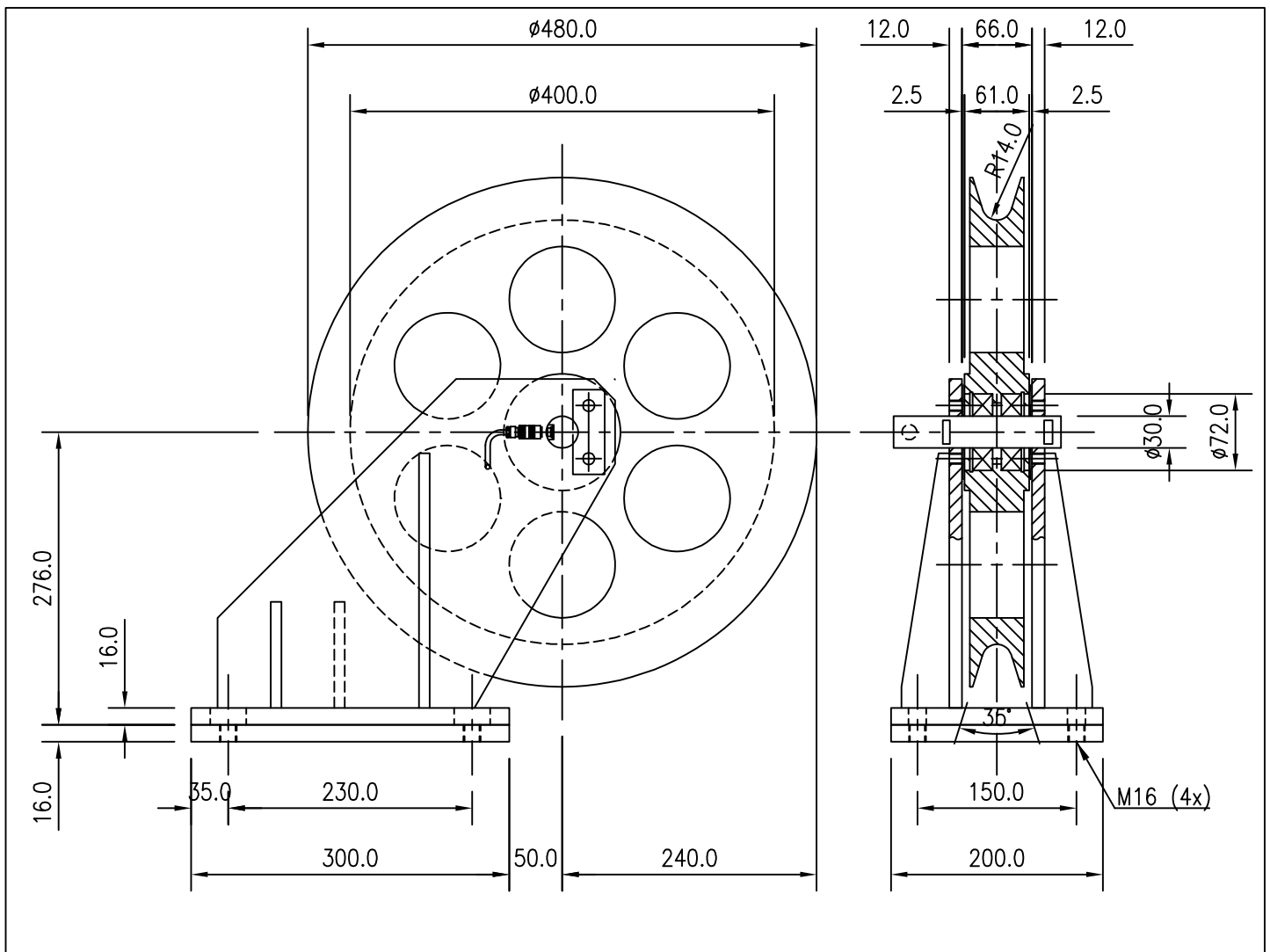
CAPACITY	2 t
ACCURACY CLASS	±0.5%
CABLE LENGTH	5 m
MAX. OPERATING LOAD	200%
BREAKING LOAD	500%
SIDE LOAD	100%
OUTPUT SIGNAL	±1.5 mV/V
PROTECTION CLASS	IP67
OPERATING TEMP. RANGE	-10 to +60 °C
STORAGE TEMP. RANGE	-20 to +80 °C
LUBRICATING HOLE	NO

#### CONNECTOR & CABLE DETAILS :




Pin 1	SUPPLY +	Red
Pin 2	SUPPLY -	Black
Pin 3	SIGNAL +	Green
Pin 4	SIGNAL -	White
Shield	Not connected to I/c	

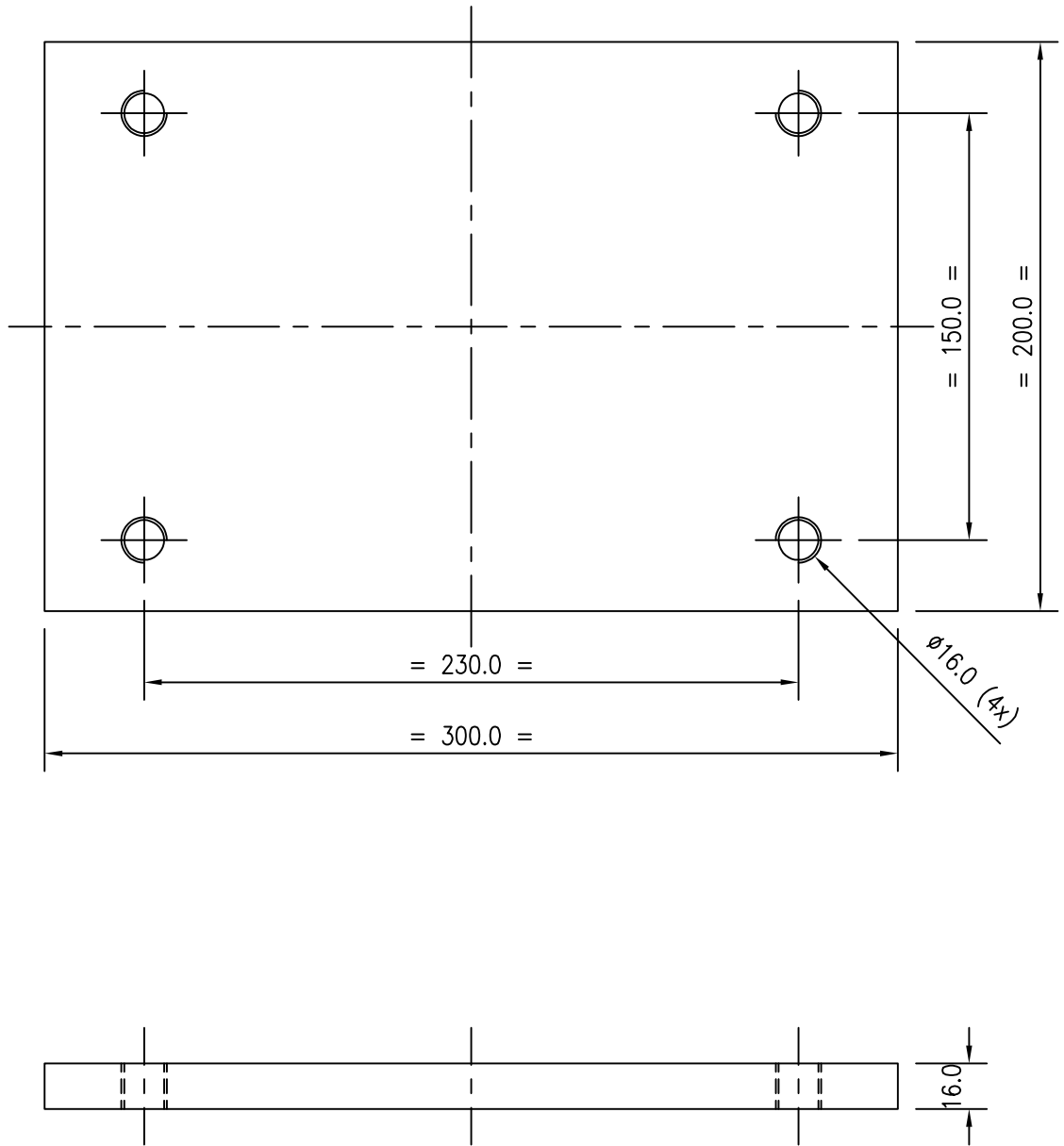
CLIENT : .				FILE : LC390028.DWG			
PROJECT : .				APPROVED		REV.5	
TOLERANCES - LINEAR: ±0.5 HOLES: H13				CHECKED	S Joshi	REV.4	
CH.: 0.5x45° U/C: 1.0x1.0 S.F.: ∇∇				DRAWN	Rajesh	24.06.13	REV.3
MATERIAL : Alloy Steel (40CrNiMoV)				UNITS	mm	REV.2	
				SCALE	NTS	REV.1	
TREATMENT/FINISH : Electroless Nickel Plated				Wt.	kg	LC/39/0028	
				DOC	DWG		
N.R. ENTERPRISES: Tel: +91-20-2547 6057/81 [] Fax: 2547 0244 [] Email: nre@nre.co.in						SHEET NO. 1 OF 1	A4




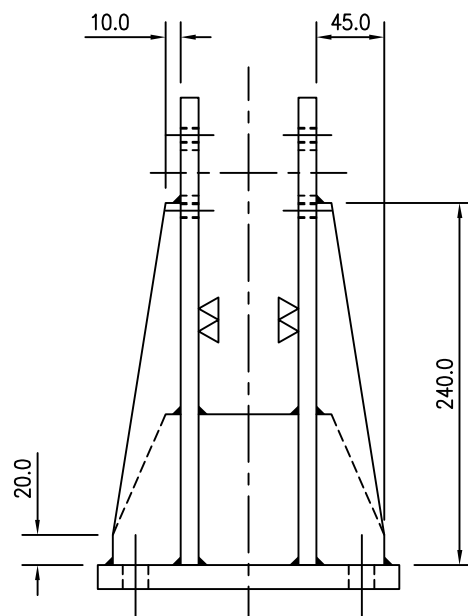
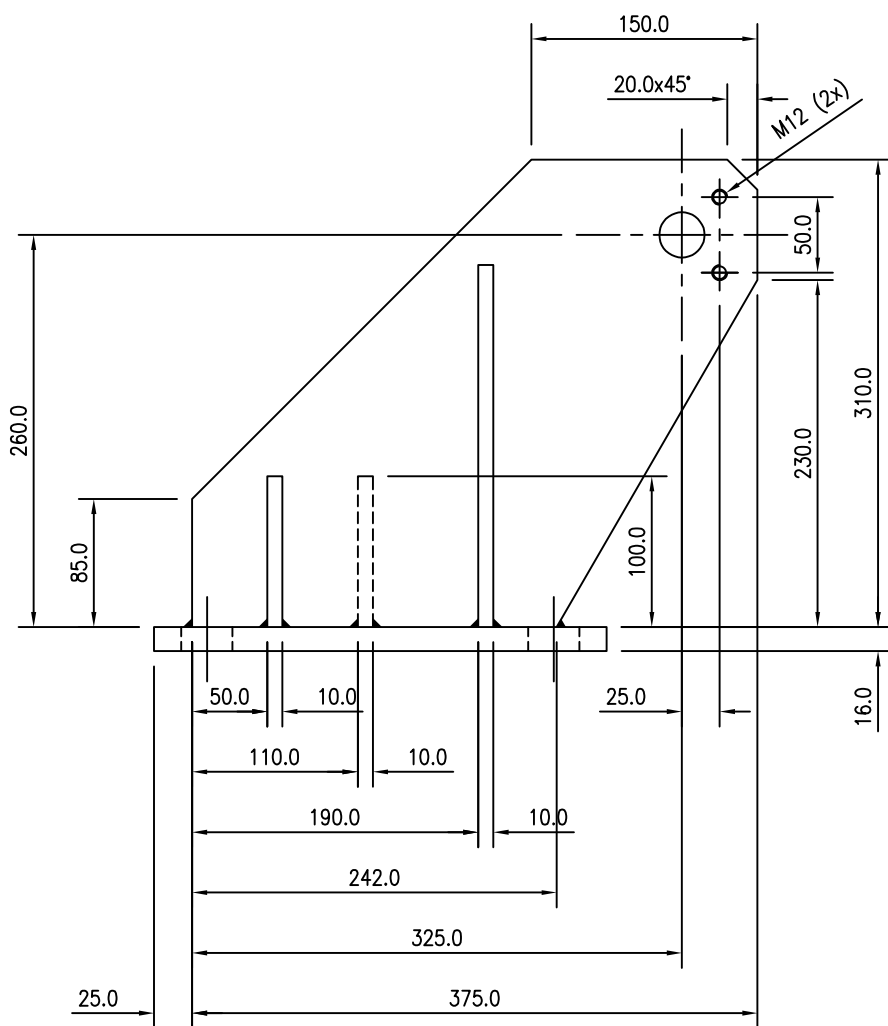
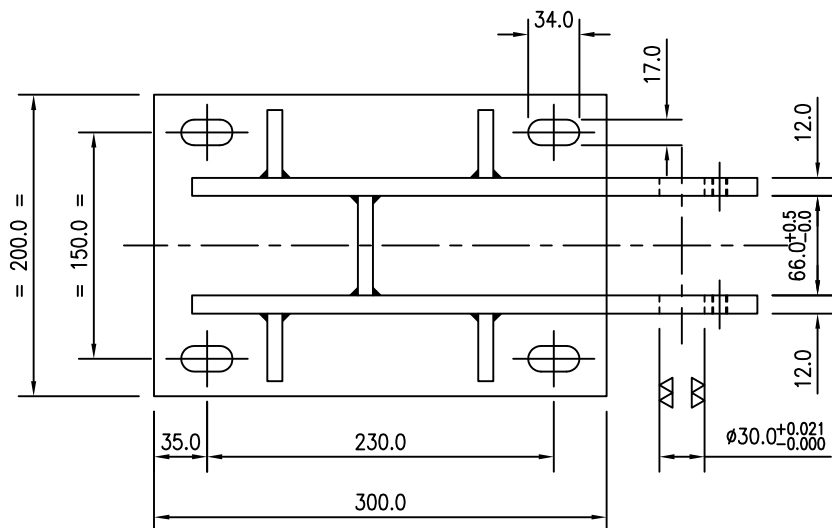
14	SPRING WASHER	FOR M10	STEEL 4.8		4
13	PLAIN WASHER	FOR M10	STEEL 4.8		4
12	ALLEN BOLT	M10 x 20	STEEL 4.8		4
11	LOCKING PLATE	85.0x15.0x6.0	MILD STEEL	PE/269/295	2
10	DUMMY LOAD PIN	ø30x	MILD STEEL	PE/269/294	1
9	INTERNAL CIRCLIP	d72	SPRING STEEL		2
8	CYLINDRICAL ROLLER BEARING	d72xd30x19	MFGR. STD.	NU306	2
7	DIVERTER PULLEY	ø400x61	MILD STEEL	PE/269/293	1
6	I N T E N T I O N A L L Y   L E F T   B L A N K				
5	SPRING WASHER	FOR M16	STEEL 4.8		4
4	PLAIN WASHER	FOR M16	STEEL 4.8		4
3	ALLEN BOLT	M16 x 30	STEEL 4.8		4
2	BRACKET	300 x 200 x 326	MILD STEEL	PE/269/292	1
1	BASE PLATE	300 x 200 x 16	MILD STEEL	PE/269/291	1

