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Paradip Refinery
Power & Utilities Department
Electrical Maintenance

Date: 02.04.2024

Sub.: Approval for Proprietary Items – Electrical Maintenance (2024-25)

Paradip Refinery is the latest, largest and the most advanced refinery among the Indian Oil Refineries. It has a variety of very large rating machines installed in different process units. The electrical power system of Paradip Refinery consist of 6 nos. of generators (3 nos. of 102 MW GTG, 2 nos. of 30 MW STG, and 1 no. of 19 MW PRTG), three (03) nos. 66 KV Gas Insulated Switchgears (GIS), 24 nos. of electrical sub-stations, 36 nos. of 11 kV & 6.6 kV switchboards, 288 nos. of 415V switchboards, 280 nos. of transformers, 276 nos. of VFDs & soft starters to cater around 338 nos. of HT motors & around 3396 nos. of LT motors. Healthiness and trouble free operation of these equipment are essential for reliable and sustained operation of refinery at full capacity. To ensure reliability of these equipment and minimize their downtime, maintaining adequate spares at site is of paramount importance.

The electrical system at Paradip Refinery is broadly classified into following three categories:

1. HT& LT machines and equipment i.e., Generators, Motors, Switchgears & Transformers, MOVs etc.

2. Systems and devices based on microprocessors having complicated design including imported items i.e., PMS, VFDs, Soft starters, DAVR, Relays, UPS, Battery Chargers, CCTV, PIDS, Access Control System etc.

3. HVAC system includes large nos. of VAM, Package AC and air conditioning systems installed in different control rooms, SRRs, Operator shelters, UPS & VFD rooms and non-plant buildings.

4. Other critical equipment & systems i.e., Elevators, EOT cranes, Electrical Heat Tracing system, Communication Systems like TETRA, EPABX, PA/GA, Furnace Ignition System, Air Conditioning System, Cathodic Protection System, Clean Agent System, Solar Power Generation System, etc.

Spares of certain electrical equipment at IOCL, Paradip Refinery need to be procured through OEM, which is proprietary in nature due to following reasons:

a. Requirement of genuine spare parts from OEM for reliable operation of equipment taking into consideration criticality of the equipment. The system & its components have been designed by the OEM. Hence, the spares for the system can be manufactured and supplied as per original design for complete compatibility with the existing system and its components only by the OEM.

b. Absence of manufacturing procedure as well as dimensional drawing & details of spares. The manufacturing process & dimensional details of the systems & its components are available only with the OEM and hence, the spares of the system can be manufactured as per required original design only by the OEM.

c. The reliability of the electrical system & its components is critical for sustained operation of the equipment & plant. Hence, to ensure reliability of the system, there is a requirement of genuine spare parts of the existing system which can be sourced only from the OEM.

In view of above, there is no technically feasible & plausible alternative but to procure the spares/ components of the system from the OEM.

Approval for Proprietary Items list for the year 2023-24 was taken from competent authority which is attached herewith as **Annexure-I** for reference. The subject list is reviewed and updated for the year 2024-25, taking into account changes in name of OEM (due to merger/acquisition), deletion of incorrect/ incomplete OEM name & inclusion of new OEMs for newly commissioned (ROG-PSA, KHDS) units/ equipment. Updated list of Proprietary Items for the year 2024-25 of Electrical Maintenance after review is enclosed as **Annexure-A**.

Changes in the updated list are summarized as below:

1) Six (06) nos. of new OEMs have been added in the list (refer **Annexure-A Table-B**). Area wise breakup of newly added OEMs details mentioned in **Annexure-II.**

2) Eleven (11) nos. of Authorized distributor(s) names have been deleted as per Cl. No. 3.10.9.3.3 of Integrated Materials Manual (copy attached herewith for reference). Names of the same have been mentioned in **Annexure-III**.

3) No name change of OEM has been done in the list.

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Total nos. of listed OEMs/ Authorized Distributor(s) in the approved proprietary item list for 2023-24 were Hundred and Eighty Eight (488).

After considering the above changes, ***total nos. of OEMs in proprietary item list for the year 2024-25 is Four Hundred and Eighty Three (483).*** Supporting documents for ***OEM have been attached as Annexure-IV.***

In view of above, the proposal for procurement of items & components from OEMs on Proprietary Item basis for the year 2024-25 is put up for approval of Competent Authority after finance concurrence as per Clause no. 3.10.9.3.2 of Integrated Materials Manual (copy attached herewith for reference). A

Put up for kind approval please.

A Patnaik 02/04/24
Ayeswarya Patnaik
ELE

- **SMNMEL** 03.04.2024 (SUDESH-N)
- **DGM(MN-EL)** S.Nanda 03/04/2024
- **GM (P&U, Inst)** Rajiv Sood 04/04/2024
- **'F': For concurrence please.** The Proposal marked 'A' above for the FY 2024-25 is concurred for approval of CGM(P&U, Inst) as per IMM Manual Clause No. 3.10.9.3.2 in conjuction with Approval Matrix Sl. No. 48 (ii).
- **CGM (P&U, Inst): For kind approval please.** Siddhu 12/04/2024

12/04/2024
DGM(F)

ANNEXURE-A

List of Proprietary spares of Electrical Maintenance: 2024-25

A.(Continuation of Last year approved vendors for proprietary spares)

ANNEXURE-A Table-A

S.No.	Name of Item	Sub Serial No.	OEM	OEM/Distributor	Reason for Proprietary	Authorisation Letter from OEM for Providing Items	Validity date of Authorization Letter
1	DAVR & Excitation Panels	a	Bharat Heavy Electricals Limited (BHEL)	Bharat Heavy Electricals Limited (BHEL)	OEM		
		b	ABB India ltd.	ABB India ltd.	OEM		
		c	NIDEC-ASI S.p.A.	NIDEC-ASI S.p.A.	OEM		
		d	Basler Electric company	Basler Electric company	OEM		
		e	GE India Industrial Pvt. Ltd.	GE India Industrial Pvt. Ltd.	OEM		
		f	Rockwell Automation India Pvt. Ltd.	Rockwell Automation India Pvt. Ltd.	OEM		
		g	Pepperl+Fuchs (India) Pvt. Ltd.	Pepperl+Fuchs (India) Pvt. Ltd.	OEM		
		h	Larsen & Toubro Limited	Larsen & Toubro Limited	OEM		
		i	Mersen India Pvt Ltd	Mersen India Pvt Ltd	OEM		
		j	Cooper Bussmann, India, Pvt. Ltd.	Cooper Bussmann, India, Pvt. Ltd.	OEM		
		k	Basler Electric (Suzhou) Co., Ltd	Basler Electric (Suzhou) Co., Ltd	OEM		
2	Power Management System	a	Schneider Electric Infrastructure Limited	Schneider Electric Infrastructure Limited	OEM		
		b	SAN TELEQUIP PVT.LTD	SAN TELEQUIP PVT.LTD	OEM		
		c	KYLAND TECHNOLOGY CO., LTD.	KYLAND TECHNOLOGY CO., LTD.	OEM		
		d	HMS Industrial Networks India Private Ltd.	HMS Industrial Networks India Private Ltd.	OEM		
		e	Hirschmann Automation and Control Ltd.	Hirschmann Automation and Control Ltd.	OEM		
		f	Advantech Industrial Computing India Pvt. Ltd	Advantech Industrial Computing India Pvt. Ltd	OEM		
		g	Moxa India Industrial Networking Private Ltd	Moxa India Industrial Networking Private Ltd	OEM		
		h	Siemens Limited	Siemens Limited	OEM		
3	ECS	a	Bharat Heavy Electricals Limited (BHEL)-EDN	Bharat Heavy Electricals Limited (BHEL)-EDN	OEM		
4	UPS	a	Vertiv Energy Private Limited (Formerly Emerson Network Power (India) Pvt Ltd.)	Vertiv Energy Private Limited (Formerly Emerson Network Power (India) Pvt Ltd.)	OEM		
		b	Hitachi Hi-Rel Power Electronics Pvt. Ltd.	Hitachi Hi-Rel Power Electronics Pvt. Ltd.	OEM		
		c	Novateur Electrical & Digital System Pvt. Ltd.	Novateur Electrical & Digital System Pvt. Ltd.	OEM		
		d	Kraus & Naimer Pte. Ltd.	Kraus & Naimer Pte. Ltd.	OEM		
		e	GE Power Controls India Pvt. Ltd.	GE Power Controls India Pvt. Ltd.	OEM		
		f	Cooper Bussmann, India, Pvt. Ltd.	Cooper Bussmann, India, Pvt. Ltd.	OEM		
		g	Eaton Power Quality Pvt Ltd	Eaton Power Quality Pvt Ltd	OEM		
		h	Datsons Electronics Pvt. Ltd.	Datsons Electronics Pvt. Ltd.	OEM		
		i	Fuji Electric Consul Neowatt Pvt. Ltd.	Fuji Electric Consul Neowatt Pvt. Ltd.	OEM		
5	Battery & Battery Charger	a	HBL Power Systems Ltd.	HBL Power Systems Ltd.	OEM		
		b	Servilink Engineers Pvt Ltd.	Servilink Engineers Pvt Ltd.	OEM		
		c	Chhabi Electricals Private limited	Chhabi Electricals Private limited	OEM		
		d	Chloride Power Systems and Solutions Ltd.	Chloride Power Systems and Solutions Ltd.	OEM		
		e	Amara Raja Power Systems Ltd.	Amara Raja Power Systems Ltd.	OEM		
		f	Exide Industries Ltd.	Exide Industries Ltd.	OEM		
		g	Universal Instruments Manufacturing Company Private Limited	Universal Instruments Manufacturing Company Private Limited	OEM		
		h	Mass-Tech Controls Pvt. Ltd	Mass-Tech Controls Pvt. Ltd	OEM		
		i	Saft India Private Limited (Formerly AMCO Saft India Private Limited)	Saft India Private Limited (Formerly AMCO Saft India Private Limited)	OEM		
		j	Amara Raja Batteries Limited	Amara Raja Batteries Limited	OEM		
6	VFD & Soft Starter	a	NIDEC-ASI S.p.A.	NIDEC-ASI S.p.A.	OEM		
		b	Innovative Technomics Pvt. Ltd.	Innovative Technomics Pvt. Ltd.	OEM		
		c	ABB India Ltd.	ABB India Ltd.	OEM		
		d	Siemens Ltd.	Siemens Ltd.	OEM		
		e	Control Techniques India Pvt. Ltd.	Control Techniques India Pvt. Ltd.	OEM		
		f	Danfoss Industries Pvt Ltd	Danfoss Industries Pvt Ltd	OEM		
		g	Yaskawa India Private Limited	Yaskawa India Private Limited	OEM		
		h	GE Automation & Controls	GE Automation & Controls	OEM		
		i	Larsen & Toubro Limited	Larsen & Toubro Limited	OEM		
		j	WAGO Private Limited	WAGO Private Limited	OEM		
		k	Ace Engineering Industries	Ace Engineering Industries	OEM		
		l	Transpower Electronics	Transpower Electronics	OEM		
		m	Sagaon Energy Equipment Pvt. Ltd.	Sagaon Energy Equipment Pvt. Ltd.	OEM		
		n	Phoenix Mecano India Pvt.Ltd..	Phoenix Mecano India Pvt.Ltd.	OEM		
		o	Sri Venkateshwara Electronics and Allied Products	Sri Venkateshwara Electronics and Allied Products	OEM		

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S.No.	Name of Item	Sub Serial No.	OEM	OEM/Distributor	Reason for Proprietary	Authorisation Letter from OEM for Providing Items	Validity date of Authorization Letter
13	PA/GA System	a	Neumann Elektronik GmbH (Formerly jm Neumann Elektronik GmbH)	Neumann Elektronik GmbH (Formerly jm Neumann Elektronik GmbH)	OEM		
		b	Industrie-Electronic GmbH & Co. KG	Industrie-Electronic GmbH & Co. KG	OEM		
14	TETRA	a	Motorola Solutions India Private Limited	Motorola Solutions India Private Limited	OEM		
15	Cable Fault Locator	a	Megger India Pvt. Ltd.	Megger India Pvt. Ltd.	OEM		
		b	Techno Instrumentation (India) Pvt Ltd.	Techno Instrumentation (India) Pvt Ltd.	OEM		
16	Cathodic Protection System	a	Corrtech International Pvt. Ltd.	Corrtech International Pvt. Ltd.	OEM		
		b	Advance Electronic System	Advance Electronic System	OEM		
		c	Raychem RPG Pvt. Ltd.	Raychem RPG Pvt. Ltd.	OEM		
		d	Furnace Fabrica (India) Ltd	Furnace Fabrica (India) Ltd	OEM		
17	MOVs/Actuators	a	Rotork Controls (India) Private Limited	Rotork Controls (India) Private Limited	OEM		
		b	Auma India Private Limited	Auma India Private Limited	OEM		
		c	Emerson Process Management,India	Emerson Process Management,India	OEM		
		d	Adams Armaturen, India	Adams Armaturen, India	OEM		
		e	Limitorque India Limited	Limitorque India Limited	OEM		
		f	Applied technology & management consultancy	Applied technology & management consultancy	OEM		
		g	Pentair Plc (formerly known as Biffi)	Pentair Valves & Controls India Pvt Ltd.	OEM		
		h	Flowserve Limitorque	Flowserve Limitorque	OEM		
		i	Flowserve India Controls Pvt Ltd	Flowserve India Controls Pvt Ltd	OEM		
		j	Marsh Automation Pvt. Ltd.	Marsh Automation Pvt. Ltd.	OEM		
18	Diesel Generator	a	Wärtsilä India Private Limited	Wärtsilä India Private Limited	OEM		
		b	ABB India Ltd.	ABB India Ltd.	OEM		
		c	JAKSON Engineers Ltd.	JAKSON Engineers Ltd.	OEM		
		d	Kirloskar Oil Engines Ltd.	Kirloskar Oil Engines Ltd.	OEM		
		e	CUMMINS India Ltd.	CUMMINS India Ltd.	OEM		
		f	Mahindra Powerol Ltd.	Mahindra Powerol Ltd.	OEM		
19	Precision AC	a	Vertiv Energy Private Limited (Formerly Emerson Network Power (India) Pvt Ltd.)	Vertiv Energy Private Limited (Formerly Emerson Network Power (India) Pvt Ltd.)	OEM		
		b	Stulz-Chspl (India) Pvt. Ltd.	Stulz-Chspl (India) Pvt. Ltd.	OEM		
20	Electric Heat Tracer	a	Thermon Heat Tracers Pvt Ltd.	Thermon Heat Tracers Pvt Ltd.	OEM		
		b	Raychem RPG Pvt. Ltd.	Raychem RPG Pvt. Ltd.	OEM		
		c	Xicon International Ltd.	Xicon International Ltd.	OEM		
21	HT/LT Motors (including PP)	a	Bharat Heavy Electricals Limited (BHEL)	Bharat Heavy Electricals Limited (BHEL)	OEM		
		b	CG Power and Industrial Solutions Limited	CG Power and Industrial Solutions Limited	OEM		
		c	Kirloskar Electric Company Limited	Kirloskar Electric Company Limited	OEM		
		d	NIDEC-ASI S.p.A.	NIDEC-ASI S.p.A.	OEM		
		e	Siemens Ltd.	Siemens Ltd.	OEM		
		f	Westchester County Electric Inc.	Westchester County Electric Inc.	OEM		
		g	ABB India Ltd.	ABB India Ltd.	OEM		
		h	Kishor Pumps Pvt. Ltd.	Kishor Pumps Pvt. Ltd.	OEM		
		i	Remi Elektrotechnik Ltd., India	Remi Elektrotechnik Ltd., India	OEM		
		j	CEMP SRL, Italy	Marathon Electric Motors (India) Limited (CEMP srl and Marathon Electric are part of Regal Beloit Corporation)	OEM		
		k	Bharat Bijlee Ltd.	Bharat Bijlee Ltd.	OEM		
		l	WEG Electric India Private Limited	WEG Electric India Private Limited	OEM		
		m	GE India Industrial Pvt. Ltd.	GE India Industrial Pvt. Ltd.	OEM		
		n	Marathon Electric Motors (India) Limited	Marathon Electric Motors (India) Limited	OEM		
		o	KSB Pumps Limited	KSB Pumps Limited	OEM		
		p	Baldor Reliance(Member of ABB group)	Baldor Reliance(Member of ABB group)	OEM		
		q	BHEL-GE Gas Turbine Services Pvt. Ltd. (BGGTS)	BHEL-GE Gas Turbine Services Pvt. Ltd. (BGGTS)	OEM		
		r	Elgi Equipments Limited	Elgi Equipments Limited	OEM		
		s	Robert Birkenbeul Gmbh & Co. KG	Robert Birkenbeul Gmbh & Co. KG	OEM		
		t	GE Power Conversion India Pvt. Ltd.	GE Power Conversion India Pvt. Ltd.	OEM		
		u	Laxmi Hydraulics Pvt. Ltd,India.	Laxmi Hydraulics Pvt. Ltd,India.	OEM		
		v	Wolong EMEA (Germany) GmbH (for ATB Nordenham brand motors)	Wolong EMEA (Germany) GmbH (for ATB Nordenham brand motors)	OEM		
		w	SEW Eurodrive India pvt. Ltd.	SEW Eurodrive India pvt. Ltd.	OEM		
		x	Mehta Industries, Bhopal	Mehta Industries,Bhopal	OEM		
		y	Precision Engineering Works (PEW)	Precision Engineering Works (PEW)	OEM		
		z	EPC Electrical private limited,Calcutta	EPC Electrical private limited,Calcutta	OEM		
		aa	Bonfiglioli India (Bonfiglioli Transmissions Private Limited)	Bonfiglioli India (Bonfiglioli Transmissions Private Limited)	OEM		

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इंजीनियर्स इंडिया लिमिटेड ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

DATA SHEET
HIGH VOLTAGE SQUIRREL CAGE INDUCTION MOTOR

Datasheet No.

PURCHASER's DATA

A.	Site conditions	BHEL W.O. 40096A401-21 REV 0 DTD. 09.05.11			
1	Ambient temperature, minimum:	°C	3	Atmospheric condition:	DUSTY, CORROSIVE
	maximum:	°C	4	Altitude:	3.91 m above sea level
	design:	45 °C	5	Location:	IOCL PARADIP
2	Relative humidity:	%	6		
B.	**Technical particulars**				
1	Motor tag no.:	—	17	Hazardous area classification:	SAFE
2	Driven equipment name:	HRSG MT PUMP	18	Gas group:	NA
3	Voltage:	6.6 KV +- 6 %	19	Type of explosion protection:	NA
4	Phase:	Three	20	Type of ingress protection:	IP 55
5	Frequency:	50 Hz ± 3%	21	Reacceleration:	Required
6	Fault level:	40 KA	22	Diff. protection CTs:	Not Required
7	Fault duration:	0.25 Sec		CT specs.:	
8	Method of starting:	DOL	24	Color shade:	RAL5021
9	Winding connection:	Star	25	Thermisters:	No
10	No. of terminals:	6	26	RTD:	Required
11	Cable size:	1 x 3Cx240 ~~3Cx185~~, 6.6KV(UE)	27	BTD:	Required
12	Cable type:	Al. cond. XLPE insulated	28	RTD/BTD monitoring device:	Not Required
13	Temperature rise:	75 °C	29	Applicable specification:	6-51-31 Rev 4
14	Cooling:	TETV	30	System earthing :	Resistance earthed
15	Insulation class:	F (temp rise limited to class B)			
16	Duty Cycle	S1			

DRIVEN EQUIPMENT MANUFACTURER's DATA

1	Suggested motor rating:	400 kW	9	Coupling type:	Flexible
2	Manufacturer:	BPCL NAINI	10	Torque required, starting:	26 mkg
3	Type of driver mounting:	HORIZONTAL	11	maximum:	132 mkg
4	Driven equipment:	PUMP	12	GD^2 of equipment	3.65 kgm^2
5	Shaft kW:	kW			kgm^2
6	kW at maximum load:	kW	13	Maximum thrust:	NA kg
7	Speed:	2960.00 RPM	14	Pulsation rate:	NA
8	Rotation of eqpt. from coupling end:	CW	15	Starting condition:	OPEN VALVE

MOTOR MANUFACTURER's DATA

1	Rating:	400	17	Space heater - voltage & power:	240 V / 630 W
2	Manufacturer:	BHEL BHOPAL	18	Moment of inertia, GD^2:	36 kgm^2
3	Frame designation:	1LA7566-2	19	DE/NDE brg type & no.:	NU219M+6219C3/NU216M
4	No. of poles:	2	20	Type of lubrication:	GREASE
5	Full load speed:	2960 RPM	21	Type of main terminal box:	PSTB
6	Mounting:	HORIZONTAL	22	Type of neutral terminal box:	PSTB
7	Full load torque (FLT):	132 mkg	23	Weight of motor:	3900 kg
8	Starting torque:	70 % of FLT	24	Thermisters, quantity:	NA no.
9	Break down or pull out torque:	225 % of FLT		make: type:	NA
10	Full load current (FLC):	41 A	25	RTD, quantity:	12 no.
11	Starting current at 100% voltage:	500% FLC including +ve tol.		make: type:	SIMPLEX
12	Rotation viewed from coupling end:	ACW	26	BTD, quantity:	2 no.
13	Starting time at80%/100% voltage:	11.6 / 4.7 sec.		make: type:	DUPLEX
14	Locked rotor withstand time (cold/hot) at,		27	Shaft voltage:	Below 250 mV
	80% voltage:	31 / 23 sec.	28	Critical speed, 1st/2nd stage:	ABOVE 3800 RPM
	100% voltage:	20 / 15 sec.	29	Pressurization panel:	○ Applicable ◉ Not applicable
15	Efficiency at 75%/100% voltage:	94.6 / 94.8 %		make: type:	NA
16	P.F. at starting/75%/100% load	0.16 / 0.89 / 0.90	30	Canopy: (GRP)	No

1. Recommended list of maintenance spares for two years operation shall include following as minimum.
a) Bearing De/NDE - one set b) Terminal box cover with screws c) Cooling fan
d) Insulator/terminal block for terminal boxes e) Bearing assembly (DE/NDE)
2. Starting time calculations shall be based on operating conditions specified in material requisition e.g., open valve condition / closed valve condition at no load/ under load as applicable.
3. All commissioning spares and special tools and tackles required for the motor shall be suplied with motor without extra cost
4. Canopy not in BHEL Bhopal scope.

Issued with MR

Rev.	Date	Purpose	Prepared	Checked	Approved

Atmospheric condition	Altitude	Location
Humid & highly corrosive	< 1000 m	Outdoor
	> 1000 m	Indoor

Voltage	Voltage	Duty	Fault level	Starting method	Earthing	No.of terminals
3.3 kV	±6%	Continuous	20 kA	D.O.L.	Direct	3
6.6. kV	±10%		25 kA	V.S.D.	Resistance	4
11 kV			40 kA	Star-delta		6
			N.A.	Auto transformer		

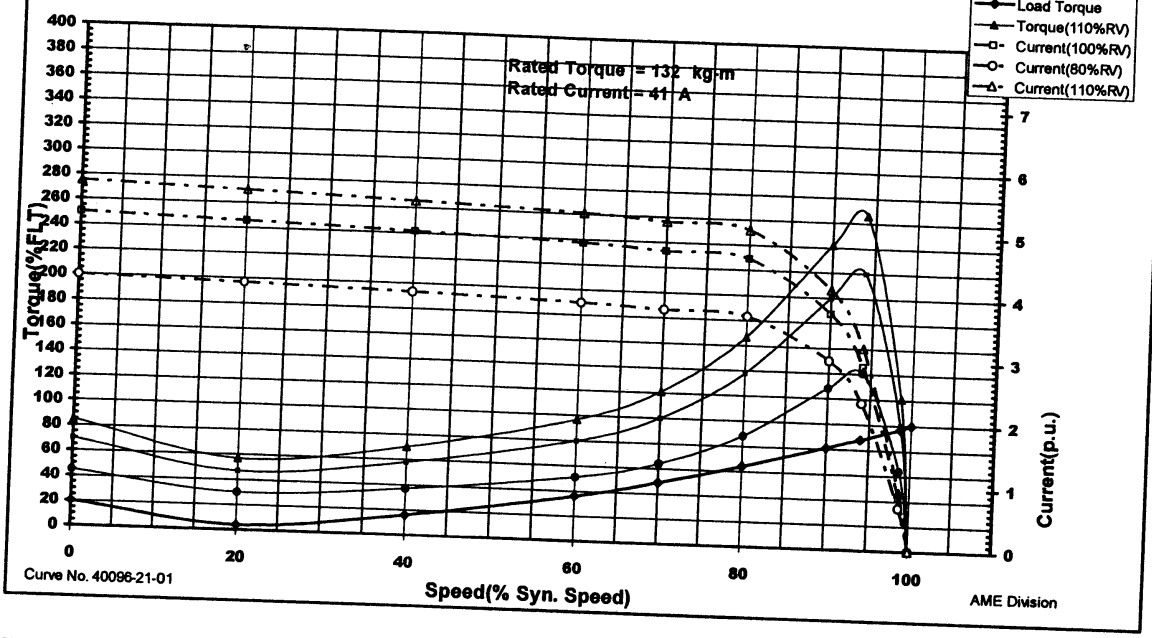
	Insulation Class		Area Class	Gas group	Area Classification	IP
	B		Zone 1	IIA	Ex(n)	IP 23
	F		Zone 2	IIB	Ex(e)	IP 44
	H		Divn. 1	IIC	Ex(d)	IP 55
	C		Divn. 2	IIB/IIC		
				A		
				B		
				C		
				D		

Std. Spec.	color		RTD/BTD
EIL spec. 6-51-0031	631 as per IS 5	C&D	Not applicable

Frequency	Frequency2	Cooling	Cable Type
±3%	50 Hz	IC401	Al. cond. XLPE insulated
±5%	60 Hz	IC511	Cu. cond. XLPE insulated
		IC611	

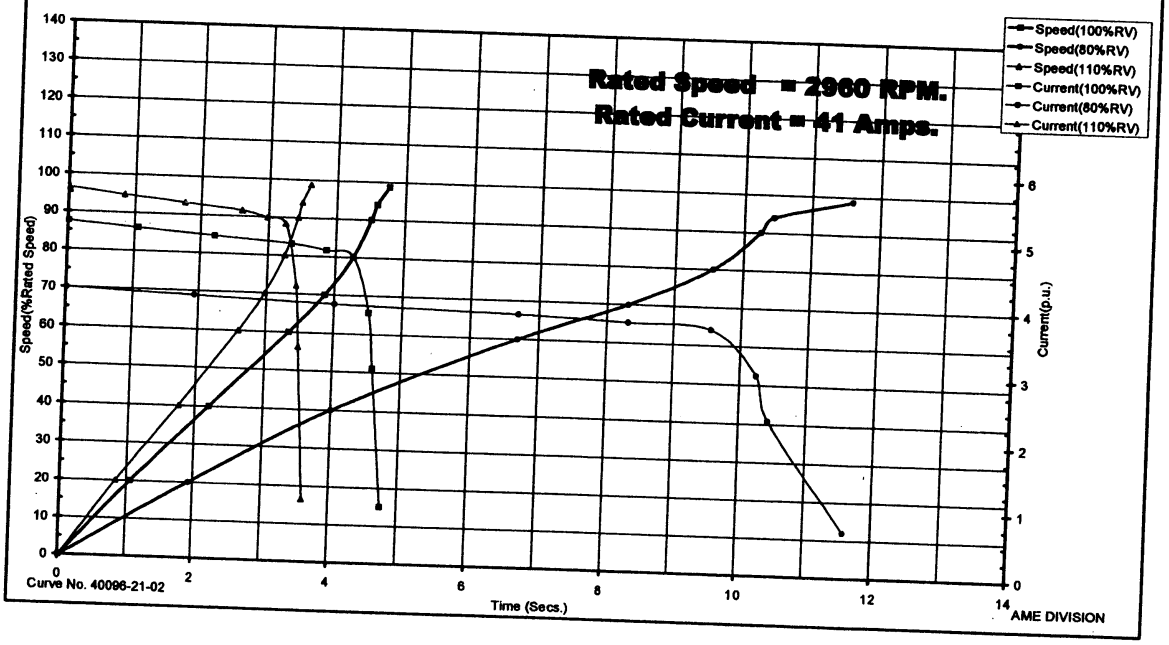
Torque & Current Vs Speed Curves

Rating : 400 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7566-2
W.O.No. : 40096A401-21
Customer : M/S IOCL FOR 350 MW PARADIP CCPP



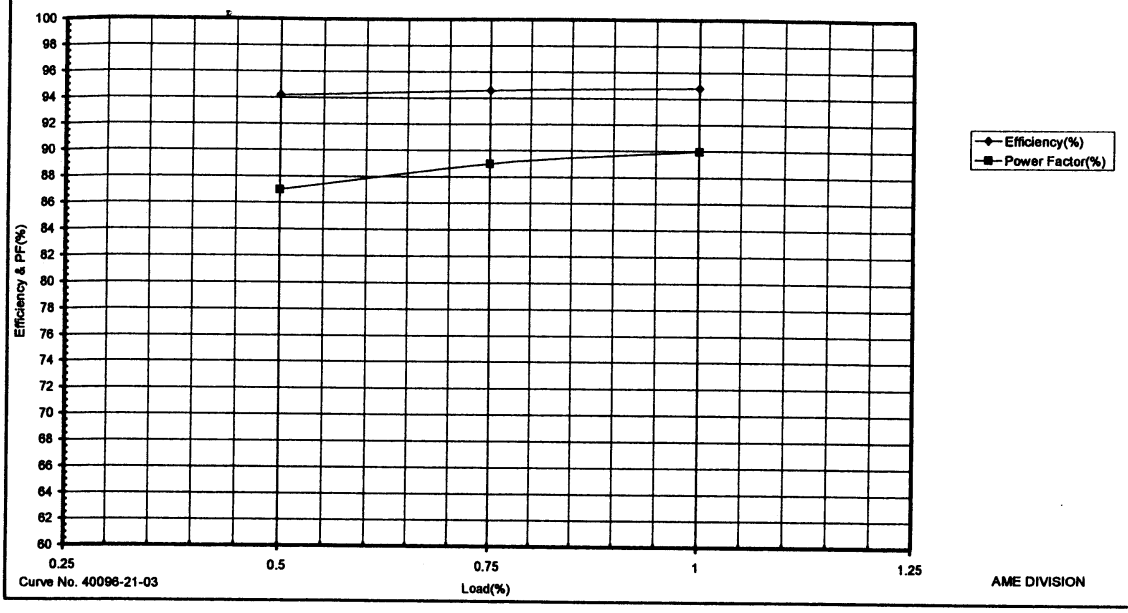
Speed & Current Vs Time Curves

Rating : 400 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7566-2
W.O.No. : 40096A401-21
Customer : M/S IOCL FOR 350 MW PARADIP CCPP



Efficiency, PF Vs Load Curves

Rating : 400 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7566-2
W.O.No. : 40096A401-21
Customer : M/S IOCL FOR 350 MW PARADIP CCPP

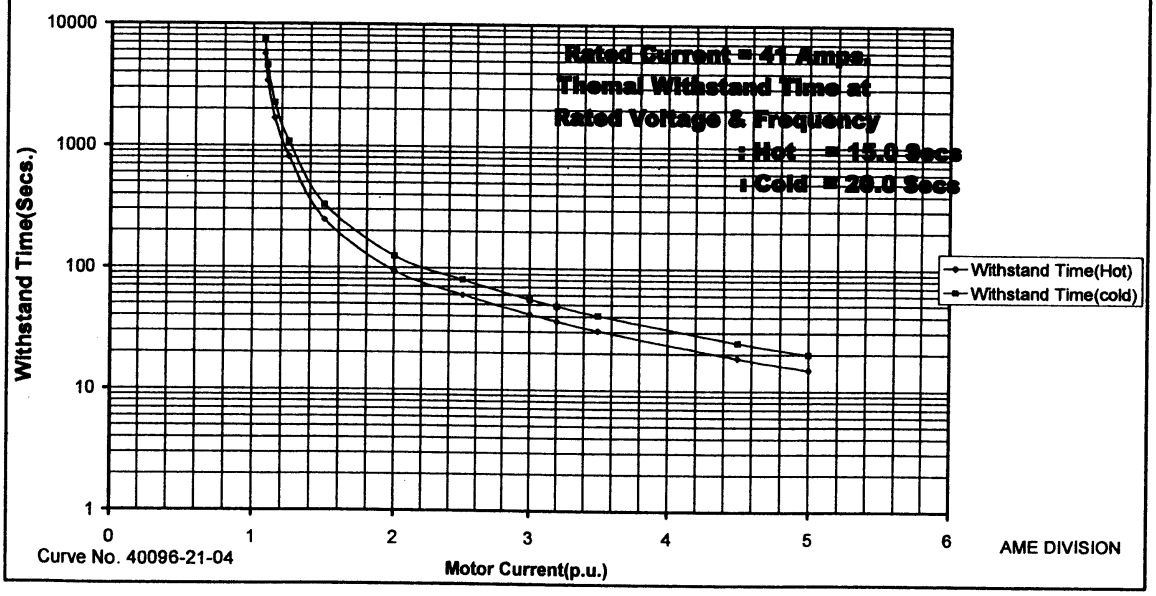


Curve No. 40096-21-03

AME DIVISION

Thermal Withstand Curves

Rating : 400 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7566-2
W.O.No. : 40096A401-21
Customer : M/S IOCL FOR 350 MW PARADIP CCPP



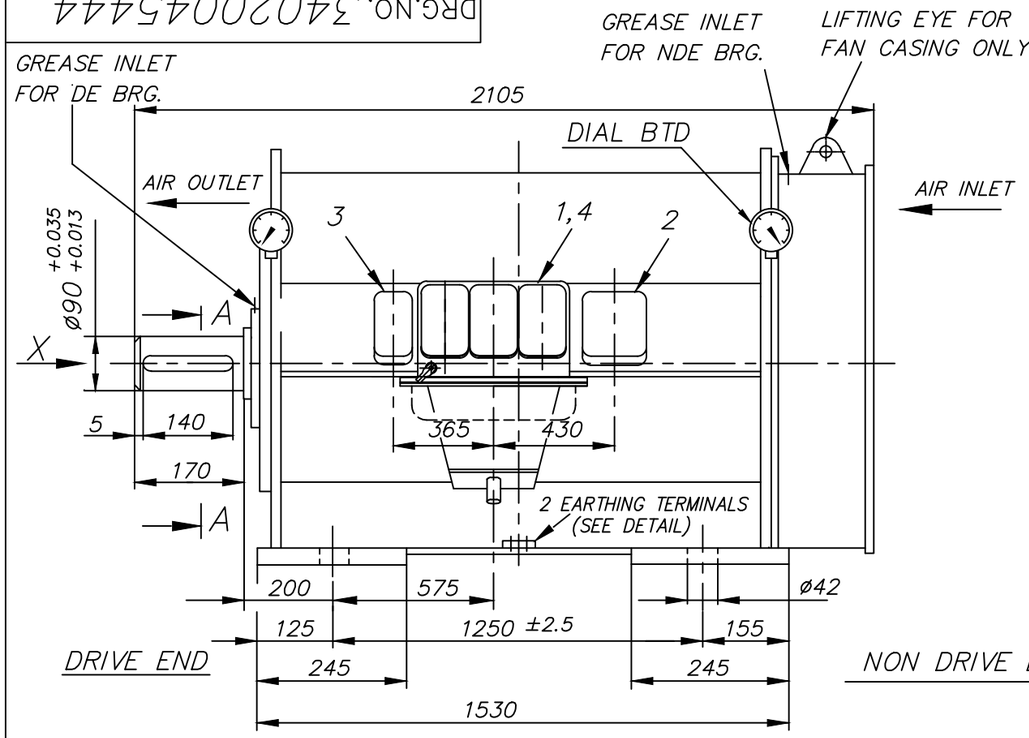
Curve No. 40096-21-04

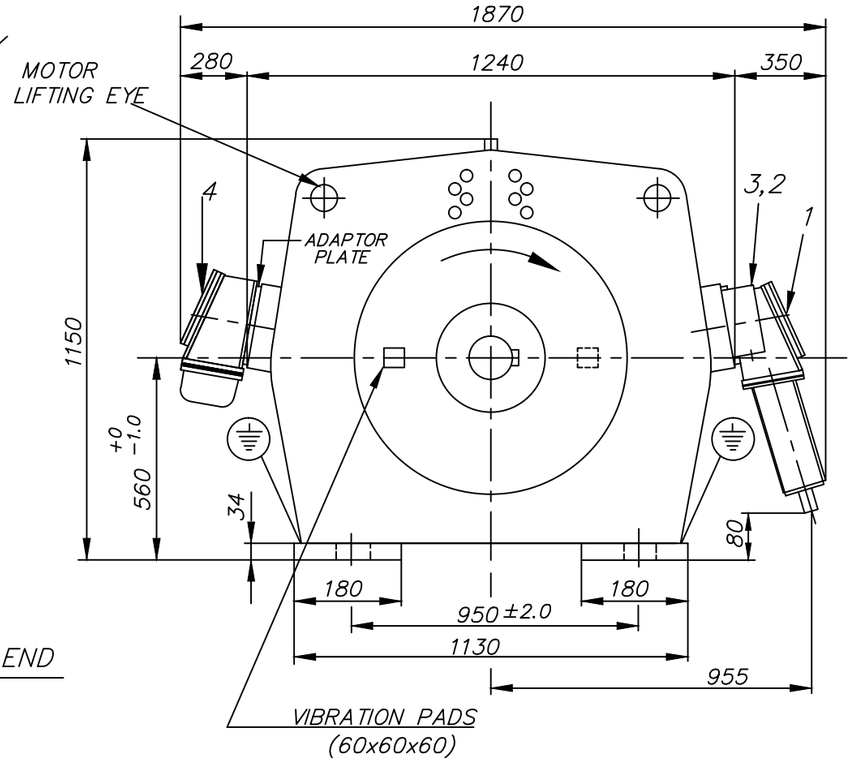
AME DIVISION

FIRST ANGLE PROJECTION

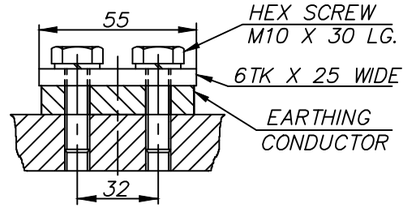
(ALL DIMENSIONS ARE IN mm)

DRG.NO. 34020045444

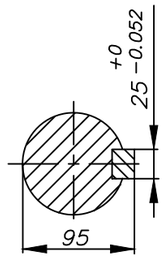




VIEW 'X'



DETAIL OF EARTHING ARRGT.



SECTION AT A-A

TECHNICAL DATA

RATING	400	kW
SPEED	2960	rpm
FULL LOAD AMP STATOR	41	AMP
VOLTAGE 3 PHASE 50 Hz	6600	VOLTS
APPROX WEIGHT OF MOTOR	3900	kg
APPROX. WEIGHT OF ROTOR	685	kg
GD 2 OF ROTOR	36	kgm 2
MAX. FOUNDATION LOADING (ALTERNATING) PER MOTOR LONGITUDINAL SIDE	0 kN UPWARDS 37 kN DNWARDS	
BEARINGS : DE NDE (HSG. INSULATED)	NU219M+6219C3 NU216M	
LUBRICATION: GREASE	SERVOGEM – 3 OR EQUIVALENT	
DIRECTION OF ROTATION VIEWED FROM DE	CLOCKWISE	
PAINT SHADE SPECIFICATION	RAL 5021	

REF. DRG. NO.

11.11.11 SIGN. & DATE

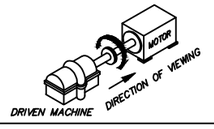
MOTOR FITMENTS

(I) TERMINAL BOXES FOR
1 – STATOR 34020045444 SH–2
2 – ETD'S+BTD'S 34020045444 SH–3
3 – SPACE HEATERS 34020045444 SH–4
4 – NEUTRAL POINT 34020045444 SH–5

(II) TEMPERATURE SENSORS
(A) WDG. ETD'S 12 Nos , 3 WIRES , SIMPLEX , PT. TYPE, 100 Ω AT 0°C
(B) BRG. RTD'S 2 Nos , 4 WIRES, DUPLEX , PT. TYPE, 100 Ω AT 0°C
(C) 2–NOS. DIAL BTD (1–EACH FOR DE & NDE BRGS.)

(III) OTHERS
SPACE HEATERS 4 Nos.
TOTAL POWER 630 WATTS
(630W,240V,50Hz. 1–ø EACH)
(2 Nos EACH AT DE & NDE)

(IV) FANS : UNI–DIRECTIONAL
CAUTION : DO NOT RUN THE MOTOR IN OPPOSITE DIRECTION.



(V) ANCHORING ITEMS
1. FOUNDATION BOLTS :
4–NOS. M36 x 3 x 1000

(VI) FOUNDATION ARRGT.
34020045444 SH–6

(VII) VIBRATION PADS
2 NOS. 1–EACH AT DE & NDE

ADDITIONAL INFORMATION
W.O. 40096A401–21

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1 TFX – 1
IMM – 3
TEX (IMM) – 1

TYPE OF PRODUCT SQ CAGE INDUCTION MOTOR
NAME OF OWNER M/S INDIAN OIL CORPORATION LTD
NAME OF PROJECT 350 MW, IOCL, PARADEEP CCPP
NAME OF CONSULTANT –
DRIVE : CT PUMP

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE
DRN	RITA	–sd–	30.04.2011
CKD	AKASH	–sd–	30.04.2011
APPD	M.K.M	–sd–	02.05.2011

NO.OF VAR.

INVENTOYR NO.

REV.	DATE	
		ALTERED
		CHECKED
		APPROVED

REV.	DATE	
02	07.03.17	ALTERED PRAVIN –sd–
		CHECKED AKASH –sd–
		APPROVED AKASH –sd–

DRAWING REVISED AS BUILT.

REV.	DATE	
01	02.06.11	ALTD RITA –sd–
		CHKD AKASH –sd–
		APPRD M.K.M –sd–

DOR WAS ANTICLOCWISE.
DRG. REDRAWN.

DEPT. AME
CODE 404
UNTOL.DIMS.GR.
SCALE NTS
WEIGHT(K.G.)
REF. TO ASSY. DRG.
ITEM NO.
NO.OF ITEMS

TITLE
OUTLINE GENERAL ARRGT.
1LA7566–2P, TETV, IP55, B3

DRAWING NO.
34020045444
REV. 02

SHEET NO. 01
NO. OF SHEETS 06

इंजीनियर्स इंडिया लिमिटेड ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

DATA SHEET
HIGH VOLTAGE SQUIRREL CAGE INDUCTION MOTOR

Datasheet No.

PURCHASER's DATA

A.	Site conditions	BHEL W.O. 40096A401-31	REV 0 DTD. 09.05.11
1	Ambient temperature, minimum:	°C	3 Atmospheric condition: DUSTY, CORROSIVE
	maximum:	°C	4 Altitude: 3.91 m above sea level
	design:	45 °C	5 Location: IOCL PARADIP
2	Relative humidity:	%	6
B.	**Technical particulars**		
1	Motor tag no.:		17 Hazardous area classification: SAFE
2	Driven equipment name:	CT PUMP	18 Gas group: NA
3	Voltage:	6.6 KV +- 6 %	19 Type of explosion protection: NA
4	Phase:	Three	20 Type of ingress protection: IP 55
5	Frequency:	50 Hz ± 3%	21 Reacceleration: Required
6	Fault level:	40 KA	22 Diff. protection CTs: Not Required
7	Fault duration:	0.25 Sec	CT specs.:
8	Method of starting:	DOL	24 Color shade: RAL5021
9	Winding connection:	Star	25 Thermisters: No
10	No. of terminals:	6	26 RTD: Required
11	Cable size:	3Cx185, 6.6KV(UE)	27 BTD: Required
12	Cable type:	Al. cond. XLPE insulated	28 RTD/BTD monitoring device: Not Required
13	Temperature rise:	75 °C	29 Applicable specification: 6-51-31 Rev 4
14	Cooling:	TETV	30 **System earthing : Resistance earthed**
15	Insulation class:	F (temp rise limited to class B)	
16	Duty Cycle	S1	

DRIVEN EQUIPMENT MANUFACTURER's DATA

1	Suggested motor rating:	385 kW	9	Coupling type:	Flexible
2	Manufacturer:	BPCL NAINI	10	Torque required, starting:	25 mkg
3	Type of driver mounting:	HORIZONTAL	11	maximum:	127 mkg
4	Driven equipment:	PUMP	12	GD^2 of equipment	3.65 kgm^2
5	Shaft kW:	kW			kgm^2
6	kW at maximum load:	kW	13	Maximum thrust:	NA kg
7	Speed:	2960.00 RPM	14	Pulsation rate:	NA
8	Rotation of eqpt. from coupling end:	CW	15	Starting condition:	OPEN VALVE

MOTOR MANUFACTURER's DATA

1	Rating:	385	17	Space heater - voltage & power:	240 V / 630 W
2	Manufacturer:	BHEL BHOPAL	18	Moment of inertia, GD^2:	36 kgm^2
3	Frame designation:	1LA7566-2	19	DE/NDE brg type & no.:	NU219M+6219C3/NU216M
4	No. of poles:	2	20	Type of lubrication:	GREASE
5	Full load speed:	2960 RPM	21	Type of main terminal box:	PSTB
6	Mounting:	HORIZONTAL	22	Type of neutral terminal box:	PSTB
7	Full load torque (FLT):	127 mkg	23	Weight of motor:	3900 kg
8	Starting torque:	70 % of FLT	24	Thermisters, quantity:	NA no.
9	Break down or pull out torque:	225 % of FLT		make:	type: NA
10	Full load current (FLC):	40 A	25	RTD, quantity:	12 no.
11	Starting current at 100% voltage:	500% FLC including +ve tol.		make:	type: SIMPLEX
12	Rotation viewed from coupling end:	ACW	26	BTD, quantity:	2 no.
13	Starting time at80%/100% voltage:	11.6 / 4.7 sec.		make:	type: DUPLEX
14	Locked rotor withstand time (cold/hot) at,		27	Shaft voltage:	Below 250 mV
	80% voltage:	31 / 23 sec.	28	Critical speed, 1st/2nd stage:	ABOVE 3800 RPM
	100% voltage:	20 / 15 sec.	29	Pressurization panel: ○ Applicable ◉ Not applicable	
15	Efficiency at 75%/100% voltage:	94.4 / 94.6 %		make:	type: NA
16	P.F. at starting/75%/100% load	0.16 / 0.89 / 0.90	30	Canopy: (GRP)	No

1. Recommended list of maintenance spares for two years operation shall include following as minimum.
a) Bearing De/NDE - one set b) Terminal box cover with screws c) Cooling fan
d) Insulator/terminal block for terminal boxes e) Bearing assembly (DE/NDE)
2. Starting time calculations shall be based on operating conditions specified in material requisition e.g., open valve condition / closed valve condition at no load/ under load as applicable.
3. All commissioning spares and special tools and tackles required for the motor shall be suplied with motor without extra cost
4. Canopy not in BHEL Bhopal scope.

Rev.	Date	Issued with MR / Purpose	Prepared	Checked	Approved

Atmospheric condition
Humid & highly corrosive

Altitude
< 1000 m
> 1000 m

Location
Outdoor
Indoor

Voltage
3.3 kV
6.6. kV
11 kV

Voltage
±6%
±10%

Duty
Continuous

Fault level
20 kA
25 kA
40 kA
N.A.

Starting method
D.O.L.
V.S.D.
Star-delta
Auto transformer

Earthing
Direct
Resistance

No.of terminals
3
4
6

Insulation Class
B
F
H
C

Area Class
Zone 1
Zone 2
Divn. 1
Divn. 2

Gas group
IIA
IIB
IIC
IIB/IIC
A
B
C
D
C&D

Area Classification
Ex(n)
Ex(e)
Ex(d)

IP
IP 23
IP 44
IP 55

Std. Spec.
EIL spec. 6-51-0031

color
631 as per IS 5

RTD/BTD
Not applicable

Frequency
±3%
±5%

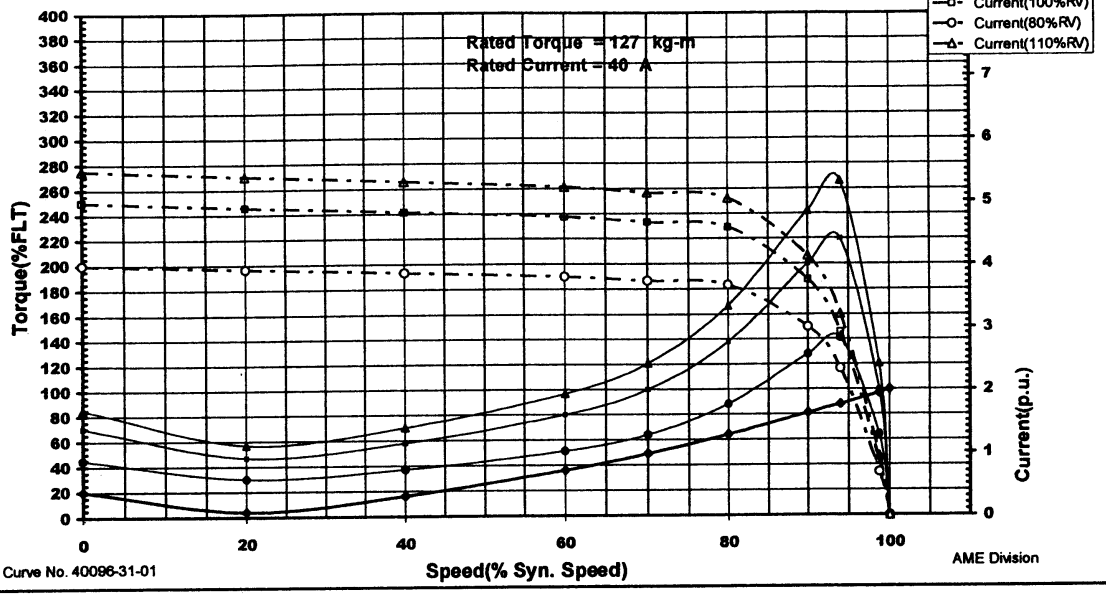
Frequency2
50 Hz
60 Hz

Cooling
IC401
IC511
IC611

Cable Type
Al. cond. XLPE insulated
Cu. cond. XLPE insulated

Torque & Current Vs Speed Curves

Rating : 385 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7566-2
W.O.No. : 40096A401-31
Customer : M/S IOCL FOR 350 MW PARADIP CCPP

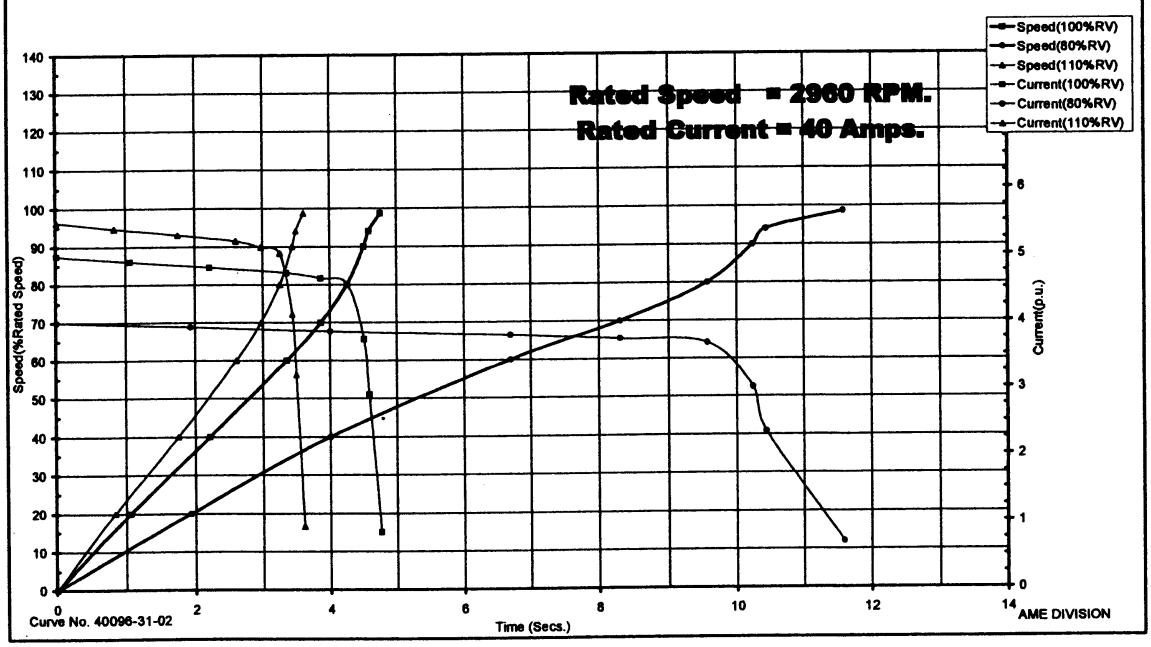


Curve No. 40096-31-01

AME Division

Speed & Current Vs Time Curves

Rating : 385 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7566-2
W.O.No. : 40096A401-31
Customer : M/S IOCL FOR 350 MW PARADIP CCPP

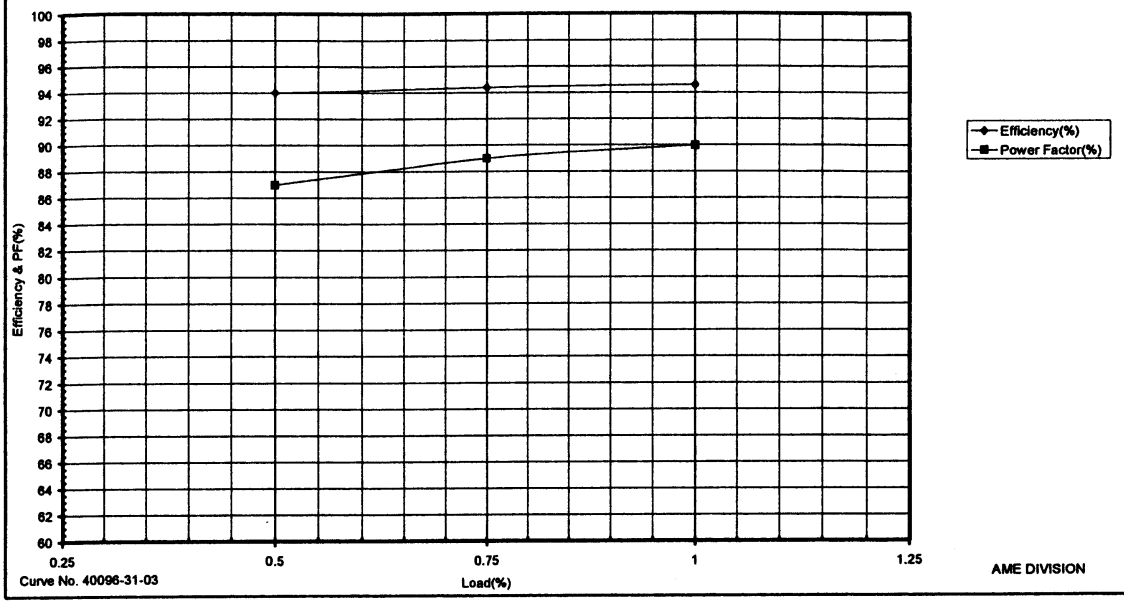


Curve No. 40096-31-02

AME DIVISION

Efficiency, PF Vs Load Curves

Rating : 385 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7566-2
W.O.No. : 40096A401-31
Customer : M/S IOCL FOR 350 MW PARADIP CCPP

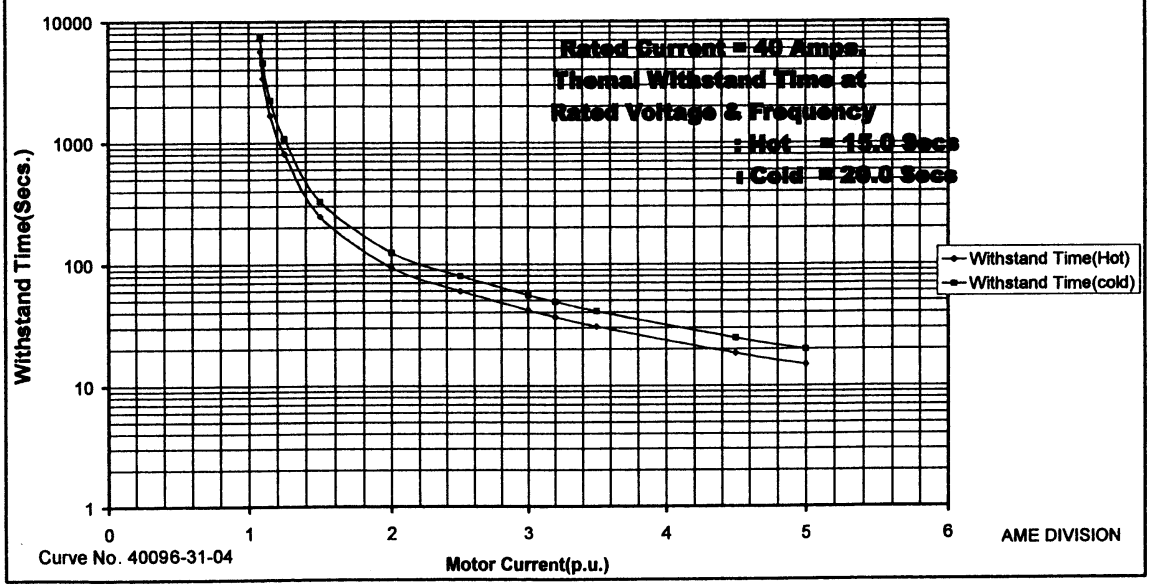


Curve No. 40096-31-03

AME DIVISION

Thermal Withstand Curves

Rating : 385 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7566-2
W.O.No. : 40096A401-31
Customer : M/S IOCL FOR 350 MW PARADIP CCPP



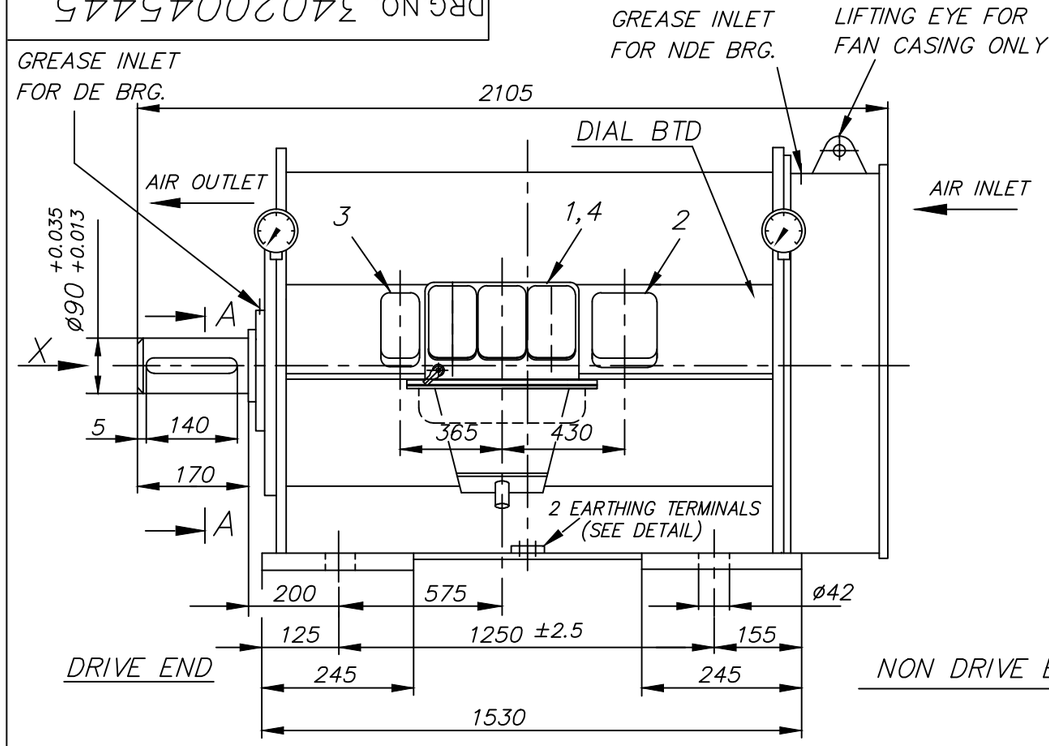
Curve No. 40096-31-04

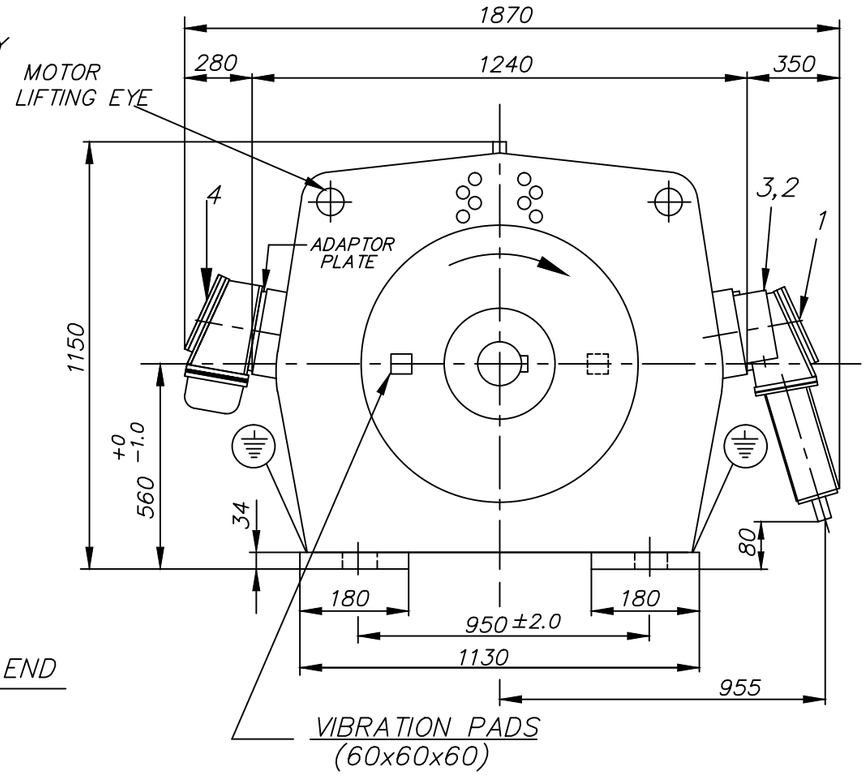
AME DIVISION

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG.NO. 34020045445





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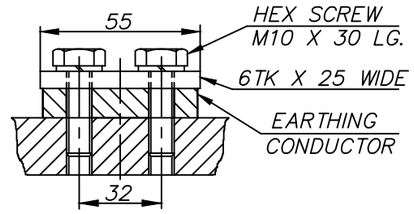
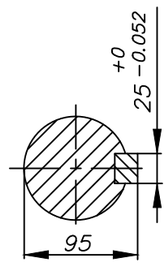


DETAIL OF EARTHING ARRGT.



SECTION AT A-A

TECHNICAL DATA

RATING	385	kW
SPEED	2960	rpm
FULL LOAD AMP STATOR	40	AMP
VOLTAGE 3 PHASE 50 Hz	6600	VOLTS
APPROX WEIGHT OF MOTOR	3900	kg
APPROX. WEIGHT OF ROTOR	685	kg
GD 2 OF ROTOR	36	kgm 2
MAX. FOUNDATION LOADING (ALTERNATING) PER MOTOR LONGITUDINAL SIDE	0 kN UPWARDS 37 kN DNWARDS	
BEARINGS : DE NDE (HSG. INSULATED)	NU219M+6219C3 NU216M	
LUBRICATION: GREASE	SERVOGEM – 3 OR EQUIVALENT	
DIRECTION OF ROTATION VIEWED FROM DE	CLOCKWISE	
PAINT SHADE SPECIFICATION	RAL 5021	

REF. DRG. NO.

11.11.11
SIGN. & DATE

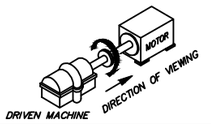
MOTOR FITMENTS

(I) TERMINAL BOXES FOR
1 – STATOR
34020045445 SH–2
2 – ETD'S+BTD'S
34020045445 SH–3
3 – SPACE HEATERS
34020045445 SH–4
4 – NEUTRAL POINT
34020045445 SH–5

(II) TEMPERATURE SENSORS
(A) WDG. ETD'S 12 Nos , 3 WIRES , SIMPLEX , PT. TYPE, 100 Ω AT 0°C
(B) BRG. RTD'S 2 Nos , 4 WIRES, DUPLEX , PT. TYPE, 100 Ω AT 0°C
(C) 2–NOS. DIAL BTD (1–EACH FOR DE & NDE BRGS.)

(III) OTHERS
SPACE HEATERS 4 Nos.
TOTAL POWER 630 WATTS
(630W,240V,50Hz. 1–ø EACH)
(2 Nos EACH AT DE & NDE)

(IV) FANS : UNI–DIRECTIONAL
CAUTION : DO NOT RUN THE MOTOR IN OPPOSITE DIRECTION.



(V) ANCHORING ITEMS
1. FOUNDATION BOLTS :
4–NOS. M36 x 3 x 1000

(VI) FOUNDATION ARRGT.
34020045445 SH–6

(VII) VIBRATION PADS
2 NOS. 1–EACH AT DE & NDE

ADDITIONAL INFORMATION
W.O. 40096A401–31
STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1 TFX – 1
IMM – 3
TEX (IMM) – 1

TYPE OF PRODUCT	SQ CAGE INDUCTION MOTOR
NAME OF OWNER	M/S INDIAN OIL CORPORATION LTD
NAME OF PROJECT	350 MW, IOCL, PARADEEP CCPP
NAME OF CONSULTANT	–

DRIVE : CT PUMP

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE
DRN	RITA	–sd–	30.04.2011
CKD	AKASH	–sd–	30.04.2011
APPD	M.K.M	–sd–	02.05.2011

NO.OF VAR.

INVENTOYR NO.

REV.	DATE	ALTERED / CHECKED / APPROVED
02	07.03.17	ALTERED PRAVIN –sd– / CHECKED AKASH –sd– / APPROVED AKASH –sd–
01	03.06.11	ALTD RITA –sd– / CHKD AKASH –sd– / APPRD M.K.M –sd–

DRAWING REVISED AS BUILT.