SR.NO.	DESCRIPTION	SIZE / SPECIFICATION	MATERIAL	REF. CODE NO.	QTY.
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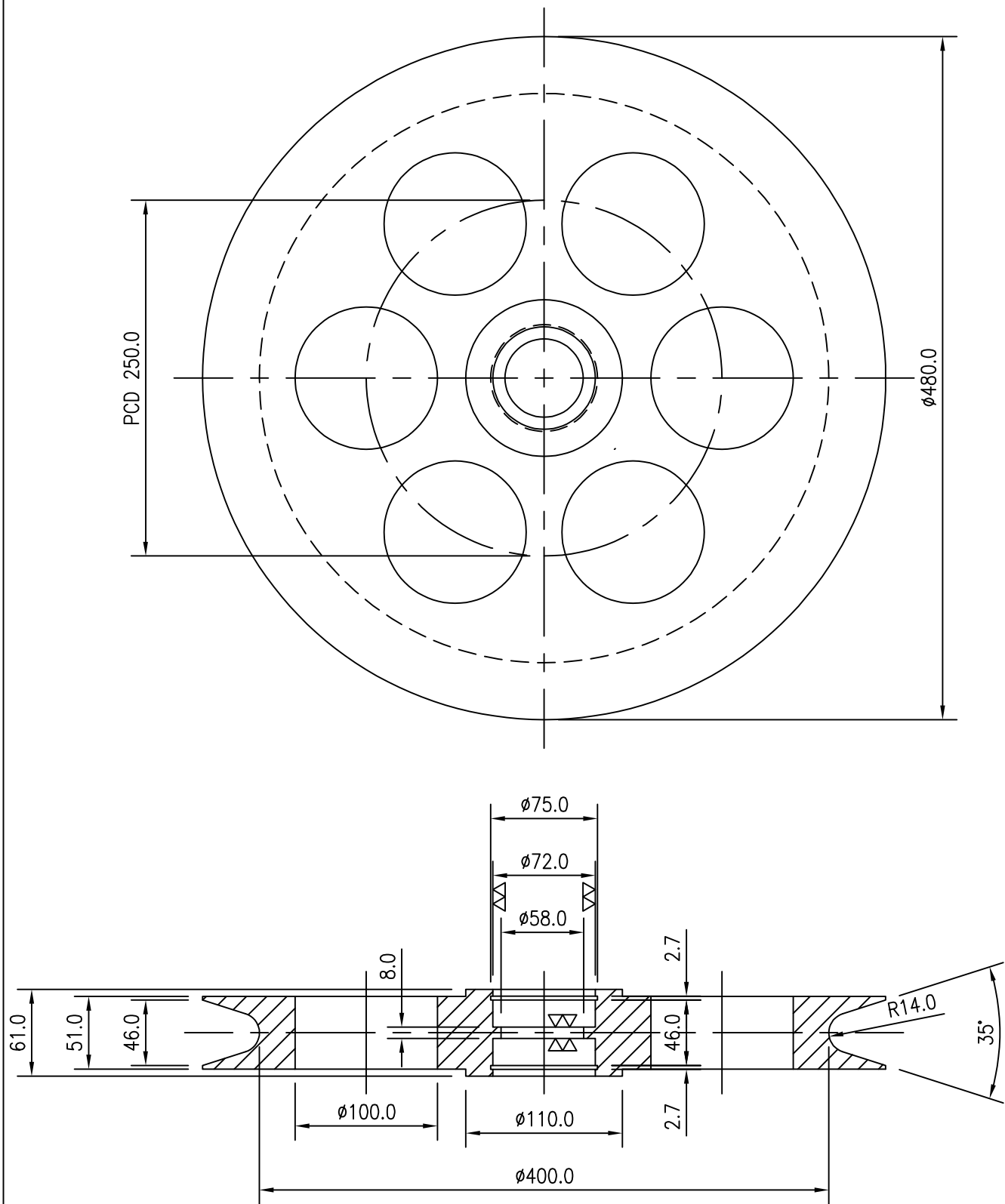
CLIENT : ANUPAM INDUSTRIES LTD., Anand						FILE : PE269290.DWG					
PROJECT : W/O 2740 (Essar Projects, Myanmar)				APPROVED				REV.5			
TOLERANCES – LINEAR: ±0.5 HOLES: H13					CHECKED		S Joshi		REV.4		
CH.: 0.5x45° U/C: 1.0x1.0 S.F.: ▽					DRAWN		Rajesh		24.06.13	REV.3	
MATERIAL : Mild Steel				UNITS mm		<div>DIVERTER PULLEY 10 t ELL CRANE WITH 2 t LOAD PIN</div>			REV.2		
:				SCALE 1:6.25					REV.1		
TREATMENT/FINISH : Painted with 2 coats each of Red Oxide Primer and Air Drying Enamel Paint,. Shade Black				Wt. 120 kg					<div>PE/269/290</div>		
				DOC DWG							
N.R. ENTERPRISES: Tel: +91-20-2547 6057/81 ☐ Fax: 2547 0244 ☐ Email: nre@nre.co.in									SHEET NO. 1 OF 1		A4



CLIENT : .							FILE : PE269291.DWG				
PROJECT : .				APPROVED				REV.5			
TOLERANCES – LINEAR: ±0.5			HOLES: H13		CHECKED		S Joshi		REV.4		
CH.: 0.5x45°			U/C: 1.0x1.0		S.F.: ▽	DRAWN		Rajesh	24.06.13	REV.3	
MATERIAL : Mild Steel				UNITS	mm		<div>BASE PLATE</div>		REV.2		
:				SCALE	1:2.5				REV.1		
TREATMENT/FINISH : Painted with 2 coats each of Red Oxide Primer and Air Drying Enamel Paint,. Shade Black				Wt.	7.5 kg				PE/269/291		
				DOC	DWG						
N.R. ENTERPRISES: Tel: +91-20-2547 6057/81 ☐ Fax: 2547 0244 ☐ Email: nre@nre.co.in								SHEET NO. 1 OF 1		A4	



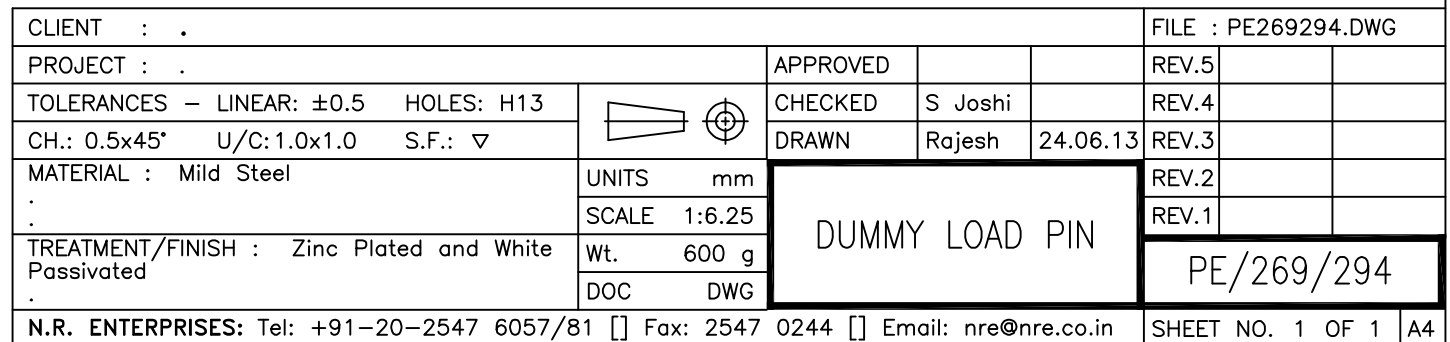
CLIENT : .				FILE : PE269292.DWG			
PROJECT : .				APPROVED		REV.5	
TOLERANCES - LINEAR: $\pm 0.5$ HOLES: H13				CHECKED	S Joshi	REV.4	
CH.: $0.5 \times 45^\circ$ U/C: $1.0 \times 1.0$ S.F.: $\nabla$				DRAWN	Rajesh	24.06.13	REV.3
MATERIAL : Mild Steel				UNITS	mm	REV.2	
:				SCALE	1:4	REV.1	
TREATMENT/FINISH : Painted with 2 coats each of Red Oxide Primer and Air Drying Enamel Paint,. Shade Black				Wt.	32.4 kg	PE/269/292	
				DOC	DWG		
N.R. ENTERPRISES: Tel: +91-20-2547 6057/81 [] Fax: 2547 0244 [] Email: nre@nre.co.in						SHEET NO. 1 OF 1	
						A4	



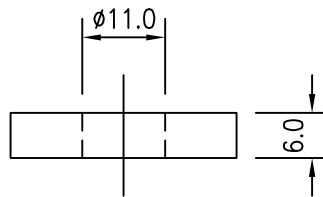
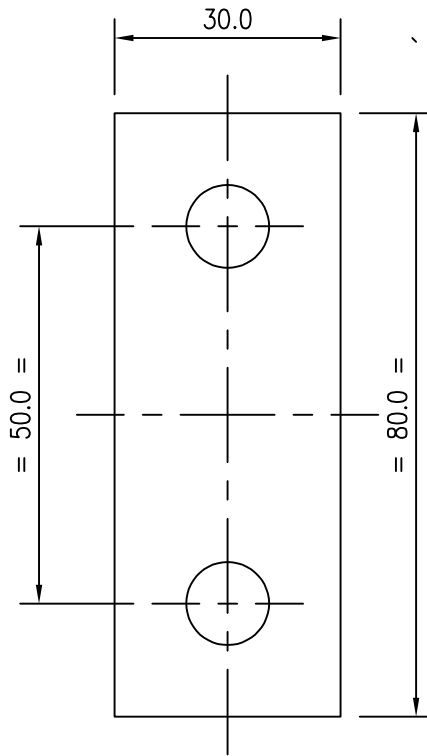
#### NOTES -


- 1) REMOVE ALL SHARP CORNERS & BURRS.
- 2)  $\phi 100.0$  HOLES (6 NOS.) TO BE MADE FIRST BEFORE FURTHER MACHINING.
- 3)  $\phi 72.0$  BORE TO BE MADE WITH TOLERANCES SUITABLE FOR FITTING CYLINDRICAL ROLLER BEARINGS (# NU306).

CLIENT : .				FILE : PE269293.DWG			
PROJECT : .				APPROVED		REV.5	
TOLERANCES - LINEAR: $\pm 0.5$ HOLES: H13				CHECKED	S Joshi	REV.4	
CH.: 0.5x45° U/C: 1.0x1.0 S.F.: $\nabla$				DRAWN	Rajesh	24.06.13	REV.3
MATERIAL : Mild Steel				UNITS	mm	REV.2	
:				SCALE	1:4	REV.1	
TREATMENT/FINISH : Painted with 2 coats each of Red Oxide Primer and Air Drying Enamel Paint, Shade Black				Wt.	62 kg	PE/269/293	
				DOC	DWG		
N.R. ENTERPRISES: Tel: +91-20-2547 6057/81 [] Fax: 2547 0244 [] Email: nre@nre.co.in						SHEET NO. 1 OF 1	
						A4	

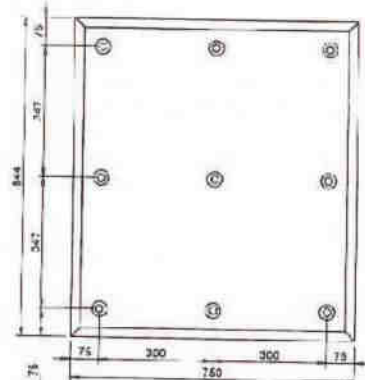
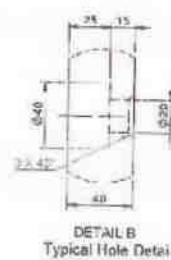
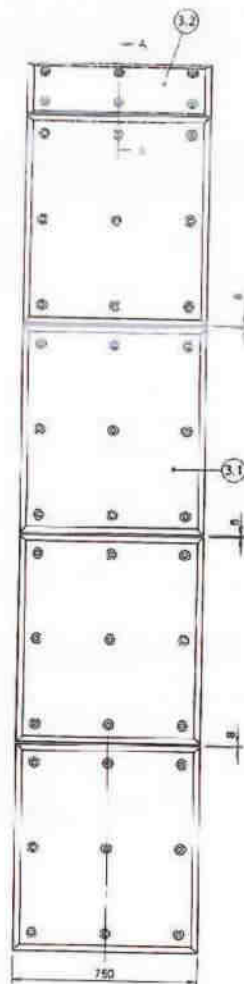




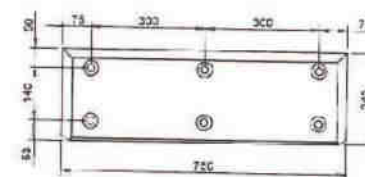


CLIENT : .							FILE : PE269295.DWG			
PROJECT : .				APPROVED				REV.5		
TOLERANCES – LINEAR: ±0.5			HOLES: H13		CHECKED	S Joshi		REV.4		
CH.: 0.5x45°			U/C: 1.0x1.0		S.F.: ▽	DRAWN	Rajesh	24.06.13	REV.3	
MATERIAL : Mild Steel			UNITS	mm	LOCKING PLATE			REV.2		
:			SCALE	1:1				REV.1		
TREATMENT/FINISH : Zinc Plated and White Passivated			Wt.	110 g				PE/269/295		
.			DOC	DWG						
N.R. ENTERPRISES: Tel: +91-20-2547 6057/81 ☐ Fax: 2547 0244 ☐ Email: nre@nre.co.in							SHEET NO. 1 OF 1		A4	