DOR WAS ANTICLOCWISE.
DRG. REDRAWN.

DEPT. AME
CODE 404
UNTOL.DIMS.GR.
SCALE NTS
WEIGHT(K.G.)
REF. TO ASSY. DRG.
ITEM NO.
NO.OF ITEMS

TITLE
OUTLINE GENERAL ARRGT.
1LA7566–2P, TETV, IP55, B3

DRAWING NO.
34020045445
REV. 02

SHEET NO. 01
NO. OF SHEETS 06

इंजीनियर्स इंडिया लिमिटेड ENGINEERS INDIA LIMITED

DATA SHEET
HIGH VOLTAGE SQUIRREL CAGE INDUCTION MOTOR

Datasheet No.

PURCHASER's DATA

A.	Site conditions	BHEL W.O. 40096A401-71 REV 01 DTD. 03.03.11			
1	Ambient temperature, minimum:	°C	3	Atmospheric condition:	DUSTY, CORROSIVE
	maximum:	°C	4	Altitude:	3.91 m above sea level
	design:	45 °C	5	Location:	IOCL PARADIP
2	Relative humidity:	%	6		
B.	**Technical particulars**				
1	Motor tag no.:		17	Hazardous area classification:	SAF
2	Driven equipment name:	ID FAN	18	Gas group:	NA
3	Voltage:	6.6 KV +- 6 %	19	Type of explosion protection:	NA
4	Phase:	Three	20	Type of ingress protection:	IP 55
5	Frequency:	50 Hz ± 3%	21	Reacceleration:	Required
6	Fault level:	40 KA	22	Diff. protection CTs:	Not Required
7	Fault duration:	0.25 Sec		CT specs.:	
8	Method of starting:	DOL	24	Color shade:	RAL5021
9	Winding connection:	Star	25	Thermisters:	No
10	No. of terminals:	6	26	RTD:	Required
11	Cable size:	3Cx185, 6.6KV(UE)	27	BTD:	Required
12	Cable type:	Al. cond. XLPE insulated	28	RTD/BTD monitoring device:	Not Required
13	Temperature rise:	75 °C	29	Applicable specification:	6-51-31 Rev 4
14	Cooling:	TETV	30	System earthing :	Resistance earthed
15	Insulation class:	F (temp rise limited to class B)			
16	Duty Cycle	S1			

DRIVEN EQUIPMENT MANUFACTURER's DATA

1	Suggested motor rating:	600 kW	9	Coupling type:	Flexible
2	Manufacturer:	BHEL RANIPET	10	Torque required, starting:	159 mkg
3	Type of driver mounting:	HORIZONTAL	11	maximum:	353 mkg
4	Driven equipment:	FD FAN	12	GD^2 of equipment	2025 kgm^2
5	Shaft kW:	536 kW			kgm^2
6	kW at maximum load:	536 kW	13	Maximum thrust:	NA kg
7	Speed:	1480.00 RPM	14	Pulsation rate:	NA
8	Rotation of eqpt. from coupling end:	CW	15	Starting condition:	Control unit closed

MOTOR MANUFACTURER's DATA

1	Rating:	600	17	Space heater - voltage & power:	240 V / 630 W
2	Manufacturer:	BHEL BHOPAL	18	Moment of inertia, GD^2:	104 kgm^2
3	Frame designation:	1LA7632-4	19	DE/NDE brg type & no.:	NU224M+6224C3/NU222M
4	No. of poles:	4	20	Type of lubrication:	GREASE
5	Full load speed:	1475 RPM	21	Type of main terminal box:	PSTB
6	Mounting:	HORIZONTAL	22	Type of neutral terminal box:	PSTB
7	Full load torque (FLT):	396 mkg	23	Weight of motor:	4950 kg
8	Starting torque:	80 % of FLT	24	Thermisters, quantity:	NA no.
9	Break down or pull out torque:	220 % of FLT		make: type:	NA
10	Full load current (FLC):	66 A	25	RTD, quantity:	12 no.
11	Starting current at 100% voltage:	500% FLC including +ve tol.		make: type:	SIMPLEX
12	Rotation viewed from coupling end:	BIDIRECTIONAL	26	BTD, quantity:	2 no.
13	Starting time at 80%/100% voltage:	42.0 / 25.0 sec.		make: type:	DUPLEX
14	Locked rotor withstand time (cold/hot) at,		27	Shaft voltage:	Below 250 mV
	80% voltage:	62 / 48 sec.	28	Critical speed, 1st/2nd stage:	ABOVE 2000 RPM
	100% voltage:	40 / 31 sec.	29	Pressurization panel: ☐ Applicable ☒ Not applicable	
15	Efficiency at 75%/100% voltage:	93.8 / 94.0 %		make: type:	NA
16	P.F. at starting/75%/100% load	0.19 / 0.81 / 0.84	30	Canopy: (GRP)	No

1. Recommended list of maintenance spares for two years operation shall include following as minimum.
a) Bearing De/NDE - one set b) Terminal box cover with screws c) Cooling fan
d) Insulator/terminal block for terminal boxes e) Bearing assembly (DE/NDE)
2. Starting time calculations shall be based on operating conditions specified in Material requisition e.g. open valve condition / closed valve condition at no load/ under load as applicable.
3. All commissioning spares and special tools and tackles required for the motor shall be supplied with motor without extra cost
4. Canopy not in BHEL Bhopal scope.

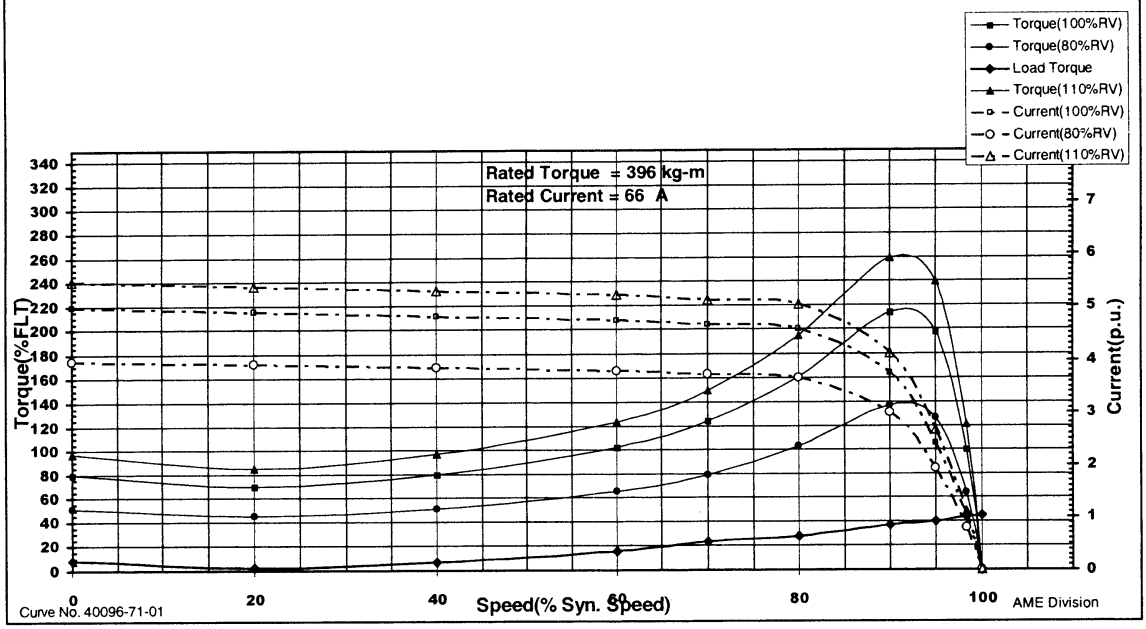
REVIEW CODE 1 2 3
समीक्षा कोड R I
Signature & Name
हस्ताक्षर एवं नाम
Date/ दिनांक 09.03.2011
P.No.
पी.नं. A011/67

Issued with MR

Rev.	Date	Purpose	Prepared	Checked	Approved

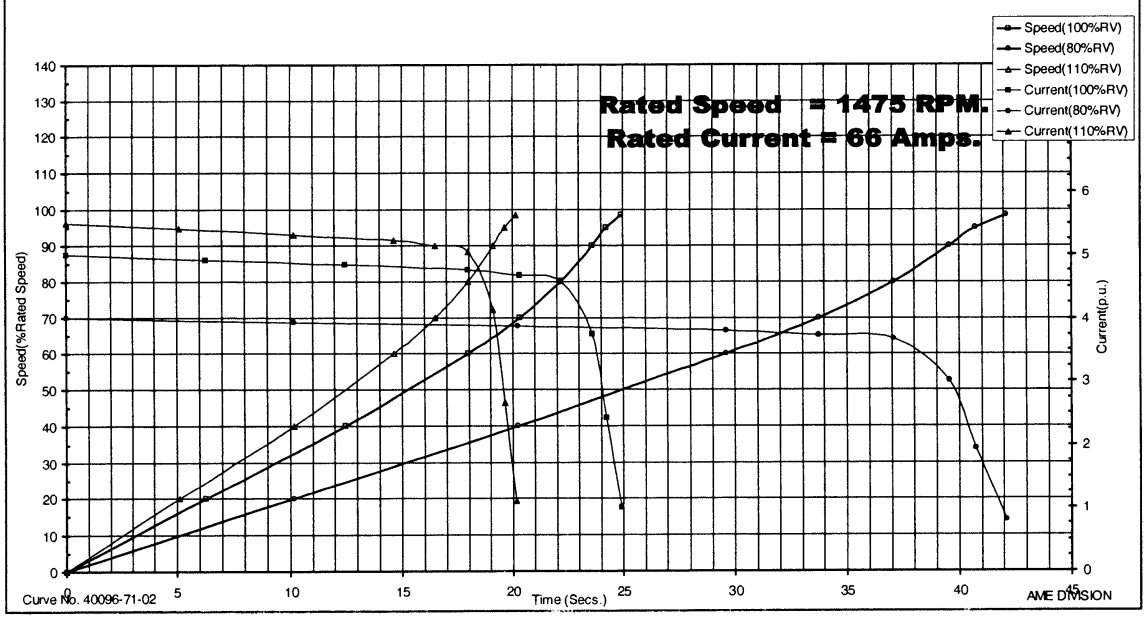
Torque & Current Vs Speed Curves

Rating : 600 KW, 6600 V, 4 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7632-4
W.O.No. : 40096A401-71
Customer : M/S BHEL FOR IOCL PARADIP CCPP



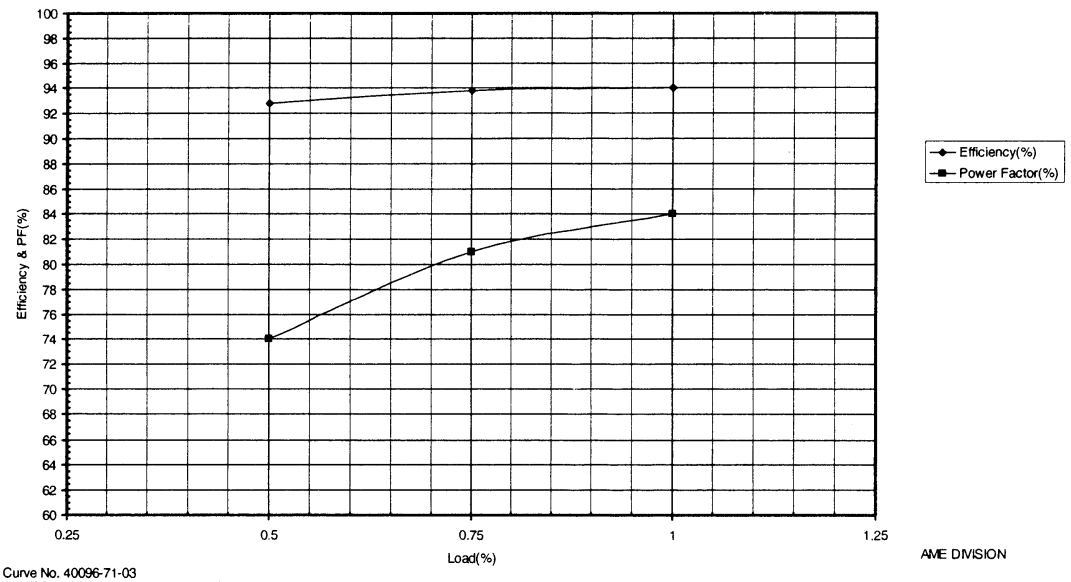
Speed & Current Vs Time Curves

Rating : 600 KW, 6600 V, 4 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7632-4
W.O.No. : 40096A401-71
Customer : M/S BHEL FOR IOCL PARADIP CCPP



Efficiency, PF Vs Load Curves

Rating : 600 KW, 6600 V, 4 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7632-4
W.O.No. : 40096A401-71
Customer : M/S BHEL FOR IOCL PARADIP CCPP

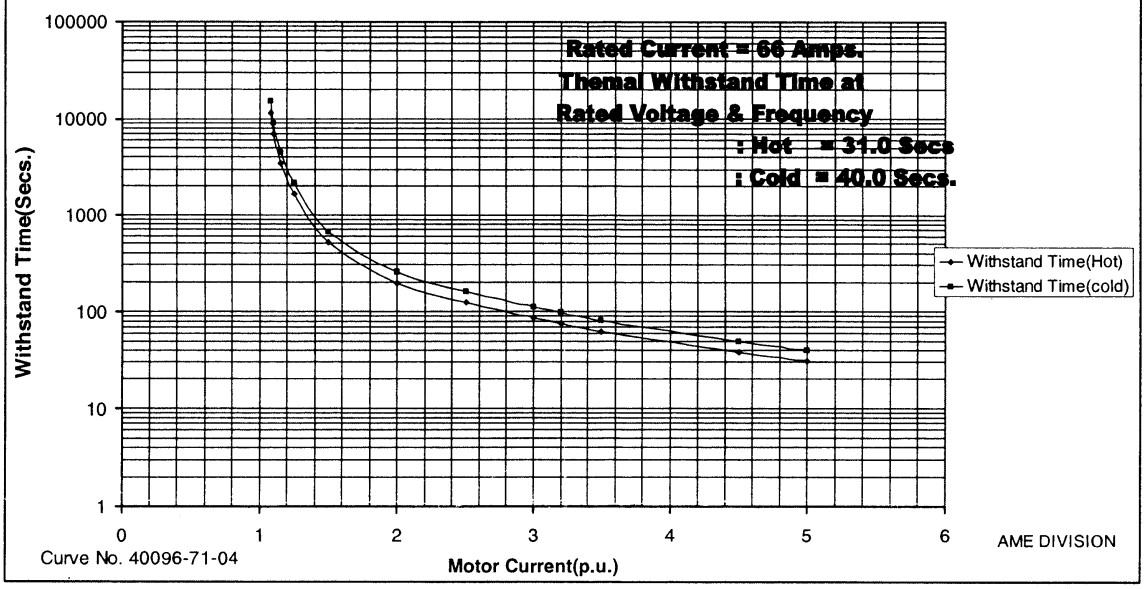


AME DIVISION

Curve No. 40096-71-03

Thermal Withstand Curves

Rating : 600 KW, 6600 V, 4 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7632-4
W.O.No. : 40096A401-71
Customer : M/S BHEL FOR IOCL PARADIP CCPP



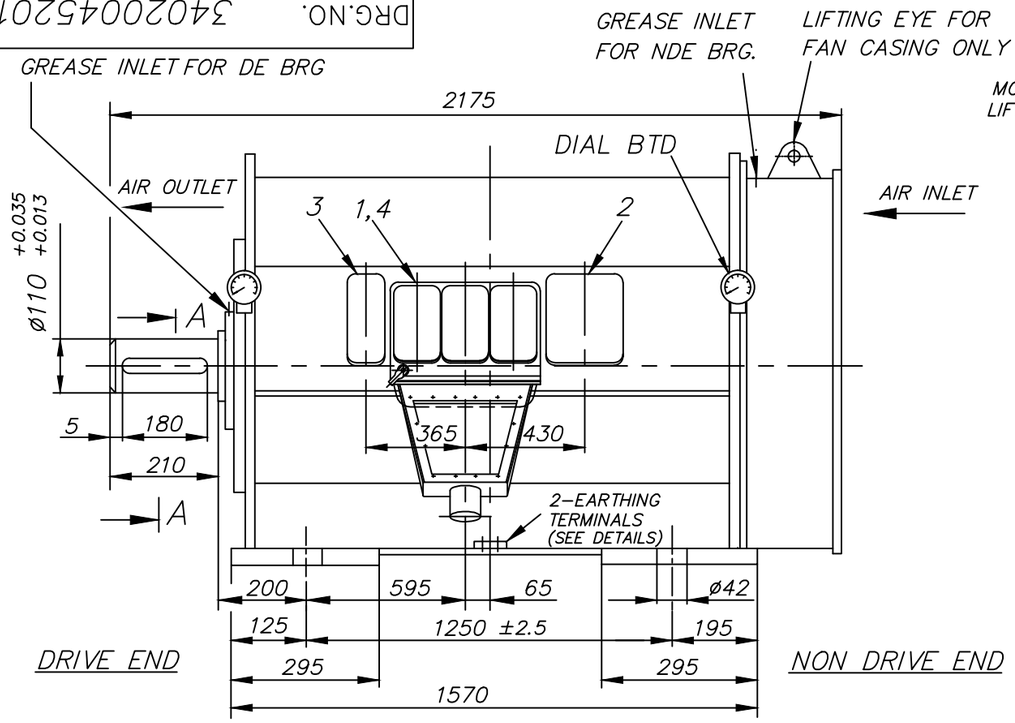
AME DIVISION

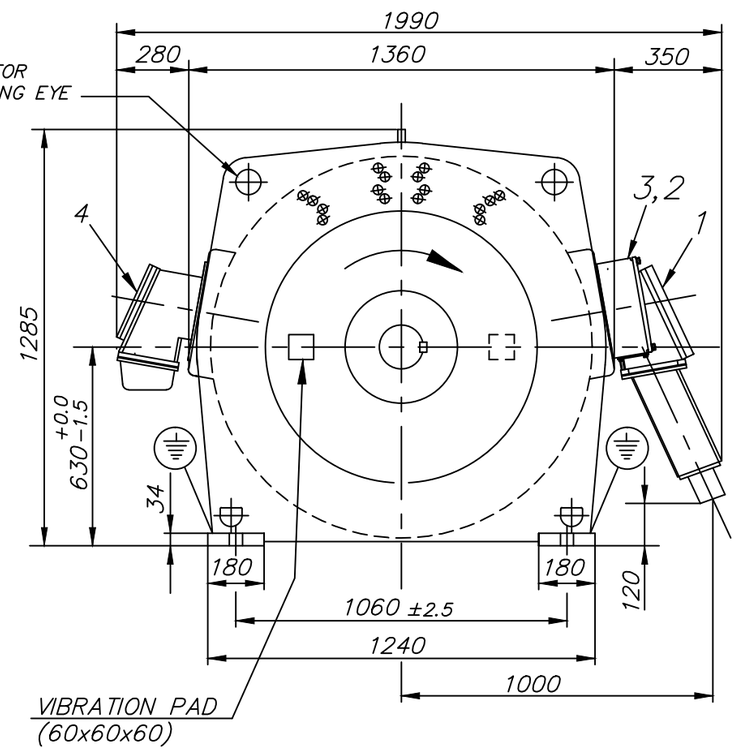
Curve No. 40096-71-04

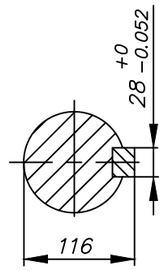
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

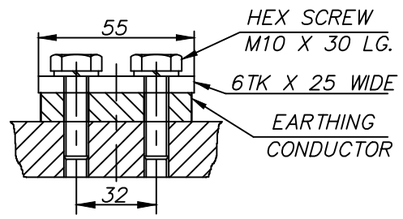
DRG.NO. 34020045201







SECTION A -A



DETAILS OF EARTHING ARRGT.

MOTOR FITMENTS

(I) TERMINAL BOXES FOR
- 1 – STATOR 34020045201, SHT–2
- 2 – ETD'S+BTD'S 34020045201, SHT–3
- 3 – SPACE HEATERS 34020045201, SHT–4
- 4 – NEUTRAL POINT 34020045201, SHT–5

(II) TEMPERATURE SENSORS
- (A) WDG. ETD'S 12–Nos', 3 WIRES, SIMPLEX, PT.TYPE, 100 Ω AT 0°C
- (B) BRG. RTD'S 2–Nos, 3 WIRES, DUPLEX, PT.TYPE, 100 Ω AT 0°C
- (C) 2–NOS. DIAL TYPE BTD. (1 EACH AT DE & NDE BRGS)

(III) OTHERS: –
SPACE HEATERS 4–Nos.
TOTAL POWER 630 WATTS
(630W, 240, 50Hz.1–ø EACH)
(2–Nos EACH AT DE & NDE)

(IV) FANS: – BI–DIRECTIONAL

(V) VIBRATION PADS: –
2–NOS. 1–EACH AT DE & NDE.

(VI) FOUNDATION ARRGT: –
34020045201, SHT–6

TECHNICAL DATA

RATING	600	kW
SPEED	1475	rpm
FULL LOAD AMP STATOR	66	AMP
VOLTAGE 3 PHASE, 50 Hz	6600	VOLTS
APPROX WEIGHT OF MOTOR	4950	kg
APPROX. WEIGHT OF ROTOR	950	kg
GD ^{2} OF ROTOR	104	kgm ^{2}
MAX. FOUNDATION LOADING (ALTERNATING) PER MOTOR LONGITUDINAL SIDE	41 89	kN UPWARDS kN DNWARDS
BEARINGS : DE NDE	NU224M+6224C3 NU222M (INSULATED)	
LUBRICATION: GREASE	SERVOGEM – 3 OR EQUIVALENT	
DIRECTION OF ROTATION VIEWED FROM DE	BI–DIRECTION (CLOCKWISE)	
PAINT SHADE SPECIFICATION	RAL 5021	

REF. DRG. NO.

17.03.11
SIGN. & DATE

INVENTOYR NO.

REV.	DATE	
		ALTERED
		CHECKED
		APPROVED

REV.	DATE	
02	07.03.17	ALTERED PRAVIN –sd–
		CHECKED AKASH –sd–
		APPROVED AKASH –sd–

DRAWING REVISED AS BUILT.

REV.	DATE	
01	05.03.11	ALTD PRAVIN –sd–
		CHKD AKASH –sd–
		APPD M.K.M –sd–

PAINT SHADE WAS 631 OF IS–5. DRAWING REDRAWN.

ADDITIONAL INFORMATION
W.O: 40096 A 401–71

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1 TFX – 1
IMM – 3 TEX(IMM) – 1

TYPE OF PRODUCT : SQ CAGE INDUCTION MOTOR
NAME OF CUSTOMER : M/S INDIAN OIL CORPORATION LTD.
NAME OF PROJECT : 350 MW, IOCL, PRADEEP CCPP

DRIVE : FD FAN

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO.OF VAR.
DRN	PRAVIN	–sd–	05.10.10	
CKD	AKASH	–sd–	05.10.10	
APPD	M.K.M.	–sd–	05.10.10	

DEPT.	UNTOL.DIMS.GR.		SCALE	WEIGHT(K.G.)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
AME			NTS				
CODE 404							

TITLE
OUTLINE GENERAL ARRGT.
1LA7632–4, TETV, IP55

DRAWING NO. 34020045201 REV. 02

SHEET NO. 01 NO. OF SHEETS 06

इंजीनियर्स इंडिया लिमिटेड ENGINEERS INDIA LIMITED (A Govt of India Undertaking)

DATA SHEET
HIGH VOLTAGE SQUIRREL CAGE INDUCTION MOTOR

Datasheet No.

PURCHASER's DATA

A.	**Site conditions**	**BHEL W.O. 40096A401-11**		REV 02 DTD. 18.05.11	
1	Ambient temperature, minimum:	°C	3	Atmospheric condition:	DUSTY, CORROSIVE
	maximum:	°C	4	Altitude:	
	design:	43 °C	5	Location:	IOCL PARADIP
2	Relative humidity:	%	6		
B.	**Technical particulars**				
1	Motor tag no.:		17	Hazardous area classification:	
2	Driven equipment name:	HRSG BFP	18	Gas group:	
3	Voltage:	6.6 KV +- 6 %	19	Type of explosion protection:	
4	Phase:	Three	20	Type of ingress protection:	IP 55
5	Frequency:	50 Hz ± 3%	21	Reacceleration:	Required
6	Fault level:	40 KA	22	Diff. protection CTs:	Required
7	Fault duration:	0.25 Sec		CT specs.:	
8	Method of starting:	DOL	24	Color shade:	RAL5021
9	Winding connection:	Star	25	Thermisters:	No
10	No. of terminals:	6	26	RTD:	Required
11	Cable size:	3Cx185, 6.6KV(UE)	27	BTD:	Required
12	Cable type:	Al. cond. XLPE insulated	28	RTD/BTD monitoring device:	Not Required
13	Temperature rise:	80 °C over water temp of 40 °C			
14	Cooling:	CACW			
15	Insulation class:	F (temp rise limited to class B)	29	Applicable specification:	6-51-31 Rev 4
16			30	System earthing :	Resistance earthed

DRIVEN EQUIPMENT MANUFACTURER's DATA

1	Suggested motor rating:	2100 kW	9	Coupling type:	FLEXIBLE	
2	Manufacturer:	BHEL HYDERABAD	10	Torque required, starting:		mkg
3	Type of driver mounting:	HORIZONTAL	11	maximum:		mkg
4	Driven equipment:	HRSG BFP	12	GD^2 of eqpt., including flywheel:	24.8	kgm^2
5	Shaft kW:	kW		excluding flywheel:		kgm^2
6	kW at maximum load:	kW	13	Maximum thrust:	NA	kg
7	Speed:	1485.00 RPM	14	Pulsation rate:	NA	
8	Rotation of eqpt. from coupling end:	CW	15	Starting condition:	open curve	

MOTOR MANUFACTURER's DATA

1	Rating:	2100	17	Space heater - voltage & power:	240 V / 1200 W	
2	Manufacturer:	BHEL BHOPAL	18	Moment of inertia, GD^2:	220	kgm^2
3	Frame designation:	1RN7632-4	19	DE/NDE brg type & no.:	NU232M+6232C3 / NU228M	
4	No. of poles:	4	20	Type of lubrication:	GREASE	
5	Full load speed:	1489 RPM	21	Type of main terminal box:	PSTB	
6	Mounting:	HORIZONTAL	22	Type of neutral terminal box:	NON-PSTB	
7	Full load torque (FLT):	1374 mkg	23	Weight of motor:	8600	kg
8	Starting torque:	85 % of FLT	24	Thermisters, quantity:		no.
9	Break down or pull out torque:	202 % of FLT		make: type:		
10	Full load current (FLC):	220 A	25	RTD, quantity:	12	no.
11	Starting current at 100% voltage:	500 % FLC		make: type:	SIMPLEX	
12	Rotation viewed from coupling end:	ACW	26	BTD, quantity:	2	no.
13	Starting time at 80%/100% voltage:	2.2 / 1.1 sec.		make: type:	DUPLEX	
14	Locked rotor withstand time (cold/hot) at,		27	Shaft voltage:	250	mV
	80% voltage:	31 / 23 sec.	28	Critical speed, $1^{st}/2^{nd}$ stage:	ABOVE 2000	RPM
	100% voltage:	20 / 15 sec.	29	Pressurization panel: ☐ Applicable ☑ Not applicable		
15	Efficiency at 75%/100% voltage:	95.8 / 96.0 %		make: type:		
16	P.F. at starting/75%/100%load	0.13/0.86 / 0.87	30	Canopy: (GRP)	Yes, will be provided	

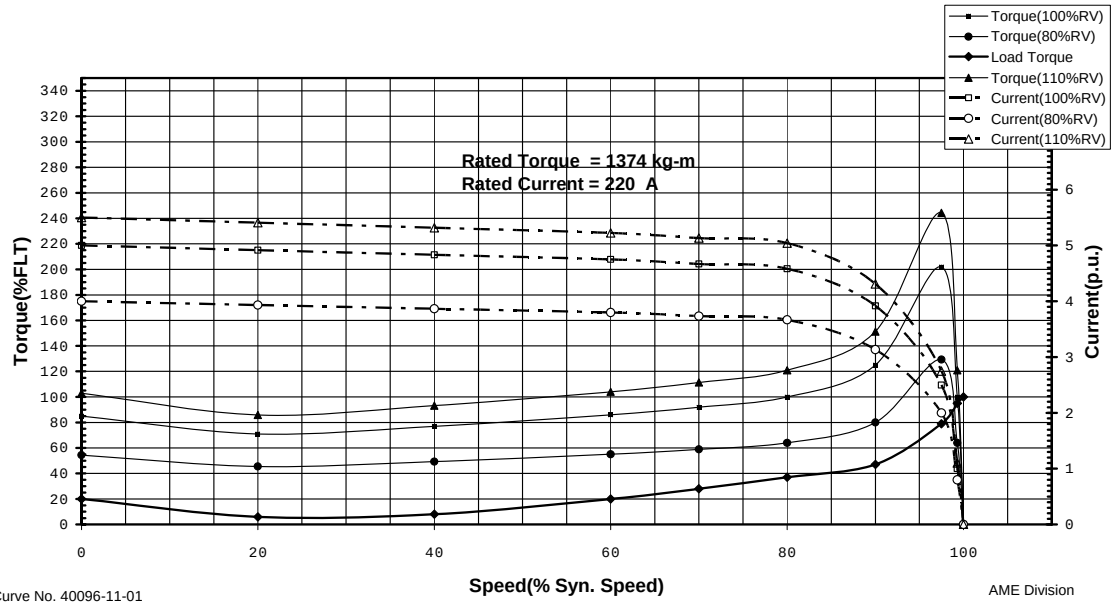
1. Recommended list of maintenance spares for two years operation shall include following as minimum.
a) Bearing De/NDE - one set b) Terminal box cover with screws c) Cooling fan
d) Insulator/terminal block for terminal boxes e) Bearing assembly (DE/NDE)
2. Starting time calculations shall be based on operating conditions specified in material requisition e.g., open valve condition / closed valve condition at no load/ under load as applicable.
3. Motor offered shall be in line with MOU between EIL and respective motor vendor.
4. Al commissioning spares and special tools and tackles required for the motor shall be suplied with motor without extra cost

Issued with MR

Rev.	Date	Purpose	Prepared	Checked	Approved

Torque & Current Vs Speed Curves

Rating : 2100 KW, 6600 V, 4 P, CACW , Cage Rotor Asyn. Motor.
Frame : 1RN7632-4
W.O.No. : 40096A401-11
Customer : M/S IOCL FOR PARADIP CCPP

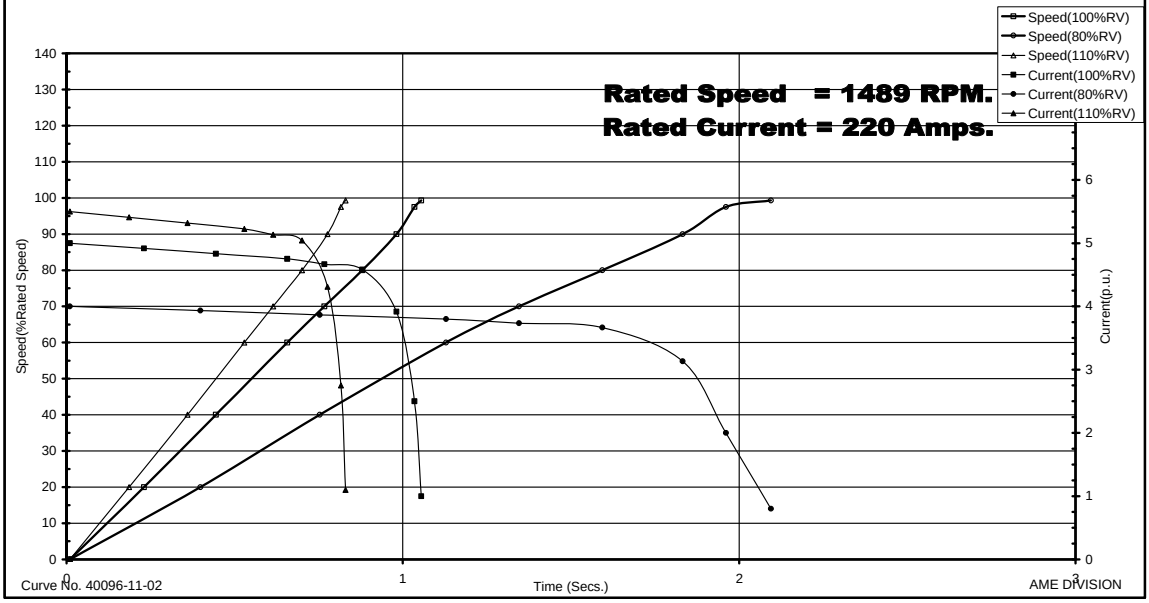


Curve No. 40096-11-01

AME Division

Speed & Current Vs Time Curves

Rating : 2100 KW, 6600 V, 4 P, CACW , Cage Rotor Asyn. Motor.
Frame : 1RN7632-4
W.O.No. : 40096A401-11
Customer : M/S IOCL FOR PARADIP CCPP

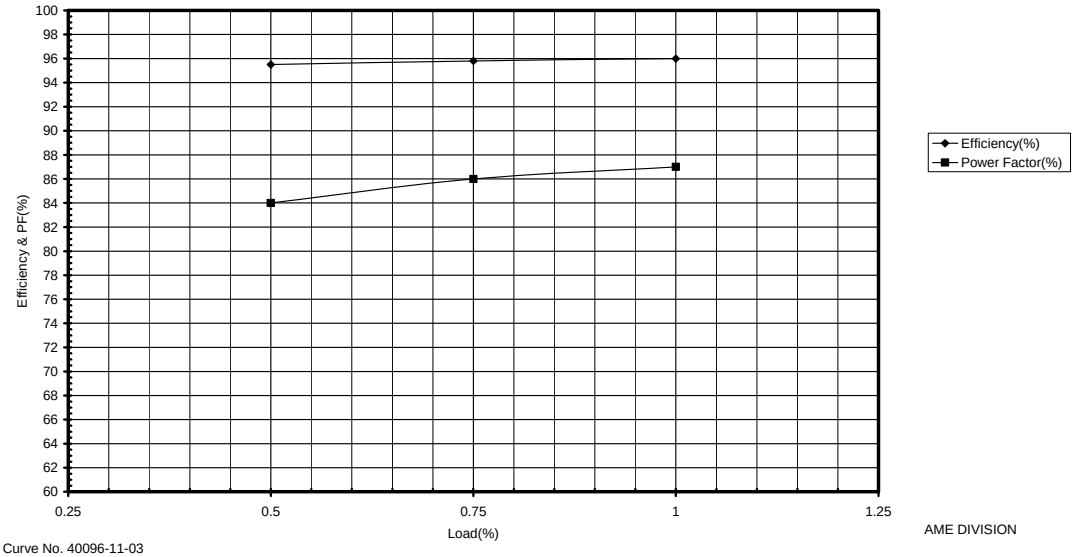


Curve No. 40096-11-02

AME DIVISION

Efficiency, PF Vs Load Curves

Rating : 2100 KW, 6600 V, 4 P, CACW , Cage Rotor Asyn. Motor.
Frame : 1RN7632-4
W.O.No. : 40096A401-11
Customer : M/S IOCL FOR PARADIP CCPP

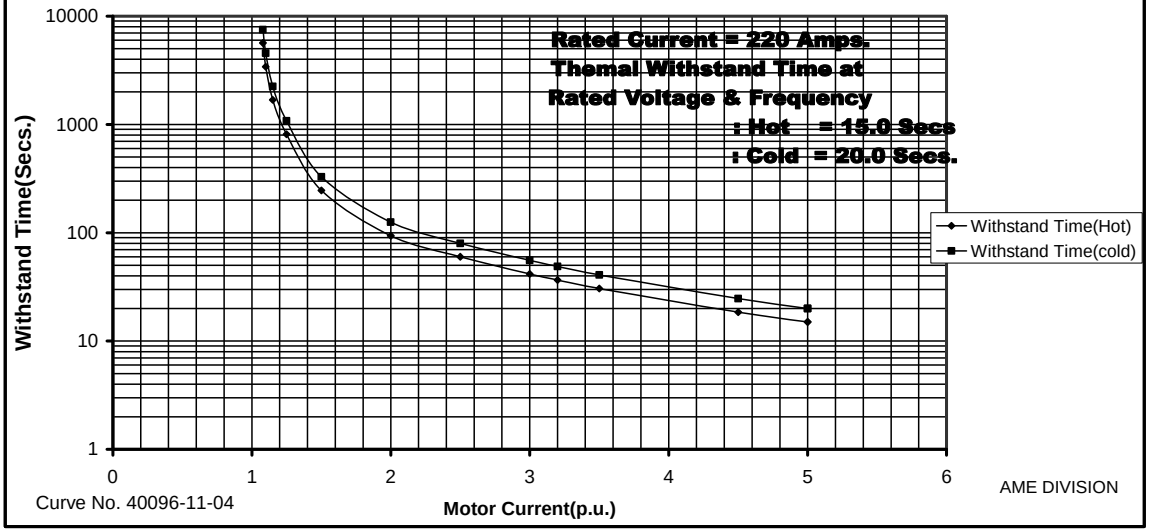


AME DIVISION

Curve No. 40096-11-03

Thermal Withstand Curves

Rating : 2100 KW, 6600 V, 4 P, CACW , Cage Rotor Asyn. Motor.
Frame : 1RN7632-4
W.O.No. : 40096A401-11
Customer : M/S IOCL FOR PARADIP CCPP



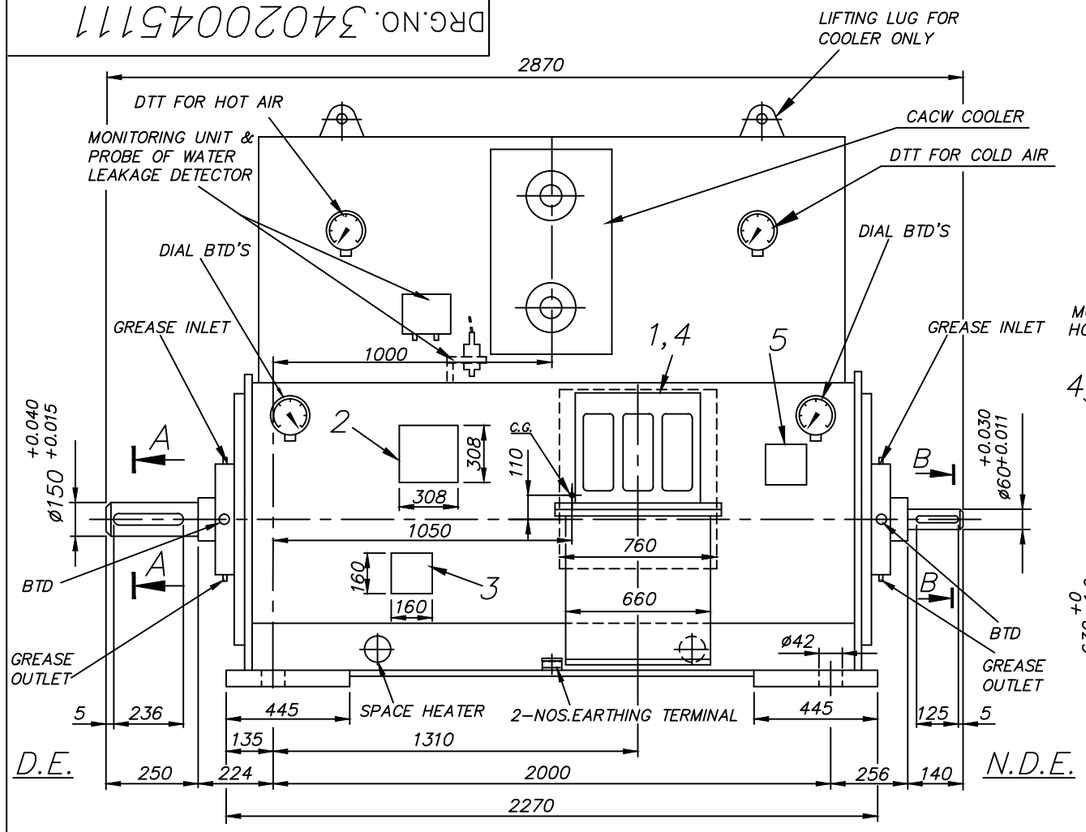
AME DIVISION

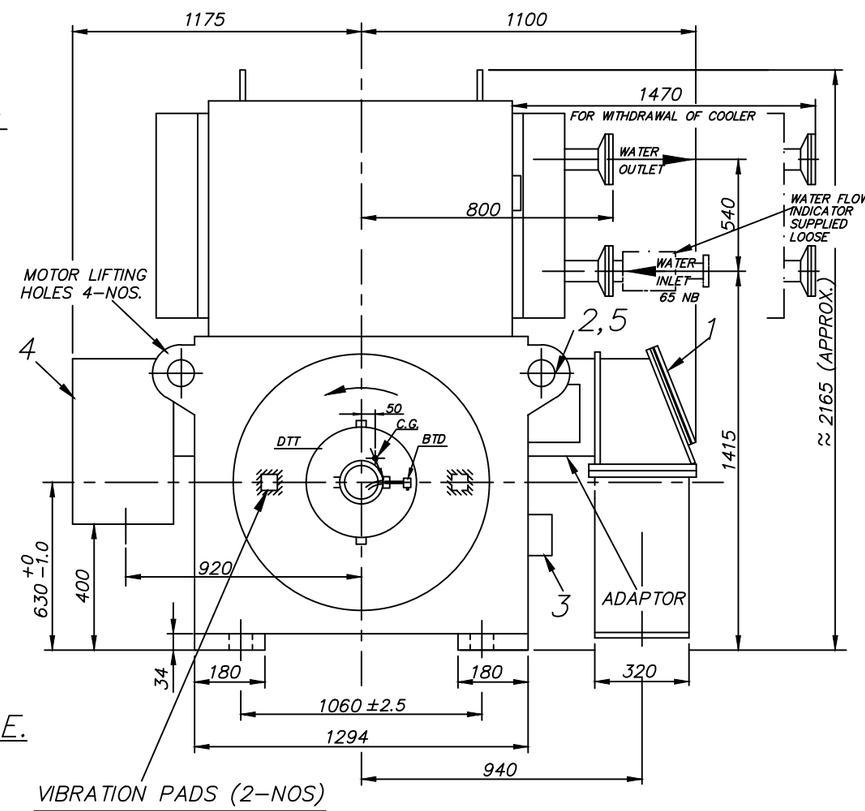
Curve No. 40096-11-04

FIRST ANGLE PROJECTION

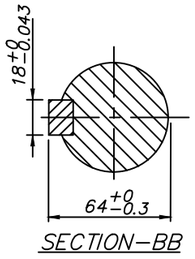
(ALL DIMENSIONS ARE IN mm)

DRG.NO. 34020045111

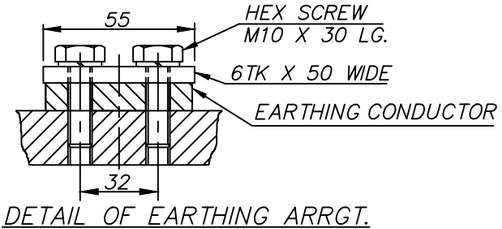




VIBRATION PADS (2-NOS)
(60x60x60)
(FOR VIBRATION PROB.)

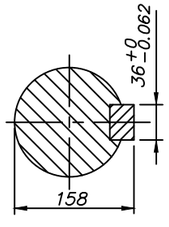


SECTION-BB



DETAIL OF EARTHING ARRGT.

NOTE:-
THIS MOTOR IS DIMENSIONLLY IDENTICAL TO EARILER SUPPLIED MOTOR AGAINST W.O.46260A401-21.
(OGA DRG. 34020043698)



SECTION-AA

MOTOR FITMENTS

(I) TERMINAL BOXES FOR

1 - STATOR
34020045111 SH-2

2 - ETD'S+BTD'S
34020045111 SH-3

3 - SPACE HEATERS
34020045111 SH-4

4 - NEUTRAL POINT
34020045111 SH-5
(PROVISION FOR CT MTG)

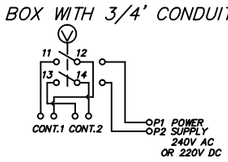
5 - DIAL BTD
34020045111 SH-6

(II) TEMPERATURE SENSORS

(A) WDG. RTD'S 12 Nos ,
3- WIRES, SIMPLEX,
PT. TYPE 100 Ω AT 0°C

(B) BRG. RTD'S 2 Nos
3- WIRES, DUPLEX,
PT. TYPE, 100 Ω AT 0°C ,

(C) 2-NOS. DIAL BTD
(1-EACH FOR DE & NDE BRGS.)
W/P BOX WITH 3/4' CONDUIT ENTRY



(III) OTHERS

SPACE HEATERS 2 Nos.
TOTAL POWER 1200 WATTS
(600 W, 240 V, 50Hz. 1-ø EACH)
(2 Nos EACH AT DE & NDE)

(IV) FANS: - UNI-DIRECTIONAL

CAUTION : DO NOT RUN THE MOTOR IN OPPOSITE DIRECTION.

(V) ANCHORING ITEMS

(1) BASEFRAME
34020045111 SH-7

TECHNICAL DATA

RATING	2100	kW
SPEED	1489	rpm
FULL LOAD AMP STATOR	220	AMP
VOLTAGE 3 PHASE 50 Hz	6600	VOLTS
APPROX WEIGHT OF MOTOR	8600	kg
APPROX. WEIGHT OF ROTOR	1900	kg
GD 2 OF ROTOR	220	kgm 2
MAX. FOUNDATION LOADING (ALTERNATING) PER MOTOR LONGITUDINAL SIDE	85 kN UPWARDS 171 kN DNWARDS	
BEARINGS DE NDE	NU232M + 6232C3 NU228M (INSULATED)	
LUBRICATION: GREASE	SERVOGEM-3 OR EQUIVALENT	
DIRECTION OF ROTATION VIEWED FROM DE	ANTI-CLOCK WISE	
PAINT SHADE SPECIFICATION	RAL 5021	

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAYDETRIMENTAL TO THE INTEREST OF THE COMPANY.

REF. DRG. NO.

16.03.2011 SIGN. & DATE

INVENTOYR NO.

ADDITIONAL INFORMATION
W.O. 40096A401-11

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME - 1
IMM - 3
TEX (IMM) - 1

TYPE OF PRODUCT SQ CAGE INDUCTION MOTOR — DRIVE : B.F.P.
NAME OF CUSTOMER M/S INDIAN OIL CORPORATION LTD.
NAME OF PROJECT 350 MW, IOCL, PARADEEP CCPP
NAME OF CONSULTANT -

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO.OF VAR.
DRN	RITA	-sd-	31.08.10	
CKD	AKASH	-sd-	31.08.10	
APPD	M.K.M.	-sd-	08.09.10	

REV.	DATE	
		ALTERED
		CHECKED
		APPROVED

REV.	DATE		
02	07.03.17	ALTERED	PRAVIN -sd-
		CHECKED	AKASH -sd-
		APPROVED	AKASH -sd-

DRAWING REVISED AS BUILT.

REV.	DATE		
01	16.03.11	ALTD	RITA -sd-
		CHKD	AKASH -sd-
		APPRD	M.K.M -sd-

PAINT SHADE WAS 631 OF IS-5.
CABLE DETAIL DELETED.
DRG. REDRAWN.

DEPT. AME
CODE 404
UNTOL.DIMS.GR.
SCALE NTS
WEIGHT(K.G.)
REF. TO ASSY. DRG.
ITEM NO.
NO.OF ITEMS

TITLE
OUTLINE GENERAL ARRGT.
1RN7632-4P, CACW, IP55

DRAWING NO. 34020045111
REV. 02

SHEET NO. 1 NO. OF SHEETS 7

इंजीनियर्स इंडिया लिमिटेड ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

DATA SHEET
HIGH VOLTAGE SQUIRREL CAGE INDUCTION MOTOR

Datasheet No.

PURCHASER's DATA

A.	**Site conditions**	**BHEL W.O. 40096A401-81**		REV 0 DTD. 09.05.11	
1	Ambient temperature, minimum:	°C	3	Atmospheric condition:	DUSTY, CORROSIVE
	maximum:	°C	4	Altitude:	3.91 m above sea level
	design:	45 °C	5	Location:	IOCL PARADIP
2	Relative humidity:	%	6		
B.	**Technical particulars**				
1	Motor tag no.:		17	Hazardous area classification:	SAFE
2	Driven equipment name:	MPFWE PUMP	18	Gas group:	NA
3	Voltage:	6.6 KV +- 6 %	19	Type of explosion protection:	NA
4	Phase:	Three	20	Type of ingress protection:	IP 55
5	Frequency:	50 Hz ± 3%	21	Reacceleration:	Required
6	Fault level:	40 KA	22	Diff. protection CTs:	Not Required
7	Fault duration:	0.25 Sec		CT specs.:	
8	Method of starting:	DOL	24	Color shade:	RAL5021
9	Winding connection:	Star	25	Thermisters:	No
10	No. of terminals:	6	26	RTD:	Required
11	Cable size:	3Cx185, 6.6KV(UE)	27	BTD:	Required
12	Cable type:	Al. cond. XLPE insulated	28	RTD/BTD monitoring device:	Not Required
13	Temperature rise:	75 °C	29	Applicable specification:	6-51-31 Rev 4
14	Cooling:	TETV	30	System earthing :	Resistance earthed
15	Insulation class:	F (temp rise limited to class B)			
16	Duty Cycle	S1			

DRIVEN EQUIPMENT MANUFACTURER's DATA

1	Suggested motor rating:	225 kW	9	Coupling type:	Flexible
2	Manufacturer:	BPCL NAINI	10	Torque required, starting:	15 mkg
3	Type of driver mounting:	HORIZONTAL	11	maximum:	74 mkg
4	Driven equipment:	PUMP	12	GD^2 of equipment	3.1 kgm^2
5	Shaft kW:	kW			kgm^2
6	kW at maximum load:	kW	13	Maximum thrust:	NA kg
7	Speed:	2967.00 RPM	14	Pulsation rate:	NA
8	Rotation of eqpt. from coupling end:	CW	15	Starting condition:	OPEN VALVE

MOTOR MANUFACTURER's DATA

1	Rating:	225	17	Space heater - voltage & power:	240 V / 500 W
2	Manufacturer:	BHEL BHOPAL	18	Moment of inertia, GD^2:	16 kgm^2
3	Frame designation:	1LA7502-2	19	DE/NDE brg type & no.:	NU216M+6216C3/NU215M
4	No. of poles:	2	20	Type of lubrication:	GREASE
5	Full load speed:	2967 RPM	21	Type of main terminal box:	PSTB
6	Mounting:	HORIZONTAL	22	Type of neutral terminal box:	PSTB
7	Full load torque (FLT):	74 mkg	23	Weight of motor:	2450 kg
8	Starting torque:	65 % of FLT	24	Thermisters, quantity:	NA no.
9	Break down or pull out torque:	220 % of FLT		make: type:	NA
10	Full load current (FLC):	24 A	25	RTD, quantity:	12 no.
11	Starting current at 100% voltage:	500% FLC including +ve tol.		make: type:	SIMPLEX
12	Rotation viewed from coupling end:	ACW	26	BTD, quantity:	2 no.
13	Starting time at80%/100% voltage:	11.6 / 4.5 sec.		make: type:	DUPLEX
14	Locked rotor withstand time (cold/hot) at,		27	Shaft voltage:	Below 250 mV
	80% voltage:	31 / 23 sec.	28	Critical speed, 1st/2nd stage:	ABOVE 3800 RPM
	100% voltage:	20 / 15 sec.	29	Pressurization panel: ○ Applicable ◉ Not applicable	
15	Efficiency at 75%/100% voltage:	93.5 / 93.8 %		make: type:	NA
16	P.F. at starting/75%/100% load	0.15 / 0.88 / 0.89	30	Canopy: (GRP)	No: W CODE

1. Recommended list of maintenance spares for two years operation shall include following as minimum.
a) Bearing De/NDE - one set b) Terminal box cover with screws c) Cooling fan
d) Insulator/terminal block for terminal boxes e) Bearing assembly (DE/NDE)
2. Starting time calculations shall be based on operating conditions specified in material requisition e.g. open valve condition/ closed valve condition at no load/ under load as applicable.
3. All commissioning spares and special tools and tackles required for the motor shall be suplied with motor without extra cost
4. Canopy not in BHEL Bhopal scope.

Rev.	Date	Purpose	Prepared	Checked	Approved
		Issued with MR			

Atmospheric condition	Altitude	Location
Humid & highly corrosive	< 1000 m	Outdoor
	> 1000 m	Indoor

Voltage	Voltage	Duty	Fault level	Starting method	Earthing	No.of terminals
3.3 kV	±6%	Continuous	20 kA	D.O.L.	Direct	3
6.6. kV	±10%		25 kA	V.S.D.	Resistance	4
11 kV			40 kA	Star-delta		6
			N.A.	Auto transformer		

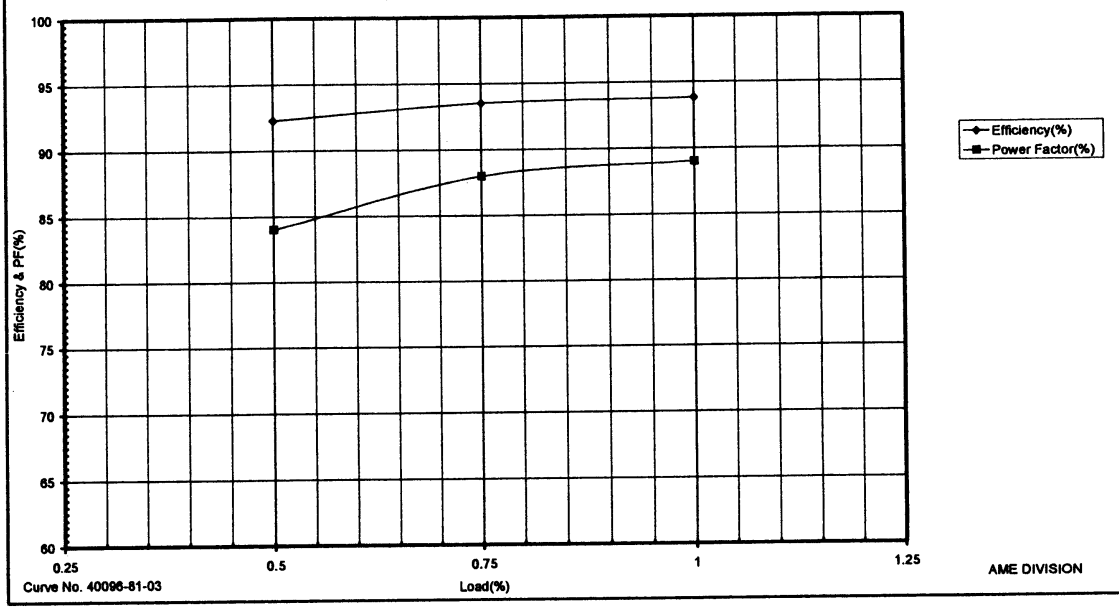
Insulation Class	Area Class	Gas group	Area Classification	IP
B	Zone 1	IIA	Ex(n)	IP 23
F	Zone 2	IIB	Ex(e)	IP 44
H	Divn. 1	IIC	Ex(d)	IP 55
C	Divn. 2	IIB/IIC		
		A		
		B		
		C		
		D		

Std. Spec.	color		RTD/BTD
EIL spec. 6-51-0031	631 as per IS 5	C&D	Not applicable

Frequency	Frequency2	Cooling	Cable Type
±3%	50 Hz	IC401	Al. cond. XLPE insulated
±5%	60 Hz	IC511	Cu. cond. XLPE insulated
		IC611	

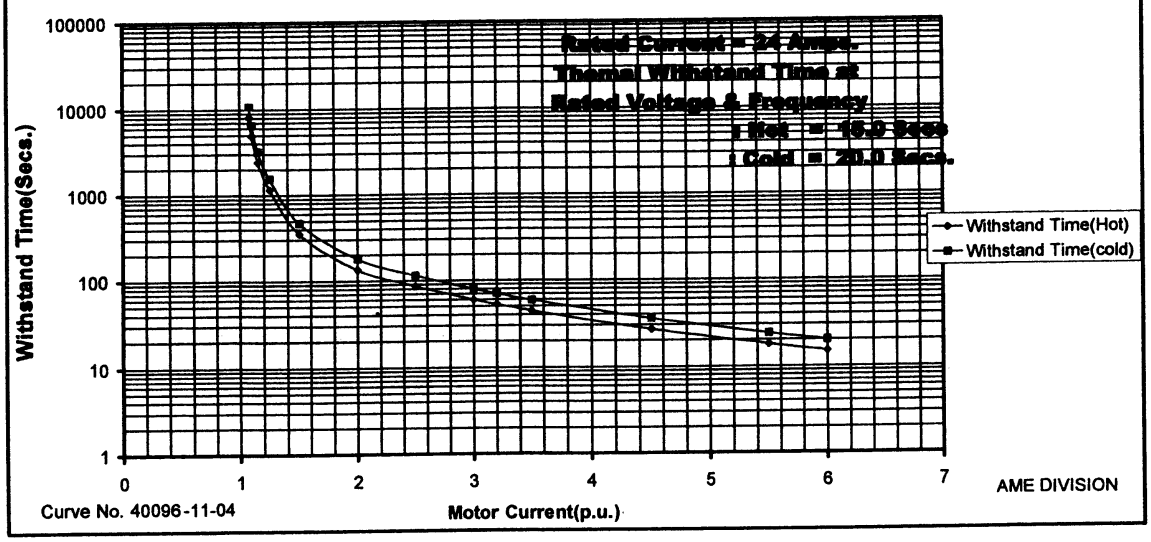
Efficiency, PF Vs Load Curves

Rating : 225 KW, 6.6 KV, 2 P , TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7502-2
W.O.No. : 40096A401-81
Customer : M/S IOCL FOR 350 MW PARADIP CCPP



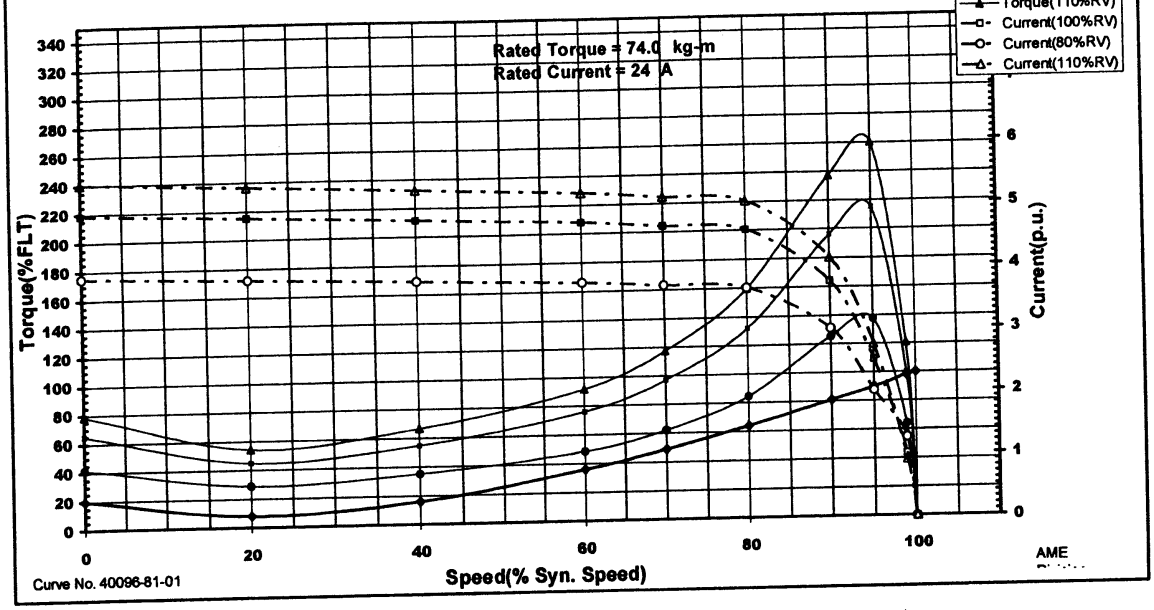
Thermal Withstand Curves

Rating : 225 KW, 6.6 KV, 2 P , TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7502-2
W.O.No. : 40096A401-81
Customer : M/S IOCL FOR 350 MW PARADIP CCPP



Torque & Current Vs Speed Curves

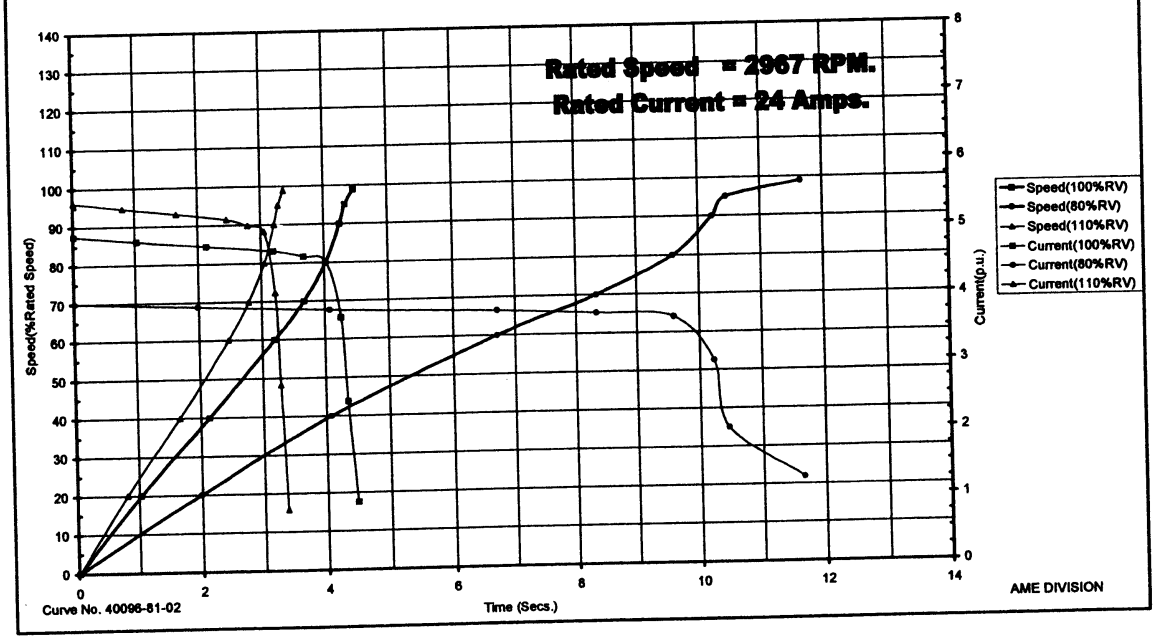
Rating : 225 KW, 6.6 KV, 2 P , TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7502-2
W.O.No. : 40096A401-81
Customer : M/S IOCL FOR 350 MW PARADIP CCPP



Curve No. 40096-81-01

Speed & Current Vs Time Curves

Rating : 225 KW, 6.6 KV, 2 P , TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7502-2
W.O.No. : 40096A401-81
Customer : M/S IOCL FOR 350 MW PARADIP CCPP

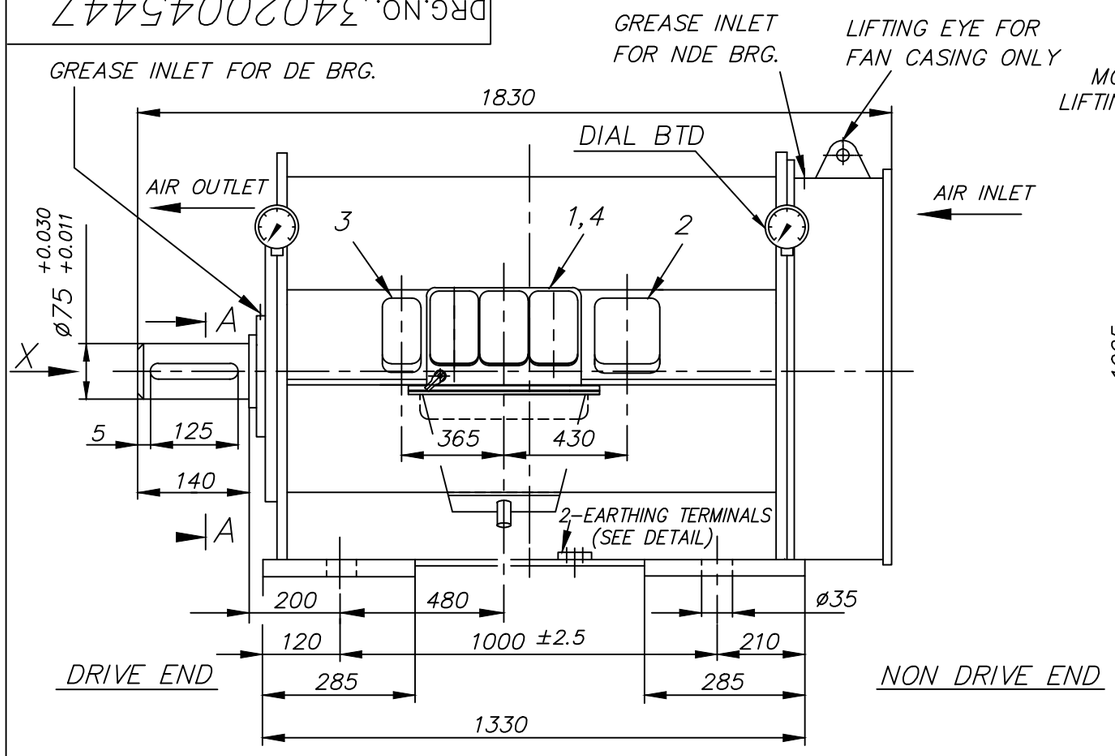


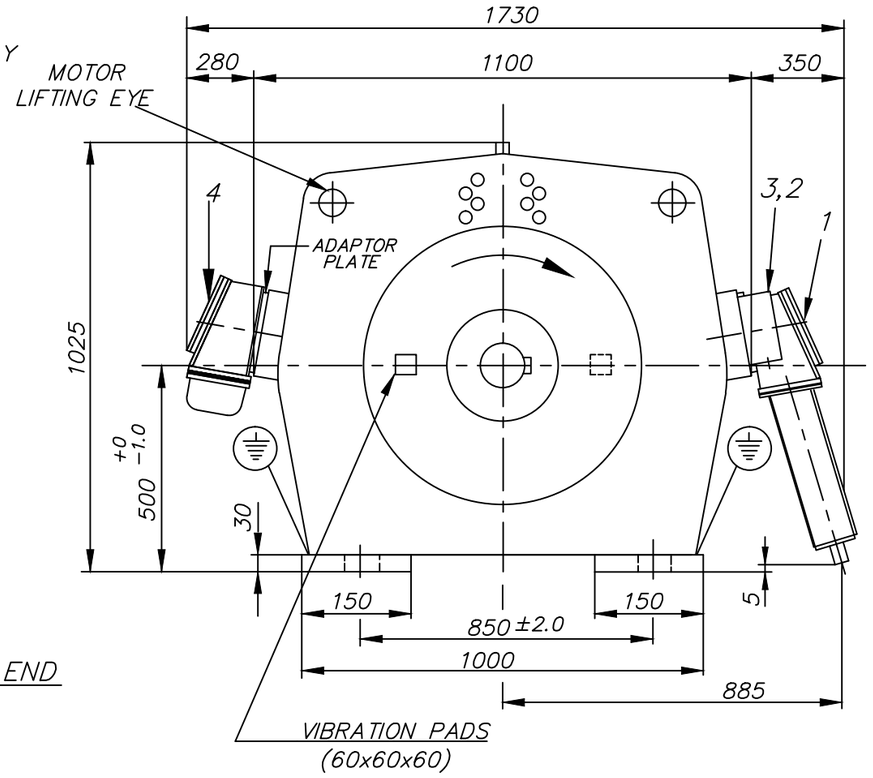
Curve No. 40096-81-02

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

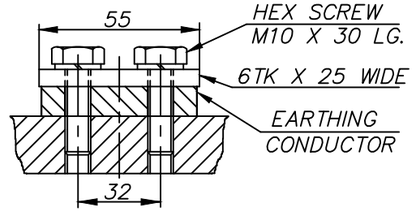
DRG.NO. 34020045447



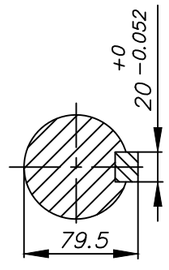


VIEW 'X'

TECHNICAL DATA		
RATING	225	kW
SPEED	2967	rpm
FULL LOAD AMP STATOR	24	AMP
VOLTAGE 3 PHASE 50 Hz	6600	VOLTS
APPROX WEIGHT OF MOTOR	2450	kg
APPROX. WEIGHT OF ROTOR	400	kg
GD 2 OF ROTOR	16	kgm 2
MAX. FOUNDATION LOADING (ALTERNATING) PER MOTOR LONGITUDINAL SIDE	2 kN UPWARDS 23 kN DNWARDS	
BEARINGS : DE NDE (HSG. INSULATED)	NU216M+6216C3 NU215M	
LUBRICATION: GREASE	SERVOGEM – 3 OR EQUIVALENT	
DIRECTION OF ROTATION VIEWED FROM DE	CLOCKWISE	
PAINT SHADE SPECIFICATION	RAL 5021	



DETAIL OF EARTHING ARRGT.