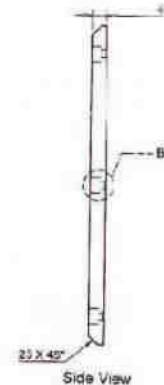




Front View  
3.1 Facing Pad - 01



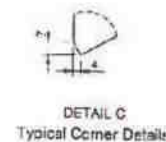
Front View  
3.2 Facing Pad - 02



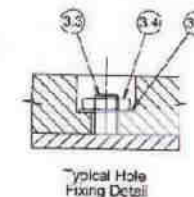
Side View



Side View



DETAIL C  
Typical Corner Details



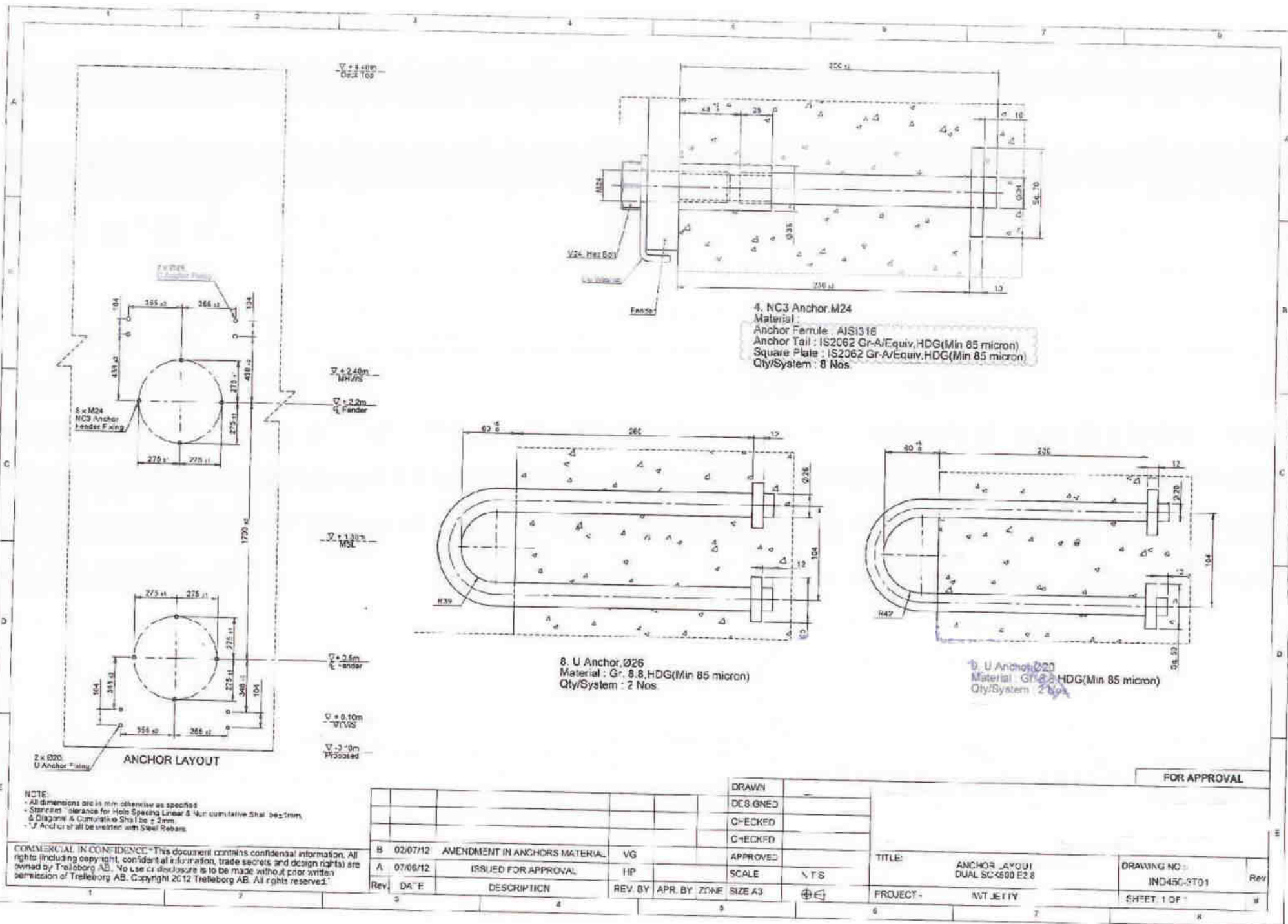
Typical Hole  
Fixing Detail

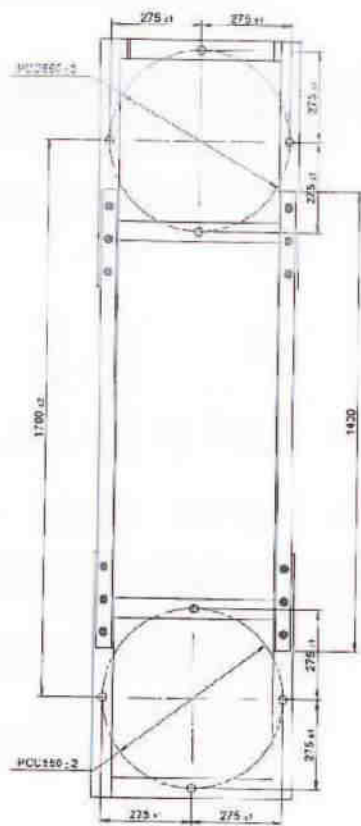
Colour of UHMW-PE: BLACK					
Part No.	Description	Dimension	Qty / Set Nos.	Material	Weight/ Qty (Kg)
3.1	Facing Pad - 01	644 x 750 x 40	4	UHMW-PE	22.81
3.2	Facing Pad - 02	750 x 243 x 40	1	UHMW-PE	6.09
3.3	Stud Bolt	M16 x 28 L	42	AISI316	-
3.4	Half Nut	M16	42	AISI316	-
3.5	Oversize Washer	OD 37 x ID 18 x 2.5 thk	42	AISI316	-

**NOTE:-**  
 \* All dimensions are in mm otherwise as specified.  
 \* Studs should be used on frontal frame after marking the facing pad hole locations on top surface of the frontal plate.  
 \* Standard Tolerances for Hole Spacing, Linear & Non cumulative shall be ± 0.1mm, & Diagonal & Cumulative shall be ± 0.2mm.  
 \* UHMW-PE Colour shall be Black.

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				DRAWN		FOR APPROVAL		
				DESIGNED				
				CHECKED				
				CHECKED				
				APPROVED				
				SCALE	N.T.S.			
A	02/07/12	ISSUED FOR APPROVAL	VG			TITLE:-	FACING PAD DETAILS DUAL SCKSC0 E2.E	DRAWN/NG NO:- IND450-3P01
Rev.	DATE	DESCRIPTION	REV. BY	APR. BY	ZONE	PROJECT:-	IWT JETTY	SHEET: 1 OF 1

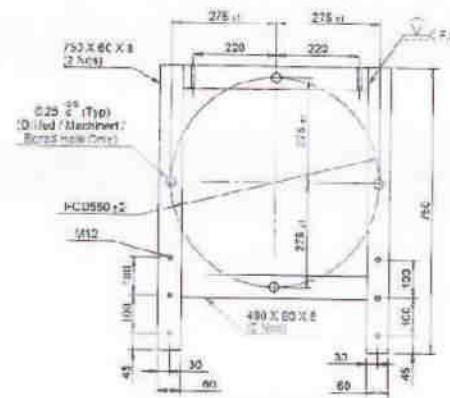




Front View  
Fender Anchor Template Details  
Weight - 30 Kg  
Material : IS2062 Gr-A / Equiv (PAINTED)  
Primer - 70 Micron



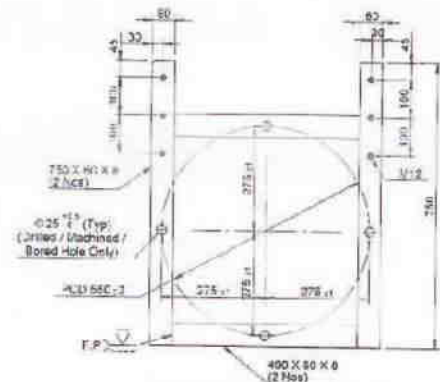
Side View



Template-01 (For Top Fender)



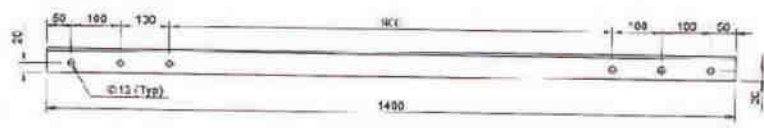
Side View



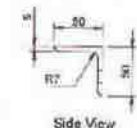
Template-02 (For Bottom Fender)



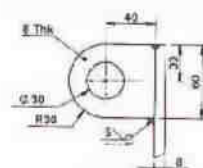
Side View



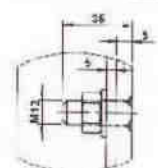
Standard Equal Angle  
Size - 50 x 50 x 5, 1400mm long  
Qty / Template - 2 Nos  
Material - IS2062 Gr-A / Equiv



Side View

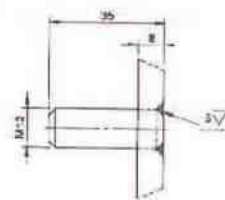


DETAIL A  
Lifting Cleat Detail



DETAIL B

Template to Angle Fixing Stud  
M12 x 35mm Long (Fully Threaded)  
Qty / Template - 12 Nos  
Material - AISI316



DETAIL C  
M12 Stud Welding Detail



Isometric View

- Notes:-**
- All Dimensions are in mm or otherwise stated.
  - All plates shall be 8 mm thick with material IS2062 Gr-A / Equiv.
  - All Holes shall be Drilled only after Assembly & Welded to maintain accuracy.
  - All Fillet Weld shall be 5mm.
  - All Butt Weld shall be Full Penetration.
  - Standard Tolerance for Hole Spacing Linear & Non cumulative shall be  $\pm 1$  mm.
  - Hole Size below 75 mm must be only Drilled, Bored, Machining.
  - Top Fender Template & Bottom Fender Template to be fixed carefully with 50 x 50 x 5mm Angle with M12 Stud, Nut & Washer.
  - Template assembly must be Handle Carefully to prevent for bending.

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Rev	DATE	DESCRIPTION	REV. BY	APP. BY	ZONE	SIZE A3
A	02/07/12	ISSUED FOR APPROVAL	VG			

DRAWN	
DESIGNED	
CHECKED	
CHECKED	
APPROVED	
SCALE	N.T.S.

FOR APPROVAL	
TITLE:-	ANCHOR TEMPLATE DETAILS
PROJECT:-	RVT JETTY
DRAWING NO:-	IND-50-3T02
SHEET 1 OF 1	





—120315/141315

## RECLAMATION

EXISTING BED

1. THE ROCK SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS AS PER IS : 1284--
  - A. THE GRAIN OF THE LEAST FAVORABLE SPECIMEN TO THE MAXIMUM LENGTH OF 150MM SHALL BE UNIFORM AND HARD-ROCKED SHALL BE UNIFORM
  - B. THE IMPACT ENERGY OF ROCK SHALL BE WITHIN 3.0J
  - C. WATER ABSORPTION SHALL NOT EXCEED 0.000001 G/G
  - D. COMPRESSIVE STRENGTH (NOT FLAMED OR HEATED SPECIMEN) SHALL BE WITHIN 0.01 N/CM<sup>2</sup> OF THE FOLLOWING
  - E. ABSORPTION OF WATER, APPROXIMATELY SHALL NOT EXCEED 0.01

KEYPLAN

STAGE - 1 CONSTRUCTION OF BUND TO BE DONE BY END ON DUMPING. 103

STAGE - 2 FILLING TO BE DONE UPTO +3.50M LEVEL.

STAGE - 3 REMAINING PORTION OF BUND TO BE COMPLETED FROM RECLAMATION AREA.

STAGE - 4 FILLING TO BE COMPLETED UPTO +5.00M LEVEL.

Ministry of Shipping, Govt. of India  
A-13 Sector 1, Kirti

PROOF CHECKED & FOUND O. K.

DETAIL 'A'

DETAIL OF BUND FOR RECLAMATION AREA  
AT SITTWE, MYANMAR.

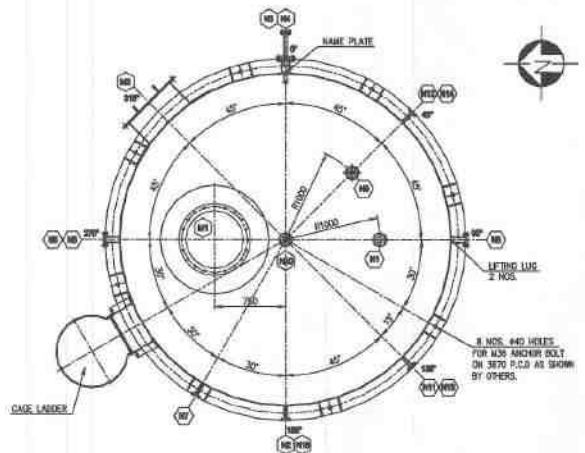
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Journal of Management Education 35(10):1079-1091, 2011. © 2011 Sage Publications

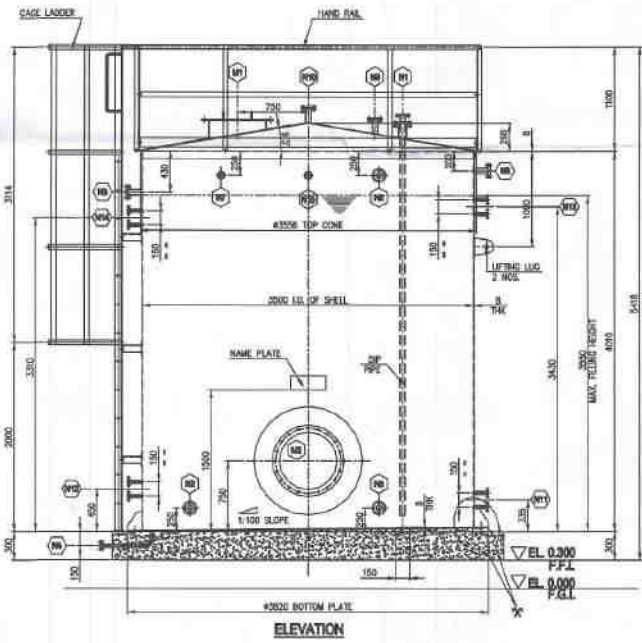




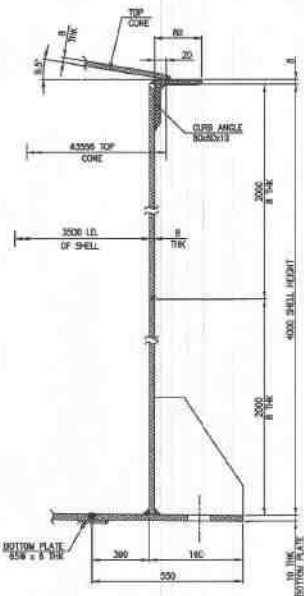
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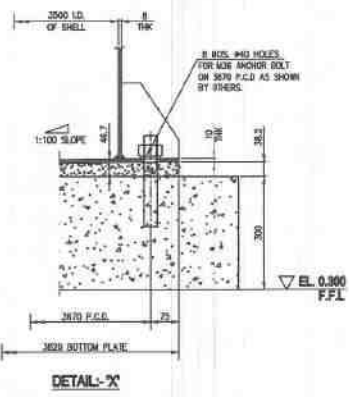
PLAN ORIENTATION



ELEVATION



SECTION VIEW FOR SHELL THICKNESS



DETAIL 'X'

NOZZLE SCHEDULE

MARK	SERVICE	NO.	QTY.	RATING	NO. & THICK.	FRACNO.	REMARK
N1	INLET	50	1	ANSI 150#	SCH.80	SOFF	
N2	OUTLET	50	1	ANSI 150#	SCH.80	SOFF	
N3	OVERFLOW	80	1	ANSI 150#	SCH.80	SOFF	
N4	DRAIN	25	1	ANSI 150#	SCH.80	SOFF	
N5	MECHANICAL LEVEL GAUGE	50	1	ANSI 150#	SCH.80	SOFF	
N6	MECHANICAL LEVEL GAUGE	50	1	ANSI 150#	SCH.80	SOFF	
N7	RECIRCULATION NOZZLE	25	1	ANSI 150#	SCH.80	SOFF	
N8	SPARE	50	1	ANSI 150#	SCH.80	SOFF	W/B.F.L.
N9	LT-RADAR	50	1	ANSI 150#	SCH.80	SOFF	
N10	VENT (FA)	50	1	ANSI 150#	SCH.80	SOFF	
N11	LEVEL SWITCH	25	2	ANSI 150#	SCH.80	SOFF	
N12	LEVEL SWITCH	25	2	ANSI 150#	SCH.80	SOFF	
N13	LEVEL SWITCH	25	2	ANSI 150#	SCH.80	SOFF	
N14	LEVEL SWITCH	25	2	ANSI 150#	SCH.80	SOFF	
N15	RECIRCULATION NOZZLE	25	2	ANSI 150#	SCH.80	SOFF	
M1	TOP MANHOLE	600	1	AS PER CODE	-	SOFF	W/B.F.L.
M2	BOTTOM MANHOLE	600	1	AS PER CODE	-	SOFF	W/B.F.L.