SECTION AT A-A

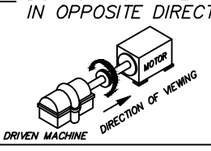
MOTOR FITMENTS

(I) TERMINAL BOXES FOR
1 – STATOR
34020045447 SH–2
2 – ETD'S+BTD'S
34020045447 SH–3
3 – SPACE HEATERS
34020045447 SH–4
4 – NEUTRAL POINT
34020045447 SH–5

(II) TEMPERATURE SENSORS
(A) WDG. ETD'S 12 Nos , 3 WIRES , SIMPLEX , PT. TYPE, 100 Ω AT 0°C
(B) BRG. RTD'S 2 Nos , 4 WIRES, DUPLEX , PT. TYPE, 100 Ω AT 0°C
(C) 2–NOS. DIAL BTD (1–EACH FOR DE & NDE BRGS.)

(III) OTHERS
SPACE HEATERS 4 Nos.
TOTAL POWER 500 WATTS
(500W,240V,50Hz. 1–ø EACH)
(2–Nos EACH AT DE & NDE)

(IV) FANS : UNI–DIRECTIONAL
CAUTION : DO NOT RUN THE MOTOR IN OPPOSITE DIRECTION.



(V) ANCHORING ITEMS
1. FOUNDATION BOLTS.
4–NOS. M30x3x1000

(VI) FOUNDATION ARRGT.
34020045447 SH–6

(VII) VIBRATION PADS
2 NOS. 1–EACH AT DE & NDE

REF. DRG. NO.

SIGN. & DATE 11.11.11

INVENTOYR NO.

ADDITIONAL INFORMATION
W.O. 40096A401–81

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1 TFX – 1
IMM – 3
TEX (IMM) – 1

TYPE OF PRODUCT: SQ CAGE INDUCTION MOTOR — DRIVE : MP FW EXP PUMP
NAME OF CUSTOMER: M/S INDIAN OIL CORPORATION LTD
NAME OF PROJECT: 350 MW, IOCL, PARADEEP CCPP
NAME OF CONSULTANT: –

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO.OF VAR.
DRN	RITA	–sd–	30.04.11	
CKD	AKASH	–sd–	30.04.11	
APPD	M.K.M	–sd–	02.05.11	

REV.	DATE	ALTERED / CHECKED / APPROVED
02	07.03.17	ALTERED PRAVIN–sd– / CHECKED AKASH –sd– / APPROVED AKASH–sd–
01	03.06.11	ALTD RITA –sd– / CHKD AKASH –sd– / APPRD M.K.M –sd–

DRAWING REVISED AS BUILT.

DOR WAS ANTICLOCWISE.
DRG. REDRAWN.

DEPT. AME | CODE 404 | UNTOL.DIMS.GR. | SCALE NTS | WEIGHT(K.G.)

REF. TO ASSY. DRG. | ITEM NO. | NO.OF ITEMS

TITLE
OUTLINE GENERAL ARRGT.
1LA7502–2P, TETV, IP55, B3

DRAWING NO. 34020045447 | REV. 02

SHEET NO. 01 | NO. OF SHEETS 06

इंजीनियर्स इंडिया लिमिटेड ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

DATA SHEET
HIGH VOLTAGE SQUIRREL CAGE INDUCTION MOTOR

Datasheet No.

PURCHASER's DATA

A.	**Site conditions**	**BHEL W.O. 40096A401-41**		REV 0 DTD. 09.05.11	
1	Ambient temperature, minimum:	°C	3	Atmospheric condition:	DUSTY, CORROSIVE
	maximum:	°C	4	Altitude:	3.91 m above sea level
	design:	45 °C	5	Location:	IOCL PARADIP
2	Relative humidity:	%	6		
B.	**Technical particulars**				
1	Motor tag no.:		17	Hazardous area classification:	SAFE
2	Driven equipment name:	HPFWE PUMP	18	Gas group:	NA
3	Voltage:	6.6 KV +- 6 %	19	Type of explosion protection:	NA
4	Phase:	Three	20	Type of ingress protection:	IP 55
5	Frequency:	50 Hz ± 3%	21	Reacceleration:	Required
6	Fault level:	40 KA	22	Diff. protection CTs:	Not Required
7	Fault duration:	0.25 Sec		CT specs.:	
8	Method of starting:	DOL	24	Color shade:	RAL5021
9	Winding connection:	Star	25	Thermisters:	No
10	No. of terminals:	6	26	RTD:	Required
11	Cable size:	3Cx185, 6.6KV(UE)	27	BTD:	Required
12	Cable type:	Al. cond. XLPE insulated	28	RTD/BTD monitoring device:	Not Required
13	Temperature rise:	75 °C	29	Applicable specification:	6-51-31 Rev 4
14	Cooling:	TETV	30	System earthing :	Resistance earthed
15	Insulation class:	F (temp rise limited to class B)			
16	Duty Cycle	S1			

DRIVEN EQUIPMENT MANUFACTURER's DATA

1	Suggested motor rating:	855 kW	9	Coupling type:	Flexible
2	Manufacturer:	BPCL NAINI	10	Torque required, starting:	56 mkg
3	Type of driver mounting:	HORIZONTAL	11	maximum:	280 mkg
4	Driven equipment:	PUMP	12	GD^2 of equipment	3.1 kgm^2
5	Shaft kW:	kW			kgm^2
6	kW at maximum load:	kW	13	Maximum thrust:	NA kg
7	Speed:	2969.00 RPM	14	Pulsation rate:	NA
8	Rotation of eqpt. from coupling end:	CW	15	Starting condition:	OPEN VALVE

MOTOR MANUFACTURER's DATA

1	Rating:	855	17	Space heater - voltage & power:	240 V / 800 W
2	Manufacturer:	BHEL BHOPAL	18	Moment of inertia, GD^2:	108 kgm^2
3	Frame designation:	1LA7714-2	19	DE/NDE brg type & no.:	SLEEVE DIA 100 / 100
4	No. of poles:	2	20	Type of lubrication:	FOLS
5	Full load speed:	2969 RPM	21	Type of main terminal box:	PSTB
6	Mounting:	HORIZONTAL	22	Type of neutral terminal box:	PSTB
7	Full load torque (FLT):	280 mkg	23	Weight of motor:	6500 kg
8	Starting torque:	80 % of FLT	24	Thermisters, quantity:	NA no.
9	Break down or pull out torque:	220 % of FLT		make: type:	NA
10	Full load current (FLC):	88 A	25	RTD, quantity:	12 no.
11	Starting current at 100% voltage:	500% FLC including +ve tol.		make: type:	SIMPLEX
12	Rotation viewed from coupling end:	ACW	26	BTD, quantity:	2 no.
13	Starting time at80%/100% voltage:	10.7 / 4.9 sec.		make: type:	DUPLEX
14	Locked rotor withstand time (cold/hot) at,		27	Shaft voltage:	Below 250 mV
	80% voltage:	31 / 23 sec.	28	Critical speed, 1st/2nd stage:	2100 rpm / above 3800 r
	100% voltage:	20 / 15 sec.	29	Pressurization panel:	○ Applicable ◉ Not applicable
15	Efficiency at 75%/100% voltage:	94.3 / 94.8 %		make: type:	NA
16	P.F. at starting/75%/100% load	0.16 / 0.88 / 0.90	30	Canopy: (GRP)	No

1. Recommended list of maintenance spares for two years operation shall include following as minimum.
a) Bearing De/NDE - one set b) Terminal box cover with screws c) Cooling fan
d) Insulator/terminal block for terminal boxes e) Bearing assembly (DE/NDE)
2. Starting time calculations shall be based on operating conditions specified in material requisition e.g., open valve condition / closed valve condition at no load/ under load as applicable.
3. All commissioning spares and special tools and tackles required for the motor shall be suplied with motor without extra cost
4. Canopy not in BHEL Bhopal scope.

Rev.	Date	Purpose	Prepared	Checked	Approved
		Issued with MR			

1 2 3
1

1134

Atmospheric condition
Humid & highly corrosive

Altitude
< 1000 m
> 1000 m

Location
Outdoor
Indoor

Voltage
3.3 kV
6.6. kV
11 kV

Voltage
±6%
±10%

Duty
Continuous

Fault level
20 kA
25 kA
40 kA
N.A.

Starting method
D.O.L.
V.S.D.
Star-delta
Auto transformer

Earthing
Direct
Resistance

No.of terminals
3
4
6

Insulation Class
B
F
H
C

Area Class
Zone 1
Zone 2
Divn. 1
Divn. 2

Gas group
IIA
IIB
IIC
IIB/IIC
A
B
C
D
C&D

Area Classification
Ex(n)
Ex(e)
Ex(d)

IP
IP 23
IP 44
IP 55

Std. Spec.
EIL spec. 6-51-0031

color
631 as per IS 5

RTD/BTD
Not applicable

Frequency
±3%
±5%

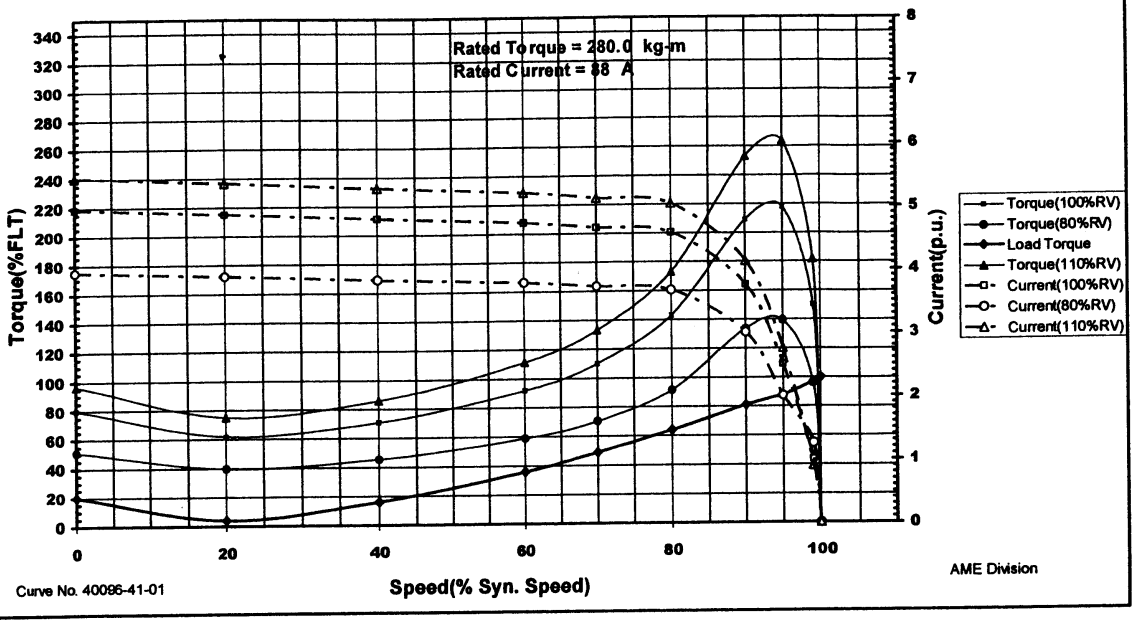
Frequency2
50 Hz
60 Hz

Cooling
IC401
IC511
IC611

Cable Type
Al. cond. XLPE insulated
Cu. cond. XLPE insulated

Torque & Current Vs Speed Curves

Rating : 855 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7714-2
W.O.No. : 40096A401-41
Customer : M/S IOCL FOR 350 MW PARADIP CCPP

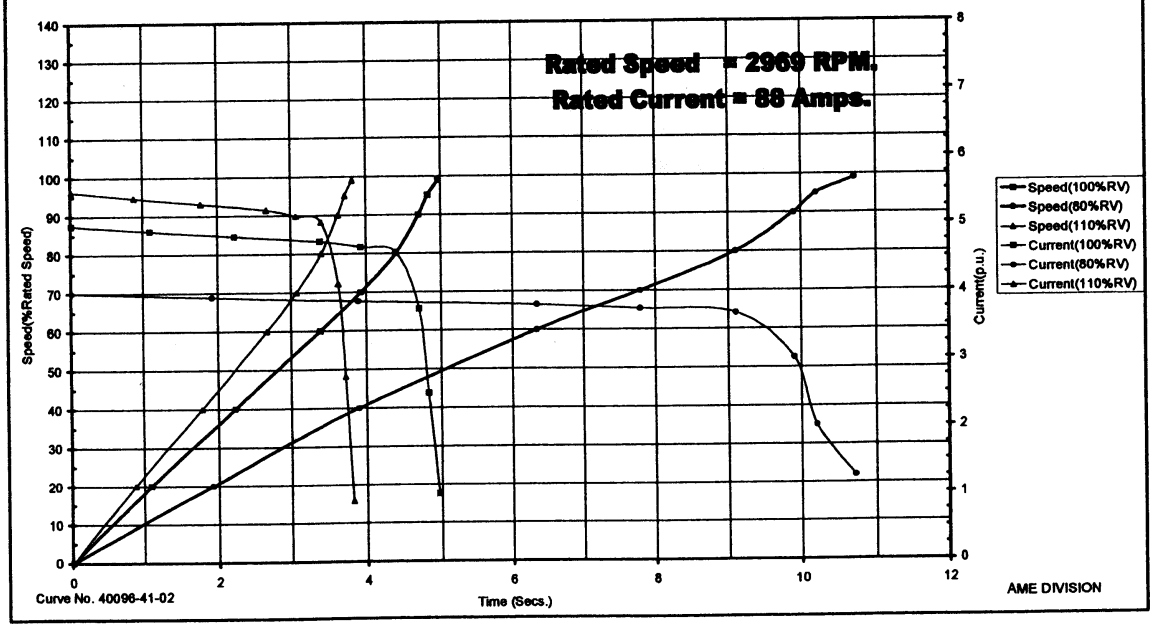


Curve No. 40096-41-01

AME Division

Speed & Current Vs Time Curves

Rating : 855 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7714-2
W.O.No. : 40096A401-41
Customer : M/S IOCL FOR 350 MW PARADIP CCPP

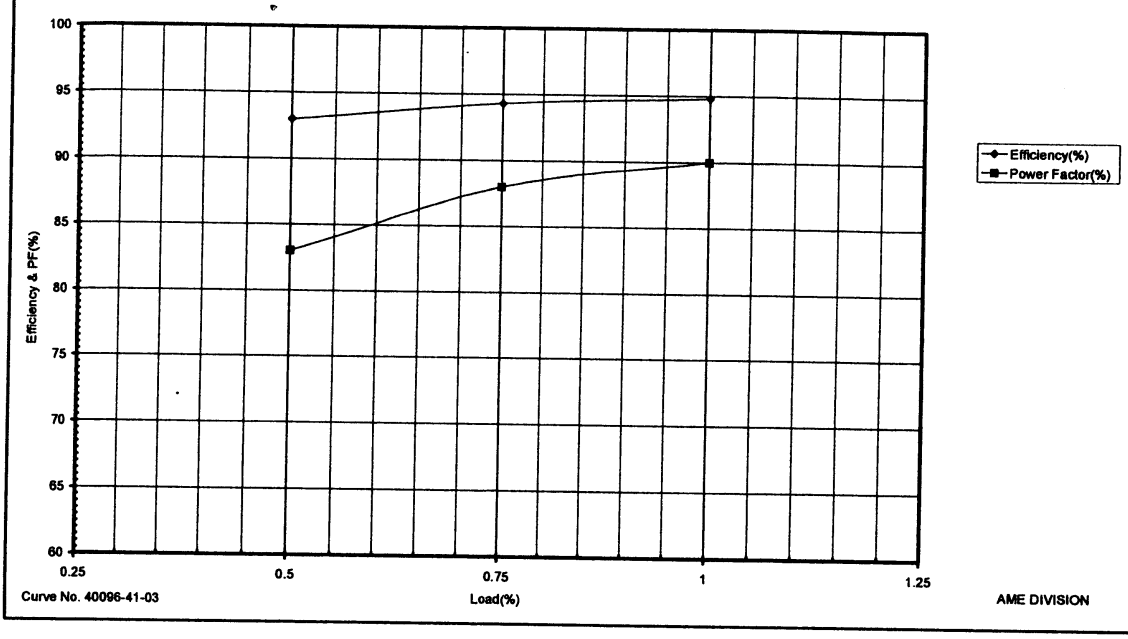


Curve No. 40096-41-02

AME DIVISION

Efficiency, PF Vs Load Curves

Rating : 855 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7714-2
W.O.No. : 40096A401-41
Customer : M/S IOCL FOR 350 MW PARADIP CCPP

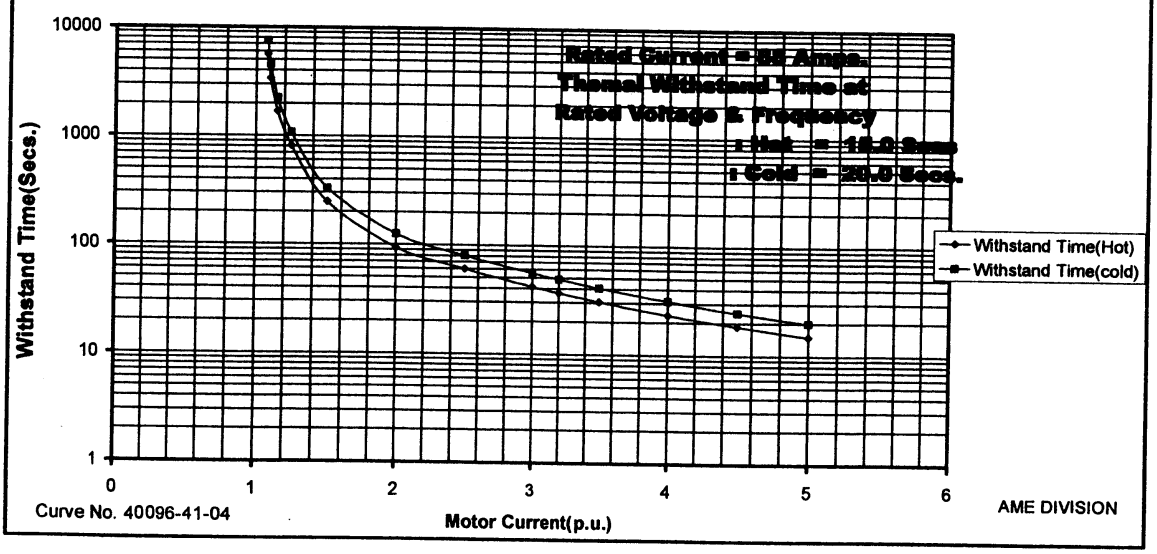


Curve No. 40096-41-03

AME DIVISION

Thermal Withstand Curves

Rating : 855 KW, 6600 V, 2 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7714-2
W.O.No. : 40096A401-41
Customer : M/S IOCL FOR 350 MW PARADIP CCPP



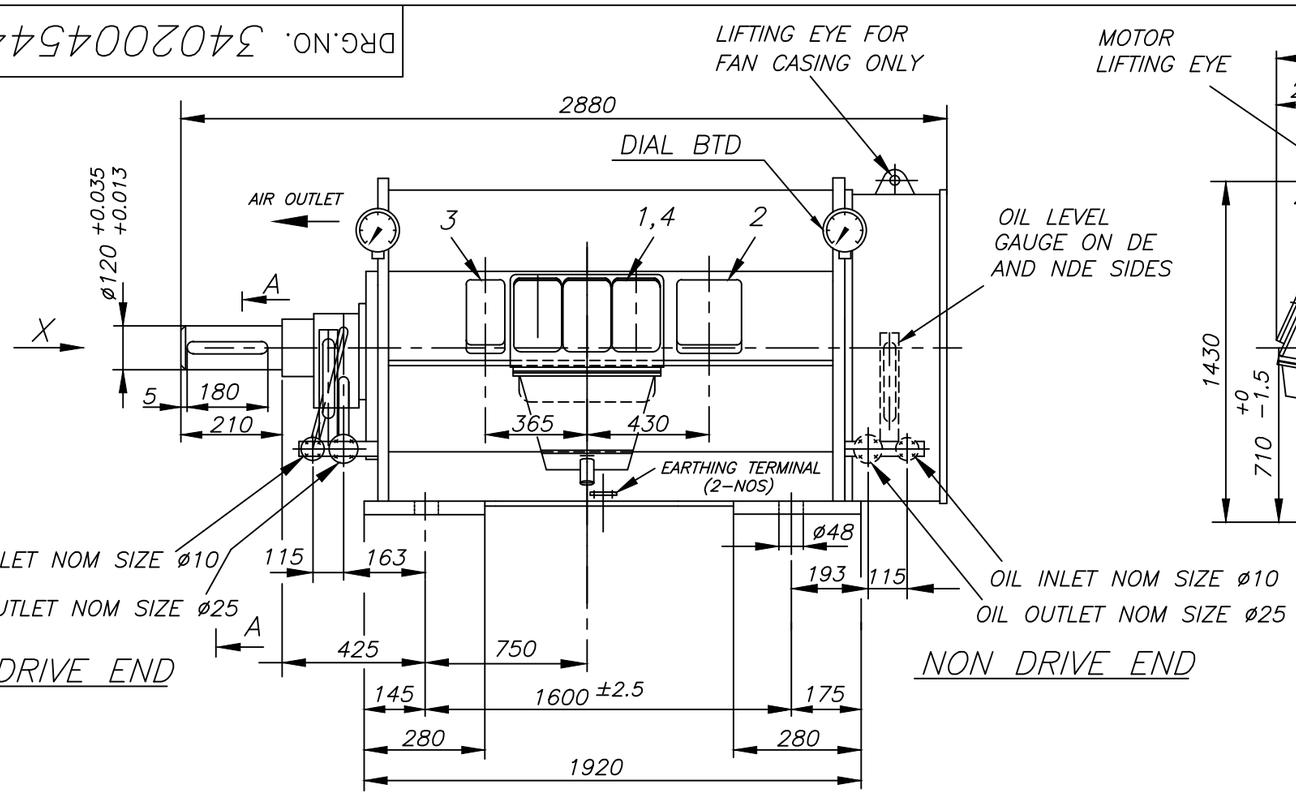
Curve No. 40096-41-04

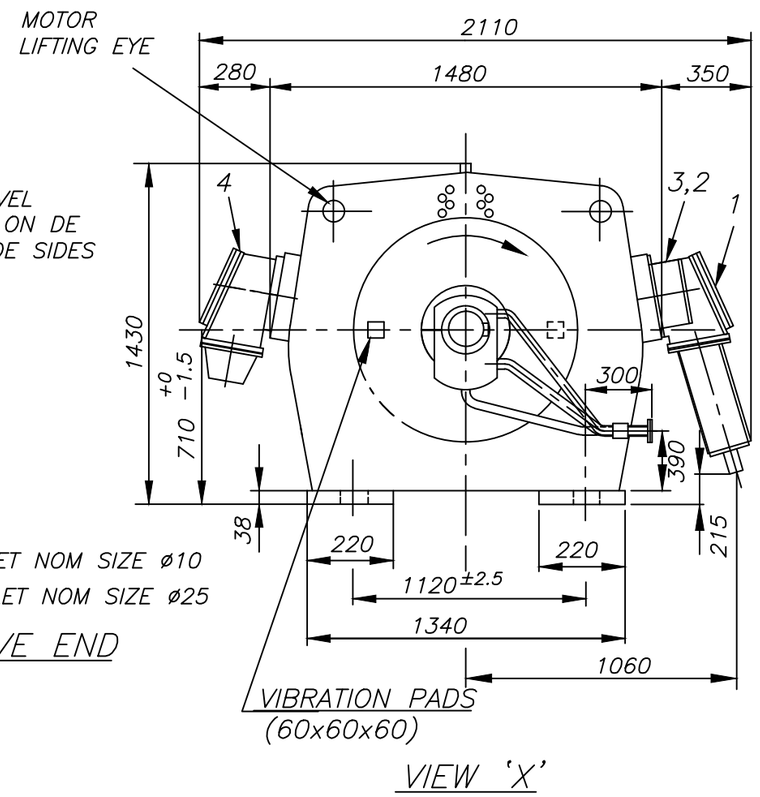
AME DIVISION

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG.NO. 34020045446





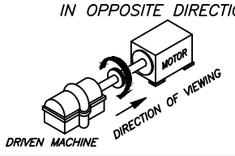
MOTOR FITMENTS

(I) TERMINAL BOXES FOR
1 – STATOR
34020045446 SH–2
2 – ETD'S+BTD'S
34020045446 SH–3
3 – SPACE HEATERS
34020045446 SH–4
4 – NEUTRAL POINT
34020045446 SH–5

(II) TEMPERATURE SENSORS
(A) WDG. ETD'S 12 Nos, 3 WIRES, SIMPLEX, PT. TYPE, 100 Ω AT 0°C
(B) BRG. RTD'S 2 Nos, 3 WIRES, DUPLEX, PT. TYPE, 100Ω AT 0°C
(C) 2–NOS. DIAL BTD (1–EACH FOR DE & NDE BRGS.)

(III) OTHERS
SPACE HEATERS 4 Nos.
TOTAL POWER 800 WATTS
(800W, 240V, 50Hz. 1–ø EACH)
(2–Nos EACH AT DE & NDE)

(IV) FANS : UNI–DIRECTIONAL
CAUTION : DO NOT RUN THE MOTOR IN OPPOSITE DIRECTION.



(V) ANCHORING ITEMS
1. FOUNDATION BOLTS.
4–NOS. M42x3x1000

(VI) FOUNDATION ARRGT.
34020045446 SH–7

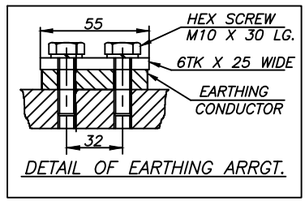
(VII) VIBRATION PADS
2–NOS., 1–EACH AT DE & NDE.

TECHNICAL DATA

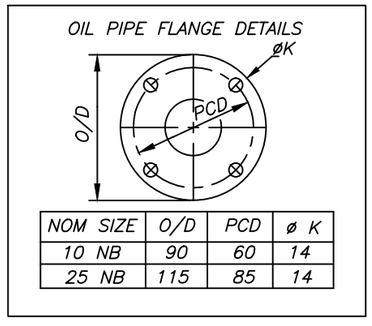
RATING	855	kW
SPEED	2969	rpm
FULL LOAD AMP STATOR	88	AMP
VOLTAGE 3 PHASE 50 Hz	6600	VOLTS
APPROX WEIGHT OF MOTOR	7050	kg
APPROX. WEIGHT OF ROTOR	1250	kg
GD² OF ROTOR	108	kgm²
MAX. FOUNDATION LOADING (ALTERNATING) PER MOTOR LONGITUDINAL SIDE	15 kN UPWARDS 85 kN DNWARDS	
BEARINGS (HSG. INSULATED) : DE : NDE	SLEEVE – ø125 SLEEVE – ø100	
LUBRICATION: OIL	IOC SERVO PRIME 46	
MAX. OIL FLOW : AT DE AT NDE	2.5–LPM/BRG 2.5–LPM/BRG	
OIL PRESSURE MIN./MAX.	0.2 BAR MAX.	
VIEWED FROM DE DIRECTION OF ROTATION	CLOCKWISE	
PAINT SHADE SPECIFICATION	RAL 5021	

NOTES:–

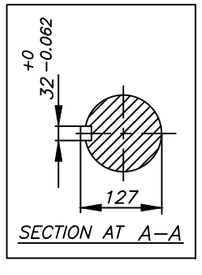
1. MOTOR ROTOR HAS A FLOAT OF TOTAL ±3.5 (TOTAL 7 MM). THE ROTOR HAS TO BE AXIALLY RESTRAINED BY LOCATING BEARING IN THE DRIVEN MACHINE OR GEARING. IT IS THEREFORE REQUIRED THAT ONLY A COUPLING WITH RIGIDLY LIMITED AXIAL PLAY OF (±0.5....±1) IS PROVIDED. REFER DRG. NO. 34020045446 SHT–6
2. MOTOR SHOULD BE RUN IN SPECIFIED DIRECTION OF ROTATION ONLY.
3. FOLS IN BHEL BHOPAL SCOPE OF SUPPLY.



DETAIL OF EARTHING ARRGT.



NOM SIZE	O/D	PCD	ø K
10 NB	90	60	14
25 NB	115	85	14



SECTION AT A–A

ADDITIONAL INFORMATION
W.O. 40096A401–41

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1 TFX – 1
IMM – 3
TEX (IMM) – 1

TYPE OF PRODUCT — SQ CAGE INDUCTION MOTOR
NAME OF CUSTOMER — M/S INDIAN OIL CORPORATION LTD
NAME OF PROJECT — 350 MW, IOCL, PARADEEP CCPP
NAME OF CONSULTANT — –
DRIVE : HP FW EXP PUMP

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO.OF VAR.
DRN	RITA	–sd–	30.04.11	
CKD	AKASH	–sd–	30.04.11	
APPD	M.K.M	–sd–	02.05.11	

REV.	DATE		
03	07.03.17	ALTERED PRAVIN	–sd–
		CHECKED AKASH	–sd–
		APPROVED AKASH	–sd–

DRAWING REVISED AS BUILT.

REV.	DATE		
02	04.07.11	ALTD PRAVIN	–sd–
		CHKD AKASH	–sd–
		APPRD M.K.M	–sd–

BRG. RTD'S DETAIL & NOT 3 MODIFIED. DRG. REDRAWN.

REV.	DATE		
01	03.06.11	ALTD RITA	–sd–
		CHKD AKASH	–sd–
		APPRD M.K.M	–sd–

MOTOR FRAME SIZE WAS 1LA7712–2, DIMENTIONS & RELATIVE DATA MODIFIED ACCORDINGLY. DOR WAS ANTICLOCKWISE. NOTE 1 & 3 MODIFIED. DRG. REDRAWN.

DEPT. AME
CODE 404
UNTOL.DIMS.GR.
SCALE NTS
WEIGHT(K.G.)
REF. TO ASSY. DRG.
ITEM NO.
NO.OF ITEMS

TITLE
OUTLINE GENERAL ARRGT.
1LA7714–2, TETV, IP55, B3

DRAWING NO. 34020045446
REV. 03
SHEET NO. 01
NO. OF SHEETS 07

11.11.11
SIGN. & DATE

REF. DRG. NO.