MATERIAL AND SPECIFICATION

01	SHELL 8 mm THK.	SA 205 Gr. C
02	BOTTOM PLATE 10 mm THK.	SA 205 Gr. C
03	ROOF PLATE 8 mm THK.	SA 205 Gr. C
04	ROOF STRUCTURE	SA 205 Gr. C
05	STAIRCASE & HANDRAIL	IS 2063 F250
06	NOZZLE UP TO 500mm	ASTM A53 Gr.B
07	NOZZLE 500mm ABOVE 300mm	API 5L Gr.B
08	NOZZLE FLANGE UP TO 500mm	ASTM A105
09	NOZZLE FLANGE ABOVE 500mm	ASTM A307 Gr. 70
10	MANHOLE NOZZLE	API 5L Gr.B
11	MANHOLE FLANGE	ASTM A516 Gr.70
12	GASKETS UP TO 300mm	NON ASBESTOS GRAPHITE FILLED, 9 1/2 IN. 150# RF, THK.3mm, CONCENTRIC RING
13	GASKET ABOVE 300mm	NON ASBESTOS GRAPHITE FILLED 9 1/2 IN. 150# RF, THK.3mm
14	BOLT AND NUTS	ASTM A193 B7/A194 2H
15	NAME PLATE	SS 304
16	PAINTING	REF. DOC. NO.-3205-1000-40000-0008-0013-0009

LEGEND:

- N/B FL. - WITH BLIND FLANGE
- LT - LIFT LUG
- WVS - WELDED VERTICAL SPRAY SYSTEM
- RF - RADIOGRAPHY TEST
- F.F.L. - FINISHED FLOOR LEVEL
- F.S.L. - FINISHED GRADE LEVEL

REVIEWED  
AND FOR CONSTRUCTION  
DATE: 15.12.2016

DESIGNED (Waterway Project)  
CHECKED (Waterway Project)  
DATE: 15.12.2016

DESIGN DATA

SER. NO.	DESIGN CONDITION	
1	DESIGN STANDARD	API 650 13th EDITION
2	DENSITY OF FLUID	kg/m <sup>3</sup> 800-870
3	CONDUCTIVITY	(μS/cm) -
4	VISCOSITY (40°C)	cP 2.5-15.7
5	CAPACITY	m <sup>3</sup> 35
6	CAPACITY (WATER VOLUME)	m <sup>3</sup> 38
7	EFFECTIVE STORAGE CAPACITY	m <sup>3</sup> 33
8	FLUID NAME	LIGHT DIESEL OIL (LDO) FLUID
9	PRESSURE (NORMAL)	kg/cm <sup>2</sup> ATM
10	PRESSURE (MAXIMUM)	kg/cm <sup>2</sup> ATM
11	PRESSURE (MINIMUM)	kg/cm <sup>2</sup> ATM
12	PRESSURE (DESIGN)	kg/cm <sup>2</sup> -
13	TEMPERATURE (NORMAL)	°C 33
14	TEMPERATURE (MAXIMUM)	°C 45
15	TEMPERATURE (MINIMUM)	°C 30
16	TEMPERATURE (DESIGN)	°C 60

OPERATION CONDITION

17	TANK DIAMETER	MM 3000
18	HEIGHT	MM 4000
19	MAXIMUM FILLING HEIGHT	MM 3500
20	TYPE OF ROOF	CONE
21	CORROSION ALLOWANCE	MM 3

SITE CONDITION

22	BAROMETRIC PRESSURE	kg/cm <sup>2</sup> ATM
23	TEMPERATURE (NORMAL)	°C 33

LOAD DETAIL

24	TANK EMPTY LOAD (APPROX)	TON -
25	WATER LOAD (APPROX)	TON -
26	TOTAL LOAD (APPROX)	TON -

INTER LINING / PROTECTION

27	TANK INSIDE	EPOXY COATING
28	TANK OUTSIDE	REF. DOC. NO.-3205-1000-40000-0008-0013-0009

GENERAL NOTES

- ALL DIMENSIONS ARE IN mm AND LEVELS IN m.
- FOR SHELL NOZZLE PROJECTION ARE REFERRED TO FROM TANK CENTRE/HORIZONTAL CENTRE AXES TO FLANGE CONTACT FACE.
- REINFORCING PADS TO HAVE TELL TALE HOLES OF 50mm. THESE PADS SHALL BE AIR TESTED AT 1.05 kg/cm<sup>2</sup> WITH SOAP SOLUTION AND THESE AFTER FILLED WITH WELD GREASE.
- ALL BOLT HOLES IN NOZZLE FLANGES AND MANHOLES TO SHADOW CENTERS EXCEPT NOTED.
- ALL TOLERANCE WILL BE AS PER CODE/SPECIFICATION.
- ALL F.P. WELD TO BE CHIPPED BACK TO SOUND METAL ON THE SECOND SIDE AND REWELDED OR F.P. WELD MAY BE ACHIEVED FROM ONE SIDE USING PROVED QUALIFIED PROCEDURE.
- ALL EJECTION LUGS AND CLATS TO BE REMOVED BEFORE HYDROTEST.
- IF UNDER CUT OR PIN HOLES EXIST, THEY SHOULD BE GRINDOUT, FILLED WITH METAL AND GRIND SMOOTH.
- ALL WELD SPATTERS AND LARGE WELD BENDS SHOULD BE REMOVED BY GRINDING.
- 2 NOS. 50mm DIA. STIFFENER SHALL BE PROVIDED FOR NOZZLE SIZE LESS THAN OR EQUAL TO 80 H.S. 90° APART.
- MANHOLE NOZZLE 500 MM AND ABOVE SHALL BE FABRICATED FROM PLATE AND 1000 UT.
- FLANGE DIMENSION SHALL CONFORM TO ASME B16.5 UP TO 3000 (EXCEPT MANHOLE (MANHOLE AS PER API 650)).
- NOZZLE SHOWN IN ELEVATIONS ARE NOTED FOR CLARITY. REFER PLAN FOR ORIENTATION OF NOZZLES.
- FOUND OF ANCHOR BOLT STIFFENER WITH NOZZLE SHOULD BE COMPENSATED BY ADJUSTING STIFFENER LOCATION.
- ULTRASONIC TEST IS REQUIRED AS PER API 650 CLAUSE B.3.2 & APPENDIX U FOR SHELL BUTT WELDS, MANHOLE PLATE BUTT WELDS AND FLANGE TYPE CONNECTING WITH BUTT WELDS FOR ALL FIELD WELDS.
- FOAM SYSTEM, ALARMS SYSTEM IS NOT REQUIRED.
- ± 0.00M CORRESPONDS TO +0.30M WITH RESPECT TO CD-BACK UP AREA.

ALL APPLICABLE HSE STANDARDS & LOCAL REQUIREMENTS ARE CONSIDERED

NAME	DOB	DATE
GA		04/10/16

NOTES

2	PIPEW. & A.D.C. FOR RAIL BLANKING SYSTEM	1000-030-ENG-P-WO-DN-CHN-SP-03-001
1	PAID FOR FUEL STORAGE TANK	1000-030-ENG-P-WO-DN-CHN-SP-03-001

REFERENCE

ME/INDIA-KALADAM MULTI-MODAL TRANSIT TRANSPORT PROJECT  
INLAND WATERWAYS AUTHORITY OF INDIA

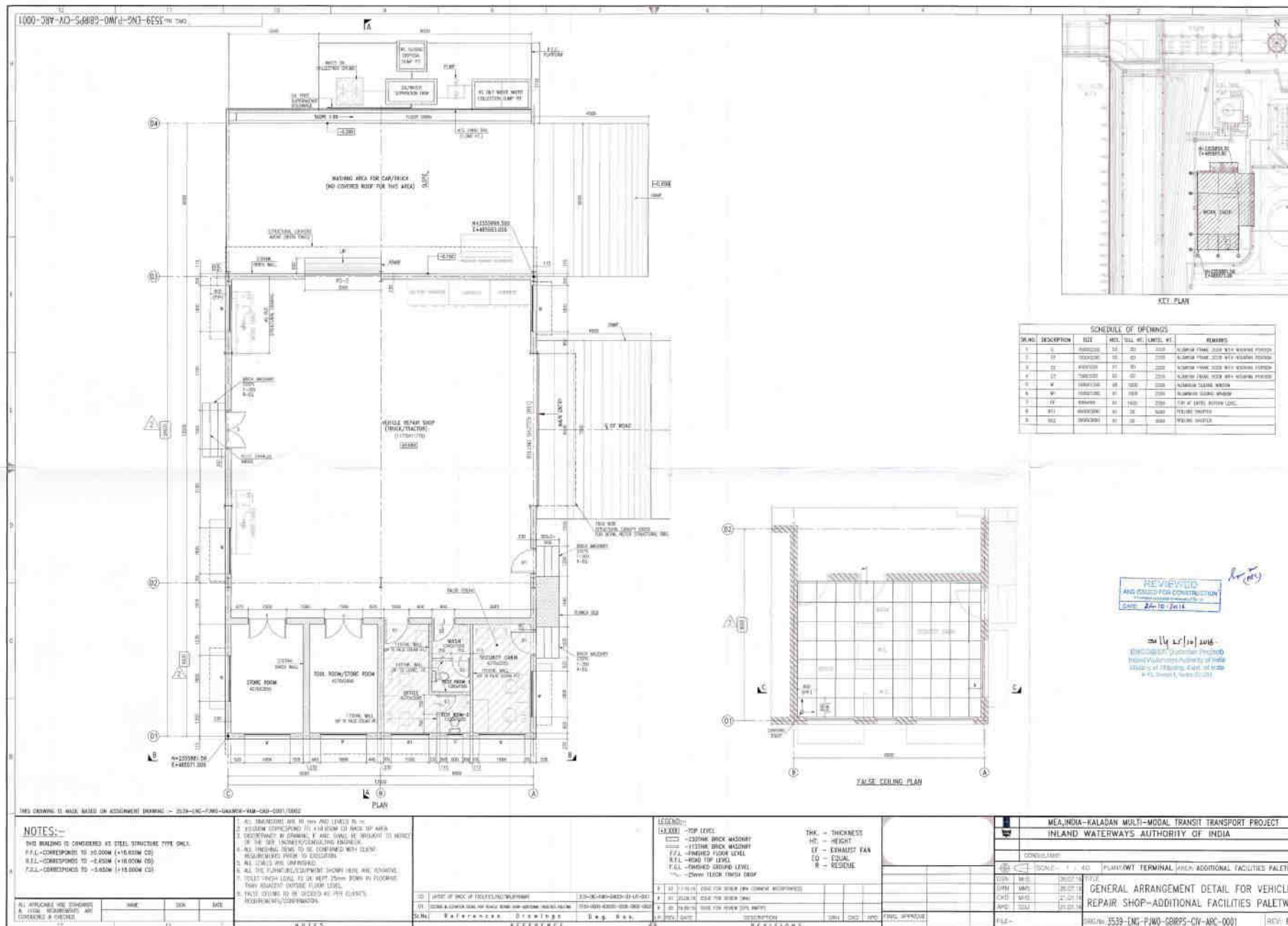
SCALE: 1:10  
PLANT: JETTY AREA: SITWE

GENERAL ARRANGEMENT DRAWING FOR  
LIGHT DIESEL OIL STORAGE TANK AT SITWE

FILE: 1000-030-ENG-P-WO-DN-CHN-SP-03-001 SL 1/4 REV: 0

DATE: 15.12.2016







		TWAJ MYANMAR		EQUIPMENT LIST FOR HVAC & WORKSHOP(VEHICLE REPAIR SHOP) EQUIPMENT		Prepared		BWP	10/1/2017	Doc. No: 3539-ENG-PJWD-IGNAGEN-YAM-LIS-0001			
		ADDITIONAL FACILITY AT MYANMAR				Checked		BWP	10/1/2017				
						Approved		SNP	10/1/2017				
S.N	Tag Number	Description	Specifications	Quantity (Nos)			Weight (kgs)		Voltage	Power, kW		Remarks	Rev
				W	S	Total	Unit	Total		Unit	Total		
HVAC EQUIPMENT													
1	-	One of the Bed Rooms of 3BHK (Total 2 nos. of 3-BHK flat)	1.0 TR Hi-wall type AC unit with its outdoor & indoor unit connected by insulated refrigerant piping & insulated drain piping, electrics & instrumentation, supports, accessories, valves & fittings.	2	0	2	DDE	DDE	1 ph., 230V AC, 50 Hz.	1.20	1.5-2 kW	1 No. of Hi-wall type Split One of the Bed of 3BHK flat	0
2	-	Security room-2 at Paletwa	1.5 TR Hi-wall type AC unit with its outdoor & indoor unit connected by insulated refrigerant piping & insulated drain piping, electrics & instrumentation, supports, accessories, valves & fittings.	1	0	1	DDE	DDE	1 ph., 230V AC, 50 Hz.	1.80	1.90		0
3	-	DG and panel room	3400 CMH Tube Axial Supply Air Fan with pre filter, accessories and mounting arrangement	1	0	1	DDE	DDE	1 ph., 230V AC, 50 Hz.	0.37	0.37	Detail is considered from building GA drg	0
4	-	DG and panel room	Exhaust Gravity Louver (400X400mm opening)	1	0	1	DDE	DDE	1 ph., 230V AC, 50 Hz.	NA	NA	Detail is considered from building GA drg	0
5	-	Vehicle/Repair Shop (Toilet/wash room)	500 CMH Exhaust Fan (Propeller type) with accessories and mounting arrangement	1	0	1	DDE	DDE	1 ph., 230V AC, 50 Hz.	0.18	0.18	Detail is considered from building GA drg	0
Remarks/assumption													
Brief Specification: 1) Air cooled type HI wall type Air-conditioning unit complete with the following components. 2) Indoor evaporating unit comprising of cooling coils, insulated drain tray, 20 Micron HDPE washable filters, blower, motor, electrical junction box etc. 3) Outdoor condensing unit comprising of hermetic / semi-hermetic compressor's, condenser coils, propeller / axial fans, motors, pressure switches / cutouts etc. 4) First charge of Refrigerant Gas and oil. 5) Inter-connected refrigerating piping of copper duly insulated with EXPANDED POLYETHYLENE TUBING. 6) Complete electrical power wiring of AL & control wiring of copper required from indoor and outdoor units. Earthing of the complete system with B G G.I. wire. 7) Each unit will be complete with necessary starters, fuses, switches, timers, over-load relays, contactors, push button, and indicating lamps, single phasing PREVENTER etc. and ALSO WITH REMOTE CONTROL WITH CORDING. 8) All outdoors units shall be mounted on MS angle base frame structure duly black painted with synthetic epoxy paint. 9) The MS plate & serrated rubber pads shall be mounted on frame structure. 10) Complete clamping and saddling of cabling work and refrigerant piping & covering with PVC conducting shall be provided.													