INVENTOYR NO.

PURCHASER's DATA

A	**Site conditions**				
1	Ambient temperature, minimum :	11.3 ℃	3	Atmospheric condition :	Humid & highly corrosive
	maximum :	42.4 ℃	4	Altitude :	< 1000 m
	design :	45 ℃	5	Location :	Outdoor
2	Relative humidity:	99.7 %	6		
B	**Technical particulars**				
1	Motor tag no :		17	Hazardous area classification :	SAFE
2	Driven equipment name :	UB BFP	18	Gas group :	NA
3	Voltage :	6.6 kV ± 6%	19	Type of explosion protection :	NA
4	Phase :	Three	20	Type of ingress protection :	IP55
5	Frequency :	50 Hz ± 3%	21	Reacceleration ☐ Required	☒ Not required
6	Fault level :	40 kA	22	Diff. protection CTs : ☒ Required	☐ Not required
7	Fault duration :	0.25 sec.	23	CT specs. : 600/1 A,6.6KV,PS,Vk>=15Rct+100, 30mA at Vk/2	
8	System earthing :	Resistance	24	Color shade :	RAL 5021
9	Duty :	Continuous (S1)	25	Thermisters ☐ Required	☒ Not required
10	Method of starting :	DOL	26	RTD : ☒ Required	☐ Not required
11	Cable size :	1RX1CX500 mm2, Al / Phase	27	BTD : ☒ Required	☐ Not required
12	Cable type :	Armoured ,AL,XLPE Cable	28	RTD / BTD monitoring device : RTD & BTD leads will be terminated in RTD/BTD terminal box for further connections. Monitoring Device is not in our scope	
13	Temperature rise :	82℃(above inlet cold water) as per IEC60034-1 Table 7 & Table 9			
14	Cooling :	CACW (IC81W)		RTD / BTD make : Reputed (BHEL approved supplier)	
15	Insulation class :	Class F(Temp. rise limited to B)	29	Applicable specification : EIL spec. 6-51-0031 (Rev.04)	
16				IS:325	

DRIVEN EQUIPMENT MANUFACTURER's DATA

1	Suggested motor rating :	4100 kW	9	Coupling type :	Hydraulic Coupling + Gear Box
2	Manufacturer :	BHEL, Hyderabad	10	Torque required Starting :	425 Kg-m
3	Type of driver mounting :	Horizontal	11	Maximum :	2230 Kg-m
4	Driven equipment :	UB BFP	12	GD^2 of eqpt. Including flywheel :	24.78 $Kg-m^2$
5	Shaft kW :(Max Torque at 100% for BFP + Hydraullic Coupling) 3223 kW			Excluding flywheel :	
6	kW at maximum load :	3223 kW	13	Maximum thrust :	NA
7	Speed :	1485 RPM	14	Pulsation rate :	NA
8	Rotation of equipment from coupling end :(Main DE)	CW	15	Starting condition :	DOL on Full Load

MOTOR MANUFACTURER's DATA

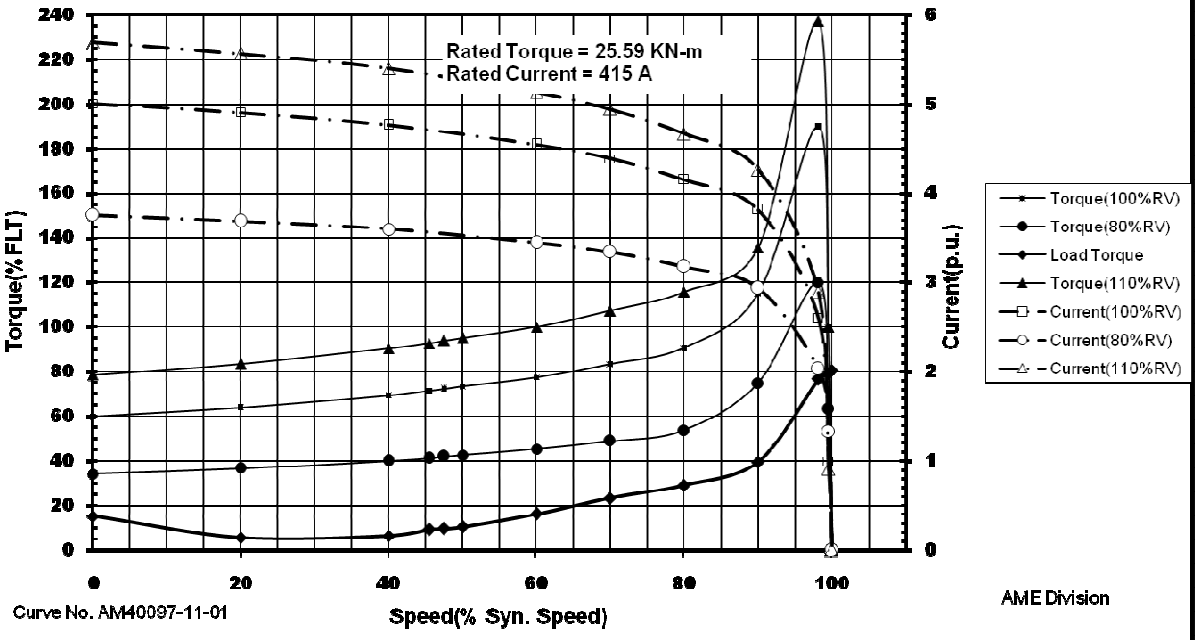
1	Rating :	4100 kW	17	Space heater - voltage & power :	240V, 1Ph, 1200W
2	Manufacturer :	BHEL Bhopal	18	Moment of inertia (GD^2) :	476 $Kg-m^2$
3	Frame designation :	1RN7716-4	19	DE/NDE bearing type & no. :	Sleeve(1+1)
4	No. of poles :	4	20	Type of lubrication :	FOLS (not in Motor's scope of supply)
5	Full load speed :	1492 RPM	21	Type of main terminal box :	PSTB
6	Mounting :	Horizontal	22	Type of neutral terminal box :	Non-PSTB with CT (3 in NTB)
7	Full load torque :	2608 Kg-m	23	Weight of motor :	Refer OGA Kg
8	Starting torque :	60% of FLT	24	Thermisters,	Qty. : NO
9	Break down or pull out torque :	195% of FLT		Make : NA	Type : NA
10	Full load current :	415.0 A	25	RTD,	Qty. : 12 nos.
11	Starting current at 100% voltage :	500%FLC (Inclusive of Tol.)		Make : Reputed	Type : PT100, Simplex, 3 WIRE
12	Rotation viewed from coupling end :	CCW (from Main DE)	26	BTD,	Qty. : 2 nos.
13	Starting time at 80% / 100% voltage :	2.9 / 1.4 sec.		Make : Reputed	Type : PT100, Duplex, 4 WIRE
14	Locked rotor withstand time (cold /hot) at,		27	Shaft voltage :	< 250 mV (NDE bearing is insulated)
	80% voltage :	32 / 25 sec.	28	Critical speed, 1st / 2nd stage :	> 2160 RPM
	100% voltage :	19 / 15 sec.	29	Pressurization panel : ☐ Applicable	☒ Not Applicable
15	Efficiency at 75%/100% load :	96.7 / 97.0 %		Make : NA	
16	Power factor at starting / 75%/100% load :	0.12 / 0.88 / 0.89	30	Canopy :	Not Applicable

1. Recommented list of maintainence spares for two years operation shall include the following as minimum:
   a) Bearings(DE/NDE), b) Terminal Box cover with screws, c) Fan, d) Terminal Block
2. Starting time calculations shall be based on operating conditions specified in material requitione.g,open valve condition/closed valve condition at no load/ under load as applicable.

Rev.	Date	Purpose	Prepared	Checked	Approved
A	21.06.11	ISSUED WITH BIDS	RSA	RS	AK

Torque & Current Vs Speed Curves

Rating : 4000 KW, 6.6 kV, 4 P , CACW, Cage Rotor Asyn. Motor.
Frame : 1RN7 716-4.
W.O.No. : 40097A421-11
Customer : Indian Oil Corporation Ltd.
Project : 350MW, IOCL Paradeep CCPP

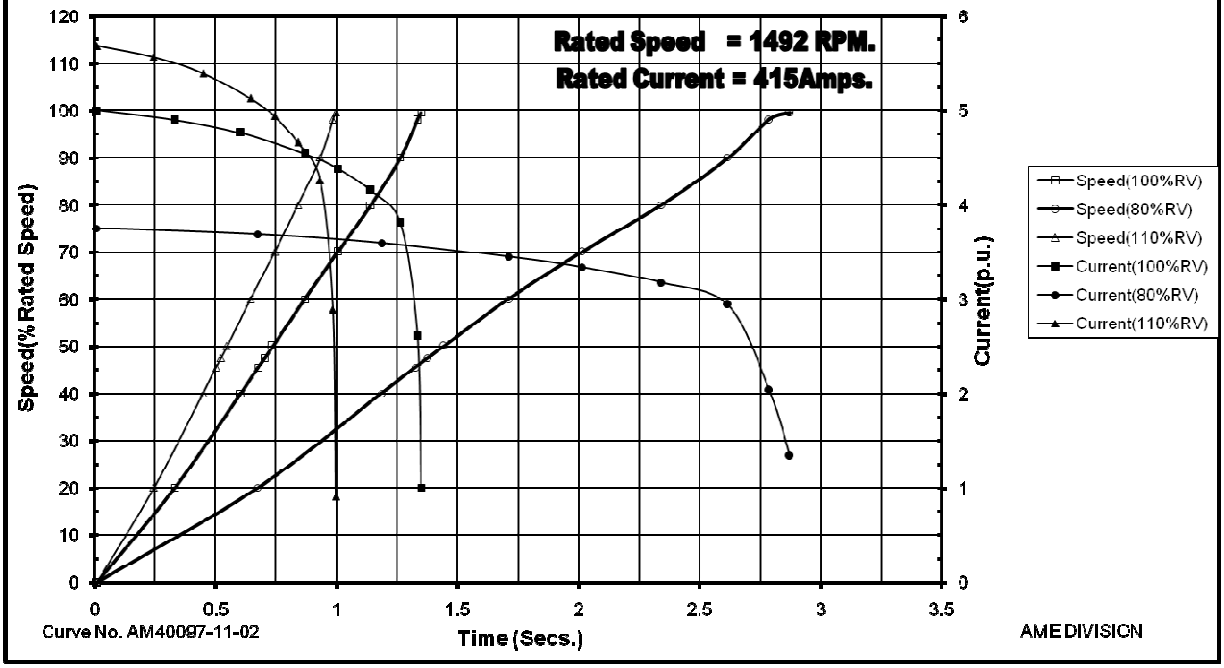


Curve No. AM40097-11-01

AME Division

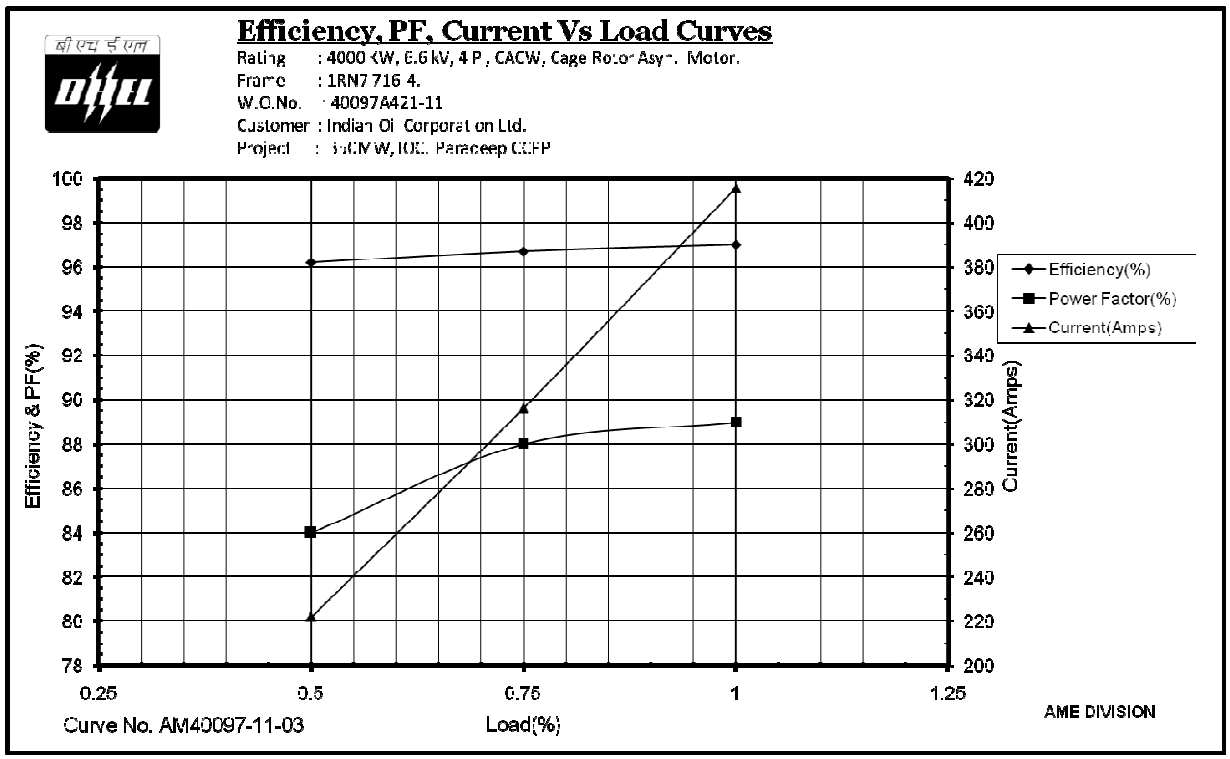
Speed & Current Vs Time Curves

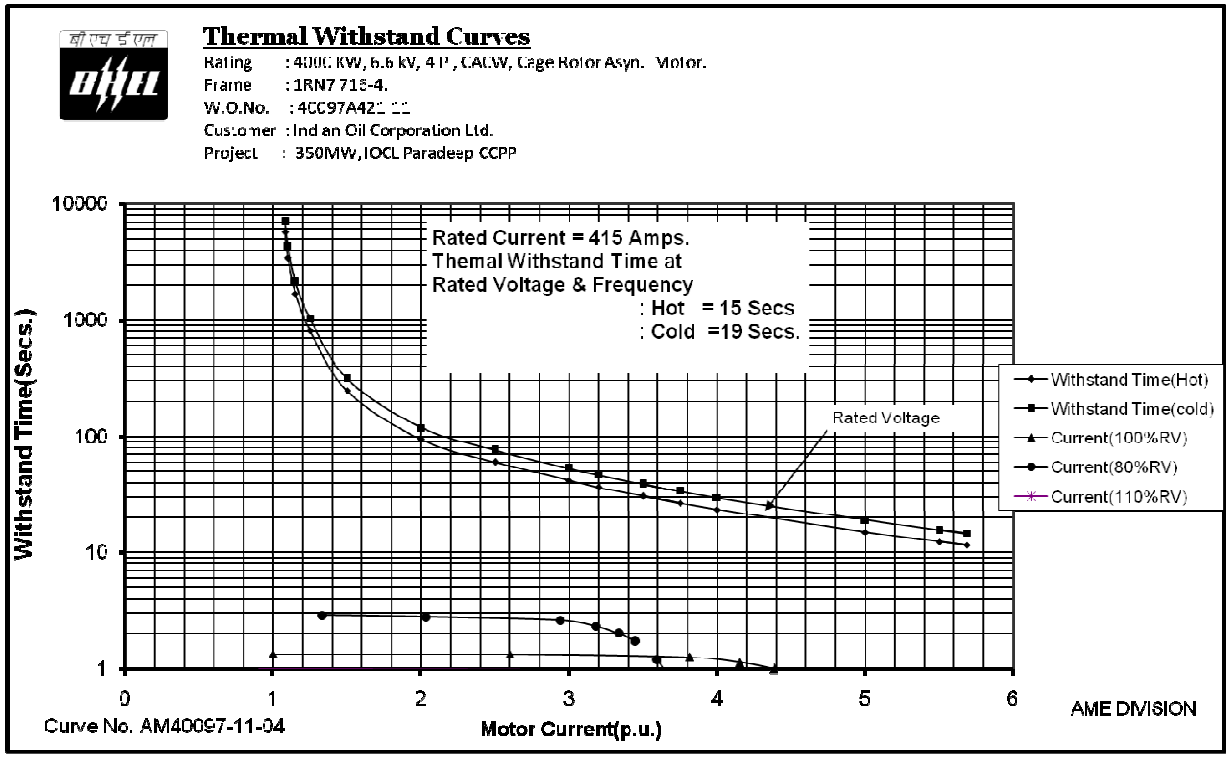
Rating : 4000 KW, 6.6 kV, 4 P , CACW, Cage Rotor Asyn. Motor.
Frame : 1RN7 716-4.
W.O.No. : 40097A421-11
Customer : Indian Oil Corporation Ltd.
Project : 350MW, IOCL Paradeep CCPP



Curve No. AM40097-11-02

AME DIVISION


Efficiency, PF, Current Vs Load Curves
Rating : 4000 KW, 6.6 kV, 4 P, CACW, Cage Rotor Asyn. Motor.
Frame : 1RN7 716 4.
W.O.No. : 40097A421-11
Customer : Indian Oil Corporation Ltd.
Project : 350MW, IOCL Paradeep CCPP
Efficiency & PF(%)
Current(Amps)
Load(%)
Efficiency(%)
Power Factor(%)
Current(Amps)
Curve No. AM40097-11-03
AME DIVISION


Thermal Withstand Curves
Rating : 4000 KW, 6.6 kV, 4 P, CACW, Cage Rotor Asyn. Motor.
Frame : 1RN7 716-4.
W.O.No. : 40097A421-11
Customer : Indian Oil Corporation Ltd.
Project : 350MW, IOCL Paradeep CCPP
Rated Current = 415 Amps.
Thermal Withstand Time at
Rated Voltage & Frequency
: Hot = 15 Secs
: Cold =19 Secs.
Rated Voltage
Withstand Time(Secs.)
Motor Current(p.u.)
Withstand Time(Hot)
Withstand Time(cold)
Current(100%RV)
Current(80%RV)
Current(110%RV)
Curve No. AM40097-11-04
AME DIVISION

FIRST ANGLE PROJECTION

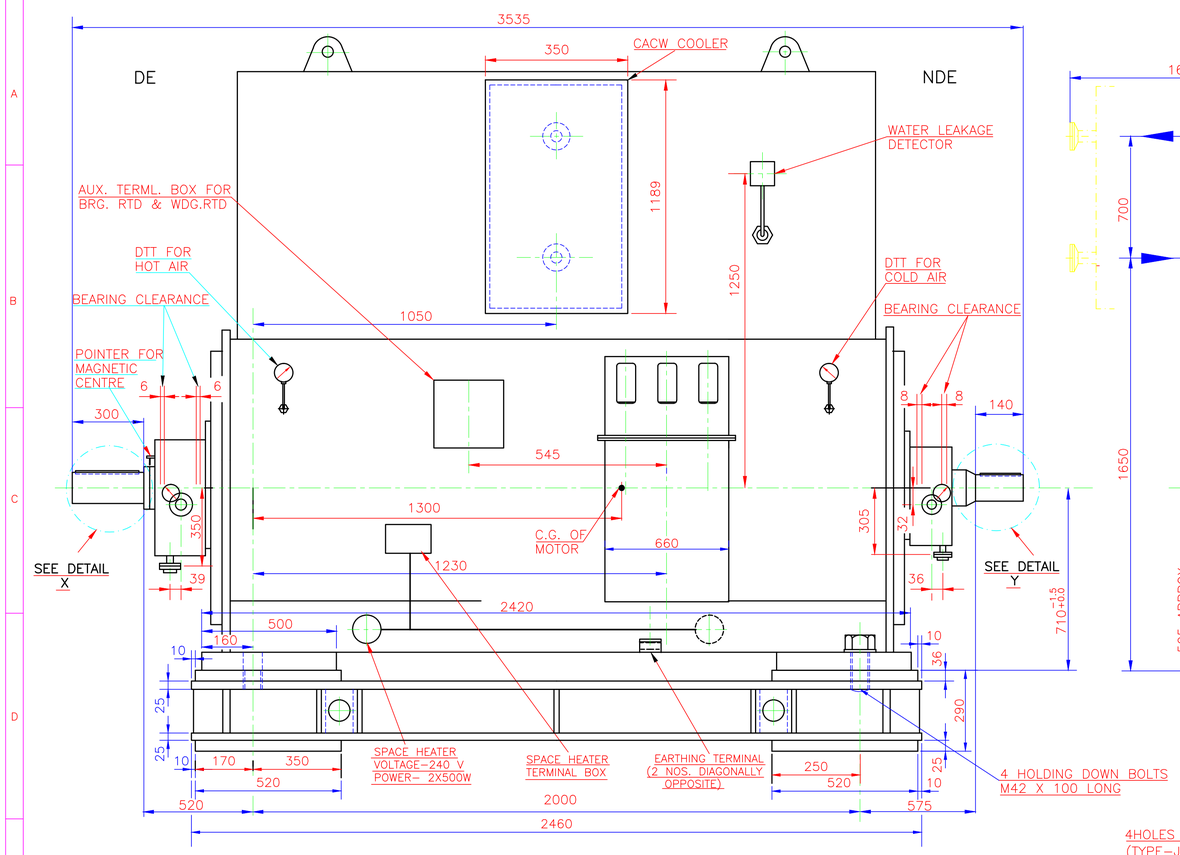
(ALL DIMENSIONS ARE IN mm.)

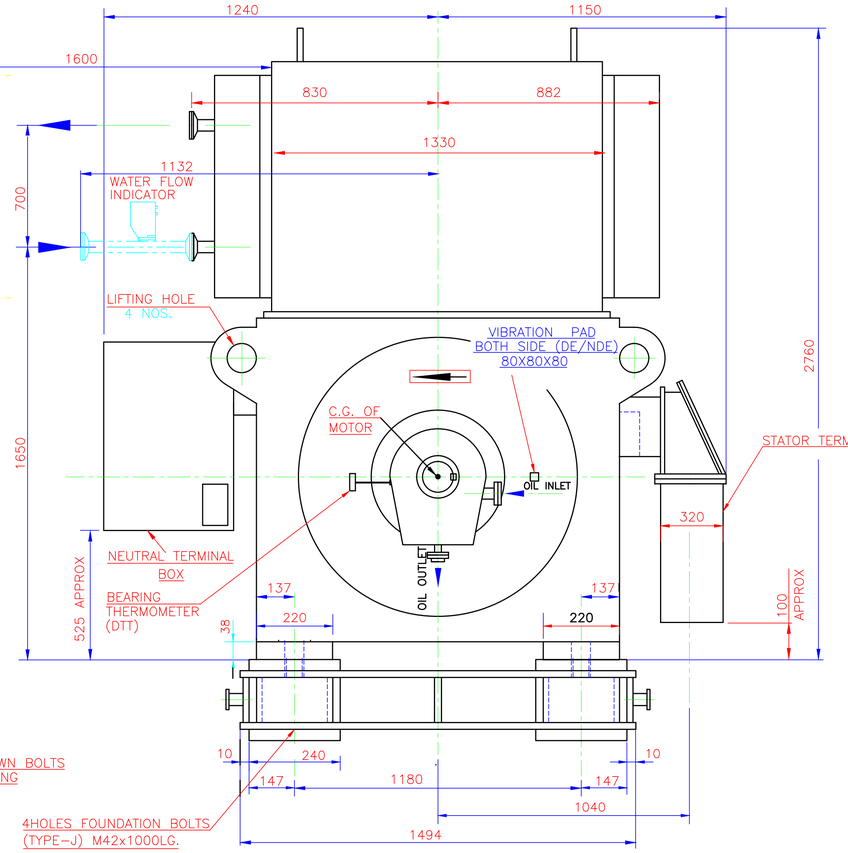
DRG. NO. 1 402 00 41018

REF. DRG. NO. 1402004049 1

SIGN & DATE

INVENTORY NO.





ADDITIONAL DRGS.	
STATOR TERMINAL BOX (PSTB)	40097–11–01
NEUTRAL TERMINAL BOX	40097–11–02
AUX.TERMINAL BOX FOR RTD & BTD	40097–11–03
AUX.TERMINAL BOX FOR SPACE HEATER	40097–11–04
C.T. SECONDARY TERMAL. BOX	40097–11–05

OIL FOR BEARING	
PRESSURE OF OIL 'bar'	0.3–0.5
REQUIREMENT OF OIL FOR BOTH BEARINGS (lit/min)	DE 6.6, NDE 3.3
TYPE OF LUBRICATION OIL	IOC VG 32

BEARING DATA	DE	NDE
BEARING SIZE	ø160X140	ø125X115

WEIGHT (kg)	
ROTOR	3000
COOLER	1600
MOTOR	13360

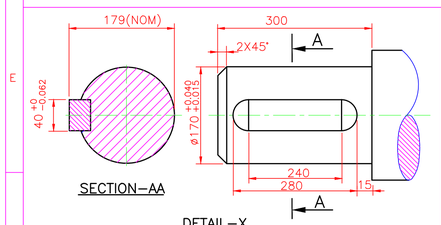
WATER FOR COOLER	
PRESSURE DROP ACROSS COOLER	4.85 FEET W.G.
TEMP. RISE OF WATER ACROSS COOLER	5°C
MAX. INLET TEMP. OF WATER (0°C)	36
MAX. PRESSURE OF WATER Kg/cm²	8
TOTAL REQUIREMENT OF WATER	400 lit/min

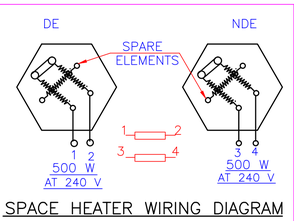
TEMPERATURE MONITORING

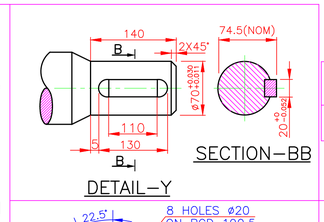
MAX. CONTINUOUS OPERATING TEMPERATURE AND TEMPERATURE MEASURING DEVICES MOUNTED BY BHEL

DESCRIPTION	STATOR WDG.	DE BRG	NDE BRG	AIR
MAX. CONTINUOUS OPERATING TEMP. (Deg.C)	120	80	80	
RESISTANCE THERMOMETER SIMPLEX Pt 100, 3 WIRE	12	–	–	
DUPLEX RTD Pt 100, 3WIRE	–	1	1	
DIAL TYPE THERMOMETER	–	1	1	1 COLD 1 HOT

RECOMMENDED PRACTICE FOR SETTING OF THE SWITCH POINT
STATOR WINDING & BEARINGS: 1–SWITCH POINT (WARNING) 5°C; 2–SWITCH POINT (SHUT DOWN) 10°C ABOVE OPERATING TEMPERATURE





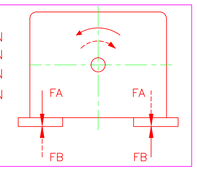


MACHINE	DRIVE	DIRECTION OF ROTATION	FRAME	KW	VOLTS	CURRENT AMP.	SPEED (RPM)	PF	FREQUENCY (HZ)	ENCLOSURE	COOLING	ROTOR GD²	DEGREE OF PROTECTION	PHASE	CLASS OF INSULATION/RISE	EFFICIENCY
SQ.CAGE IND.MOTOR	BF PUMP	(ANTI CLOCKWISE FROM DE)	1RN7716–4	4100	6600	415	1492	0.89	50	CACW	IC81W	476 Kgm²	IP55	3	F /B	97.0%

FOUNDATION LOAD

MAX. FORCE CALCULATED FROM THE MAX. IMPULES TORQUE – FM = 207 kN
FORCE EXERTED BY THE WEIGHT ON EACH SIDE–––––––– FG = 69 kN
FOUNDATION LOAD ON EACH SIDE COMPRESSION–– FA = FM+FG = 276 kN
TENSILE FORCE–––––––––––––––––––––– FB = FM–FG = 138 kN

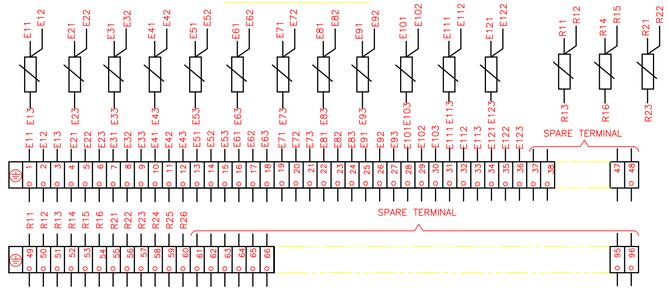
THE FORCE OCCUR ALTERNATIVELY INDEPENDENT OF THE DIRECTION OF ROTATION.

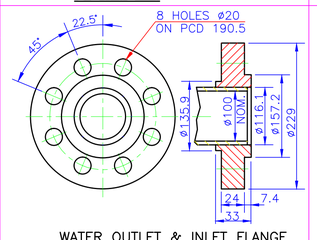


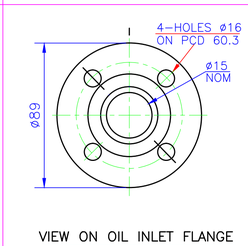
1	2	3	4	5	6	7	8	9	10	11	12	PHASE
2	8	14	20	26	32	38	44	50	56	62	68	SLOT NOS.

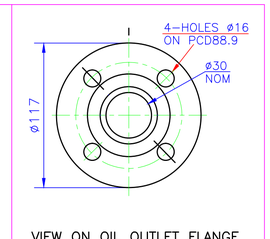
DUPLEX BRG. THERMOMETER (RTD)
D.E. N.D.E.

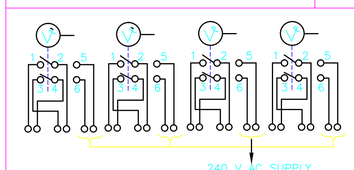
STATOR WINDING RTD

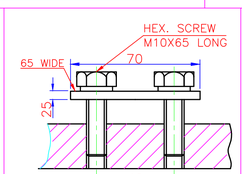


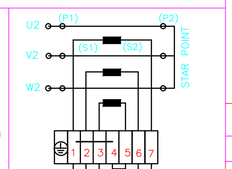












TECH. REQUIREMENTS:–

1. ANY MACHINE OR OTHER ITEMS OF DRIVING EQUIPMENT OR ANY OTHER ITEMS OR EQUIPMENT INSTALLED AT NDE MUST NOT SHORT CIRCUIT THE BRG. INSUL.
2. MACHINE TERMINAL CONN.FOR COUNTER CLOCKWISE ROTATION (LOOKING FROM DE):– MACHINE TERMINALS U,V,W SHALL BE CONNECTED TO SYSTEM PHASES B , Y , R . RESPECTIVELY
3. THE ROTOR IS DYNAMICALLY BALANCED WITH HALF KEY.
4. LIFTING ELEMENTS SUITABLE FOR LIFTING COMPLETE MACHINE WHEN LIFTING WITH ONE HOOK SPREADERS MUST BE USED.
5. PAINTING – EPOXY SHADE RAL 5021.
6. THE ROTOR HAS TO BE LOCATED BY THE BRG. OF DRIVEN MACHINE. END FLOAT IN ALL LOCATING BRGS. SHALL BE SIGNIFICANTLY SMALLER THEN THE END FLOAT IN MOTOR DE BRG. IT IS ALSO REQUIRED THAT ONLY A COUPLING WITH LIMITED END FLOAT IS USED.

STATOR WINDING RTD & BRG. RTD WIRING DIAGRAM

REV.	DATE	
		ALTERED
		CHECKED
		APPROVED.
01	16.11.10	ALTERED RV; CHECKED LDV; APPROVED. AKB

IN T.R. 5 PAINT SHADE CHANGED AS PER CUSTOMER'S COMMENTS.

ADDITIONAL INFORMATION: W.O. 40097 A 421 – 11

STATUS OF DRAWING

DISTRIBUTION OF PRINTS: AME–1 TEX(PLM)–1 PLM–4

TYPE OF PRODUCT: 1RN 7716–4 DRIVE : BFP

OR

NAME OF CUSTOMER/PROJECT: M/S IOCL PARADEEP CCPP

BHARAT HEAVY ELECTRICALS LTD. BHOPAL

	NAME	SIGN.	DATE
DRN	RV	–Sd–	03.08.2010
CHD.	LDV	–Sd–	03.08.2010
APPD	AKB/AKS	–Sd–	03.08.2010

73 74 NO OF VAR.

DEPT. AME; CODE 404; GRADE OF UN. TOL. DIM. C/M/F; SCALE NTS; WEIGHT(Kg.) 13360; REF. TO ASSY. DRG.; ITEM NO.; 75 77 NO. OF ITEMS

TITLE: OUTLINE AND GENERAL ARRANGEMENT

1 3 7 CARD CODE

DRAWING NO. 1 402 00 41018 22 23 24 REV 01

SHEET NO. 01 NO. OF SHEETS 01

RV/OGA/14020041018

CORE CODE 40500001 SIZE A1

इंजीनियर्स इंडिया लिमिटेड ENGINEERS INDIA LIMITED (A Govt. of India Undertaking)

DATA SHEET
HIGH VOLTAGE SQUIRREL CAGE INDUCTION MOTOR

Datasheet No.

PURCHASER's DATA

A.	**Site conditions**	**BHEL W.O. 40096A401-51**		REV 01 DTD. 03.03.10	
1	Ambient temperature, minimum:	°C	3	Atmospheric condition:	DUSTY, CORROSIVE
	maximum:	°C	4	Altitude:	3.91 m above sea level
	design:	45 °C	5	Location:	Outdoor
2	Relative humidity:	%	6		
B.	**Technical particulars**				
1	Motor tag no.:		17	Hazardous area classification:	Safe
2	Driven equipment name:	ID FAN	18	Gas group:	NA
3	Voltage:	6.6 KV +- 6 %	19	Type of explosion protection:	NA
4	Phase:	Three	20	Type of ingress protection:	IP 55
5	Frequency:	50 Hz ± 3%	21	Reacceleration:	Required
6	Fault level:	40 KA	22	Diff. protection CTs:	Not Required
7	Fault duration:	0.25 Sec		CT specs.:	NA
8	Method of starting:	DOL	24	Color shade:	RAL5021
9	Winding connection:	Star	25	Thermisters:	No
10	No. of terminals:	6	26	RTD:	Required
11	Cable size:	3Cx185, 6.6KV(UE)	27	BTD:	Required
12	Cable type:	Al. cond. XLPE insulated	28	RTD/BTD monitoring device:	Not Required
13	Temperature rise:	75 °C	29	Applicable specification:	6-51-31 Rev 4
14	Cooling:	TETV	30	System earthing :	Resistance earthed
15	Insulation class:	F (temp rise limited to class B)			
16	Duty Cycle	S1			

DRIVEN EQUIPMENT MANUFACTURER's DATA

1	Suggested motor rating:	800 kW	9	Coupling type:	Hydraulic coupling
2	Manufacturer:	BHEL RANIPET	10	Torque required, starting:	51 mkg
3	Type of driver mounting:	HORIZONTAL	11	maximum:	678 mkg
4	Driven equipment:	ID FAN	12	GD^2 of of hydraulic coupling	1200 kgm^2
5	Shaft kW:	682 kW			kgm^2
6	kW at maximum load:	682 kW	13	Maximum thrust:	NA kg
7	Speed:	931.00 RPM	14	Pulsation rate:	NA
8	Rotation of eqpt. from coupling end:	CW	15	Starting condition:	Hydraulic coupling curve

MOTOR MANUFACTURER's DATA

1	Rating:	800	17	Space heater - voltage & power:	240 V / 800 W
2	Manufacturer:	BHEL BHOPAL	18	Moment of inertia, GD^2:	256 kgm^2
3	Frame designation:	1LA7712-6	19	DE/NDE brg type & no.:	NU230M+6230C3/NU226M
4	No. of poles:	6	20	Type of lubrication:	GREASE
5	Full load speed:	990 RPM	21	Type of main terminal box:	PSTB
6	Mounting:	HORIZONTAL	22	Type of neutral terminal box:	PSTB
7	Full load torque (FLT):	787 mkg	23	Weight of motor:	6850 kg
8	Starting torque:	80 % of FLT	24	Thermisters, quantity:	NA no.
9	Break down or pull out torque:	220 % of FLT		make: type:	MA
10	Full load current (FLC):	87 A	25	RTD, quantity:	12 no.
11	Starting current at 100% voltage:	500 % FLC icluding +ve tol.		make: type:	SIMPLEX
12	Rotation viewed from coupling end:	BIDIRECTIONAL	26	BTD, quantity:	2 no.
13	Starting time at 80%/100% voltage:	9.2 / 5.8 sec.		make: type:	DUPLEX
14	Locked rotor withstand time (cold/hot) at,		27	Shaft voltage:	Below 250 mV
	80% voltage:	31 / 23 sec.	28	Critical speed, $1^{st}/2^{nd}$ stage:	ABOVE 2000 RPM
	100% voltage:	20 / 15 sec.	29	Pressurization panel: ☐ Applicable ☒ Not applicable	
15	Efficiency at 75%/100% voltage:	94.8 / 95.0 %		make: type:	NA
16	P.F. at starting/75%/100% load	0.17/0.83 / 0.85	30	Canopy: (GRP)	No

1. Recommended list of maintenance spares for two years operation shall include following as minimum.
a) Bearing De/NDE - one set b) Terminal box cover with screws c) Cooling fan
d) Insulator/terminal block for terminal boxes e) Bearing assembly (DE/NDE)
2. Starting time calculations shall be based on operating conditions specified in Material Requisition e.g., open valve condition / closed valve condition at no load/ under load as applicable.
3. All commissioning spares and special tools and tackles required for the motor shall be suplied with motor without extra cost
4. Canopy not in BHEL Bhopal scope.

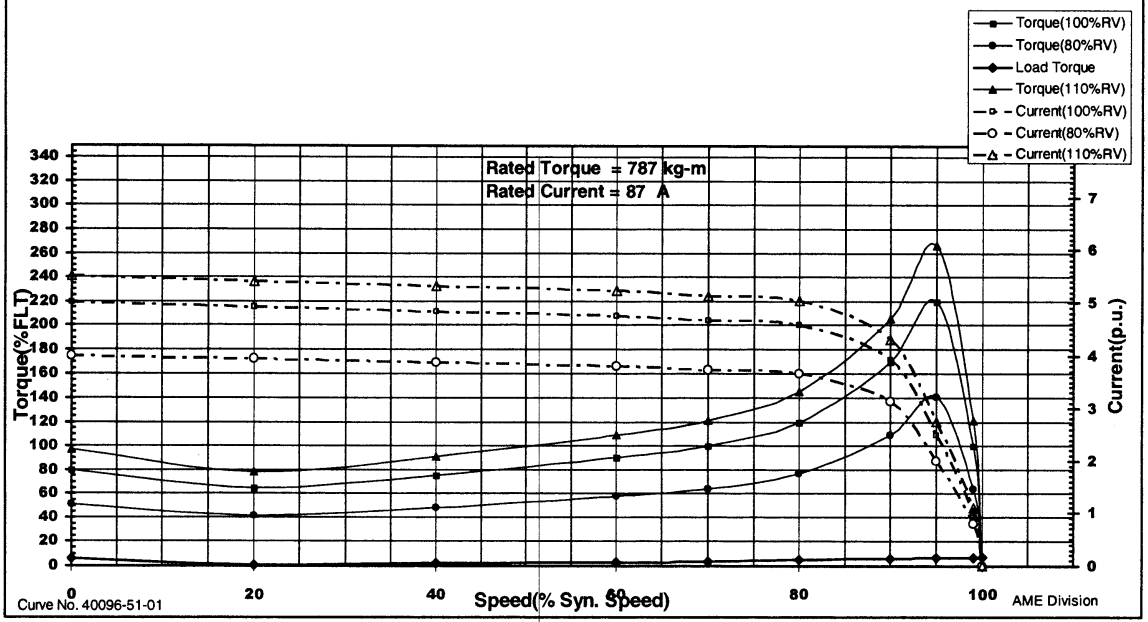
REVIEW CODE समीक्षा कोड 1 2 3 / B I
Signature & Name हस्ताक्षर एवं नाम
Date/ दिनांक 09.03.2011
V. P. No. वी.पी.नं. A011/656

Issued with MR

Rev.	Date	Purpose	Prepared	Checked	Approved

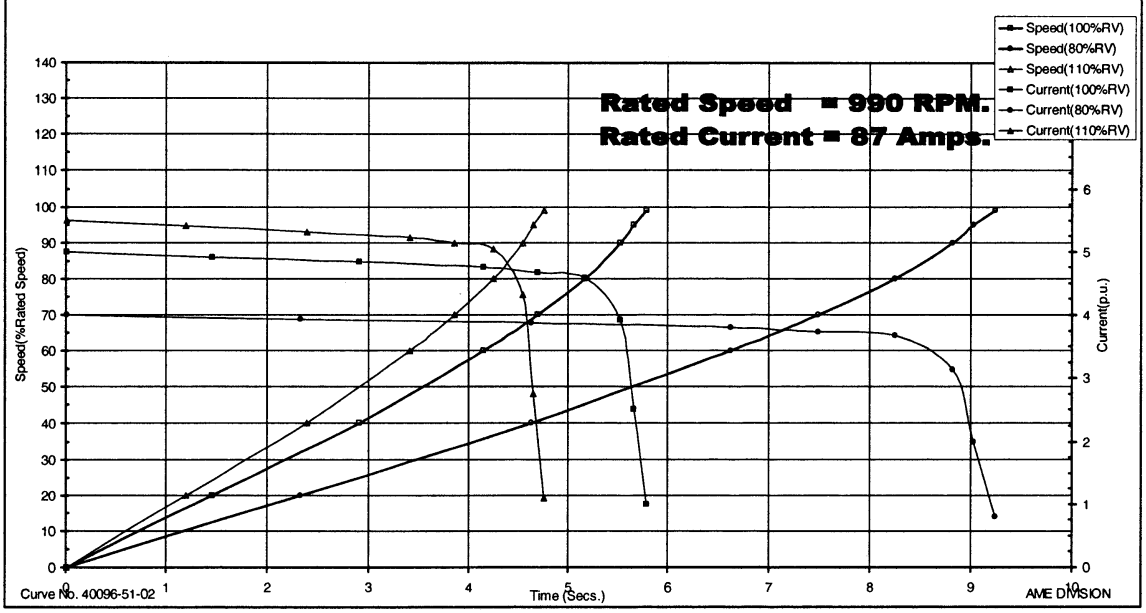
Torque & Current Vs Speed Curves

Rating : 800 KW, 6600 V, 6 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7712-6
W.O.No. : 40096A401-51
Customer : M/S BHEL FOR IOCL PARADIP CCPP



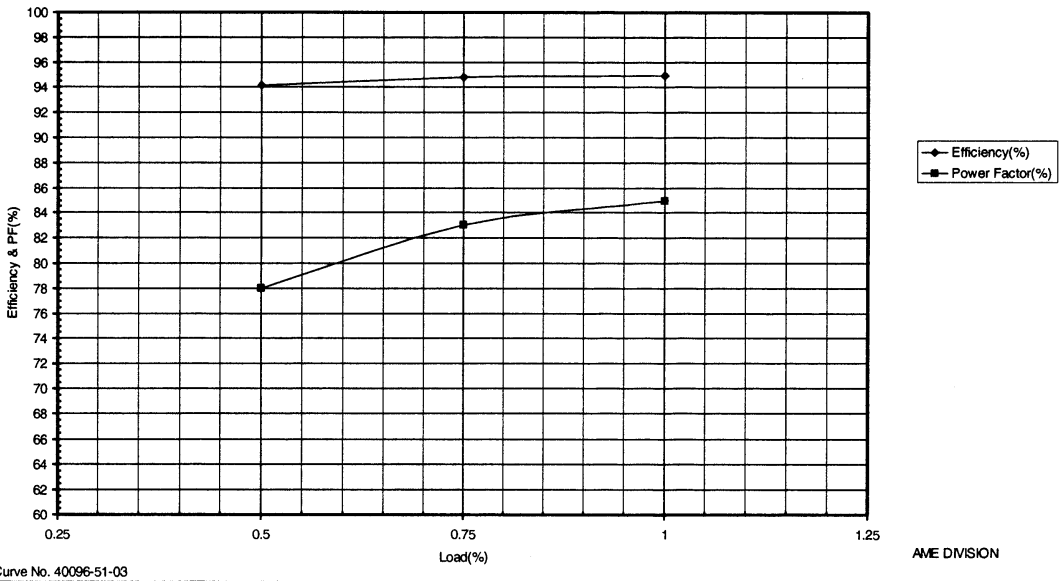
Speed & Current Vs Time Curves

Rating : 800 KW, 6600 V, 6 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7712-6
W.O.No. : 40096A401-51
Customer : M/S BHEL FOR IOCL PARADIP CCPP



Efficiency, PF Vs Load Curves

Rating : 800 KW, 6600 V, 6 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7712-6
W.O.No. : 40096A401-51
Customer : M/S BHEL FOR IOCL PARADIP CCPP

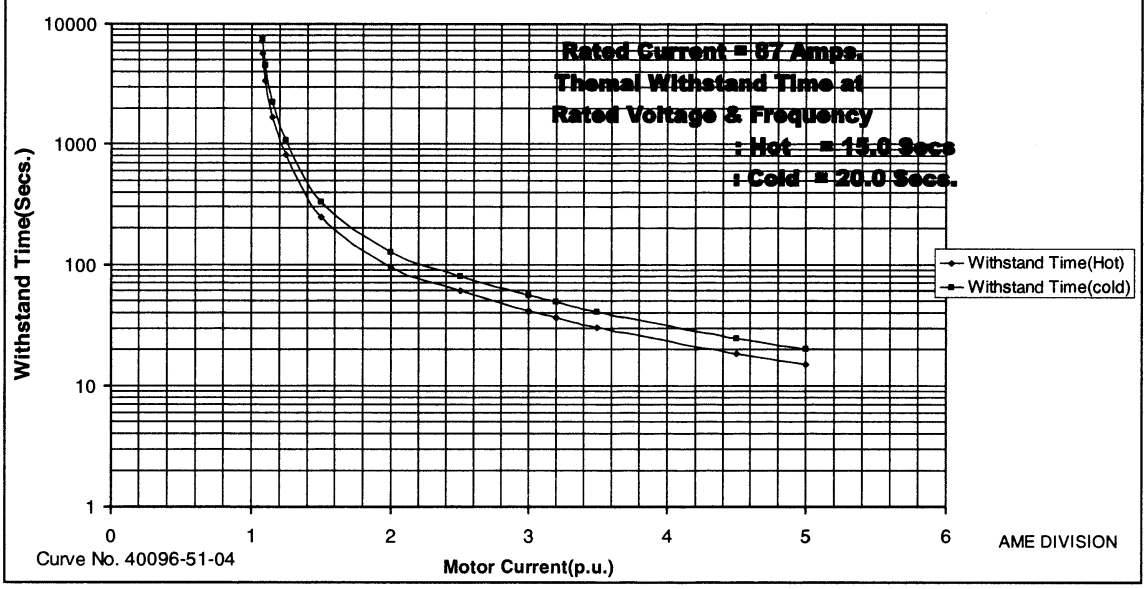


AME DIVISION

Curve No. 40096-51-03

Thermal Withstand Curves

Rating : 800 KW, 6600 V, 6 P, TETV , Cage Rotor Asyn. Motor.
Frame : 1LA7712-6
W.O.No. : 40096A401-51
Customer : M/S BHEL FOR IOCL PARADIP CCPP



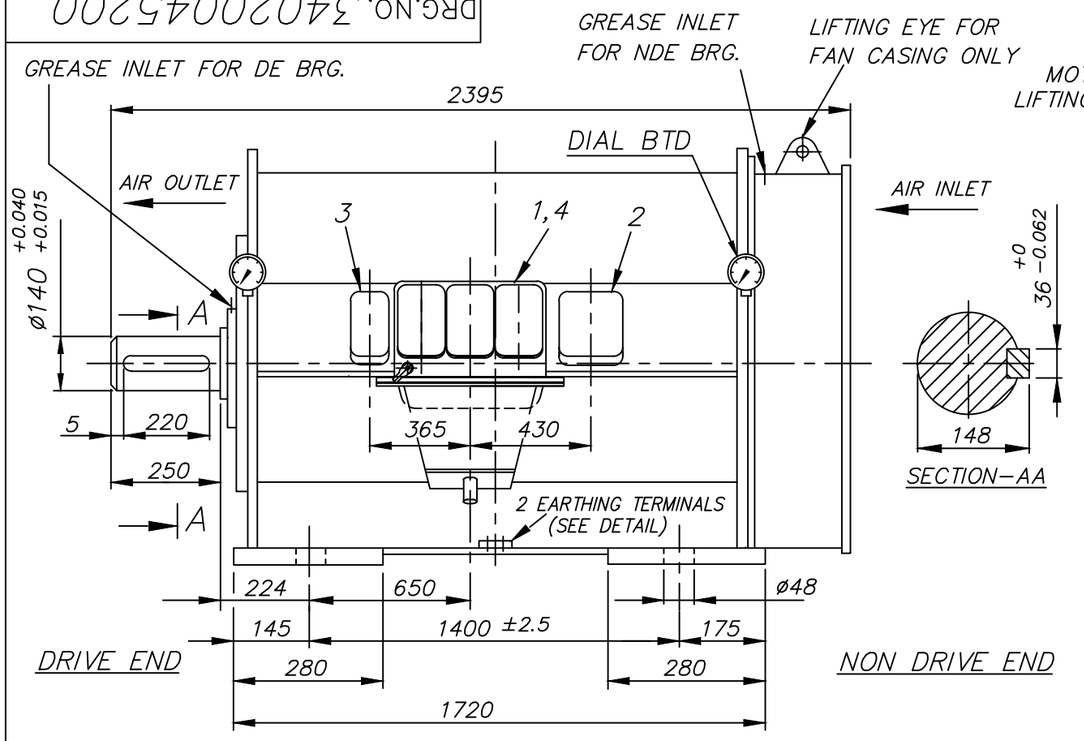
AME DIVISION

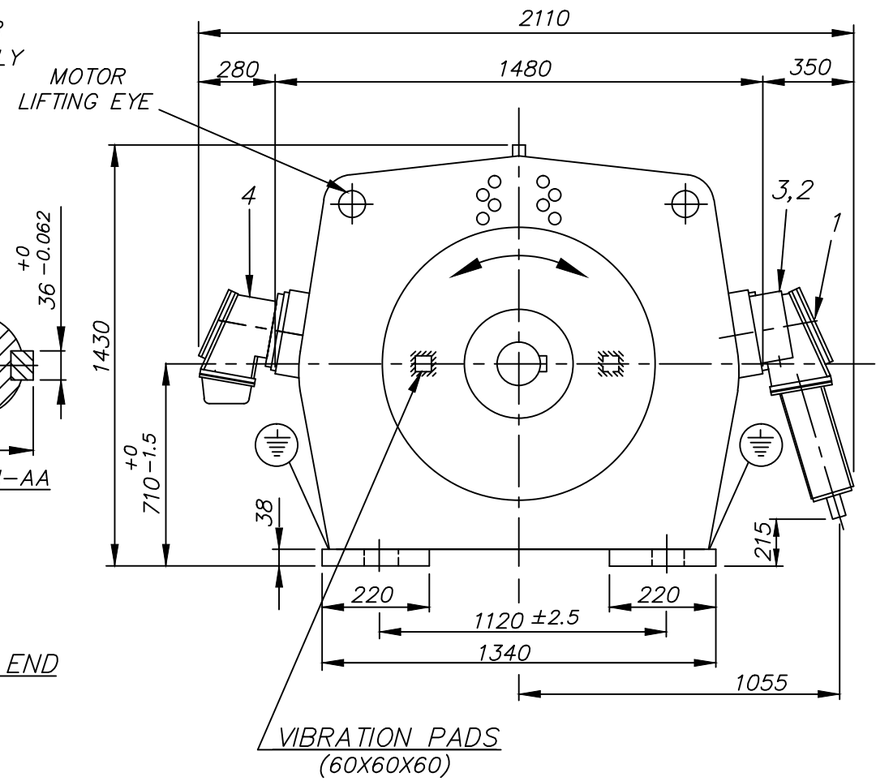
Curve No. 40096-51-04

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG.NO. 34020045200





MOTOR FITMENTS

(I) TERMINAL BOXES FOR

1 – STATOR 34020044200 SH–2

2 – ETD'S+BTD'S 34020045200 SH–3

3 – SPACE HEATERS 34020045200 SH–4

4 – NEUTRAL POINT 34020045200 SH–5

(II) TEMPERATURE SENSORS

(A) WDG. ETD'S 12–Nos, 3–WIRES, SIMPLEX, PT.TYPE, 100 Ω AT 0°C

(B) BRG. RTD'S 2–Nos, 3–WIRES, DUPLEX, PT.TYPE, 100 Ω AT 0°C

(C) 2–NOS. DIAL BTD (1–EACH FOR DE & NDE BRGS.) W'P BOX WITH 3/4' CONDUIT ENTRY

(III) OTHERS: –

SPACE HEATERS 4–Nos.
TOTAL POWER 800 WATTS
(800W, 240V, 50Hz. 1–ø EACH)
(2–Nos EACH AT DE & NDE)

(IV) FANS: – BI–DIRECTIONAL

(V) ANCHORING ITEMS: –

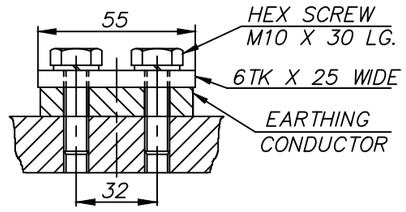
1. FOUNDATION ARRGT. 34020045200 SH–6

(VI) VIBRATION PADS: –

2–NOS., 1–EACH AT DE & NDE.

TECHNICAL DATA

RATING	800	kW
SPEED	990	rpm
FULL LOAD AMP STATOR	87	AMP
VOLTAGE 3 PHASE 50 Hz	6600	VOLTS
APPROX WEIGHT OF MOTOR	6850	kg
APPROX. WEIGHT OF ROTOR	1600	kg
GD^2 OF ROTOR	256	kgm^2
MAX. FOUNDATION LOADING (ALTERNATING) PER MOTOR LONGITUDINAL SIDE	86 kN UPWARDS 153 kN DNWARDS	
BEARINGS : DE NDE	NU230M+6230C3 NU226M (INSULATED)	
LUBRICATION: GREASE	SERVOGEM – 3 OR EQUIVALENT	
DIRECTION OF ROTATION VIEWED FROM DE	BI–DIRECTION	
PAINT SHADE SPECIFICATION	RAL 5021	
ENCLOSURE & TYPE OF PROTECTION	TETV, IP55	



DETAIL OF EARTHING ARRGT.

REF. DRG. NO.

SIGN. & DATE 17.03.11

INVENTOYR NO.

REV.	DATE	
		ALTERED
		CHECKED
		APPROVED

REV.	DATE		
02	07.03.17	ALTD	PRAVIN –sd–
		CHKD	AKASH –sd–
		APPD	AKASH –sd–

DRAWING REVISED AS BUILT.

REV.	DATE		
01	05.03.11	ALTD	PRAVIN –sd–
		CHKD	AKASH –sd–
		APPD	M.K.M –sd–

PAINT SHADE WAS 631 OF IS–5. DRAWING REDRAWN.

ADDITIONAL INFORMATION
W.O. 40096A401–51

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
AME – 1 TFX – 1
IMM – 3 TEX (IMM) – 1

TYPE OF PRODUCT : SQ CAGE INDUCTION MOTOR — DRIVE : ID FAN
NAME OF CUSTOMER : M/S INDIAN OIL CORPORATION LTD.
NAME OF PROJECT : 350 MW, IOCL, PRADEEP CCPP

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN	DATE	NO.OF VAR.
DRN	PRAVIN	–sd–	06.10.10	
CKD	AKASH	–sd–	06.10.10	
APPD	M.K.M.	–sd–	06.10.10	

DEPT.	UNTOL.DIMS.GR.	SCALE	WEIGHT(K.G.)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
AME		NTS				
CODE 404						

TITLE
OUTLINE GENERAL ARRGT.
1LA7712–6, TETV, IP55, B3

DRAWING NO. 34020045200 — REV. 02

SHEET NO. 01 — NO. OF SHEETS 06

PURCHASER's DATA

A	**Site conditions**				
1	Ambient temperature, minimum :	11.3 °C	3	Atmospheric condition :	Humid & highly corrosive
	maximum :	42.4 °C	4	Altitude :	< 1000 m
	design :	45 °C	5	Location :	Outdoor
2	Relative humidity:	99.7 %	6		
B	**Technical particulars**				
1	Motor tag no :		17	Hazardous area classification :	SAFE
2	Driven equipment name :	FGD BOOSTER FAN	18	Gas group :	NA
3	Voltage :	6.6 kV ± 6%	19	Type of explosion protection :	NA
4	Phase :	Three	20	Type of ingress protection :	IP55
5	Frequency :	50 Hz ± 3%	21	Reacceleration ☐ Required	☒ Not required
6	Fault level :	40 kA	22	Diff. protection CTs : ☒ Required	☐ Not required
7	Fault duration :	0.25 sec.	23	CT specs. :	CT details attached in Anx-I in BHEL format.
8	System earthing :	Resistance	24	Color shade :	RAL 5021
9	Duty :	Continuous (S1)	25	Thermisters ☐ Required	☒ Not required
10	Method of starting :	DOL	26	RTD : ☒ Required	☐ Not required
11	Cable size :	2Rx3Cx240mm^2	27	BTD : ☒ Required	☐ Not required
12	Cable type :	Al cond. XLPE insulated	28	RTD / BTD monitoring device : RTD & BTD leads will be terminated in RTD/BTD terminal box for further connections. BHEL (PSM) to reply	
13	Temperature rise :	75 °C			
14	Cooling :	TETV (IC511)		RTD / BTD make : Reputed (BHEL approved supplier)	
15	Insulation class :	F (Temp. rise limited to B)	29	Applicable specification : EIL spec. 6-51-0031 (Rev.04)	
16	Starting power factor :	0.099		IS:325	

DRIVEN EQUIPMENT MANUFACTURER's DATA

1	Suggested motor rating :	3050 kW	9	Coupling type :	Hydraulic Coupling
2	Manufacturer :	BHEL Ranipet	10	Torque required Starting :	139.44 Kg-m
3	Type of driver mounting :	Horizontal	11	Maximum :	130.73 Kg-m
4	Driven equipment :	FGD BOOSTER FAN	12	GD^2 of eqpt. :	650 Kg-m^2
5	Shaft kW :	kW			
6	kW at maximum load :	2648 kW	13	Maximum thrust :	NA
7	Speed :	1480 RPM	14	Pulsation rate :	40%
8	Rotation of equipment from coupling end :(Main DE)	CCW	15	Starting condition :	No-Load

MOTOR MANUFACTURER's DATA

1	Rating :	3050 kW	17	Space heater - voltage & power :	240V, 1Ph, 1200W
2	Manufacturer :	BHEL Bhopal	18	Moment of inertia (GD^2) :	508 Kg-m^2
3	Frame designation :	1LA7905-4	19	DE/NDE bearing type & no. :	Ball & Roller / Roller 2 + 1
4	No. of poles :	4	20	Type of lubrication :	GREASE (Self)
5	Full load speed :	1493 RPM	21	Type of main terminal box :	PSTB (500 MVA for 0.25 s)
6	Mounting :	Horizontal	22	Type of neutral terminal box :	Non-PSTB with CT (3 in NTB)
7	Full load torque :	1987 Kg-m	23	Weight of motor :	Refer OGA 14500Kg
8	Starting torque :	50% of FLT	24	Thermisters, Qty. :	NO
9	Break down or pull out torque :	175% of FLT		Make : NA	Type : NA
10	Full load current :	310.0 A	25	RTD, Qty. :	12 nos.
11	Starting current at 100% voltage :	500%FLC (Inclusive of Tol.)		Make : Reputed	Type : PT100, Simplex, 3 WIRE
12	Rotation viewed from coupling end :	CW (from Main DE)	26	BTD, Qty. :	2 nos.
13	Starting time at 80% / 100% voltage :	8.0 / 4.0 sec.		Make : Reputed	Type : PT100, Duplex, 4 WIRE
14	Locked rotor withstand time (cold /hot) at,		27	Shaft voltage :	< 250 mV (NDE bearing is insulated)
	80% voltage :	31 / 25 sec.	28	Critical speed, 1st / 2nd stage :	> 2160 RPM
	100% voltage :	23 / 20 sec.	29	Pressurization panel : ☐ Applicable	☒ Not Applicable
15	Efficiency at 75%/100% load :	96.5 / 96.8 %		Make : NA	
16	Power factor at 75%/100% load :	0.86 / 0.89	30	Canopy :	M/S BHEL / Trichy scope.

1. Recommented list of maintainence spares for two years operation shall include the following as minimum:
   a) Bearings(DE/NDE), b) Terminal Box cover with screws, c) Fan, d) Terminal Block
2. Starting time calculations shall be based on operating conditions specified in material requitione.g,open valve condition/closed valve condition at no load/ under load as applicable.

Rev.	Date	Purpose	Prepared	Checked	Approved
A	21.07.09	ISSUED WITH BIDS	RSA	RS	AK

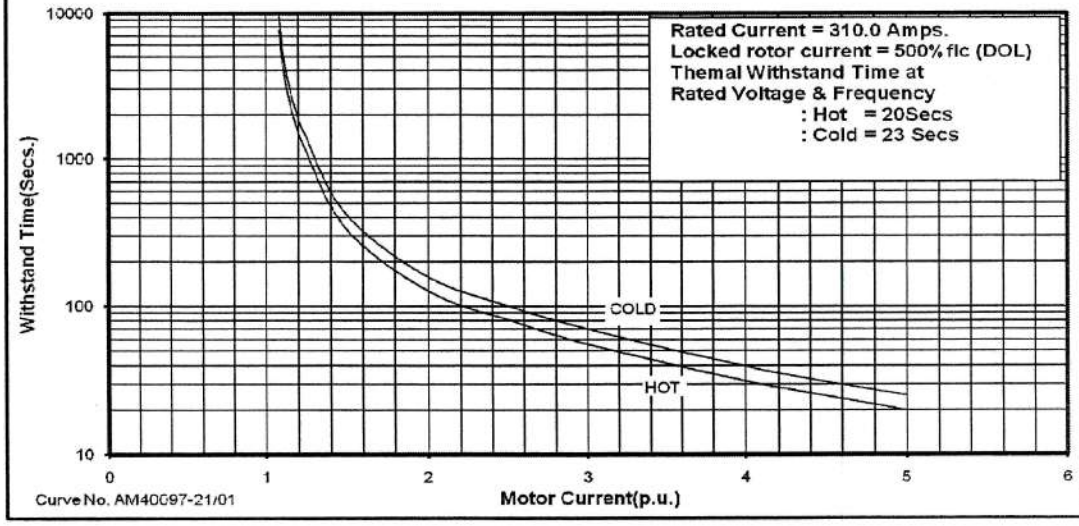
Starting PF

REVIEW CODE 1 2 3
समीक्षा कोड R I
Signature & Name
हस्ताक्षर एवं नाम
Date/ दिनांक 13/05/11
V. P. No.
उ.का.सं. A011/703

अंबिका सिंह/AMBIKA SINGH
अभिकल्प अभियंता/ Design Engineer
ए.एम.ई. विभाग/ AME Division
बी.एच.ई.एल.,भोपाल/B.H.E.L.,BHOPAL

Thermal Withstand Curves

Rating : 3050 KW, 6.6 kV,4 P , TETV, Cage Rotor Asyn. Motor.
Frame : 1LA7905-4
W.O.No. : 40097A421-21
Customer : M/s. IOCL FOR 350MW,IOCL,PARADEEP CCPP



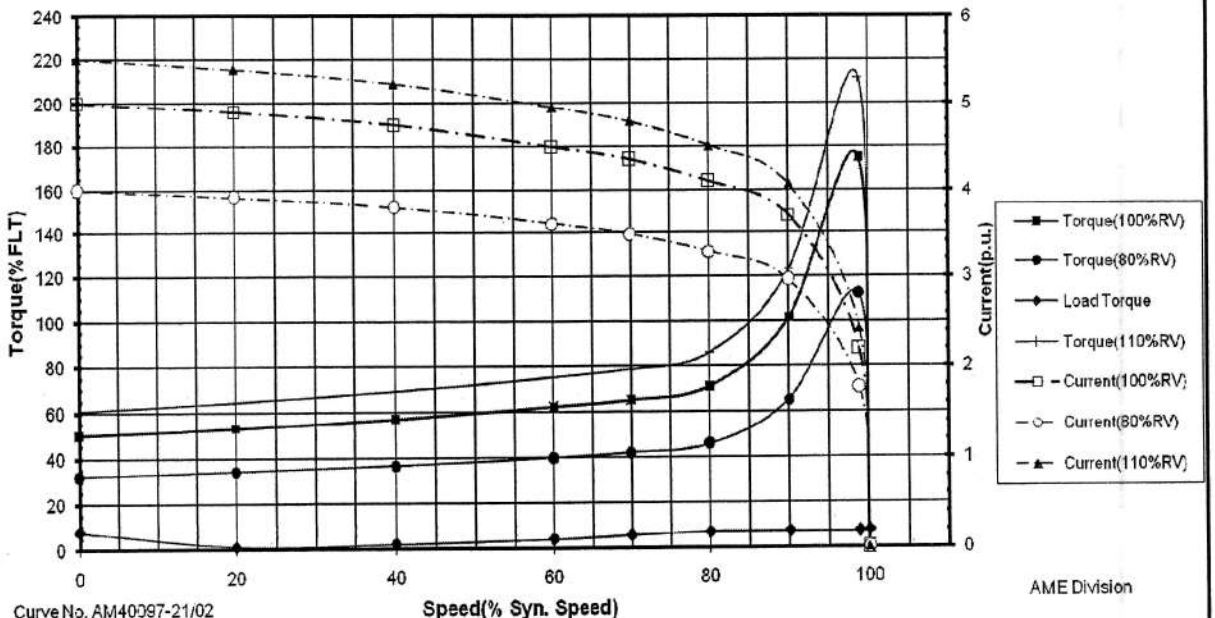
Curve No. AM40097-21/01

AME DIVISION

Torque & Current Vs Speed Curves

Rating : 3050 KW, 6.6 kV,4 P , TETV, Cage Rotor Asyn. Motor.
Frame : 1LA7905-4
W.O.No. : 40097A421-21
Customer : M/s. IOCL FOR 350MW,IOCL,PARADEEP CCPP