		IWAT, MYANMAR	EQUIPMENT LIST FOR HVAC & WORKSHOP(VEHICLE REPAIR SHOP) EQUIPMENT	Prepared		BPP	10/1/2017	Doc. No: 3539-ENG-PJW0-GNAGEN-VAM-LIS-0001					
		Checked		BPP	10/1/2017								
		Approved		SNP	10/1/2017								
S.N	Tag Number	Description	Specifications	Quantity (Nos)			Weight (kgs)		Voltage	Power, kW		Remarks	Rev
				W	S	Total	Unit	Total		Unit	Total		
Workshop (Vehicle Repair Shop) Equipment													
1	-	Pressure washer (For Outdoor Duty)	Pressure 180 kg/cm² & Flow : 1200 LPH with 2 Nos nozzles/Hose gun	1	0	1	150.0	150.0	3 ph., 415V AC, 50 Hz.	12.00	12.00	Capacity is selected from range of 1000-2000 LPH	0
2	-	Oil water separator set including pumps, portable tanks. (For Outdoor Duty)	Flow rate 5 CMH	1	1	1	NA	NA	3 ph., 415V AC, 50 Hz.	1.50	1.50		0
3	-	Level switch for oil water separator. (For Outdoor Duty)	-	1	0	1	NA	NA	1 ph., 240V AC, 50 Hz.	-	-		0
4	-	Air compressor	Free Air CMH @12Bar : 42 , Air Tank size: 115 Ltr Air Tank type: Horizontal Max pressure: 12 Bar	1	0	1	900.0	900.0	3 ph., 415V AC, 50 Hz.	9.70	9.70		0
5	-	Lubrication equipment	Trolley mounted with hose reel assy.	1	0	1	50.0	50.0	NA	NA	NA		0
7	-	Portable grease pumps	Blocked pressure 35 kg/cm² ,drum capacity 20 Ltr	2	0	2	50.0	100.0	NA	NA	NA		0
8	-	Hydraulic hoist/4 Post lift	Capacity : 3 T, Lift 2M	1	0	1	1400.0	1400.0	3 ph., 415V AC, 50 Hz.	3.00	3.00		0
9	-	Tire changer	For truck and car tire	1	0	1	200.0	200.0	3 ph., 415V AC, 50 Hz.	0.75	0.75		0
10	-	Tube vulcanizing set	For truck and Car tire	1	0	1	70.0	70.0	1 ph., 220V AC, 50 Hz.	1.00	1.00		0
11	-	Battery charger	Full load current, 12 Amp , Max No Batteries 4 x 12 V	1	0	1	30.0	30.0	1 ph., 120/220 V AC, 50 Hz.	-	-		0
12	-	Misc. tools	1 Lot of jacks, spanners, wrenches etc.	1	0	1	NA	NA	NA	NA	NA		0
13	-	Portable drill machine	8-10 Dia, 1600 RPM	2	0	2	2.2	4.4	3 ph., 415V AC, 50 Hz./1 ph., 120/220 V AC, 50 Hz.	0.60	1.20		0
14	-	Portable grinding machine	150-180 mm Wheel dia	2	0	2	2.0	4.0	3 ph., 415V AC, 50 Hz./1 ph., 120/220 V AC, 50 Hz.	1.20	2.40		0

	[WAT MYANMAR ADDITIONAL FACILITY AT MYANMAR]		EQUIPMENT LIST FOR HVAC & WORKSHOP(VEHICLE REPAIR SHOP) EQUIPMENT	Prepared		BPP	10/1/2017				
				Checked		BPP	10/1/2017				
				Approved		SNP	10/1/2017	Doc. No: 3539-ENG-PJW0-GNAGEN-VAM-LIS-0001			

S.N	Tag Number	Description	Specifications	Quantity (Nos)			Weight (kgs)		Voltage	Power, kW		Remarks	Rev.
				W	S	Total	Unit	Total		Unit	Total		
Remarks/Assumption													
1. Details given for above equipment are tentative and final details shall be provided after receipt of data from supplier.													
2. All equipment shall be connected for electrical power supply through power sockets indicated in drg no : 3539-ENG-PJW0-GMAWOR-VAM-GAD-0001 excluding SF No. 2 Oil water Separator.													
3. All details of equipment may change based on finalization of Drg No:3539-ENG-PJW0-GMAWOR-VAM-GAD-0001/2													
4. Above equipment are considered for design of Workshop Building. Procurement shall be done as per contract													



Client

# MEA, INDIA-KALADAN MULTI-MODAL TRANSIT TRANSPORT

POC

INLAND WATER WAY AUTHORITY OF INDIA (IWAI)

## KALADAN Multimodal Transit Transport Project (KMTTP)

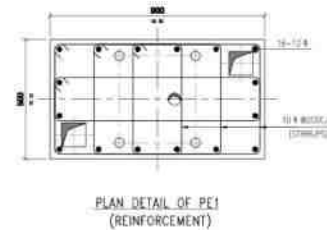
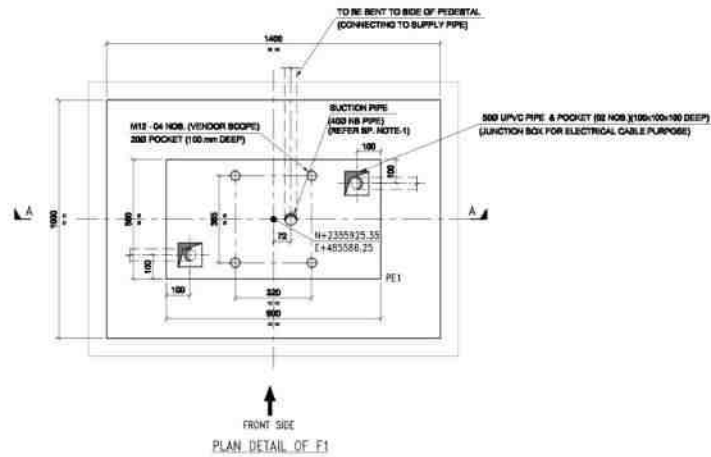
### EQUIPMENT LIST FOR HVAC & WORKSHOP (VEHICLE REPAIR SHOP) EQUIPMENT



ENGINEER (Kaladan Project)  
Inland Waterways Authority of India  
Ministry of Shipping, Govt. of India  
A-12, Sector-1, Gurgaon-122001

01	10/1/2017	Issued for review (KASHEC)	B.P. Jaiswal	B.P. Jaiswal	SNP
00	26/12/2016	Issued for review (EPIL KMTTP)	BPP	BPP	SNP
REV.	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
		EQUIPMENT LIST	DOCUMENT NO		
			3539-ENG-PJWD-GNAGEN-VAM-LIS-0001		

8000-FOU-CV-FOU-0006



CHECKED & FOUND O.K.

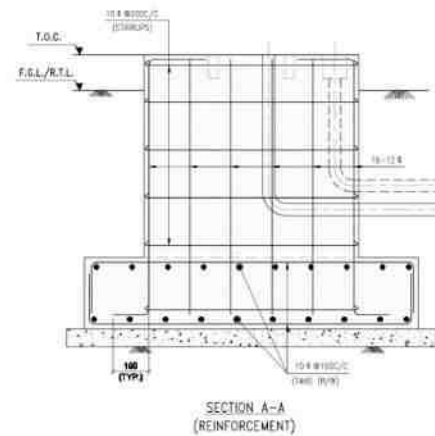
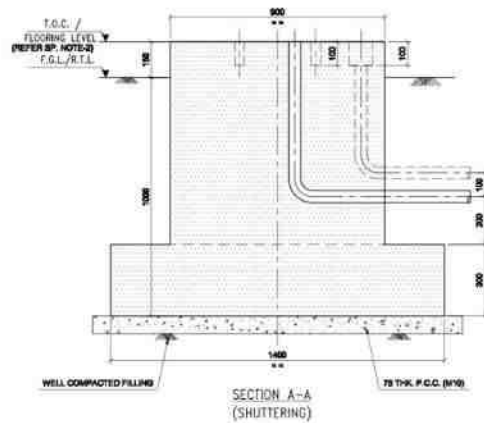
ASSOCIATE PROFESSOR  
Applied Mechanics Department  
S. V. National Institute of Technology  
SURAT-395 007.



ASSISTANT PROFESSOR  
APPLIED MECHANICS DEPARTMENT  
S V NATIONAL INSTITUTE OF TECHNOLOGY,  
SURAT - 395007

ASSISTANT PROFESSOR  
APPLIED MECHANICS DEPARTMENT  
SV NATIONAL INSTITUTE OF TECHNOLOGY,  
SURAT - 395007

QUANTITY OF MATERIALS		
TYPE	GRADE	QUANTITY
R.C.C.	M20	1.00 m <sup>3</sup>
R.C.C.	M10	0.27 m <sup>3</sup>
STEEL	10#	58.16
STEEL	12#	21.36
TOTAL		80.42



# SP. NOTE:-

1. PIPE SHALL BE Laid AS M.S. PIPE SUITABLE TO SUPPLY PIPE CONNECTIVITY/LOCAL MATERIAL AVAILABILITY AS PER PRACTICAL SITE CONDITION.
2. FINISHING ALL AROUND DISPENSER UNIT SHALL BE DONE WITH PAVEMENT BLOCK SAME AS USED IN DRIVE/PALLETTING CAR PARKING UNIT/AS PER CLIENT REQUIREMENTS.

## NOTES:-

1. FLOORING CORRESPONDS TO +18.00M (GD FOR PAVING).
- F.G.L.-CORRESPONDS TO +8.00M (+18.00M GD).
- R.T.L.-CORRESPONDS TO +8.00M (+18.00M GD).
- F.G.L.-CORRESPONDS TO +8.00M (+18.00M GD).

1. ALL DIMENSIONS & LEVELS ARE IN M.
2. CONCRETE AND FOR R.C.C. WORK SHALL BE M-20.
3. REINFORCEMENT SHALL CONFORM TO IS-1786.
4. LAP LENGTH FOR REINFORCEMENT SHALL BE AS THREE TIMES DIAMETER OF BAR.
5. ALL 1<sup>ST</sup> BENDS OF REINFORCEMENT ARE 90°.
6. LAPS SHALL BE CONSIDERED IN SUCH A WAY THAT NOT MORE THAN ONE OF BAR ARE LAPTED AT THE PARTICULAR SECTION.
7. LAPPING SHALL BE WORKED BEHIND COLUMN/PIEDESTALS.
8. DISCREPANCY IN DRAWING, IF ANY, SHALL BE BROUGHT TO NOTICE OF THE CLIENT/ENGINEERING/DESIGNER.
9. SMC OF FOUNDATION LEVEL SHALL BE CONSIDERED AS 10 KN/M<sup>2</sup>.

THIS DRAWING IS MADE BASED ON VENDOR Dwg. NO. TS-18010002 (VENDOR NO. M241111).

Sl.No.	DESCRIPTION	DATE	BY	CHKD	APPD
1	GENERAL LAYOUT FOR ADDITIONAL FACILITIES/PALETTE/PAVING	20/06/2024	SHR		
2	LAYOUT OF WORK FOR FOUNDTION/PAVING	20/06/2024	SHR		

## LEGEND:-

1. F.G.L. - FINISHED GROUND LEVEL
2. F.L. - FINISHED FLOOR LEVEL
3. F.L. - ROAD TOP LEVEL
4. F.L. - TOP OF CONCRETE
5. B.M. - BENCH MARK
6. B.M. - BOTH MARKS

Sl.No.	REVISIONS	DATE	BY	CHKD	APPD
1	AS PER CLIENT REQUIREMENT FOR WORK APPROVED & ISSUED AS PER APPROVED				
2	AS PER CLIENT REQUIREMENT FOR WORK APPROVED & ISSUED AS PER APPROVED				

WEA,INDIA-KALADAN MULTI-MODAL TRANSIT TRANSPORT PROJECT  
INLAND WATERWAYS AUTHORITY OF INDIA

SCALE: 1:10 (PLANT) TWT TERMINAL (AREA: ADDITIONAL WORKS PALETTEWA)

Sl.No.	REVISIONS	DATE	BY	CHKD	APPD
1	AS PER CLIENT REQUIREMENT FOR WORK APPROVED & ISSUED AS PER APPROVED				
2	AS PER CLIENT REQUIREMENT FOR WORK APPROVED & ISSUED AS PER APPROVED				

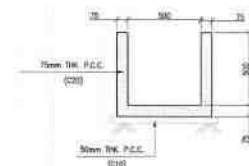
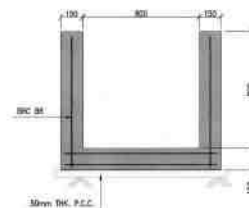
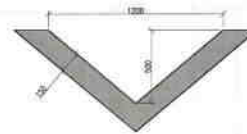
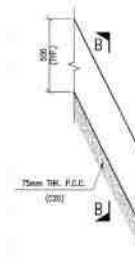
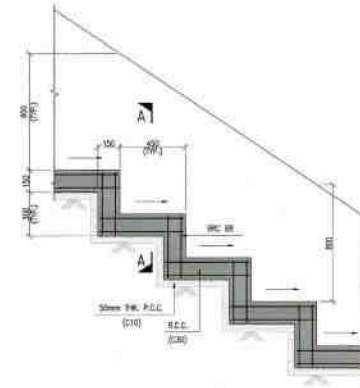
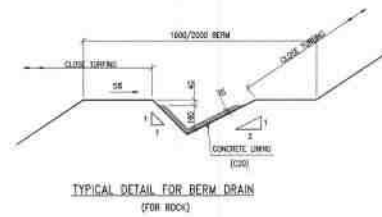
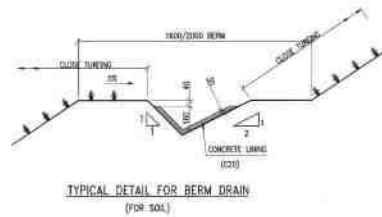
TYPICAL FOUNDATION DETAIL FOR DISPENSER UNIT FOR PALETTEWA

DRG. No. 3339-ENG-PJWO-GIGEN-CV-FOU-0006 SH. 1/1 (REV: 01)

P.L. Scale: 1:10



8000-045-AID-K2010-GW-0-9N3-6ESS (in mm)



REVIEWED  
AND ISSUED FOR CONSTRUCTION  
Consent/Remarks for revision if any  
Date 23-08-17

ENGINEER (Kalandan Project)  
Inland Waterways Authority of India  
Ministry of Shipping, Govt. of India  
A-13, Sector-1, Noida-201301

Sl. No.	NAME	THICK	DATE
1			
2			

1. ALL DIMENSIONS ARE IN mm AND LISTED IN mm.  
2. LOCATION CORRESPONDING TO 1:100000 (2:10000) SCALE.  
3. DISCREPANCY IN DRAWING, IF ANY, SHALL BE SUBJECT TO NOTICE OF THE SITE ENGINEER/CONSULTING ENGINEER.

Sl. No.	DESCRIPTION	DATE	BY	CHKD	APPD
1					
2					

LEGEND:  
- SLOPE/INTERCEPT DRAIN  
- TYPICAL DRAIN  
- TYPICAL  
P.C.C. - PLAIN CEMENT CONCRETE

Sl. No.	DESCRIPTION	DATE	BY	CHKD	APPD
1					
2					

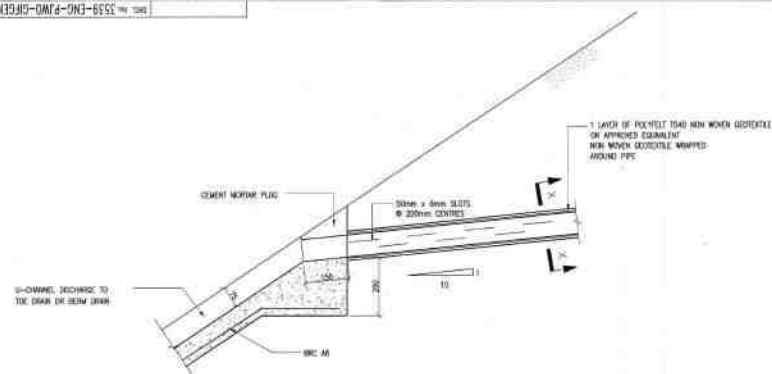
Sl. No.	DESCRIPTION	DATE	BY	CHKD	APPD
1					
2					

ALL DIMENSIONS ARE IN mm AND LISTED IN mm.  
1. LOCATION CORRESPONDING TO 1:100000 (2:10000) SCALE.  
2. DISCREPANCY IN DRAWING, IF ANY, SHALL BE SUBJECT TO NOTICE OF THE SITE ENGINEER/CONSULTING ENGINEER.

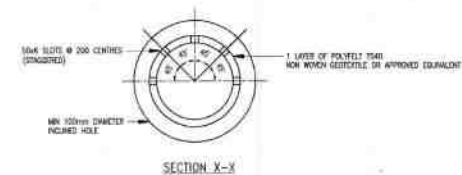
DATE: 23/08/17  
BY: [Signature]  
CHKD: [Signature]  
APPD: [Signature]

REV: 01

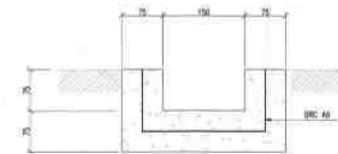




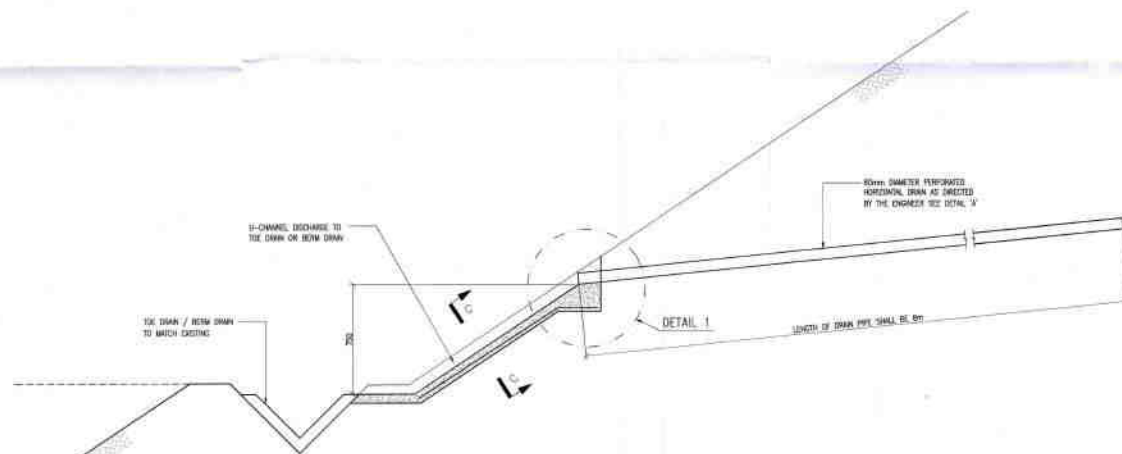
DETAILS 'A'  
TYPICAL DETAILS OF HORIZONTAL DRAIN PIPE



SECTION X-X



SECTION C-C



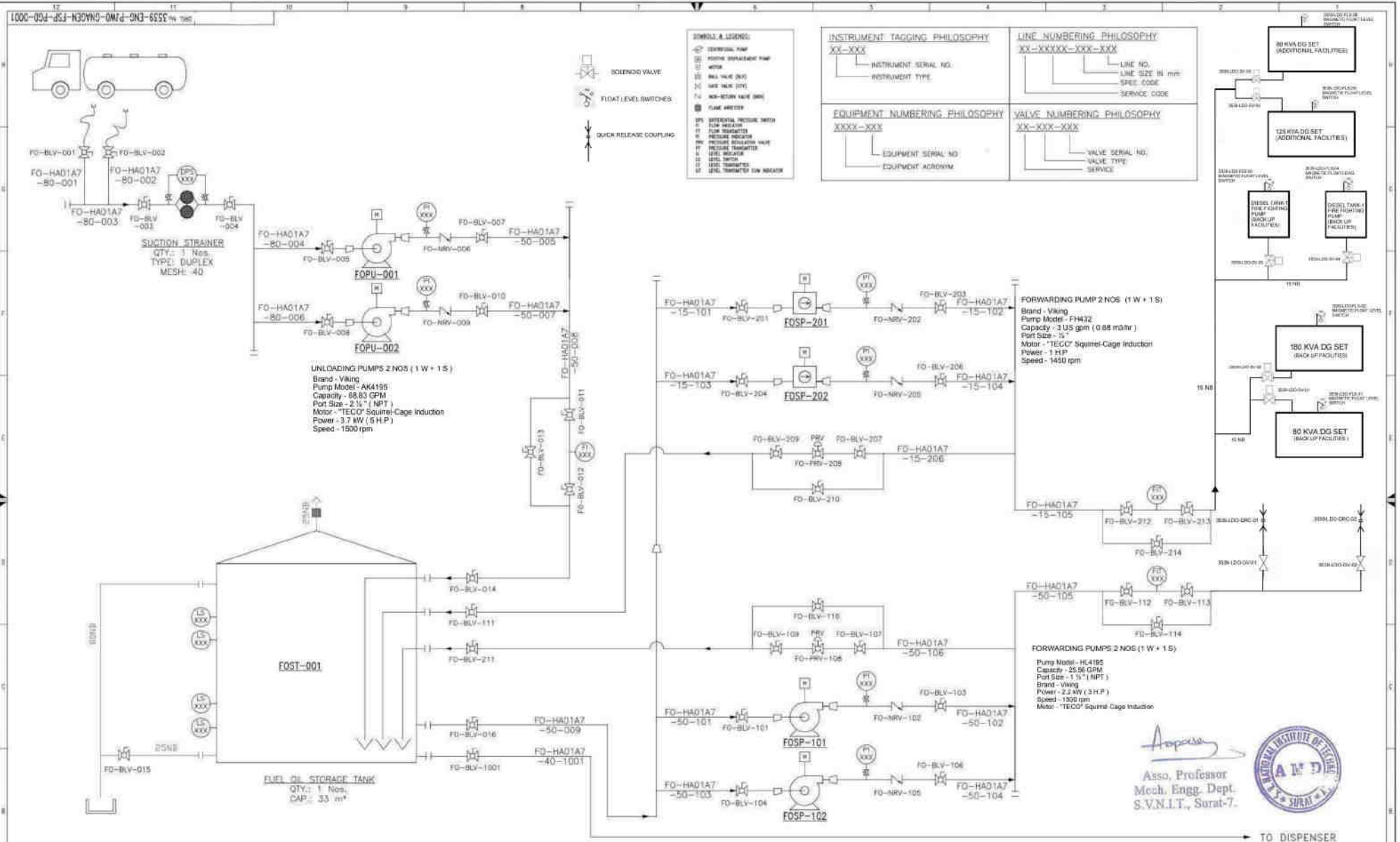
TYPICAL DETAIL OF HORIZONTAL DRAIN

REVIEWED  
AND ISSUED FOR CONSTRUCTION  
Guaranty responsible for accuracy of design  
Date 2-2-2017

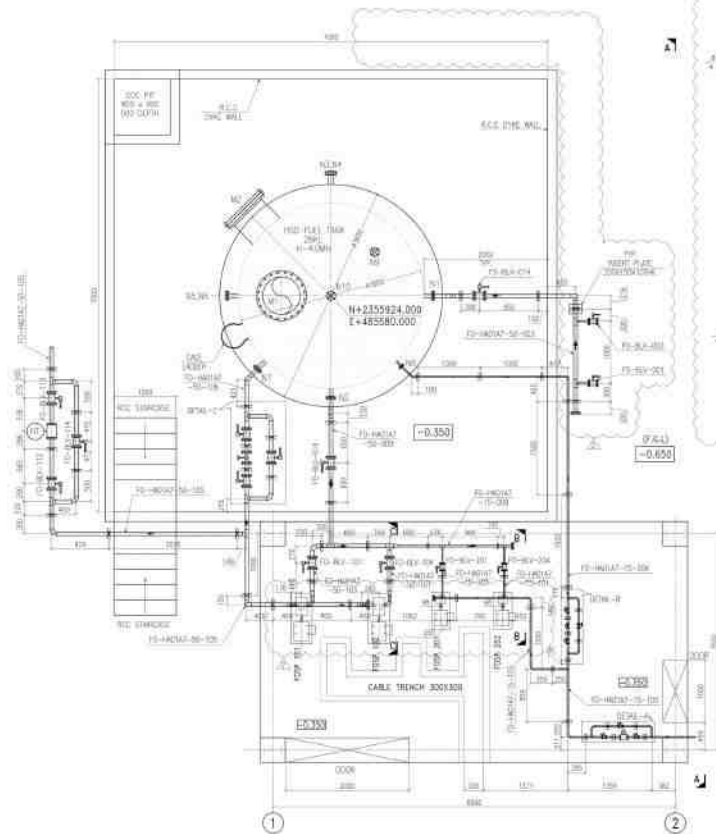
ENGINEER (Kakadi Project)  
Inland Waterways Authority of India  
Ministry of Shipping, Govt. of India  
A-13, Sector-1, Noida - 201301

- (NOTES)**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS SPECIFIED OTHERWISE.
  2. ALL HORIZONTAL DRUMS SHALL BE INSTALLED AT 3m V/S HORIZONTALLY.
  3. START AND END LOCATION FOR THE INSTALLATION OF HORIZONTAL DRUMS SHALL BE AS PER THE INSTRUCTION BY THE ENGINEER DURING CONSTRUCTION WORKS FOR THE CUT SLOPES.
  4. IF A PART OF THE CUT SLOPES IS NOT OF WHITE SECTANCE IS OBSERVED FROM THE CUT SLOPES, HORIZONTAL DRUMS SHALL BE INSTALLED AS PER THE INSTRUCTION BY THE ENGINEER.
  5. IF THE WATER SEEPAGE FROM THE CUT SLOPES IS OBSERVED TO BE EXCESSIVE, CONTRACTOR SHALL ADVISE TO NOTIFY THE ENGINEER STOPPING PROCEEDINGS WITH SLOPE CUTTING FOR THE NEXT BAY.
  6. ALL HORIZONTAL DRUMS SHALL BE INCLINED UPWARDS.

[illegible]



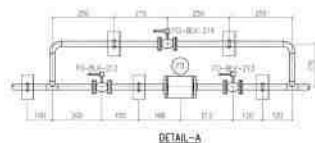
<p>1. REQUIREMENT OF DRAIN &amp; VENT SHALL BE DECIDED BASED ON PIPE ROUTING &amp; PIPING REQUIREMENT.</p>				<p>MEA, INDIA - KALADAN MULTI-MODAL TRANSIT TRANSPORT PROJECT INLAND WATERWAYS AUTHORITY OF INDIA</p>			
<p>ALL APPLICABLE HSE STANDARDS &amp; LEGAL REQUIREMENTS ARE CONSIDERED &amp; CHECKED</p>				<p>SCALE: 1" = 10' (P&amp;ID) / 1" = 10' (TERMINAL) / MEA: ADDITIONAL FACILITIES PALETTA</p>			
<p>NAME: _____ SIGN: _____ DATE: 10/08/16</p>				<p>P&amp;ID FOR FUEL BUNKERING SYSTEM</p>			
<p>NOTES</p>				<p>FIGURE NO. 3539-ENG-PJWO-DNAGN-FSP-PD-0001 SH. 1/1 REV. 03</p>			
<p>REFERENCE</p>				<p>REVISIONS</p>			
<p>31. PROCESS FLOW SHEET FOR FUEL BUNKERING SYSTEM</p>				<p>DESCRIPTION: _____ DATE: _____ BY: _____ CHECKED: _____ APPROVED: _____</p>			



PLAN FOR FUEL BUNKER  
SCALE: 1:40

LOAD & PIPE SUPPORT SPAN			
LINE TAG	LINE SIZE (mm)	SERVICE	VERTICAL LOAD kg/m
1	800	FUEL OIL	50
2	800	FUEL OIL	30
3	150	FUEL OIL	15

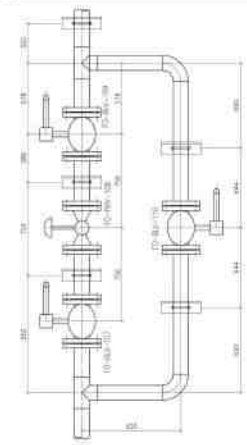
NOTE: 1 - MINIMUM JOINT OF VERTICAL LOAD TO BE CONSIDERED FOR HORIZONTAL LOAD.