Full Load Torque = 19.51 kNm
Full Load Current = 310 A



Curve No. AM40097-21/02

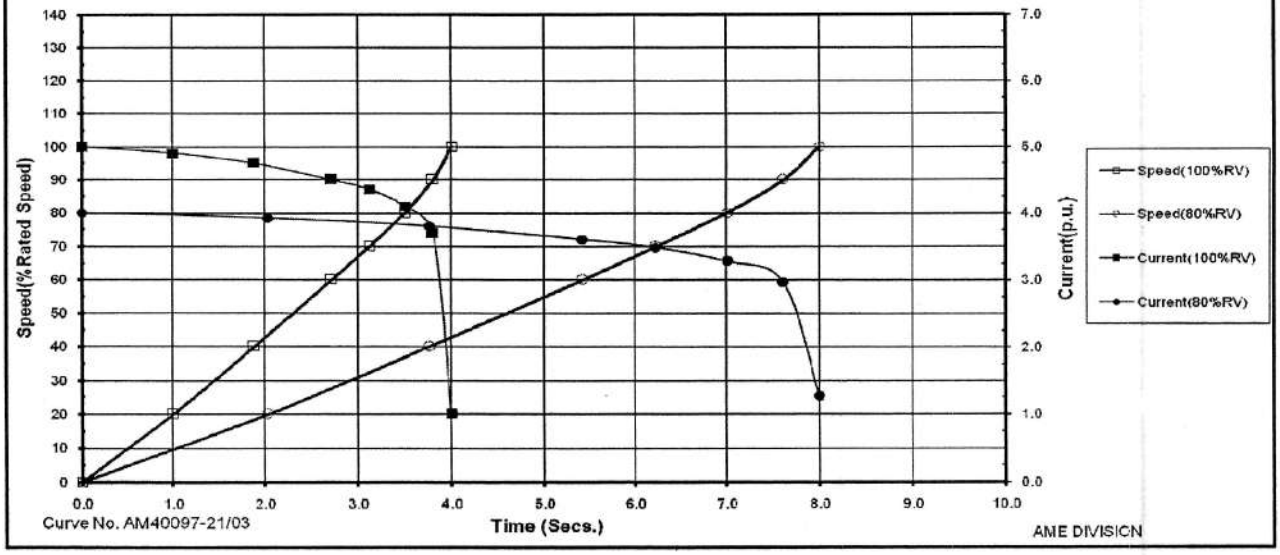
AME Division

Ambika

Speed & Current Vs Time Curves

Rating : 3050 KW, 6.6 kV,4 P , TETV, Cage Rotor Asyn. Motor.
Frame : 1LA7905-4
W.O.No. : 40097A421-21
Customer : M/s. IOCL FOR 350MW,IOCL,PARADEEP CCPP

Rated RPV =1493
Rated Current = 310A

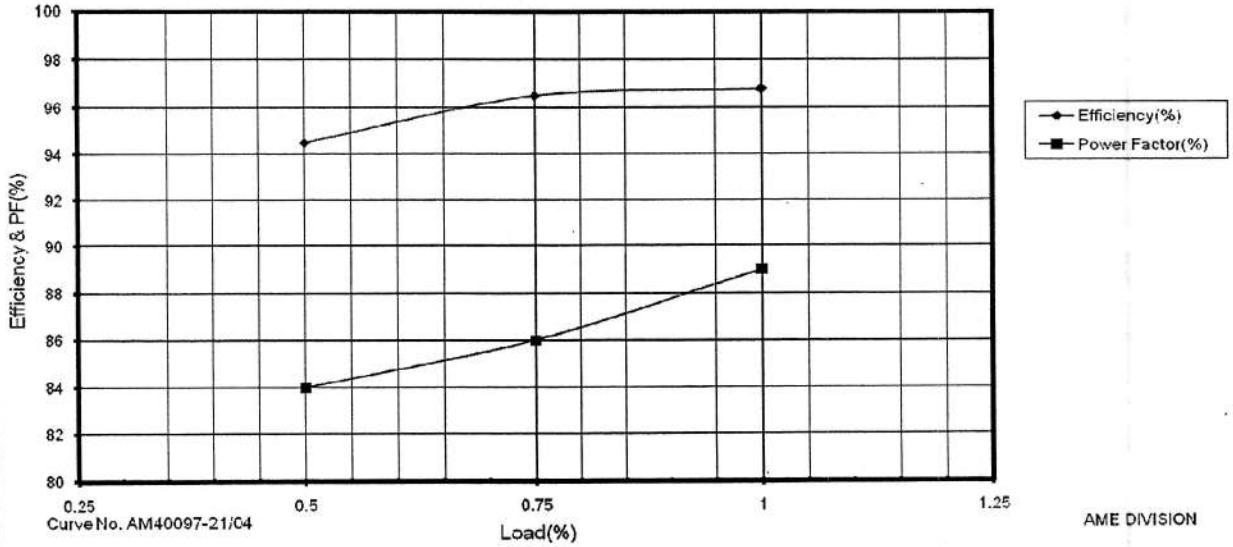


Curve No. AM40097-21/03

AME DIVISION

Efficiency, PF Vs Load Curves

Rating : 3050 KW. 6.6 kV,4 P , TETV, Cage Rotor Asyn. Motor.
Frame : 1LA7905-4
W.O.No. : 40097A421-21
Customer : M/s. IOCL FOR 350MW,IOCL,PARADEEP CCPP

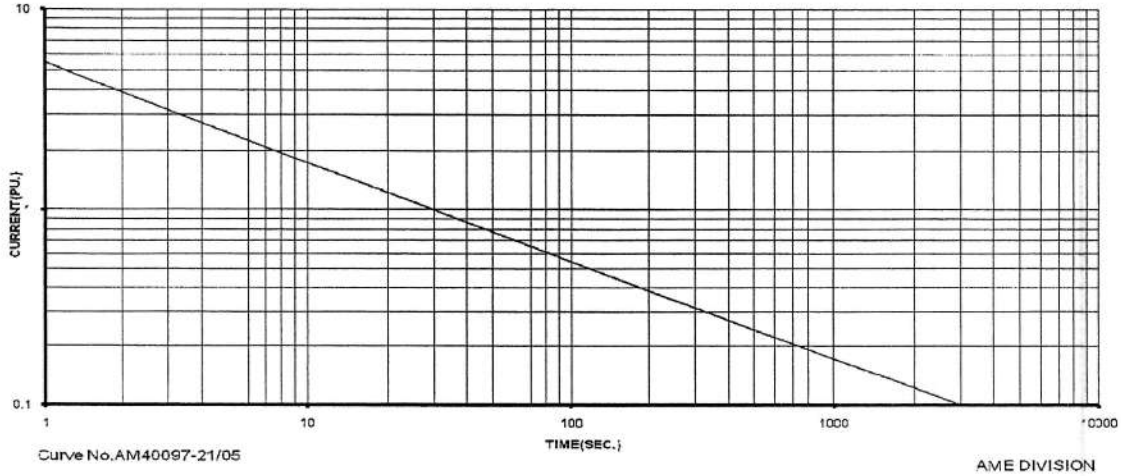


Curve No. AM40097-21/04

AME DIVISION

NEGATIVE SEQUENCE CURVE

Rating : 3050 KW, 6.6 kV,4 P , TETV, Cage Rotor Asyn. Motor.
Frame : 1LA7905-4
W.O.No. : 40097A421-21
Customer : M/s. IOCL FOR 350MW,IOCL,PARADEEP CCPP

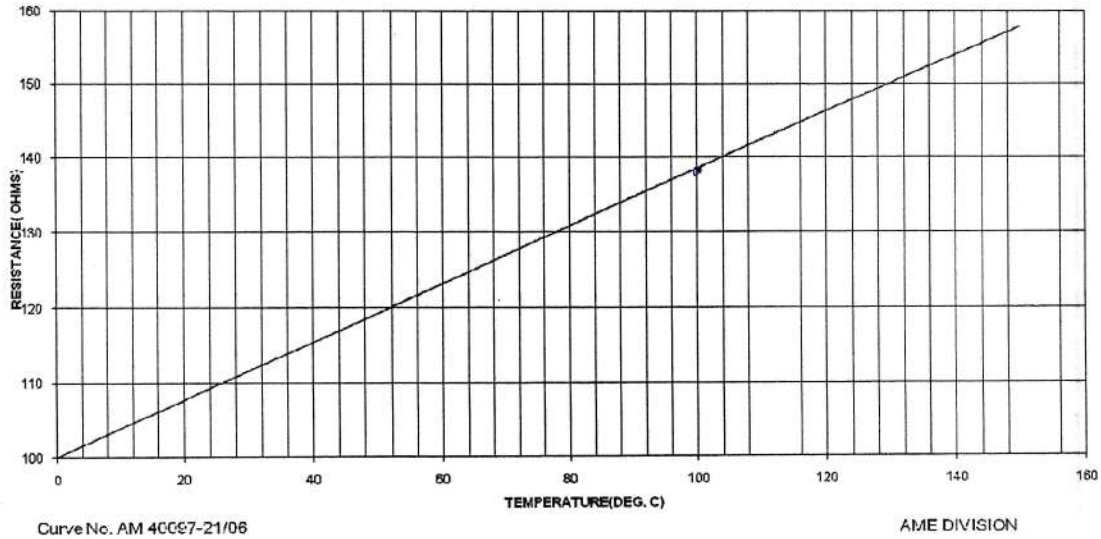


Curve No.AM40097-21/05

AME DIVISION

CALIBRATION CURVE FOR RTD/BTD - PT100

Rating : 3050 KW, 6.6 kV,4 P , TETV, Cage Rotor Asyn. Motor.
Frame : 1LA7905-4
W.O.No. : 40097A421-21
Customer : M/s. IOCL FOR 350MW,IOCL,PARADEEP CCPP



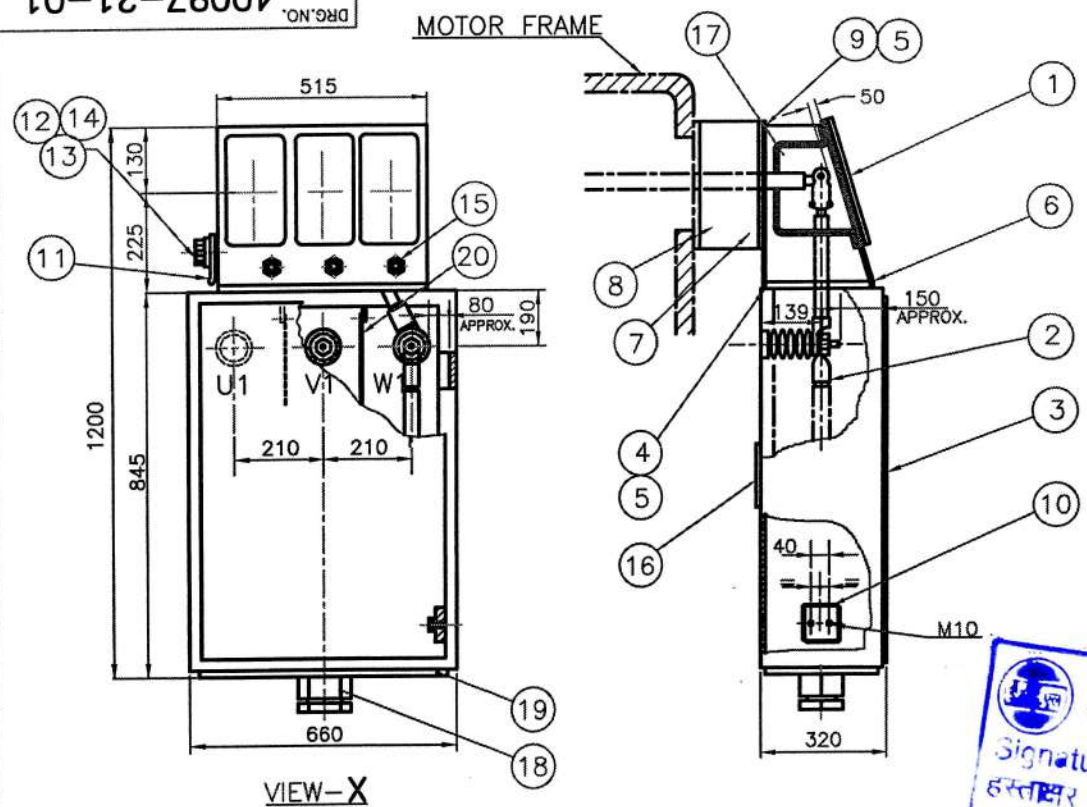
Curve No. AM 40097-21/06

AME DIVISION

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)

DRG.NO. 40097-21-01



QTY	IT.NO.	DESCRIPTION
01	01	P.S.TERMINAL BOX.
06 MAX.	02	TERMINALS
01	03	TRIFURCATING BOX.
10	04	HEX. SCREW M10X30 -8.8
20	05	WASHER SPRING B 10-ST
01	06	GASKET
01	07	GASKET
01	08	ADAPTOR
10	09	HEX. SCREW M10X50-8.8
01	10	EARTHING PAD
01	11	TUBULAR LUG SOCKET TYPE I-11E
01	12	HEX SCRU M12X30 P-8.8
01	13	WASHER M CD 13-ST
01	14	WASHER SPRING B 12-ST
03	15	DESSICATOR
03	16	PR. RELIEF DIAPHRAGM
03	17	JOINT BOX (GRP MOULDING)
02	18	CABLE GLAND
01	19	DETACHBLE GLAND PLATE
02	20	PHASE BARRIER

REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

NOTES:-

1. TERMINAL BOX IS SUITABLE FOR MAXIMUM CABLE SIZE UPTO 1X1CX630 mm², 6.6KV XLPE.
2. TYPE OF PROTECTION – IP 55.
3. FAULT LEVEL WITHSTAND CAPACITY 40KA FOR 0.25 sec. AT 6.6KV.

REVIEW CODE 1 2 3 R J
Signature • Name
Date/ दिनांक

REV.	DATE	ALTERED / CHECKED

ADDITIONAL INFORMATION
W.O. 40097A421-21
STATUS OF DRAWING

DISTRIBUTION OF PRINTS
OC – 1

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 1LA 7905-4, (BOOSTER FAN)
M/S. IOCL / 350MW, IOCL, PARADEEP CPP.

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN.	DATE
DRN	UPENDRA		04.10.10
CHD.	RPB		04.10.10
APPD	AS/DKD		04.10.10

DEPT. AME | CODE 404 | GRADE OF UN. TOL. DIM. C/M/F | SCALE NTS | WEIGHT(Kg.) | REF. TO ASSY. DRG. | ITEM NO. | NO. OF ITEMS

TITLE
STATOR TERMINAL BOX (PSTB)

CARD CODE

DRAWING NO. 40097-21-01 REV 00

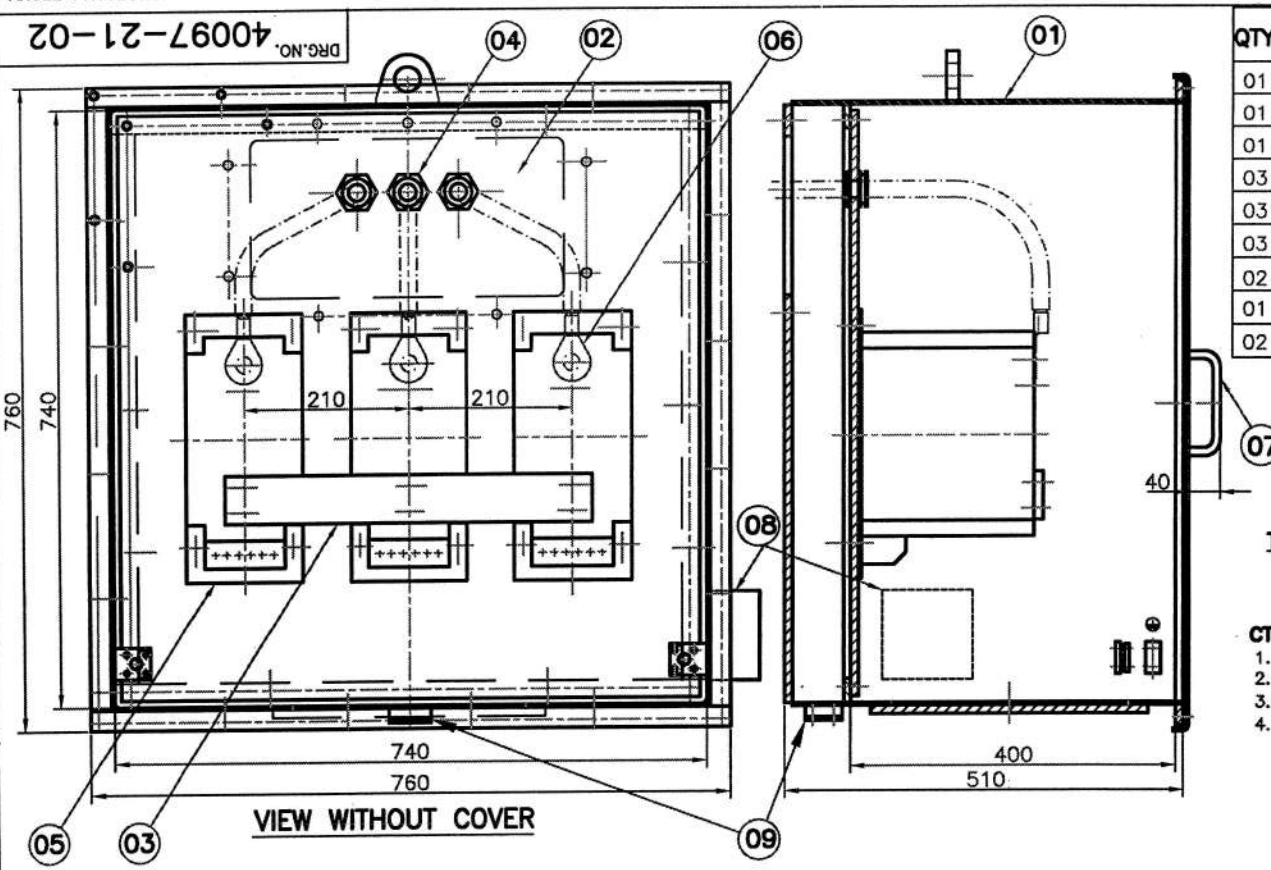
SHEET NO. 01 NO. OF SHEETS 01

RPB/40097-21-01

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)

DRG.NO. 40097-21-02



VIEW WITHOUT COVER

QTY	IT.NO	DESCRIPTION
01	001	NEUTRAL TERMINAL BOX ASSY.
01	002	SUPPORT PLATE
01	003	STAR POINT LINK
03	004	GLAND
03	005	CURRENT TRANSFORMER
03	006	CABLE LUG
02	007	HANDLE
01	008	CT SECONDARY BOX
02	009	EARTHING TERMINAL

TECH. REQUIREMENTS:-

1. DEGREE OF PROTECTION IP55.
2. SUITABLE FOR MOUNTING CTS.

CT DETAILS:

1. CT RATIO: 500/1
2. RATED VOLTAGE/FREQ.: 6.6KV/50HZ.
3. MIN. KNEE POINT VOLTAGE V_k: >=15Rct +100V
4. MAX. EXCITATION CURRENT AT $V_k/2$: 30mA

REF. DRG. NO. K 22 3765 (a)

SIGN & DATE

INVENTORY NO.

ADDITIONAL INFORMATION
W.O. 40097A421-21

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
OC – 1

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 1LA 7905-4, (BOOSTER FAN) M/S. IOCL / 350MW, IOCL, PARADEEP CPP.

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN.	DATE
DRN	UPENDRA		
CHD.	RPB		
APPD	AS/DKD		

REV.	DATE	ALTERED / CHECKED
01	7.05.11	DRG. REVISED AS PER CUSTOMER COMMENTS.

DEPT. AME | CODE 404 | GRADE OF UN. TOL. | DIM. C/M/F | SCALE NTS | WEIGHT(Kg.) | REF. TO ASSY. DRG. | ITEM NO. | NO. OF ITEMS

TITLE: NEUTRAL TERMINAL BOX ARRGT. WITH C.T

CARD CODE

DRAWING NO. 40097-21-02

REV 01

SHEET NO. | NO. OF SHEETS

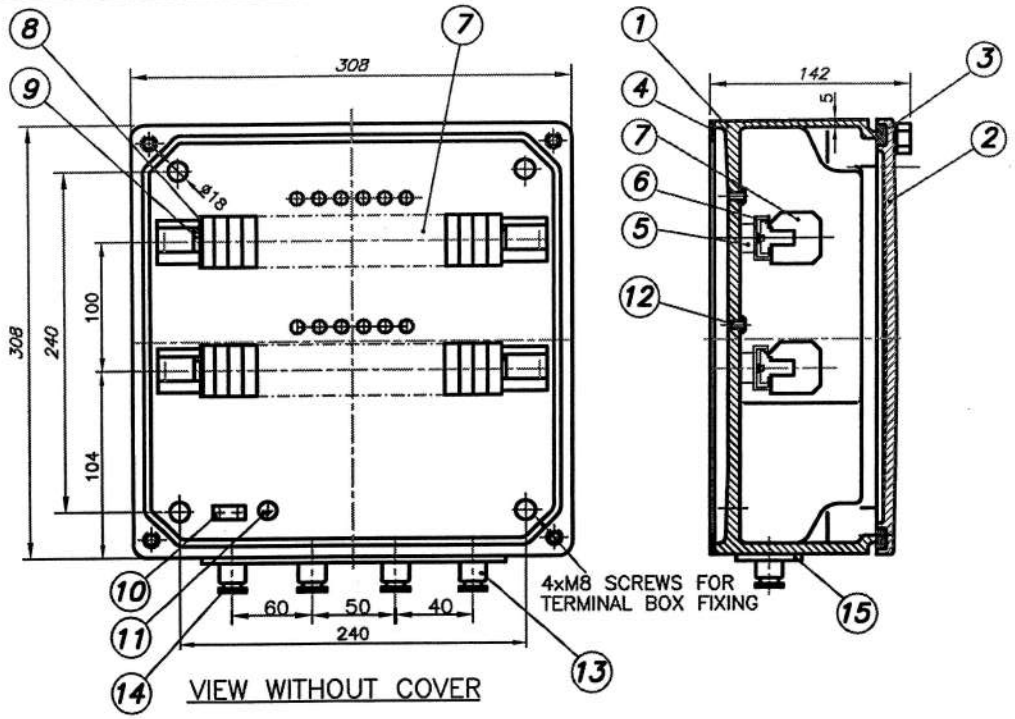
RPB/40097-21-02

Anbiky

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)

DRG.NO. 40097-21-03



QTY	IT.NO	DESCRIPTION
01	001	TERMINAL BOX (ALUMINIUM)
01	002	COVER (ALUMINIUM)
01	003	GASKET– NEOPRENE RUBBER
01	004	GASKET– NEOPRENE RUBBER
04	005	DISTANCE PIECE
02	006	TERMINAL RAIL
AS REQD.	007	TERMINAL BLOCK WAGO OR CONNECT WELL
02	008	END PLATE
04	009	END CLAMP
01	010	EARTHING PLATE
01	011	EARTHING SYMBOL
12	012	RUBBER GROMMET
02	013	DOUBLE COMPRESSION CABLE GLAND 3/4" ,BRASS
02	014	DOUBLE COMPRESSION CABLE GLAND 1 1/4", BRASS
01	015	DETACHABLE GLAND PLATE, STEEL

NOTES :–

1. CURRENT RATING OF TERMINALS AT 50°C
   FOR ALUMINIUM CONDUCTOR = 10 A
   FOR COPPER CONDUCTOR = 18 A
2. TYPE OF PROTECTION IP–55

REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

REV.	DATE	ALTERED / CHECKED	REV.	DATE	ALTERED / CHECKED

ADDITIONAL INFORMATION
W.O. 40097A421-21
STATUS OF DRAWING

DISTRIBUTION OF PRINTS
OC – 1

TYPE OF PRODUCT 1LA 7905–4, (BOOSTER FAN)
OR
NAME OF CUSTOMER/PROJECT M/S. IOCL / 350MW, IOCL, PARADEEP CPP.

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN.	DATE
DRN	UPENDRA		04.10.10
CHD.	RPB		04.10.10
APPD	AS/DKD		04.10.10

DEPT.	GRADE OF UN. TOL.	SCALE	WEIGHT(Kg.)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS
AME		NTS				
CODE 404	DIM. C/M/F					

TITLE
AUX. TERMINAL BOX FOR WDG. RTD & BTD

CARD CODE

DRAWING NO. 40097–21–03

REV 00

SHEET NO. 01 NO. OF SHEETS 01

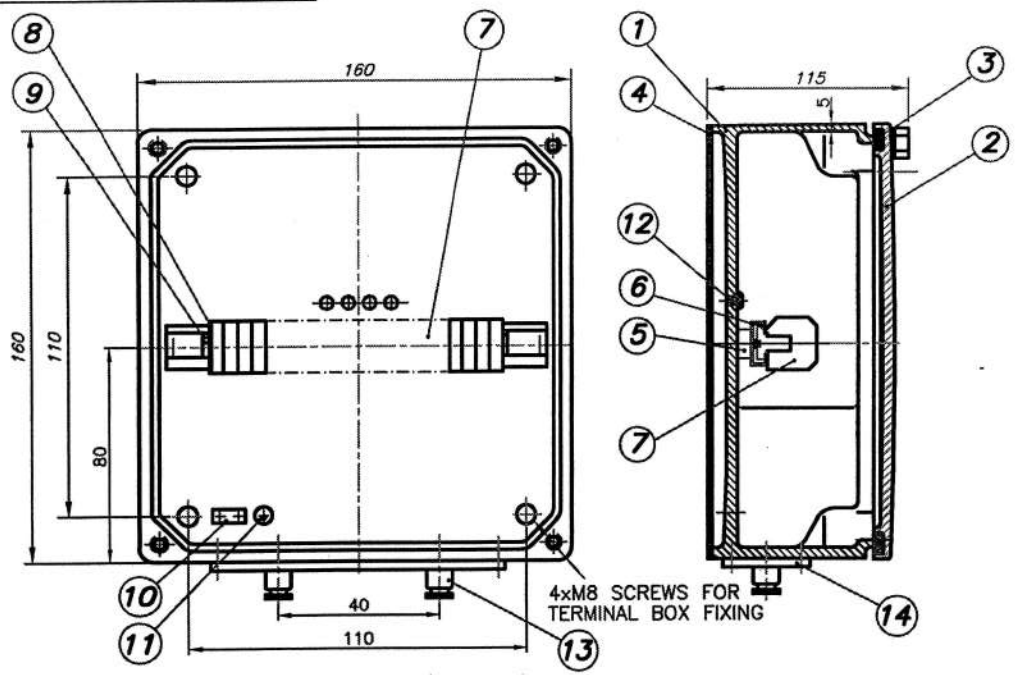
RPB/40097-21-03

Ambika

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)

DRG.NO. 40097-21-04



VIEW WITHOUT COVER

QTY	IT.NO	DESCRIPTION
01	001	TERMINAL BOX (ALUMINIUM)
01	002	COVER (ALUMINIUM)
01	003	GASKET– NEOPRENE RUBBER
01	004	GASKET– NEOPRENE RUBBER
02	005	DISTANCE PEICE
01	006	TERMINAL RAIL
14	007	TERMINAL BLOCK
01	008	END PLATE
02	009	END CLAMP
01	010	EARTHING PLATE
01	011	EARTHING SYMBOL
04	012	RUBBER GROMMET
02	013	DOUBLE COMPRESSION CABLE GLAND (BRASS)
02	014	DETACHABLE GLAND PLATE(STEEL)

NOTES :–

1. CURRENT RATING OF TERMINALS AT 50°C
   FOR ALUMINIUM CONDUCTOR = 10 A
   FOR COPPER CONDUCTOR = 18 A
2. TYPE OF PROTECTION IP–55 .

REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

REV.	DATE	ALTERED / CHECKED

ADDITIONAL INFORMATION
W.O. 40097A421-21
STATUS OF DRAWING

DISTRIBUTION OF PRINTS
OC – 1

TYPE OF PRODUCT 1LA 7905–4, (BOOSTER FAN)
OR
NAME OF CUSTOMER/PROJECT M/S. IOCL / 350MW, IOCL, PARADEEP CPP.

BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

	NAME	SIGN.	DATE
DRN	UPENDRA		04.10.10
CHD.	RPB		04.10.10
APPD	AS/DKD		04.10.10

DEPT.	GRADE OF UN. TOL. DIM. C/M/F	SCALE	WEIGHT(Kg.)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS
AME		NTS				
CODE 404						

TITLE
AUX. TERMINAL BOX FOR SPACE HEATER

CARD CODE

DRAWING NO. 40097–21–04 REV 00

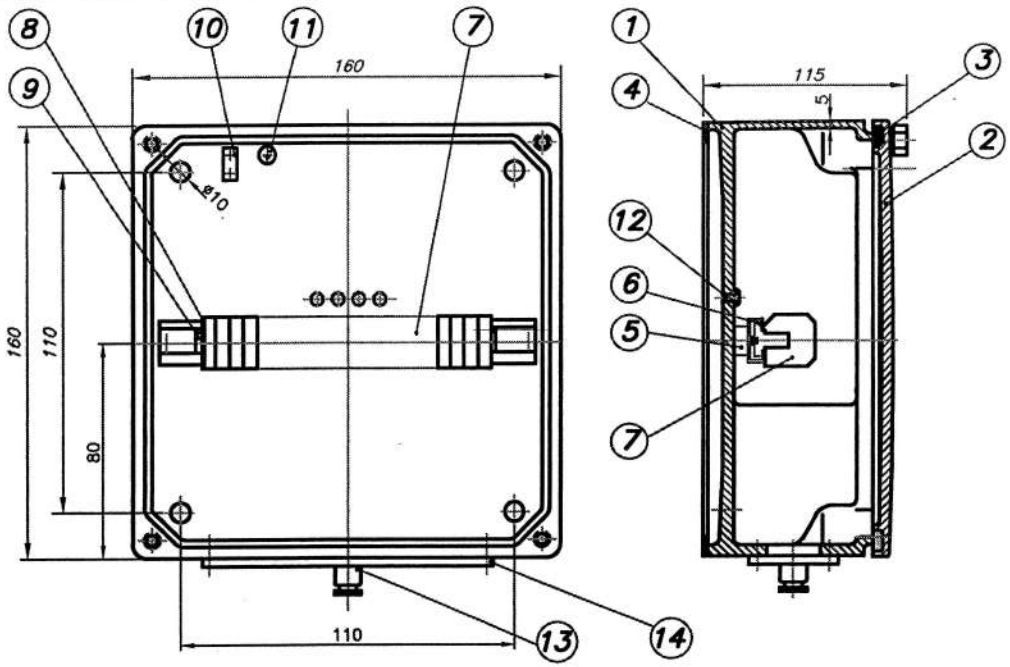
SHEET NO. 01 NO. OF SHEETS 01

RPB/40097-21-04

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)

DRG.NO. 40097-21-05



VIEW WITHOUT COVER

QTY	IT.NO	DESCRIPTION
01	001	TERMINAL BOX (ALUMINIUM)
01	002	COVER (ALUMINIUM)
01	003	GASKET– NEOPRENE RUBBER
01	004	GASKET– NEOPRENE RUBBER
02	005	DISTANCE PEICE
01	006	TERMINAL RAIL
AS REQD	007	TERMINAL BLOCK
01	008	END PLATE
02	009	END CLAMP
01	010	EARTHING PLATE
01	011	EARTHING SYMBOL
04	012	RUBBER GROMMET
01	013	DOUBLE COMPRESSION CABLE GLAND BRASS
01	014	GLAND PLATE

NOTES :–

1. CURRENT RATING OF TERMINALS AT 50°C
   FOR ALUMINIUM CONDUCTOR = 20 A
   FOR COPPER CONDUCTOR = 25 A
2. TYPE OF PROTECTION IP–55 .
3. MINIMUM CLEARANCES :–
   (A) BETWEEN TERMINALS – 5 MM
   (B) TERMINAL TO EARTH – 15 MM

REF. DRG. NO.

SIGN & DATE

INVENTORY NO.

REV.	DATE	ALTERED / CHECKED

ADDITIONAL INFORMATION
W.O. 40097A421-21

STATUS OF DRAWING

DISTRIBUTION OF PRINTS
OC – 1

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 1LA 7905–4, (BOOSTER FAN) — M/S. IOCL / 350MW, IOCL, PARADEEP CPP.

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CHD.	RPB		04.10.10
APPD	AS/DKD		04.10.10

73 74 NO. OF MVE

DEPT. AME | CODE 404 | GRADE OF UN. TOL. | DIM. C/M/F | SCALE NTS | WEIGHT(Kg.)

REF. TO ASSY. DRG. | ITEM NO. | 75 77 NO. OF ITEMS

TITLE
C.T. SECONDARY TERMINAL BOX

1 3 CARD CODE

7 DRAWING NO. 40097–21–05 — 22 23 24 REV 00

SHEET NO. 01 NO. OF SHEETS 01

RPB/40097-21-05

Ambika