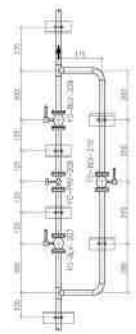
DETAIL-A  
SCALE: 1:10

DETAIL OF FOSP 101/102  
SCALE: 1:10

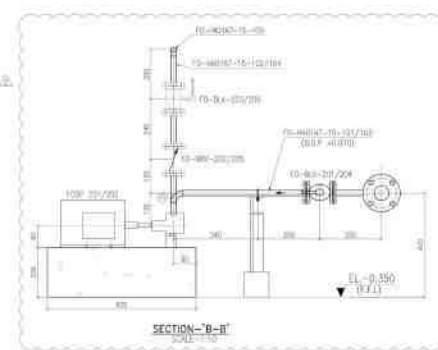
DETAIL OF FOSP 201/202  
SCALE: 1:10



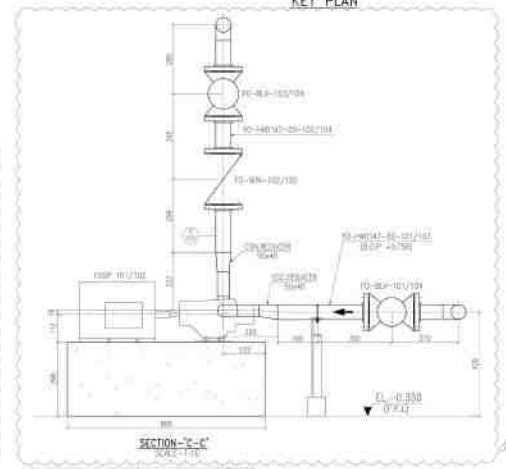
DETAIL-C  
SCALE: 1:10



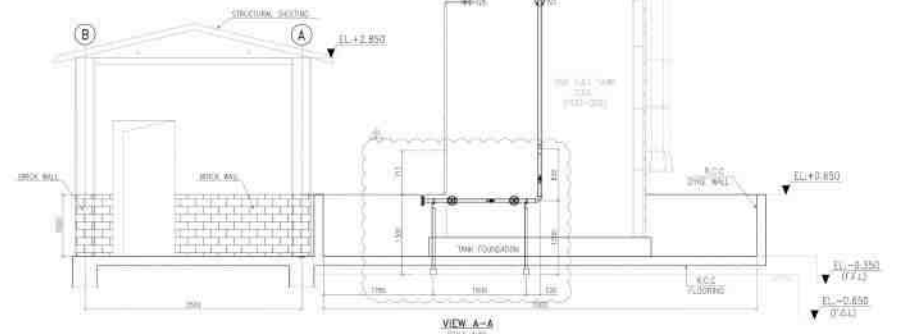
DETAIL-B  
SCALE: 1:10



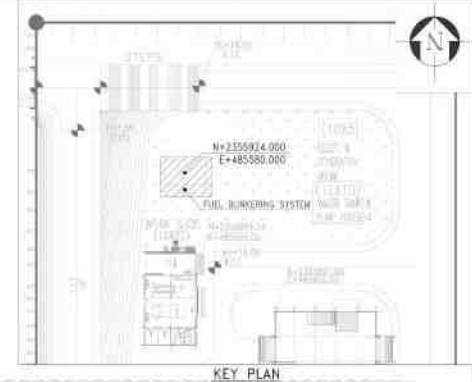
SECTION-B-B'  
SCALE: 1:10



SECTION-C-C'  
SCALE: 1:10



VIEW A-A  
SCALE: 1:40



KEY PLAN

NOTES:-

1. ALL DIMENSIONS ARE IN mm AND LEVELS IN M.
2. A. 5.000M CORRESPOND TO 416.000M CO BACK UP AREA.
3. PUMP AND TANK FOUNDATION ARE IN UNDER HOLD.
4. FOR FUEL TANK DETAIL REFER TO: DWG. NO. 3539-ENG-PJWO-CHAGEN-FSP-PGD-0001.
5. FOR ELECTRICAL DETAIL REFER TO: DWG. NO. 3539-ENG-PJWO-CHAGEN-FSP-PGD-0001.

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5. FOR ELECTRICAL DETAIL REFER TO: DWG. NO. 3539-ENG-PJWO-CHAGEN-FSP-PGD-0001.

LEGEND:  
F.L.L. = FINISHED FLOOR LEVEL  
F.L.L. = FINISHED GROUND LEVEL

NO.	DESCRIPTION	DATE
1	FORWARDING PUMP SYSTEM	20/01/2017
2	FORWARDING PUMP SYSTEM	20/01/2017
3	FORWARDING PUMP SYSTEM	20/01/2017
4	FORWARDING PUMP SYSTEM	20/01/2017
5	FORWARDING PUMP SYSTEM	20/01/2017

NO.	DESCRIPTION	DATE
1	FORWARDING PUMP SYSTEM	20/01/2017
2	FORWARDING PUMP SYSTEM	20/01/2017
3	FORWARDING PUMP SYSTEM	20/01/2017
4	FORWARDING PUMP SYSTEM	20/01/2017
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3	FORWARDING PUMP SYSTEM	20/01/2017
4	FORWARDING PUMP SYSTEM	20/01/2017
5	FORWARDING PUMP SYSTEM	20/01/2017

MEASUREMENTS			
MEASUREMENTS	MEASUREMENTS	MEASUREMENTS	MEASUREMENTS
MEASUREMENTS	MEASUREMENTS	MEASUREMENTS	MEASUREMENTS
MEASUREMENTS	MEASUREMENTS	MEASUREMENTS	MEASUREMENTS
MEASUREMENTS	MEASUREMENTS	MEASUREMENTS	MEASUREMENTS

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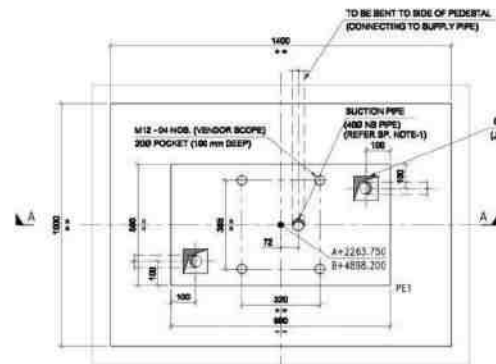
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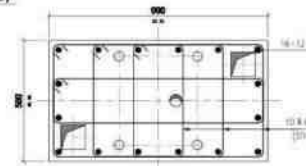
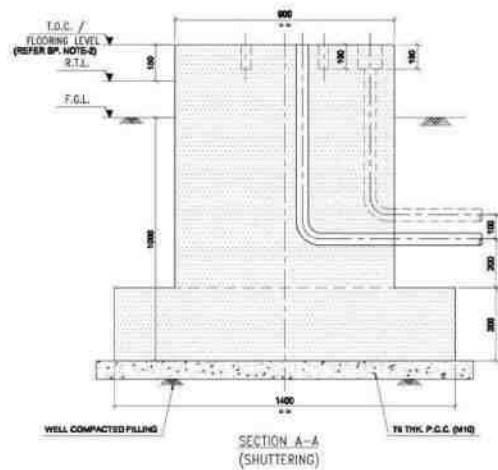
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3	FORWARDING PUMP SYSTEM	20/01/2017
4	FORWARDING PUMP SYSTEM	20/01/2017
5	FORWARDING PUMP SYSTEM	20/01/2017



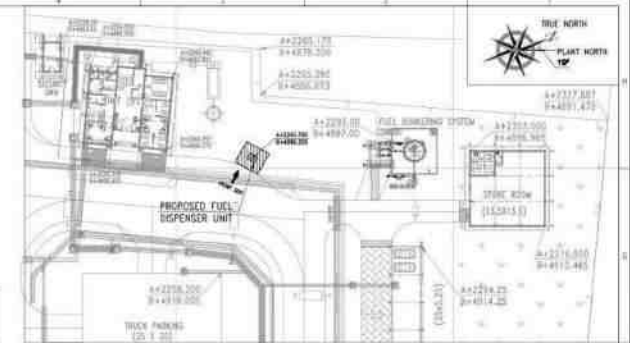
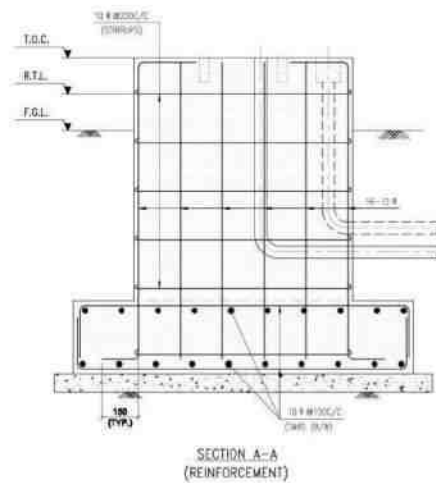
1500-H080-8000-00000Y-000H-505E



FRONT SIDE  
PLAN DETAIL OF F1



PLAN DETAIL OF PE1  
(REINFORCEMENT)



KEY PLAN

CHECKED & FOUND O.K.

ASSOCIATE PROFESSOR  
Applied Mechanics  
S. V. NATIONAL INSTITUTE OF TECHNOLOGY  
BURAT-355 007.

ASSISTANT PROFESSOR  
APPLIED MECHANICS DEPARTMENT  
S.V NATIONAL INSTITUTE OF TECHNOLOGY,  
SURAT - 395007

ASSISTANT PROFESSOR  
APPLIED MECHANICS DEPARTMENT  
S.V NATIONAL INSTITUTE OF TECHNOLOGY,  
SURAT - 395007

QUANTITY OF MATERIALS		
TYPE	GRADE	QUANTITY
B.C.C.	M20	1.05 M <sup>3</sup>
R.C.C.	M20	0.30 M <sup>3</sup>
	M10	55 kg
	10B	21 kg
	TOTAL	77 kg

SP. NOTE:-

1. PIPE SHALL BE Laid AS 45° PIPE SLOPE TO SUPPLY PIPE CONNECTIVITY/LOCAL MATERIAL AVAILABILITY AS PER PRACTICAL SITE CONDITION.
2. 100 THK. R.C.C. FLOORING (WITH HEAVY REINFORCEMENT AT 300 C/C STITCHES) OR SUFFICIENT WARE ALL AROUND DISPENSER UNIT TO BE DONE WITH RESPECT TO CLIENT REQUIREMENTS / PRACTICAL SITE CONDITION.

NOTES:-

1. 45.000M CORRESPONDING TO +3.300M CH FOR SITHM.
- F.F.L.-CORRESPONDING TO +0.000M (+3.30M CH)
- R.T.L.-CORRESPONDING TO -0.250M (+3.05M CH)
- F.G.L.-CORRESPONDING TO -0.450M (+2.85M CH)

- A. ALL DIMENSIONS & LEVELS ARE IN M.
- B. CONCRETE MIX FOR R.C.C. WORK SHALL BE M-20.
- C. REINFORCED REINFORCEMENT SHALL CORRESPOND TO IS-1786.
- D. LAY JOINTS FOR REINFORCEMENT SHALL BE 30 TIMES DIAMETER OF BARS.
- E. ALL 'S' BENDS OF REINFORCEMENT ARE 90° ONLY.
- F. BARS SHALL BE STAGGERED IN SUCH A MANNER THAT NOT MORE THAN ONE OF BARS ARE LAPPED AT ONE PARTICULAR SECTION.
- G. LAPPING SHALL BE PROVIDED BELOW COLUMN PIEDESTAL.
- H. DISCREPANCY IN DRAWING, IF ANY, SHALL BE PRESENT TO NOTIFY BY THE SITE ENGINEER/CONSULTING ENGINEER.
- I. SEE AT FOUNDATION LEVEL SHALL BE CONSIDERED AS IN PLAN.

THIS DRAWING IS MADE BASED ON VENDOR Dwg. NO. SD-1001001 (MODEL NO. P041111).

LEGEND:-

- F.G.L. - FINISHED GROUND LEVEL
- F.F.L. - FINISHED FLOOR LEVEL
- R.T.L. - ROAD TOP LEVEL
- T.O.C. - TOP OF CONCRETE
- 10B - TOP & BOTTOM
- 8/8 - BOTH SAYS

ALL APPLICABLE HSE STANDARDS & LOCAL REQUIREMENTS ARE CONSIDERED & OBSERVED.	NAME	DOE	DATE

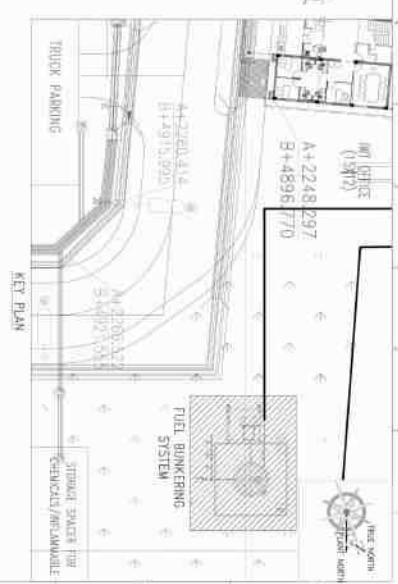
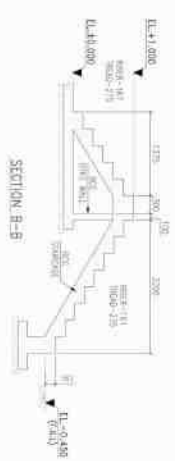
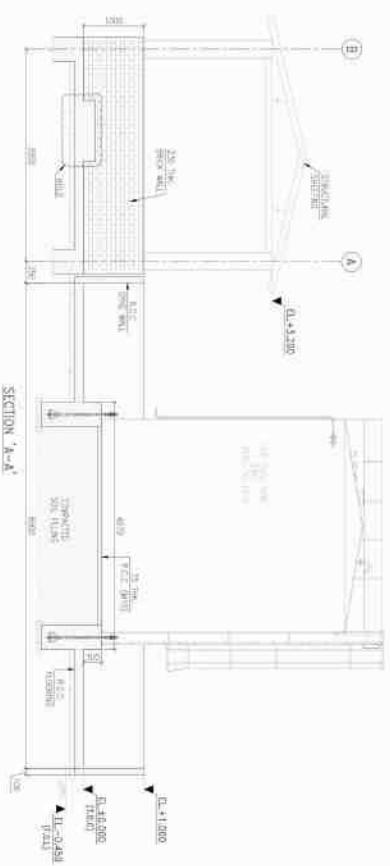
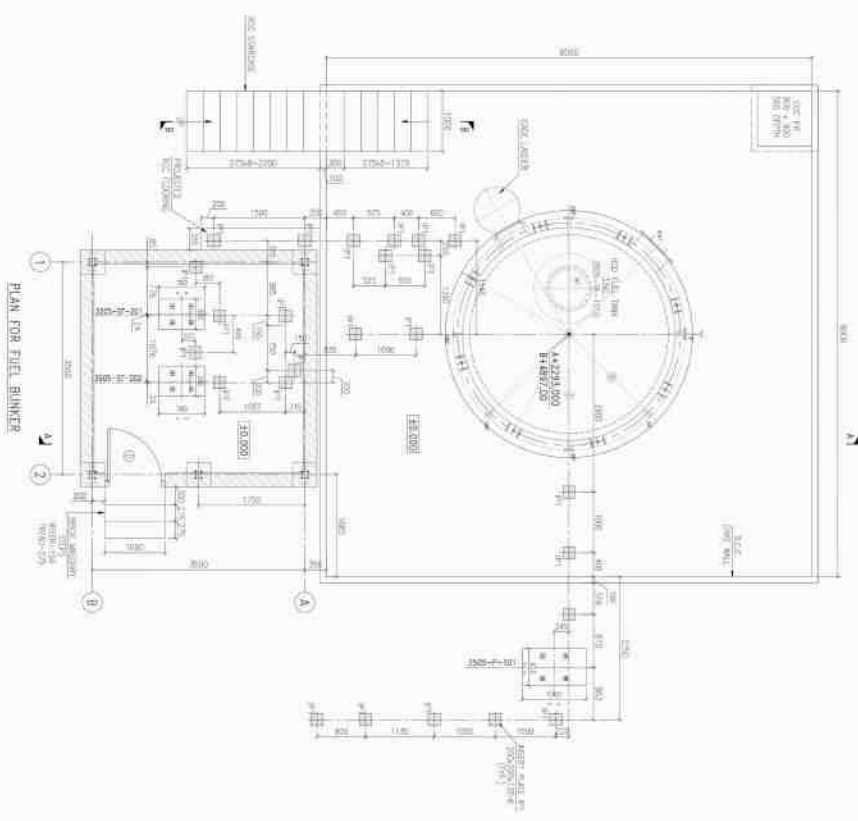
DATE	REVISIONS	BY	DATE

DATE	REVISIONS	BY	DATE

MEVA/INDIA-KALADAN MULTI-MODAL TRANSIT TRANSPORT PROJECT			
INLAND WATERWAYS AUTHORITY OF INDIA			
SCALE: 1:100	PLAN/JETTY	AREA: SITTING	
FOUNDATION DRAWING FOR FUEL DISPENSER UNIT - SITTING			
FILE: 3505-H000-A00000-0008-0804-0031	REV: 60		

SEE REMARKS & P. 002 FOR WORK. 0.002 FOR DESIGN. 0.002 FOR CONSTRUCTION. 0.002 FOR MATERIAL. 0.002 FOR...  
0.002 FOR MATERIAL. 0.002 FOR DESIGN. 0.002 FOR CONSTRUCTION. 0.002 FOR MATERIAL. 0.002 FOR...

FILE Scale: 1:10



THIS DRAWING IS BASED ON ASSUMPTIONS. SEE: 3505-000-283560-0003-0001 & 3505-000-283560-0003-0002-0001

1. ALL DIMENSIONS ARE IN METERS AND DECIMALS THEREOF.

2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

4. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

5. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

6. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

7. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

8. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

9. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

10. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

LEGEND:

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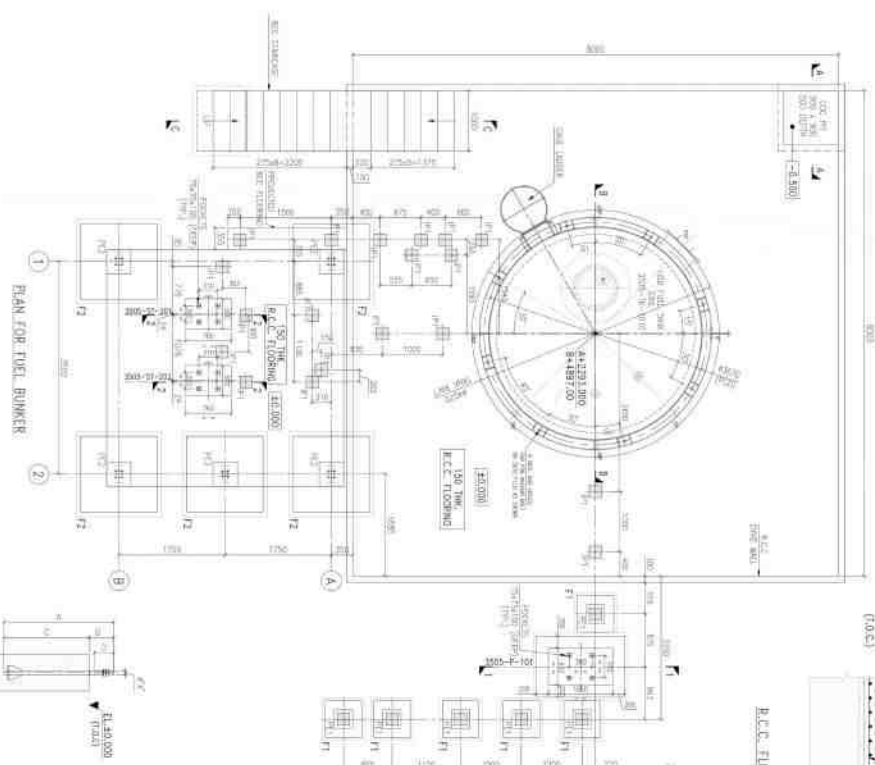
10. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

INDIAN WATERWAYS AUTHORITY OF INDIA

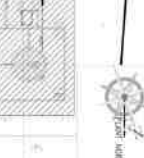
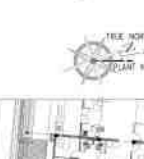
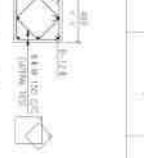
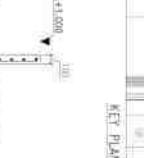
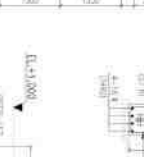
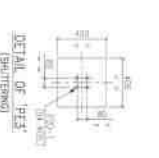
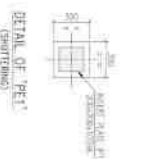
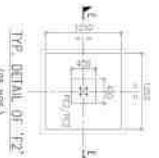
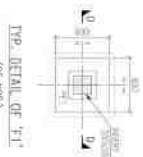
G.A. PLAN FOR FUEL BUNKERING SYSTEM AND PUMP HOUSE - SITHE

3505-000-283560-0003-0001

NO.	REVISION	DATE	BY	CHKD.
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				



COLUMN FOUNDATION BOLTS (TYPE = 1 & 2)											WEIGHT IN LBS.		AGGREGATE TYPE	NO. OF BOLTS	
BOLT #	BOLT DIA.	WASHER		FLUTE DIA.		STIFF. PL. DIA.		CONC. W/OUT WASHER, INCH #		CONC. W/IN WASHER, INCH #					
BOLT #1	1/2"	A	B	C	D	E	F	G	H	I	J	2.1	1	31	4.6
W/O.	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1	28	6.6
BOLT #2	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1	28	6.6
W/O.	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1	28	6.6
BOLT #3	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1	28	6.6
W/O.	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1	28	6.6
BOLT #4	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1	28	6.6
W/O.	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1	28	6.6



QUANTITY OF MATERIALS		
TYPE	GRADE	QUANTITY
REINFC	400	25.52 MT
WELLS	200 MM	17000 MM

1. The first step is to identify the problem. In this case, the problem is that the company is not meeting its sales targets.

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DETAIL OF INSERT PLATE			
DESCRIPTION	VIEW	QTY.	WEIGHT
81 750x350x12mm		25	44.02 Kg

Figure 1 consists of three technical drawings labeled (a), (b), and (c), each showing a rectangular specimen with dimensions 100 mm x 100 mm x 10 mm. Drawing (a) is labeled 'DETAIL OF "HEP" (HEAT-RESISTANT POLYETHYLENE)' and shows a specimen with a central hole of diameter 10 mm. Drawing (b) is labeled 'DETAIL OF "HEP" (SHUTTING) (OF HEP)' and shows a specimen with a central hole of diameter 10 mm. Drawing (c) is labeled 'DETAIL OF "HEP" (SHUTTING) (OF HEP)' and shows a specimen with a central hole of diameter 10 mm.

DETAIL OF R.C.C. DOOR WALL.

Figure 1 consists of three diagrams labeled (a), (b), and (c), showing details of the reinforcement in the test specimens. Diagram (a) shows a cross-section of the top reinforcement with dimensions 50x75 mm, 100 mm, and 150 mm, and a reinforcement bar labeled 'E-6.5N20'. Diagram (b) shows a cross-section of the bottom reinforcement with dimensions 100 mm, 150 mm, and 200 mm, and a reinforcement bar labeled 'E-6.5N20'. Diagram (c) shows a cross-section of the side reinforcement with dimensions 100 mm, 150 mm, and 200 mm, and a reinforcement bar labeled 'E-6.5N20'.

FLEK BINGKANG  
SISTEM



CHECKED &amp; FOUND O.K.



**ASSOCIATE PROFESSOR**  
Applied Mechanics Department  
S.V. National Institute of Technology  
SURAT-395 007.

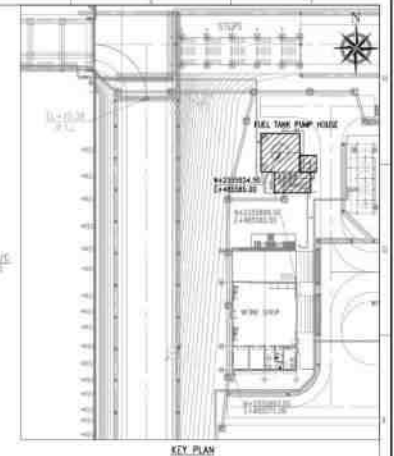
**ASSISTANT PROFESSOR**  
Applied Mechanics Department  
S.V. National Institute of Technology  
SURAT-395007

**ASSISTANT PROFESSOR**  
Applied Mechanics Department  
S.V. National Institute of Technology,  
SURAT - 395007

-0.350

DETAIL OF 'PE1'  
(SHUTTERING)  
(17 NOS.)DETAIL OF 'PE1'  
(REINFORCEMENT)DETAIL OF 'PE2' & 'PE4'  
(SHUTTERING)  
(05 NOS.)DETAIL OF 'PE3'  
(SHUTTERING)  
(01 NO.)

DETAIL OF 'PE2, 'PE3' &amp; 'PE4'

DETAIL OF 'PE10'  
(REINFORCEMENT)

KEY PLAN

TYP. DETAIL OF 'F1a'  
(01 NOS.)TYP. DETAIL OF 'F1'  
(17 NOS.)TYP. DETAIL OF 'F2'  
(04 NOS.)

BOLT DETAIL

TYP. DETAIL OF 'F3'  
(01 NO.)SECTION A-A  
(SHUTTERING)SECTION A-A  
(REINFORCEMENT)SECTION B-B  
(SHUTTERING)SECTION B-B & C-C  
(REINFORCEMENT)SECTION C-C  
(SHUTTERING)SECTION C-C  
(REINFORCEMENT)

QUANTITY OF MATERIALS		
TYPE	GRADE	QUANTITY
M.C.C.	M30	88.00 M <sup>3</sup>
P.C.C.	M10	81.00 M <sup>3</sup>
	120	180 kg
	100	90 kg
	80	150 kg
TOTAL		400 kg

N+2355916.650  
E+485579.065

FOUNDATION MARKING PLAN

THIS DRAWING IS MADE BASED ON ASSIGNMENT DRAWING :- 3539-ENG-PJWO-GNAGEN-FSP-PCD-0001 & 3539-ENG-PJWO-GNAGEN-FSP-DED-0001  
REV.03 MADE BASED ON: UNLOADING PUMP/PIPE SUPPORT DETAIL UPDATED AS PER VENDOR/PIPING DATA.(PUMP MODEL AS4195D)

NOTES:-

1. ALL DIMENSIONS ARE IN MM AND CORRECT TO 10.
2. CONCRETE WORK FOR P.C.C. SHALL BE DONE BY HAND.
3. CONCRETE WORK FOR M.C.C. SHALL BE DONE BY MACHINE.
4. ALL DIMENSIONS SHALL BE AS PER VENDOR/PIPING DATA.
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LEGEND

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CLEAR COVER TO MAIN REIN.

1. 25MM FOR SINGLE BOLT
2. 25MM FOR DOUBLE BOLT
3. 25MM FOR TRIPLE BOLT
4. 25MM FOR QUAD BOLT
5. 25MM FOR PENT BOLT
6. 25MM FOR HEX BOLT
7. 25MM FOR SEPT BOLT
8. 25MM FOR OCT BOLT
9. 25MM FOR NINE BOLT
10. 25MM FOR TEN BOLT
11. 25MM FOR ELEVEN BOLT
12. 25MM FOR TWELVE BOLT
13. 25MM FOR THIRTEEN BOLT
14. 25MM FOR FOURTEEN BOLT
15. 25MM FOR FIFTEEN BOLT
16. 25MM FOR SIXTEEN BOLT
17. 25MM FOR SEVENTEEN BOLT
18. 25MM FOR EIGHTEEN BOLT
19. 25MM FOR NINETEEN BOLT
20. 25MM FOR TWENTY BOLT
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96. 25MM FOR NINETY SIX BOLT
97. 25MM FOR NINETY SEVEN BOLT
98. 25MM FOR NINETY EIGHT BOLT
99. 25MM FOR NINETY NINE BOLT
100. 25MM FOR HUNDRED BOLT

MEAJNDA-KALADAN MULTI-MODAL TRANSIT TRANSPORT PROJECT  
INLAND WATERWAYS AUTHORITY OF INDIA

SCALE: 1:30 (PLAN) 1:30 (SECTION) 1:30 (DETAIL)

PROJECT: TWT TERMINAL (PALETWA)

TITLE: FOUNDATION MARKING PLAN &amp; DETAIL FOR FUEL BUNKERING SYSTEM-PALETWA

DRAWING NO: 3539-ENG-PJWO-GNAGEN-CIV-FOU-0002

REV: 04

P.T. Scale

